

Chapter 1 – Introduction

KEY POINTS

- The amount and value of freight are critical components of the overall economic health of Missouri.
- Missouri’s multimodal freight system supports the movement of trucks, planes, barges, and trains as they transport over one billion tons of freight valued at more than \$1.2 trillion per year.
- Every resident in the State spends a significant portion of their disposable income (\$4,500 per year) on transportation, whether directly or indirectly, in the goods they purchase.
- Truck freight will continue to grow in importance based on both value and tonnage. While at a slower rate, the freight moved by air, water, and rail will also continue to grow.

Making smart investments in the freight transportation system can provide better options for Missouri businesses to get their products to both domestic and global markets. An improved freight transportation system can also lower transportation costs and create jobs.

With the help of hundreds of key stakeholders, the Missouri Department of Transportation (MoDOT) has drafted this State Freight Plan to make sure that freight continues to move smoothly. The plan provides a better understanding of Missouri’s existing freight transportation system, establishes goals and strategies for updating the system over the next 10+ years, guides future investments in freight transportation, and prioritizes freight projects that would provide the most benefits.

MoDOT recognizes the importance of freight transportation in contributing to the economic vitality and competitiveness of the State of Missouri. In 2013, for example, Missouri exported \$12.9 billion in freight to foreign countries, representing a 79 percent increase in the past 10 years.

The Economic Importance of Freight

There are strong correlations between the amount or value of freight shipped and the overall health of a State or regional economy. The freight transportation system is how Missouri’s four largest exports—transportation equipment, chemicals, food products, and machinery—are delivered around the world. Freight movement is vital to the State, and increases in freight transportation are directly related to increases in economic growth.

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The cost of transporting and storing freight directly impacts everyone. One study estimated that the average person in the United States spends approximately \$4,500 per year¹ in transportation and storage costs related to goods purchased and consumed. The cost of transportation is a significant portion of the price of a loaf of bread. Improving the efficiency of freight transportation can lower the cost of goods and result in more disposable income for consumers.

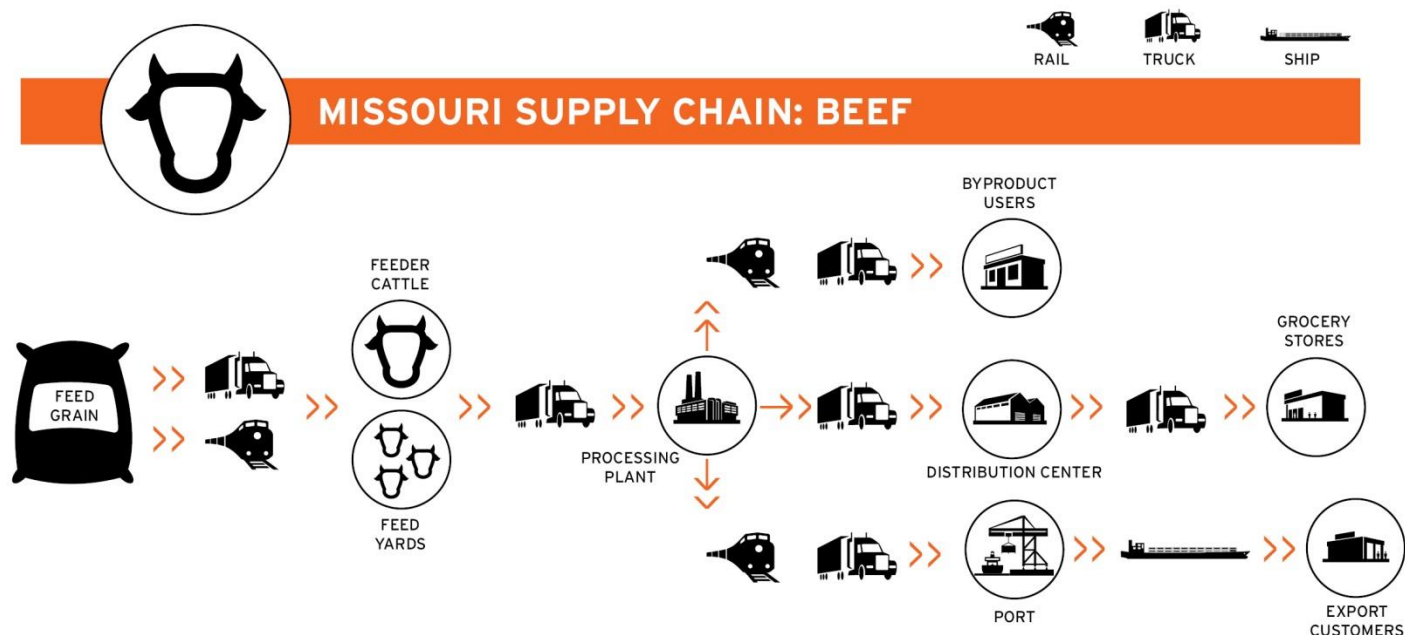
Supply Chains: Pathways for Products

Efficient freight transportation in Missouri is essential for industry supply chains. Supply chains are the pathways that raw materials and products move from their original sources, through the production process, and eventually to the end consumer. Supply chains have grown more sophisticated as businesses look to minimize supply chain costs and maximize profits. For example, Missouri is a major producer of beef. Feed grain and feeder cattle are imported to the feed yards. Finished cattle are then shipped to a meat processing plant to be processed, and then the meat is shipped to grocery stores or other final destination as a finished product (as illustrated in **Figure 1-1**).

¹ <http://www.cts.umn.edu/events/freight/2009/documents/murphy.pdf>

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Figure 1-1: Missouri Beef Supply Chain



Many products Missourians buy are created and delivered through these complex supply chains and each step uses the freight transportation network to deliver source materials and finished goods in a timely manner. If the freight network breaks down, so do these supply chains. The efficiency of these chains has a significant impact on how various businesses compete.

Current and Future Challenges

Over the next 20 to 30 years, the growth of freight transportation throughout the nation is expected to continue to accelerate. The reduction in and unpredictability of funds needed to maintain and improve the transportation network significantly impairs the ability to continue to improve the supply chain. All transportation modes—road, rail, air, and water—continue to experience congestion along major corridors and at key bottlenecks, including critical interstate highway interchanges; outdated and under-designed locks, dams, and ports; and the two largest rail terminals—St. Louis and Kansas City. Major air cargo hubs (i.e. Atlanta, Chicago, and Dallas-Fort Worth) are operationally sensitive to disruptions, such as from weather or maintenance. Delays at these major hubs often reverberate throughout the U.S. air system, including the Kansas City and St. Louis airports.

How Freight Travels in Missouri

By far, the largest percentage of freight in Missouri travels either by truck on the roadway network or by rail. As shown in **Figure 1-2**, data indicate that trucks move 49 percent of the freight tonnage and 59 percent of the freight value in Missouri, while rail lines move 45 percent of the freight tonnage and 39 percent of the freight value. Waterways transport five percent of the freight tonnage and one percent of the freight value. Air cargo and pipelines combined transport approximately one percent of the

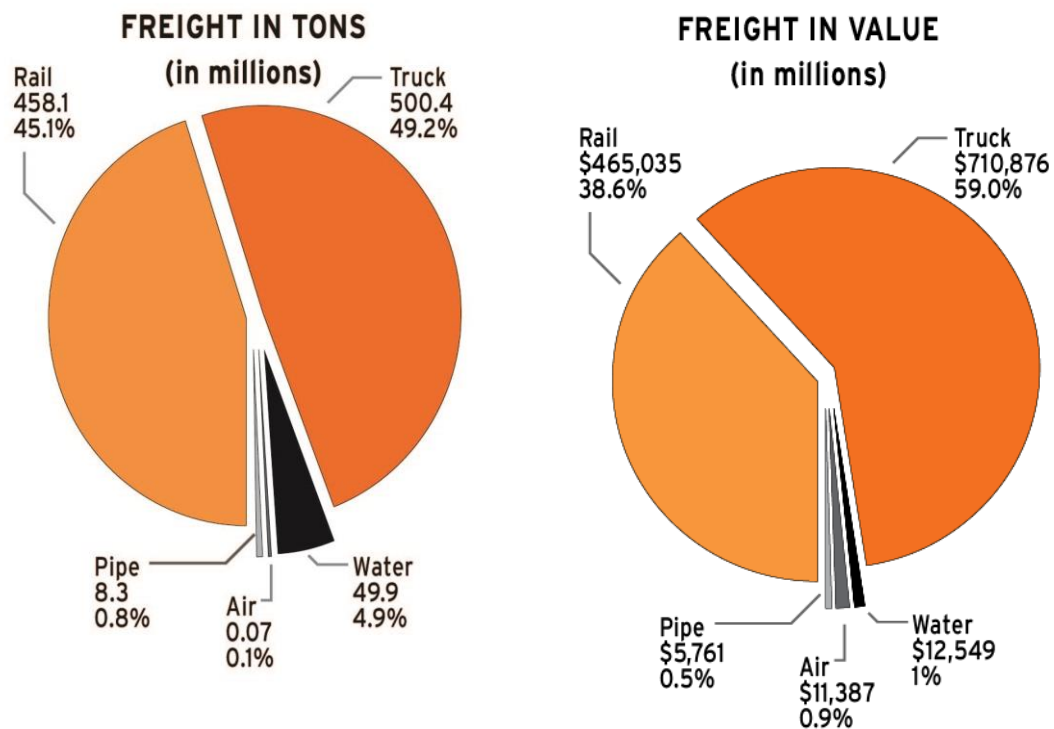
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freight tonnage and one percent of freight value in Missouri.

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Figure 1-2: Actual Freight Movement by Tonnage and Value per Mode (2011)

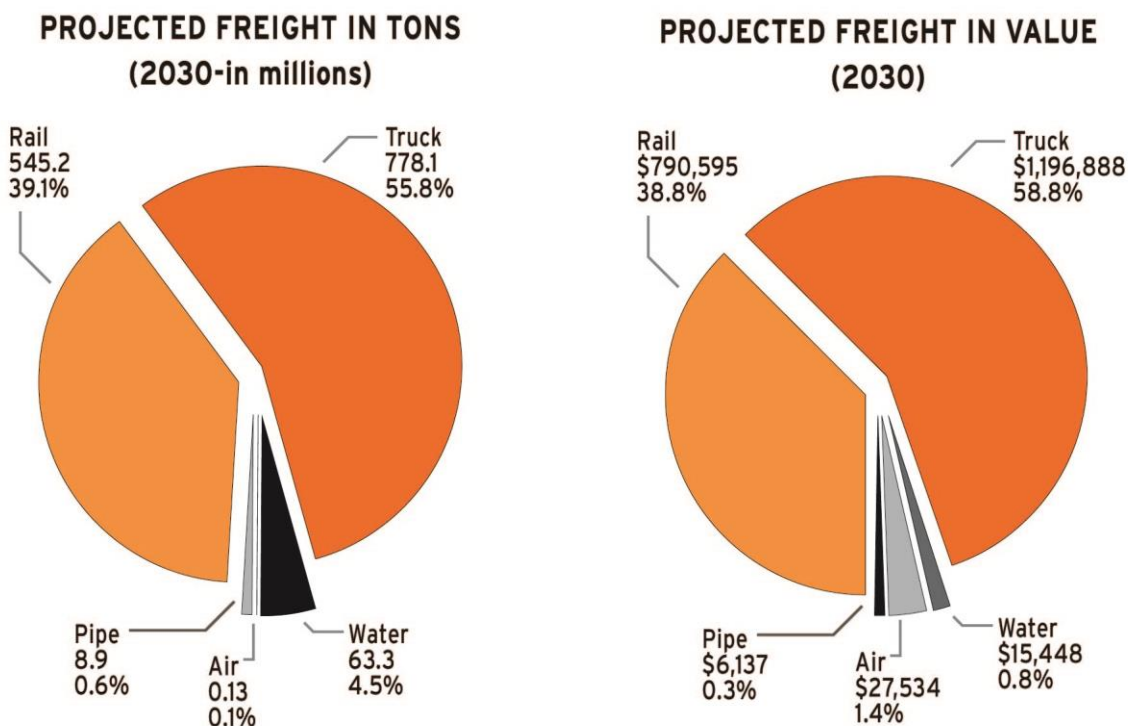


Source: Prepared by CDM Smith, based on Transearch® data for 2011

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Data suggests that truck and rail will be the dominant modes in 2030, as shown in **Figure 1-3**. Trucks are forecasted to transport 56 percent of the freight tonnage and 59 percent of the freight value, while rail lines are projected to transport 39 percent of the freight tonnage and 39 percent of the freight value in 2030. Waterways are expected to move five percent of the freight tonnage and one percent of the freight value in 2030. Air cargo and pipelines combined will transport approximately one percent of the freight tonnage and two percent of freight value in Missouri.

Figure 1-3: Projected Freight Movement by Tonnage and Value per Mode (2030)



Source: Prepared by CDM Smith, based on TRANSEARCH® data for 2011

Improvements in the truck freight network will continue to be critical to the freight system. However, all transportation modes are expected to see significant increases in freight tonnage. Improving the efficiency and reliability of alternative modes — rail, water, air, and pipelines — will grow in importance.

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Missouri Freight Goals

In 2013, MoDOT began *On the Move* stakeholder outreach activities to help identify a vision for the future of transportation in Missouri as part of an update to MoDOT's Long Range Transportation Plan. *On the Move* was a MoDOT initiative, completed in 2013, in which Missourians from all 114 counties were included in conversations about the State's transportation future.

This State Freight Plan is an offshoot of that planning effort that included four focus areas, or pillars, that drive transportation decisions at the statewide level. Building on the four pillars outlined in Missouri's Long Range Transportation Plan and through collaboration with freight partners, opportunities and actions have been identified as the goals of the Freight Plan. These goals are:

- **Maintenance** – Maintain the freight system in good condition by keeping highways and bridges in good condition and supporting the maintenance of railways, waterways, airports, and multimodal connections.
- **Safety** – Improve safety on the freight system by decreasing the number and severity of crashes involving commercial vehicles and improving safety at railroad crossings.
- **Economy** – Support economic growth and competitiveness in the State through strategic improvements to the freight system.
- **Connectivity and Mobility** – Improve the connectivity and mobility of the freight system by reducing congestion and increasing reliability on the roadways; supporting improved efficiency of rails, waterways, and airports; and improving connections between freight modes.

Missouri's Long Range Transportation Plan also includes three strategic considerations that have been incorporated into this Freight Plan. These include:

- **Environmental** – Reduce and/or mitigate adverse environmental impacts of freight.
- **Organizational and Process** – Institute policies and practices that support the freight system, such as exploring funding flexibility and stability and using technology to improve operations on the freight system.
- **Customers and Partners** – Improve coordination and collaboration with freight stakeholders.

National Freight Goals

The Missouri State Freight Plan was organized to meet the requirements of the *Fixing America's Surface Transportation (FAST) Act* and the national freight goals developed as part of that legislation. The Freight Plan also supports the freight-related strategies and recommendations in Missouri's Long Range

On the Move was a MoDOT initiative, completed in 2013, in which Missourians from all 114 counties and the City of St. Louis were included in conversations about the State's transportation future.

As part of FAST ACT, the U.S. Department of Transportation directed states to develop a freight plan. The Missouri State Freight Plan fits within this guidance.



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Transportation Plan, which incorporates the key findings in MoDOT's Tracker, MoDOT's previous State Freight Study, Missouri's Statewide Rail Plan, Missouri River Plan, and other regional initiatives as they relate to freight mobility.

It is important that the Missouri State Freight Plan not stand alone, but instead align and be informed by the national, State and local plans and policies that already exist or are in development. FAST Act requires the U.S. Department of Transportation to develop a National Freight Policy that will include the following goals for the national freight system:

- Improve the contribution of the freight transportation system to economic competitiveness, reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network (NMFN) and increase productivity, particularly for domestic industries and businesses that create high-value jobs;
- Improving the safety, security, and resiliency of the freight transportation system;
- Improving the state of good repair of the freight transportation system;
- Using innovation and advanced technology to improve the safety, efficiency and reliability of the NMFN
- Improve the economic efficiency and productivity of the NMFN;
- Improve the reliability of freight transportation;
- Improve the short- and long- distance movement of goods that travel across rural areas between population centers, travel between rural areas and populations centers, and travel from the Nation's ports, airports and gateways to the NMFN;
- Improve the flexibility of States to support multi-state corridor planning and the creation of multi-state organizations to increase the ability of States to address multimodal freight connectivity and
- Reducing adverse environmental and community impacts of the freight transportation system.

Figure 1-4 illustrates how MoDOT's goals and strategic considerations align with the national FAST Act goals.

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Figure 1-4: MoDOT Goals and Strategic Considerations

National Freight Goals	Missouri Freight Goals				Missouri Freight Strategies		
	Maintenance	Safety	Economy	Connectivity and Mobility	Environmental	Organizational and Process	Customers and Partners
(1) Increase economic competitiveness, reduce congestion and eliminate bottlenecks, increase productivity	*	*	*	*	*	*	*
(2) Improve the safety, security, and resiliency	*	*	*	*		*	*
(3) Improve the state of good repair	*			*			*
(4) Use innovation and advanced technology to improve the safety, efficiency and reliability	*	*	*	*		*	*
(5) Improve the economic efficiency and productivity	*	*	*	*		*	*
(6) Improve the reliability	*	*	*	*			*
(7) Improve the short- and long- distance movement	*	*	*	*		*	*
(8) Multi-State corridor planning and connectivity			*	*		*	*
(9) Reducing adverse environmental and community impacts	*			*	*		*

Plan Organization

The Missouri State Freight Plan is organized so that the elements required by FAST Act are met within the following chapters:

Chapter 1, Introduction – Establishes the context for the creation of the Missouri State Freight Plan. This chapter identifies the strategic goals of the plan and how they dovetail with other federal and State policies and plans.

Chapter 2, Stakeholder Outreach – Outlines the extensive outreach and involvement activities that were performed throughout the planning process. This chapter summarizes information from key freight stakeholder interviews, as well as motor carrier, shipper, and receiver survey results and analysis

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along with input received at forums and through website comments.

Chapter 3, Missouri Freight System – Includes an overview of the various components that make up the freight system. The chapter provides a summary of existing transportation assets and data on freight movement.

Chapter 4, Freight Network Conditions and Performance – Provides an analysis of conditions of the freight system including bottlenecks, level of service, safety and crashes, and pavement and bridge conditions. The chapter also discusses performance measures for these areas.

Chapter 5, Needs Assessment and Freight Forecast – Looks at freight system needs through an analysis of the identified strengths and problems. The chapter looks at the 20-year State freight forecast, emerging trends, and freight impacts on communities.

Chapter 6, Economic Context of Freight – Outlines the importance of freight in the State's economy. The chapter looks at the role of freight in supporting job creation, economic development, supply chains in Missouri, and regional economies.

Chapter 7, Freight Policies, Strategies, and Institutions – Discusses the State's freight policies and strategies for guiding freight-related transportation decisions. The chapter includes discussion of funding programs, freight-related institutions, freight roles and responsibilities, private infrastructure owners, statutory and constitutional constraints, regional freight planning activities, and the State's priorities.

Chapter 8, The Decision-Making Process – Lays out the State's process for identifying freight transportation improvements. The chapter describes how the various strategies, projects, and policy changes were considered and prioritized.

Chapter 9, Strategies and Recommendations – Outlines recommendations for programs, policies, and projects that address the needs identified in Chapter 5.

Chapter 10, Action Plan and Implementation Strategies – Outlines the next steps to include organizing the Freight Advisory Committee (FAC), identifying funding and financing options, and establishing action steps to implement the freight strategy and goals.

Appendices – Provides additional detailed information and analysis used to prepare the Missouri State Freight Plan and include:

- Appendix A: Assets and Freight Flow
- Appendix B: Trends, Needs, and Issues
- Appendix C: Strengths and Challenges
- Appendix D: Stakeholder Outreach
- Appendix E: Goals and Performance Measures
- Appendix F: Scenario Planning
- Appendix G: Freight Project List
- Appendix H: Freight District Summaries

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- Central District
 - Kansas City District
 - Northwest District
 - Northeast District
 - St. Louis District
 - Southeast District
 - Northwest District
- Appendix I: Freight Modal Profiles
 - Highways
 - Rail
 - Ports/Waterways
 - Air Cargo
 - Intermodal Connectors
 - Pipelines
 - Freight Commodities
 - Trade and Growth
- Appendix J: Freight Topical White Papers
 - Intermodal Transloading
 - Airports
 - Port Investment in Container-on-Vessel Service

Chapter 2 – Stakeholder Outreach

KEY POINTS

- Stakeholder input was integral in the development of the Missouri State Freight Plan – from qualitative assessments of freight infrastructure conditions, to highlighting what the State needs to do to be economically competitive, to shaping the freight project prioritization process.
- MoDOT learned that the most effective way to gather input from freight stakeholders is to go to them, where they work and gather for industry meetings.
- Stakeholders' top concerns center on the maintenance and capacity of I-70 and the need for better multi-modal connections.

Introduction

Hundreds of freight stakeholders were involved in helping MoDOT create the Missouri State Freight Plan that identifies strategic investments in the system and helps bolster Missouri's economy today and in the decades to come. Outreach efforts focused on reaching out to stakeholders such as logistics directors, shipping managers, economic development professionals, and leaders in private industry. Those that use the system most offered their perspectives on the conditions, issues, and needs of the freight network.

The goals of stakeholder outreach were to:

- Better understand, as an agency and as a State, what the costs are to Missouri's economy if the freight network stagnates or deteriorates.
- Articulate what freight projects would be most helpful to the State if additional funds were made available.
- Collect thoughts on making businesses and communities more competitive – whether through improvement projects or policy changes.

From November 2013 to July 2014, MoDOT engaged key freight stakeholders via surveys, interviews, multiple rounds of forums, and direct/grassroots outreach throughout the State. All activities were guided by the Freight Steering Committee made up of key stakeholders and MoDOT leadership. Figure 2-1 summarizes stakeholder outreach efforts.

Stakeholder input has influenced each piece of the Freight Plan, from the development of a prioritized project list to policy recommendations.

Figure 2-1: Summary of Stakeholder Outreach



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Guiding the Plan: How Stakeholders Provided Input

Freight stakeholders provided valuable input and helped guide MoDOT during the entire life of the project and at project milestones.

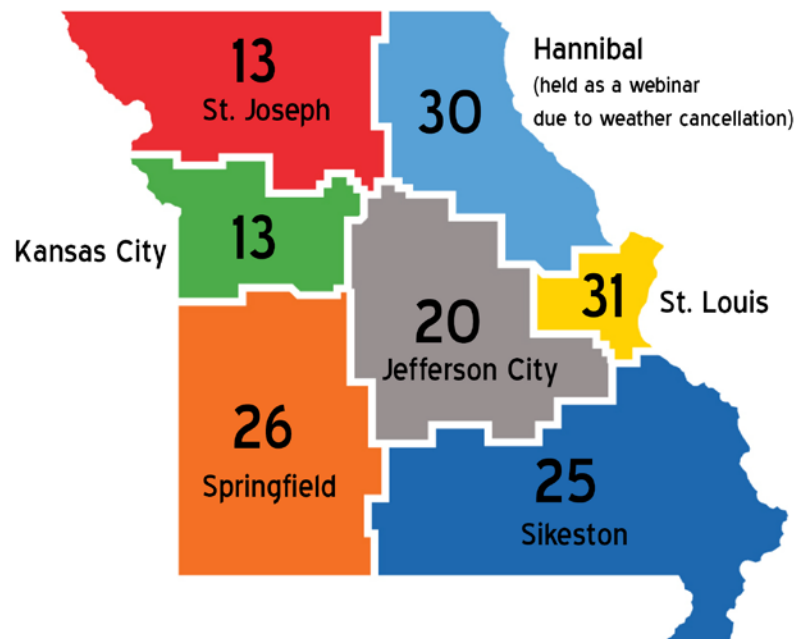
Input was provided by:

- A **Freight Steering Committee** made up of freight and State leaders and select members of MoDOT leadership. The committee—representing a diverse group of freight interests—convened monthly to provide feedback, reviewed materials, and helped connect MoDOT to other stakeholders. A full listing of Freight Steering Committee members is available in Appendix E.
- **Key Freight Stakeholder Interviews and Surveys** from leaders in freight-related services including manufacturing, economic development, logistics, and carriers. MoDOT discussed with these stakeholders the strengths, weaknesses, and investments needed in the freight network. A listing of the interviews and surveys is available in Appendix A.
- **Surveys emailed to 1,300 plus stakeholders and available on the project's website, www.MoFreightPlan.org**, to gather feedback from the general public.
- **Grassroots meetings** with currently existing freight interest groups and associations; such as supply chain management groups and trucking, port, and railroad associations throughout the State.
- **District and Regional Forums** that brought together hundreds of key stakeholders from across the State to discuss the plan with MoDOT. These forums are outlined below.

District Freight Forums (January-February 2014)

Building on the stakeholder interviews and surveys, freight forums were held in each MoDOT district to discuss freight issues and opportunities with a broader set of freight stakeholders. Forums were held across the State, as shown in **Figure 2-2**.

Figure 2-2: Number of Stakeholders in Attendance at Each District Freight Forum



In all, more than 150 stakeholders participated in these discussions and provided valuable feedback to Freight Plan efforts.

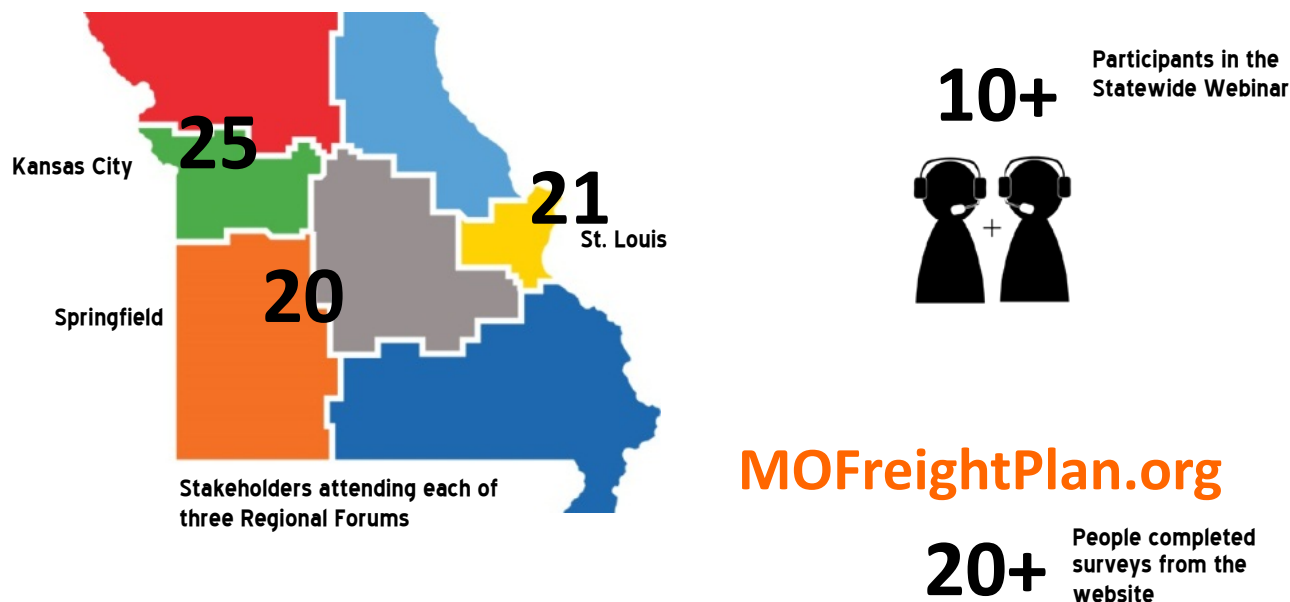
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Regional Priorities and Investment Forums (April-May 2014)

Close to 100 stakeholders were engaged in the Regional Priorities and Investment Forums. Three regional forums held in Kansas City, St. Louis, and Springfield hosted a combined total of 65 stakeholders. An additional 30 stakeholders participated in a statewide focused webinar held in early May or in surveys made available on the website for those stakeholders who were not able to participate in any of the forums (see **Figure 2-3**).

Stakeholders participated in several exercises to identify types of projects important to them and the region and provided guidance to the project team in creating a list of priority freight projects.

Figure 2-3: Number of Stakeholders Engaged in Regional Priorities and Investment Forum Activities



=~100 Engaged Stakeholders

Comment Period Process (October 2014)

The draft State Freight Plan was available for public comment from October 1 to October 31. The following outreach efforts and activities happened during the public comment period:

- A survey, targeting key stakeholders, was posted on the project website to gather input about the draft plan.
- Project team members reached out to existing groups of freight stakeholders to schedule opportunities to present the draft plan and solicit feedback.
- The draft plan was presented during a webinar on October 14 during which participants could provide comments. The presentation used during the webinar was then posted to the project website.
- Stakeholders who had previously participated in the planning efforts were sent an email outlining the variety of ways they could review the draft plan and provide comments. From that email, stakeholders could also request a speaker for a group presentation.

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The State Freight Plan website was updated to include:

- The draft plan posted for public review.
- A graphic communicating the work done to-date and the work expected in the coming months.
- A link to the survey being used to gather comments.
- Information about the webinar presentation, including a link to the presentation given during the webinar.

During the comment period, 80 comments were submitted via the website, grassroots events, and the webinar discussion.

Listening to Missourians: What MoDOT Heard

Stakeholders spoke to a number of consistent themes and helped identify a series of important projects for Missouri's freight network.

Consistent Statewide Themes

Reoccurring themes—throughout the State and regionally—emerged during stakeholder outreach. As shown in **Figure 2-4**, themes include:

- Missouri generally has a well-connected road network. It is good until there is a hiccup such as congestion, weather, or construction. However, there is a need for capacity and maintenance improvements to maintain the reliability of the network. Maintenance and improvements along I-70 were mentioned most consistently.
- There is a need to integrate freight networks for better multimodal connectivity.
- MoDOT should engage all stakeholders, both public and private. An example of a group that hasn't traditionally been engaged in freight discussions is those who represent railroads.
- There is a need to investigate possibilities for using waterways including Panama Canal expansion opportunities, increasing dredging, and updating locks and dams on the Mississippi River.

Figure 2-4: Statewide Themes During all Stakeholder Outreach Efforts

What have we heard during outreach across the state?



Generally, well-connected road network, but...



Connect all freight modes



Engage all stakeholders



Utilize waterways



Priority Project Types

During the three Regional Priorities and Investment forums, stakeholders were also asked to identify types of statewide and regional projects that MoDOT should consider high priority. They included:

All Regions

- Maintenance and improvements along I-70.

Kansas City

- Increased capacity and improvements at ports.
- Increased safety across all modes.
- Rail-highway at-grade crossing improvements and grade separations.
- Waterway and port infrastructure and terminal improvements (i.e., building, storage facilities, equipment).

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St. Louis

- Multimodal approach focused on strategic economic development efforts.
- Roadway improvements that address first and last mile as well as accommodate wider and heavier loads.
- Improved container handling for all modes.
- Improved cargo facilities, such as aprons, and their connections to warehouses or distribution centers.
- Harbor and channel dredging along the Mississippi River.
- Improved connections from airport cargo areas to other modes.

Springfield

- Maintenance on shoulders.
- Connectivity—i.e., rail spurs to industrial parks.
- Additional truck parking facilities and improving in-cab notification technologies.
- Additional roadway lanes.
- New truck arterials.

Purpose of Key Stakeholder Input

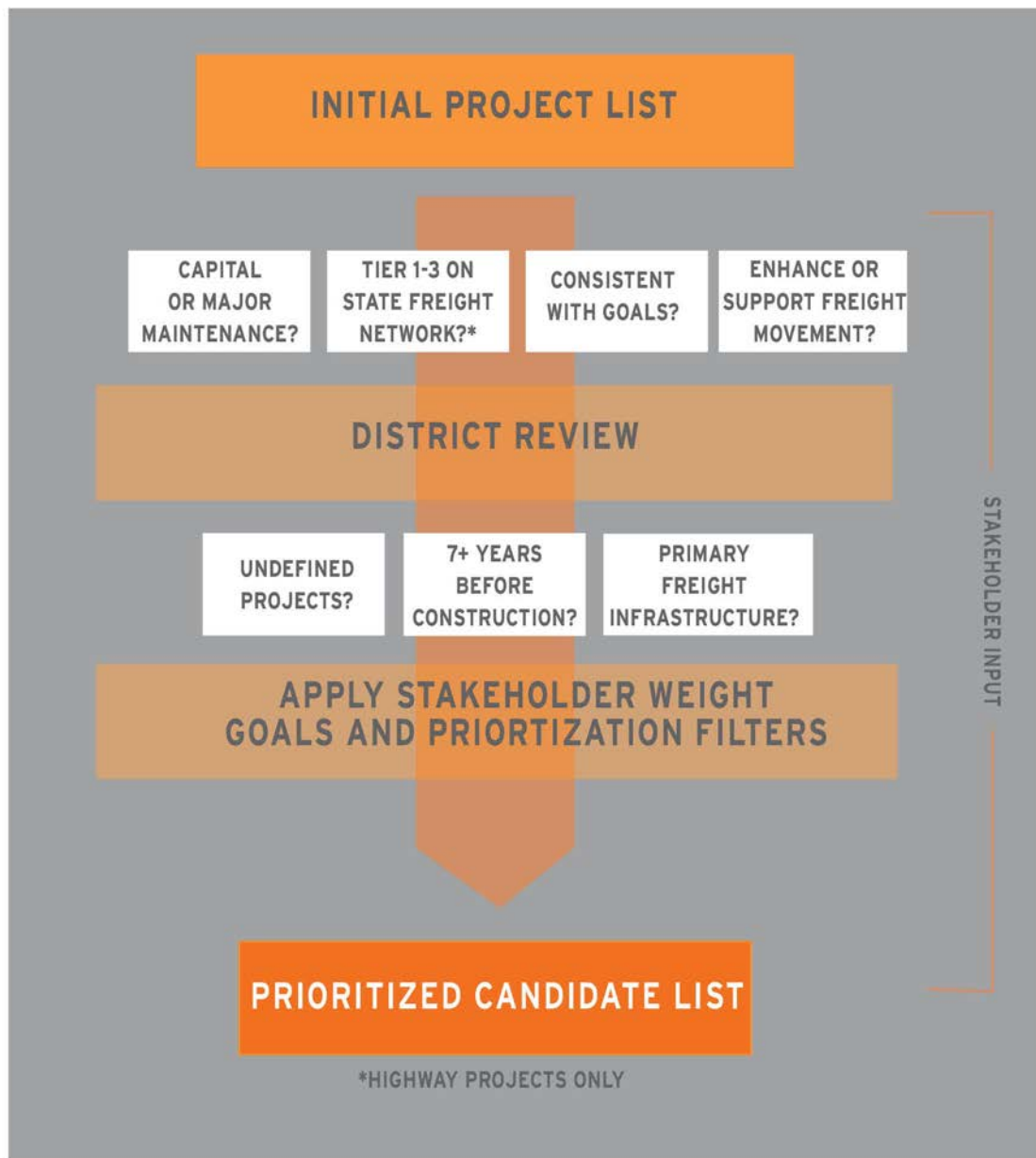
MoDOT used more than 1,300 stakeholder contacts during the Freight Plan process to develop a plan well-vetted by Missourians who are the most involved and affected by freight network movement and development. The purpose of these open dialogues with key stakeholders was to gather input on stakeholders' priorities as well as to inform them on plan progress.

Stakeholders provided input on:

- An inventory of freight assets and assessment of needs that includes statewide data that did not exist before this plan.
- What Missouri needs to do to be competitive and attract economic development to the State.
- A defined State freight network.
- Weighted freight goals and priorities that line up with goals of the State's last long-range planning effort.
- Strategic recommendations and an action plan (found in Chapters 9 and 10) that can be used moving forward.
- A list of prioritized investments and a project list based on the weighted goals and priorities from stakeholders; see **Figure 2-5** for how stakeholders were involved in crafting this list.

