Kansas Statewide Freight Plan

Kansas Department of Transportation

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Chapter 1

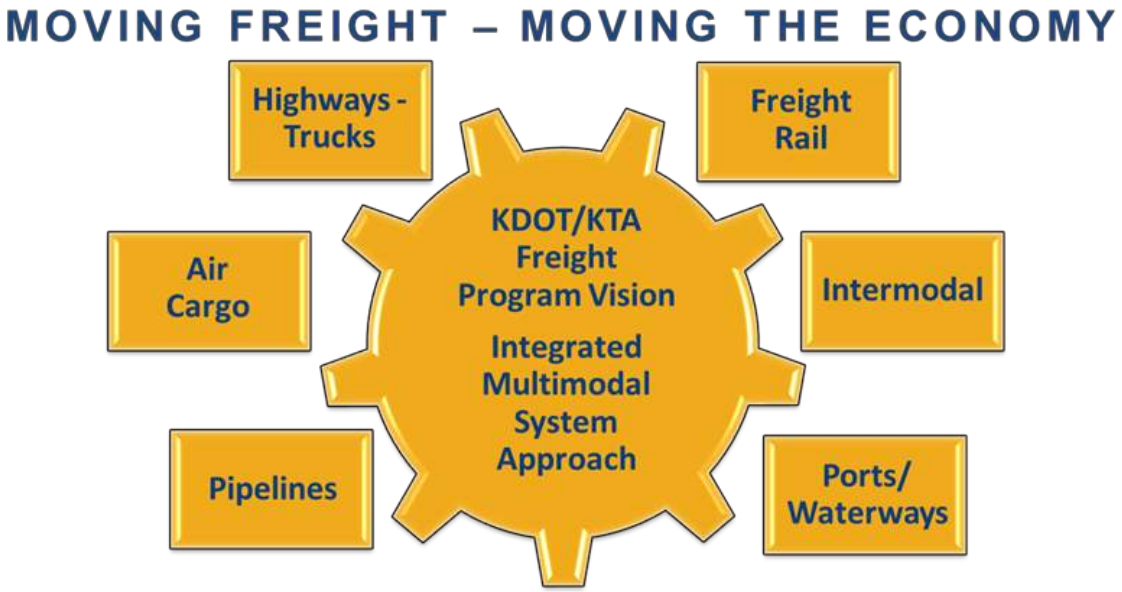
Freight Plan Introduction and Freight Goals

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.

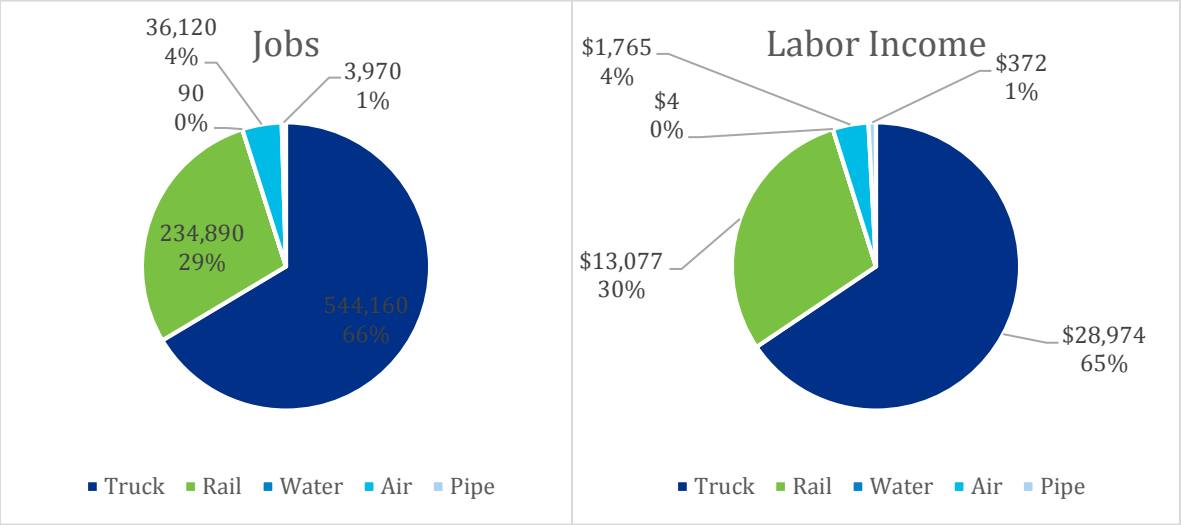
[5] Note that the indirect and induced impact types are often referred to, jointly, as multiplier impacts.

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



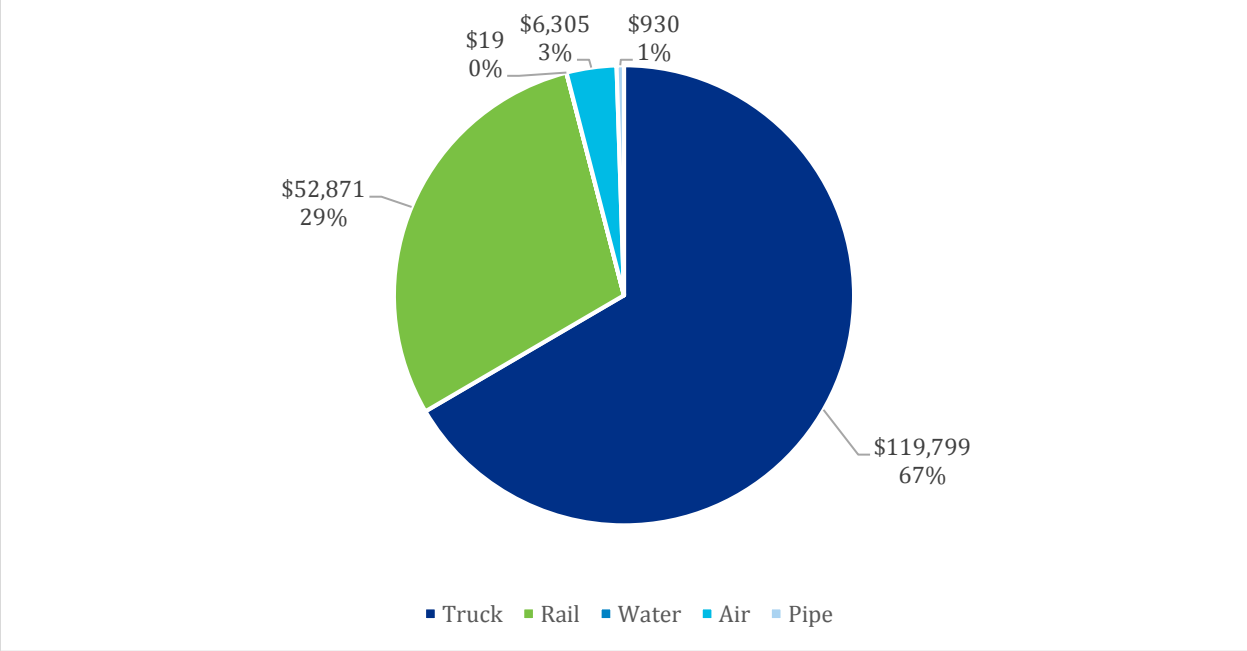
Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®.
Employment rounded to the nearest ten job-years; totals may not sum due to rounding.
Income estimates are in millions of 2014 dollars.

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

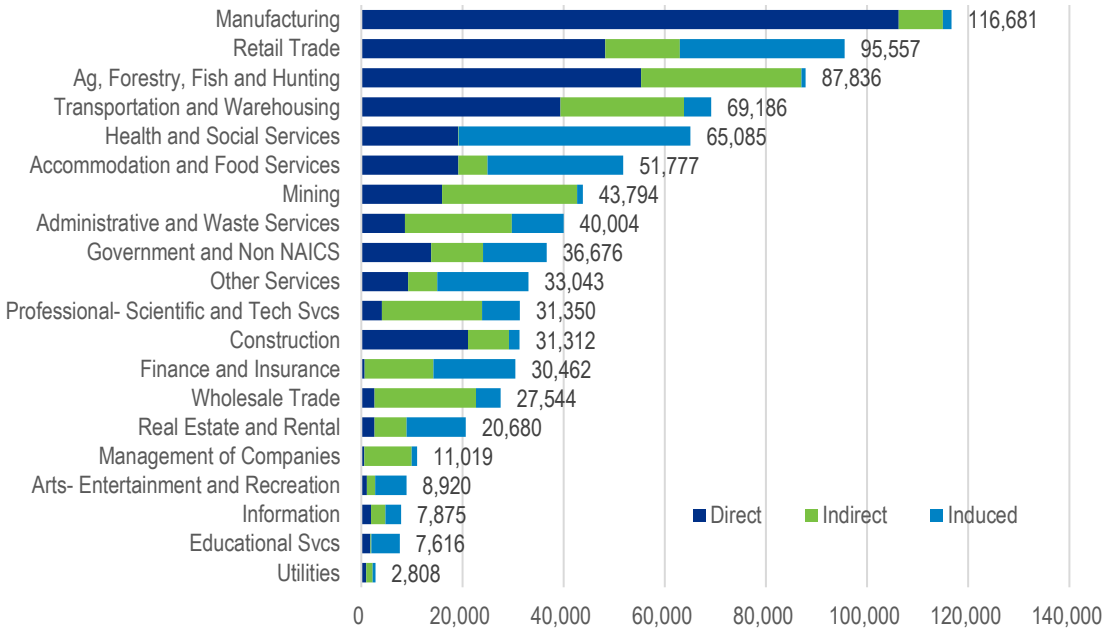


Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®.
Output estimates are in millions of 2014 dollars.

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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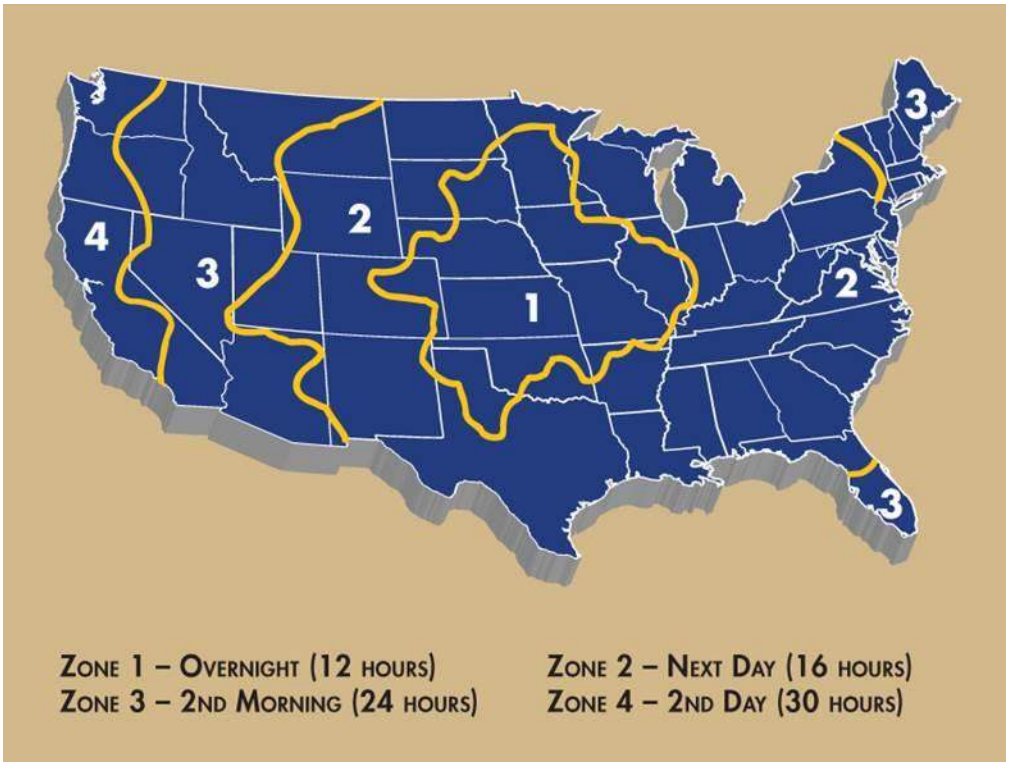
Chapter 3

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.

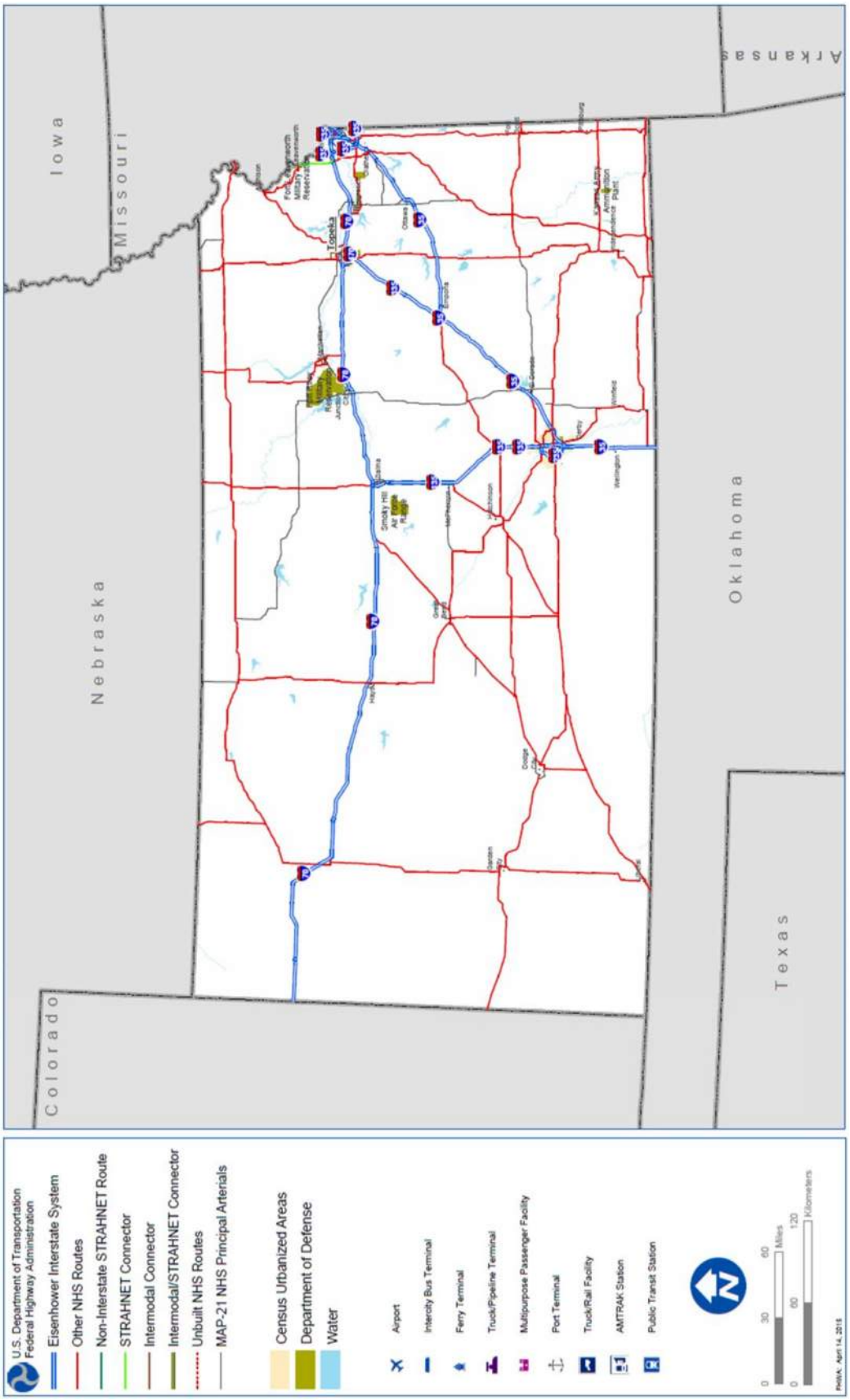


Figure 3.1: Kansas National Highway System

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.

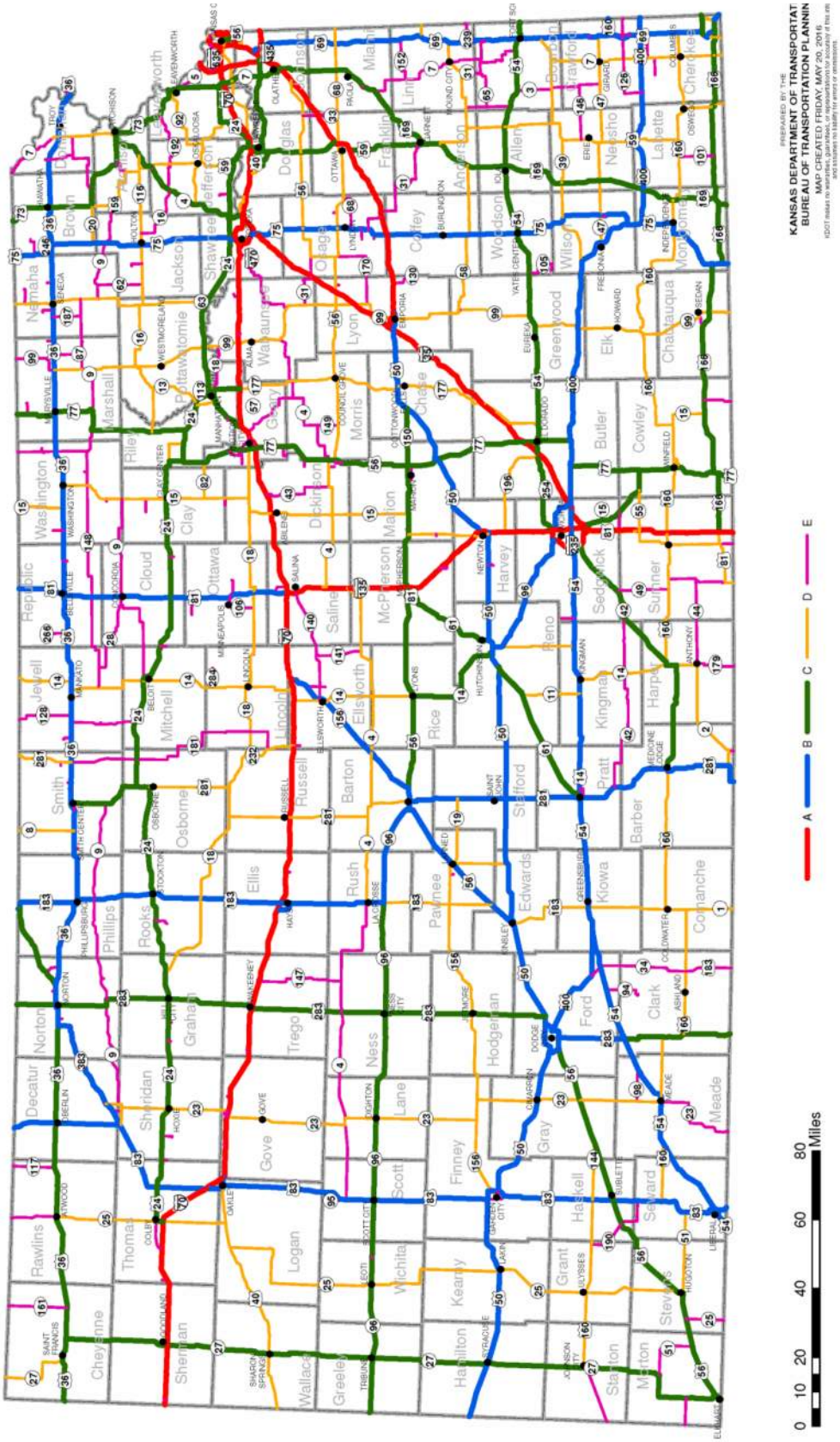


Figure 3.2: KDOT Route Classification System

Source: KDOT, 2015

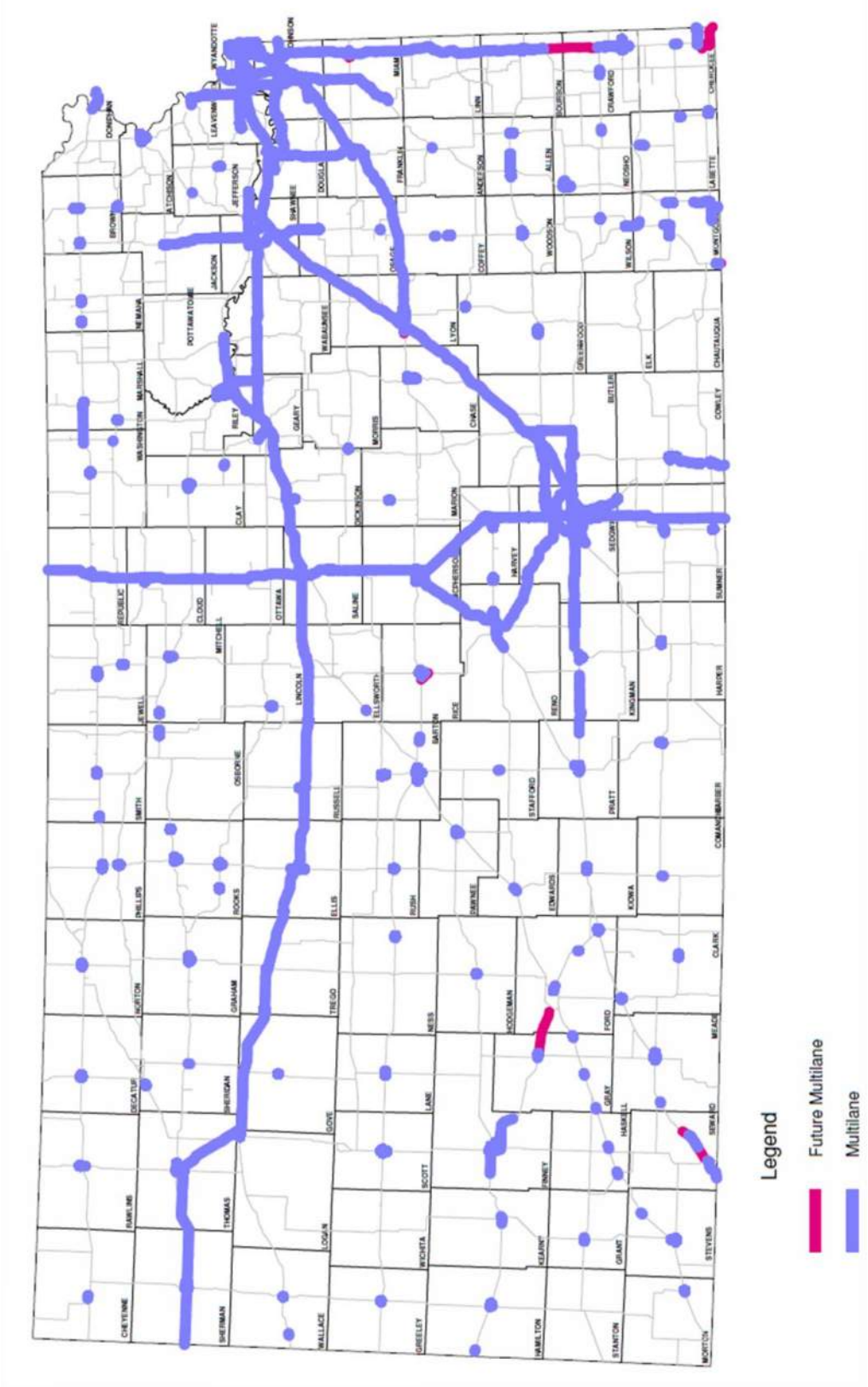


Figure 3.3: Roadways with Four or More Lanes

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.**

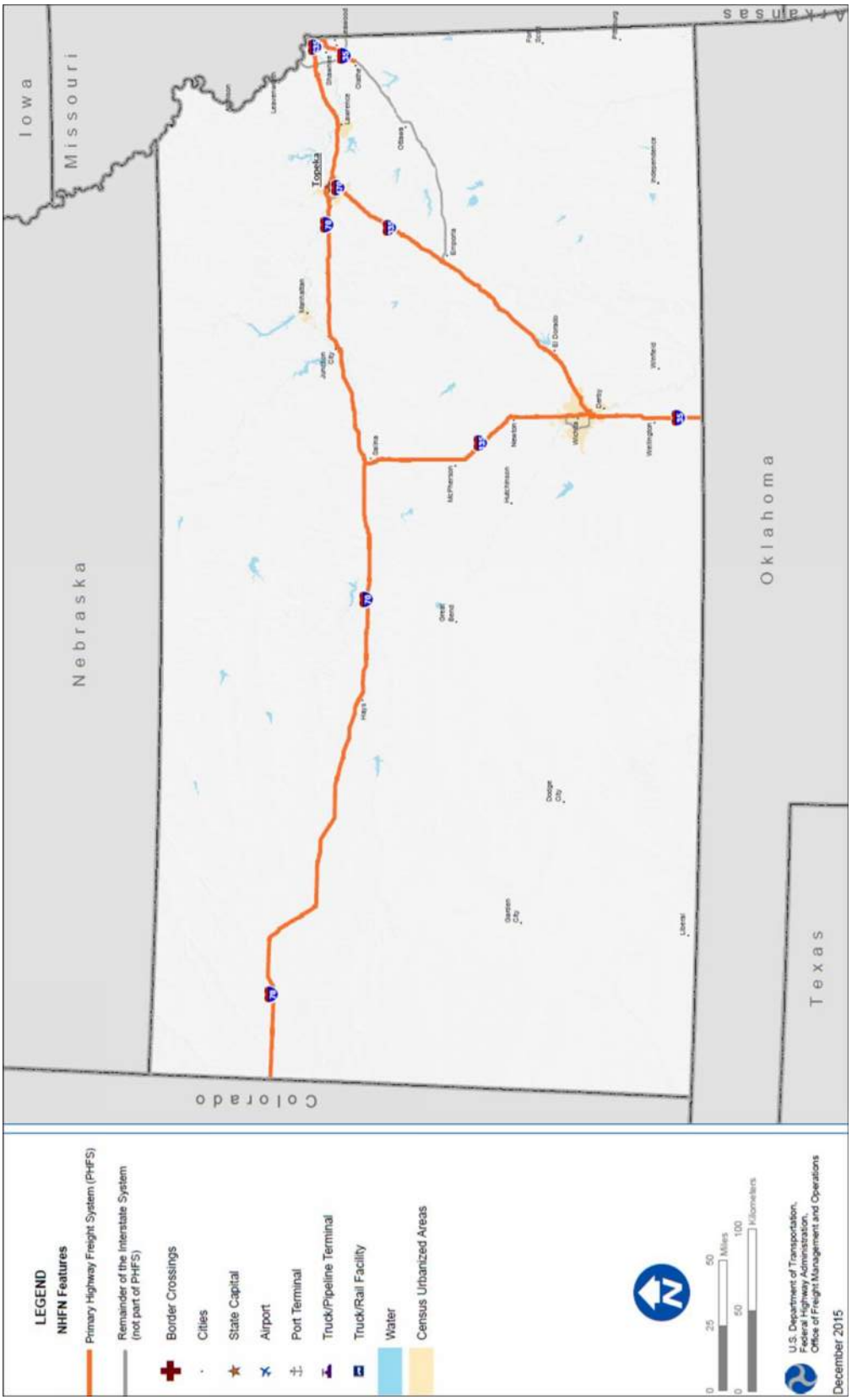


Figure 3.4: Kansas Primary Highway Freight Network

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**

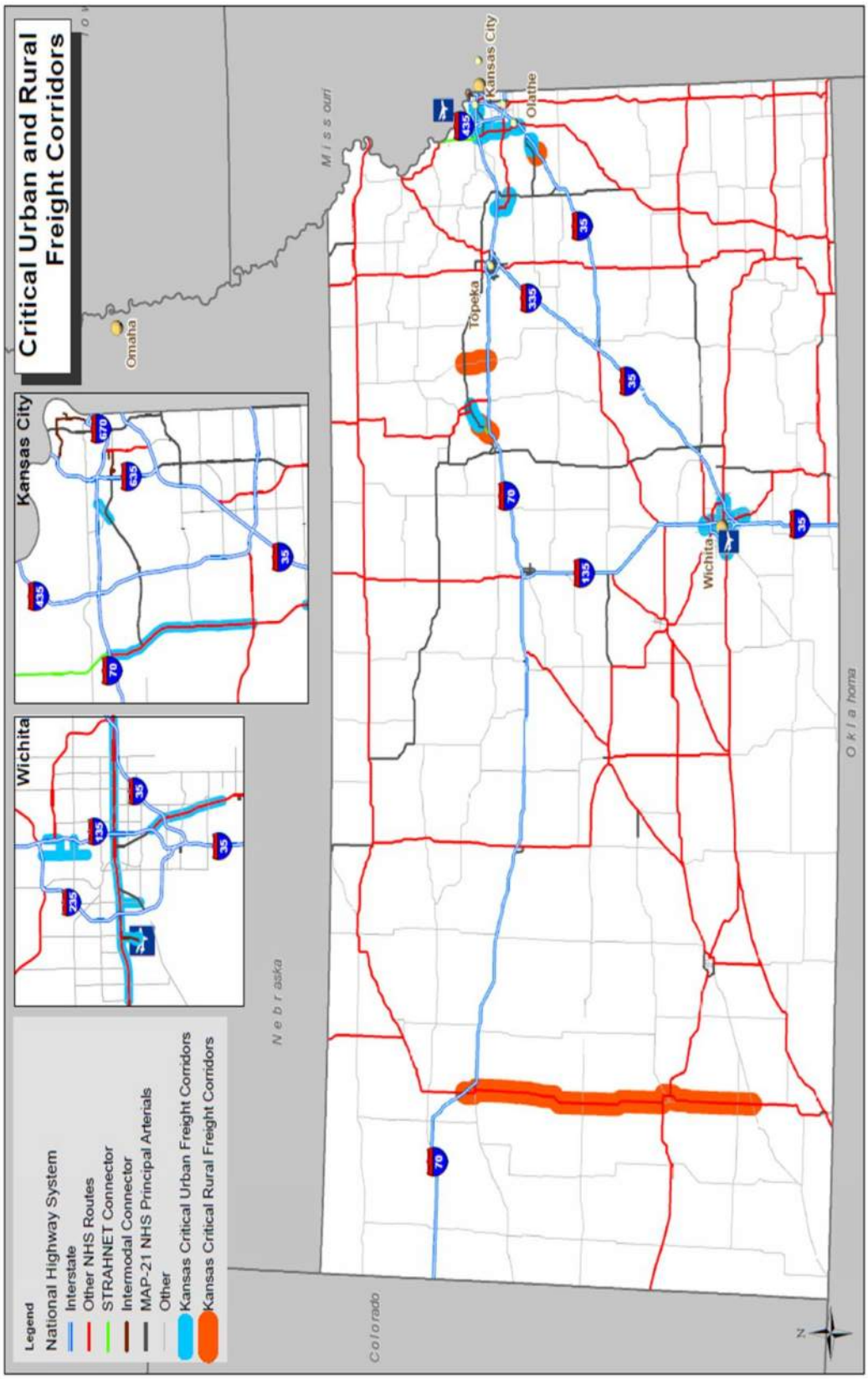


Figure 3.5: Kansas Critical Urban and Rural Freight Corridors

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

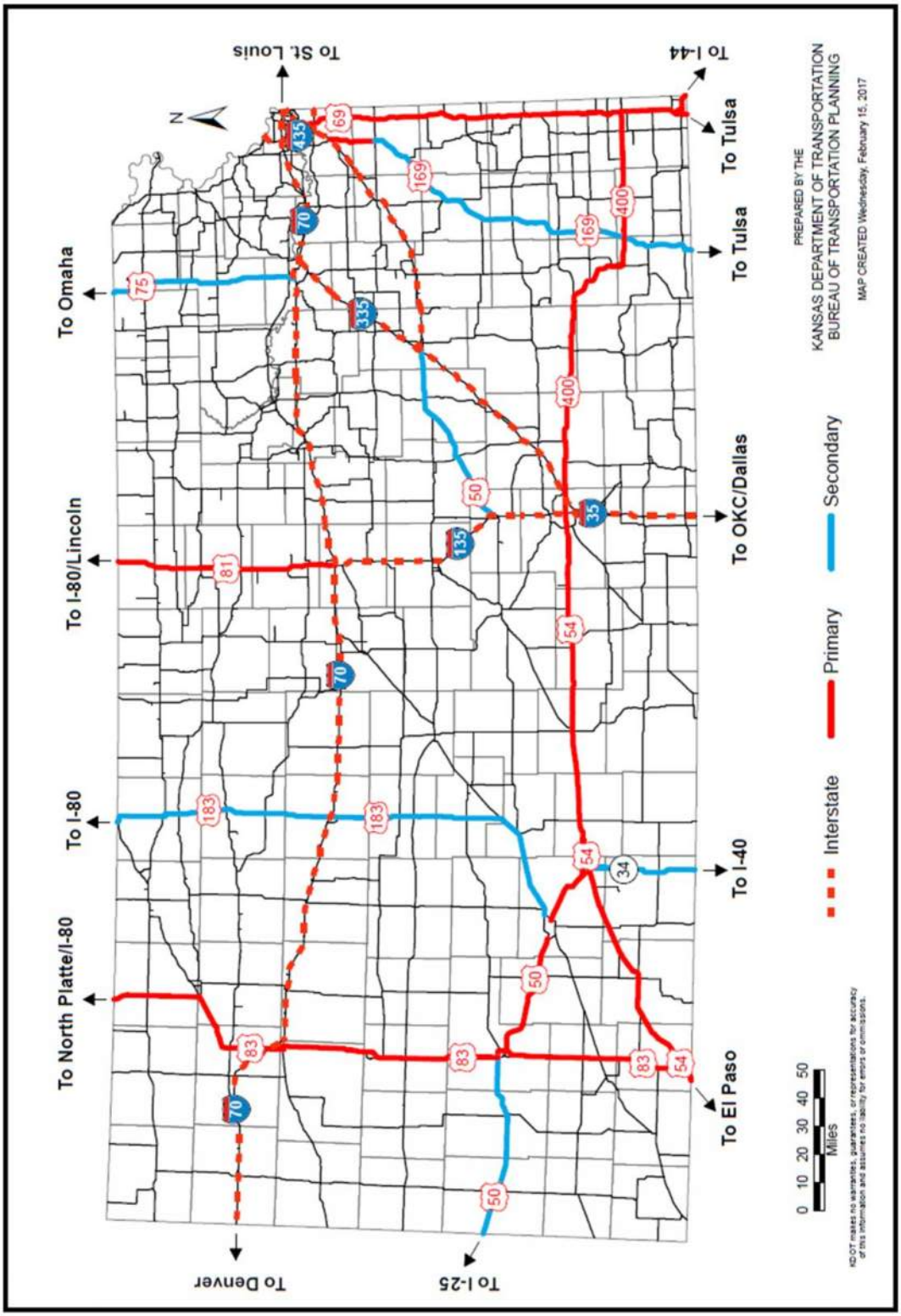


Figure 3.6: KDOT Corridors of Significance

Source: KDOT, 2017

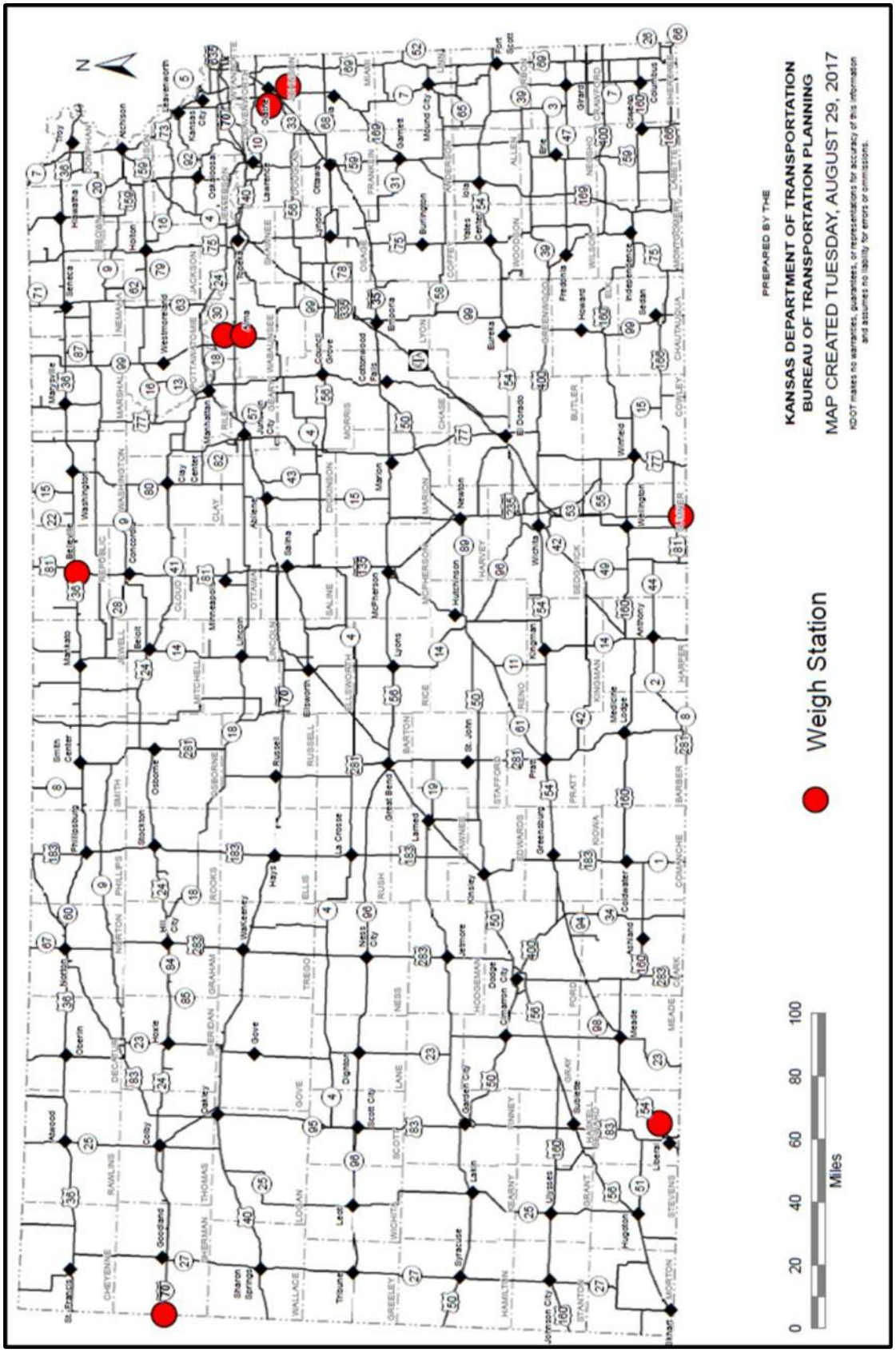


Figure 3.7: Weigh Station Locations

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.

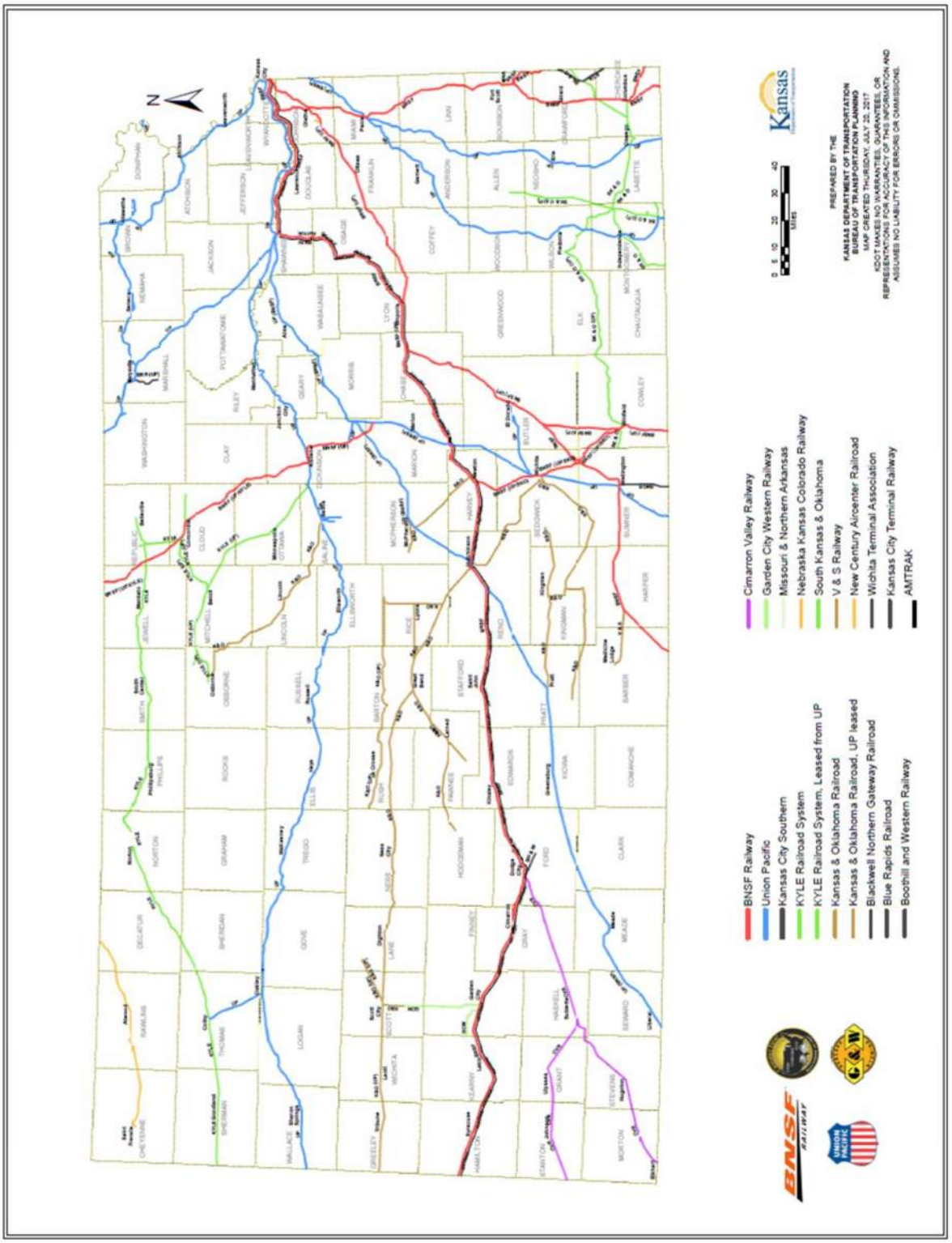


Figure 3.8: Kansas Freight Rail Network 2017

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.

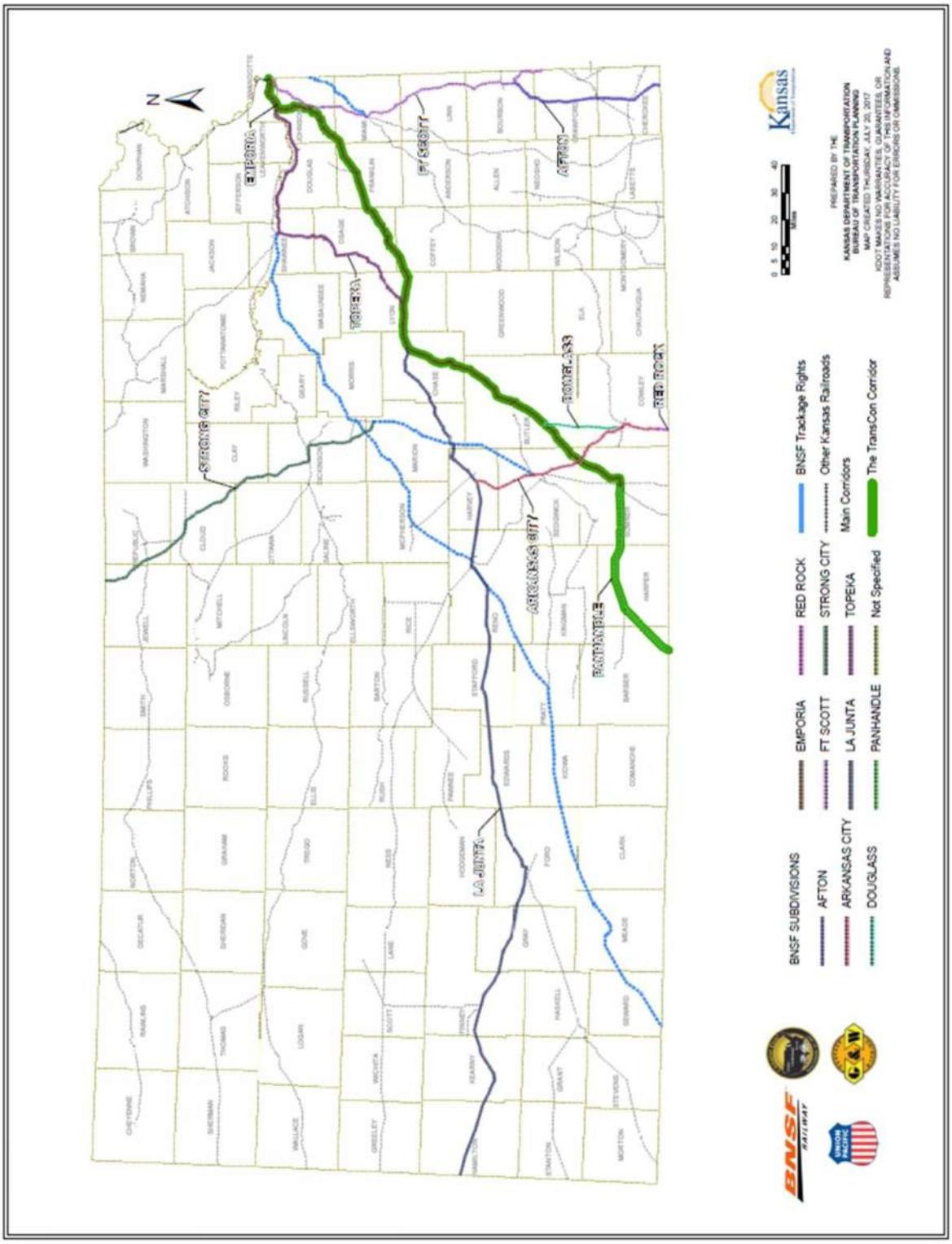


Figure 3.9: BNSF Rail Network in Kansas

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.

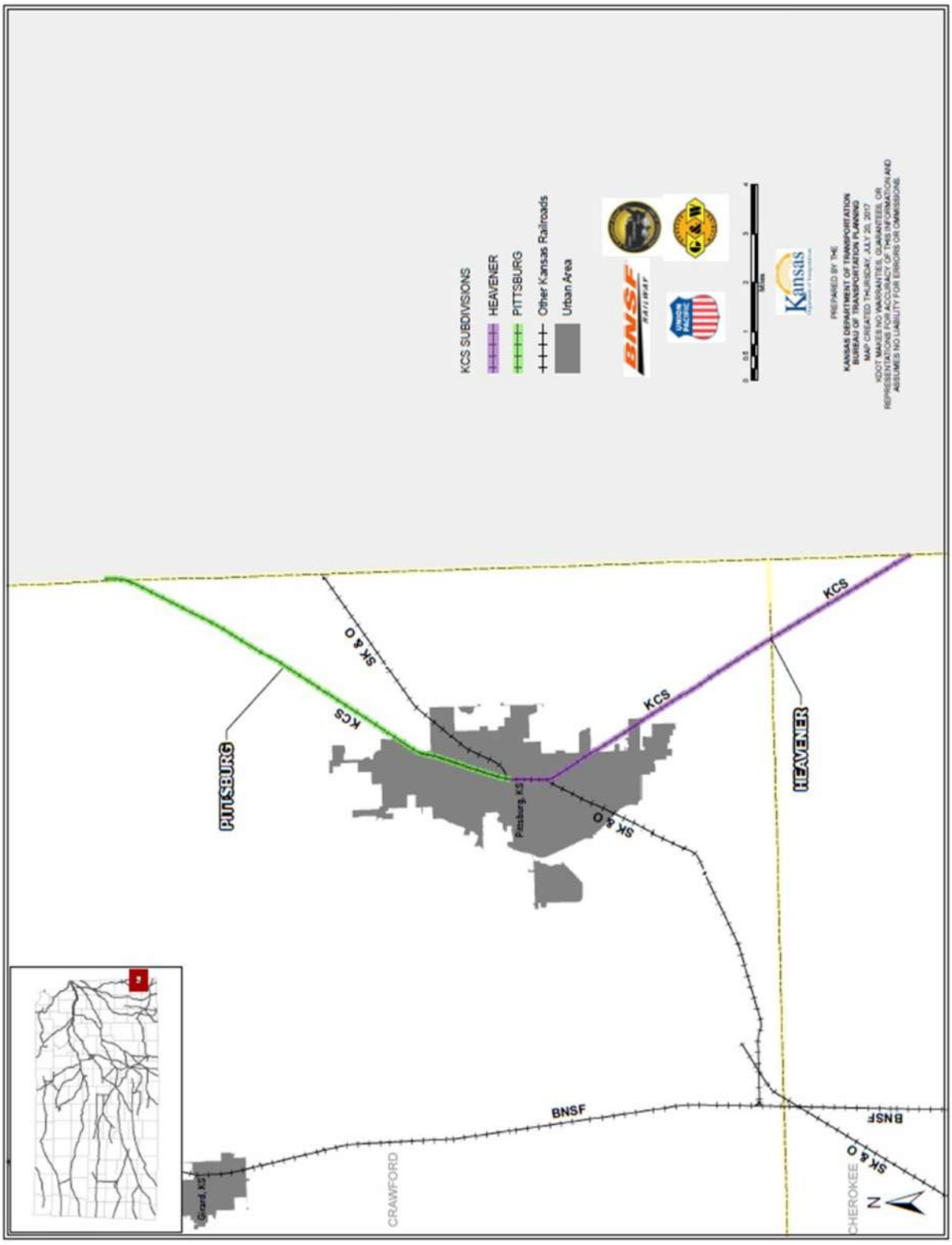


Figure 3.10: KCS Rail Network in Kansas

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.

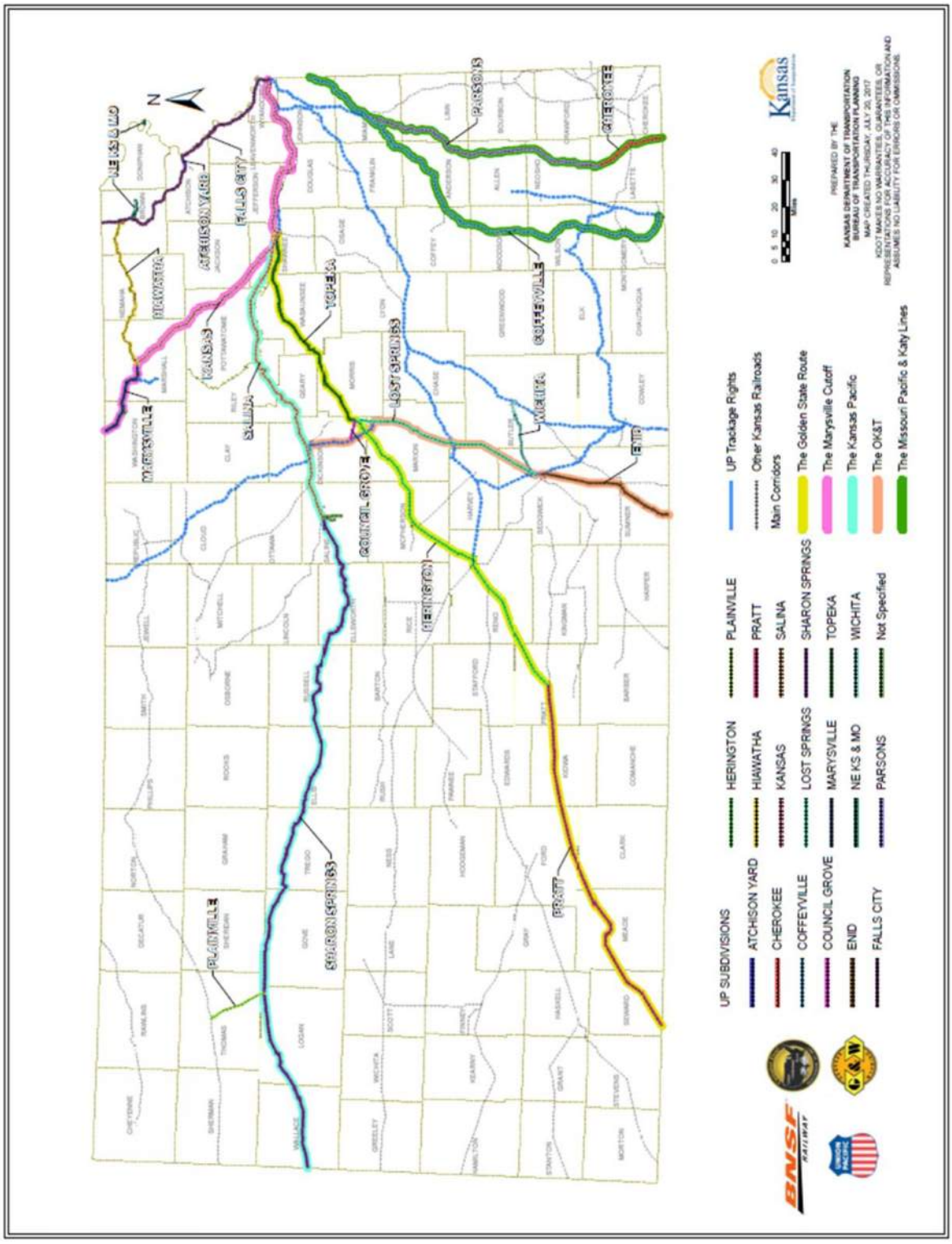


Figure 3.11: UP Rail Network in Kansas

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).

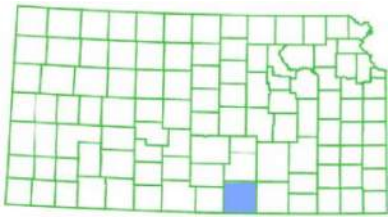
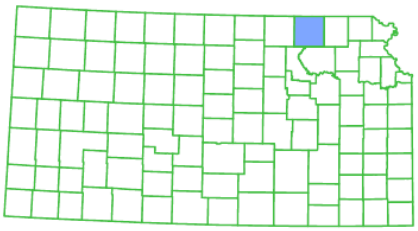


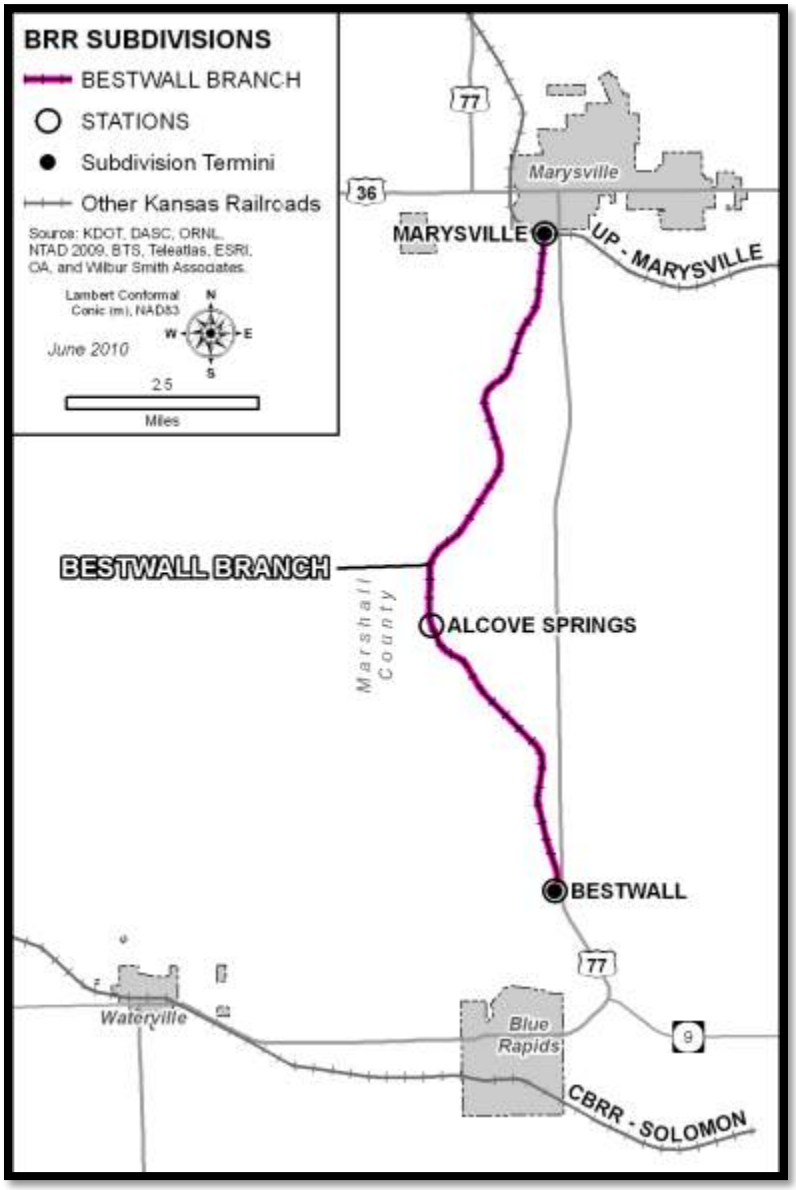
Figure 3.12: Blackwell Northern Gateway Rail Network in Kansas

3.3.2 Blue Rapids Railroad



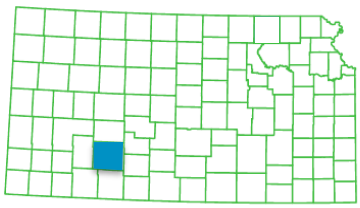
The Blue Rapids Railroad (BRRR) is a 10-mile line running south from Marysville to the Georgia Pacific Gypsum processing facility at Bestwall near Blue Rapids (**Figure** 3.13). The BRRR moves railcars loaded with industrial gypsum plaster from the plant to the rail yard in Marysville, and via Class 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



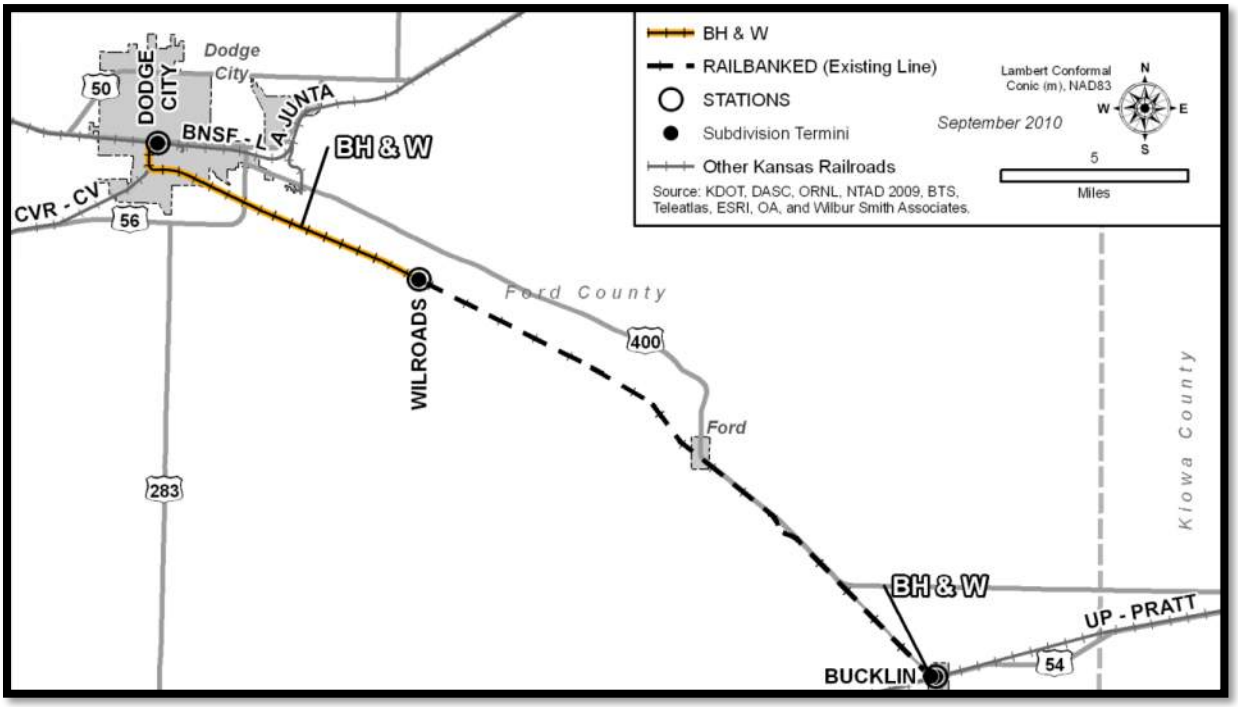
3.3.3 Boot Hill and Western Railway

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



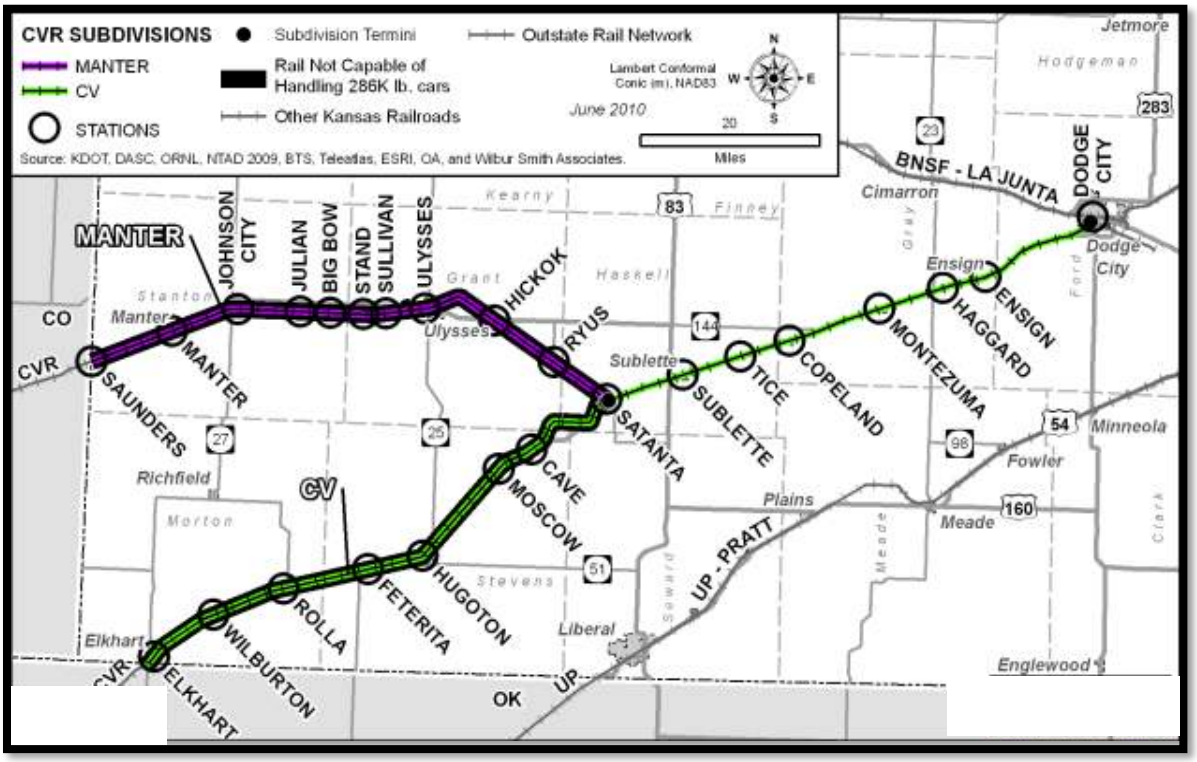
3.3.4 Cimarron Valley Railroad

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.

