Kansas Statewide Freight Plan

Kansas Department of Transportation

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Kansas

Kansas Turnpike Authority

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Chapter 1

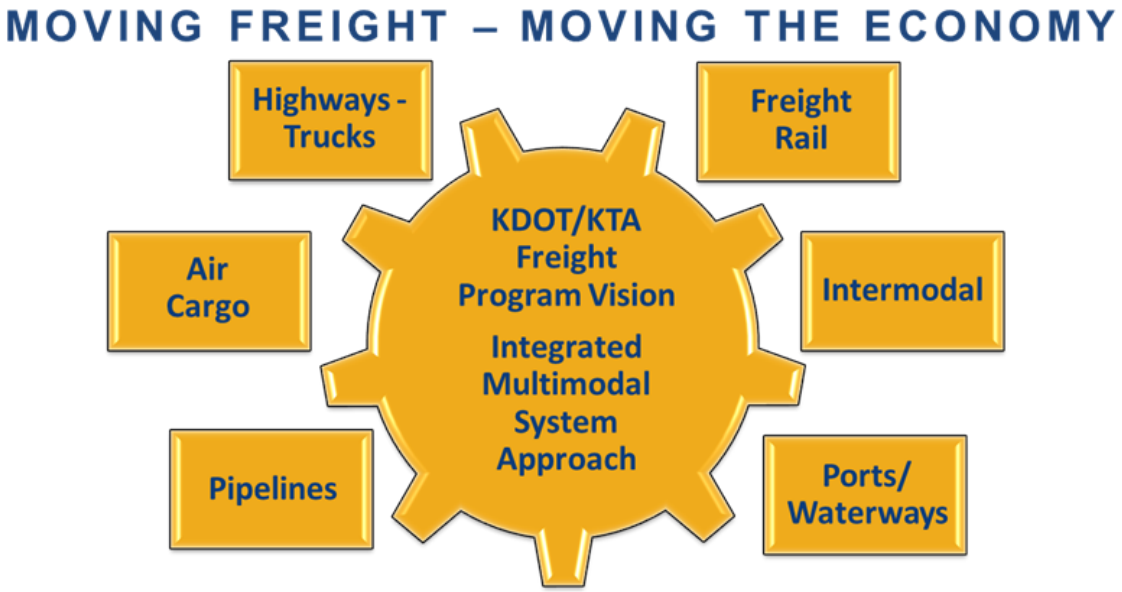
Freight Plan Introduction and Freight Goals

Making smart investments in the freight transportation system provides better options for Kansas businesses to get their products to both domestic and global markets. An improved freight transportation system can also lower transportation costs, provide economic development opportunities, and serve as a catalyst for job creation.

With the help of key stakeholders, and input from the Kansas Freight Advisory Committee (KFAC), the Kansas Department of Transportation (KDOT) has developed this Statewide Freight Plan to make sure that freight continues to move efficiently and safely throughout the state. The plan provides a better understanding of Kansas' existing freight transportation system, establishes goals and strategies for updating the system over the next 20 years, guides future investments in freight transportation, and prioritizes freight projects that would provide the most benefits.

1.1 State Freight Plan Purpose

Every business and resident in Kansas depends on the freight transportation system, which includes roads, railroads, waterways, airports, and pipelines for the goods they use daily. Each investment in the multimodal freight network that increases throughput, improves efficiency, and reduces transportation costs has a direct positive impact on Kansas' economy. At the same time, freight transportation requires significant expenditures of effort to move large quantities of industrial and consumer goods over long distances. Many agencies and businesses develop policies, investments, and programs to understand and mitigate the risks of freight transportation and to improve safety and environmental quality for all transportation system users.



The Kansas Statewide Freight Plan looks at a 20-year planning horizon including freight shipping trends and prioritizes freight projects to be completed over the next 5 years. It is intended to serve the needs of KDOT and both its public sector and private sector partners to improve freight transportation in Kansas. This plan considers highway, rail, aviation, waterway, and pipeline needs. The Freight Plan also supports the freight-related strategies and recommendations in Kansas' Long Range Transportation Plan, the Kansas Statewide Rail Plan, the national multimodal freight policy goals, and other local and regional initiatives as they relate to freight mobility.

1.2 FAST Act and National Freight Goals

It is important that the Kansas Statewide Freight Plan not stand alone, but instead align with, and be informed by, national, State and local plans and policies that already exist or are in development. The Kansas Statewide 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. FAST Act requires the US Department of Transportation to develop a National Multimodal Freight Policy that will include the following goals for the National Multimodal Freight Network:

- Identify infrastructure improvements, policies, and operational innovations that:
  - Strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States
  - Reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network
  - Increase productivity, particularly for domestic industries and businesses that create high-value jobs
- Improve the safety, security, efficiency, and resiliency of multimodal freight transportation
- Achieve and maintain a state of good repair on the National Multimodal Freight Network
- Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network
- Improve the economic efficiency and productivity of the National Multimodal Freight Network
- 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 population centers
  - Travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network
- 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

- Reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network
- Pursue the goals described in this subsection in a manner that is not burdensome to State and local governments

In addition to the National Multimodal Freight goals, the Kansas Statewide Freight Plan also addresses the FAST Act requirements of:

- Encouraging each State to establish a State freight advisory committee (FAC) to consist of a representative cross-section of public and private freight stakeholders, discussed further in Chapter 6.
- Developing a State freight plan, which must comprehensively address Kansas' freight planning activities and investments (both immediate and long-range).
- Designating and certifying Critical Rural Freight Corridors (CRFC) and Critical Urban Freight Corridors (CUFC), discussed further in Chapter 3.

1.3 Kansas Freight Goals

Through collaboration with freight partners throughout Kansas, KDOT has identified four opportunities and actions as the goals of the Kansas Statewide Freight Plan. These goals are:

- Improve the **mobility** of the freight system
- Improve the **safety** of the freight system
- Support **economic development**, trade, and commerce in Kansas
- Minimize the **environmental impacts** of the freight system

Figure 1.1 illustrates how the Kansas Statewide Freight Plan goals align with the FAST Act National Multimodal Freight Policy goals.

The last National Multimodal Freight Policy goal, *to pursue the goals described in a manner that is not burdensome to State and local governments*, will be addressed by providing a clear and concise Kansas Statewide Freight Plan. This includes implementable action items and a fiscally constrained projects list.

Figure 1.1: FAST Act National Multimodal Freight Network Goals and Kansas Statewide Freight Plan Goals

National Multimodal Freight Policy Goals	Kansas State Freight Plan Goals			
	Improve the Mobility of the Freight System	Improve the Safety of the Freight System	Support Economic Development, Trade and Commerce in Kansas	Minimize the Environmental Impacts of the Freight System
Identify infrastructure improvements, policies, and operational innovations that strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the U.S., reduce congestion and eliminate bottlenecks on the National Multimodal Network, increase productivity, for domestic industries and businesses that create high-value jobs.	✓	✓	✓	
Improve the safety, security, efficiency, and resiliency of multimodal freight transportation.	✓	✓	✓	✓
Achieve and maintain a state of good repair on the National Multimodal Freight Network.	✓			
Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network.	✓	✓	✓	
Improve the economic efficiency and productivity of the National Multimodal Freight Network.	✓	✓	✓	
Improve the reliability of freight transportation.	✓	✓	✓	
Improve the short- and long-distance movement of goods.	✓	✓	✓	
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.	✓		✓	
Reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network.	✓			✓
Pursue the goals described in a manner that is not burdensome to State and local governments.				

1.4 Plan Organization

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

- **Chapter 1 Freight Plan Introduction and Freight Goals** – Establishes the context of the creation of the Kansas Statewide Freight Plan. This chapter identifies strategic goals of the plan and how they align with federal goals.
- **Chapter 2 Economic Context of Freight** – Outlines the importance of freight to the State's economy. The chapter looks at the role of freight in supporting job creation, economic development, regional economies, and supply chains in Kansas.
- **Chapter 3 Kansas Freight System and State Transportation Assets** – Includes an overview of the various components that make up the Kansas freight system, including the designated CRFC and CUFC. The chapter provides a summary of the existing transportation assets and data on freight movement.

- **Chapter 4 Condition and Performance of the State's Freight System** – Provides an analysis of the condition of the Kansas freight system including bottlenecks, level of service, safety and crashes, and pavement and bridge conditions. This chapter also discusses performance measures for these areas in conjunction with National Freight Performance Measures.
- **Chapter 5 Trends, Issues, and Needs Assessment and Freight Forecast** – Looks at the Kansas freight system needs through an analysis of identified strengths and challenges. This chapter looks at the 20-year freight forecast, emerging trends, and freight impacts on communities.
- **Chapter 6 Public and Stakeholder Outreach** – Discusses the outreach meetings, interviews and comments received during the study.
- **Chapter 7 Freight Policies, Strategies, and Institutions** – Discusses Kansas' freight policies and strategies for guiding freight related decisions. This chapter includes a discussion of funding programs, freight-related institutions, freight roles and responsibilities, private infrastructure owners, regional freight planning activities, and Kansas' freight transportation priorities.
- **Chapter 8 Scenario Planning** - Discusses scenario planning, a visioning tool for the future of Kansas freight and freight planning. This chapter outlines four potential future scenarios and how they might impact the Kansas freight system.
- **Chapter 9 The Project Prioritization Framework** – Outlines the prioritization filters that reflect the goals, stakeholder feedback, targeted economic development sectors, and freight generator data. This chapter includes the framework that was used to prepare a prioritized list of freight projects for KDOT. As the FAST Act requires that State freight plans be updated every five years, the prioritized list of freight projects only includes projects to be completed over the next five years.
- **Appendices** – Provides additional detailed information and analysis used to prepare the Kansas Statewide Freight Plan and include:
  - A: Economic Impacts and Key Industry Maps
  - B: Percent Truck Volume Maps
  - C: Commodity Flow Summaries
  - D: Stakeholder Interview Questionnaire
  - E: KFAC Members
  - F: Public Comment Summary
  - G: Prioritization Process

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Chapter 2 Economic Impacts of Freight

Chapter 2 addresses the economic impacts related to freight in Kansas, including freight service providers and the trade-related impacts facilitated by the transportation industries.

Freight services facilitate economic activity associated with the production and consumption of goods traded. Trade-oriented impacts include the production of intermediate and final goods, the reallocation of intermediate goods, and consumption of final goods. Kansas-specific goods movements are translated into economic activity by tracing directional commodity values through commodity-industry economic interrelationships.

In addition to encapsulating economic activity directly relating to provisioning freight services (e.g., the trucking industry), translating economically-relevant freight values into trade-related impacts demonstrates the role of freight in Kansas's economy. Such economic impact analysis provides a complementary perspective for traditional freight-related analysis that emphasizes movement volume (tons and/or units) and the route/facility capacity.

2.1 Data and Methodology

Simple and straightforward estimates of the economic impact of goods movement at a statewide level do not exist. Therefore, for this project, multiple datasets and models were combined to develop estimates of the economic impacts of freight in Kansas in both jobs and dollar (i.e., economic output) terms. In particular, two key datasets were crucial to the analysis:

- **TRANSEARCH®** - Developed by IHS Global Insight, TRANSEARCH® is an extensive database of North American freight,[1] compiled from various industry, commodity, and proprietary sources, including from some of the largest rail and truck freight carriers, with base- and future-year, county-level freight estimates. TRANSEARCH® establishes market-specific production tonnages by industry/commodity, drawn mostly from IHS Global Insight's Business Markets Insights (BMI) database, supplemented by trade associations, industry reports, and federal government data.

- **IMPLAN®** - While TRANSEARCH® is useful for understanding commodity movement patterns, it does not directly measure the economic impacts associated with such movements. The IMPLAN® model is an economic modeling, input-output based, social account matrix software used to estimate the economic impacts to a defined geography (i.e., Kansas) ensuing from assumed changes in an industry or commodity. The model is designed to reflect the complex interrelationships between various industries, households, and governments in a given timeframe[2] and measures the economic interdependency of each industry on others through impact multipliers. IMPLAN® also provides commodity-to-industry production and absorption matrices that enable the quantification, for example, of how inbound

[1] NATFA-related and excludes international freight traffic from countries other than Canada and Mexico.

[2] Results pertain to one-year *static* impacts for year 2014 flows (in year 2014 values), and do not provide any *dynamic* or feedback changes over a projected time horizon.

commodities are used (absorbed) across Kansas industries in respective production processes to create final goods and services, or by institutions for final consumption.

In addition, United States Census County Business Patterns data was used to isolate freight-only service provider impacts for the aggregated air transportation sector; similarly, STB Waybill data was used to isolate such impacts for freight rail.

The analytic approach was as follows:

1. **Estimate economically relevant freight.** The commodity tonnage value data for Kansas was adjusted to reflect only economically relevant movements. Economically relevant movements include those moving from, to, and within the state because the production and/or consumption of that cargo occurs in Kansas, meaning that such movements are supplying Kansas industries. Through movements were excluded since they are not directly related to economic activity in Kansas.[3] In addition, certain commodities were excluded from the analysis either to avoid double counting or because they have essentially zero trade value and therefore minimal economic impacts.[4]

2. **Develop industry-commodity concordance.** IMPLAN® and TRANSEARCH® use different commodity/industry classifications at different levels of detail. The IMPLAN® model contains 536 industries categorized at the three-digit North American Industry Classification (NAICS) level, while TRANSEARCH® uses 40 two-digit Standard Transportation Commodity Code (STCC) classifications to categorize commodities. Hence, it was necessary to aggregate the IMPLAN® data to the two-digit NAICS level (86 industries) to facilitate bridging the two databases and accommodate the limited commodity detail found in the TRANSEARCH® data set.

3. **Evaluate economic impacts of freight.** Estimates of the economic impacts of freight in Kansas were derived by bridging TRANSEARCH® commodity flows with the IMPLAN® industrial input-output matrices. This process generated estimates of the economic impact of goods movement in Kansas, categorized across different activities, types, and measures as shown in **Table 2.1.**

The remainder of this section summarizes the results of the economic impact analysis. More details about the data and methodology as well as detailed results can be found in **Appendix A** along with maps of the key industries**.**

[3] Through movements do stimulate some economic activity in Kansas (for example at truck stops), but it is not possible to estimate those impacts with the available data sources and they are likely minimal in comparison to the total economic impacts of the other movement types.

[4] The specific commodities excluded were Waste or Scrap Materials, Shipping Containers, Waste, and Secondary Traffic. Secondary Traffic represents the truck drayage portion of rail-truck intermodal movements; the economic impacts of those movements are captured in the main rail movement to avoid double counting. The trade value of the other three commodities is essentially null, but they do generate some economic benefits for the carriers moving them.

Table 2.1: Economic Impact Categories for Freight in Kansas

Activities	
Freight Service Providers	Impacts associated with providers of freight transportation services, e.g. trucking and rail firms.
Trade Users	Impacts associated with shippers and receivers of transported goods, excluding freight transportation providers.
Types	
Direct	Calculated freight service providers and trade users impacts.
Indirect	Impacts associated with the suppliers that provide intermediate goods and services to the directly impacted industries.
Induced	Impacts associated with the re-spending of earned income from both the direct and indirect industries in the study area.[5]
Total	Summation of direct, indirect, and induced types.
Measures	
Jobs (Employment)	Measured in terms of full-time-equivalent (FTE) job-years.
Income	Wage/salary earnings paid to the associated jobs.
Value Added	Net additional economic activity (i.e., total output less gross intermediate inputs), synonymous with GRP (gross regional product); includes employee and proprietor income, other income types, taxes, etc., required to produce final goods and services.
Output	Total sales value associated with all levels of economic activity (comprised of gross intermediate inputs and value added, combined).
Taxes	Various taxes on production and imports (sales, property, excise, etc.), fines, fees, licenses, permits, etc. resulting from business economic activity; and all federal, state, and local tax revenues.

Source: CDM Smith analysis of Transearch® and Implan® data.

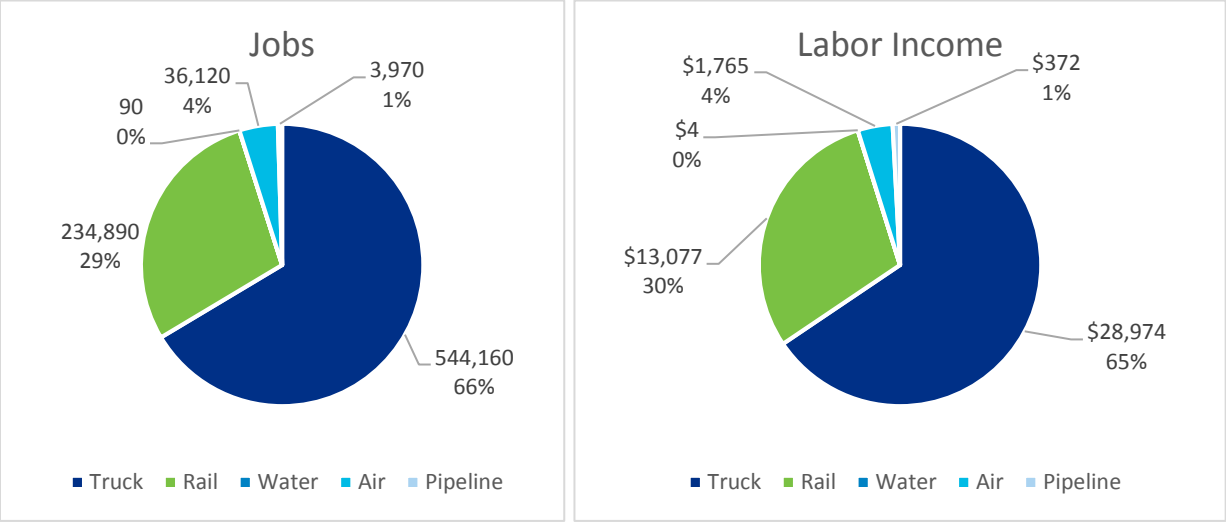
[5] Note that the indirect and induced impact types are often referred to, jointly, as multiplier impacts.

2.2 Jobs and Income

Freight movement is a significant job generator in Kansas. The direct employment impact of goods movement (freight service providers as well as the trade facilitated by them) amounted to more than 372,000 jobs in 2014, earning $22.0 billion in wages for Kansas workers. When indirect and induced impacts are included, freight movement generated an additional 446,620 jobs and $22.2 billion in wages in 2014.

As shown in **Figure 2.1**, the truck and rail modes are responsible for the bulk of these jobs and income, which is not surprising given the dominance of those modes in overall Kansas freight movement. This distribution is primarily driven by the value of cargo moved by each mode across Kansas' transportation system. Nonetheless, the marine, air, and pipeline modes all provide critical linkages for key commodities; air cargo is an important mode for high-value, time-sensitive freight, while the marine and pipeline modes are critical for the movement of bulk commodities that would otherwise have to move via truck or rail.

Figure 2.1: Total Jobs and Labor Income Related to Freight in Kansas, by Mode



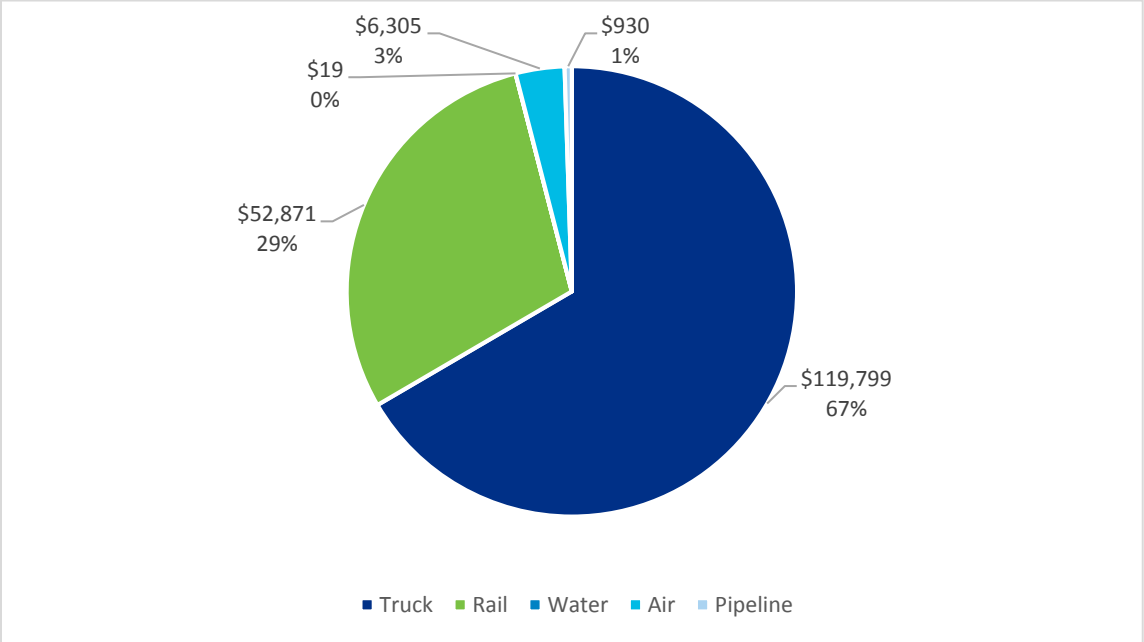
Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®.
Employment rounded to the nearest ten job-years; totals may not sum due to rounding.
Income estimates are in millions of 2014 dollars.

2.3 Economic Output and Taxes

By facilitating commerce and supplying critical Kansas industries, goods movement also contributes significantly to Kansas's economic output. The overall Gross State Product (GSP) directly attributable to freight in Kansas is nearly $35 billion. The total sales value of that activity across all levels of the state's economy is more than $108 billion, which yields about $2.1 billion in local, state, and federal tax revenues. Including indirect and induced impacts, the total economic output arising from freight movement in Kansas is almost $180 billion and $5.1 billion in taxes.

From a modal standpoint, truck and rail generate most of these impacts. The truck mode alone accounts for two thirds of the total (direct, indirect, and induced) output impacts of freight in Kansas, as shown in **Figure 2.2**. Rail accounts for most of the rest (29%, or nearly $53 billion), with air, pipeline, and water transportation accounting for the remainder.

Figure 2.2: Total Economic Output Generated by Freight in Kansas, by Mode

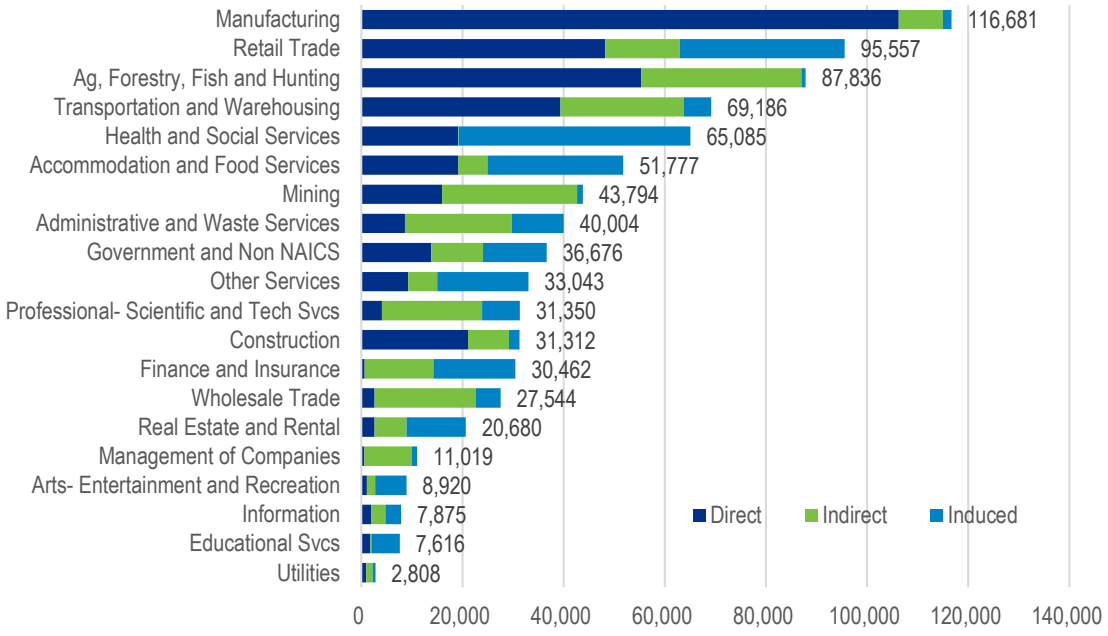


Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®.
Output estimates are in millions of 2014 dollars.

2.4 Industry Impacts

Different industries in Kansas depend on freight to varying degrees. For example, manufacturers are more dependent on the efficient movement of goods than more service-oriented businesses such as information technology. **Figure 2.3** shows the estimated employment impacts of freight by industry in Kansas. More than half (53%) of the employment impacts are concentrated within the top five industries of *Manufacturing*; *Retail Trade; Agriculture, Forestry, Fishing and Hunting; Transportation and Warehousing; and, Health and Social Services.* Of these, all but *Health and Social Services* are directly related to freight whereas the impacts to *Health and Social Services* are mostly re-spending of the extra income (i.e., induced activity).

Figure 2.3: Total Freight Activity-Related Employment by Industry



Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®.

2.5 Conclusions and Next Steps

Clearly, freight is a critical driver of Kansas's economic health. As shown above, when considering direct, indirect, and induced impacts, goods movement generates almost 820,000 jobs in Kansas and more than $44 billion in wages. The total statewide economic output that can be attributed to freight is almost $180 billion and it directly or indirectly generates more than $5 billion in tax revenues.

To put these numbers in context, it is useful to compare the economic indicators associated with freight movement to the overall economic composition of the state of Kansas.

Table 2.2 compares the total (statewide) value of several key economic indicators with the share that is attributable to goods movement (direct, indirect, or induced). In 2014, the movement of

freight in Kansas was directly or indirectly responsible for about 44 percent of the state's job base, 46 percent of its wage income, 47 percent of GSP, nearly 55 percent of total output, and more than half of local, state, and federal tax revenues. These estimates exemplify the extent to which the Kansas economy is reliant on the transportation infrastructure network, especially with regards to the interstate and international connections that facilitate trade.

Table 2.2: Kansas Economic Measures and the Share Attributed to Freight, 2014

Measure	Statewide Value	Attributable to Freight	Freight Share of Total
Employment	1,883,641	819,230	43.5%
Income *	$95,166	$44,191	46.4%
Gross State Product *	$150,764	$70,969	47.1%
Output *	$329,432	$179,925	54.6%
Tax Revenues *	$9,829	$5,142	52.3%

Source: IMPLAN®
** in millions of 2014 dollars*

This economic analysis of existing freight in Kansas serves to recognize the contribution of freight to the economy, and contextualize the mostly behind-the-scenes interaction of goods between people, businesses, and institutions. Additionally, the estimated economic impacts may be considered as a criterion in the prioritization of transportation infrastructure projects. In other words, proposed transportation improvements could be evaluated in terms of their existing contribution to the state's economic activity.

This State Freight Plan has taken an initial step in that direction by using economically-relevant trade data (i.e., goods moved via trucks on the highway network) as one criterion in a freight project prioritization process.

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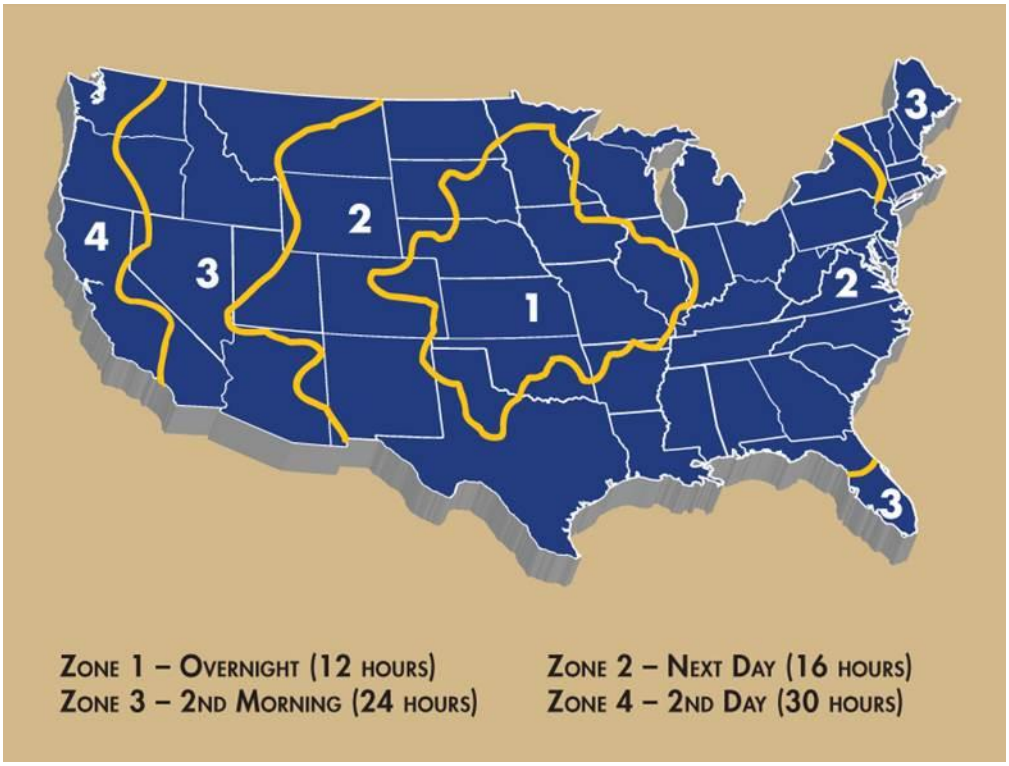
Chapter 3

Kansas Freight Assets

This chapter provides an inventory of the existing freight assets in the state of Kansas. The inventory includes all modes of freight transportation; highway, rail, air, water, and pipeline. Chapter 4 includes the condition and performance of these assets as well as an inventory of intermodal facilities where the different modes interact to exchange freight and the major freight generators located within Kansas. Kansas' central location is one of its key assets being able to reach the Pacific, Atlantic, and Gulf Coasts in less than three days.



3.1 Highways and Bridges

The Kansas State Highway System is made up of 10,533 miles of roadway and over 5,100 bridges that carry over 49 million vehicle miles on an average day. These highways are identified with an "I," "US" or "K" prefix. Rural highways are established by statute as the State Highway System and primarily under the jurisdiction of KDOT. The City Connecting Links (CCL) are a subset of the state highway network within city limits performing dual function as state highways and city streets. As such, the responsibility of the CCLs is shared between KDOT and the city where the CCL is located. The Kansas Turnpike is a tolled Interstate corridor between the Oklahoma state line and Kansas City which covers 236 miles and sees over 4.6 million vehicle miles on an average day. This highway is operated and maintained by the Kansas Turnpike Authority (KTA). In addition, the

Kansas State Highway System network is supported by over 20,000 miles of non-state rural highways.

The majority of the State highway system consists of two-lane, undivided roadways with surface intersections. Interchanges and driveway restrictions increase the safety and mobility of the roads, but decrease the accessibility and are applied based on the relative importance of the roadway. The Interstate and urban segments of major arterial routes offer four or more lanes for increased traffic capacity. Major arterial routes often have multi-lane segments where they pass through rural towns and non-urban cities. **Figure 3.3** shows the available multi-lane highways and planned expansions.

3.1.1 Highway Classification

KDOT and the Federal Highway Administration (FHWA) classify roadways in several different ways, relating to funding, maintenance, and travel patterns. The base for FHWA categories is the Functional Classification system which is primarily used to determine funding. KDOT has defined a route classification for maintenance and operational priority. More recent Federal legislation has focused on the National Highway System and priority freight corridors. State efforts related to these initiatives have established freight corridors guided by both input from various freight stakeholders, MPOs and local units of government, as well as KDOT freight data.

3.1.1.1 Federal Classifications

The federal Functional Classification system organizes roadways by the type of travel into broad groups: Arterials, Collectors, and Locals. Federal funding is available for projects on Arterials and some Collectors. Within the Arterial group, the Principal Arterials form the most important national network with the Interstate System serving as the backbone. The highways most important to freight concerns are refined from this funding group.

National Highway System

The National Highway System (NHS) comprises approximately 160,000 miles of roadways important to the nation's economy, defense, and mobility.[5] There are approximately 4,436 NHS facilities in Kansas. The NHS was developed by the United States Department of Transportation in cooperation with states, municipalities, and metropolitan planning organizations (MPOs). The NHS includes the Interstate Highway System and the Strategic Highway Network (STRAHNET). The STRAHNET is a system of public highways that provides access, continuity, and emergency capabilities for military personnel and equipment. Other principal arterials and connector routes are also part of the NHS. In all, the NHS includes:

- Interstates;
- Other principal arterials in rural and urban areas which support the interstate system by providing access to and from freight generators, major port, airport, public transportation facility, or other intermodal transportation facility;
- The STRAHNET (STRAtegic Highway NETwork) is a network of highways which have been identified as important for US strategic defense policy;
- Major strategic highway connectors which provide access between major military installations and the STRAHNET; and

- NHS designated intermodal connectors which provide access between major intermodal facilities and the NHS.

Figure 3.1 shows the nearly 4,436 miles of NHS facilities in Kansas.

The backbone of the NHS system is the interstate system shown in blue in **Figure 3.1**. A closer look at the routes, miles and cities served by Kansas Interstates are shown in **Table 3.1**.

Table 3.1: Kansas Interstate Highways

	Interstate Route	Total Miles	Major Cities Served (population larger than 5,000)
Main Routes	I-35	235.51	Andover, El Dorado, Emporia, Gardner, Haysville, Kansas City, Lenexa, Merriam, Mission, Olathe, Ottawa, Overland Park, Wichita
	I-70	424.15	Abilene, Bonner Springs, Colby, Hays, Junction City, Kansas City, Lawrence, Salina, Topeka
Auxiliary Routes	I-135	95.74	McPherson, Newton, Salina, Wichita
	I-235	16.52	Wichita
	I-335 (KTA)	50.13	Emporia, Topeka
	I-435	28.03	Kansas City, Lenexa, Olathe, Overland Park, Shawnee
	I-470	13.72	Topeka
	I-635	8.9	Kansas City
	I-670	1.64	Kansas City
	9 Routes	**874.34**	

Source : http://www.fhwa.dot.gov/reports/routefinder/table1.cfm, http://www.fhwa.dot.gov/reports/routefinder/table2.cfm, http://www.fhwa.dot.gov/reports/routefinder/table3.cfm

"Intermodal connectors" are roadways that tie together the intermodal freight facilities to the national transportation system. Connectors link major freight activity nodes to arterial highway systems and improve the ability of networks to serve ports, rail yards, airports and other freight intensive nodes efficiently. When designed, maintained, and operated with freight in mind, connector routes facilitate the best use of individual modes and improve the overall efficiency of regional highway networks. Designated NHS connectors are often referred to as the first and last miles of roadway used by truckers to travel between the major highways of the NHS and the nation's ports, rail terminals, and air cargo hubs and are included in **Table 3.2**.

However, there are many more non-designated intermodal connectors that serve facilities every day. One key non-designated intermodal connectors include Homestead Road serving the BNSF LPKC. Highways and road serving the Kansas' transload facilities, water ports, and freight airports are also non-designated intermodal connectors.

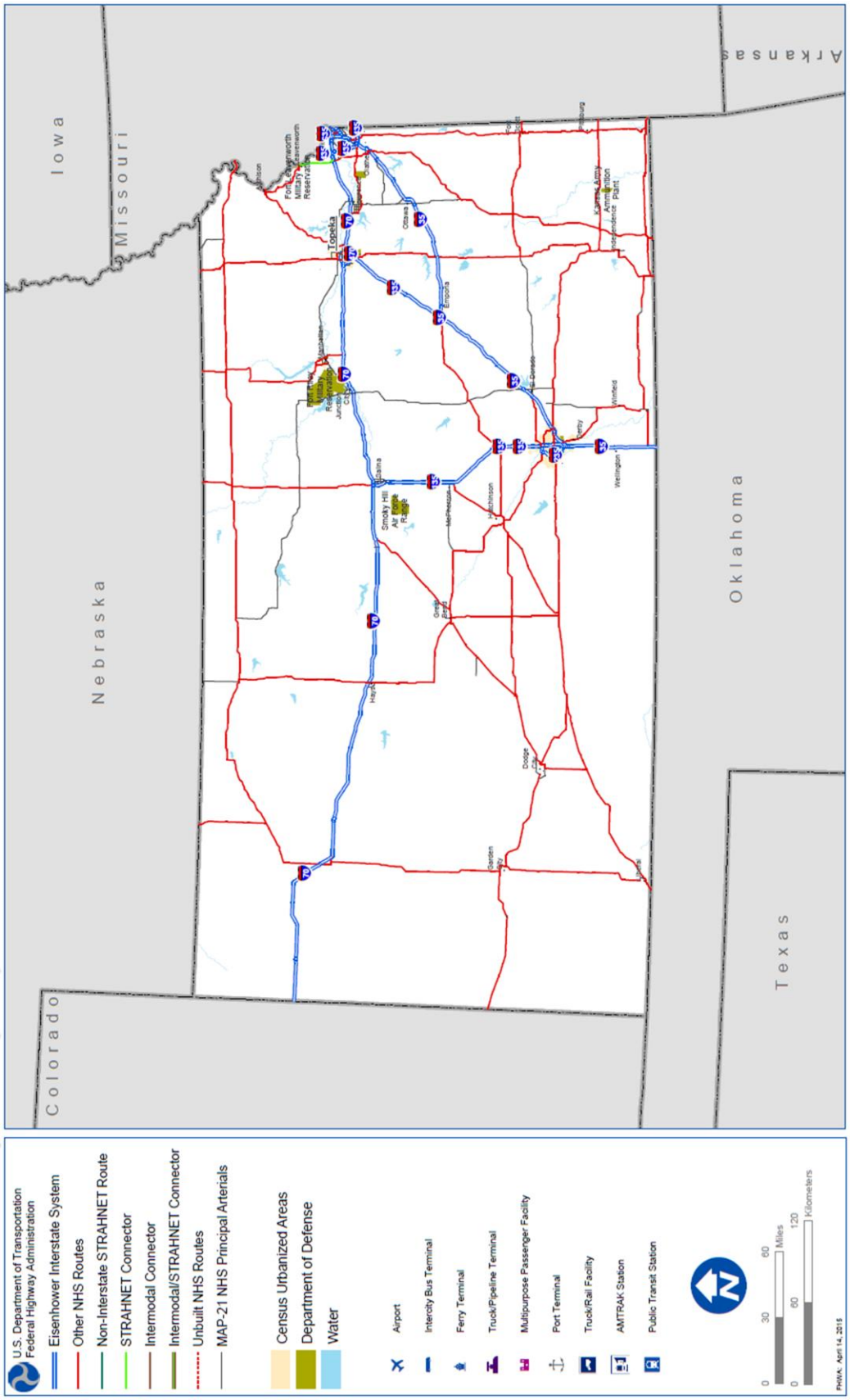


Figure 3.1: Kansas National Highway System

Source: FHWA

Table 3.2: FHWA Intermodal Connectors

Facility	Type	Connector No.	Connector Description	Connector Length	Facility Id
Dwight D. Eisenhower Airport, Wichita	Airport	1	From U.S. 54 south on Mid-Continental Drive 1.180 miles to terminal & terminal loop for 0.68 miles. From Mid-Continent south on Air Cargo Rd for 0.5 miles	2.36	KS1A
BNSF Argentine Yard, Kansas City	Truck/Rail Facility	1	From I-635 E on K-32 for 0.462 mi, S 0.1 mi on 39th, E 0.1 mi on Fairbanks, S 0.1 mi on 38th	0.8	KS2R
BNSF Argentine Yard, Kansas City	Truck/Rail Facility	2	From U.S. 69 W on K32 for 1.248 mi, S 0.1 mi on 39th, E 0.1 mi on Fairbanks, S 0.1 mi on 38th	1.3	KS2R
Union Pacific's 18th Street Yard, Kansas City	Truck/Rail Facility	1	From I-635 E on K-32 for 1.710 mi, N 0.2 mi under 18th, 0.3 mi west on Baynard	0.5	KS3R
Union Pacific's 18th Street Yard, Kansas City	Truck/Rail Facility	2	From U.S. 69 under 18th St heading north, west on Baynard (no additional miles)	0	KS3R
Williams Pipeline Terminal	Truck/Pipeline Terminal	1	From I-635 E on K5 for ~2.242 mi, E 1.150 mi on Sunshine Rd, S 1.0 mi on Fairfax, EN 0.490 mi on Donovan	4.6	KS4L
Williams Pipeline Terminal	Truck/Pipeline Terminal	2	From I-70 on Fairfax for 1.510 mi, EN 0.49 on Donovan	1.5	KS4L
TOTAL				**11.06**	

Source : FHWA, https://www.fhwa.dot.gov/planning/national_highway_system/intermodal_connectors/kansas.cfm

3.1.1.2 State Classifications

KDOT uses a route classification system to establish project, maintenance, and operational priority for highways under its jurisdiction.

- **A** - Interstate Highways
- **B** - Routes that serve as the most important statewide and inter-state corridors for travel. These routes serve distinct trip movements since they are widely spaced throughout the state. On major sections of the routes traffic volumes are relatively constant. A significant number of out-of-state vehicles and long-haul freight carriers use Class B, and trips are typically very long.
- **C** - These routes are closely integrated with Class A and B routes in service to all parts of the state. Major locations that are not on an A or B are connected to them by a C route. Average trip lengths are typically long.
- **D** - These minor routes provide access to small urban areas and other communities not on a higher-class route. These routes are important for inter-county travel.
- **E** - Primarily for intra-county travel, these routes typically carry short trips. Class E routes are used to connect rural residents with other routes or to provide access to small towns in the same area.

Table 3.3 lists the miles and **Figure 3.2** graphically shows the Kansas' State Highway System by classification. Route classification A is the same as the federal interstate category and classification B is generally the long-distance Principal Arterial routes. Although the interstates and turnpike account for only 8.3 percent of the centerline miles, these highways accommodate over 41 percent of the annual vehicle miles traveled including nearly 44 percent of the annual truck miles in Kansas.

Table 3.3: Mileage and Daily Travel By KDOT Route Classification System

KDOT Route Priority Ranking	Total Centerline Miles	Total Vehicle Miles of Travel (VMT)	Total Truck Miles of Travel	Total Truck Miles of Travel as Percent of Total VMT	Total Truck Miles Travel as a Percent Total Truck Miles of Travel
A	874	20,799,059	3,378,550	16.2%	43.8%
B	2,177	11,912,689	2,176,715	18.3%	28.2%
C	2,453	9,644,274	1,245,753	12.9%	16.1%
D	3,233	5,549,542	755,865	13.6%	9.8%
E	1,797	1,473,270	165,280	11.2%	2.1%
Total	**10,534**	**49,378,834**	**7,722,163**	**15.6%**	**100.0%**

Source: KDOT, 2015

The Kansas highway network includes several roadways with four or more lanes to efficiently move freight traffic. Beyond the interstate system, there are freeway and major arterial routes with multiple lanes. **Figure 3.3** also shows the large number of towns and cities that have four or more lanes passing through them. The Kansas Highway Network also features large numbers of two lane highways. As traffic volumes dictate, passing lanes are utilized throughout Kansas to improve traffic and freight flows. In addition, the Kansas Highway network is supported by over 20,000 miles of non-state rural major collectors that are also eligible for federal funding.

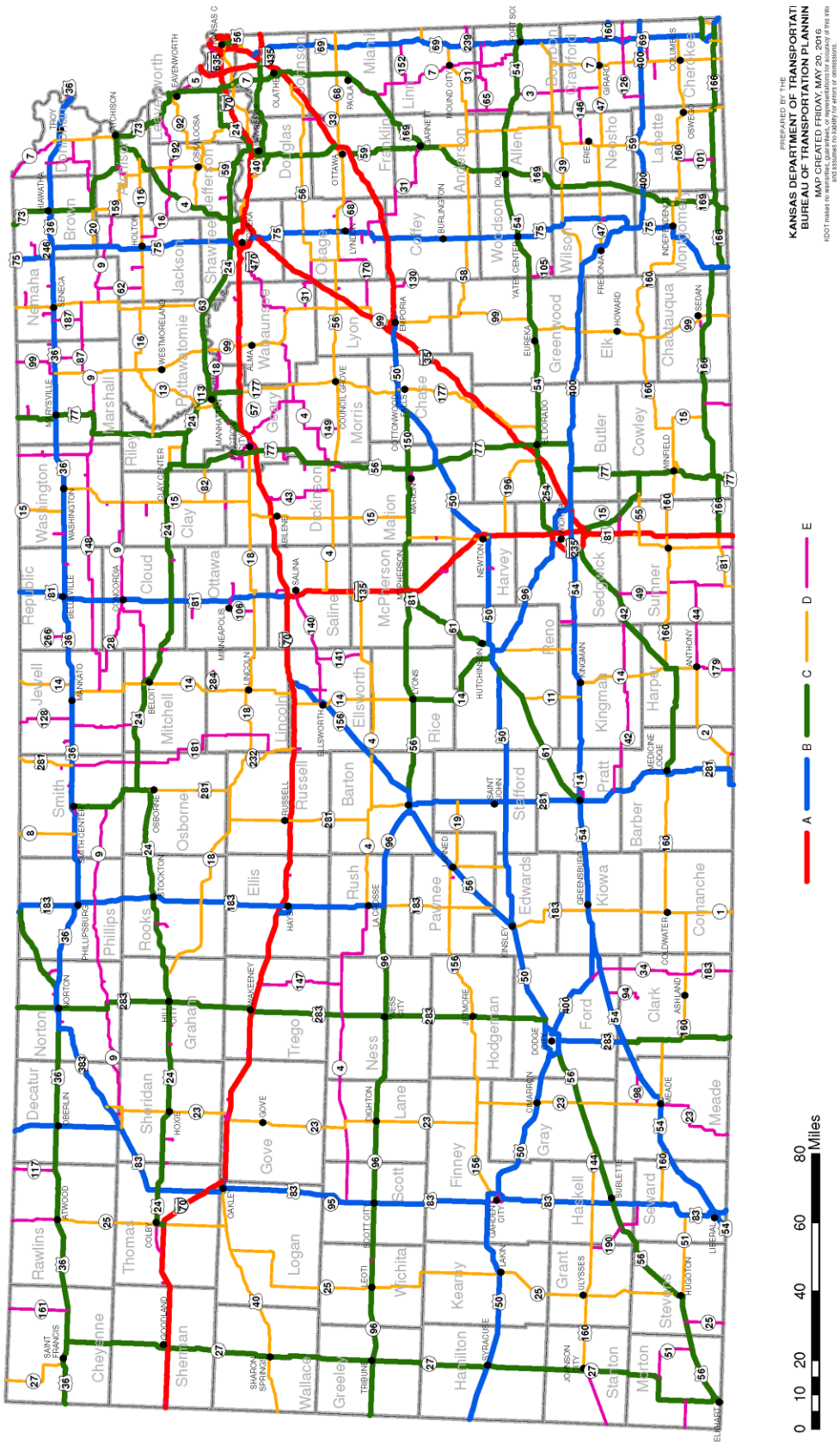


Figure 3.2: KDOT Route Classification System

Source: KDOT, 2015

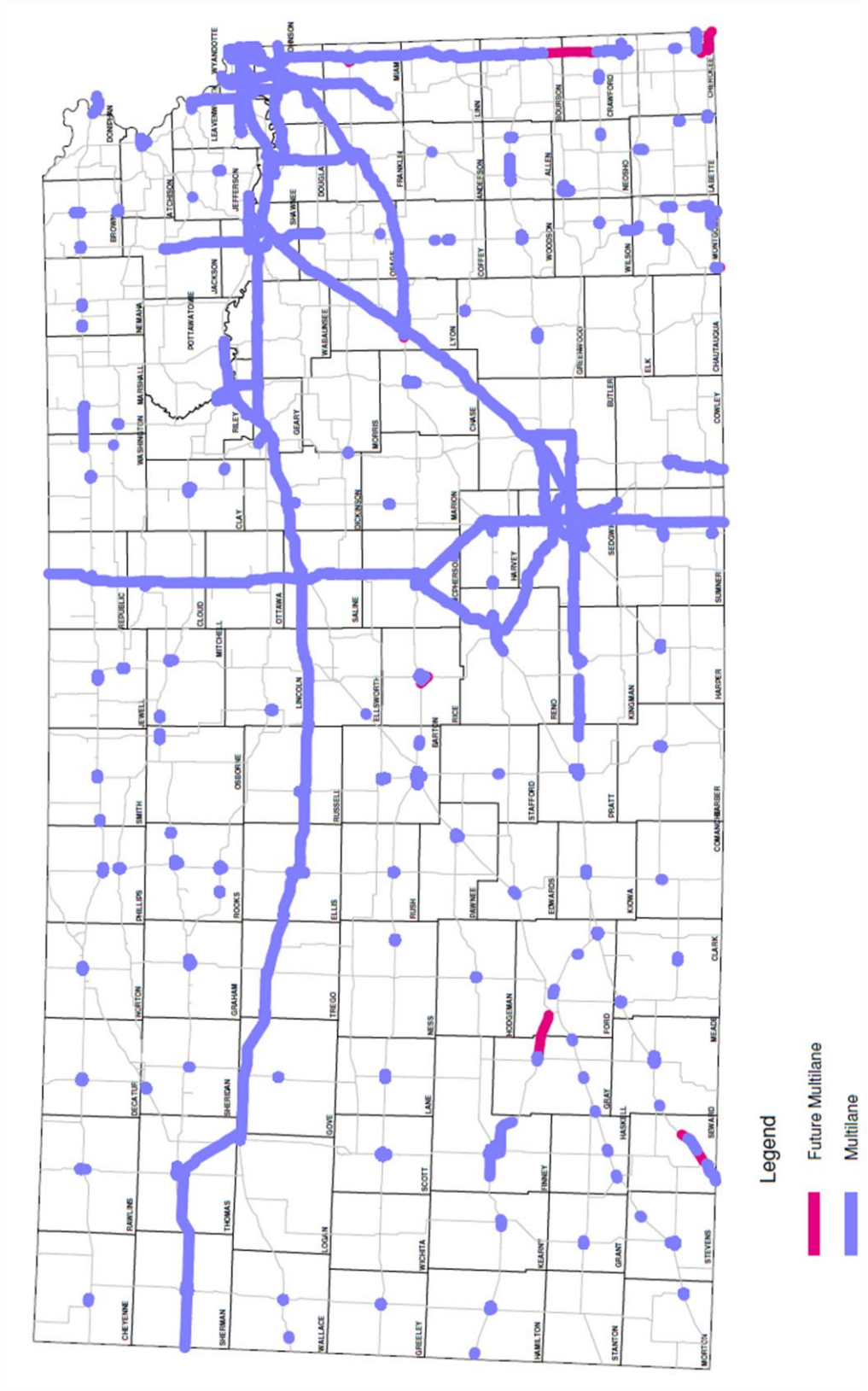


Figure 3.3: Roadways with Four or More Lanes

Source: KDOT, 2017

3.1.2 Highway Freight Classification

Within the broader transportation goals of the highway classification systems, freight goals are significant but can be better addressed by more freight-focused objectives. As with the broader classification systems, there are both National- and State-level priorities which lead to different highway networks.