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Figure 2-5: Project Prioritization Process Using Stakeholder Input



Chapter 2 - Stakeholder Outreach

Forming Partnerships and Moving Forward

After the Missouri State Freight Plan has been finalized and recommendations have been made, MoDOT will continue to build upon relationships formed and enhanced during the Freight Plan process. There is a commitment that this Freight Plan will not sit on a shelf and gather dust, regardless of existing transportation funding.

A complete listing of strategic recommendations from the Freight Plan is covered in Chapter 9. Listed below are examples of those that MoDOT will continue to work on with key stakeholders:

- Implementing a freight advisory committee made up of leaders from the public sector, private companies, elected or appointed officials, and other planning partners.
- Improving multimodal connectivity.
- Helping in future efforts to develop comprehensive freight corridors.
- Working to leverage private sector investment to gain political support for public investment.
- Ensuring rural accessibility/just-in-time performance needs are considered during planning and project selection.
- Working to create statewide and district processes for programmatic freight projects.

Lessons Learned

Through drafting and vetting this Freight Plan, stakeholders communicated and reaffirmed some lessons for MoDOT on how best to communicate with them, engage additional stakeholders, and identify high level concepts always to consider when discussing freight in Missouri.

- Engaging all freight interests is more complicated than simply having public meetings. The most effective way to engage with these stakeholders is by doing grassroots outreach and going to meet private stakeholders at industry-specific events and conferences.
- Economic development and freight go hand-in-hand. Be prepared to talk about economic impacts.
- There are opportunities for no- or low-cost partnerships to enhance freight opportunities in the State.
- Public and private stakeholders are concerned about a lack of adequate dedicated revenue for transportation projects.

Chapter 3 – Missouri Freight System

KEY POINTS

- One of the key products of this Missouri State Freight Plan is a defined Missouri freight network. This is the first time Missouri has had a defined freight network. That is important for several reasons, chief among those: a proposed improvement project must be located on or adjacent to the defined freight network to be considered in the freight prioritization process.
- The top 100 freight generators in Missouri were identified based on truck activity. This information helped support the identification of the freight network and shaped the prioritization process.
- Freight and commodity flows underscore the role Missouri plays as a bridge state for the nation, as most freight travels through our state instead of starting or ending here.

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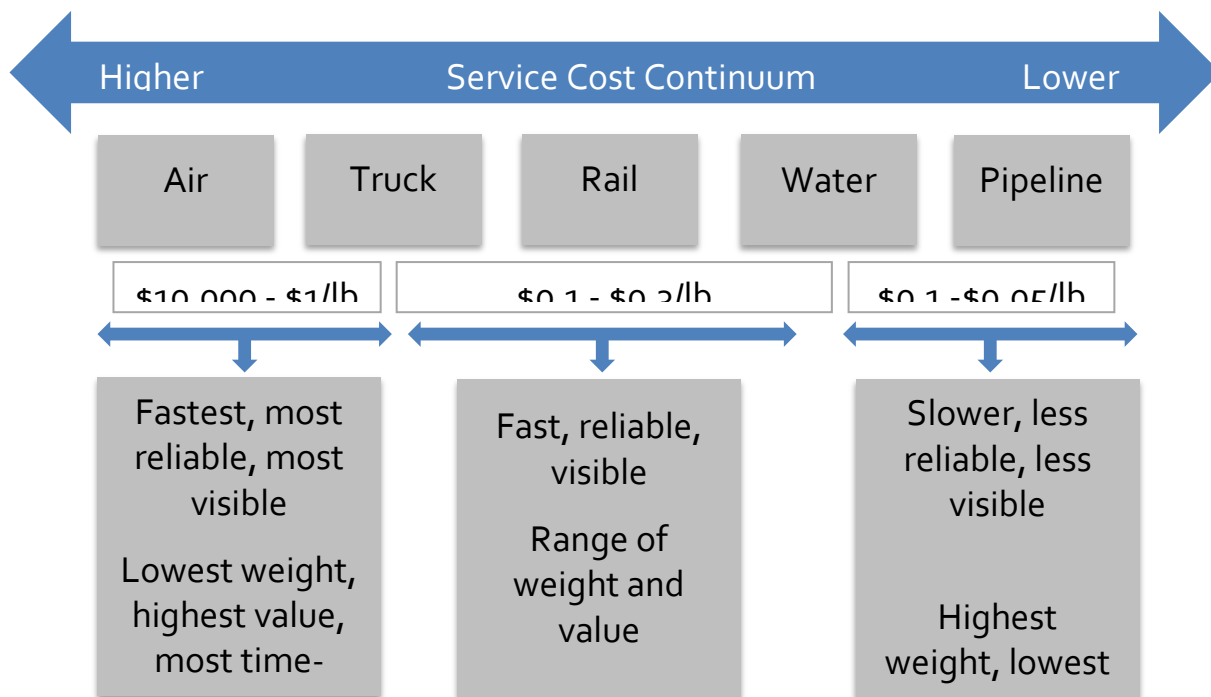
Missouri is at the freight crossroads of America. As the geographic and demographic center of population for the United States, Missouri is well positioned as the country's freight nexus.

Missouri's freight system is a network of highway, rail, air, water, pipeline, intermodal facilities, and freight generators that together move goods and commodities. The freight system is how Missouri products like soybeans and aviation parts are transported around the world. An understanding of the key features of the Missouri Freight Network is integral to understanding the strategies and future goals outlined in this Missouri State Freight Plan.

The freight system offers a range of service options. The best freight service for a particular shipment depends on the shipment weight, shipment value, the origin and destination, when the product is needed, security and safety, transportation costs, and customer needs. As shown in **Figure 3-1**, shippers use different freight modes depending on the type of shipment. All these freight modes are elements of the Missouri freight system.

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Figure 3-1: Range of Freight Service Options



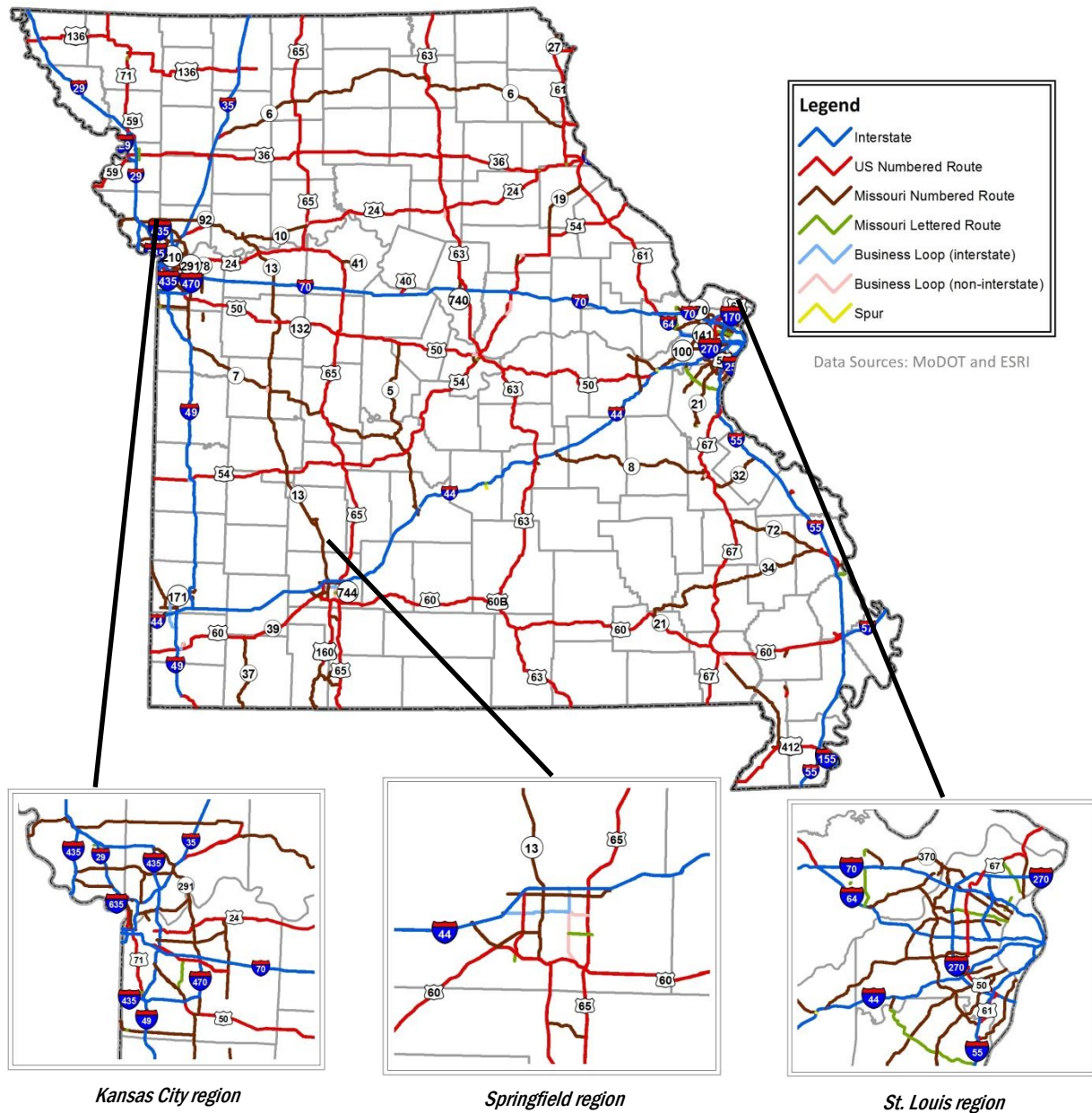
Source: Federal Highway Administration

Highway

Missouri has the seventh largest state highway system in the United States. It is made up of approximately 33,700 centerline miles of roadway, 5,500 of which are classified as heavily traveled “major highways” and 28,200 miles of which are defined as lesser traveled “minor highways.” Missouri’s major highways are just 20 percent of the State highway miles, but carry 80 percent of the system’s traffic and the majority of the highway freight traffic. There are 18 Interstate Highways within Missouri, including 9 main routes and 9 auxiliary routes. The more than 10,000 bridges that cross rivers, other highways, and valleys are also important elements of the highway system. **Figure 3-2** shows the Missouri major highway system, which defines many of the paths on which freight moves.

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Figure 3-2: Missouri Major Highway System



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Rail

Railroads are categorized as Class I, II, or III depending on operating revenues. In 2012 dollars, a railroad with operating revenues greater than \$433.2¹ million for at least three consecutive years is a Class I railroad. A railroad with revenues greater than \$34.7 million but less than \$433.2² million is a Class II railroad, commonly referred to as a “regional” railroad. A railroad not within the Class I or II categories is considered a Class III railroad, also known as a “short line.”

Missouri has a significant freight rail infrastructure with six Class I freight railroads currently operating on 4,218 miles of main track rail lines, 2,500 miles of yard track, and approximately 5,697 public rail-highway crossings within the State. There are no Class II railroads operating in Missouri; however, five short line railroads serve Missouri. The short line railroads collectively own and operate 426 track miles, varying from the smallest with 33 track miles to the largest with 331 track miles. **Figure 3-3** shows railroad ownership in Missouri.

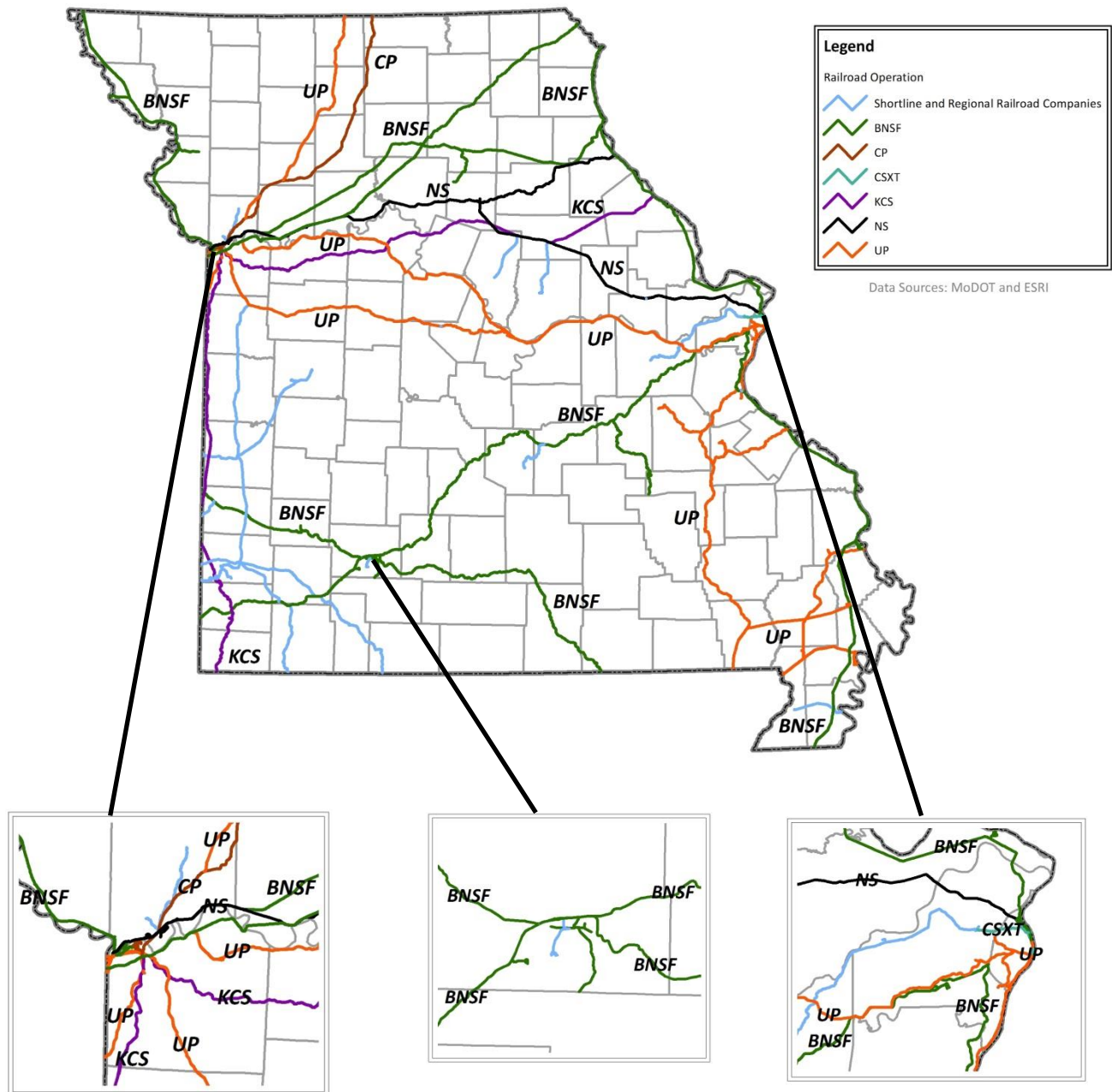
At-grade rail crossings present potential roadway safety and delay issues. There are over 5,697 at-grade railroad crossings within Missouri, including freight railroad, Amtrak, and commuter rail operations.

¹ http://www.aslrra.org/about_aslrra/faqs/

² http://www.aslrra.org/about_aslrra/faqs/

Chapter 3 – Missouri Freight System

Figure 3-3: Missouri Railroad Ownership



Chapter 3 – Missouri Freight System

Water

Missouri waterways move an average of \$12.5 billion in cargo annually. The State contains 1,050 miles of navigable rivers, including 500 miles of the Mississippi River and 550 miles of the Missouri River. The Mississippi River is divided into the Upper Mississippi (nearly 860 miles) limited by a series of locks and dams and the Lower Mississippi (1,480 miles) with uninterrupted flow south to the Gulf of Mexico.

A total of 14 public ports and more than 200 private ports can be found along Missouri's waterways. There are eight active ports; six of the eight shipped product within the last year, and two of the eight did not. There are six developing ports which currently do not have a public port facility. **Figure 3-4** shows the port authority locations.

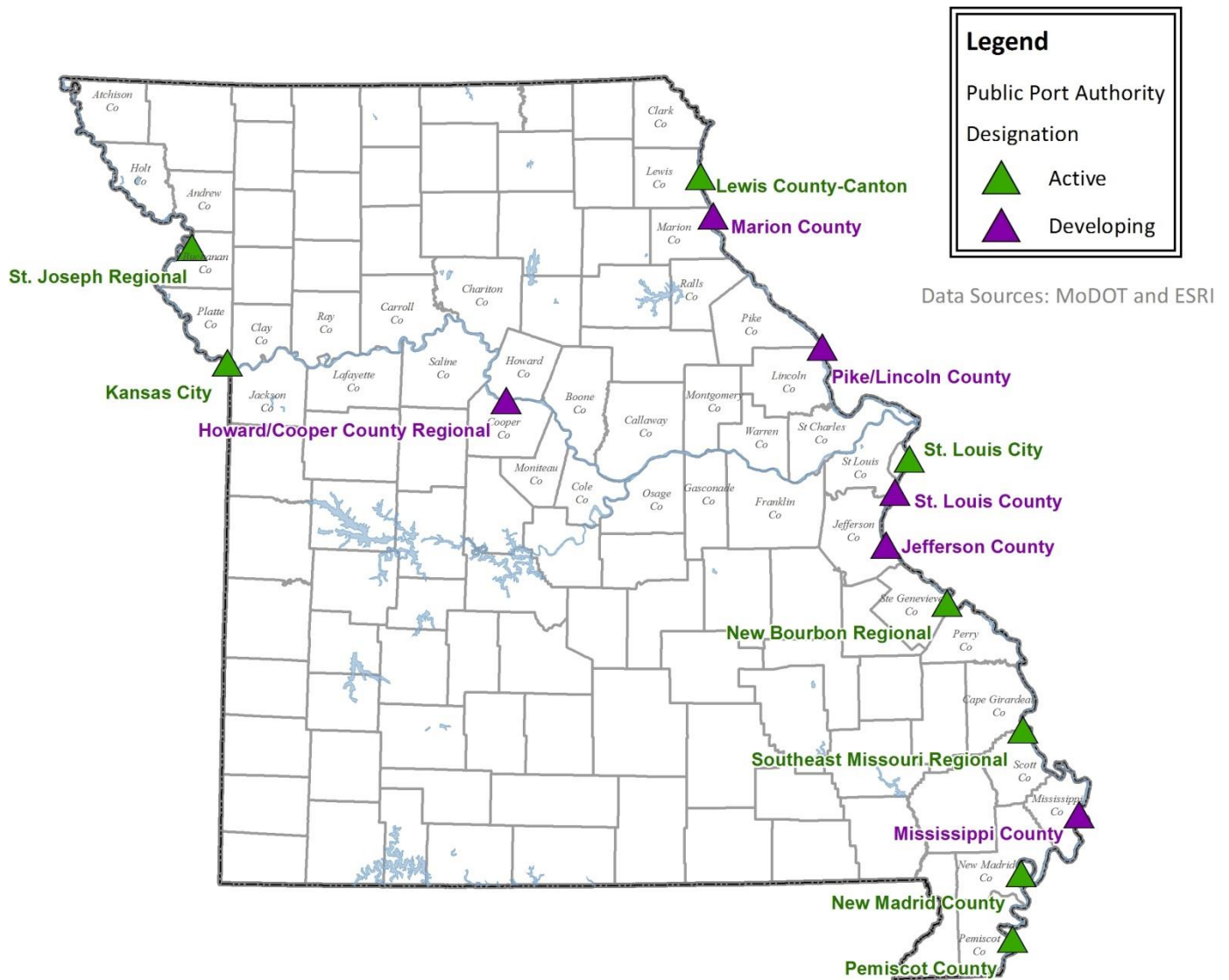
Since 2009, the U.S. Department of Transportation (USDOT) has designated several marine highways for transporting cargo on water, thereby reducing pollution and congestion on roads. Designated marine highways receive preferential treatment for federal assistance from the U.S. Maritime Administration (MARAD). Marine highways serving Missouri include:

- M-29 connecting the Upper Missouri River from Kansas City to Sioux City, Iowa
- M-70 covering the Missouri River from Kansas City to St. Louis
- M-35 recently approved and covering the Upper Mississippi River from the Twin Cities to St. Louis
- M-55 connecting the Illinois River from Chicago to St. Louis and then the Mississippi River from St. Louis to the Gulf of Mexico

Figure 3-5 shows the marine highways serving Missouri.

Chapter 3 – Missouri Freight System

Figure 3-4: Missouri Public Port Authorities



Source: MoDOT and ESRI

Chapter 3 – Missouri Freight System

Figure 3-5: U.S. Marine Highway Routes



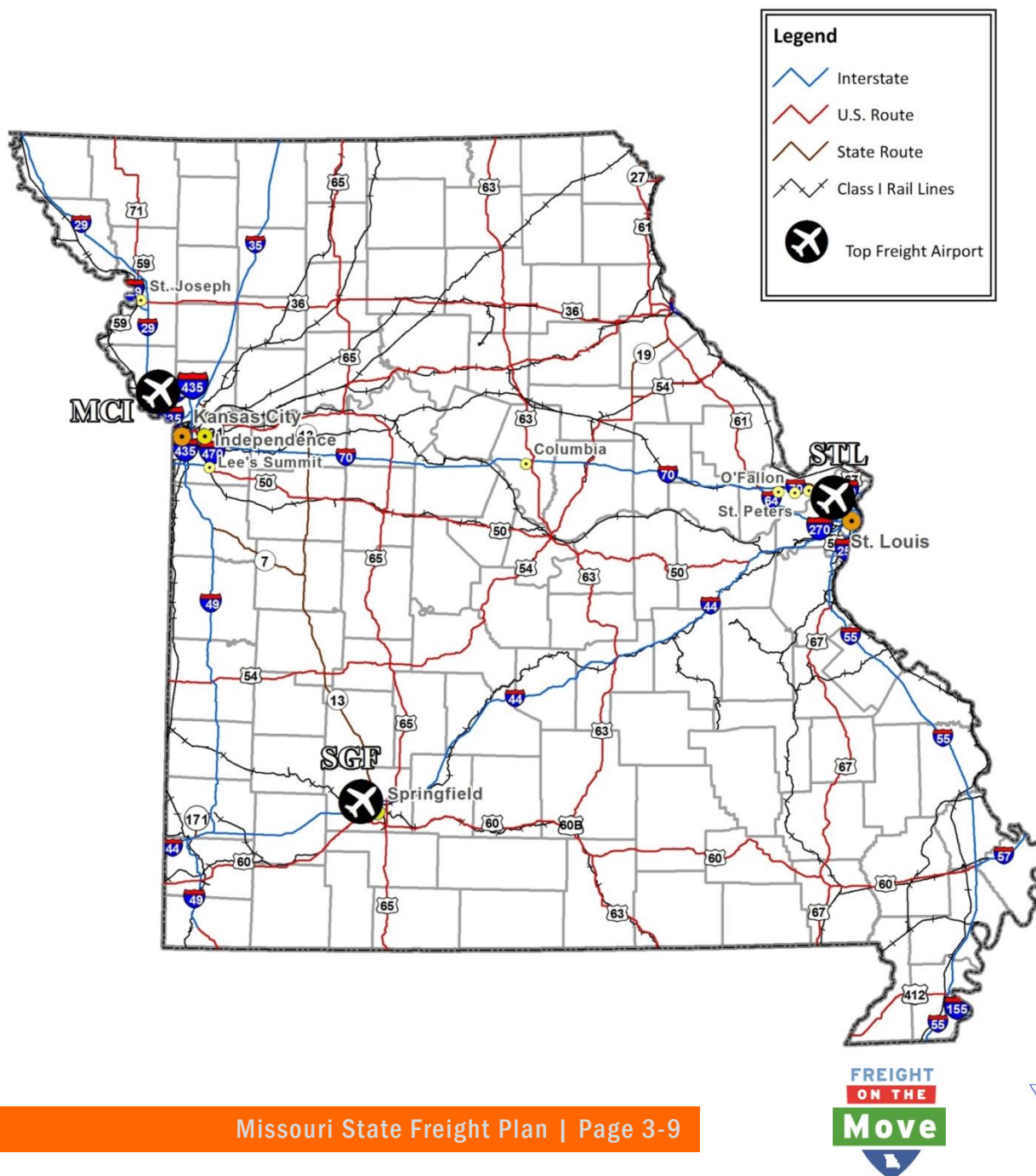
Source: U.S. Department of Transportation

Chapter 3 – Missouri Freight System

Air

Missouri is home to three of the top 110 cargo airports in North America in terms of total tonnage in 2012. These three airports handled nearly 170,000 tons of air cargo in 2011, which is a decrease of 4.9 percent annually since 2001. In this same time frame, Missouri's fastest growing airport by total tonnage was Springfield-Branson National (SGF) at 0.79 percent increase annually. Kansas City International and Lambert – St. Louis International airports both experienced decreases in total air cargo from 2001-2011. **Figure 3-6** shows Missouri's top freight airports.

Figure 3-6: Missouri Top Freight Airports



Chapter 3 – Missouri Freight System

Source: MoDOT and ESRI

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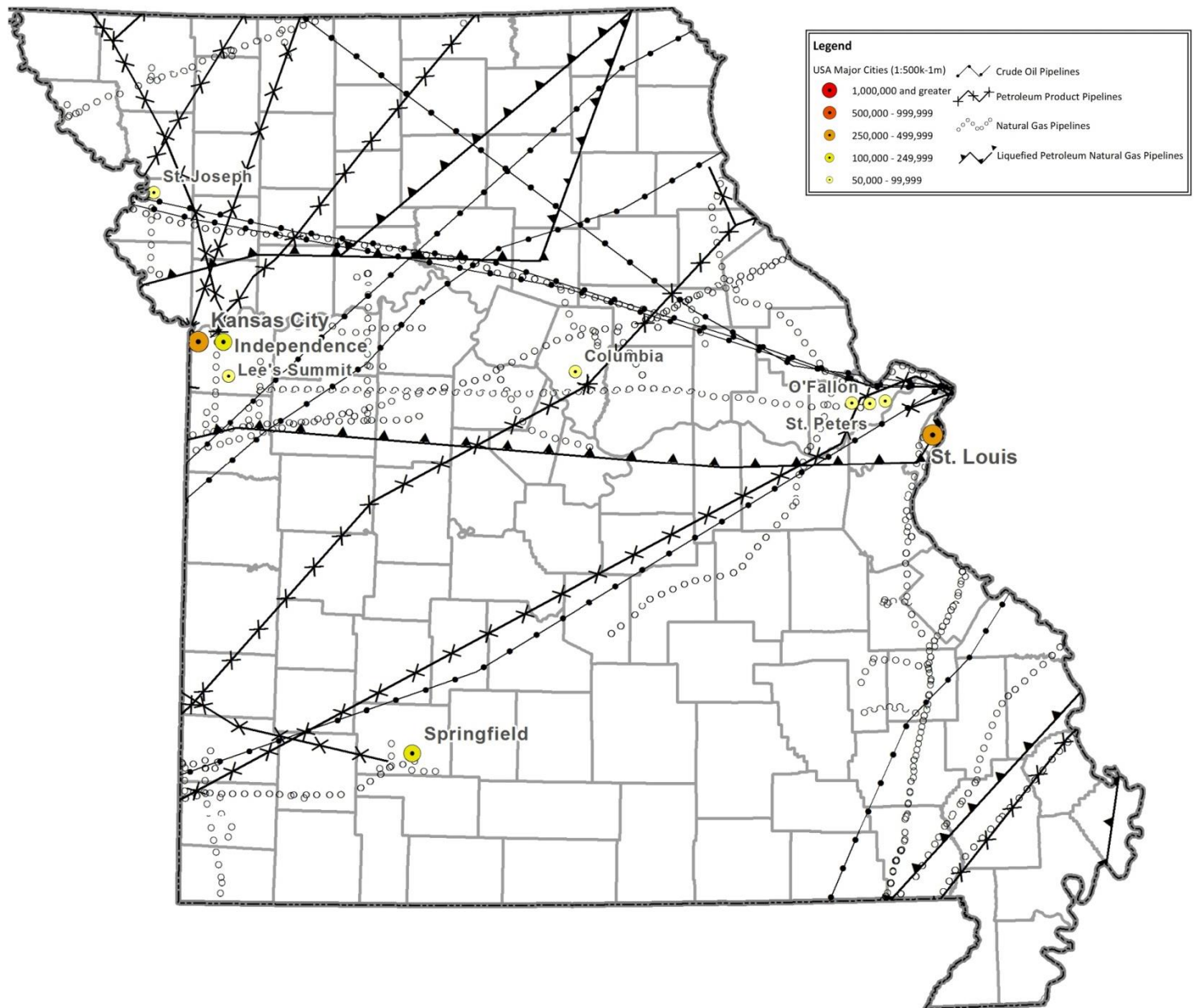
Pipeline

Approximately 10,700 miles of pipelines move natural gas, crude oil, and petroleum products throughout Missouri. The highest percentages of pipeline miles, according to the Missouri Incident and Mileage Overview authored by the Pipeline and Hazardous Materials Safety Administration (PHMSA), are in St. Charles County (4.9 percent), Cass County (3.6 percent), Audrain County (3.5 percent), and Johnson County (3.4 percent). These counties are located in the northern half of the State where the majority of major pipelines pass. **Figure 3-7** shows Missouri's major pipelines.

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Figure 3-7: Missouri Major Pipelines

Source: U.S. Energy Information Administration, MoDOT, and ESRI



Chapter 3 – Missouri Freight System

Intermodal Facilities

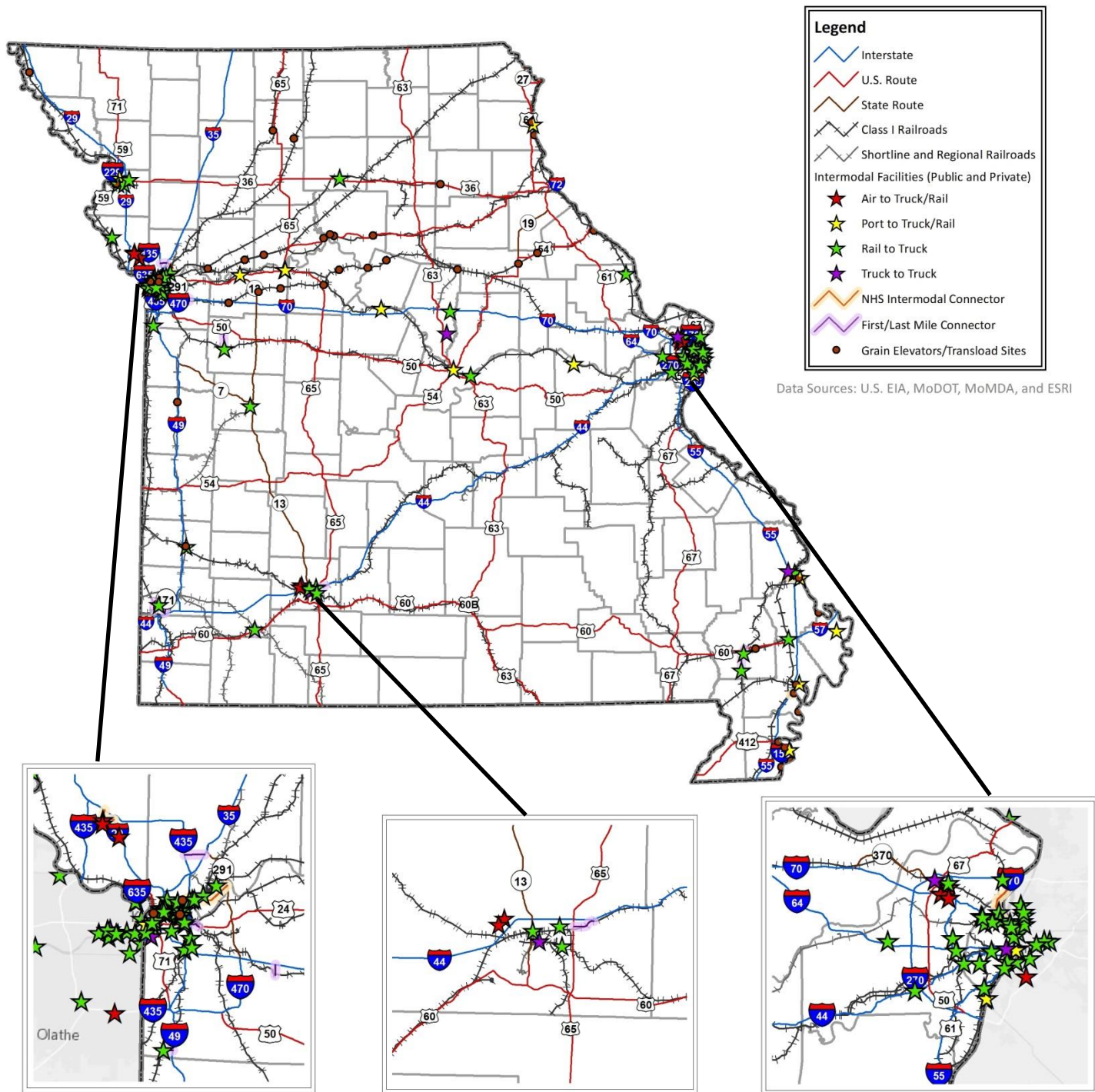
The National Transportation Atlas Data through the Bureau of Transportation Statistics identified 114 intermodal facilities located in Missouri. These facilities provide a variety of intermodal connections. The majority of the intermodal facilities (71 percent) accommodate transfers of commodities between rail and trucks. Other intermodal facilities offer transfers between rail/truck and ports (16 percent), rail/truck and airports (eight percent), or other modes (five percent).

The majority of intermodal activity occurs in metropolitan areas. The Kansas City area has 47 intermodal facilities and St. Louis has 30 intermodal facilities. Smaller clusters of intermodal facilities are in Springfield, which has six intermodal facilities, and St. Joseph, which has four intermodal facilities. The remaining 28 intermodal facilities are dispersed throughout the State. **Figure 3-8** shows Missouri's Intermodal Facilities.

Most, if not all, intermodal facilities are associated with private companies and offered as a service to customers. Intermodal facilities can affect the overall cost of logistics, increase efficiency, reduce congestion and burden on the highway system, and generate higher returns on public and private infrastructure investments. For these reasons, intermodal facilities can enhance Missouri's ability to compete domestically and internationally.

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Figure 3-8: Missouri Intermodal Facilities



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Kansas City region

Springfield region

St. Louis region

Source: U.S. EIA, MoDOT, and ESRI

Freight Generators

Freight generators create freight. Freight generators include distribution centers, warehouses, manufacturing facilities, and other origins and destinations.