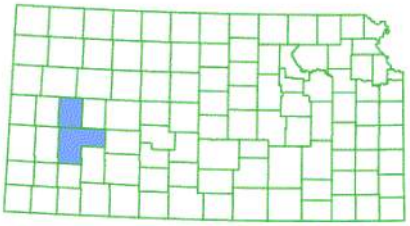
The CVR has 20 employees in Kansas and includes a car repair shop at Satanta, Kansas.

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



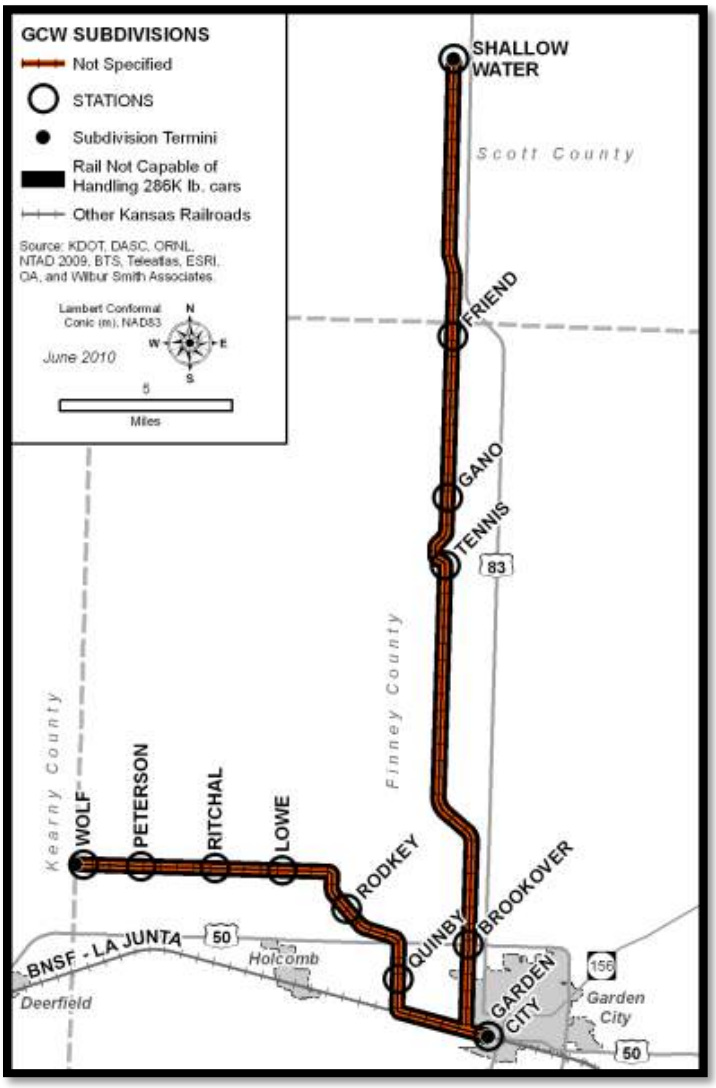
3.3.5 Garden City Western Railway, Inc.



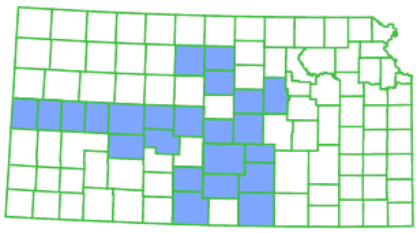
Garden City Western (GCW) has been in business since 1916, serving the agricultural market of southwestern Kansas by connecting Garden City to Wolf (**Figure** 3.16). The rail line's customers ship grain (wheat and milo), farm equipment, feeding ingredients, molasses, peanut meal, fertilizers, frozen 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 98 employees in Kansas.

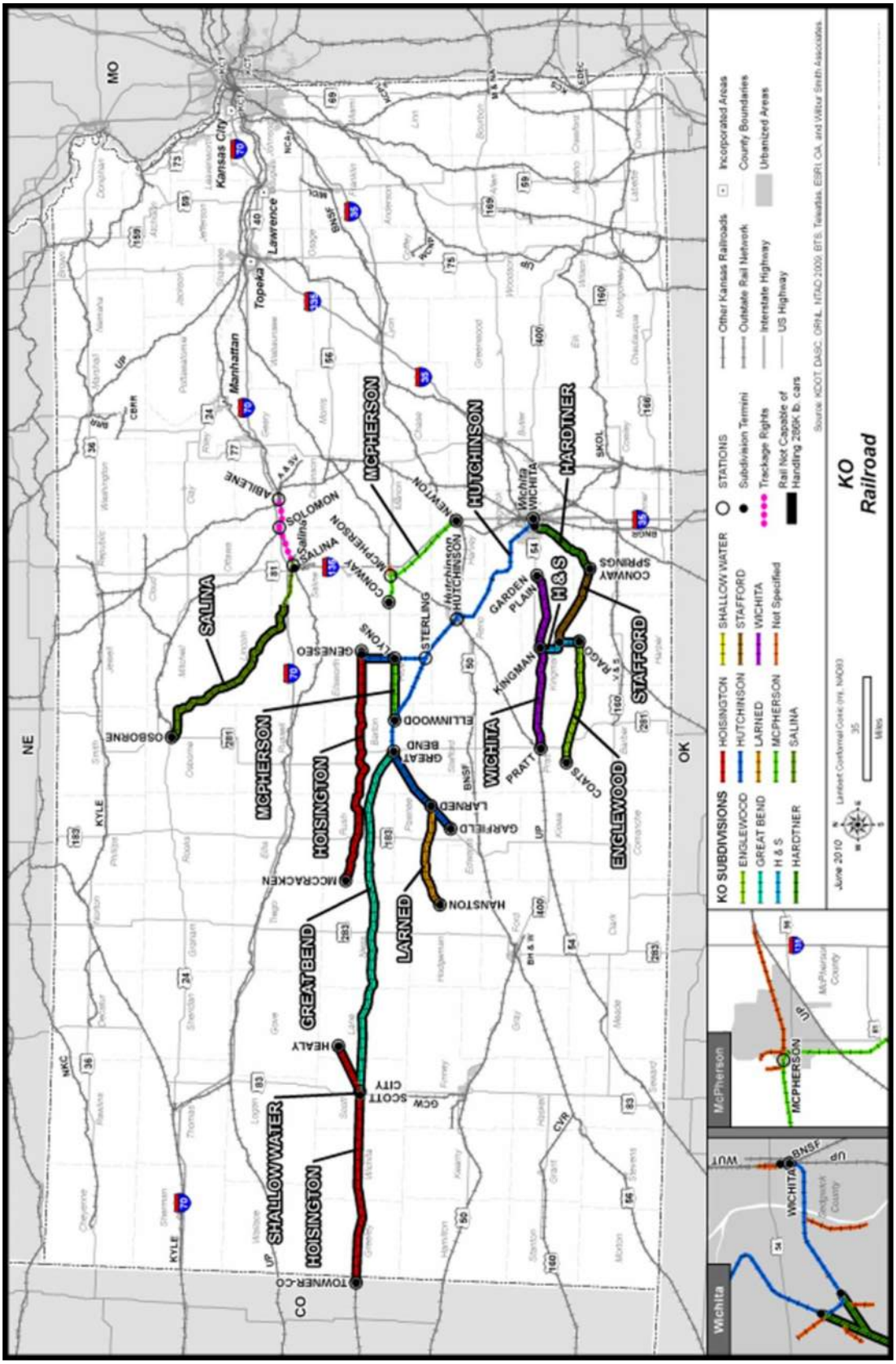
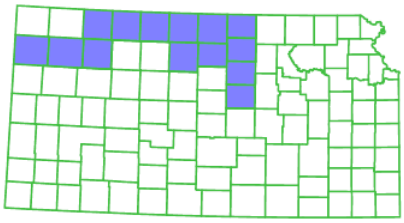


Figure 3.17: Kansas and Oklahoma Rail Network in Kansas

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.

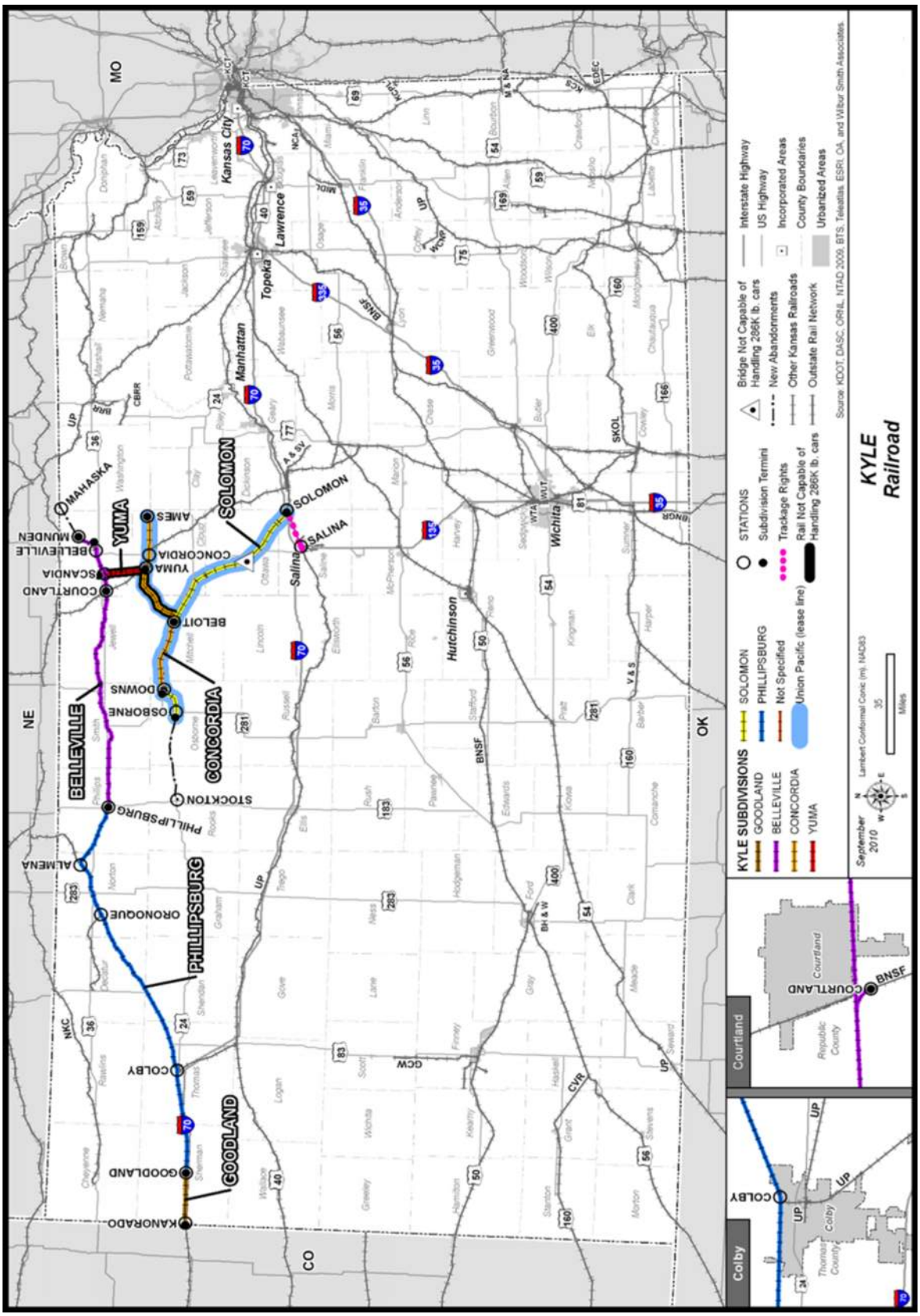
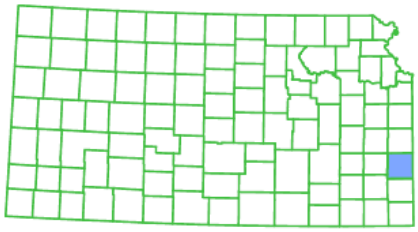


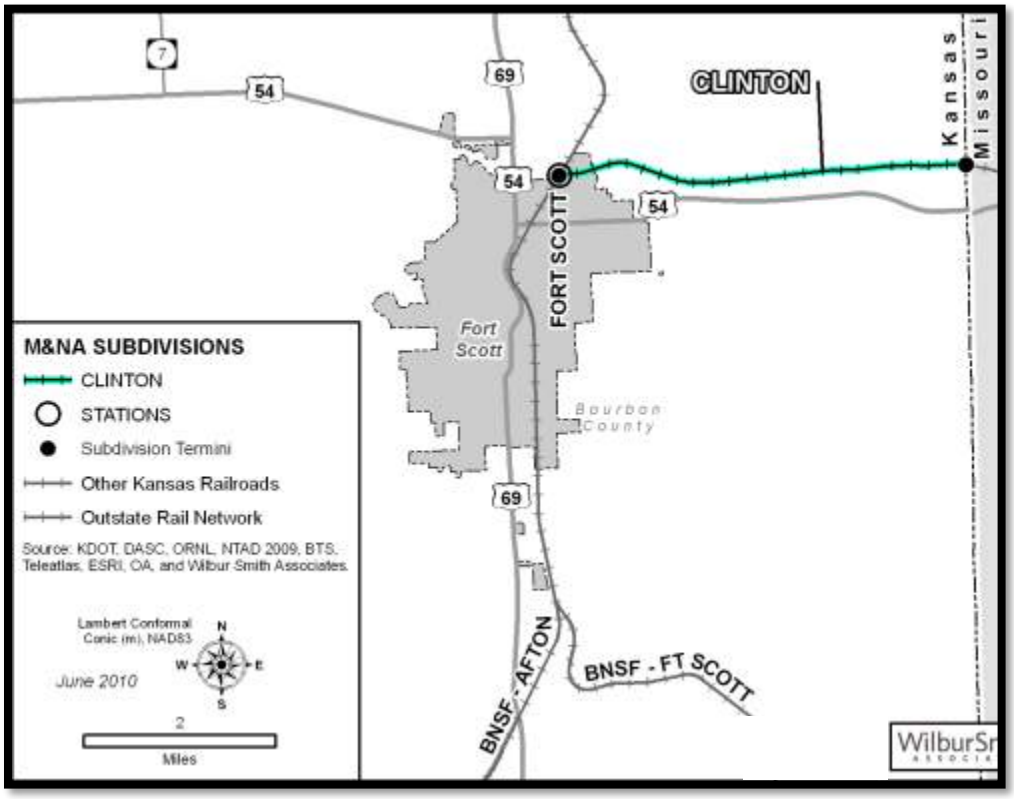
Figure 3.18: Kyle Rail Network in Kansas

3.3.8 Missouri and Northern Arkansas Railroad

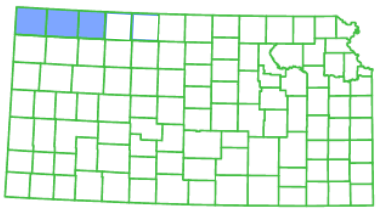


The Missouri and Northern Arkansas Railroad (M&NA), owned by Genesee and Wyoming (GW), located in Darien, CT, leases eight miles of UP line in Kansas (**Figure** 3.19). Currently there is no freight moving on this line, which lies between Fort Scott, Kansas, and the state line a few miles to the west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

Figure 3.19: Missouri and Northern Arkansas Rail Network

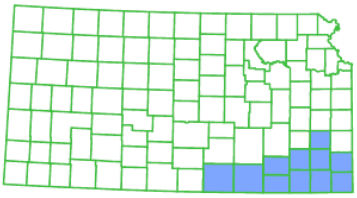


3.3.9 Nebraska Kansas Colorado Railroad



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.

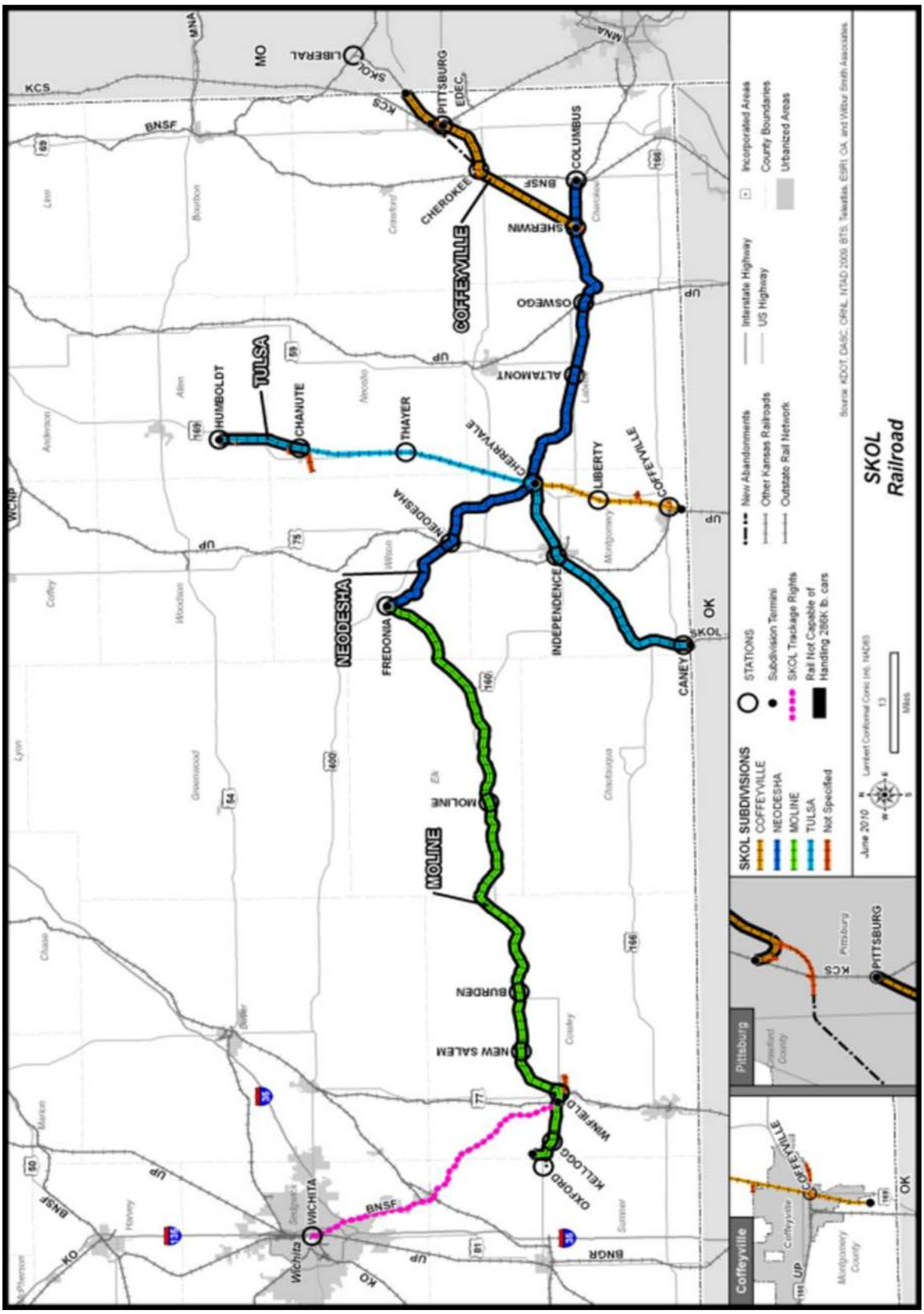
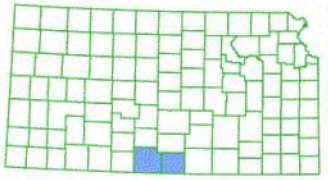
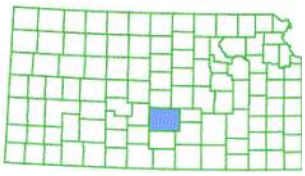


Figure 3.20: South Kansas and Oklahoma Rail Network in Kansas

3.3.11 V&S Railway LLC

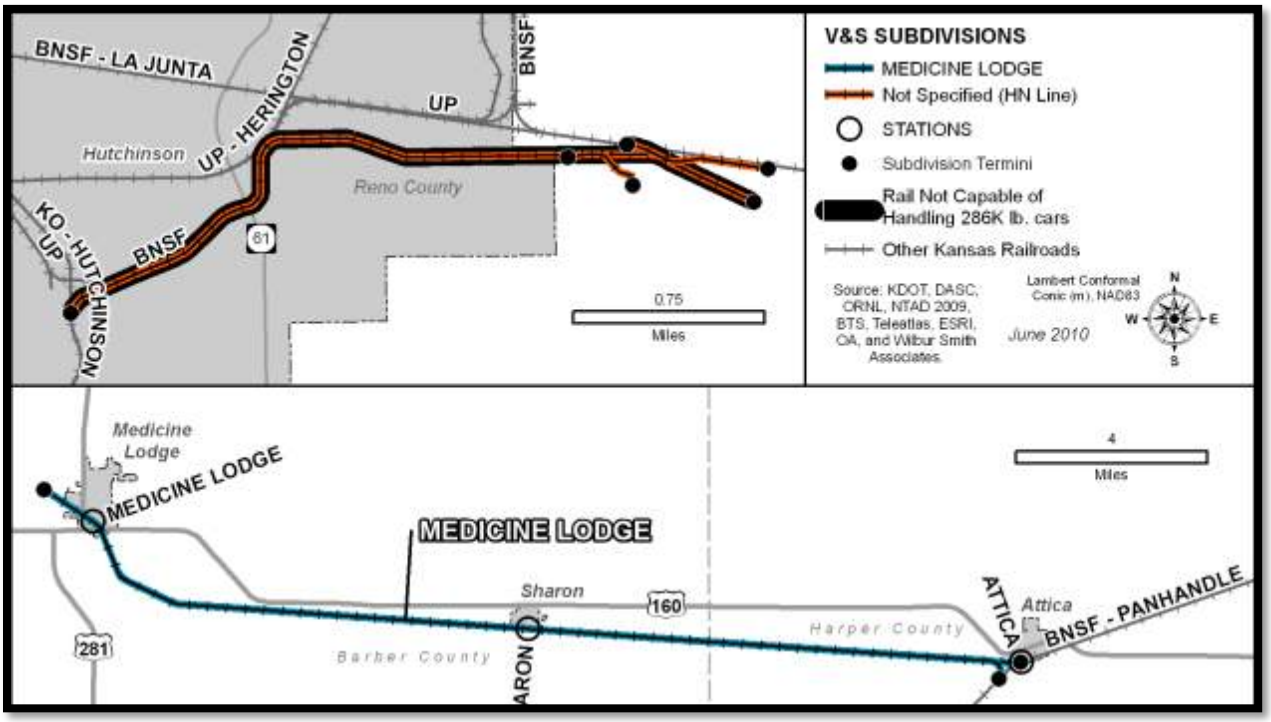




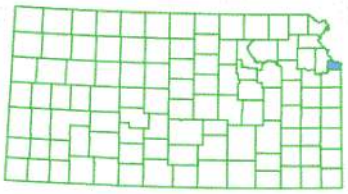
V&S Railway operates two separate rail lines in Kansas (**Figure** 3.21). It has a 21.5 mile line that is located in Barber and Harper Counties between the cities of Attica and Medicine Lodge. The second line is 3.5 miles long and is located in Hutchinson. The V & S Railway connects with the BNSF Railway 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



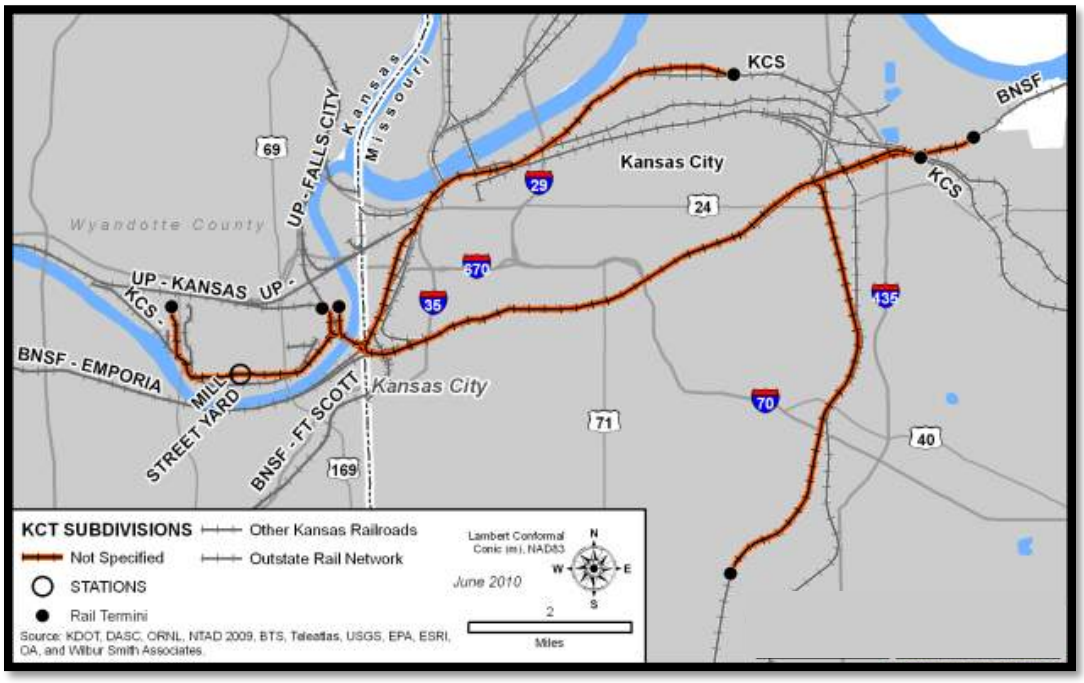
3.3.12 Kansas City Terminal Railway Company



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

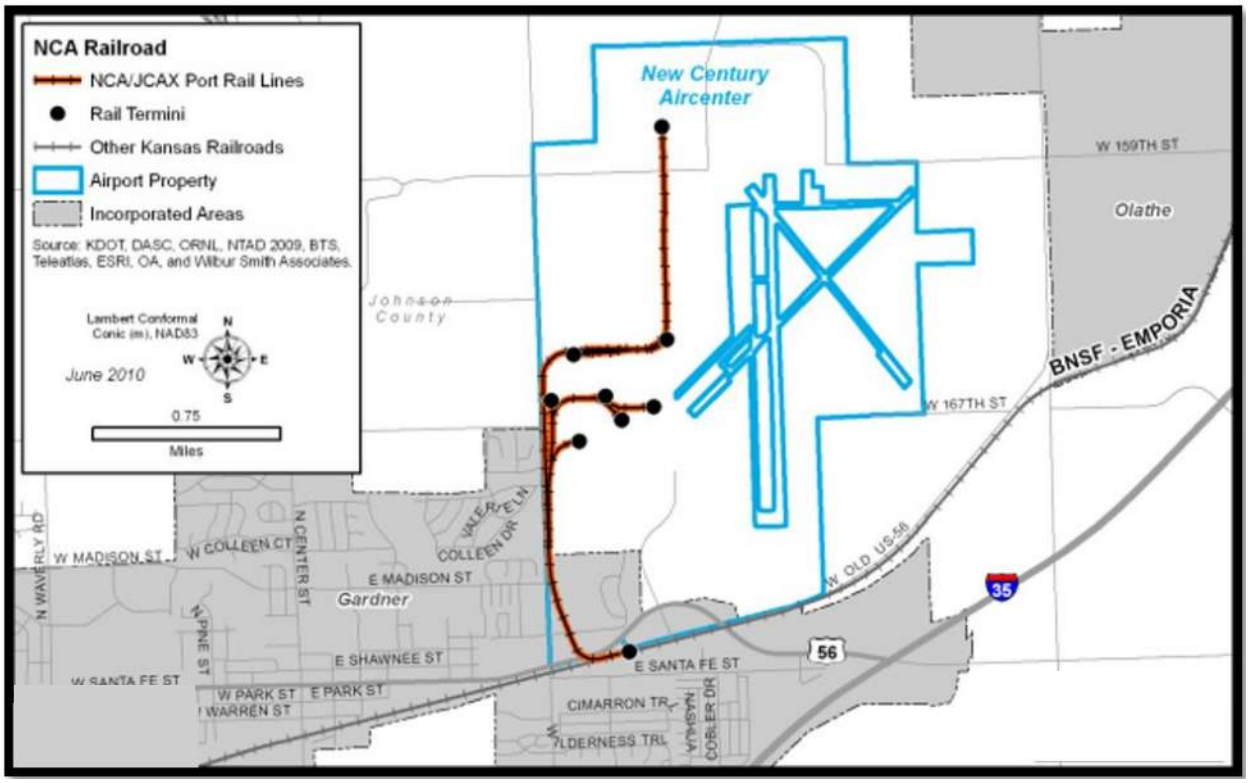


3.3.13 New Century AirCenter Railroad

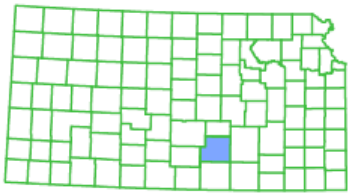
New Century AirCenter is a 2,300-acre inland port located along the I-35 NAFTA corridor with five miles of rail lines (**Figure** 3.23). Rail service is provided by the New Century AirCenter Railroad (NCA), owned by Johnson County (KS), and interchanges with the BNSF Railway.

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 Termnal.

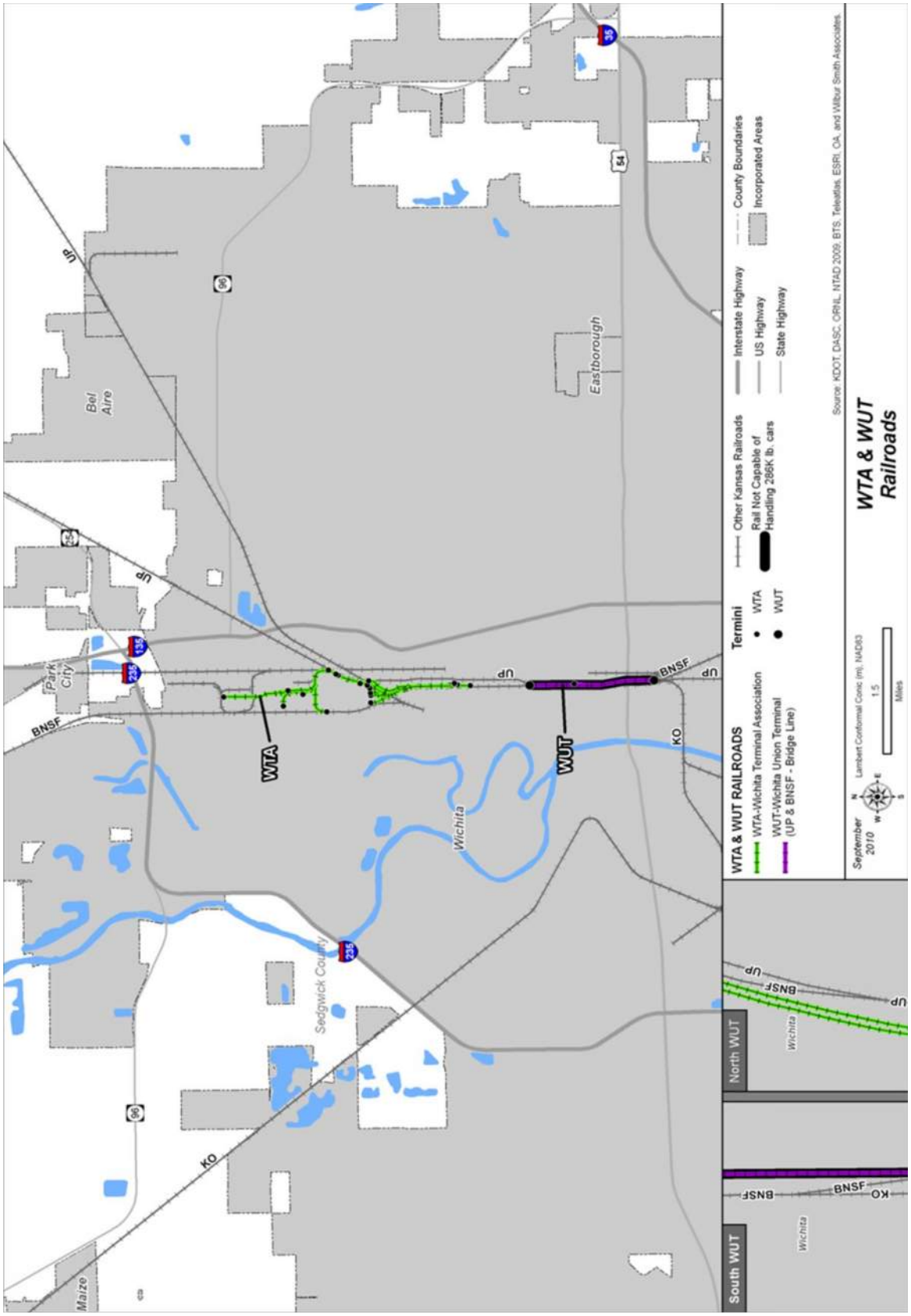


Figure 3.24: Wichita Terminal Association Rail Network in Kansas

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 Missouri 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 – Atchinson 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.

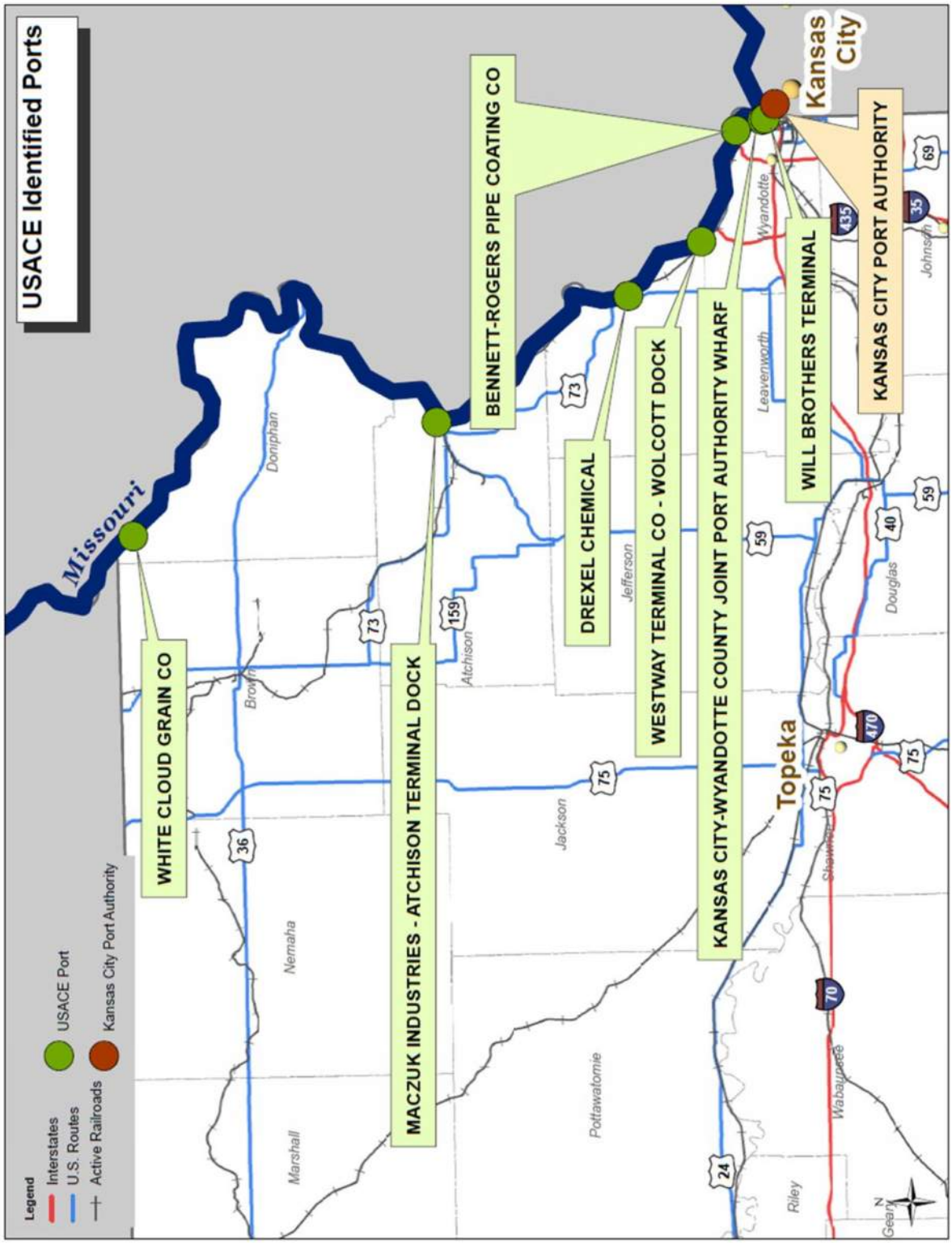


Figure 3.25: Kansas River Ports

Source: CDM Smith, USACE data

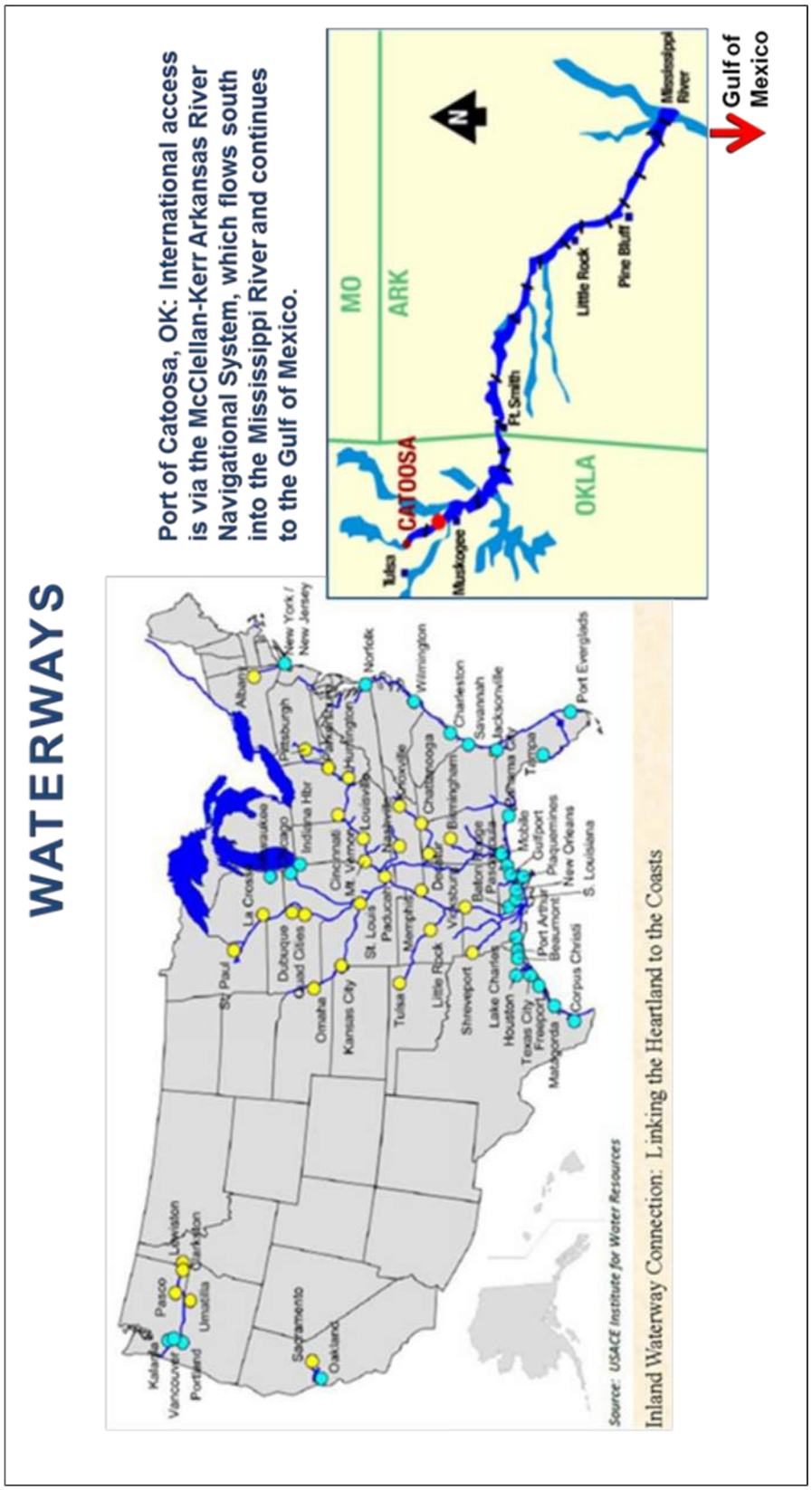


Figure 3.26: Port of Catoosa

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/

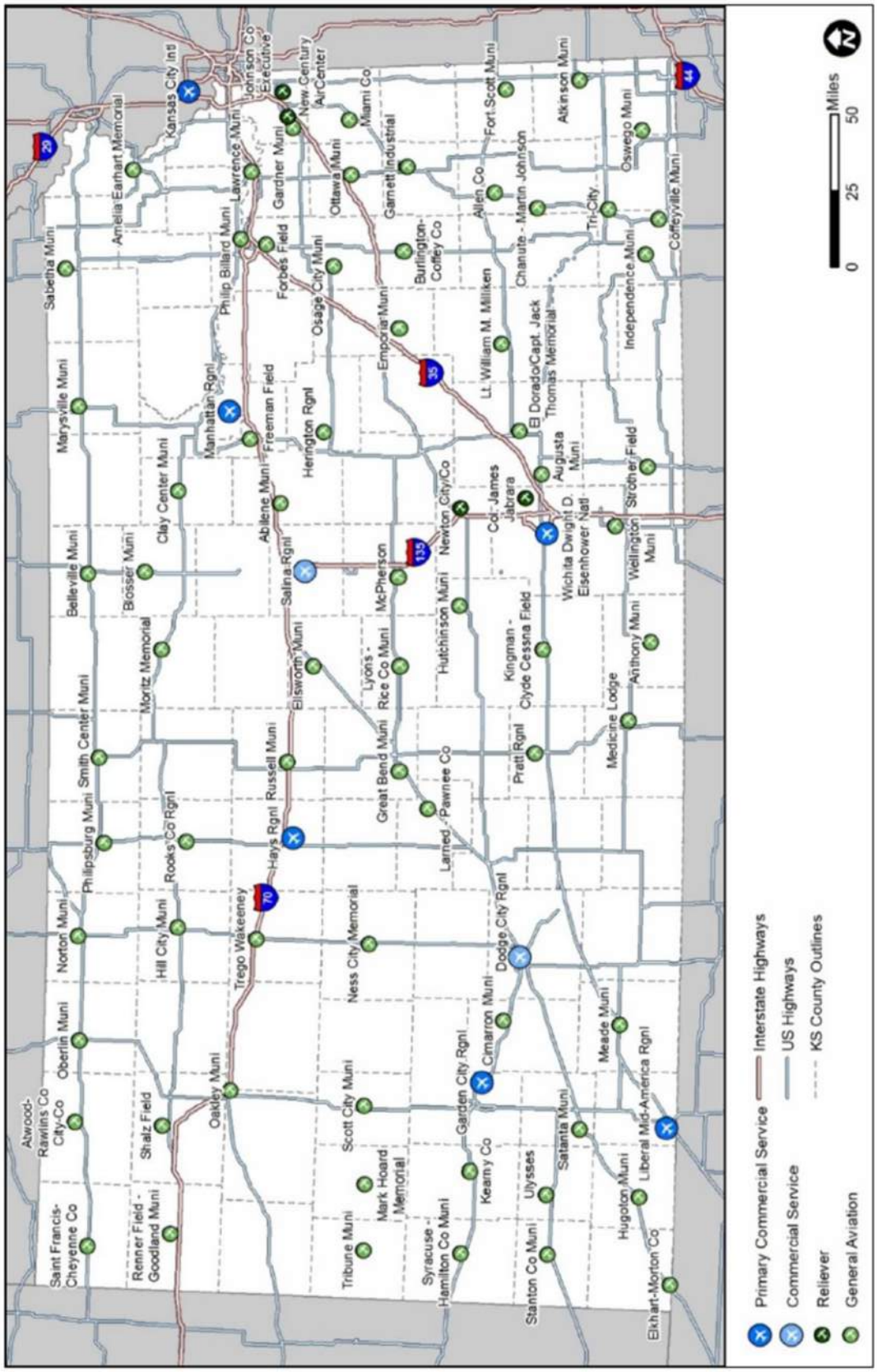


Figure 3.27: Kansas Aviation System Plan Airports

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

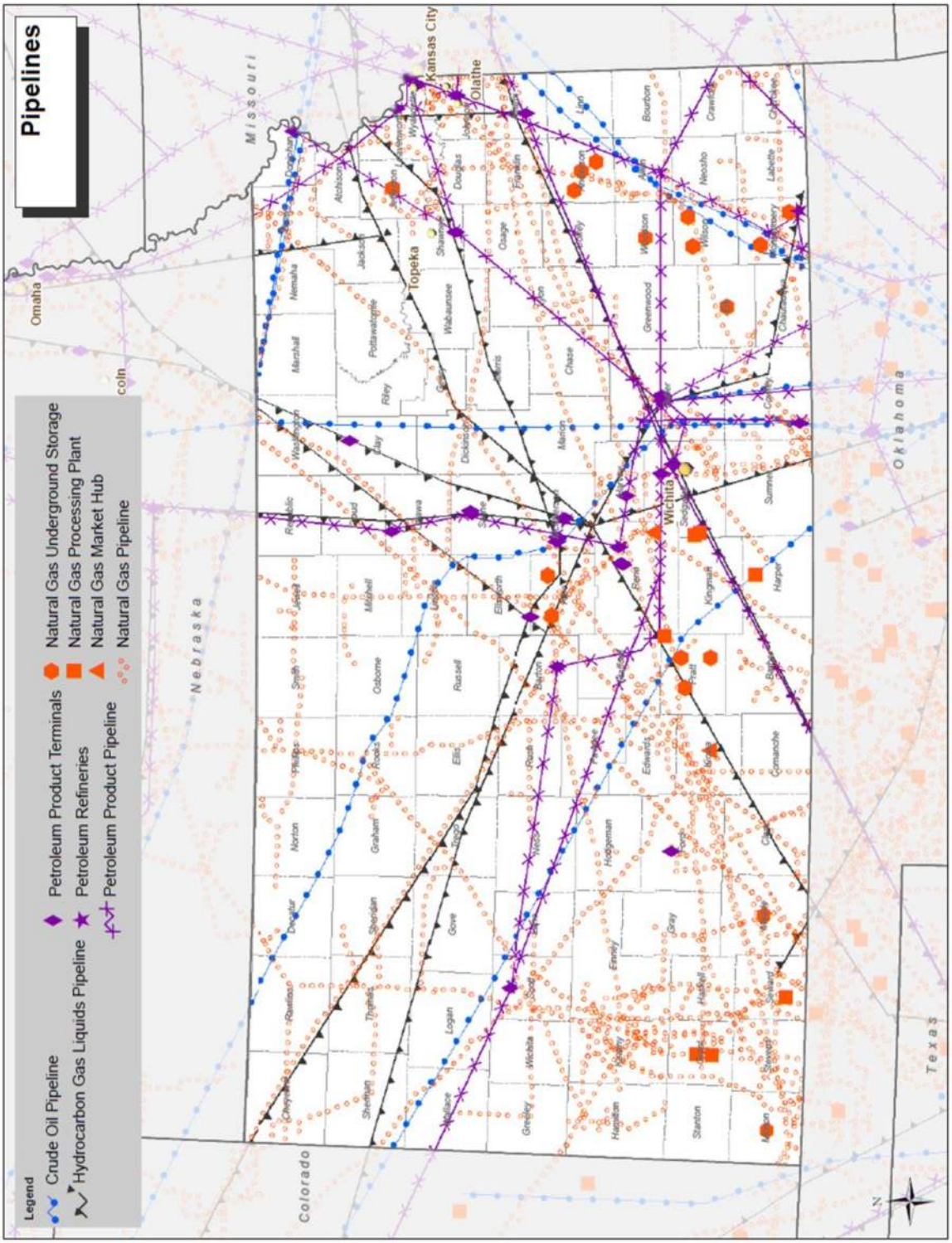


Figure 3.28: Major Pipelines in Kansas

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.

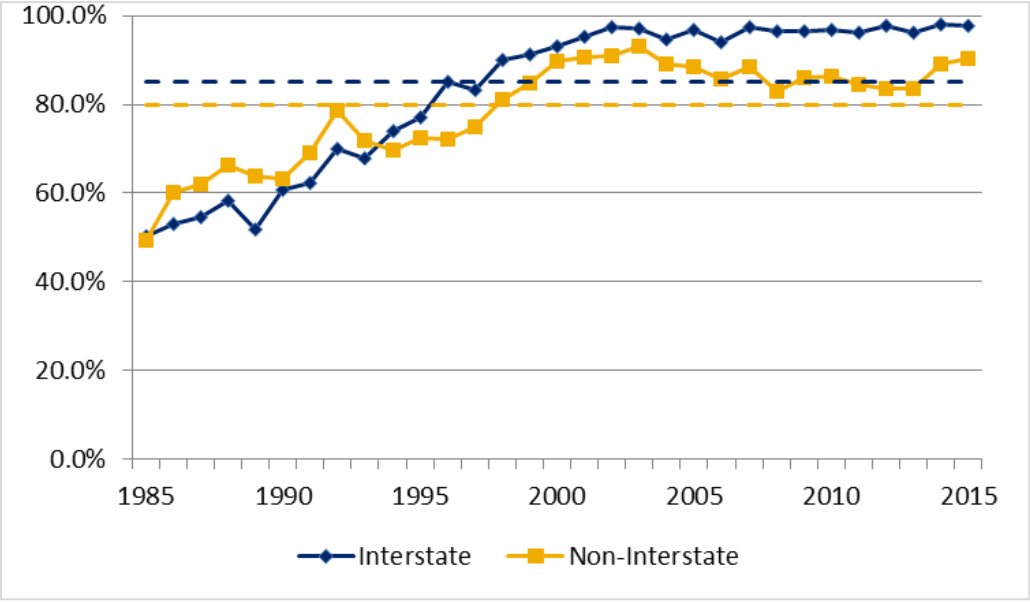
4.1 Highway

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

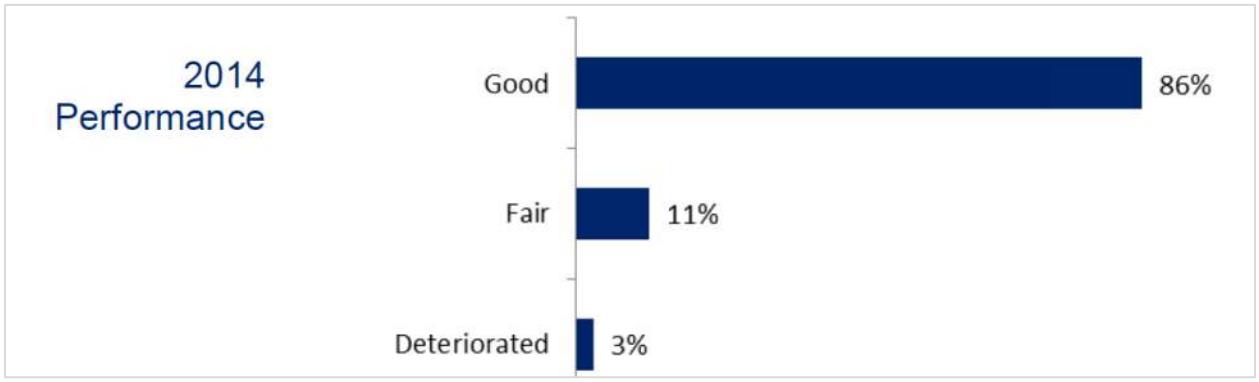


Source: KDOT Performance Measures, 2015

[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**.

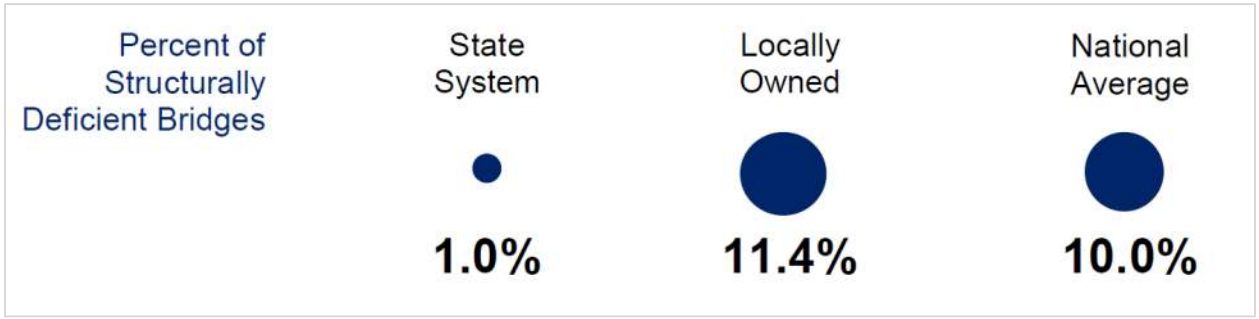
Figure 4.2: Kansas Bridge Performance Conditions



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 (OS/OW) 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.**

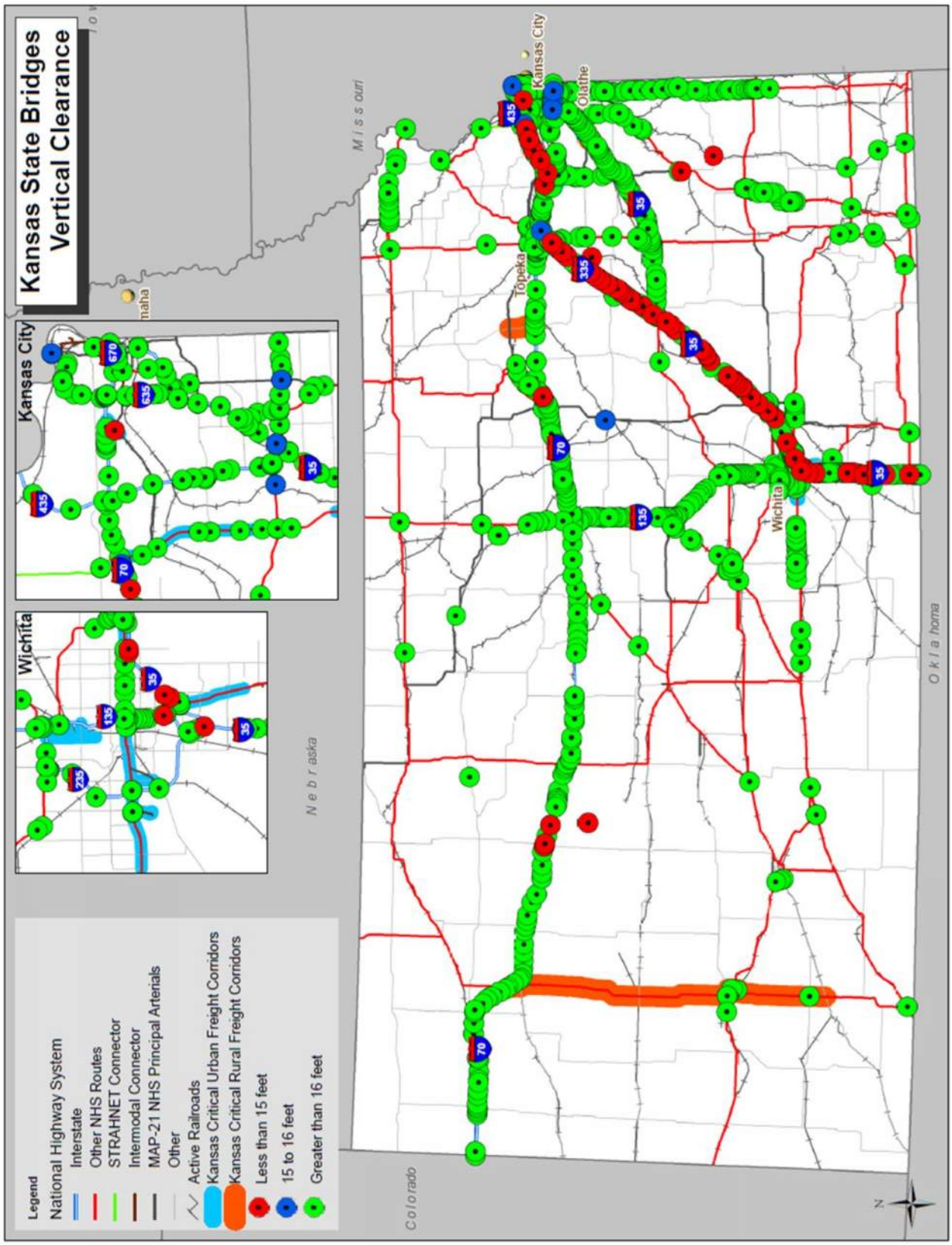


Figure 4.4: Vertical Clearances of Bridges in Kansas

Source: KDOT, 2016

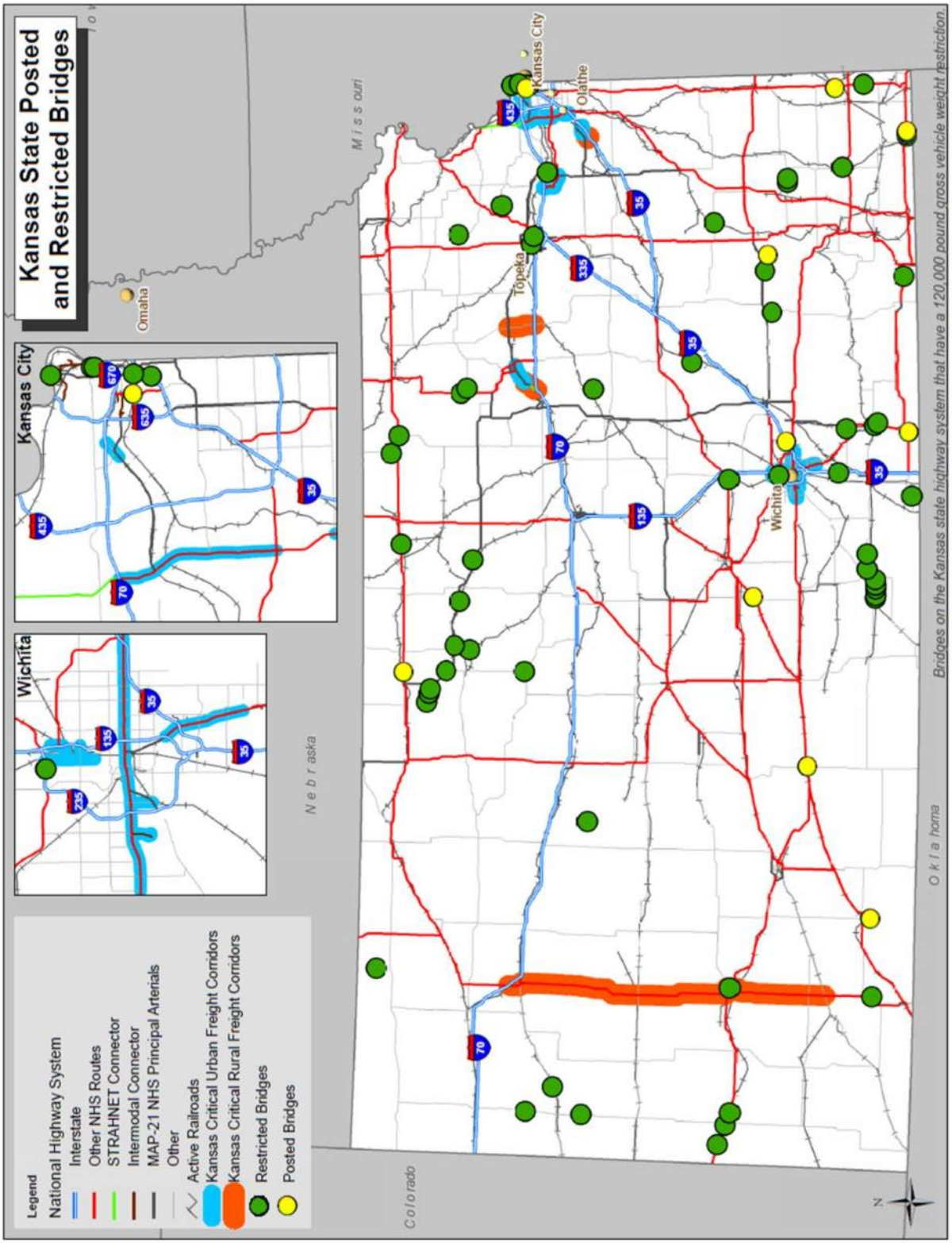


Figure 4.5: Posted and Restricted Bridges in Kansas

Source: KDOT, 2017

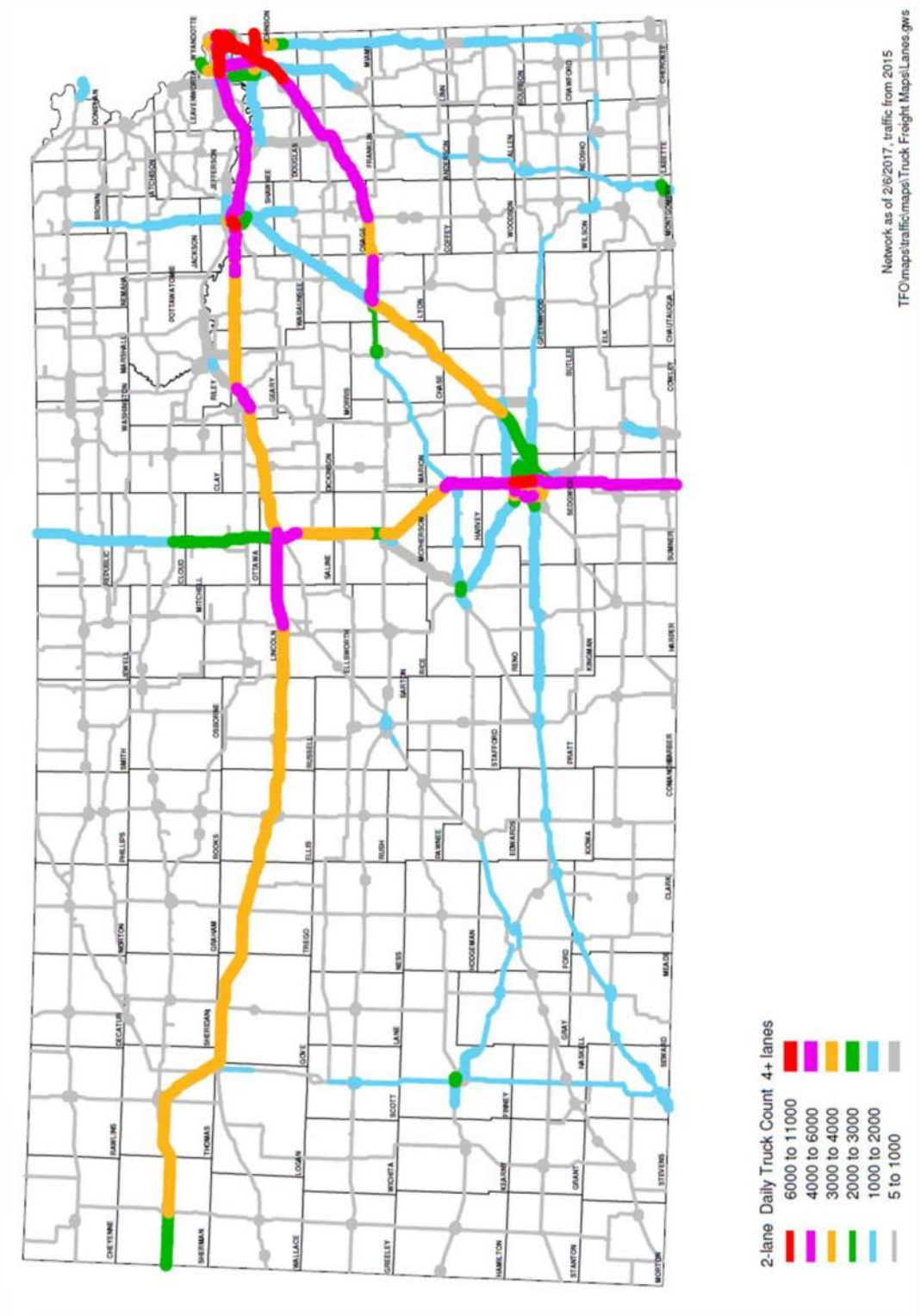


Figure 4.6: Truck Volumes by Number of Lanes

Source: KDOT, 2017

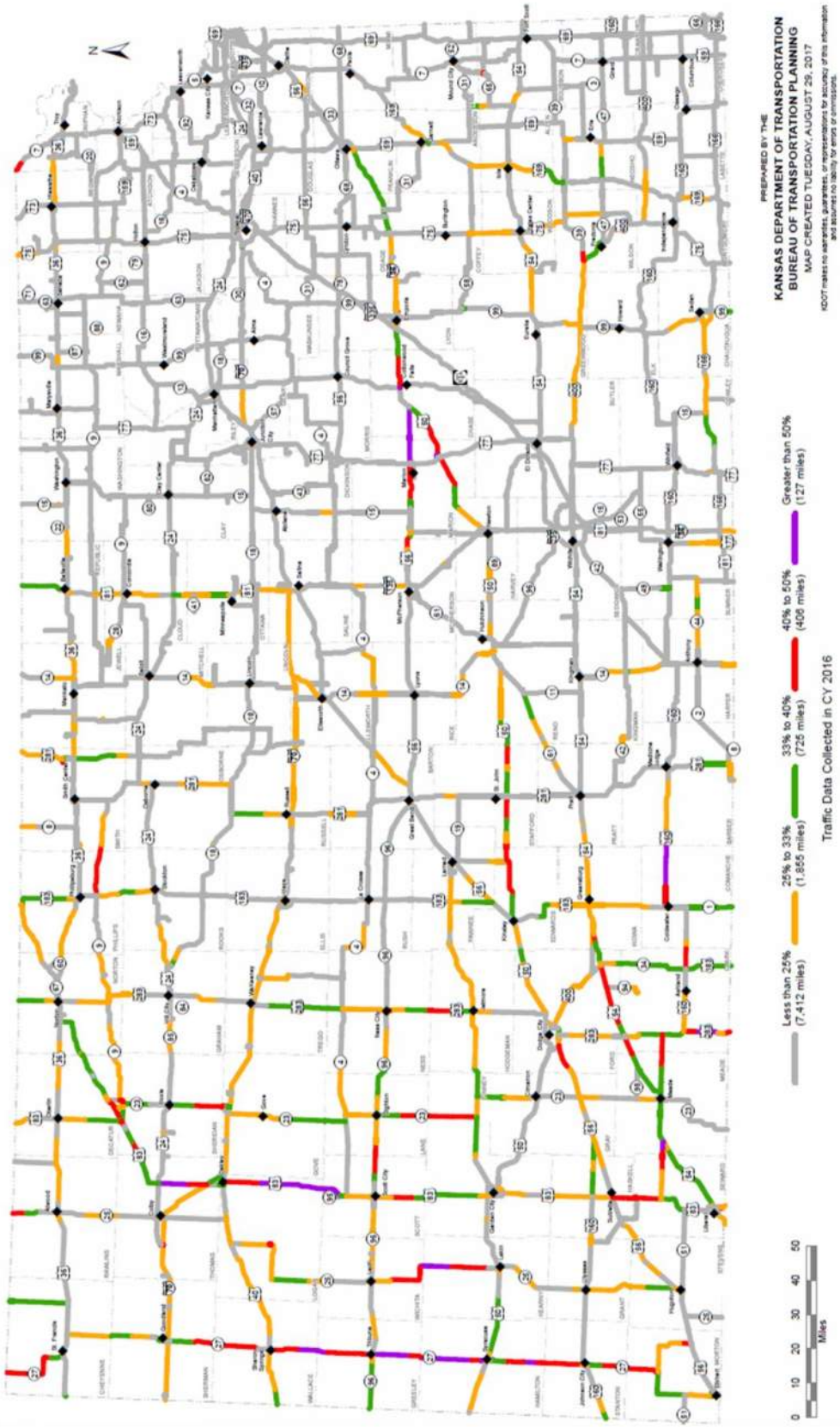


Figure 4.7: 2016 Percent Truck Traffic

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**.