3.1.2.1 National Highway Freight Network

The **Fixing America's Surface Transportation Act (FAST Act)** repealed both the Primary Freight Network and National Freight Network from Moving Ahead for Progress in the 21st Century Act (MAP-21), and directed the FHWA Administrator to establish a National Highway Freight Network (NHFN) to strategically direct Federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system. The NHFN includes the following subsystems of roadways:

- **Primary Highway Freight System (PHFS):** This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable and objective national data. The national network consists of 41,518 centerlines miles, including 37,436 centerline miles of Interstate and 4,082 centerline miles of non-Interstate roads. Kansas has 730 miles designated on the PHFS. The Primary Highway Freight Network in Kansas is shown in **Figure 3.4**.
- **Other Interstate portions not on the PHFS:** These highways consist of the remaining portion of Interstate roads not included in the PHFS. These routes provide important continuity and access to freight transportation facilities. These portions amount to an estimated 9,511 centerline miles of Interstate nationwide, and will fluctuate with additions and deletions to the Interstate Highway System. Kansas has about 150 miles of interstates not on the PHFS.
- **Critical Rural Freight Corridors (CRFCs):** These are public roads not in an urbanized area which provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or other intermodal freight facilities. KDOT identified the state's CRFC routes through coordination with MPOs and applying the FAST Act requirements. The identified CRFC are in **Table 3.4** and shown in **Figure 3.5**.
- **Critical Urban Freight Corridors (CUFCs):** These are public roads in urbanized areas which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities. KDOT worked with the state's six MPOs during the CUFC process to identify the state's 75 miles of CUFC routes. The six MPOs include the Mid-America Regional Council (MARC); Wichita Area Metropolitan Planning Organization (WAMPO); Flint Hills MPO; Topeka/Shawnee County MPO; Lawrence/Douglas County MPO; and the St. Joseph/Elwood MPO. The identified CUFC are in **Table 3.11** and shown in **Figure 3.6.**

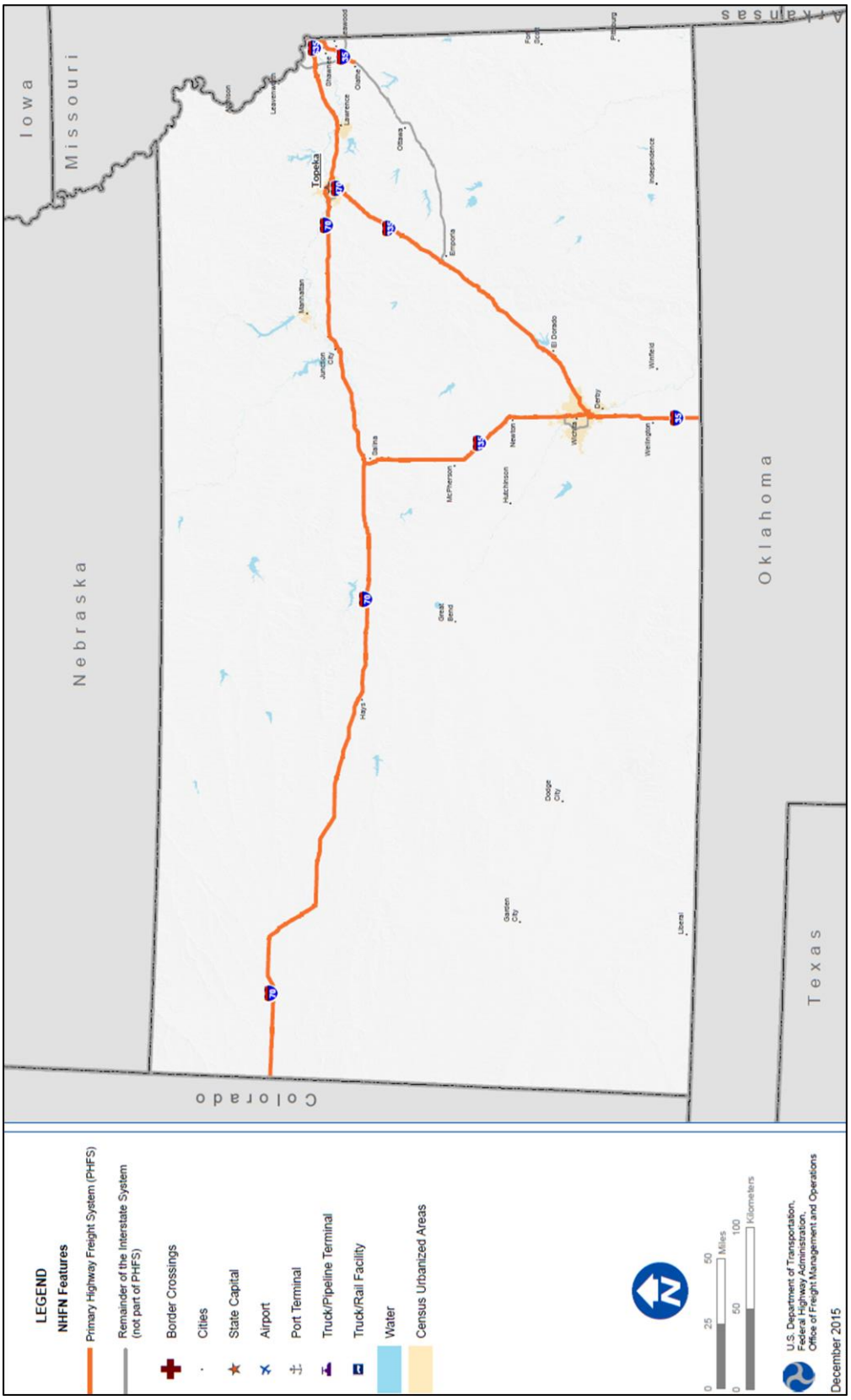


Figure 3.4: Kansas Primary Highway Freight Network

Table 3.4: Kansas Critical Urban and Rural Freight Corridors

KANSAS CRITICAL URBAN FREIGHT CORRIDORS: 2017 - 2018				
City	**County**	**MPO**	**Corridor Identification**	**Mileage**
Olathe	Johnson	MARC	K-7, Dennis Ave. to Santa Fe St.	1
Olathe	Johnson	MARC	Lone Elm Rd., Old 56 Hway. To 151st St.	1
Kansas City	Wyandotte	MARC	K-32/Kaw Drive, I-70/57th St. to 65th St.	1.5
Kansas City/Lenexa/Olathe	Johnson	MARC	K-7, I-70 to K-10	11
Lenexa	Johnson	MARC	191st St., Four Corners to I-35	2.8
TOTAL		**MARC**		**17.3**
Wichita	Sedgwick	WAMPO	K-15, I-135 to 71st St. South	5.6
Wichita	Sedgwick	WAMPO	61st St. North, I-135 to Floodway Bridge	1
Wichita	Sedgwick	WAMPO	Hydraulic St, I-135 to 37th St. North	1
Wichita	Sedgwick	WAMPO	21st St., I-135 to Broadway North	1
Wichita	Sedgwick	WAMPO	29th St., I-135 to Broadway North	1
Wichita	Sedgwick	WAMPO	West St., K-42 to US-54/400	1.5
Wichita	Sedgwick	WAMPO	North Broadway, I-235 to 13th St.	3.5
Wichita	Sedgwick	WAMPO	US 54/400, KTA Interchange to 135th St. West	17.5
Wichita	Sedgwick	WAMPO	Eisenhower Airport Connector, US 54/400 to Eisenhower Airport	1.5
TOTAL		**WAMPO**		**33.6**
Lawrence	Douglas	Lawrence/Douglas County	K-10, US-59 to I-70	9
TOTAL		**Lawrence/Douglas County**		**9**
Manhattan/Junction City	Riley/Geary	Flint Hills	K-18, 11th St. to Wildcat Creek Rd.	7.5
TOTAL		**Flint Hills**		**7.5**
GRAND TOTAL CUFCs				**67.4**
KANSAS CRITICAL RURAL FREIGHT CORRIDORS: 2017 - 2018				
City	**County**	**MPO**	**Corridor Identification**	**Mileage**
Edgerton	Johnson	MARC	207th St., Co-op Road to I-35	1.2
TOTAL		**MARC**		**1.2**
Ogden	Riley	Flint Hills	K-18, Wildcat Creek Rd to I-70	5.7
TOTAL		**Flint Hills**		**5.7**
Wamego	Pottawatomie/Wabaunsee	Rural	K-99, US-24 to I-70	11
Garden City	Multiple	Rural	US-83, US 56 to I-70	124
TOTAL		**KDOT**		**135**
GRAND TOTAL CUFCs				**141.9**

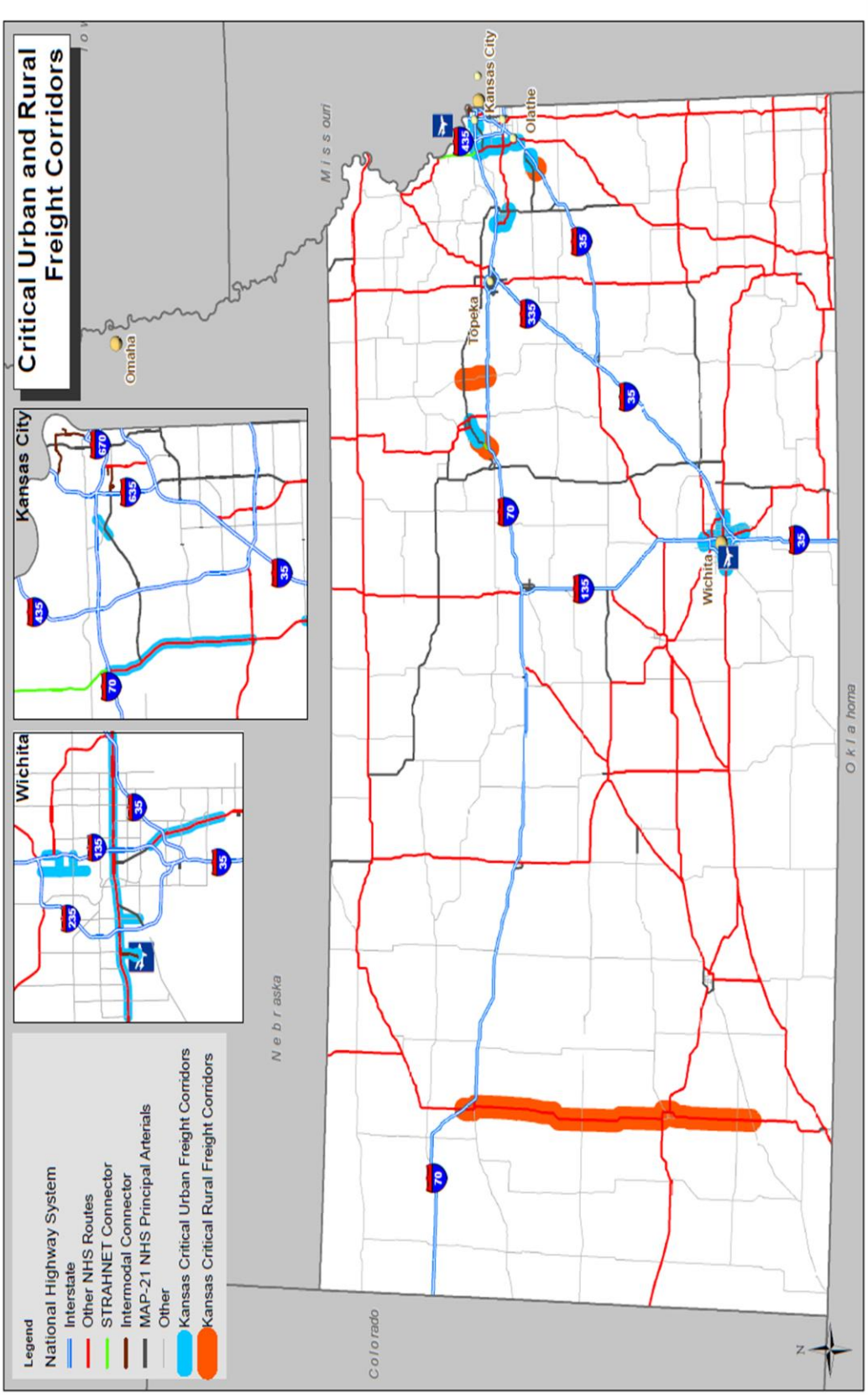


Figure 3.5: Kansas Critical Urban and Rural Freight Corridors

3.1.3 State Freight Network

The Kansas State Freight Corridors of Significance builds on the NHFN as a backbone and adds routes of statewide and regional importance. Members of the Kansas Freight Advisory Committee (KFAC) provided input to supplement KDOT highway data to develop the Kansas Freight Corridors of Significance. The Kansas Freight Corridors of Significance were approved by the KFAC in 2014. The Kansas Freight Corridor of Significance map is shown in **Figure 3.6**.

3.1.3.1 Traffic Operation Centers (TOC)

Wichita and Kansas City regions have incorporated various Intelligent Transportation Systems (ITS) technologies to help reduce congestion and provide traffic related information to the traveling public. Each region has established a TOC to collect and assemble traffic data, disseminate traveler information, and manage the roadway facilities. Each one is a partnership among State, County, and City departments including roadway managers, law enforcement officers, and public information professionals.

WICHway is the TOC for the highway network in Wichita. The WICHway network includes closed circuit cameras, traffic sensors and dynamic message signs (DMS). KC Scout is Kansas City's bi-state traffic management system. KC Scout manages traffic on more than 300 miles of continuous freeways in the greater Kansas City metropolitan area. The KC Scout system includes ramp metering, freeway speed monitors, DMS and cameras as some of the ITS technologies implemented. KC Scout is also the statewide TOC for I-70 with DMS and cameras across Kansas.

3.1.3.2 Weigh Stations

The Kansas Highway patrol operates eight fixed weigh stations at six locations in the state to enforce the safe travel of commercial vehicles. The Wabaunsee and Kanorado scale locations have recently added weigh in motion capabilities. The fixed weigh station locations are listed in **Table 3.5** and shown in **Figure 3.7**.

Table 3.5: Highway Patrol Fixed Weigh Stations

Station	City	Location
21W	Wabaunsee (scales) WB	1-70, 1 mile west of McFarland
22W	Wabaunsee (scales) EB	1-70, 1 mile west of McFarland
23W	Olathe (scales) NB	1-35, 5 miles south of Olathe
24W	Olathe (scales) SB	1-35, 5 miles south of Olathe
26A	South Haven (scales)	South end of Turnpike, I-35
37A	Liberal	US-54, 5 miles east of Liberal
46	Kanorado (scales)	1-70 near Colorado State Line
58	Belleville (scales)	US-81, I mile south of Jct. US-36

Source: Kansas Highway Patrol

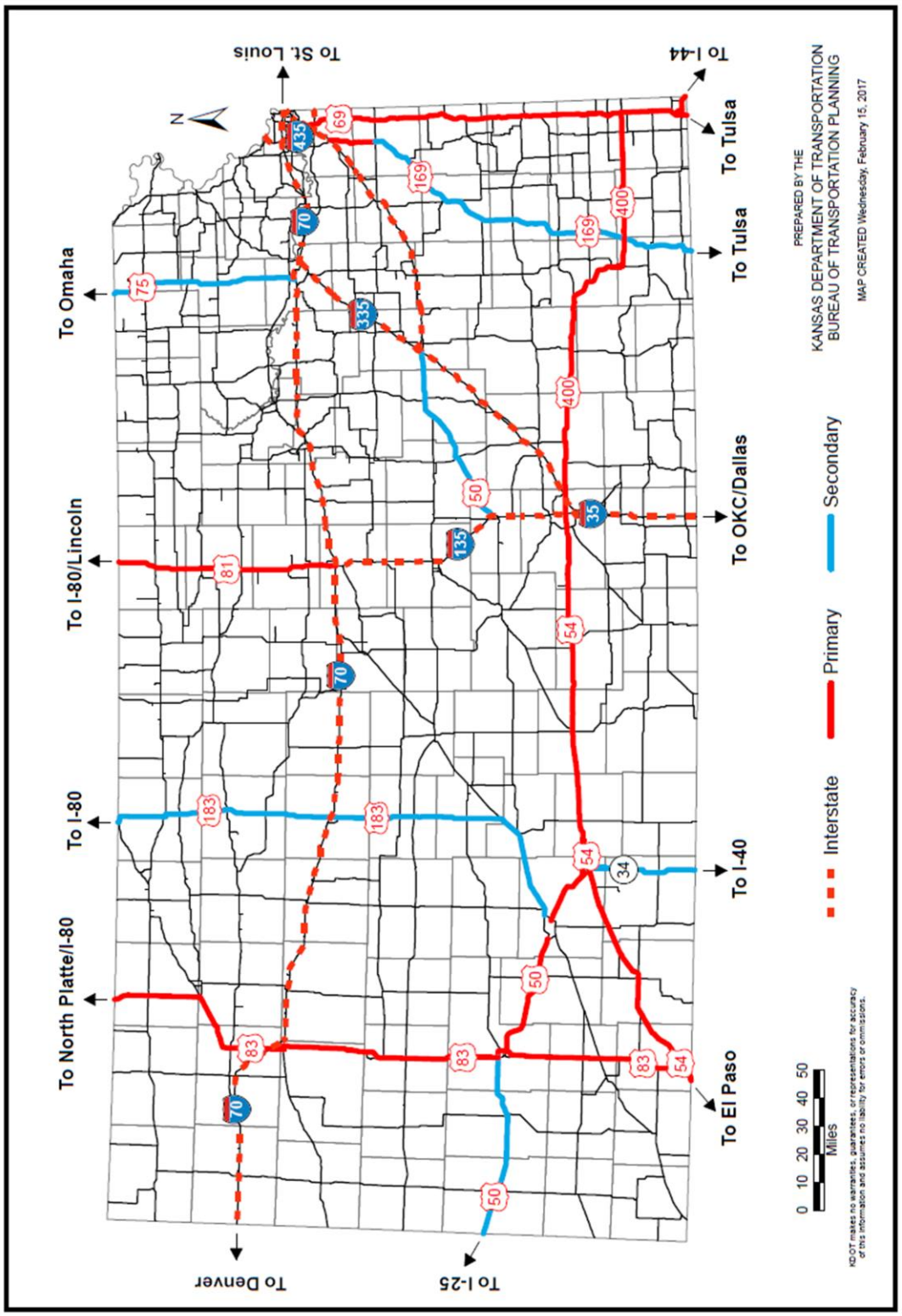


Figure 3.6: KDOT Corridors of Significance

Source: KDOT, 2017

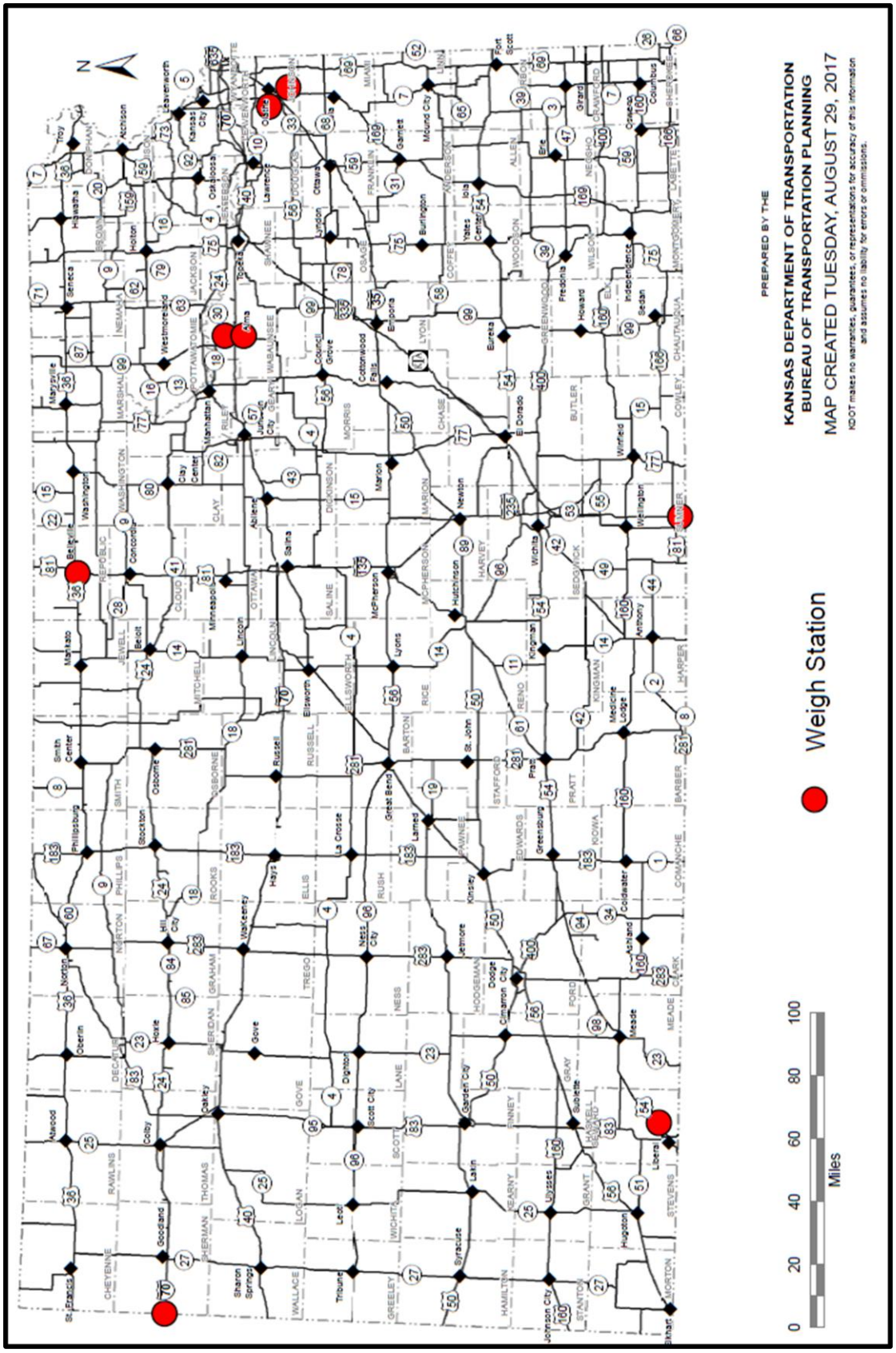


Figure 3.7: Weigh Station Locations

3.2 Rail

Kansas is served by a comprehensive rail network comprising a total of 4,216 route miles. The Class I or large railroad network is a 2,723-mile spine which provides long haul service for both in- and out-bound products as well as through traffic. The Class I railroads currently operating in Kansas are BNSF Railway, Kansas City Southern Railway (KCS), Norfolk Southern Railway (NS), and the Union Pacific (UP) Railroad. BNSF operates 1,142 route miles of track in Kansas and UP operates 1,563 miles. KCS enters and exits the state in its southeastern corner with 18 route miles. The NS has three miles of trackage rights in the Kansas City metropolitan area. There are also 11 Class III railroads and three switching/terminal railroads in the state. These small railroads own an additional 1,493 route miles. **Figure 3.8** displays a map of the Kansas railroad network.

3.2.1 Railroad Classification

The rail industry classifies the freight rail network into three distinct operating categories: Class I, II, and III. Railroad classification is determined by the US Surface Transportation Board (STB) based on annual revenue dollars. In 2012 dollars, a railroad with operating revenues greater than $433.2[6] million for at least three consecutive years is considered a Class I railroad. Similarly, a railroad with revenues greater than $34.7[7] million, but less than $433.2[8] million, is considered a Class II railroad; such railroads are commonly referred to as "regional" railroads.

A railroad not within the Class I or II categories is considered a Class III railroad, also known as a "short line." As the name indicates, short lines operate over a relatively short distance. Short lines serve the larger railroads by collecting and distributing railcars to individual industrial and agricultural shippers and receivers. They provide a critical service, particularly in lower-density rail corridors and markets where the larger railroads cannot operate cost-effectively. From a historical standpoint, many of the nation's short lines operate on branches previously owned and operated by the Class I railroads.

There are four Class I railroads, or large railroads, operating in Kansas[9]. Three of the four own lines in the state, and the fourth operates over trackage rights. The Kansas route miles of the Class I railroads appear **Table 3.6**.

Table 3.6: Class I Railroad Route Mileage in Kansas

Class I Carriers	Main Line Owned	Lines Leased to Class III	Miles Operated Excluding Trackage Rights*
BNSF	1,142	0	1,142
Kansas City Southern	18	0	18
Norfolk Southern*	0	0	0
Union Pacific	1,563	313	1,563
Class I Total	**2,723**	**313**	**2,723**

** Norfolk Southern has 3 miles of trackage rights in Kansas*

[6] http://www.aslrra.org/about_aslrra/faqs/

[7] http://www.aslrra.org/about_aslrra/faqs/

[8] http://www.aslrra.org/about_aslrra/faqs/

[9] U.S. Class I railroads are line haul freight railroads with operating revenue of $475.75 million.

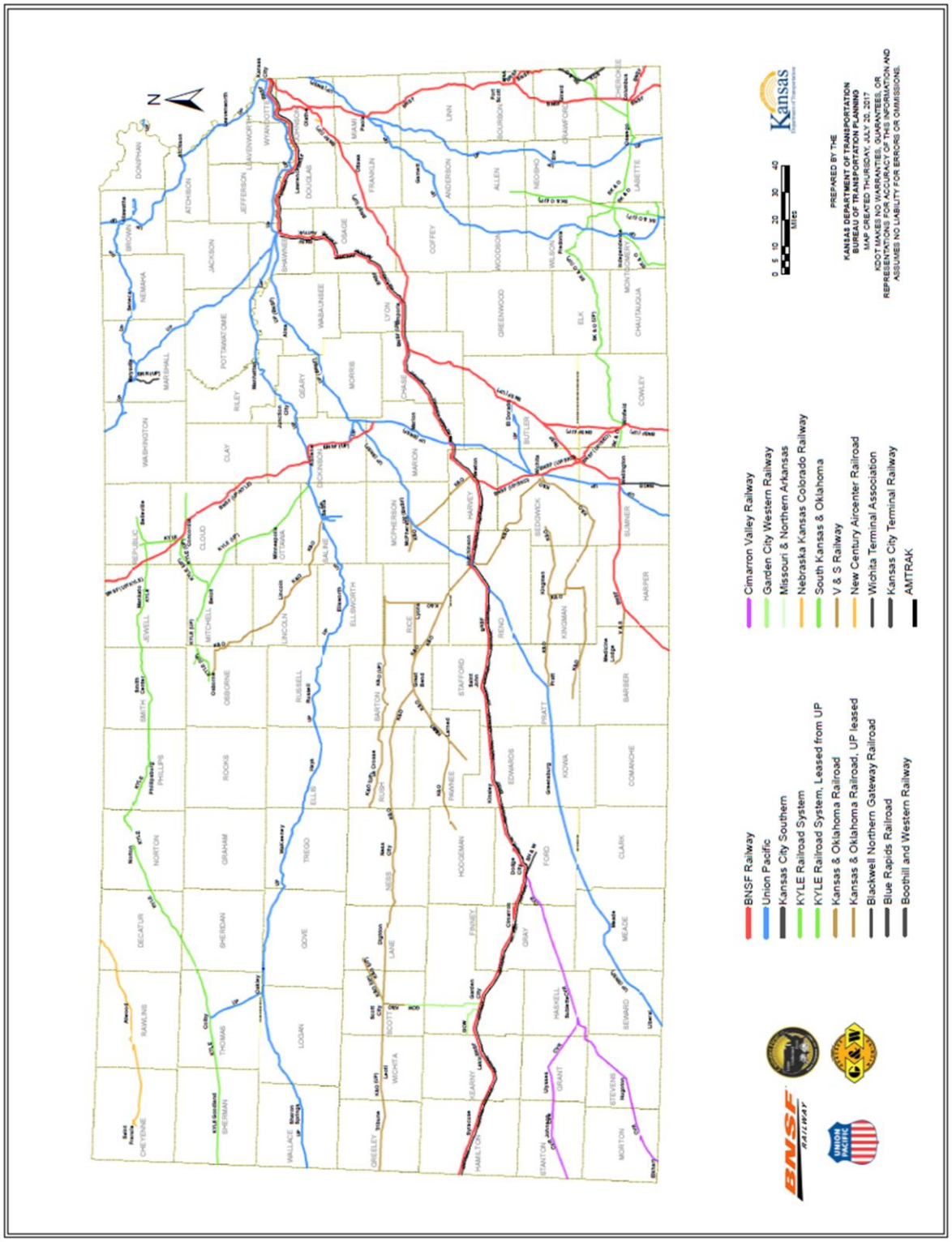


Figure 3.8: Kansas Freight Rail Network 2017

Source: KDOT, 2017

3.2.2 BNSF Railway

BNSF has 11 subdivisions in Kansas. The BNSF rail system in Kansas is portrayed in **Figure** 3.9. Each corridor carries substantial through freight as well as origin and termination service for shippers and receivers in Kansas. In 2016, BNSF hauled nearly 4.1 million carloads in Kansas.

BNSF's Transcontinental (Transcon) corridor connects Chicago to Los Angeles and Oakland, California. It stretches across Kansas on the Emporia and Panhandle Subdivisions between Kansas City and Kiowa. It is neither a primary export grain route nor a primary coal route. Local traffic within Kansas on the Transcon is not substantial as it skirts the primary grain growing areas and population centers. The Transcon is mostly double-track and equipped with a Centralized Traffic Control (CTC) signal system. The Kansas segment of the Transcon is approximately 305 miles in length. Approximate rail traffic ranges from 60 to 80 trains per day, depending on the rail segment. **Table 3.7** provides additional information on each BNSF subdivision in Kansas.

The 11 BNSF subdivisions in Kansas are profiled in Appendix A.

Table 3.7: BNSF Subdivision Information

Subdivision	Track Miles (Approx.)	Average Trains per Day	Commodities Transported (minimum 1 train per day)
Afton	83	12	Coal and Merchandise
Arkansas City	78	31	Coal, Grain, Intermodal, Merchandise
Douglass	31	10	Coal, Grain, Intermodal, Merchandise
Emporia	239	81	Coal, Grain, Intermodal, Merchandise
Fort Scott	199	18	Coal, Grain, Merchandise
La Junta			
Ellinor-Newton	61	34	Grain, Intermodal, Merchandise, Amtrak
Newton-Dodge City	168	6	Grain, Merchandise, Amtrak
Dodge City-Las Animas, CO	184	6	Merchandise, Amtrak
Panhandle	313	58	Grain, Intermodal, Merchandise
Red Rock	260	25	Coal, Grain, Intermodal, Merchandise
St. Joseph	207	43	Coal, Grain, Merchandise
Strong City	151	5	Coal, Grain, Merchandise
Topeka	110	7	Merchandise, Amtrak

Source: BNSF, 2016

3.2.2.1 BNSF Line Capacity Conditions in Kansas

BNSF adds capacity to its network in response to volume driven customer demand to eliminate constraints and bottlenecks. Line capacity expansion projects are programmed on the BNSF network in Kansas in the 2020-2021 timeframe between Wellington and Ellinor. The timing of execution of these projects could be moved up or pushed back depending on demand.

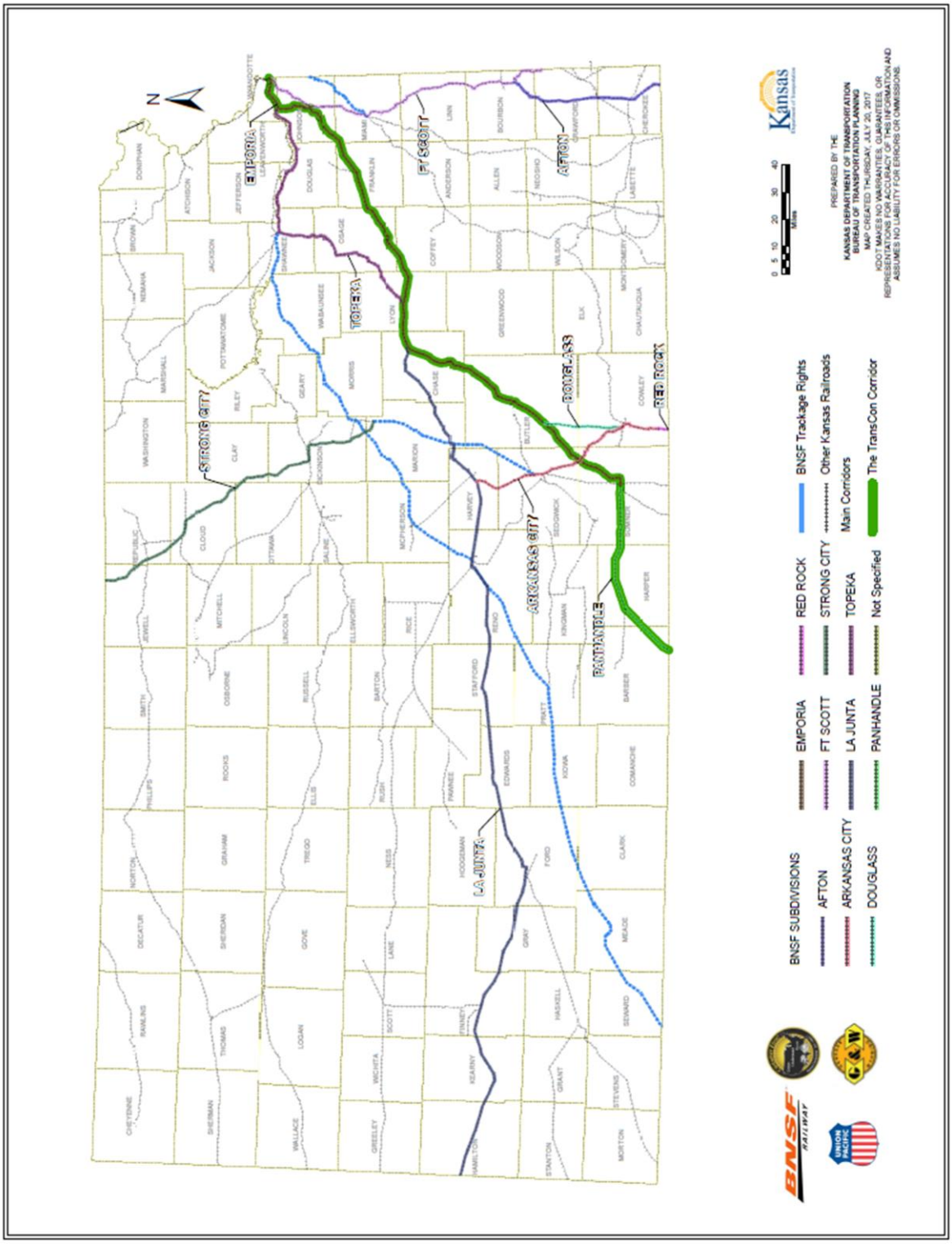


Figure 3.9: BNSF Rail Network in Kansas

3.2.2.2 BNSF Weight and Clearance Restrictions in Kansas

BNSF's network in Kansas is capable of carrying maximum loaded car weights of 286,000 pounds. BNSF has no clearance restrictions on its network in Kansas.

3.2.2.3 BNSF Capital Spending in Kansas

BNSF capital spending in Kansas totaled $189 million in 2014, $182 million in 2015, and $160 million in 2016. For 2017, BNSF has planned capital expenditures of $125 million in Kansas.

3.2.3 Kansas City Southern

3.2.3.1 KCS Corridor in Kansas

There are two KCS subdivisions in Kansas, and these subdivisions are part of KCS's one principal north-south route. The KCS rail system in Kansas is portrayed in **Figure** 3.10. The line follows the Kansas and Missouri border southward from Kansas City (mostly in Missouri) and crosses into Kansas northeast of Pittsburg. The line exits Kansas southeast of Pittsburg continuing into Missouri. KCS moved 269,000 carloads in 2016. The two KCS subdivisions are profiled in Appendix A.

3.2.3.2 KCS Line Capacity Conditions in Kansas

KCS reported that the capacity on the two subdivisions in Kansas is adequate for providing for fluid conditions for the planned traffic volumes.

3.2.3.3 KCS Weight and Clearance Restrictions in Kansas

KCS's network in Kansas is capable of carrying maximum loaded car weights of 286,000 pounds. KCS has no clearances restrictions on its network in Kansas.

3.2.3.4 KCS Capital Spending in Kansas

KCS does not release capital spending figures per state. However, the railroad said that there are no major improvements outside of routine maintenance planned for its subdivisions in Kansas.

3.2.4 Norfolk Southern Railway

NS has trackage rights on three miles of track in Kansas, specifically in the Kansas City area. The NS intermodal facility for the metropolitan Kansas City area is located in Kansas City, Missouri.

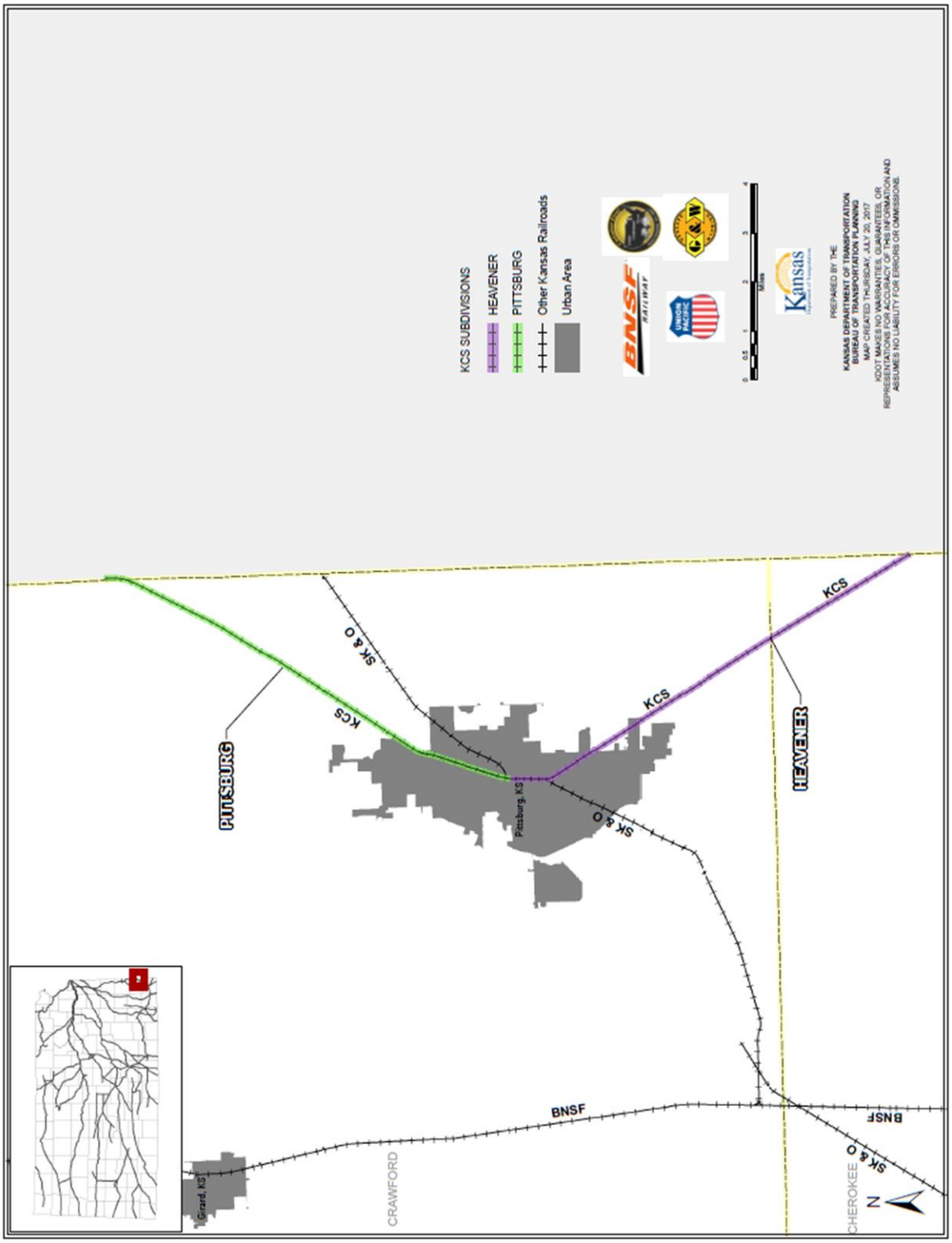


Figure 3.10: KCS Rail Network in Kansas

3.2.5 Union Pacific Railroad

3.2.5.1 UP Main Corridors in Kansas

Several of the subdivisions are aligned into corridors. UP has six principal corridors in and through Kansas as described below. There are 13 UP subdivisions in Kansas. The UP rail system in Kansas is portrayed in **Figure** 3.11. Each corridor carries substantial through freight as well as origin and termination service for shippers and receivers in Kansas. Minor portions of these various routes merge with other routes in and around the Kansas City area.

Overall, UP hauled nearly 2.2 million carloads in Kansas. The top five UP commodities shipped out of Kansas by volume in 2016 included wheat and flour, grain, assembled autos, fertilizer, and cement and materials. The top five UP commodities received to Kansas by volume in 2016 included coal, assembled autos, cement and materials, industrial chemicals, and stone/gravel.

The Golden State Route, comprised of the Pratt, Herington, Topeka, and Kansas Subdivisions, enters Kansas near Liberal, in the state's southwestern corner, and terminates at Kansas City, passing through Hutchinson and Topeka *en route*. It serves as a primary route between Southern California and the Ports of Los Angeles and Long Beach and Kansas City. At Kansas City, it connects to UP routes to St. Louis and Chicago. Traffic on the Golden State is primarily domestic and international intermodal freight, finished domestic and imported autos and light trucks, and general manifest freight moving in individual carloads. Significant local traffic is generated at Hutchinson and Topeka. Most of the Golden State is single-track and it is equipped with Centralized Traffic Control (CTC). It is approximately 455 miles. Traffic between Topeka and Kansas City can be as many as 60 trains per day.

The Marysville Cutoff, comprised of the Marysville and Kansas Subdivisions, begins at Gibbon, Nebraska, where it leaves UP's principal east-west main line, the Overland Route, enters Kansas along its northern border and terminates at Kansas City. It is approximately 173 miles. The line serves as a primary outlet route for unit coal trains from the Gillette Field of the Powder River Basin in Wyoming to utilities in Kansas, Missouri, Oklahoma, Louisiana, Arkansas, Texas, and the Southeast. It also serves as a return route for empty coal trains.

Empty return coal trains are also carried on UP's Falls City Subdivision and the former St. Joseph & Grand Island Railroad between Hiawatha and Upland, near Marysville. This route serves in effect as a third track. The Marysville Cutoff is mostly double-track and equipped with CTC. Approximate rail traffic per day is 40 trains.

The Kansas Pacific, consisting of the Kansas, Salina and Sharon Springs Subdivisions, begins at Kansas City and leaves Kansas at its western border near Sharon Springs *en route* to its terminus at Denver. Primary traffic is unit coal trains that originate in the Yampa and North Fork Coal Fields in Colorado *en route* to utilities in Kansas and the Midwest, empty return coal trains, and locally originating unit grain trains and grain moving in blocks of 26 or 52 cars. The Kansas Pacific is mostly single-track and is not currently equipped with CTC. It is approximately 445 miles. Approximate rail traffic per day is 15 trains.

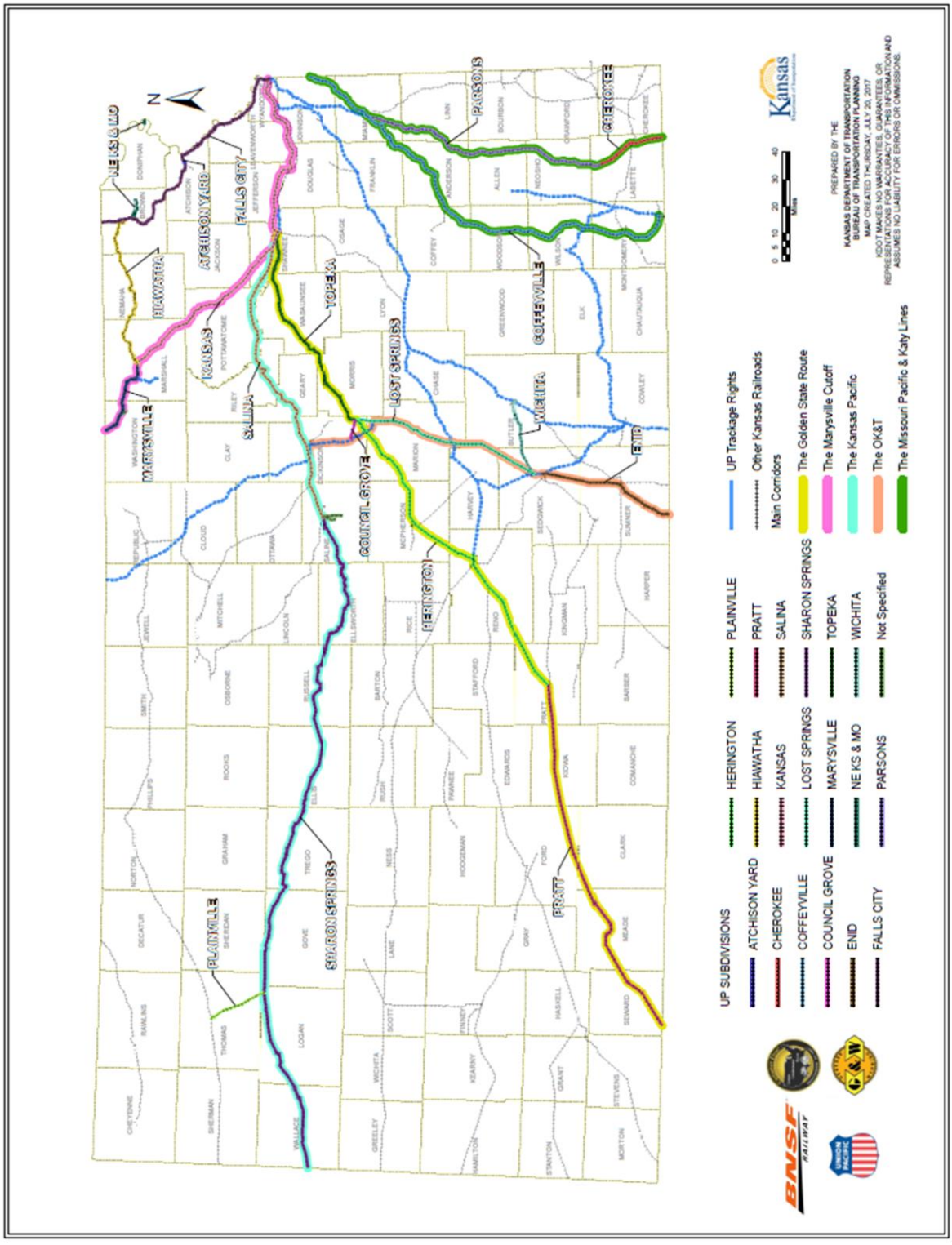


Figure 3.11: UP Rail Network in Kansas

The Falls City Subdivision begins at Omaha, Nebraska, and terminates at Kansas City. Primary traffic is general carload freight and empty unit coal trains returning to Wyoming, moving northward from Kansas City on the Falls City Subdivision as far as Hiawatha. The Falls City Subdivision is mostly single-track and equipped with CTC. It is approximately 96 miles. Approximate rail traffic per day is 20 trains.

The OK&T, so named because it was at one time called the Oklahoma, Kansas & Texas Railroad, was formed out of the bankruptcy of the Chicago, Rock Island & Pacific Railroad. Consisting primarily of the Lost Springs and Enid Subdivisions, it originates at Herrington and runs southward, exiting Kansas near Wellington *en route* to Oklahoma City and Fort Worth, Texas. Its primary traffic is unit grain trains originating on the Kansas Pacific and general carload freight. The OK&T is single-track and is mostly not signaled. It is approximately 125 miles. Approximate rail traffic per day is less than 10 trains.

The Missouri Pacific and Katy Lines, comprised of the Coffeyville, Parsons, and Cherokee Subdivisions, are single-track main lines that run southward from Kansas City leaving the state near Coffeyville and Chetopa. These lines carry coal trains forwarded from the Marysville Cutoff and the Kansas Pacific, unit grain trains destined to poultry feeders in Arkansas, Oklahoma, and Texas, unit grain trains destined to export at Galveston or to Mexico, and substantial carload, chemical, and finished automobile traffic between Texas, Mexico, and the Southeast, and Kansas City, Chicago, and the northeastern U.S. Both lines are mostly single-track and are equipped with CTC. Approximate rail traffic on each line is 25 trains per day. The Missouri Pacific line runs approximately 142 miles south from Paola, while the Katy line is approximately 160 miles between the Kansas/Oklahoma border and Paola. Between Paola and the Kansas/Missouri border in Kansas City the line is approximately 42 miles. The Missouri Pacific line primarily carries traffic into Arkansas and the Southeast, whereas the Katy line primarily carries Texas and Mexico traffic.

The 13 UP subdivisions are profiled in Appendix A.

3.2.5.2 UP Line Capacity Conditions in Kansas

Generally, UP's infrastructure in Kansas is able to handle the demand. However, UP is planning a major upgrade to its lines in Willard (the Willard Cutoff), inclusive of new alignment connecting the Salina Subdivision and the Topeka Subdivision and a new bridge over the Kansas River. The improvement will have the effect of reducing 8 route miles between Menoken and Maple Hill and boosting line capacity.

3.2.5.3 UP Weight and Clearance Restrictions in Kansas

UP's network in Kansas is capable of carrying maximum loaded car weights of 286,000 pounds or more. UP has no clearance restrictions on its network in Kansas.

3.2.5.4 UP Capital Spending in Kansas

Union Pacific's planned investment covers a range of initiatives: $43 million to maintain railroad track and $12 million to maintain bridges in the state. Key projects planned this year include:

- $13 million investment in the rail line between Topeka and Herington to replace 102,740 railroad ties and install 53,137 tons of rock ballast.

- $4.8 million investment in the rail line between Junction City and Salina to replace 33,828 railroad ties and install 327 tons of rock ballast.

In general, and not specific to Kansas, UP expects capital spending to average around 16 to 17 percent of revenue over its planning horizon, assuming business conditions warrant and that potential new laws or regulations do not impact its ability to generate sufficient returns on these investments. From 2012 to 2016, Union Pacific's capital investment reached more than $425 million in Kansas.

3.3 Class III Railroads

Class III railroads are also known as local, terminal and switching railroads. Class III carriers providing line haul services are known as short lines. Class III railroads are small railroads that provide connections for their shippers to the Class I railroads and the national rail system. There are 11 short lines and three terminal and switching railroads in Kansas. During 2016, short line railroads in Kansas hauled a total of 156,140 carloads versus 144,392 in 2015, an 8% increase. The railroads and their mileages appear in **Table 3.8**. A brief description of these railroads follows the table.

Table 3.8: Class III Railroad Route Mileage in Kansas

Class III Railroads (Short Lines)	Main Line Owned	Lines Leased from Class I	Miles Operated Excluding Trackage Rights
Blackwell Northern Gateway Railroad	18		18
Blue Rapids Railroad	10		10
Boot Hill &Western Railroad	10		10
Cimarron Valley Railroad	179		179
Garden City Western Railroad	45		45
Kansas & Oklahoma Railroad	554	166	720
Kyle Railroad	282	139	421
Missouri & Northern Arkansas		8	8
Nebraska, Kansas, Colorado Railway	62		62
South Kansas & Oklahoma	267		267
V & S Railway	25		25
Switching and Terminal Railroads			
Kansas City Terminal (Switching service by KAW River Railroad)	27		27
New Century AirCenter Railway	5		5
Wichita Terminal Association and Wichita Union Terminal	9		9
Class III Total	**1,493**	**313**	**1,806**

3.3.1 Blackwell Northern Gateway Railroad Co.

The Blackwell Northern Gateway Railway Co. (BNGR) is an 18-mile-long rail line operated by the Blackwell Industrial Authority (BIA). The railroad's main source of revenue is from rail car storage fees (**Figure** 3.12).

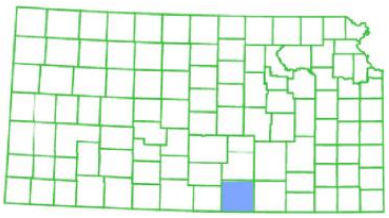
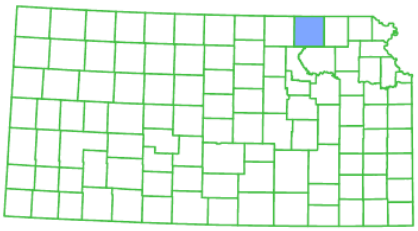


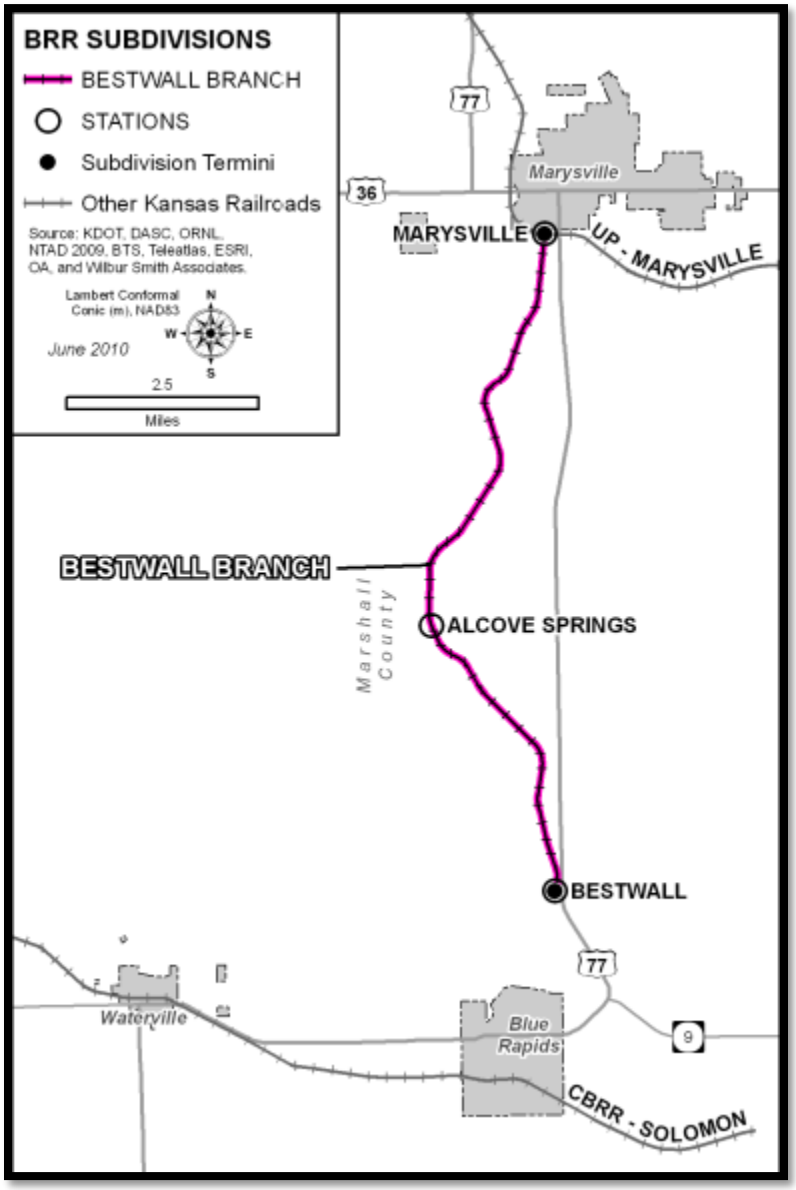
Figure 3.12: Blackwell Northern Gateway Rail Network in Kansas

3.3.2 Blue Rapids Railroad



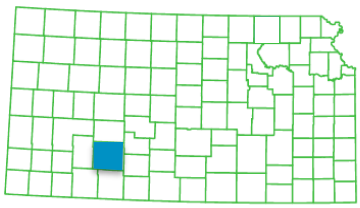
The Blue Rapids Railroad (BRRR) is a 10-mile line running south from Marysville to the Georgia Pacific Gypsum processing facility at Bestwall near Blue Rapids (**Figure** 3.13). The BRRR moves railcars loaded with industrial gypsum plaster from the plant to the rail yard in Marysville, and via Class I railroad connections to customers across the country. Current volume (2016) is 500 carloads average per year of finished plaster products on this line. The BRRR does not own any locomotives or rolling stock. It relies on the Union Pacific to perform the switching of railcars once or twice per week.

Figure 3.13: Blue Rapids Rail Network in Kansas



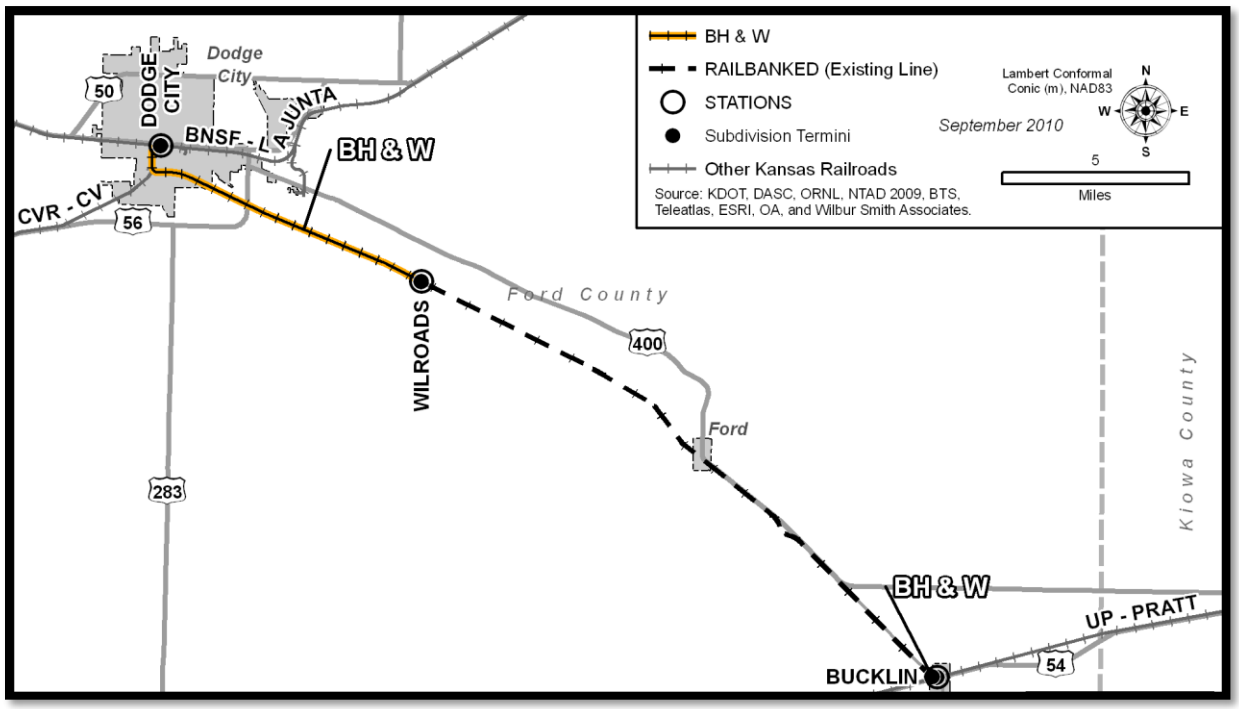
3.3.3 Boot Hill and Western Railway

The Boot Hill and Western Railway (BH&W) was created from parts of the former Chicago, Rock Island & Pacific Railroad that connected Dodge City to Bucklin, Kansas (**Figure** 3.14). The railroad's current revenue is generated from rail car storage fees. There were no carloads moved over this 10-mile line in 2016.