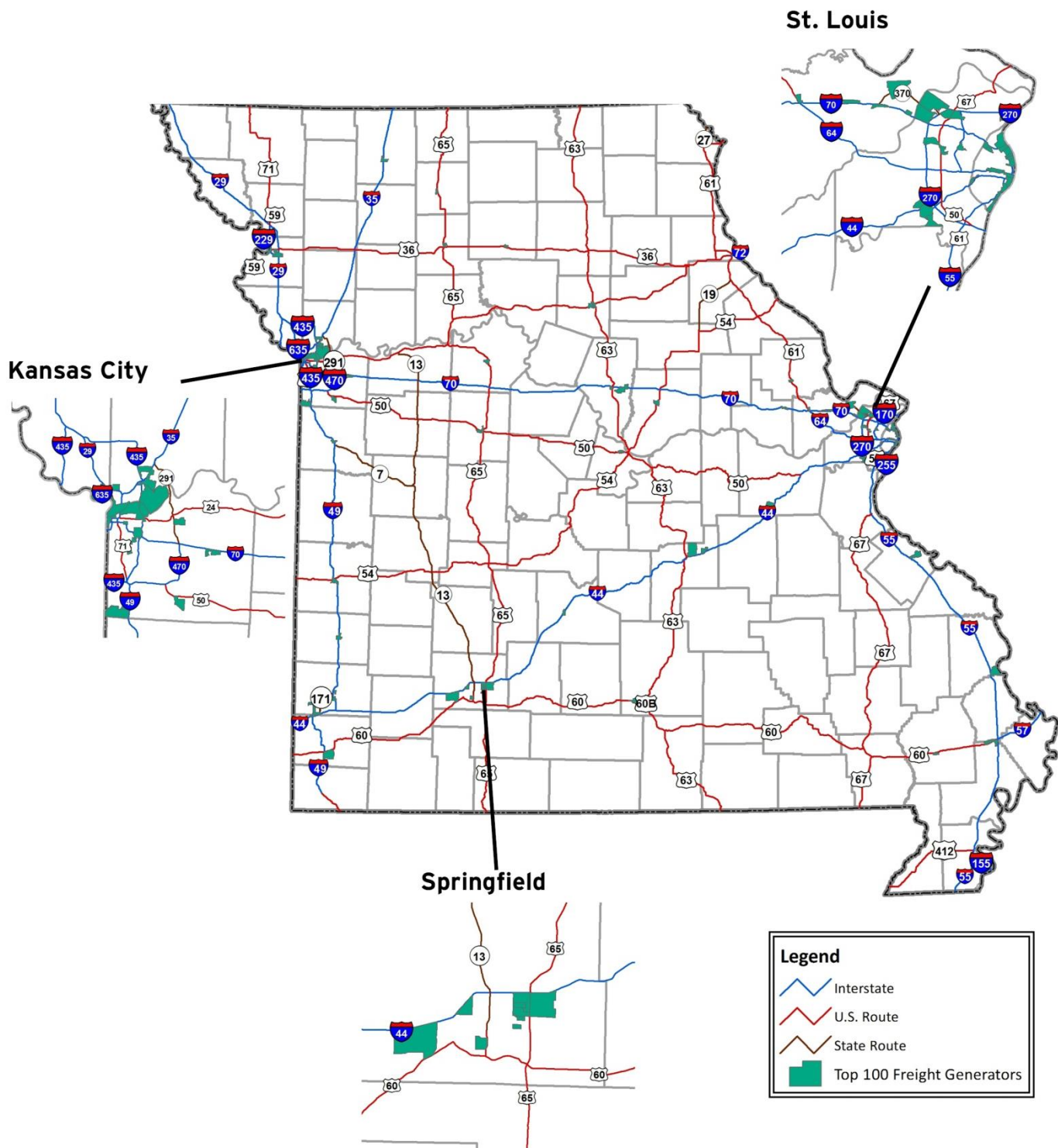
American Transportation Research Institute (ATRI) analyzed Global Positioning System (GPS) data from Missouri to identify census block groups where freight activity is most intense. The goal of the analysis was to identify geographic locations where freight is generated. These locations were identified based on the intensity of truck activity to, from, and within the census block group. The results of this analysis provide insight into the sources of freight movement.

Based on truck activity, the analysis identified 400 census block groups with significant freight movement, out of a total of 4,506 census block groups in the State. The 100 most intense freight generators were identified among the 400 census block groups. Note that the analysis included only stopped trucks and filtered out locations on major roadways or at truck stops. The full text of the ATRI *Missouri Freight Generators Analysis* is located in Appendix A-Attachment B.

The majority of key freight generators are located adjacent to (but not within the footprint of) major roadways. Urban areas such as St. Louis and Kansas City contain the largest share of freight generators, although several other freight generating locations were identified throughout the State. **Figure 3-9** depicts the 100 Missouri freight generators identified through this analysis. Each of the 100 locations is shown in green.

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Figure 3-9: Missouri Top 100 Freight Generators



Source: MoDOT, ESRI, and ATRI

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Freight Flows

More than one billion tons of freight crosses Missouri's infrastructure annually. Volumes of freight (especially compared to the capacity of the Missouri freight system), values of freight and related economic impacts, and public perception regarding freight movement are important considerations in the development of the Missouri State Freight Plan. **Table 3-1** shows the flow of freight in Missouri by freight tonnage and value by transportation mode and relative direction.

Table 3-1: Missouri Flow of Freight (2011)

Direction	Air	Pipe	Rail	Truck	Water	Total
Tons						
Outbound	34,313	#N/A	21,510,433	75,301,621	19,973,291	116,819,658
Inbound	38,249	932,258	92,326,793	89,250,507	5,093,847	187,641,654
Intrastate	370	#N/A	2,436,087	105,627,915	4,941,503	113,005,875
Through	71	7,412,827	341,805,597	230,212,488	19,850,043	599,281,026
Total	73,003	8,345,085	458,078,910	500,392,531	49,858,684	1,016,748,213
Value, in millions						
Outbound	\$7,620	#N/A	\$40,364	\$95,005	\$3,479	\$146,468
Inbound	\$3,656	\$643	\$39,647	\$119,731	\$3,083	\$166,760
Intrastate	\$100	#N/A	\$1,616	\$62,346	\$117	\$64,179
Through	\$10	\$5,117	\$383,409	\$433,794	\$5,870	\$828,200
Total	\$11,387	\$5,761	\$465,035	\$710,876	\$12,549	\$1,205,607

Source: Prepared by CDM Smith, based on TRANSEARCH® data for 2011

Truck Commodity Flows

In 2011, 40.6 million trucks in Missouri carried 500.4 million tons of freight valued at \$710.9 billion (see **Table 3-1**). On average, truck commodity movements are valued at \$1,421 per ton. More freight was moved by trucks than by any other transportation mode in Missouri in 2011—truck movements were 49.2 percent of freight movement by tonnage and 59.0 percent of freight movement by value. The major truck freight corridors include the major interstates (I-44, I-55, I-70, I-35, I-29, and I-49), as shown in **Figure 3-10** based on tonnage and **Figure 3-11** based on freight value. Additionally, major U.S. and State highways in the urban centers also accommodate significant freight movements (US-61 and I-49).

Chapter 3 – Missouri Freight System

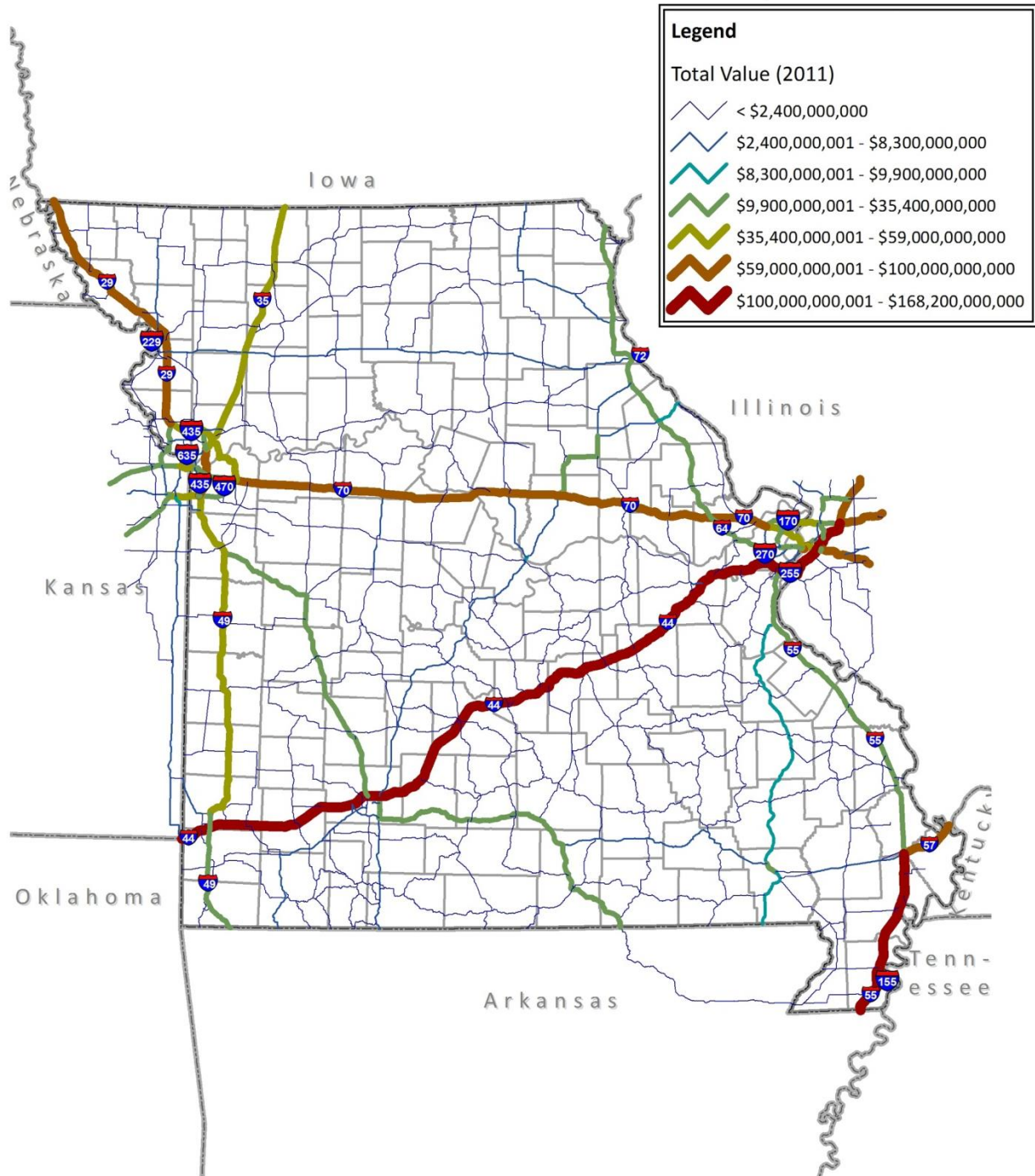
Figure 3-10: Total Tonnage of Freight Moved by Truck in Missouri (2011)



Source: MoDOT, ESRI, TRANSEARCH 2011, and CDM Smith

Chapter 3 – Missouri Freight System

Figure 3-11: Total Value of Freight Moved by Truck in Missouri (2011)



Source: MoDOT, ESRI, TRANSEARCH 2011, and CDM Smith

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Rail Commodity Flows

In 2011, 8.2 million rail cars carried 458.1 million tons of freight valued at \$465.0 billion (see Table 3-1). On average, total rail commodity movements are valued at \$1,015 per ton. Rail was the second most common way to move freight in Missouri in 2011—rail movements accounted for 45.1 percent of freight movement by tonnage and 38.6 percent of freight movement by value. Key rail freight corridors include routes served by the major Class I carriers, especially those surrounding Kansas City, as seen in **Figure 3-12** based on tonnage and **Figure 3-13** based on freight value. The routes carrying the most rail tonnage include the Union Pacific line between Kansas City and St. Louis and the Burlington Northern-Santa Fe lines between Kansas City and Chicago and between Kansas City and Wyoming (via Nebraska).

Table 3-2: Missouri Railroad Abbreviations, Routes and Classes

Class	Abbreviation	Route
Class 1	BNSF	Burlington Northern Santa Fe
Class 1	CSX	CSX Transportation
Class 1	KCS	Kansas City Southern Railway
Class 1	NS	Norfolk Southern Railway
Class 1	CP	Soo Line Corporation (U.S. operating arm of Canadian Pacific)
Class 1	UP	Union Pacific Railroad
Switching and Terminal Railroads	CMR	Central Midland Railway
Switching and Terminal Railroads	(COLT)	Columbia Terminal
Switching and Terminal Railroads	KCT	Kansas City Terminal Railway Company
Switching and Terminal Railroads	MRS	Manufacturers Railway Company
Switching and Terminal Railroads	MVP	Missouri & Valley Park Railroad
Switching and Terminal Railroads	MNC	Missouri North Central Railroad
Switching and Terminal	(SE)	Semo Port Railroad

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Railroads		
Switching and Terminal Railroads	TRRA	Terminal Railroad Association of St. Louis
Short Line Railroads	AM	Arkansas & Missouri Railroad
Short Line Railroads	KAW	Kaw River Railroad
Short Line Railroads	MNA	Missouri & Northern Arkansas Railroad
Short Line Railroads	OVRR	Ozark Valley Railroad
Short Line Railroads	SKOL	South Kansas & Oklahoma Railroad

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Figure 3-12: Total Tonnage of Freight Moved by Rail in Missouri (2011)



Source: MoDOT, ESRI, TRANSEARCH 2011, and CDM Smith

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Figure 3-13: Total Value of Freight Moved by Rail in Missouri (2011)



Source: MoDOT, ESRI, TRANSEARCH 2011, and CDM Smith

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Source: MoDOT, ESRI, TRANSEARCH 2011, and CDM Smith



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Waterway and Ports Commodity Flows

In 2011, Missouri ports (waterborne) carried 49.9 million tons of freight valued at \$12.5 billion (**Table 3-1**). On average, total port commodity movements are valued at \$252 per ton. Port movements were 4.9 percent of freight movement by tonnage and 1.0 percent of freight movement by value in Missouri in 2011, a small proportion relative to the dominant truck and rail modes.

Air Commodity Flows

In 2011, Missouri air cargo was 73,003 tons valued at \$11.4 billion (**Table 3-1**). On average, total air cargo movements are valued at \$155,974 per ton. Air cargo movements were less than 0.01 percent of freight movement by tonnage and less than 1.0 percent of freight movement by value in Missouri in 2011, a very small proportion relative to other modes.

Pipeline Commodity Flows

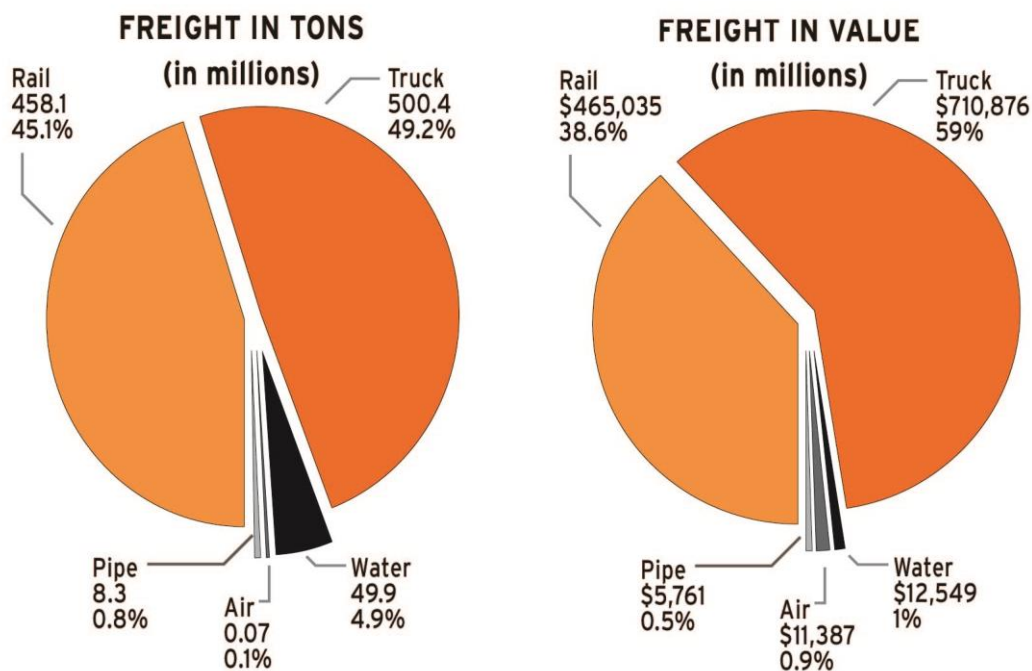
In 2011, Missouri pipelines moved 8.3 million tons of freight valued at \$5.8 billion (**Table 3-1**). On average, total pipeline commodity movements are valued at \$690 per ton. Pipelines movements were less than one percent of freight movements by tonnage and 0.5 percent of freight movements by value in Missouri in 2011, also a small proportion relative to the dominant truck and rail modes.

Freight Flow Summary

Data indicates that Missouri is a bridge state. This means that the majority of movements traversing Missouri's transportation network is truck- and rail-based through traffic. The main commodities are rail-based coal and truck-based secondary traffic. Secondary traffic is the movement of goods from a distribution source (i.e. warehouse). The goods at the distribution source had previously been transported to the facility by truck or another freight transportation mode. Truck transports the largest relative volume and value of freight relative to the other transportation modes, followed closely by rail (**Figure 3-14**).

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Figure 3-14: Freight Movement by Tonnage and Value per Mode (2011)



Source: Prepared by CDM Smith, based on TRANSEARCH® data for 2011

Missouri Freight Network

The *Moving Ahead for Progress in the 21st Century Act* (MAP-21) directed the U.S. DOT to establish a national freight network to assist states in strategically directing resources toward improved system performance for efficient movement of freight on the highway portion of the nation's freight transportation system. In response to MAP-21, the Freight Plan developed the Missouri Freight Network of highway, freight rail, air cargo, and inland waterways.

This Missouri Freight Network is important and will be used in a number of ways:

- The network is one of the criteria used in the projects prioritization process for this Missouri State Freight Plan. A project would need to be a freight network Tier 1, 2, or 3 route or be an immediate connection (i.e. within one mile or an agreed-upon range).
- The network can help prioritize future freight projects beyond those identified in the Missouri State Freight Plan.
- The network includes the Primary Freight Network, designated by U.S. DOT and key rural freight routes which will be part of Missouri's Critical Rural Freight Network.

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Freight Data Analysis

The first step in developing the Missouri Freight Network was compiling and analyzing data from several sources, including existing internal MoDOT data. Data included:

- TRANSEARCH 2011 data
- ATRI – freight generators via truck
- Truck volumes
- Other network maps
- Modal data – rail, ports, airports, and intermodal facilities

Along with the above data, specific criteria were used to determine the proposed facilities for each mode. These criteria were established based on best practices from across the country and based on what is most relevant to Missouri.

Highways

The Missouri Freight Network includes the Missouri major and minor highway system. Segments of these highways are classified by a tiered approach, which includes four classes of importance (Tiers 1 through 4). The primary criterion for classification is the amount of freight tonnage. All the interstates and particular U.S. and State routes are Tier 1, Tier 2, or Tier 3. The remaining routes in the network are Tier 4, and they impact freight in some way. For example, Tier 4 includes the lettered routes that are important for the movement of farm-to-market goods.

Below are the criteria for classifying the Tier 1, Tier 2, and Tier 3 highway segments.

- Interstate
 - Identified on the National Freight Network
 - Identified on the Missouri Major Road System
 - Federal Truck Route designation
 - Truck tonnage of over one million for a section or all of the route and/or at least 5,000 trucks per day for a section of the route
 - Connectivity to freight generators and/or intermodal facilities
- U.S. and State Routes
 - Identified on the Missouri Major Road System
 - Federal/State Truck Route designation
 - Truck tonnage of over one million for a section or all of the route and/or at least 2,500 trucks per day for a section of the route
 - Connectivity to freight generators and/or intermodal facilities

Figure 3-15 shows the proposed highway network with segments by freight class.

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Freight Rail

Freight railroads in Missouri are grouped into several categories: Class I, Switching and Terminal, and Class III (Short Line) railroads. A total of 19 railroads operate within the State:

- **Class I Railroads** – Burlington Northern Santa Fe (BNSF), CSX Transportation (CSX), Kansas City Southern Railway (KCS), Norfolk Southern Railway (NS), Soo Line Corporation (CP - U.S. operating arm of Canadian Pacific), and Union Pacific Railroad (UP)
- **Switching and Terminal Railroads** – Central Midland Railway (CMR), Columbia Terminal (COLT), Kansas City Terminal Railway Company (KCT), Manufacturers Railway Company (MRS), Missouri & Valley Park Railroad (MVP), Missouri North Central Railroad (MNC), Semo Port Railroad (SE), and Terminal Railroad Association of St. Louis (TRRA)
- **Short Line Railroads** – Arkansas & Missouri Railroad (AM), Kaw River Railroad (KAW), Missouri & Northern Arkansas Railroad (MNA), Ozark Valley Railroad (OVR), and South Kansas & Oklahoma Railroad (SKOL)

Figure 3-15 shows the proposed freight rail network.

Air Cargo

The Missouri Freight Network includes airports that report the movement of cargo to the Air Carrier Activity Information System. These airports are:

- Kansas City International Airport (MCI)
- Lambert-St. Louis International Airport (STL)
- Springfield-Branson National Airport (SGF)

Airports selected on the Missouri Freight Network are classified as either primary or secondary. A primary airport has domestic and international air cargo routes. A secondary airport offers only domestic air cargo routes. Figure 3-15 shows the airports by class.

Inland Waterways

The Missouri Freight Network includes inland waterways with a public port authority along the Missouri or Mississippi Rivers. The 14 public water port authorities in Missouri are:

- | | |
|---------------------------------|-------------------------------|
| • City of St. Louis | • New Bourbon Regional |
| • Howard/Cooper County Regional | • New Madrid County |
| • Jefferson County | • Pemiscot County |
| • Kansas City | • Pike/Lincoln County |
| • Lewis County-Canton | • Southeast Missouri Regional |
| • Marion County | • St. Joseph |
| • Mississippi County | • St. Louis County |

Chapter 3 – Missouri Freight System

Ports selected for inclusion in the Missouri Freight Network are classified as either active or developing. Active means that a port has the ability to ship freight. Developing means that a port does not have the ability to ship freight. **Figure 3-15** shows the ports by class.

NHS Intermodal Connectors and First and Last Mile Connectors

The Missouri Freight Network incorporates the National Highway System (NHS) freight intermodal connectors and first and last mile connectors. NHS intermodal connectors are designated public roads identified by the state departments of transportation and metropolitan planning organizations because the roads connect major intermodal terminals to the Missouri Freight Network. The final designations are approved by the U.S. DOT. In Missouri, there are 15 NHS intermodal connectors. These are critical components of the freight system and important conduits for the timely and reliable delivery of goods and services.

The function of first/last mile connectors is similar to NHS intermodal connectors; however, they are not approved by the USDOT. During the development of the Freight Plan, 11 first and last mile connectors were identified by evaluating the locations of the top 100 freight generators and intermodal facilities in Missouri. **Table 3-3** shows the first/last mile connectors.

Table 3-3: First/Last Mile Connectors in Missouri

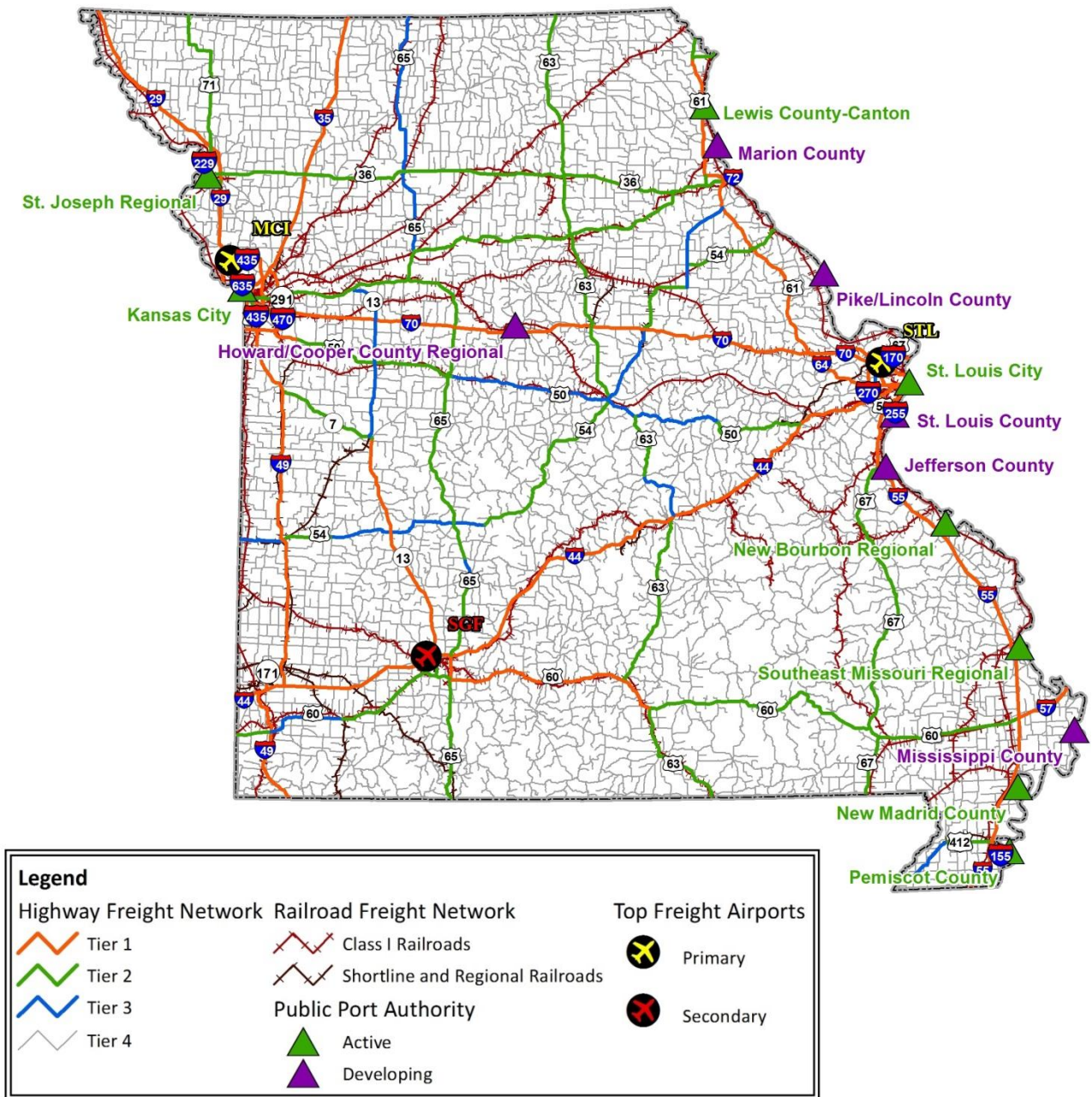
Route	Limits
US-24	I-435 to Winner Road
MO-7	I-70 to US-40
MO-25	US-60 to RT-U/Z
MO-39	US-60 to Olive Street
MO-43	MO-171 to MO-66
MO-131	US-50 to MO-58
MO-150	I-49 to Thunderbird Road
MO-152	I-35 to I-435
MO-171	MO-171/249 to MO-43
MO-744	US-65 to Mulroy Road
LP-49	MO-171 to I-44

Data Source: CDM Smith

The proposed freight network is discussed in further detail in Appendix A: Assets and Freight Flow.

Chapter 3 – Missouri Freight System

Figure 3-15: Missouri Freight Network



Source: MoDOT, ESRI, TRANSEARCH 2011, and CDM Smith

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Figure 3-16: Missouri Freight Network-Kansas City

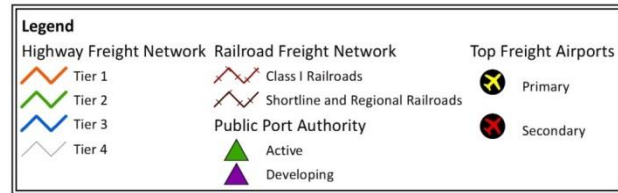
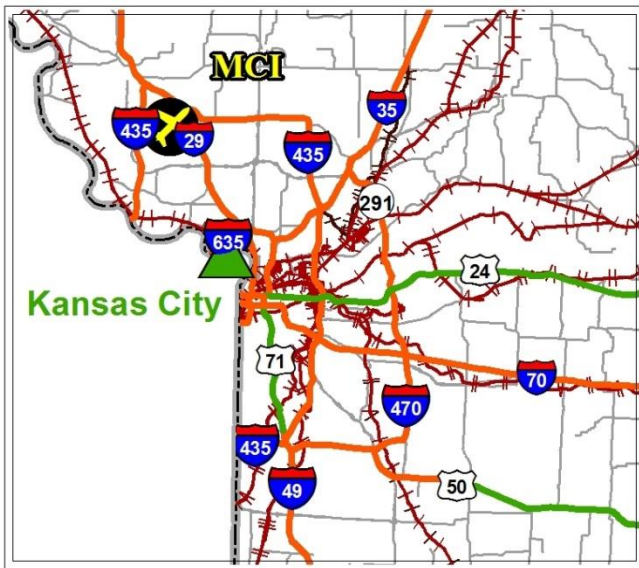
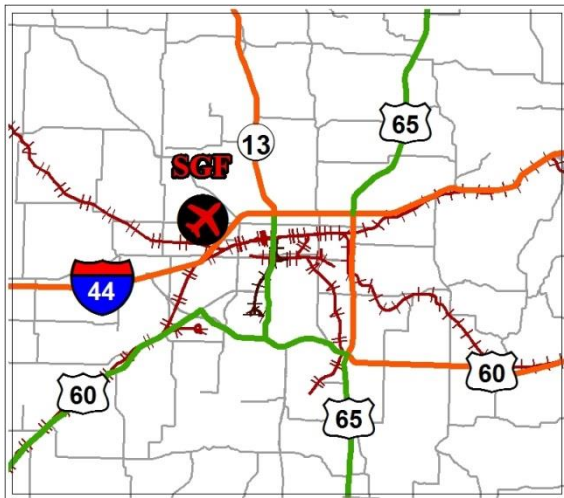


Figure 3-17: Missouri Freight Network-St. Louis



Figure 3-18: Missouri Freight Network-Springfield



Source: MoDOT, ESRI, TRANSEARCH 2011, and CDM Smith

Chapter 3 – Missouri Freight System

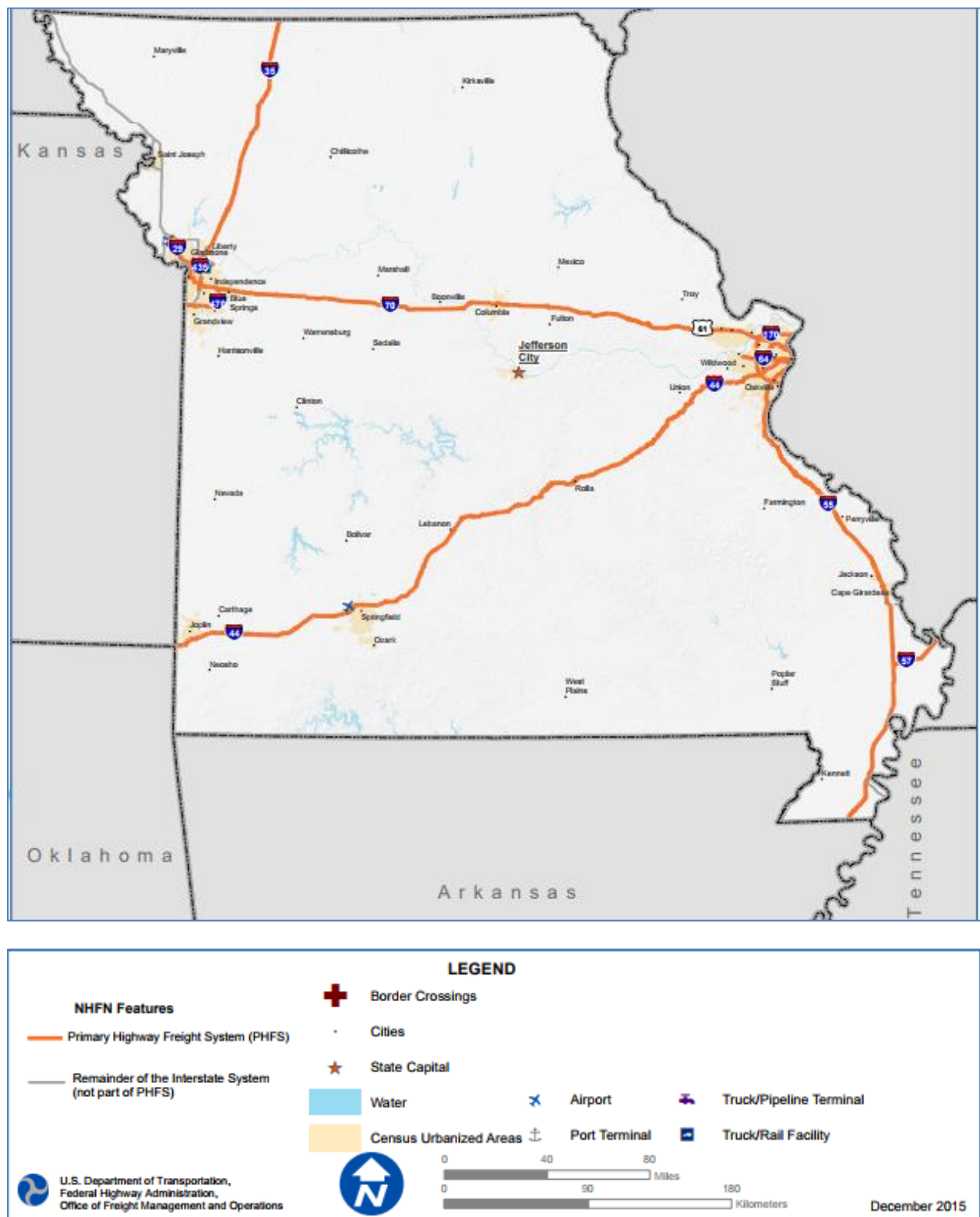


Figure 3-19: National Primary Highway Freight Network

Chapter 4 - Freight Network Condition and Performance

KEY POINTS

- While Missouri has improved the freight system in recent years, aging infrastructure is affecting all freight modes.
- Funding for maintenance and improvements is an on-going concern.
- The condition and performance of various components of the existing freight network provides important data to assess the current and future needs of the system and prioritize future investments.

Introduction

In recent years, Missouri has made improvements to the freight system, and these improvements have enhanced freight network condition and performance. However, aging infrastructure is affecting all of the freight modes and funding for maintenance and improvements will continue to be a concern. Accurately identifying the Missouri Freight Network's current condition and performance helps assess the need for improvements to the freight system.

Performance measures are used across the transportation industry to evaluate transportation systems and agencies. The Missouri Department of Transportation's (MoDOT's) rich history in performance measurement and management is best exemplified by Tracker, MoDOT's quarterly performance measure publication. Tracker, mode-specific measures, and national performance measures were used to help develop this Missouri State Freight Plan.

Highway

Missouri has the seventh largest state highway system in the United States. It is made up of approximately 33,700 centerline miles of roadway, 5,500 miles of which are classified as heavily traveled "major highways" and 28,200 miles of which are defined as lesser traveled "minor highways." Missouri's major highways include just 20 percent of the State highway miles, but carry 80 percent of the State

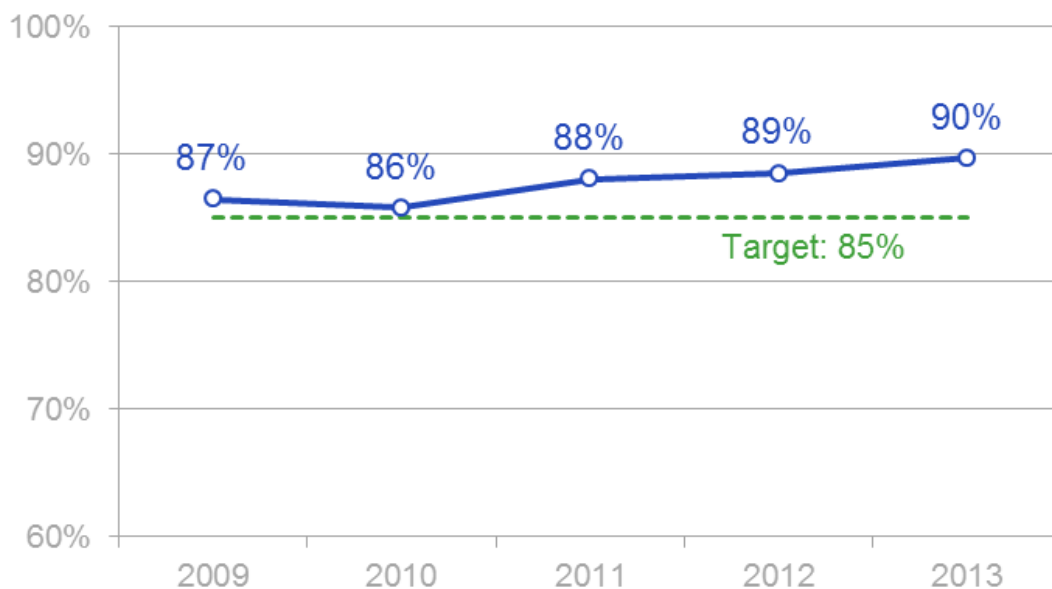
Chapter 4 – Freight Network Condition and Performance

highway traffic. The more than 10,000 bridges that cross rivers, other highways, and valleys are also important elements of the highway system.