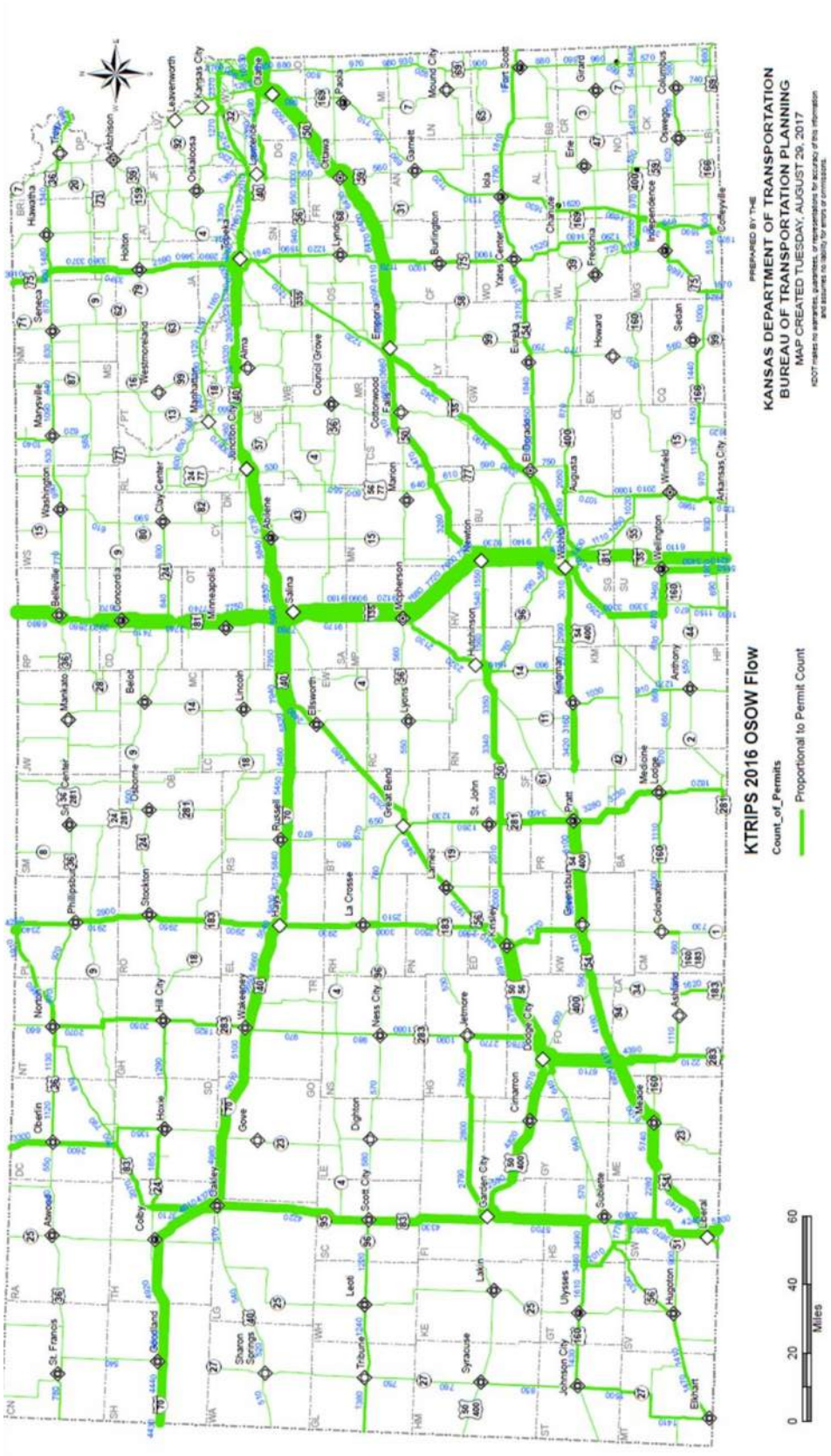


Figure 4.8: KTRIPS 2016 OSOW Flow

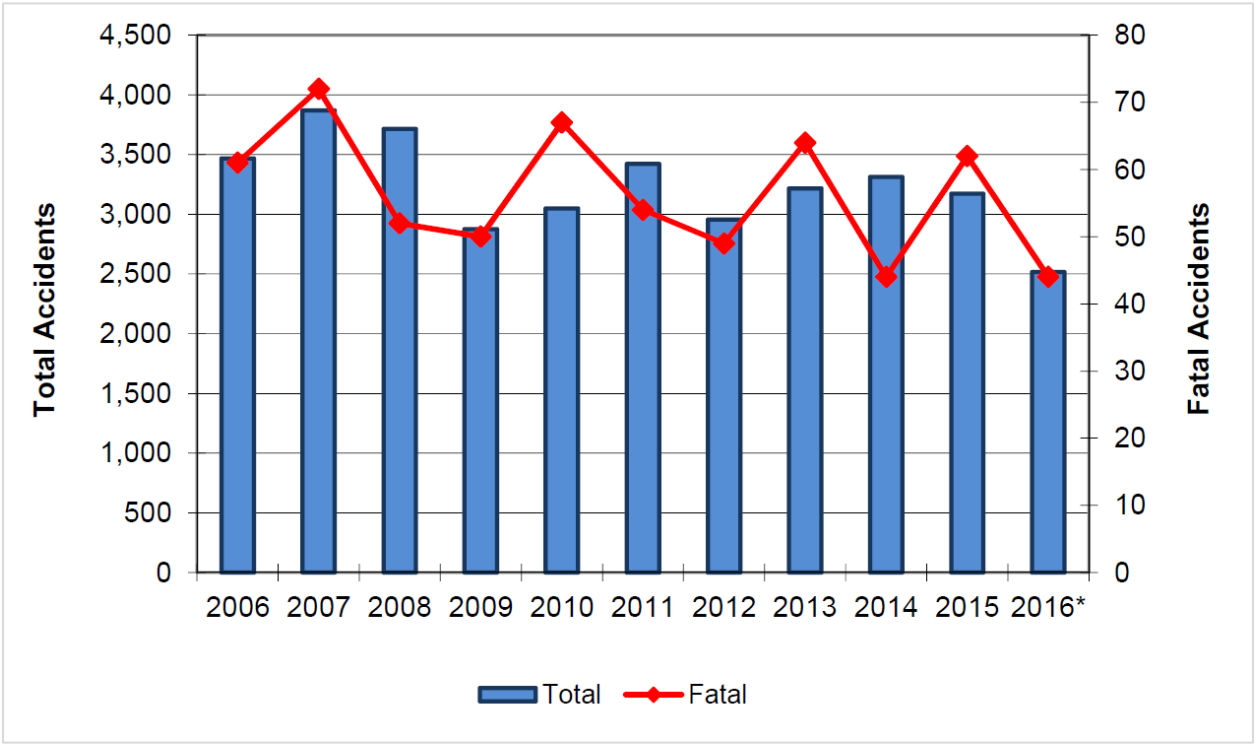
Source: KDOT, 2017.

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

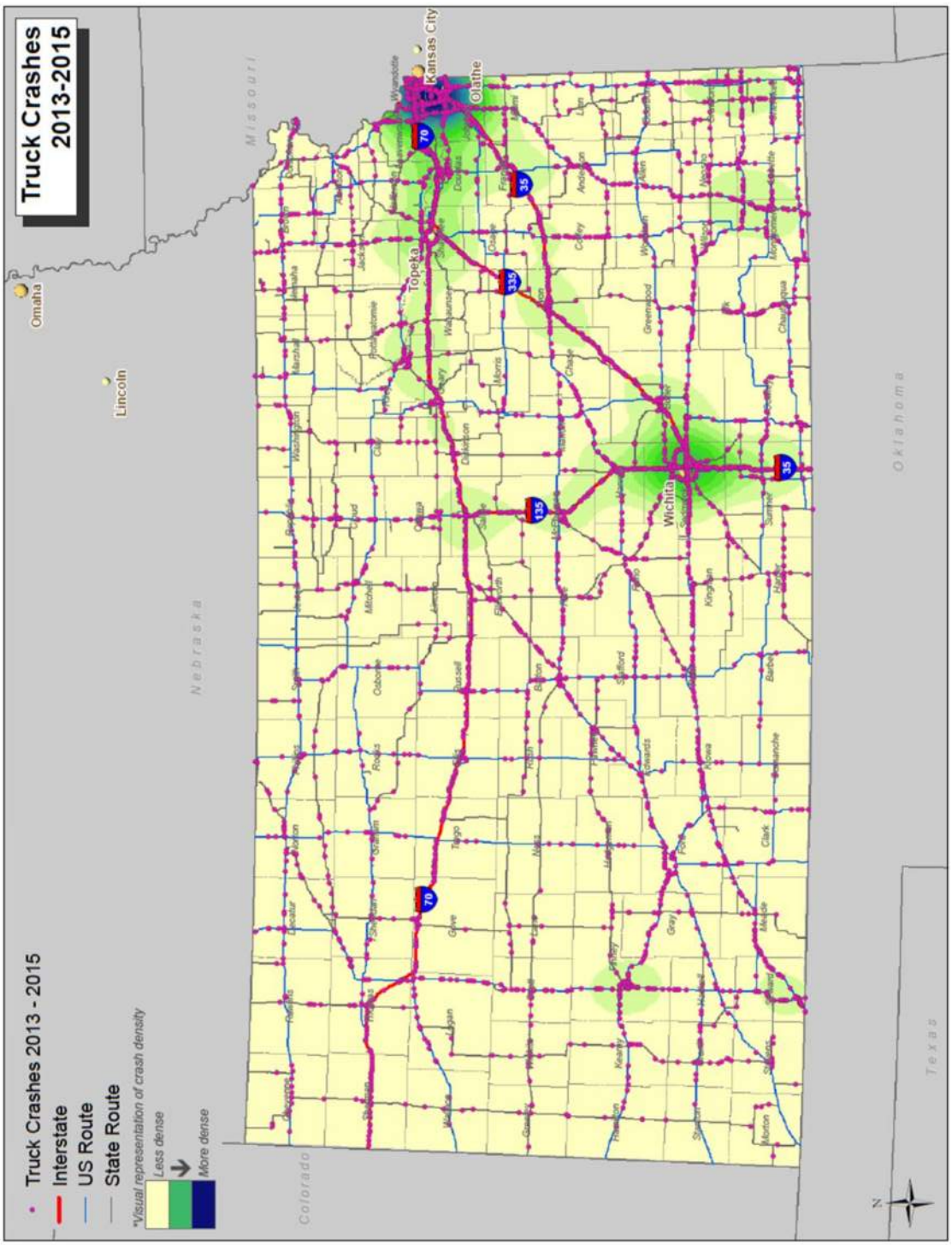


Figure 4.10: Truck Crash Density in Kansas

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 $25 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

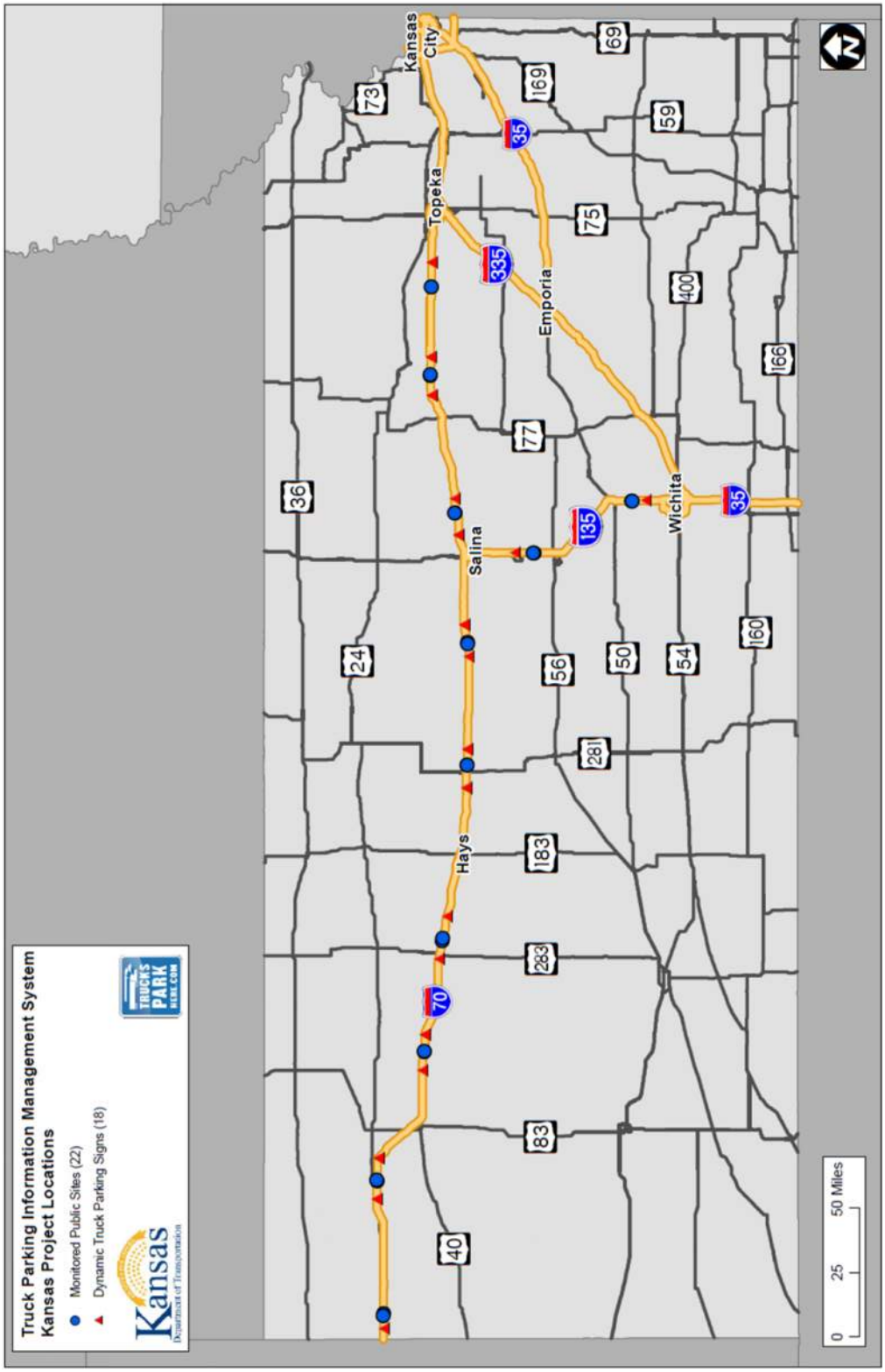


Figure 4.12: Kansas TPIMS Parking Locations

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.

Kansas City uses the NPMRDS to identify congestion/bottlenecks. The 2016 top ten congested highway segments in Kansas make up the following congested 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 Wichita, US-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 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 4.13**, 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. Detailed truck freight data is in Chapter 2 Economic Context of Freight.

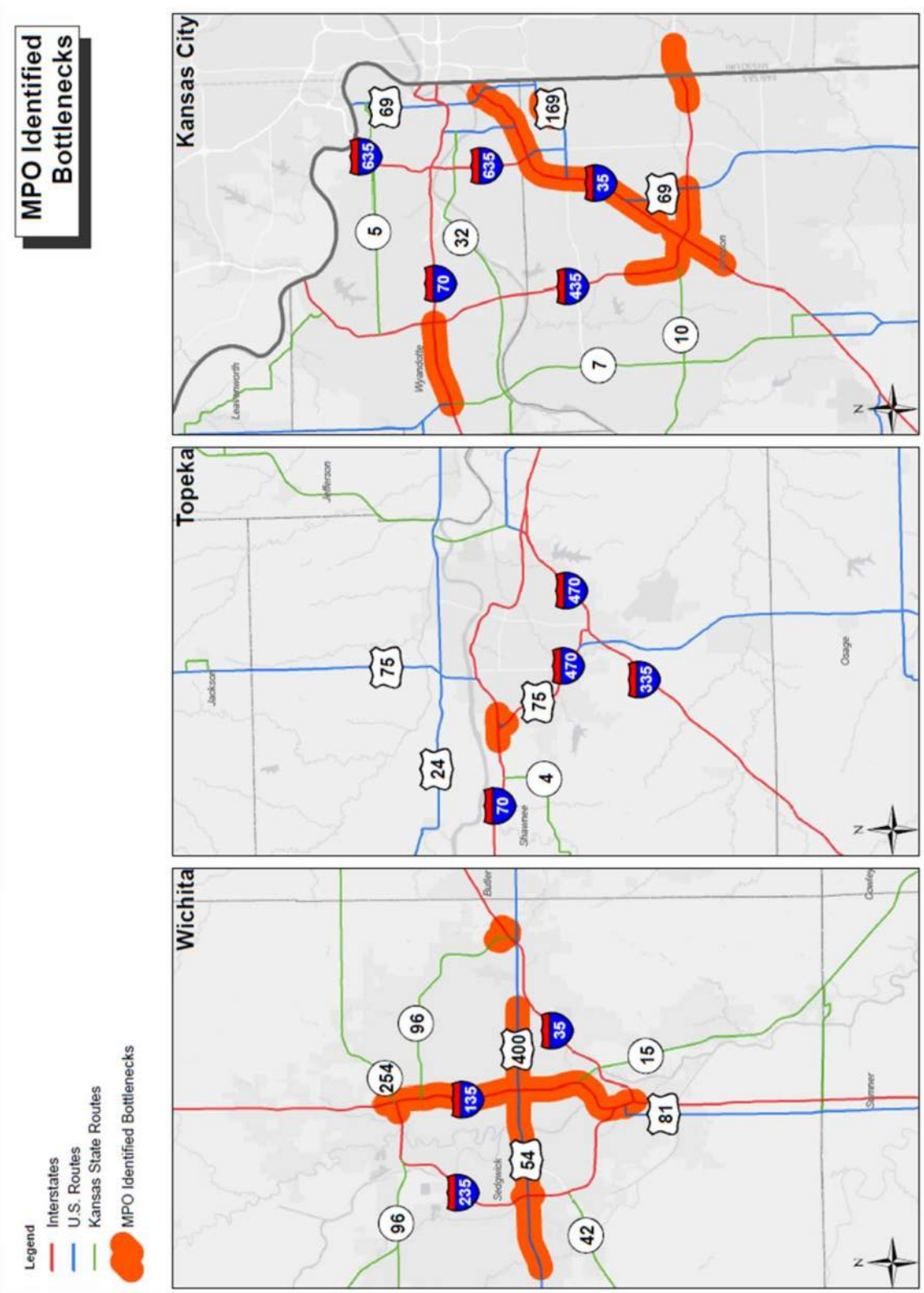


Figure 4.13: MPO Identified Bottlenecks

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 2,818 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, 30 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 4.14** 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 4.2**, 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 4.2: 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*.

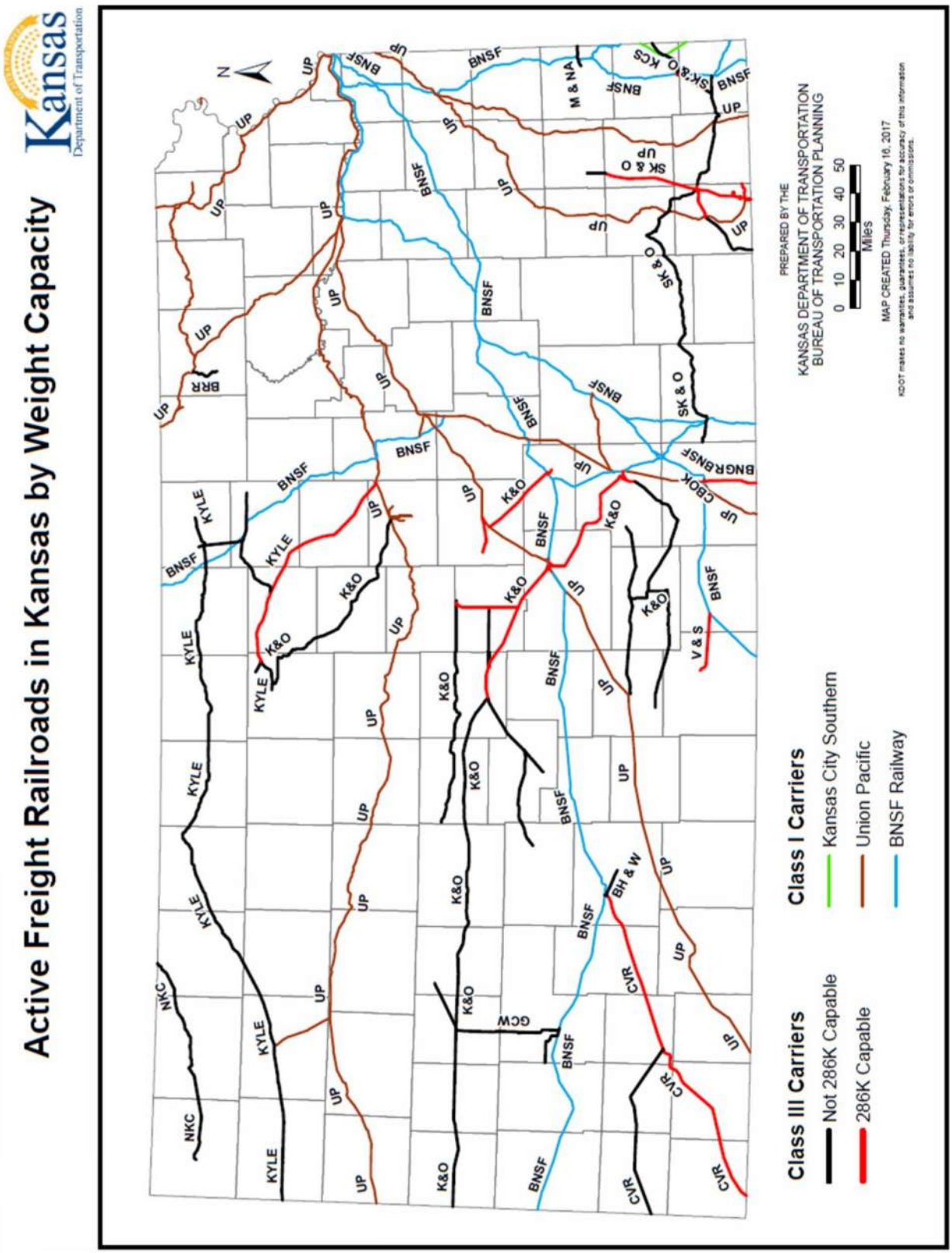


Figure 4.14: Kansas Non-286,000 lb. Rail Segments

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

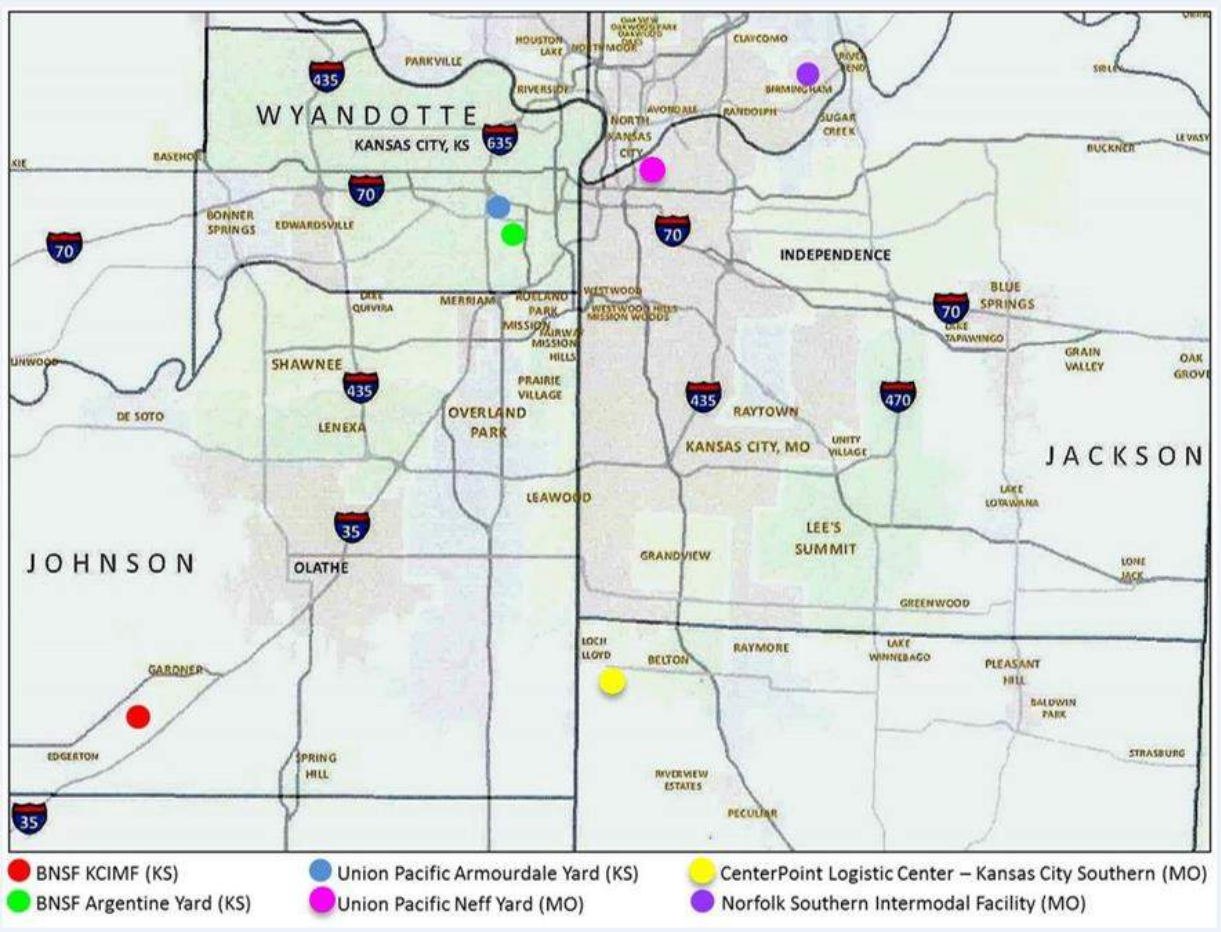
This section will discuss three key elements of intermodal service including the facilities where commodities are transferred from one mode to another, intermodal connectors which provide landside connections between the facilities and the freight network and the first/last mile connectors that facilitate 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 **Figure 4.15**. LPKC is a major economic driver and jobs creator for Kansas. LPKC can currently handle over 750,000 containers annually with a full build out capacity of 1.5 million containers. In 2017, it is expected that BNSF will exceed 350,000 lifts at their Edgerton facility. In addition, the adjacent warehousing growth is expected to reach 10 million of the available 17 million square feet of warehousing space with over 5,000 associated jobs.

Figure 4.15: 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 4.3**.

Table 4.3: 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 4.4** and displayed in **Figure 4.16**.

Table 4.4: 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

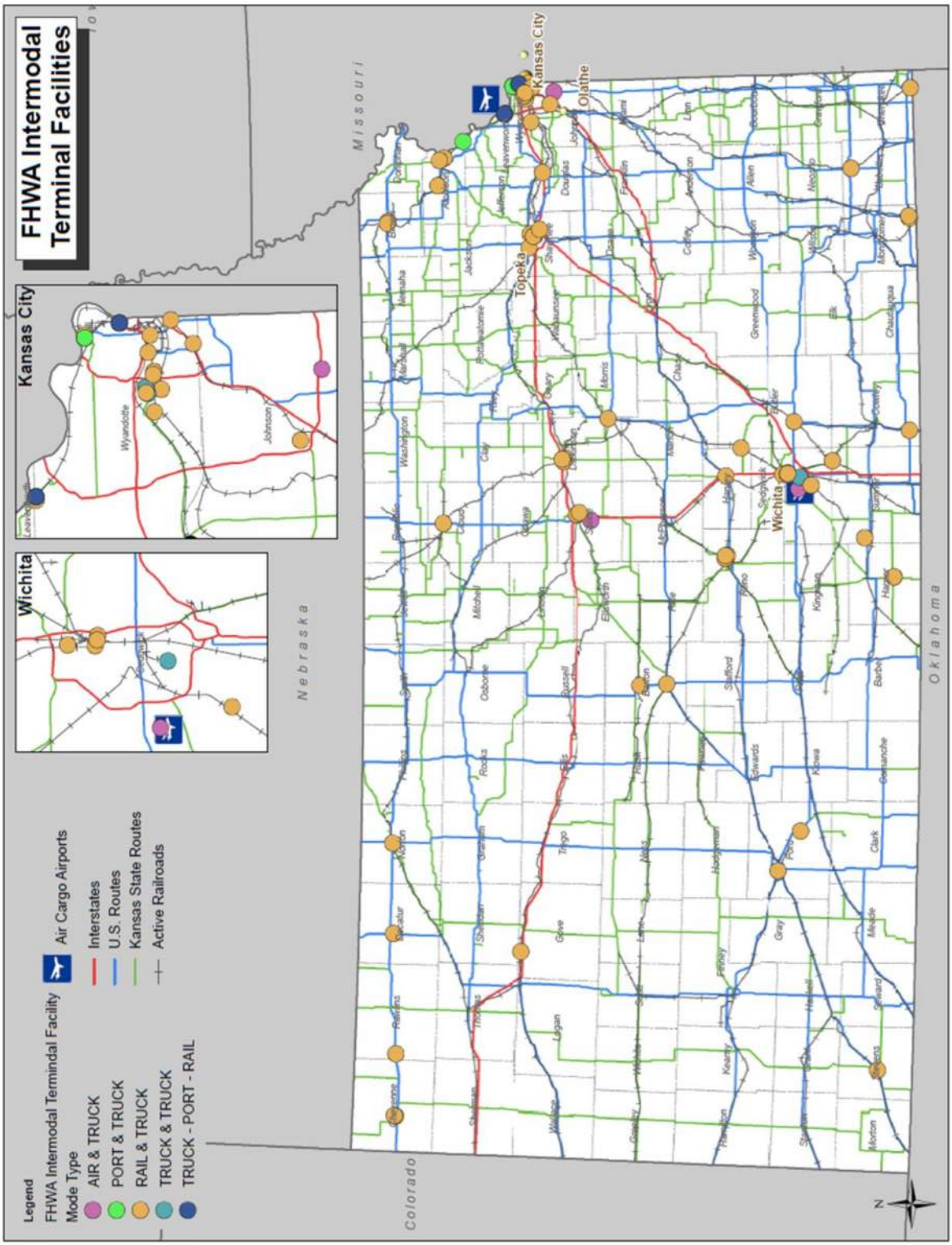


Figure 4.16: FHWA Intermodal Facilities

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 4.5**. 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.

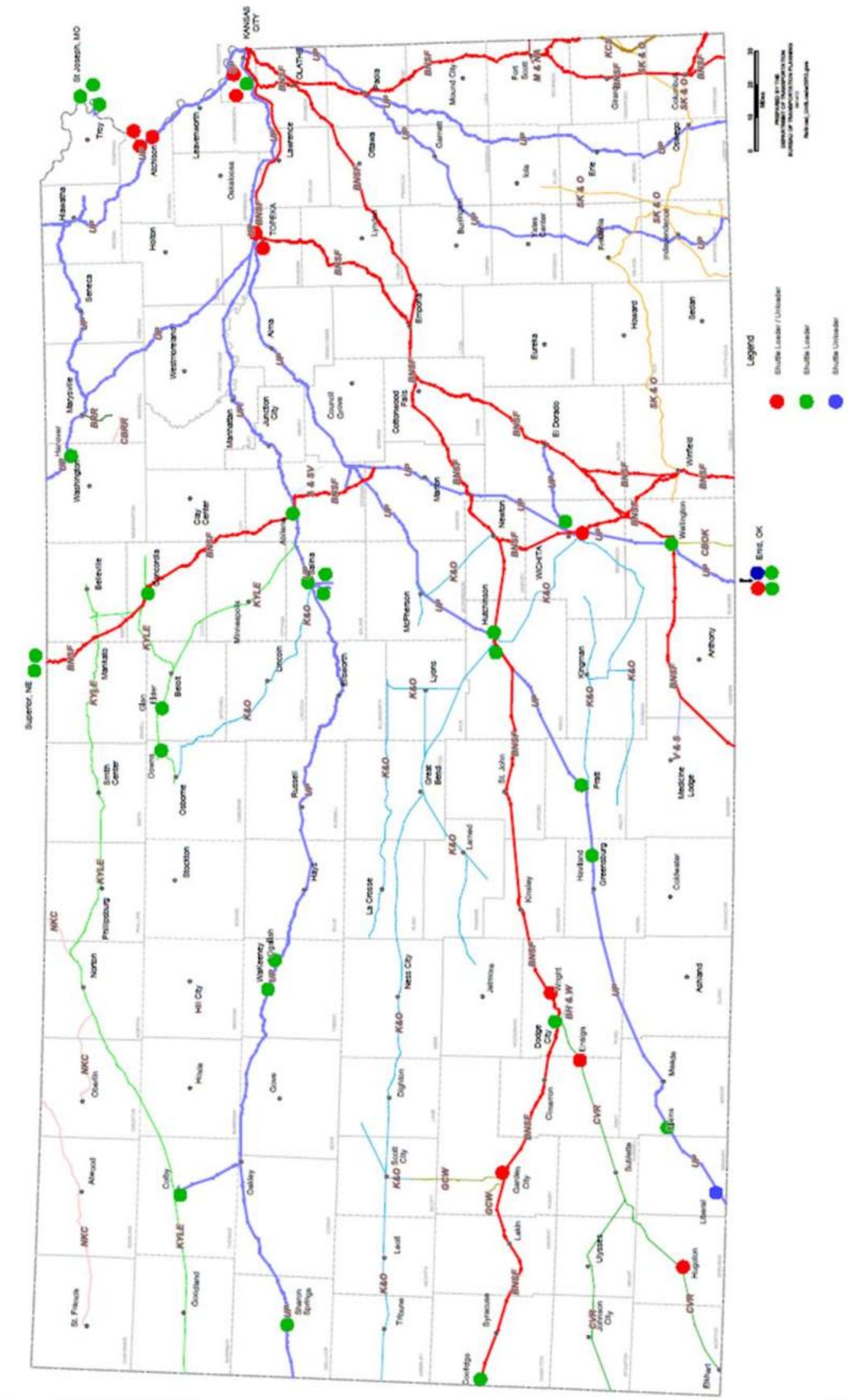
Table 4.5: Major Freight Rail Yards and Facilities in Kansas

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 4.17** and **Table 4.6** 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 4.7** lists the Kansas water ports that have direct rail access and their connecting railroads. **Table 4.8** lists the National Highway System Truck to Rail intermodal terminals in operation in the state of Kansas.

Figure 4.17: Kansas Unit Loader Location



Source: Kansas DOT, 2017

CDM Smith

Table 4.6: 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 4.7: 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 4.8: 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 4.9** shows at-grade rail crossings by type.

Table 4.9: 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 (inbound aggregate unit trains with a concrete aggregate holding pit and conveyor belt system for transfer to truck) and inbound cement products. 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 4.18 and **Figure 4.19** 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.

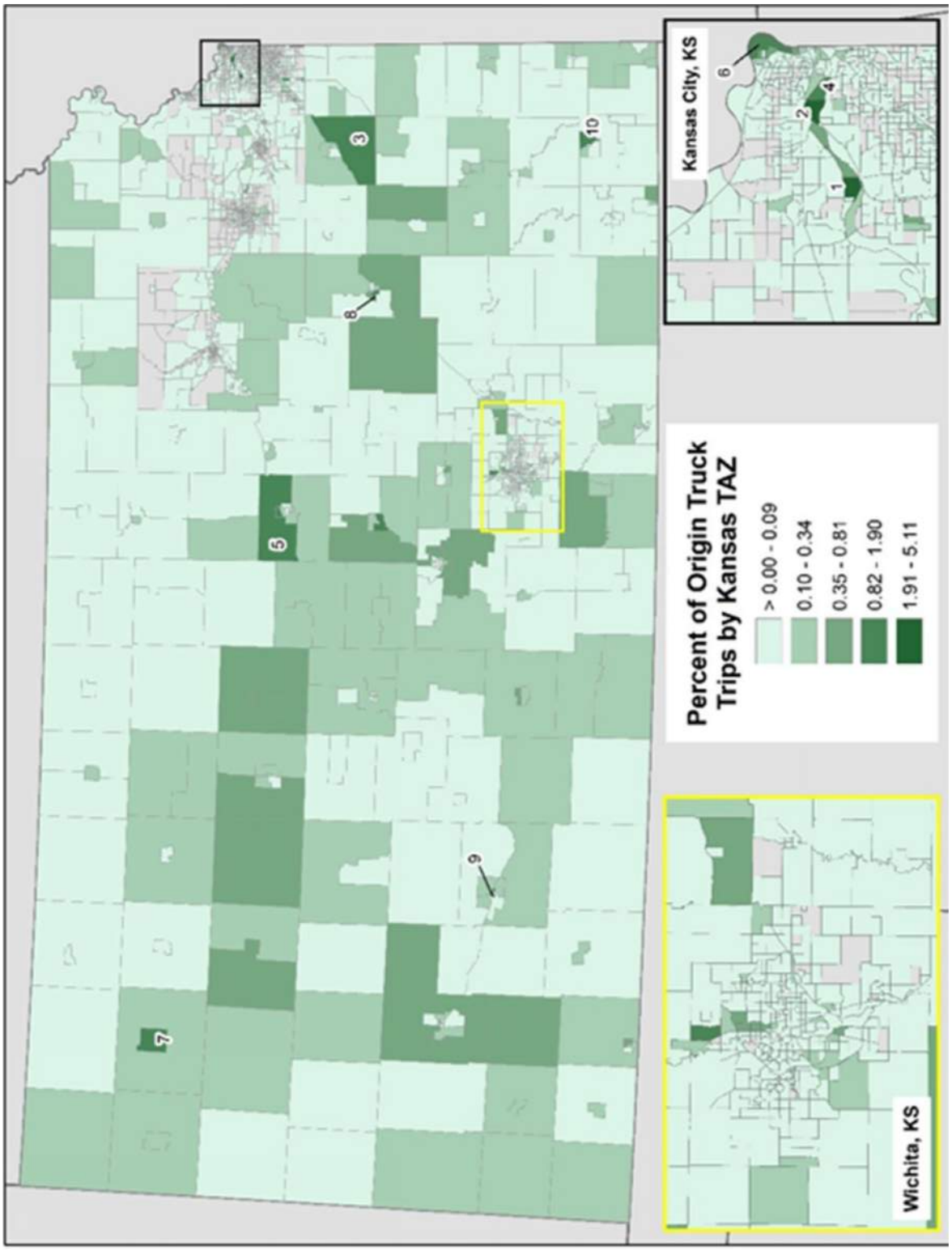


Figure 4.18: Kansas Truck Trip Origin Percentage

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

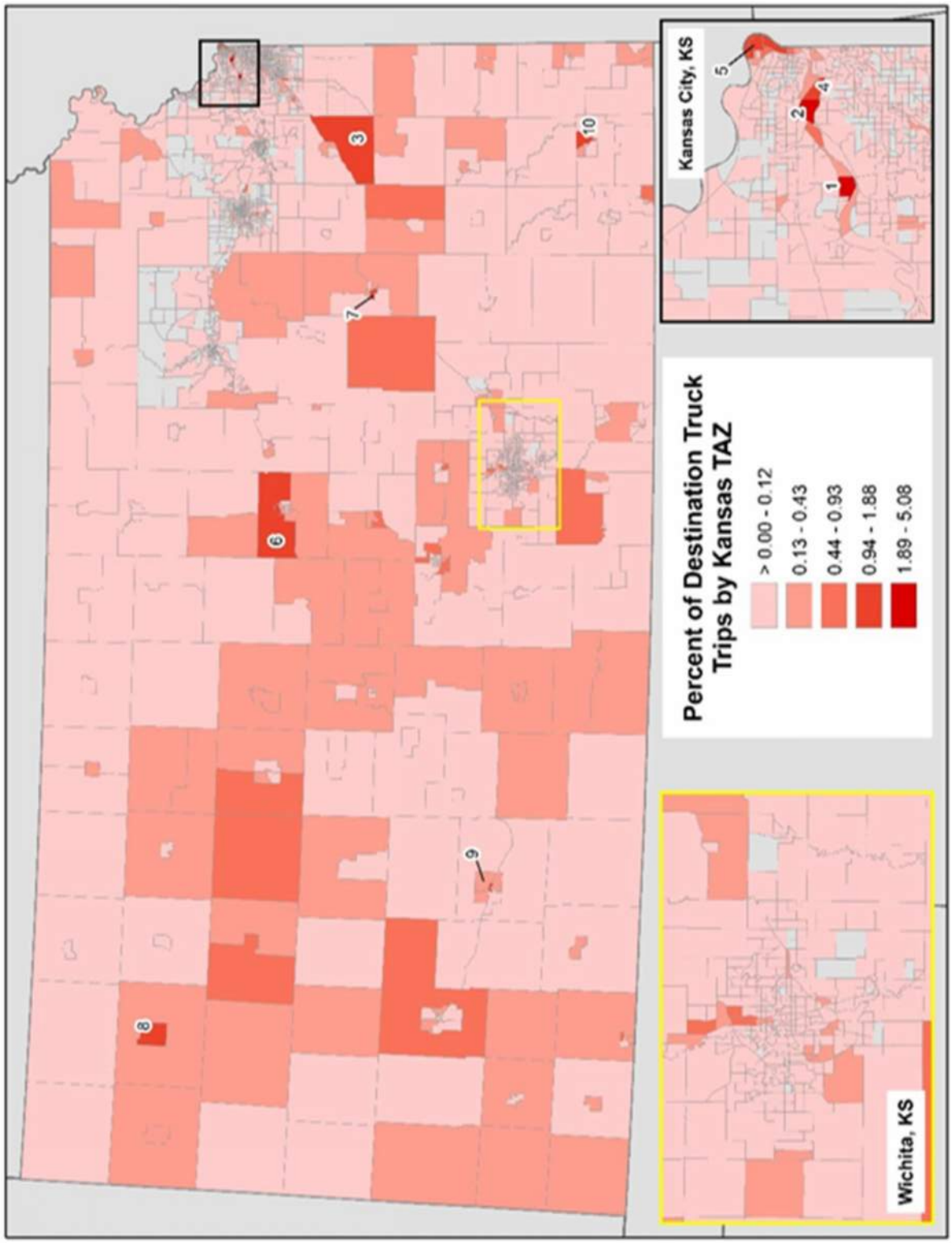


Figure 4.19: Kansas Truck Trip Destination Percentage

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 4.10** and **Figure 4.18**. 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 4.10: 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 4.11** and **Figure 4.19**)

Table 4.11: 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 4.12**.

Table 4.12: 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.

- **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 little 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

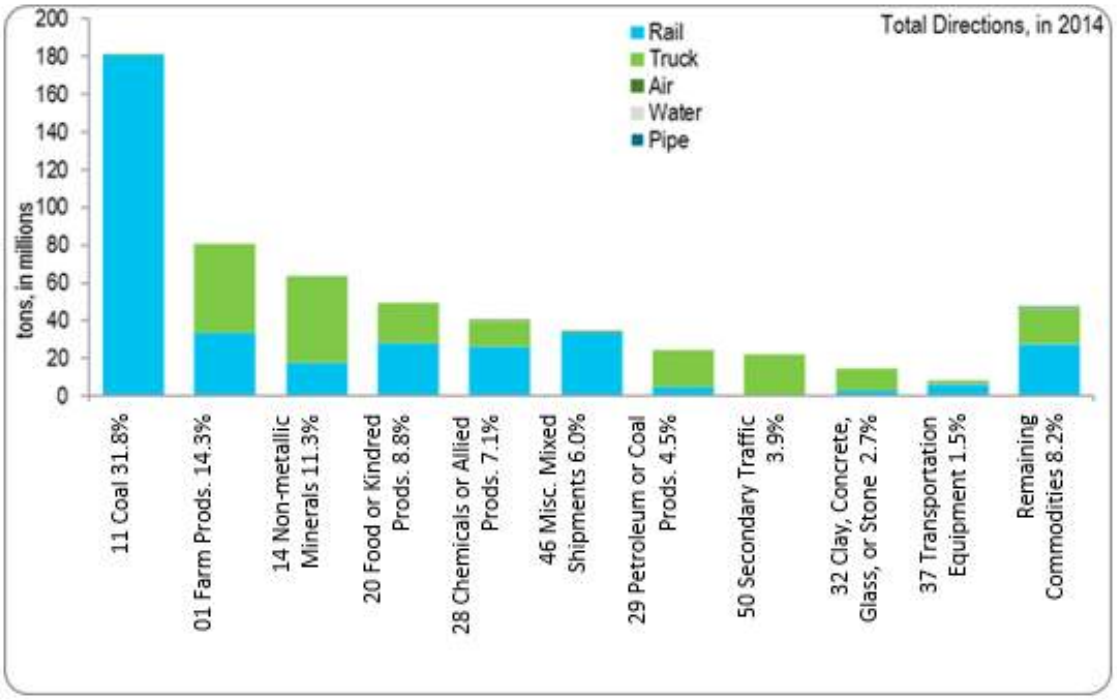
Table 5.2: Top Commodities by Value, 2014

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

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.

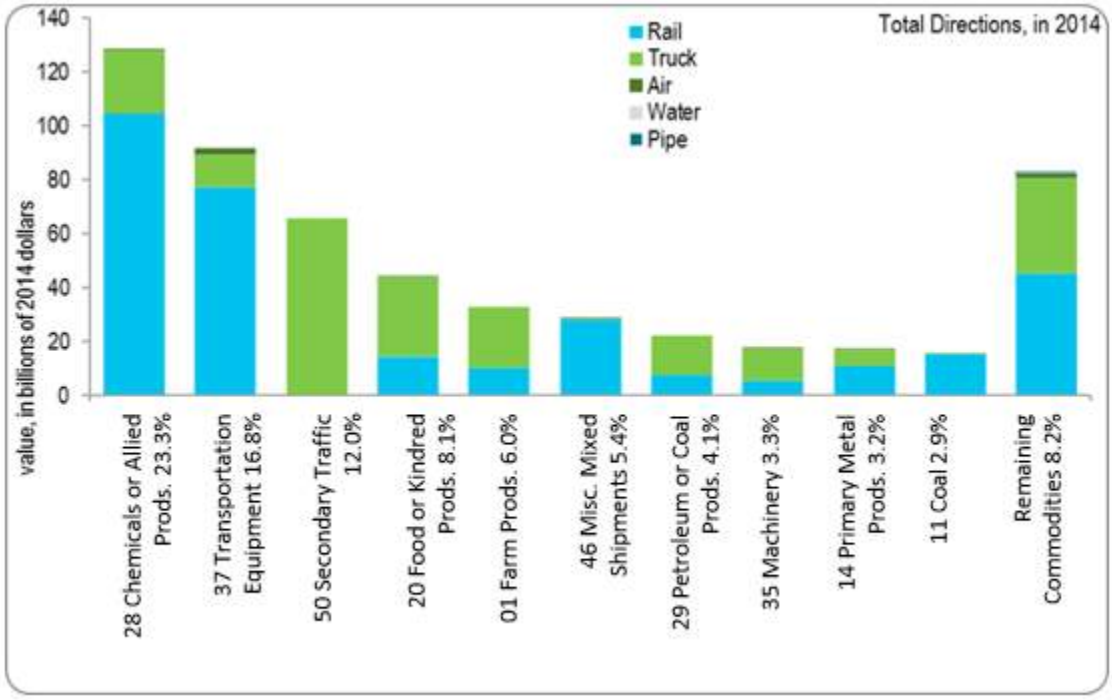
Figure 5.1: Top Commodities by Tonnage and Mode, 2014



Source: Prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

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

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	57.8%	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."

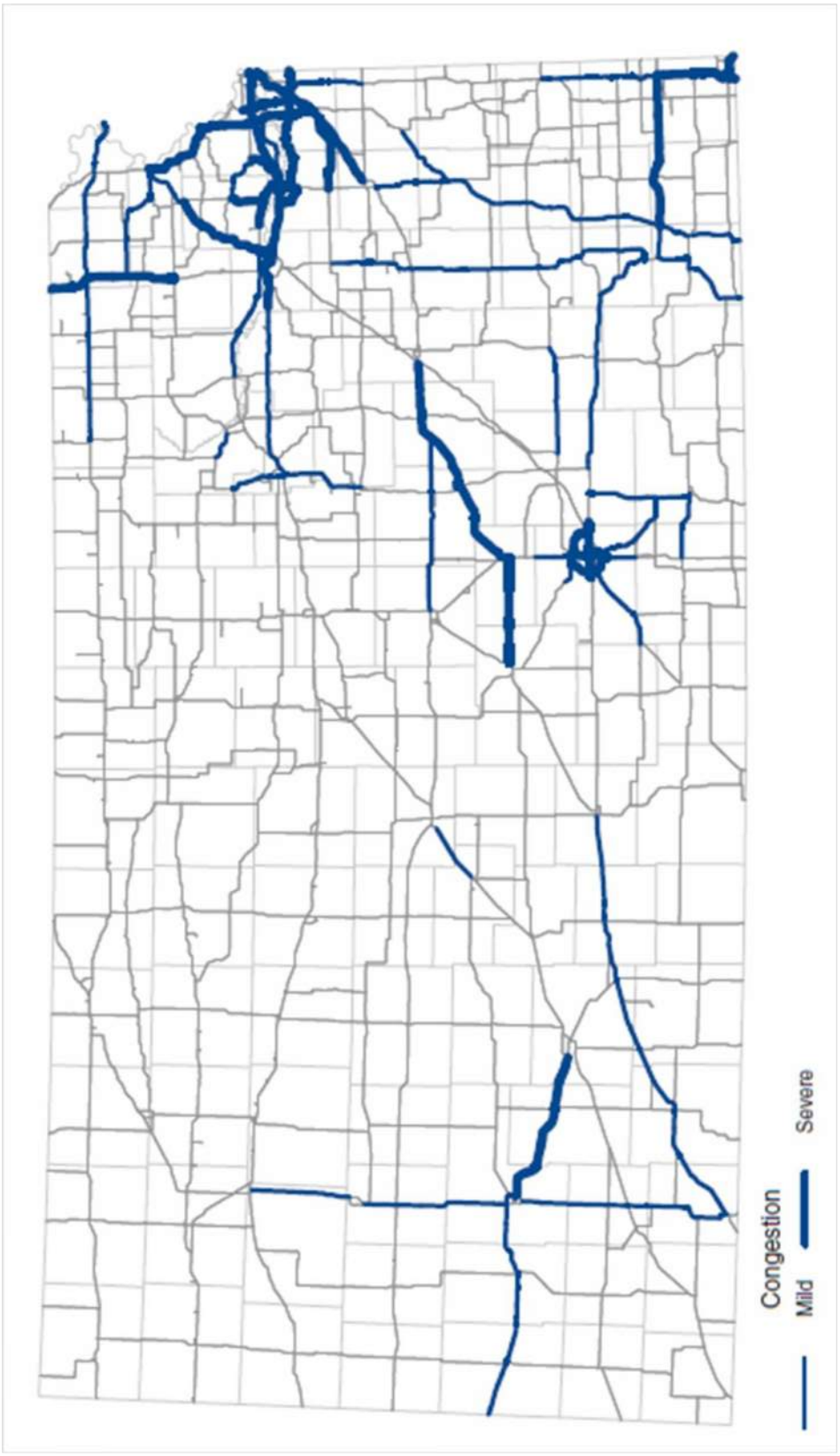


Figure 5.3: Projected Highway Miles at or Nearing Congestion in 2030

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 may have some impact on future freight flows. The expanded 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

[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>

ports in the Gulf due to using larger, more efficient ships reduces 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 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.

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 eight 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

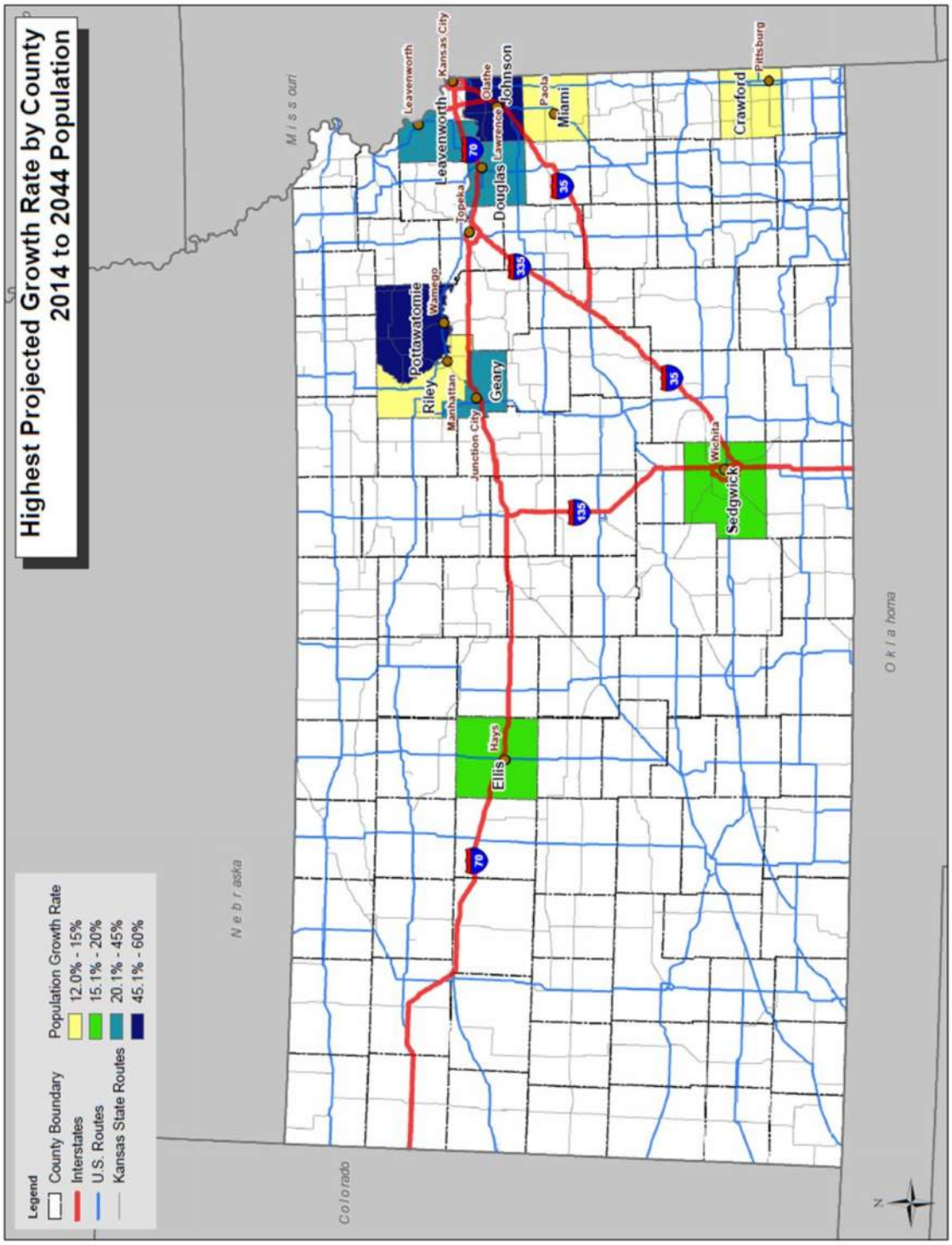


Figure 5.4: Highest Percent Population Increase 2014 – 2044

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.