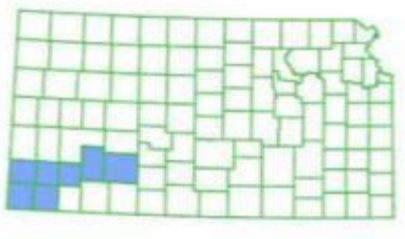


The BH&W interchanges with BNSF Railway at Dodge City.

Figure 3.14: Boot Hill and Western Rail Network in Kansas



3.3.4 Cimarron Valley Railroad

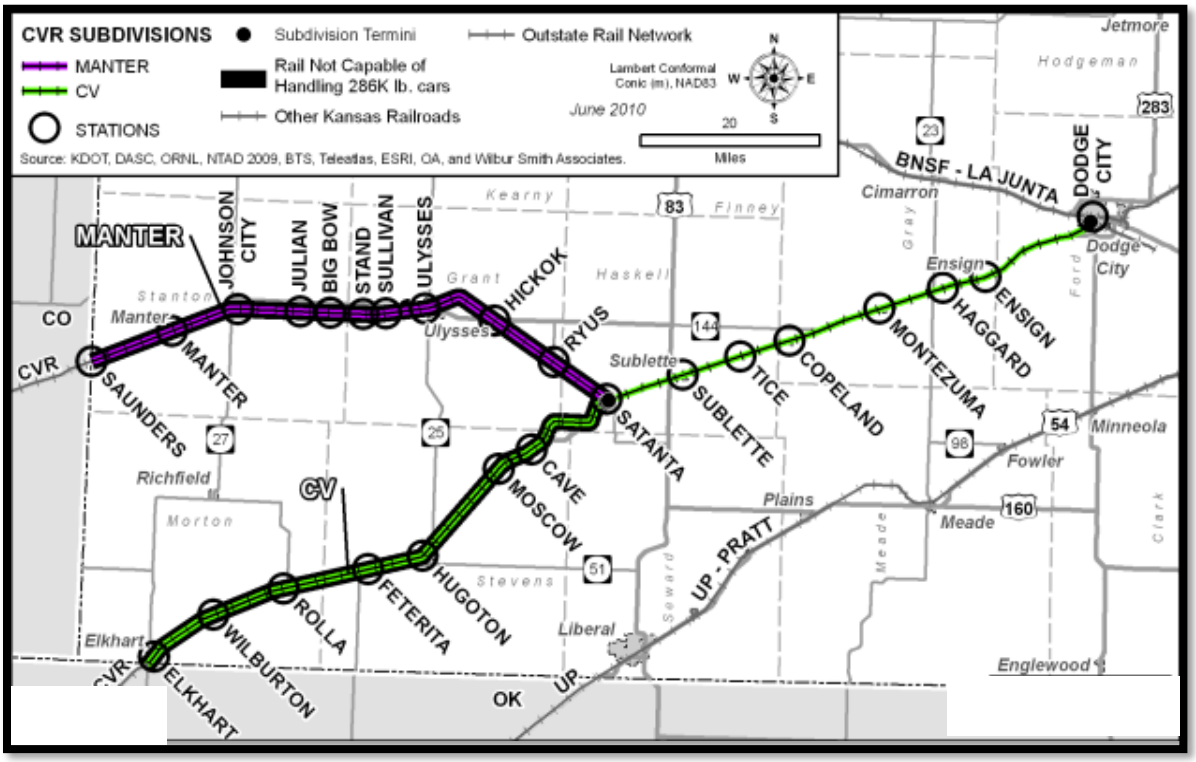


The Cimarron Valley Railroad (CVR) is a subsidiary of the Western Group, located in Ogden, Utah (**Figure** 3.15). The Western Group owns six other railroads and a construction company. The CVR operates in the southwestern corner of Kansas. Its line runs southwest from Dodge City to Satanta where the line splits and the southern route goes to Boise City, Oklahoma; the western route continues to Springfield, Colorado. The railroad's operating plan calls for a two train operation. Other trains are frequently added during grain season to accommodate harvest. The CVR owns 179 miles of track in Kansas.

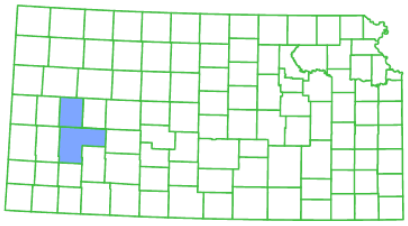
The CVR has 20 employees in Kansas and includes a car repair shop at Satanta, Kansas.

Primary commodities shipped on this line include grain and grain-related products. Secondary commodities shipped include fertilizer, soy bean meal, carbon black, chemicals, and miscellaneous shipments. The CVR handled over 14,400 carloads in 2016.

Figure 3.15: Cimarron Valley Rail Network In Kansas



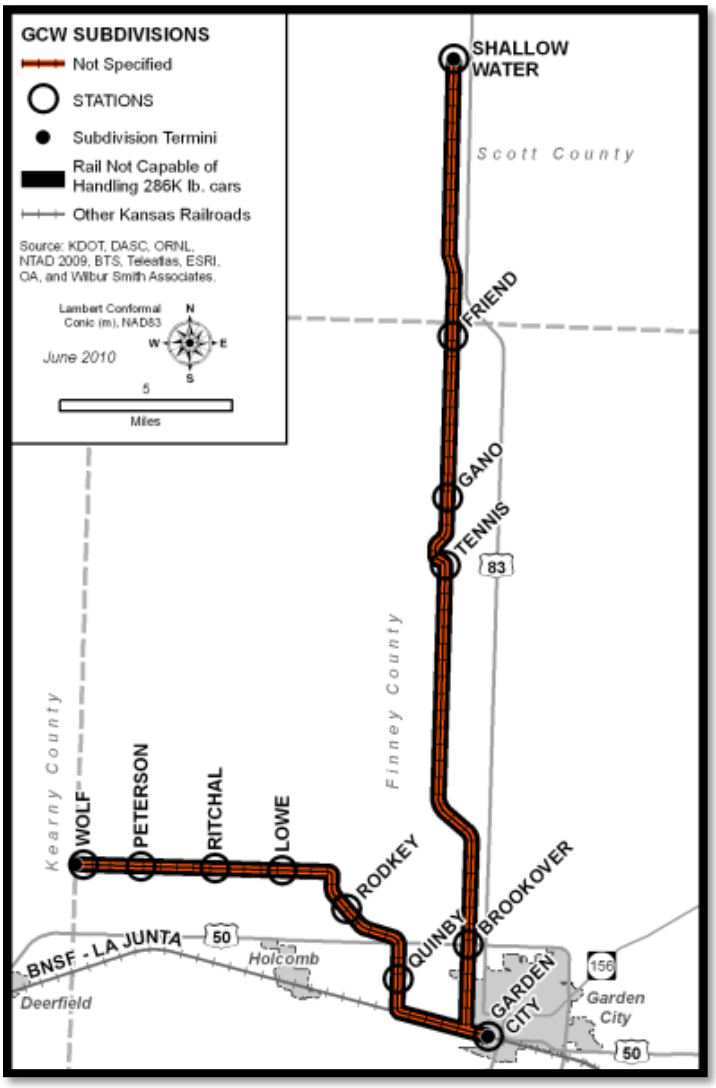
3.3.5 Garden City Western Railway, Inc.



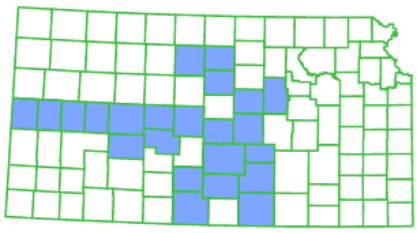
Garden City Western (GCW) has been in business since 1916, serving the agricultural market of southwestern Kansas by connecting Garden City to Wolf (**Figure** 3.16). The rail line's customers ship grain (wheat and milo), farm equipment, feeding ingredients, molasses, peanut meal, fertilizers, frozen foods, and petroleum products. In addition, several other products, such as utility poles, are shipped in and out of a large rail-to-truck transfer facility located on the GCW in Garden City. In 2016, the railroad handled approximately 1,460 carloads on their 45 miles of rail lines. Currently, the GCW has three full-time employees.

GCW's corporate parent, Pioneer Railcorp, located in Peoria, IL, is a short line railroad holding company which owns 23 rail operations in 13 states with over 600 miles of track serving over 100 customers, including some of the largest industrial corporations in the United States.

Figure 3.16: Garden City Western Rail Network in Kansas



3.3.6 Kansas and Oklahoma Railroad



The Kansas and Oklahoma Railroad (KO) is a subsidiary of WATCO Companies, Inc. (WATCO), a Pittsburg, Kansas, based company (**Figure** 3.17). As of 2015, WATCO owned and operated 35 railroads nationwide, including the KO, South Kansas and Oklahoma Railroad (SKOL), and Kaw River Railroad (KAW) in Kansas. The WATCO national network covers 5,053 miles of track and ships more than half a million carloads annually.

WATCO purchased the KO on June 29, 2001. The KO operates over 720 track miles in three directions, making it one of the largest short lines in the industry. It originates in Wichita and extends to the Colorado state line. It owns 554 miles of track in Kansas and has 166 miles of leased track from UP lines. In Kansas, the KO owns 39 locomotives. It has access to 1,282 freight cars; 471 owned and 812 leased. In 2016, the KO transported just over 45,000 carloads of agricultural and industrial products, such as corn, wheat, fertilizers, lumber, cement, sand, and rock in Kansas. KO has 103 employees in Kansas.

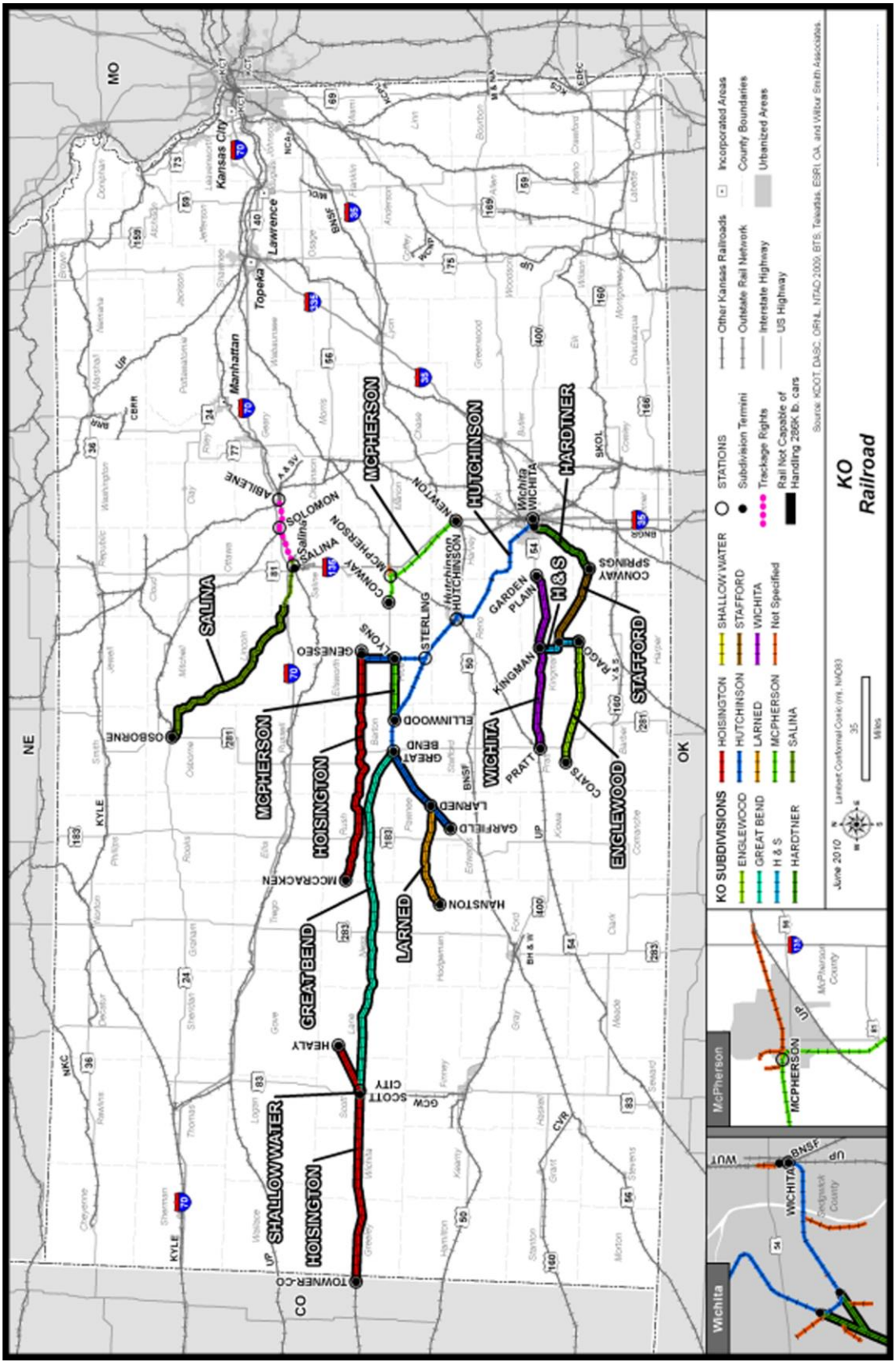
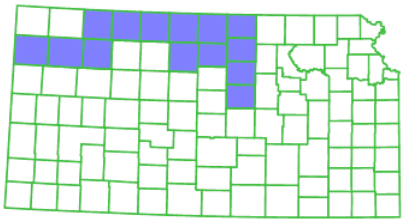


Figure 3.17: Kansas and Oklahoma Rail Network in Kansas

3.3.7 KYLE Railroad Company



The Kyle Railroad (KYLE) is wholly-owned subsidiary of Genesee & Wyoming Inc. (G&W), located in Darien, CT, that owns or leases 121 freight railroads organized into 10 operating regions with approximately 7,200 employees and more than 2,800 customers (**Figure** 3.18). G&W's eight North American regions serve 41 U.S. states and four Canadian provinces, and include 114 short line and regional freight railroads with more than 13,000 track-miles.

In Kansas, the KYLE Railroad operates 421 route miles in the northwestern/north central section of the state of which 139 miles are under a lease agreement with the UP Railroad. It operates an additional 87 miles in Colorado. The KYLE is based in Phillipsburg, Kansas, where extensive locomotive and repair shops are maintained. Other on duty locations are in Concordia and Goodland, KS. KYLE's freight is primarily based with agricultural products, chemicals, granules, petroleum products and other products. The KYLE handled approximately 24,100 carloads during 2016 and employs 57 Kansans.

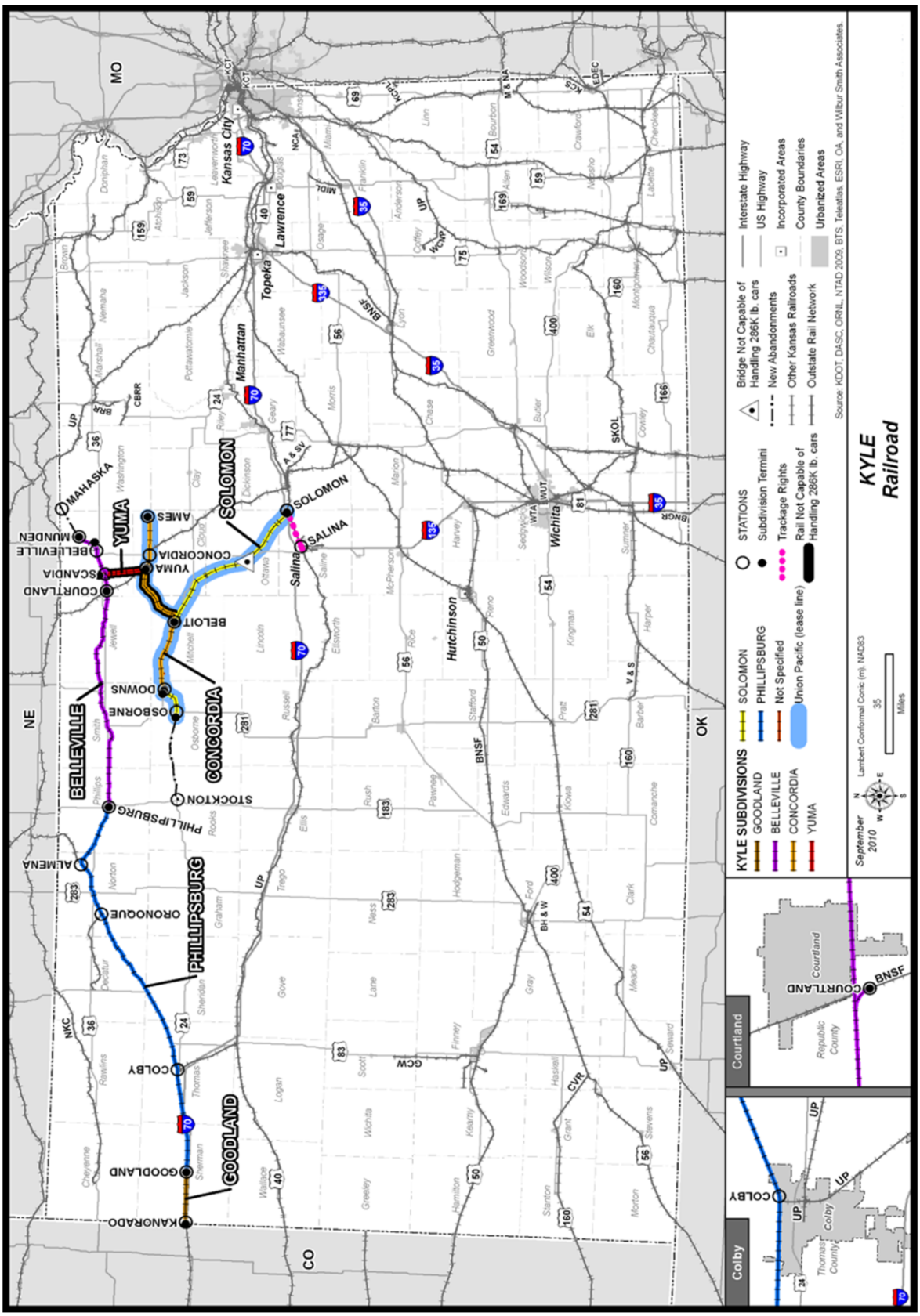
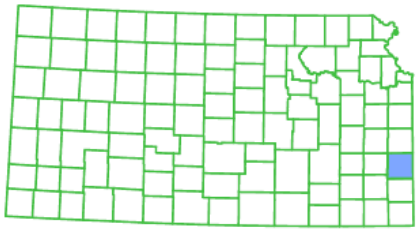


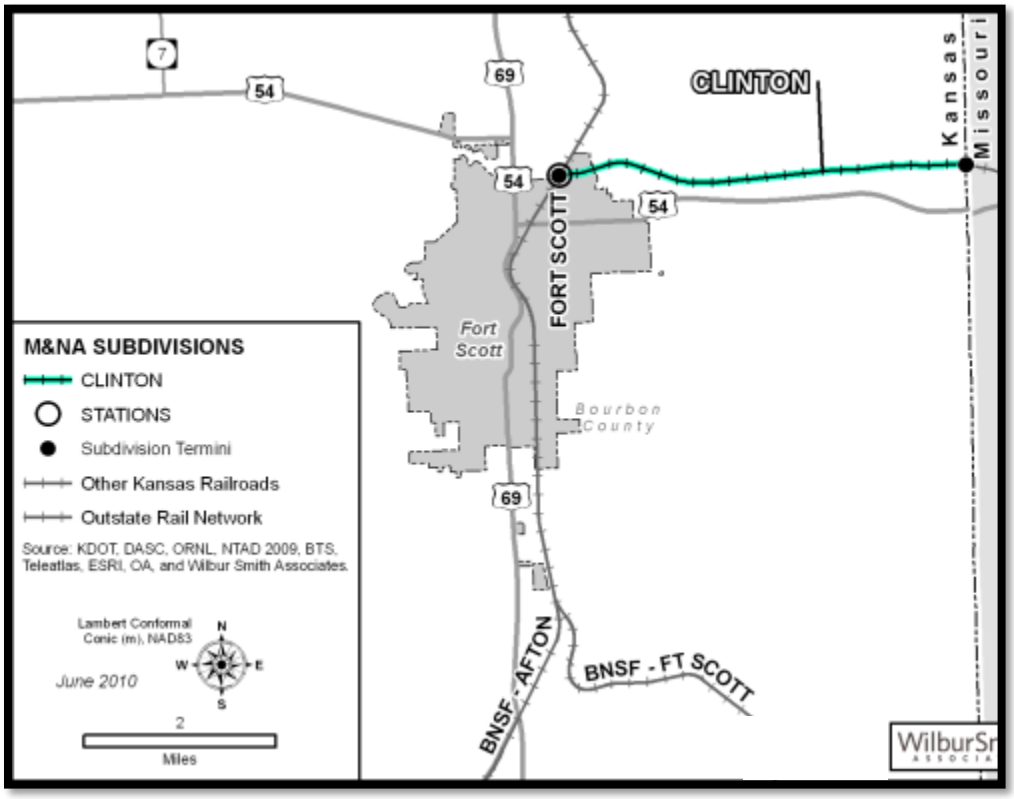
Figure 3.18: Kyle Rail Network in Kansas

3.3.8 Missouri and Northern Arkansas Railroad

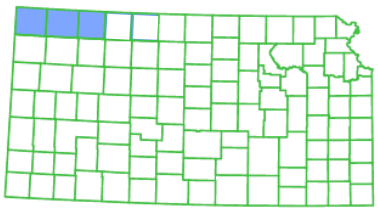


The Missouri and Northern Arkansas Railroad (M&NA), owned by Genesee and Wyoming (GW), located in Darien, CT, leases eight miles of UP line in Kansas (**Figure** 3.19). Currently there is no freight moving on this line, which lies between Fort Scott, Kansas, and the state line a few miles to the west of Nevada, Missouri.

Figure 3.19: Missouri and Northern Arkansas Rail Network

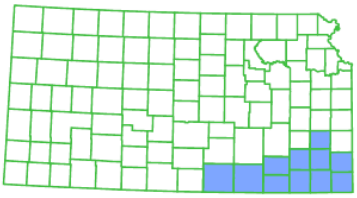


3.3.9 Nebraska Kansas Colorado Railroad



The Nebraska, Kansas, Colorado Railway, Inc. (NKCR), owned by Omnitrax, located in Denver, CO, has a branch line in northwest Kansas. This line connects St. Francis to Orleans, NE. NKCR recently abandoned 45 miles of their Oberlin Subdivision but will have 62 miles of track on the St. Francis Subdivision in place for car storage.

3.3.10 South Kansas and Oklahoma Railroad



The South Kansas and Oklahoma Railroad (SKOL) is a subsidiary of WATCO Companies, Inc. (WATCO), a Pittsburg, Kansas based company (**Figure** 3.20).

The SKOL, purchased in 1987, was the first short line railroad operated by WATCO. The SKOL operates 267 route miles in Kansas, originating from Cherryvale and serves customers primarily in southeastern Kansas and northeastern Oklahoma. Traffic consists of agricultural and industrial products such as corn, wheat, fertilizers, lumber, cement and sand. The SKOL handles the most traffic of any short line railroad in Kansas. During 2016 the SKOL transported over 68,800 carloads and have 90 employees.

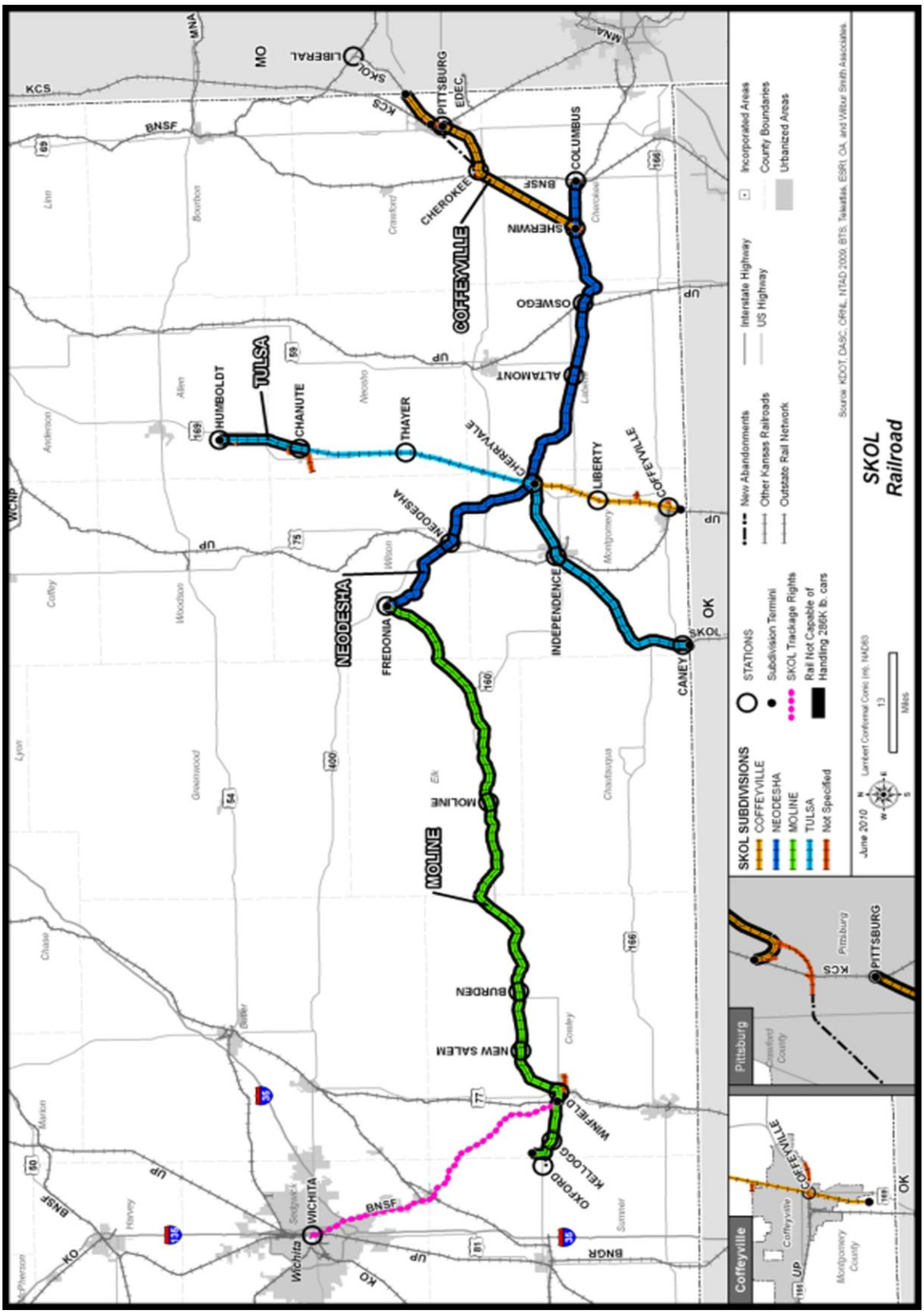
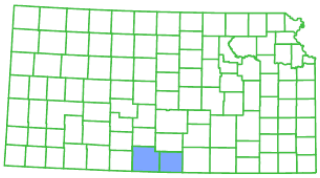
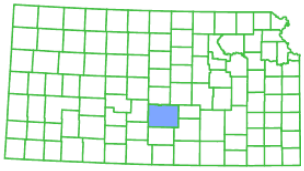


Figure 3.20: South Kansas and Oklahoma Rail Network in Kansas

3.3.11 V&S Railway LLC

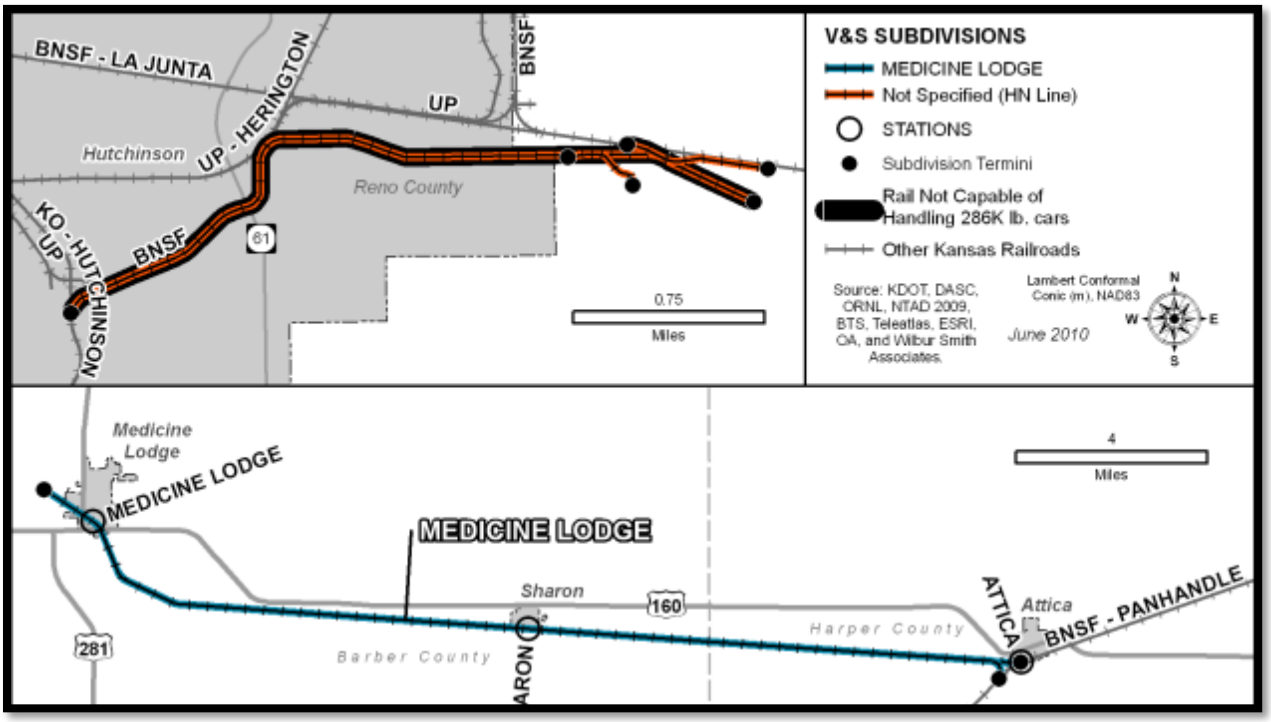




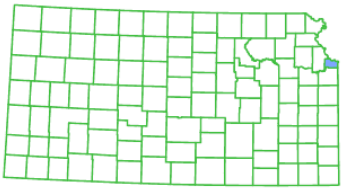
V&S Railway operates two separate rail lines in Kansas (**Figure** 3.21). It has a 21.5 mile line that is located in Barber and Harper Counties between the cities of Attica and Medicine Lodge. The second line is 3.5 miles long and is located in Hutchinson. The V & S Railway connects with the BNSF Railway at Attica and Hutchinson, as well as with the UP and Kansas and Oklahoma in Hutchinson. The V&S moved approximately 850 carloads in 2016 on its 25 miles of rail lines.

In November 2005, the Hutchinson and Northern Railroad (HN) was purchased by Pacific Western Railway. In January 2006 V & S Railway LLC began operating the railroad on behalf of Pacific Western Railway. In May 2006, V&S acquired the 3.5-mile line in Hutchinson, and currently operates the line in conjunction with its operations in Medicine Lodge. Major commodities shipped on the line include salt and scrap iron. The railroad also has a freight car repair facility. V&S has three employees in Kansas.

Figure 3.21: V&S Railway Rail Network in Kansas



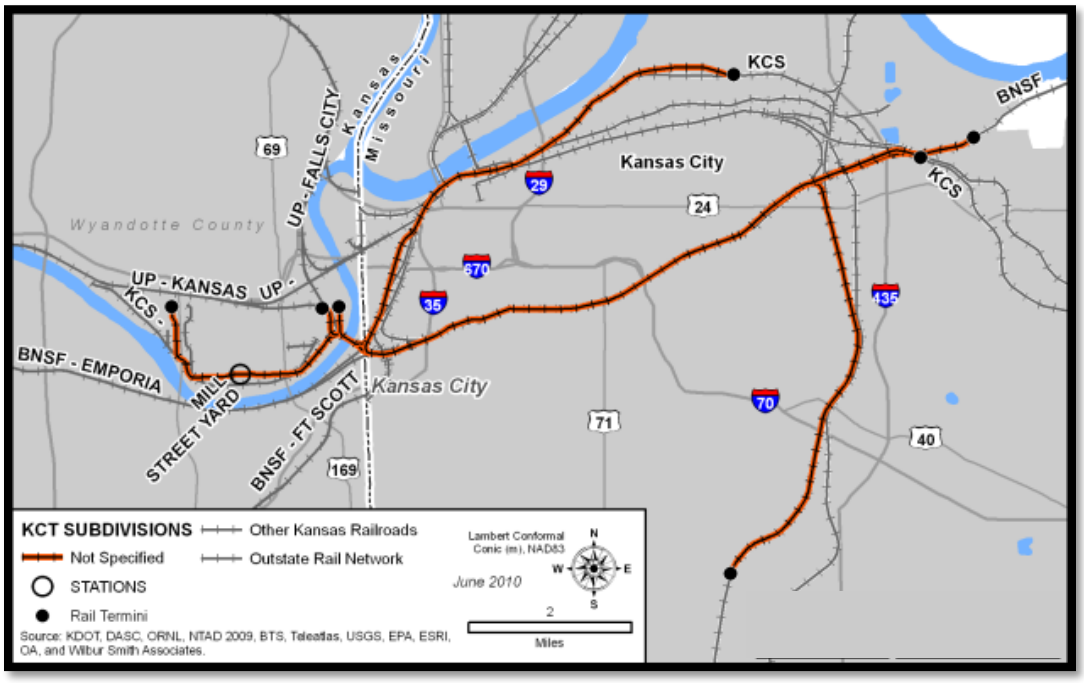
3.3.12 Kansas City Terminal Railway Company



The Kansas City Terminal Railway Company (KCT) and its subsidiaries, founded in 1906, is a joint facility operation which serves the railroads that operate in Kansas City, Kansas and Missouri (**Figure** 3.22). The KCT provides dispatching and switching services for trains in and out of the metropolitan Kansas City area, with approximately 3 route miles in Kansas. The company is owned by the UP, BNSF, KCS, NS, and Iowa, Chicago & Eastern Railroad), which are the primary customers and users of the KCT's facilities.

In 1992 the KCT's maintenance of way activities were contracted to BNSF. In March of 2006, the KCT formed a new corporation, Kansas City Transportation Company, with the KAW River Railroad (KAW) providing the industry switching operations for this new corporation. In 2016 the KCT switched over 17,800 cars.

Figure 3.22: Kansas City Terminal Rail Network in Kansas

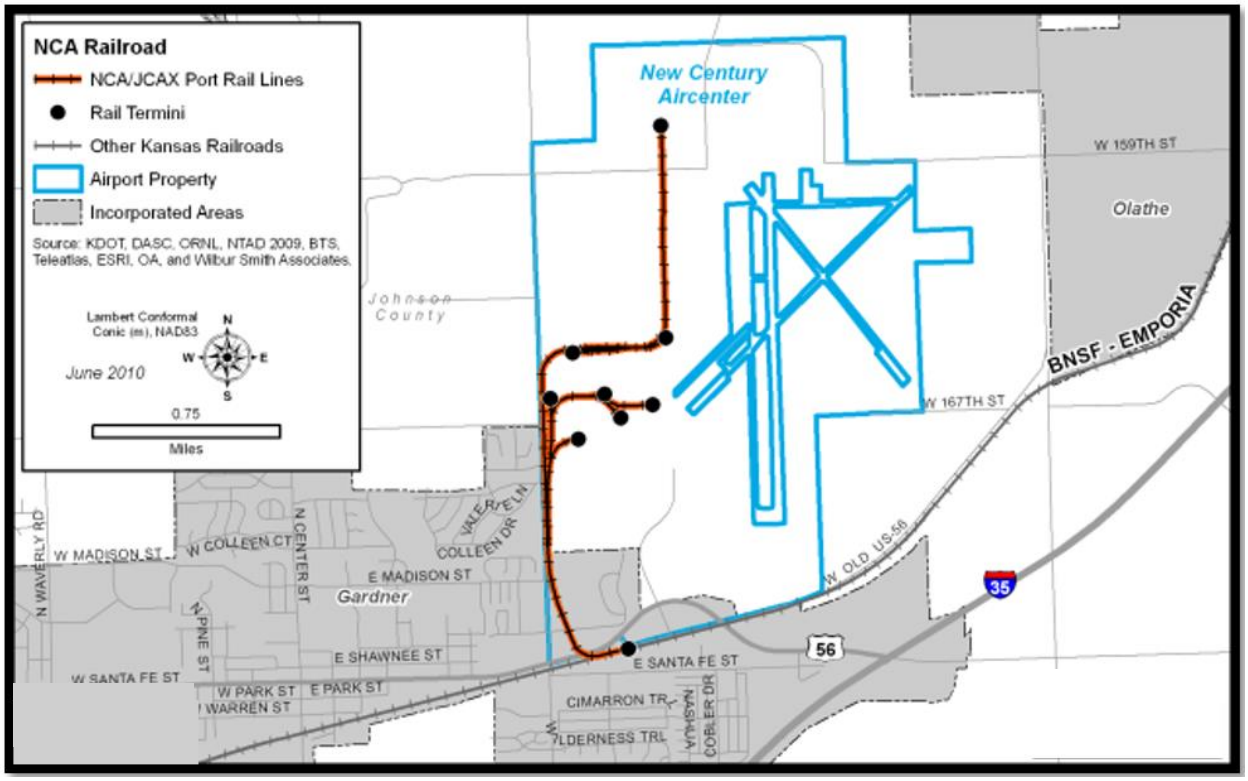


3.3.13 New Century AirCenter Railroad

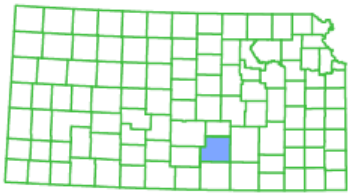
New Century AirCenter is a 2,300-acre inland port located along the I-35 NAFTA corridor with five miles of rail lines (**Figure** 3.23). Rail service is provided by the New Century AirCenter Railroad (NCA), owned by Johnson County (KS), and interchanges with the BNSF Railway.

NCA provides switching services to meet intra-plant requests; usually within twenty minutes during normal business hours and as otherwise requested. The industrial park maintains a certified track scale for special weighing requirements and has recently installed in-motion railcar weight scales with computerized railcar identification and reporting systems. A total of 820 carloads were interchanged in 2016.

Figure 3.23: New Century AirCenter Rail Network



3.3.14 Wichita Terminal Association Railroad, Inc.



The Wichita Terminal Association Railroad Inc. (WTA) was formed in 1889 to service the stockyards in Wichita, Kansas (**Figure** 3.24). The railroad is owned by a partnership between the BNSF Railway and Union Pacific. WTA maintains and operates their facilities and infrastructure.

The WTA is a switching and terminal railroad, which primarily handles grain and grain-related products including wheat for flourmills. Often shipments of grain involve subsequent moves related to the processing of flour products. Some scrap steel is also moved. In 2016, WTA switched over 15,700 cars across nine miles of rail lines.

The WTA should not be confused with the Wichita Union Terminal, which is comprised of two miles of track owned jointly by BNSF and UP. WTA provides maintenance for the Wichita Union Terminal but the tracks over which the WTA crews operate have no physical connection with the Wichita Union Terminal's tracks. BNSF dispatches the mainline of the Wichita Union Terminal.

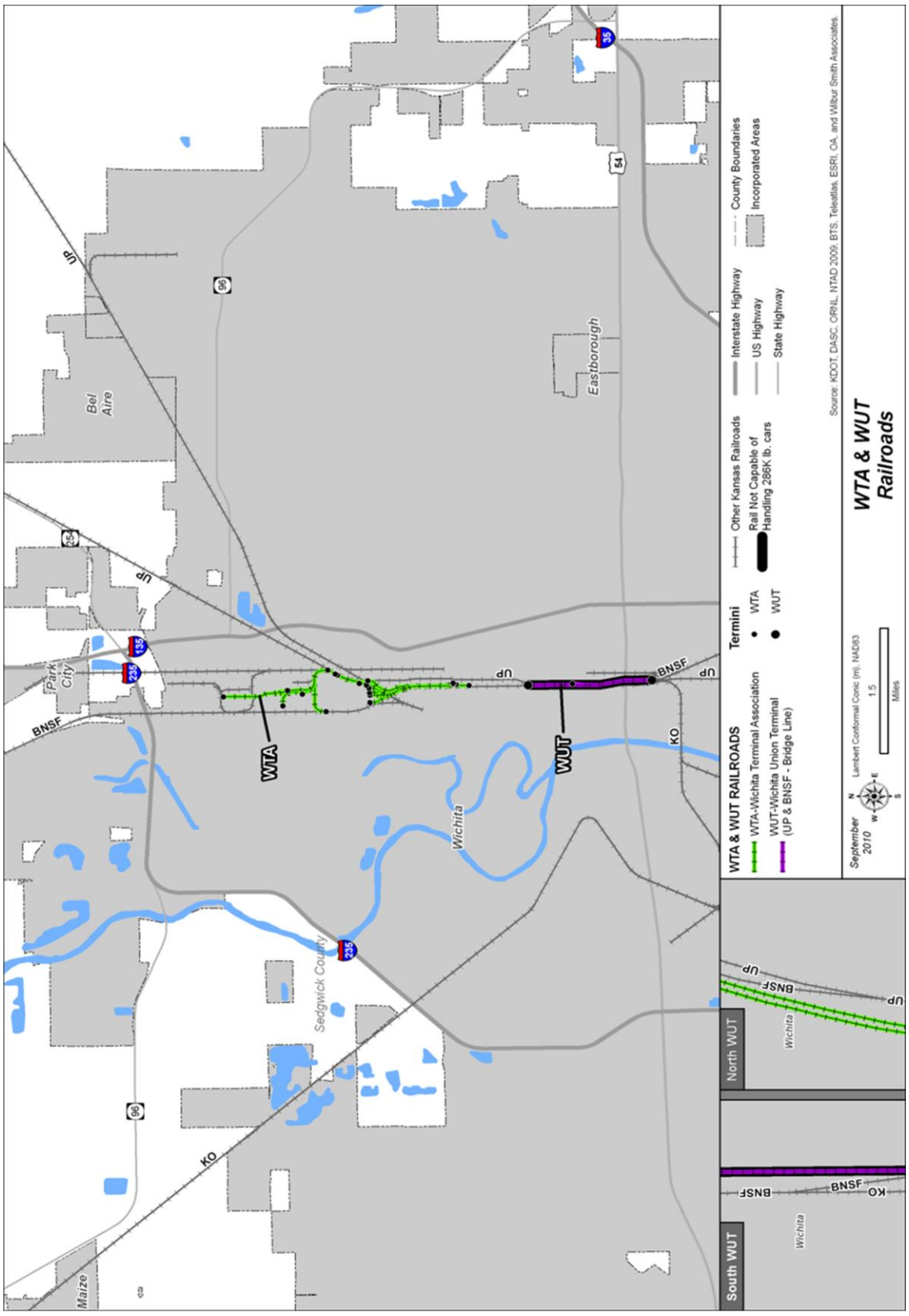


Figure 3.24: Wichita Terminal Association Rail Network in Kansas

3.4 Waterways

Kansas has direct access to one inland barge navigable waterway, the Missouri River. The Missouri River has two parts of the National Marine Highway system, M-29 is a marine highway "connector Corridor" that connects the upper Missouri River from Kansas City to Sioux City, Iowa. At Kansas City, the M-29 corridor ties into the M-70 marine highway which runs from Kansas City to St. Louis. The Missouri River runs along approximately 121 miles along the northeast corner of Kansas. The Kansas River feeds into the Missouri River which flows east across the state of Missouri and connects with the Mississippi River providing barge access to Louisiana ports and the Gulf of Mexico. There are 90 jobs associated with waterborne freight in Kansas.

3.4.1 Water Ports

In Kansas, the US Army Corps of Engineers (USACE) identified seven ports in Kansas along the Missouri River according to their navigational database. **Table 3.9** identifies these waterway ports in Kansas and **Figure 3.25** illustrates the same.

Table 3.9: USACE Identified Ports in Kansas

Port	River Mile	Commodity
Kansas City-Wyandotte County Joint Port Authority Wharf	Mile 367.6	Grain
Will Brothers Terminal	Mile 368	N/A
Bennet-Rogers Pipe Coating Company	Mile 372*	N/A
Westway Terminal Company – Wolcott Dock	Mile 386.4	Petroleum Pitches, Coke, Asphalt, Solvents, Chemicals, Grain
Drexel Chemical	Mile 395.9	Fertilizers, Chemicals
Maczuk Industries – Atchison Terminal Dock	Mile 423.1	N/A
White Cloud Grain Company	Mile 488	Food and Farm Products, Fertilizers

Source: USACE, http://www.navigationdatacenter.us/ports/data/, accessed August 2016
**Estimated from Google Maps and USACE navigational data center*

3.4.2 Private Ports

In addition to the ports noted above, there are other numerous private ports in Kansas that include marinas and docks that directly connect businesses to waterways. The MARC Regional Hazardous Materials Emergency Preparedness Plan identifies all Missouri River ports along the border of Kansas in **Figure 3.25**.

3.4.3 Out of State Ports

Freight shippers also use nearby out of state water ports for freight movements to and from Kansas. These include the recently reopened Port of Kansas City (Port KC) in Kansas City, Missouri and the Port of Catoosa in Tulsa, Oklahoma shown in **Figure 3.26**. Through the first seven months of 2017, 35 barges carrying 1,750,000 bushels of Kansas grain have been transported via Port KC. Port KC is accessible from Kansas using N. James Street, Central Avenue Viaduct, or I-670. The likely routes to access the Port of Catoosa from Kansas are I-44, US 169, or US 75 as well as rail service on the SKOL to the port. Through August 2017, SKOL railroad has moved 1,158 rail carloads from Kansas to the Port of Catoosa and five carloads in return.

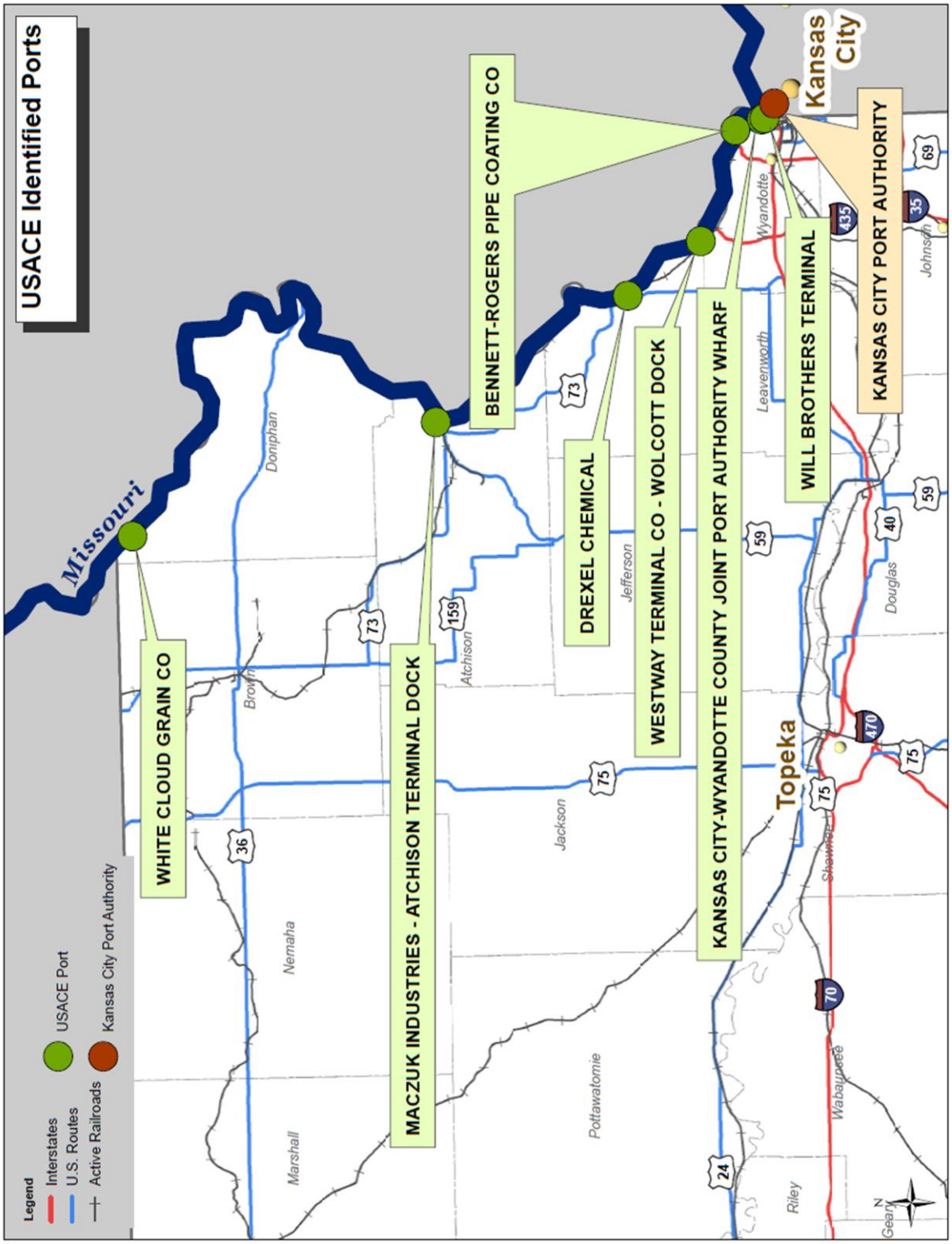


Figure 3.25: Kansas River Ports

Source: CDM Smith, USACE data

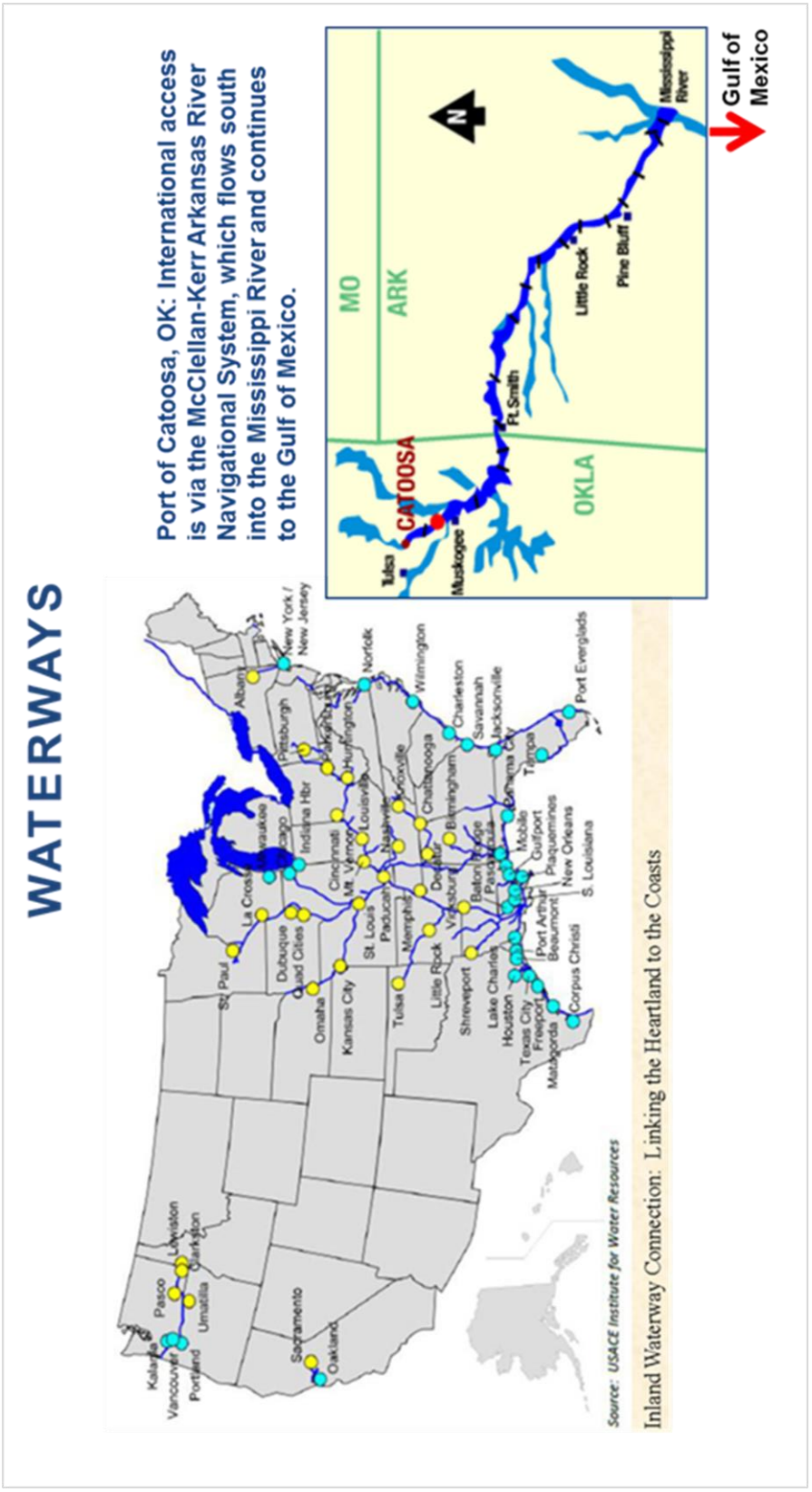


Figure 3.26: Port of Catoosa

Source: KDOT, 2017

3.5 Air

The Kansas airport system consist of approximately 300 designated landing areas. Kansas is home to 137 public-use airports including 7 commercial service facilities and over 200 private airports that serve general aviation for either public or private use, see **Figure 3.27**. Airports provide over 63,800 jobs and generate nearly $10.8 billion in total economic activity in the state.[10]

Air cargo is typically, although not always, lightweight, time-sensitive, and high-value commodities. Common examples of air freight include perishables (flowers, fish, produce), computers and peripherals, aviation components, telecommunications equipment, vehicle parts, oil and gas drilling equipment, pharmaceuticals, clothing, medical supplies and equipment, beauty supplies, as well as many others.