Highway and Bridge Condition and Performance

The major highways include busy routes in urban areas, particularly where vehicles travel between business districts and residential areas. Overall, most major highways in Missouri are in good condition, as shown in **Figure 4-1**. MoDOT has established a target rate of greater than 85 percent for this measure, which has been exceeded each year for the past five years.

Figure 4-1: Percent of Major Highways in Good Condition in Missouri



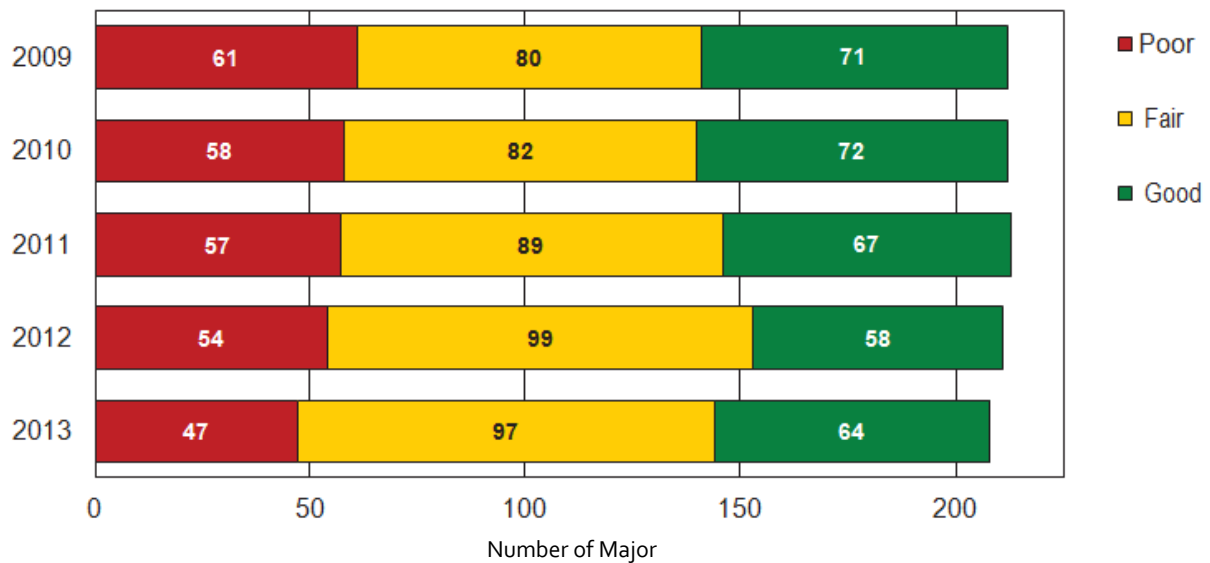
Source: MoDOT Tracker, July 2014 edition

Missouri has 208 major bridges that cross large rivers and lakes and are longer than 1,000 feet. These bridges can be classified as in good, fair, or poor condition. Significant investment in Missouri's major bridges resulted in a decreased number of structures falling into the poor category, but the number of structures classified in the good category also decreased.

Major bridges are very expensive to rehabilitate and replace. A simple rehabilitation typically costs over \$10 million, while major bridge replacements can exceed hundreds of millions of dollars. The 2013 Missouri major bridge conditions are shown in **Figure 4-2**.

Chapter 4 – Freight Network Condition and Performance

Figure 4-2: Condition of Major Bridges in Missouri (208 Total Bridges)



Source: MoDOT Tracker, July 2014 edition

MoDOT tracks the percentage of structurally deficient deck area for bridges that are part of the National Highway System (NHS). The *Fixing America's Surface Transportation (FAST) Act* requires that states track this measure, with a target of less than 10 percent. Missouri is meeting this target with only 7.0 percent of structurally deficient deck areas on NHS bridges.

Structurally deficient means there is a need for significant maintenance, rehabilitation, or replacement.

Low vertical clearances at overpasses can restrict truck traffic on highways. There are 73 low vertical clearance bridges in Missouri. This is less than one percent of all bridges in the State. None of these low clearance bridges cross interstates, but four (5 percent) of these bridges cross U.S. highways in Missouri.

Chapter 4 – Freight Network Condition and Performance

Low clearance bridges have a height restriction less than the standard 16 feet, 6 inches. In Missouri, the minimum clearance is 14 feet.

In addition to the 73 low clearance bridges, 4,849 load-restricted bridges can restrict truck traffic on highways in Missouri. These load-restricted bridges are about 20 percent of all bridges in the State. A total of 135 (three percent) of these bridges cross interstates, and 81 (2 percent) cross U.S. highways. A total of 44 of these load-restricted bridges are also low clearance bridges.

Load restriction means the bridge is only capable of safely supporting loads less than the posted or standard load weight of 80,000 pounds maximum.

Truck Bottlenecks

ATRI's (American Transportation Research Institute) Freight Performance Measures (FPM) database compiles anonymous trucking operations data from several hundred thousand trucks using Global Positioning System (GPS) data from onboard trucking systems, generating billions of data points annually. The truck GPS data gives an average speed and numerous position counts for every hour of the day based on where the trucks traveled across the 3,311 road segments in Missouri.

Peak travel times occur in the morning, midday, and evening.

Using the ATRI data, the truck travel times per mile were

calculated for these three periods and were then added together to calculate a total congestion index.

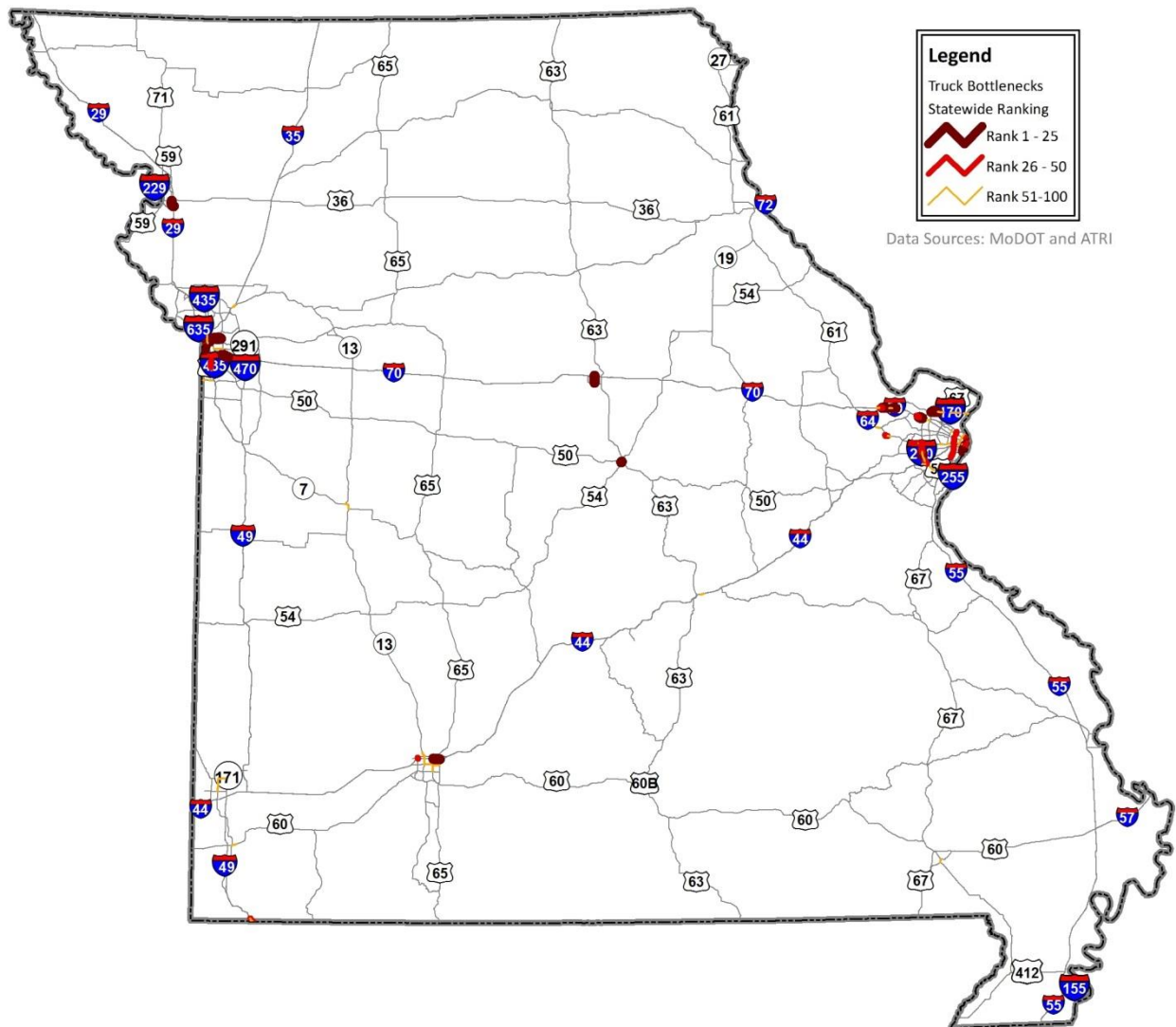
Highway segments with highest total congestion indices reflect the most congested trucking bottlenecks in Missouri.

The 100 segments with the highest total congestion indices were selected for further analysis. St. Louis and Kansas City contained 81 out of the State's 100 most congested truck bottlenecks; however, Springfield also contained several bottlenecks. The remaining bottlenecks were dispersed throughout cities and towns across the State. The 100 most congested trucking bottlenecks are shown on **Figure 4-3**. Further trucking bottleneck details are in Appendix A.

A bottleneck is a section of road where movement of traffic is limited by the road design. This is often a section of road with a fewer number of lanes, a sharp curve, or access points where traffic is entering or exiting the road. A bottleneck is the most vulnerable point for congestion in a road network and is also referred to as a chokepoint.

Chapter 4 – Freight Network Condition and Performance

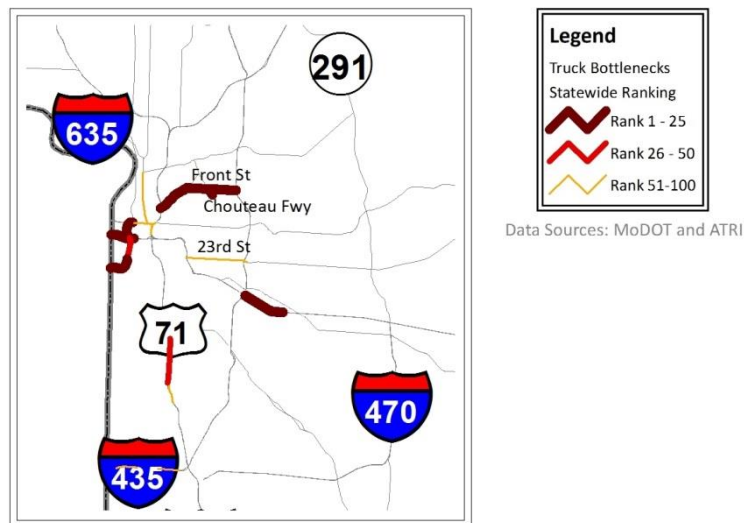
Figure 4-3: 100 Most Congested Trucking Bottlenecks in Missouri



Source: CDM Smith, ATRI, ESRI

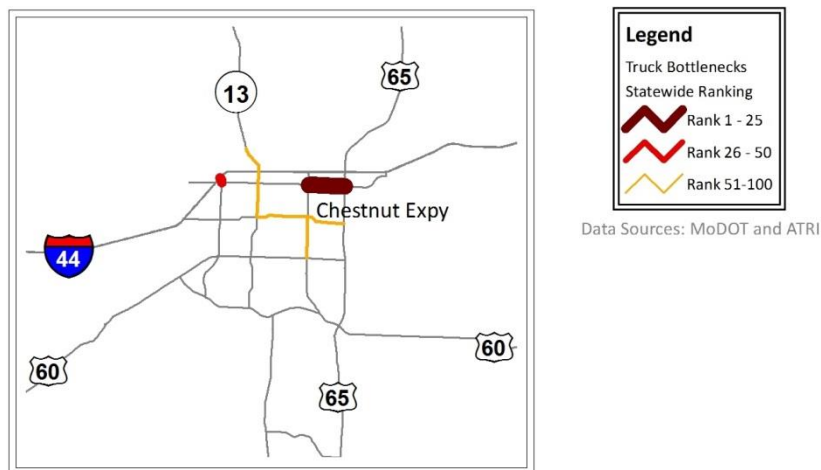
Chapter 4 – Freight Network Condition and Performance

Figure 4-3, a: Most Congested Trucking Bottlenecks in Kansas City



Source: CDM Smith, ATRI, ESRI

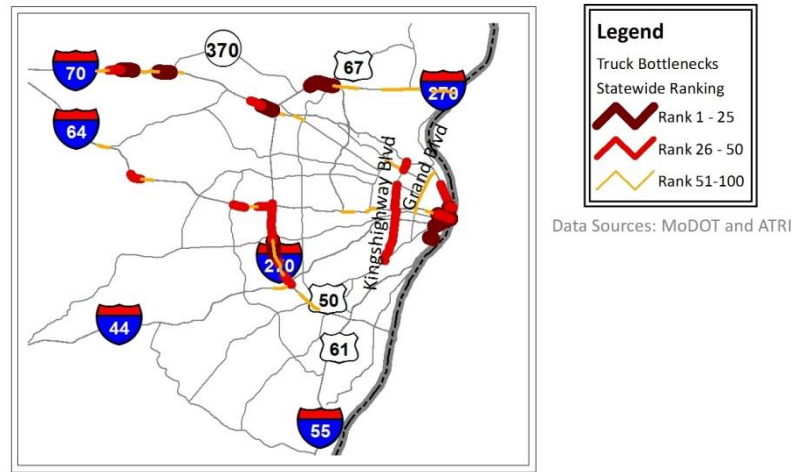
Figure 4-3, b: Most Congested Trucking Bottlenecks in Springfield



Source: CDM Smith, ATRI, ESRI

Chapter 4 – Freight Network Condition and Performance

Figure 4-3, c: Most Congested Trucking Bottlenecks in St. Louis



Source: CDM Smith, ATRI, ESRI

Highway Safety

A three-year crash rate (2010-2012) was calculated for highway segments proposed for the Missouri Freight Network. Crash rates were calculated for both directions for each highway segment. The three highway segments with the largest Commercial Motor Vehicle (CMV) crash rates are shown in **Table 4-1**.

Table 4-1: Highway Segments with the Largest Commercial Motor Vehicle Crash Rates in Missouri

Interstate Segment	Direction	To	From
I-55	North	I-44	I-70
I-55	South	I-70	I-44
I-29	South	I-435 (north)	I-35 split

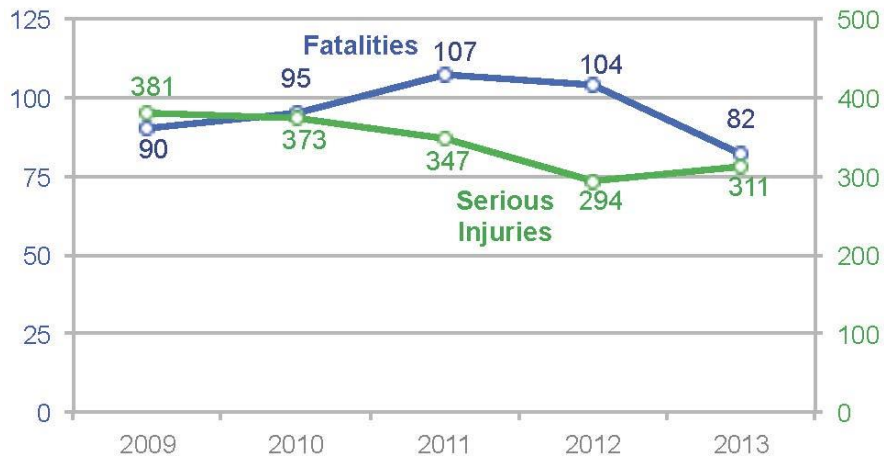
US/MO Route Segment	Direction	To	From
MO 13	South	I-44	US 60
MO 210	East	I-435	MO 291
MO 13	North	US 60	I-44

Source: CDM Smith, 2010-2012

The number of commercial vehicle crashes that resulted in fatalities and serious injuries during the 2009-2013 time period is shown in **Figure 4-4**. MoDOT uses this information to target educational, enforcement, and safety improvement features. Both the rates of fatalities and serious injuries decreased between 2009 and 2013.

Chapter 4 – Freight Network Condition and Performance

Figure 4-4: Number of Commercial Vehicle Crashes Resulting in Fatalities and Serious Injuries in Missouri



Source: MoDOT Tracker, July 2014 edition

Truck Freight Performance

In 2011, the Missouri highway freight system supported over 40.6 million truck trips carrying more than 500.4 million tons valued at \$710.9 billion. The top five truck commodities by tonnage, units, value, and growth are provided in Appendix A. In addition, Chapter 6 of this plan highlights the truck hours of delay and reliability index on key Missouri interstates.

Freight Generators

ATRI's Freight Performance Measures (FPM) database was also used to identify where most freight activity occurs in Missouri. A detailed analysis of this data identified the 100 most intense freight generators in Missouri. The analysis found that the majority of key freight generators were located along major roadways. Furthermore, urban areas such as St. Louis and Kansas City contained the greatest share of freight generators, although several other notable freight-generating locations were identified throughout the State. The top 100 freight generators are shown in **Figure 3-9** in Chapter 3.

Rail

The State of Missouri has significant freight rail infrastructure with six Class I freight railroads currently in operation of 4,218 miles of main track rail lines, 2,500 rail yard track miles, and approximately 5,697 public and private rail-highway crossings within the State. There are no Class II railroads operating in Missouri; however, five short line railroads serve Missouri. These short line systems include 426 track

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miles, ranging from 33 to 331 track miles per operator. **Figure 3-3** in Chapter 3 displays the rail lines and ownership in Missouri.

Rail Condition and Performance

Railroads are categorized as Class I, II, or III depending on operating revenues. In 2012 dollars, a railroad with operating revenues greater than \$433.2¹ million for at least three consecutive years is a Class I railroad. A railroad with revenues greater than \$34.7 million but less than \$433.2 million is a Class II railroad, commonly referred to as a “regional” railroad. A railroad not within the Class I or II categories is considered a Class III railroad, also known as a “short line.”

Railroads provide important connections to water ports and intermodal terminals. In Missouri, there are five Missouri water ports that have direct rail access and eight National Highway System Designated (NHS) Truck/Rail Intermodal Facilities in Missouri.

The National Rail Freight Infrastructure Capacity and Investment Study, prepared by the Association of American Railroads (AAR), developed a methodology for determining the level of service (LOS) for a specific freight rail corridor. The basis for determining the level of congestion on a rail corridor is a calculated volume-to-capacity (V/C) ratio. For Missouri, rail capacity assessments considered three factors: ratio of the number daily trains to the number of tracks, train control system, and train type. See **Figure 4-5**.

Level of service (LOS) is a measure by which transportation planners determine the quality of service on a given facility. The transportation LOS system uses the letters A through F, with A being uncongested and F being extremely congested.

The 2012 Missouri State Rail Plan provides LOS based on rail line V/C ratios for railroads operating in Missouri.² Some of this LOS data may have changed since 2012 due to changes in the economy and demand of specific goods. Regardless, it appears that some rail lines will be reaching or exceeding capacity. The rail lines that should be monitored for potential capacity concerns are:

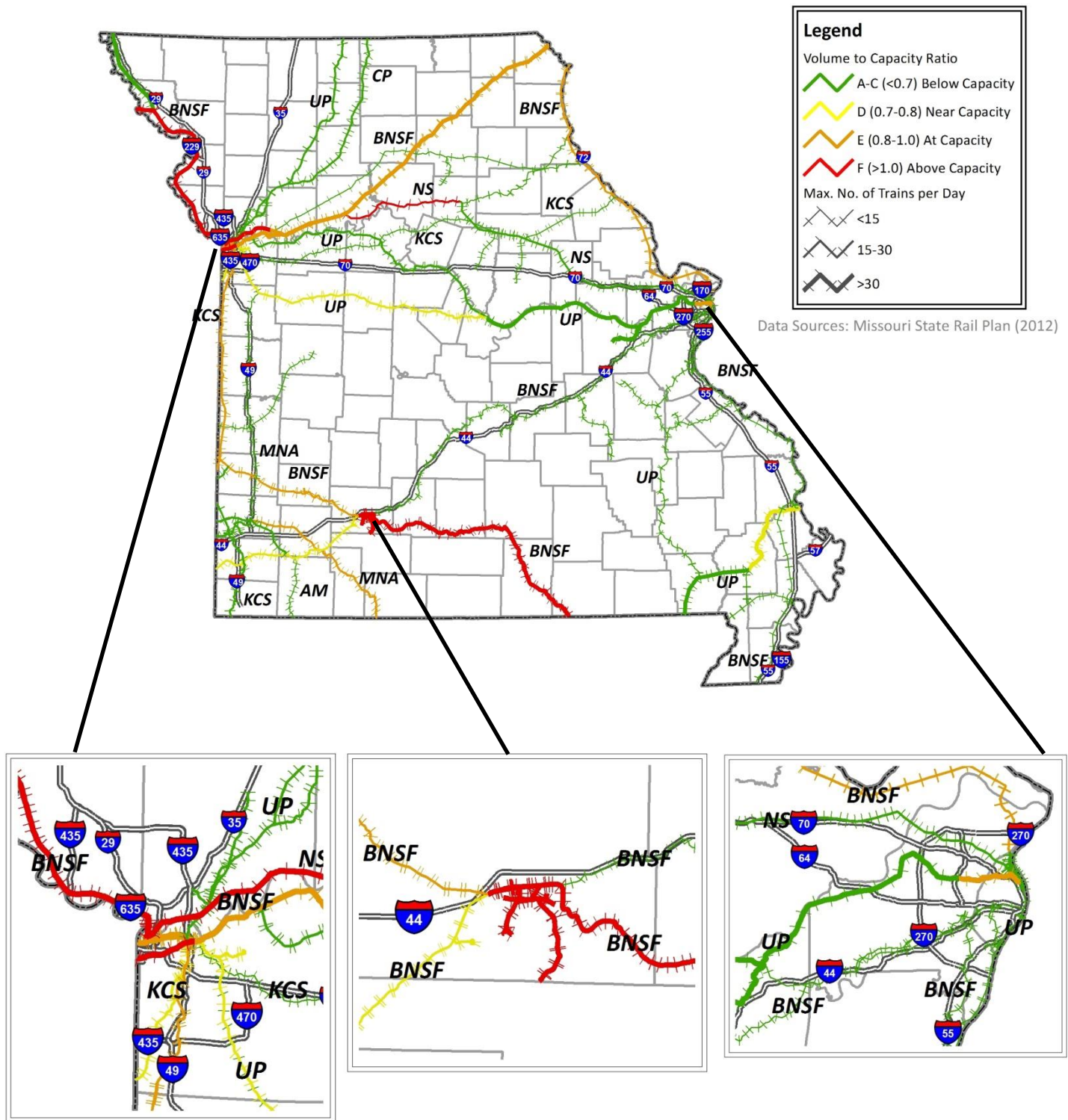
- BNSF –Thayer North Sub (from Springfield to Arkansas state line to south)
- BNSF – St. Joseph Sub (from Kansas City to Nebraska state line to northwest)
- UP – Chester Sub (from Dexter to Illinois state line to east)
- UP – Hoxie Sub (from Dexter to Arkansas state line to south)
- UP – Sedalia Sub (from Jefferson City to Kansas City)
- NS – Kansas City District (from Moberly to Kansas City)
- KCT – Kansas City (from I-435 to Kansas state line to west)

¹ http://www.aslrra.org/about_aslrra/faqs/

² Missouri State Rail Plan, MoDOT, 2012

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Figure 4-5: Rail Corridor Volume Capacity

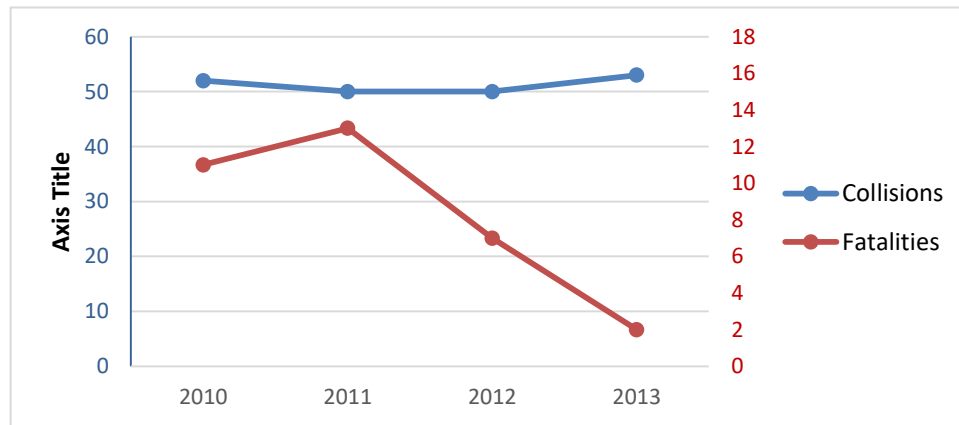


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Rail Safety

The number of train-vehicle collisions and fatalities at public railroad crossings in Missouri are shown in **Figure 4-6**. This data drives the development and focus of a portion of the Missouri Highway Safety Plan. Although the number of collisions has remained relatively constant, the number of fatalities dropped between 2011 and 2013.

Figure 4-6: Number of Highway-Rail Crossing Collisions and Fatalities in Missouri



Source: <http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/>

Rail Freight

With the given condition and performance of the rail system in Missouri, 8.2 million rail cars carried 458.1 million tons of freight valued at \$465.0 billion in 2011. Freight transport through the Missouri rail network increased most on the BNSF line connecting Kansas City and Chicago. The top five rail commodities by tonnage, units, value, and growth are provided in Appendix A.

Waterway

The State of Missouri contains 1,050 miles of navigable rivers, including 500 miles of the Mississippi River and 550 miles of the Missouri River. A total of 14 public port authorities and more than 200 private ports can be found along Missouri's waterways. Three public port authorities and more than 50 private ports operate along the Missouri River; 11 public port authorities and more than 150 private ports operate on the Mississippi River.

Waterway Condition and Performance

The lock and dam system, under the jurisdiction of the U.S. Army Corps of Engineers, was designed to control the river levels to maintain a minimum nine-foot deep channel on the Upper Mississippi River for more reliable navigation. The majority of the locks and dams were constructed in the 1930s and are aging. The locks and dams are in need of major rehabilitation or replacement, which is an expensive undertaking. Replacement may be the most economical and feasible option as many of the locks are undersized at 600 feet long and cannot accommodate standard 15-barge tow configuration, which is 1,200 feet. This causes operators to have to run smaller configurations or break down the barges to

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transport them through the locks, adding time to a shipping method that is already slower than other methods.

The seven locks and dams in or near Missouri are part of the Upper Mississippi River, starting just north of St. Louis and continuing to the Iowa border, and are listed in **Table 4-2**. **Figure 4-7** shows the age and location, as well as the annual volume of trade versus delays for the Upper Mississippi River locks and dams. The Lower Mississippi River (south of St. Louis) and the Missouri river contain no locks or dams.

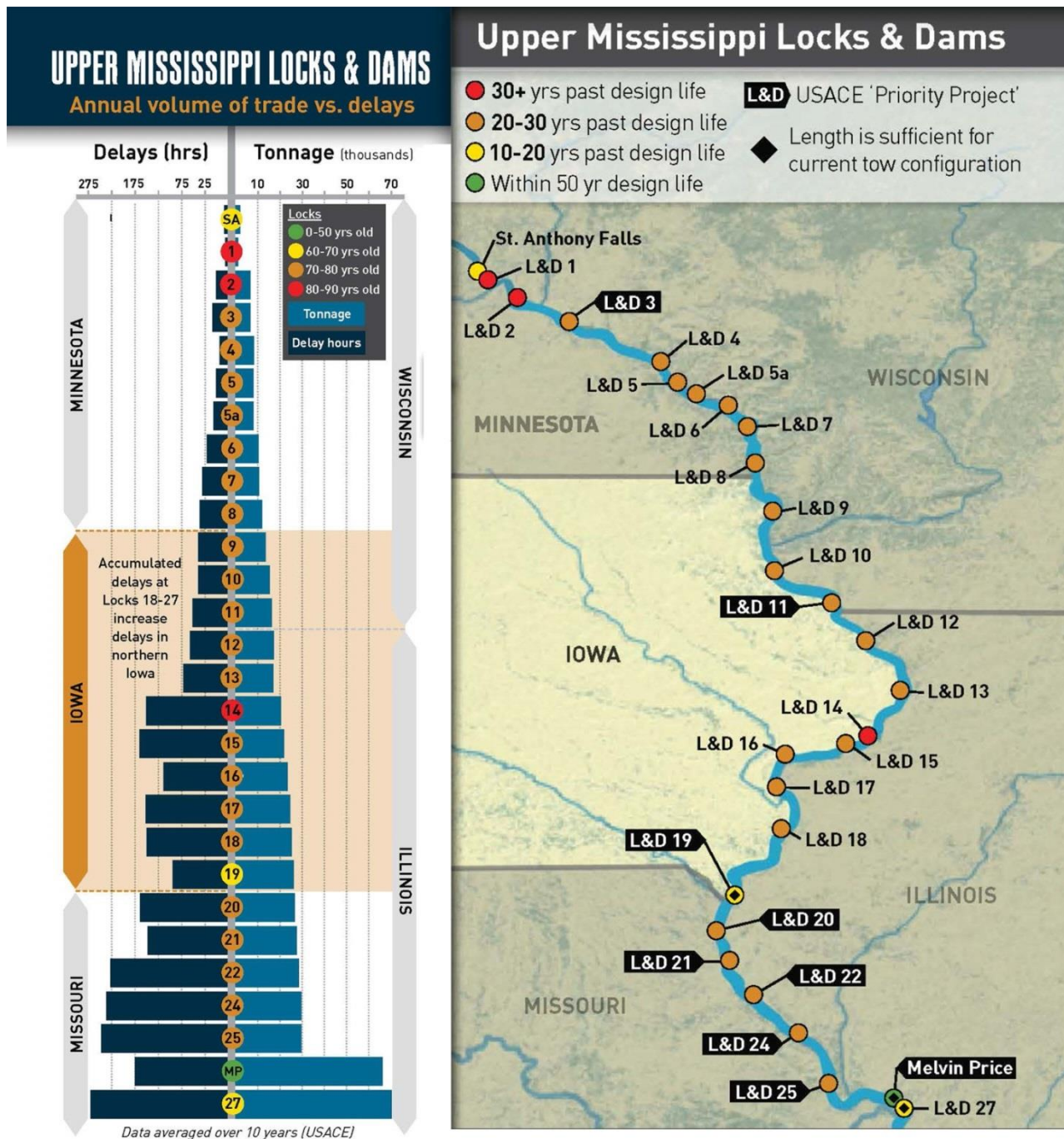
Table 4-2: Upper Mississippi Locks and Dams in or Near Missouri

Lock/Dam Number	Location
No. 20	Canton, MO
No. 21	Quincy, IL
No. 22	Saverton, MO
No. 24	Clarksville, MO
No. 25	Winfield, MO
No. 26 (Melvin Price)	East Alton, IL
No. 27 (Chain of Rocks Dam)	Glasgow Village, MO
No. 27 (Chain of Rocks Lock)	Granite City, IL

Source: U.S. Army Corps of Engineers

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Figure 4-7: Status of Upper Mississippi Locks and Dams



Source: "A River Run Dry," Iowa Department of Transportation, 2013

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The maintenance needs of the aging infrastructure are increasing at a rate much greater than the operations and maintenance funding provided for the waterway system. This adversely affects the reliability of the system. Long-established programs for preventive maintenance of major lock components have given way to a fix-as-fail strategy, with repairs sometimes requiring weeks or months to complete. Depending on the malfunction, extended repairs can have major consequences for shippers, manufacturers, consumers, and commodities investors.



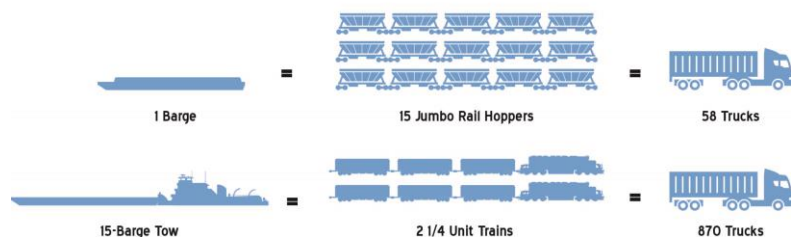
Waterway Capacity

A barge offers greater freight capacity than other freight transportation modes, as shown in **Figure 4-8**. A “standard” tow is 15 barges with a total capacity of 22,500 tons or 45 million pounds. “Large” tows on the Mississippi River below St. Louis can be as large as 40 barges. It would take 225 railroad cars or 870 semi-trucks to carry the same amount of cargo as a standard tow. The benefits of

moving freight on the inland waterways include: a separation from highways and railways, efficient fuel consumption and low GHG emissions, and excellent safety record. Reducing fuel and labor costs reduces transportation costs, which in turn improves the profits for both commercial and agricultural industries. Waterways are the original Missouri transportation system. This resource led to wealth and development that then spread outward from Missouri’s rivers.

Waterways are comparable in capacity and importance to interstate highways. Annual cargo through Missouri’s ports is worth billions of dollars. Waterways are currently uncongested and have capacity to move substantially more freight. Like other transportation networks, Missouri’s waterways, private ports, and public ports are important due to their significant economic impact.

Equivalent Units



Source: www.celticmarine.com



Missouri River Barge

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Maintaining Navigation

Three public port authorities identified improving navigation on the Missouri River as an important performance issue. The Missouri River has potential to serve Missouri's agriculture industry; however, many competing demands for use of the Missouri River have made it difficult to maintain this waterway as a reliable means of freight transportation. Further, public and private port authorities have expressed concern about floodplain development restrictions that impede construction of cargo handling infrastructure.

Dredging has become a constant issue both in-channel on the Missouri and Lower Mississippi Rivers and at harbors on the Lower Mississippi River. In order to maintain navigation in these areas, dredging is often needed due to the regular flow of water and sometimes due to flood events. If a navigable channel cannot be maintained, freight moved on the water is slowed or stopped completely. This affects the performance of the waterways as a reliable method of shipping goods.

Waterway Freight

With the given waterway conditions and performance, Missouri's waterways carried 49.9 million tons of freight valued at \$12.5 billion in 2011. The top five port commodities by tonnage, units, value, and growth are provided in Appendix A.

Air

Missouri is home to three of the top 110 cargo airports in North America in terms of total tonnage in 2012: Kansas City International Airport (MCI), Lambert-St. Louis International Airport (STL), and Springfield-Branson National Airport (SGF).

Air Condition and Performance

Missouri's busiest cargo airports are located near major metropolitan areas that produce consistent passenger and air cargo traffic. Consequently, these facilities must be able to support large aircraft capable of accommodating market demand. The State's smaller airports, generally located near Missouri's medium-sized metropolitan areas, have infrastructure capable of supporting smaller-scale air cargo operations. These smaller airports can be, and often are, used to move cargo to larger Missouri airports or airports outside of the State.

Three Missouri cargo airports handled nearly 177,000 tons of total air cargo and mail in 2013, which reflects a 3.7 percent decrease annually since 2001. In this same time frame, Missouri's fastest growing airport by total tonnage was SGF, which increased by 0.95 percent annually. MCI and STL both experienced losses in total air cargo from 2001-2013.

Two issues could affect cargo at Missouri airports. First, stakeholder input identified freight concerns regarding onsite facilities at STL. There is an interest in improving old, outdated facilities and relocating

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them to a new site at STL. Second, the potential reduction in tower operations at Springfield Airport would limit the available operating hours at the airport.

Air Freight

With the given air freight conditions and performance, Missouri's airports transported 73,000 tons of freight valued at \$11.4 million in 2011. The top five port commodities by tonnage, units, value, and growth are provided in Appendix A.