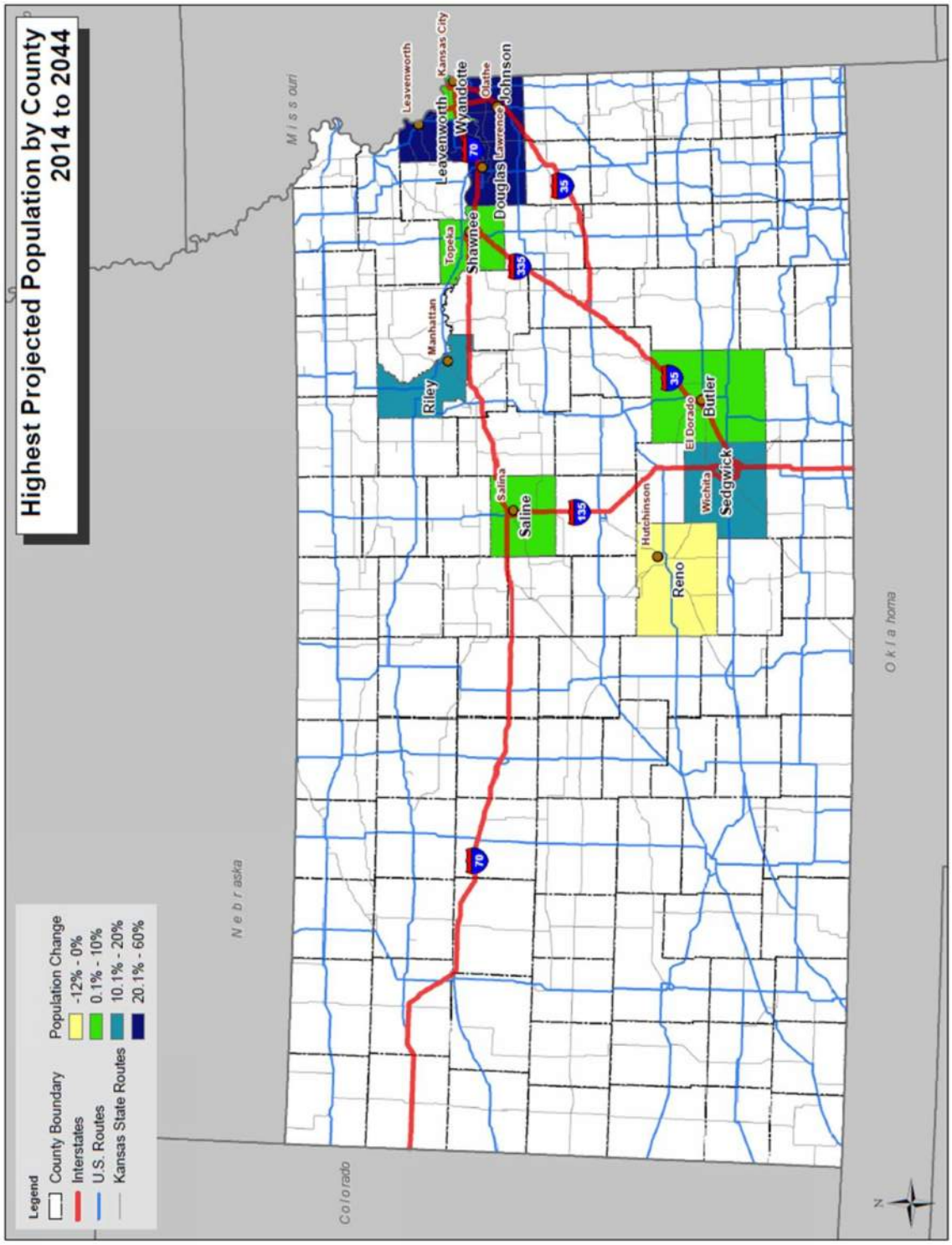


Figure 5.5: Highest Projected County Population 2044

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 'train' or 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 from the current and future conditions, input from KDOT and KTA, MPO conversions and plans, KFAC input, and results from the stakeholder interviews.

[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>

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 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:

- New 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.

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.

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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.

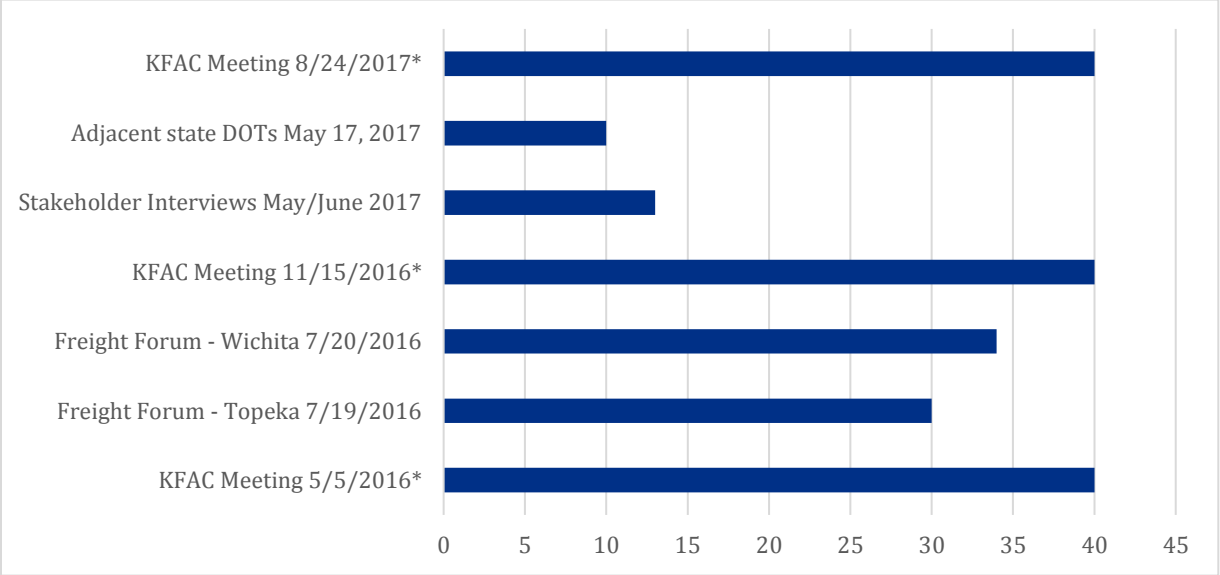
KDOT used stakeholder input during the process to develop a plan well-vetted by Kansans who are the most involved and affected by the freight multimodal for their transport of their goods, whether they are inbound materials for manufacturing or outbound finished products and agricultural commodities. 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)** 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 available for public comment from September 21, 2017 to October 20, 2017. A total of X comments were received. A summary is available in Appendix F.

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:

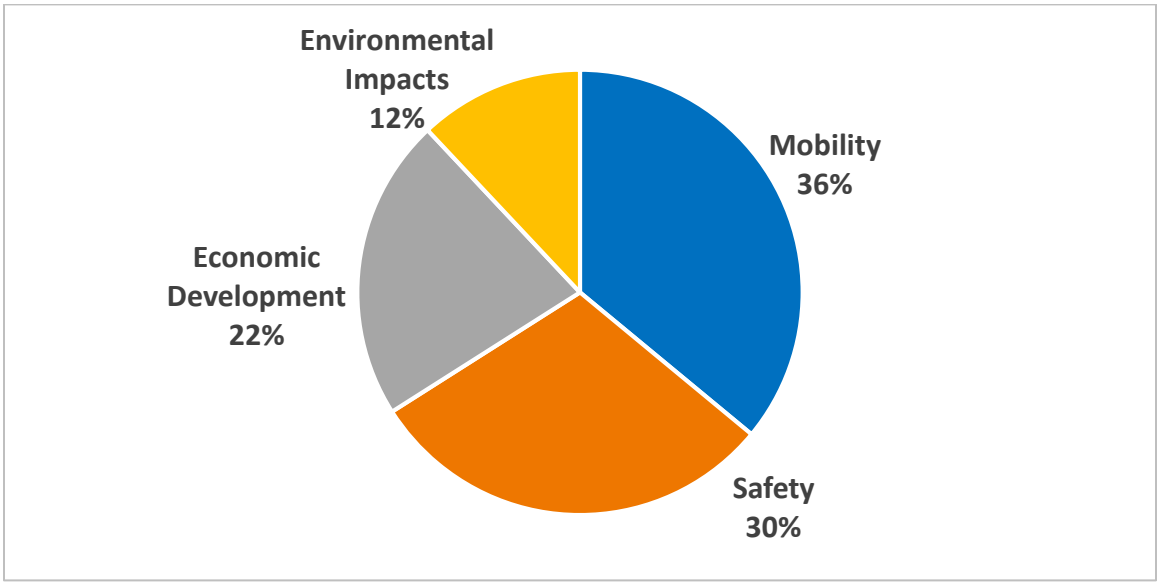
Freight

- 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.

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 ensure 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 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 $25 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.

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 (OS/OW) 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.

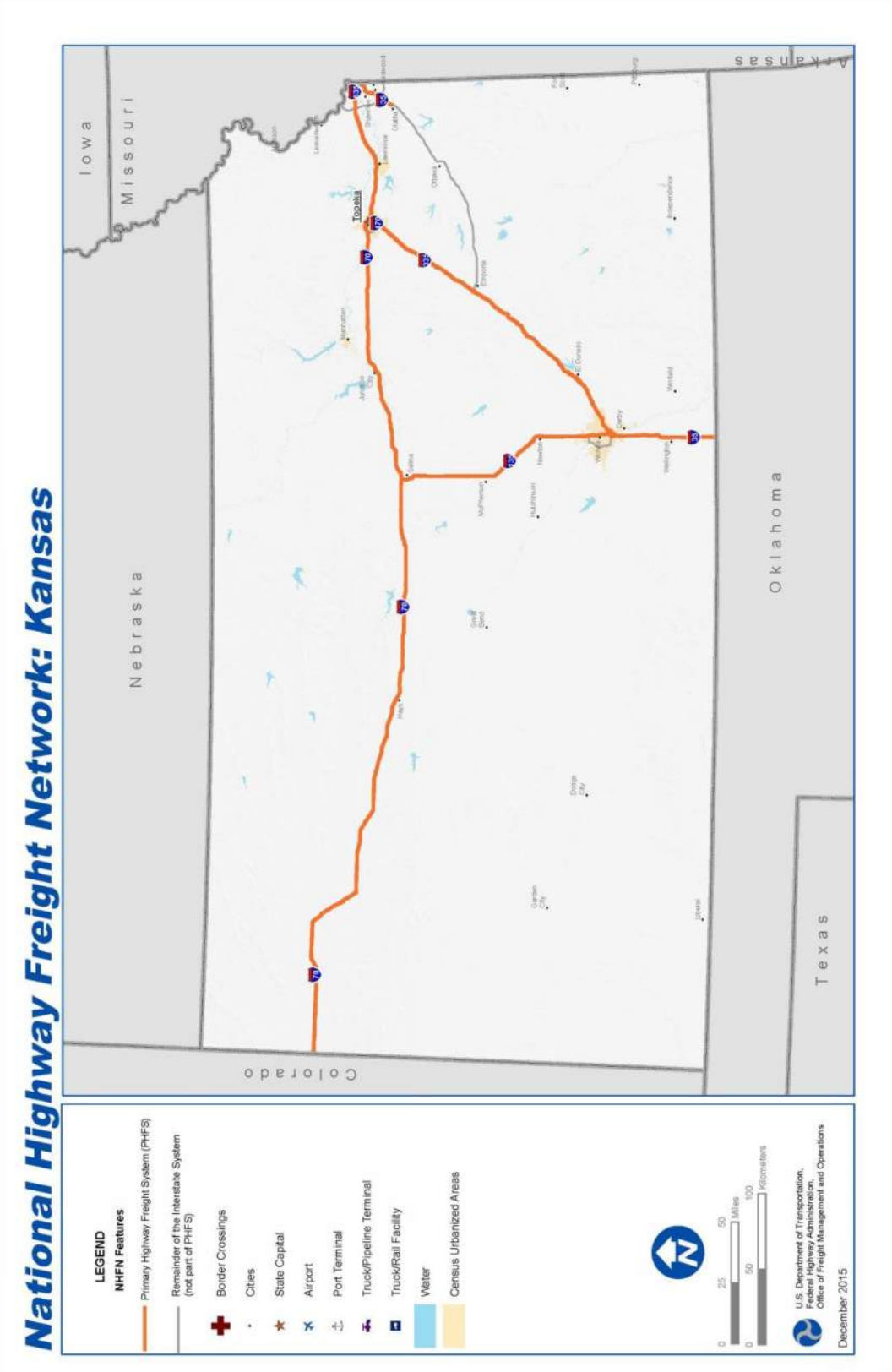


Figure 7.1: National Highway Freight Network in Kansas

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

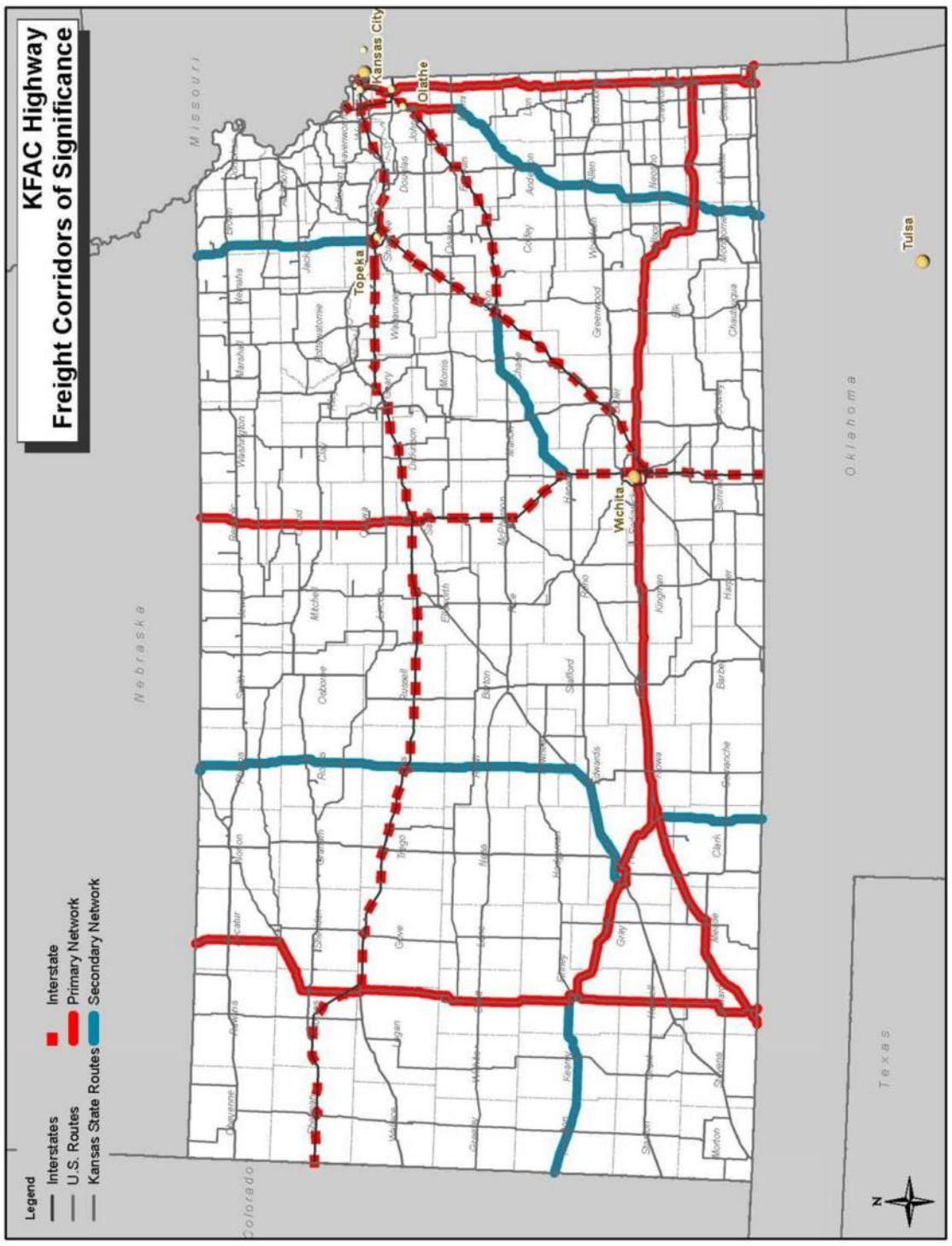


Figure 7.2: Kansas Freight Corridors of Significance

Source: KDOT.

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

ensure 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 4.12**, 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 size and weight policy –** As with many states, truck size and weight 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 OS/OW 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 transload 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 ensure that KDOT and its partners are optimizing the use of limited freight dollars and maximizing 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 must also ensure timely deliveries that 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 ensure Kansas's multimodal freight network remains 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 ensures that the prioritization effort is consistent 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 ensure 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

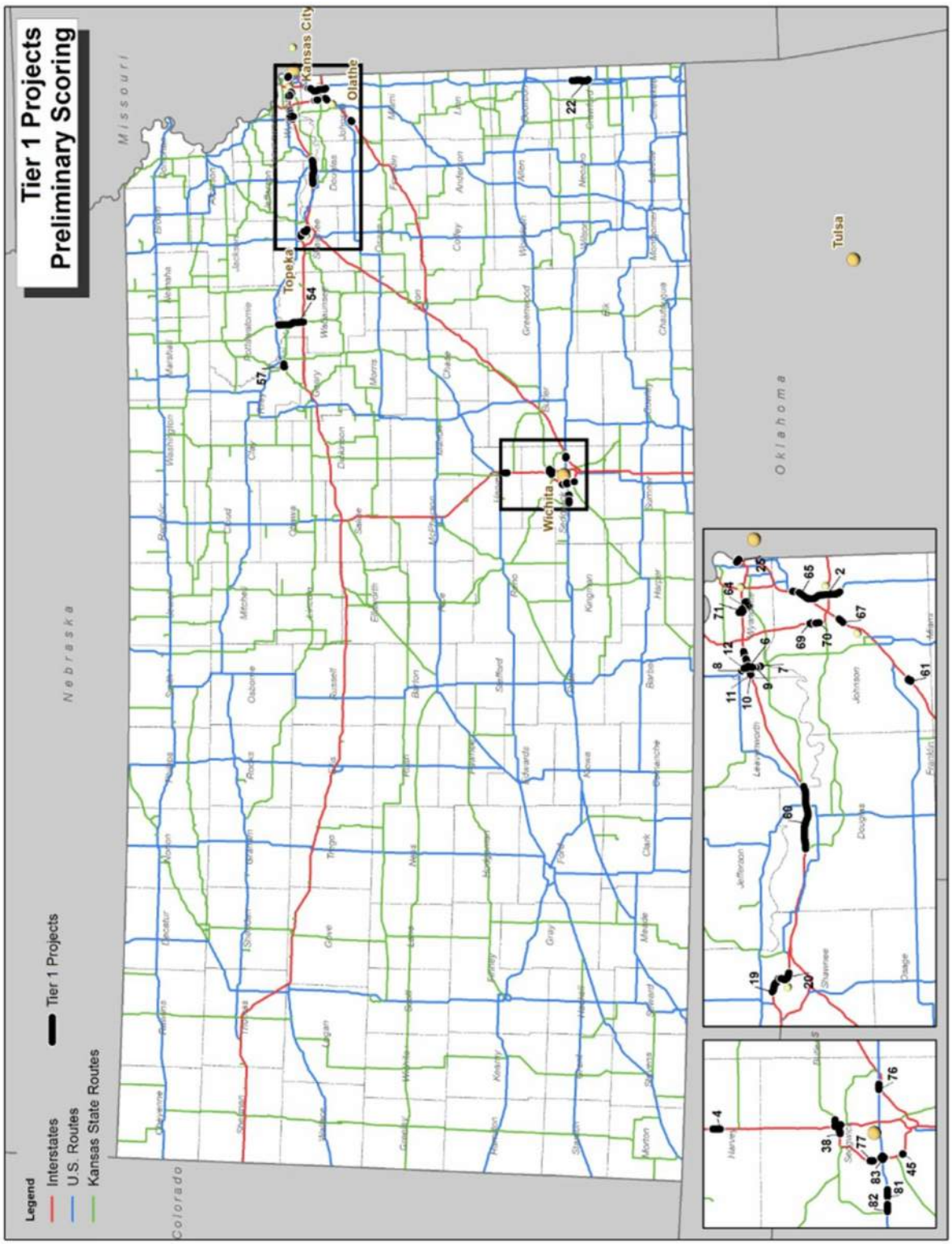

Figure 9.1: Tier 1 Highway Freight Projects

Table 9.4 lists the Tier 1 rail projects, which includes all 12 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
**	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 five 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 consultation with the railroads 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 ensure that limited freight dollars are targeted 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.

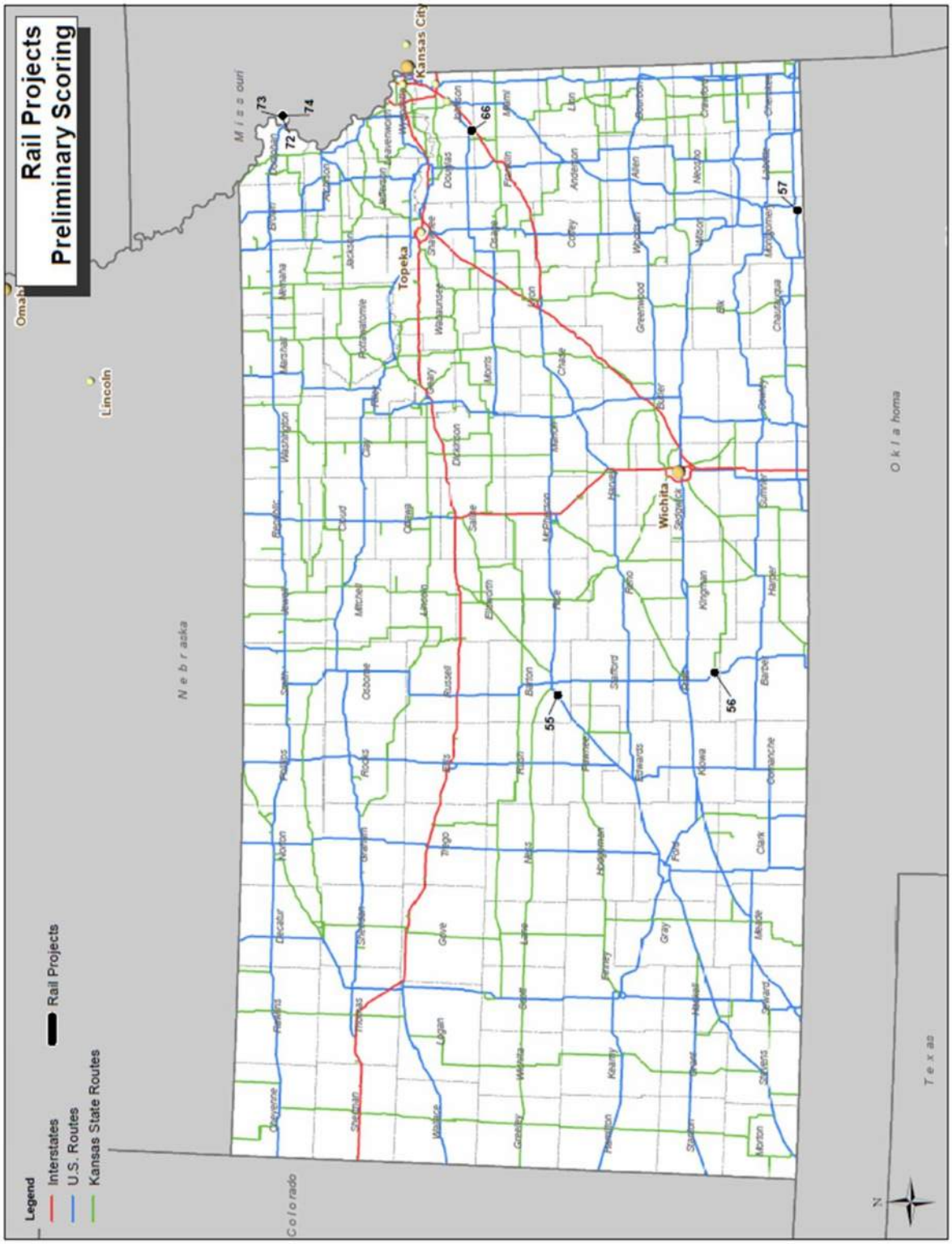

Figure 9.2: Tier 1 Rail Freight Projects

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 Recission		$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	

Appendix A: Economic Impacts and Key Industry Maps

Appendix A Introduction, Methodology, and Data

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' 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. Appendix A contains a series of maps showing the key industry locations across the state.

Impact Terminology

Economic impacts of freight are categorized into two activities: freight service providers, and trade users; three types: direct, indirect, and induced; and, five measures: jobs (employment), income, value-added, output, and taxes.

Activities:

- *Freight Service Providers* – Impacts associated with provisioning freight services (e.g., the truck industry) include primarily modal transportation, but also includes support and administrative operations. Service provider impact estimates are based on existing transportation industry data in IMPLAN® (e.g., "truck transportation"), proportioned by the freight-related composition for certain aggregate industries.[1]

- *Trade Users* –Impacts associated with shippers/receivers using freight services for goods movement (intermediate and final goods), excepting the freight industries itself. Trade-related impacts are estimated via tracing Kansas-specific commodity values (from IHS TRANSEARCH®) through commodity-industry interrelationships (from IMPLAN®) as a gauge to how freight goods movements are interconnected throughout the economy.

[1] Such aggregate transportation industries (i.e., "rail transportation" and "air transportation") were disaggregated into respective freight and passenger subcomponents by proportionally applying the United States Census County Business Patterns data for air, and AMTRAK data for rail.

Types:

- *Direct* – Calculated 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.[2]
- *Total* – Summation of direct, indirect, and induced types.

Measures:[3]

- *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, include all federal, state, and local tax revenues.

Data Sources and Models

Two predominate data sources/models were obtained and applied: IMPLAN® as the underlying economic model for Kansas; and, the IHS TRANSEARCH® database for commodity movement values (for the trade-user impacts). Additionally, United States Census County Business Patterns data was used to isolate freight-only service provider impacts for the aggregated air transportation sector, and AMTRAK data for rail.

Transearch®

Developed by IHS Global Insight, TRANSEARCH® is an extensive database of North American freight,[4] 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

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[2] Note that the indirect and induced impact types are often referred to, jointly, as multiplier impacts.
[3] Monetary measures are presented in constant 2014 dollars (income, value-added, output, and taxes).
[4] NATFA-related and excludes international freight traffic from countries other than Canada and Mexico.

mostly from IHS Global Insight's Business Markets Insights (BMI) database, supplemented by trade associations, industry reports, and federal government data.

However, the comprehensiveness of TRANSEARCH® varies by mode. Originally built for private sector truck and rail users, other modes subsequently-added lack extensiveness, especially due to the NAFTA-focused geography. As such, water movements to/from Asia, the Middle East, Europe, South America, etc. are excluded; and, similarly, non-NAFTA and small volume air movements are excluded. Lastly, pipeline movements are perhaps the most under-represented mode due to insufficient federal government reporting requirements and private sector data-sharing. Nonetheless, TRANSEARCH® arguably provides the most comprehensive and internally-comparable database of freight, especially of the two major modes (truck and rail) and, as such, is utilized for trade-related freight impacts.

Implan®

IMPLAN® v3 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. A social account matrix reflects the economic interrelationships between various industries (and commodities), households, and governments in a given timeframe[5] and measures the economic interdependency of each industry on others through impact multipliers. Multipliers are developed within IMPLAN® from regional purchase coefficients, production functions, and socioeconomic data for each impact variable and are geographically-specific. IMPLAN® is one of the most commonly accepted models used for economic impact analysis and estimation throughout the country.

Additionally, IMPLAN® provides commodity-to-industry production and absorption matrices that enable the quantification, for example, of how inbound commodities are used (absorbed) across Kansas industries in respective production processes to create final goods and services, or by institutions for final consumption. Further, algorithms developed translate commodity (Standard Transportation Commodity Classification, or STCC) data into IMPLAN® industry categories to estimate the impacts associated with directional commodity movements.

Combined

TRANSEARCH® commodity detail is bridged with the IMPLAN® model to assess the freight-related interrelationships within the Kansas economy, and derive the economic impacts. TRANSEARCH® provides commodity data for translation into detailed economic interrelationships between commodities, industries, and institutions, via the IMPLAN® model.

IMPLAN® does not identify commodity value movements (only the underlying commodity to industry structure), and TRANSEARCH® does not provide the economic interrelationships necessary to determine how the commodity movements interact within the economy. As such, the two sources are combined to derive the freight-related economic impacts to Kansas. Lastly, both the commodity detail and the IMPLAN® model reflect year 2014 activity.

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[5] 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.

IMPLAN® v3 for 2014 is structured with 536 industries/commodities (NAICS3 level); and, given such resolution, is most-amenable to bridging with a STCC4 commodity structure (700+ four-digit specific commodities), such that the bridge is a close 1:1 with a (mostly) straightforward concordance. However, as the IHS TRANSEARCH® database available to KSDOT is truncated to a STCC2 hierarchy (40 aggregate commodity groupings), the IMPLAN® model was thus aggregated into 86 industries (NAICS2 level) to better-accommodate the STCC2 limitations. In unavoidably doing so, the modeling and analysis at the aggregated level thus introduces some biases (e.g., aggregation bias) and limits the transparency and accuracy of estimates.

Freight Value

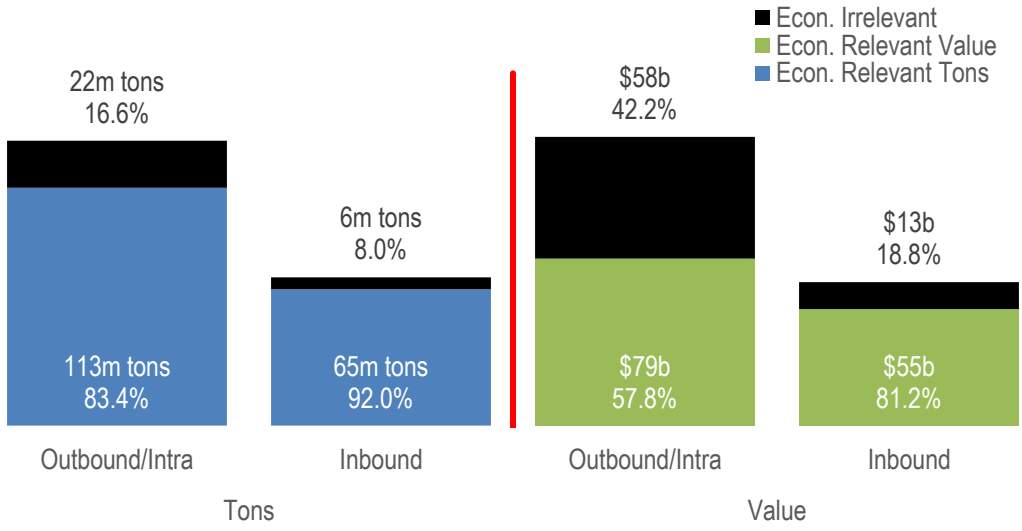
Applied freight data for trade-user estimates are based on the information presented in Task 4.2 (Commodity Flow Analysis), sourced from IHS TRANSEARCH®. However, while the flow analysis focuses on tonnage on Kansas infrastructure, the trade-related impacts are a function of value and the relationship to economic activity in the state. As such, the freight data are summarized in **Table A-1** and **Figure A-1** by economically-relevant direction and commodity, and reflecting some adjustments vis-à-vis the commodity flow data (which includes all movements, including those economically irrelevant). Considerations and adjustments to the freight data for applicability into this economic analysis include the following.

Table A-1: Economically-Relevant Freight (Direction/Commodity)

SCTG2	Commodity	Tons		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	
OUTBOUND/INTRA						
01	Farm Products	38,395,691	34.1%	$14,581	18.4%	$380
20	Food or Kindred Products	11,487,103	10.2%	$13,650	17.2%	$1,188
29	Petroleum or Coal Products	13,191,158	11.7%	$12,267	15.5%	$930
37	Transportation Equipment	1,032,781	0.9%	$11,857	15.0%	$11,481
28	Chemicals or Allied Products	5,042,698	4.5%	$9,200	11.6%	$1,824
35	Machinery	311,179	0.3%	$4,001	5.1%	$12,858
30	Rubber or Miscellaneous Plastics	600,869	0.5%	$2,531	3.2%	$4,212
34	Fabricated Metal Products	753,277	0.7%	$2,337	3.0%	$3,102
36	Electrical Equipment	179,866	0.2%	$1,740	2.2%	$9,674
32	Clay, Concrete, Glass, or Stone	8,735,796	7.7%	$1,705	2.2%	$195
	Remaining Commodities	33,014,639	29.2%	$5,328	6.6%	$161
	Total	*112,745,057*	*100.0%*	*$79,197*	*100.0%*	*$702*
INBOUND						
37	Transportation Equipment	1,039,621	1.6%	$12,292	22.3%	$11,824
01	Farm Products	13,596,141	21.0%	$7,332	13.3%	$539
20	Food or Kindred Products	4,526,736	7.0%	$6,490	11.7%	$1,434
28	Chemicals or Allied Products	3,256,101	5.0%	$5,433	9.8%	$1,669
11	Coal	13,998,507	21.6%	$3,735	6.8%	$267
29	Petroleum or Coal Products	4,536,483	7.0%	$3,391	6.1%	$748
36	Electrical Equipment	245,287	0.4%	$3,181	5.8%	$12,968
33	Primary Metal Products	1,371,084	2.1%	$2,406	4.4%	$1,755
30	Rubber or Miscellaneous Plastics	498,338	0.8%	$1,975	3.6%	$3,963
35	Machinery	202,934	0.3%	$1,844	3.3%	$9,087
	Remaining Commodities	21,490,750	33.2%	$7,139	12.9%	$332
	Total	*64,761,982*	*100.0%*	*$55,218*	*100.0%*	*$853*

Source: CDM Smith and IHS Transearch®

Figure A-1: Economically-Relevant Freight (Comparison with Total Freight)



Directional Movements

Economically-relevant directions include outbound (originating within Kansas, terminating beyond), inbound (originating beyond Kansas, terminating within), and intra (originating and terminating within Kansas). Such directional movements are economically relevant because the respective production and/or consumption of such traded goods occur in-state. However, through traffic (originating and terminating beyond Kansas) is not directly applicable to freight users (shippers/receivers) in Kansas, and are thus excluded; albeit, such movements bear on the magnitude of freight service providers (carriers) in Kansas.

Irrelevant Commodities

Certain commodity groups physically moved across Kansas infrastructure are economically irrelevant from a trade perspective, pertaining to neither Kansas consumption (intermediate, or final) or production, regardless of economically-relevant direction:

- STCC40, Waste or Scrap Materials;
- STCC42, Shipping Containers (empty TEUs/FEUs);
- STCC48, Waste; and,
- STCC50, Secondary Traffic6

In the first three groups, the production and/or consumption-related trade value is effectively null; as such, the tons associated with these commodities yields no translation into trade-related economic activity. However, such *Waste*, *Scrap*, and *Shipping Containers* movements are physically repositioned and thus yield some service provider-related (carrier) economic activity.

[6] STCC50 is a TRANSEARCH®-designation not normally included in the STCC hierarchy, to reflect the truck drayage portion of rail-truck intermodal movements.

In contrast, *Secondary Traffic*, which is included within TRANSEARCH® to encapsulate short-haul intermodal drayage and repositioning movements by truck, is a significant value. However, including the value of such *Secondary Traffic* movements into the trade-users-related impacts would be a duplication of the primary modal movement. As such, the *Secondary Traffic* is excluded from the analysis from a trade-perspective; and such exclusion is the primary reason why the economically-relevant freight data below is a subset proportion of the total movements along the infrastructure network in Kansas.

Intrastate Movements

Intrastate movements are combined with outbound movements, since both reflect industry production within Kansas.

Outbound/Intrastate

Combining outbound and intrastate directions, 113 million tons of economically-relevant freight, valued at $79 billion, originates in Kansas in 2014, representing 83 percent and 92 percent of all outbound/intrastate freight movements. Impacts associated with outbound/intrastate movements are derived by mapping the freight values with the respective industrial production in Kansas from the IMPLAN® model. Top five commodities by value:

1. Farm Products ($14.6 billion; 18%)
2. Food or Kindred Products ($13.7 billion; 17%)
3. Petroleum or Coal Products ($12.3 billion; 16%)
4. Transportation Equipment ($11.9 billion; 15%)
5. Chemicals or Allied Products ($9.2 billion; 12%)

Inbound

Economically-relevant inbound commodities destined to Kansas in 2014 amount to 64.8 million tons and $55.2 billion, representing 58 percent and 81 percent of the respective total inbound movements. Inbound commodities are translated into economic impacts by mapping the value of the inbound goods via the absorption of such respective goods into the industry production in Kansas. Top five commodities by value:

1. Transportation Equipment ($12.3 billion; 16%)
2. Farm Products ($7.3 billion; 9%)
3. Food or Kindred Products ($6.5 billion; 8%)
4. Chemicals or Allied Products ($5.4 billion; 7%)
5. Coal ($3.7 billion; 5%)

Intramodal Overlap

Translating economically-relevant directional commodity values into trade-related impacts results in a potential overlap between the directional impacts. Such a potential overlap, or double-counting, is possible where the outbound/intrastate impacts stem (partially, or wholly) from inbound commodities utilized in industrial activity that produces primary or byproduct commodities thereafter shipped in- or out-of-state (intrastate or outbound movements,

respectively)[7]. Within each mode, the directionally- and industry-specific impacts were compared and any potential redundancies are subtracted-out.[8]

Intermodal Overlap

Intermodal overlap potential likewise similarly exists; however, determining that potential is more difficult given the myriad multi-modal-industry-commodity permutations; and such nuances are beyond the analysis scope. Despite that, the major intermodal overlap potential conflict (rail-truck) is effectively handled through the exclusion of *Secondary Traffic*, per the IHS TRANSEARCH® definition as a catch-all drayage and repositioning commodity category. As such, the rail-truck intermodal overlap is attributed to rail in the results.

Economic Impacts

Impacts are summarized for each of five major transportation modes (truck, rail, water, air, and pipeline) by activity (service providers, trade users, and a combined total), type (direct, indirect, induced, and an economic total), and measure (employment, income, value added, output, and tax revenue) for year 2014 to provide a comprehensive perspective on how freight in Kansas impacts the economy.

Summary-level impacts from all freight-related activity (both service providers and trade users combined) by mode and measure/type are presented below in **Table A-2**.

Direct

Accounting for both the freight service providers and the trade facilitated by such providers, the direct economic impact to Kansas from all freight activity amounts to 372,610 jobs in 2014, earning $22.0 billion by producing $34.8 billion in value-added (gross state product, or GSP), which equates to $108.2 billion in output (the sales value of goods/services) taxed to yield $2.1 billion to local, state, and federal coffers.

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[7] An example: seeds imported by farmers (inbound) into Kansas are used as intermediary inputs into the farm industry, translating into crop farming economic activity. As industrial crop farming is not subsistence farming, the farm products produced are shipped within (intrastate) and beyond (outbound) Kansas for further processing (food products) or direct consumption. Such outbound/intrastate farm product movements are thus also translated into crop farming-related economic activity. A potential impact overlap thus arises when the inbound seed is used to produce farm products subsequently-transported outbound/intrastate. As such, various inbound commodities may be associated with the same economic activity as different (but related) outbound commodities – the potential redundancy must be removed.

[8] An example: #XXX tons worth $YYY of inbound seeds translate into $100 million of crop farming-related economic activity; #ZZZ worth $AAA of farm products shipped outbound/intrastate translate into $500 million of crop farming-related activity. $600 million aggregation would potentially be double-counting $100 million if the inbound seeds are used entirely in producing the $500 million farm products.

Table A-2: Total Freight Activity-Related Impacts by Mode and Economic Measure/Type

Measure/Type	Truck	Rail	Water	Air	Pipe	Total
EMPLOYMENT *						
Direct	244,690	106,370	30	20,380	1,140	372,610
Indirect	159,190	65,130	40	7,150	1,040	232,550
Induced	140,280	63,390	20	8,580	1,790	214,060
Total	544,160	234,890	90	36,120	3,970	819,230
INCOME **						
Direct	$14,067	$6,715	$1	$1,011	$243	$22,037
Indirect	$9,160	$3,765	$2	$402	$56	$13,385
Induced	$5,746	$2,597	$1	$352	$73	$8,769
Total	$28,974	$13,077	$4	$1,765	$372	$44,192
VALUE ADDED **						
Direct	$22,402	$10,816	$1	$1,257	$309	$34,785
Indirect	$14,364	$5,836	$3	$644	$76	$20,923
Induced	$9,998	$4,520	$1	$613	$128	$15,260
Total	$46,764	$21,172	$6	$2,515	$513	$70,970
OUTPUT **						
Direct	$71,225	$32,416	$9	$3,975	$531	$108,156
Indirect	$31,122	$12,566	$7	$1,261	$177	$45,133
Induced	$17,452	$7,890	$2	$1,070	$223	$26,637
Total	$119,799	$52,871	$19	$6,305	$930	$179,924
TAX REVENUE **						
Direct	$1,009	$904	$0	$99	$67	$2,079
Indirect	$1,193	$489	$0	$50	$6	$1,738
Induced	$869	$393	$0	$53	$11	$1,326
Total	$3,071	$1,785	$0	$202	$84	$5,142

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

Total

Incorporating multiplier impacts (indirect and induced) associated with direct freight activity translates into an additional 446,620 jobs earning $22.2 billion, by producing $36.2 billion in GSP. In total, the direct and multiplier impacts related to freight activity amounts to 819,230 jobs in 2014, earning $44.2 billion by producing $71.0 billion in GSP, equating to $180.0 billion in output, taxed to yield $2.1 billion to local, state, and federal coffers.

A majority of the freight-related impacts are intuitively attributable to the major freight modes: trucking and rail, followed by air, pipeline, and water. Such an impact distribution is predominately a function of the freight values hauled via the respective modes across Kansas infrastructure – descending by mode in the same sequence as the total impacts.

Depending on measure and type for all freight modes combined, between 82 percent and 94 percent of the freight activity impacts are trade-user related, with the remaining 6.3 percent to 18 percent pertaining to freight service providers. A detailed breakdown by freight activity for each mode (service providers versus trade users) are in Section 4.

It is important to contextualize the preceding economic impact estimates, as it is difficult to visualize hundreds of thousands of jobs and billions of dollars, etc. As such, the economic impacts are compared with the existing economic composition of Kansas in 2014, by the exact same existing economic measures as the presented economic impacts, per **Table A-3**.

Table A-3: Kansas Economic Measures, 2014

Measure	Value
Employment	1,883,641
Income *	$95,166
Value Added *	$150,764
Output *	$329,432
Tax Revenues *	$9,829

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

Accounting for both the providers (carriers) and users (shippers/receivers), the direct impacts associated with Kansas-related freight amount to between 20 percent (employment) and 33 percent (output) of the statewide economy, per **Table A-4**. Accounting for supplier-related impacts (indirect) and the income re-circulation impacts (induced), the total economic impacts pertaining to all freight-related activity in Kansas amounts to between 44 percent (employment) and 55 percent (output) of the statewide economy. Such 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 A-4: Total Freight Activity-Related Impacts, Percent of Economy

Measure/Type	Truck	Rail	Water	Air	Pipe	Total
EMPLOYMENT *						
Direct	13.0%	5.6%	0.001%	1.1%	0.1%	19.8%
Indirect	8.5%	3.5%	0.002%	0.4%	0.1%	12.5%
Induced	7.4%	3.4%	0.001%	0.5%	0.1%	11.4%
Total	28.9%	12.5%	0.005%	1.9%	0.2%	43.5%
INCOME **						
Direct	14.8%	7.1%	0.001%	1.1%	0.3%	23.2%
Indirect	9.6%	4.0%	0.002%	0.4%	0.1%	14.1%
Induced	6.0%	2.7%	0.001%	0.4%	0.1%	9.2%
Total	30.4%	13.7%	0.004%	1.9%	0.4%	46.4%
VALUE ADDED **						
Direct	14.9%	7.2%	0.001%	0.8%	0.2%	23.1%
Indirect	9.5%	3.9%	0.002%	0.4%	0.1%	13.9%
Induced	6.6%	3.0%	0.001%	0.4%	0.1%	10.1%
Total	31.0%	14.0%	0.004%	1.7%	0.3%	47.0%
OUTPUT **						
Direct	21.6%	9.8%	0.003%	1.2%	0.2%	32.8%
Indirect	9.4%	3.8%	0.002%	0.4%	0.1%	13.7%
Induced	5.3%	2.4%	0.001%	0.3%	0.1%	8.1%
Total	36.4%	16.0%	0.006%	1.9%	0.3%	54.6%
TAX REVENUE **						
Direct	10.3%	9.2%	0.001%	1.0%	0.7%	21.1%
Indirect	12.1%	5.0%	0.002%	0.5%	0.1%	17.7%
Induced	8.8%	4.0%	0.001%	0.5%	0.1%	13.4%
Total	31.2%	18.2%	0.004%	2.1%	0.9%	52.4%

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

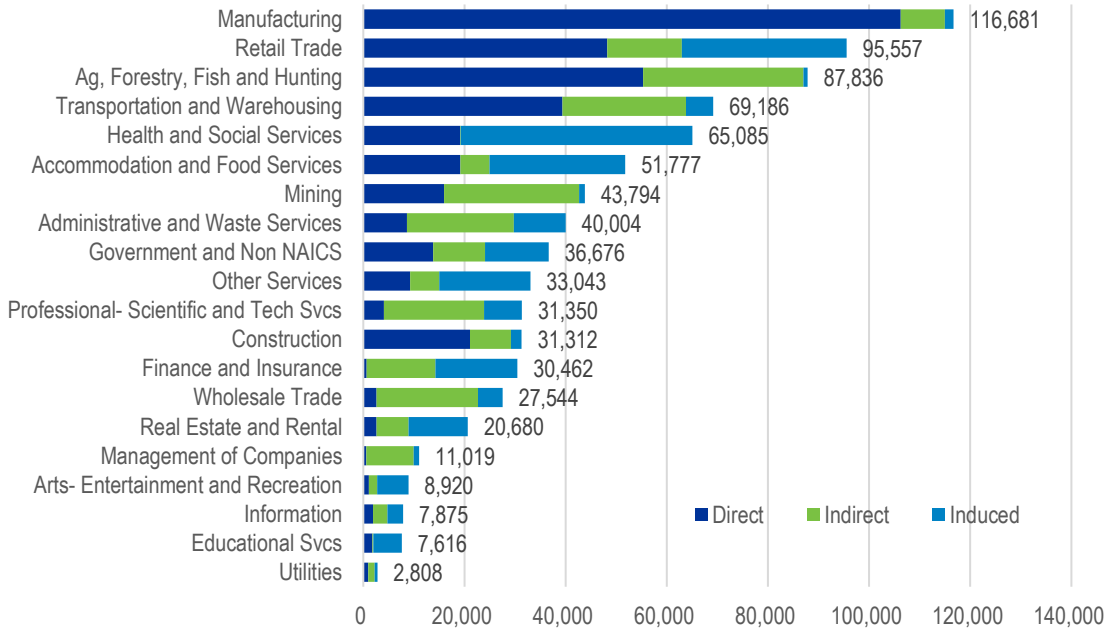
Impacts relating to Kansas freight are distributed across various industries, including not only the freight service industries (modal carriers) but all the other industries depending on the direct physical movement of goods (trade). Employment impacts by industry are presented in **Table A-5** and graphically in Figure A-2.

Table A-5: Total Freight Activity-Related Employment by Industry

Industry Description	Direct	Indirect	Induced	Total	Percent
Manufacturing	106,233	8,736	1,712	116,681	14.2%
Retail Trade	48,240	14,747	32,570	95,557	11.7%
Ag, Forestry, Fish and Hunting	55,316	31,710	810	87,836	10.7%
Transportation and Warehousing	39,375	24,397	5,414	69,186	8.4%
Health and Social Services	19,127	136	45,822	65,085	7.9%
Accommodation and Food Services	19,185	5,746	26,846	51,777	6.3%
Mining	15,944	26,751	1,100	43,794	5.3%
Administrative and Waste Services	8,643	21,125	10,236	40,004	4.9%
Government and Non NAICS	13,792	10,249	12,635	36,676	4.5%
Other Services	9,289	5,759	17,995	33,043	4.0%
Professional- Scientific and Tech Services	4,061	19,792	7,496	31,350	3.8%
Construction	21,108	8,096	2,108	31,312	3.8%
Finance and Insurance	654	13,590	16,218	30,462	3.7%
Wholesale Trade	2,607	20,057	4,880	27,544	3.4%
Real Estate and Rental	2,622	6,314	11,745	20,680	2.5%
Management of Companies	599	9,363	1,057	11,019	1.3%
Arts- Entertainment and Recreation	1,080	1,679	6,160	8,920	1.1%
Information	1,949	2,832	3,094	7,875	1.0%
Educational Services	1,820	176	5,620	7,616	0.9%
Utilities	961	1,303	545	2,808	0.3%
Total	*372,605*	*232,558*	*214,063*	*819,225*	*100.0%*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

Figure A-2: Total Freight Activity-Related Employment by Industry



Industry Impacts

Employment impacts are categorized by the North American Industry Classification System (NAICS) using the top-level two-digit industries. The employment impacts amount to 819,230 when combining all freight modes and reflecting total impacts. 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 the top five, all but *Health and Social Services* employment impacts are directly related to freight whereas the impacts to *Health and Social Services* are mostly a re-spending of the extra income. *Construction* is most directly-related to freight as well however it did not rank within the top five.

Modal Impacts

Detailed impacts by modal activity, including the directionally-related composition of trade user impacts, are presented in **Table A-6** through **Table A-15** in Section 4. As noted, the largest impacts are attributable to the truck and rail modes, with about 95 percent of the total impacts associated to the two combined; the remaining 5 percent is attributed to the non-surface modes, with most to airborne freight. Such modal impacts are mostly a function of the associated trade values facilitated by the respective modes from IHS Transearch®.

- Trucking constitutes the largest modal impacts, with 544,160 total employees in Kansas associated either directly with the trucking industry (23,390) and users (221,300) or the associated multiplier effects (299,470). Over 90 percent of the modal impacts (depending on measure/type) are trade-related, with the directions closely-balanced in total. However, outbound/intra-related directional trade facilitates a larger relative multiplier impact and more-productive jobs[9] than the inbound-related impacts.

- Freight rail is attributed the second-largest impacts, with 234,890 total employees: 5,420 directly employed in freight rail, 100,960 directly use freight rail carrier services to trade goods, and multiplier impacts include another 128,520. Similar to trucking, most impacts are trade-related, accounting for over 90 percent, excepting direct taxes (71%). Directionally, impacts associated with inbound rail are larger than outbound, especially employment-related. However, the outbound/intra-impacts are associated with a higher relative multiplier and more-productive per employee than inbound-related impacts.

[9] higher monetary-measure impacts (income, output, etc.) per direct employment

Table A-6: Truck Impacts by Activity and Economic Measure/Type

Measure and Type	Services	Trade Users			Service and Trade
		Outbound/Intra	Inbound	Trade Total	
Employment *					
Direct	23,390	89,050	132,250	221,300	244,690
Indirect	12,650	87,560	58,980	146,540	159,190
Induced	12,670	68,570	59,040	127,610	140,280
Total	*48,710*	*245,180*	*250,270*	*495,450*	*544,160*
Income **					
Direct	$1,395	$6,144	$6,528	$12,672	$14,067
Indirect	$696	$5,198	$3,266	$8,464	$9,160
Induced	$519	$2,807	$2,419	$5,226	$5,745
Total	*$2,610*	*$14,149*	*$12,213*	*$26,362*	*$28,973*
Value Added **					
Direct	$1,725	$10,614	$10,063	$20,677	$22,402
Indirect	$1,039	$7,937	$5,388	$13,325	$14,364
Induced	$903	$4,885	$4,210	$9,095	$9,998
Total	*$3,667*	*$23,436*	*$19,661*	*$43,097*	*$46,764*
Output **					
Direct	$3,844	$40,503	$26,877	$67,380	$71,220
Indirect	$2,228	$17,883	$11,011	$28,894	$31,122
Induced	$1,577	$8,526	$7,350	$15,876	$17,453
Total	*$7,649*	*$66,912*	*$45,238*	*$112,150*	*$119,799*
Tax Revenue **					
Direct	$42	$349	$618	$967	$1,009
Indirect	$77	$683	$433	$1,116	$1,193
Induced	$78	$424	$366	$790	$869
Total	*$197*	*$1,456*	*$1,417*	*$2,873*	*$3,071*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

** employment rounded to the nearest ten job-years; totals may not sum due to rounding*

*** in millions of 2014 dollars*

Table A-7: Truck Impacts, Percentage of Economy

Measure and Type	Services	Users	Total
Employment			
Direct	1.2%	11.7%	13.0%
Total	*2.6%*	*26.3%*	*28.9%*
Income			
Direct	1.5%	13.3%	14.8%
Total	*2.7%*	*27.7%*	*30.4%*
Value Added			
Direct	1.1%	13.7%	14.9%
Total	*2.4%*	*28.6%*	*31.0%*
Output			
Direct	1.2%	20.5%	21.6%
Total	*2.3%*	*34.0%*	*36.4%*
Tax Revenues			
Direct	0.4%	9.8%	10.3%
Total	*2.0%*	*29.2%*	*31.2%*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

Table A-8: Rail Impacts by Activity and Economic Measure/Type

Measure and Type	Services	Trade Users			Service and Trade
		Outbound/Intra	Inbound	Trade Total	
Employment *					
Direct	5,420	32,710	68,240	100,950	106,370
Indirect	4,220	29,520	31,390	60,910	65,130
Induced	5,340	25,230	32,820	58,050	63,390
Total	*14,980*	*88,460*	*132,450*	*219,910*	*234,890*
Income **					
Direct	$636	$2,398	$3,681	$6,079	$6,715
Indirect	$242	$1,768	$1,755	$3,523	$3,765
Induced	$219	$1,033	$1,345	$2,378	$2,597
Total	*$1,097*	*$5,199*	*$6,781*	*$11,980*	*$13,077*
Value Added **					
Direct	$1,725	$3,801	$5,289	$9,090	$10,815
Indirect	$353	$2,729	$2,754	$5,483	$5,836
Induced	$381	$1,798	$2,340	$4,138	$4,519
Total	*$2,459*	*$8,328*	*$10,383*	*$18,711*	*$21,172*
Output **					
Direct	$2,650	$14,825	$14,940	$29,765	$32,415
Indirect	$851	$5,923	$5,792	$11,715	$12,566
Induced	$666	$3,139	$4,085	$7,224	$7,890
Total	*$4,167*	*$23,887*	*$24,817*	*$48,704*	*$52,871*
Tax Revenue **					
Direct	$265	$124	$515	$639	$904
Indirect	$27	$226	$236	$462	$489
Induced	$33	$156	$203	$359	$392
Total	*$325*	*$506*	*$954*	*$1,460*	*$1,785*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

** employment rounded to the nearest ten job-years; totals may not sum due to rounding*

*** in millions of 2014 dollars*

Table A-9: Rail Impacts, Percentage of Economy

Measure and Type	Services	Users	Total
Employment			
Direct	0.3%	5.4%	5.6%
Total	*0.8%*	*11.7%*	*12.5%*
Income			
Direct	0.7%	6.4%	7.1%
Total	*1.2%*	*12.6%*	*13.7%*
Value Added			
Direct	1.1%	6.0%	7.2%
Total	*1.6%*	*12.4%*	*14.0%*
Output			
Direct	0.8%	9.0%	9.8%
Total	*1.3%*	*14.8%*	*16.0%*
Tax Revenues			
Direct	2.7%	6.5%	9.2%
Total	*3.3%*	*14.9%*	*18.2%*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

Table A-10: Water Impacts by Activity and Economic Measure/Type

Measure and Type	Services	Trade Users			Service and Trade
		Outbound/Intra	Inbound	Trade Total	
Employment *					
Direct	10	10	0	10	20
Indirect	30	10		10	40
Induced	10	10	0	10	20
Total	*50*	*30*		*30*	*80*
Income **					
Direct		$1		$1	$1
Indirect	$2	$0	$0	$0	$2
Induced	$1				$1
Total	*$3*	*$1*	*$0*	*$1*	*$4*
Value Added **					
Direct	$0	$1	$0	$1	$1
Indirect	$3	$1		$1	$4
Induced	$1	$1	$0	$1	$2
Total	*$4*	*$3*		*$3*	*$7*
Output **					
Direct	$6	$3		$3	$9
Indirect	$6	$1	$0	$1	$7
Induced	$2	$1		$1	$3
Total	*$14*	*$5*	*$0*	*$5*	*$19*
Tax Revenue **					
Direct	$0	$0	$0	$0	$0
Indirect					
Induced	$0	$0	$0	$0	$0
Total					

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

** employment rounded to the nearest ten job-years; totals may not sum due to rounding*

*** in millions of 2014 dollars*

Table A-11: Water Impacts, Percentage of Economy

Measure and Type	Services	Users	Total
Employment			
Direct	0.001%	0.001%	0.001%
Total	*0.003%*	*0.002%*	*0.005%*
Income			
Direct	0.000%	0.001%	0.001%
Total	*0.003%*	*0.002%*	*0.004%*
Value Added			
Direct	0.000%	0.001%	0.001%
Total	*0.003%*	*0.002%*	*0.004%*
Output			
Direct	0.002%	0.001%	0.003%
Total	*0.004%*	*0.002%*	*0.006%*
Tax Revenues			
Direct	0.000%	0.001%	0.001%
Total	*0.002%*	*0.002%*	*0.004%*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

Table A-12: Air Impacts by Activity and Economic Measure/Type

Measure and Type	Services	Trade Users			Service and Trade
		Outbound/Intra	Inbound	Trade Total	
Employment *					
Direct	30	6,010	14,340	20,350	20,380
Indirect	40	3,610	3,500	7,110	7,150
Induced	20	3,850	4,710	8,560	8,580
Total	*90*	*13,470*	*22,550*	*36,020*	*36,110*
Income **					
Direct	$1	$416	$594	$1,010	$1,011
Indirect	$2	$215	$185	$400	$402
Induced	$1	$158	$193	$351	$352
Total	*$4*	*$789*	*$972*	*$1,761*	*$1,765*
Value Added **					
Direct	$2	$478	$778	$1,256	$1,258
Indirect	$3	$332	$309	$641	$644
Induced	$1	$275	$336	$611	$612
Total	*$7*	*$1,085*	*$1,423*	*$2,508*	*$2,514*
Output **					
Direct	$9	$2,187	$1,779	$3,966	$3,975
Indirect	$7	$663	$591	$1,254	$1,261
Induced	$2	$481	$587	$1,068	$1,070
Total	*$18*	*$3,331*	*$2,957*	*$6,288*	*$6,306*
Tax Revenue **					
Direct	$1	$19	$80	$99	$100
Indirect		$26	$24	$50	$50
Induced	$0	$24	$29	$53	$53
Total	*$1*	*$70*	*$132*	*$202*	*$203*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

** employment rounded to the nearest ten job-years; totals may not sum due to rounding*

*** in millions of 2014 dollars*

Table A-13: Air Impacts, Percentage of Economy

Measure and Type	Services	Users	Total
Employment			
Direct	0.002%	1.1%	1.1%
Total	*0.005%*	*1.9%*	*1.9%*
Income			
Direct	0.001%	1.1%	1.1%
Total	*0.004%*	*1.9%*	*1.9%*
Value Added			
Direct	0.001%	0.8%	0.8%
Total	*0.004%*	*1.7%*	*1.7%*
Output			
Direct	0.003%	1.2%	1.2%
Total	*0.005%*	*1.9%*	*1.9%*
Tax Revenues			
Direct	0.005%	1.0%	1.0%
Total	*0.008%*	*2.1%*	*2.1%*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

Table A-14: Pipe Impacts by Activity and Economic Measure/Type

Measure and Type	Services	Trade Users			Service and Trade
		Outbound/Intra	Inbound	Trade Total	
Employment *					
Direct	930	210	0	210	1,140
Indirect	920	130		130	1,050
Induced	1,680	110	0	110	1,790
Total	*3,530*	*450*		*450*	*3,980*
Income **					
Direct	$231	$11		$11	$242
Indirect	$48	$8	$0	$8	$56
Induced	$69	$5		$5	$74
Total	*$348*	*$24*	*$0*	*$24*	*$372*
Value Added **					
Direct	$302	$8	$0	$8	$310
Indirect	$65	$10		$10	$75
Induced	$120	$8	$0	$8	$128
Total	*$487*	*$26*		*$26*	*$513*
Output **					
Direct	$489	$42		$42	$531
Indirect	$152	$25	$0	$25	$177
Induced	$209	$14		$14	$223
Total	*$850*	*$81*	*$0*	*$81*	*$931*
Tax Revenue **					
Direct	$65	$2	$0	$2	$67
Indirect	$5	$1		$1	$6
Induced	$10	$1	$0	$1	$11
Total	*$80*	*$4*		*$4*	*$84*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

** employment rounded to the nearest ten job-years; totals may not sum due to rounding*

*** in millions of 2014 dollars*

Table A-15: Pipe Impacts, Percentage of Economy

Measure and Type	Services	Users	Total
Employment			
Direct	0.05%	0.01%	0.06%
Total	*0.19%*	*0.02%*	*0.21%*
Income			
Direct	0.24%	0.01%	0.26%
Total	*0.37%*	*0.02%*	*0.39%*
Value Added			
Direct	0.20%	0.01%	0.21%
Total	*0.32%*	*0.02%*	*0.34%*
Output			
Direct	0.15%	0.01%	0.16%
Total	*0.26%*	*0.02%*	*0.28%*
Tax Revenues			
Direct	0.66%	0.02%	0.68%
Total	*0.81%*	*0.04%*	*0.85%*

Source: CDM Smith, IHS TRANSEARCH® and IMPLAN®

- Airborne freight is a distant third to truck and rail, with 36,120 jobs associated with the service and use. A vast majority of the airborne freight impacts (99.5+%) are attributable to the users shipping and receiving mostly high value/weight cargo. Service-related impacts are disproportionately small for airborne freight relative to surface modes because dedicated air freight services are small in relation to the air cargo that is opportunistically carried in the belly of passenger planes with such related employment dedicated mostly to the primary function as passenger services.