Air freight accounts for a small component of the state's overall freight universe. Within Kansas, Wichita's Dwight D. Eisenhower Airport (ICT) is the only airport that handles substantial freight movements. There are several other airports in Kansas that can support air cargo operations but their annual volumes are minimal. There are also airports that accommodate private freight shipments.

Dwight D. Eisenhower Airport (ICT) provides three runways with lengths varying from 10,301 feet on the primary runway to 7,301 feet and 6,301 feet for the two auxiliary runways. Additional runway details are provided in **Table 3.10**.

At Dwight D. Eisenhower Airport (ICT), cargo carriers operate from a 65,000 square-yard air cargo apron for aircraft movement and parking. ICT has two dedicated all-cargo buildings for freight processing. Air cargo providers include DHL, Federal Express Corp., United Parcel Service, UPS Supply Chain Solutions, Empire Airlines and Integrated Airline Services.[11] In addition, Southwest Airlines Cargo began offering air cargo services in conjunction with Leadfoot Air Cargo in July 2016.[12] ICT has highway access from Airport Cargo Drive to an interchange with US-54/400.

[10] Federal Aviation Administration. Aviation Economic Impact Report by State. 2009

[11] http://www.flywichita.com/cargo-operations/

[12] http://www.flywichita.com/southwest-cargo-begins-service-ict/

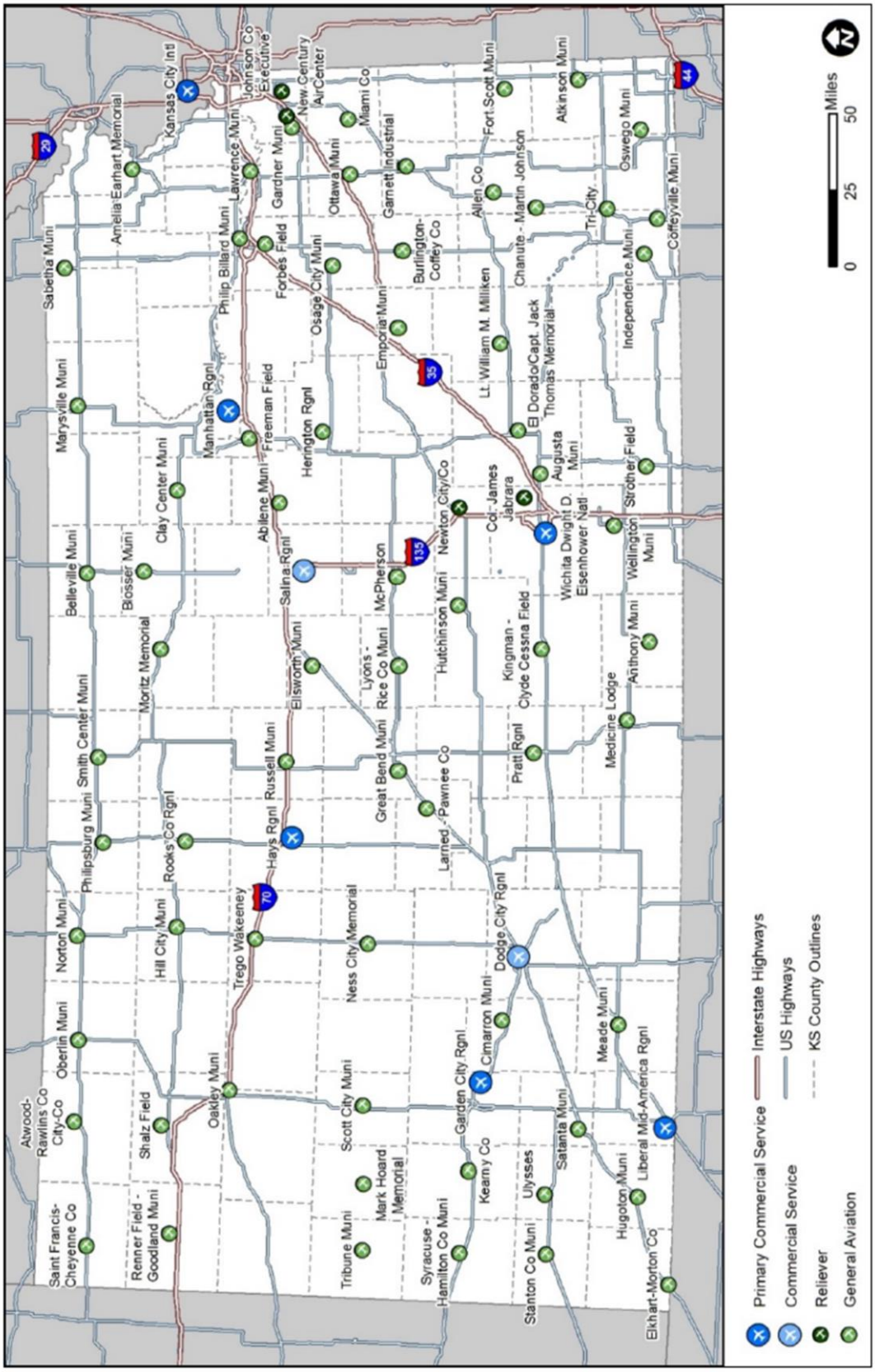


Figure 3.27: Kansas Aviation System Plan Airports

Source: 2016 Kansas Aviation System Plan

Table 3.10: Dwight D Eisenhower Airport (ICT) Runway Inventory

	Runway		
	01L/19R	01R/19L	14/32
Runway	Primary	Auxiliary	Auxiliary
Length	10,301	7,301	6,301
Width	150	150	150
Surface	Concrete	Concrete	Concrete
Surface Condition	Good	Good	Good
Edge Lights	High Intensity	High Intensity	High Intensity
Treatment	Grooved	Grooved	Grooved
Markings	Precision Instrument	Precision Instrument	Non-Precision Instrument
Marking Conditions	Good/Good	Good/Good	Good/Good
Approach Lights	ALSF2/MALSR	MALSR /MALSR	N/A
Runway End Identifier Lights (REIL)	No/No	No/No	Yes/Yes
Centerline Lights	Yes/Yes	No/No	No/No
Touchdown Lights	Yes/No	No/No	No/No
Runway Weight Capabilities (lbs.)			
Single Wheel	100,000	125,000	100,000
Double Wheel	210,000	240,000	190,000
Double Tandem Wheel	300,000	400,000	280,000
Dual Double Wheel	N/A	N/A	N/A
Runway Category	Precision Instrument Runway	Precision Instrument Runway	Utility runway with a non-precision approach and visibility minimum greater than ¾ mile

Source: KDOT Aviation System Plan, 2016 and WAMPO Freight Plan, March 2010

Freight shippers may also use larger, nearby out of state airports for freight movements to and from Kansas. These include Kansas City (MCI), Denver (DEN), Omaha, Tulsa, or Oklahoma City Airports. **Table 3.11** provides a representative sample of the airports and their respective freight tons moved. Air cargo using an out of state airport would likely transport their shipments by truck.

Table 3.11: Top Freight Airports used by Kansas Shippers

ID	Airport Name	Associated City	2016 Landed Weight*	2015 Landed Weight *	2015-2016 Percent Change	North American Rank 2016
DEN	Denver International Airport	Denver	1,425	1,363	4.54%	20st
MCI	Kansas City International Airport	Kansas City	617	503	22.65%	36th
OMA	Eppley Airfield	Omaha	396	365	8.25%	61st
TUL	Tulsa International	Tulsa	322	314	2.54%	72nd
OKC	Will Rogers World	Oklahoma City	216	215	0.24%	88th
ICT	Dwight D. Eisenhower Airport	Wichita	205	211	-2.70%	91st

**In million pounds*
Source: Federal Aviation Administration

McConnell Air Force Base also supports air cargo in Kansas, however the unavailability of data is an issue. Spirit Aerosystems flies completed aircraft out of McConnell AFB for delivery. Additionally, parts and materials used for aircraft manufacturing are delivered to Spirit Aerosystems via truck and rail.

Garden City Regional also handled air cargo in 2015 totaling 414,205 pounds up four percent over 2014 total of 397,388 pounds.

3.6 Pipeline

Approximately 25,500 miles of pipelines move natural gas, crude oil, petroleum products, highly volatile liquids, and CO_2 throughout Kansas. The pipe mileage carrying each commodity is shown in **Table 3.12**. The USDOT Pipeline and Hazardous Materials Safety Administration (PHMSA) regulates pipeline transport. The Office of Pipeline Safety (OPS – within PHMSA) inspects and enforces interstate and intrastate (highly volatile only) pipeline safety regulations and certifies state representatives, through the Kansas Corporation Commission, for intrastate gas pipeline inspection.

Table 3.12: Kansas Pipeline Transmission Mileage by Commodity

Commodity	Pipeline Miles
Natural Gas	13,764
Refined Products	3,556
Crude Oil	3,483
Highly Volatile Liquids (HVL) – Flammable and Toxic	4,643
CO2	29

Notes:
BIOFUEL *is distilled from biological feedstock, such as corn and sugar. Examples include ethanol and biodiesel.*
CO2 *is carbon dioxide in the liquid state.*
HVL FLAMM TOXIC *includes Highly Volatile Liquids (HVL), flammable, and toxic liquids. HVL products form a vapor cloud when released to the atmosphere. Flammable products are defined in 49 CFR 173.120. Toxic products are defined in 49 CFR 173.132. Examples include propane, ethane, butylene, and anhydrous ammonia.*
REFINED Products *are petroleum products obtained by distilling and processing crude oil that are liquid at ambient conditions. Examples include gasoline, diesel, jet fuel, kerosene, and fuel oil.*

Source: https://hip.phmsa.dot.gov/analyticsSOAP/saw.dll?Portalpages
Accessed on August 2, 2016

There are several major crude oil, petroleum product, and liquefied petroleum gas pipelines traversing the state. Oil fields span Kansas in many of the counties in the south and central portion of the state. Kansas is one of the nation's top 10 crude oil-producing states. Kansas is also an oil-refining state. A network of pipelines delivers crude oil to the state's three refineries in Coffeyville, El Dorado, and McPherson which have a combined capacity of about 340,000 barrels of crude oil per calendar day and account for 3,970 jobs.

Many of the crude oil and petroleum product pipelines originate near the Gulf Coast (Texas) and Oklahoma, as well as Canada, and pass through the state to Midwest refineries. Natural gas supplies are primarily from the south-central US and Rocky Mountain region including Oklahoma, Texas, and Colorado.

Kansas has one of the largest natural gas fields in North America and covers much of southwestern Kansas. The Hugoton Field is one of many natural gas and oil fields in the 12,000-square-mile Hugoton Gas Area. In addition to natural gas and crude oil, the Hugoton Field contains unusually high concentrations of helium and has the largest reserves of helium in the United States. The helium is separated out of natural gas and is piped to the National Helium Reserve in Amarillo, Texas.[13]

Thirteen interstate natural gas pipelines cross Kansas. Natural gas enters the state via pipelines from Oklahoma, Nebraska, and Colorado, and pipelines ship natural gas out of state, primarily to Nebraska. Kansas consumes most of the natural gas it produces. The Mid-Continent Center, a 194-mile pipeline system in south-central Kansas, is a key natural gas interconnect, merging production from several states in the region and piping it east toward major natural gas-consuming markets. The major pipelines in Kansas are in **Figure 3.28**.

[13] Energy Information Administration, accessed September 2016 at http://www.eia.gov/state/print.cfm?sid=KS

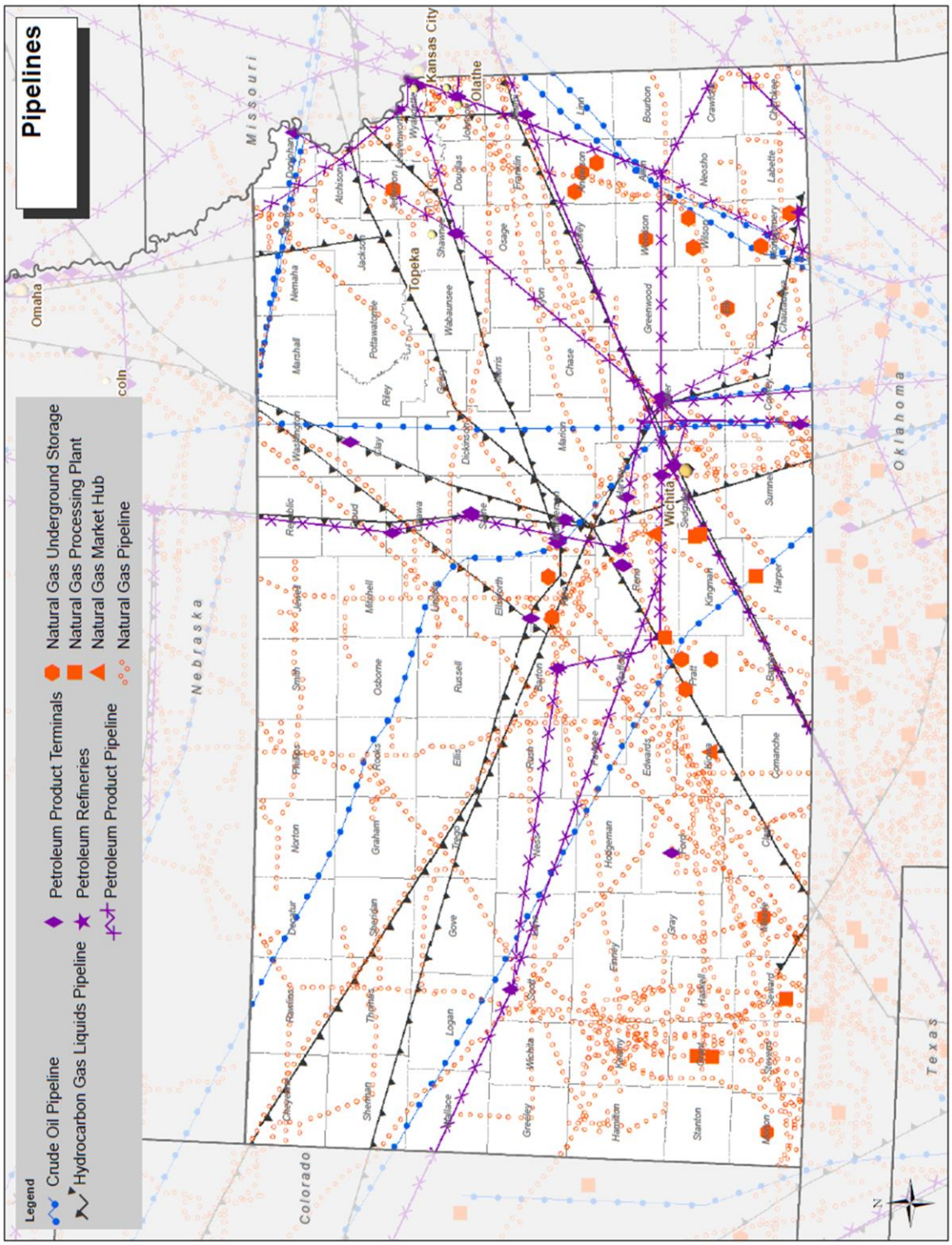


Figure 3.28: Major Pipelines in Kansas

Source: Energy Information Administration, 2016

3.7 Conclusion

The Kansas freight system includes a wide variety of assets of varying modes, including highway, rail, air, water and pipeline, intermodal and transload facilities as well as freight generators- the largest of these assets being the 10,533 miles on the Kansas Highway Network. By identifying not only the critical nodes, links, and corridors of the State's freight system, but the system's current condition and performance this analysis will ultimately build the foundation for the assessment of needs of the current freight system.

The fact that Kansas has a robust freight system is only the beginning of the story. How well the freight system works and is maintained are vital elements to keep freight moving in Kansas. Chapter 4 Freight Network Condition and Performance will explore these elements.

Chapter 4

Freight Network Condition and Performance

This chapter highlights the conditions and performance of the various elements of the Kansas Freight Network. This freight network is made of highway, rail, air, waterway and pipeline modes that transport freight into, out of, within and through Kansas, including the interaction between the modes. It is vitally important to keep the freight network in good condition and operating well for safe and efficient freight movements that drive the Kansas economy.

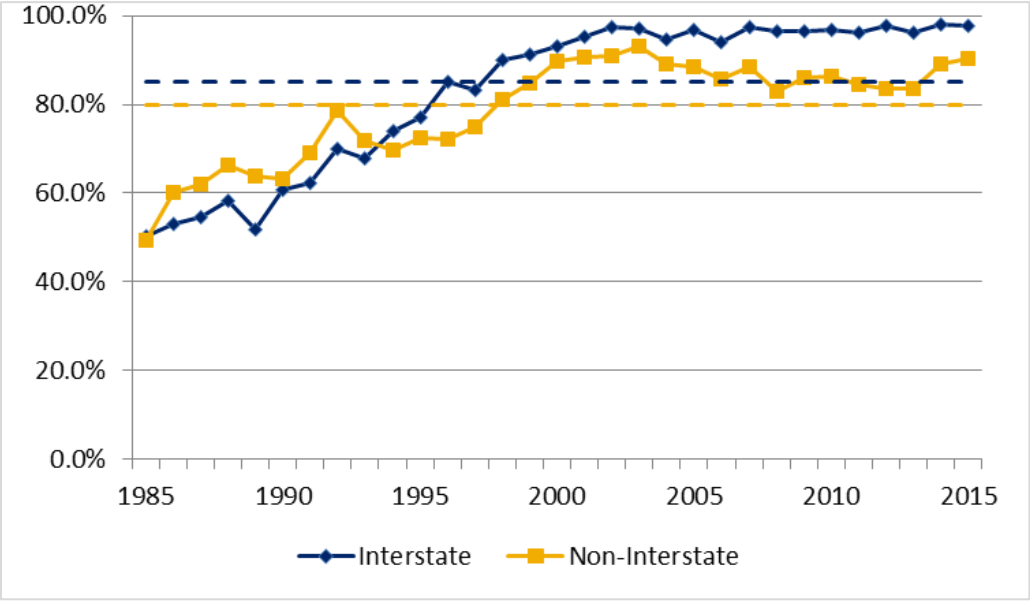
4.1 Highway

Kansas' state highway network (interstates, US highways and state highways) is made up of 10,533 miles of roadway which accounts for just 8 percent of all highway miles in Kansas but carries 57 percent of the highway system's traffic.

4.1.1 Highway and Bridge Condition and Performance

Kansas has more than 10,500 miles of highways and 5,100 bridges to maintain. **Figure 4.1** shows the percent of Kansas' highways that are in good condition[14]. KDOT has established a target of better than 85 percent for interstates and 80 percent for non-interstates for this measure. In 2015, over 90 percent of the non-interstate and 97.7 percent of the interstate highways were in good condition. KDOT has exceeded their minimum threshold in each of the past 15 years.

Figure 4.1: Percent of Highways in Good Condition

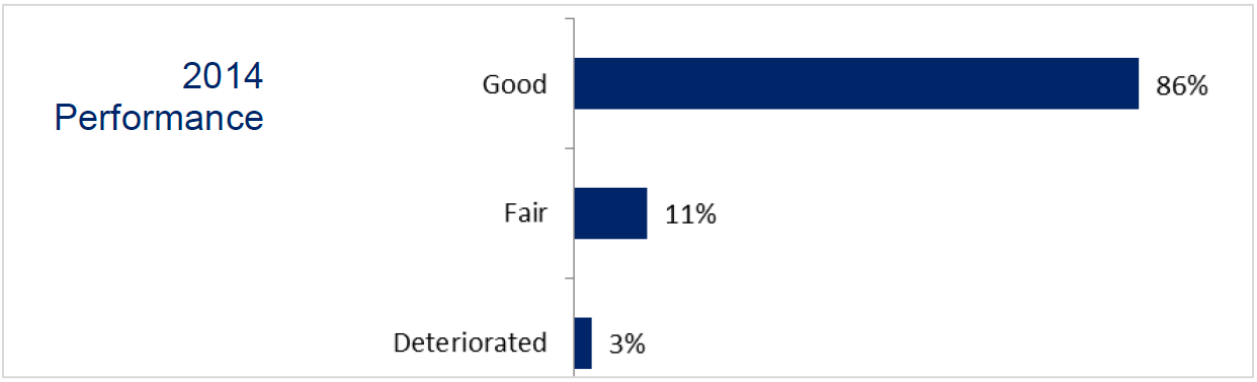


Source: KDOT Performance Measures, 2015

[14] Pavement Condition is a combined score based on roughness, joint distress in concrete or transverse cracking in asphalt, and faulting in concrete or rutting in asphalt

Kansas has exceeded their 85 percent target of bridges in good condition[15] for the past 10 years. With an average bridge age of 48 years and 44 percent of bridges 50 years old or older, KDOT must maintain a steady program of preventative maintenance, rehabilitation, and replacement of their bridge inventory. A simple rehabilitation typically costs $0.5 to $2 million while major bridge replacements can reach $50 to $80 million. These are average costs and the actual cost can be higher or lower depending on various factors such as the location, feature crossed, and the scope of work. The 2014 statewide bridge condition performance report is shown in **Figure 4.2**.

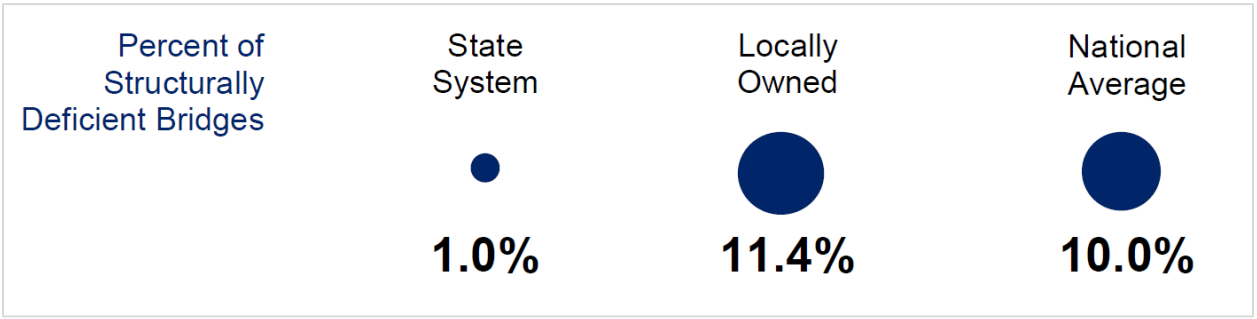
Figure 4.2: Kansas Bridge Performance Conditions



Source: KDOT Performance Measures, 2015

KDOT tracks the percent of structurally deficient bridges that are part of the State Highway System. The FAST Act maintained the MAP-21 requirement to track this measure with a target of less than 10 percent. Kansas is meeting this target with only one percent of structurally deficient bridges on the State Highway System as shown in **Figure 4.3**.

Figure 4.3: Kansas Structurally Deficient Bridges



Source: KDOT Performance Measures, 2015

[15] Bridge conditions are calculated using the Bridge Health Index (BHI) which is an average score for all elements of the bridge including deck, super-structure and sub-structure.

Truck traffic can be restricted on highways due to low clearances at overpasses and weight restrictions on bridges. Low clearance bridges have a height restriction less than the standard 16 foot 4 inches. In Kansas, there are 75 low clearance bridges with a vertical clearance of less than 16 foot as shown in **Figure 4.4**. Most of these low clearance bridges are on the Kansas State Corridors of Significance, particularly on the Kansas Turnpike. The Kansas Turnpike Authority has initiated a bridge raising program to increase bridge clearances to 15'9". This is still below the standard but remains cost effective. KTA anticipates completing 50 bridges over the next 10 years. Over the past two years the KTA has completed six projects that increased vertical bridge clearance.

In addition, to the low clearance bridges there are 15 weight posted bridge structures and 63 restricted bridge structures in Kansas as of spring 2017. The weight posted bridges are more critical because they are posted below legal load values. These bridges are signed to alert traffic of the maximum load values.

The restricted bridges have a maximum load of 120,000 lbs. Everyday traffic is not restricted on these bridges, but large over-sized/over-weight (OSOW) permitted vehicles may be restricted. OSOW loads receive automated routing during the permit process to avoid necessary bridges. Although, most of the restricted bridges are not on the State Freight Corridors of Significance, there are a few. The posted and restricted bridges are shown in **Figure 4.5**.

The described Kansas highway network supports the movement of truck freight throughout Kansas. The truck volumes and number of lanes are shown in **Figure 4.6** and percent truck traffic is in **Figure 4.7**. Percent truck traffic within MPO areas are in **Appendix B.**

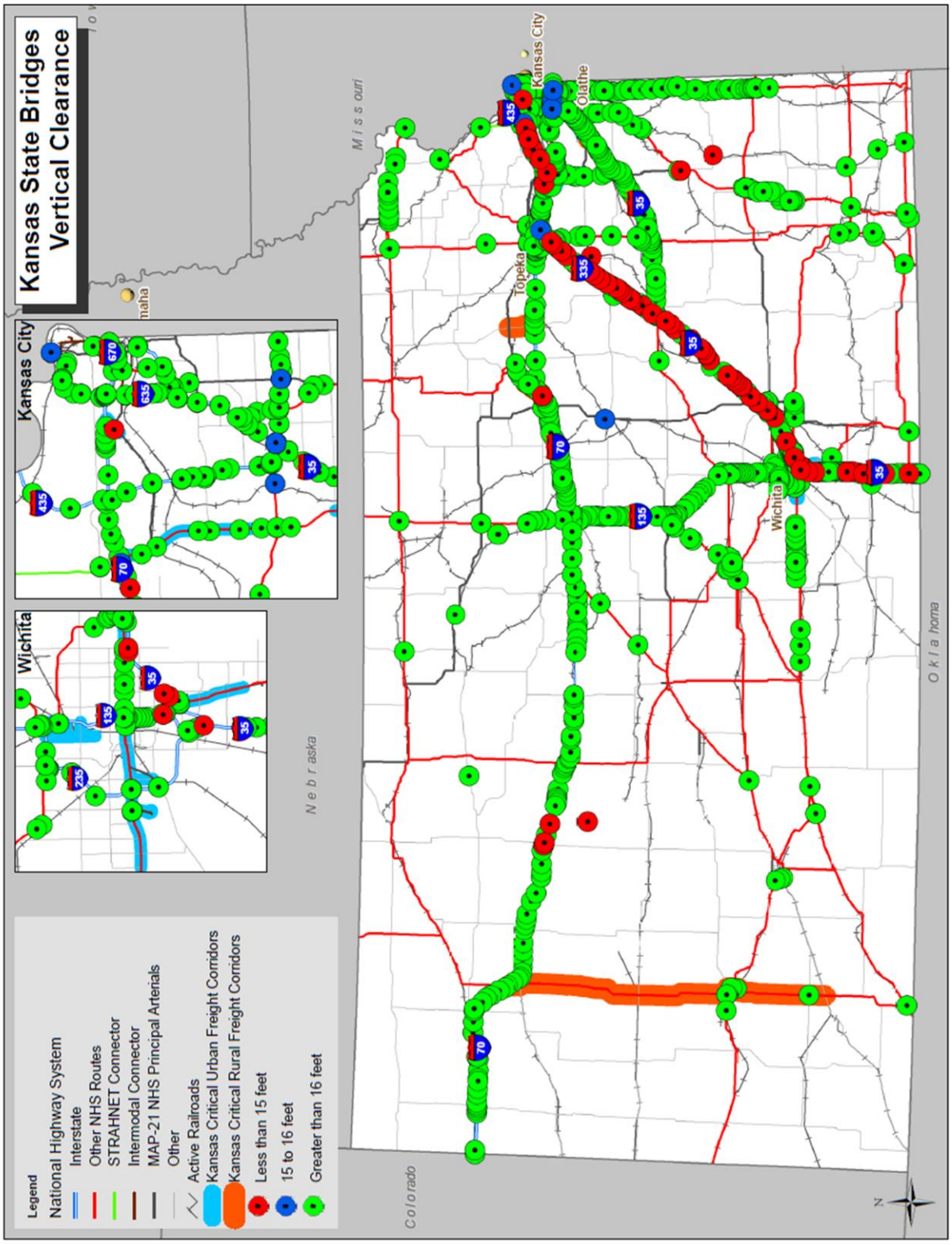


Figure 4.4: Vertical Clearances of Bridges in Kansas

Source: KDOT, 2016

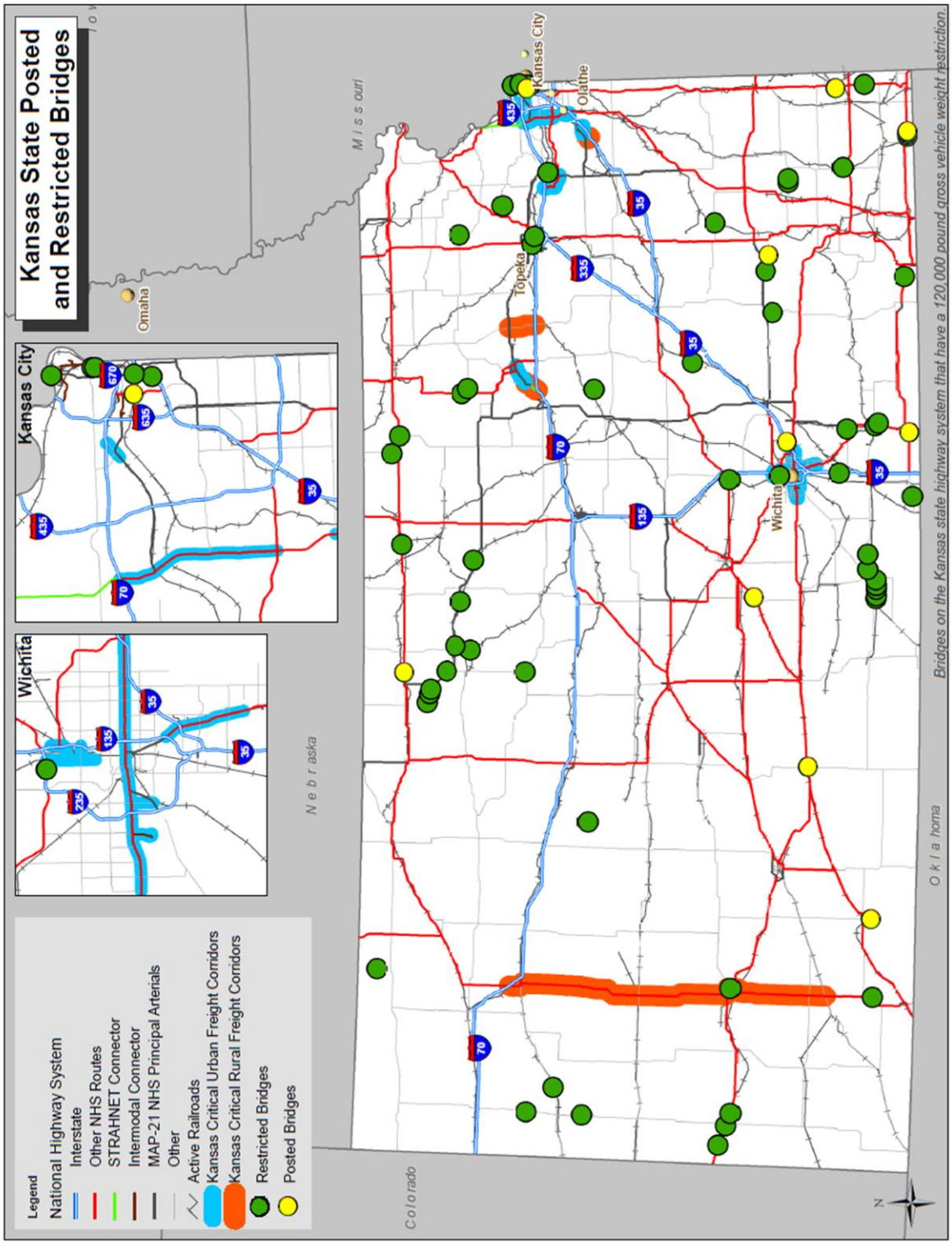


Figure 4.5: Posted and Restricted Bridges in Kansas

Source: KDOT, 2017

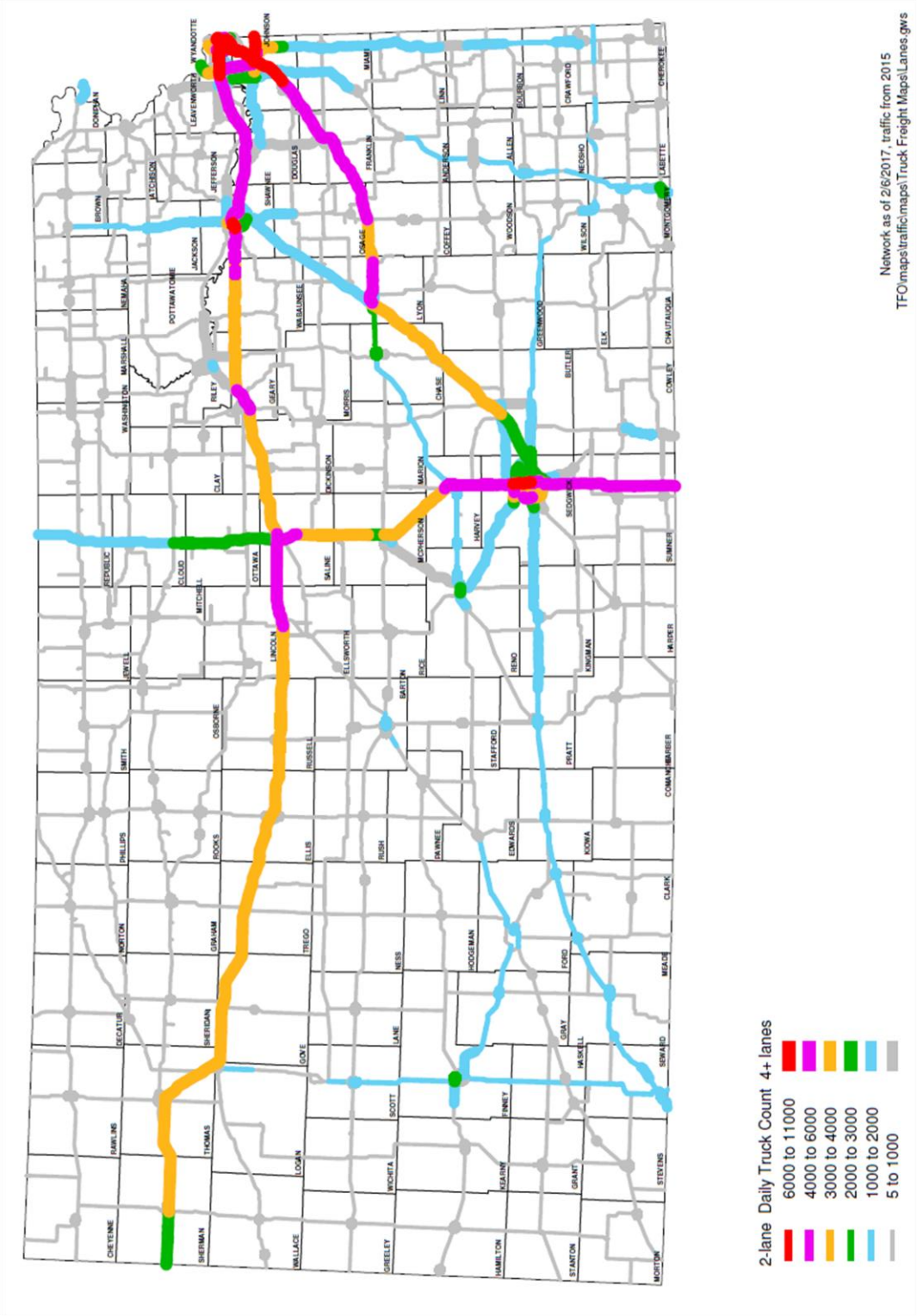


Figure 4.6: Truck Volumes by Number of Lanes

Source: KDOT, 2017

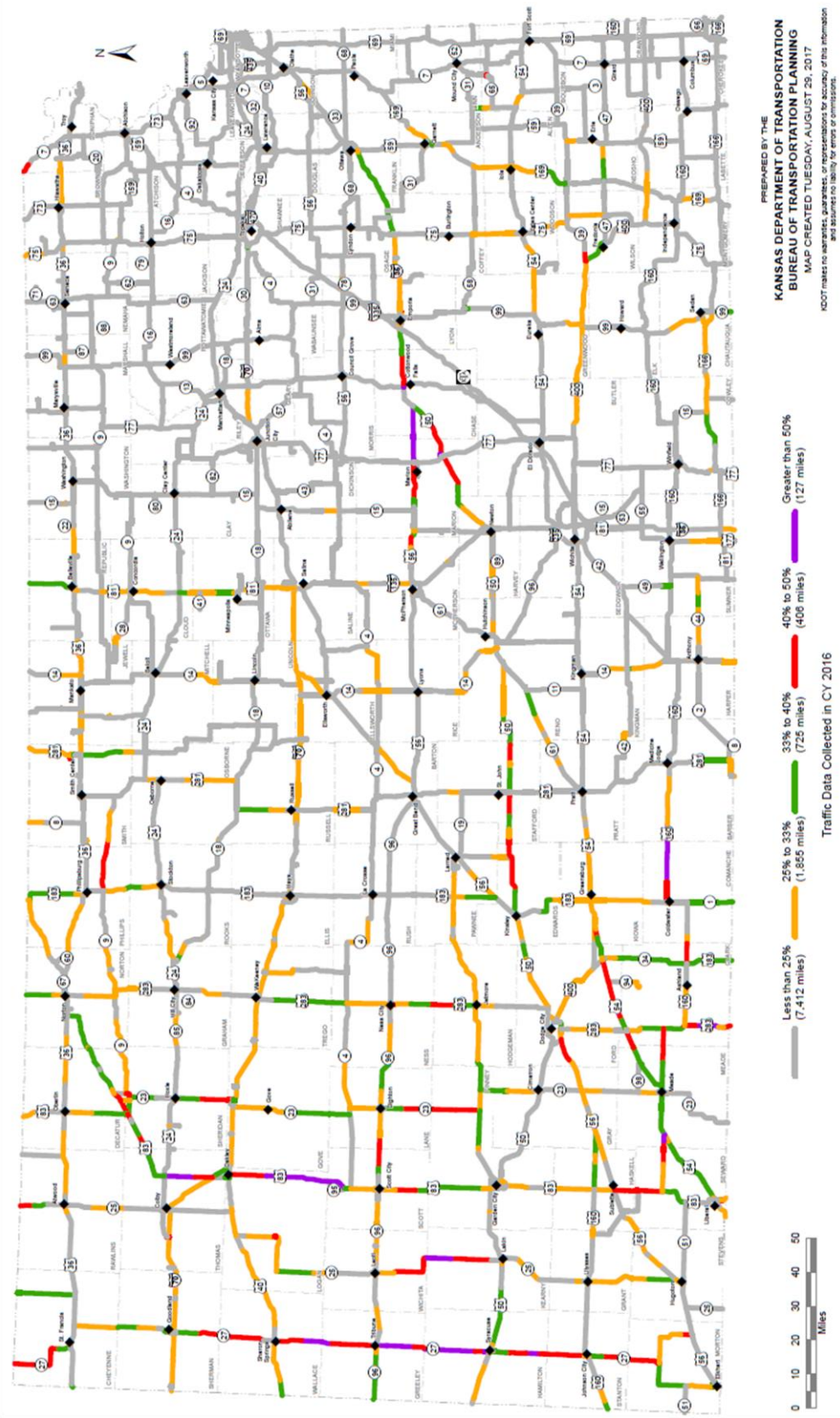


Figure 4.7: 2016 Percent Truck Traffic

Source: KDOT, 2017

4.1.1.1 Oversize Overweight Loads

The Kansas highway system is also carries oversize/overweight (OSOW) loads through a permit process. The Kansas Truck Routing and Intelligent Permitting System (K-TRIPS) was a cooperative effort between the Kansas Department of Transportation, the Kansas Highway Patrol, the Kansas Department of Revenue, and the motor carrier industry, to develop software that would enhance safety, increase efficiency, and be a one-stop shop for all oversize/overweight permitting needs. Launched in January 2014, K-TRIPS provides an internet based application that provides, in some cases, self-issuance capabilities, reduced turn-around times, and turn-by-turn directions. K-TRIPS also provides the user with tools to manage their account, including vehicle inventory, reporting, and managing their own account users. The user has the ability to pay for their permits either with an escrow account or by credit card. KDOT routinely issues over 90,000 permits each year, with about 70 percent of these being self-issued. **Table 4.1** shows the top five OSOW permits from 2014 to 2016.

Table 4.1: Top Five OSOW Permits 2014 - 2016

Permit	2014	2015	2016	2014 vs 2015	2015 vs 2016
Overdimension Oversize and/or Overweight	62,497	55,912	52,382	(6,585)	(3,530)
Overdimension Superload	6,872	8,941	9,488	2,069	547
Overdimension Large Structure	4,402	6,907	7,259	2,505	352
Annual Oversize and/or Overweight	4,412	4,352	4,016	(60)	(336)
Annual Oversize Only	1,548	1,825	1,646	277	(179)
Others	20,987	20,316	17,633	(671)	(2,683)
Total	100,718	98,253	92,424	(2,465)	(5,829)

Source: KDOT

Although there is a decline in total OSOW permits, two of the top three permits (Overdimension Superload and Overdimension Large Structure) have increased each of the past two years. KTRIPS is allows for self-permitting of OSOW loads that do not exceed specific size or weight criteria. In addition, there is an automated routing feature that designates the best route given the applicant's OSOW data input. For superload permits, KDOT does a bridge analysis to provide a safe route for the given the weight of the load and the possible bridges the load will cross. KTRIPS routing information for all 2016 OSOW trips are shown in **Figure 4.8**.

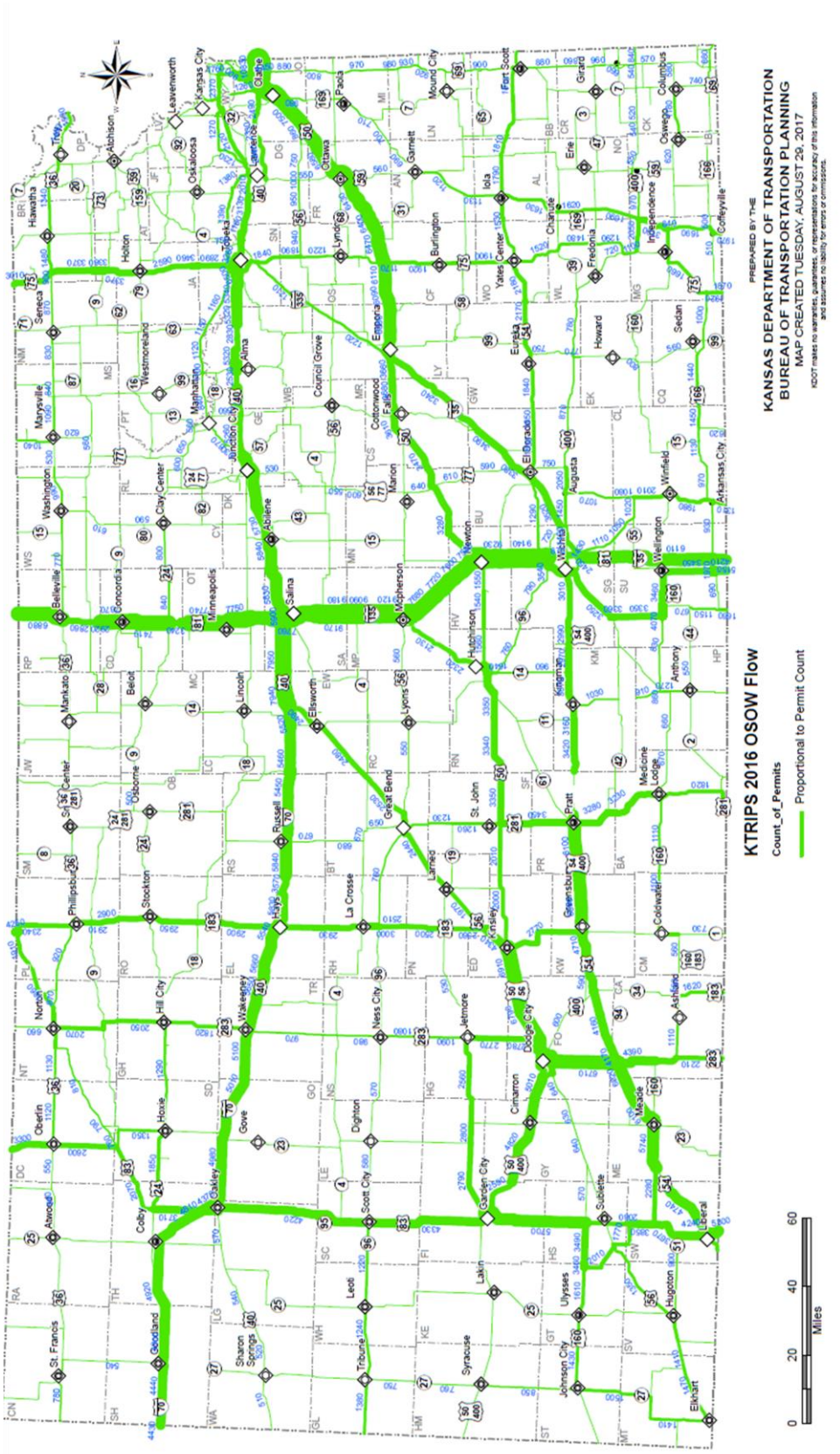


Figure 4.8: KTRIPS 2016 OSOW Flow

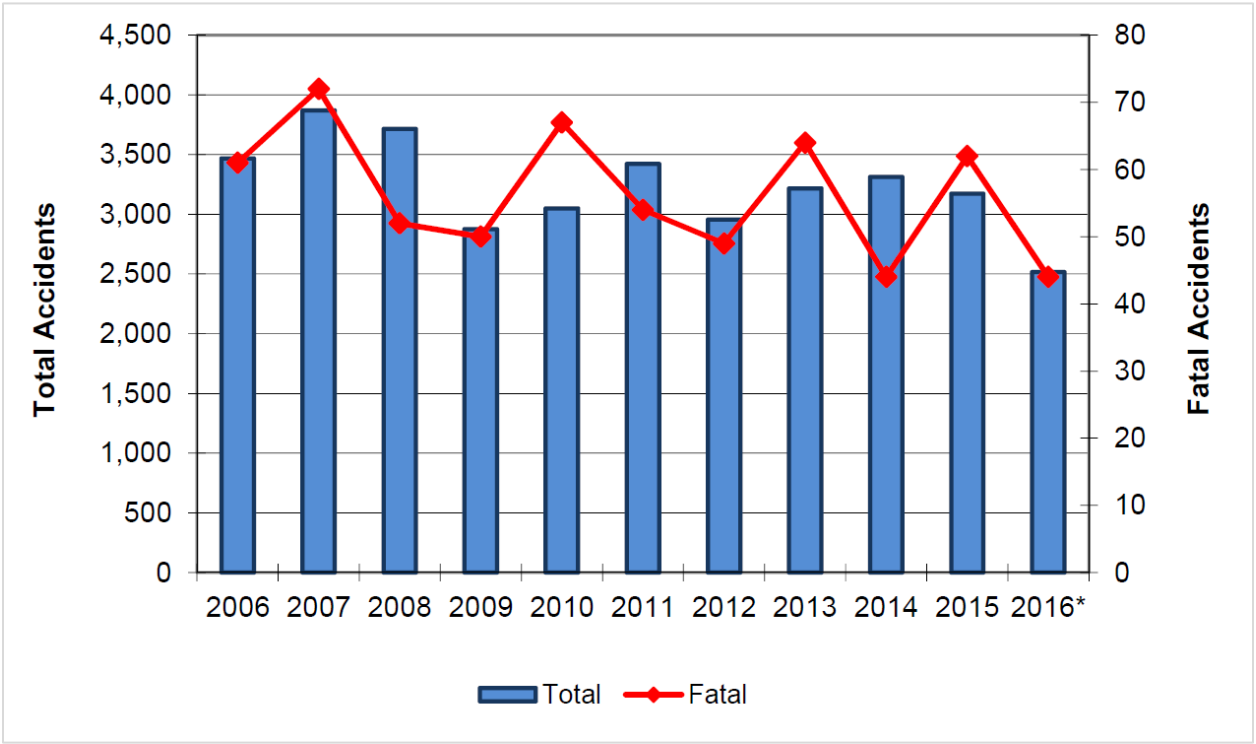
Source: KDOT, 2017.

4.1.2 Highway Safety

Commercial vehicle involved crashes on the Kansas Highway System from 2013 to 2015 were analyzed (shown in **Figure 4.9** and **Figure 4.10**). All truck involved crashes were mapped to determine hotspot locations and identify any crash clustering that may indicate a potential geometric issue. The mapping identified a concentration in the number of truck crashes occurring in the metropolitan areas, in particular Kansas City and Wichita.

KDOT tracks the commercial motor vehicles crashes each year. KDOT uses the information to target educational, enforcement and safety improvement efforts. Both the total number of crashes and the number of fatalities involving commercial vehicles have been trending downward since 2006. The number of commercial vehicle crashes resulting in fatalities is shown in Figure 4.9. In 2015, large commercial vehicles were involved in 5.2 percent of all crashes and 19.3 percent of fatal crashes. Kansas Freight Advisory Committee members noted that routing OSOW loads on K-99 is challenging due to highway geometrics.

Figure 4.9: Kansas Commercial Vehicle Crashes and Fatalities



** 2016 data is incomplete and unofficial*
Source: KDOT Crash Statistics, 2016

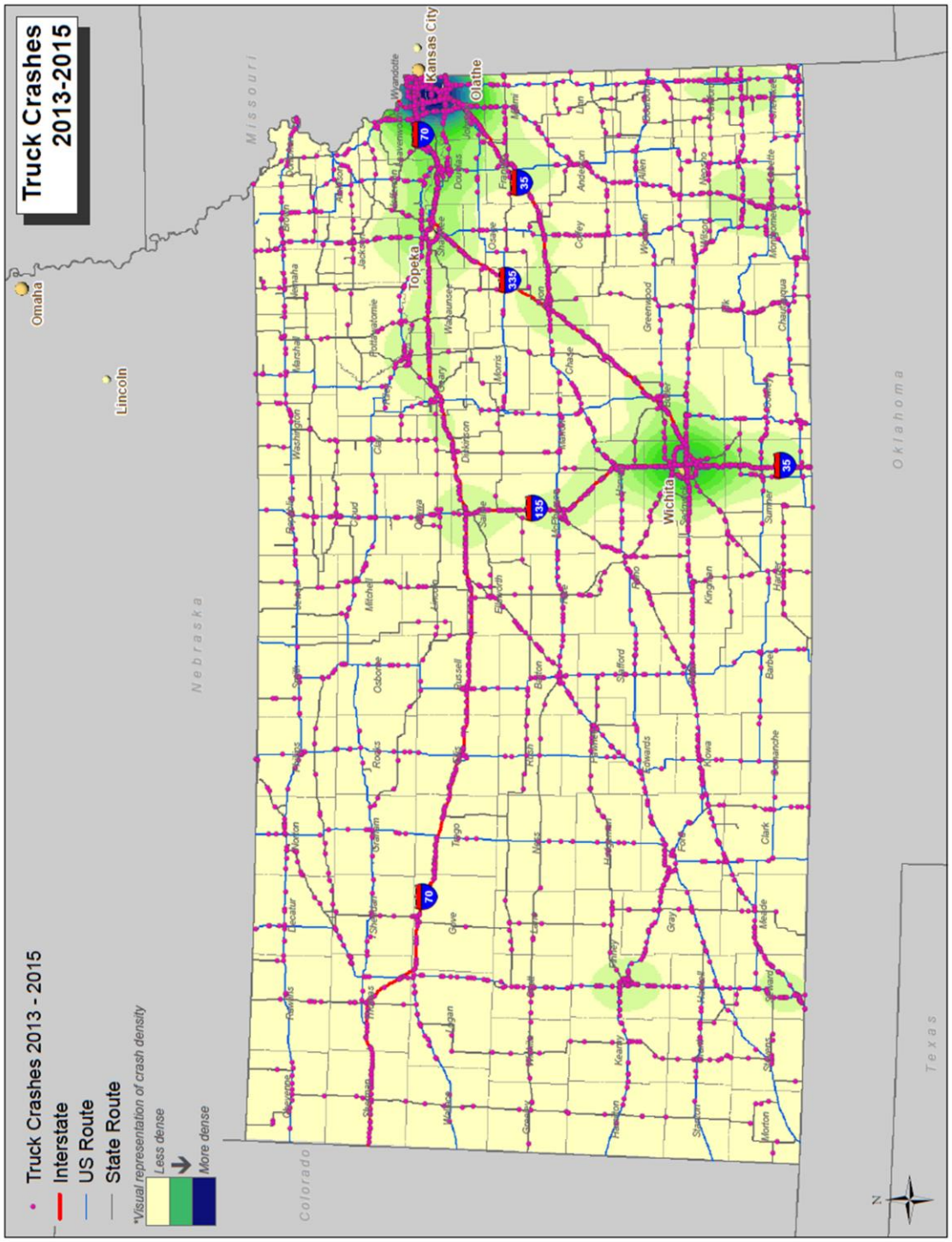


Figure 4.10: Truck Crash Density in Kansas

Source: KDOT data, CDM Smith analysis

4.1.3 Truck Parking

Adequate commercial vehicle parking is not only a Kansas issue but a national concern as well. Drivers frequently search for over 30 minutes to find available parking. It is common for drivers to use parking lots, side roads, shoulders or ramps to stay within their hours of service requirements. Recognizing this need, KTA constructed 37 new truck parking spots at the Towanda rest area located at milepost 65 on I-35. The Kansas Statewide Freight Network Parking Plan, 2016 not only identified the issues noted above but also developed four recommendations and implementation strategies.