Pipeline

Approximately 10,700 miles of pipelines move natural gas, crude oil, and petroleum products throughout Missouri. The highest percentages of pipeline miles, according to the USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) Missouri Incident and Mileage Overview, are in St. Charles County (4.9 percent), Cass County (3.6 percent), Audrain County (3.5 percent), and Johnson County (3.4 percent), which are located in the northern half of the State where the majority of major pipelines pass.

Pipeline Condition and Performance

There are several major crude oil, petroleum product, and liquefied petroleum gas pipelines crossing the State. Many of the crude oil and petroleum product pipelines originate near the Gulf Coast (Texas), Oklahoma, or Canada, and pass through the State in route to Midwest refineries.

TransCanada's proposed Keystone XL pipeline would connect to the existing Keystone Pipeline in Steele City, Nebraska, and increase access to Midwest markets. The project is currently awaiting decision on a Presidential Permit application. Enbridge is currently constructing the Flanagan South Pipeline Project adjacent to their Spearhead Pipeline to provide more efficient transportation of oil from western Canada and North Dakota to refinery hubs in the Midwest and Gulf Coast. The Flanagan South Pipeline is planned to be in service in 2014.

Pipeline Freight

With the given pipeline conditions and performance, Missouri's pipelines totaled 8.3 million tons valued at \$5.8 million in 2011. The top five port commodities by tonnage, units, value, and growth are provided in Appendix A.

Intermodal

There are three key elements of the intermodal system: the facilities where commodities are transferred from one mode to another, designated intermodal connectors that connect the major intermodal facilities to the freight network, and the first/last mile connectors that connect all remaining freight origins or destinations.

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Facilities

Chapter 3 describes the details of the intermodal facilities in Missouri. **Figure 3-8** displays the location of these intermodal facilities.

Intermodal Connectors

The Missouri Freight Network includes the 15 NHS freight-related intermodal connectors that provide the integral connections between major intermodal facilities and the NHS roadways. The Federal Highway Administration designated NHS freight intermodal connectors provides landside access locations to and from intermodal facilities for rail, waterway ports, and airports.

First and Last Mile Connectors

The first and last mile connectors were determined by evaluating the locations of the top 100 freight generators and intermodal facilities in Missouri relative to their proximity to the rest of the Missouri Freight Network. The first and last mile connectors are part of the Missouri Freight Network; connectors link the freight generators and intermodal facilities with the Missouri Freight Network.

Chapter 5 - Needs Assessment and Freight Forecast

KEY POINTS

- Missouri's central location in the United States was consistently identified as a top strength of the State's freight system and an asset for attracting new businesses.
- The sheer size of Missouri's highway system is a strength and challenge. While the highway system is well- connected for handling traffic, maintaining and upgrading that system is difficult.
- Freight tonnage is forecast to grow 37 percent from 2011 to 2030 with truck and rail continuing to dominate freight transportation in Missouri.

Introduction

Missouri has an integrated multimodal freight system that facilitates the efficient, reliable, and safe movement of freight. The challenge will be to maintain and expand the system to meet future needs.

To help Missouri plan and respond more effectively and create a transportation system prepared for the future, it is important to thoroughly assess needs for freight movement and forecast future demands related to freight by:

- Identifying the strengths and challenges of the existing system.
- Discussing freight system goals and objectives.
- Forecasting future freight transportation demands for highways, rail lines, ports, airports, and pipelines over the next 20 years.
- Considering emerging trends—issues outside traditional forecasting methods, but which could impact the future of freight in the State.

Freight movement is vital to Missouri's economy. A detailed assessment of future freight transportation needs will help Missouri prepare to keep freight moving smoothly.

Chapter 5 – Needs Assessment and Freight Forecast

Strengths and Challenges

A review of the State's competitive advantages and critical challenges helps identify the strengths and problems in the Missouri freight system. These strengths and challenges can be grouped into four categories: system capacity, system operations, safety, and connectivity.

System Capacity

The size of Missouri's transportation system is a strength. There is a well-connected system for handling highway freight traffic. Missouri has significant freight rail infrastructure with six Class I freight railroads and five short line railroads. These railroads provide important freight connections with the other freight transportation modes. Designated marine highways transport freight along the Missouri and Mississippi Rivers. Missouri also has 3 of the top 110 cargo airports in North America.

The size of the system also presents challenges. Maintaining and upgrading numerous miles of highways can be an issue, especially as funding continues to diminish. Roadway congestion, bottlenecks, and infrastructure that is nearing the end of its useful life are challenges. The annual hours and cost of truck delays are significant. For example, delay on I-44 is approximately 422,000 hours each year, costing the economy \$38.6 million annually¹. Capacity upgrades are already needed for I-70 between Kansas City and St. Louis, but I-44 was also identified as a key corridor for continued investment based on future volume projections. St. Louis and Kansas City contain 81 of Missouri's most congested truck bottlenecks; seven are located in Springfield. Missouri's rail lines are reaching maximum capacity at several locations. Missouri's waterways have adequate capacity but are often seen as unreliable due to inconsistent water levels and the lack of improvements to the lock and dam system. Air cargo facilities are limited and outdated; they need to be updated to accommodate changes in technology, security, and handling of larger cargo.

System Operations

Missouri currently ranks fifth best in the nation for transportation infrastructure². Due to the two statewide road improvement programs in the last decade, more than 89 percent of Missouri's major highways are rated in good condition. Similarly, other bridge-related programs dramatically decreased the number of bridge structures in poor condition. Less than one percent of the bridges in the State have low vertical clearance and only three percent of the load restricted bridges cross Missouri interstates.

Missouri has made great progress in addressing the condition of the transportation system, but there are still needs for maintenance and capacity improvements. Minimizing travel times and delays on the State's most traveled routes are essential to operating a reliable transportation system. Individual roadways within St. Louis and Kansas City experienced longer travel times than the regional averages. Columbia and Springfield also experience delays. Due to Missouri's central geographic location, when

¹ Missouri Department of Transportation, Tracker Report, April 2014

² Missouri Department of Transportation, Tracker Report, April 2014

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interstates are shut down, it can be difficult to move freight east/west across the country. In 2013, I-70 experienced 26 complete closures and I-44 experienced 22³. While the number of bridges in poor condition decreased, the number of bridge structures in good condition also dropped over a five-year period.

The service discontinuance and abandonment of short-line rail track creates an almost irreversible situation for rail freight to reach adjacent businesses. Further, this may interrupt some last-mile and intermodal connections. Private ownership and operation of rail lines makes track monitoring and upgrades difficult.

Much of the lock and dam system on the inland waterway system is in need of major rehabilitation or replacement. The lack of dredging to maintain navigable channels and harbors on both the Missouri and Mississippi Rivers hinders efficient and reliable waterborne freight movements.

Safety

Improvements in safety have been a strength of the highway system over the last decade. Roadway safety improvements helped reduce overall roadway fatalities from 1,200 in 2005 to less than 800 in 2013, the lowest level since the 1940s. There were 82 Commercial Motor Vehicle (CMV) crashes through the fourth quarter of 2013, which is 22 fewer than reported in 2012. Between 2009 and 2013, fatal crashes involving CMV decreased by 8.9 percent, and the number of CMV serious injury crashes decreased by 21.3 percent.

Diminished funding will hamper MoDOT's ability to make significant safety improvements in the future. Key issues include: the lack of an information system that conveys available truck parking locations to commercial drivers, need for safety and security at truck parking locations, numerous at-grade rail crossings and roadway design improvements to facilitate safety. In particular, at-grade rail crossings continue to present a safety issue and improvements are needed. In 2011 and 2012, Missouri had 50 highway-rail incidents each year, while in 2013 there were 53 highway-rail incidents.

Connectivity

Missouri's central location in the United States is consistently identified as a top strength of the State's freight system and an asset for attracting new business. The Kansas City area is one of the largest rail freight and trucking hubs in the country, while St. Louis is the third largest for rail. St. Louis is working diligently to develop into a freight hub as well. The Springfield/Joplin area is near major truck freight operations in Northwest Arkansas. The Missouri River and Lower Mississippi River are key assets due to their central location and because they are lock-free. The expansion of the Panama Canal may have some impact on freight movements in Missouri. This change could manifest itself in various ways to include some directional freight flow changes, shifting among transportation modes, and overall freight volume changes.

³ Missouri Department of Transportation, Tracker Report, April 2014

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One of the biggest problems with connectivity is that some transportation modes are not readily accessible or in close proximity to other modes (e.g., rail to water ports). Major freight generator sites have been identified throughout the State. Improving freight modal connections, including short line rail connections, to freight generator sites is important for providing options for businesses to improve their supply chains and their competitiveness in the marketplace. Stakeholders at regional workshops indicated that future growth is threatened by railroads closing local crossings and spurs and removing scales.

Freight System Goals and Objectives

After examining the strategic frameworks from relevant State plans, other statewide and regional plans, and the new federal requirements as defined by *Fixing America's Surface Transportation (FAST) Act*, MoDOT determined that the goal areas developed for Missouri's Long Range Transportation Plan should also be adopted as the freight plan goals. The goals focus on maintenance, safety, economy, and connectivity/mobility. The Freight Plan looks at these goals in more detail as they directly relate to freight movement. Three strategic considerations have also been incorporated in this Freight Plan: environmental, organizational/process, and customers/partners. **Figure 1-4** in Chapter 1 shows the relationship between the Freight Plan goals and the FAST Act goals.

Stakeholder input and a review of other freight-related plans helped craft a group of objectives, which are listed below according to goal.

Goal 1: Maintenance

The maintenance goal aims to ensure that the freight system and services are maintained in good condition by:

- Keeping the highways and bridges in good condition
- Supporting and encouraging the maintenance of railways, waterways, airports, and multimodal connections

The good condition level will be increasingly difficult to maintain for all freight modes because of a lack of consistent, reliable, and dedicated funding.

Goal 2: Safety

The safety goal looks to improve safety on the highway and rail freight system by:

- Decreasing the number and severity of crashes involving CMVs
- Improving safety at railroad crossings

While the instances of CMV highway crashes has trended downward, highway-rail crossing incidents have slightly increased over the last several years. MoDOT continually strives to decrease the number and severity of incidents across all transportation modes. However, diminished funding will hamper MoDOT's ability to make significant safety improvements in the future. There currently is not a need

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for additional freight-related safety goals that address the other transportation modes (i.e., air, water, and pipeline).

Goal 3: Economy

The economy goal supports economic growth and competitiveness as well as job growth in Missouri by:

- Improving the economic competitiveness in Missouri through improvements to the freight system
- Enhancing and supporting opportunities for economic development and job growth through improvements to the freight system

While the cost to ship several of Missouri's major export commodities (e.g., soybeans, automobiles, and chemicals) is relatively low compared to competing states, MoDOT has recently begun quantifying and calculating costs as a reflection of goods movement and competitiveness. The bulleted items above have been identified as performance measures in the Missouri State Freight Plan and will continue to be monitored in relation to meeting economic goals.

Goal 4: Connectivity and Mobility

The connectivity and mobility goal seeks to improve the connectivity and mobility of the freight system throughout the State by:

- Improving the multimodal connectivity of the freight system
- Reducing congestion and increasing reliability on roadways
- Supporting and encouraging improved efficiency of rails, waterways, and airports
- Improving connections to freight generators

MoDOT recently began measuring annual hours of truck delay and calculating the truck reliability index in their quarterly performance tracker report. These parameters have been identified as performance measures in the Freight Plan and will continue to be monitored in relation to meeting the connectivity and mobility goal.

20-Year Freight Forecast

A vast amount of freight traverses Missouri's infrastructure annually. This freight includes finished goods, materials, and supplies. In the future, highway and rail systems will continue to be relied on as Missouri's primary freight transportation modes. Missouri continues to accommodate a large percentage of through freight movements, defined as movements that neither originate nor have destinations in Missouri. This places strain on the Missouri system because through freight movements cause wear-and-tear on the transportation system but do not provide the economic benefits that normally accompany freight movements that originate or end within Missouri.

Chapter 5 – Needs Assessment and Freight Forecast

Freight tonnage across the Missouri freight network is forecast to grow by 378.8 million tons, a 37.3 percent increase from 2011 to 2030 (1.7 percent increase annually)⁴. Truck and rail are the dominate modes of freight transportation in Missouri. Truck movements account for 49 percent of the total freight tonnage, and rail movements account for 45 percent. Trucking is forecast to grow by 55.5 percent (2.4 percent annually), from 500.4 million tons in 2011 to 778.1 million in 2030, a 277.7 million ton increase. The 277.7 million ton increase in truck freight movement accounts for 73.3 percent of the total growth and about half of truck movements are attributable to through movements. While rail growth is forecast to grow by 19 percent (0.9 percent annually), from 458.1 million tons in 2011 to 545.2 million tons in 2030, it still constitutes 40 percent of the total tonnage moved through Missouri. Additional details are available in the Appendix A.

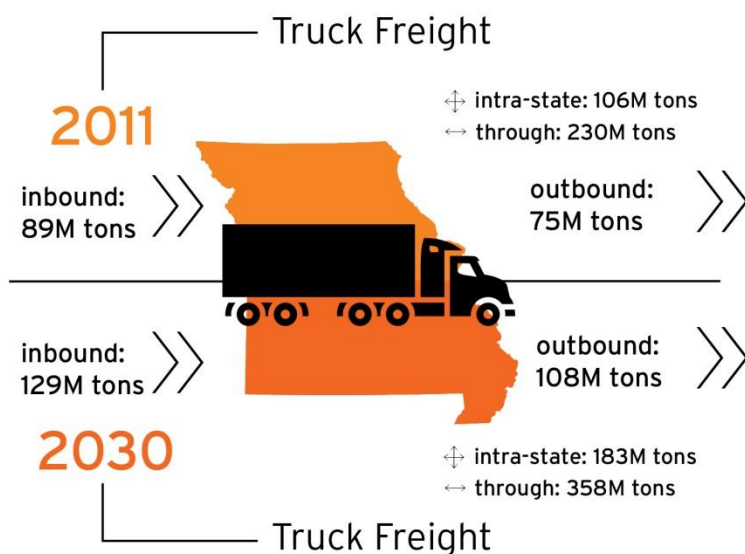
⁴ TRANSEARCH Data, 2011

Chapter 5 – Needs Assessment and Freight Forecast

Truck Forecast

Figure 5-1 depicts the directions of truck freight movements in Missouri between 2011 and 2030. Truck tonnage is forecast to increase 55.6 percent between 2011 and 2030. Truck commodity value is forecast to increase from \$710.9 billion in 2011 to \$1.20 trillion by 2030, a cumulative increase of 68.4 percent (2.8 percent annually).

Figure 5-1: Missouri Truck Tonnage Forecast by Direction, 2011 and 2030



Total Truck Freight Growth by 2030:

+ 55.6%

inbound » + 44.6% outbound » + 44.0%

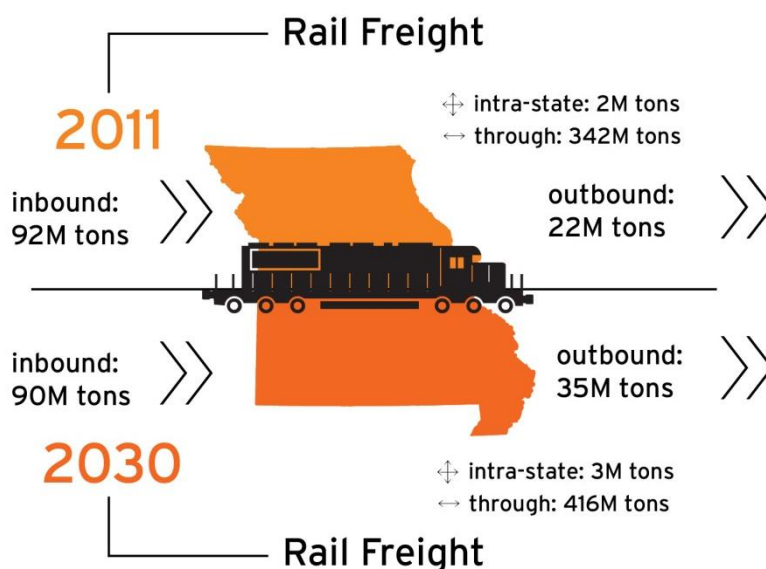
intra-state » + 72.9% through » + 55.5%

Chapter 5 – Needs Assessment and Freight Forecast

Rail Forecast

Figure 5-2 depicts the directions of rail freight movements in Missouri between 2011 and 2030. Rail tonnage is forecast to increase from 458.1 million in 2011 to 545.2 million in 2030, a cumulative increase of 19.0 percent (0.9 percent annually). Rail commodity value is forecast to increase from \$465.0 billion in 2011 to \$790.6 billion by 2030, a cumulative increase of 70.0 percent (2.8 percent annually). Note that inbound tonnage is forecast to decline, primarily due to less coal consumption for power plants as use of natural gas increases, renewable energy sources increase, and other power technologies improve.

Figure 5-2: Missouri Rail Tonnage Forecast by Direction, 2011 and 2030



Total Rail Freight Growth by 2030:

+ 19.0%

inbound » - 2.3% outbound » + 64.4%

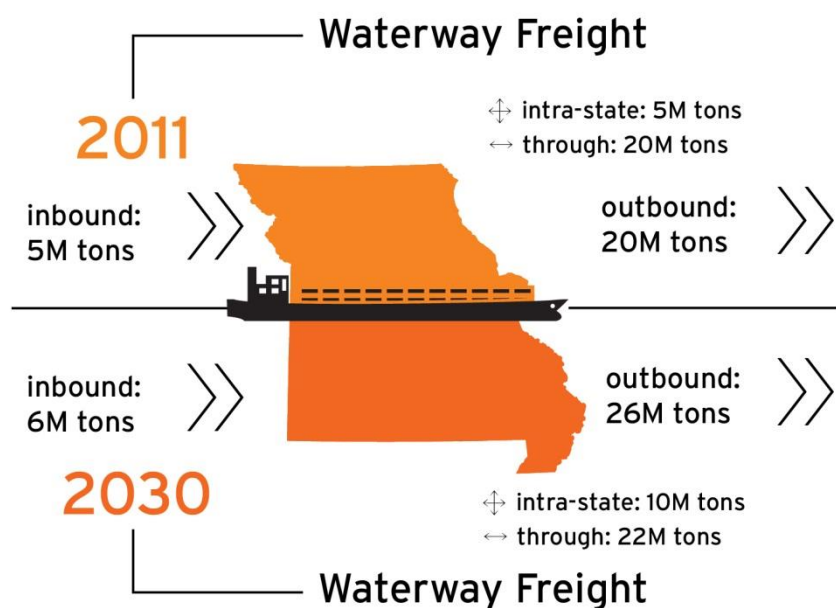
intra-state » + 32.9% through » + 21.8%

Chapter 5 – Needs Assessment and Freight Forecast

Port Forecast

Figure 5-3 depicts the direction of port freight movements in Missouri between 2011 and 2030. Port tonnage is forecast to increase from 49.9 million in 2011 to 63.3 million in 2030, a cumulative increase of 26.9 percent (1.3 percent annually). Port commodity value is forecast to increase from \$12.5 billion in 2011 to \$15.4 billion by 2030, a cumulative increase of 23.1 percent (1.1 percent annually).

Figure 5-3: Missouri Waterway Tonnage Forecast by Direction, 2011 and 2030



Total Waterway Freight Growth by 2030:

+ 26.9%

inbound » + 16.0% outbound » + 29.8%

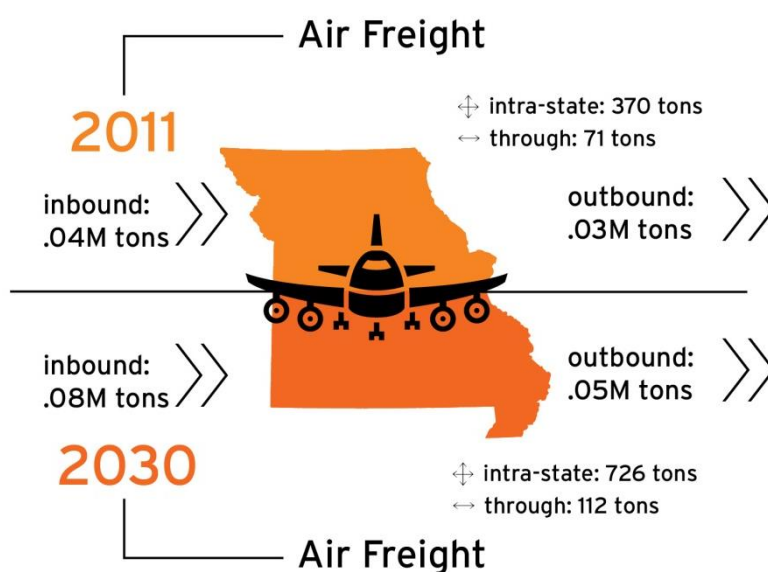
intra-state » + 93.6% through » + 10.2%

Chapter 5 – Needs Assessment and Freight Forecast

Air Forecast

Figure 5-4 depicts the direction air freight movements in Missouri between 2011 and 2030. In this time period, outbound freight movements decrease in relative proportion, while inbound movements increase. Air tonnage is forecast to nearly double from 73,003 in 2011 to 139,296 in 2030, a cumulative increase of 90.8 percent (3.5 percent annually). Air commodity value is forecast to increase from \$11.4 billion in 2011 to \$27.5 billion by 2030, a cumulative increase of 141.8 percent (4.8 percent annually).

Figure 5-4: Missouri Air Tonnage Forecast by Direction, 2011 and 2030



Total Air Freight Growth by 2030:

+ 90.8%

inbound » + 119.8% outbound » + 58.5%

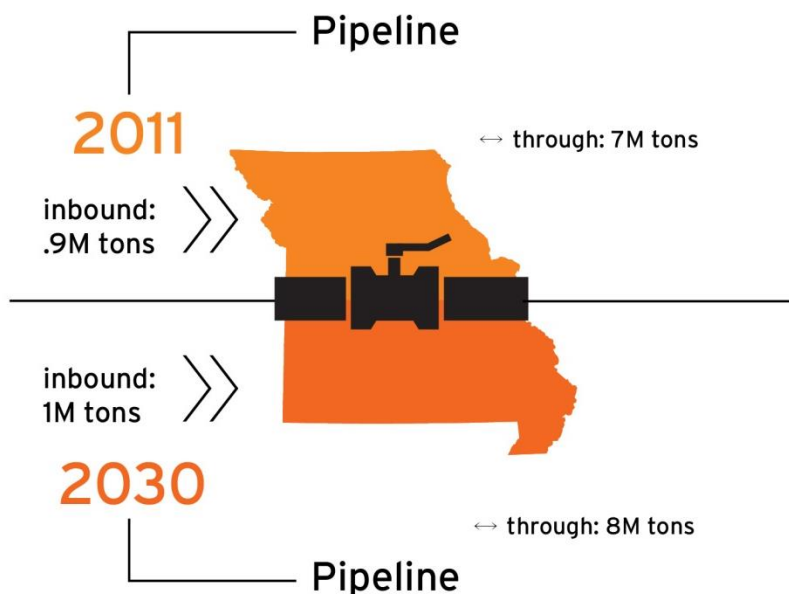
intra-state » + 96.2% through » + 56.8%

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Pipeline Forecast

Figure 5-5 depicts the direction of pipeline freight movements in Missouri between 2011 and 2030. Pipeline freight movements are only inbound, and that is expected to remain unchanged over the future analysis horizon. Pipeline tonnage is forecast to increase from 8.3 million tons in 2011 to 9.0 million in 2030, a cumulative increase of 6.5 percent (0.3 percent annually). Pipeline commodity value is forecast to increase from \$5.8 billion in 2011 to \$6.1 billion by 2030, a cumulative increase of 6.5 percent (0.3 percent annually).

Figure 5-5: Missouri Pipeline Tonnage Forecast by Direction, 2011 and 2030



Total Pipeline Freight Growth by 2030:

+ 6.5%

inbound » + 6.6% through » + 6.5%

Chapter 5 – Needs Assessment and Freight Forecast

Growth in freight movements across all modes of freight transportation requires continued improvements and maintenance to the freight system to accommodate this growth. Chapter 9 discusses the specific projects and programs identified for maintaining and improving the freight system.

Emerging Trends

This section discusses the emerging freight trends in the State. Identifying these trends helps to anticipate needs and develop programs and policies to address them.

Trade and Industry Growth

There is a close relationship between industrial health and vitality and transportation. Industries need parts and supplies to manufacture products (i.e., agricultural grains, food products, and automobiles) that are then transported across Missouri, the country, and the world. Transportation is responsible for bringing supplies into Missouri as well as exporting the products of Missouri industries.

Manufacturing productivity in the U.S. increased 73 percent between 1993 and 2011, according to the U.S. Department of Commerce. Today, U.S. manufacturing accounts for 20 percent of the world's manufacturing output, and U.S. manufacturing is greater than that of China, India, Brazil and Russia combined.

Many of Missouri's exports have increased in the last decade. Exports of aircraft have doubled since 2009 and the global demand for aircraft is expected to double over the next twenty years, which translates to significant business opportunities for the Missouri aerospace and aviation sector. Chemicals are Missouri's second largest international export and the chemical industry employs over 17,000 workers. Missouri food and food ingredient exports have increased 148 percent since 2005. There has been an increased demand for U.S. agricultural products due to higher quality standards and greater variety. Export industries in Missouri account for 95,000 direct jobs.

The expansion of the Panama Canal, which is expected to be completed in 2015, will likely have some impact on future freight flows. The timing and scale of the impacts on Missouri freight flows are unknown but it is anticipated that there will be some change in the demands on transportation networks, service, and operations.

All of these factors lead to a growth in freight movements in Missouri. In turn, the growth in freight movements will result in increased demands on the highways, rail lines, port facilities, and airports that handle freight.

Chapter 5 – Needs Assessment and Freight Forecast

Institutional and Regulatory Trends

Federal, institutional, and regulatory trends may affect Missouri freight transportation. Examples of these trends and their potential effects are:

- Federal regulation of trucking/trucker safety could affect costs and cause driver shortages
- Public-private partnership financial market trends for private capital in transportation infrastructure projects
- Federal water resource policy trends could impact waterborne freight
- U.S. Department of Agriculture food product traceability requirements could make bulk food shipping less attractive
- U.S. Department of Homeland Security requirements for electronic pre-filing of export documentation could take additional time and cause delays
- U.S. Environmental Protection Agency emission requirements for marine diesel barge engines and rail locomotive engines could require retrofitting existing equipment
- At the local and state level, the acceptance of “Complete Streets” policies could impact the movement of freight, particularly in the last mile of delivery

Population Trends

As Missouri’s population and employment grows, the demand for and production of finished goods will increase throughout the State, and the transportation of these goods will increase accordingly. According to economic data, Missouri is expected to have an annual population growth rate of 0.62 percent from 2012 to 2040. This results in more than a million additional Missouri residents by 2040. Additional information can be found in Appendix B.

Logistical Challenges

A number of logistical challenges face shippers in Missouri and throughout the Midwest:

- Variable shipping rates as they relate to the variability of fuel costs and truck driver availability
- Growing shortage of labor for trucking, rail, and water
- Availability of truck and rail equipment

In particular, recruiting trained labor is becoming increasingly difficult due to experience and training requirements and an aging workforce. Labor shortages will impact what happens in the industry as shippers continue to try to keep costs down and become more efficient.

Technology Trends

Technology trends could impact freight movement in Missouri:

- Dedicated truck lanes could improve safety and allow for the potential use of advanced technology to move more freight. However, there is not a consensus on how to develop, fund, or finance a dedicated truck lane project.

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- A Freight Shuttle System would use autonomous transporters to move trailers or containers in a highway median, but the technology likely will not be available for some time.
- E-commerce requires fast, on-time deliveries, but is affected by distance and travel direction. E-commerce also brings more parcel delivery vehicles into neighborhoods, causing congestion and wear-and-tear on the local road network.
- Natural gas is the fastest-growing fuel in the transportation sector due to its comparatively lower price, but there is a high initial cost to retrofit or replace existing equipment. The high demand for natural gas from the trucking industry has prompted the fuel retail industry to provide compressed natural gas (CNG) and liquefied natural gas (LNG) at fuel stations on major truck corridors.
- The use of container-on-vessel (COV) for moving containers on the inland waterway can, in certain situations, be an alternative to truck and rail transport. However, there are problems with port readiness, delivery requirements to sustain service, and inefficiencies in backhauling and positioning empty containers.

Some of these concepts, such as dedicated truck lanes, have been studied in Missouri. Other concepts would need additional planning to determine their viability, cost-benefit ratio, and overall applicability to the freight network in Missouri.

Identified Needs

Freight network needs were identified through an analysis of the strengths and challenges of the Missouri freight system, 20-year freight forecast, and emerging trends. The identified needs are discussed below according to freight transportation mode. Each identified need falls into one of six categories: system capacity, system operations, freight network, safety, connectivity, and policy regulations.

Highway

The identified highway transportation needs are:

- Improved corridor capacity
- First and last mile connectors
- Improved freight movement through bottlenecks (see **Figure 4-3** in Chapter 4 for the locations of the 100 most congested bottlenecks in Missouri)
- Safety improvements such as sufficient numbers of safe truck parking spots at rest areas and weigh stations, reduction in the number of at-grade rail crossings, and improved roadway design and geometrics
- Connectivity to major freight generator sites, including last mile connections

While Missouri did not have a designated freight network, this Missouri State Freight Plan identifies the designated Missouri Freight Network to help prioritize improvements for all modes of freight transportation, including highways (see Chapter 3).

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Rail

The identified rail transportation needs are:

- There are congestion and capacity issues on numerous rail lines throughout the State. Improvements to the rail lines with congestion and capacity issues are needed.
- The Kansas City area currently has a bottleneck at intersecting rail lines. St. Louis also faces issues because rail lines historically connected at Union Station for passenger rail, resulting in a network of multiple connections which can require days to switch rail cars across the region.⁵ Coordination with the rail companies that own these rail lines and a solution to eliminate these bottlenecks is needed.
- At-grade rail crossings throughout the State present a safety issue. Improvements at all at-grade rail crossings with safety issues are needed.
- In the Northwest and Northeast MoDOT districts, short line rail lines are being removed, adversely affecting economic development in these areas. Coordination with the short line rail companies is needed to craft a different solution than removal of rail lines.
- At the Howard/Cooper Regional Port, rail access to and from this port is needed.
- St. Louis has two rail bridges across the Mississippi River that support all Class I railroad crossings, the Merchants Bridge and the MacArthur Bridge. Both bridges are more than 100 years old and require major work to strengthen and reinforce capacity.

Air

The identified air transportation needs are:

- The cargo facilities at the St. Louis Airport (STL) are limited and outdated. These facilities need to be updated and expanded.
- The Springfield Airport (SGF) has been identified as an airport that may have its tower hours reduced by the FAA. Reduction of the tower hours could reduce the airport's capacity to handle freight at key nighttime hours.
- The safety and perimeter security at the Kansas City International Airport (MCI) is in need of additional, updated, and improved fencing and gates.

Water

The identified waterborne transportation needs are:

- At ports throughout the State, increased maintenance activities are needed on both the land and water sides of the operations.
- Upgrades and rehabilitation is needed on many of the locks and dams in the State. Coordination with the U.S. Army Corps of Engineers will be needed.

⁵ *St. Louis Regional Freight Study*, June 2013

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- Sufficient depth for navigation is needed in channels and at harbors. This is achieved through additional dredging or through increased water releases from upstream dams.
- Numerous emerging ports have been identified throughout the State. Support for their development is needed.

Pipeline

There are no freight system needs identified for the pipeline mode of transportation.

Intermodal

The identified intermodal needs are:

- New intermodal connection points are needed.
- Improved intermodal road connections to ports are needed at several locations in the State.
- First and last mile intermodal connections are needed.

Funding

The majority of Missouri transportation funds come from fuel taxes. State fuel tax rates have not increased since 1993, and Missouri has one of the lowest state fuel tax rates in the nation. This has put pressure on the transportation sector to find alternative funding sources for highway projects. Funding is also an issue in upgrading and expanding ports, locks and dams, airports, and intermodal facilities in order to stay competitive. There is need to identify innovative and alternative funding sources. These issues have created project funding challenges for MoDOT.

Conclusions

The purpose of identifying needs as seen through the lens of the identified strengths and challenges of Missouri's transportation system, the future forecast of freight in the state and other emerging trends is to better inform the decision-making process. The needs discussed in this chapter have been considered as the strategies and recommendations of the Freight Plan contained in subsequent chapters and will help to make implementation of the outcomes more successful.

Chapter 6 - Economic Context of Freight

KEY POINTS

- The amount and value of freight are critical components of the overall economic health of Missouri. Missouri's multimodal freight system supports the movement of trucks, planes, barges, and trains as they transport over one billion tons of freight valued at more than \$1.2 trillion per year.
- Every resident in the State spends a significant portion of their disposable income (\$4,500 per year) on transportation, whether directly or indirectly, in the goods they purchase.
- Truck freight will continue to grow in importance based on both value and tonnage. While at a slower rate, the freight moved by air, water, and rail will also continue to grow.

Introduction

Approximately half of Missouri's economy is highly dependent on freight and everyone is affected by freight on a daily basis. Freight is integral to job growth and economic development. Most of the time, Missouri's freight system accommodates the movement of a significant amount of valuable freight with ease. However, congestion, safety concerns, issues with first and last mile connectors, and challenges with overall system operations can sometimes substantially cost haulers and shippers who rely on the freight system. As the importance of trade and the demands of customers continue to evolve, Missouri companies often find freight an increasingly important factor in sustaining and enhancing their competitive position in the marketplace through reliable connections to customers and links to a multitude of markets to ensure timely deliveries of goods and services.

Importance of Freight to Missouri's Economy

Missouri's freight system and the State's economy are closely connected. Freight movement and the Missouri freight system support the State's economy by:

- Allowing Missouri manufacturers to bring in raw materials and parts, and transport products to and from other parts of the State, across the country, and around the world.
- Allowing Missouri farmers and agricultural producers to get their products to market and bring feed, seed, and equipment to their farms.

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- Ensuring that the goods Missouri residents need are available in local stores or can be delivered to their homes.
- Directly employing approximately 83,500Missourians in transportation and warehousing industries¹ and those in numerous other industries indirectly.

Statewide Importance and Trade

Missouri's strategic position in the heartland of the country and access to diverse freight transportation modes mean that a lot of goods are shipped into, out of, within, and through the State. This also means that manufacturers and shippers choose Missouri to facilitate the shipment of freight to consumers and markets. Chapters 2 and 4 of this plan discuss this freight movement by transportation mode in detail.

Table 6-1 has removed the through freight traffic and summarizes only the economically relevant data for Missouri freight movements in 2011.

Table 6-1: Summary of Missouri Freight Movement by Tonnage and Value per Mode

Direction	Air	Pipe	Rail	Truck	Water	Total
Tons						
Outbound	34,313	#N/A	21,510,433	75,301,621	19,973,291	116,819,658
Inbound	38,249	932,258	92,326,793	89,250,507	5,093,847	187,641,654
Intrastate	370	#N/A	2,436,087	105,627,915	4,941,503	113,005,875
Through	71	7,412,827	341,805,597	230,212,488	19,850,043	599,281,026
Total	73,003	8,345,085	458,078,910	500,392,531	49,858,684	1,016,748,213
Value, in millions						
Outbound	\$7,620	#N/A	\$40,364	\$95,005	\$3,479	\$146,468
Inbound	\$3,656	\$643	\$39,647	\$119,731	\$3,083	\$166,760
Intrastate	\$100	#N/A	\$1,616	\$62,346	\$117	\$64,179
Through	\$10	\$5,117	\$383,409	\$433,794	\$5,870	\$828,200
Total	\$11,387	\$5,761	\$465,035	\$710,876	\$12,549	\$1,205,607

Source: Prepared by CDM Smith, based on TRANSEARCH® data for 2011

Missouri has several key domestic trading partners, listed in **Table 6-2**. Between 2011 and 2030, outbound freight shipped from Missouri to other states and internationally is expected to grow by 45.3 percent.