- Pipeline impacts are a relatively small proportion of the total impacts, amount to 3,970 jobs, most of which are attributed to the industry itself. A small trade-related impact component is a function of the comparatively small value associated with pipeline movements in the IHS TRANSEARCH® database (<0.01% of all economically-relevant trade values for all modes, combined).

- Waterborne freight impacts are likewise a relatively small proportion of total impacts for similar reasons: a very small trade value associated with outbound *Nonmetallic Minerals* (rocks/aggregate) and a niche river services industry. In total, the impacts associated with waterborne freight in Kansas amounts to 90 jobs.

Next Steps

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 some criteria, or decision-making factor, in prioritization of transportation infrastructure developments – that is, a proposed development or improvement could be framed within the context of the existing relative economic contribution.

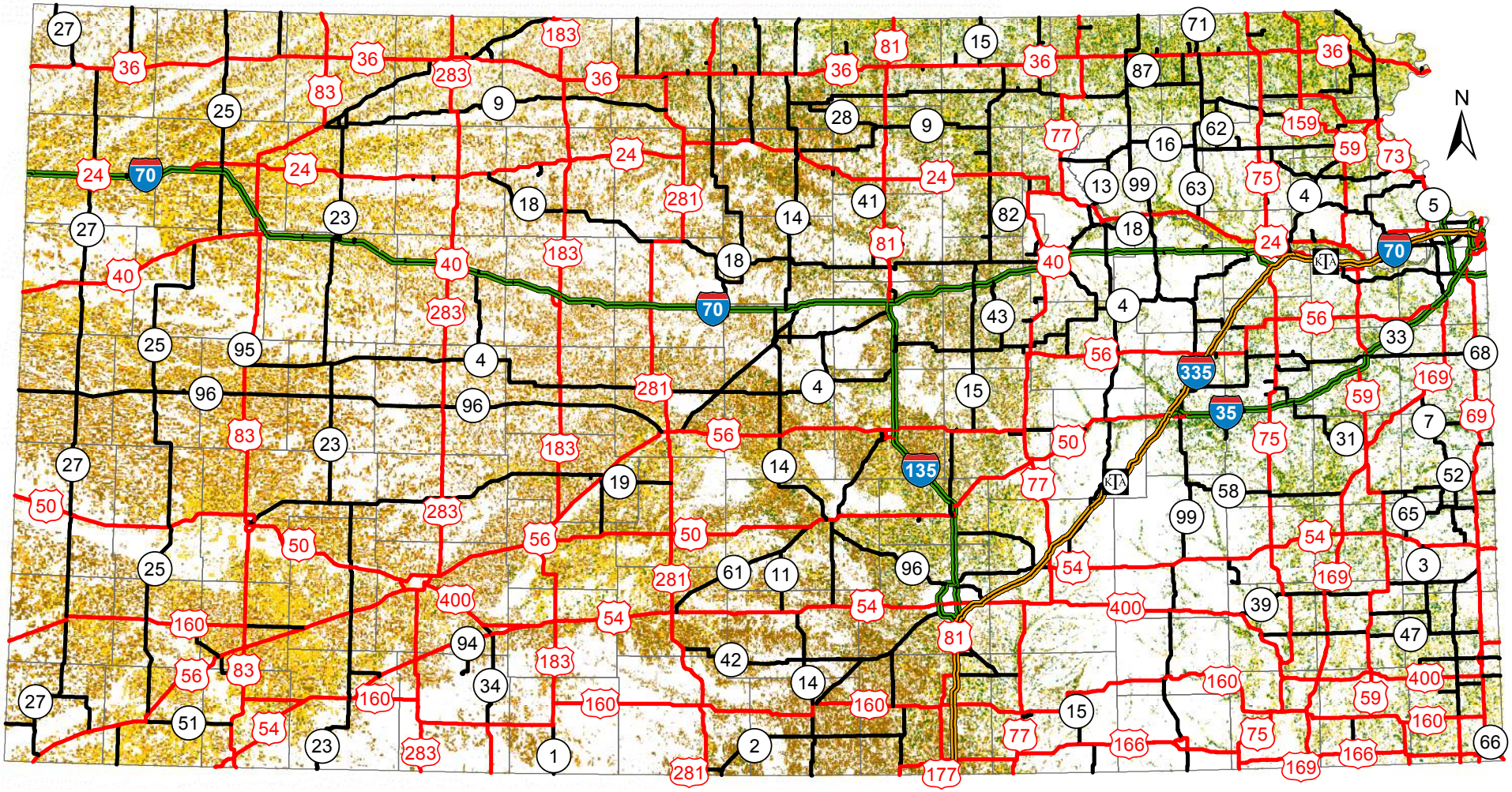
For economically-relevant trade data routed along specific infrastructure (e.g., trade via trucks on a highway network), routes could be characterized by relative economic relevance via a more-detailed application of this analysis (route-level resolution). Such detailed attribution could be incorporated into a ranking or prioritization scheme.

Kansas Transportation and Crop Map

Highways

Kansas Department of Transportation

Kansas Transportation and Crop Map 2016 - Wheat, Corn, Soybeans and Sorghum



USDA

NASS

Corn 698,640,000 Bushels

Sorghum 268,450,000 Bushels

Soybeans 192,480,000 Bushels

Winter Wheat 467,400,000 Bushels

Turnpike

Interstate

U.S. Route

State Route

PREPARED BY THE

KANSAS DEPARTMENT OF TRANSPORTATION

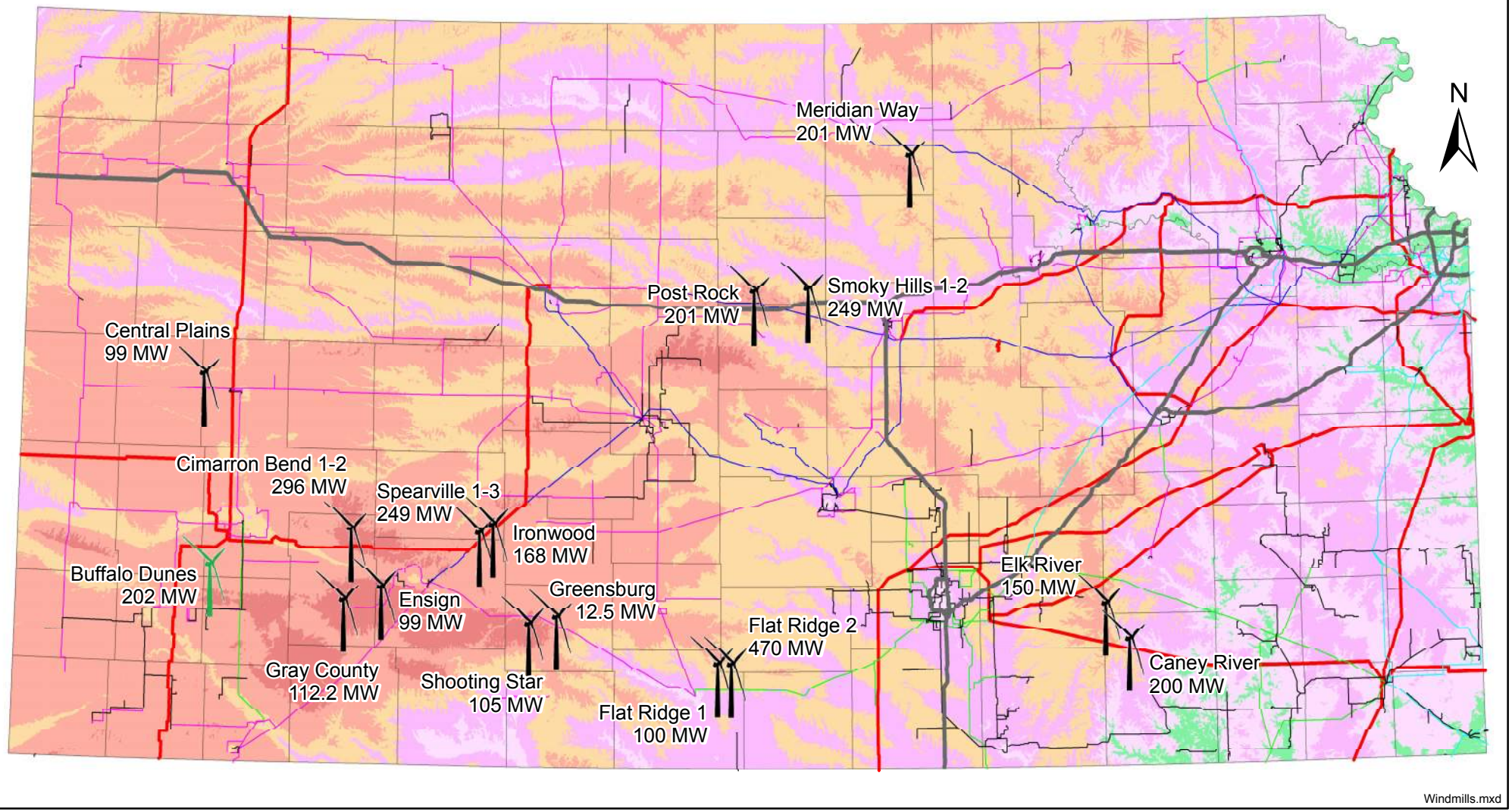
BUREAU OF TRANSPORTATION PLANNING

0 10 20 30 40 50

Miles

MAP CREATED Tuesday, February 14, 2017

Kansas Wind Resources 2,712 MW Total



Existing

Under Construction

Transmission Lines

345 KV
230 KV
161 KV
138 KV
115 KV
69 KV

Roads

Interstate

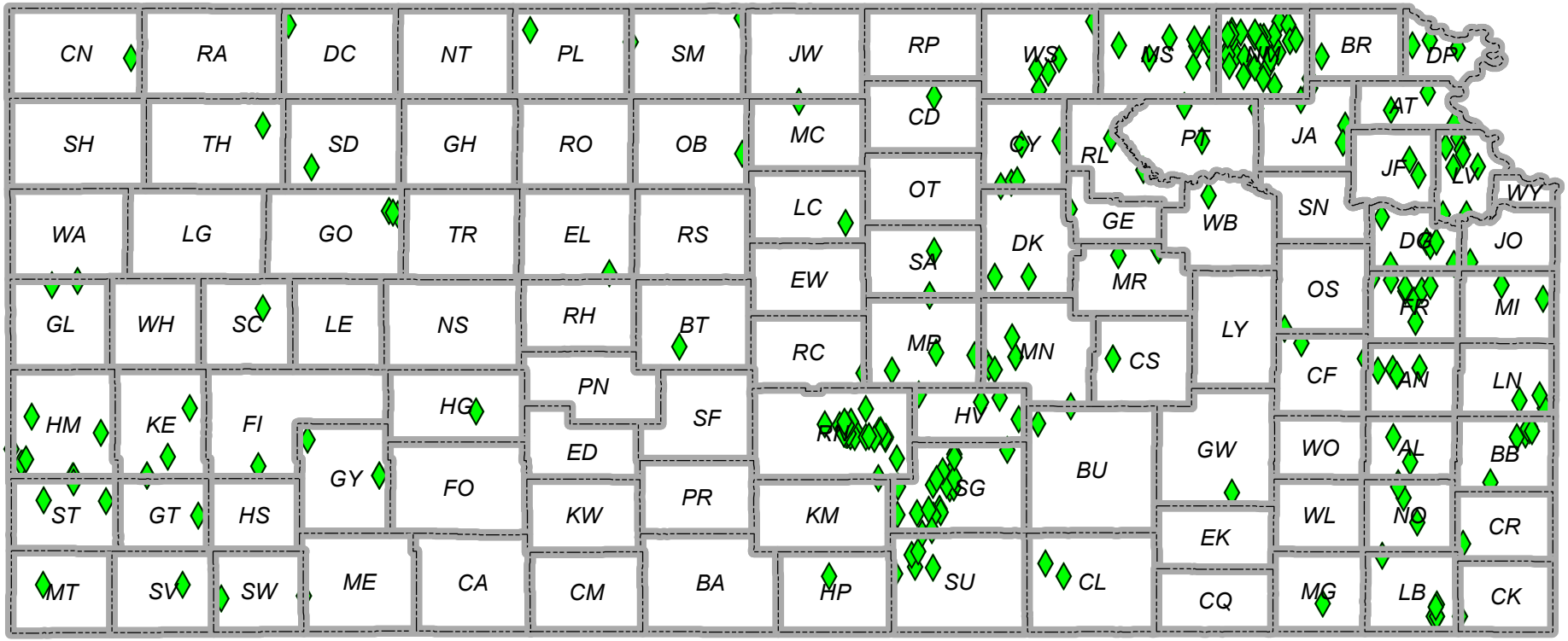
Wind Speed at 100 m

4.0 - 5.5	7.5 - 8
5.5 - 6	8.0 - 8.5
6.0 - 6.5	8.5 - 9
6.5 - 7	9.0 - 9.5
7.0 - 7.5	9.5 - 12

Wind speed at 100 meters data layer was created by AWS Truewind using the MesoMap system and historical weather data.
July 2008

Kansas Corporation Commission
Information Technology
February 20, 2013

Kansas Dairy Producers
February 2017



Kansas
Department of Agriculture

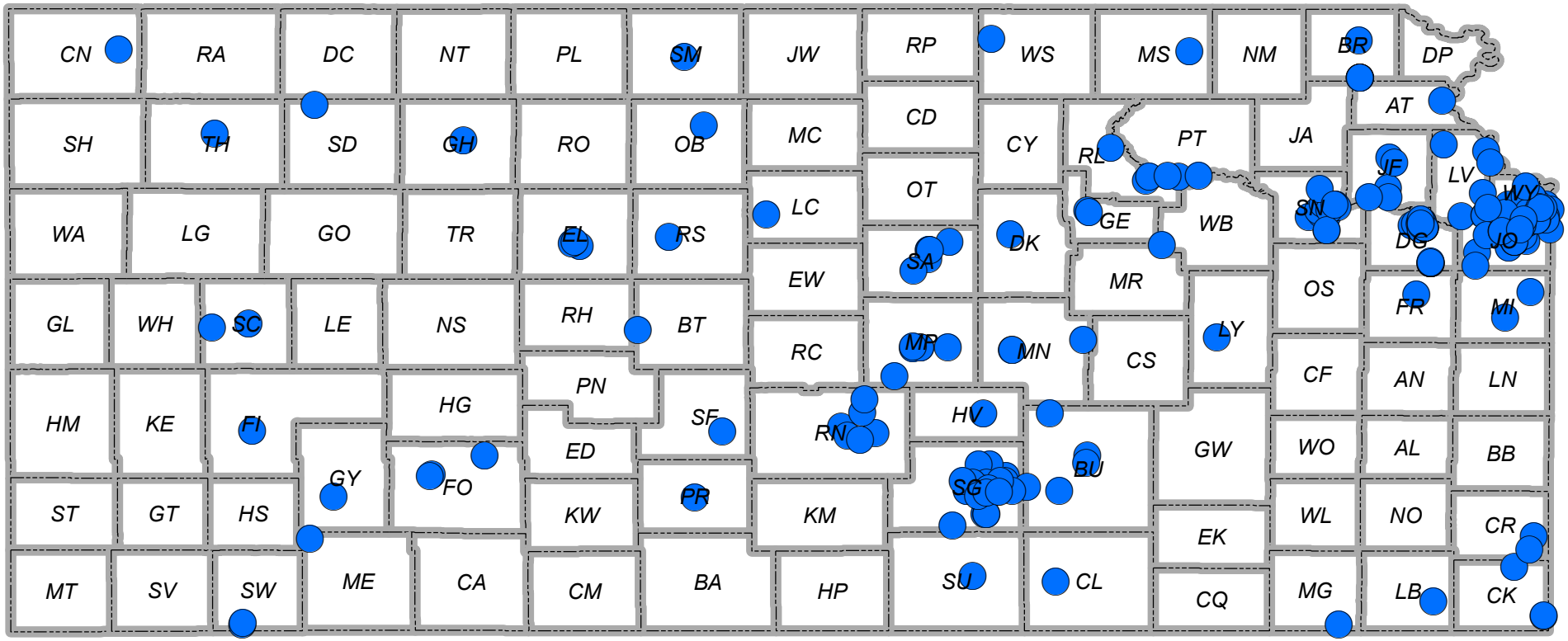
N

Legend

County Boundary

Dairy Producers

Kansas Food Manufactures
February 2017



Kansas Department of Agriculture

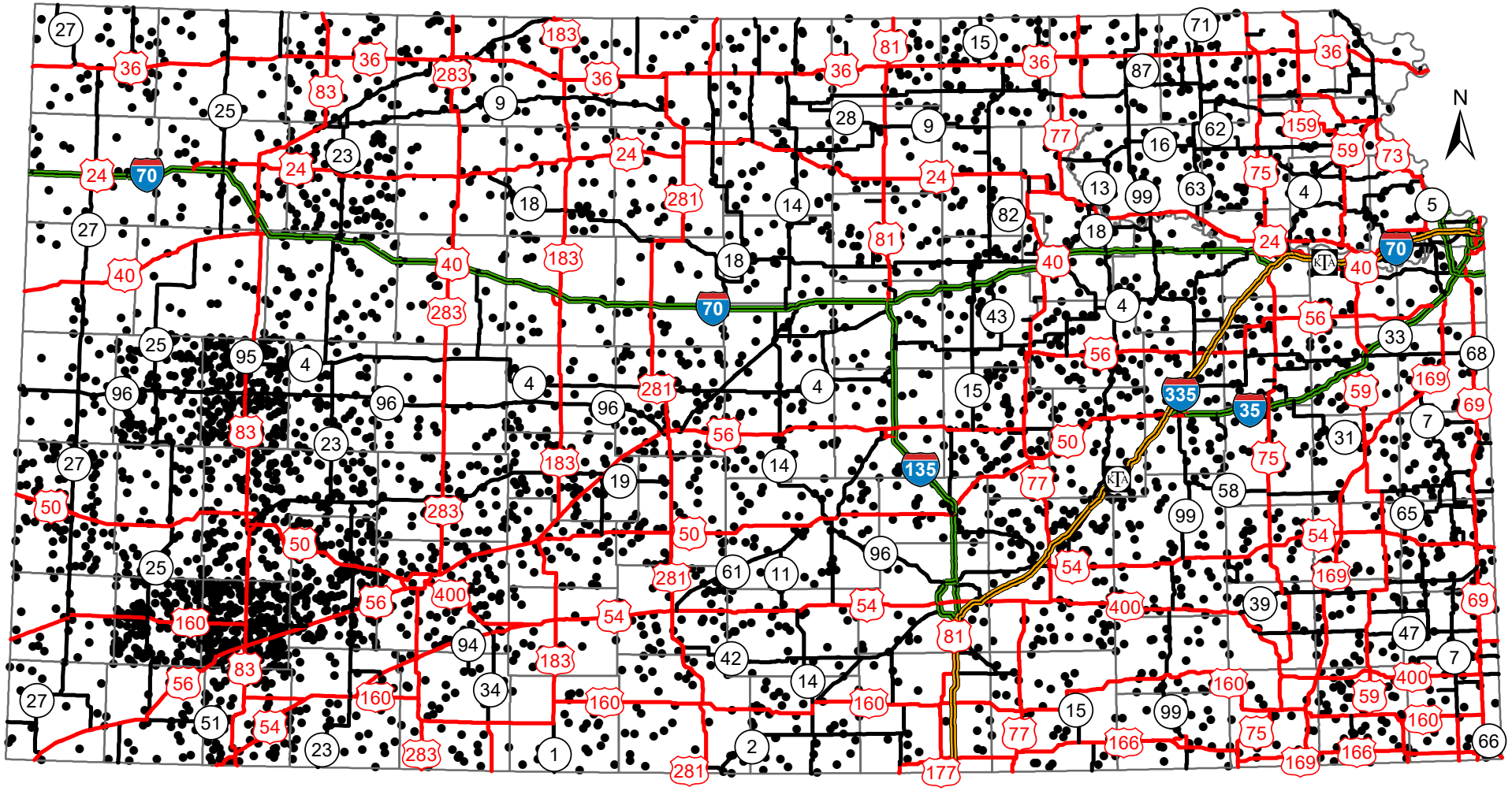
N

Legend

- Food Manufacture
- County Boundary

2016 Livestock and Transportation

Kansas Department of Transportation



USDA

AGRICULTURE COUNTS NASS

*Based on 2016 Agriculture Survey.
Census is taken once every five years

2016 All Cattle and Calves
1 Dot = 1,500 head

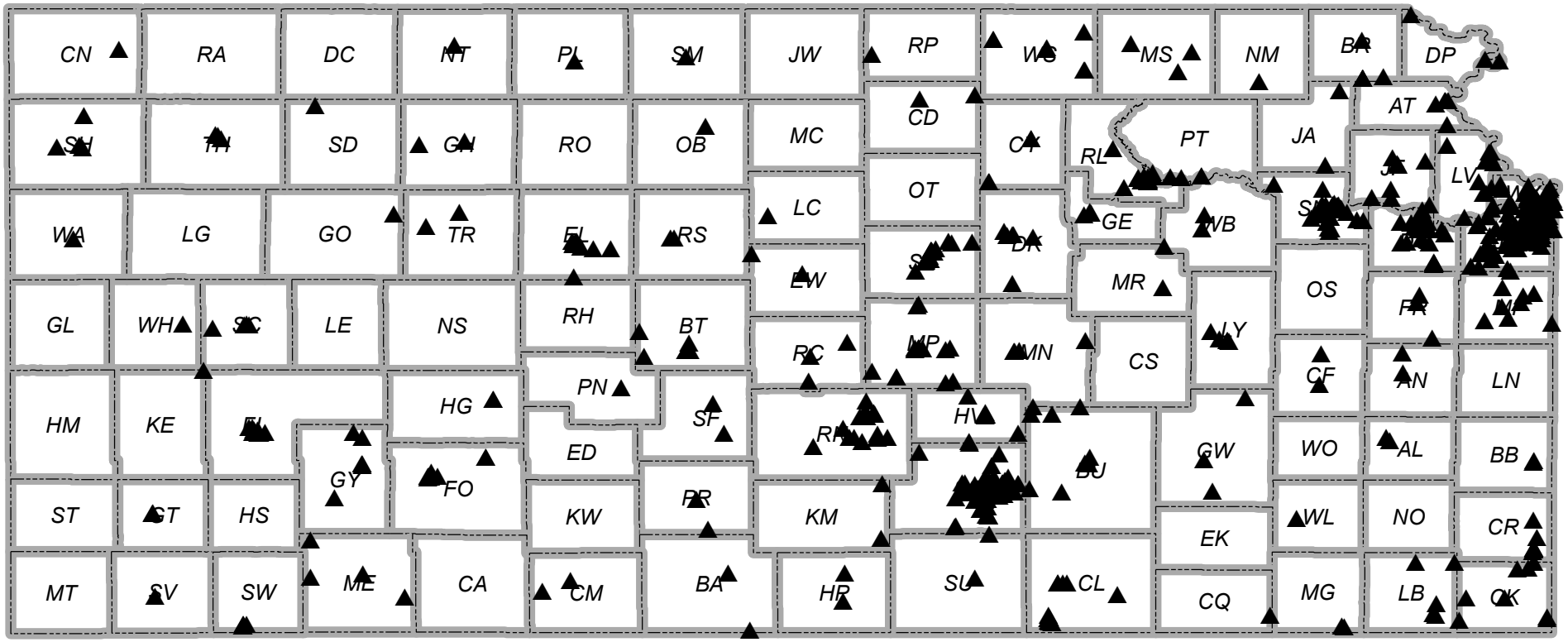
Turnpike
Interstate
U.S. Route
State Route

PREPARED BY THE
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING

0 10 20 30 40 50
Miles

MAP CREATED Thursday, August 31, 2017

Kansas Food Processors
February 2017



Kansas
Department of Agriculture

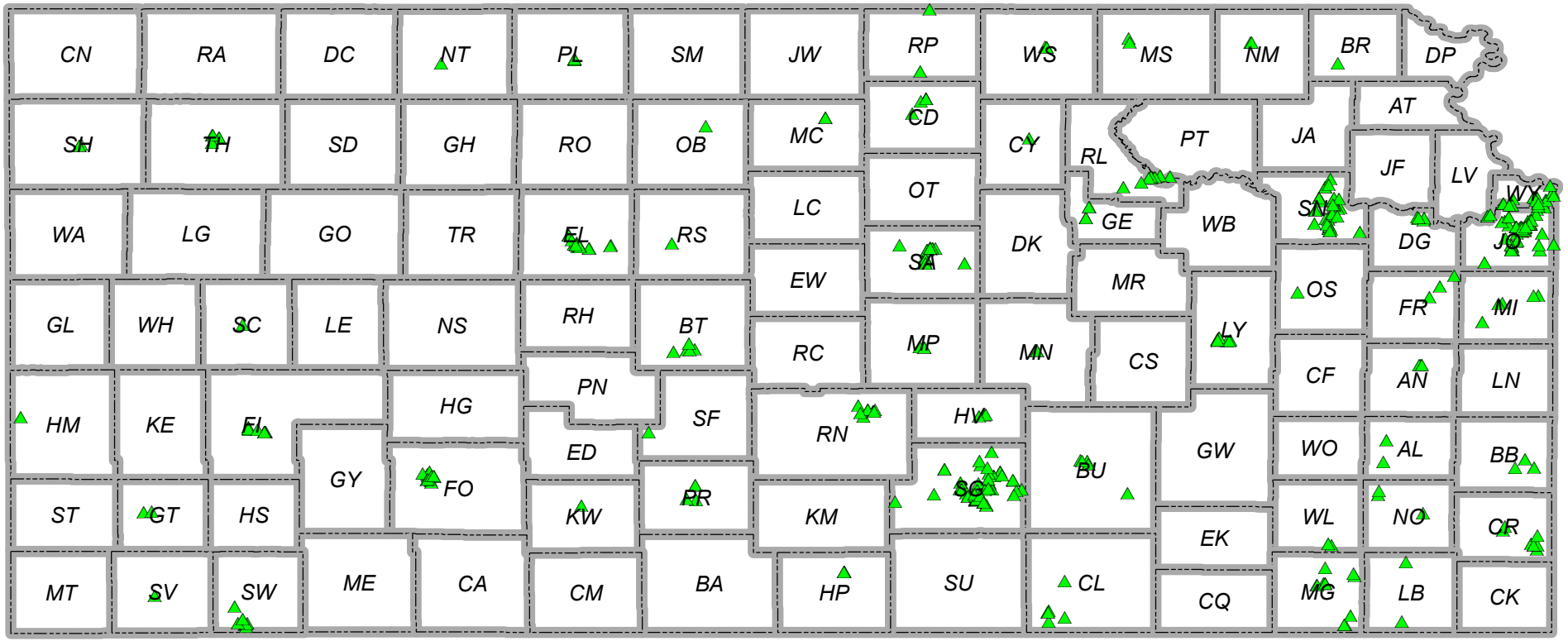
N

Legend

▲ Food Processor

County Boundary

Kansas Food Storage
February 2017



Kansas
Department of Agriculture

N

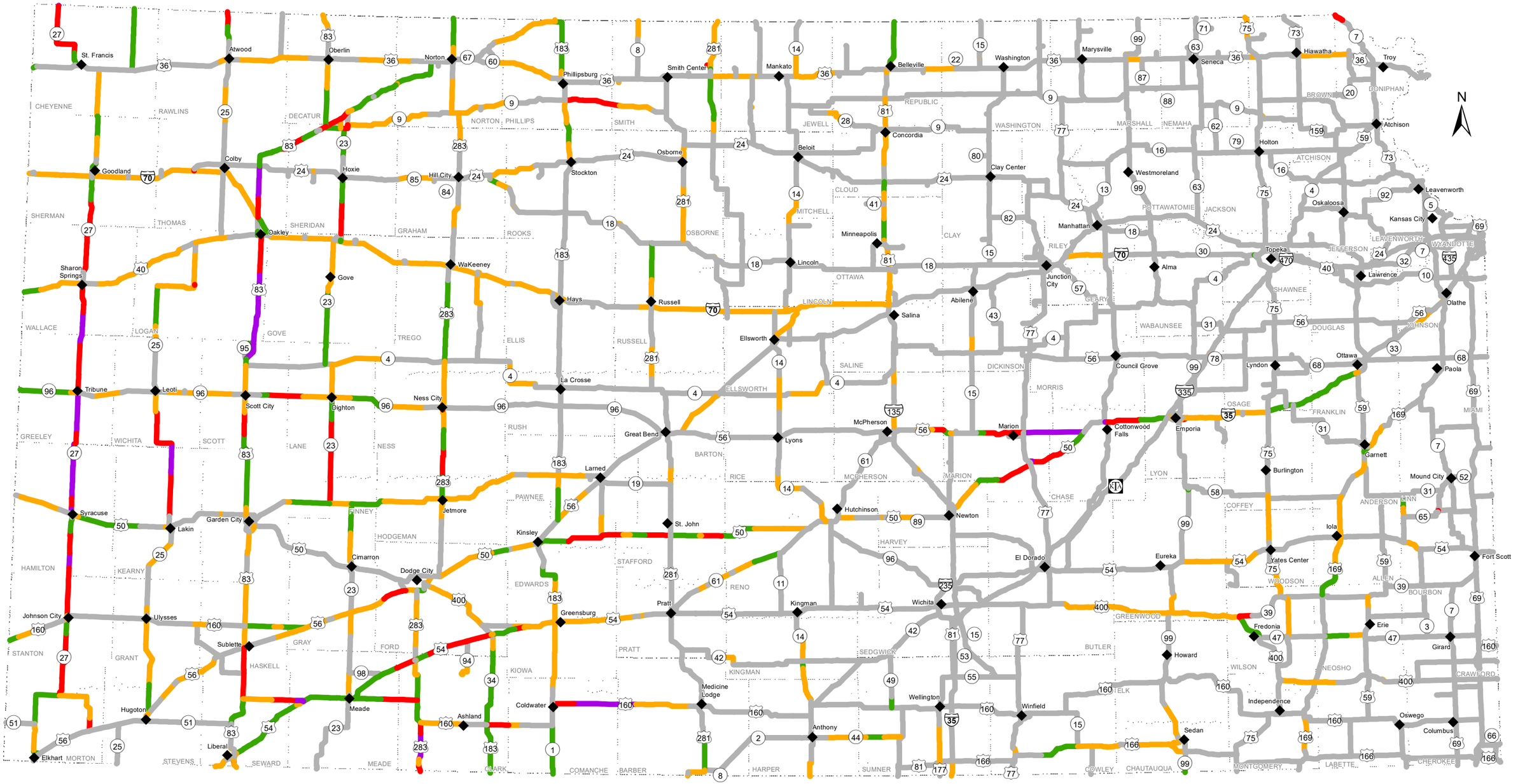
Legend

Food Storage

County Boundary

Appendix B: Percent Truck Traffic

2016 Percent Truck Traffic
FHWA Class 8 and Above

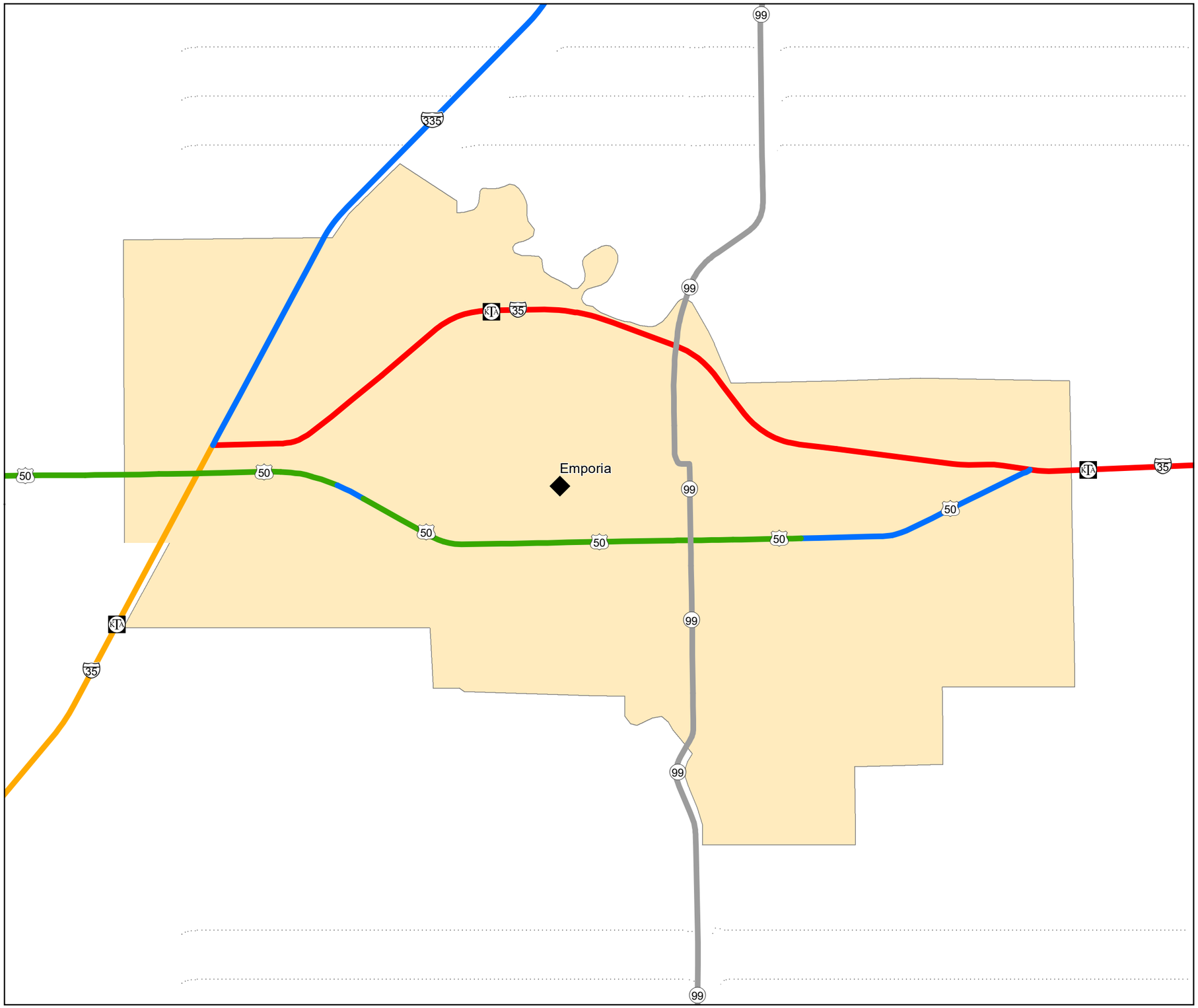


Traffic Data Collected in CY 2016

PREPARED BY THE

KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING

MAP CREATED TUESDAY, AUGUST 29, 2017



2016
Multi Truck ADT

Multi Truck = Class 8 and above
Traffic Data Collected in CY 2016

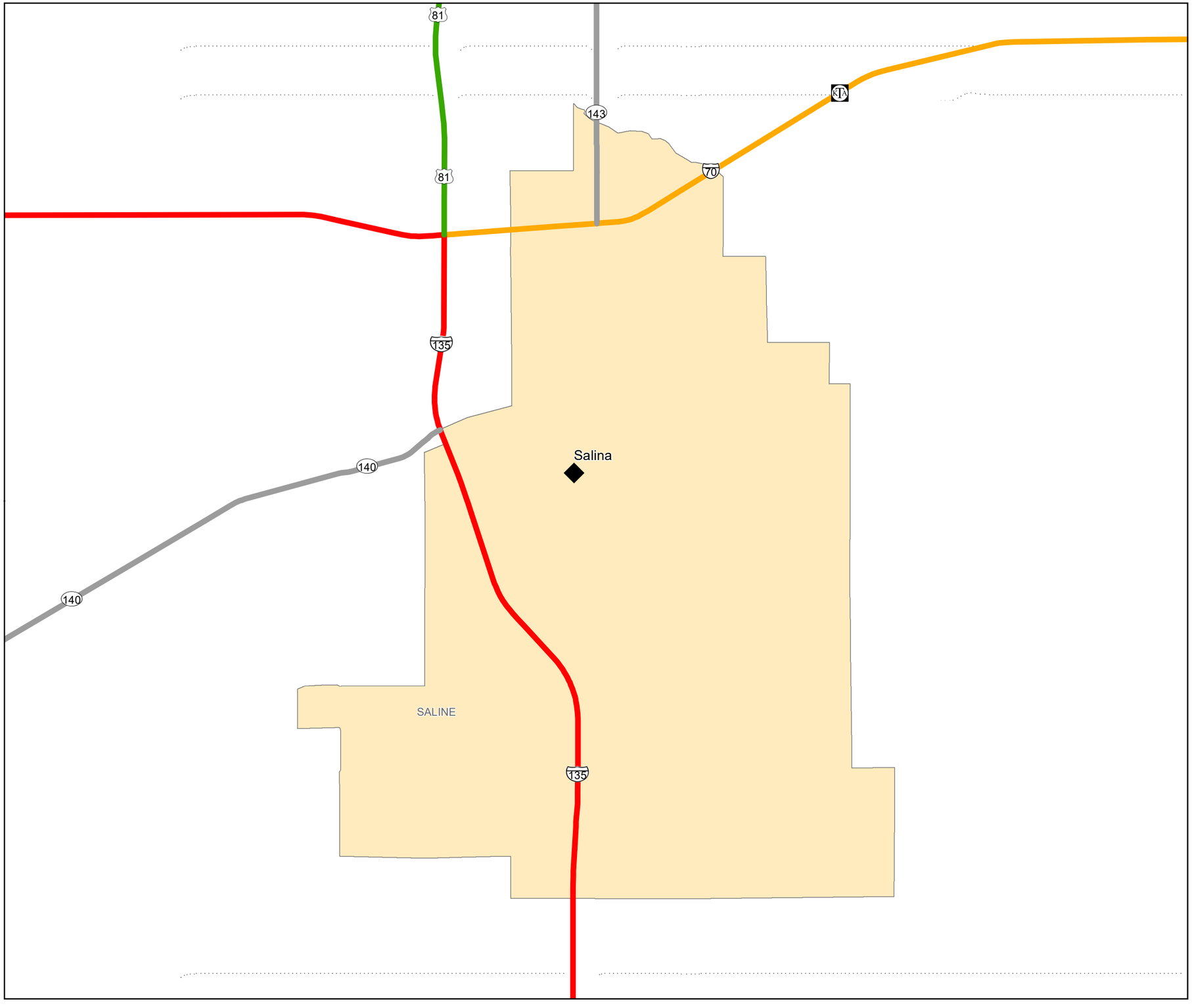
Emporia
Urban Area

- Less than 1,000
- 1,000 to 2,000
- 2,000 to 3,000
- 3,000 to 4,000
- Greater than 4,000

N

0 0.2 0.4 0.6 0.8 1
Miles

PREPARED BY THE
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING
MAP CREATED TUESDAY, AUGUST 29, 2017



2016
Multi Truck ADT

Multi Truck = Class 8 and above
Traffic Data Collected in CY 2016

Salina
Urban Area

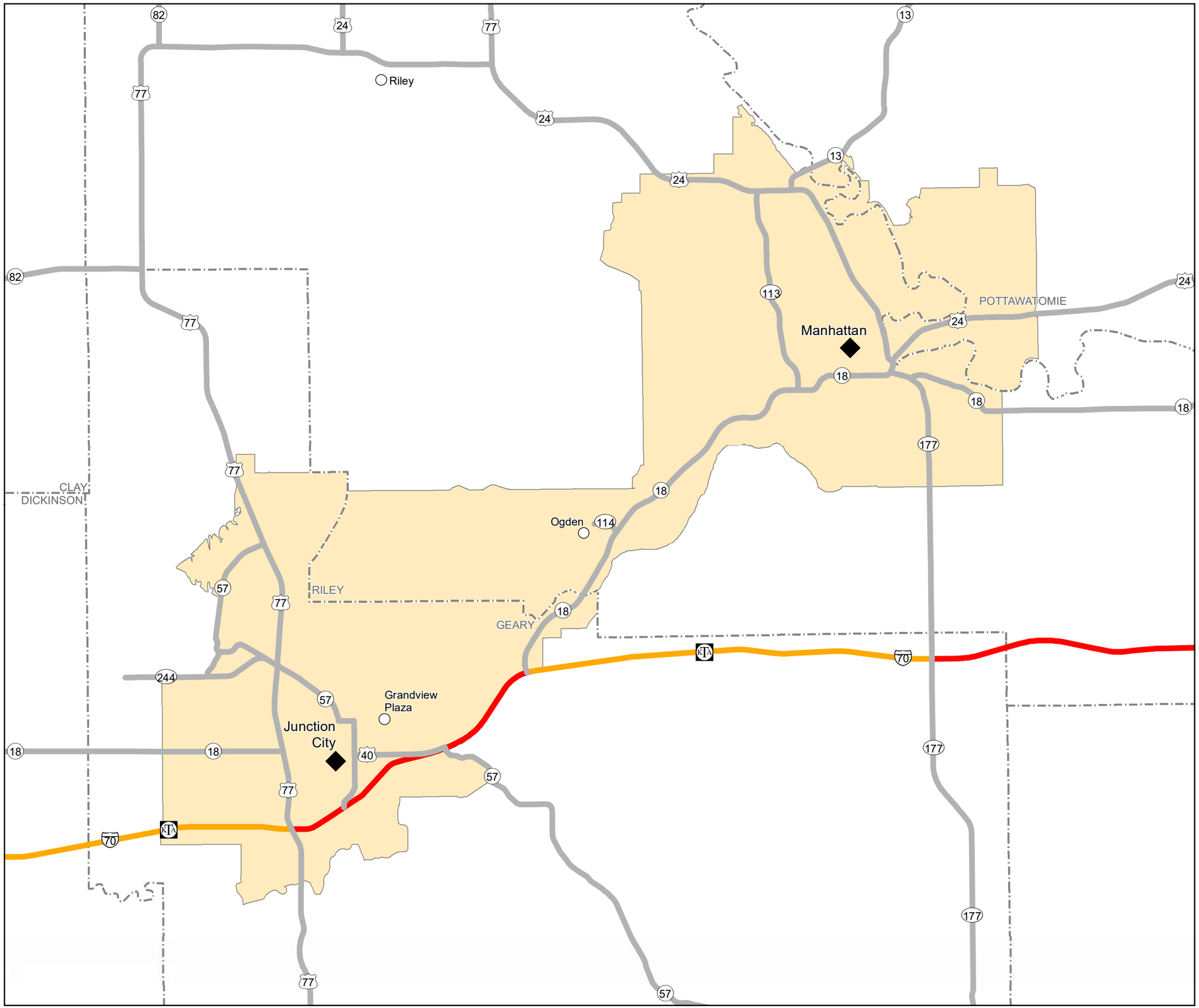
- Less than 1,000
- 1,000 to 2,000
- 2,000 to 3,000
- 3,000 to 4,000
- Greater than 4,000

N

0 0.4 0.8 1.2 1.6 2
Miles

PREPARED BY THE
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING

MAP CREATED TUESDAY, AUGUST 29, 2017



2016
Multi Truck ADT

Multi Truck = Class 8 and above
Traffic Data Collected in CY 2016

FHMPO - Manhattan

- Less than 1,000
- 1,000 to 2,000
- 2,000 to 3,000
- 3,000 to 4,000
- Greater than 4,000

N

0 0.9 1.8 2.7 3.6 4.5
Miles

PREPARED BY THE
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING
MAP CREATED TUESDAY, AUGUST 29, 2017

2016
Multi Truck ADT

Multi Truck = Class 8 and above
Traffic Data Collected in CY 2016

L-DC MPO - Lawrence

- Less than 1,000
- 1,000 to 2,000
- 2,000 to 3,000
- 3,000 to 4,000
- Greater than 4,000

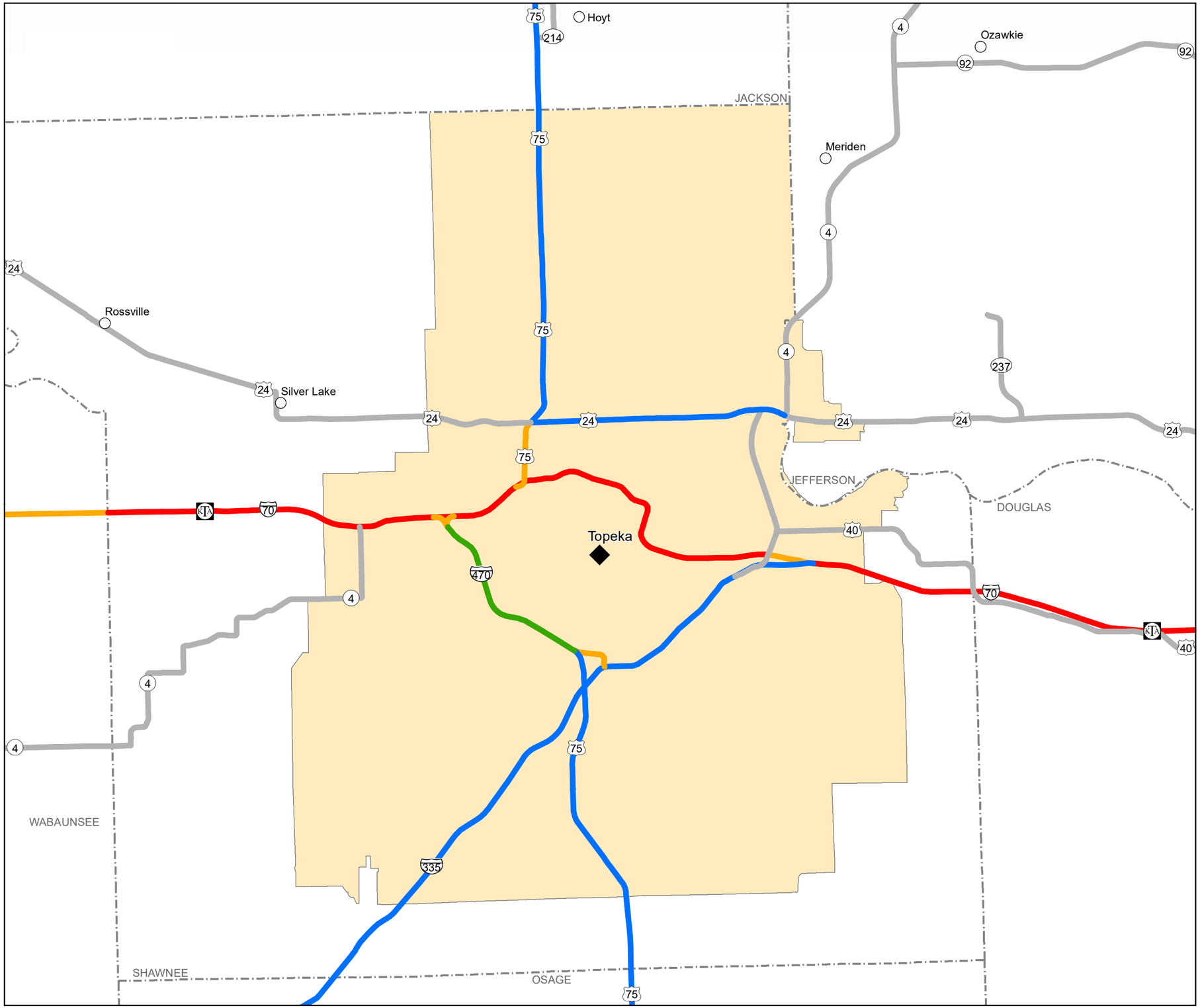
N

0 1 2 3 4 5
Miles

PREPARED BY THE

KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING

MAP CREATED TUESDAY, AUGUST 29, 2017



2016
Multi Truck ADT

Multi Truck = Class 8 and above
Traffic Data Collected in CY 2016

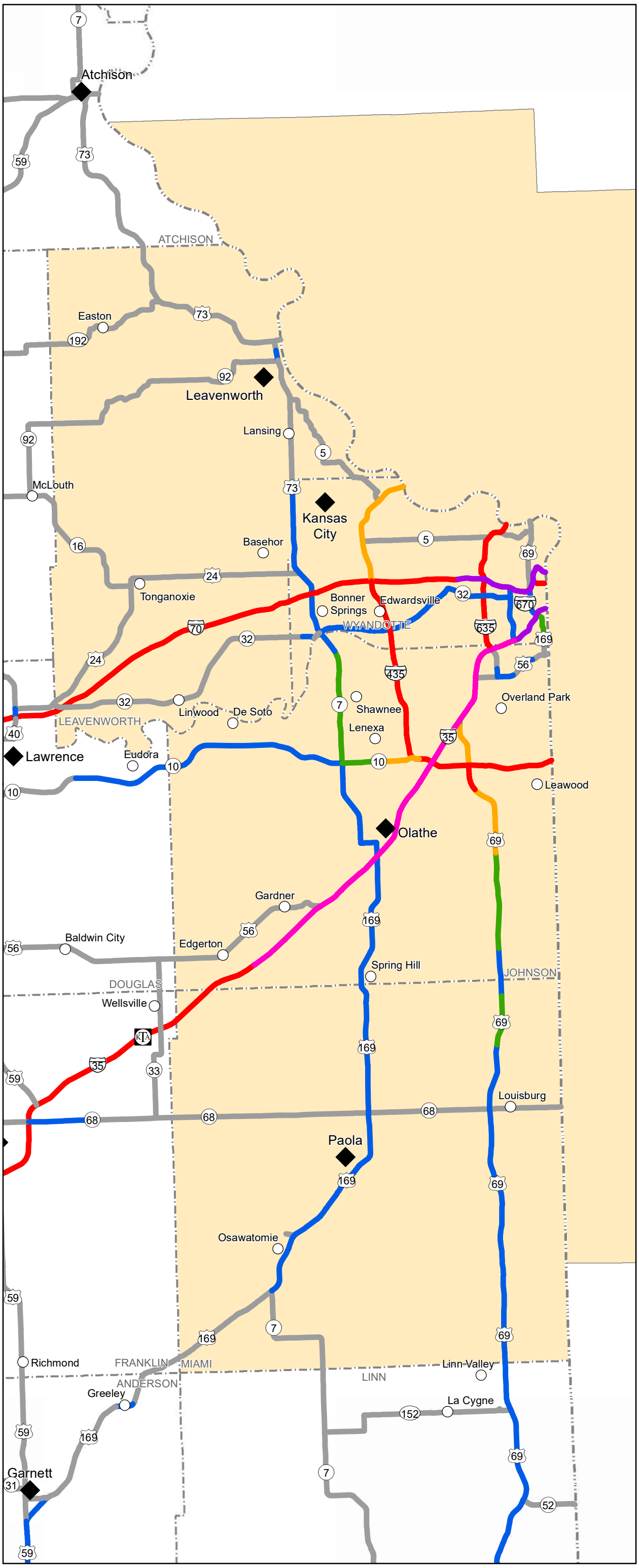
MTPO - Topeka

- Less than 1,000
- 1,000 to 2,000
- 2,000 to 3,000
- 3,000 to 4,000
- Greater than 4,000

N

0 1 2 3 4 5
Miles

PREPARED BY THE
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING
MAP CREATED TUESDAY, AUGUST 29, 2017



2016
Multi Truck ADT

Multi Truck = Class 8 and above
Traffic Data Collected in CY 2016

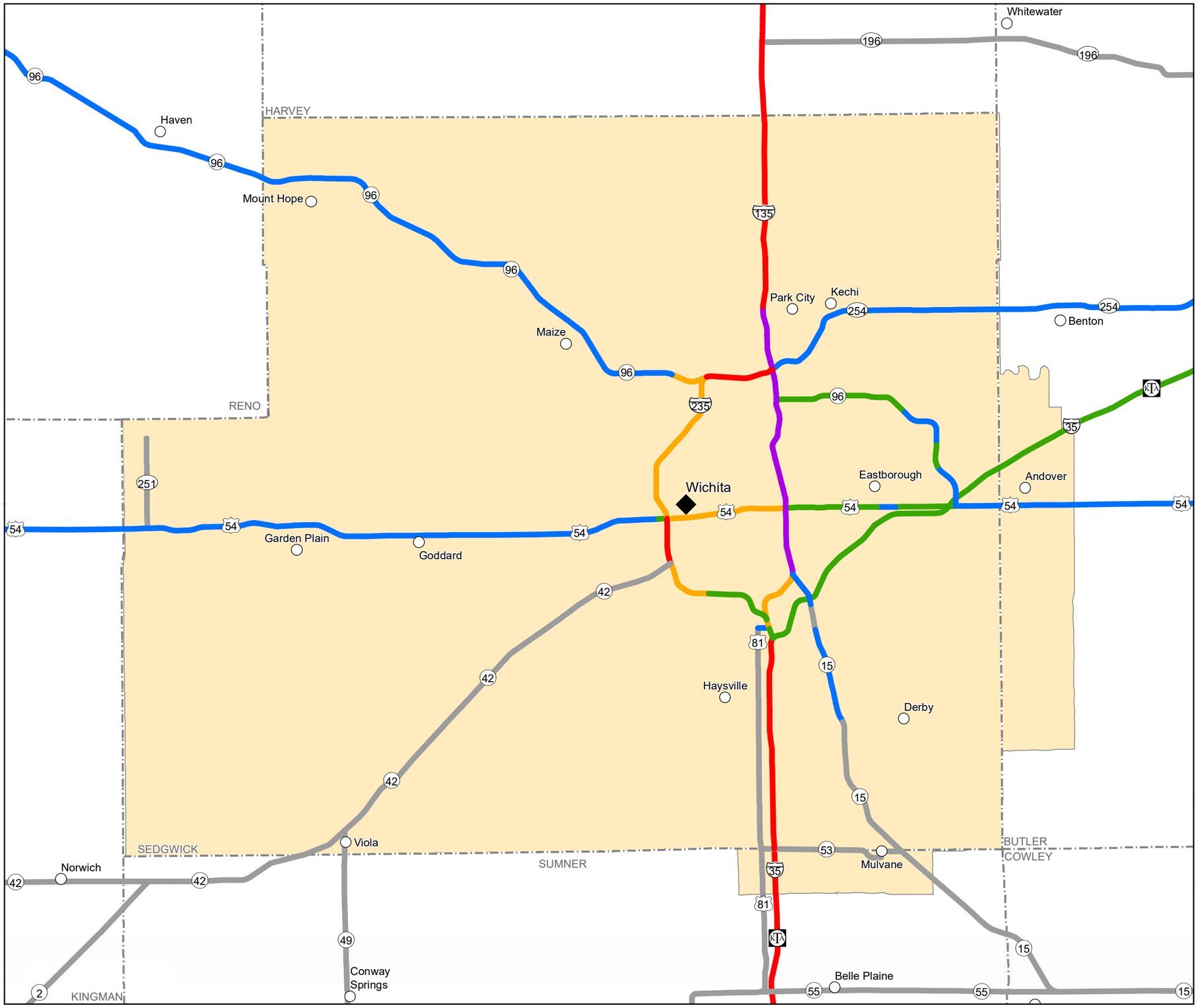
MARC - Kansas City

- Less than 1,000
- 1,000 to 2,000
- 2,000 to 3,000
- 3,000 to 4,000
- 4,000 to 7,500
- 7,500 to 10,000
- Greater than 10,000

N

0 2 4 6 8 10
Miles

PREPARED BY THE
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING
MAP CREATED TUESDAY, AUGUST 29, 2017



2016
Multi Truck ADT

Multi Truck = Class 8 and above
Traffic Data Collected in CY 2016

WAMPO - Wichita

- Less than 1,000
- 1,000 to 2,000
- 2,000 to 3,000
- 3,000 to 4,000
- 4,000 to 5,000
- Greater than 5,000

N

0 1 2 3 4 5
Miles

PREPARED BY THE
KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING
MAP CREATED TUESDAY, AUGUST 29, 2017

Appendix C: Commodity Flow Analysis

Kansas DOT
Statewide Freight/Rail Plan:
Commodity Flows Analysis

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Executive Summary

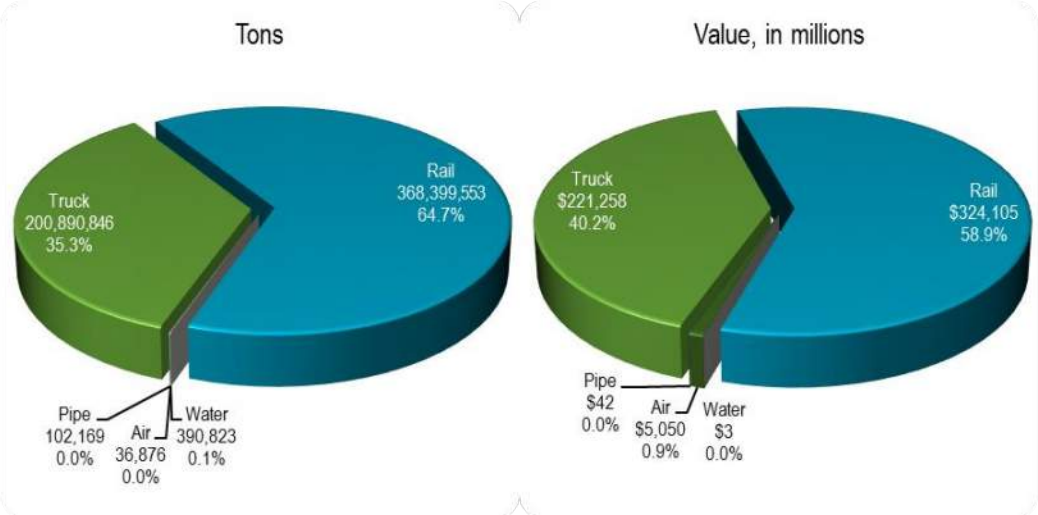
Different analyses perspectives help identify the most important freight movements to Kansas. IHS TRANSEARCH®, STB WAYBILL, and FHWA FAF sources provide Kansas-related freight data by mode, direction, and commodity; by tonnage, units, and value. Each dataset has strengths and weaknesses, and each partially overlaps. Sorting the extensive databases generates different perspectives and observations.

For example, are the most important movements assessed by volume (tons), units (trucks or railcars), shipment value (dollars), commodity type, transport mode, directional movement, or some other factor (e.g., economic relevancy, growth, etc.), or a combination of the abovementioned? As such, the complex multidimensionality precludes a simplified synopsis of all freight dimensions simultaneously, instead necessitating selected partial depictions of the most-salient combinations, with such combinations not exceeding three dimensions at once.

Movement Totals

According to IHS TRANSEARCH® and STB WAYBILL data, almost 570 million tons of freight traversed the Kansas transportation infrastructure network in 2014, valued at over $550 billion (in 2014-dollar values)[1]. Rail and truck carry the significant majority of both tonnage (99.9%) and value (99.1%), as per Figure 1, with the other three modes (air, pipeline, and water) contributing to the remaining sliver.

Figure 1: Total Tons and Value by Mode, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

- *Rail* –largest: 368.4 million tons (64.7% of total) and $324.1 billion (58.9%).
- *Truck* – second largest: 200.9 million tons (35.3%) and $221.3 billion (40.2%).
- Air – third by value: $5.1 billion (0.9%), but small volumes (<0.01%)

[1] In comparison, the United States' Gross Domestic Product (GDP) in 2014 amounted to $17.2 trillion (Bureau of Economic Analysis); as such, the $550 billion freight value represents about 3.2%.

- *Water/Pipeline* – relatively insignificant volumes and value compared to other modes

Disaggregation of the movements by direction reveals nuances. Through tonnage dominates directional movements, due almost entirely to rail. Tonnage and value data are tabulated by mode and direction in Table 1, and summarized below:

- *Outbound* – 77.0 million tons from Kansas to out-of-state destinations represent 13.5% of directional volumes, with trucking as the dominate mode (54.7 million, 71.0%), followed by rail (21.9 million, 28.5%). Outbound value is $80.7 billion, for 14.7% of directions.
- *Inbound* – 70.4 million tons from out-of-state destined to Kansas (12.3% of directions) are mostly truck (46.8 million, 66.5%) and rail (23.5 million, 33.5%). Inbound tonnage is valued at $68.0 billion, for 12.4% of directional value.
- *Intrastate* – At 58.1 million tons (10.2% of directions) and valued at $56.2 billion (10.2%), intrastate tonnage movements are the smallest proportion of directional movements. As with inbound and outbound directions, the intrastate movements are comprised mostly of truck (99.0% for tonnage and 98.3% for value).
- *Through* – A total of 364.3 million tons of through movements valued at $345.5 billion, mostly via rail (88.5% for tonnage, and 80.9% for value), comprise the largest relative share of the directional movements (63.9% of volumes and 62.8% of values), highlighting Kansas's role as "bridge" state for long-haul goods.