1. Improve Parking Information and Sharing

a. Post parking information via static signage
b. Deploy a truck parking information management system (TPIMS)

2. Add or Improve Parking Assets

a. Expand parking lot numbers and capacity
b. Use excess ROW for parking
c. Improve geometrics for better parking

3. Explore Creating Parking Improvement Partnerships

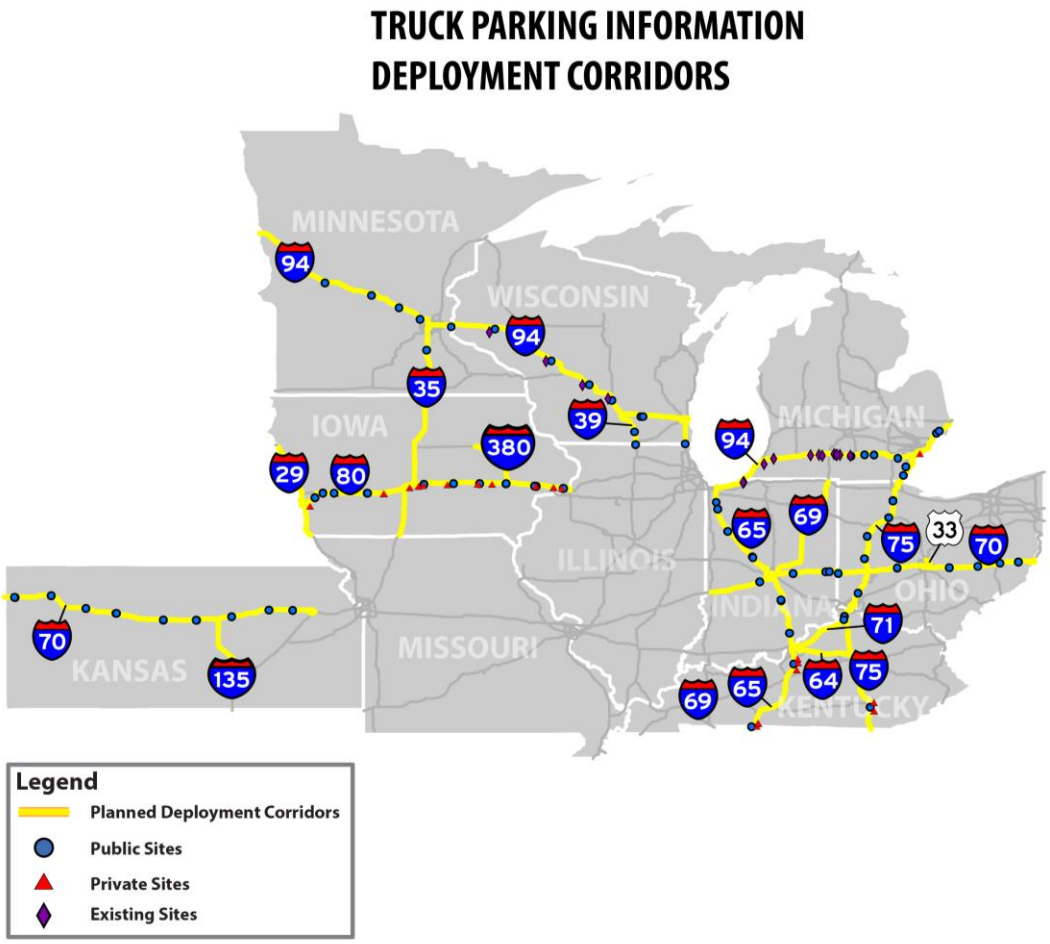
a. Identify intra-agency opportunities for expanding parking
b. Investigate benefits of potentially creating regional truck parking policies
c. Secure marketplace guidance as to the viability of expanding parking via public private partnerships (P3's)

4. Examine Potential Pro-Parking Policies for Freight Trucks

a. Look at developing integrated local parking policies
b. Explore opportunities for coordinating delivery policies to expand parking

This effort was the catalyst to form a partnership with seven other states within the Mid-America Association of State Transportation Officials (MAASTO) to submit and be awarded a $31 million 2016 Federal TIGER Grant. The corridors for the eight states are shown in **Figure 4.11**. The eight participating states contributed a combine $4 million towards the project. When implemented, the Truck Parking Information Management System (TPIMS) will collect truck parking availability information and disseminate it to users over a variety of media, including dynamic truck parking signs upstream of rest areas, state DOT traveler information websites, trucksparkhere.com, and smart phone applications. The multistate TPIMS system will be fully operational in January 2019. The Kansas TPIMS parking locations are shown in **Figure 4.12**.

Figure 4.11: TPIMS MAASTO TIGER Grant Corridors



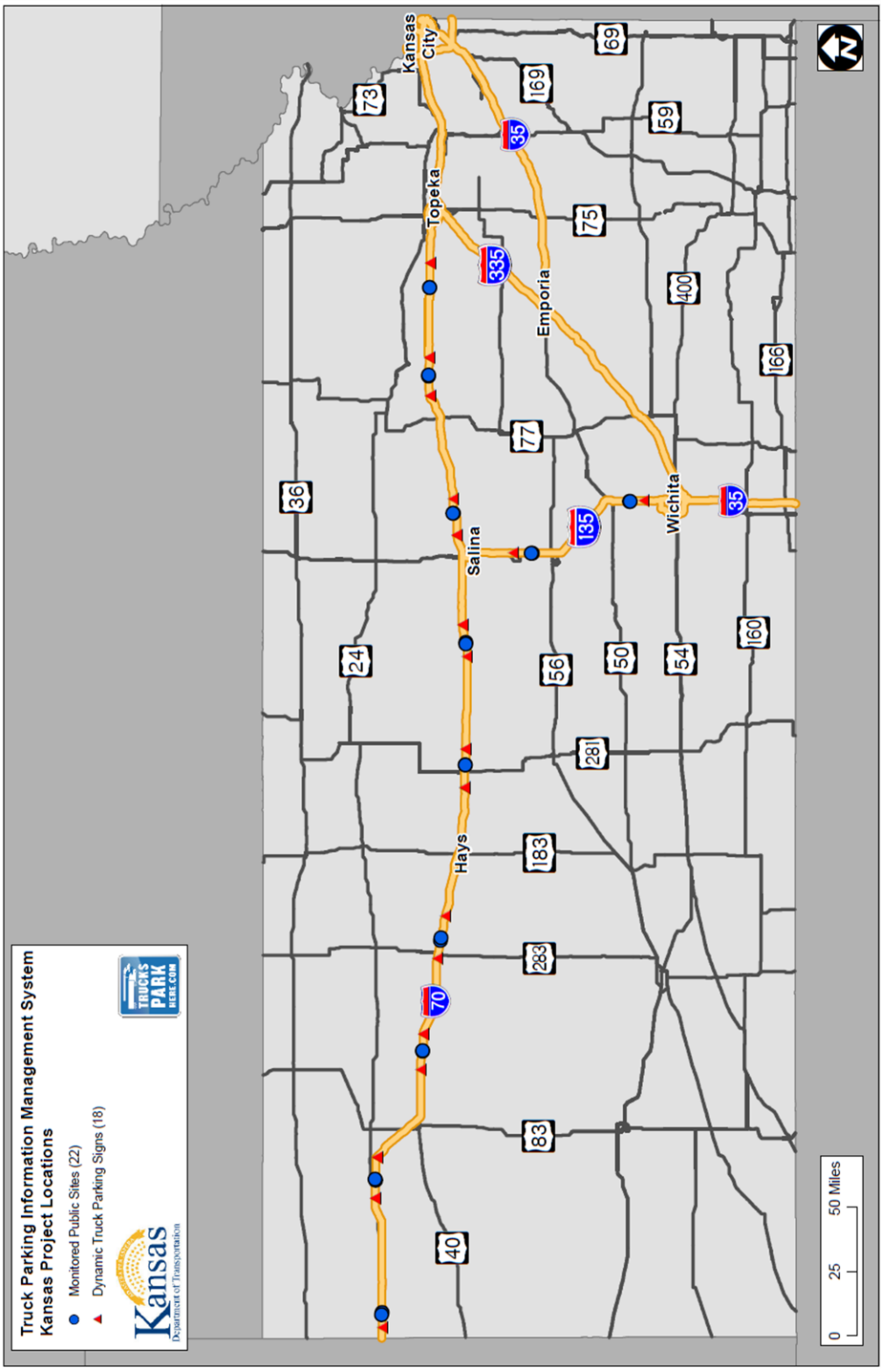


Figure 4.12: Kansas TPIMS Parking Locations

Source: Truck Parking Information Management System, 2016

4.1.4 Highway Congestion/Bottlenecks

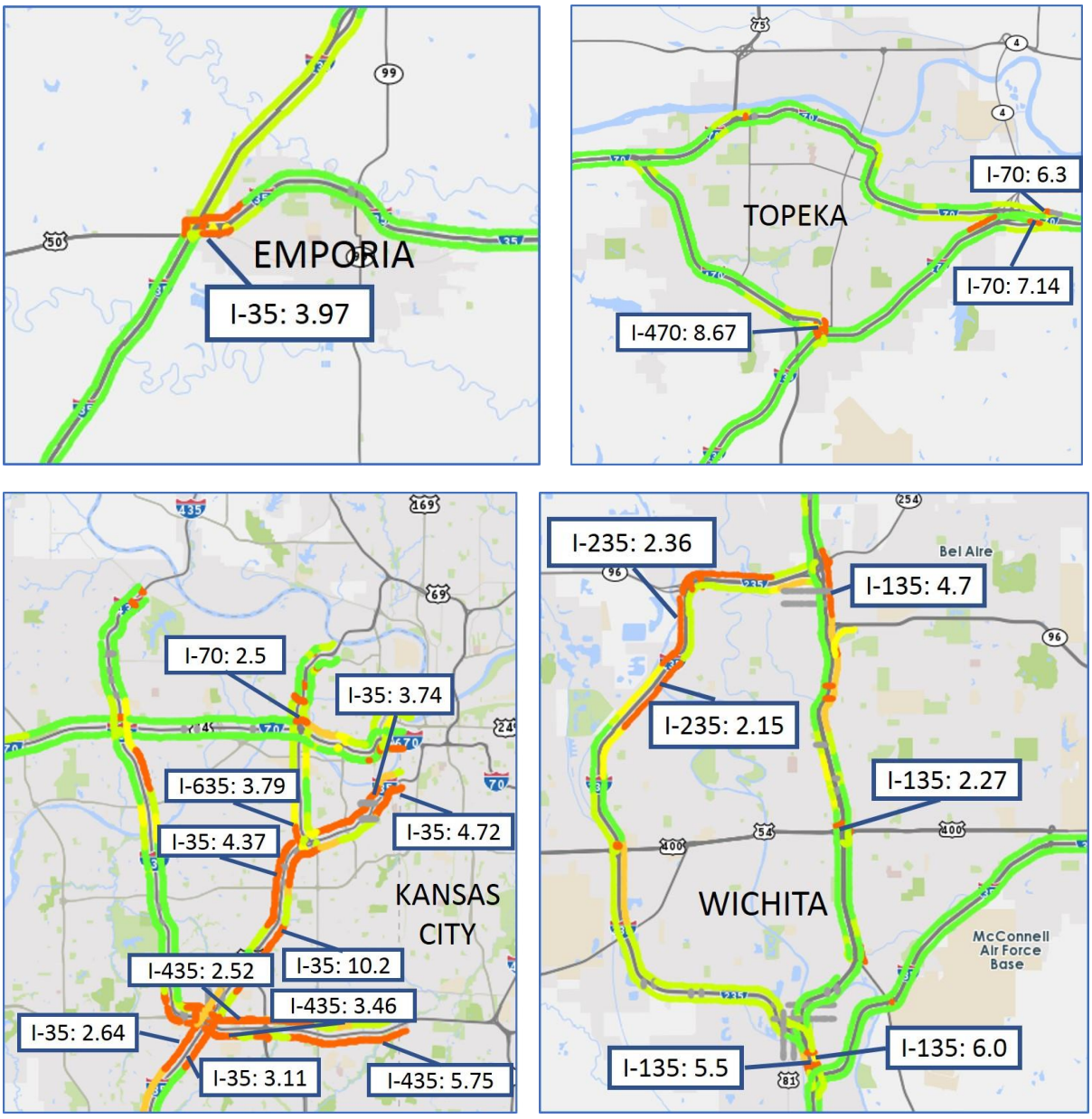
Today, the Kansas Highway network operates smoothly throughout most of the day. The exception is during commuter peak hours within the metropolitan areas. Although trucks are often in the peak commuter traffic, truck are not the cause of the congestion and bottlenecks rather the volume of vehicles using the highway at given times of the day.

One measure of freight bottlenecks is reliability. Truck drivers hauling just-in-time shipments must factor in delay when scheduling trips. The Truck Travel Time Reliability (TTTR) index is used by FHWA to determine how well freight mobility goals are being met. Looking at different time periods, such as morning and evening rush hour, midday and weekend, the 95 percent greatest travel time for a given highway segment is compared to median time. This gives a metric for the variability of speed on that segment. Speed data comes from a national network of GPS probes (the National Performance Measure Research Data Set – NPMRDS) and reflects the entirety of 2016 for the Interstate Highway System in Kansas. A TTTR value of more than 1.5 is where congestion variance might concern users, meaning every 20th trip requires 50 percent or more time than the median trip on that segment. KDOT has identified freight bottlenecks on Interstate routes based on high Truck Travel Time Reliability (TTTR) from NPMRDS. Based on NPMRDS data these bottlenecks are listed in **Table 4.2** and **Figure 4.13**. All but one location is in metropolitan areas.

Table 4.2: KDOT Identified Interstate Bottlenecks

Metro Area	Congested Road	Direction	From	To	Low TTTR	High TTTR
Emporia	I-35	NB	I-335	US-50	3.89	3.97
Kansas City	I-35	NB	Mission Rd	7th St	2.45	4.72
Kansas City	I-35	SB	7th St	Southwest Blvd	3.50	3.74
Kansas City	I-35	SB	Johnson Dr	75th St	2.37	4.37
Kansas City	I-35	NB	87th St	75th St	4.30	10.20
Kansas City	I-35	NB	119th St	I-435	3.10	3.11
Kansas City	I-35	SB	I-435	119th St	2.62	2.64
Kansas City	I-70	EB	38th St	I-635	1.85	2.50
Kansas City	I-435	EB	I-35	Quivira Rd	2.72	3.46
Kansas City	I-435	WB	Quivira Rd	I-35	2.50	2.52
Kansas City	I-435	EB	Antioch Rd	State Line	3.28	5.75
Kansas City	I-635	SB	Shawnee Dr	I-35	3.00	3.79
Topeka	I-470	EB	Burlingame Rd	I-335	2.04	8.67
Topeka	I-70	EB	K-4	I-470	1.43	7.14
Topeka	I-70	WB	I-470	K-4	1.40	6.30
Wichita	I-135	NB	K-96	I-235	3.33	4.70
Wichita	I-235	SB	K-96	W 25th N	2.35	2.36
Wichita	I-235	NB	Zoo Blvd	W 25th N	2.14	2.15
Wichita	I-135	NB	Ramp to	WB US-54	2.27	2.27
Wichita	I-135	NB	I-35	47th St	1.35	6.00
Wichita	I-135	SB	47th St	I-35	1.44	5.50

Figure 4.13: KDOT Identified Interstate Bottlenecks



The Mid-America Regional Council (MARC) uses the NPMRDS to identify congestion/bottlenecks. The 2016 top congested highway segments in the MARC Kansas region consist of the following corridors: I-435 from the Missouri state line to Nall Avenue; I-435 from US 69 to 87th Street; I-35 from the Missouri state line to 119th Street; and I-70 from I-435 to K-7. The descriptions above may contain more than one congested segment.

In WichitaUS-54/400 has sections between Rock Road and Maize Road (3,920 trucks, three percent of daily volume) as well as I-135 between the K-254/K-96 interchange and the I-35 interchange (6,510 trucks, 7 percent of daily volume) that are congested at specific times of the day. The 2010

WAMPO Freight Plan also identifies four major highway bottlenecks in the Wichita Area Metropolitan Planning Organization (WAMPO) region. Three of these interchanges, I-135/I-235/K-254; I-235/US-54; and I-35/K-96 are on system interchanges of major roadways. The fourth, I-135/47th Street, is a service interchange providing local access which has since been addressed.

In Topeka, the Topeka/Shawnee County MPO Long Range Transportation Plan notes the I-70/US 75 interchange (6,220 trucks, 9 percent of daily volume) as a bottleneck. These bottlenecks, shown in **Figure 4.14**, can present a significant source of delay for truck traffic, especially during commuter peak times.

All of the identified locations with congestion are located on the Kansas State Freight Corridors of Significance and the National Highway Freight Network. All except US 54/400 through Wichita are interstate routes and US 54/400 is identified as a CUFC through Wichita.

In rural Kansas, freight congestion is when trucks slow down through cities that do not have a bypass. KDOT is working to expand bypasses around cities including US 54 Kingman bypass and 4 lane corridors or passing lanes across the state to enhance the safe and efficient movement of freight.

4.1.5 Truck Freight Carried

With the given condition and performance of the highway freight system, truck commodity movements in 2014 totaled 200.9 million tons, carried via 17.6 million units, valued at $221.3 billion. Truck freight density across the Kansas road network is the interstate system, most notably I-35, I-70 and I-135. KDOT allows trucks hauling agricultural commodities to run at 91,0000 gross vehicle weight on six axles. Detailed truck freight data is in Chapter 2 Economic Context of Freight.

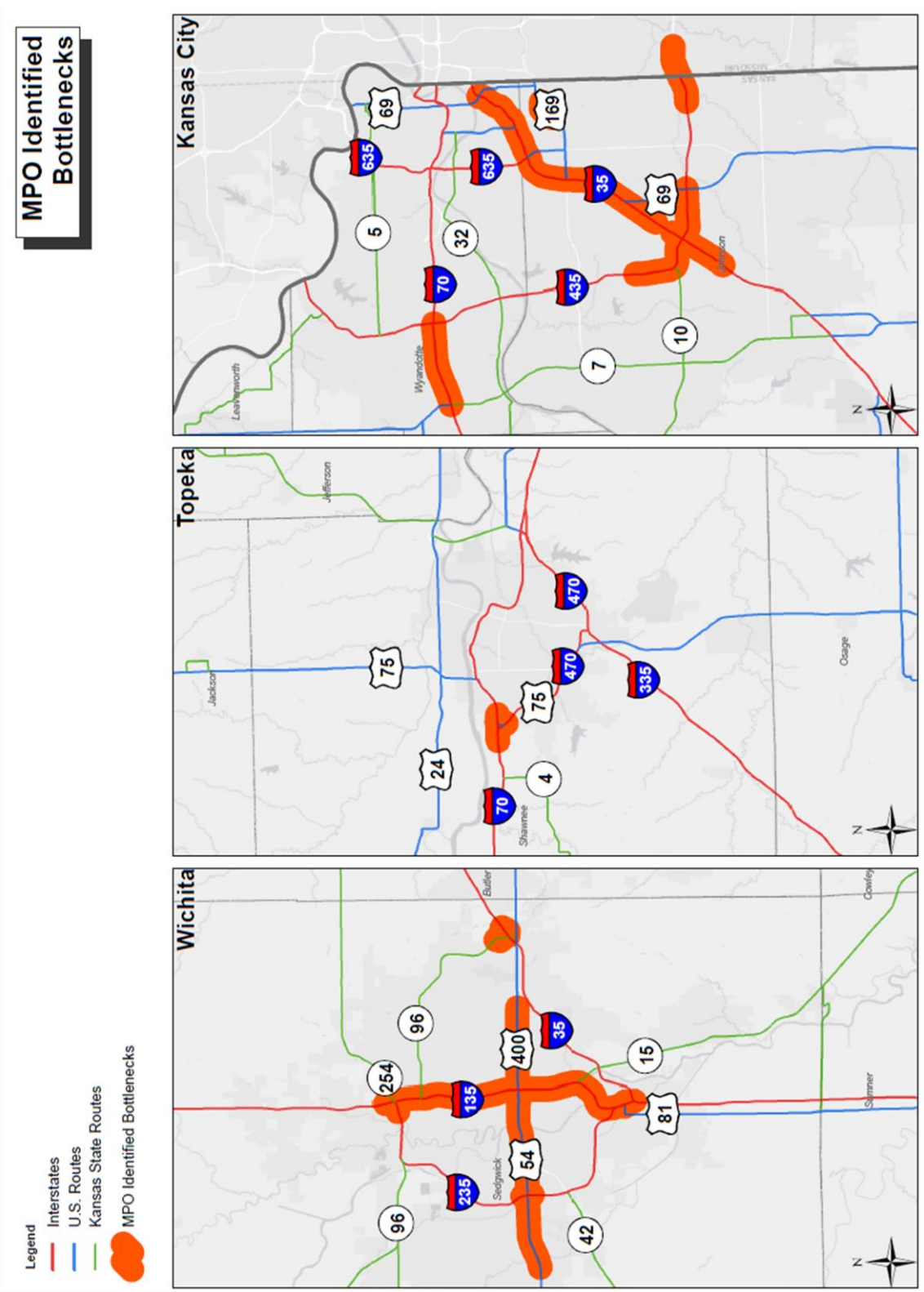


Figure 4.14: MPO Identified Bottlenecks

Source: MPO analysis or MPO Long Range Transportation Plans

4.2 Rail

The state of Kansas has a significant freight rail infrastructure with four Class I freight railroads currently operating 2,723 miles of rail line within the state. There are no Class II railroads operating in Kansas. A total of 11 Class III (short line) railroads serve Kansas operating over 1,755 track miles. Additionally, three switching/terminal railroads own and operate 41 miles of track.

4.2.1 Rail Condition and Performance

BNSF's network in Kansas is capable of carrying maximum loaded car weights of 286,000 pounds. BNSF has no clearances restrictions on its network in Kansas. BNSF adds capacity to its network in response to volume driven customer demand to eliminate constraints and bottlenecks. Line capacity expansion projects are programed on the BNSF network in Kansas in the 2020-2021 timeframe between Wellington and Ellinor. The timing of execution of these projects could be moved up or pushed back depending on demand. BNSF capital spending in Kansas totaled $189 million in 2014 and another $182 million in 2015. BNSF invested approximately $160 million in capital projects on its Kansas network in 2016.

KCS reported that the capacity on the two subdivisions in Kansas is adequate for providing for fluid conditions for the planned traffic volumes. KCS's network in Kansas is capable of carrying maximum loaded car weights of 286,000 pounds. KCS has no clearances restrictions on its network in Kansas. The railroad said that there are no major improvements outside of routine maintenance planned for its subdivisions in Kansas.

UP's network in Kansas is capable of carrying maximum loaded car weights of 286,000 pounds or more. UP has no clearances restrictions on its network in Kansas. UP's infrastructure in Kansas currently handles the demand. However, UP is planning a major upgrade to its lines in Willard (the Willard Cutoff), inclusive of new alignment connecting the Salina Subdivision and the Topeka Subdivision and a new bridge over the Kansas River. The improvement will have the effect of shaving 8 route miles between Menoken and Maple Hill and boosting line capacity. Union Pacific's planned investment covers a range of initiatives: $65 million to maintain railroad track and $5.7 million to maintain bridges in the state. Key projects planned in 2016 include:

- $9.2 million investment in the rail line between Kansas City, Leavenworth and Hiawatha to replace more than 67,000 railroad ties and install 44,080 tons of rock ballast.
- $6.1 million investment in the rail line between Atchison and Huron to replace 12 miles of rail.

In general, and not specific to Kansas, UP expects capital spending to average around 16 to 17 percent of revenue over its planning horizon on system expansion, assuming business conditions warrant and that potential new laws or regulations do not impact its ability to generate sufficient returns on these investments. From 2011 to 2015, Union Pacific's capital investment reached more than $519 million in Kansas.

NS has trackage rights on three miles of track in Kansas, specifically in the Kansas City area. The NS intermodal facility for the metropolitan Kansas City area is located in Kansas City, Missouri.

Historically, **Class III** railroads purchased trackage from lower volume Class I railroad lines that primarily serve first and last line mile customer operations. These lines have often been the victim of deferred maintenance resulting in slower operating speeds. As the industry has accepted heavier rail cars as the standard, Class III railroads have struggled to keep up with the costs to upgrade their track to accommodate these heavier loads. As a result, 70 percent of the Class III rail lines remain non-286,000-pound segments.

Kansas State University studied the rail capacity of Class III rail lines in Kansas and found that only 30 percent of the Class III route mileage was capable of carrying the standard 286,000-pound loads. **Figure 4.15** shows all the rail segments in Kansas that are non-286,000-pound segments.

4.2.2 Railroad Safety

Rail crossing crashes and fatalities, as shown in **Table 4.3**, tracks the annual trends resulting from train-vehicle crashes at all public and private railroad crossings in Kansas. Although the number of collisions has remained relatively constant, the number of fatalities fluctuates between 2012 and 2015 at six or fewer each year.

Table 4.3: Number of Highway-Rail Crossing Collisions and Fatalities

Year	Total	Fatal	Injuries
2012	37	6	18
2013	46	3	12
2014	40	6	8
2015	41	2	15
2016	40	3	18

Source: Federal Railroad Association, Table 5.11

4.2.3 Rail Freight

With the given condition and performance of the rail system, rail movements in Kansas total 368.4 million tons, carried via 6.9 million carloads, valued at $324.1 billion according to 2014 Transearch and STB Waybill data. The top five rail commodities by tonnage, units, value and growth can be reviewed in the *Chapter 2 Economics Context of Freight*.

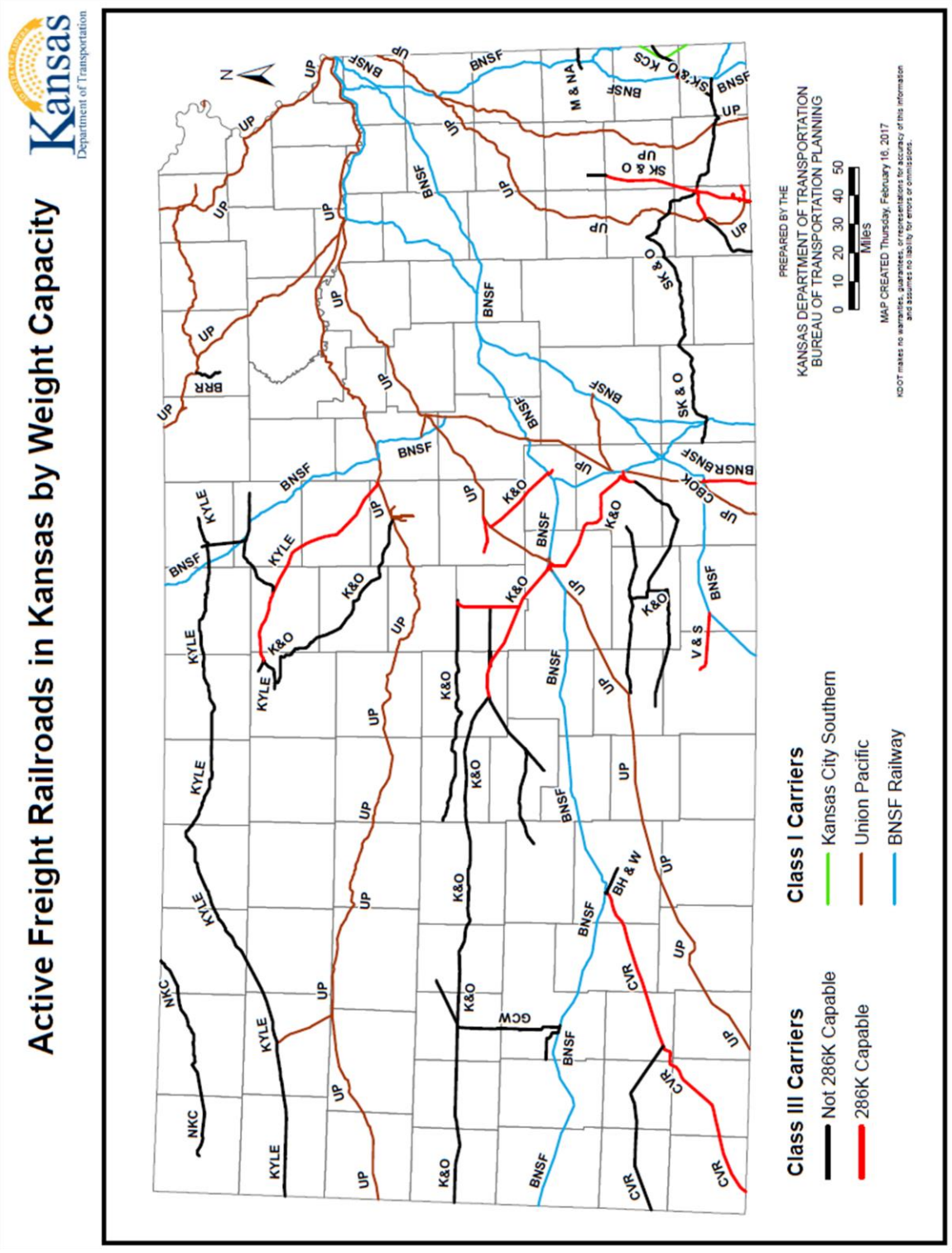


Figure 4.15: Kansas Non-286,000 lb. Rail Segments

Source: 2017 Kansas State University Research, KSU 16-5

4.3 Waterway Condition and Performance

Waterways are the original Kansas transportation system. This resource led to wealth and development that then spread outward from the Missouri River. A "standard' tow is 15 barges with a capacity of 22,500 tons or 45 million pounds. It would take 225 railroad cars or 900 semi-trucks to carry the same amount of cargo as a standard tow. Unlike trucks, tows can carry a lot of cargo with relatively few crewmembers. Additionally, waterways are inherently grade separated from highways and railways, thus they do not cause congestion with other modes. However, there is a railroad swing bridge across the Missouri River in Atchison that is an exception.

When waterborne cargo is used instead of trucking, it saves fuel and improves highway conditions including safety, reduced congestion, pavement life and reduced emissions. Reducing fuel and labor costs reduces transportation costs which in turn improves the profits for both commercial and agricultural industries. In Kansas, direct access to waterways for freight movement is limited to the Missouri River in northeast part of the state. Barge is best for moving lower value bulk quantities of less time sensitive freight

The 2014 Transearch data indicates the annual cargo through Kansas' ports are worth $3 million. Waterways are currently uncongested with significant excess capacity. Although, maintaining year-round water levels to adequately support barge flows has been an issue in the past.

The Missouri River also serves Kansas farmers, resulting in diversion of flows. Because of dams built for flood control and lake creation it is often more economically beneficial to change out flows as needed to maintain steady lake levels. Also, land in the Missouri River valley has often been worth more than navigation on the Missouri River and the river is also a resource for fresh water. There is an economic advantage for adjacent farmers, industry and communities to consume its waters and thus decrease its flow quantities. The result of these issues is that the Missouri River has a reputation for unreliable navigation.

4.3.1 Waterway Freight

With the given waterway conditions and performance, Kansas' waterways totaled 391,000 tons valued at $3.0 million according to 2014 Transearch data. The top five port commodities by tonnage, units, value and growth can be reviewed in the *Chapter 2 Economic Context of Freight*.

4.4 Airport Condition and Performance

Kansas is home to one of the top 110 cargo airports in North America in terms of total tonnage in 2015; Wichita's Dwight D. Eisenhower (ICT) Airport. Kansas' busiest cargo airport is able to adequately handle consistent passenger and air cargo traffic. Consequently, these facilities must be able to support large aircraft capable of accommodating market demand.

Shippers in Kansas also use two nearby, out of state airports to ship to and from – Kansas City International Airport and Denver International Airport. Additionally, several public and private airports throughout the state support air cargo service.

At McConnell Air Base and private airports, it is unknown exactly what items or how much of them are shipped as this information is not published. In Wichita for example, it is known that airplane

components and parts are flown in to manufacturing facilities at their private airports. Likewise, the manufacturing facility will fly out/deliver the completed product/airplane to the buyer. As a result, the aviation freight tons and values are under counted in Kansas.

According to Transearch data, Kansas airports handled nearly 37,000 tons of total air cargo in 2014 with Dwight D. Eisenhower Airport in Wichita the most prominent air freight location. The Kansas Aviation Plan does not identify any airport system concerns at Dwight D. Eisenhower Airport.

4.4.1 Air Freight

With the given air freight conditions and performance, Kansas' airports totaled 37,000 tons valued at $5.1 billion in 2014. The top five port commodities by tonnage, units, value and growth can be reviewed in the *Chapter 2 Economic Context of Freight*.

4.5 Pipeline Condition and Performance

Approximately 25,500 miles of pipelines move natural gas, crude oil, and petroleum products throughout Kansas. There are several major crude oil, petroleum product, and liquefied petroleum gas pipelines traversing the state. Many of the crude oil and petroleum product pipelines originate near the Gulf Coast (Texas) and Oklahoma, as well as Canada, and pass through the state 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 line is planned to be in service by mid-2014.

4.5.1 Pipeline Forecast

With the given pipeline conditions and performance, Kansas' pipelines totaled 102.2 thousand tons valued at $42 million according to 2014 Transearch data. The top five port commodities by tonnage, units, value and growth can be reviewed in the *Chapter 2 Economic Context of Freight*.

4.6 Intermodal

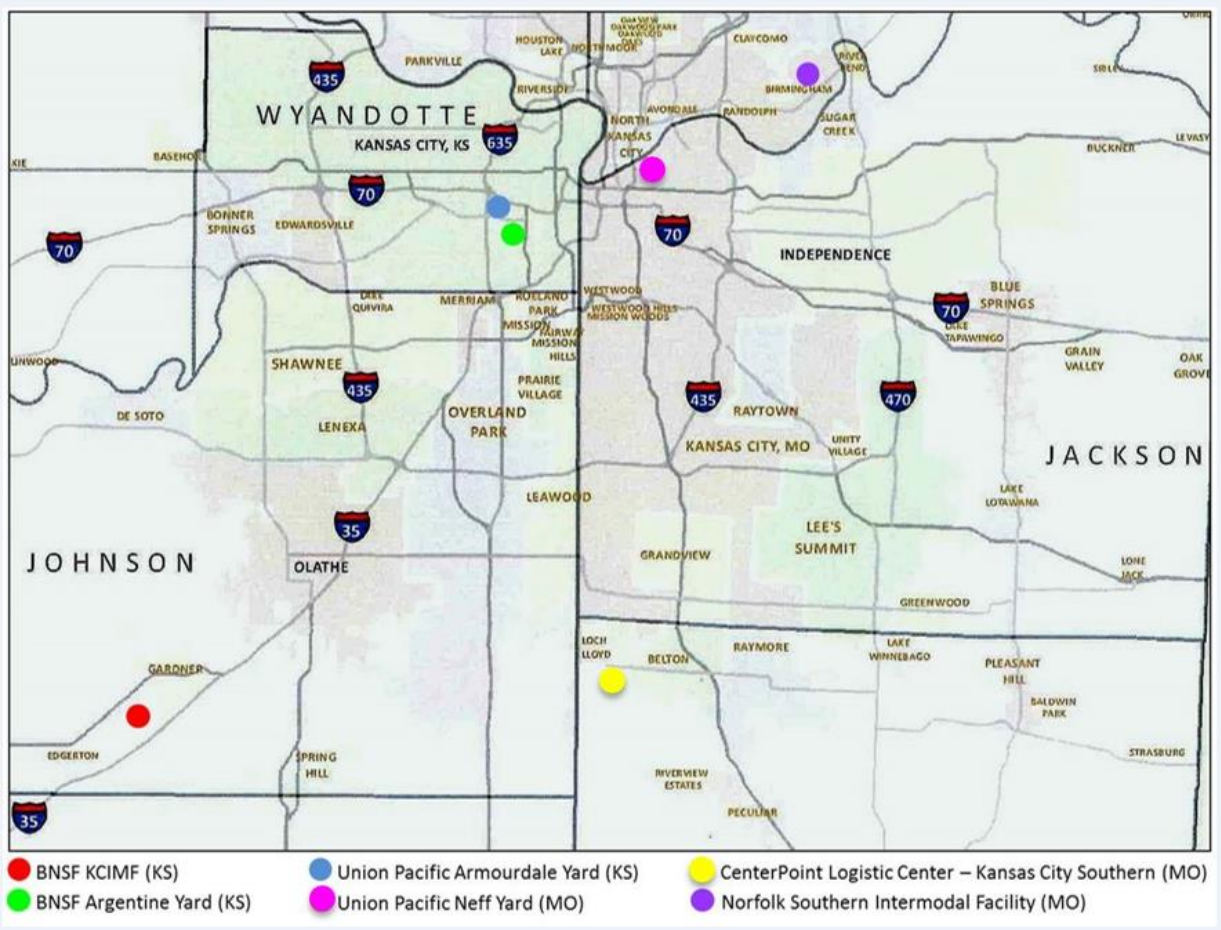
This section will discuss three key elements of intermodal service including the facilities where commodities are transferred from one mode to another, intermodal connectors which provide landside connections between the facilities and the freight network and the first/last mile connectors that facilitate access to and from the commodity's origin or destination.

4.6.1 Intermodal Facilities

Intermodal facilities are locations where freight is transferred between modes. In the case of air and water ports, the facility is both a freight asset and an intermodal facility. Highway and rail have distinct networks (assets) with specific intermodal facilities. The facilities can vary widely from grain elevators to air and water ports to transload and intermodal container facilities.

Kansas is the proud home of BNSF's newest state of the art intermodal container facility. The Logistics Park Kansas City (LPKC) Intermodal Facility is in Edgerton within the Kansas City metropolitan area. It is one of the three major intermodal facilities in Kansas City region within the state of Kansas, see Error! Reference source not found.. LPKC is a major economic driver and jobs creator for Kansas. The BNSF Intermodal LPKC has an enormous growth opportunity available. LPKC handled over 360,000 lifts in 2016 with a current capacity of more than 500,000 lifts. The adjacent warehousing and distribution centers are part of the 1,700-acre North Park Development that offers 3.4 million square feet of rail served warehousing as a portion of the 17 million square feet of building capacity.

Figure 4.16: Major Intermodal Facilities in Kansas City Region



The National Transportation Atlas Data through the Bureau of Transportation Statistics identified 77 intermodal facilities located in Kansas that provide a variety of intermodal interactions. Most of the intermodal facilities (84%) accommodate the Rail – Truck commodity transfers followed by modal transfers at ports (8%) and airports (4%) as shown in **Table 4.4**.

Table 4.4: Intermodal Facilities by Type

Intermodal Type	Number of Facilities	Percent of Total
Rail – Truck	65	84.4%
Port – Truck/Rail	6	7.8%
Air – Truck	3	3.9%
Truck - Truck	3	3.9%
Total	77	100.0%

Source: Bureau of Transportation Statistics
http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/2015/point

It is not surprising that Rail-truck connections are the most common intermodal facilities in Kansas. Many of these facilities are grain elevators to support the state's agricultural industry. The majority of these grain elevators accommodate grain unit trains of up to 110 railcars. The majority of the intermodal activity occurs in the metropolitan areas. The Kansas City area has 23 facilities while Wichita has eight of the intermodal facilities. Topeka (5) and Hutchinson (4) each also have smaller clusters of intermodal facilities. The remaining 37 intermodal facilities are dispersed throughout the state as outlined in **Table 4.5** and displayed in **Figure 4.17**.

Table 4.5: Intermodal Facilities by Urban Area

Urban Area	Number of Facilities	Percent of Total
Kansas City	23	29.9%
Wichita	8	10.4%
Topeka	5	6.5%
Hutchinson	4	5.2%
Rest of State	37	48.0%
Total	77	100.0%

Source: Bureau of Transportation Statistics

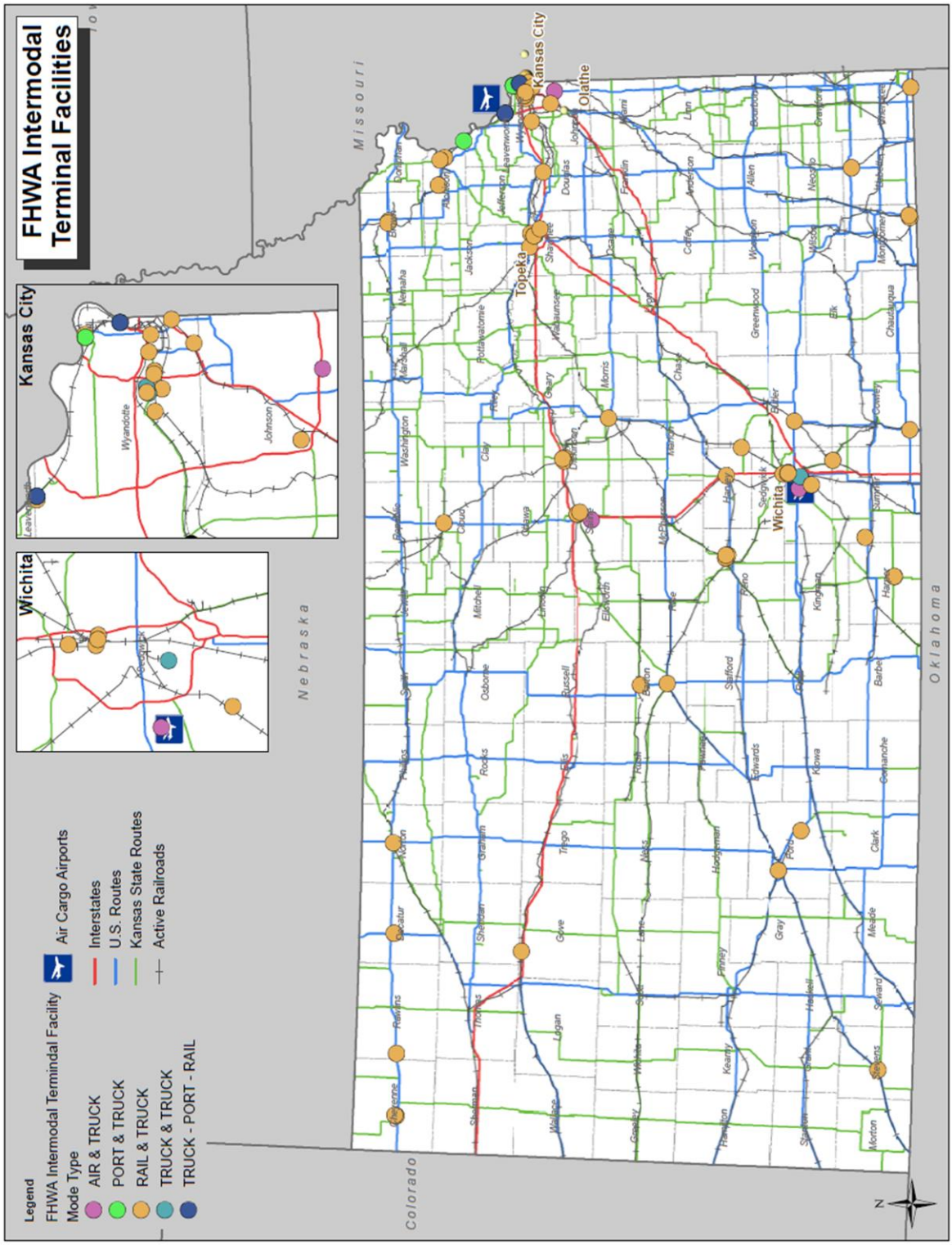


Figure 4.17: FHWA Intermodal Facilities

Source: Federal Highway Administration, accessed August 2016

4.6.2 Railroad Connectivity

The major freight facilities for the Class I railroads in Kansas appear in **Table 4.6**. The type of facility is also noted. Intermodal refers to the handling of intermodal containers. Transload refers to a number of potential activities including cross docking, bulk breaking, and repackaging to name a few. Auto indicates the ability to handle automobiles. Manifest refers to mixed trains with a variety of rail car types and products.

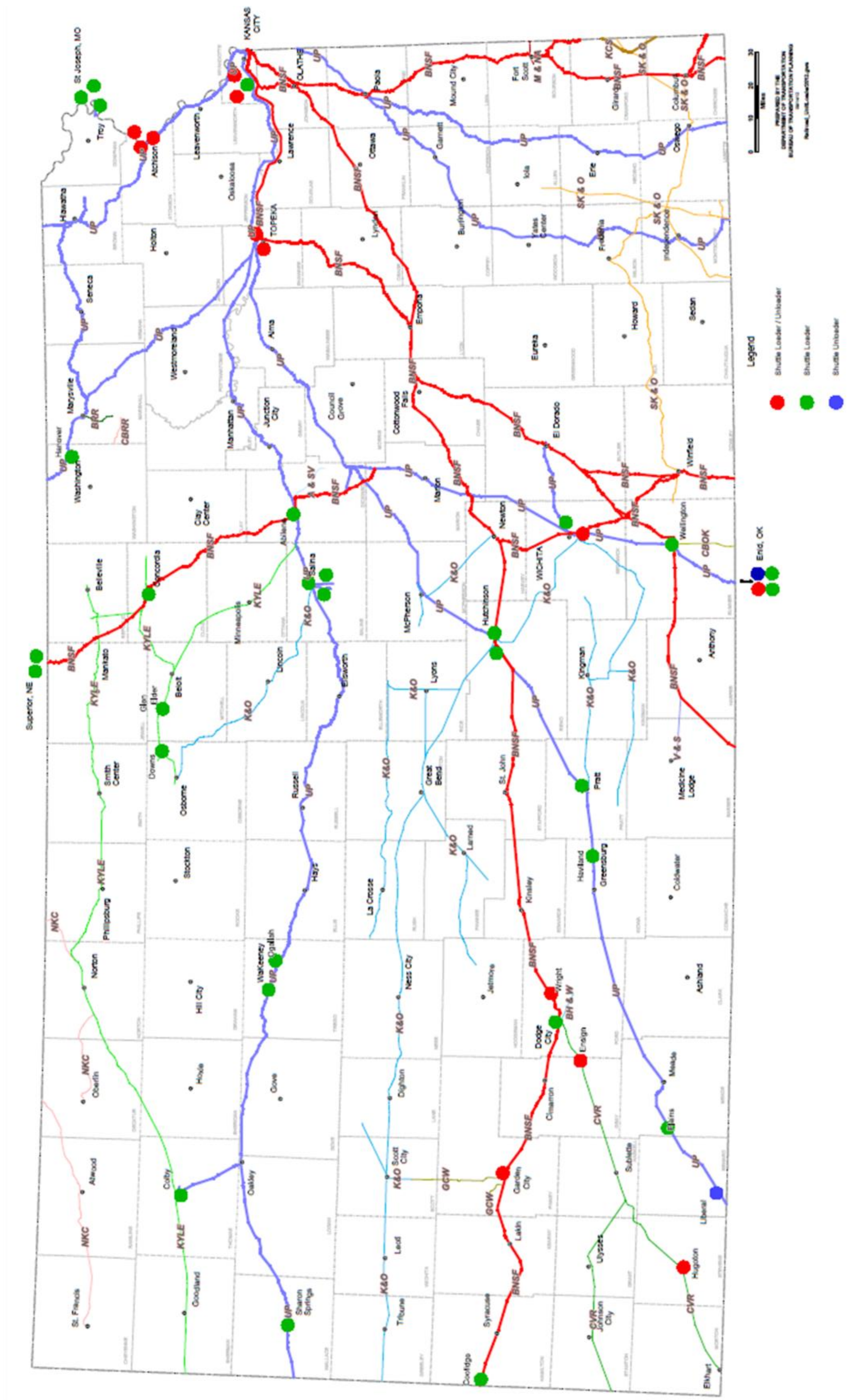
Table 4.6: Major Freight Rail Yards and Facilities in Kansas

Railroad	City	Terminal	Intermodal	Transload	Auto	Manifest
BNSF	Kansas City	Argentine Yard		●	●	●
	Arkansas City, KS					●
	Dodge City, KS					●
	Emporia, KS					●
	Hutchinson, KS			●		●
	Wichita, KS					●
	Edgerton, KS	Logistics Park Kansas City (LPKC)	●	●		
	Newton, KS			●		●
	Topeka, KS					●
	Wellington, KS					●
KCS	Pittsburg, KS	Classification Yard				●
UP	Fairfax, KS					●
	Kansas City, KS	18th Street Yard				●
	Kansas City, KS	Armourdale				●
	Kansas City, KS	Quindaro				●
	Liberal, KS					●
	Muncie, KS	Ramp			●	
	Salina, KS	Team Track		●		
	Topeka, KS					●
	Wichita, KS	United Warehouse				●

In addition to the highway rail connections, there are numerous shuttle train loading and unloading facilities throughout the state. A grain shuttle train is a dedicated set of grain hopper cars that operate as a unit train between two specific locations, generally one location is at a collection/consolidation point such as a grain elevator, the most common rail-truck intermodal transfer type in Kansas. **Figure 4.18** and **Table 4.7** identifies the unit loader locations that load and unload the shuttle trains in Kansas as well as the Kansas Freight Advisory Committee (KFAC) defined Kansas Primary Freight Highway Network.

Railroads also provide important connections to water ports and intermodal terminals. **Table 4.8** lists the Kansas water ports that have direct rail access and their connecting railroads. **Table 4.9** lists the National Highway System Truck to Rail intermodal terminals in operation in the state of Kansas.

Figure 4.18: Kansas Unit Loader Location



Source: Kansas DOT, 2017

Table 4.7: Kansas Unit Loader Locations

City	Name	Railcar Capacity	Elevator Capacity (in 1,000 bushels)	Carriers
Abilene	Gavilon Grain LLC	110	4,839	UP, BNSF
Atchison	Bartlett Grain	85	936	UP
Atchison	Cargill	78	9,212	UP, BNSF
Atchison	Bunge Milling	62	10,929	UP, BNSF, KCS
Canton	Producer Ag	110	7,500	UP
Colby	Cornerstone Ag LLC	100	928	UP
Concordia	AgMark LLC	115	4,750	BNSF
Coolidge	Scoular Company	110	2,300	BNSF
Dodge City	ADM Grain	104	1,880	BNSF
Downs	Scoular Grain	110	1,500	UP, KYLE
Ensign	Dodge City Coop Exchange	112	2,301	BNSF, CVR
Frankfort	Farmers Coop	110	4,200	UP
Garden City	WindRiver Grain LLC	110	4,856	BNSF
Glen Elder	AgMark LLC	110	1,200	UP, KYLE
Hanover	Farmers Coop Assn	110	522	UP
Haviland	Farmers Cooperative Co.	100	1,300	UP
Hugoton	United Plains Ag LLC	110	2,360	BNSF, CVR
Hutchinson	ADM Grain (Elevator A)	110	5,800	UP
Hutchinson	ADM Grain (Elevator J)	108	18,300	BNSF
Kansas City	Bartlett River Rail	75	10,000	UP, BNSF
Kansas City	ADM/Farmland Fairfax	60	8,700	UP, BNSF
Kansas City	ADM Gowmark Wolcott	65	2,300	UP
Liberal	Conestoga Energy	100	2,400	UP
New Cambria	ADM Grain, Elev. A	110	2,057	UP
Ogallah	Castle Rock Marketing	103	568	UP
Plains	Collingwood Grain	100	3,000	UP
Pratt	Scoular Company	110	1,800	UP
Salina	Cargill	112	32,000	UP, BNSF, KO
Salina	Scoular Company	110	11,047	UP, BNSF
Salina	ADM Collingwood (Term. A)	110	2,000	UP
Salina	Cargill	110	32,000	UP, BNSF, KO
Sharon Springs	United Plains Ag LLC	110	1,800	UP
Topeka	Cargill Gordon Unit	110	27,000	UP, BNSF, KCS
Topeka	Cargill AgHorizon	75	12,055	UP, BNSF, KCS
WaKeeney	Castle Rock Marketing	100	550	UP
Wellington	Scoular Company	110	2,280	BNSF
Wichita	Bartlett Grain	110	10,340	UP, BNSF, WTA
Wichita	Gavilon Grain LLC	110	22,549	UP, BNSF, KO
Wright	Right Coop	120	2,943	BNSF

Source: UP (http://dx01.my.uprr.com/pubdir/graindir.nsf/webstate?OpenView&Start=1&Count=1000&Expand=9#9), BNSF (https://www.bnsf.com/customers/grain-facilities/elevators/),and KDOT

Table 4.8: Kansas Ports with Connecting Railroads

Port	Location	Connecting Railroads
Kansas City Wyandotte County Port Authority Wharf	Mile 367.6, above the mouth of the Kansas River	UP
Westway Terminal Company, Wolcott Dock	Mile 386.4, above the mouth of Island Creek	UP
Drexel Chemical	Mile 395.9, 1.5 miles below Leavenworth Bridge/K-92	UP

Source: Kansas State Rail Plan, 2016

Table 4.9: NHS Truck/Rail Yard and Intermodal Facilities

Facility	Connector Description	Facility ID
BNSF Terminal, Argentine Yard, Kansas City	From I-635 east on K-32 for 0.462 mi, south 0.1 mi on 39th, east 0.1 mi on Fairbanks, south 0.1 mi on 38th	KS2R
BNSF Terminal, Argentine Yard, Kansas City	From U.S. 69 west on K32 for 1.248 mi, south 0.1 mi on 39th, east 0.1 mi on Fairbanks, south 0.1 mi on 38th	KS2R
Union Pacific's 18th Street Yard Kansas City	From I-635 east on K-32 for 1.710 mi, north 0.2 mi under 18th, 0.3 mi west on Baynard	KS3R
Union Pacific's 18th Street Yard Kansas City	From U.S. 69 under 18th Street heading north, west on Baynard (no additional miles)	KS3R

Source: FHWA

In addition to the nationally designated Intermodal Connectors, there are a number of routes that serve an intermodal purpose related to recent freight developments. These would include Homestead Lane which connects the Edgerton Logistics Park to I-35, and routes connecting transload facilities, airport, and ports to arterial and NHS routes.

4.6.3 At-Grade Railroad Crossings

At-grade rail crossings present potential roadway safety and delay issues. There are over 7,500 at-grade railroad crossings within the state of Kansas. **Table 4.10** shows at-grade rail crossings by type.

Table 4.10: Highway-Rail Grade Crossings by Type

State	Total (number)	Public, motor vehicle	Private, motor vehicle	Pedestrian
Kansas	7,548	5,203 (68.9%)	2,332 (30.9%)	13 (0.2%)

Source: US Department of Transportation, Federal Railroad Administration, available at http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/query/invtab.aspx as of September 2016.