¹ 2013 Data Produced by the Missouri Economic Research and Information Center (MERIC) in cooperation with U.S. Department of Labor, Bureau of Labor Statistics.

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Table 6-2: Missouri's Major Domestic Trading Partners

<u>Outbound Freight 2011</u>	<u>Inbound Freight 2011</u>
Illinois	Wyoming
Texas	Illinois
Kansas	Kansas
California	Iowa
Arkansas	Arkansas
Iowa	Texas
Oklahoma	North Dakota
Arizona	California

Source: Prepared by CDM Smith based on TRANSEARCH® data for 2011

Not surprisingly, Missouri's major trading partners include neighboring states, energy supplying states (Wyoming coal and Texas and North Dakota petroleum), and large coastal population centers (Texas and California).

Missouri exported approximately \$13 billion in goods to other countries in 2013. The State's largest trading partners include North American Free Trade Agreement (NAFTA) countries of Canada and Mexico and also China². While domestic exports to other U.S. states are significantly higher than international exports, international freight is still important to the Missouri economy.

Supply Chains and Goods Movement Competitiveness

Efficient freight transportation in Missouri is essential for the supply chains of the State's industries. Supply chains are the pathways that raw materials and products move from their original source, through the production process, eventually reaching the end consumer. Supply chains have grown more sophisticated as businesses look to minimize supply chain costs and maximize profits.

² U.S. Census Bureau Foreign Trade Division and WISERTrade.

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For example, Missouri is a major producer of beef. Feed grain and feeder cattle are imported to the feed yards. Finished cattle are then shipped to a meat processing plant to be processed, and then the meat is shipped to grocery stores or another final destination as a finished product. Every product Missouri residents buy is created and delivered through these complex supply chains and each step uses the freight transportation network to deliver inputs and finished goods in a timely manner. If the freight network breaks down, so do these supply chains. The efficiency of these chains has a significant impact on how various companies compete.

Freight transportation is a key competitiveness factor for Missouri businesses. Some industries are highly dependent on transportation, as measured by the amount spent on transportation as a share of the total output. Based upon the most recent analysis by the U.S. Department of Transportation (USDOT) Research and Innovative Technology Administration, the average agriculture or forestry business spends 14 percent of each dollar of product output for transportation. The average manufacturing business spends 8.5 percent, and the average transportation equipment and parts business spends 12.5 percent.³

As part of this Freight Plan, the Missouri Department of Transportation (MoDOT) developed a performance measure to track the effectiveness of the transportation of goods in Missouri that are involved in trade to other states and countries. The measure tracks annual trends in the cost of transporting three key commodities (soybeans, crop production products, and motor vehicles) in Missouri compared to the costs of transporting these commodities in other Midwest states. There is much more to economic competitiveness than just the costs associated with transporting these commodities. However, this performance measure offers some insight into the costs for moving goods using different modes and to different destinations. More details can be found in Appendix F.

Figures 6-1, 6-2, and 6-3 show the current relative costs for transporting these three key commodities. As the figures illustrate, Missouri is highly competitive for some goods and less competitive for others.

³ "Transportation Satellite Accounts: A Look at Transportation's Role in the Economy, 2012

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Figure 6-1: Cost of Shipping One Ton of Soybeans from Key States to New Orleans (*largely by barge*), 2014



Figure 6-2: Cost of Shipping One Ton of Crop Protection from Key States to Mexico (*largely by rail*), 2014



Figure 6-3: Cost of Shipping One Motor Vehicle from Key States to Toronto (*by truck*) and Los Angeles (*by rail*), 2014



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Economic Impacts of Freight in Missouri

What is the value and economic impact of freight on Missouri's economy? How much of Missouri's economy is affected by or relies on freight? In this Freight Plan, specific data sources and economic models are used to address these questions. The TRANSEARCH® freight database is used to analyze Missouri goods movements, commodity volumes, and values. The IMPLAN® economic model is used to determine how freight movements generate economic impacts in Missouri.

Economic impacts can be grouped into direct, indirect, and induced impacts:

- **Direct** – Impacts from transportation providers delivering transportation services as well impacts from transportation users shipping and receiving goods.
- **Indirect** – Impacts associated with the suppliers that provide intermediate goods and services to the directly impacted industries.
- **Induced** – Impacts associated with re-spending earned income from both the direct and indirect impacts in the study area.

Direct, indirect, and induced impacts combined are used to estimate the total economic impact of freight. Each impact is measured in terms of employment, income, value-added (i.e., GSP), output, and taxes. The industries that use transportation services, such as manufacturing and production industries are much larger than transportation service provider industries and thus generate the greater economic impacts.

Total Impacts as Percentage of State Economy

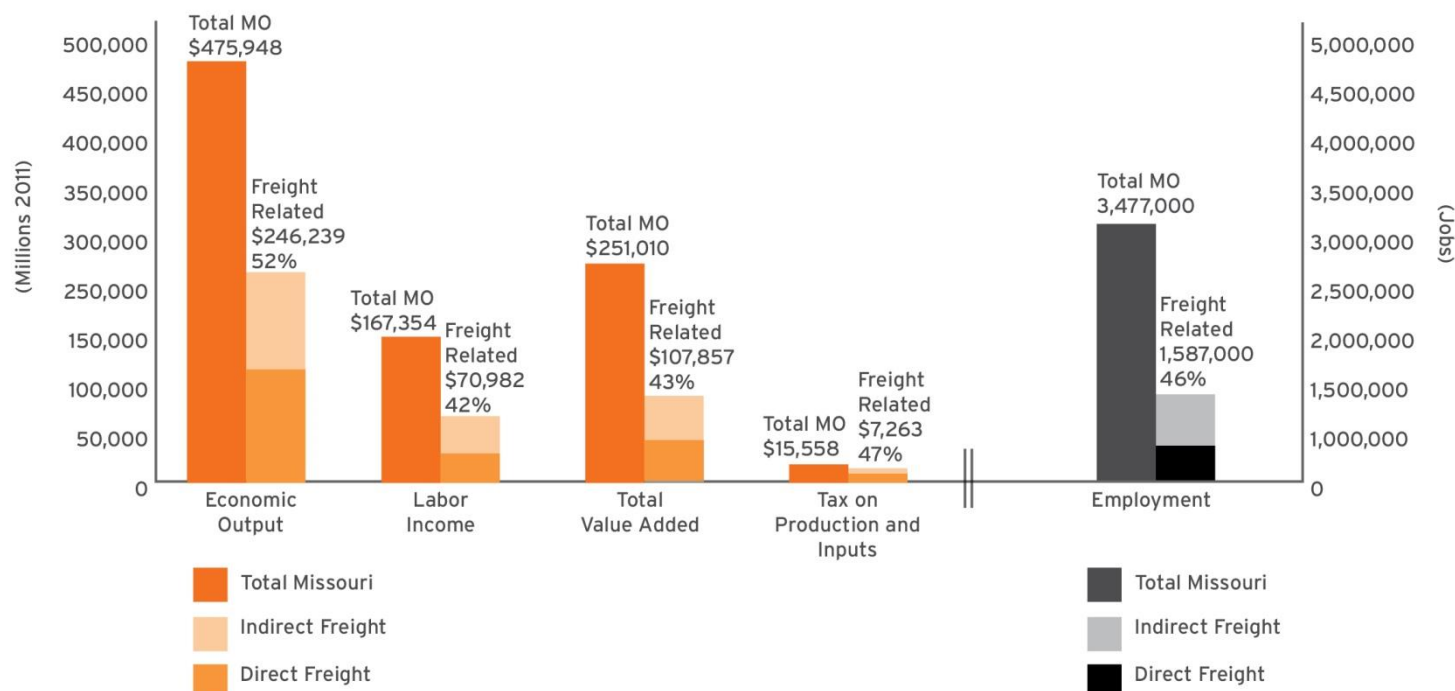
An understanding of the overall size of the State's economy provides context for the estimated impacts specifically from freight. The economic impacts of freight are best compared with the existing economic composition of Missouri in 2011. **Figure 6-4** shows 2011 freight-related economic data compared to the economic data for Missouri as a whole.

Gross State Product (GSP)

The monetary value of all the finished goods and services produced within a state's borders in a specific time period, though GSP is usually calculated on an annual basis. It includes all private and public consumption, government spending, investments, and exports less imports.

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Figure 6-4: 2011 Missouri Economic Data Compared with Freight Economic Data (in Millions of Dollars)

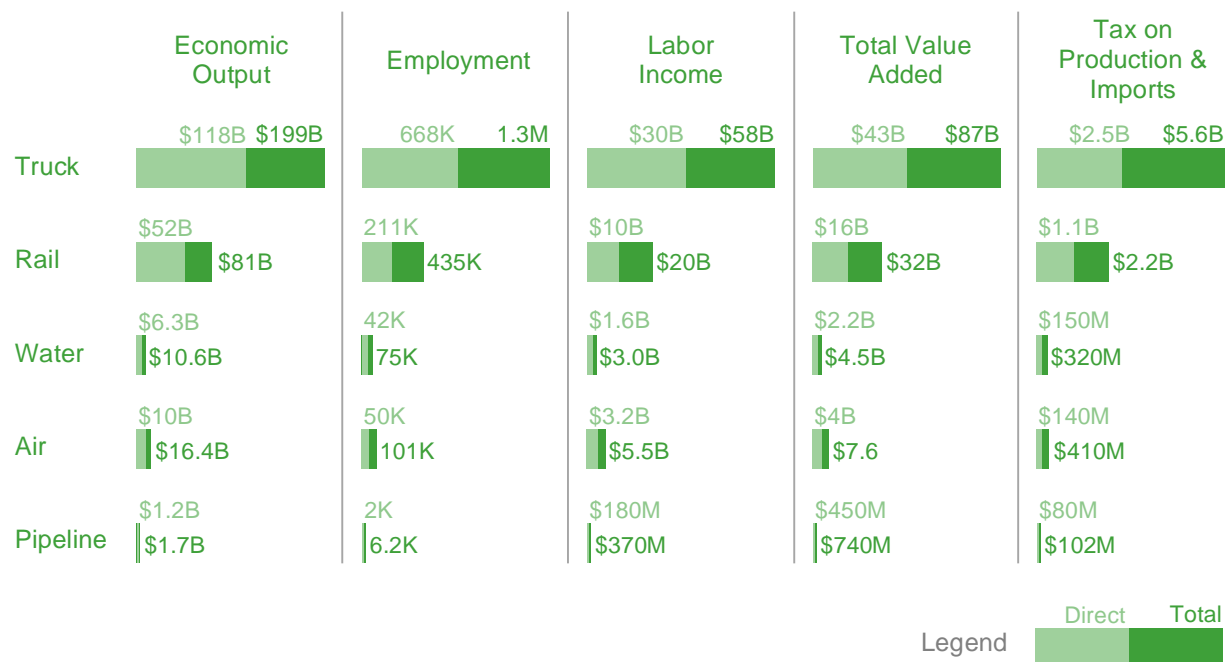


Source: TRANSEARCH Data modeled with IMPLAN®

Total economic impacts related to freight movements in Missouri range from 42 percent (labor income) to 52 percent (economic output) of the statewide economy, depending on the measure. Freight transportation service providers directly comprise between 0.7 percent and 2.2 percent of the Missouri economy; including the multiplier impacts. The total impact ranges between 2.6 percent and 3.8 percent. For users of freight, the total (direct and multiplier) impacts are between 38.6 percent and 47.9 percent of the State's economy. This is reflective of industries specifically reliant on freight; in reality every person or business that buys goods or receives a package uses the freight system. **Figure 6-5** presents the impacts categorized by mode.

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Figure 6-5: Estimated Economic Impacts of Freight in Missouri by Mode



Source: TRANSEARCH Data modeled with IMPLAN®

As **Figure 6-5** shows, truck and rail freight have the greatest economic impact of freight in Missouri, which is expected since they lead the State in tonnage and value of freight carried. Note that the estimates for waterborne freight may be conservative because the data do not include non-NAFTA country (countries other than Canada and Mexico) freight movements by water. In other words, if freight moves out of a Missouri port by barge and is then loaded on a ship to Asia, it is not captured in the data. The reason it is not captured in the data is that the tracking data used for that freight is not reliable.

The totals in **Figure 6-4** do not add to the totals in **Figure 6-5** due to intermodal overlap. As shippers and receivers in Missouri use various transportation modes in combinations, such as truck and rail, to move the same product, a simple sum of the totals would overestimate the impact estimates. As a result, the analysis removes this potential double-counting of impacts when developing the statewide totals.

In conclusion, the data suggests that approximately half of Missouri's economy is substantially affected by freight, either directly or indirectly. Almost everyone relies on freight in some form on a daily basis.

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Freight, Jobs, and Economic Development

Missouri's economy is significantly affected by and dependent on freight movements. Effective movement of freight is directly linked to job growth and economic development.

Jobs

Freight-related jobs are directly tied to key Missouri industries. The North American Industry Classification System (NAICS) defines industry sectors. **Table 6-3** lists the most economically important NAICS-defined industry sectors for various freight transportation modes. As shown in the table, more than 50 percent of the total truck and rail freight-related employment is concentrated within the top industry sectors for the State—manufacturing; transportation and warehousing; retail trade; agriculture, forestry, fishing, and hunting; health and social services; and accommodation and food services. Almost 50 percent of the total employment impacts stemming from water-related freight movements are concentrated within the top four Missouri industry sectors—agriculture, forestry, fishing, and hunting; manufacturing; transportation and warehousing; and retail trade. Over 50 percent of the total employment impacts stemming from air-related freight movements are concentrated within the top three Missouri NAICS-defined industry sectors—manufacturing, retail trade, and health and social services.

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Table 6-3: Top Industries with Highest Employment Impacts Due to Freight

Mode	Industries
Truck	<ul style="list-style-type: none">• Manufacturing• Transportation and Warehousing• Retail Trade• Agriculture, Forestry, Fishing and Hunting• Health and Social Services• Accommodation and Food Services
Rail	<ul style="list-style-type: none">• Manufacturing• Transportation and Warehousing• Retail Trade• Agriculture, Forestry, Fishing and Hunting• Health and Social Services• Accommodation and Food Services
Water	<ul style="list-style-type: none">• Agriculture, Forestry, Fishing and Hunting• Manufacturing• Transportation and Warehousing• Retail Trade
Air	<ul style="list-style-type: none">• Manufacturing• Retail Trade• Health and Social Services

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For three key transportation-reliant sectors—agriculture, manufacturing, and transportation and logistics — 10-year trends for Missouri jobs and economic performance (as measured by gross domestic product, or GDP) are presented in **Figures 6-6, 6-7, and 6-8**.

Figure 6-6: Jobs and Economic Growth (GDP) in the Agriculture Industry in Missouri

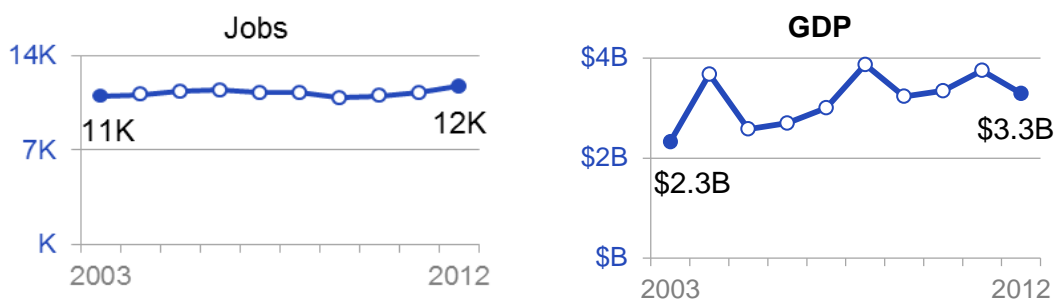


Figure 6-7: Jobs and Economic Growth in the Manufacturing Industry in Missouri

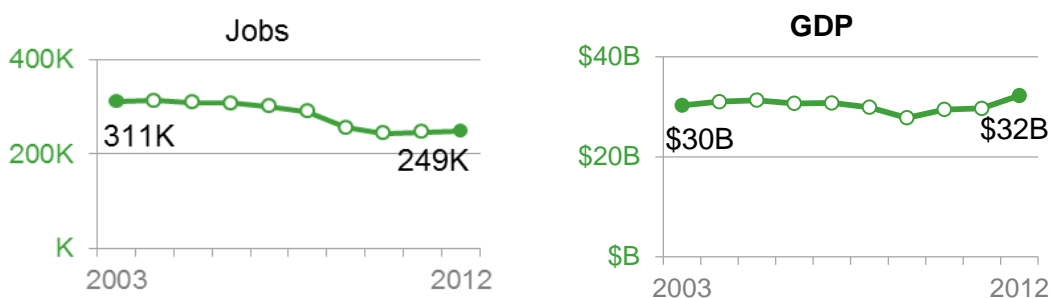
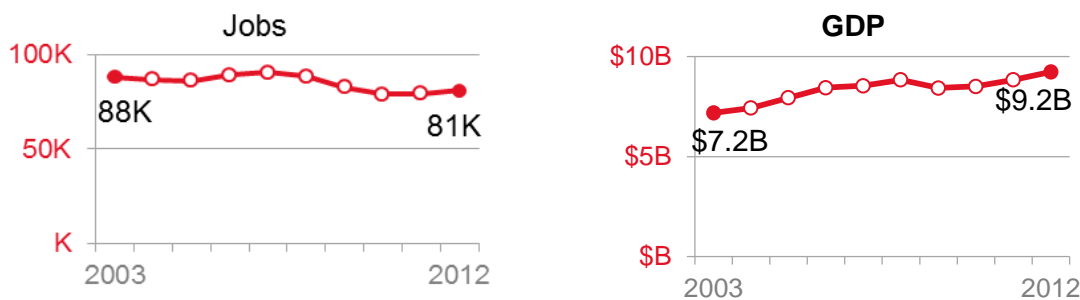


Figure 6-8: Jobs and Economic Growth in the Transportation/Logistics Industry in Missouri



Source: Missouri Department of Economic Development

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The connection between freight and the key transportation-reliant industries identified above relates directly to the implementation of the Missouri Strategic Initiative for Economic Growth. MoDOT is partnered with the Missouri Department of Economic Development, Missouri Department of Agriculture, and other organizations to implement economic strategies focused on certain industries, including advanced manufacturing, transportation and logistics, and biosciences (which include plant and agriculture technology and companion and feed animal sciences). This Freight Plan directly addresses the Initiative's strategy, "Missouri will provide the infrastructure necessary for companies and communities to be successful."

Economic Development and District Freight

Missouri's freight system is also important for economic development and the District economies in the State (see **Figure 6-9**). Global trade and new technologies continue to transform the economy, redefining the way businesses operate, challenging supply chains and transportation networks, and creating new customer opportunities for Missouri businesses. Businesses and their employees are more dependent than ever on integrated, agile, and efficient transportation networks to sustain economic competitiveness and connections to markets.

To compete in this global marketplace, businesses must optimize every asset—workforce skills, competitively priced products, and reliable transportation systems—to ensure their customers receive quality goods and services when they expect them. As the importance of trade and the demands of customers continue to evolve, Missouri companies often find freight an increasingly important factor in sustaining and enhancing their competitive position in the marketplace. Freight supports the domestic and international trade of Missouri businesses, and supports State and local economic development and job growth.

Figure 6-9: Missouri Freight Districts



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Freight transportation represents a key competitiveness factor for businesses in every region of Missouri as they compete not only on product quality and cost, but also on the reliability and timeliness of product deliveries. Each of the regions in Missouri has specific attributes related to freight movement:

- **Kansas City District** – The Kansas City region is the second largest rail hub in the nation. It is the second largest export market in the State. Of the top 100 freight generators, 23 are located in the region. Kansas City also has the 45th busiest freight airport in the nation and the greatest concentration of intermodal facilities in the State.
- **St. Louis District** – The St. Louis region is the third largest rail hub in the nation. It is the largest export market in the State. Of the top 100 freight generators, 35 are located in the region. St. Louis also has the 53rd busiest freight airport in the nation and is the largest inland port.
- **Central District** – Central Missouri has 7 of the top 100 freight generators in the State. As a central location for the State's two longest interstates, it also includes several truck facilities. The region has the only ports on the Missouri River between St. Louis and Kansas City. The region provides critical freight support for agricultural industries and for excavation industries such as sand and gravel.
- **Northeast District** – Northeast Missouri has 4 of the top 100 freight generators in the State. It also has the northernmost port in Missouri on the Mississippi River at Lewis County. This region would benefit from improvements to the lock and dam system on the Mississippi River. Notable industries that rely on freight include chemical manufacturing, agriculture, and food processing.
- **Northwest District** – Northwest Missouri has 7 of the top 100 freight generators in the State. The emerging port at St. Joseph would be the northernmost Missouri port on the Missouri River. This region provides critical freight support for agricultural industries.
- **Southeast District** – Southeast Missouri has 5 of the top 100 freight generators in the State. With four active Mississippi River ports, it provides critical water freight opportunities, particularly for container-on-vessel and with the Panama Canal expansion. Energy-related industry concentrations in the region are dependent on freight.
- **Southwest District** – Southwest Missouri has 19 of the top 100 freight generators in the State as well as the 104th busiest freight airport in the nation. The region's proximity to major freight operations in Northwest Arkansas presents unique opportunities. Advanced manufacturing is a fast-growing regional sector, along with warehousing and distribution and food processing.

System Weaknesses and Economic Costs

Since approximately half of Missouri's economy is directly or indirectly affected by freight, the current and emerging weaknesses in Missouri's freight system can affect approximately half of the Missouri economy. The effects of congestion, safety concerns, issues with first and last mile connectors, and the performance of system operations/intermodal facilities can be correlated with economic impacts.

Chapter 6 – Economic Context of Freight

Congestion

Congestion costs freight transportation service providers and transportation users in several ways, including:

- It can cause lost hours by drivers and equipment stuck in congestion. This includes costs for hourly wages, wasted fuel, and idle equipment, and these costs are then passed on to shippers and consumers.
- Inability to meet delivery and production schedules results in costly delays of production. Congestion disrupts industry supply chains. Some industries measure in minutes the downtime costs due to lack of products and inputs—time matters.
- Congestion creates costs due to lack of system reliability, which is the ability of shippers to accurately predict the length of time to ship and receive goods and inputs. All freight modes and supply chains can have reliability issues, often related to congestion. As a result, additional inventory must be stored to address potential shortages and shippers must account for extra time in planning production and delivery schedules.

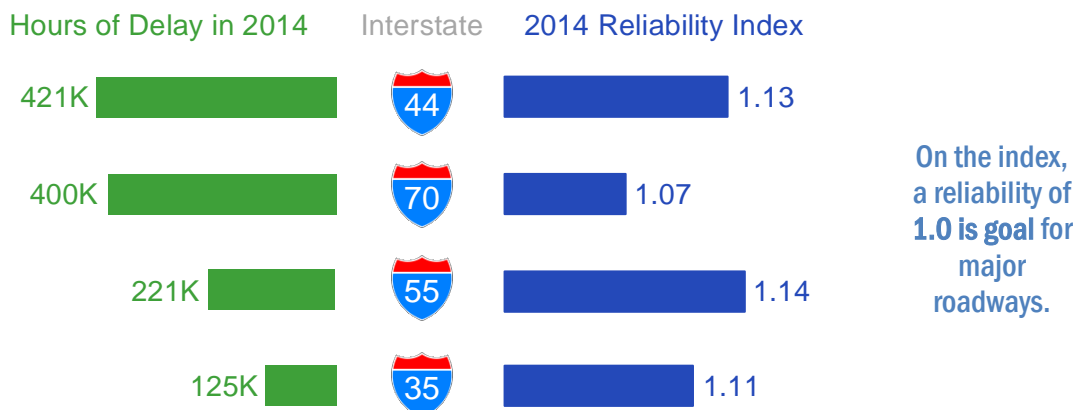
MoDOT is tracking truck congestion by measuring annual hours of truck delay and a truck reliability index. Annual hours of truck delay and a truck reliability index are measures proposed in the *Moving Ahead for Progress in the 21st Century Act* (MAP-21) and finalized in the *Fixing America's Surface Transportation (FAST) Act* to measure national freight performance.

Delay is measured anytime trucks experience congestion, defined in this case as when speeds drop to below five miles per hour below the posted speed limit. These delays impact the cost of goods and reduce business's ability to compete on a global scale.

The reliability index is a measure of how consistent truck travel times are on a corridor. The closer the index is to 1.0, the more reliable the corridor. Shippers and freight carriers require predictable travel times to control transportation costs and remain competitive. **Figure 6-10** Illustrates hours of delay and reliability index on key Missouri interstate routes.

Chapter 6 – Economic Context of Freight

Figure 6-10: Hours of Truck Delay and Truck Reliability Index



Safety

As identified in Chapter 5, Missouri has shown strong improvements related to freight safety in recent years. However, funding constraints may hamper this progress. Freight safety affects the economy in several ways:

- Crashes resulting in injury or loss of life are immensely costly for individuals and to the overall economy due to medical costs and the loss of productivity of the individuals involved and their families.
- Freight-related crashes result in damaged equipment and damaged loads, costing shippers and haulers.
- Crashes often result in short-term congestion and bottlenecks that affect the reliability of the freight network.

First and Last Mile Connectors

The Missouri Freight Network identified in Chapter 3 includes several National Highway System intermodal connectors and first and last mile connectors that are crucial to Missouri's freight system. These connectors are the last roads that join the highway system to intermodal facilities, terminals, ports, airports, and major freight generator sites. Often, these connectors include local roads and interchanges between highways and local roads. If these connections aren't efficient due to lack of capacity, traffic conflicts, poor intersections, safety issues, or poor maintenance, then the connections can have an adverse economic impact.

Chapter 6 – Economic Context of Freight

System Operations and Intermodal Facilities

Chapter 5 identified several potential issues with freight system maintenance and connectivity that could affect the economic performance of the system and/or result in missed economic opportunities. A poorly maintained system results in greater delays, rerouting, and even equipment damage that cost freight haulers and shippers. Similarly, opportunities may be missed to take advantage of growing trade conditions, Panama Canal expansion, and container-on-vessel (COV.) if Missouri does not have strong intermodal connections, particularly to ports and rail lines.

Chapter 7 - Freight Policies, Strategies, and Institutions

KEY POINTS

- MoDOT has established a reputation for working with public and private freight stakeholders to support its multimodal freight system. Maintaining and developing these mature relationships will be critical to Missouri's economic future.
- Selecting freight projects that are important both regionally and statewide will become increasingly difficult in the future as freight tonnage increases and transportation revenues decline. One of the most principle products of this Freight Plan is to provide a robust methodology for evaluating and prioritizing potential freight investments.
- The lack of flexibility in using State and Federal funds limits Missouri's ability to use innovation or multimodalism to address freight challenges.

Introduction

To develop implementable strategies that will support Missouri's freight transportation system for years to come, it is important to understand the policy environment in which the freight system functions. Funding programs, freight-related institutions, freight roles and responsibilities, private infrastructure owners, statutory and constitutional constraints, and regional freight planning activities all create the framework for implementation.

Context for Policy Making

Missouri's economic future relies on the ability of the multimodal transportation system to support an increasingly complex supply chain. Recognizing this, the Missouri Department of Transportation (MoDOT) is focused on improving the freight transportation system. The Missouri State Freight Plan is designed to support this effort to build a freight network that will support Missouri's future success.

To accomplish this, the Freight Plan must be an actionable and implementable document. A critical step in building an implementable plan is to understand the overall framework of and relationships among MoDOT's partners in the freight transportation system. Providing context for the current policy

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environment will lay the groundwork for identifying strategic steps MoDOT can take to achieve its goals and objectives.

Long Range Transportation Plan Goals

In 2014, Missouri's Long Range Transportation Plan established a vision for Missouri's transportation future. This vision was molded from over 12,000 public and stakeholder ideas. The vision is expressed in four goals and their corresponding implementation strategies. While each goal has individual qualities, all are related and interconnected. The goals are:

- **Maintenance** – Take care of the transportation system and services we enjoy today
- **Safety** – Keep all travelers safe, no matter the mode of transportation
- **Economic Development** – Invest in projects that spur economic growth and create jobs
- **Connections and Choices** – Give Missourians better transportation choices

National Freight Policy Goals

When the *Moving Ahead for Progress in the 21st Century Act* (MAP-21) was passed in 2012, it transformed legacy surface transportation programs into a unified program that focuses on performance and outcomes. States are encouraged to invest in projects that support national goals. Among these goals is "to improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development." To support this goal, MAP-21 requires the U.S. Department of Transportation (U.S. DOT) to develop a National Freight Policy that supported the following seven National Freight Policy Goals.

- Economic competitiveness
- Safety, security, and resiliency
- State of good repair
- Advanced technology
- Performance and accountability
- Economic efficiency
- Environmental

The *Fixing America's Surface Transportation (FAST) Act* requires states develop freight plans that support the National Freight Policy Goals. This Missouri State Freight Plan has been developed to meet the FAST Act Statewide Freight Plan requirements and in close collaboration with public and private sector partners. It identifies a multimodal freight network in which Missouri can make strategic investments to support the State and national freight goals. Chapter 1 discusses how the Missouri State Freight Plan goals and objectives will help achieve the national goals.

Performance Measures

Performance measures are an important way to monitor progress towards achieving the goals of the Missouri State Freight Plan. Likewise, performance measures can be an effective means of communicating future freight needs to decision-makers and stakeholders. Currently MoDOT uses a

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quarterly publication, Tracker, to report the performance of the State's transportation system. Many of the existing Tracker metrics can be easily translated to measure the established State Freight Plan goals. Chapter 4 provides additional freight-specific measures that could be used to provide a more comprehensive view of multimodal freight system performance.

Critical Partnerships for Success

MoDOT's future success as a national freight leader will be due largely to its history using partnerships to drive the development of the State's overall transportation system. Missouri was among the first states to create regional planning commissions to help drive transportation decision-making. Today, this has resulted in a robust, grassroots-driven transportation program that is unrivaled among its peer states. Similarly, MoDOT established a reputation for working with public and private freight stakeholders to support its multimodal freight system. Maintaining and developing these mature relationships will be critical to Missouri's economic future.

Modal Partners

MoDOT's modal partners manage airports, freight railroads, pipelines, water ports, and inland waterways. Transportation professionals, who specialize in particular freight modes, are best suited to lead and manage their respective freight modal specialties. These key partners understand customer needs, the unique cost model of their respective mode, and how to best balance these key factors.

Airports

The Missouri aviation system includes 99 public use general aviation and 12 commercial airports.¹ These commercial airports include Kansas City International, Lambert – St. Louis International, and Springfield-Branson National. Each airport authority is a vital stakeholder and partner in the development of air cargo facilities and the infrastructure required to support this underutilized freight mode. Improvements to freight significant airports are largely funded through the Aviation Trust fund and from landing fees at the individual airports.

¹ 2012 Missouri Statewide Airports Economic Impact Study

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Freight Railroads

Missouri serves as a major rail junction point between the east and west coast Class I railroads. Missouri has the second (Kansas City) and third (St. Louis) largest rail hubs in the nation. Together these two hubs serve as major interchange points for the two west-based and the two east-based Class I railroads as well as interchange points for rail freight moving on North-South rail corridors to/from Canada and Mexico.

In total, six Class I railroads cross Missouri. Additionally, local and switching/terminal railroads provide critical connections to local industries that might not receive service from the larger Class I railroads. Missouri's railroads serve an important role in the State's ability to be responsive to future freight growth. However, the Class I railroads are privately owned and, while MoDOT has regulatory authority concerning grade crossings and safety, they are not regulated by a Missouri State agency.² Instead they are heavily regulated by multiple federal agencies.

All major railroads that transverse Missouri are private companies. As such, the majority of capital investment made in terms of new, upgraded and properly maintained infrastructure is funding by the railroads themselves. However, it is important to note that there has been increasing public investment in Missouri and across the nation to alleviate major chokepoints and develop corridors for intermodal container transport.

Pipelines

Much like railroads, pipelines are privately owned and not regulated by MoDOT. Pipelines are a critical piece of the Missouri freight system and are regulated primarily at the federal level by the Pipeline and Hazardous Materials Safety Administration (PHMSA). Approximately 10,700 miles of pipelines move natural gas, crude oil, and petroleum products throughout Missouri. At the State level, the Missouri Public Service Commission regulates the safety of the State's six investor-owned natural gas companies' operations.³ Pipelines are privately held infrastructure, but because of importance to the national economy there are opportunities to receive federal assistance for the construction of new pipelines (Example: Loan guarantees from U.S. Department of Energy)

Water Ports

Missouri's port authorities are important connection points to the underutilized inland waterway system. As freight volumes continue to increase and traditional freight transportation modes begin to exceed capacity, the ports' importance will only grow. Many ports are preparing for this influx of freight volumes by laying the groundwork for container-on-vessel (COV) activities and by adding infrastructure to handle multiple commodity types.

MoDOT's waterways unit assists cities and counties in forming port authorities, promoting the use of navigable waterways in the State, assisting in capital and administrative funding, providing information related to ports and waterways, providing technical assistance, and representing the interests of the 14

² Short lines and other intrastate railroads are regulated by the State of Missouri.

³ http://primis.phmsa.dot.gov/comm/reports/safety/MO_detail1.html?nocache=9244

<http://psc.mo.gov/CMSInternetData/ConsumerInformation/A%20Snapshot%20of%20What%20We%20Do.pdf>

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public ports in Missouri. In past years, the State has funded capital improvements at the state's port facilities. However, inconsistency in appropriated funding levels makes it difficult for ports and MoDOT to plan or leverage available funding.

Inland Waterways: U.S. Army Corps of Engineers/Maritime Administration

The U.S. Army Corps of Engineers (USACE) is responsible for maintaining the navigability, channel, and lock and dam system along the Mississippi and Missouri Rivers. The USACE Northwestern and Mississippi Valley divisions lead improvements in and maintenance of the locks and dams as well as perform dredging and other solutions to sedimentation problems in order to maintain the channel and harbors at public ports. While the Inland Waterway system is maintained by the US Army Corps of Engineers (USACE), the level of funding to adequately maintain and improve this system is somewhat limited by congressional appropriations and the lack of flexibility from other forms of federal aid.

While USACE is the federal agency responsible for the physical inland waterway system, USDOT's Maritime Administration (MARAD) administers the marine highway system. This national maritime freight network includes marine highways on the Missouri River (M-70 and M-29) and Mississippi River (M-55 and M-35). MARAD funds state and locally driven projects to offer water-based modal alternatives to freight normally transported by trucks on the nation's interstate system.

Organizational Partners

MoDOT's organizational partners include planning organizations, economic development organizations, and State agencies.

Regional Planning Commissions/Metropolitan Planning Organizations

MoDOT has a long history of working with regional planning organizations to plan transportation improvements. The State is divided into 19 Regional Planning Commissions (RPCs). The formal responsibility of each RPC is as varied as the region it represents. However, every RPC is an actively engaged partner in the transportation planning process.

Missouri has nine Metropolitan Planning Organizations (MPOs). Federal law requires the creation of MPOs to carry out transportation planning, programming, and project coordination in urbanized areas that have a population greater than 50,000. It is important to note that portions of the State that are included within MPOs are still considered inside their respective RPC areas. Some MPOs, like the Mid-America Regional Council (MARC) and East-West Gateway Council of Governments function as both an MPO and an RPC.

MPOs that serve regional populations greater than 200,000 are also considered Transportation Management Areas (TMAs). TMAs receive federal funds for projects selected by the MPO. Missouri has four TMAs:

- Mid-America Regional Council (Kansas City area)
- East-West Gateway Council of Governments (St. Louis area)
- Ozarks Transportation Organization (Springfield area)
- Northwest Arkansas Regional Planning Commission (McDonald County area)

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While all of Missouri's MPOs and RPCs consider the impact and importance of freight to their regions, the Kansas City and St. Louis MPOs have the most mature freight planning programs. Each has completed regional freight plans. As freight volumes continue to increase dramatically, partnerships among MPOs, RPCs, and MoDOT will be increasingly critical to the freight system.