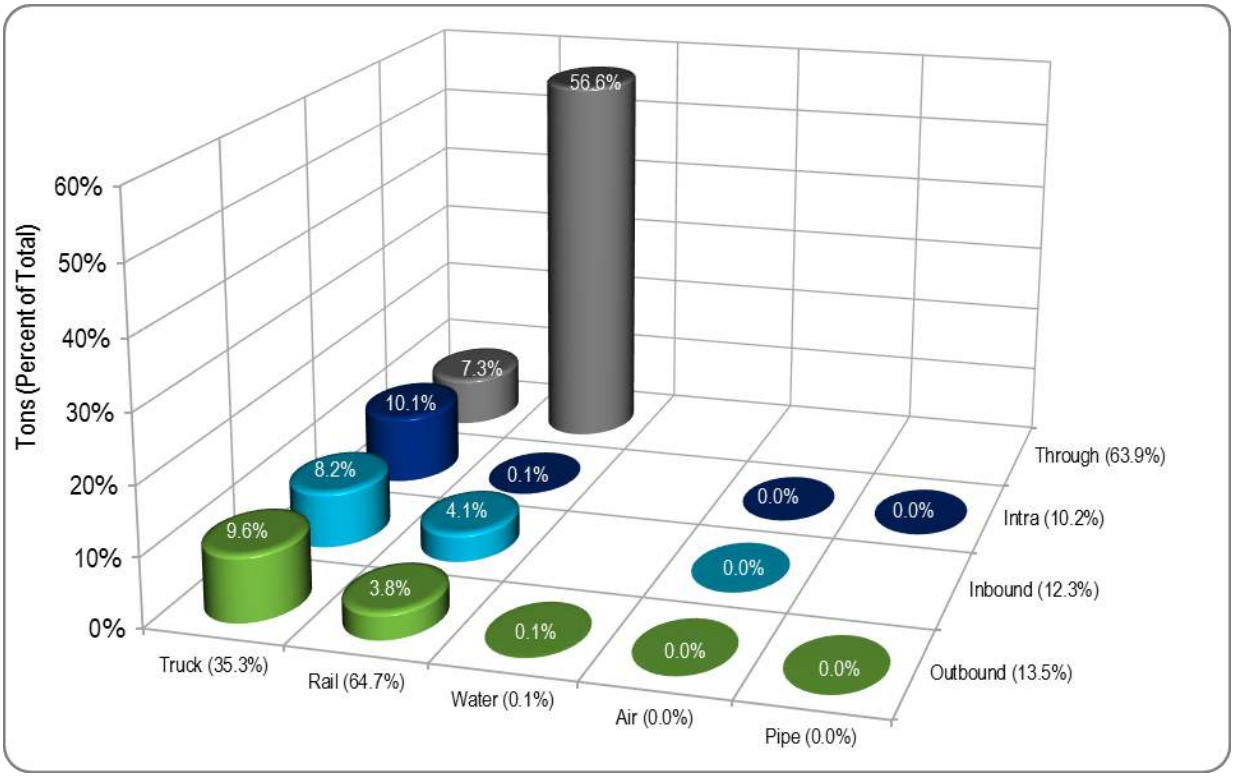
Table 1: Tons and Value by Mode and Direction, 2014

Direction	Truck	Rail	Water	Air	Pipe	Total
Tons						
Outbound	54,660,822	21,919,113	390,823	17,660	34,450	77,022,868
Inbound	46,808,700	23,543,312	#N/A	18,756	#N/A	70,370,768
Intra	57,569,853	489,604	#N/A	460	67,720	58,127,637
Through	41,851,471	322,447,524	#N/A	#N/A	#N/A	364,298,995
Total	200,890,846	368,399,553	390,823	36,876	102,169	569,820,268
Value, in millions						
Outbound	$55,397	$22,622	$3	$2,688	$10	$80,720
Inbound	$44,698	$21,005	#N/A	$2,334	#N/A	$68,037
Intra	$55,258	$901	#N/A	$28	$31	$56,218
Through	$65,905	$279,577	#N/A	#N/A	#N/A	$345,482
Total	$221,258	$324,105	$3	$5,050	$42	$550,457

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

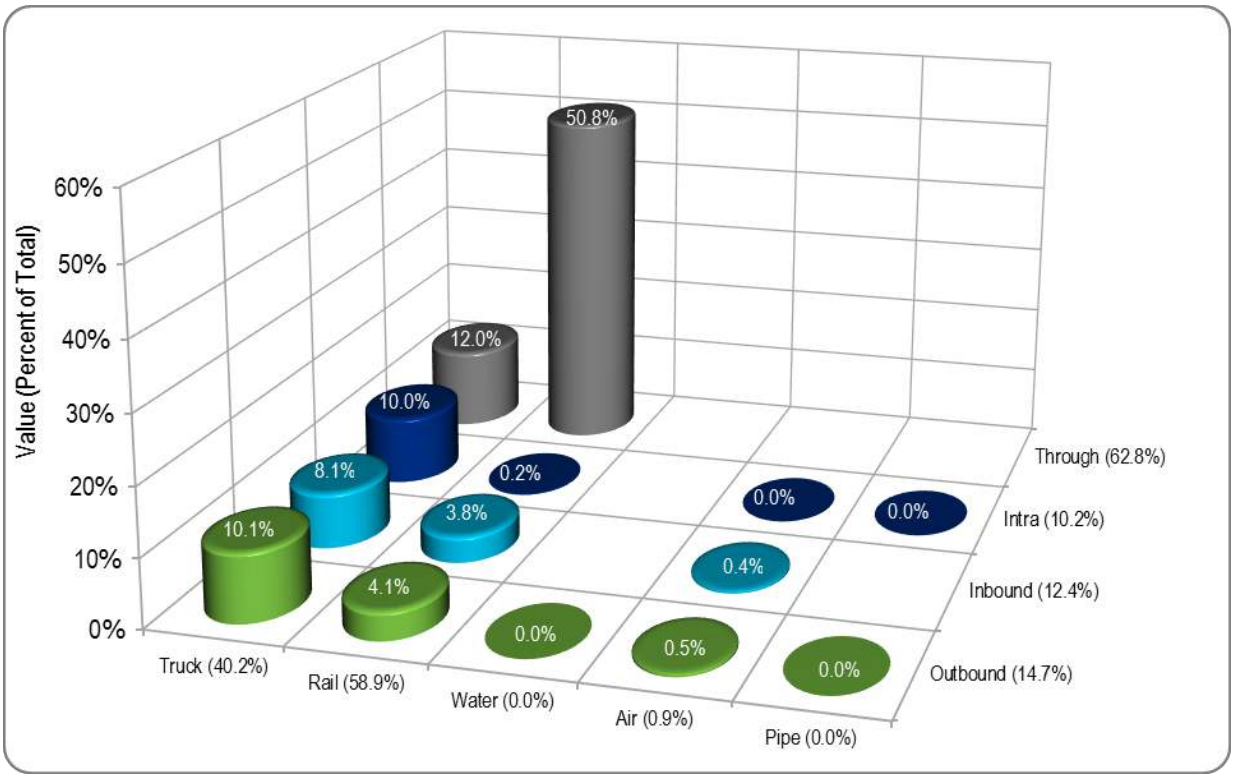
Relative modal and directional shares of total tonnage movements are depicted in Figure 2, and by total value in Figure 3, which clearly indicate that through-based rail movements comprise over half of all freight in Kansas (56.6% of total tonnage and 50.8% of total value). This reinforces the perspective of Kansas' bridge-state for long-haul low value/ton goods.

Figure 2: Tonnage Share by Mode and Direction, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 3: Value Share by Mode and Direction, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Perspective

Directional movement, commodity tonnage, and commodity value help illustrate the importance of freight movements to Kansas from different perspectives.

Directional Movement – Directional freight movements affect 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, while inbound materials are used in Kansas manufacturing or other value-added processes. Similarly, outbound commodities from Kansas to other states also represent the result of value-added Kansas production. Additionally, intrastate Kansas movements represent both value-added Kansas production and/or final product consumption. However, freight movements through Kansas generate little, if any, economic value to the State (i.e., transport service only). Nonetheless, the magnitude of through state rail volumes is important in a freight plan, given the effect on modal infrastructure capacity.

Commodity Tonnage and Value – While important to understand tonnage movements, such observations do not unilaterally 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 2. 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 3.

Table 2: 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	1.4%
	Remaining Commodities	46,969	8.2%
	Total	569,818	100.0%

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Table 3: 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	3.1%
11	Coal	$15,844	2.9%
	Remaining Commodities	$82,809	15.0%
	Total	$550,457	100.0%

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Commodity Tons by Mode – Figure 4 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.

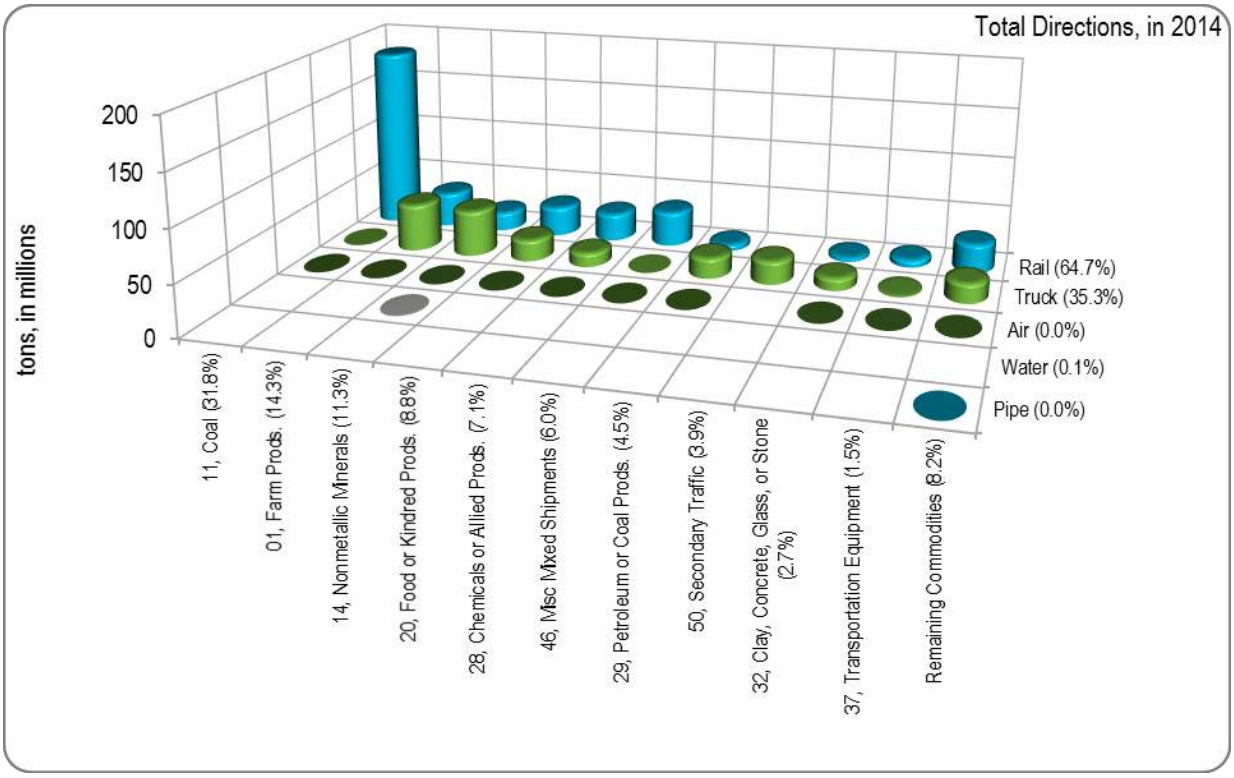
Commodity Value by Mode – Figure 5 shows modal differences by commodity value. A similar pattern is observed in terms of modal concentration (rail then truck dominating); however, the commodity mix is drastically different due to the varying values/ton for certain commodities. In effect, the tonnage that dominates the freight movements are 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.

Forecast

Unfortunately, the available IHS Transearch® database to KSDOT does not include forecasts, and an alternative source, the Federal Highway Administration Freight Analysis Framework (FHWA FAF v4.1) was culled to address general forecast trends in freight. By 2040, FHWA FAF forecasts an increase in tonnage related to outbound, inbound, and intrastate movements combined[2] by 30.5% (1.0% annually) from the 2014 base. In value terms, the forecast for such Kansas-related freight movements amounts to an 49.8% increase (1.6% annually). Compositionally, the directional movements and modal composition is slated to remain relatively constant.

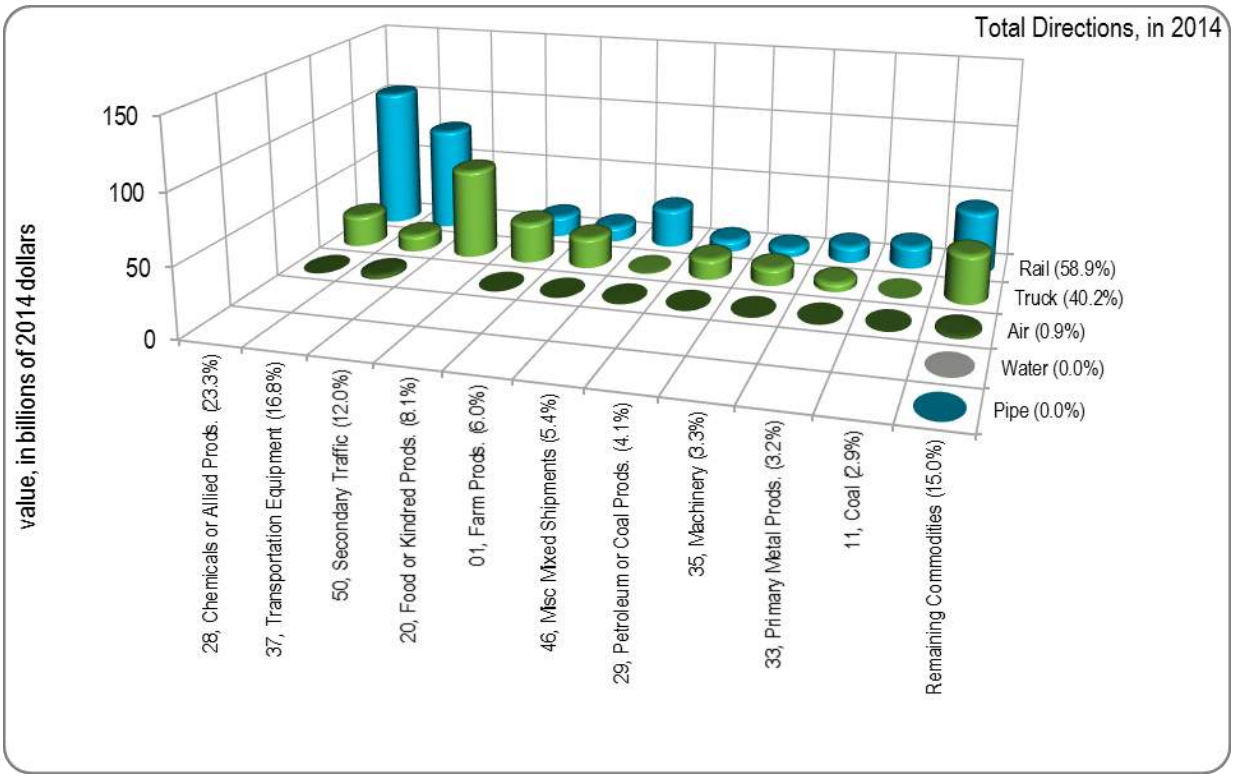
[2] through movements are unavailable from the FHWA FAF v4.1

Figure 4: Top Commodities by Tonnage and Mode, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 5: Top Commodities by Value and Mode, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

1 Introduction

Millions of tons and billions of dollars' worth of freight traverses Kansas' multimodal freight infrastructure annually. Such freight includes finished goods, materials, and supplies. Central issues concerning freight are identifying the movements most important to Kansas, and identifying options to facilitate/support them. Identifying the importance of, and solutions for, freight comprises several perspectives: volumes (especially compared to capacity), values (especially related to the State economy), and public perception.

In this paper, freight volume (tons), units (trucks or railcars), shipment value (dollars), as reported in the IHS TRANSEARCH®, STB WAYBILL, and FHWA FAF databases, are summarized using tables and charts to simplify understanding. Structurally, the report is as follows:

- Section 1 overviews the commodity reporting conventions and data sources;
- Section 2 summarizes year 2014 volumes, units, and value by mode (truck, rail, port/water, air, and pipeline) and direction (outbound, inbound, intrastate, and through) from the IHS TRANSEARCH® and STB WAYBILL sources;
- Section 3 summarizes growth rate forecasts (2014 to 2040) via the FHWA FAF database;
- Section 4 concludes; and,
- Section 5 is an Appendix with various freight data tables used in the analysis.

1.1 Commodity Reporting Conventions

Three data sources are used to evaluate the various freight flows, which use two different commodity reporting conventions.

Standard Transportation Commodity Code (STCC) – A STCC is a seven-digit numeric code, categorized by 40 commodity groupings, based on a publication specifying physical product information used on waybills and other shipping documents and published/maintained by the American Association of Railroads (AAR). North American Freight Railroads, the Railroad Waybill, the Commodity Flow Survey (CFS), and TRANSEARCH® adopt the STCC coding system. A hierarchical STCC structure allows data collapsibility, enabling summarization of commodity information at various levels (i.e., '01' represents 'Farm Products', '011' identifies 'Field Crops,' '0112' indicates 'Raw Cotton', etc., narrowing in specificity to a seven-digit level). Freight movements are tallied herein at the two-digit aggregated level.

Standard Classification of Transported Goods (SCTG) - The USDOT, US Census Bureau, Statistics Canada, and Transport Canada developed the SCTG to replace the STCC for the 1997 and subsequent Commodity Flow Surveys (CFS). It is a four-tiered hierarchical code (i.e., 2- to 5-digits) similar to the STCC; however, the commodity groupings do not all easily concord with the STCC hierarchy. The 4-digit level SCTG categories reflect industry patterns and transportation characteristics, which can be closely associated with the North American Industry Classification System (NAICS). However, due to data confidentiality, insignificant sample size,

or reliability issues, the 4- and 5-digit SCTG are generally unpublished. FHWA FAF data subscribes to the SCTG commodity structure.

1.2 Data Sources

TRANSEARCH® and the STB WAYBILL both use the STCC reporting convention while the FHWA FAF uses the SCTG. These and other data sources are detailed and contrasted.

TRANSEARCH® – Developed by IHS Global Insight, TRANSEARCH® is an extensive database of North American freight flows, compiled from more than a hundred industry, commodity, and proprietary data exchange sources. TRANSEARCH® combines primary shipment data obtained from some of the nation's largest rail and truck freight carriers with information from public, commercial, and proprietary sources to generate a base year estimate of freight flows at the county level. Further, TRANSEARCH® establishes market-specific production tonnages by industry or commodity, drawn mostly from IHS Global Insight's Business Markets Insights (BMI) database, and supplemented by trade association and industry reports, and United States government-collected data. TRANSEARCH® provides data for NATFA-related trade and excludes international freight traffic from countries other than Canada and Mexico.

However, the comprehensiveness of TRANSEARCH® varies. Originally built for private sector truck and rail users, other modal movement data subsequently added lacks the extensiveness found in other sources. This is because the truck and rail data focus on movements across North America – specifically the NAFTA countries of the United States, Canada, and Mexico. As such, water movements to/from Asia, the Middle East, Europe, South America, etc. are not included. Similarly, non-NAFTA air movements, as well as many other small volume air movements, are not included. Lastly, pipeline movements are perhaps the most under-represented modal movements in TRANSEARCH® due to insufficient U.S. federal reporting requirements and insufficient private sector pipeline data-sharing participation. Nonetheless, TRANSEARCH® arguably provides the most comprehensive database of all movements, especially of the two major modes (truck and rail).

KSDOT obtained a truncated version of the standard TRANSEARCH® product, with some limitations. The truncated version excludes: routed STB WAYBILL (e.g., rail) information, detailed STCC commodity breakdown, and forecasts. Such data availability limitations constrained some of the freight analysis detail, and necessitated compiling and incorporating the STB WAYBILL dataset and the FHWA FAF (for forecasting).

STB WAYBILL – Based on STCC codes[3], the STB WAYBILL provides detailed most-recently available year 2014 movement data by commodity for rail. It uses a 2% stratified sample carload waybills for all rail traffic submitted by rail carriers that terminate 4,500 or more revenue carloads annually. It is a more-robust and accurate estimate of rail movements than the IHS

[3] STB WAYBILL designates freight rail movements via two STCC conventions: one includes the 49xxxxx (HAZMAT-related) and 50xxxxx (bulk movements) STCC designations; the alternative translates those HAZMAT- and bulk-related movements into actual product STCC. Summary data herein pertains to the non-HAZMAT/non-bulk STCC convention.

TRANSEARCH®-derived rail; however, the database itself has limitations that the standard IHS TRANSEARCH® incorporates and makes available. The STB WAYBILL includes tons and carload units, but does not associate a value with the cargo. All values pertaining to rail presented herein are derived from applying proxy commodity- and directional-specific value/ton estimates from IHS TRANSEARCH® to the STB Waybill-reported tonnage movements. Forecasts are unavailable from the source and the routing network is proprietary/unavailable.

FHWA FAF v4.1 – Given the absence of forecasts from the truncated TRANSEARCH®, the Federal Highway Administration's Freight Analysis Framework v4.1 database was mined to obtain growth rate forecasts of modal growth. FHWA FAF integrates year 2012 U.S. Census Bureau Commodity Flow Survey (CFS) and additional sources to provide freight movement metrics in terms of tonnage, value, and domestic ton-miles by region of origin and destination, commodity type, and mode for the current year and forecasts in five-year increments. While FAF is not as exhaustive (excludes railcar unit metrics or through state movements; limited commodity detail; no routing, etc.) as the typical TRANSEARCH®, FAF does provide a means by which to assess future tonnage growth. Note that FAF presents data by two-digit SCTG, which differs notably from the STCC.

Other Potential Data Sources – A more comprehensive analysis of all modes requires supplementing the other three modes (water, air, and pipeline). Water is the quickest and easiest to supplement by using the United States Army Corps of Engineers (USACE) Waterborne Commerce Statistics (obtained at no cost via the internet), which includes all tonnage but excludes values. United States Census USA Trade Online provides additional tonnage and value data on goods shipped between the U.S. and foreign countries; such data can supplement both water and air data provided herein by TRANSEARCH®.

2 Current Freight

The following presents year 2014 freight movements by mode (truck, rail, port/water, air, and pipeline), direction (outbound, inbound, intrastate, and through), and term (tons, units[4], and values), as applicable and available from the IHS TRANSEARCH® and STB WAYBILL databases. Each subsection summarizes modal movements by direction and term, and identifies the top two-digit STCC commodity movements. Graphic data presentation facilities visualization of important commodity movements and related observations, with the supporting tabulated comprehensive data located in the Appendix, in Table 18 through Table 38. Structurally, this report compilation and synopsis facilitates independent review of respective modal sections without dependence on preceding or subsequent subsections.

2.1 Truck, 2014

Kansas truck movements in 2014 totaled 200.9 million tons, valued at $221.3 billion, and carried within 17.6 million units (see Table 4). On average, total truck commodity movements are valued at $1,101/ton. Truck movements represent 35.3% of modal tonnage in Kansas and 40.2% of total modal value in 2014, the second largest relative share following rail.

Direction – As depicted in Figure 6, the directional breakdown for truck movements are similarly distributed between outbound, inbound, intrastate, and through traffic. Intrastate volumes and units are the relatively largest direction, at 28.7% and 35.8%, respectively, of the directional truck movements; however, through traffic is the relatively largest directional movement by value, at 29.8%. A higher proportion of value relative to tonnage for the through traffic reflects the higher average value/ton as compared with the other directions.

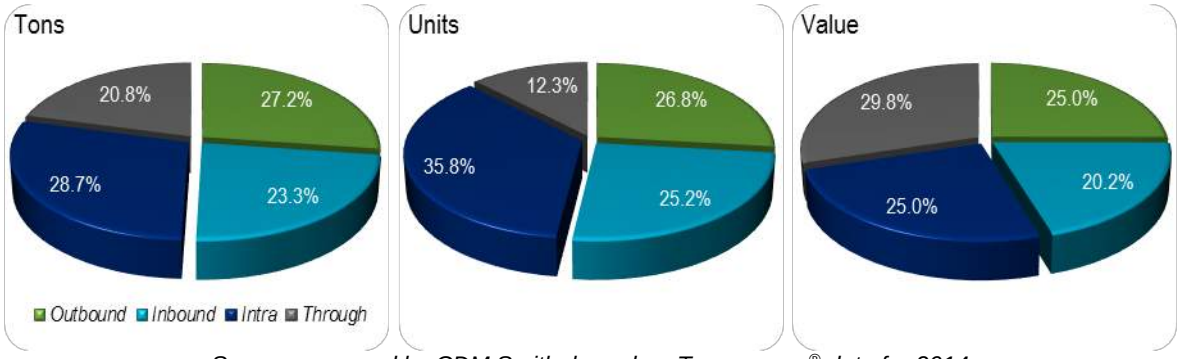
Table 4: Truck by Direction, 2014

Direction	Tons		Units		Value (in millions)		Average Value/Ton
	Amount	Percent	Amount	Percent	Amount	Percent	
Outbound	54,660,822	27.2%	4,708,080	26.8%	$55,397	25.0%	$1,013
Inbound	46,808,700	23.3%	4,425,758	25.2%	$44,698	20.2%	$955
Intra	57,569,853	28.7%	6,288,194	35.8%	$55,258	25.0%	$960
Through	41,851,471	20.8%	2,156,594	12.2%	$65,905	29.8%	$1,575
Total	200,890,846	100.0%	17,578,626	100.0%	$221,258	100.0%	$1,101

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

[4] units are available and presented only for truck and rail modes

Figure 6: Truck Percentages by Direction, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Density – As expected, the major truck freight corridors include the major interstates (I-35, I-70, and I-135), as seen in Figure 7. The densest truck freight routes are along I-35 and I-70, to/from Texas and the West. The map depicts all directions combined; however, for the intrastate movements (28.7% of directional truck tonnage), the IHS TRANSEARCH® database does not allocate *intra-county* movements to the network. As such, a small percentage of the movements are not included in the density map, but the general conclusions and route density relatively would be identical if such data were incorporated.

Commodities – Figure 8, Figure 9, and Figure 10 depict the top two-digit STCC commodities for Kansas truck movements, by tonnage, units, and value, respectively, by direction[5]. Tabular support data is shown in Table 18 through Table 22 (in the Appendix), and is expanded upon in the respective subsections.

In terms of all truck directions combined, the top five commodities include:

- *by Tonnage*:
  1. Farm Products (47.0 million tons, 23.4% of truck total);
  2. Nonmetallic Minerals (45.5 million, 22.7%);
  3. Secondary Traffic (22.5 million, 11.2%);
  4. Food or Kindred Products (21.1 million, 10.5%); and,
  5. Petroleum or Coal Products (19.7 million, 9.8%)

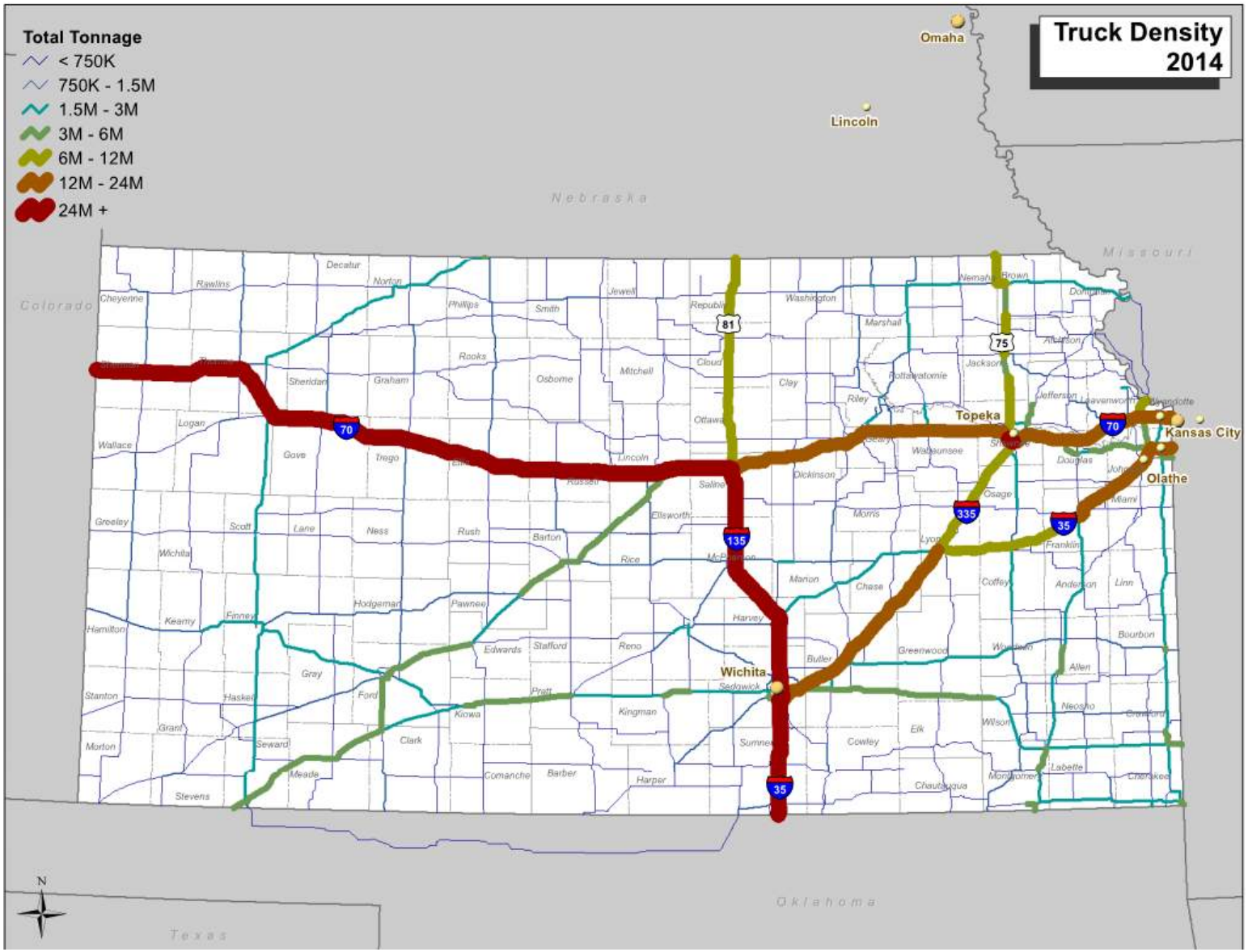
- *by Units*:
  1. Shipping Containers (7.4 million units, 42.1% of truck total); [6]
  2. Farm Products (2.9 million, 16.4%);
  3. Nonmetallic Minerals (1.9 million, 10.6%);
  4. Secondary Traffic (1.3 million, 7.2%); and,
  5. Food or Kindred Products (0.9 million, 5.2%)

[5] the respective figures identify the top commodities by relative percentage of the depicted term (tons, units, or value), sequenced left-to-right in descending order; the same convention is applied for all modes; the numbers preceding the commodity descriptions are the corresponding STCC2 codes.
[6] Shipping Containers includes empty shipping containers and Semi-Trailers Returned Empty.

- *by Value*:
    1. Secondary Traffic ($66.2 billion, 29.9% of truck total);[7]
    2. Food or Kindred Products ($29.4 billion, 13.3%);
    3. Chemicals or Allied Products ($23.3 billion, 10.5%);
    4. Farm Products ($22.2 billion, 10.0%); and,
    5. Petroleum or Coal Products ($14.6 billion, 6.6%)

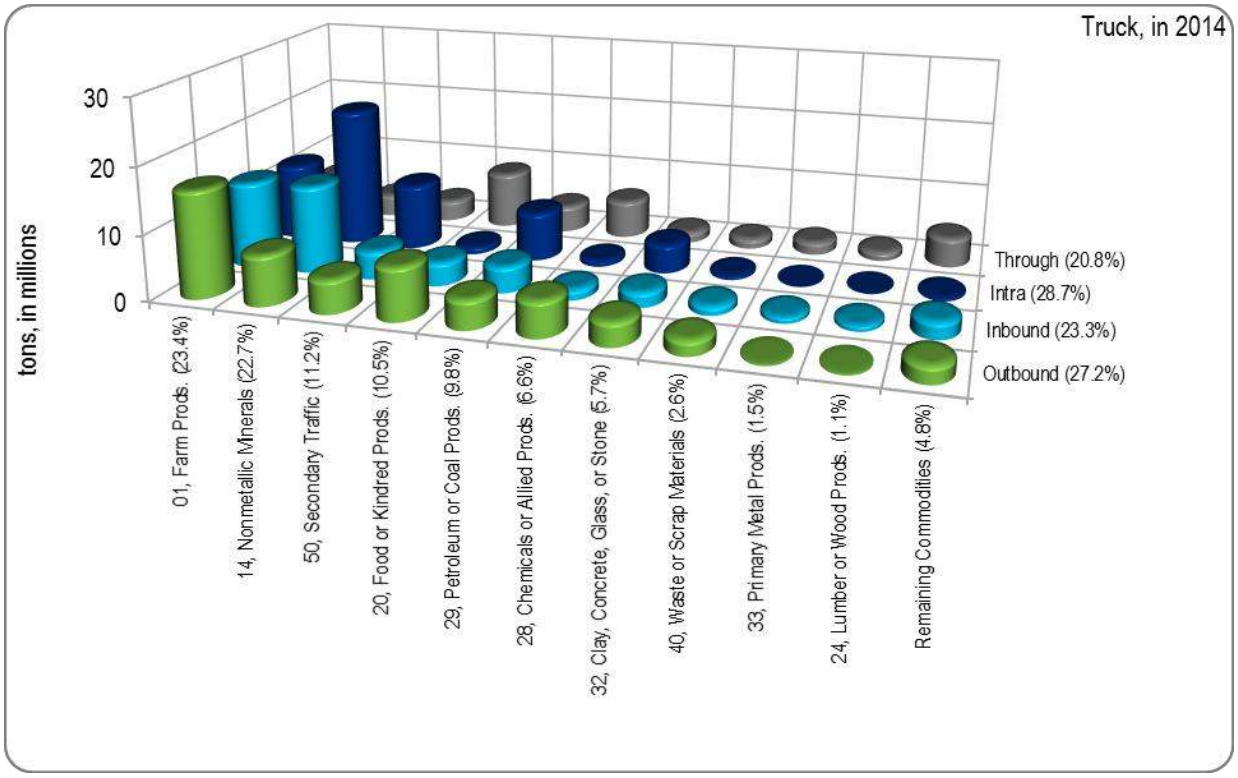
[7] Secondary Traffic includes warehousing and distribution center-related movements, as well as drayage to/from airports, railyards, and other intermodal facilities.

Figure 7: Truck Density, 2014



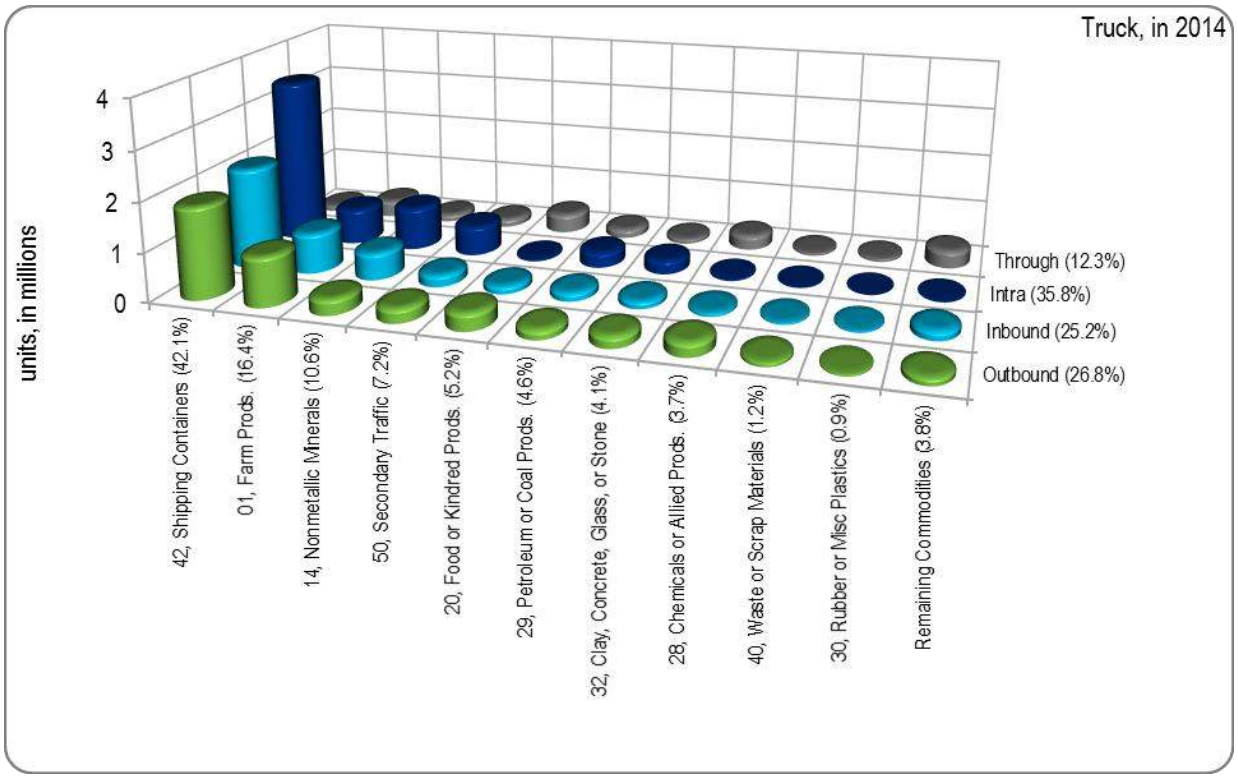
Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 8: Truck Top Commodities by Tonnage, 2014



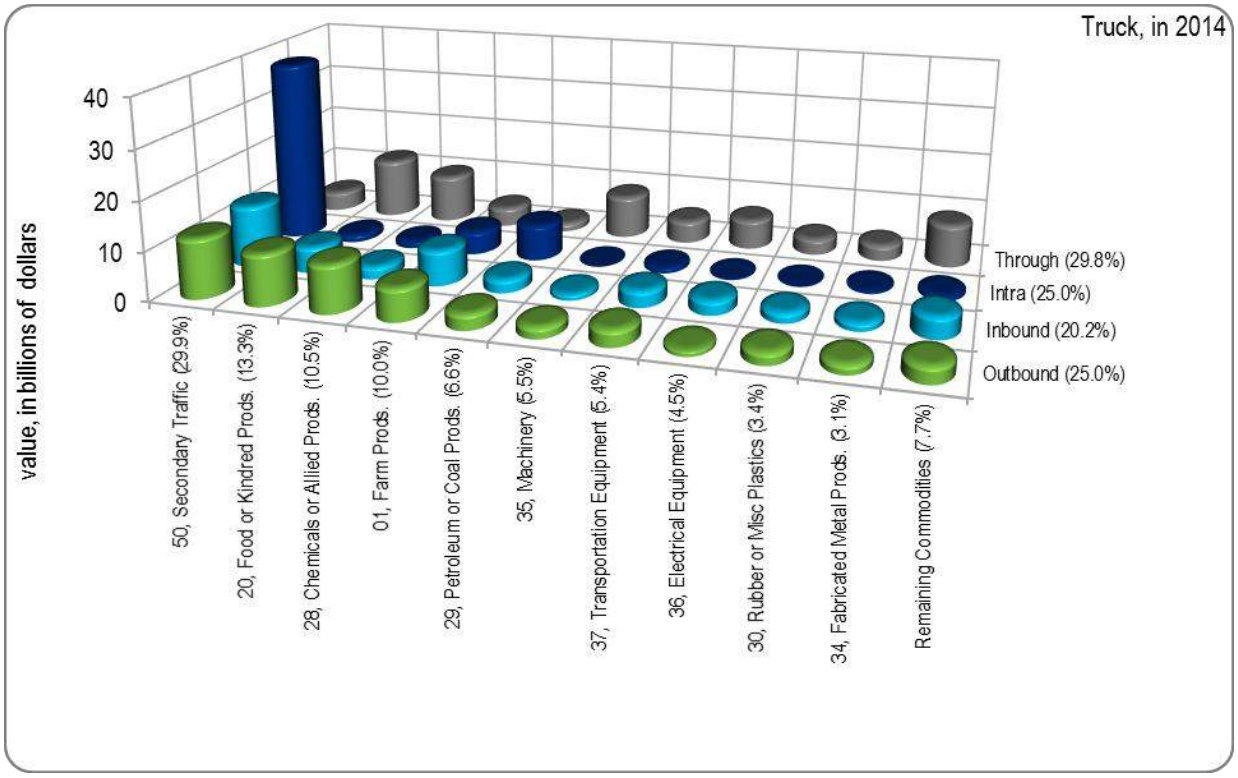
Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 9: Truck Top Commodities by Units, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 10: Truck Top Commodities by Value, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

2.1.1 Truck Outbound

Table 18 in the Appendix presents outbound truck commodities from Kansas, in 2014, which total 54.7 million tons (27.2% of directional movements), via 4.7 million units (26.8%), valued at $55.4 billion (25.0%), with an average value/ton of $1,013; top five commodities include:

- *by Tonnage*:
  1. Farm Products (16.2 million tons, 29.6% of outbound total);
  2. Food or Kindred Products (7.9 million, 14.5%);
  3. Nonmetallic Minerals (7.6 million, 13.8%);
  4. Chemicals or Allied Products (5.3 million, 9.6%); and,
  5. Secondary Traffic (5.0 million, 9.1%)

- *by Units*:
  1. Shipping Containers (1.9 million units, 39.5% of outbound total);
  2. Farm Products (1.0 million, 21.3%);
  3. Food or Kindred Products (0.3 million, 7.3%);
  4. Nonmetallic Minerals (0.3 million, 6.6%); and,
  5. Secondary Traffic (0.3 million, 5.9%)

- *by Value*:
    1. Secondary Traffic ($12.1 billion, 21.9% of outbound total);
    2. Food or Kindred Products ($10.4 billion, 18.8%);
    3. Chemicals or Allied Products ($9.7 billion, 17.5%);
    4. Farm Products ($6.6 billion, 11.8%); and,
    5. Transportation Equipment ($3.2 billion, 5.8%)

Outbound Tonnage Origin – Major outbound truck tonnages in 2014 are shown by county origin in Figure 11 and Figure 13. 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%).

- *Johnson County:*
    1. Petroleum or Coal Products (1.5 million tons, 27.3% of outbound county total);
    2. Nonmetallic Minerals (1.5 million, 26.9%); and,
    3. Clay, Concrete, Glass, or Stone (0.7 million, 12.1%)

- *Wyandotte County:*
    1. Secondary Traffic (3.0 million tons, 56.2% of outbound county total);
    2. Petroleum or Coal Products (0.8 million, 14.0%); and,
    3. Clay, Concrete, Glass, or Stone (0.7 million, 13.6%)

- *Montgomery County:*
    1. Chemicals or Allied Products (3.9 million tons, 85.5% of outbound county total);
    2. Farm Products (0.3 million, 5.5%); and,
    3. Petroleum or Coal Products (0.1 million, 3.1%)

Outbound Tonnage Destination – Major outbound truck tonnages in 2014 are shown by state destination in Figure 12 and Figure 13. Truck movements destined out-of-state are primarily traveling to Missouri (13.7 million, 25.1%), Oklahoma (8.5 million, 15.5%), and Nebraska (5.7 million, 10.4%).

- *Missouri*:
    1. Nonmetallic Minerals (3.1 million tons, 22.9% of outbound state total);
    2. Secondary Traffic (2.6 million, 19.0%); and,
    3. Petroleum or Coal Products (2.5 million, 17.9%)

- *Oklahoma*:
    1. Farm Products (3.1 million tons, 36.2% of outbound state total);
    2. Nonmetallic Minerals (2.5 million, 29.6%); and,
    3. Chemicals or Allied Products (1.0 million, 11.2%)

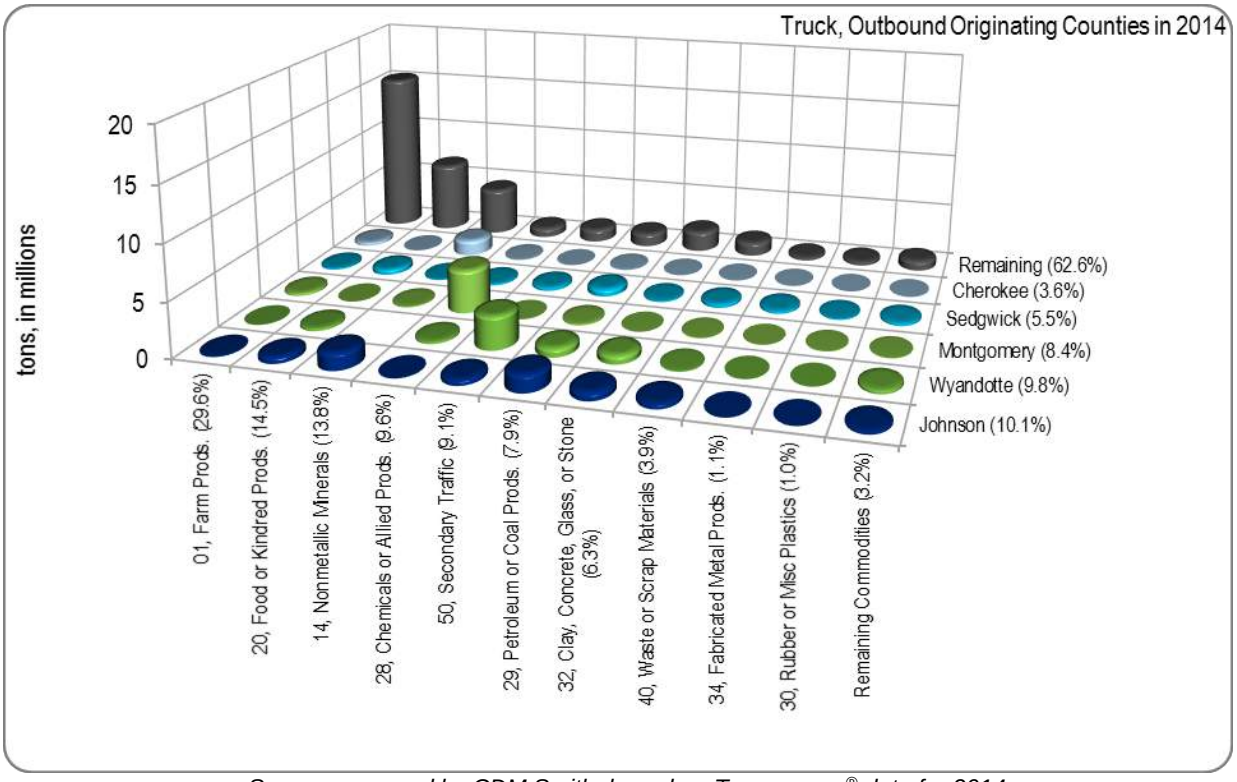
- *Nebraska*:
    1. Farm Products (3.4 million tons, 59.4% of outbound state total);
    2. Nonmetallic Minerals (1.2 million, 21.5%); and,
    3. Food or Kindred Products (0.3 million, 5.7%)

Table 5: Outbound Truck O/D by Commodity, 2014

STCC2		Truck, Outbound Originating Kansas Counties in 2014							
		Johnson	Wyandotte	Montgomery	Sedgwick	Cherokee	Remaining	Total	Percent
01	Farm Prods.	97,860	9,459	250,538	169,231	318,338	15,340,914	16,186,340	29.6%
20	Food or Kindred Prods.	543,467	247,455	8,343	479,287	17,911	6,607,432	7,903,895	14.5%
14	Nonmetallic Minerals	1,485,714	0	106,837	95,315	1,428,123	4,444,138	7,560,127	13.8%
28	Chemicals or Allied Prods.	21,408	212,871	3,921,689	191,300	68,303	838,686	5,254,257	9.6%
50	Secondary Traffic	477,831	3,014,730	25,039	312,654	2,312	1,164,359	4,996,925	9.1%
	Remaining Commodities	2,887,696	1,880,485	273,282	1,767,982	119,949	5,829,885	12,759,279	23.3%
	Total	5,513,976	5,365,000	4,585,728	3,015,769	1,954,936	34,225,414	54,660,823	100.0%
	Percent	10.1%	9.8%	8.4%	5.5%	3.6%	62.6%	100.0%	
STCC2		Truck, Outbound Terminating State in 2014							
		MO	OK	NE	TX	IA	Remaining	Total	Percent
01	Farm Prods.	2,264,557	3,069,929	3,391,332	1,928,047	1,025,756	4,506,720	16,186,341	29.6%
20	Food or Kindred Prods.	587,002	307,471	327,991	760,593	816,275	5,104,563	7,903,895	14.5%
14	Nonmetallic Minerals	3,142,243	2,506,948	1,227,832	171,306	147,065	364,732	7,560,126	13.8%
28	Chemicals or Allied Prods.	144,980	950,432	51,634	843,418	49,330	3,214,462	5,254,256	9.6%
50	Secondary Traffic	2,601,957	384,611	158,296	137,497	280,718	1,433,846	4,996,925	9.1%
	Remaining Commodities	4,960,072	1,254,035	552,638	995,763	428,797	4,567,975	12,759,280	23.3%
	Total	13,700,811	8,473,426	5,709,723	4,836,624	2,747,941	19,192,298	54,660,823	100.0%
	Percent	25.1%	15.5%	10.4%	8.8%	5.0%	35.1%	100.0%	

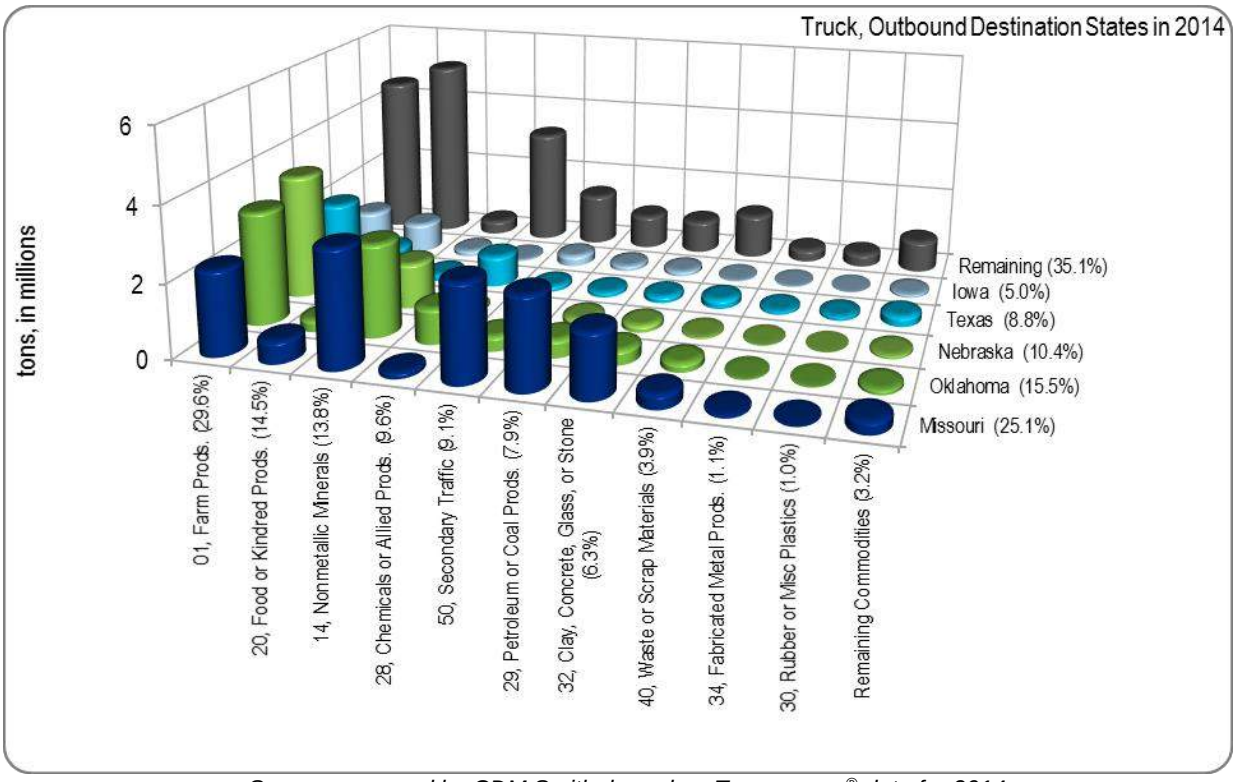
Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 11: Truck Outbound Commodities by County Origin, 2014



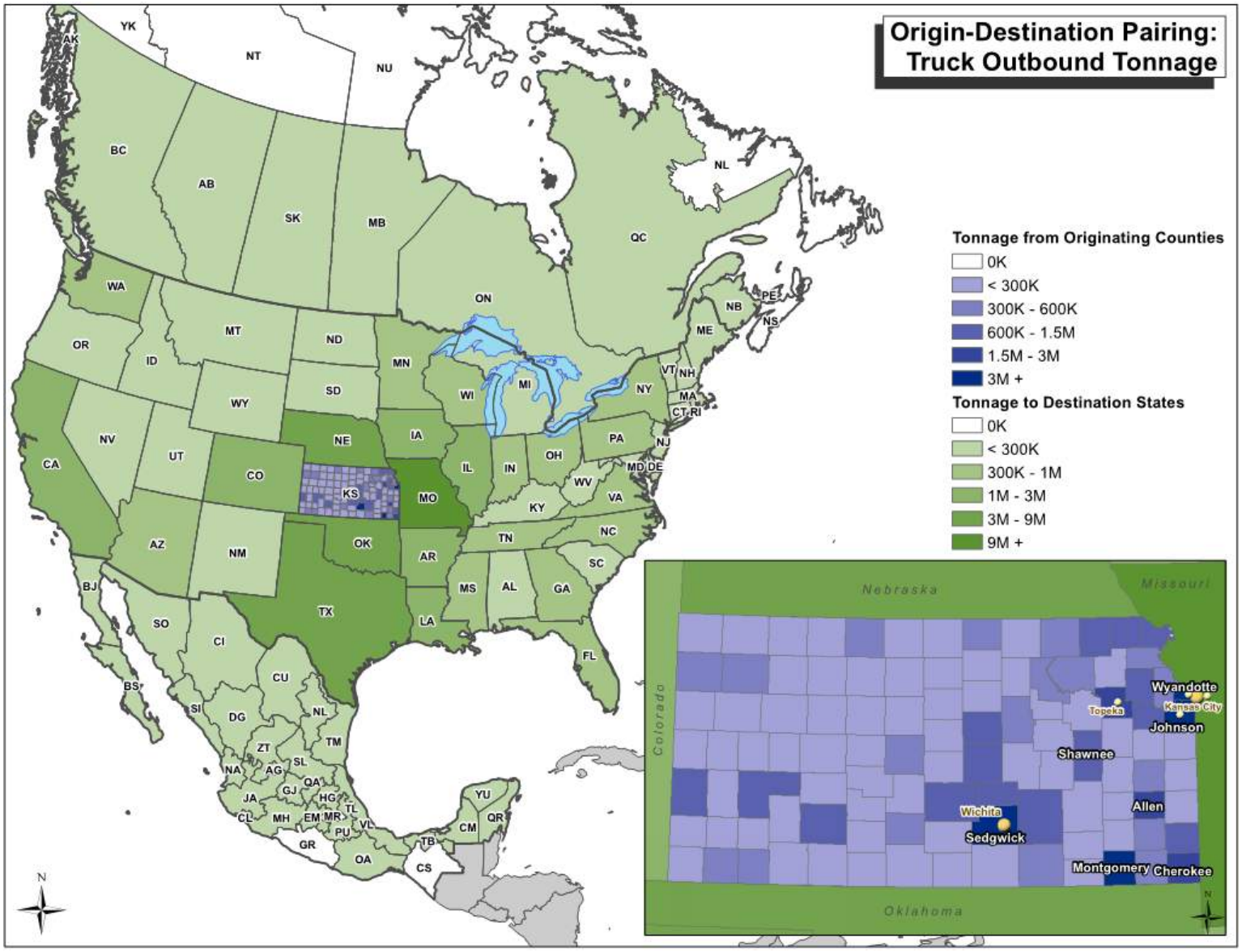
Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 12: Truck Outbound Commodities by State Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 13: Truck Outbound by Origin and Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

2.1.2 Truck Inbound

Table 19 in the Appendix presents inbound truck commodities to Kansas, in 2014, which total 46.8 million tons (23.3% of directional movements), via 4.4 million units (25.2%), valued at $44.7 billion (20.2%), with an average value/ton of $955; top five commodities include:

- *by Tonnage*:
  1. Nonmetallic Minerals (13.3 million tons, 28.4% of inbound total);
  2. Farm Products (13.0 million, 27.7%);
  3. Secondary Traffic (4.2 million, 8.9%);
  4. Petroleum or Coal Products (3.9 million, 8.3%); and,
  5. Food or Kindred Products (3.5 million, 7.4%)

- *by Units*:
  1. Shipping Containers (2.0 million units, 46.2% of inbound total);
  2. Farm Products (0.8 million, 18.4%);
  3. Nonmetallic Minerals (0.5 million, 12.4%);
  4. Secondary Traffic (0.2 million, 5.2%); and,
  5. Petroleum or Coal Products (0.2 million, 3.7%)

- *by Value*:
  1. Secondary Traffic ($12.5 billion, 28.0% of inbound total);
  2. Farm Products ($7.1 billion, 16.0%);
  3. Food or Kindred Products ($5.2 billion, 11.6%);
  4. Transportation Equipment ($3.2 billion, 7.2%); and,
  5. Electrical Equipment ($2.7 billion, 6.1%)

Inbound Tonnage Origin – Major inbound truck tonnages in 2014 are shown by state origin in Figure 14 and Figure 16. Truck movements originating out-of-state are primarily traveling from Missouri (17.3 million, 36.9%), Nebraska (7.9 million, 17.0%), and Oklahoma (4.1 million, 8.8%).

- *Missouri*:
  1. Nonmetallic Minerals (9.5 million tons, 54.9% of inbound state total);
  2. Secondary Traffic (2.0 million, 11.4%); and,
  3. Farm Products (1.9 million, 11.3%)

- *Nebraska*:
  1. Farm Products (5.3 million tons, 66.5% of inbound state total);
  2. Nonmetallic Minerals (1.2 million, 15.0%); and,
  3. Petroleum or Coal Products (0.4 million, 5.0%)

- *Oklahoma*:
  1. Farm Products (1.1 million tons, 25.8% of inbound state total);
  2. Nonmetallic Minerals (0.9 million, 21.9%); and,
  3. Petroleum or Coal Products (0.8 million, 19.3%)

Inbound Tonnage Destination – Major inbound truck tonnages in 2014 are shown by county destination in Figure 15 and Figure 16. 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%).