4.6.4 Transload Facilities

Transloading is the movement of freight from one mode of transportation to other. This process is common when one mode of shipping often cannot be used for the entire move from origination to destination point. Transloading can occur at any place depending on the requirements of the shipment. Transload facilities are designed to minimize the handling of cargo and may require warehouses, truck or rail yards, or material handling facilities. Some of the benefits of transloading include:

- Faster return of ocean containers to productive use by the steamship line
- Reduced repositioning expenses
- Reduced cost for inland moves of ocean containers and other commodities
- Multimodal choice which leads to a faster delivery to market

BNSF identifies the following five transload facilities in Kansas[16].

Metro Park Warehouse Fairbanks is a warehousing and open air storage transload facility in Kansas City. The warehouse serves grocery products, wine, paper products and various metal products including aluminum, lead, copper, and zinc. There is 1 rail car capacity.

Harcros Chemicals handles bulk products in Kansas City. Some of the commodities include acids, solvents, peroxide, cottonseed oil, vegetable oil, and potash to name a few of the products. There are 8 tracks capable of storing 55 rail cars.

United Warehouse Company in Wichita offers warehousing and dimensional storage. They handle aluminum, bricks, grocery products, household appliances, lumber and other paper products. They have 2 tracks and 15 rail car spots available.

Garvey Public Warehouse also offers warehousing and dimensional storage in Wichita. Some of the products include bricks, lumber, wallboard, particle board, plywood, railroad ties, and roofing materials.

Transportation Partners and Logistics is located in Garden City with uncovered storage of dimensional products. An important product stored at the facility is wind energy tower components such as windmill blades. Other commodities stored at the facility include bricks, lumber, siding, machinery, poles and posts, railroad ties, and roofing materials.

Union Pacific identifies six transload facilities on its system.

Union Pacific Delivery Services Partner has four transload locations in the Kansas City area. These facilities offer services such as sampling, freight consolidation, packing, re-wrapping, and truck brokerage. The range in rail car storage available is from 3 to 39 to 75 rail cars. One facility does not have rail car storage available. Likewise, the commodities vary widely from aggregates, food, metals, liquid bulk, and hazmat liquids.

UP has another **Union Pacific Delivery Services Partner** located in Pittsburg with warehouse space available. Some of the commodities the facility handles include machinery, metals, foods, liquids, lumber, paper, and plastics to name a few. There are 6 rail cars spots at this facility and offer strapping/banding, pick and pack, Re-wrapping, and sorting services.

Savage Services Corporation in a UPDS Gold Network Partner in El Dorado. Wet and dry bulk, metals, lumber, paper, plastics, and hazmat materials are handled at this facility. There are 40 rail car spots at this location.

[16] BNSF, http://domino.bnsf.com/website/premtransloader.nsf/mapprlocations

KDOT has worked the past two years to select two sites for additional transload facilities. From an initial call for applications that resulted in 83 applications and 111 sites submitted, the two selected sites were in Great Bend and Garden City. The **Garden City facility** is an expansion of the existing Transportation Partners and Logistics operations from 200 acres to 900 acres. This site was completed in 2016. The **Great Bend facility** is located at the Airport Industrial Park on the west side of the city and opened in June 2017. Currently, this facility serves as a laydown yard for wind energy components (nacelles, blades, tower sections and hubs), aggregate (1,000 ton per hour railcar unloading system that transloads rock from railcars via a series of conveyors, then to a computer automated stacker that allows materials to be placed in separate piles for different materials. Aggregates are loaded onto trucks by a large front end loader, weighed and sent out), bulk cement truck loading station, and the capability to transload a variety of materials. This facility will also offer warehousing and laydown facilities for pipe, lumber, dimensional goods and oil field related products. Additionally, the facility will also be able to accommodate agricultural commodities in the future.

4.6.5 Freight Generators

American Transportation Research Institute (ATRI) analyzed truck Global Positioning System (GPS) data from Kansas to identify traffic analysis zones (TAZ) where freight activity is most intense. The output from this analysis provides insight regarding the source locations of freight movement.

The goal of this analysis is to identify geographic locations (at the block group level) where freight is generated. Such locations include distribution centers, warehouses, manufacturing facilities and other origin and destination points. These locations were identified based on the intensity of truck activity within block group. To conduct the analysis, a truck GPS dataset was first assembled that included data of over 57,000 unique trucks for the month of April 2016.

ATRI's sample included only stopped trucks with the greatest freight intensity. This identification allowed the research team to filter the larger statewide dataset and focus on only the data from freight generators.

Figure 4.19 and **Figure 4.20** depict the most frequent truck origins and destinations identified through this analysis. The analysis found that the majority of key freight generators were located along major roadways. Furthermore, urban areas such as Kansas City and Wichita contained a concentrated share of generators, although several other freight generating locations were identified throughout the state.

This information can be used by KDOT to prioritize infrastructure investments that will improve freight mobility in the state. In addition, this information may be valuable for identifying the investment needs of critical last-mile connectors.

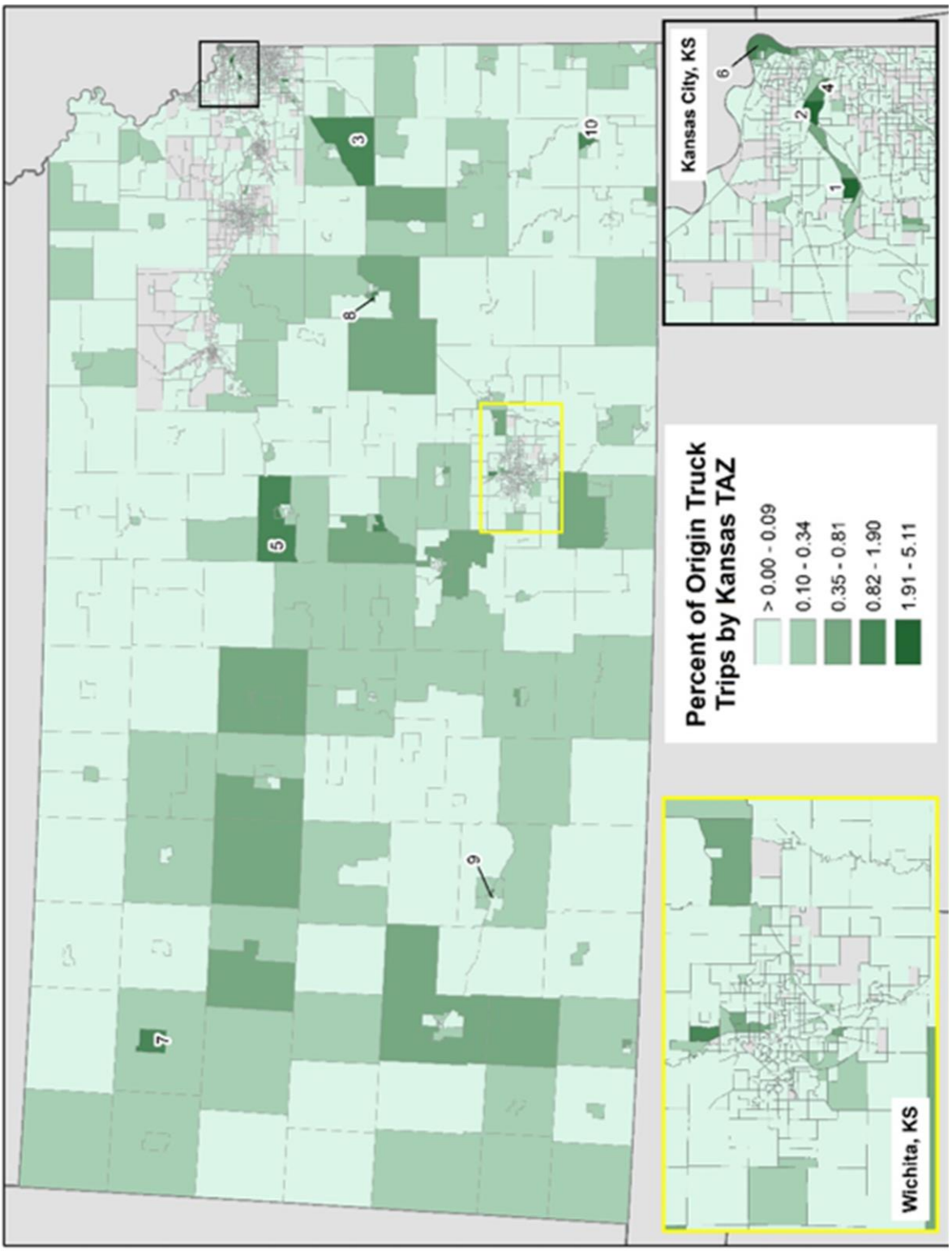


Figure 4.19: Kansas Truck Trip Origin Percentage

Source: ATRI Truck Analysis for Kansas, April 2016 data.

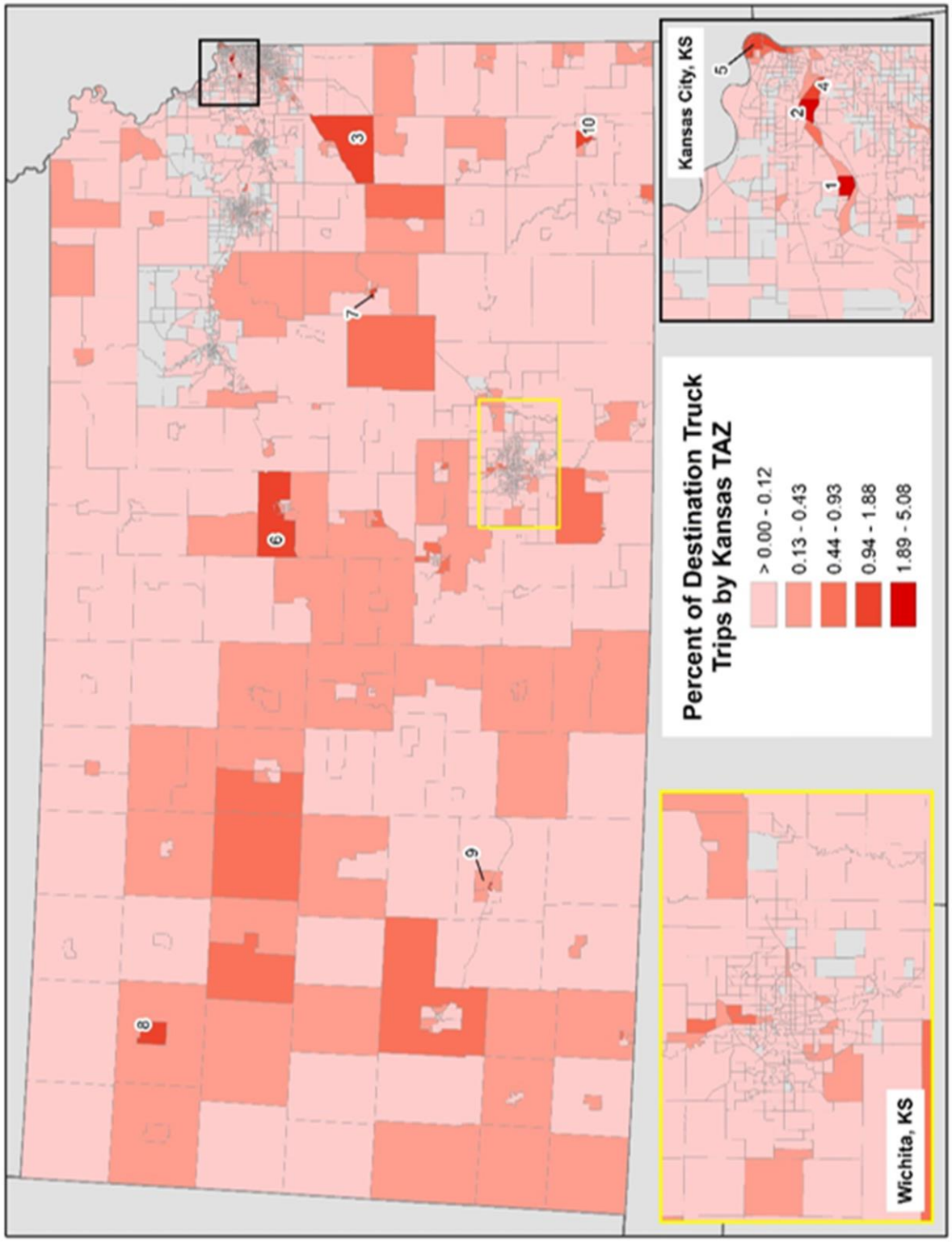


Figure 4.20: Kansas Truck Trip Destination Percentage

Source: ATRI Truck Analysis for Kansas, April 2016 data.

The ten origins and the destinations are the same however in different rank order shown in **Table 4.11** and **Figure 4.19**. The top ten truck generating TAZs are most closely located to the following Kansas cities – Kansas City, Ottawa, Parsons, Emporia, Salina, Dodge City and Colby.

Table 4.11: Top Ten Truck Generating TAZs by Origin

Truck Origins TAZs	
Rank	Associated City
1	Kansas City
2	Kansas City
3	Ottawa
4	Kansas City
5	Salina
6	Kansas City
7	Colby
8	Emporia
9	Dodge City
10	Parsons

Source: ATRI Truck Analysis for Kansas, April 2016 data.

When evaluating the Transearch data, the county level outbound truck movements destined out-of-state are primarily traveling from Johnson County (5.5 million, 10.1%), Wyandotte County (5.4 million, 9.8%), and Montgomery County (4.6 million, 8.4%). (**Table 4.12** and **Figure 4.20**)

Table 4.12: Top Ten Truck Generating TAZs by Destination

Truck Destinations	
Rank	Associated City
1	Kansas City
2	Kansas City
3	Ottawa
4	Kansas City
5	Kansas City
6	Salina
7	Emporia
8	Colby
9	Dodge City
10	Parsons

Source: ATRI Truck Analysis for Kansas, April 2016 data.

The Transearch data indicates the inbound truck movements originating out-of-state are primarily traveling to Johnson County (8.9 million, 19.0%), Sedgwick County (6.0 million, 12.7%), and Wyandotte County (3.1 million, 6.7%).

In addition, Transearch data analyzed the origins and destination of truck trips with beginning and end locations within Kansas. Inbound trucks to Kansas are predominately from their neighboring states with Missouri having the largest percent of inbound truck origins at 37 percent. Outbound truck trips from Kansas is a very similar story with Missouri being the top outbound destination

accounting for 37 percent of the outbound truck trips. The top three states for truck trip origins and destinations are in **Table 4.13**.

Table 4.13: Top Inbound and Outbound Truck Origins and Destinations

Truck Origins into Kansas		Truck Destinations from Kansas	
Rank	State	Rank	State
1	Missouri – 36.9%	1	Missouri – 25.1%
2	Nebraska – 17.0%	2	Oklahoma – 15.5%
3	Oklahoma – 8.8%	3	Nebraska – 10.4%

4.6.5.1 Military Institutions

The U.S. military has a significant presence in Kansas. Military installations require efficient and reliable access to the freight transportation system for national defense purposes. The U.S. military depends on the Kansas multimodal freight system to move cargo to not only support the installations, but also to deploy personnel and equipment for national defense. To meet this critical need, the Strategic Highway Network (STRAHNET) and the Strategic Rail Corridor Network (STRACNET) were developed by the Department of Defense (DoD) in coordination with FHWA. The STRAHNET and STRACNET are networks of highways and rail lines, respectively, which provides the U.S. military access, continuity and emergency capabilities for defense purposes.

The state's military installations serve as major freight generators and consumer markets thus needing connectivity to the freight transportation system. Fort Riley located just north of Junction City and west of Manhattan, is one the largest military installations in the U.S. and hosts over 25,000 soldiers. Fort Leavenworth, located in the Kansas City metropolitan area, is a training center focusing on operational and strategic military planning. It is also the headquarters for the 35th Infantry Division, Kansas National Guard. McConnell Air Force Base, near Wichita, has a primary mission of aerial refueling of any military aircraft. The Great Plains Joint Training Center, near Salina, provides support for year-round training for the Kansas National Guard. The Kansas National Guard has numerous Army and Air Guard units domiciled throughout the state.

Diverse and complex supply chains are necessary to efficiently and reliably provide logistics support to these military sites. Enormous amounts of fuel, food, ammunition, maintenance, equipment and materials, and medical supplies are critical to supporting these supply chains and to support deployment of units. Transportation infrastructure including highways, rail, inland waterways and air cargo are critical to supporting these supply chains and to support deployment of units.

Chapter 5

Trends, Needs and Issues

5.1 Introduction

To help Kansas plan and create a transportation system for the future, it is important to understand the underlying trends, needs, and potential issues. This chapter assesses those trends, needs, and potential issues associated with multimodal freight movements. This chapter assesses those trends, needs, and issues.

- **Strengths and Challenges** – Evaluating the existing system to identify key advantages, disadvantages, and potential issues.
- **Economics** – Looking at areas of growth and forecasting future freight transportation demands for each mode over the next 20 years.
- **Emerging Trends and Technology** – Considering issues outside traditional forecasting methods, but which could impact the future of freight in the state.

5.2 Strengths and Challenges

Looking at Kansas' advantages and disadvantages helps identify the strengths, challenges and potential issues that currently exist in the state's freight system. These strengths and challenges are grouped into four categories: system capacity, system operations, safety and connectivity.

5.2.1 System Capacity

A strength of the Kansas Transportation System is adequate capacity along all major modes. Although as population continue to grow throughout the state, the need and desire for the transportation of goods will also increase. KDOT continues to monitor the capacity needs throughout the state.

- **Highway Network -** Kansas has a well-connected system for handling highway freight traffic. Truck commodity movements in 2014 totaled 200.9 million tons carried mainly on the interstate system, most notably I-35, I-70 and I-135. The densest truck freight routes are along I-35 and I-70, to/from Texas and the West. Capacity is not currently an issue except within select corridors in the urban areas near Kansas City and Wichita. These corridors include portions of I-35 and US 69 in the Kansas City area and I-35, I-135, I-235 and US 54 in the Wichita area. In rural areas, KDOT is working to enhance safe and efficient movement of goods with city bypasses, extending 4 lane highways, and adding passing lanes.

One of the capacity challenges for truck freight is the availability of safe and legal parking for drivers. MAASTO has found that more than 83 percent of commercial drivers routinely took longer than 30 minutes to find parking. The *Kansas Statewide Freight Network Truck Parking*

Plan, completed February 2016, recommended implementation strategies which include: improved parking and information and sharing, adding or improving parking, explore parking improvement partnerships and examine pro-parking policies for freight trucks. The Truck Parking Information and Management System (TPIMS), which Kansas will participate in through a partnership with seven other MAASTO states, will help drivers plan their routes and find safe parking on high-volume corridors across the eight-state region, including I-70, I-35 and I-135 in Kansas.

- **Rail Network -** Kansas has a substantial freight rail infrastructure with four Class I freight railroads, currently operating 2,723 miles of rail line and 11 short line railroads operating a total of 1,806 track miles.

Class I investments in rail infrastructure in the state of Kansas has been focused on developing the capacity necessary to efficiently handle the increase in import and export products and commodities moving to/from the west coast to the greater Midwest and eastern part of the U.S. The increased demand has been the catalyst to upgrade and add multiple tracking to existing lines, expansion of existing and construction of new terminal facilities. Each year the Class I railroads budget funds to facilitate capital investment in the state's rail network.

Class I railroads have continued to invest heavily in the networks during recent years to solve on-going issues with capacity constraints, operational efficiencies, chokepoints, maintenance and safety, and increased volumes of through traffic in Kansas. Also, the federally mandated positive train control (PTC) systems, which reduce the risk for train overspeed incidents and collisions between trains, consume significant funding.

Challenges potentially impacting the ability of the Class III operations to meet the demand for freight in the future include the movement toward 286,000 lb. heavy axle loads. In order to work with their Class I connecting partners and customers wanting to take advantage of economies of scale, this could have a large impact in terms of safety, maintenance and structure costs for these short line railroads.

- **Water Network -** Kansas has access to ports and docks, along approximately 121 miles of the Missouri River in the northeast corner of the state, which are uncongested and have excess capacity. Of the 27 docks, over half handle either grain products or building materials. Two docks ship fertilizer or chemicals. Although the Missouri River ports have adequate capacity, they face operational challenges due to unreliable and inconsistent water levels.

- **Air Cargo Network -** Kansas is home to 140 public and private airports including 8 commercial service and 132 general aviation. Kansas' Dwight D. Eisenhower Airport in Wichita is one of the top 110 cargo airports in North America in terms of total tonnage in 2015. Air cargo facilities are limited in Kansas and larger airports in Kansas City and Denver are used to a higher degree.

Dwight D. Eisenhower Airport in Wichita needs to continue to support large aircraft in order to compete for air cargo business. Dedicated cargo carriers ship freight only. Integrated cargo carriers are passenger carriers that offer freight shipping as a limited option.

Integrated cargo carriers transport the largest percentage of air cargo. The reduction in aircraft size and fewer flights has had an adverse impact on integrated cargo capabilities at the airport. Freight operations based at Dwight D. Eisenhower include five dedicated air cargo carriers and eight integrated cargo carriers. A terminal renovation along with other improvements were completed in 2015. Air cargo can be shipped or received internationally directly from this airport. Capacity is currently available at Dwight D. Eisenhower.

- **Pipeline Network -** There are approximately 25,500 miles of pipelines moving natural gas, crude oil, petroleum products and highly volatile liquids (HVL) throughout Kansas. Pipeline movements in 2014 totaled 102.2 thousand tons, valued at $42 million.

- **Intermodal Facilities –** There are 77 intermodal facilities located in Kansas with varying types of intermodal interactions. The majority of the facilities (84%) accommodate Rail-Truck commodity transfers with modal transfers at ports (8%) and airports (4%) being much fewer. Most of the intermodal facilities in rural parts of the state are grain elevators that accommodate the transfer of grain from trucks to elevator storage units, then to shuttle trains for transport to regional, national and international markets. Much of the intermodal activity occurs in the Kansas City and Wichita areas. Recent intermodal facilities growth in Kansas include the new BNSF intermodal facility in Edgerton. New transload facilities opened within the last year in Great Bend and Garden City. These facilities serve as laydown yards for wind energy components, agricultural products, aggregates and cement.

5.2.2 System Operations

Of Kansas' 10,500 miles of highways, over 90 percent are in good condition. Kansas has set a target of 85 percent of highways in good condition and it has been exceeded each of the past 15 years. Similarly, Kansas has exceeded its target of over 85 percent of bridges in good condition for the last 10 years. Only one percent of the bridges on the state highway system are considered structurally deficient. There are few low clearance bridges and only 3 percent of the load restricted bridges in Kansas cross Interstates and two percent cross U.S. Highways. Maintaining the condition of the system will continue to be a priority.

KTA is has identified the need to implement open road tolling. This method of tolling allows electronic customers who have transponders like K-TAG or Oklahoma's PIKEPASS to keep moving through highway speed lanes. Highway users who prefer to pay with cash can slow and pull out of the way of highway traffic to pay their tolls. KTA will be implementing Open Road Tolling at its three mainline toll plazas: Eastern Terminal near Kansas City, East Topeka and Southern Terminal south of Wichita.

Generally, Kansas railroads are in good condition. Class I rail line expansion is dependent on demand. For these rail companies, capacity additions are in response to customer demands to eliminate constraints and bottlenecks, as well as increased carload requirements based on business expansion. With 30 percent of the Class III system not being able to accommodate 286,000 pound railcars, Class III carriers have an option to make more rail trips with less than full rail cars to reduce weight or haul heavier loads at lower operating speeds, thus impacting operating efficiencies and customer service.

The lack of dredging to maintain navigable channels on the Missouri River hinders efficient and reliable waterborne freight movements.

5.2.3 Safety

Improvements in safety have had a positive impact on the highway system over the last decade. Improvements helped reduce the number of fatalities involving commercial vehicles from over 70 in 2004 to less than 45 in 2014. Overall accidents involving commercial vehicles have also been reduced since 2004 when there around 4,000, to less than 3,500 each year between 2009 and 2014.

The number of train-vehicle crashes at public railroad crossings in Kansas, has remained relatively constant between 2012 and 2015. However, the number of fatalities dropped in 2015.

5.2.4 Connectivity

Kansas has the advantage of being centrally located in the United States. The Kansas City area is one of the largest rail freight and trucking hubs in the country. There is a need to maintain multimodal connections to freight generators, industrial parks and distribution centers.

The Missouri River is a key asset due to its central location and because it is lock free all the way to the Mississippi River. The expansion of the Panama Canal may have some impact on freight movements in Kansas. This change could include some directional freight flow changes to east coast Atlantic and Gulf ports, shifting among different transportation modes and overall freight volume changes.

Connectivity issues are a result of the distance/proximity of the different transportation modes to each other. Improving these freight connections is important for providing options for businesses to improve their supply chains and competitiveness in the marketplace.

5.3 Economics

5.3.1 Freight Commodity Growth

The analysis of the type of freight commodities, the tonnage, dollar value and direction movement (into, out of, within or through Kansas) of those commodities being transported, illustrate the importance of freight movements to Kansas from different perspectives. Each of these represents components that assist in estimating the whole of the economic impacts of freight movement.

Directional Movement – Directional freight movements impact Kansas differently.

- Inbound commodities from out-of-state comprise two basic types: final goods and intermediate production materials (inputs). Final goods typically go directly to consumers or to retail outlets; hence, associated economic impacts are, at most, a function of markup margins. Comparatively, economic impacts associated with inbound materials used in Kansas manufacturing or other value-added processes can be quite significant.
- Outbound commodities from Kansas to other states represent the result of value-added Kansas production.

- Intrastate Kansas movements represent both value-added Kansas production and/or product markup.
- Truck freight commodities moved through Kansas generate economic value to the State only through the purchase of fuel, food, and hotel rooms. Nonetheless, the magnitude of through state truck volumes is important in a freight plan given the effect on modal infrastructure capacity. Rail freight commodities moved through Kansas do not add to the economy from value added processes or final sale however economic value of rail through movements include annual property tax receipts, jobs for Kansans, and job-related income taxes to the state.

Commodity Tonnage and Value – Although it is important to understand tonnage movements, these observations do not solely address the importance of freight movements to Kansas (other considerations matter such as value, direction, mode, etc.). Top commodity tonnages (via all modes and directions, combined) are led by Coal (181.0 million, 31.8%), followed by Farm Products (81.2 million, 14.3%), and Nonmetallic Minerals (64.2 million, 11.3%); see **Table 5.1**. Comparatively, the top commodity value movements (via all modes and directions, combined) are led by Chemicals or Allied Products ($128.2 billion, 23.3%), followed by Transportation Equipment ($92.2 billion, 16.8%), and Secondary Traffic ($66.2 billion, 12.0%), see **Table 5.2**

Table 5.1: Top Commodities by Tonnage, 2014

STCC2	Commodity	Tons (in thousands)	
		Amount	Percent
11	Coal	181,039	31.8%
01	Farm Prods.	81,241	14.3%
14	Nonmetallic Minerals	64,150	11.3%
20	Food or Kindred Prods.	50,121	8.8%
28	Chemicals or Allied Prods.	40,503	7.1%
46	Misc. Mixed Shipments	34,348	6.0%
29	Petroleum or Coal Prods.	25,361	4.5%
50	Secondary Traffic	22,496	3.9%
32	Clay, Concrete, Glass, or Stone	15,315	2.7%
37	Transportation Equipment	8,275	1.5%
	Remaining Commodities	46,969	8.1%
	Total	569,818	100.0%

Source: Prepared by CDM Smith, based on TRANSEARCH®/STB Waybill for 2014
note totals may not sum due to rounding

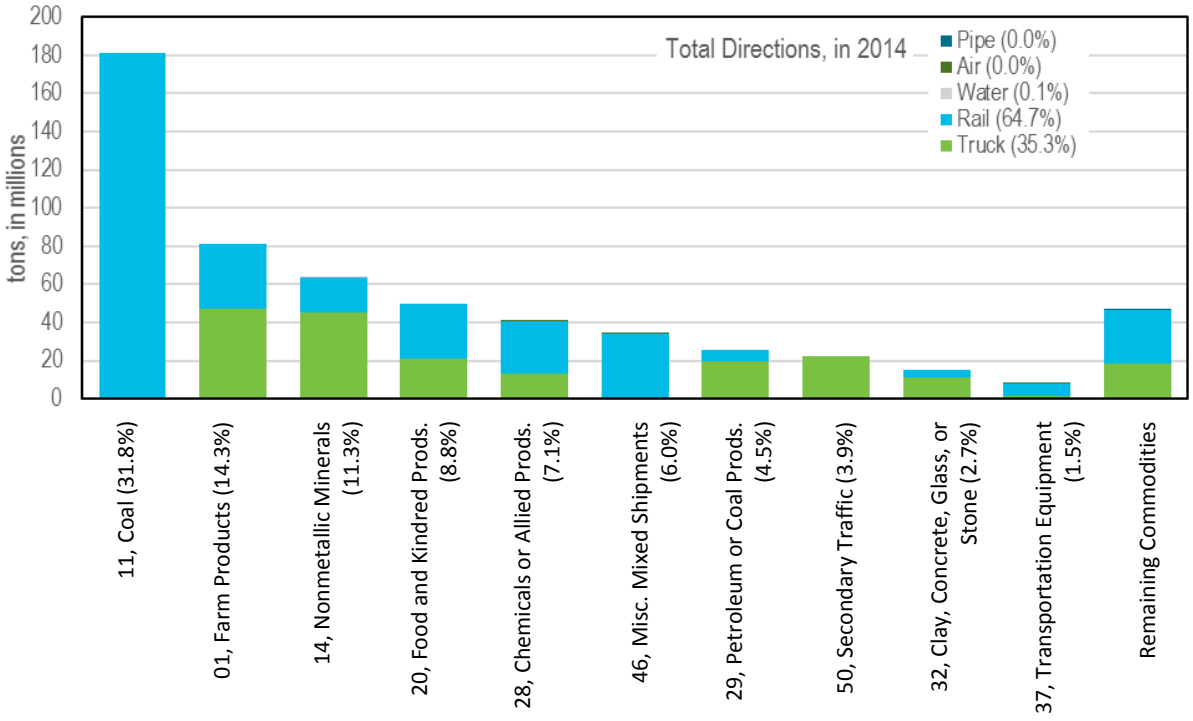
Table 5.2: Top Commodities by Value, 2014

STCC2	Commodity	Value (in millions)	
		Amount	Percent
28	Chemicals or Allied Prods.	$128,150	23.3%
37	Transportation Equipment	$92,234	16.8%
50	Secondary Traffic	$66,157	12.0%
20	Food or Kindred Prods.	$44,411	8.1%
01	Farm Prods.	$33,143	6.0%
46	Misc. Mixed Shipments	$29,490	5.4%
29	Petroleum or Coal Prods.	$22,647	4.1%
35	Machinery	$18,212	3.3%
33	Primary Metal Prods.	$17,360	3.2%
11	Coal	$15,844	2.8%
	Remaining Commodities	$82,809	15.0%
	Total	$550,457	100.0%

Source: Prepared by CDM Smith, based on Transearch®/STB WAYBILL for 2014
note totals may not sum due to rounding

Commodity Tons by Mode - Figure 5.1 illustrates modal differences by commodity tonnage. Rail leads all major commodity ton movements, with a dominant proportion attributable to a single commodity: Coal. No other single mode-commodity combination is as close to the relative dominance of Coal tonnage; however, truck-bound Farm Products and Nonmetallic Minerals are relatively larger than the remaining mode-commodities.

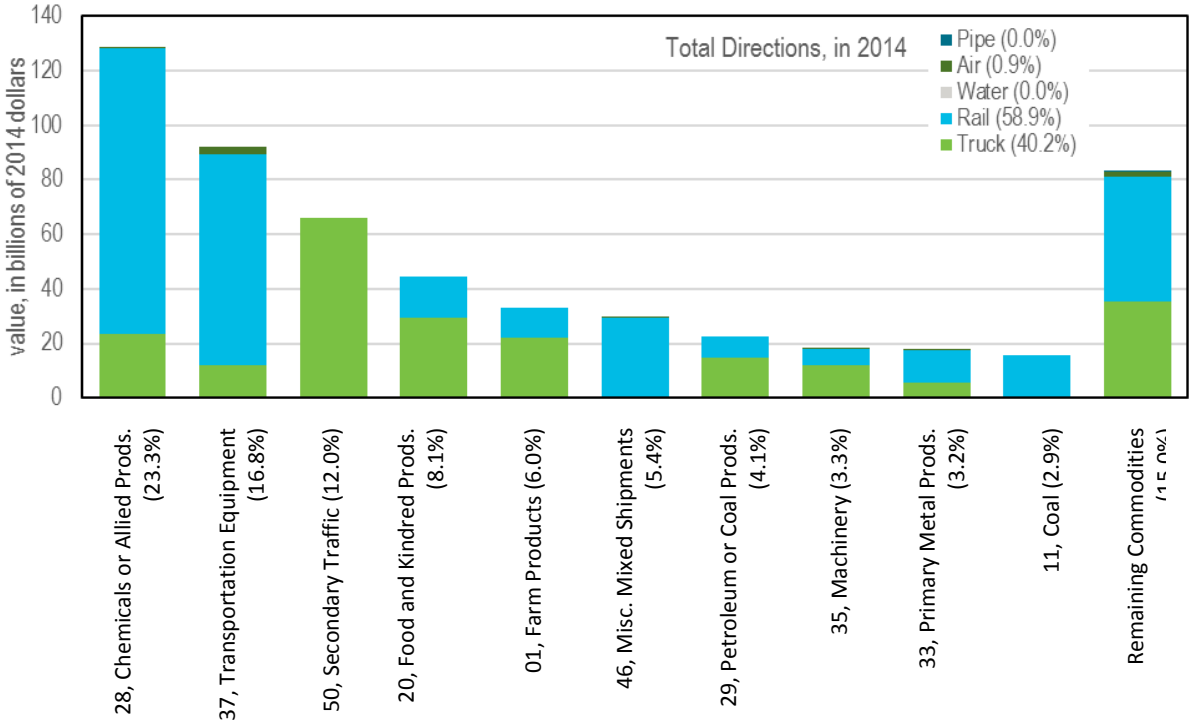
Figure 5.1: Top Commodities by Tonnage and Mode, 2014



Source: Prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014
note totals may not sum due to rounding

Commodity Value by Mode - Figure 5.2 shows modal differences by commodity value. A similar pattern is observed in terms of modal concentration (rail then truck dominating); however, the commodity mix is drastically different due to the varying values/ton for certain commodities. In effect, the tonnage that dominates the freight movements is mostly low valued goods (per weight); as such, those commodities (e.g., Coal, Farm Products, and Nonmetallic Minerals) do not tend to represent large portions of the value of the freight moved. Instead, the major commodities by value are relatively higher values per ton, such as Chemical or Allied Products, Transportation Equipment, Secondary Traffic (repositioning), etc.

Figure 5.2: Top Commodities by Value and Mode, 2014



Source: Prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014
note totals may not sum due to rounding

5.3.2 20-Year Freight Forecast

Kansas is, from a freight traffic perspective, a long-haul bridge state. According to the Commodity Flow Analysis completed as part of the Kansas DOT Statewide Freight Plan, tonnage across the Kansas freight network is forecast to grow by 128.8 million tons, a 30.5 percent increase from 2014 to 2040 (1.0 percent increase annually). A significant portion of freight traversing the transportation network of Kansas is rail-based through traffic. Rail movements account for 64.7 percent of the total freight tonnage. Truck is second to rail, accounting for 35.5 percent of the freight movements. The Commodity Flow Analysis notes rail tonnage is forecast to grow 11.6 percent over the future horizon (0.4 percent annually). The value of the tonnage is forecast to increase 40.0 percent (1.1% annually). Truck freight is forecast to grow 33.9 percent (1.1 percent annually), with an increase in value of 46.5 percent (1.5 percent annually).

It is worth noting that the IHS TRANSEARCH® database available to KDOT is truncated and does not include forecasts. The FHWA FAF data was culled to determine relative growth in freight by mode, direction and commodity. FHWA FAF and IHS TRANSEARCH® are notably different regarding non-surface modes. FAF does not include through traffic and commodity compositions are different. As such, direct comparison between the sources is not attempted in this document.

5.3.3 Truck Forecast

Table 5.3 depicts the directional composition of truck freight movements in Kansas between 2014 and 2040. Truck tonnage is forecast to increase 33.9 percent between 2014 and 2040. Inbound traffic is projected to increase more quickly than outbound or intrastate truck movements.

Table 5.3: Truck Forecast by Direction, 2014 to 2040

Direction	2014		2040		Percent Change	
	Amount	Percent	Amount	Percent	Total	CAGR
TONS						
Outbound	52,413,268	20.2%	67,617,587	19.5%	29.0%	1.0%
Inbound	53,644,432	20.7%	79,015,374	22.8%	47.3%	1.5%
Intra	153,396,620	59.1%	200,685,836	57.7%	30.8%	1.0%
Through *					36.6%	1.2%
Total	259,454,320	100.0%	347,318,797	100.0%	33.9%	1.1%
VALUE, IN MILLIONS						
Outbound	$102,544	36.8%	$150,800	37.0%	47.1%	1.5%
Inbound	$78,043	28.0%	$124,850	30.6%	60.0%	1.8%
Intra	$97,781	35.2%	$132,165	32.4%	35.2%	1.2%
Through *					70.1%	2.1%
Total	**$278,368**	**100.0%**	**$407,815**	**100.0%**	**46.5%**	**1.5%**

** through growth reflects national totals as proxy*
Source: prepared by CDM Smith, based on FHWA FAF v4.1 data for 2014 and 2040

The commodity movements (all directions) by truck, in 2040, total 347.3 million tons and are valued at $407.8 billion. Truck commodity value is forecast to increase 46.5 percent or 1.5 percent annually. The top five truck commodities by tonnage, value and growth can be reviewed in the **Appendix C**.

The forecasted growth in truck freight will add capacity pressure to the highway system. KDOT's Long Range Transportation Plan also recognizes the traffic growth and future congestion may impact the highway system without future investments. (**Figure 5.3**) The LRTP points out that "Due to the inherently difficult task of making future predictions, by 2030 it is likely that some routes shown as congested won't be, while others not shown will be congested."

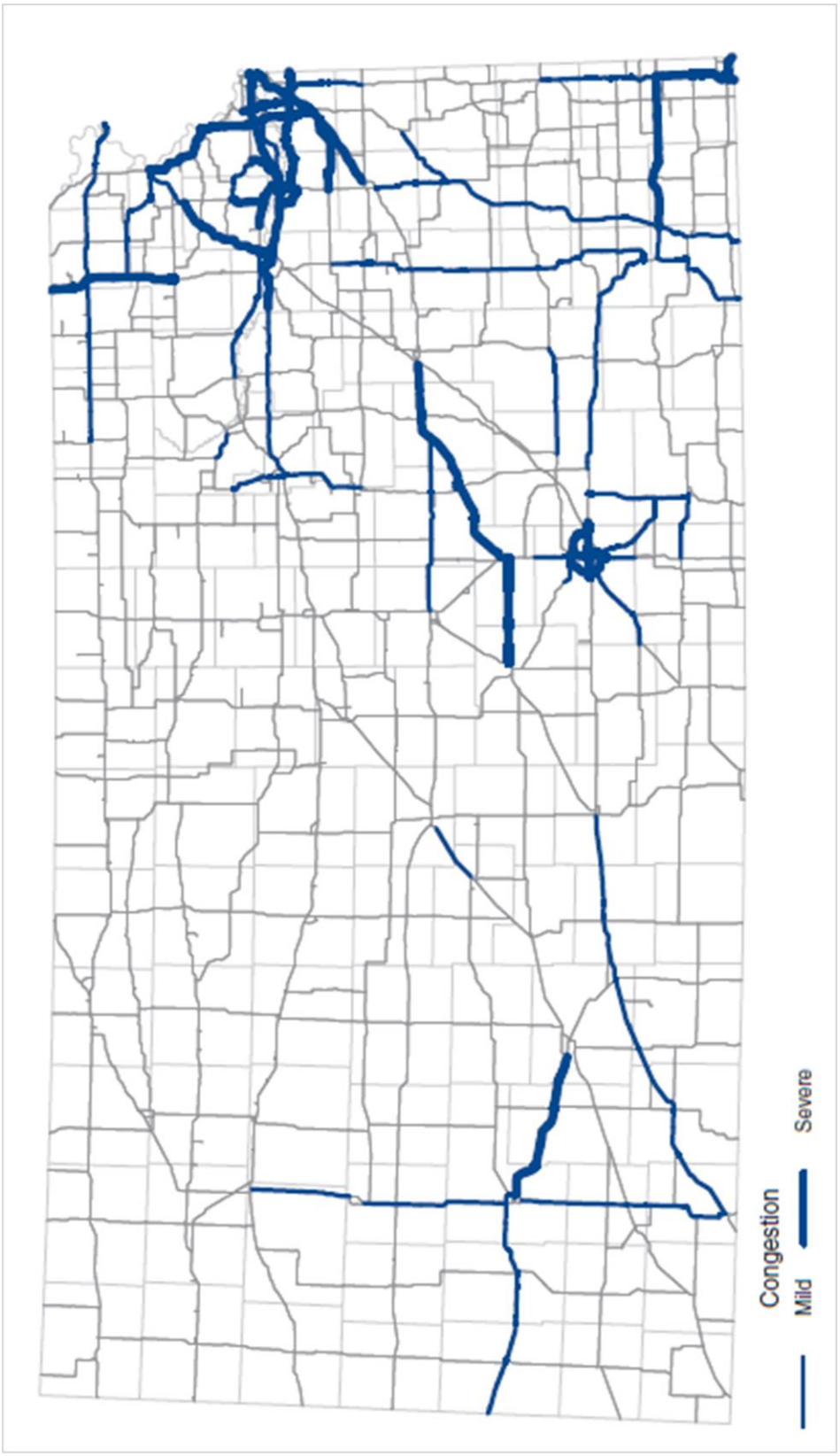


Figure 5.3: Projected Highway Miles at or Nearing Congestion in 2030

Source: 2008 KDOT Long Range Transportation Plan

5.3.4 Rail Forecast

Table 5.4 depicts the directional composition of rail freight movements in Kansas between 2014 and 2040. The Commodity Flow Analysis indicates rail tonnage is forecast to increase by 11.6 percent (0.4 percent annually) between 2014 and 2040. Rail commodity value is forecast to increase 40.0 percent (1.3 percent annually). Worth noting is that most of Kansas through rail is coal, which national forecasts for 2014 to 2040, show declining 38.2 percent (1.8 percent annually). This is affecting the inbound tonnage forecasted decline as well, due to less coal consumption for power plants as use of natural gas increases, renewable energy sources increase, and other technologies improve.

Table 5.4: Rail Forecast by Direction, 2014 to 2040

Direction	2014		2040		Percent Change	
	Amount	Percent	Amount	Percent	Total	CAGR
TONS						
Outbound	36,428,929	62.7%	46,194,027	71.3%	26.8%	0.9%
Inbound	20,335,728	35.0%	16,801,526	25.9%	-17.4%	-0.7%
Intra	1,316,832	2.3%	1,832,397	2.8%	39.2%	1.3%
Through *					13.8%	0.5%
Total	**58,081,489**	**100.0%**	**64,827,950**	**100.0%**	**11.6%**	**0.4%**
VALUE, IN MILLIONS						
Outbound	$12,236	60.6%	$16,237	57.5%	32.7%	1.1%
Inbound	$7,630	37.8%	$11,573	41.0%	51.7%	1.6%
Intra	$319	1.6%	$442	1.5%	38.8%	1.3%
Through *					68.9%	2.0%
Total	**$20,185**	**100.0%**	**$28,252**	**100.0%**	**40.0%**	**1.3%**

** through growth reflects national totals as proxy*
Source: prepared by CDM Smith, based on FHWA FAF v4.1 data for 2014 and 2040

The commodity movements (all directions) by rail, in 2040, total 64.8 million tons which are valued at $28.3 billion. The top five rail commodities by tonnage, value and growth can be reviewed in the *Commodity Flows Analysis Technical Memoranda.*

5.3.5 Water Forecast

Table 5.5 depicts the directions of waterborne movements in Kansas between 2014 and 2040. Water tonnage is forecast to increase 166.4 percent (3.8 percent annually) between 2014 and 2040. The value of water tonnage is forecast to increase 225.9 percent (4.6 percent annually) during the future horizon. Kansas waterborne movements are forecasted to grow two-to-three times as quickly as the national total in waterborne movements. The growth in water freight is related to national growth in commodity shipments such as cereal grains, agricultural products, milled grain; products that Kansas is well suited to benefit from as a result of the Panama Canal expansion.

The commodity movements (all directions) by water, in 2040, total 6.8 million tons and are valued at $17.4 billion. The top five water commodities by tonnage, value and growth can be reviewed in the *Commodity Flows Analysis Technical Memoranda.*

Table 5.5: Water Forecast by Direction, 2014 to 2040

Direction	2014		2040		Percent Change	
	Amount	Percent	Amount	Percent	Total	CAGR
TONS						
Outbound	1,777,261	69.7%	4,757,540	70.0%	167.7%	3.9%
Inbound	743,745	29.1%	2,018,627	29.7%	171.4%	3.9%
Intra	30,688	1.2%	20,290	0.3%	-33.9%	-1.6%
Through *					32.1%	1.1%
Total	**2,551,694**	**100.0%**	**6,796,457**	**100.0%**	**166.4%**	**3.8%**
VALUE, IN MILLIONS						
Outbound	$1,806	33.9%	$5,383	31.0%	198.0%	4.3%
Inbound	$3,497	65.7%	$11,953	68.9%	241.8%	4.8%
Intra	$21	0.4%	$14	0.1%	-33.9%	-1.6%
Through *					96.3%	2.6%
Total	**$5,324**	**100.0%**	**$17,350**	**100.0%**	**225.9%**	**4.6%**

** through growth reflects national totals as proxy*
Source: prepared by CDM Smith, based on FHWA FAF v4.1 data for 2014 and 2040

5.3.6 Air Forecast

Table 5.6 depicts the directions of air freight movements in Kansas between 2014 and 2040. Air tonnage is forecast to increase 142.8 percent (3.5 percent annually) over the future horizon, and the value is forecast to increase 183.2 percent (4.1 percent annually). Inbound traffic is projected to increase more quickly than outbound or intrastate air movements. Kansas airborne movements are forecasted to grow slightly more slowly than the national total in airborne movements. As noted in Chapter 4, air freight in Kansas is under counted. The aviation production industry in Wichita is known to fly in parts and equipment directly to their manufacturing facilities and fly out/deliver the finished planes which are not captured in data.

Table 5.6: Air Forecast by Direction, 2014 to 2040

Direction	2014		2040		Percent Change	
	Amount	Percent	Amount	Percent	Total	CAGR
TONS						
Outbound	38,992	46.7%	94,768	46.7%	143.0%	3.5%
Inbound	43,707	52.3%	105,715	52.1%	141.9%	3.5%
Intra	863	1.0%	2,383	1.2%	176.2%	4.0%
Through *					192.6%	4.2%
Total	83,562	100.0%	202,866	100.0%	142.8%	3.5%
VALUE, IN MILLIONS						
Outbound	$4,182	49.7%	$11,716	49.1%	180.2%	4.0%
Inbound	$3,782	44.9%	$11,015	46.2%	191.2%	4.2%
Intra	$456	5.4%	$1,117	4.7%	145.0%	3.5%
Through *					252.9%	5.0%
Total	$8,420	100.0%	$23,848	100.0%	183.2%	4.1%

** through growth reflects national totals as proxy*
Source: prepared by CDM Smith, based on FHWA FAF v4.1 data for 2014 and 2040

The commodity movements (all directions) by air, in 2040, total 202,866 tons and are valued at $23.8 million. The top five air commodities by tonnage, value and growth can be reviewed in the *Commodity Flows Analysis Technical Memoranda.*

5.3.7 Pipeline Forecast

Table 5.7 depicts the directions of pipe tonnage movements in Kansas between 2014 and 2040. Pipe tonnage is forecast to increase 29.1 percent (1.0 percent annually) between 2014 and 2040. The value of pipe tonnage is forecast to increase 22.6 percent (0.8 percent annually). Of all the modal options, pipe tonnage is forecast to grow the most slowly over the future horizon.

Table 5.7: Pipe Forecast by Direction, 2014 to 2040

Direction	2014		2040		Percent Change	
	Amount	Percent	Amount	Percent	Total	CAGR
TONS						
Outbound	41,314,883	40.3%	54,395,573	41.0%	31.7%	1.1%
Inbound	49,103,829	47.8%	68,492,172	51.7%	39.5%	1.3%
Intra	12,268,499	11.9%	9,651,094	7.3%	-21.3%	-0.9%
Through *					38.7%	1.3%
Total	**102,687,211**	**100.0%**	**132,538,839**	**100.0%**	**29.1%**	**1.0%**
VALUE, IN MILLIONS						
Outbound	$11,787	33.4%	$14,804	34.2%	25.6%	0.9%
Inbound	$18,020	51.0%	$24,275	56.0%	34.7%	1.2%
Intra	$5,531	15.6%	$4,252	9.8%	-23.1%	-1.0%
Through *					25.2%	0.9%
Total	**$35,338**	**100.0%**	**$43,331**	**100.0%**	**22.6%**	**0.8%**

** through growth reflects national totals as proxy*

Source: prepared by CDM Smith, based on FHWA FAF v4.1 data for 2014 and 2040

The commodity movements (all directions) by pipeline, in 2040, total 132.5 million tons and are valued at $43.3 million. The only four pipeline commodities by tonnage, value and growth can be reviewed in the *Commodity Flows Analysis Technical Memoranda.*

5.4 Emerging Trends

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

5.4.1 Trade and Industry Growth

Industrial health and vitality have a close relationship with transportation. Industries need parts and supplies to manufacture products that are transported across Kansas, the country and the world. Transportation is responsible for importing supplies to Kansas for manufacturing or other value-added processes. Exporting the products of Kansas industries also represent value-added processes. U.S. Department of Commerce indicates that the top 3 categories of exports from Kansas in 2015 are transportation equipment, processed foods and agricultural products. Exports from Kansas helped contribute $2.26 trillion to U.S. goods and services exports in 2015.

Nationally, employment and investment in advanced industries is continuing to grow. These industries include advanced manufacturing like aerospace, auto, medical devices and pharmaceuticals, energy-oriented industries such as oil and gas extraction and electric power generation, and high-tech service activities such as computer system design, Research & Development (R&D) services, software and telecommunications. The advanced industry sector is critical to local and national prosperity because this is where much of the nation's private-sector R&D is conducted (89%) and generates most of the nation's patents (80%). The advanced industries sector trains and employs the nation's STEM workforce. As of 2015, advanced industries accounted for over 17 percent of Gross Domestic Product and 6o percent of U.S. exports while representing less than 9 percent of the nation's employment. However, the sector's long supply chains (network between a company and its suppliers to produce and distribute a specific product) mean that it supports nearly 39 million jobs nationally, or a quarter of all private employment.[17]

Advanced manufacturing, especially aviation and aerospace manufacturing, is important to the Kansas economy. Exports in aircraft have seen a significant increase in the last five years, and are expected to continue growing, which can translate to significant business opportunities for the Kansas aerospace and aviation sector. The Wichita region of Kansas produces more than 30 percent of the world's general aviation aircraft. Approximately 53 percent of Wichita's manufacturing employment is related to the aviation/aerospace industry. Kansas is home to many aviation companies, including Cessna, Beechcraft, Bombardier, Learjet and Spirit AeroSystems. In addition to aviation, General Motors and its suppliers have a significant automotive presence in Kansas City, Kansas.[18]

Over 3,300 companies exported from Kansas locations in 2012. Of those, over 83 percent were small and medium-sized business enterprises with fewer than 500 employees. Small and medium-sized firms generated one-quarter of Kansas' total exports of merchandise in 2012. The state's largest merchandise export category was Transportation Equipment, which accounted for $2.5 billion of Kansas' total merchandise exports. Other top merchandise exports were Food & Kindred Products; Agricultural Products; Machinery, Except Electrical; and Chemicals.[19]

The United States currently has trade agreements in force with 20 countries, which accounted for 45 percent of Kansas' exports in 2014. Between 2005 and 2014, exports from Kansas to these markets grew 60 percent. The state's largest market was Canada, which accounted for over 21 percent of the state's total merchandise exports. Canada was followed by Mexico, China, Japan and Brazil.[20]

The expansion of the Panama Canal opened in June 2016 complete with new locks that will allow for deeper, longer and wider vessels, doubling its existing throughput capacity. Reduction of the costs of transportation due to the expansion could affect the movement of goods in a couple of ways. The reduction in costs out of ports in the Gulf due to using larger, more efficient ships reduces

[17] Hart, David M., Muro, Mark & Kulkarni, Siddharth (August 4, 2016). America's advanced industries: New trends. The Brookings Institution. Web. 5 Dec 2016 <https://www.brookings.edu/research/americas-advanced-industries-new-trends/>

[18] Economy. Kansas Department of Commerce. Web. 5 Dec 2016. <http://www.kansascommerce.com/index.aspx?NID=438>

[19] U.S. Department of Commerce, International Trade Administration (2015). Kansas: Expanding Exports and Supporting Jobs Through Trade Agreements. Web. 6 Dec 2016 <http://www.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005329.pdf>

[20] U.S. Department of Commerce, International Trade Administration (2015). Kansas: Expanding Exports and Supporting Jobs Through Trade Agreements. Retrieved from <http://www.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005329.pdf>

the cost of exporting bulk commodities, like grain. Second, lower transportation costs linked to expansion of the Canal could increase export volumes which could help to make U.S. exports more competitive in world markets. These factors could make the Mississippi and Missouri River routes a more attractive transportation option. The timing and scale of the impacts on Kansas freight flows are unknown but it is anticipated that there will be some change in demands on the transportation networks, service and operations.

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

5.4.2 Institutional and Regulatory Trends

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

- Public-private partnership financial market trends for private capital in transportation infrastructure projects could help Kansas bridge the gap in state and federal funding. This could mean increased costs for freight in the form of additional tolls, however the benefit would be increased reliability.
- Federal water resource policy trends could impact waterborne freight. The U.S. Army Corps of Engineers sets policy on the Missouri River which impacts water levels and the reliability of navigation for waterborne freight.
- U.S. Department of Agriculture food product traceability requirements could make bulk food shipping (unit train, barge) less attractive for some shippers. Food products were the 4th largest commodity in terms of tonnage and value in Kansas in 2014.
- U.S. Department of Homeland Security requirements for electronic pre-filling 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. "Complete Streets" policies are a design approach that requires streets to be planned in a way that allows for safe mobility regardless of mode. Because the design is not focused solely on cars and trucks, last mile deliveries from freight may be more difficult to access and parking can be an issue.
- Federal regulation of trucking/trucker safety could affect costs and cause driver shortages as discussed below.
- KDOT will continue to adhere to all federal guidance that regulate multimodal transportation.