Economic Development Organizations

The Missouri Department of Economic Development (DED) works as the State facilitator assisting private companies in identifying locations and financial incentive structures to attract, retain, and expand targeted industries in Missouri. The DED has identified eight targeted industries in which to focus its business retention and expansion efforts:

- Transportation and logistics
- Automotive suppliers
- Biosciences
- Information technology
- Energy solutions
- Advanced manufacturing
- Health sciences and services
- Financial and professional services

The transportation and logistics industry was identified as one of the eight targeted industries; however, the other seven targeted industries rely on the transportation and logistics industry (and the multimodal freight system) to support continued growth. For this reason, the DED has stated that Missouri's extensive transportation infrastructure is critical to the continued success of the State.

In addition to the DED, several other economic development organizations work to improve the State's economy and grow the workforce.

In 2007, the Missouri Partnership, a non-profit public/private economic development organization was formed to work with State, regional, and local economic development agencies to support economic development in the State. The Partnership also identified transportation and logistics as a key industry.

A similar organization, the private Missouri Chamber of Commerce, represents more than 4,000 employers who supply over 425,000 Missouri jobs. The Chamber provides representation before the Missouri General Assembly and offers tools to help businesses grow.

KC Smart Port is a non-profit economic development organization covering the 18-county, bi-state Kansas City region. The organization's focus is to drive economic development in the region's transportation and logistics industry. The organization also strives to improve supply chain data and cargo security in the region through the Trade Data Exchange (TDE) initiative. In addition, KC Smart Port works to provide additional business services focused on aiding businesses in moving goods to the area.

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Other State Agencies

The Missouri Department of Public Safety State Emergency Management Agency (SEMA) is responsible for planning and training related to hazardous material emergencies—including those related to transportation-related incidents—through its Missouri Emergency Response Commission (MERC) and Local Emergency Planning Commissions (LEPCs).

The Commercial Vehicle Enforcement (CVE) Division of the Missouri State Highway Patrol is responsible for enforcement of laws and regulations related to commercial vehicles in the State. There are currently 24 fixed-scale sites and 25 portable scales in the State. In addition, Missouri uses weigh-in-motion technology called PrePass. The CVE also has 32 CVE Troopers who are certified to perform safety inspections.

Professional Organizations

Transportation-related professional organizations in Missouri, including those specifically related to freight transportation such as the Missouri Railroad Association, the Missouri Trucking Association, Missouri Port Authorities, and the Pipeline Association of Missouri, provide important professional training, information, and assistance to the freight transportation industry in the State. The members of these organizations can provide important insight into the state of freight transportation in Missouri.

The Council of Supply Chain Management Professionals (CSCMP) is a national professional organization with strong local presence in the St. Louis and Kansas City regions. The organization offers educational sessions and networking to members and non-members interested in supply chain issues.

Multijurisdictional Partnerships

Missouri is a connector state, which means the majority of freight moving across the State's transportation networks is pass-through traffic. As such, MoDOT participates in many multijurisdictional partnerships to support Missouri's multimodal freight system. For example, with the growing truck volume along I-70, MoDOT partnered with the Indiana, Illinois, and Ohio DOTs to evaluate the feasibility of dedicated truck lanes along the I-70 corridor from Kansas City to the Ohio/West Virginia border.

The Mid-America Freight Coalition (MAFC) is a 10-state coalition in the Midwest with a mission to support the economy of the region by working to ensure that freight can move reliably, safely, and efficiently within and through the region. Similarly, the Institute for Trade and Transportation Studies (ITTS) in the southeast is a nine-state partnership that assists members in improving freight mobility and international trade. This group evolved from the Latin American Trade and Transportation Studies, which worked to improve trade and freight movement between the Midwest and Southeast regions. Missouri is a member of both the MAFC and ITTS.

Missouri is a member of the Mid-America Intermodal Authority Port (also known as the Mid-America Port Commission) which serves as a port commission for the northeast portion of Missouri and

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bordering areas in Illinois and Iowa. The group is charged with developing ports, supporting facilities, and overall economic development within a 13,000-square-mile area.⁴

The St. Louis Port Working Group includes freight partners from Illinois and Missouri who are focused on improving freight movement, activities, and efficiencies within the Port Authority of the City of St. Louis. While the City administers the port, the working group focuses on improving freight in the larger metropolitan areas (including Illinois and Jefferson County).

Project Selection and Funding

Each of MoDOT's seven District offices is responsible for maintaining the State and interstate roadway mileage within its jurisdiction. In collaboration with the RPCs and MPOs, the districts are also responsible for most of the project selection and delivery within each region. This leads to a decentralized system in which freight projects are primarily selected by regional needs. This process has been effective.

However, selecting freight projects that are important both regionally and statewide will become increasingly difficult in the future. By 2030, total freight tonnage in Missouri is expected to increase by more than 37 percent. To account for this growth and to maintain the system, over \$65 million worth of project needs are identified in this Missouri State Freight Plan (see Chapter 9). However, transportation funds continue to decline. Missouri's Long Range Transportation Plan only identified \$14.4 billion available to fund projects for the *entire* Missouri transportation system. This Freight Plan is prepared, in part, to support transportation investment decision-makers as they face the tough decisions that will be required in the future.

To aggravate these challenges even further, the limited funding is subdivided into several small funds. Most of the funds are either constitutionally or statutorily limited to certain eligible project types. The lack of flexibility among these funds potentially limits the ability to use innovation or multimodalism to find the best and most cost-effective solutions to address Missouri's freight challenges.

State Road Fund

Missouri created the State Road fund to receive the first Federal-Aid Road funds in 1917. Today, this account is funded by Federal Highway Administration (FHWA) reimbursements, licenses, permits, and fees for motor vehicles and drivers; State sales tax on motor vehicles; cost reimbursements; and other miscellaneous fees. Expenditures from this fund are constitutionally limited to State highway projects (and supporting activity).

State Highways and Transportation Department Fund

The State Highways and Transportation Department Fund (commonly referred to as the highway fund) is funded by the motor fuel tax and licenses, permits, and fees for motor vehicles and drivers. The current State motor fuel tax (gasoline, gasohol, and diesel) is 17 cents per gallon. The last increase in

⁴ <http://www.midamericaport.com/history/>

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the State motor fuel tax was in 1996. Similar to the road fund, the highway fund can be used only for costs associated with State highway projects and the enforcement of motor vehicle laws and traffic laws.

State Transportation Fund

The State Transportation Fund is funded by one percent of the overall 4.225 percent State sales tax on motor vehicles. Unlike the highway and road funds, the State transportation fund is limited to non-highway investment. It can be used to invest in air cargo, railroads, ports, and waterway projects. Most recently, this fund has been used to create the Freight Enhancement Program and provide funds for the administration, planning, and development of local port authorities. The Freight Enhancement Program funds freight projects that improve the efficiency of freight between two modes, excluding highways.

Port Capital Improvement Program

The Port Capital Improvement Program was established to fund transportation-related capital projects at Missouri's local public port authorities. The program is funded by annual General Revenue allocations. However, funding has been very sporadic. While \$3 million was available in 2014, funding was unavailable between 2010 and 2013. It was recently announced by the Governor's office that 2015 funds will be restricted due to revenue shortfalls. The inconsistency in funding makes it difficult to plan and/or leverage these funds.

Aviation Trust Fund

The Aviation Trust Fund is 100 percent user-funded through a fee on aviation fuel and a portion of the State sales tax collected on jet fuel. The fund is used to match the Federal Aviation Administration's Airport Improvement Program (AIP). The program provides funding to public use airports across the State. In particular, commercial airports receive funds based on the number of annual passenger boardings and on the landed weight of air cargo. Expenditures from this fund are limited to maintenance of AIP-eligible runways, taxiways, and aprons and for emergency repairs on safety-related items.

Grade Crossing Safety Fund

MoDOT has a long-standing partnership with the railroads to improve grade crossings across the State. The State's 3,800 public grade crossings are evaluated and ranked by a hazard exposure index. Annually, MoDOT uses this index to select 30 to 35 grade crossings to be improved using federal safety funds and Missouri's Grade Crossing Safety Account. The account receives funding from a State motor vehicle licensing fee. Since 1996, the program has resulted in an estimated 81 percent decrease in crashes.⁵

⁵ http://www.modot.org/plansandprojects/construction_program/STIP2012-2016/documents/Seco7_MultimodalOperations.pdf section 7-12

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Railroad Expense Fund

The Railroad Expense Fund is funded by assessments collected from intrastate railroads for the expenses of regulation. The fund is devoted to the payment of expenditures incurred by state agencies for the regulation of railroads.

State Transportation Assistance Revolving (STAR) Fund

The STAR Fund was established to provide loans to political subdivisions (local governments) of Missouri and not-for-profit organizations to develop non-highway related transportation projects. Each loan has been generally limited to \$1 million. While the program funds waterway, railroad, and mass transit projects, the majority of the loans have been used to support small general use airports, where they have been used to build hangars and other small projects not eligible for funding through the Aviation Trust Fund.

Federal Funding Limitations

Federal funding has clear limitations. While USDOT has embraced multimodalism on the whole, funding programs are still administered by mode. Furthermore, many programs are very specific on their applicability and present the same lack of flexibility as state funding.

For example, USACE is charged with maintaining the Missouri and Mississippi Rivers' locks and dams, channel depth, and navigability. However, USACE is not enabled to make necessary changes because Congressional priorities are on traditional surface transportation projects. Likewise, funding from other modal administrations that serve the same general purpose cannot be used to invest in maritime improvements. This is particularly challenging for the aging lock and dam system that can shut down all movement on a river if the system fails.

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Complexity in Freight Planning

Freight planning is among the most complex activities that MoDOT undertakes. MoDOT is tasked with supporting and expanding a multimodal freight system that, in some cases, is outside MoDOT's jurisdiction or MoDOT is statutorily limited in its ability to fund. All while overall transportation funds continue to dramatically decline. MoDOT has succeeded in navigating these complexities in the past. This is particularly crucial because a freight strategy will not work without the coordination and support of all aspects of MoDOT and its freight partners.

MoDOT is charged with several freight-related tasks:

- Build, maintain and operate over 33,000 miles of roads and over 10,000 bridges
- Permit, regulate, and enforce commercial vehicle laws (including commercial vehicle weight and development state enforcement plan)
- Regulate railroad safety and intrastate railroad companies
- Administer airport funding
- Administer State funding for public port authority administrative and capital budgets

Because of the long history of partnerships throughout the State to accomplish these tasks and to support and enable public and private partners, MoDOT is the natural leader to champion the future of the Missouri multimodal freight system. With this in mind, the Missouri State Freight Plan establishes a series of strategic recommendations and tactics for MoDOT to guide its future work.

Strategic Recommendations

It is critical to the State's economic future that the Missouri State Freight Plan be an actionable and implementable plan. To accomplish this, 14 strategic recommendations were developed to support the freight plan's goals, listed in **Table 7-1**. The recommendations include broad-based policies and programs, as well as projects and studies that will help MoDOT overcome challenges documented in the plan and capture future economic opportunities. Each of the strategic recommendations are supported by a series of implementation tactics (see Chapter 9) that can serve as a potential "to-do" list for MoDOT officials as they work day-to-day to execute the plan. While some of the tactics are long-term projects, several are immediately actionable.

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Table 7-1: Potential Strategies to Achieve Goals and Objectives

	Missouri State Freight Plan Goals and Objectives			
	Maintenance	Safety	Economy	Mobility and Connectivity
Strategic Policy Recommendations				
Work with MoDOT internal and external partners to improve multimodal connectivity			✓	✓
Focus on maintaining a state of good repair of the multimodal system	✓		✓	
Cultivate a long-term focus to develop comprehensive freight corridors	✓	✓	✓	✓
Take a pragmatic approach to highway system capacity expansion, given financial constraints	✓		✓	✓
Improve the availability of truck parking		✓		
Enhance the resiliency and maintain flexibility of the multimodal freight system to adapt to quickly changing needs		✓	✓	✓
Improve multimodal safety		✓	✓	✓
Improve the health, safety, and welfare of truck drivers		✓	✓	✓
Capitalize on the momentum created by <i>Freight on the Move</i>	✓	✓	✓	✓
Invest in freight infrastructure and operational improvements to drive long-term job creation			✓	
Enhance Missouri's ability to export goods			✓	✓
Expand interagency collaboration and coordination	✓	✓	✓	✓
Use technology to improve freight movement	✓	✓	✓	✓
Develop opportunities for maritime and air cargo			✓	✓

Chapter 8 - The Decision-Making Process

KEY POINTS

- One of the most important products of this Missouri State Freight Plan is a consistent process to prioritize freight investments (projects).
- The process incorporates the needs and conditions of all freight modes as well as land use, economic development, safety and economic impacts to rank projects based on criteria that reflect the Freight Plan goals.
- Stakeholder input helped shaped the prioritization process so that process reflects what matters most to the people and businesses of Missouri.

Introduction

Fewer dollars are available to preserve and maintain the existing freight transportation system and meet the increasing freight demands of Missouri's businesses. This Missouri State Freight Plan defines a prioritization process to provide information that will help decision-makers choose the strategic freight investments that best support the transportation goals of the State.

The Need to Prioritize Projects

Freight transportation represents a key economic competitiveness factor for Missouri. Companies depend on the efficient and cost-effective movement of materials, components, and finished goods to and from their operations. As the transportation needs of businesses and their customers continue to evolve, companies are more dependent than ever on an integrated and reliable multimodal freight transportation network. Today, Missouri businesses and industries compete not only on the basis of product quality and cost. Their transportation networks must provide reliable connections to customers, access to diverse domestic and international markets, and ensure timely deliveries that meet or exceed the consumer's expectations.

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The transportation assets that make up Missouri's freight network are critical to the State's economy. If the freight network fails, the economy will fail. Funding for transportation is seriously constrained; as a result, funding for investments needed to sustain the existing freight network and provide additional capacity to meet the increasing freight volumes may not be available. Decision-makers are faced with fewer dollars to preserve and maintain the existing transportation system and meet the growing freight demand required to support Missouri's businesses.

To help decision-makers make the best strategic investment choices, a freight project prioritization process was developed. This prioritization does not take the place of the decision-maker's assessment; rather, it is an additional tool to aid in the evaluation of future freight projects. The project prioritization process was designed to help identify projects that will best support the safety, connectivity, and mobility of the Missouri Freight Network and promote economic development and prosperity for Missouri's people and businesses.

Implementation of this prioritization process will help ensure Missouri's multimodal freight network remains a distinguishing feature of the State's economic success.

Inputs to the Prioritization Process

The prioritization process builds upon and reflects the goals and performance measures identified in Missouri's Long Range Transportation Plan and this Missouri State Freight Plan, and incorporates input from hundreds of key stakeholders.

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Freight Plan Goals

The prioritization process was developed to reflect the four goals of this Freight Plan. Projects were screened to ensure they were consistent with and would achieve progress towards one or more of the goals. These goals are:

- **Maintenance** – Maintain the freight system in good condition by keeping highways and bridges in good condition and supporting the maintenance of railways, waterways, airports, and multimodal connections.
- **Safety** – Improve safety on the freight system by decreasing the number and severity of crashes involving commercial vehicles and improving safety at railroad crossings.
- **Economy** – Support economic growth and competitiveness in Missouri through strategic improvements to the freight system.
- **Connectivity and Mobility** – Improve the connectivity and mobility of the freight system by reducing congestion and increasing reliability on the roadways; by supporting improved efficiency of rails, waterways, and airports; and by improving connections between freight modes.

Performance Measures

Performance measures are used across the transportation industry to evaluate transportation systems and agencies. The Missouri Department of Transportation's (MoDOT's) rich history in performance measurement and management is best exemplified by Tracker, the department's quarterly performance measure publication.

For the Freight Plan, performance measures were established to assist with plan development, implementation, and accountability. With Tracker as the foundation, and through consultation with the Freight Steering Committee made up of key stakeholders and MoDOT leadership, a limited number of strategic performance measures were identified for each of the four goals. These measures, summarized in **Figure 8-1**, provide insight into the project selection prioritization process by establishing how freight performance is and will be measured in Missouri.

Figure 8-1: Missouri State Freight Plan Performance Measures

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Freight Plan Goal	Recommended Measures
Maintenance Maintain the freight system in good condition	<ul style="list-style-type: none">• Percent of the major highways in good condition*• Percent of structurally deficient deck area on National Highway System bridges*
Safety Improve safety on the freight system	<ul style="list-style-type: none">• Number of commercial vehicle crashes resulting in fatalities or serious injuries*• Rail crossing crashes or fatalities*
Economy Support economic growth and competitiveness	<ul style="list-style-type: none">• Goods movement competitiveness*• Job and economic growth by key sector, including:<ul style="list-style-type: none">○ Agriculture○ Manufacturing○ Transportation/Logistics
Connectivity and Mobility Improve the connectivity and mobility of the freight system	<ul style="list-style-type: none">• Freight tonnage by mode*• Annual hours of truck delay*• Truck reliability index*

* These or similar measures have been established in MoDOT's Tracker

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The Freight Network

The Missouri Freight Network was designated to help decision-makers choose the best strategic investments for freight transportation. The Missouri Freight Network includes the significant statewide and multiregional transportation assets—highways, freight rail, intermodal facilities, ports, and airports—most critical to the movement of freight and goods in the State. The network was developed based on the Freight Plan goals and performance measures, and responds in part to *the Fixing America's Surface Transportation (FAST) Act* Primary Freight Network and Critical Rural Freight Network.

The top three tiers of the Missouri Freight Network, as discussed in Chapter 3, is the foundation of the state's multimodal prioritization process because they serve as the first screening filter in the project selection process. In order for a highway project to be considered it must be on the top three tiers of the highway network. This approach focuses freight investment decisions on the multimodal corridors that are most critical.

Freight Partners' Insight

Freight movement in Missouri is impacted by a number of public and private sector organizations, agencies, and businesses. It is, therefore, increasingly important to engage a broad cross-section of stakeholders in planning for the State's freight infrastructure. The prioritization process was developed with the help of key stakeholders who participated in freight forums, business forums, steering committee meetings, surveys, and webinars as part of the freight planning process.

Stakeholders offered varied perspectives on changing freight transportation needs, existing system conditions, critical domestic and international market destinations, and strategies to optimize the benefits of the multimodal transportation network. These insights were vital to establishing what matters most to the people and businesses of Missouri.

The Prioritization Process

As available funding for transportation becomes more constrained, decision-makers need better information to help make the most strategic investment choices. Project prioritization provides a reasoned approach to evaluating competing needs and conditions in order to identify transportation investments that best position Missouri to meet the freight needs of tomorrow. The prioritization process developed for the Missouri State Freight Plan, shown in **Figure 8-2**, incorporates all transportation modes as well as land use, economic development, safety, and economic impacts in order to rank projects based on criteria that reflect the Freight Plan goals.

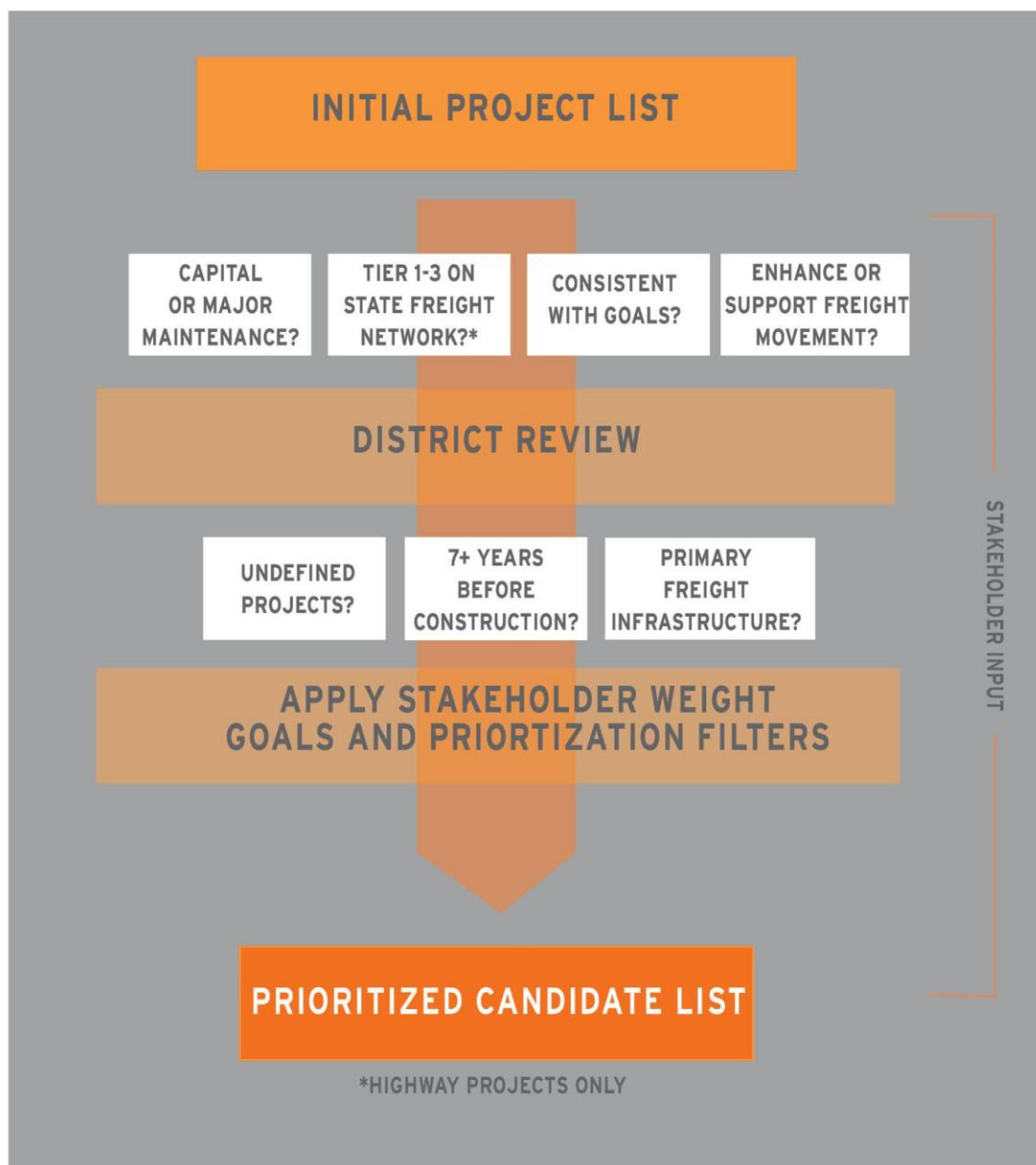
The Missouri State Freight Plan prioritization process included four steps:

- **Step 1** – The initial step evaluated and refined a list of potential projects. A three-tiered process was used to screen projects to determine which would be prioritized.
- **Step 2** – The second step in the prioritization process generated a gap analysis to identify projects that were missing from the initial list of potential investments. These were added to the project list.

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- **Step 3** – In step three, a prioritization framework was developed to define prioritization filters, project scoring factors, data sources, and scoring methodologies for each mode.
- **Step 4** – The last step in the process analyzed each project on the final list and produced a scoring classification for every project. Feedback from community stakeholders, MoDOT district staff, the Freight Steering Committee, and freight stakeholders was used to refine the final list of projects.

Figure 8-2: Project Prioritization Process



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Defining the Freight Projects

Determining an initial project list is an important step in any prioritization process. For the prioritization process, a potential freight project must fit in one of the following categories:

- **Freight focused** – The primary purpose of the project is to address a specific freight transportation need.
- **Freight related** – The primary purpose of the project is to address multiple transportation concerns, of which freight is one element.
- **Freight impacted** – The primary purpose of the project is to address general transportation needs; however, freight mobility may be positively affected.

The initial list of potential freight projects included 3,800 projects from across the State. These projects came from the Statewide Transportation Improvement Program, modal plans, Missouri's Long Range Transportation Plan, Metropolitan Planning Organization plans, freight forums, interviews, business forums, MoDOT district offices, and stakeholders and planning partners. A three-tiered process was used to refine the list of potential projects.

Tier one screening used four filters to refine the initial project list:

- Projects are located on, linked to, or within the prescribed buffer of the Missouri Freight Network (see Chapter 3).
- Projects are capital expenditure projects or major maintenance projects. Major maintenance projects are high-cost, replace-in-place projects; they do not include routine maintenance. General maintenance, operations, and planning projects were captured for further evaluation, but were not included in the prioritization process.
- Projects are consistent with the goals and the modes incorporated in the Freight Plan.
- Projects enhance and support the movement of freight.

The tier one screening process reduced the initial freight project list to approximately 480 projects.

In the tier two screening process, the remaining candidate projects were reviewed by each of the MoDOT district offices. Projects were added or deleted based on criteria determined by the districts. Participants at each of three business forums were asked to suggest additional projects, and these were added to the project list.

The tier three screening process identified projects that were determined to be speculative. Projects on the list were screened to remove:

- Projects with descriptions too general to define or locate
- Projects requiring 7 or more years before initiation of construction (a list of longer-term projects was captured for future consideration)
- Interchange projects that did not serve freight-related activities (based on the percentage of truck volumes on the primary corridors)
- Planning studies (planning projects captured from the project lists for future freight project studies are included in Chapter 9)

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- General maintenance projects
- Statewide planning projects
- Projects that did not support freight-related activities

At the close of this tier three screening process, approximately 122 projects remained on the project list. Projects deleted during the screening process were captured for consideration in the next generation of freight projects, and for further consideration as future planning and initial program review projects.

The Prioritization Framework

Once the list of 122 projects was compiled, prioritization filters and project scoring factors were used to evaluate and prioritize each project. Twenty-nine filters and project scoring factors were identified for the four freight modes (road, rail, water, air). The filters were the general criteria for prioritization while the scoring factors were how each filter was measured.

Filters were weighted to reflect the goals of the Missouri State Freight Plan—maintenance, safety, economic development, and connectivity and mobility. These filters were discussed in stakeholder meetings, and based on stakeholder feedback, several scoring factors were deleted from the prioritization process and other scoring factors were determined to be more important.

The economic impacts of freight activity in Missouri were calculated in a process that integrates TRANSEARCH® commodity information, an IMPLAN economic model for Missouri, and indirect and induced economic impacts.

The process used quantitative data when it was practical and available. Data for each transportation mode was collected from a number of sources including MoDOT, Federal Highway Administration, and reliable geographic information system resources, TRANSEARCH® data, the U.S. Census, and the U.S. Department of Commerce. Geospatial analysis was also incorporated into the process.

Tables 8-1 through **8-4** show the prioritization filters used for each of the four transportation modes included in the process.

Table 8-1: Highway Mode Prioritization Filters

Freight Plan Goal	Prioritization Filter
Safety	<ul style="list-style-type: none">• Reduces number of substandard bridges• Improves high truck crash location
Connectivity and Mobility	<ul style="list-style-type: none">• Improves bridges with vertical clearance or weight restrictions• Addresses freight bottlenecks• Improves multimodal connections

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	<ul style="list-style-type: none"> Improves capacity
Economic Development	<ul style="list-style-type: none"> Improves connection to top freight generators Economic link scores
Major Maintenance	<ul style="list-style-type: none"> Project maintains existing freight network

Table 8-2: Freight Rail Mode Prioritization Filters

Freight Plan Goal	Prioritization Filter
Safety	<ul style="list-style-type: none"> Improves rail safety
Connectivity and Mobility	<ul style="list-style-type: none"> Adds capacity to improve rail bottlenecks Improves vertical clearance Improves rail access to intermodal or transload facilities
Economic Development	<ul style="list-style-type: none"> Improves rail access to ports Improves rail access to freight generators Improves rail access to certified industrial sites Economic link scores
Major Maintenance	<ul style="list-style-type: none"> Project maintains existing freight network

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Table 8-3: Ports Mode Prioritization Filters

Freight Plan Goal	Prioritization Filter
Safety	<ul style="list-style-type: none">• 2013 port projects scoring includes projects that address all goals
Connectivity and Mobility	<ul style="list-style-type: none">• Establishes or improves rail-port intermodal facilities• Improves on-port facilities for increased throughput
Economic Development	<ul style="list-style-type: none">• Supports retention or expansion of business• Economic link scores
Major Maintenance	<ul style="list-style-type: none">• Project maintains existing freight network

Table 8-4: Aviation Mode Prioritization Filters

Freight Plan Goal	Prioritization Filter
Connectivity and Mobility	<ul style="list-style-type: none">• Improves access to air cargo facilities• Expands aviation freight services• Increases air cargo operations
Economic Development	<ul style="list-style-type: none">• Supports or expands aviation/land use for air cargo operations
Major Maintenance	<ul style="list-style-type: none">• Project maintains existing freight network

Results

Each project was classified as very high, high, medium, or low priority.

The prioritization process ranked 19 projects as very high priority; of which 14 were highway projects and five were rail projects. Most of the 19 projects addressed capacity and safety issues, and the remaining projects improved intermodal connectivity. Projects were located in five of the MoDOT districts or represented I-70 improvements to the statewide network. The estimated cost of these

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projects exceeded \$5 billion. (Note that costs for two significant I-70 statewide project segments were not available, and thus are not included in this overall cost information.)

The process ranked 34 projects as high priorities, and they represent all of the freight modes. Projects in this category addressed mobility and capacity needs, safety concerns, I-44 statewide improvements, modernization of air cargo facilities, and access to ports and industrial parks. These projects are located in all seven MoDOT Districts, and project costs range from \$300,000 to over \$2 billion. A list of projects is included in Appendix G.

This project prioritization process developed for the Missouri State Freight Plan can be reapplied in the future and can be modified as new resources, data, and needs are identified. The prioritization process can evolve over time to reflect the needs of business, freight stakeholders, and MoDOT.

Each year during development of the Statewide Transportation Improvement Plan (STIP) transportation needs are identified in conjunction with the planning partners. Projects that are ready for construction and have available funds are then programmed in the next STIP. MoDOT does not fully program years four and five of the STIP, therefore National Highway Freight Program (NHFP) funds are not 100% programmed in the latter years. Any freight-focused needs (funded or unfunded) identified through the STIP process, from partners and from system and network analysis are appended to the Missouri State Freight Plan Appendix G.

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KEY POINTS

- To make this Freight Plan actionable and implementable, fourteen strategic recommendations were developed to address the freight plan's goals and are supported by a series of implementation tactics.
- These recommendations include broad-based policies and programs, as well as projects and studies that will help Missouri overcome the challenges outlined in this plan and capture future economic opportunities.

Introduction

Missouri's freight network continues to be the foundation of the State's economic success. Freight supports jobs in freight-dependent businesses such as manufacturing, retail trade, agriculture, and tourism. For the most part, this transportation infrastructure was constructed many years ago. The cost to maintain the system continues to increase and the demands on the system continue to grow. To compete in the 21st century global economy, Missouri must find a way to make the strategic investments in its freight network that are necessary to support economic growth.

Smart programs, policies, and projects can help the Missouri Department of Transportation (MoDOT) continue to maintain and enhance the multimodal freight system upon which the State's economy depends. The strategies and recommendations presented in this Missouri State Freight Plan include major investments in freight transportation infrastructure, as well as low-cost programs and policies designed to enhance freight operations and freight-supported economic development in the State.

Program Recommendations

The following is list of program recommendations developed for the Missouri freight transportation system. Each recommendation can be implemented as a stand-alone initiative.

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However, there are synergies among these initiatives and when implemented in a collective manner the effectiveness may be magnified.

Maintain and improve the designated Missouri Freight Network to ensure the freight system continues to move toward achieving the transportation goals identified in the Missouri Long Range Transportation Plan and the Missouri State Freight Plan. The proposed freight network is identified in Chapter 3. An initial list of prioritized freight projects is discussed later in this chapter and included in Appendix G. Missouri needs to further evaluate alternative funding and financing sources to ensure the Missouri Freight System is preserved and maintained, and critical high priority improvements are implemented. Chapter 10 includes some starting points for this analysis. For modal investments planned for, owned by, and maintained by private businesses, MoDOT should continue to work with these private businesses to ensure the State's multimodal freight network supports the ongoing needs of the State's businesses and residents.

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Use MoDOT's freight project prioritization framework to help decision-makers prioritize future investments on the freight network. Under the *Moving Ahead for Progress in the 21st Century Act* (MAP-21), states are directed to identify freight projects in a statewide plan. The MoDOT freight prioritization process, developed as a part of this Freight Plan, provides a framework for evaluating and prioritizing key multimodal freight projects using both quantitative and qualitative data and analysis. Chapter 8 describes this prioritization process in detail. This is the first-generation freight prioritization process for MoDOT; future refinements and additional quantitative data inputs may be incorporated over time to improve the process and enhance project evaluation.

Expand performance measures. MoDOT should continue to expand its Tracker performance measures and consider incorporating future data into the prioritization process. MoDOT should work with its modal offices to identify other freight data needed to support the prioritization process.

Expand ongoing collaboration with the Missouri Department of Economic Development (MDED) to address specific freight transportation needs of targeted industries. Identify clusters of targeted industries within the State and the transportation issues facing each industry sector. Work with MDED, Metropolitan Planning Organizations (MPOs), Regional Planning Commissions (RPCs), and regional economic development agencies to develop and fund projects that will address the transportation needs of these industry clusters.

Assist in developing freight and land use guidance. This guidance can facilitate creation of freight supportive land use policies and guidelines to ensure practical freight considerations are incorporated in local planning and design efforts, promote good neighbor development strategies for freight facilities, support safe practices, and help communities and local governments better understand how land use practices can improve freight and community development linkages.

Increase awareness about economic development and freight. Residents generally do not recognize the important role freight plays in their jobs, in the economic well-being of their communities, and in many aspects of everyday life. In order for elected officials to support increased investment in freight infrastructure, residents must recognize why these investments are important to them and to the State, and must appreciate the tangible benefits that would result from these investments. Education that clearly establishes the link between Missouri's freight system, the State's economy, and community sustainability is a key factor in future freight infrastructure funding. Integrating green initiatives and environmental quality in this discussion can also help address community concerns regarding social equity and quality.

Continue to engage the Missouri Chamber of Commerce, Missouri Economic Development Council (MEDC), Missouri Association of Manufacturers, private sector freight stakeholders, MPOs and RPCs, and related organizations. Ongoing stakeholder engagement can develop a public information exchange with MPOs, RPCs, planning organizations, economic development agencies, and other State, regional, and local groups about the role of freight transportation in the State and regional economy.

Host an annual Freight and Economic Development Roundtable. This program would enhance the exchange of information and communicate about current freight and



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development issues and opportunities. This effort would be in addition to the Freight Advisory Committee (FAC). It could offer an opportunity for small group roundtable discussions and presentations on key issues, and would promote broader understanding regarding the links between freight and economic development.

Consider developing a public-private partnership program to facilitate development of freight infrastructure, terminals, and intermodal facilities. Public-private partnerships could be used for rail and intermodal facility improvements critical to the State but that may not solely align with private investment criteria. Funding from MoDOT would leverage targeted private investments in rail infrastructure to address significant freight rail capacity issues within the State and rail bridges at major river crossings.

Identify and preserve critical multimodal freight-intensive development nodes and adjoining industrial land assets. This companion program to the Missouri Certified Sites Program would focus on identifying and preserving key locations where strategic multimodal freight assets and available industrial land could be reserved for future freight-intensive development such as intermodal freight terminals and major manufacturing facilities including aerospace, automotive, and similar operations. One of the greatest challenges facing freight-intensive businesses today is the lack of suitable and available industrial land that is readily and efficiently served by freight infrastructure, particularly multimodal services. Often, land adjacent to valuable freight infrastructure has been developed for incompatible uses including retail, commercial, or even residential purposes.

Partner with agencies already involved in the Certified Site Program, including MEDC and regional power utility firms. MoDOT freight staff and private transportation partners could provide geographic information system data and valuable information from the Freight Plan to be integrated with site and non-transportation infrastructure data. If strategic freight-intensive sites are identified, these partners should work with State, local, and regional transportation and economic development partners as well as private partnerships to preserve freight-intensive sites. To help with this, planners can analyze the inventory of industrial land with proximity to strategic multimodal freight assets. This inventory can be used to develop a model Freight and Industrial Facilities Planning Guide to help planning organizations, cities and counties, developers, and economic development agencies identify freight supportive land use strategies and best practices. These land use strategies and best practices encourage better land use and development to accommodate the needs of freight-intensive businesses.