- *Johnson County:*
  1. Nonmetallic Minerals (4.0 million tons, 45.0% of inbound county total);
  2. Food or Kindred Products (0.9 million, 10.6%); and,
  3. Petroleum or Coal Products (0.8 million, 8.8%)

- *Sedgwick County:*
  1. Nonmetallic Minerals (1.7 million tons, 29.0% of inbound county total);
  2. Farm Products (0.8 million, 13.2%); and,
  3. Food or Kindred Products (0.7 million, 11.4%)

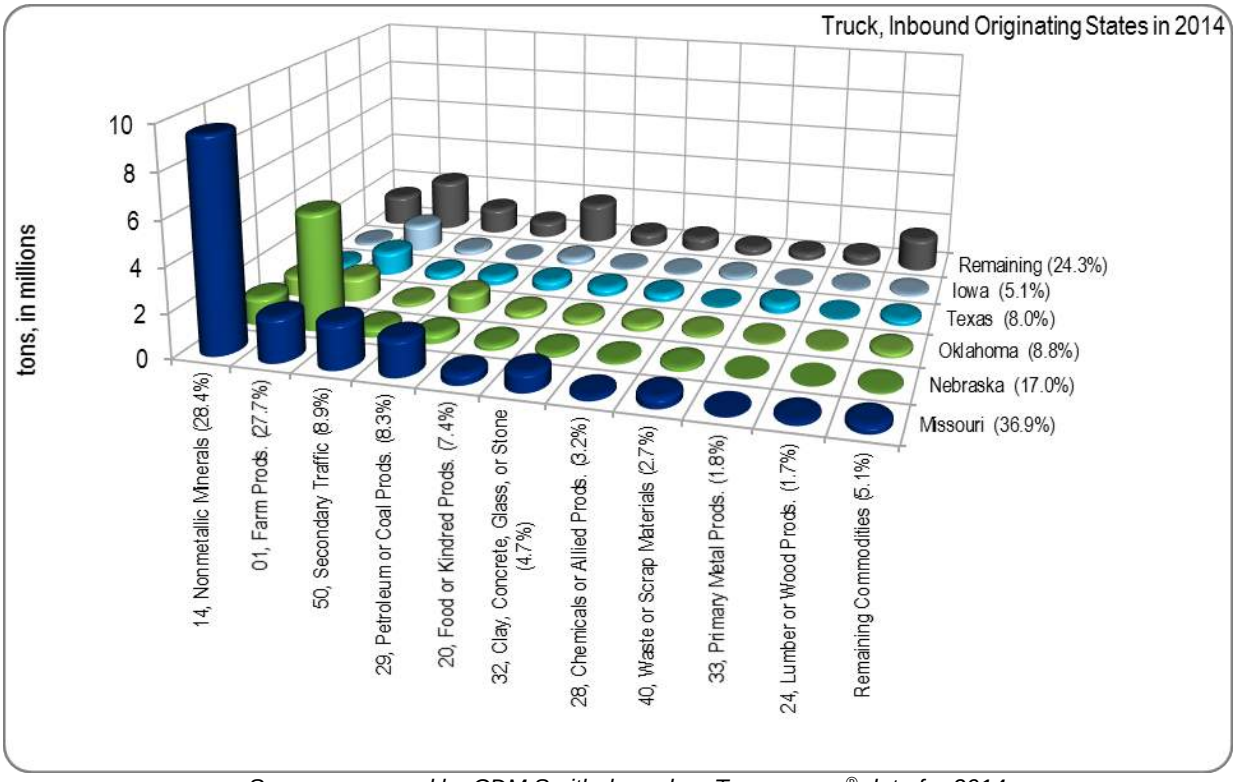
- *Wyandotte County:*
  1. Secondary Traffic (1.9 million tons, 60.8% of inbound county total);
  2. Petroleum or Coal Products (0.3 million, 10.6%); and,
  3. Farm Products (0.3 million, 9.3%)

Table 6: Inbound Truck O/D by Commodity, 2014

STCC2		Truck, Inbound Originating State in 2014							
		MO	NE	OK	TX	IA	Remaining	Total	Percent
14	Nonmetallic Minerals	9,474,150	1,192,033	905,567	199,802	123,338	1,415,510	13,310,400	28.4%
01	Farm Prods.	1,945,382	5,272,496	1,066,684	1,064,218	1,228,833	2,404,783	12,982,396	27.7%
50	Secondary Traffic	1,974,507	377,685	158,627	286,668	193,014	1,191,311	4,181,812	8.9%
29	Petroleum or Coal Prods.	1,595,575	400,111	799,713	357,160	25,819	717,389	3,895,767	8.3%
20	Food or Kindred Prods.	436,331	206,762	261,789	414,263	283,219	1,866,751	3,469,115	7.4%
	Remaining Commodities	1,843,231	485,308	943,247	1,410,622	513,452	3,773,348	8,969,208	19.3%
	Total	17,269,176	7,934,395	4,135,627	3,732,733	2,367,675	11,369,092	46,808,698	100.0%
	Percent	36.9%	17.0%	8.8%	8.0%	5.1%	24.2%	100.0%	
STCC2		Truck, Inbound Terminating Kansas Counties in 2014							
		Johnson	Sedgwick	Wyandotte	Shawnee	Saline	Remaining	Total	Percent
14	Nonmetallic Minerals	3,994,797	1,725,454	156,003	538,296	214,225	6,681,625	13,310,400	28.4%
01	Farm Prods.	428,876	785,682	290,311	283,156	558,617	10,635,754	12,982,396	27.7%
50	Secondary Traffic	747,167	269,626	1,900,667	147,275	70,484	1,046,595	4,181,814	8.9%
29	Petroleum or Coal Prods.	786,375	327,787	330,488	210,903	32,795	2,207,418	3,895,766	8.3%
20	Food or Kindred Prods.	937,907	679,584	128,645	315,294	153,705	1,253,981	3,469,116	7.4%
	Remaining Commodities	1,991,267	2,166,775	320,036	845,346	184,747	3,461,037	8,969,208	19.3%
	Total	8,886,389	5,954,908	3,126,150	2,340,270	1,214,573	25,286,410	46,808,700	100.0%
	Percent	19.0%	12.7%	6.7%	5.0%	2.6%	54.0%	100.0%	

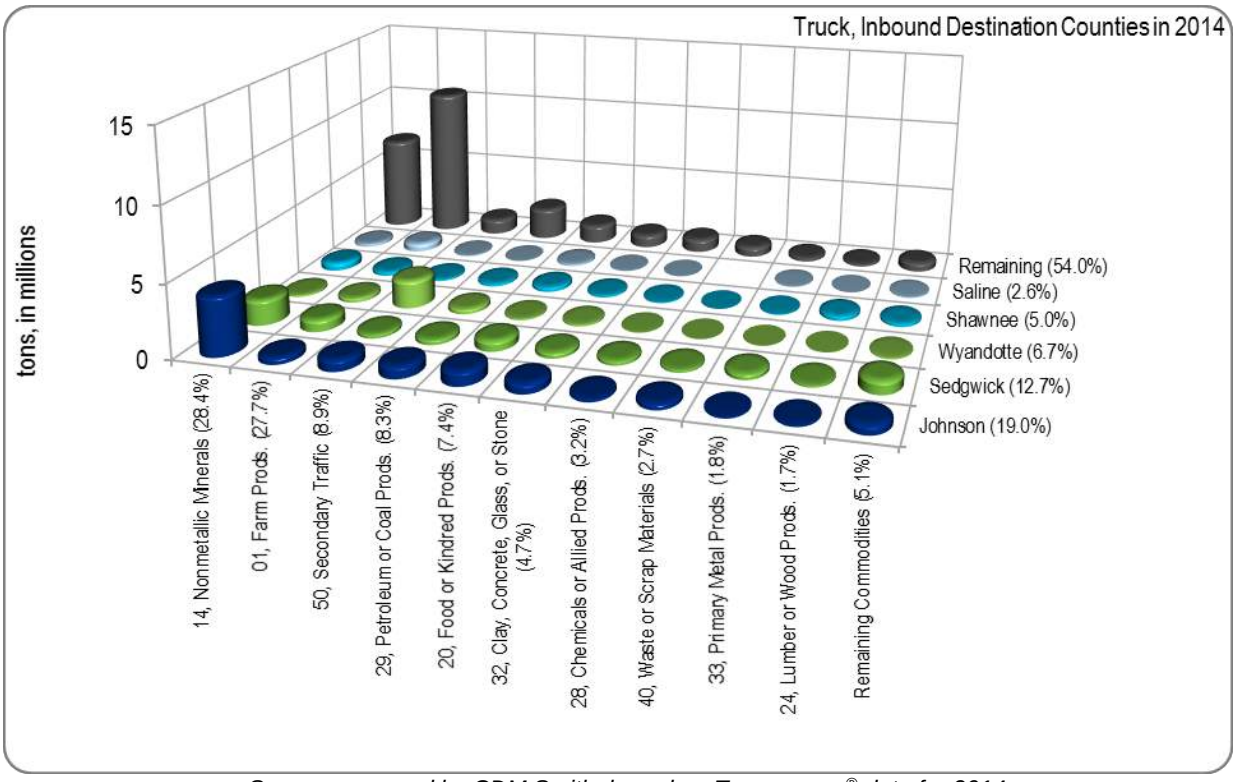
Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 14: Truck Inbound Commodities by State Origin, 2014



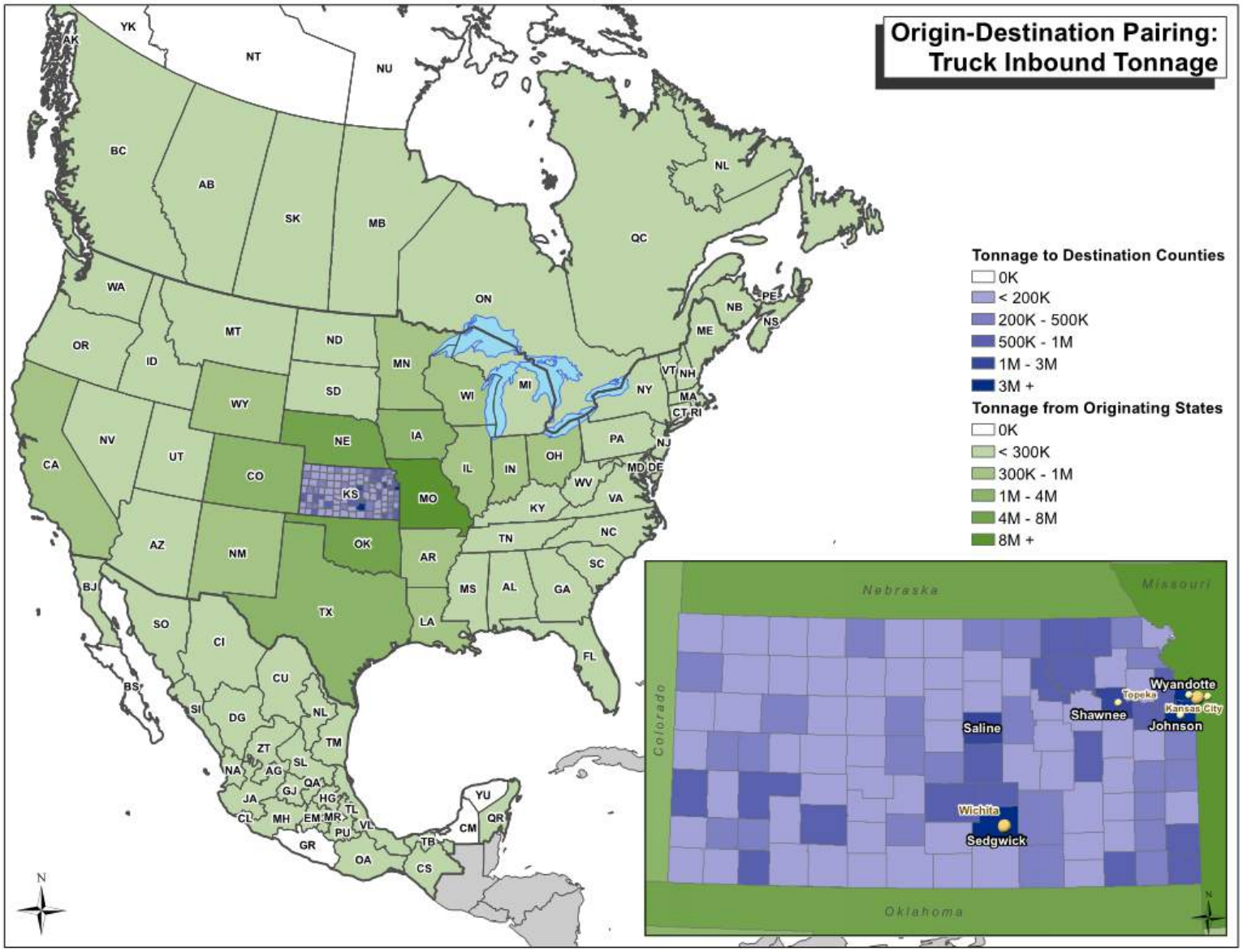
Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 15: Truck Inbound Commodities by County Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 16: Truck Inbound by Origin and Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

2.1.3 Truck Intra

Table 20 in the Appendix presents intrastate truck commodities within Kansas, in 2014, which total 57.6 million tons (28.7% of directional movements), via 6.3 million units (35.8%), valued at $55.3 billion (25.0%), with an average value/ton of $960; top five commodities include:

- *by Tonnage*:
  1. Nonmetallic Minerals (21.2 million tons, 36.9% of intra total);
  2. Farm Products (11.7 million, 20.3%);
  3. Secondary Traffic (10.1 million, 17.5%);
  4. Petroleum or Coal Products (7.4 million, 12.9%); and,
  5. Clay, Concrete, Glass, or Stone (4.3 million, 7.5%)

- *by Units*:
  1. Shipping Containers (3.4 million units, 53.8% of intra total);
  2. Nonmetallic Minerals (0.9 million, 13.9%);
  3. Farm Products (0.7 million, 11.5%);
  4. Secondary Traffic (0.6 million, 9.5%); and,
  5. Petroleum or Coal Products (0.3 million, 4.8%)

- *by Value*:
  1. Secondary Traffic ($37.5 billion, 67.9% of intra total);
  2. Petroleum or Coal Products ($7.3 billion, 13.1%);
  3. Farm Products ($4.7 billion, 8.5%);
  4. Food or Kindred Products ($1.4 billion, 2.6%); and,
  5. Chemicals or Allied Products ($1.3 billion, 2.4%)

2.1.4 Truck Through

Table 21 in the Appendix presents through truck commodities moving across Kansas, in 2014, which total 41.9 million tons (20.8% of directional movements), via 2.2 million units (12.3%), valued at $65.9 billion (29.8%), with an average value/ton of $1,575; top five commodities include:

- *by Tonnage*:
  1. Food or Kindred Products (8.7 million tons, 20.8% of through total);
  2. Farm Products (6.2 million, 14.8%);
  3. Chemicals or Allied Products (5.8 million, 13.8%);
  4. Petroleum or Coal Products (4.1 million, 9.7%); and,
  5. Nonmetallic Minerals (3.4 million, 8.1%)

- *by Units*:
  1. Food or Kindred Products (0.4 million units, 17.6% of through total);
  2. Farm Products (0.3 million, 15.9%);
  3. Chemicals or Allied Products (0.3 million, 13.2%);
  4. Petroleum or Coal Products (0.2 million, 7.9%); and,
  5. Secondary Traffic (0.2 million, 7.3%)

- *by Value*:
  1. Food or Kindred Products ($12.4 billion, 18.8% of through total);
  2. Chemicals or Allied Products ($9.9 billion, 15.0%);
  3. Machinery ($8.7 billion, 13.2%);
  4. Electrical Equipment ($6.0 billion, 9.1%); and,
  5. Transportation Equipment ($4.5 billion, 6.9%)

2.2 Rail, 2014

Kansas rail movements in 2014 totaled 368.4 million tons, valued at $324.1 billion, carried by 6.9 million carload units, see Table 7[8]. On average, total rail commodity movements are valued at $880/ton. Rail movements represent 64.7% or modal tonnage in Kansas and 58.9% of total modal value in 2014, by far, the largest modal share.

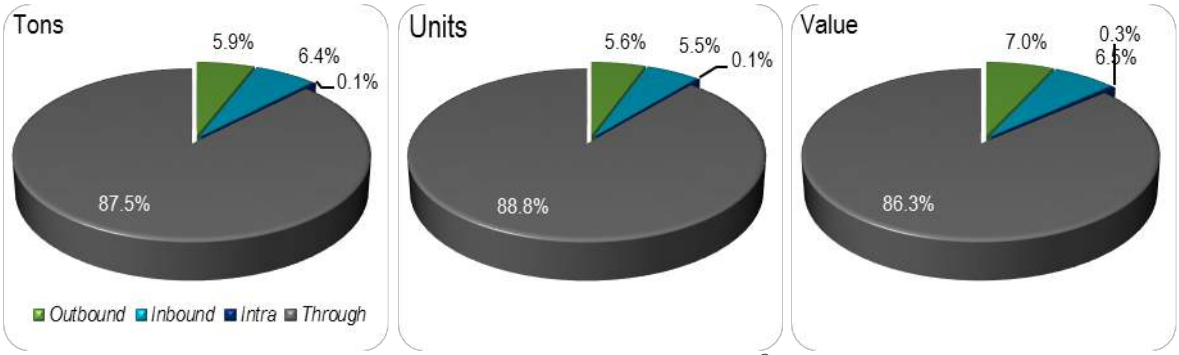
Direction – As depicted in Figure 17, through rail movements dominate directional movements by all three terms: 87.5% of total tonnage, 88.8% of carload units, and 86.3% of value. Inbound and outbound rail each comprise similar shares of the remaining directional movements for rail, with intrastate rail traffic accounting for a fractional percentage.

Table 7: Rail by Direction, 2014

Direction	Tons		Units		Value (in millions)		Average Value/Ton
	Amount	Percent	Amount	Percent	Amount	Percent	
Outbound	21,919,113	5.9%	386,788	5.6%	$22,622	7.0%	$1,032
Inbound	23,543,312	6.4%	381,768	5.5%	$21,005	6.5%	$892
Intra	489,604	0.1%	6,106	0.1%	$901	0.3%	$1,840
Through	322,447,524	87.6%	6,141,358	88.8%	$279,577	86.2%	$867
Total	368,399,553	100.0%	6,916,020	100.0%	$324,105	100.0%	$880

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 17: Rail Percentages by Direction, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Commodities – Figure 18, Figure 19, and Figure 20 depict the top two-digit STCC commodities for Kansas rail, by tonnage, units, and value, respectively, with a directional composition. Such graphics depict the largest respective commodity movements for rail by direction, and in

[8] Tonnage and carload units for rail are from the STB WAYBILL database; values are derived by applying proxy directional- and commodity-specific values per ton from the IHS TRANSEARCH® database.

conjunction with the tabulated data in Table 23 through Table 27, in the Appendix, the top rail commodity movements by direction are identified in the respective subsections.

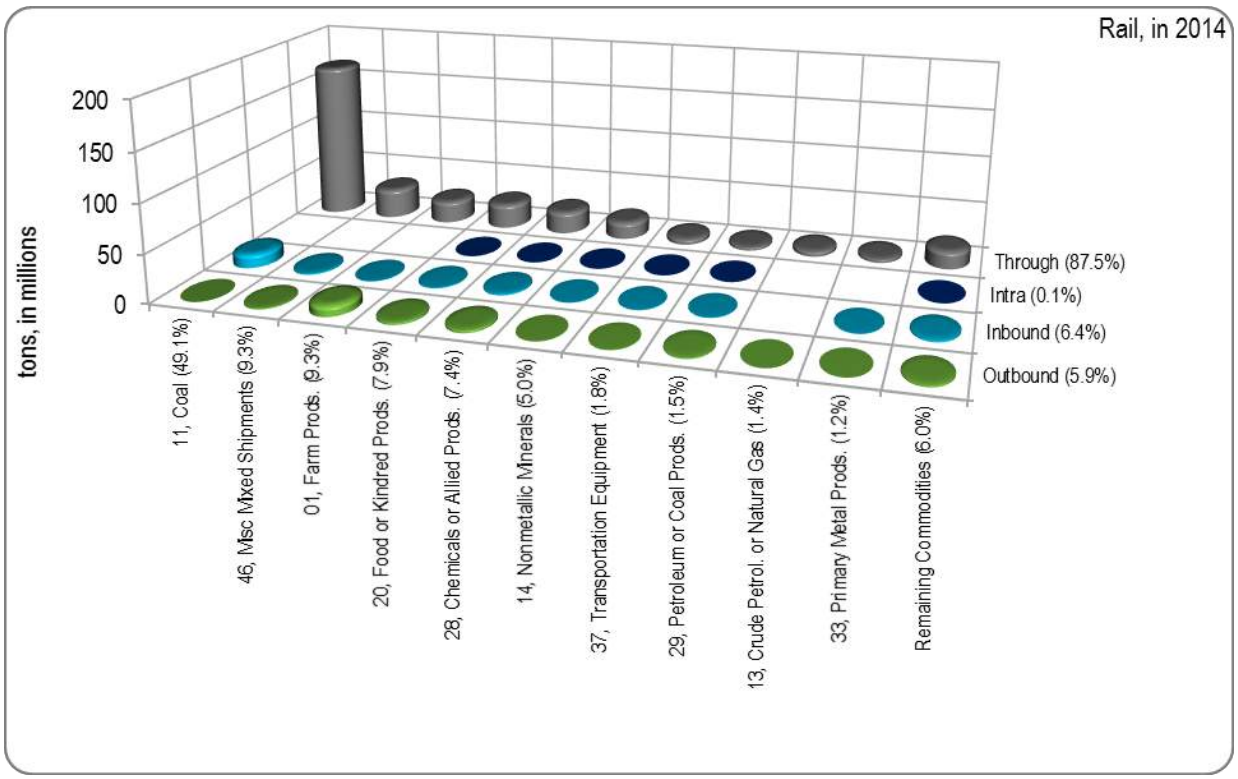
In terms of all rail directions combined, the top five commodities include:

- *by Tonnage*:
  1. Coal (181.0 million tons, 49.1% of rail total);
  2. Miscellaneous Mixed Shipments (34.3 million, 9.3%);
  3. Farm Products (34.2 million, 9.3%);
  4. Food or Kindred Products (29.0 million, 7.9%); and,
  5. Chemicals or Allied Products (27.2 million, 7.4%)

- *by Units*:
  1. Miscellaneous Mixed Shipments (2.3 million units, 33.3% of rail total);
  2. Coal (1.5 million, 21.9%);
  3. Food or Kindred Products (0.5 million, 7.1%);
  4. Farm Products (0.5 million, 6.9%); and,
  5. Chemicals or Allied Products (0.4 million, 5.7%)

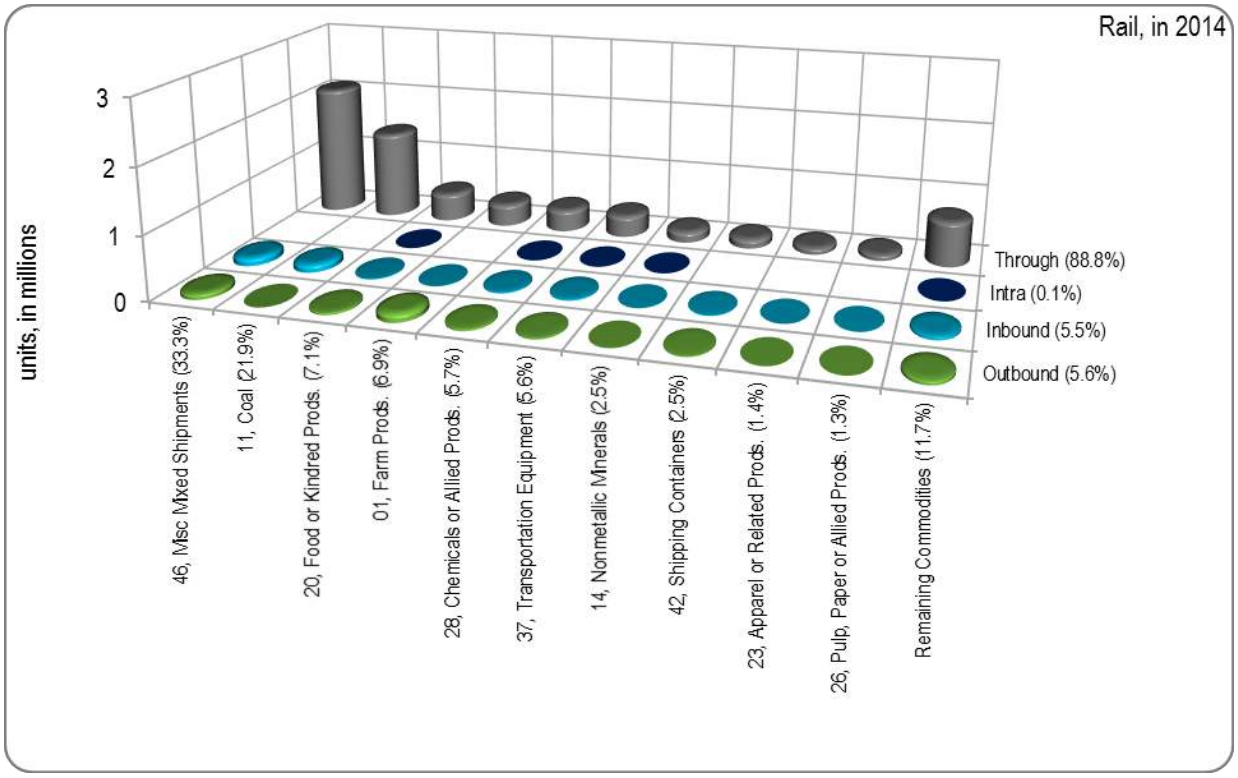
- *by Value*:
  1. Chemicals or Allied Products ($104.8 billion, 32.3% of rail total);
  2. Transportation Equipment ($77.4 billion, 23.9%);
  3. Miscellaneous Mixed Shipments ($28.6 billion, 8.8%);
  4. Coal ($15.8 billion, 4.9%); and,
  5. Food or Kindred Products ($15.0 billion, 4.6%)

Figure 18: Rail Top Commodities by Tonnage, 2014



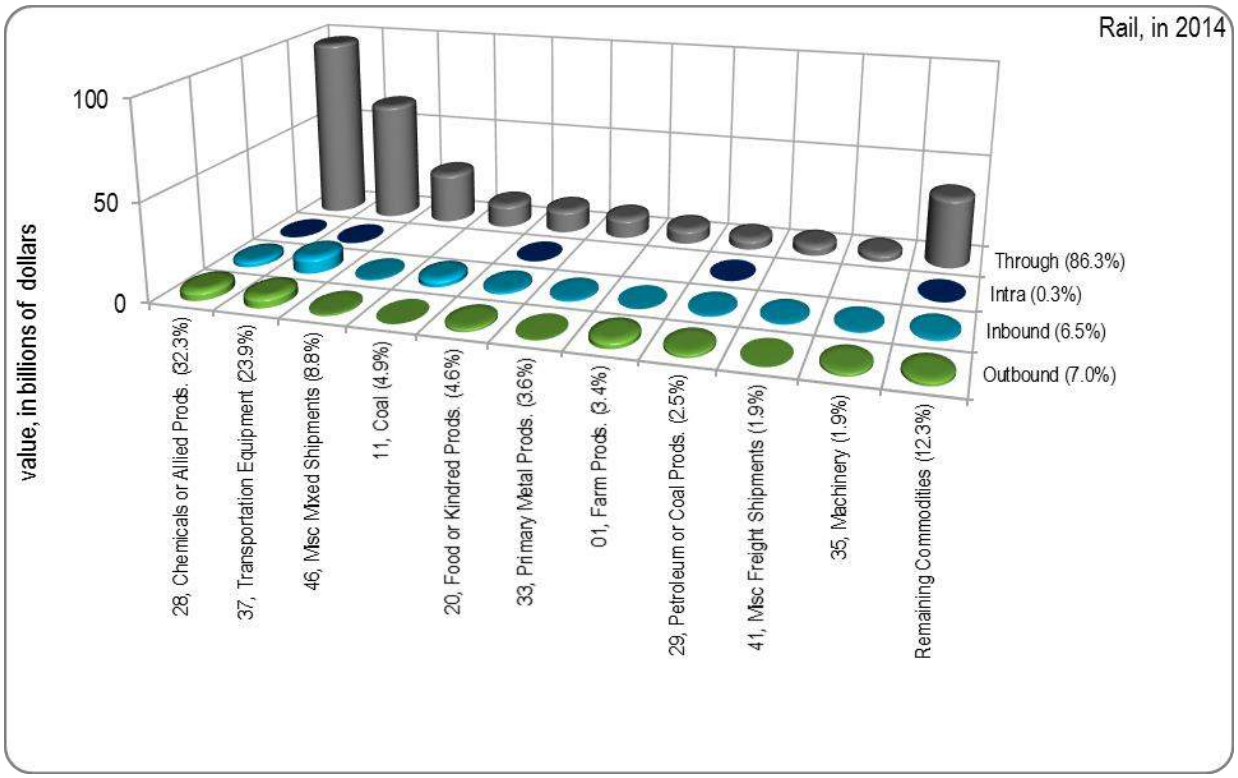
Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 19: Rail Top Commodities by Units, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 20: Rail Top Commodities by Value, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

2.2.1 Rail Outbound

Table 23 in the Appendix presents outbound rail commodities from Kansas, in 2014, which total 21.9 million tons (5.9% of directional movements), via 386,788 carload units (5.6%), valued at $22.6 billion (7.0%), with an average value/ton of $1,032; top five commodities include:

- *by Tonnage*:
  1. Farm Products (10.6 million tons, 48.1% of outbound total);
  2. Chemicals or Allied Products (2.7 million, 12.5%);
  3. Food or Kindred Products (2.5 million, 11.4%);
  4. Miscellaneous Mixed Shipments (1.5 million, 6.8%); and,
  5. Petroleum or Coal Products (1.5 million, 6.7%)

- *by Units*:
  1. Farm Products (0.1 million units, 32.3% of outbound total);
  2. Miscellaneous Mixed Shipments (0.1 million, 21.8%);
  3. Food or Kindred Products (0.0 million, 9.7%);
  4. Chemicals or Allied Products (0.0 million, 8.4%); and,
  5. Transportation Equipment (0.0 million, 6.5%)

- *by Value*:
  1. Transportation Equipment ($5.3 billion, 23.5% of outbound total);
  2. Chemicals or Allied Products ($4.9 billion, 21.4%);
  3. Farm Products ($3.3 billion, 14.8%);
  4. Petroleum or Coal Products ($1.9 billion, 8.4%); and,
  5. Food or Kindred Products ($1.8 billion, 7.8%)

Outbound Tonnage Origin – Major outbound rail tonnages in 2014 are shown by county origin in Figure 21 and Figure 23. Rail movements destined out-of-state are primarily traveling from Wyandotte County (3.5 million, 16.1%), Sedgwick County (2.5 million, 11.2%), and Reno County (2.1 million, 9.7%).

- *Wyandotte County*:
  1. Miscellaneous Mixed Shipments (1.2 million tons, 34.9% of outbound county total);
  2. Farm Products (0.8 million, 23.8%); and,
  3. Transportation Equipment (0.4 million, 11.2%)

- *Sedgewick County:*
  1. Farm Products (0.8 million tons, 33.6% of outbound county total);
  2. Chemicals or Allied Products (0.7 million, 29.7%); and,
  3. Food or Kindred Products (0.6 million, 24.6%)

- *Reno County:*
  1. Farm Products (1.0 million tons, 46.2% of outbound county total);
  2. Petroleum or Coal Products (0.6 million, 28.8%); and,
  3. Nonmetallic Minerals (0.2 million, 10.2%)

Outbound Tonnage Destination – Major outbound rail tonnages in 2014 are shown by state destination in Figure 22 and Figure 23. Rail movements destined out-of-state are primarily

traveling to Texas (8.0 million, 36.6%), California (4.2 million, 19.3%), and Illinois (1.8 million, 8.1%).

- *Texas*:
    1. Farm Products (6.1 million tons, 75.3% of outbound state total);
    2. Food or Kindred Products (0.5 million, 6.5%); and,
    3. Chemicals or Allied Products (0.5 million, 5.6%)

- *California*:
    1. Miscellaneous Mixed Shipments (1.2 million tons, 29.3% of outbound state total);
    2. Farm Products (1.1 million, 25.9%); and,
    3. Chemicals or Allied Products (0.7 million, 16.5%)

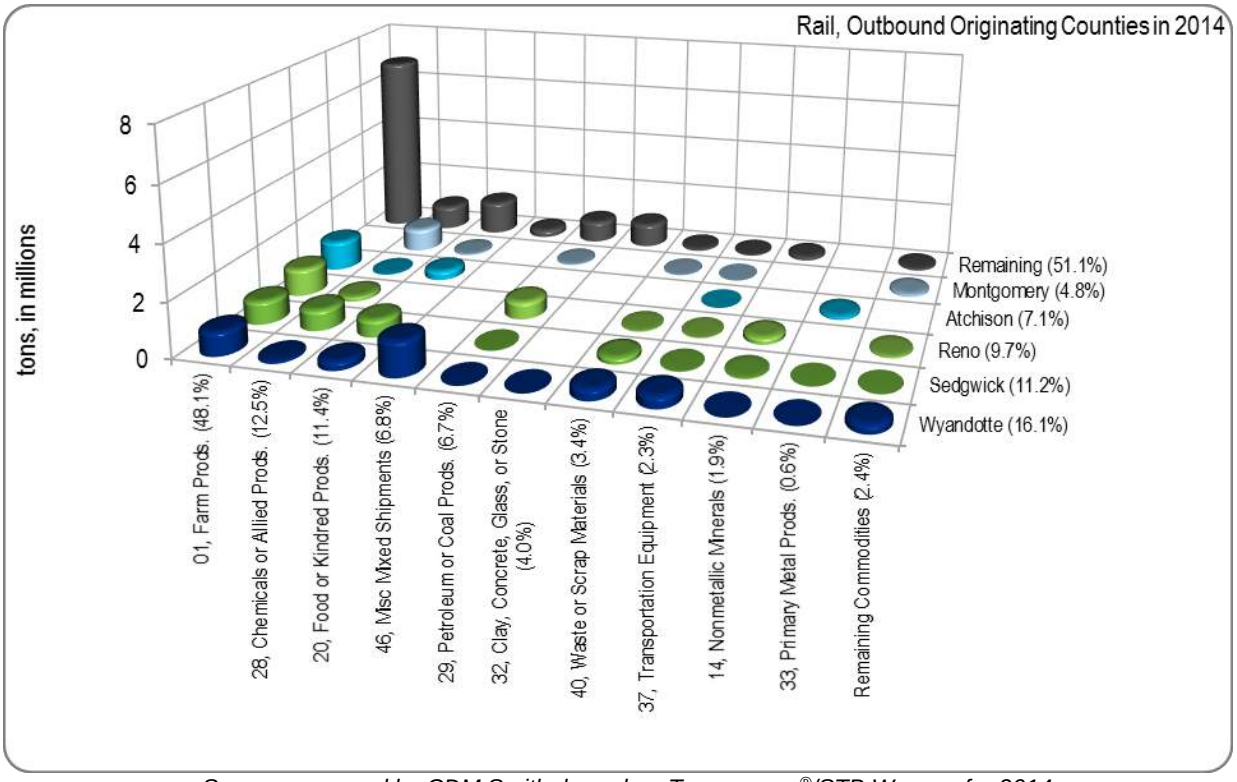
- *Illinois*:
    1. Farm Products (0.6 million tons, 36.2% of outbound state total);
    2. Food or Kindred Products (0.4 million, 20.1%); and,
    3. Chemicals or Allied Products (0.2 million, 11.2%)

Table 8: Outbound Rail O/D by Commodity, 2014

STCC2		Rail, Outbound Originating Kansas Counties in 2014							
		Wyandotte	Sedgwick	Reno	Atchison	Montgomery	Remaining	Total	Percent
01	Farm Prods.	841,464	824,137	981,952	1,077,241	0	6,825,907	10,550,701	48.1%
28	Chemicals or Allied Prods.	96,960	727,840	157,640	30,400	834,896	888,826	2,736,562	12.5%
20	Food or Kindred Prods.	301,960	602,000	0	320,400	54,224	1,228,580	2,507,164	11.4%
46	Misc Mixed Shipments	1,231,160	0	0	0	0	254,000	1,485,160	6.8%
29	Petroleum or Coal Prods.	6,720	10,680	611,340	0	47,080	784,348	1,460,168	6.7%
	Remaining Commodities	1,050,242	287,006	374,898	119,880	126,300	1,221,032	3,179,358	14.5%
	Total	3,528,506	2,451,663	2,125,830	1,547,921	1,062,500	11,202,693	21,919,113	100.0%
	Percent	16.1%	11.2%	9.7%	7.1%	4.8%	51.1%	100.0%	
STCC2		Rail, Outbound Terminating State in 2014							
		TX	CA	IL	AR	MO	Remaining	Total	Percent
01	Farm Prods.	6,050,119	1,096,642	645,632	404,080	349,468	2,004,760	10,550,701	48.1%
28	Chemicals or Allied Prods.	450,684	696,346	198,728	22,068	92,616	1,276,120	2,736,562	12.5%
20	Food or Kindred Prods.	522,584	498,916	358,560	83,588	398,848	644,668	2,507,164	11.4%
46	Misc Mixed Shipments	16,920	1,240,600	165,320	0	0	62,320	1,485,160	6.8%
29	Petroleum or Coal Prods.	267,292	361,936	38,128	75,952	0	716,860	1,460,168	6.7%
	Remaining Commodities	722,012	337,468	375,336	395,994	102,744	1,245,804	3,179,358	14.5%
	Total	8,029,611	4,231,908	1,781,704	981,682	943,676	5,950,532	21,919,113	100.0%
	Percent	36.6%	19.3%	8.1%	4.5%	4.3%	27.1%	100.0%	

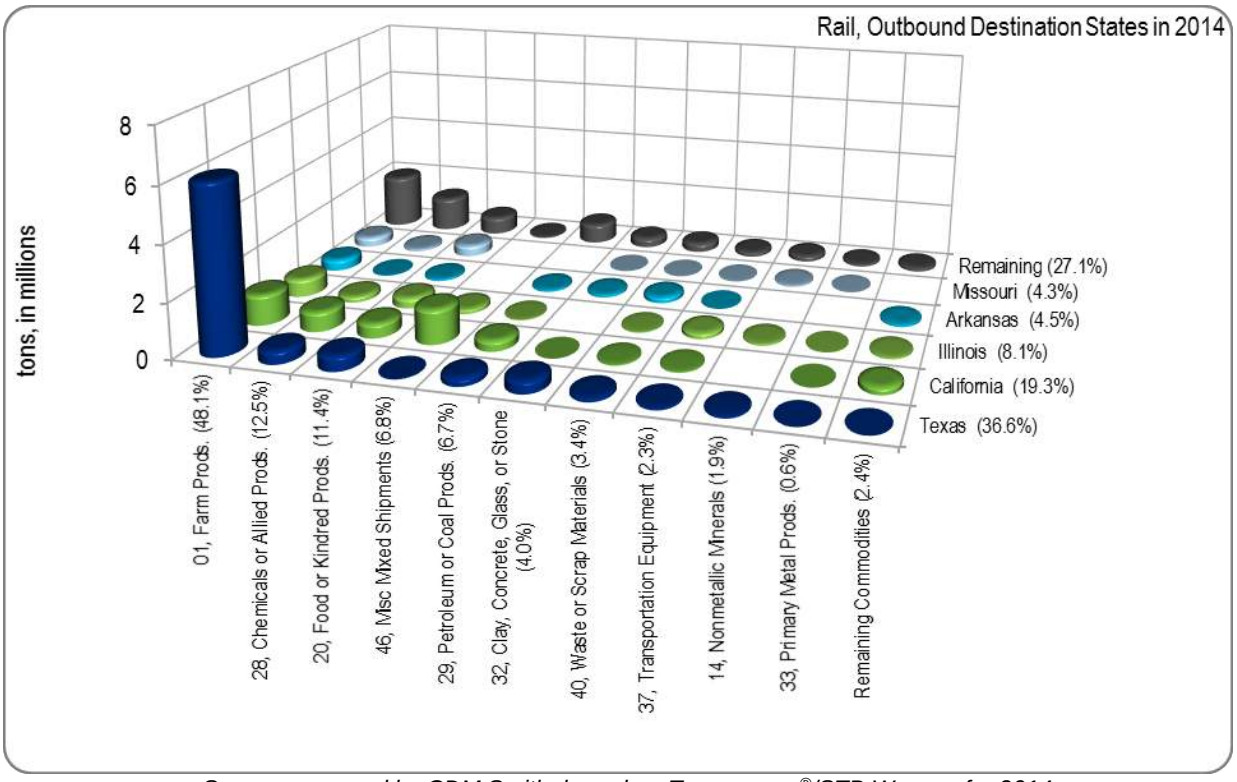
Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 21: Rail Outbound Commodities by County Origin, 2014



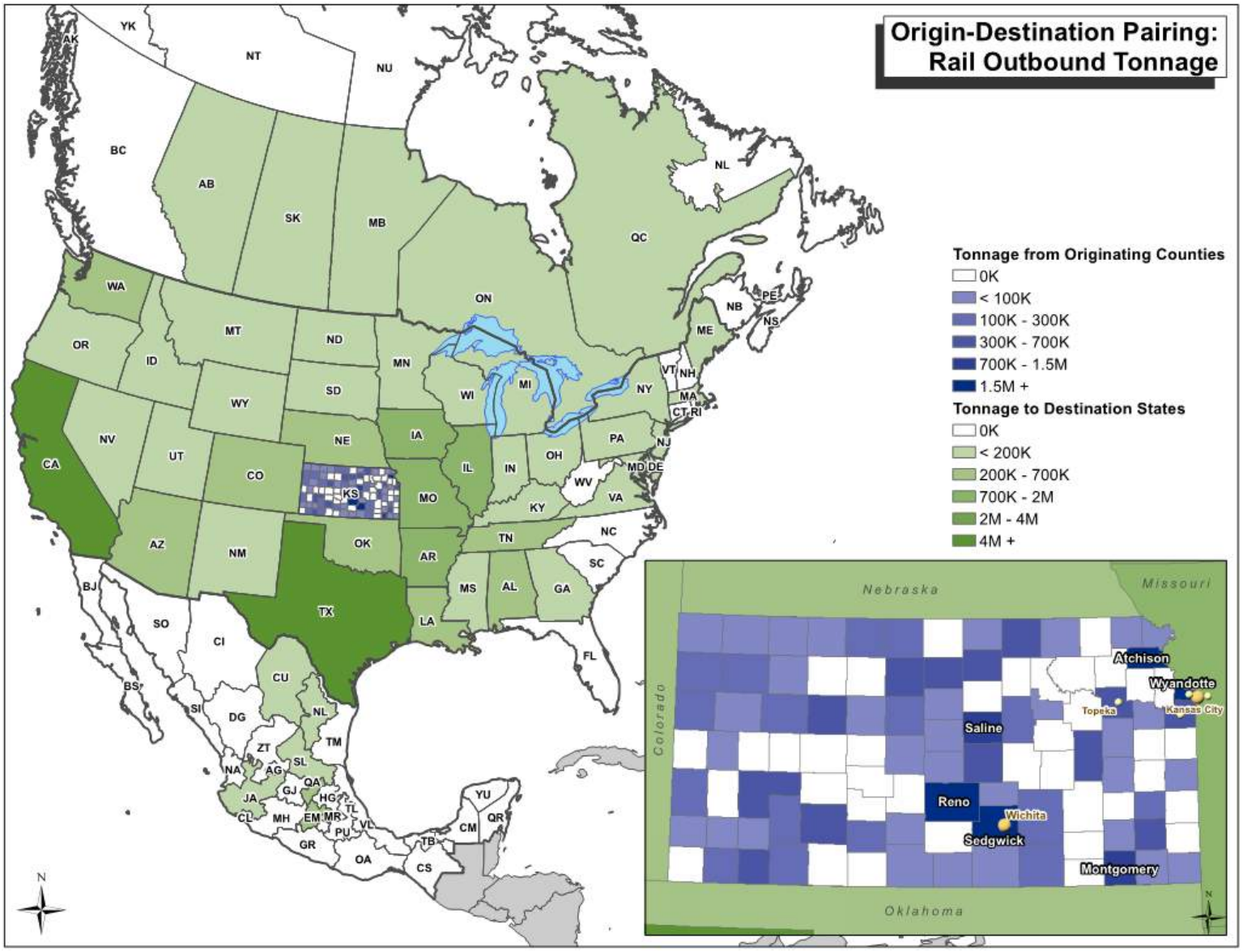
Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 22: Rail Outbound Commodities by State Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 23: Rail Outbound by Origin and Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

2.2.2 Rail Inbound

Table 24 in the Appendix presents inbound rail commodities to Kansas, in 2014, which total 23.5 million tons (6.4% of directional movements), via 381,768 carload units (5.5%), valued at $21.0 billion (6.5%), with an average value/ton of $892; top five commodities include:

- *by Tonnage*:
  1. Coal (13.9 million tons, 59.2% of inbound total);
  2. Chemicals or Allied Products (1.8 million, 7.5%);
  3. Miscellaneous Mixed Shipments (1.7 million, 7.2%);
  4. Clay, Concrete, Glass, or Stone (1.2 million, 5.2%); and,
  5. Food or Kindred Products (1.1 million, 4.5%)

- *by Units*:
  1. Miscellaneous Mixed Shipments (122.7 thousand units, 32.1% of inbound total);
  2. Coal (116.8 thousand, 30.6%);
  3. Transportation Equipment (26.3 thousand, 6.9%);
  4. Chemicals or Allied Products (23.8 thousand, 6.2%); and,
  5. Food or Kindred Products (15.3 thousand, 4.0%)

- *by Value*:
  1. Transportation Equipment ($8.1 billion, 38.5% of inbound total);
  2. Coal ($3.7 billion, 17.8%);
  3. Chemicals or Allied Products ($2.9 billion, 14.0%);
  4. Food or Kindred Products ($1.3 billion, 6.3%); and,
  5. Primary Metal Products ($0.9 billion, 4.3%)

Inbound Tonnage Origin – Major inbound rail tonnages in 2014 are shown by state origin in Figure 24 and Figure 26. Rail movements originating out-of-state are primarily traveling from Nebraska (7.6 million, 32.1%), Wyoming (7.4 million, 31.5%), and California (2.0 million, 8.6%).

- *Nebraska*:
  1. Coal (7.3 million tons, 96.2% of inbound state total);
  2. Farm Products (0.2 million, 2.3%); and,
  3. Food or Kindred Products (0.1 million, 1.2%)

- *Wyoming*:
  1. Coal (6.7 million tons, 89.9% of inbound state total);
  2. Clay, Concrete, Glass, or Stone (0.4 million, 5.8%); and,
  3. Chemicals or Allied Products (0.2 million, 2.4%)

- *California*:
  1. Miscellaneous Mixed Shipments (1.5 million tons, 71.3% of inbound state total);
  2. Food or Kindred Products (0.2 million, 9.8%); and,
  3. Chemicals or Allied Products (0.1 million, 5.7%)

Inbound Tonnage Destination – Major inbound rail tonnages in 2014 are shown by county destination in Figure 25 and Figure 26. Rail movements originating out-of-state are primarily

traveling to Pottawatomie County (8.0 million, 34.1%), Wyandotte (5.9 million, 25.0%), and Douglas County (2.5 million, 10.4%).

- *Pottawattamie County*:
  1. Coal (8.0 million tons, 99.8% of inbound county total);
  2. Primary Metal Products (9,600, 0.1%); and,
  3. Chemicals or Allied Products (8,040, 0.1%)

- *Wyandotte County*:
  1. Coal (1.5 million tons, 26.0% of inbound county total);
  2. Miscellaneous Mixed Shipments (1.5 million, 25.3%); and,
  3. Transportation Equipment (0.5 million, 9.2%)

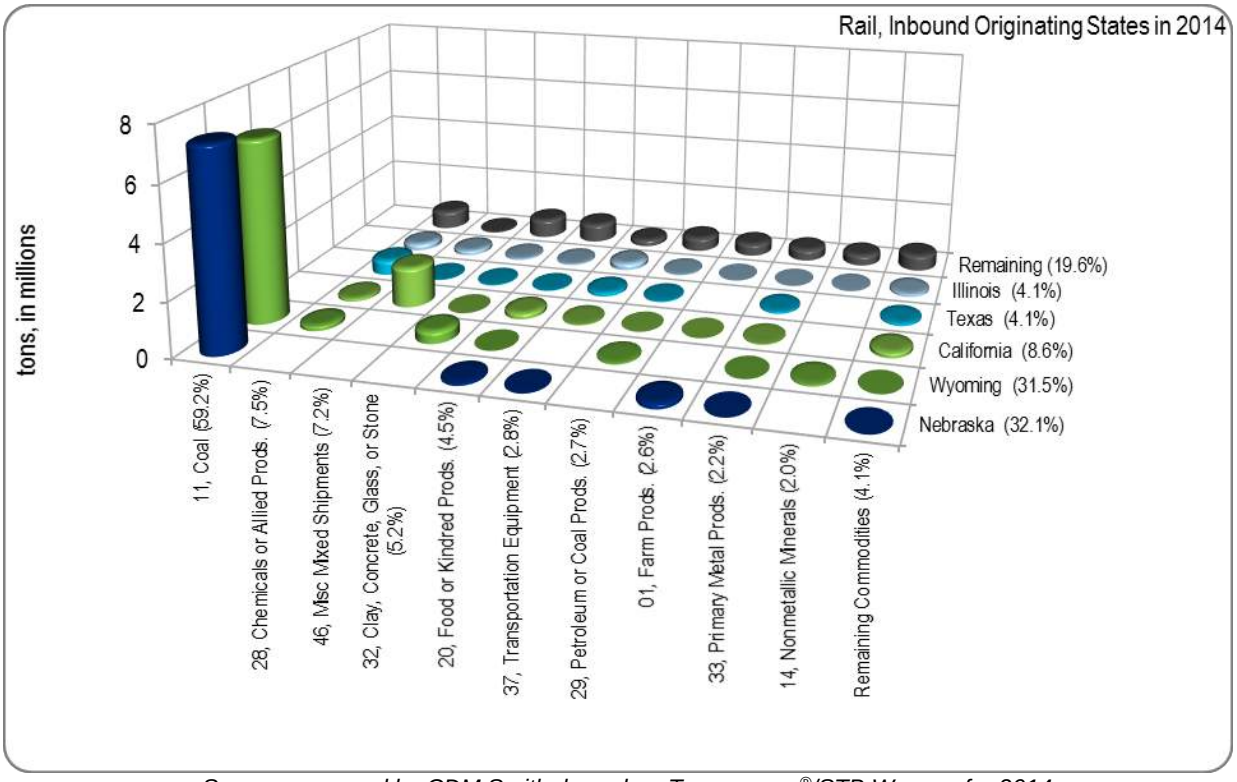
- *Douglas County*:
  1. Coal (2.3 million tons, 92.7% of inbound county total);
  2. Chemicals or Allied Products (0.2 million, 6.4%); and,
  3. Food or Kindred Products (156,128, 0.6%)

Table 9: Inbound Rail O/D by Commodity, 2014

STCC2		Rail, Inbound Originating State in 2014							
		NE	WY	CA	TX	IL	Remaining	Total	Percent
11	Coal	7,265,730	6,660,905	0	0	0	0	13,926,635	59.2%
28	Chemicals or Allied Prods.	0	174,760	115,280	542,582	246,088	685,680	1,764,390	7.5%
46	Misc Mixed Shipments	0	0	1,451,520	22,640	175,120	41,680	1,690,960	7.2%
32	Clay, Concrete, Glass, or Stone	0	427,960	7,640	32,720	68,960	693,252	1,230,532	5.2%
20	Food or Kindred Prods.	88,372	3,960	199,320	27,080	55,920	682,968	1,057,620	4.5%
	Remaining Commodities	199,308	141,708	261,842	348,440	412,160	2,509,717	3,873,175	16.4%
	Total	7,553,410	7,409,293	2,035,602	973,462	958,248	4,613,297	23,543,312	100.0%
	Percent	32.1%	31.5%	8.6%	4.1%	4.1%	19.6%	100.0%	
STCC2		Rail, Inbound Terminating Kansas Counties in 2014							
		Pottawatomie	Wyandotte	Douglas	Finney	Johnson	Remaining	Total	Percent
11	Coal	8,004,034	1,530,180	2,272,895	1,369,918	0	749,608	13,926,635	59.2%
28	Chemicals or Allied Prods.	8,040	513,480	156,128	15,760	59,560	1,011,422	1,764,390	7.5%
46	Misc Mixed Shipments	0	1,486,440	0	0	204,520	0	1,690,960	7.2%
32	Clay, Concrete, Glass, or Stone	0	366,920	0	28,120	493,080	342,412	1,230,532	5.2%
20	Food or Kindred Prods.	0	400,644	15,360	92,440	69,920	479,256	1,057,620	4.5%
	Remaining Commodities	9,600	1,579,817	8,200	242,774	242,760	1,790,024	3,873,175	16.4%
	Total	8,021,674	5,877,481	2,452,583	1,749,012	1,069,840	4,372,722	23,543,312	100.0%
	Percent	34.1%	25.0%	10.4%	7.4%	4.5%	18.6%	100.0%	

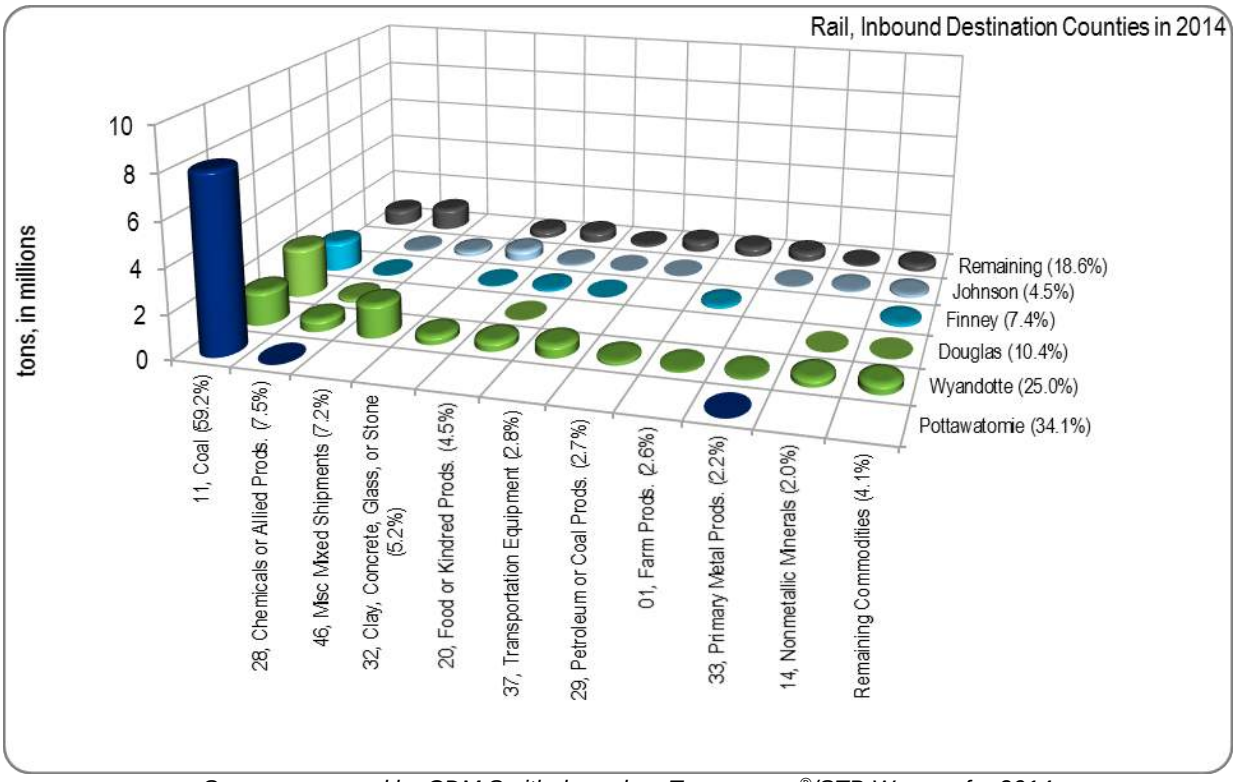
Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 24: Rail Inbound Commodities by State Origin, 2014



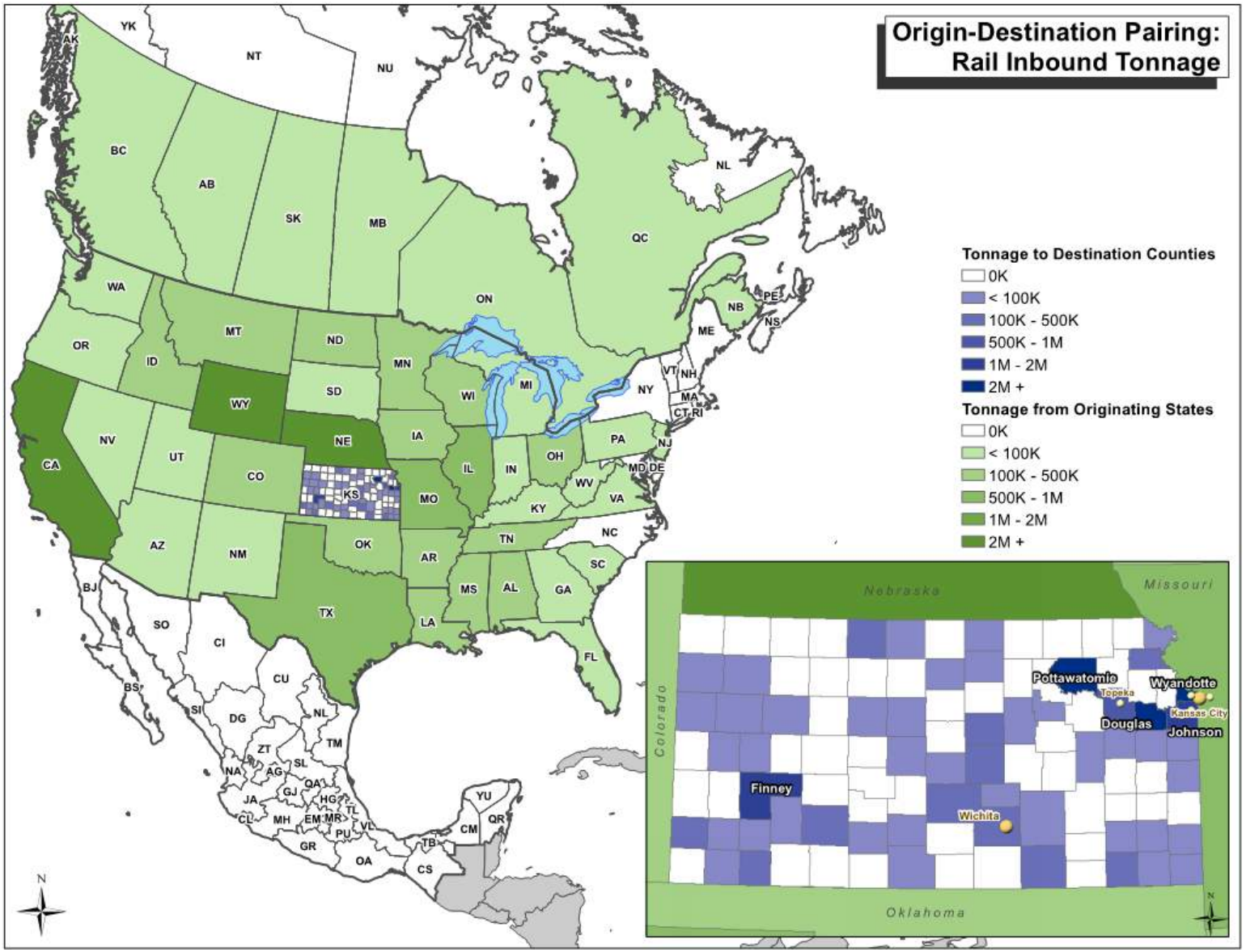
Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 25: Rail Inbound Commodities by County Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Figure 26: Rail Inbound by Origin and Destination, 2014



Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

2.2.3 Rail Intra

Table 25 in the Appendix presents intrastate rail commodities within Kansas, in 2014, which total 489,604 tons (0.1% of directional movements), via 6,106 units (0.1%), valued at $901 million (0.3%), with an average value/ton of $1,841; top five commodities include:

- *by Tonnage*:
  1. Nonmetallic Minerals (144.3 thousand tons, 29.5% of intra total);
  2. Clay, Concrete, Glass, or Stone (113.2 thousand, 23.1%);
  3. Chemicals or Allied Products (102.1 thousand, 20.8%);
  4. Food or Kindred Products (61.4 thousand, 12.5%); and,
  5. Transportation Equipment (39.9 thousand, 8.2%)

- *by Units*:
  1. Transportation Equipment (1.6 thousand units, 25.6% of intra total);
  2. Nonmetallic Minerals (1.5 thousand, 23.8%);
  3. Clay, Concrete, Glass, or Stone (1.1 thousand, 17.7%);
  4. Chemicals or Allied Products (1.0 thousand, 17.0%); and,
  5. Food or Kindred Products (0.6 thousand, 10.5%)

- *by Value*:
  1. Transportation Equipment ($455.8 million, 50.6% of intra total);
  2. Chemicals or Allied Products ($262.9 million, 29.2%);
  3. Clay, Concrete, Glass, or Stone ($75.1 million, 8.3%);
  4. Food or Kindred Products ($49.6 million, 5.5%); and,
  5. Petroleum or Coal Products ($27.9 million, 3.1%)

2.2.4 Rail Through

Table 26 in the Appendix presents the through rail commodities moving across Kansas, in 2014, which total 322.4 million tons (87.5% of directional movements), via 6.1 million carload units (88.8%), valued at $280.0 million (86.3%), with an average value/ton of $867; top five commodities include:

- *by Tonnage*:
  1. Coal (166.9 million tons, 51.8% of through total);
  2. Miscellaneous Mixed Shipments (31.1 million, 9.6%);
  3. Food or Kindred Products (25.4 million, 7.9%);
  4. Farm Products (23.1 million, 7.2%); and,
  5. Chemicals or Allied Products (22.6 million, 7.0%)

- *by Units*:
  1. Miscellaneous Mixed Shipments (2.1 million units, 34.1% of through total);
  2. Coal (1.4 million, 22.8%);
  3. Food or Kindred Products (0.4 million, 7.2%);
  4. Farm Products (0.3 million, 5.6%); and,
  5. Chemicals or Allied Products (0.3 million, 5.5%)

- *by Value*:
    1. Chemicals or Allied Products ($96.7 billion, 34.6% of through total);
    2. Transportation Equipment ($63.6 billion, 22.7%);
    3. Miscellaneous Mixed Shipments ($26.9 billion, 9.6%);
    4. Coal ($12.1 billion, 4.3%); and,
    5. Food or Kindred Products ($11.9 billion, 4.3%)

2.3 Water, 2014

According to IHS TRANSEARCH® data, Kansas water movements in 2014 totaled 390,823 tons, valued at $3 million, pertaining to just outbound Nonmetallic Minerals from Atchison and Leavenworth Counties to Missouri. On average, those movements are valued at $7/ton. Water movements represent 0.001% or modal tonnage and value in Kansas, representing the smallest relative modal movements. As TRANSEARCH® compiles freight movement data on NAFTA-related trade only, the data presented excludes any international ocean-bound freight from/to non-Canada and Mexico origins and/or destinations. A fuller freight perspective on Kansas's water freight movements is obtainable from alternative data sources[9], but would nonetheless represent a fractional percentage of total freight movements pertaining to Kansas, given the landlocked, central location within the continent.

2.4 Air, 2014

Kansas air movements in 2014 totaled 36,876 tons, valued at $5.1 billion, see Table 10. On average, total air commodity movements are valued at $136,944/ton. Air movements represent less than 0.01% of modal tonnage, but due to the very high value/ton, the total air freight value represents 0.9% of total Kansas freight value. As noted for waterborne movements, the TRANSEARCH® database only includes NAFTA-related freight movements; as such, the airborne freight data presented would exclude any non-Canada/Mexico international movements. A fuller freight perspective on Kansas's air freight movements would need to be supplemented with alternative data from another source[10].

Direction – As depicted in Figure 27, the proportional composition of air freight between outbound and inbound in closely split, with inbound tonnage constituting the majority at 50.9%, while outbound, at 53.2% is the majority for value. Outbound share of value exceeds tonnage proportion, given the higher value/ton at $152,227 for outbound relative to inbound at $124,425. Intrastate movements constitute a small remaining directional percentage and through air movements are not provided/applicable.