5.4.3 Regulatory Impacts on Trucking Labor Productivity and Availability

The Federal Motor Carrier Safety Administration (FMCSA) regulates hours of service (HOS) for commercial truck drivers. The goal of these regulations is to prevent job conditions from causing excess fatigue, thus increasing safety. In general, drivers of property-carrying commercial vehicles are limited to driving a maximum of 11 hours after 10 consecutive hours of off duty. Drivers are also limited to 60 hours of driving in seven days or 70 hours in eight days. FMCSA updated HOS regulations in December 2014 to limit '34-hour restarts' to once per week. This provision allows for a driver to 'reset' the number of hours driven for a given week by being off-duty for 34 consecutive hours. Drivers are also required to take a 30-minute rest every 8 hours. The FMCSA has pushed to try to reduce the HOS from 11 to 10 hours per shift but has been met with many legal challenges.

Federal regulations also require all interstate truck drivers to be 21 years of age or older. However, states are able to set their own age requirement for drivers operating intrastate. The trucking industry has raised concerns that the federal age requirement for interstate trucking restricts the labor market for drivers. There is also an issue of discretion used by insurance companies to determine coverage for young potential truck drivers. These are perceived as negatives by the trucking industry because younger drivers may have less difficulty, than their older peers, with the long hours and variable locations associated with the truck driving profession.

5.4.4 Population Growth Trends

As Kansas' 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, Kansas is expected to have a slow annual population growth rate of 0.48 percent from 2010 to 2040. This results in approximately 385,000 additional Kansas residents by 2040.

Table 5.8 and **Figure 5.4** show the ten counties with highest projected growth between 2014-2044. Most of the growth counties are located near urban areas of Kansas City, Wichita, Lawrence, Manhattan and Topeka. Kansas City and Wichita are areas which already experience freight bottlenecks. This growth will continue to add to the pressure on facility condition and delays that already exist. Areas around Lawrence, Manhattan and Topeka will begin feeling these same issues as they continue to grow in the future.

Table 5.8: Highest Projected Growth Rate by County, 2014 to 2044

County	2014 Population	2044 Population	Percent Change 2014-2044
Pottawatomie	22,897	36,459	59.2%
Johnson	574,272	904,305	57.5%
Geary	36,713	52,379	42.7%
Douglas	116,585	165,504	42.0%
Leavenworth	78,797	105,844	34.3%
Ellis	29,013	34,665	19.5%
Sedgwick	508,803	601,711	18.3%
Crawford	39,290	44,818	14.1%
Riley	75,194	84,826	12.8%
Miami	32,822	36,978	12.7%

Source: Wichita State University, Center for Economic Development and Business Research

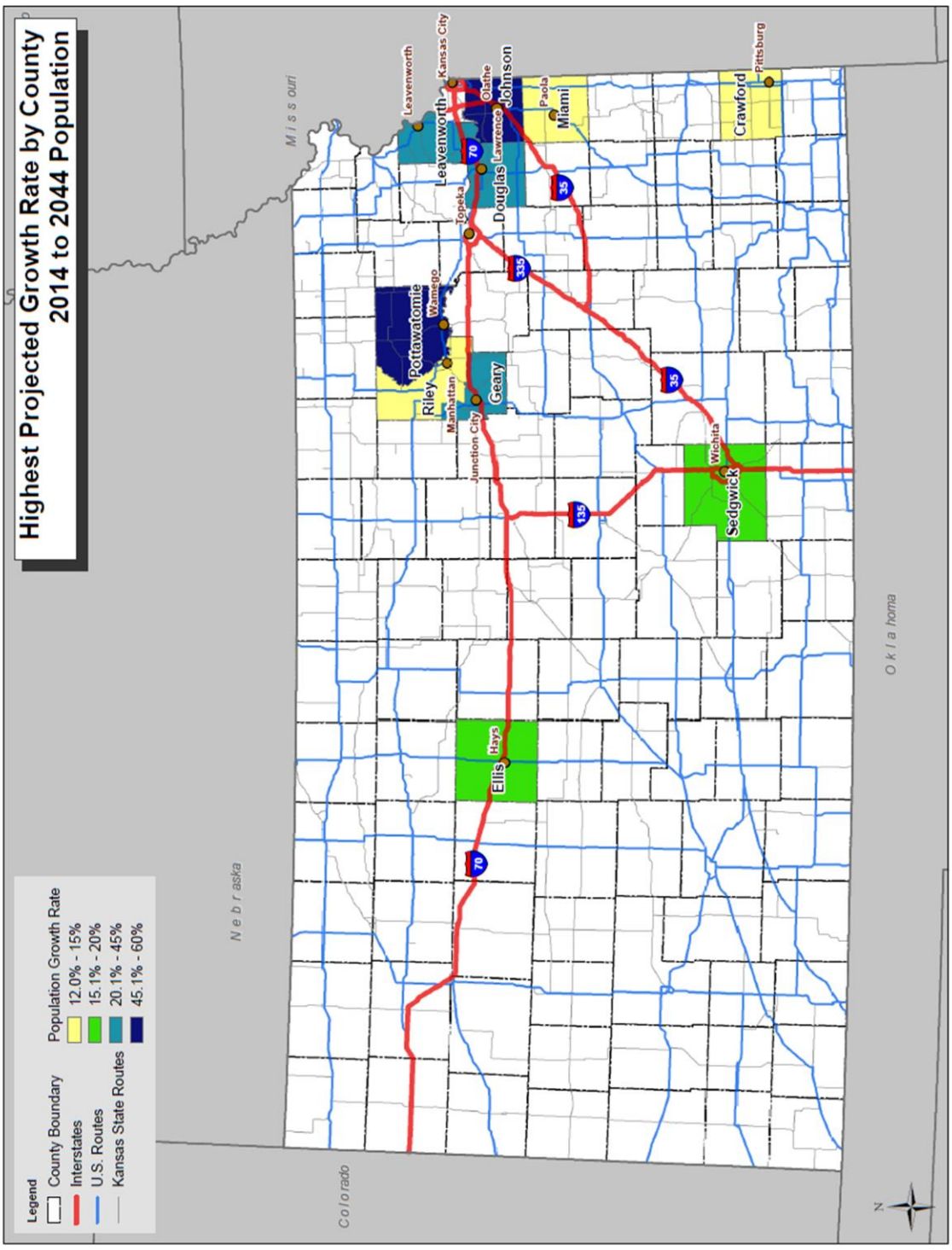


Figure 5.4: Highest Percent Population Increase 2014 – 2044

Source: CDM, based on Wichita State data

Kansas follows national trends where the majority of population growth is in and around urban counties. Only 10 additional counties show positive growth between 2014 and 2040, the rest are showing a population loss for the same time period. **Table 5.9** and **Figure 5.5** identifies the ten most populated counties in 2044.

Table 5.9: Highest Projected Population by County, 2014 to 2044

County	2014 Population	2044 Population	Percent Change 2014-2044
Johnson	574,272	904,305	57.5%
Sedgwick	508,803	601,711	18.3%
Shawnee	178,406	192,718	8.0%
Wyandotte	161,636	169,549	4.9%
Douglas	116,585	165,504	42.0%
Leavenworth	78,797	105,844	34.3%
Riley	75,194	84,826	12.8%
Butler	66,227	71,623	8.1%
Reno	63,794	56,577	-11.3%
Saline	55,755	56,012	0.5%

Source: Wichita State University, and Business Research Center for Economic Development

5.4.5 Logistical Challenges

Several logistical challenges face shippers in Kansas and throughout the Midwest:

- Fluctuations in fuel costs and lack of truck driver availability lead to shipping rates that vary, thus impacting the predictability of freight transportation costs and ultimately the cost of goods reaching market.
- Growing shortage of labor for trucking and water. 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 try to keep costs down and become more efficient.
- Availability of truck equipment is an issue facing shippers. Containers and chassis are in limited supply and coordinating equipment movement to be where it is needed is increasingly complicated.

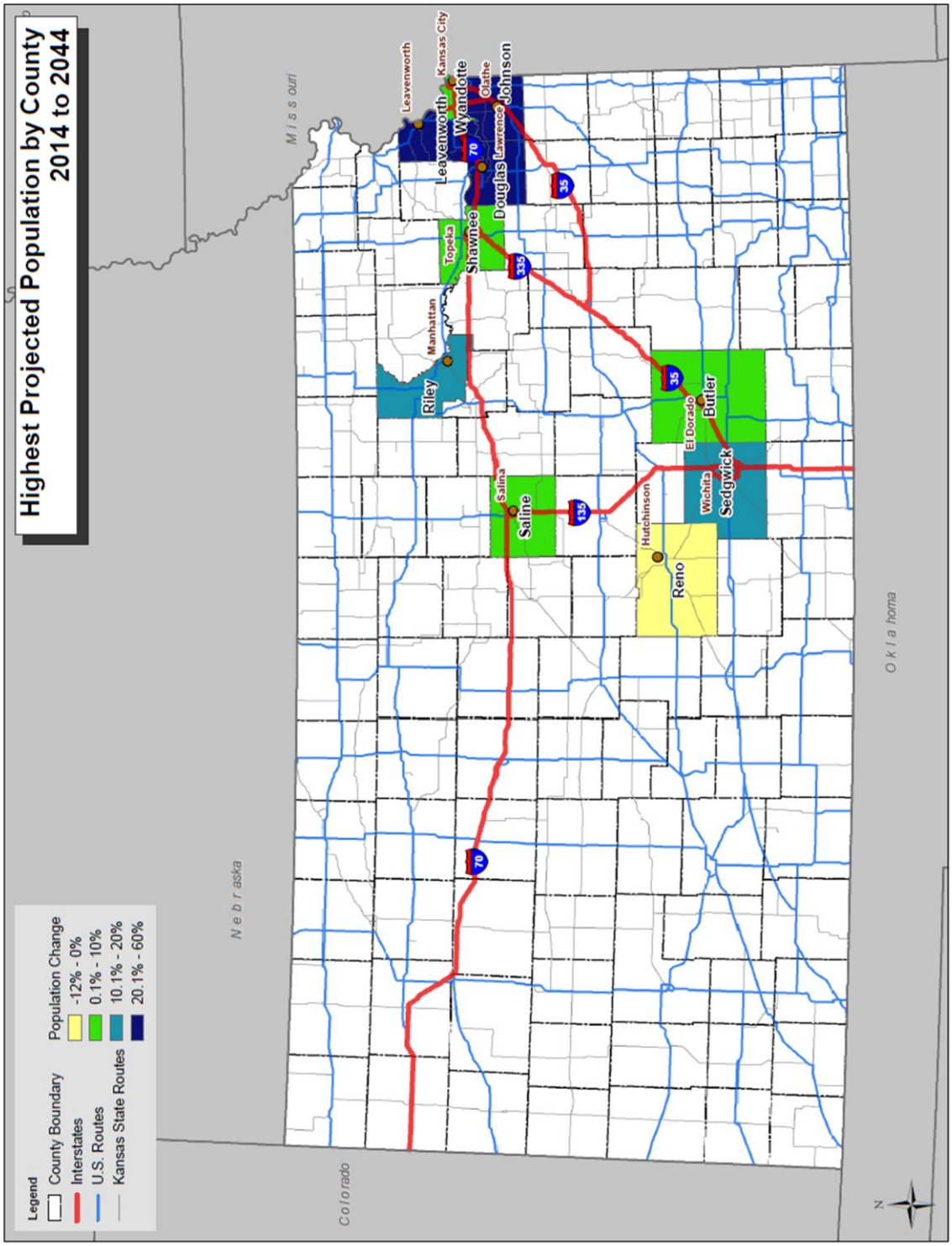


Figure 5.5: Highest Projected County Population 2044

5.5 Technology

Technology is often associated with advanced electronics, but more traditionally technology is broadly defined by the ways in which technical knowledge is interrelated with life, society and the environment.

5.5.1 Dedicated Truck Lanes

As freight volumes have dramatically increased across the U.S. during the past several decades, concepts for dedicated freight infrastructure, such as dedicated truck lanes have entered conversations in transportation. Dedicated truck lanes physically separate commercial vehicles from passenger vehicles or mixed traffic flows. In recent years, several states, including neighboring Missouri, have examined dedicated truck lane concepts. Existing examples of dedicated truck facilities tend to be short routes serving ports or key border crossings.

The concept of long-distance truck lanes is frequently tied to tolling as a means of raising revenue to support construction. The trucking industry is opposed to tolling truck lanes due to high administrative costs compared to traditional fuel taxes and reluctance of shoppers to reimburse carriers. While, a portion of Kansas interstates are currently part of the Kansas Turnpike, there is still a significant percentage that is not subject to tolls. Some dedicated truck lane concepts would also force trucks off infrastructure constructed in part with taxes and fees already paid by the industry. Benefits of dedicated truck lanes include significant safety gains, the potential of adopting new configurations and the possibility of advanced technologies falling under the umbrella of Intelligent Vehicle Initiatives (IVI). The potential for heavier trucks with more axles or longer combination vehicles (LCVs) have been proposed as one means of off-setting the costs of tolls often associated with dedicated truck facilities.

5.5.2 Autonomous Vehicle Technology

Autonomous (self-driving) vehicles are being tested in real world conditions and are closer to implementation than ever before. Connected vehicle platooning and autonomous trucks will dramatically change the freight industry.

The use of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication to platoon groups of vehicles is likely to be implemented as soon as next year. Sensor communication between vehicles will adjust the vehicle speed to prevent collisions. Freight and passenger vehicles will benefit from a reduction in congestion related to crashes, reduced operating costs, and more reliable travel times. Eleven states have approved demonstration trials for platooning trucks, while an additional 25 are considering it. One state, Michigan, has given the go ahead for commercial truck platoon use. Peloton Technology will deliver its V2V system package late this year to a small number of truck fleets. Peloton's V2V technology is similar to adaptive cruise control. The system is an integrated safety, efficiency, and analytics platform that builds on advanced safety technologies such as collision mitigation and adaptive cruise control systems, and uses short-range communication radio signals to transmit information between vehicles.[21] Drivers in each truck steer their vehicle, while cruise control systems adjust speed.

[21] Hall, Larry E. "V2V Semi Truck Platooning Coming At End Of This Year". January 4, 2017.

KDOT has instituted an internal Truck Platooning Committee with representation from a variety of bureaus and units within the agency and the Kansas Highway Patrol. The goals of the committee will be to research and better understand truck platooning and its benefits and challenges, identify potential test/demonstration corridors, identify potential statutory modifications that may need to be addressed, and educational efforts to explain what truck platooning is, and isn't, to state legislators and the traveling public.

The progression of steering technology is anticipated to eventually provide for a single driver in the lead vehicle and autonomous/driverless vehicles in two or three connected vehicles. This technology is available in the agriculture industry. Fendt GuideConnect is a system that connects two tractors via satellite navigation and radio communication to form one unit. One of the vehicles is unmanned and performs the same working procedure as the manned vehicle.[22]

These technologies can help address the freight industry challenges of driver shortages and potentially hours of service limitations. Additional benefits include operational savings and reduced number and severity of vehicle crashes.

The Texas A&M Transportation Institute (TTI) has been advancing the concept of an elevated structure dedicated solely to the transport of freight called the Freight Shuttle System (FSS). Autonomous transporters carry truck trailers or containers along an elevated guide way designed to be located along the median of an existing right-of-way, usually a freeway or highway.[23] A FSS could change the dynamic of short and medium-range freight shipments by reducing congestion and deterioration of roads, increasing import and export capacity, and easing the infrastructure burden on public tax dollars.

Likewise, the Rail Safety Improvement Act of 2008 mandates that Positive Train Control (PTC) be implemented across a significant portion of the nation's rail industry by December 31, 2018. PTC is advanced technology designed to automatically stop or slow a train before accidents occur. Three of the Class I railroads (BNSF, KCS and UP) in Kansas are on pace to complete PTC implementation by 2018, with only one railroad (NS) suggesting they will ask for the 24-month extension to 2020.

5.5.3 E-Commerce Delivery

E-Commerce in the U.S. increased from 0.6 percent of total retail activity in 1999, to 7.7 percent in the third quarter of 2016. The rapid increase of E-Commerce and related increase to direct home delivery has impacted the freight network. Similar to traditional retailers such as Wal-Mart and Target that have implemented a series of distribution warehouses as part of their supply chain management and to facilitate just-in-time delivery, e-retailers such as Amazon and eBay have constructed a series of centralized distribution centers. E-Commerce requires fast, on-time delivery, which is sensitive to both distance and congestion. These distribution centers help the E-Commerce retailers achieve next-day or even same day delivery for their products.

Common to this trend is the higher penetration of parcel delivery vehicles in to residential neighborhoods delivering products ordered online. According to the 2012 Commodity Flow Survey,

[22] DHL Trend Research. Self-Driving Vehicles in Logistics. 2014.

[23] "The Freight Shuttle System: A 21st Century Solution to Freight Transportation Challenges." Texas A&M Transportation Institute. Web. 5 Sep. 2013. <http://tti.tamu.edu/freight-shuttle/>.

the value of freight shipped by parcel, U.S. Postal Services, or courier, increased from 11.8 percent of total freight by value in 2002, to 12 percent in 2012. As residential deliveries increase, there is the potential for an increase in related congestion and wear and tear to the local road network as this form of freight traffic disperses from major arterial networks into local neighborhoods. The short temporary parking requirements of delivery vehicles will need to be considered as state and local governments implement "Complete Streets".

5.5.4 Energy

Natural gas, as compressed natural gas (CNG) and liquefied natural gas (LNG), is the fastest-growing fuel in the transportation sector, with an average annual growth rate of 11.9 percent from 2011 to 2040.[24] Heavy duty vehicles (HDVs)—which include tractor trailers, vocational vehicles, buses, and heavy-duty pickups and vans with a gross vehicle weight rating (GVWR) of 10,001 pounds or more—lead the growth in natural gas demand throughout the projection period.[25] However there is an initial high total cost to retrofit or replace existing equipment. If trucking companies elect to make the switch, they will first need public LNG fuel stations every 400 miles on major truck corridors before adopting alternative fuels for their fleets.

In November 2016, FHWA announced 55 routes that will serve as a basis for a national network of "alternative fuel" corridors spanning 35 states. The network is nearly 85,000 miles long, with more miles anticipated in the future to accommodate electric, hydrogen, propane and natural gas vehicles as additional fueling and charging stations are built. These fuels were designated by Congress in the FAST Act. Supporting lower-emission vehicles with a network for refueling will help reduce transportation emissions.[26] Kansas does not currently have any FHWA designated Alternative Fuel and Electric Charging Network routes. There is currently potential for designating I-70 and, in the future, I-35 and I-135.

5.5.5 Container-on-Barge

Port authorities, government agencies and shippers look to the feasibility of container-on-barge (COB) service to enhance existing truck and rail transport. COB is cost-effective for shippers in unit, operation and labor costs when compared to rail and truck. Potential obstacles to greater use of COB on the Missouri River include: readiness of ports, delivery requirements for ports to sustain service and inefficiencies in backhauling empty containers.

5.6 Identified Needs

The identified needs for each mode were compiled in light of the current and desired future conditions, input from KDOT and KTA, MPO conversions and planning documents, KFAC input, and results from the stakeholder interviews. KDOT strives to maintain a safe multimodal transportation network that provide shippers and receivers multiple freight options for the safe and efficient movement of goods through meeting the goals of the Kansas Statewide Freight Plan of:

[24] U.S. Energy Information Administration. Web June 20, 2014. http://www.eia.gov/forecasts

[25] U.S. Energy Information Administration. Web June 20, 2014. shttp://www.eia.gov/forecasts

[26] "Federal Highway Administration Unveils National 'Alternative Fuel Charging' Network." FHWA. Web. 8 Dec 2016. <https://www.fhwa.dot.gov/pressroom/fhwa1656.cfm>

- Improve the **mobility** of the freight system
- Improve the **safety** of the freight system
- Support **economic development**, trade, and commerce in Kansas
- Minimize the **environmental impacts** of the freight system

5.6.1 Highway

The identified highway transportation needs are:

- Improved freight movement through reducing bottlenecks in the Kansas City and Wichita areas.
- Improved rural freight movement through bypasses, adding/extending 4-lane corridors, and installing passing lanes.
- Safety improvements such as sufficient numbers of safe truck parking spots at rest areas, reduction in the number of at-grade rail crossings, and improved roadway design and geometrics.
- Implement open road tolling on the KTA.

5.6.2 Rail

The identified rail transportation needs are:

- Improving short line tracks to 286k pound weight capacity.
- Improvements to rail lines to address capacity issues.
- Improvements to at-grade rail crossings with negative incident trends.
- Taking into account clearance and width when replacing bridges over rail.
- Additional transload facilities, based on thorough analyses, to accommodate the transfer of freight between truck and rail.

5.6.3 Air

The identified air transportation needs are:

- The cargo facilities at Dwight D. Eisenhower Airport in Wichita need to be maintained to continue to be able to support large aircraft for freight purposes. In addition, the 2016 Aviation System Plan did not identify any airport access issues at Dwight D. Eisenhower Airport.

5.6.4 Water

The identified waterborne transportation needs are:

- Sufficient depth for navigation is needed in channels and at ports. This is achieved through additional dredging or through increased water releases from upstream dams.

5.6.5 Pipeline

- None Identified

5.6.6 Intermodal

The identified intermodal needs are:

- The need for intermodal connection points are needed in central and western Kansas. The new transload facilities in Great Bend and Garden City will help to meet this need in the future. KDOT will analyze potential programs to address the transload facility needs that is described in further detail in Chapter 6.
- Although not a current issue, maintaining adequate first and last mile intermodal connections.

5.7 Funding

While some resources have been limited, freight transportation needs continue to grow. Dedicated freight funding through the federal Fixing America's Surface Transportation Act (FAST Act), as well as federal grant programs such as the Infrastructure for Rebuilding America (INFRA) and Transportation Investment Generating Economic Recovery (TIGER) provide funding opportunities to address multimodal freight infrastructure improvement needs.

KDOT is constantly seeking out opportunities to leverage funds to improve the multimodal transportation network throughout Kansas. As an example, KDOT is preparing two INFRA Grants with Class III railroads due in early November 2017. The two projects applying for grant funding are described below:

KYLE Railroad Rural Kansas Connectivity Project

The Rural Kansas Connectivity Project will strengthen and improve 207 bridges spanning over 500 miles of track in Kansas and Colorado. Funding made possible through an INFRA grant will allow KYLE Railroad customers to ship in the industry standard 286,000-pound railcar. Currently these customers are forced to use 268,000-pound railcars due to the condition of the bridges along this line. Gaining new transportation efficiencies through higher capacity railcars is critical for Kansas farmers and elevators who rely on affordable and competitive rail transportation to move their goods to marker. The total cost of the project is estimated at $9,223,498.

5.8 Conclusions

The purpose of identifying needs as seen through the lens of the identified strengths and challenges of Kansas' transportation system, the future forecast of freight in the state and other emerging trends is to better inform the decision-making process as it pertains to the safe and efficient movement of freight across the state's multimodal freight network. 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

Stakeholder Engagement

6.1 Introduction

Numerous freight stakeholders were involved in helping KDOT create the Kansas State Freight Plan. Stakeholder engagement began prior to the start of the development of the freight plan and continued throughout the process. Active participation and professional dialogue were characteristic of the many carriers, logistics, distribution and shipping managers, economic development professionals, and leaders in private industry. Those that use the system most provided their perspectives on the conditions, issues, and needs of the multimodal freight network.

The goals of the stakeholder outreach program were to:

- Better understand what the costs are to Kansas' economy if the freight network stagnates or deteriorates.
- Articulate what freight projects would be most helpful if additional funds become available.
- Collect opinions on how to leverage freight mobility to provide conditions for businesses and communities to be more competitive – whether through improvement projects or policy changes.

Throughout the process KDOT engaged key freight stakeholders via surveys, interviews, forums, and direct/grassroots outreach throughout the State. All activities were guided by the Kansas Freight Advisory Committee made up of key stakeholders and KDOT leadership.

Figure 6.1 summarizes stakeholder outreach participation.

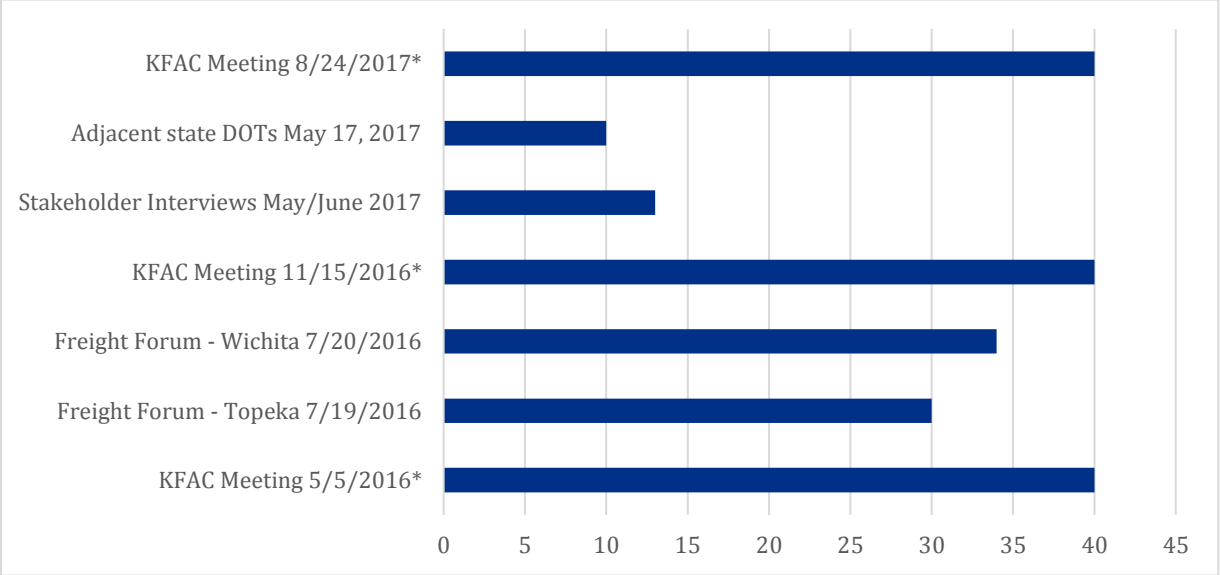
KDOT used stakeholder input during the process to develop a plan well-vetted by Kansans who are the most involved and affected by the freight multimodal network for transport of their goods, whether they are inbound materials for manufacturing or outbound finished products and agricultural commodities. The purpose of these open dialogues with key stakeholders was to gather input on stakeholders' priorities as well as inform them on plan progress.

Stakeholders provided input on:

- An inventory of freight assets and assessment of needs.
- What Kansas needs to do to be competitive and attract economic development and support existing businesses.
- A defined State multimodal freight network.
- Weighted freight goals and priorities that line up with goals of the State's last long-range planning effort.

- A list of prioritized investments and a project list based on the weighted goals and priorities from stakeholders.

Figure 6.1: Public Outreach Participants



** Approximate attendance*

6.2 Guiding the Plan: How Stakeholders Provided Input

Freight stakeholders provided valuable input and helped guide KDOT during the entire development of the plan, by:

- Initially updating existing contact lists that included key stakeholders that were engaged and kept informed of activities related to the process. Those lists were maintained and updated throughout the plan update process.
- **Stakeholder interviews** of adjacent state DOTs and rail stakeholders were conducted to enrich KDOT's understanding of the stakeholder's perception of rail and freight issues and needs throughout the state. A total of 13 agencies and firms participated in various conference calls. The interview questions are in Appendix D and their insights are summarized below in Section 6.4: Listening to Kansans: What KDOT Heard.
- The **Kansas Freight Advisory Committee (KFAC)** is made up of freight and State leaders and select members of KDOT leadership. The committee, representing a diverse group of freight interests, convened three times during the plan update process (May 2016, November 2016, and August 2017) to provide feedback, review materials, and help connect KDOT to other stakeholders. A full listing of KFAC members is available in Appendix E. The KFAC was organized in early 2014 and serves as a private sector partner to KDOT. The Kansas Freight Advisory Committee advises and assists the Kansas Department of Transportation and the Kansas Turnpike Authority with identifying freight transportation issues, priority highway and rail freight corridors of significance, and identification of multimodal freight infrastructure improvement needs. The Committee advocates for a

seamless multimodal freight transportation system for the efficient and safe movement of Kansas products throughout the state, region, nation and around the globe.

- **District Forums** that brought together a number of key stakeholders from across the State to discuss the Freight Plan with KDOT. Two freight forums were held to ensure KDOT understood the perception of needs, trends and issues about freight. The forums were held on July 19, 2016 at the KDOT District 1 Office in Topeka and on July 20, 2016 at City Hall in Wichita. Over 60 stakeholders attended the forums and provided valuable feedback to the Freight Plan efforts regarding needs, issues and trends.

6.3 Comment Period Process

The draft State Freight Plan was made available for public comment from September 21, 2017 to October 20, 2017. A total of two comments were received. Both comments were related to the length of time roadway were blocked by trains.

6.4 Listening to Kansans: What KDOT Heard

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

6.4.1 Consistent Statewide Themes

Reoccurring themes—throughout the State and regionally—emerged during stakeholder outreach. These themes include:

- Kansas enjoys a centralized geographic location that helps to attract and grow foreign-owned businesses.
- The Kansas rail network is efficient and has good interchanges between Class I and short line railroads.
- The interstate highway system, including the Kansas Turnpike, is well designed and most of the State's population is located within 30 miles of the major north/south and east/west routes.
- The freight network has the flexibility to move exports to the west coast or Gulf coast.
- Lack of congestion problems.
- Southeast Kansas has access to an inland waterway system via the Port of Catoosa in Tulsa.
- Kansas has overall good air cargo access.
- The Kansas City Logistics Park in Edgerton has good capacity and access.
- There is a significant natural gas and oil pipeline network in Kansas.
- ITS systems associated with KC Scout and WICHway are effective.

6.4.2 Needs, Issue, Concerns

Specific needs, issues, and concerns were also identified:

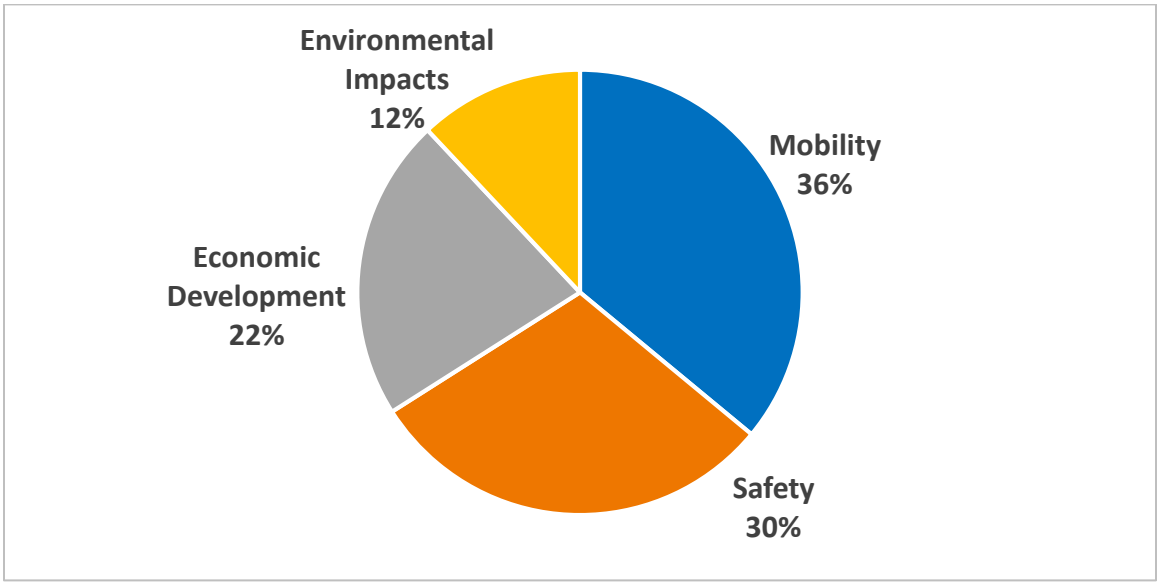
Freight

- Better coordination with surrounding states on oversize and overweight (OSOW) truck loads and routing needs.
- Routing OSOW loads on K-99 is challenging due to highway geometrics.
- There's a need to improve bridge condition, clearance heights, and overall road base on the Kansas Turnpike.
- Port (e.g., water and air) access efficiency is important.
- Desire for more transload facilities, especially in west and central Kansas.
- Strengthen ITS to link freight movement and separate trucks from general traffic.
- Strengthen pool of KDOT funds for local projects that support freight movement.
- KDOT online permitting working very well.
- More truck passing lanes on rural highways west of Emporia/Salina.
- Local governments are having a hard time meeting their financial match and would like to see more grant programs.
- Western Kansas and movement of livestock along with size and weight harmonization amongst other states that don't monitor truck weights puts Kansas shippers at a disadvantage.
- General lack of efficient north/south freight corridors.
- Improve/eliminate selected existing at-grade rail crossings.
- Moving agricultural products in most efficient means possible.
- Additional funding for short line railroads.

6.4.3 Project Prioritization Process

During the second KFAC meeting, stakeholders were asked to set weighted criteria for identifying high priority projects using an apportionment of 100 points total. The criteria included mobility, safety, economic development, and environmental impacts. Mobility ranked highest with a score of 36, followed by safety with a score of 30, economic development with a score of 22, and environmental impacts with a score of 12. (**Figure 6.2**)

Figure 6.2: KFAC Recommended Project Prioritization Weighting



Within the **mobility criteria,** the following factors were ranked highest for prioritizing potential projects:

- Improving intermodal and transload freight facilities to support increased multimodal traffic;
- Addressing freight bottlenecks;
- Improving system capacity;
- Improving connections to major freight generators and high growth target industries; and
- Maintaining existing facilities.

Within the **safety criteria,** the following factors were ranked highest:

- Improving conditions at high crash locations;
- Addressing rail-highway safety issues;
- Addressing geometric/shoulder issues; and
- Providing ITS or other technological solutions.

Within the **economic development** criteria, the following factors were ranked highest:

- Projects supporting business expansion or new business development for a new or existing company;
- Improving multimodal connections to freight generators, industrial parks or similar facilities in economically distressed counties; and
- Projects supporting expansion, retention or new business for Kansas Department of Commerce targeted industries.

Within the **environmental impacts** criteria, the following factors were ranked highest:

- Enhancing opportunities for Environmental Justice communities; and
- Providing opportunities to reduce impacts to air and water quality.

In addition, a scenario planning exercise was conducted at the second KFAC meeting. The scenarios centered around four themes: The Hungry World, the Global Market, Convenient Living and Technology Overlay. Discussion of these themes focused around how Kansas could leverage its strengths depending on the potential future scenario.

6.5 Forming Partnerships and Moving Forward

Upon adoption of the Kansas State Freight Plan, KDOT will continue to build upon relationships formed and enhanced during the Freight Plan process. Transportation funding is limited. However, there is a commitment that this Freight Plan will be implemented. KDOT will develop a process to prioritize and actively manage, monitor and measure the implementation of the policies, programs and projects recommended within this plan. Consideration for the timing of these efforts, i.e. short-term and long-term, and the funding and financing options will weigh heavily on how and when implementation is most effective. A complete listing of strategic recommendations from the Freight Plan is covered in Chapter 7.

6.6 Lessons Learned

Through drafting and vetting this Freight Plan, stakeholders communicated and reaffirmed some lessons for KDOT on how best to communicate with them, engage additional stakeholders, and identify high level concepts that should be considered when discussing freight in Kansas.

- 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.
- Stakeholder input was integral in the development of the Kansas 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.
- 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 voiced concerns about growing needs and limited resources for transportation.
- Freight Stakeholders' top concerns aligned with the state's freight goals.

Chapter 7

Freight Policies, Strategies and Institutions

7.1 Introduction

To develop implementable strategies that will support Kansas' freight transportation system for years to come, it is important to understand the policy environment in which the Kansas 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 the implementation of strategies to improve Kansas' multimodal freight transportation system.

7.2 Context for Policy Making

Kansas' economic future relies on the ability of the multimodal transportation system to support an increasingly complex supply chain. Recognizing this, the Kansas Department of Transportation (KDOT) is focused on improving the multimodal freight transportation system. The Kansas Statewide Freight Plan is designed to support this effort to build a freight network that will support Kansas' future multimodal freight flows, last mile connections and economic development potential.

KDOT strives to maintain a safe transportation network that offers multiple freight options for the safe and efficient movement of goods. 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 KDOT's partners in the freight transportation system. Providing context for the current policy environment will lay the groundwork for identifying strategic steps KDOT can take to achieve its goals and objectives. To do this, KDOT's policy actions need to consider Kansas' Long Range Transportation Plan, the National freight policy goals, and performance measures. **Table 1.1** shows the relationship between KDOT's goals and the National freight policy goals.

7.2.1 Long Range Transportation Plan Goals

In 2008, Kansas' Long Range Transportation Plan established a practical vision of how to maintain and improve Kansas' transportation system. It is based on a year-long dialogue with more than 120 Kansans representing many different groups that share a common interest in transportation. The strong opinions stakeholders voiced about the state's transportation system and its future had three themes or guiding principles. The guiding principles are:

- **Preserve the transportation system** – protect the state's investment in its transportation infrastructure.
- **Make travel safer** – work with stakeholders and the public to make state highways and local roads safer and to diligently promote safe driving.

- **Support economic growth** – the approach to transportation must be more flexible and responsive, and Kansas must be ready to make strategic investment choices among various transportation modes. These choices must assist the wise investment of limited resources.

7.2.2 National Freight Policy Goals

In December 2015, the Fixing America's Surface Transportation (FAST) Act was signed into law. The FAST Act replaced the previous transportation authorization and funding bill, Moving Ahead for Progress in the 21st Century (MAP-21) Act. The FAST Act maintains a focus on safety, keeps intact the established structure of the various highway-related programs managed by the Federal Highway Administration (FHWA), continues efforts to streamline project delivery and, for the first time, provides a dedicated source of federal dollars for freight projects. The bill places major emphasis on freight investments to be supported by the Highway Trust Fund by creating a new National Highway Freight Program (NHFP). The FAST Act outlined nine National Multimodal Freight Policy Goals. These nine goals are:

- To identify infrastructure improvements, policies, and operational innovations that:
  - Strengthen the contribution of the National Multimodal Freight Network (NMFN) (consisting of the National Highway Freight Network (NHFN); freight rail systems of Class I railroads; U.S. public ports that have total annual foreign and domestic trade of at least 2 million short tons; U.S. inland and intracoastal waterways; the Great Lakes, the St. Lawrence Seaway, and coastal and ocean domestic freight routes; the 50 U.S. airports with the highest annual landed weight; and other strategic freight assets, including strategic intermodal facilities and other freight rail lines) to the economic competitiveness of the United States;
  - Reduce congestion and eliminate bottlenecks on the NMFN; and
  - Increase productivity, particularly for domestic industries and businesses that create high-value jobs.
- To improve the safety, security, efficiency, and resiliency of multimodal freight transportation.
- To achieve and maintain a state of good repair on the NMFN.
- To use innovation and advanced technology to improve the safety, efficiency, and reliability of the NMFN.
- To improve the economic efficiency and productivity of the NMFN.
- To improve the reliability of freight transportation.
- To improve the short- and long-distance movement of goods that:
  - Travel across rural areas between population centers,
  - Travel between rural areas and population centers, and
  - Travel from the Nation's ports, airports, and gateways to the NMFN.

- To 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.
- To reduce the adverse environmental impacts of freight movement on the NMFN.
- To pursue the goals described in a manner that is not burdensome to State and local governments.

The FAST Act requires that state freight plans provide a description of how the plan will improve the ability of the State to meet the National Multimodal Freight Policy Goals.

7.2.3 Performance Measures

Performance measures are an important way to monitor progress towards achieving the goals of the Kansas Statewide Freight Plan. Likewise, performance measures can be an effective means of communicating future freight needs to decision-makers and stakeholders. KDOT already collects a wide breath of data that could be assembled into freight-specific performance measures to track progress towards national policy goals. The recommended performance measures are below.

- Safety
  - Truck involved crashes (Figure 4.10)
  - Truck involved fatalities and serious injuries (Figure 4.10)
  - Rail at-grade crossing incidents (Federal Rail Administration data)
- Mobility/Economic Vitality/Environment – Baselines to be determined
  - Uncongested Interstate System Miles
  - Truck Travel Time Reliability on Interstate
- Mobility/Economic Vitality
  - Pavement Condition (see Figure 4.1)
  - Bridge Condition (Figures 4.2 through 4.5)
  - Percent short line rail miles at 286,000 lb. (Figure 4.13)

7.3 Critical Partnerships for Success

KDOT's future success as a national freight leader will be the continuation of using partnerships to drive the development of the State's overall transportation system. HB 2234 "merged" KDOT and the Kansas Turnpike Authority (KTA) as organizational partners. While each organization operates as a separate entity, there are various freight transportation issues/challenges as well as opportunities that affect both and the two organizations work together on them.

One such partnership example is KDOT and KTA work together on is the Kansas Freight Advisory Committee (KFAC). KDOT has established a solid basis for freight modal partnerships with the establishment of the KFAC. The KFAC was established in 2014 to advise and assist KDOT and KTA with identifying freight transportation issues, priority highway and rail freight corridors of significance, and identification of multimodal freight infrastructure improvement needs. The KFAC advocates for a seamless multimodal freight transportation system for the efficient and safe movement of Kansas products throughout the state, region, nation, and around the globe. Many of its members are discussed in the following sections.

7.3.1 Modal Partners

KDOT's modal partners manage airports, freight railroads (Class I, short lines and switching), pipelines, water ports, and inland waterways. Transportation professionals, who specialize in 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.

7.3.1.1 Airports

The Kansas aviation system includes 137 public use and seven commercial airports. These commercial airports include Wichita's Dwight D. Eisenhower National Airport, which handled about 21.3 million pounds of air freight in 2015.[27] While air freight accounts for only a small portion of freight movements in Kansas, each airport authority is still a vital stakeholder and partner in the development of air cargo facilities and the infrastructure required to support this freight mode. Improvements to freight significant airports are largely funded through the Aviation Trust Fund and from landing fees at the individual airports.

7.3.1.2 Freight Railroads

Kansas is served by a comprehensive rail network comprising a total of 4,216 route miles. There are four Class I railroads operating a total of 2,723 miles in Kansas: BNSF Railway, Kansas City Southern Railway, Norfolk Southern Railway, and the Union Pacific Railroad. Local and switching/terminal railroads provide critical connections to local industries that might not receive service from the larger Class I railroads. Kansas' railroads serve an important role in the State's ability to be responsive to future freight growth. A network of 11 short line railroads, operating 1,493 miles of track, provide service to rural agricultural areas of the state and keeps this key Kansas economic sector connected to the Class I national rail network.

All railroads that traverse Kansas are private companies. As such, most of the capital investment made in terms of new, upgraded, and properly maintained infrastructure is funded by the railroads themselves and must be aligned with their individual business goals and market priorities. However, it is important to note that there has been increasing public investment across the nation to enhance safety at highway/rail grade crossings, alleviate major chokepoints and develop corridors for intermodal container transport.

7.3.1.3 Pipelines

Much like railroads, pipelines are privately owned and not regulated by KDOT. Pipelines are a critical piece of the Kansas freight system and are regulated primarily at the federal level by the Pipeline and Hazardous Materials Safety Administration (PHMSA). Approximately 25,500 miles of pipelines move natural gas, crude oil, petroleum products, highly volatile liquids, and carbon dioxide (CO_2) throughout Kansas. Pipelines are privately held infrastructure, but because of their importance to the national economy there are opportunities to receive federal assistance for the construction of new pipelines, such as loan guarantees from U.S. Department of Energy.

[27] United States Department of Transportation, Bureau of Transportation Statistics T-100 Segment data. Retrieved January 25, 2017 from http://www.transtats.bts.gov/Fields.asp?Table_ID=293.

7.3.1.4 Water Ports

While Kansas' ports/docks currently play a small role in the overall movement of freight through the State they are an important connection to the Missouri River that runs along Kansas' northeastern boundary. Greater use of barges provides would provide an inexpensive and environmentally friendly way to move heavy basic commodities such as agricultural commodities (grains, fertilizers, etc.), gravel and stone. As freight volumes continue to increase and traditional freight transportation modes begin to exceed capacity, the incorporation of commodity movement through ports on the Missouri River will need to be investigated as a water-based modal alternative.

7.3.1.5 Inland Waterways

The U.S. Army Corps of Engineers (USACE) is responsible for maintaining the navigability, channel, and lock and dam system along the Missouri River. The USACE Northwestern division leads improvements in and maintenance of the locks and dams as well as performs dredging and other solutions to sedimentation problems to maintain the channel and harbors at public ports. While the Inland Waterway system is maintained by the 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 one marine highway on the Missouri River that is adjacent to Kansas, M-29. 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.

7.3.1.6 Intermodal

In addition to the modal partners described above, there are several intermodal and transload facilities across the State. The operators of these facilities provide a key link in supply chains and are important partners to KDOT as they serve a wide variety of freight needs across Kansas. In addition to existing facilities in the state like the BNSF Logistics Park KC, KDOT has worked with local units of government and private sector freight partners to develop transload facilities in less densely populated areas of Kansas. Transload sites are located in Great Bend and Garden City.

7.3.2 Organizational Partners

KDOT's organizational partners include metropolitan planning organizations, economic development organizations, local chambers of commerce and other State agencies.

7.3.2.1 Metropolitan Planning Organizations

KDOT has a long history of working with Metropolitan Planning Organizations (MPOs) to plan transportation improvements. 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. Kansas has six MPOs:

- Mid-America Regional Council [Kansas City Area] (MARC)
- Lawrence-Douglas County Metropolitan Planning Organization
- Wichita Area Metropolitan Planning Organization (WAMPO)

- Topeka-Shawnee County Metropolitan Topeka Planning Organization
- St. Joseph Area Transportation Study Organization (Elwood, KS Area)
- Flint Hills Metropolitan Planning Organization (Manhattan/Junction City Corridor)

As federal legislation, particularly MAP-21 and the FAST Act, has placed a greater emphasis on freight as an integral part of transportation planning, the importance of freight planning at the MPO level as increased. This can be seen through the creation of specific committees formed by MPOs to focus on freight, such as MARC's Goods Movement Committee and WAMPO's Goods Movement Freight Roundtable.

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. Kansas has two TMAs, Mid-America Regional Council and Wichita Area Metropolitan Planning Organization. TMAs have the added challenge of balancing freight needs with air quality concerns. Freight moving through TMAs should at least consider modes with less emissions. Freight bottlenecks have the added urgency of more emissions per vehicle than more commute-related bottlenecks.

7.3.2.2 Economic Development Organizations

The Kansas Department of Commerce (KDOC) assists private companies in identifying locations and financial incentive structures to attract, retain, and expand targeted industries in Kansas. The Department of Commerce has identified five targeted industries in which to strengthen efforts to grow the business presence of. These five targeted industries are:

- Alternative Energy
- Distribution
- Bioscience
- Advanced Manufacturing
- Value-Added Agriculture and Food Processing[28]

In addition to the Department of Commerce, several other economic development organizations work to improve the State's economy and grow the workforce. One of these organizations is the Kansas Chamber of Commerce. The Chamber is a member driven organization that provides representation before the Kansas legislature and offers tools to help businesses grow. This also includes numerous local and county economic development organizations, local chambers of commerce, and other regional organizations that promote business and job growth opportunities across the state.

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.

[28] Kansas Department of Commerce, Target Industries. Retrieved March 10, 2017. http://www.kansascommerce.com/index.aspx?nid=451.

7.3.2.3 Other State Agencies

The Kansas Division of Emergency Management is responsible for planning and training related to both natural and man-made disasters and emergencies, including transportation logistics during such events. They work with county emergency management agencies to prepare for and coordinate response to disasters.

Troop I of the Kansas Highway Patrol is responsible for the Motor Carrier Inspectors (MCIs) and the Motor Carrier Safety Assistance Program (MCSAP). "There are two types of MCIs; fixed weigh station personnel and mobile units. All MCIs inspect for and enforce state and federal weight statues and regulations. MCSAP troopers inspect commercial vehicles and drivers to decrease potential fatalities, injuries, and property damage."[29] There are currently eight fixed-scale weigh stations in the State.

7.3.3 Professional Organizations

Transportation-related professional organizations in Kansas, including those specifically related to freight transportation such as the Kansas Grain and Feed Association, the Kansas Motor Carriers Association, Kansas Livestock Association, and the Kansas Independent Oil and Gas Association, provide important professional training, information, and assistance to the freight transportation industry in the State.

The members of these organizations provide important insight into the state of freight transportation in Kansas as they are members of the Kansas Freight Advisory Committee and provide a variety of data inputs to KDOT on an ongoing basis.

7.3.4 Multijurisdictional Partnerships

Kansas is a connector state, which means much of freight moving across the State's transportation networks is pass-through traffic. As such, KDOT participates in many multijurisdictional partnerships to support Kansas' multimodal freight system.

One of these multijurisdictional partnerships KDOT is a member of is the Mid-America Freight Coalition (MAFC), the freight arm of the Mid-America Association of State Transportation Officials (MAASTO). 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. Additionally, KDOT participates in the American Association of Transportation Officials (AASHTO) and various AASHTO committees such as the Subcommittee on Highway Transport (SCOHT), Motor Carrier Committee (MCC), Special Committee on Freight (SCOF) and the Standing Committee on Rail Transportation (SCORT).

In addition, Kansas, in partnership with Indiana, Iowa, Kentucky, Michigan, Minnesota, Ohio, and Wisconsin is developing a multi-state Regional Truck Parking Information and Management System (TPIMS). The project is funded through a $31 million TIGER grant and matching state funds. The Regional TPIMS is envisioned to be a network of safe, convenient parking areas with the ability to collect and broadcast real-time parking availability to drivers through a variety of media outlets

[29] http://www.kansashighwaypatrol.org/154/Troop-I

including dynamic signs, smart phone applications, and traveler information websites. This will help drivers proactively plan their routes and make safer, smarter parking decisions.

KDOT also interacts with surrounding states FACs and has attended an Iowa DOT FAC meeting.

7.4 Project Selection and Funding

Each KDOT District is responsible for maintaining the Interstate and State highway network in its jurisdiction. Specific selection processes vary by program, but most needs are at least initially identified at the District or local level, in consultation with localities and MPOs as necessary. Project lists are sometimes collated and prioritized at the statewide level by KDOT headquarters. In any case, regional priorities, potential economic impact, and traditional engineering factors are all considered. Project delivery is typically handled by the Districts. Overall, this process has been effective, especially since freight projects tend to score well on factors related to job creation and economic development.

As demand on the multimodal freight system will continue to grow and available resources may be limited. Dedicated freight funding through the federal Fixing America's Surface Transportation Act (FAST Act), as well as federal grant programs such as the Infrastructure for Rebuilding America (INFRA) and Transportation Investment Generating Economic Recovery (TIGER) provide funding opportunities to address multimodal freight infrastructure improvement needs.

7.4.1 Kansas State Highway Fund

The Kansas State Highway Fund collects revenues from the state sales tax, state motor fuels tax, federal funding, vehicle registration fees, and certain other charges such as driver's license fees and special vehicle permits. These funds can be used to pay for highway projects and other supporting activities.

7.4.2 State Rail Service Improvement Fund

The State Rail Service Improvement Fund (SRSIF) provides a combination of loans and reimbursement grants, along with a recipient match, for projects that improve the condition or expand the capacity of short line railroads operating in Kansas, or help to recruit or expand business within the State by providing better access to the rail network. Eligible projects include major rail rehabilitation projects as well as capacity improvements such as new rail spurs, sidings, or extensions. The program provides $5 million annually that is used in the form of low-interest loans and reimbursable grants for rail improvements projects.

7.4.3 Highway/Railroad Crossing Program Safety Funds

KDOT administers both state and federal funding programs that address grade crossing safety issues. The federal-aid program selects rail grade crossings for potential improvements based on a "hazard index" formula that accounts for highway and train traffic as well as existing warning devices. The federal-aid program can fund up to 100 percent of the cost of an improvement, although state and/or local participation is frequently required. There is also a state-funded highway/railroad crossing program that provides funding for crossings that don't meet the federal-aid program eligibility requirements.

Finally, KDOT provides some funding for at-grade highway/railroad crossing approaches and surface upgrades on rural State Highways with local or railroad match required.

7.4.4 KDOT Economic Development Program

The Kansas Legislature passed Transportation Works for Kansas (T-WORKS) in May 2010. T-WORKS is a 10-year, $8 billion transportation program designed to preserve critical infrastructure, create jobs, provide more flexible multimodal funding, and promote economic development. T-WORKS expanded this program to include all modes (not just highways), increased funding to $10 million per year from $7 million, and promoted quick decision making for KDOT (within 30 days) to allow communities to take advantage of time-limited opportunities. This program provides KDOT with an additional tool to fund freight-beneficial projects.

7.4.5 Federal Funding

In December 2015, President Obama signed the FAST Act into law. It was the first long-term federal surface transportation spending bill enacted in more than a decade.[30] The FAST Act is a five year, $305 billion bill that reauthorized key federal transportation programs and, for the first time ever, provided a dedicated source of federal funding for freight projects. This funding is provided through two new programs: the NHFP, a formula apportionment granted to each state based on their total fiscal year 2015 highway funding apportionment; and a new discretionary program called Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) Grants. In 2017, the FASTLANE Grant program was renamed Infrastructure For Rebuilding America (INFRA) and included some application criteria changes. There is matching funding required for both the NHFP and INFRA grant programs.

While this was certainly a positive development in terms of implementing freight projects, available funding is still limited in key ways:

- **Multimodal funding –** Although both the formula and discretionary FAST Act funds may be used for non-highway freight modes, such usage is rather limited by the law. Of the formula freight funds that a state receives, only up to 10 percent may be used on non-highway projects. In Kansas, this amounts to about $6 million out of the state's total apportionment of $60.5 million over the five-year duration of the FAST Act. Meanwhile the discretionary FASTLANE program provides $4.5 billion over five years for merit-based projects, however non-highway projects are limited to $500 million over five years, for the entire nation.
- **Qualifying mileage for highway freight dollars is limited –** Dedicated formula freight highway funds are only available for projects located on the NHFN, which consists of:
  - The FHWA-defined Primary Highway Freight Network (PHFN, defined under the previous federal transportation authorization);
  - Any Interstate segments not already identified on the PHFN; and
  - Critical Urban Freight Corridors (CUFCs) and Critical Rural Freight Corridors (CRFCs), which are designated by state DOTs and the MPOs within the state. In Kansas, these corridors are limited to 75 miles for CUFCs and 150 miles for CRFCs, statewide.

[30] The previous authorization, MAP-21, was a two-year bill.