Policy Recommendations

A critical step in building an implementable plan is to understand the overall framework and interactions among the stakeholders who carry out the various aspects of Missouri's supply chains. This process started with an extensive outreach effort called *Freight on the Move*. While the outreach was underway, the MoDOT team evaluated current freight policies to identify the potential opportunities

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and shortcomings of the current system.

Based on this information as well as information from the Missouri Long Range Transportation Plan, three plausible but extreme future scenarios were developed to help the Freight Steering Committee evaluate and discuss the future of freight transportation in Missouri. Considering these alternate scenarios enabled MoDOT leadership and freight stakeholders to discuss trade-offs, nuances, and cause-and-effect relationships that would not be identified in a traditional planning process. By working through the alternate future scenarios, stakeholders identified common needs that are likely to be relevant no matter what the future may hold.

The three scenarios examined are shown in **Table 9-1**. Additional details are contained in Appendix F.

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Table 9-1: Future Scenarios Considered

SCENARIO	Hungry World	Global Market	Convenient Living
DESCRIPTION	Missouri will play a major role in feeding the ever-increasing world population (35% increase by 2050). As a top 10 agricultural producer in the United States, Missouri's role in feeding the world will continue to require changes in how freight moves.	The current global trend of re-shoring manufacturing will continue. Given Missouri's manufacturing sector's history, this would elevate Missouri's position in the global marketplace.	Freight movements will change as people drive considerably less—seeking to work from home and live in communities where they can walk to jobs, schools, and other services. For example, more shopping will be done online with increasing residential deliveries, resulting in the decrease of traditional shopping trips.

The scenario planning results were used to guide further policy research and establish 14 strategic policy recommendations to support Freight Plan goals. These recommendations are shown in **Table 9-2**. Each recommendation is supported by a series of implementation tactics, designed as a potential to-do list for MoDOT and its freight partners. The tactics represent broad-based policies and programs as well as future projects or studies that Missouri should consider undertaking to position the State to capture future opportunities. Many of the tactics are long-term solutions, but several are immediately actionable. Tactics are grouped by realistic timeframes for implementation—short-term (0-2 years), intermediate (2-6 years), and long-term (6-10 years).

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Table 9-2: Strategic Policy Recommendations and Implementation Tactics

STRATEGY 1: Work with MoDOT Internal and External Partners To Improve Multimodal Connectivity	
Implementation Tactics	Timeframe
Update Federal Highway Administration Functional Classification (attention paid to locating all intermodal connectors)	Short-Term
Partner with local governments and private partners to proactively manage the condition of intermodal connectors and connectivity points	Short-Term
Develop a program to educate local officials on the importance of intermodal connectors	Short-Term
Work with MoDOT districts to identify district staff members interested in cross-training in multimodal freight	Short-Term
Work with local officials to mitigate negative impacts of the projected increase in truck traffic volumes	Intermediate
Identify and close any first or last mile gaps near major manufacturing hubs and multimodal connectivity points	Intermediate
Ensure public investments in modal connectivity will connect and enhance logistical partnerships	Intermediate
Work with rail, marine, and air partners to share expertise and create cross-functional relationships to help identify non-highway projects and key connectors on the strategic freight network	Intermediate

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STRATEGY 2:

Focus on Maintaining a State of Good Repair of the Multimodal System

Implementation Tactics	Timeframe
Focus investment in corridors that exhibit a strong correlation between truck vehicle miles traveled and substandard pavement and bridge ratings on the Tier 1, 2, and 3 highway freight network	Short-Term
Mitigate disruptions along critical freight corridors by proactively analyzing bridge inspection reports for unfavorable trends; pay particular attention to corridors without recognized route redundancy	Short-Term
Monitor the MoDOT Tracker to identify system challenges before they impact freight flow	Short-Term
Proactively protect MoDOT assets from potential freight-related incidents; identify potential barriers restricting freight movements, plan work zones, and detours to handle freight vehicles, etc.	Short-Term
Develop minimum design standards for facilities publicly funded on the multimodal Missouri Freight Network	Intermediate
Develop a plan for weigh station maintenance and safety precautions	Intermediate
Continue to work with the railroads to identify opportunities and solve unique rail challenges around the State	Intermediate
Work with the U.S. Army Corps of Engineers (USACE) to dredge slack harbors and replace aging locks and dams on the Mississippi River	Intermediate

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STRATEGY 3:

Cultivate a Long-Term Focus to Develop Comprehensive Freight Corridors

Implementation Tactics	Timeframe
Partner with the private sector to identify and designate future multimodal, oversize, and overweight corridors	Intermediate
Identify and catalog challenges along these key corridors (geometric, bridge, design, and regulatory)	Intermediate
Identify where non-traditional capacity building improvements may significantly reduce congestion (Intelligent Transportation Systems [ITS], managed lanes, value pricing)	Intermediate
Focus on development of north-south and east-west connectivity, including railroad improvements over the Mississippi River	Long-Term

STRATEGY 4:

Take a Solutions-Based Approach to Highway System Capacity Expansion

Implementation Tactics	Timeframe
Partner with the private sector and local governments to identify and implement operational changes to improve freight flow (routing, off-hours delivery, etc.)	Short-Term
Continue to evaluate innovative designs that provide added capacity with limited impacts (diverging diamond interchanges, super-twos, superstreets, etc.)	Short-Term
Continuously evaluate the practical use of innovative solutions to alleviate capacity constraints (dedicated truck lanes, container shuttles, container-on-barge, etc.)	Short-Term
Implement a policy that requires the consideration of cost-effective methods of capacity expansion before building new lane-miles	Intermediate
Examine dedicated facilities for non-freight activity that will serve to restore capacity for freight movement (managed lanes, etc.)	Intermediate
Implement a policy that requires the consideration of available multimodal capacity before building new lane-miles	Long-Term
Study the feasibility of value pricing to fund construction of new lane-miles	Long-Term

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STRATEGY 5:

Improve the Availability of Truck Parking

Implementation Tactics	Timeframe
Study the placement and availability of public and private truck parking spaces	Short-Term
Partner with the Highway Patrol to develop an education and enforcement program to reduce prohibited parking where parking facilities are readily available	Intermediate
Use technology to provide real-time parking availability at upcoming public and private facilities	Intermediate
Increase overall truck parking capacity along key corridors (public and private)	Long-Term

STRATEGY 6:

Enhance the Resiliency and Maintain Flexibility of the Multimodal Freight System

Implementation Tactics	Timeframe
Plan an annual freight workshop to complete a multimodal system SWOT (strengths, weaknesses, opportunities, and threats) analysis with key statewide stakeholders and partners; this can be done as part of the Freight and Economics Roundtable	Short-Term
Develop a multimodal freight resiliency plan in partnership with the private sector, MPOs, RPCs, homeland security, and safety stakeholders	Intermediate
Review the potential use of time-of-day truck restrictions through major chokepoints	Long-Term
Evaluate, rank, and widen one-lane bridges to increase the safety of rural last-mile trips	Long-Term

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STRATEGY 7:

Improve Multimodal Safety and Security

Implementation Tactics	Timeframe
Encourage participation of freight stakeholders in the development of future MoDOT Safety Plans	Short-Term
Ensure that bicycle and pedestrian accommodations are considered in the purpose and need process of future grade separations and railroad crossing improvements	Short-Term
Work with the private sector to strategically locate and develop areas for secure cargo and container storage	Intermediate
Work with legislators and the railroads to maintain and expand the successful MoDOT Highway/Rail Crossing Safety Program	Long-Term

STRATEGY 8:

Improve the Health, Safety, and Welfare of Truck Drivers

Implementation Tactics	Timeframe
Transfer lessons learned from this Freight Plan to workforce development officials and efforts	Short-Term
Conduct speed studies along major truck corridors to identify potential speed limit changes	Short-Term
Shift construction activities to overnight when possible	Short-Term
Using the lessons from the 2010 Commercial Vehicle Safety Belt survey, develop an outreach strategy to increase restraint use by truck drivers	Intermediate
Work with MPO partners to improve the physical relationship between interstates and local roads in urban areas	Long-Term

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STRATEGY 9:

Capitalize on the Momentum Created by *Freight On The Move*

Implementation Tactics	Timeframe
Continue conversation with private sector stakeholders by creating a Freight Advisory Council (FAC)	Short-Term
Transition private sector partners into the MoDOT planning process, especially the FAC	Short-Term
Work with regional planning partners to develop regional FACs	Short-Term
Coordinate freight plans and programs of municipalities, counties, MPOs, and RPCs	Short-Term
Develop an outreach program to educate the public on the importance of Missouri's freight system to their daily lives	Short-Term

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STRATEGY 10:

Invest in Freight Infrastructure and Operational Improvements to Drive Long-Term Job Creation

Implementation Tactics	Timeframe
Work with Missouri Department of Economic Development and the Missouri Partnership to enhance connections with the Missouri Certified Sites program (vetted and supported shovel-ready sites designated by the State DED)	Short-Term
Leverage private sector investment to gain political support for investment in non-traditional project types	Short-Term
Explore use of a rail bank to preserve rail corridors for future needs	Short-Term
Evaluate programs like in- lieu fees for their ability to encourage short-line investment	Short-Term
Monitor neighboring states' truck licensing fees to limit leakage from trucks that may register in nearby states with lower fees, but travel mostly in Missouri	Short-Term
Continue to explore the use of private activity bonds to improve multimodal connectivity facilities	Short-Term
Ensure planning and project selection processes consider rural accessibility and just-in-time performance	Intermediate
Streamline and work to reinstate the Rapid Response Cost-Share program	Intermediate
Study the feasibility of alternative funding sources for future needs	Intermediate
Create a statewide programmatic freight selection process and work with districts to supplement district processes	Long-Term
Work with the legislature to study the potential for dedicating additional non-fuel-tax revenue for multimodal investment	Long-Term

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STRATEGY 11:

Enhance Missouri's Ability to Export Goods

Implementation Tactics	Timeframe
Work with statewide partners (MDED, local chambers, and modal partners) to develop infrastructure to support and market Missouri as a multimodal hub; North-south and east-west connectivity has the potential to leverage activities such as foreign trade zones	Short-Term
Prioritize investment within infrastructure corridors that are critical to developing Missouri's export market; to support export growth, the State must fully utilize its highway, rail, and inland waterway corridors	Intermediate
Work with economic development officials to develop opportunities that increase inbound trips; to support basic economic growth, the State must increase opportunities for backhaul container availability (empty trains, barges, and trucks that Missouri exports can fill)	Intermediate

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STRATEGY 12:

Expand Interagency Collaboration and Coordination

Implementation Tactics	Timeframe
Continue to support strong relationships between MoDOT districts and local government economic development staff	Short-Term
Continue to work with multijurisdictional and multistate partners to make corridor-wide system decisions, such as dedicated truck lanes	Short-Term
Provide transportation and land use guidance to local and regional agencies to support economic development and freight mobility	Short-Term
Collaborate with economic development partners to support the state DED focus on the Transportation and Logistics industry for business retention and growth	Short-Term
Work with other State agencies to ensure consistency of regulations that impact freight mobility	Intermediate
Work with agency partners to expedite the environmental permitting process while maintaining a focus on mitigating negative impacts	Intermediate

STRATEGY 13:

Use Technology to Improve Freight Movement

Implementation Tactics	Timeframe
Ensure freight stakeholders are involved in the development of future MoDOT Intelligent Transportation Systems (ITS) plans and architecture	Short-Term
Develop a common information protocol to increase the availability of real-time traffic data to assist in routing decisions by logicians and truck drivers	Intermediate
Improve resiliency (advanced ITS, Freight Advanced Traveler Information System, smart routing, etc.)	Intermediate
Expand the Missouri Smart Roadside Program to increase commercial vehicle enforcement throughout the State	Long-Term
Improve and expand ITS technology along key corridors to increase efficiency and reliability	Long-Term

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STRATEGY 14:

Develop Opportunities for Maritime and Air Cargo

Implementation Tactics	Timeframe
Market the availability of the inland waterway system, significant unused capacity, potential mode-shift opportunity	Short-Term
Work with USACE to improve inland waterway resiliency	Short-Term
Work with airport authorities of major air cargo facilities to create multijurisdictional partnerships to coordinate efforts surrounding airports (freight movement and redevelopment strategies); for example, there are several overlapping zoning requirements that hinder redevelopment near Lambert-St. Louis International Airport's air cargo facilities	Short-Term

Project Recommendations

The prioritization process (see Chapter 8) identified a list of priority projects. In addition to the projects in the final prioritized list, some projects that did not progress to the final prioritization process were captured for future consideration. These priority and non-priority projects are discussed below.

Priority Projects

The initial freight project prioritization process generated the prioritized projects list. The initial prioritized list included 76 highway projects, 15 freight rail projects, 3 aviation projects, and 28 port projects. Each of the seven MoDOT districts had projects that ranked either "very high" or "high" priority, demonstrating needs across the State. These projects are listed in Appendix G. Needs and projects identified after the adoption of *Freight On the Move* are appended annually to Appendix G in coordination with the STIP development.

Non-Prioritized Planning Projects

The Freight Plan recommends planning studies for 10 of the approximately 355 non-prioritized projects. These planning efforts would provide in-depth studies to better define transportation needs and improvements. Examples of planning projects are environmental studies, operational analysis, and corridor studies. **Table 9-3** shows the recommended planning projects.

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Table 9-3: Non-Prioritized Planning Projects

District	Type	Route	Project Description	Cost Information (Millions)
KC	Highway	I-35	Improvements from I-35/I-29 split to Rt. 69/33	\$200 - \$225
KC	Highway	US-50	Update the U.S. 50 corridor study. This should require a new interchange at US-50/MO-291 South, a new interchange at US-50/3rd Street and additional capacity of I-470 from US-50 to I-70. (New planning and design standards that employ current approaches to this type of road classification should be sought, especially in light of the exponential growth in Lee's Summit and associated increase in traffic.	\$.5 - \$1
SW	Highway	Joplin West Corridor	New West Corridor in Joplin metro area from MO-171 to I-44	Unknown
CD	Highway	US-63	Construct another Missouri River Bridge in Jefferson City to connect US-63 so traffic doesn't have to go on US-50 through Jeff City	\$55 - \$100
NE	Highway	US-54	Construct shared four-lane roadway from Mexico to Louisiana	\$80 - \$90
SL	Highway	I-44	New interchange at I-44 east of Shrewsbury (South County Connector)	\$45 - \$55
SL	Highway	I-44	Corridor improvements from Shawneetown Ford Rd and Route O, including interchange improvements at US-50	\$25 - \$50
SL	Highway	I-44	Corridor improvements between MO-141 and I-270	\$50 - \$60
SE	Highway	US-61	Construction of a bypass around the northwest side of Jackson is needed, perhaps beginning near County Rd. 335, going northeast and tying back into North High Street (US-61) at Rt. Y, or somewhere north of the Jackson North Industrial Park	\$6 - \$8
SE	Highway	US-63	Construct bypass of West Plains with no stop lights	\$50 - \$60

Gap Analysis Planning Projects

Additional projects identified from the American Transportation Research Institute (ATRI) top 100 Missouri truck bottleneck locations and high commercial vehicle crash rate locations were reviewed and captured for future evaluation. **Table 9-4** lists 12 non-prioritized planning projects for truck bottlenecks or the highest 25 percent of commercial vehicle crash rate locations.

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Table 9-4: Planning Projects for Truck Bottlenecks or the Highest 25 Percent of CMV Crash Rate Locations

District	Type	Route	Project Description	Cost Estimate (Millions)	Bottleneck and/or CMV Crash Rate
NW	Highway	I-29	Interchange improvements at Faraon Rd. in St. Joseph	\$1.5 - \$2.5	CMV
NW	Highway	I-29	Construct an interchange at Cook and I-29 in St. Joseph	\$15 - \$20	CMV
SW	Highway	I-49 loop	Intersection and access improvements on LP49 (Range Line Rd./Madison Ave.) from MO-171 in Webb City to I-44 in Joplin	\$3 - \$4	CMV
SW	Highway	MO-171	Intersection and access improvements on MO-171 (McArthur Drive) from Jefferson St. to Hall St. in Webb City	\$1.5 - \$3	BN
SW	Highway	MO-7 and MO-13	Corridor and safety improvements on MO-7/13 in Clinton.	Unknown	BN
SW	Highway	US-60	Super 2 highway from Monett to Springfield	Unknown	CMV
CD	Highway	US-50	Complete the four-lane of US-50 from west of Linn to Union	\$400 - \$450	CMV
CD	Highway	US-63	Construct four-lane roadway of US-63 from US-50 in Cole County to north of Rolla	\$250 - \$300	CMV
SL	Highway	I-270	Construct additional lanes on I-270 from US-67 to the Missouri River, MO-100 to I-64 and I-44 to MO-30	\$500 - \$700	Partial CMV and BN
SL	Highway	US-50	Add capacity from Progress Parkway to I-44	\$10 - \$15	CMV
SL	Highway	I-270	Corridor and operational improvements to address safety and mobility from McDonnell Blvd to MO-367. Includes adding capacity, improving interchanges, outer roads and access for transit users, bicycles and pedestrians.	\$300 - \$350	BN
SE	Highway	US-63	Upgrade US-63 to 4-lane from Rt. CC in Phelps County to US-60 at Cabool	\$215 - \$220	CMV

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Table 9-5 shows 29 ATRI truck bottlenecks and the highest 25 percent of commercial vehicle crash rate locations where no non-prioritized projects were listed. Each of these locations will require a planning study.

Table 9-5: Truck Bottlenecks and the Highest 25 Percent of CMV Crash Rate Locations with No Projects Identified

District	Route	To	From	Bottleneck Locations	Commercial Vehicle Crash Locations
NW	US-169	I-29	US-36	Yes	
NW	I-29	US-36	I-229		Yes
NW	US-36	I-29	I-229		Yes
KC	I-29	I-435	I-635		Yes
KC	I-435	I-35	I-70		Yes
KC	MO-291	I-35	MO-210		Yes
KC	MO-9	I-35	MO-210	Yes	
KC	Front St	I-29/35	I-435	Yes	
KC	22nd St	I-435	I-70	Yes	
KC	I-35	Kansas state line	I-670	Yes	Yes
KC	I-670	Kansas state line	I-35	Yes	Yes
KC	MO-13	I-70	US-24		Yes
SW	US-65	Marshall	Warsaw		Yes
SW	MO-13	US-54	I-44		Yes
SW	US-60	Kansas state line	I-49		Yes
SW	MO-744	US-65	Glenstone Ave.	Yes	
SW	BU-65	Chestnut Expy	US-60	Yes	
SW	Chestnut Expy	MO-13	US-65	Yes	
CD	US-50	US-54	California		Yes
CD	MO-763	I-70	BU-70	Yes	
NE	None Identified				
SL	Grand Ave	I-70	US-64	Yes	Yes
SL	Kings Highway	I-70	south of I-64	Yes	Yes
SL	MO-115 (Natural Bridge Ave)	Kings Highway	Goodfellow Blvd	Yes	Yes
SL	I-64	RT-K	I-55	Yes	
SL	US-67 (Lindbergh Blvd)	I-70	Illinois state line		Yes
SL	I-270	I-70	US-64		Yes
SL	I-55	I-44	I-270		Yes
SE	BU-67	in Poplar Bluff		Yes	
SE	US-63	US-60	West Plains		Yes

* Route not located on the Missouri Freight Network

** Route owned by local municipality

*** Route not located on the Missouri Freight Network and route owned by local municipality

Chapter 9 – Strategies and Recommendations

Conclusion

Missouri's freight network continues to be the foundation of the state's economic success. Freight supports jobs in targeted freight-dependent businesses such as manufacturing, retail trade, agriculture, and tourism. For the most part, this transportation infrastructure was constructed many years ago. The cost to maintain the system continues to increase and the demands on the system continue to grow. To compete in the 21st century global economy, Missouri must find a way to make the strategic investments in its freight network, as outlined in this chapter, which are necessary to support economic growth and foster the quality of life and place. At the same time, funding to maintain and improve publicly-owned transportation infrastructure is declining to perilous levels.

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KEY POINTS

- To implement this Freight Plan, people, businesses, organizations, and the State must work together to achieve economic success and improved quality of life. Success will require partnership with communities, economic developers, businesses, and other freight stakeholders willing to tackle real assignments and be responsible and accountable.
- By 2030 freight tonnage is forecast to increase by 37 percent.
- Current funding and financing sources and methods are not providing the resources we need to maintain, much less grow our freight transportation infrastructure to meet the needs of today and tomorrow.

The Missouri State Freight Network is the backbone of the State's economy, supporting the movement of goods and commodities, facilitating the retention and creation of jobs and setting the conditions for private investment, and enhancing the quality of life for Missourians. By 2030, total projected freight tonnage along Missouri's freight system is estimated to increase 37 percent. There is a need for capacity and maintenance improvements to relieve congestion and maintain the reliability of the network.

Maintenance of the multimodal freight infrastructure is critical to the State's economy and high priority improvements to the freight network will facilitate the movement of people and goods throughout the state to ensure businesses, which compete in an increasingly global marketplace, can promise just-in-time deliveries to customers around the world and can reliably deliver on that promise.

Future decisions regarding maintenance, safety, connectivity and mobility, and economic growth and competitiveness of the freight network present real challenges, the greatest of which is the availability of funding for freight infrastructure and facilities. A successful approach for implementing this Missouri

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State Freight Plan considers the challenges and opportunities to maintain and expand the system to meet current demands as well as the needs of tomorrow.

Freight Strategic Action Plan

A freight action plan implements the strategies and recommendations identified in this Freight Plan and adopts a new decision-making process to create the freight transportation system prepared for the future.

Prioritized Freight Projects

The freight project prioritization process involved stakeholders from across the State adding to the significant public outreach efforts from the Missouri *On the Move* initiative. Over 3,800 projects were initially reviewed and through a tiered evaluation process (outlined in Chapter 8), those projects were narrowed to a prioritized list of 122 projects (Appendix G). These projects represent all freight modes and each of the MoDOT Districts. This is a testament to the freight needs statewide and the recognition of the critical linkages between economic development and freight.

The next step in this process is to identify which projects will be moved forward first and then addressing planning and environmental studies that may be needed before the projects can be included in the Missouri State Transportation Improvement Program (STIP). The very high priority projects should be evaluated to identify steps required to move these projects through the planning phase to the programmed phase. As part of this process, the Freight Advisory Committee and stakeholders will provide input on which freight projects to move forward.

Current and Future Funding

Funding is critical to implementation. The estimated cost of the freight projects ranked “very high” in the prioritization process exceeded \$5 billion. These projects include improvements to a rail terminal in Springfield, capacity improvements to I-70 in St. Louis, improvement to I-35 and I-670 in downtown Kansas City, and a rail to port connection for the New Bourbon Port. Every project is important to freight movement and economic development. Securing the funding to maintain the freight network, address safety concerns, improve connectivity and mobility of the freight system, and support economic growth and competitiveness for Missouri requires financial resources well beyond those currently available. Additional federal resources, increased State investment, and other financing strategies will be needed to close the gap between the freight infrastructure and facility needs and the supply of funds.

The shortage of funds is a critical problem. The Missouri Department of Transportation (MoDOT) should review the list of priority projects with its partner organizations, agencies, and freight stakeholders to identify funding for these projects. Initial funding for planning and preliminary engineering should be identified so that strategic projects can be positioned and ready for development if funding is identified. The lack of funding available today need not stop progress in its tracks, but it represents the most significant obstacle to the implementation of the Freight Plan.

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Freight and Economic Development

Much of Missouri's economy is dependent upon freight and goods movement. Over 52 percent of Missouri's Gross Domestic Product (GDP) in 2013 was generated by industries that are directly dependent on transportation and 89 percent of Missouri's exports were manufactured goods. Nevertheless, many of the State's residents don't recognize the role that freight plays in their daily lives—at their jobs, on the dinner table, and in the quality of life they enjoy each day. The implementation of the State Freight Plan is an opportunity to continue to engage freight stakeholders, economic development partners, and the business community. It also is useful to educate elected officials and policy leaders in the State so they have a better understanding of why freight matters to Missouri. This freight plan should be the framework for future freight planning initiatives and education and communication strategies. Specific actions designed to expand the understanding of freight's role in the State's economy, address issues of concern related to freight, and strengthen relationships with freight stakeholders and partners is included later in this chapter as well as in Chapter 7.

Policy Issues, Trends, and Challenges in Missouri

Stakeholder outreach activities and research conducted as part of the development of this plan identified a number of policy issues. Future scenarios were used to guide additional policy recommendations that support the Freight Plan goals. Trends and issues including freight growth by mode were projected out until 2030, and emerging trends for the growth or decline of key industries and other significant conditions influencing Missouri goods movement were addressed. This information is presented in Chapters 5 and 9.

The future economic prosperity of Missouri will be built on existing strengths and on new policies, programs, and opportunities that MoDOT will pursue in a targeted and focused manner. Chapter 7 outlines these policies. To implement this Freight Plan, people, businesses, organizations, and the State must work together to achieve economic success and improved quality of life. Success will require partnership with communities, economic developers, businesses, and other freight stakeholders willing to tackle real assignments and be responsible and accountable. Additional guidance on interagency coordination and external partnerships can be found in this chapter.

Engaging Partners and Stakeholders

MoDOT has a long history of building partnerships to drive the development of the State's transportation system. Today, that grassroots engagement encourages Missourians to share their ideas about transportation and brings stakeholders together for meaningful discussions about challenges and opportunities. The State's future success as a freight leader will continue to build on these partnerships by engaging modal partners, organizational partners, Metropolitan Planning Organizations (MPOs) and Regional Planning Commissions (RPCs), economic development organizations, other State agencies, professional organizations, and multi-jurisdictional partners in an ongoing discussion about freight needs, issues, and opportunities.

Interagency coordination and external partnerships must be united with a common vision and goals to effectively advance the actions and recommendations identified in the freight plan. MoDOT should also

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continue to expand its relationship with external stakeholders through the continuation of regional freight forums, presentations at economic development conferences, and participation in business roundtables in the State. MoDOT should continue to participate in multi-jurisdictional partnerships that support Missouri's multimodal freight network and associations. Multi-jurisdictional partners include the Mid-America Freight Coalition, Institute for Trade and Transportation Studies, the Mid-America Intermodal Authority Port, and related American Association of State Highway and Transportation Officials (AASHTO) committees.

Ongoing Freight Planning

Ongoing freight planning is important. The freight system must continue to meet the transportation needs of a rapidly changing economic environment, integrating each of the freight modes with connections to a growing array of origins and destinations. Updates to this State Freight Plan should be undertaken regularly on a three- to five-year cycle to ensure the plan reflects the most current conditions and the evolving needs for freight services within the State.

The State Freight Plan has identified additional planning activities for the future:

- Build upon the analysis and the identified State Freight network in Chapter 3 by identify first and last mile gaps in the freight network near major manufacturing hubs and multimodal connectivity points
- Develop minimum design standards for freight facilities publically funded on the multimodal freight network; encourage compliance with these standards for all freight facilities regardless of funding source
- Undertake a public-private partnership plan to identify future multimodal, oversize and overweight corridors; evaluate their condition; determine necessary improvements; and designate the future network in advance
- Work with the private sector to evaluate north-south and east-west connections across the Mississippi River for highway and freight rail
- Develop a guide book incorporating freight-supportive design standards, freight-supportive land use, operational improvements such as delivery requirements, designation of truck routes, and other strategies that can help to improve the movement of freight; careful consideration should be given to the impacts of these standards on freight operators, and review by the Freight Advisory Committee could provide valuable input to ensure the standards can benefit both freight and communities
- Prepare a statewide study of available truck parking areas, the need for future truck parking locations, and guidance for the placement of future truck park facilities
- Conduct a study to determine the potential benefits and challenges of developing a rail bank or similar entity to preserve future rail corridors or retain rail corridors that may be abandoned by railroads in the future
- Analyze Missouri's inventory of industrial land with proximity to existing ports and freight rail lines and facilities as preservation of industrial land resources with multimodal transportation access is crucial to key industries

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- Develop a model “Freight and Industrial Facilities Planning Guide” incorporating good neighbor guidelines to assist planning organization, municipalities, developers, elected officials, and others in identifying tools and strategies that can be valuable to the development of quality freight and industrial facilities
- Promote the use of clean green smart technologies with freight operators throughout the State; create a Green Goods Movement award program to recognize freight operators who effectively implement these technologies

Interagency Coordination and External Partnerships

Implementation of the freight plan should build on the interest and momentum created through the freight planning process. Ongoing communication will help develop projects and implement policies as well as efforts to secure needed funding. By formalizing a Freight Advisory Committee (FAC), freight needs and issues can be discussed regularly and a coordinated and consistent message about the importance of freight can be shared. The FAC will be comprised of private stakeholders representing industries, freight transportation modes, all geographical regions, and various government agencies (state, local and MPOs). The FAC represents economic, transportation, industry, agricultural and safety interests working together to find opportunities to improve freight movement in Missouri to enhance the state’s economy and quality of life.

Formalizing the FAC provides an important vehicle for continuing discussions with representatives from the public and private sector about freight policy, programs, and future resources. This committee can provide meaningful insights and ongoing evaluation of markets, infrastructure conditions, and economic development impacts. Bringing together executive-level representatives from freight industry leaders on a quarterly basis provides a valuable platform for the discussion of freight network conditions, available resources, new financing options, and evaluation of proposed policy changes.

Although comprised of a diverse group of stakeholders—Class I and short line rail carriers, port authorities, major shippers, trucking and logistics companies, intermodal terminal operators, and public sector freight representatives from MoDOT, Federal Railroad Administration (FRA), Federal Aviation Administration (FAA), Federal Highway Administration (FHWA), Federal Maritime Administration (MARAD), Missouri Department of Economic Development, Missouri Department of Agriculture (MDA), and major economic development organizations—the committee shares a goal to improve freight mobility and connectivity, safe operations, increased economic development, and funding availability.

Coordinating the freight plans and programs of the cities, counties, MPOs, RPCs and regional economic development organizations is important to the successful implementation of the Missouri State Freight Plan.

Regional Freight Councils can engage MPOs, RPCs, bi-state development agencies, and regional economic and planning organizations such as KC Smart Port, Mid-America Regional Council, the East-West Gateway Council of Governments, University Transportation Centers, and other organizations. These councils should be important partners for ongoing freight planning, development of outreach

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freight education programs, and monitoring the conditions of freight facilities and infrastructure.

Funding Assessment and Financing Strategies

The State of Missouri is very familiar with the traditional federal resources available to support freight transportation services including US DOT, FHWA, MARAD, FAA, FRA, discretionary TIGER Grant funding, as well as federal financing tools such as Grant Anticipation Revenue Vehicle (GARVEE) Bonds. Beyond those traditional transportation programs, several other federal programs could provide funding for certain freight infrastructure projects through agencies including the Department of Commerce Economic Development Administration (EDA), Department of Homeland Security, Department of Agriculture Rural Community Facility Programs, and Department of Housing and Urban Development (HUD). The State should consider an evaluation of non-traditional funding and financing strategies that could be used to advance the priority projects identified in the freight plan.

The National Disaster Resilience Competition was recently announced providing almost \$1 billion in funding from HUD Community Development Block Grants and Resiliency Disaster Recovery (CDBG-RDC) funds. Funding may be used for infrastructure projects, and the State of Missouri is an eligible applicant. With continued funding for TIGER grants, consideration should be given to high priority freight projects that could effectively compete in this funding process.

Innovative State Funding and Financing Programs

Many state DOT's are evaluating new financing strategies for transportation, including mileage-based user fees. Currently, Missouri does not have legislative authority to pursue Public-Private Partnership (P3) projects. While there are a number of financing programs, including GARVEE Bonds, that allow states to borrow against future government funding, these funds do not expand the available financial resources to support transportation infrastructure and facilities but can be an effective tool to fund critical near term improvements.

Many states have developed programs offering grants or low/no interest loans to facilitate needed improvements to freight infrastructure and facilities. Missouri has a program to assist airports. Dedicated funding for freight rail, ports, or intermodal facilities are provided by a number of states including Ohio, Florida, Virginia, Tennessee, Washington, and Texas.

Public-Private Partnerships (P3s)

Public-private partnerships engage the private sector to fund and often operate and maintain infrastructure assets. The partnerships are contractual agreements between a public entity and the private sector that allows the private sector to participate in the delivery of transportation projects for an agreed upon return. Missouri has not enacted legislation for P3s, but it is an active topic.

Thirty-three states have enacted enabling legislation allowing the use of various P3s to fund transportation projects, and eight states have actually initiated P3 projects. Texas used a P3 approach to develop the Trans Texas Corridor, a statewide transportation network including roads, commuter and freight rail, and utility infrastructure. The State of Virginia has used a P3 for the Dulles Rail Corridor,

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high occupancy toll lanes, and the reconstruction of toll truck lanes.

There are a number of different P3 models:

- Build-transfer is similar to a design-build project in which the public sector contracts with a private partner to design and build a facility according to a set of requirements developed by the public entity. When the project is completed, the public agency becomes responsible for operating and maintaining the facility. The advantage of this approach is the speed of completion and efficiencies realized by private sector project management.
- Under the design-build-finance-operate model the private sector design, builds, finances, and operates and/or maintains the infrastructure under a long-term lease. At the end of the lease term, the facility is transferred to public ownership.

P3s will not replace traditional transportation infrastructure financing, but it is one tool that can help address critical infrastructure needs. The process requires careful analysis of the most appropriate structure, risk allocation, and other important objectives. Public-private partnership provides a new source of funding for infrastructure projects, and other benefits often are realized, as well, including better construction completion, shifted construction and maintenance risk to private partners, cost savings, accelerated infrastructure construction, and a process that allows the public sector to focus on outcomes rather than inputs and process.

Missouri should evaluate the various public-private partnership models including more innovative hybrid models that have been used recently. Public-private partnership can provide significant benefits, but it also generates challenges. Because the use of public-private partnership has expanded in recent years, there are valuable lessons to be learned from other state governments. Public-private partnerships can enable critical transportation projects to move forward even in this constrained financial environment.

Rail Loan Assistance Programs

A number of states provide no-interest or very low interest loans - most are exclusive to short line railroads - to preserve railroad infrastructure through track maintenance and rail rehabilitation projects. These loans have a specific repayment period. Project eligibility is frequently tied to fixed asset improvements and structures such as bridges and culverts, rather than to mobile assets like trains. As an example, the Michigan Rail Loan Assistance Program provides a maximum of \$1 million per project and will cover 90 percent of eligible projects through the loan. Minnesota, Ohio, Oregon, and Virginia have similar programs. Ohio's Rail Line Acquisition Program provides loans to acquire and preserve rail right-of-way for future rail use.

Connect Oregon is a lottery funded initiative that Oregon DOT utilizes to provide grants and low-interest loans to public and private entities to invest in non-highway transportation projects to enhance multimodal transportation and promote economic development in the state. A selection process is approved by the Oregon Transportation Commission and this selection process is subsequently used to evaluate project applications. The program, started in 2005 has awarded \$140 million in state funds (2005 – 2014) resulting in direct investment of \$834 million in leveraged funding from other non-state

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public and private sources. These projects have helped to create new jobs, retain major employers, remove barriers to economic development in rural and urban areas, and support other strategic multimodal economic development investments in the State for rail, aviation, marine, and transit infrastructure.

Conclusion

If we continue to do things the way we have always done, we'll get the same results. Unfortunately, the results and resources we are getting today are insufficient to support freight mobility in Missouri and throughout our nation. Change is necessary. Current funding and financing sources and methods are not providing the resources we need to maintain, much less grow our freight transportation infrastructure to meet the needs of today and tomorrow.

Missouri has been a victim of its success. It has maintained the freight transportation system very well with shrinking funds. As such we take it for granted that tomorrow will be the same. The legacy funding and financing programs have run their course and no longer yield the resources required for today's freight mobility needs. Different funding means, which fairly assess users and are directed to freight projects, are needed. Stakeholders and system users have a voice in the process. Inclusion of the private sector in the decision-making process will greatly assist the public sector in making the right investment decisions. This in turn will set the conditions for Missouri's economic development.