Thus, the eligible highways in Kansas are limited to the state's Interstate system plus corridors that are designated as CUFCs or CRFCs by this plan. In all, Kansas has a total of about 1,105 miles statewide to invest their highway freight dollars. This potentially could leave out facilities that don't meet these criteria but are still critical to freight movement in the state.

Figure 7.1 shows the Kansas portion of the NHFN, minus the CUFCs and CRFCs. **Figure 7.2** shows the KDOT-designated Freight Corridors of Significance. Although the Interstate highways are on both networks, KDOT's primary and secondary freight corridors are not on the NHFN, and the available mileage is insufficient to include all of them.

7.5 Complexity in Freight Planning

Freight planning is a complex activity and requires the involvement of multiple bureaus and agencies throughout KDOT as well as with key private stakeholders in the freight community such as the Class I railroads. Freight movement often crosses multiple jurisdictional boundaries, so KDOT must develop and implement policies, with input and corroboration from MPOs and local units of government, that support a multimodal system that encompasses various entities throughout the state. There are also statutory limitations on state funding for non-highway freight modes. Meanwhile, freight volumes to, from, within, and through the state continue to grow.

KDOT handles a variety of freight-related tasks:

- Administering the State Rail Service Improvement Fund (SRSIF);
- Freight data assimilation and analysis;
- Involvement with various regional and national multimodal freight committees and subcommittees;
- Preparing freight planning documents such as the State Rail Plan and Statewide Multimodal Freight Plan;
- Coordinating state policy on multimodal freight and rail issues, including the activities of the KFAC;
- Implementing programs related to commercial vehicle operations (CVO), including oversize/overweight (OSOW) vehicle permitting and routing, and Kansas's participation in the multi-state Truck Parking Information Management System (TPIMS);
- Administering the state rail crossing safety program; and
- Administering the KDOT Transload Initiative, which provides funding to help develop new transload facilities in Kansas.

KDOT has a long history of partnerships with public and private freight stakeholders around the state, making it a natural leader to help the state meet the challenges ahead. To that end, this Kansas Statewide Freight Plan establishes several key strategic recommendations for KDOT.

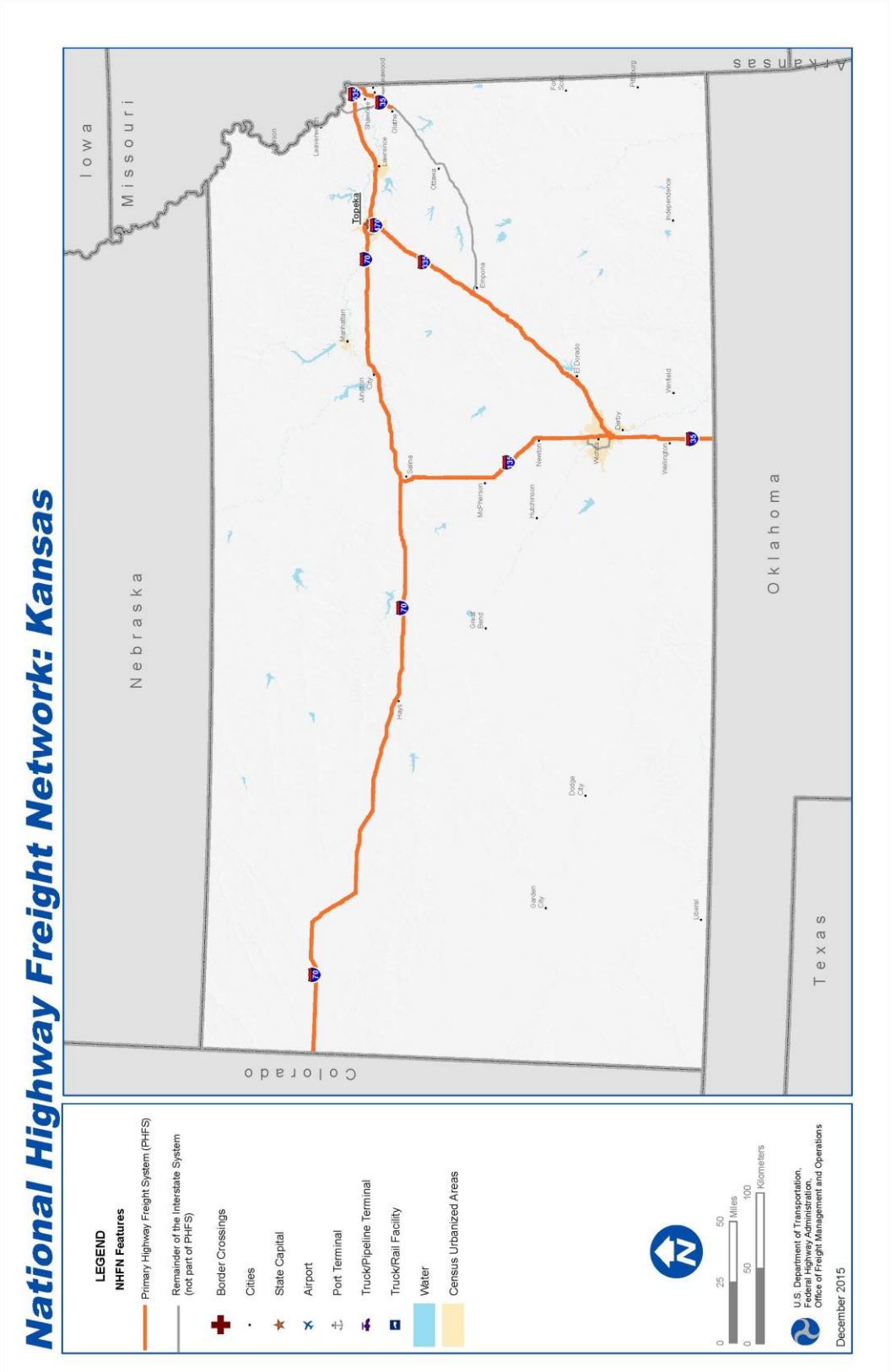


Figure 7.1: National Highway Freight Network in Kansas

Note: Map does not show CUFCs and CRFCs.
Source: FHWA.

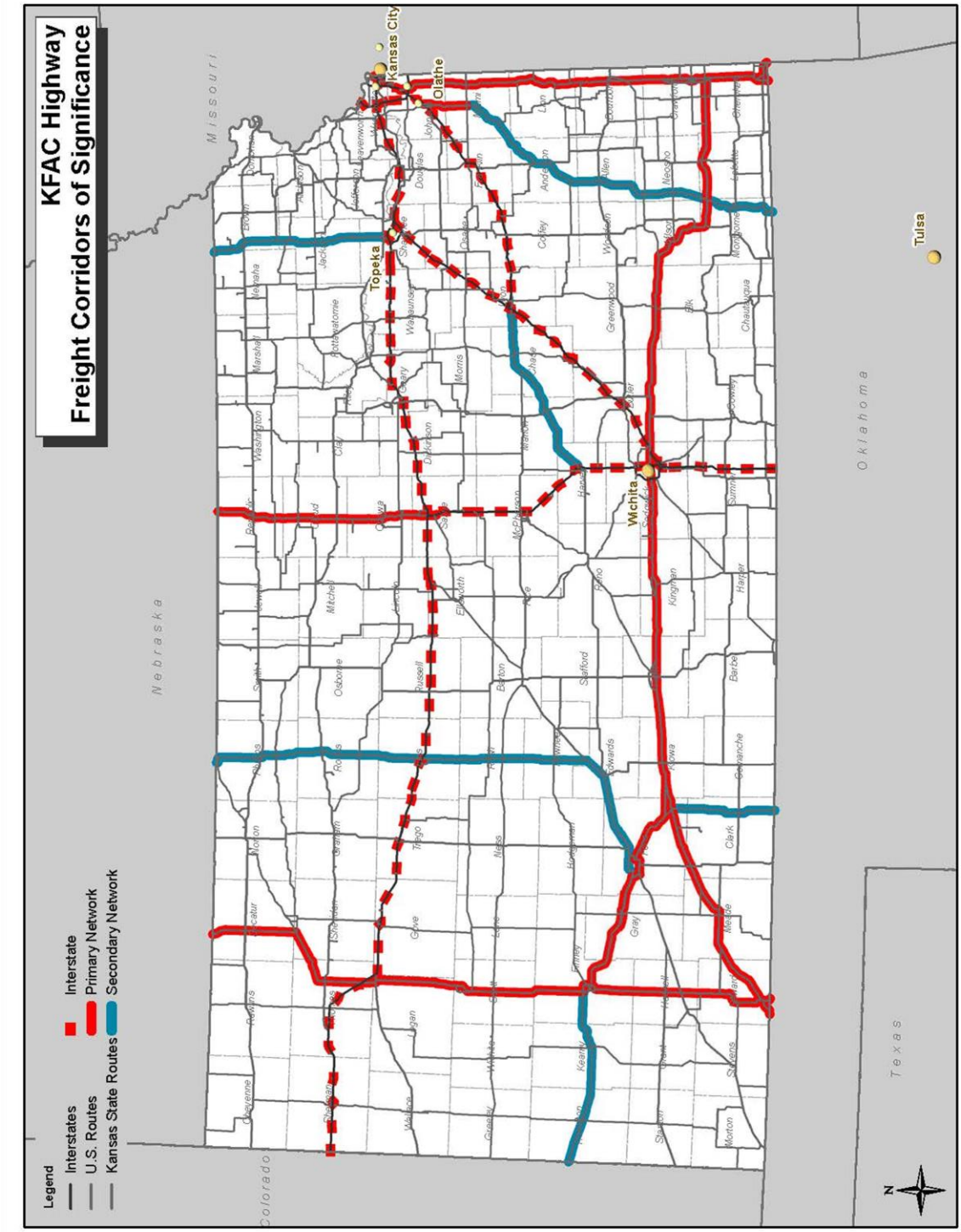


Figure 7.2: Kansas Freight Corridors of Significance

Source: KDOT.

CDM Smith

7.6 Strategic Recommendations

The following recommendations were developed to provide a guideline so KDOT and its partners can implement the various components of the Kansas Statewide Freight Plan. These recommendations are responsive to the key goals of this Freight Plan, as well as the Long-Range Transportation Plan. While some of these recommendations represent long-term projects, others are immediately implementable.

1. **Incorporate freight into the regular KDOT project evaluation and selection process –** The FAST Act established the NHFP, marking the first time ever that federal transportation funds have been provided specifically for freight. To take advantage of this funding, Kansas must have an approved state freight plan and a fiscally-constrained freight investment plan by federal fiscal year 2018. This freight plan will fulfill the federal requirement for Kansas. Going forward however, KDOT may wish to explore ways to incorporate freight more closely into its regular project selection processes, including the Long-Range Transportation Plan and the Statewide Transportation Improvement Program (STIP). Freight projects are likely to score well on some of the existing selection categories used by KDOT. For example, the Transportation-Leveraging Investments for Kansas (T-LINK) program specifically includes economic impact as a selection criterion for highway expansion projects. KDOT may also wish to consider developing a prioritization tool that can compare freight projects across modes, so that multimodal freight projects can be better represented in statewide planning and programming activities. The prioritization rubric in Chapter 9 may serve as the foundation.

2. **Evaluate using public-private partnerships** to fund major projects – 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. 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. KDOT 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.

3. **Make targeted improvements to assure key freight design guidelines are met –** KDOT should assess where design factors like geometric issues, bridge heights, and load-limited bridges are impacting freight movement the most, and devise improvements that will help

the state freight network meets the minimum standards necessary for safe and efficient goods movement. KDOT can leverage existing data such as the Highway Performance Monitoring System (HPMS) and the National Bridge Inventory (NBI), combined with local knowledge from KDOT Districts and MPOs, to facilitate this assessment. Existing bridge and pavement condition are in Chapter 4. The Districts can also provide information on needs for more rural routes, particularly in the energy sector areas where heavy loads may be contributing to accelerated infrastructure deterioration.

4. **Continue Identifying and mitigating truck congestion hot spots and freight bottlenecks –** This plan has identified several key truck freight bottlenecks in **Figure 4.13** and **Figure 4.14**, mostly in the Kansas City and Wichita urban areas. As KDOT works with its partners to address these chokepoints, it should consider ways to continually reassess and evaluate existing and emerging freight bottlenecks. Thanks to the wide availability of truck vehicle probe data and ongoing research by FHWA and others, there is a significant body of research available to help KDOT identify such problem areas both on and off the state system. This may include the purchase of truck probe datasets, combined with regular stakeholder outreach to gather anecdotal information from local engineers and planners, as well as the KFAC. Once truck congestion hotspots are identified, KDOT can assess the underlying causes (e.g., lane drops, access points where traffic is entering or exiting a road, geometric issues) to develop potential solutions.

5. **Strategically prioritize short line rail segments that don't meet the 286,000-pound standard –** This important issue is reflected in the KTRAN Study by Kansas State University. Some short line railroads in Kansas may be having difficulty maintaining their track at a level that supports the industry standard 286,000 pound loaded rail car. This can make it harder for them to interline effectively with the Class I railroads on whom they depend to get Kansas shippers' products to market. Some segments of Class III track suffer from weak infrastructure and bridges that are unable to handle the heavier axle loads. Continued deterioration may effectively cut off shippers from access to the national rail network. KDOT should therefore continue leveraging the SRSIF program, working to proactively identify and prioritize projects that will maintain rail access for key industries. This will be especially important as the Class I railroads transition to even heavier 315,000-pound rail cars.

6. **Develop a methodology to continuously review and identify freight-focused improvement projects –** Given the limited federal freight funding available, as well as the severely limited eligible highway miles under the FAST Act, it will be necessary for KDOT to continually assess, evaluate, and re-prioritize the state's freight needs and identify shovel-ready projects to address them. This plan developed a freight project prioritization rubric that KDOT can continue to leverage as it executes freight projects around the state. This plan also identified Kansas CUFCs and CRFCs as required by the FAST Act. However, given the limited extent of these networks, KDOT should implement a rolling designation system for CUFCs and CRFCs such that as projects are completed, the network can be adjusted to accommodate new projects that are ready to execute. Any proposed methodology should consider the available data (and what gaps may need to be filled) while being flexible enough to respond to changing business needs. This rubric should also pay special attention

to developments at critical intermodal facilities and large freight generators, as well as trends in key growth industries that are dependent on freight. The KFAC can provide valuable insight and advice to KDOT here.

7. **Identify and mitigate locations with high truck crashes –** During the prioritization exercise in which the KFAC participated, safety was identified as the second most important goal behind freight mobility. Fortunately, truck-involved accidents and fatalities have been on a downward trend in Kansas over the last several years. However, this study identified truck safety hotspots around the state, particularly in and around major urban areas including Kansas City and Wichita. The KFAC specifically identified Highway 99 in southeast Kansas as a route that needs geometric improvements based on standard truck traffic, as well as overdimensional and heavy loads, that utilize the route. KDOT already uses the extensive crash data at its disposal to improve its educational, enforcement, and safety programs. Since the freight project prioritization task used safety as one criteria for selecting projects, KDOT should continue using it as a metric when evaluating freight improvements.

8. **Consider developing and testing freight-focused intelligent transportation systems (ITS) solutions –** Technological solutions can help improve freight movement, especially in congested urban areas where large-scale capacity expansions may be impractical. KDOT should therefore consider the use of freight-focused ITS and truck connected vehicle technologies to make the most of existing capacity where appropriate. Such solutions can tie into many existing resources, including the ongoing TPIMS initiative, Kansas City Scout, WICHway (ITS for Wichita), and KanDrive (the statewide traffic information portal). As an example, the City of Columbus, Ohio is implementing a truck platooning project as part of its Smart Cities Challenge grant from the USDOT. The project will involve deploying two-truck platoons on limited access freeways in the region, using trucks from participating fleets. The project will also include Freight Signal Priority on key truck arterials, which will prioritize signal timing for participating trucks on routes leading from an intermodal terminal to the freeway such that travel time is minimized and the trucks remain together so they can begin platooning on the highway. Some states are also implementing freight ITS for major Interstate corridors. For example, part of the National I-10 Freight Corridor Study involved the development of a corridor-wide ITS architecture based on the needs of major carriers and shippers using the corridor.

9. **Implement high-tech weigh stations –** KDOT should analyze the components and costs of high-tech weigh stations as well as ongoing maintenance and operational costs of these weigh stations. KDOT may also consider implementing some technological solutions for commercial vehicle operations and enforcement. This could include weigh-in-motion (WIM), combined with other roadside sensors, to develop virtual weigh stations (VWS) at strategic locations and known truck bypass routes. This effort would need to be closely coordinated with Kansas's existing Pre-Pass program as well as other initiatives such as TPIMS. KDOT should work with the Kansas Highway Patrol to develop a comprehensive data collection and enforcement program so that enforcement resources can be allocated most effectively.

10. **Consider developing a regional truck oversize and overweight policy –** As with many states, truck oversize and overweight regulations differ in Kansas compared to its neighboring states. In addition, the KTA has different guidelines and regulations than the rest of the KDOT system (the KTA is less restrictive than the rest of the state). This can make it difficult for carriers to plan OSOW moves efficiently when the shipments cross state lines. Depending on the OSOW load type, the route is developed through KTRIPS. KDOT may therefore wish to explore ways to harmonize truck size and weight rules, either within Kansas or in coordination with surrounding states. However, it must be noted that achieving total uniformity across several states is a difficult undertaking; therefore, the best approach is likely to involve developing voluntary recommendations for states to follow that achieve some basic minimum standard, rather than mandating a more restrictive policy. This will help facilitate commerce as much as possible while allowing some flexibility for different policy approaches.

Table 7.1 provides a summary of these recommendations along with the expected lead agencies and implementation timeframes. Timeframes are expressed as short (within the next 5 years), medium (5 to 10 years out), and long (more than 10 years).

Table 7.1: Kansas Statewide Freight Plan Policy Recommendations and Expected Timeframes

Recommendation	Lead Entity	Timeframe
1. Incorporate freight into the regular KDOT project evaluation and selection process	KDOT	Short
2. Evaluate using public private partnerships	KDOT	Short
3. Make targeted improvements to assure key freight design guidelines are met	KDOT	Long
4. Continue identifying and mitigating truck congestion hot spots and freight bottlenecks	KDOT	Medium
5. Strategically prioritize short line rail segments that don't meet the 286,000-pound standard	KDOT/Short Line Railroads	Medium
6. Develop a methodology to continuously review and identify freight-focused improvement projects	KDOT/KFAC	Short
7. Identify and mitigate locations with high truck crashes	KDOT/Kansas Highway Patrol	Short
8. Consider developing and testing freight-focused intelligent transportation systems (ITS) solutions	KDOT	Medium
9. Implement high-tech weigh stations	KDOT/Kansas Highway Patrol	Medium
10. Consider developing a regional truck size and weight policy	KDOT/Other State DOTs and State Patrols	Long

Chapter 8

Scenario Planning

This chapter discusses scenario planning, a visioning tool for the future of Kansas multimodal freight transportation mobility and freight planning.

8.1 Why Scenario Planning?

Before one can write any sort of plan, the future that we envision must be defined to plan towards. Traditionally, this has meant looking at past data trends to predict what the future might be. However, for freight plans a different approach must be taken. Unlike traditional plans, which are driven by population and job growth, statewide freight plans are driven by freight growth, which is largely a function of global trends. Typically, global trends are much more volatile and unpredictable. Essentially, a decision made half-way around the world can have a dramatic effect on freight volumes in Kansas. For example, the decrease in demand for widebody jetliners has impacted Spirit Aerosystems, Wichita's largest employer.

To account for these global trends, scenario planning was utilized as part of the development of this freight plan. It looks at global trends to develop various future scenarios that allow KDOT leaders and freight stakeholders to evaluate and plan for likely, or potential, future scenarios. It allows for an open dialog among stakeholders such as modal and operational experts and public officials to discuss trade-offs, nuances, and cause-effect relationships that the traditional methods would not identify. By discussing the alternate futures described in each scenario, stakeholders are able to extract common needs that are likely to be relevant no matter what the future may hold.

8.2 Scenario Development

The project team began this process by identifying probable future trends based on lessons learned during stakeholder outreach and interaction with the Kansas Freight Advisory Committee (KFAC), known industry trends, and the KDOT Long Range Transportation Plan (LRTP). **Table 8.1** identifies the key trends identified that served as the framework for the development of the future scenarios.

Table 8.1: Trends Driving Future Freight Movement in Kansas

Identified Trend	Description
Reduction in Funding	Reductions in funding for freight transportation infrastructure
Science and Technology Advances	Advances in science and technology, such as advanced agricultural pesticides or machinery
Volatile Fuel Prices	Volatility of all oil based fuels
Increase in Population	Continued increases in population of Kansas, the US, and World
Aging of the Kansas Population	Average life expectancy continues to increase
Population Shift	Continued populations migration from rural areas to urban areas
Automated Vehicle Technology	Connected and autonomous vehicles will dramatically change the freight industry
Freight Transportation System Resiliency	The ability for the transportation system to absorb the consequences of disruptions, to reduce the impacts of disruptions, and maintain freight mobility
Online Retailing	Shift towards online purchase and point of use delivery leading to reduction of physical retail stores
Increase/Reduction in Global Trade	Sustained increases or reductions in global imports and exports
The "Sensible Network"	Widespread ability to capture and monetize real-time sensing data on all products, vehicles, and facilities across a supply chain at essentially no cost
Alternative Fuels Development	Increases in production and usage of alternative fuels
Panama Canal Expansion	Widening of the Panama Canal could change freight flows if the Mississippi and Missouri Rivers become more attractive options for the movement of freight
Small Batch Manufacturing	Widespread adoption of technologies enabling efficient and low-cost small batch manufacturing
Re-shoring of Manufacturing	Rebound of US manufacturing jobs returning from overseas
Security Threats	Large increase in the number and magnitude of threats (domestic and aboard)

8.3 Defining Future Scenarios

Consideration of future trends and impacts, listed in **Table 8.1**, led to the following four future scenarios:

8.3.1 Hungry World

Kansas will play a major role in feeding the ever-increasing world population. As a top agricultural producer in the United States, Kansas' role in feeding the world will continue to require changes in how freight moves.

8.3.2 Global Market

The current global trend of re-shoring manufacturing will continue. Given Kansas' prominence in the manufacturing sector, manufacturing accounts for approximately 15% of the total output in the state and employs approximately 12% of the workforce, this would elevate Kansas' position in the global marketplace.

8.3.3 Convenient Living

Kansans' travel and 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. More shopping will be done online with increasing residential deliveries resulting in the decrease of traditional shopping trips.

8.3.4 Regionalism and Technology

Kansas competes regionally to attract more business investment and development. Technology allows material to be maintained in the raw form until needed for production. Technological innovations have lowered economies of scale so that customized production in small batches is economically sound. Supply chains mostly carry undifferentiated/raw material for long distance and differentiated goods for short distance. People reuse and recycle, technology enables better recapture of the raw materials. Technology allows for more informed government, businesses, and citizens, and more reliable investment decisions and travel.

8.4 Freight Advisory Committee Meeting

A scenario planning workshop was held during the November 2016 KFAC meeting. During the workshop, KFAC members discussed the potential scenarios, what these scenarios would mean for the future of Kansas, and what Kansas would have to do to successfully capture the unique opportunities presented by each scenario. In the following tables (**Table 8.2** to **Table 8.5**) the main issues discussed for each of the scenarios by the KFAC members are listed with potential actions that KDOT might take to mitigate the issue, capture the opportunity, or limit the impact to Kansas' freight transportation system.

Table 8.2: Hungry World Scenario

Issues Discussed	Potential Actions
Markets emerging and growing, such as dairy industry and value added agriculture industries, such as ethanol and dry grain	Position Kansas to capture these emerging and growing industries through freight system investments that connect to fuel terminals, grain terminals, etc.
Increased domestic containerization	Continue to build and/or expand intermodal facilities
Safety regulations and food safety	Review current safety regulations and determine if new regulations are required
High tech weigh/inspection stations	Upgrade existing weigh/inspection stations
Weight Limit Standardization	Coordinate with surrounding states to work towards a standardization of weight limits
Water availability and water rights, particularly in Western Kansas	Develop policies in coordination with the Kansas Department of Agriculture's Division of Water Resources that balance the protection of the state's supplies of groundwater and surface water with the needs of the freight shipping community
Importance of food processing industry to Kansas	Invest in freight adaptive technologies, such as truck platooning
Need for more fertilizer to be shipped into Kansas	Continued maintenance of the existing transportation system

Table 8.3: Global Market Scenario

Issues Discussed	Potential Actions
Growth in Kansas' aviation industry	Make investments in the air transportation system, such as at regional airports particularly those close to Wichita
Kansas' aviation industry has an opportunity to capture business in the private space industry	Make investments in the air freight transportation system, such as at regional airports particularly those close to Wichita
Produce a workforce that meets the needs of the aviation industry and is willing to stay in Kansas	Encourage coordination between the aviation industry and state universities through the Kansas Board of Regents' Workforce Development unit
Increase in the value of air cargo	Make investments in the air freight transportation system, such as at regional airports across the state
Efficient functionality at borders	Upgrade existing weigh/inspection stations and coordinate with surrounding states
Importance of new technologies, like drones, ecommerce, and wind technology	Review Kansas regulations and determine if any of them could hinder the use of these new technologies Develop a state policy in coordination with the FAA and local governments
Improvements needed to the local network and last mile connectors through rail system expansion and additional capacity	Work with the Railroads to identify first and last mile connector improvement projects

Table 8.4: Convenient Living Scenario

Issues Discussed	Potential Actions
More leisure time, which could result in more driving for leisure, i.e. on vacation	Continued maintenance of the existing transportation system
More farm-to-market deliveries thus changing the makeup of trucks on the road	Plan and design for current and future vehicles
More loading zones would be needed and/or staging areas outside of communities where goods could be transferred from large over the road truck to smaller delivery vehicles	Work with local communities to review potential zoning changes that would be needed to accommodate more deliveries
More people utilizing public transit, Uber/Lyft, and automated, and connected vehicles	Review Kansas regulations and determine if any of them could hinder the use of these new technologies
Fewer personal vehicles are on the roadways	Continued maintenance of the existing transportation system
Creates more isolated rural areas	Improve mobility to urban centers through increased use of the RTAP

Table 8.5: Regionalism and Technology Scenario

Issues Discussed	Potential Actions
Kansas would need to be flexible, able to adapt to, and embrace evolving technologies	Review Kansas regulations and determine if any them could hinder the use of new technologies
Drones, Uber/Lyft, real time traffic information, big data, and alternative fuels	Review Kansas regulations and determine if any of them could hinder the use of these new technologies
High tech 55 mph weigh/inspection stations	Upgrade existing weigh/inspection stations
Less driving, results in less funding from the gas tax	Look at alternative funding sources and expand the KTA
Safety, privacy, and security would be key priorities	Review and update, as needed, the Kansas Strategic Highway Safety Plan

8.5 Overall Recommendations

While each of the scenarios has key takeaways and lessons learned, there are several commonalities that could reasonably be expected to drive the success or the continued ability of the Kansas multimodal freight system to handle freight demand, no matter what scenario. These recommendations will provide critical inputs to the project selection and policy development sections of this plan:

- **Strategic Investment**: Decisions must be made in the context of supporting economic growth through emerging opportunities. This includes positioning Kansas to capture emerging and growing industries through freight investments, investing in freight adaptive technologies, and upgrading existing weigh/inspection stations.
- **Flexibility**: KDOT processes must be responsive to private sector needs, such as the use of emerging technologies or encouraging coordination between industries and universities.
- **State of Good Repair**: Focus on road, waterway, rail, and bridge improvements to meet the demands of increasing freight movements and changing vehicle types.
- **Multimodalism and Connectivity**: Without adequate planning and design considerations, the current highway network will be hard pressed to handle future freight needs. In order to continue the state's economic prominence, new and improved intermodal connectivity points and linkages must take place. This includes first and last mile connections, links to grain terminals, fuel terminals, intermodal and transload facilities, warehousing and distribution centers, and regional airports.
- **Funding**: Infrastructure should be funded at appropriate levels and alternative revenue sources should be considered on an ongoing basis.

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Chapter 9

Freight Project Prioritization and Funding

A well-maintained transportation system is crucial to meet the increasing freight demands of Kansas's businesses. This chapter describes the prioritization process developed to provide information that will help decision-makers choose the strategic investments that best support the freight transportation goals of the State of Kansas.

9.1 Introduction

This freight plan has shown that demand on Kansas's freight system will continue to grow. Although the FAST Act included a dedicated freight funding program for the first time ever and freight projects can compete effectively for many of KDOT's state funding sources, the identified needs will continue to exceed available resources. It is therefore important to establish a prioritization process for freight projects so that the most critical freight projects are advanced and executed.

9.2 The Need to Prioritize Freight Investments

Freight transportation is critical to Kansas's economic competitiveness – access to markets, support for critical industries like agriculture, aviation, wind energy, biofuels, advanced manufacturing.

While Kansas decision makers recognize the importance of freight, they must also balance freight needs with non-freight transportation needs as well as other state funding priorities.

This Statewide Freight Plan therefore defines a freight project prioritization process to help decision makers make the best strategic freight investment choices. This process is designed to guide KDOT and its partners prioritize projects and maximize return on investment.

Freight transportation represents a key economic competitiveness factor for Kansas. Kansas businesses depend on efficient and cost-effective freight transportation for the movement of materials, components, and finished goods to and from their operations. Freight transportation is constantly impacted by market forces such as environmental concerns, fluctuating fuel prices, and other factors that increase the cost of moving all goods. In addition, congestion can affect the long and often vulnerable supply chains of high-value, time-sensitive commodities. 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. The importance of transportation varies by economic sector. For example, transportation accounts for approximately 14 percent of the cost of agricultural products, compared with 9 percent for manufactured goods and about 8 percent for mining products.[31]

[31] FHWA, Economic Cost of Freight Transportation, http://www.ops.fhwa.dot.gov/freight/freight_analysis/freight_story/costs.htm

Transportation in Kansas must provide reliable connections to customers and that timely deliveries meet or exceed the consumer's expectations in addition to offering product quality at a reasonable cost. The transportation assets that make up Kansas's freight network are critical to the state's economy. If the freight network falters, the economy will falter.

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 provides an additional source of analytical rigor to aid in the evaluation of future freight projects. The project prioritization process was designed to assist decision-makers in evaluating freight network investment choices to help identify those that will best support the safety, connectivity, and mobility of the network and promote economic development and prosperity for Kansas' citizens and businesses. It builds upon and reflects the goals and performance measures identified in the Kansas Long Range Transportation Plan and the Kansas Freight Plan, and incorporates input from a variety of public and private sector partners.

Implementation of this prioritization process will help Kansas' multimodal freight network remain an asset of the state's economic success.

9.3 Inputs to the Prioritization Process

When prioritizing any list of freight transportation capital projects, it is important to consider existing policy, plans, and stakeholder needs. This links the prioritization effort with overall agency goals and objectives, while also reflecting the needs of key freight stakeholders. Hence, the prioritization process developed for the Kansas Statewide Freight Plan leveraged data and inputs from several existing transportation plans and stakeholder meetings as discussed below.

9.3.1 Stakeholder Input – KDOT and KFAC

Freight movement in Kansas is impacted by many public and private sector organizations, agencies, and businesses. It is, therefore, increasingly important to engage a broad cross-section of partners in planning to meet the ever-increasing demands for the state's freight infrastructure system. The prioritization process was developed in concert with, and with input from, many partners through the freight planning process. Stakeholder input was gathered in several ways including from the KFAC, a scenario planning exercise, stakeholder interviews, and freight forums. Stakeholder input directly informed the development of freight project evaluation and prioritization criteria, which are discussed below.

Discussing the prioritization framework with KFAC stakeholders allowed planners to incorporate varied perspectives on changing freight transportation needs, existing system conditions, and strategies to optimize the benefits of the multimodal transportation network. These insights were invaluable in establishing the project screening and prioritization filters and adjusting them to reflect what matters most to the people and businesses of Kansas.

9.3.2 Freight Plan Goals

The prioritization process was developed to reflect the goals of the Kansas Department of Transportation (KDOT) Freight Plan. Projects were screened to verify they were consistent with and achieved progress towards one or more of the goals. The prioritization filters were designed to measure how well a project aligns with these goals:

- **Mobility:** Improve the connectivity and mobility of the freight system by reducing congestion and increasing reliability on the roadways; by supporting improved efficiency of rail transportation; and by improving connections between freight modes. Maintain the freight system in good condition by keeping highways and bridges in good condition and supporting the maintenance of railways 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.
- **Economic Development:** Support economic growth and competitiveness in Kansas through strategic improvements to the freight system to support new and existing businesses through improved multimodal connections. Enhance opportunities in economically distressed communities.
- **Environmental Impacts**: Provide opportunities to reduce impacts to air and water quality in the state. Enhance opportunities in Environmental Justice communities and economically distressed communities.

9.4 The Prioritization Process

The KDOT Statewide Freight Plan prioritization process included the following steps:

- Step 1 – Identify Projects
- Step 2 – Screen Projects
- Step 3 – Develop Prioritization Framework
- Step 4 – Score and Rank Projects

9.4.1 Identify Projects

Determining which projects will be prioritized is a key step in any prioritization process. For this prioritization effort, the project team compiled a list of Kansas freight projects from the following sources:

- **KDOT future project file.** This file includes 54 fiscally constrained highway and rail projects around the state.
- **MPO Long-Range Transportation Plans and Transportation Improvement Programs.** Projects contained in the existing fiscally constrained Long-Range Transportation Plans (LRTPs) and Transportation Improvement Programs (TIPs) from Kansas MPOs were reviewed and added to the list.

- **Critical Urban Freight Corridor (CUFC) and Critical Rural Freight Corridor (CRFC) projects.** As noted in Chapter 6, the FAST Act included a provision allowing state DOTs and MPOs to establish CUFCs and CRFCs within certain mileage limits to be added to the National Highway Freight Network, making them eligible for FAST Act formula freight funding. Projects on designated CUFCs and CRFCs were added to the prioritization list based on input from KDOT, WAMPO, MARC, Flint Hills MPO, Topeka/Shawnee County MPO, Lawrence Douglas County MPO, and St. Joseph/Elwood MPO.

- **Rail projects.** A list of rail projects was developed through discussions with KDOT, review of MPO plans, and interviews conducted with Class I and short line railroads. This process helped identify grade crossing needs as well as key short line railroad improvements.

These lists were combined to develop a "universe" of projects for further screening and evaluation. This effort resulted in a list of about 600 projects for further assessment.

9.4.2 Screen Projects

The extensive initial project universe required further refinement to focus only on truly freight-beneficial projects. To narrow down the initial list, the following project types were screened out:

- **Projects not on KDOT Freight Corridors of Significance.** KDOT and the KFAC have designated a freight highway network to help decision-makers choose the best strategic investments for freight transportation. These are the highways, rail connections, and grain shuttle facilities that are most critical to the movement of freight and goods in the state. Designation of the network was based on a set of objective criteria reflecting the Freight Plan goals and performance measures. This network was therefore used as the first screening filter in the project selection process. Simply put, for a project to be considered it must be on the Kansas Freight Network. This approach focuses freight investment decisions on the multimodal corridors that are most critical to the movement of freight.

- **Projects that are not executable within 10 years.** This screen removed projects that have no identified funding source, as well as those with descriptions too general to define. This screen retained all projects contained in MPO LRTPs and TIPs since those documents are fiscally constrained.

- **Routine maintenance projects.** Projects must be capacity expansions or major maintenance projects (i.e., high cost, replace-in-place projects), not routine maintenance of existing assets.

- **Non-freight beneficial projects.** This screen removed non-freight projects such as bicycle and pedestrian improvements as well as planning projects.

This process resulted in a final list of 92 projects for scoring and prioritization. The WAMPO and MARC freight projects were further validated through meetings with KDOT and the project team, which served as an additional check on the projects contained in their planning documents. The list included 80 highway/road projects and 12 freight rail projects.

9.4.3 The Prioritization Framework

The final project list was scored using a multi-criteria analysis rubric. The scoring rubric includes metrics corresponding to the four goal areas established by the KFAC:

- **Mobility –** The extent to which a project improves goods movement efficiency, for instance by relieving a bottleneck, improving access to a key freight generator, or improving a physical constraint that impedes freight flows.
- **Safety –** Projects improve safety if they address a truck crash hotspot or otherwise promote safe operations.
- **Economic development –** The extent to which a project is likely to create jobs (measured by job impact ratios), or whether it improves access to a Kansas Department of Commerce targeted industry sector.
- **Environment –** Whether the project improves air quality by relieving a freight bottleneck or promoting truck to rail mode shift.

Due to differences in data availability between modes, scoring and ranking were completed separately for truck and rail projects. **Table 9.1** shows the prioritization filters used for highway projects. The goal weights were derived from input received at the KFAC meeting held on November 15, 2016. Additional details about the scoring methodology and data sources for each filter are provided in Appendix G.

Table 9.1: Highway Scoring Criteria, Prioritization Filters and Weights

Freight Plan Goal	Weight	Prioritization Filters
Mobility	36%	Addresses freight bottlenecks identified from MPO Long Range Transportation Plans Reduces number of substandard bridges Enhances multimodal freight connections Improves freight network capacity
Safety	30%	Improves high crash locations
Economic Development	22%	Improves access to freight generators Economic impact (jobs) Improves access to targeted industry sector
Environmental Impacts	12%	Reduces impacts to air quality

Table 9.2 lists the scoring criteria and data sources used for the rail mode. Note that after assembling and reviewing all the rail projects, it was determined that all of them would be placed in the top tier since there were only 12 rail projects total. Hence, no further scoring was conducted for the rail mode. However, the framework and methodology are presented here and in Appendix G as a basis for future prioritization efforts.

Once scoring was complete for the highway mode, the projects were rank ordered and sorted into tiers based roughly on key break points in the scores. After KDOT reviewed the initial list, it was determined to move the Lewis & Clark Viaduct project in Kansas City, KS from Tier 2 to Tier 1 since KDOT intends to use their FAST ACT freight formula funding on this project.

Table 9.2: Rail Scoring Criteria, Prioritization Filters and Weights

Freight Plan Goal Area	Weight	Prioritization Filters
Mobility	36%	Improves freight rail bottlenecks or adds capacity to network for freight Improves rail access to freight generators
Safety	30%	Improves Rail Safety
Economic Development	22%	Reduces Delays to Truck Traffic at Grade Crossings
Environmental Impacts	12%	Reduces Impacts to Air Quality or Promotes Mode Shift from Truck to Rail

9.4.4 Results

The prioritized Tier 1 highway projects are shown in **Table 9.3** and mapped in **Figure 9.1**. Note that the projects are not presented in rank order. The intent is to provide KDOT and its stakeholders flexibility in moving projects up and down the list as needed to take advantage of emerging opportunities. Projects from **Table 9.3** can be matched to the map using the "Project ID" column.

A total of 30 highway projects are included in this highest priority category. The projects represent a mix of urban and rural freight priorities located throughout the state. Most of them provide for capacity or interchange improvements that will improve goods movement efficiency and freight mobility while improving access to key freight generators and freight-intensive land uses. Note that multi-phase projects such as the I-70/K-7 Interchange and Polk/Quincy Viaduct projects could be consolidated into fewer phases if funding availability allows, but they have been kept separate here to maximize flexibility for project execution.

Lists and maps of the Tier 2 and 3 highway freight projects are provided in Appendix G.

Table 9.3: Tier 1 Highway Freight Projects

Project ID	Route	Location	Improvement	Source	Urban/Rural
2	US-69	119th St to I-35 & I-35 to 75th St	Reconstruct US-69 Corridor to 6 lanes in Johnson County	KDOT	Urban
4	I-135	I-135/36th St (2 miles south of South Junction of I-135/US-50)	Improve Interchange in Harvey County	KDOT	Rural
6	I-70	K-7 Interchange – Phase 9	Interchange Improvements in Wyandotte County	KDOT	Urban
7	I-70	K-7 Interchange – Phase 10	Interchange Improvements in Wyandotte County	KDOT	Urban
8	US-24	K-7 Interchange – Phase 11	Interchange Improvements in Wyandotte County	KDOT	Urban
9	US-24	K-7 Interchange – Phase 12	Interchange Improvements in Wyandotte County	KDOT	Urban
10	I-70	K-7 Interchange – Phase 13	Interchange Improvements in Wyandotte County	KDOT	Urban
11	I-70	K-7 Interchange – Phase 14	Interchange Improvements in Wyandotte County	KDOT	Urban
12	I-70	K-7 Interchange – Phase 15	Interchange Improvements in Wyandotte County	KDOT	Urban
19	I-70	Polk/Quincy Viaduct & approach roadway – Phase 1	Polk/Quincy Viaduct & approach roadway	KDOT	Urban
20	I-70	Polk/Quincy Viaduct & approach roadway – Phase 2	Polk/Quincy Viaduct & approach roadway	KDOT	Urban
22	US-69	K-47 to RS-169	Road Improvements in Crawford County	KDOT	Rural
25	I-70	The Lewis & Clark Viaduct in Kansas City, KS	Bridges for the Lewis & Clark Viaduct in Kansas City, KS	KDOT	Urban
38	I-235/I-135/K-254	I-235/I-135/K-254 Interchange	Interchange Improvements in Sedgwick County	KDOT	Urban
45	I-235	Bridges #079 & #080 on I-235 in Sedgwick County	Bridge Replacement on I-235 in Sedgwick County (S/O K-42)	KDOT	Urban
54	K-99	K-99 in Wabaunsee County	Roadway Improvements in Wabaunsee County	KDOT	Rural
57	K-18	11th Street to Wildcat Creek Dr.		Flint Hills	Urban
60	I-70/Kansas Turnpike	K-10 Lecompton Interchange E to Douglas/Leavenworth County Line	Widen to 6 lanes	Lawrence	Urban
61	I-35 and Gardner Rd Interchange	I-35 and Gardner Rd Interchange	Construction of a 5-legged roundabout on each side of the interchange	MARC	Urban
64	K-32	Turner Diagonal Interchange	Interchange Improvements in Wyandotte County	MARC	Urban
65	I-35	South of 75th St. to South of 67th St.	Widen 6 to 8-lane, increase NB vertical clearance under 75th Street	MARC	Urban
67	I-35	119th St Interchange	Interchange Improvements in Johnson County	MARC	Urban
69	I-435	87th Street Interchange	Interchange Improvements in Johnson County	MARC	Urban
70	I-435	95th Street Interchange	Interchange Improvements in Johnson County	MARC	Urban
71	I-70	Turner Diagonal Interchange Re-configuration	Re-configuration and reconstruction of existing interchange.	MARC	Urban
76	US-54	Wiedemann to 127th St. E.-Phase IIC	Widen Road	WAMPO	Urban
77	I-235	US-54 and Central Interchanges	Interchange Improvements in Sedgwick County	WAMPO	Urban
81	US-54/400 (W Kellogg)	119th-135th	Widen Road	WAMPO	Urban
82	US-54/400 (W Kellogg)	151st-167th	Widen Road	WAMPO	Urban
83	I-235	I-235 Kellogg Interchange (Phase 2-4)	Interchange Improvements in Sedgwick County	WAMPO	Urban

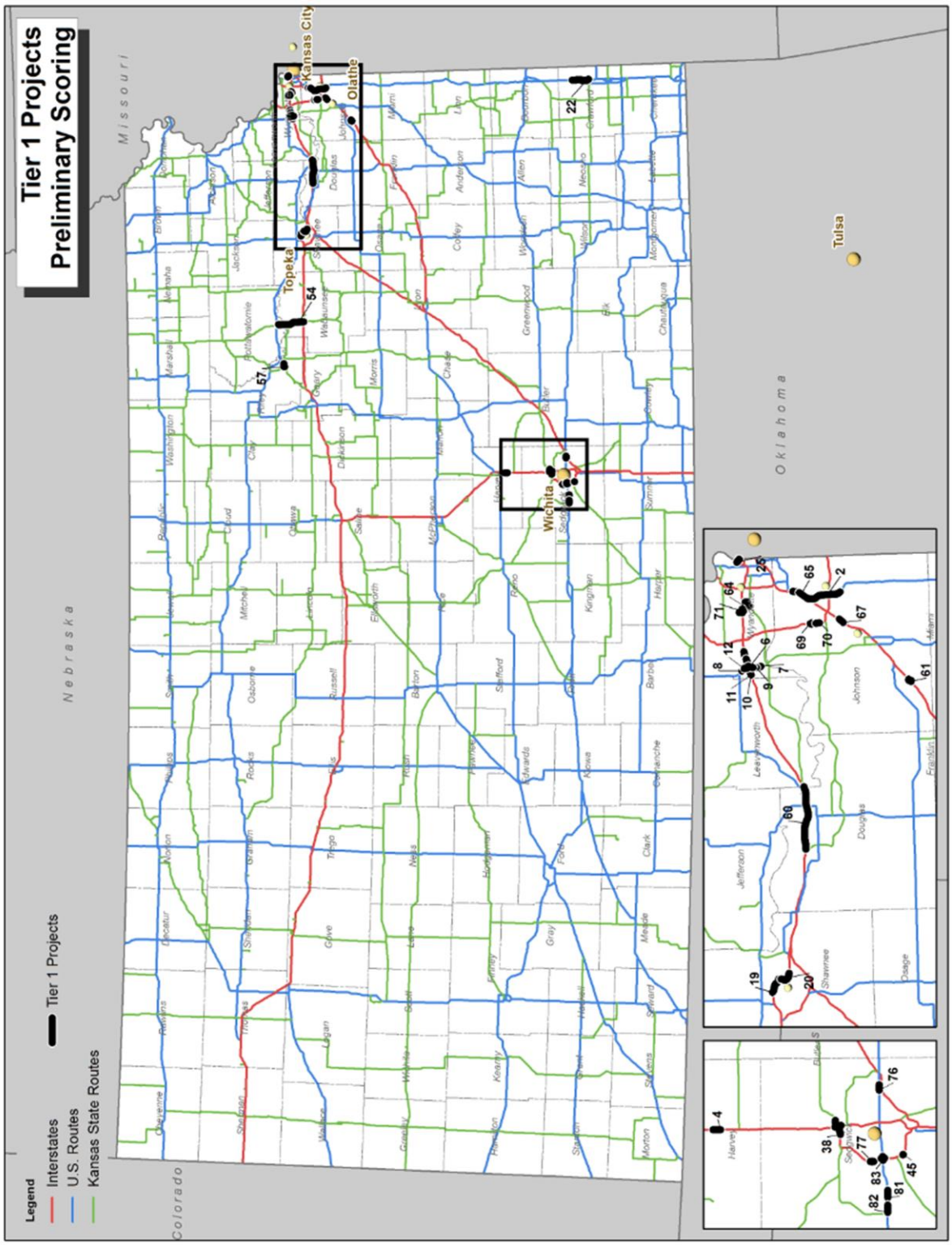

Figure 9.1: Tier 1 Highway Freight Projects

Table 9.4 lists the Tier 1 rail projects, which includes all 13 projects identified for prioritization. These projects are mapped in **Figure 9.2**.

Table 9.4: Tier 1 Rail Freight Projects

Project ID	Route	Location	Improvement	Source
55	Kansas & Oklahoma Railroad (Watco)	US-56 Southwest of Great Bend	Crossing Safety Improvements	KDOT
56	Kansas & Oklahoma Railroad (Watco)	US-281 in Sawyer	Crossing Safety Improvements	KDOT
57	South Kansas & Oklahoma Railroad (Watco)	US-169 (Walnut St.) in Coffeyville	Crossing Safety Improvements	KDOT
66	BNSF	207th Street	New bridge over BNSF tracks	MARC
72	UP	15th Street Elwood	Crossing Safety Improvements	St. Joseph/ Elwood
73	UP	7th Street Elwood	Crossing Safety Improvements	St. Joseph/ Elwood
74	UP	Vermont Street Elwood	Crossing Safety Improvements	St. Joseph/ Elwood
**	BNSF and UP	Various	Rail Crossing Consolidation and Separation Program	Railroads
**	Kyle Railroad (Genesee & Wyoming)	Network wide	Increase rail to 286K lbs. throughout network	Railroad
**	Kyle Railroad (Genesee & Wyoming)	Yuma Sub	Bridge replacement Yuma Subdivision	Railroad
**	Kyle Railroad (Genesee & Wyoming)	Network wide	Upgrade and replace selected bridges throughout network	Railroad
**	Kyle Railroad (Genesee & Wyoming)	Western and Central Kansas	Bulk shuttle loader(s)	Railroad
**	Kansas and Oklahoma Railroad (Watco)	Western and Central Kansas	Bulk shuttle loader(s)	Railroad

*** Project represents a general, non-specific need and therefore could not be mapped.*

These projects include six grade crossing safety improvements, a new bridge for 207th Street over the BNSF tracks in Edgerton, various improvements to bridges and track weight capacity for the Kyle Railroad and Kansas and Oklahoma Railroad, and new bulk shuttle loaders for the Kyle Railroad in western and central Kansas. Note that the last six projects in **Table 9.4** could not be mapped since they represent general, non-specific needs; however, making targeted improvements to the short line and regional rail networks would help improve rail capacity and economic development in the areas affected. Additional railroad consultation is needed to determine individual projects and potential roles for state funding, perhaps through the State Rail Service Improvement Fund.

This prioritization process developed for the Kansas Statewide Freight Plan can be replicated and updated, allowing KDOT to evaluate new project concepts and existing investment programs to direct freight dollars towards the most high-impact projects. This will help KDOT continue optimizing its transportation resources and maximizing return on investment. The tool can also be modified as new data sources, funding streams, and project needs emerge, allowing the prioritization framework to evolve over time to reflect changing business conditions and stakeholder needs.

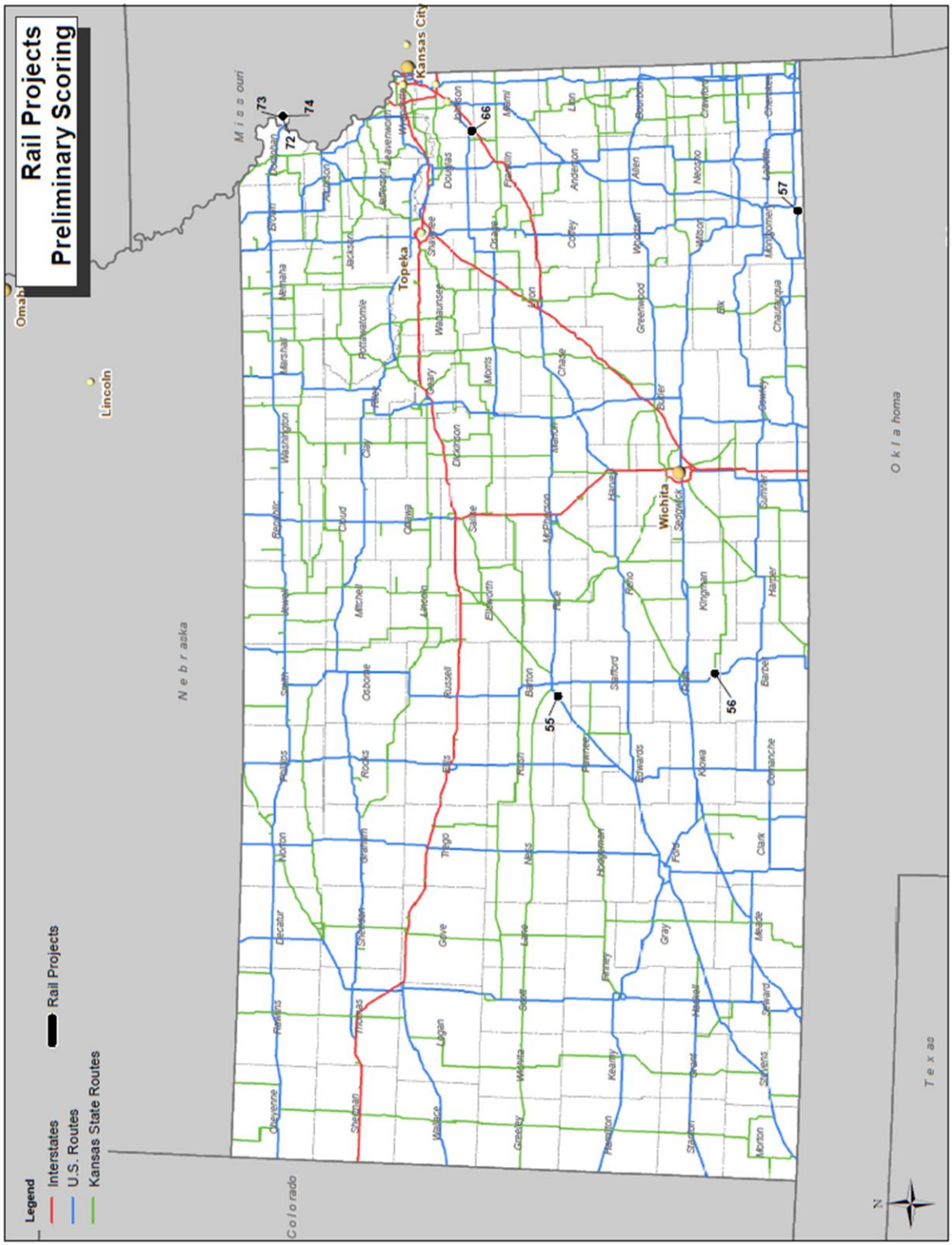

Figure 9.2: Tier 1 Rail Freight Projects

9.5 Freight Funding Plan

The project list was constructed from state and MPO fiscally constrained projects in the state and MPO Long Range Transportation Plans and Transportation Improvement Programs thus making the Freight project list fiscally constrained. KDOT programmed their Section 167 Freight Formula funds towards the following projects shown in **Table 9.5**. The I-435 project is under construction and thus was not prioritized in Table 9.4.

Table 9.5: Kansas' National Freight Program Allocation and Programming

Project	FFY 2016	FFY 2017	FFY 2018 (est.)	FFY 2019 (est.)	FFY 2020 (est.)	Total
Allocation	$10,818,867	$10,281,704	$11,289,182	$12,700,409	$14,111,566	$59,201,728
Less Transfer to NHPP Less Rescission		$5,409,434 $578,523				$5,409,434 $578,523
				Total Allocation Available		**$53,213,771**
National Freight Funding Programming						
I-435 (Metcalf To Quivira)	$10,818,867	$4,293,747	$2,657,329			$17,769,943
Lewis and Clark Viaduct			$8,631,853	$12,700,409	$14,111,566	$35,443,828
						$53,213,771
Project Funding		**Federal Section 167**	**Other Federal Funds**	**KDOT Match**	**Total**	
I-435 (Metcalf To Quivira)		$17,769,943	$0	$2,742,152	$18,512,095	
Lewis and Clark Viaduct		$35,443,828	$26,476,172	$6,980,000	$68,900,000	