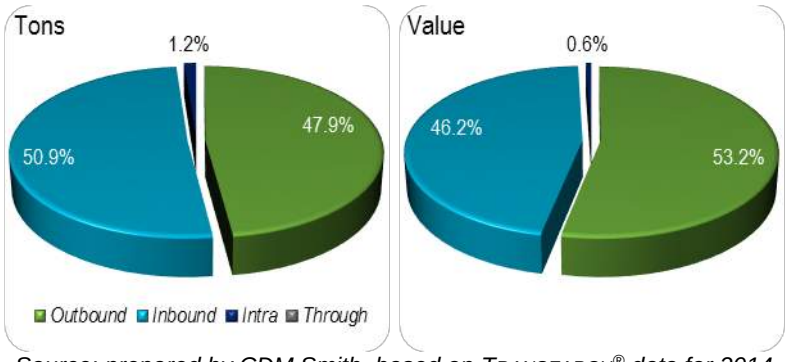
[9] the United States Army Corps of Engineers (USACE) Waterborne Commerce Statistics provides waterborne freight trade data for both domestic and foreign freight movements, and provides a more comprehensive perspective on current port-related freight movements than TRANSEARCH®
[10] the United States Census USA Trade Online database provides detailed airport-related freight movements for all international origins/destinations and provides a supplementary perspective on current air-related freight movements relative to TRANSEARCH®

Table 10: Air by Direction, 2014

Direction	Tons		Value (in millions)		Average Value/Ton
	Amount	Percent	Amount	Percent	
Outbound	17,660	47.9%	$2,688	53.2%	$152,208
Inbound	18,756	50.9%	$2,334	46.2%	$124,440
Intra	460	1.2%	$28	0.6%	$60,870
Through	#N/A	#N/A	#N/A	#N/A	#N/A
Total	36,876	100.0%	$5,050	100.0%	$136,945

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 27: Air Percentages by Direction, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

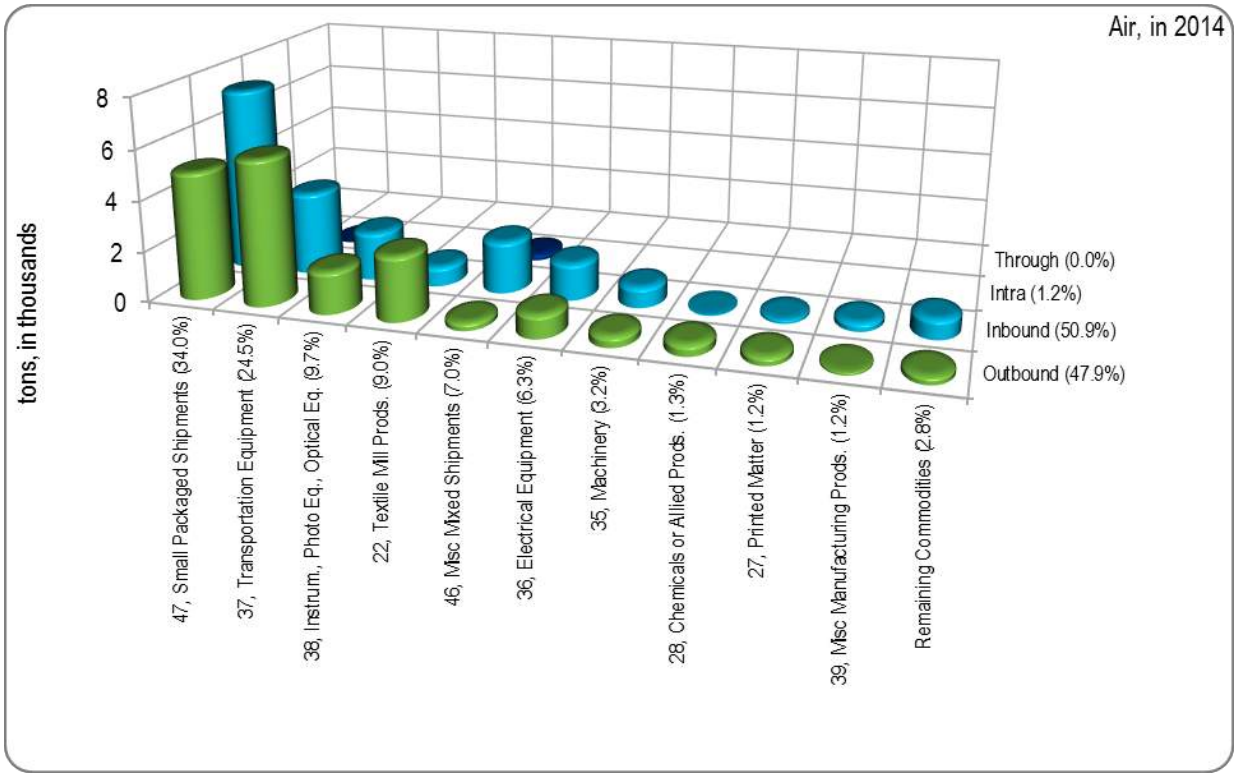
Commodities – Figure 28 and Figure 29 depict the top two-digit STCC commodities for Kansas air, by tonnage and value, respectively, with a directional composition. Such graphics depict the largest respective commodity movements for air by direction, and in conjunction with the tabulated data in Table 29 through Table 32, in the Appendix, the top air commodity movements by direction are identified in the respective subsections.

In terms of all air directions combined, the top five commodities include:

- *by Tonnage*:
  1. Small Packaged Shipments (12.5 thousand tons, 34.0% of air total);
  2. Transportation Equipment (9.0 thousand, 24.5%);
  3. Instrument, Photo, and Optical Equip. (3.6 thousand, 9.7%);
  4. Textile Mill Products (3.3 thousand, 9.0%); and,
  5. Miscellaneous Mixed Shipments (2.6 thousand, 7.0%)

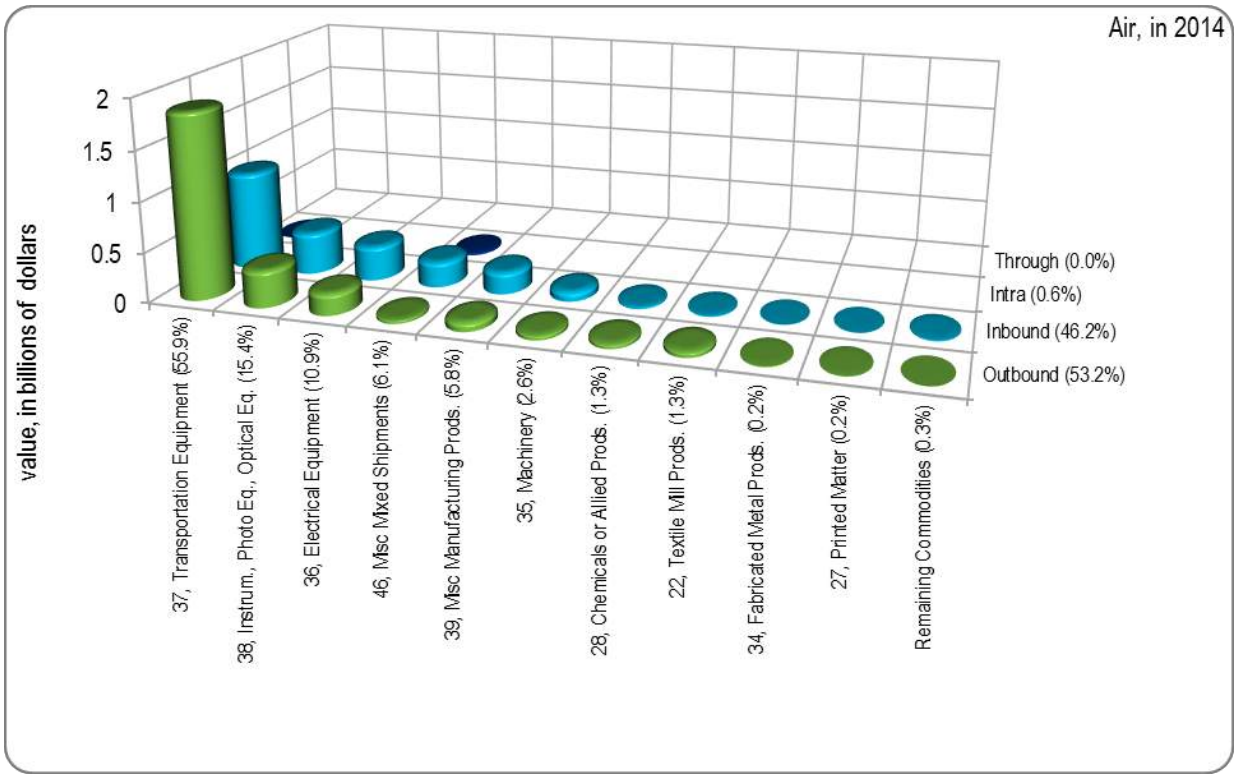
- *by Value*:
  1. Transportation Equipment ($2.8 billion, 55.9% of air total);
  2. Instrument, Photo, and Optical Equip. ($0.8 billion, 15.4%);
  3. Electrical Equipment ($0.5 billion, 10.9%);
  4. Miscellaneous Mixed Shipments ($0.3 billion, 6.1%); and,
  5. Miscellaneous Manufacturing Products ($0.3 billion, 5.8%)

Figure 28: Air Top Commodities by Tonnage, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 29: Air Top Commodities by Value, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

2.4.1 Air Outbound

Table 29 in the Appendix presents outbound air commodities from Kansas, in 2014, which total 17,660 tons (47.9% of directional movements), valued at $2.7 billion (53.2%), with an average value/ton of $152,227; top five commodities include:

- *by Tonnage*:
  1. Transportation Equipment (5.7 thousand tons, 32.5% of outbound total);
  2. Small Packaged Shipments (5.0 thousand, 28.5%);
  3. Textile Mill Products (2.5 thousand, 14.4%);
  4. Instrument, Photo, and Optical Equip. (1.7 thousand, 9.4%); and,
  5. Electrical Equipment (0.9 thousand, 5.0%)

- *by Value*:
  1. Transportation Equipment ($1.8 billion, 68.8% of outbound total);
  2. Instrument, Photo, and Optical Equip. ($0.4 billion, 13.4%);
  3. Electrical Equipment ($0.2 billion, 7.8%);
  4. Miscellaneous Manufacturing Products ($0.1 billion, 3.1%); and,
  5. Textile Mill Products ($0.0 billion, 1.8%)

2.4.2 Air Inbound

Table 30 in the Appendix presents inbound air commodities to Kansas, in 2014, which total 18,756 tons (50.9% of directional movements), valued at $2.3 billion (46.2%), with an average value/ton of $124,425; top five commodities include:

- *by Tonnage*:
  1. Small Packaged Shipments (7.3 thousand tons, 38.8% of inbound total);
  2. Transportation Equipment (3.3 thousand, 17.4%);
  3. Miscellaneous Mixed Shipments (2.0 thousand, 10.9%);
  4. Instrument, Photo, and Optical Equip. (1.9 thousand, 10.1%); and,
  5. Electrical Equipment (1.4 thousand, 7.7%)

- *by Value*:
  1. Transportation Equipment ($1.0 billion, 41.8% of inbound total);
  2. Instrument, Photo, and Optical Equip. ($0.4 billion, 17.8%);
  3. Electrical Equipment ($0.3 billion, 14.6%);
  4. Miscellaneous Mixed Shipments ($0.2 billion, 10.6%); and,
  5. Miscellaneous Manufacturing Products ($0.2 billion, 9.1%)

2.4.3 Air Intra

Table 31 in the Appendix presents intrastate air commodities to Kansas, in 2014, which total 460 tons (1.2% of directional movements), valued at $28 million (0.6%), with an average value/ton of $60,730. Miscellaneous Mixed Shipments and Small Packaged Shipments are the only two relevant commodities.

2.5 Pipeline, 2014

Kansas pipeline movements in 2014 totaled 102.2 thousand tons, valued at $42 million, see Table 11. On average, total pipeline commodity movements are valued at $410/ton. Pipeline movements represent less than 0.02% or modal tonnage in Kansas and 0.01% of total modal value in 2014, according the IHS TRANSEARCH® database.

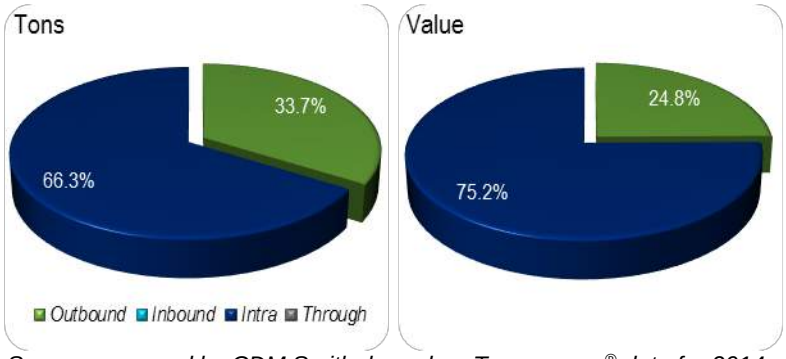
As depicted in Figure 30, only outbound and intrastate directions exist for pipeline in Kansas, with intrastate constituting about twice the volume as outbound and three times the value.

Table 11: Pipeline by Direction, 2014

Direction	Tons		Value (in millions)		Average Value/Ton
	Amount	Percent	Amount	Percent	
Outbound	34,450	33.7%	$10	24.8%	$290
Inbound	#N/A	#N/A	#N/A	#N/A	#N/A
Intra	67,720	66.3%	$31	75.2%	$458
Through	#N/A	#N/A	#N/A	#N/A	#N/A
Total	102,170	100.0%	$41	100.0%	$411

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Figure 30: Pipeline Percentages by Direction, 2014



Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

As Kansas pipeline movements comprise just one STCC2 commodity (STCC 13: Crude Petroleum and Natural Gas) and two directions (outbound and intrastate), graphical depictions of the top two-digit STCC commodities are unwarranted, as are the aggregated directional top commodity outline and detailed Appendix tables.

3 Forecast Freight

Given the available IHS TRANSEARCH® database to KSDOT is a truncated version relative to the standard product 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, the commodity compositions are different. As such, direct comparison between the sources is not attempted herein and should be cautioned. FHWA FAF forecast data is presented, with focus on the relative growth projected via that data source. As through traffic is excluded from the FHWA FAF, the directional subtotals presented account for the combination of outbound, inbound, and intrastate movements for Kansas; however, total national freight forecasts were obtained to serve as a crude proxy for through traffic growth.

Tonnage across the Kansas freight network is forecast, by FHWA FAF, to grow 30.5% from 2014 to 2040 (1.0% annually), as summarized in Table 12. While waterborne and airborne freight are forecast to exhibit the fastest growth rates of the modes (3.8% and 3.5% annually, respectively), growth is from a relatively small tonnage base in 2014, and has little bearing on the absolute tonnage growth projected on the entire network. In contrast, truck growth is forecast to grow by 33.9% (1.1% annually), and rail at 11.6% (0.4% annually). Directionally, the growth projections are all similar, with a slightly greater growth in inbound relative to outbound and intrastate freight projections.

Table 12: Tonnage Forecast by Mode and Direction, 2014 to 2040

Direction	Truck	Rail	Water	Air	Pipe	Total
2014						
Outbound	52,413,268	36,428,929	1,777,261	38,992	41,314,883	131,973,333
Inbound	53,644,432	20,335,728	743,745	43,707	49,103,829	123,871,441
Intra	153,396,620	1,316,832	30,688	863	12,268,499	167,013,502
Through	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total	259,454,320	58,081,489	2,551,694	83,562	102,687,211	422,858,276
2040						
Outbound	67,617,587	46,194,027	4,757,540	94,768	54,395,573	173,059,495
Inbound	79,015,374	16,801,526	2,018,627	105,715	68,492,172	166,433,414
Intra	200,685,836	1,832,397	20,290	2,383	9,651,094	212,192,000
Through	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total	347,318,797	64,827,950	6,796,457	202,866	132,538,839	551,684,909
Annual % Growth						
Outbound	1.0%	0.9%	3.9%	3.5%	1.1%	1.0%
Inbound	1.5%	-0.7%	3.9%	3.5%	1.3%	1.1%
Intra	1.0%	1.3%	-1.6%	4.0%	-0.9%	0.9%
Through *	1.2%	0.5%	1.1%	4.2%	1.3%	1.1%
Total	1.1%	0.4%	3.8%	3.5%	1.0%	1.0%
Total % Growth						
Outbound	29.0%	26.8%	167.7%	143.0%	31.7%	31.1%
Inbound	47.3%	-17.4%	171.4%	141.9%	39.5%	34.4%
Intra	30.8%	39.2%	-33.9%	176.2%	-21.3%	27.1%
Through *	36.6%	13.8%	32.1%	192.6%	38.7%	34.5%
Total	33.9%	11.6%	166.4%	142.8%	29.1%	30.5%
Growth in Tons						
Outbound	15,204,319	9,765,098	2,980,279	55,776	13,080,690	41,086,162
Inbound	25,370,942	-3,534,202	1,274,882	62,008	19,388,343	42,561,973
Intra	47,289,216	515,565	-10,398	1,520	-2,617,405	45,178,498
Through	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Total	87,864,477	6,746,461	4,244,763	119,304	29,851,628	128,826,633

* through growth reflects national totals as proxy

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

3.1 Truck Forecast

Table 13 depicts outbound, inbound, and intrastate truck estimates for Kansas in 2014 and 2040 from the FHWA FAF. Truck tonnage is forecast to increase 33.9% (1.1% annually) over that future horizon, and value is forecast to increase 46.5% (1.5% annually). Inbound traffic is projected to increase more quickly than outbound or intrastate truck movements.

Table 13: 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 *	#N/A	#N/A	#N/A	#N/A	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 *	#N/A	#N/A	#N/A	#N/A	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

Table 33 in the Appendix summarizes truck-based commodity tonnage growth from 2014 to 2040; top five commodities include:

- *by Tonnage in 2040*:
  1. Cereal Grains (81.6 million tons, 23.5% of truck total);
  2. Nonmetal Mineral Products (30.9 million, 8.9%);
  3. Animal Feed (22.5 million, 6.5%);
  4. Mixed Freight (20.2 million, 5.8%); and,
  5. Fuel Oils (18.5 million, 5.3%)

- *by Tonnage Percent Growth*:
  1. Electronics (139.4%, 3.4% CAGR);
  2. Precision Instruments (128.7%, 3.2% CAGR);
  3. Waste/Scrap (98.7%, 2.7% CAGR);
  4. Machinery (97.9%, 2.7% CAGR); and,
  5. Building Stone (97.7%, 2.7% CAGR)

- *by Tonnage Volume Growth*:
  1. Cereal Grains (11.9 million tons, 0.6% CAGR);
  2. Nonmetal Mineral Products (11.2 million, 1.7% CAGR);
  3. Animal Feed (8.0 million, 1.7% CAGR);
  4. Natural Sands (6.5 million, 1.9% CAGR); and,
  5. Mixed Freight (4.8 million, 1.1% CAGR)

3.2 Rail Forecast

Table 14 depicts outbound, inbound, and intrastate rail estimates for Kansas in 2014 and 2040 from the FHWA FAF. Rail tonnage is forecast to increase 11.6% (0.4% annually) over that future horizon, and value is forecast to increase 40.0% (1.3% annually). As through rail traffic is a large current movement (see Section 2.2.4), a forecast of such movement would be ideal from FHWA FAF. In the absence of through movement data from the FAF, the national total for rail was obtained, which estimates 13.8% tonnage growth (0.5% annually) over that timeframe.

However, as most of Kansas through rail is coal, it is worth noting that the national total rail forecasts for Coal, from 2014 to 2040, declines 38.2% (1.8% annually).

Table 14: 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 *	#N/A	#N/A	#N/A	#N/A	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 *	#N/A	#N/A	#N/A	#N/A	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

Table 34 in the Appendix summarizes rail-based commodity tonnage growth from 2014 to 2040; top five commodities include:

- *by Tonnage in 2040*:
  1. Cereal Grains (44.0 million tons, 67.9% of rail total);
  2. Coal (6.3 million, 9.7%);
  3. Other Foodstuffs (2.4 million, 3.7%);
  4. Fertilizers (2.3 million, 3.6%); and,
  5. Basic Chemicals (1.8 million, 2.7%)

- *by Tonnage Percent Growth*:
  1. Furniture (435.5%, 6.7% CAGR);
  2. Electronics (269.8%, 5.2% CAGR);
  3. Textiles/Leather (186.3%, 4.1% CAGR);
  4. Machinery (136.9%, 3.4% CAGR); and,
  5. Other Ag Prods. (127.2%, 3.2% CAGR)

- *by Tonnage Volume Growth*:
  1. Cereal Grains (9.3 million tons, 0.9% CAGR);
  2. Other Foodstuffs (1.0 million, 2.1% CAGR);
  3. Fertilizers (0.8 million, 1.5% CAGR);
  4. Basic Chemicals (0.7 million, 1.8% CAGR); and,
  5. Milled Grain Prods. (0.4 million, 1.9% CAGR)

3.3 Water Forecast

Table 15 depicts outbound, inbound, and intrastate water estimates for Kansas in 2014 and 2040 from the FHWA FAF. Water tonnage is forecast to increase 166.4% (3.8% annually) over that future horizon, and value is forecast to increase 225.9% (4.6% annually). Kansas-related

waterborne movements are forecasted to grow two-to-three times as quickly as the national total in waterborne movements (as per the through traffic proxy).

Table 15: 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 *	#N/A	#N/A	#N/A	#N/A	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 *	#N/A	#N/A	#N/A	#N/A	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

Table 35 in the Appendix summarizes water-based commodity tonnage growth from 2014 to 2040; top five commodities include:

- *by Tonnage in 2040*:
  1. Cereal Grains (3.8 million tons, 55.3% of water total);
  2. Other Ag Prods. (0.5 million, 8.0%);
  3. Electronics (0.3 million, 4.8%);
  4. Machinery (0.3 million, 4.0%); and,
  5. Milled Grain Prods. (0.3 million, 3.7%)

- *by Tonnage Percent Growth*:
  1. Metallic Ores (539.4%, 7.4% CAGR);
  2. Furniture (453.9%, 6.8% CAGR);
  3. Building Stone (446.2%, 6.7% CAGR);
  4. Precision Instruments (398.8%, 6.4% CAGR); and,
  5. Alcoholic Beverages (397.7%, 6.4% CAGR)

- *by Tonnage Volume Growth*:
  1. Cereal Grains (2.4 million tons, 4.0% CAGR);
  2. Other Ag Prods. (0.4 million, 5.2% CAGR);
  3. Electronics (0.2 million, 5.4% CAGR);
  4. Machinery (0.2 million, 4.9% CAGR); and,
  5. Milled Grain Prods. (0.2 million, 3.7% CAGR)

3.4 Air Forecast

Table 16 depicts outbound, inbound, and intrastate air estimates for Kansas in 2014 and 2040 from the FHWA FAF. Air tonnage is forecast to increase 142.8% (3.5% annually) over that future horizon, and value is forecast to increase 183.2% (4.1% annually). Inbound traffic is projected to increase more quickly than outbound or intrastate air movements. Kansas-related

airborne movements are forecasted to grow slightly more slowly than the national total in airborne movements (as per the through traffic proxy).

Table 16: 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 *	#N/A	#N/A	#N/A	#N/A	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 *	#N/A	#N/A	#N/A	#N/A	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

Table 36 in the Appendix summarizes air-based commodity tonnage growth from 2014 to 2040; top five commodities include:

- *by Tonnage in 2040*:
  1. Electronics (51.0 thousand tons, 25.1% of air total);
  2. Machinery (27.2 thousand, 13.4%);
  3. Transport Equip. (22.8 thousand, 11.3%);
  4. Precision Instruments (20.6 thousand, 10.2%); and,
  5. Textiles/Leather (19.4 thousand, 9.6%)

- *by Tonnage Percent Growth*:
  1. Furniture (452.3%, 6.8% CAGR);
  2. Alcoholic Beverages (340.0%, 5.9% CAGR);
  3. Chemical Prods. (263.0%, 5.1% CAGR);
  4. Electronics (230.3%, 4.7% CAGR); and,
  5. Precision Instruments (198.8%, 4.3% CAGR)

- *by Tonnage Volume Growth*:
  1. Electronics (35.5 thousand tons, 4.7% CAGR);
  2. Machinery (17.9 thousand, 4.2% CAGR);
  3. Precision Instruments (13.7 thousand, 4.3% CAGR);
  4. Transport Equip. (12.5 thousand, 3.1% CAGR); and,
  5. Textiles/Leather (10.7 thousand, 3.1% CAGR)

3.5 Pipeline Forecast

Table 17 depicts outbound, inbound, and intrastate pipe estimates for Kansas in 2014 and 2040 from the FHWA FAF. Pipe tonnage is forecast to increase 29.1% (1.0% annually) over that future horizon, and value is forecast to increase 22.6% (0.8% annually). Of the modal movements reported by FAF, pipeline is forecast to grow most slowly over the horizon.

Table 17: 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 *	#N/A	#N/A	#N/A	#N/A	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 *	#N/A	#N/A	#N/A	#N/A	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

Table 37 in the Appendix summarizes pipe-based commodity tonnage growth from 2014 to 2040; the only four commodities include:

- *by Tonnage in 2040*:
  1. Coal-N.E.C. (111.8 million tons, 84.3% of pipe total);
  2. Crude Petroleum (18.3 million, 13.8%);
  3. Gasoline (2.1 million, 1.6%); and,
  4. Basic Chemicals (0.4 million, 0.3%)

- *by Tonnage Percent Growth*:
  1. Coal-N.E.C. (34.6%, 1.2% CAGR);
  2. Basic Chemicals (33.6%, 1.1% CAGR);
  3. Gasoline (8.6%, 0.3% CAGR); and,
  4. Crude Petroleum (4.7%, 0.2% CAGR)

- *by Tonnage Volume Growth*:
  1. Coal-N.E.C. (28.8 million tons, 1.2% CAGR);
  2. Crude Petroleum (0.8 million, 0.2% CAGR);
  3. Gasoline (0.2 million, 0.3% CAGR); and,
  4. Basic Chemicals (0.1 million, 1.1% CAGR)

4 Summary

Kansas freight movements comprise a range of commodities moving in different directions (outbound, inbound, intrastate, and through) by various modes (truck, rail, ports, air, and pipeline), measured in different terms (tons, units, and value), and with varying geographic origins and destinations. These various directional movements, modes, terms, and geographies complicate simple summarization. Nonetheless, the following summary highlights major movements in 2014 from the IHS TRANSEARCH® and STB WAYBILL databases, with forecasts from the FHWA FAF.

Total Movements – A combined total 569.8 million tons of freight moved across the transportation network in Kansas in 2014, valued at over $550.4 billion, for an average value per ton of $966.

Modal Summary – Rail and truck modes carry a significant majority of the freight tonnages and values across Kansas's transportation infrastructure, with 99.9% of total tonnage and 99.1% of total value attributable to those two combined modes.

- *Rail* – 368.4 million tons in 6.9 million carload units, valued at $324.1 billion, for an average value per ton of $880. A significant majority of rail tonnage is through, by both tonnage and value – more than half of which, by volume, is comprised of coal. Rail tonnage represents 64.7% of all modal tonnage, and value represents 58.9%.

- *Truck* – 200.9 million tons in 17.6 million units, valued at $221.3 billion, for an average value per ton of $1,101. Directionally, the truck movements are fairly evenly split along the four directions. Truck volumes represent 35.3% of all modal tonnage, with value representing 40.2%.

- *Air* – 36,876 tons valued at $5.1 billion, for an average value per ton of $136,944 – smallest total volumes by mode; but, due to the relatively high values per ton, the total value is the third largest of the modes, although still less than 1.0% of all freight value.

- *Water* – 390,823 tons valued at just $3 million, for an average value per ton of $7 is represented by outbound movements of Nonmetallic Minerals to Missouri.

- *Pipeline* – 102,169 tons of energy-related commodities, valued at $42 million, for an average value per ton of $410 - all of the movements are Crude Petroleum or Natural Gas as either intrastate or outbound movements.

Directional Summary – Commodity movement, and composite terms, vary by direction.

- *Through* – Constitutes almost two-thirds of all directional movements in terms of both tonnage and value (almost entirely rail related). In terms of tonnage, the 364.3 million tons constitutes 63.9% of all directional movements, and in terms of value, the $345.5 billion of through traffic represents 62.8% of total directional value. As through traffic amounts to almost twice as much as the other three directions (inbound, outbound, and

intrastate) combined, the non-Kansas related movements disproportionately uses the Kansas transportation infrastructure. A large portion of the through movement in Coal.

- *Outbound* – About one-seventh of all freight movements for Kansas pertain to outbound movements, with 77.0 million tons, valued at $80.7 billion representing 13.5% and 14.7% of directional movements, respectively. A majority (71.0%) of all outbound tonnage is via truck, the remaining mostly via rail.

- *Inbound* – With similar directional proportions as outbound, inbound movements amount to 70.4 million tons, at 12.3% of all directional tonnage, and $68.0 billion for 12.4% of directional value. As with outbound movements, a majority of the inbound freight is carried via trucks (66.5%) with the remaining inbound coming to Kansas via rail.

- *Intrastate* – Intrastate represents the smallest relative percentage in terms of both tonnages and value, with 58.1 million tons representing 10.2% and $56.2 billion equating to 10.2% of the directional movements.

Notable Commodity Movements – Commodity movements are compared and contrasted.

- *Coal (STCC 11)* – The largest tonnage STCC commodity for all modes and directions, at 181.0 million tons (31.8% of all freight); however, given the relatively low value per ton ($88), the total value of all the such Coal-related movements only totals $15.8 billion, just 2.9% of all freight value. 166.9 million tons are through traffic (92.2%), with the remaining 14.0 million tons as inbound, mostly to the power plant in Pottawatomie County. Most of the through Coal is from Wyoming to Texas (40.1 million), Missouri (29.5 million), Illinois (22.8 million), and various other southern and eastern states (74.5 million)

- *Farm Products (STCC 01)* – The second largest tonnage STCC commodity for all modes and directions, at 81.2 million tons (14.3% of all freight). However, with a relatively small value per ton of $408, the commodity movement is worth $33.2 billion, representing 6.0% of total freight values, the fifth largest valued movement. Most of the Farm Products are moved via truck, with the remaining via rail – with outbound and through directional movements for the commodities amounting to 68.9%.

- *Nonmetallic Minerals (STCC 14)* – Third largest volumes, at 64.2 million tons (11.3% of all freight), but representing just 0.5% of all freight value due to the low value per ton of $46. Intrastate truck movements and through rail are the largest directional-mode movements for Nonmetallic Minerals, at 21.2 million and 17.2 million tons, respectively.

- *Food or Kindred Products (STCC 20)* – The fourth largest tonnage and value commodity movement, with 50.1 million tons, worth $44.4 billion, representing 8.8% and 8.1% of total freight tonnage and value, respectively – more than half of which is through rail.

- *Chemicals of Allied Products (STCC 28)* – The major commodity movement by value, with $128.2 billion dollars, representing 23.3% of all freight value movements. As the commodity has relatively high value per ton, at $3,164, the tonnage contribution to total

movements is a much smaller proportion, with 40.5 million tons representing 7.1% of all freight tonnages. As with many of the other commodities noted, a large portion of this commodity movement pertains to through rail traffic.

Forecasts – In the absence of TRANSEARCH® forecasts, data from the FHWA FAF were culled to estimate general growth expectations by mode and direction (as available). According to the FHWA FAF, the Kansas-relevant combined inbound, intrastate, and outbound freight is projected to increase 30.5% (1.0% annually) from 2014 to 2040. Waterborne and airborne freight movements are forecasted to appreciate most quickly of the modes, at 3.8% and 3.5% annually, respectively. Rail, by contrast is projected to appreciate in volumes by 0.4% annually.

Conclusion – Clearly, from a freight traffic perspective, Kansas is a longer-haul bridge state. The IHS TRANSEARCH® STB WAYBILL and data confirms this assertion with evidence indicating that the significant proportion of freight traversing the transportation network of Kansas is rail-based through traffic (mostly coal). It is thus important to understand the implications of these movements on the freight infrastructure network in Kansas, as a high proportion of the users of the system are accordingly non-Kansas based.

5 Appendix

Table 18: Truck Outbound, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average
		Amount	Percent	Amount	Percent	Amount	Percent	Value/Ton
01	Farm Products	16,186,340	29.6%	1,000,711	21.3%	$6,554	11.8%	$405
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	3,701	0.0%	149	0.0%	$0	0.0%	$35
13	Crude Petroleum or Natural Gas	6,515	0.0%	288	0.0%	$3	0.0%	$487
14	Nonmetallic Minerals	7,560,126	13.8%	310,984	6.6%	$95	0.2%	$13
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	7,903,895	14.5%	345,042	7.3%	$10,404	18.8%	$1,316
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	1,216	0.0%	57	0.0%	$7	0.0%	$5,400
23	Apparel or Related Products	158	0.0%	10	0.0%	$1	0.0%	$8,965
24	Lumber or Wood Products	228,105	0.4%	8,770	0.2%	$194	0.3%	$848
25	Furniture or Fixtures	378	0.0%	25	0.0%	$4	0.0%	$10,908
26	Pulp, Paper, or Allied Products	227,357	0.4%	9,388	0.2%	$317	0.6%	$1,396
27	Printed Matter	269,079	0.5%	15,108	0.3%	$586	1.1%	$2,178
28	Chemicals or Allied Products	5,254,257	9.6%	259,081	5.5%	$9,669	17.5%	$1,840
29	Petroleum or Coal Products	4,310,060	7.9%	178,727	3.8%	$3,075	5.6%	$713
30	Rubber or Miscellaneous Plastics	543,871	1.0%	46,007	1.0%	$2,270	4.1%	$4,174
31	Leather or Leather Products	40	0.0%	3	0.0%	$0	0.0%	$4,163
32	Clay, Concrete, Glass, or Stone	3,455,719	6.3%	217,565	4.6%	$507	0.9%	$147
33	Primary Metal Products	226,312	0.4%	9,131	0.2%	$648	1.2%	$2,865
34	Fabricated Metal Products	586,971	1.1%	32,800	0.7%	$1,782	3.2%	$3,037
35	Machinery	224,209	0.4%	16,869	0.4%	$2,134	3.9%	$9,518
36	Electrical Equipment	125,754	0.2%	7,546	0.2%	$1,045	1.9%	$8,313
37	Transportation Equipment	368,896	0.7%	26,393	0.6%	$3,187	5.8%	$8,640
38	Instrument, Photo, and Optical Equip.	14,297	0.0%	1,138	0.0%	$96	0.2%	$6,740
39	Miscellaneous Manufacturing Products	45,454	0.1%	2,362	0.1%	$186	0.3%	$4,098
40	Waste or Scrap Materials	2,121,190	3.9%	84,326	1.8%	$507	0.9%	$239
41	Miscellaneous Freight Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42	Shipping Containers	#N/A	#N/A	1,857,573	39.5%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
47	Small Packaged Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	4,996,924	9.1%	278,028	5.9%	$12,123	21.9%	$2,426
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	54,660,822	100.0%	4,708,080	100.0%	$55,397	100.0%	$1,013

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 19: Truck Inbound, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	12,982,397	27.7%	815,885	18.4%	$7,142	16.0%	$550
08	Forest Products	5	0.0%	0	0.0%	$0	0.0%	$2,860
09	Fresh Fish or Marine Products	2,284	0.0%	98	0.0%	$3	0.0%	$1,371
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	71,871	0.2%	2,897	0.1%	$3	0.0%	$35
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	13,310,400	28.4%	547,520	12.4%	$194	0.4%	$15
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	3,469,115	7.4%	151,054	3.4%	$5,164	11.6%	$1,489
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	4,036	0.0%	190	0.0%	$27	0.1%	$6,739
23	Apparel or Related Products	43	0.0%	3	0.0%	$0	0.0%	$8,407
24	Lumber or Wood Products	787,643	1.7%	30,889	0.7%	$358	0.8%	$454
25	Furniture or Fixtures	15,427	0.0%	1,032	0.0%	$76	0.2%	$4,919
26	Pulp, Paper, or Allied Products	419,113	0.9%	17,386	0.4%	$737	1.6%	$1,758
27	Printed Matter	120,765	0.3%	6,787	0.2%	$265	0.6%	$2,196
28	Chemicals or Allied Products	1,491,655	3.2%	72,534	1.6%	$2,468	5.5%	$1,654
29	Petroleum or Coal Products	3,895,766	8.3%	162,158	3.7%	$2,640	5.9%	$678
30	Rubber or Miscellaneous Plastics	494,709	1.1%	41,793	0.9%	$1,955	4.4%	$3,951
31	Leather or Leather Products	226	0.0%	15	0.0%	$3	0.0%	$12,491
32	Clay, Concrete, Glass, or Stone	2,192,618	4.7%	137,878	3.1%	$342	0.8%	$156
33	Primary Metal Products	845,901	1.8%	33,843	0.8%	$1,489	3.3%	$1,761
34	Fabricated Metal Products	456,175	1.0%	25,480	0.6%	$1,509	3.4%	$3,307
35	Machinery	137,785	0.3%	10,263	0.2%	$1,149	2.6%	$8,340
36	Electrical Equipment	222,844	0.5%	13,429	0.3%	$2,749	6.1%	$12,335
37	Transportation Equipment	375,094	0.8%	26,917	0.6%	$3,220	7.2%	$8,584
38	Instrument, Photo, and Optical Equip.	23,550	0.1%	1,873	0.0%	$145	0.3%	$6,145
39	Miscellaneous Manufacturing Products	34,562	0.1%	1,797	0.0%	$142	0.3%	$4,102
40	Waste or Scrap Materials	1,256,253	2.7%	48,466	1.1%	$278	0.6%	$221
41	Miscellaneous Freight Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42	Shipping Containers	#N/A	#N/A	2,045,154	46.2%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	16,648	0.0%	810	0.0%	$138	0.3%	$8,274
47	Small Packaged Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	4,181,813	8.9%	229,606	5.2%	$12,504	28.0%	$2,990
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	46,808,700	100.0%	4,425,758	100.0%	$44,698	100.0%	$955

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 20: Truck Intra, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	11,658,650	20.3%	721,155	11.5%	$4,681	8.5%	$401
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	21,243,018	36.9%	873,827	13.9%	$194	0.4%	$9
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	1,014,647	1.8%	44,262	0.7%	$1,439	2.6%	$1,418
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
23	Apparel or Related Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24	Lumber or Wood Products	68,594	0.1%	2,666	0.0%	$43	0.1%	$622
25	Furniture or Fixtures	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
26	Pulp, Paper, or Allied Products	40,071	0.1%	1,655	0.0%	$56	0.1%	$1,390
27	Printed Matter	28,508	0.0%	1,599	0.0%	$62	0.1%	$2,188
28	Chemicals or Allied Products	800,535	1.4%	39,556	0.6%	$1,308	2.4%	$1,634
29	Petroleum or Coal Products	7,399,810	12.9%	304,241	4.8%	$7,262	13.1%	$981
30	Rubber or Miscellaneous Plastics	42,958	0.1%	3,633	0.1%	$172	0.3%	$4,011
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	4,297,667	7.5%	274,074	4.4%	$408	0.7%	$95
33	Primary Metal Products	56,975	0.1%	2,284	0.0%	$108	0.2%	$1,889
34	Fabricated Metal Products	158,927	0.3%	8,857	0.1%	$482	0.9%	$3,032
35	Machinery	10,619	0.0%	798	0.0%	$75	0.1%	$7,030
36	Electrical Equipment	27,705	0.0%	1,667	0.0%	$215	0.4%	$7,758
37	Transportation Equipment	114,280	0.2%	8,138	0.1%	$1,055	1.9%	$9,229
38	Instrument, Photo, and Optical Equip.	1,289	0.0%	103	0.0%	$8	0.0%	$6,010
39	Miscellaneous Manufacturing Products	14,451	0.0%	751	0.0%	$56	0.1%	$3,907
40	Waste or Scrap Materials	505,902	0.9%	20,273	0.3%	$112	0.2%	$222
41	Miscellaneous Freight Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42	Shipping Containers	#N/A	#N/A	3,383,088	53.8%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
47	Small Packaged Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	10,085,246	17.5%	595,567	9.5%	$37,523	67.9%	$3,721
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	57,569,853	100.0%	6,288,194	100.0%	$55,258	100.0%	$960

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 21: Truck Through, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	6,189,902	14.8%	342,634	15.9%	$3,849	5.8%	$622
08	Forest Products	4,419	0.0%	190	0.0%	$31	0.0%	$7,021
09	Fresh Fish or Marine Products	237	0.0%	10	0.0%	$2	0.0%	$8,594
10	Metallic Ores	597	0.0%	24	0.0%	$1	0.0%	$1,404
11	Coal	165	0.0%	7	0.0%	$0	0.0%	$1,958
13	Crude Petroleum or Natural Gas	35,011	0.1%	1,437	0.1%	$14	0.0%	$411
14	Nonmetallic Minerals	3,396,992	8.1%	139,734	6.5%	$148	0.2%	$44
19	Ordnance or Accessories	2,981	0.0%	133	0.0%	$14	0.0%	$4,681
20	Food or Kindred Products	8,694,406	20.8%	378,748	17.6%	$12,371	18.8%	$1,423
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	7,029	0.0%	329	0.0%	$22	0.0%	$3,078
23	Apparel or Related Products	2,874	0.0%	173	0.0%	$31	0.0%	$10,792
24	Lumber or Wood Products	1,217,790	2.9%	47,524	2.2%	$769	1.2%	$632
25	Furniture or Fixtures	66,358	0.2%	4,437	0.2%	$371	0.6%	$5,595
26	Pulp, Paper, or Allied Products	665,618	1.6%	27,606	1.3%	$1,061	1.6%	$1,595
27	Printed Matter	232,201	0.6%	13,048	0.6%	$508	0.8%	$2,186
28	Chemicals or Allied Products	5,781,499	13.8%	284,562	13.2%	$9,866	15.0%	$1,706
29	Petroleum or Coal Products	4,060,693	9.7%	171,100	7.9%	$1,647	2.5%	$406
30	Rubber or Miscellaneous Plastics	778,375	1.9%	65,821	3.1%	$3,175	4.8%	$4,079
31	Leather or Leather Products	794	0.0%	53	0.0%	$11	0.0%	$13,804
32	Clay, Concrete, Glass, or Stone	1,567,339	3.7%	95,903	4.4%	$400	0.6%	$255
33	Primary Metal Products	1,843,312	4.4%	73,871	3.4%	$3,459	5.2%	$1,876
34	Fabricated Metal Products	599,074	1.4%	33,432	1.6%	$3,110	4.7%	$5,192
35	Machinery	763,409	1.8%	56,948	2.6%	$8,702	13.2%	$11,399
36	Electrical Equipment	450,555	1.1%	27,084	1.3%	$5,989	9.1%	$13,292
37	Transportation Equipment	657,700	1.6%	47,495	2.2%	$4,523	6.9%	$6,878
38	Instrument, Photo, and Optical Equip.	50,479	0.1%	4,027	0.2%	$746	1.1%	$14,784
39	Miscellaneous Manufacturing Products	63,686	0.2%	3,307	0.2%	$275	0.4%	$4,311
40	Waste or Scrap Materials	1,439,574	3.4%	55,282	2.6%	$351	0.5%	$244
41	Miscellaneous Freight Shipments	327	0.0%	16	0.0%	$4	0.0%	$12,917
42	Shipping Containers	#N/A	#N/A	122,205	5.7%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	46,547	0.1%	2,264	0.1%	$447	0.7%	$9,613
47	Small Packaged Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	3,231,527	7.7%	157,189	7.3%	$4,007	6.1%	$1,240
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	41,851,471	100.0%	2,156,594	100.0%	$65,905	100.0%	$1,575

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 22: Truck Total, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	47,017,289	23.4%	2,880,385	16.4%	$22,226	10.0%	$473
08	Forest Products	4,424	0.0%	190	0.0%	$31	0.0%	$7,017
09	Fresh Fish or Marine Products	2,520	0.0%	109	0.0%	$5	0.0%	$2,050
10	Metallic Ores	597	0.0%	24	0.0%	$1	0.0%	$1,404
11	Coal	75,737	0.0%	3,053	0.0%	$3	0.0%	$39
13	Crude Petroleum or Natural Gas	41,527	0.0%	1,725	0.0%	$18	0.0%	$423
14	Nonmetallic Minerals	45,510,536	22.7%	1,872,065	10.6%	$631	0.3%	$14
19	Ordnance or Accessories	2,981	0.0%	133	0.0%	$14	0.0%	$4,681
20	Food or Kindred Products	21,082,064	10.5%	919,106	5.2%	$29,377	13.3%	$1,393
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	12,281	0.0%	576	0.0%	$55	0.0%	$4,511
23	Apparel or Related Products	3,074	0.0%	185	0.0%	$33	0.0%	$10,665
24	Lumber or Wood Products	2,302,132	1.1%	89,849	0.5%	$1,363	0.6%	$592
25	Furniture or Fixtures	82,163	0.0%	5,494	0.0%	$451	0.2%	$5,492
26	Pulp, Paper, or Allied Products	1,352,158	0.7%	56,035	0.3%	$2,171	1.0%	$1,606
27	Printed Matter	650,553	0.3%	36,542	0.2%	$1,421	0.6%	$2,185
28	Chemicals or Allied Products	13,327,946	6.6%	655,732	3.7%	$23,311	10.5%	$1,749
29	Petroleum or Coal Products	19,666,330	9.8%	816,226	4.6%	$14,625	6.6%	$744
30	Rubber or Miscellaneous Plastics	1,859,913	0.9%	157,255	0.9%	$7,572	3.4%	$4,071
31	Leather or Leather Products	1,059	0.0%	71	0.0%	$14	0.0%	$13,163
32	Clay, Concrete, Glass, or Stone	11,513,344	5.7%	725,420	4.1%	$1,657	0.7%	$144
33	Primary Metal Products	2,972,500	1.5%	119,129	0.7%	$5,704	2.6%	$1,919
34	Fabricated Metal Products	1,801,146	0.9%	100,569	0.6%	$6,883	3.1%	$3,821
35	Machinery	1,136,022	0.6%	84,879	0.5%	$12,060	5.5%	$10,616
36	Electrical Equipment	826,858	0.4%	49,727	0.3%	$9,998	4.5%	$12,092
37	Transportation Equipment	1,515,971	0.8%	108,943	0.6%	$11,985	5.4%	$7,906
38	Instrument, Photo, and Optical Equip.	89,615	0.0%	7,141	0.0%	$995	0.4%	$11,104
39	Miscellaneous Manufacturing Products	158,153	0.1%	8,218	0.0%	$659	0.3%	$4,167
40	Waste or Scrap Materials	5,322,919	2.6%	208,347	1.2%	$1,247	0.6%	$234
41	Miscellaneous Freight Shipments	327	0.0%	16	0.0%	$4	0.0%	$12,917
42	Shipping Containers	#N/A	#N/A	7,408,020	42.1%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	63,195	0.0%	3,074	0.0%	$585	0.3%	$9,260
47	Small Packaged Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	22,495,511	11.2%	1,260,390	7.2%	$66,157	29.9%	$2,941
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	200,890,846	100.0%	17,578,626	100.0%	$221,258	100.0%	$1,101

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 23: Rail Outbound, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	10,550,701	48.1%	125,098	32.3%	$3,346	14.8%	$317
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	97,900	0.4%	1,000	0.3%	$20	0.1%	$200
13	Crude Petroleum or Natural Gas	9,160	0.0%	120	0.0%	$5	0.0%	$555
14	Nonmetallic Minerals	405,924	1.9%	4,140	1.1%	$138	0.6%	$339
19	Ordnance or Accessories	7,500	0.0%	512	0.1%	$35	0.2%	$4,681
20	Food or Kindred Products	2,507,164	11.4%	37,616	9.7%	$1,758	7.8%	$701
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	840	0.0%	40	0.0%	$3	0.0%	$3,309
23	Apparel or Related Products	840	0.0%	40	0.0%	$6	0.0%	$7,334
24	Lumber or Wood Products	27,880	0.1%	920	0.2%	$131	0.6%	$4,709
25	Furniture or Fixtures	5,560	0.0%	1,080	0.3%	$33	0.1%	$6,019
26	Pulp, Paper, or Allied Products	27,200	0.1%	1,520	0.4%	$20	0.1%	$748
27	Printed Matter	240	0.0%	80	0.0%	$0	0.0%	$1,312
28	Chemicals or Allied Products	2,736,562	12.5%	32,582	8.4%	$4,852	21.4%	$1,773
29	Petroleum or Coal Products	1,460,168	6.7%	19,548	5.1%	$1,902	8.4%	$1,302
30	Rubber or Miscellaneous Plastics	14,040	0.1%	960	0.2%	$88	0.4%	$6,285
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	869,232	4.0%	8,108	2.1%	$714	3.2%	$822
33	Primary Metal Products	125,200	0.6%	1,680	0.4%	$420	1.9%	$3,358
34	Fabricated Metal Products	7,120	0.0%	440	0.1%	$64	0.3%	$9,019
35	Machinery	75,952	0.3%	1,128	0.3%	$1,748	7.7%	$23,018
36	Electrical Equipment	25,520	0.1%	2,040	0.5%	$270	1.2%	$10,590
37	Transportation Equipment	503,920	2.3%	25,324	6.5%	$5,310	23.5%	$10,536
38	Instrument, Photo, and Optical Equip.	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
39	Miscellaneous Manufacturing Products	3,920	0.0%	240	0.1%	$19	0.1%	$4,840
40	Waste or Scrap Materials	743,710	3.4%	11,079	2.9%	$540	2.4%	$726
41	Miscellaneous Freight Shipments	13,352	0.1%	965	0.2%	$163	0.7%	$12,241
42	Shipping Containers	83,680	0.4%	17,560	4.5%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	92,840	0.4%	5,400	1.4%	$60	0.3%	$642
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	1,485,160	6.8%	84,280	21.8%	$954	4.2%	$642
47	Small Packaged Shipments	33,040	0.2%	3,240	0.8%	$21	0.1%	$642
48	Waste	4,788	0.0%	48	0.0%	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	21,919,113	100.0%	386,788	100.0%	$22,622	100.0%	$1,032

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Table 24: Rail Inbound, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	613,744	2.6%	5,874	1.5%	$190	0.9%	$309
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	760	0.0%	40	0.0%	$1	0.0%	$1,360
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	13,926,635	59.2%	116,808	30.6%	$3,733	17.8%	$268
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	476,057	2.0%	4,362	1.1%	$29	0.1%	$61
19	Ordnance or Accessories	3,320	0.0%	176	0.0%	$16	0.1%	$4,681
20	Food or Kindred Products	1,057,620	4.5%	15,272	4.0%	$1,326	6.3%	$1,254
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	4,400	0.0%	200	0.1%	$15	0.1%	$3,309
23	Apparel or Related Products	480	0.0%	80	0.0%	$3	0.0%	$5,285
24	Lumber or Wood Products	289,520	1.2%	3,152	0.8%	$227	1.1%	$783
25	Furniture or Fixtures	9,360	0.0%	1,000	0.3%	$58	0.3%	$6,173
26	Pulp, Paper, or Allied Products	193,360	0.8%	3,680	1.0%	$156	0.7%	$809
27	Printed Matter	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28	Chemicals or Allied Products	1,764,390	7.5%	23,808	6.2%	$2,943	14.0%	$1,668
29	Petroleum or Coal Products	640,716	2.7%	8,664	2.3%	$751	3.6%	$1,172
30	Rubber or Miscellaneous Plastics	3,400	0.0%	240	0.1%	$13	0.1%	$3,840
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	1,230,532	5.2%	12,628	3.3%	$191	0.9%	$155
33	Primary Metal Products	525,148	2.2%	5,788	1.5%	$913	4.3%	$1,738
34	Fabricated Metal Products	3,920	0.0%	280	0.1%	$42	0.2%	$10,789
35	Machinery	64,364	0.3%	1,300	0.3%	$608	2.9%	$9,448
36	Electrical Equipment	21,000	0.1%	1,400	0.4%	$93	0.4%	$4,422
37	Transportation Equipment	661,256	2.8%	26,276	6.9%	$8,097	38.5%	$12,244
38	Instrument, Photo, and Optical Equip.	2,080	0.0%	200	0.1%	$38	0.2%	$18,167
39	Miscellaneous Manufacturing Products	8,680	0.0%	760	0.2%	$44	0.2%	$5,062
40	Waste or Scrap Materials	53,128	0.2%	812	0.2%	$35	0.2%	$659
41	Miscellaneous Freight Shipments	56,642	0.2%	2,328	0.6%	$693	3.3%	$12,241
42	Shipping Containers	56,640	0.2%	12,800	3.4%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	71,280	0.3%	4,080	1.1%	$46	0.2%	$642
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	1,690,960	7.2%	122,720	32.1%	$707	3.4%	$418
47	Small Packaged Shipments	60,480	0.3%	6,280	1.6%	$39	0.2%	$642
48	Waste	53,440	0.2%	760	0.2%	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	23,543,312	100.0%	381,768	100.0%	$21,005	100.0%	$892

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Table 25: Rail Intra, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	144,300	29.5%	1,456	23.8%	$25	2.8%	$175
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	61,396	12.5%	644	10.5%	$50	5.5%	$808
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
23	Apparel or Related Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24	Lumber or Wood Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
25	Furniture or Fixtures	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
26	Pulp, Paper, or Allied Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
27	Printed Matter	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28	Chemicals or Allied Products	102,080	20.8%	1,040	17.0%	$263	29.2%	$2,575
29	Petroleum or Coal Products	21,120	4.3%	240	3.9%	$28	3.1%	$1,323
30	Rubber or Miscellaneous Plastics	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	113,172	23.1%	1,080	17.7%	$75	8.3%	$663
33	Primary Metal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
34	Fabricated Metal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
35	Machinery	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
36	Electrical Equipment	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
37	Transportation Equipment	39,936	8.2%	1,566	25.6%	$456	50.6%	$11,414
38	Instrument, Photo, and Optical Equip.	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
39	Miscellaneous Manufacturing Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
40	Waste or Scrap Materials	7,600	1.6%	80	1.3%	$5	0.5%	$616
41	Miscellaneous Freight Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42	Shipping Containers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
47	Small Packaged Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	489,604	100.0%	6,106	100.0%	$901	100.0%	$1,841

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Table 26: Rail Through, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	23,059,351	7.2%	345,700	5.6%	$7,381	2.6%	$320
08	Forest Products	16,000	0.0%	600	0.0%	$148	0.1%	$9,263
09	Fresh Fish or Marine Products	22,080	0.0%	1,160	0.0%	$30	0.0%	$1,360
10	Metallic Ores	1,811,615	0.6%	18,265	0.3%	$2,411	0.9%	$1,331
11	Coal	166,939,121	51.8%	1,397,220	22.8%	$12,088	4.3%	$72
13	Crude Petroleum or Natural Gas	5,253,123	1.6%	55,761	0.9%	$2,889	1.0%	$550
14	Nonmetallic Minerals	17,222,858	5.3%	162,809	2.7%	$2,152	0.8%	$125
19	Ordnance or Accessories	31,260	0.0%	1,204	0.0%	$146	0.1%	$4,681
20	Food or Kindred Products	25,413,126	7.9%	440,587	7.2%	$11,900	4.3%	$468
21	Tobacco Products	2,800	0.0%	280	0.0%	$62	0.0%	$22,000
22	Textile Mill Products	52,920	0.0%	4,160	0.1%	$175	0.1%	$3,309
23	Apparel or Related Products	1,202,840	0.4%	96,880	1.6%	$3,893	1.4%	$3,236
24	Lumber or Wood Products	2,618,360	0.8%	36,400	0.6%	$2,131	0.8%	$814
25	Furniture or Fixtures	468,240	0.1%	42,920	0.7%	$2,962	1.1%	$6,326
26	Pulp, Paper, or Allied Products	3,013,920	0.9%	87,200	1.4%	$2,266	0.8%	$752
27	Printed Matter	169,120	0.1%	9,840	0.2%	$953	0.3%	$5,635
28	Chemicals or Allied Products	22,571,817	7.0%	339,239	5.5%	$96,718	34.6%	$4,285
29	Petroleum or Coal Products	3,572,252	1.1%	49,984	0.8%	$5,341	1.9%	$1,495
30	Rubber or Miscellaneous Plastics	640,840	0.2%	48,480	0.8%	$3,873	1.4%	$6,044
31	Leather or Leather Products	7,560	0.0%	560	0.0%	$104	0.0%	$13,804
32	Clay, Concrete, Glass, or Stone	1,589,188	0.5%	24,156	0.4%	$1,610	0.6%	$1,013
33	Primary Metal Products	3,901,280	1.2%	57,464	0.9%	$10,320	3.7%	$2,645
34	Fabricated Metal Products	380,680	0.1%	27,840	0.5%	$2,355	0.8%	$6,186
35	Machinery	407,498	0.1%	26,958	0.4%	$3,665	1.3%	$8,994
36	Electrical Equipment	480,480	0.1%	44,320	0.7%	$4,291	1.5%	$8,930
37	Transportation Equipment	5,545,245	1.7%	333,389	5.4%	$63,562	22.7%	$11,462
38	Instrument, Photo, and Optical Equip.	34,520	0.0%	2,600	0.0%	$627	0.2%	$18,167
39	Miscellaneous Manufacturing Products	337,040	0.1%	33,400	0.5%	$1,781	0.6%	$5,283
40	Waste or Scrap Materials	1,435,048	0.4%	34,188	0.6%	$663	0.2%	$462
41	Miscellaneous Freight Shipments	424,080	0.1%	62,960	1.0%	$5,191	1.9%	$12,241
42	Shipping Containers	693,720	0.2%	140,560	2.3%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	5,080	0.0%	320	0.0%	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	826,840	0.3%	49,680	0.8%	$531	0.2%	$642
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	31,106,360	9.6%	2,095,564	34.1%	$26,934	9.6%	$866
47	Small Packaged Shipments	660,520	0.2%	63,360	1.0%	$424	0.2%	$642
48	Waste	530,742	0.2%	5,350	0.1%	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	322,447,524	100.0%	6,141,358	100.0%	$279,577	100.0%	$867

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Table 27: Rail Total, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	34,223,796	9.3%	476,672	6.9%	$10,917	3.4%	$319
08	Forest Products	16,000	0.0%	600	0.0%	$148	0.0%	$9,263
09	Fresh Fish or Marine Products	22,840	0.0%	1,200	0.0%	$31	0.0%	$1,360
10	Metallic Ores	1,811,615	0.5%	18,265	0.3%	$2,411	0.7%	$1,331
11	Coal	180,963,656	49.1%	1,515,028	21.9%	$15,841	4.9%	$88
13	Crude Petroleum or Natural Gas	5,262,283	1.4%	55,881	0.8%	$2,894	0.9%	$550
14	Nonmetallic Minerals	18,249,139	5.0%	172,767	2.5%	$2,344	0.7%	$128
19	Ordnance or Accessories	42,080	0.0%	1,892	0.0%	$197	0.1%	$4,681
20	Food or Kindred Products	29,039,306	7.9%	494,119	7.1%	$15,034	4.6%	$518
21	Tobacco Products	2,800	0.0%	280	0.0%	$62	0.0%	$22,000
22	Textile Mill Products	58,160	0.0%	4,400	0.1%	$192	0.1%	$3,309
23	Apparel or Related Products	1,204,160	0.3%	97,000	1.4%	$3,901	1.2%	$3,240
24	Lumber or Wood Products	2,935,760	0.8%	40,472	0.6%	$2,489	0.8%	$848
25	Furniture or Fixtures	483,160	0.1%	45,000	0.7%	$3,053	0.9%	$6,319
26	Pulp, Paper, or Allied Products	3,234,480	0.9%	92,400	1.3%	$2,442	0.8%	$755
27	Printed Matter	169,360	0.0%	9,920	0.1%	$953	0.3%	$5,629
28	Chemicals or Allied Products	27,174,849	7.4%	396,669	5.7%	$104,776	32.3%	$3,856
29	Petroleum or Coal Products	5,694,256	1.5%	78,436	1.1%	$8,022	2.5%	$1,409
30	Rubber or Miscellaneous Plastics	658,280	0.2%	49,680	0.7%	$3,975	1.2%	$6,038
31	Leather or Leather Products	7,560	0.0%	560	0.0%	$104	0.0%	$13,804
32	Clay, Concrete, Glass, or Stone	3,802,124	1.0%	45,972	0.7%	$2,591	0.8%	$681
33	Primary Metal Products	4,551,628	1.2%	64,932	0.9%	$11,653	3.6%	$2,560
34	Fabricated Metal Products	391,720	0.1%	28,560	0.4%	$2,461	0.8%	$6,284
35	Machinery	547,814	0.1%	29,386	0.4%	$6,021	1.9%	$10,992
36	Electrical Equipment	527,000	0.1%	47,760	0.7%	$4,654	1.4%	$8,831
37	Transportation Equipment	6,750,357	1.8%	386,555	5.6%	$77,424	23.9%	$11,470
38	Instrument, Photo, and Optical Equip.	36,600	0.0%	2,800	0.0%	$665	0.2%	$18,167
39	Miscellaneous Manufacturing Products	349,640	0.1%	34,400	0.5%	$1,844	0.6%	$5,273
40	Waste or Scrap Materials	2,239,486	0.6%	46,159	0.7%	$1,242	0.4%	$555
41	Miscellaneous Freight Shipments	494,074	0.1%	66,253	1.0%	$6,048	1.9%	$12,241
42	Shipping Containers	834,040	0.2%	170,920	2.5%	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	5,080	0.0%	320	0.0%	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	990,960	0.3%	59,160	0.9%	$636	0.2%	$642
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	34,282,480	9.3%	2,302,564	33.3%	$28,595	8.8%	$834
47	Small Packaged Shipments	754,040	0.2%	72,880	1.1%	$484	0.1%	$642
48	Waste	588,970	0.2%	6,158	0.1%	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	368,399,553	100.0%	6,916,020	100.0%	$324,105	100.0%	$880

Source: prepared by CDM Smith, based on TRANSEARCH®/STB WAYBILL for 2014

Table 28: Water Outbound, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	390,823	100.0%	#N/A	#N/A	$3	100.0%	$7
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
23	Apparel or Related Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24	Lumber or Wood Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
25	Furniture or Fixtures	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
26	Pulp, Paper, or Allied Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
27	Printed Matter	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28	Chemicals or Allied Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
29	Petroleum or Coal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
30	Rubber or Miscellaneous Plastics	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
33	Primary Metal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
34	Fabricated Metal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
35	Machinery	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
36	Electrical Equipment	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
37	Transportation Equipment	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
38	Instrument, Photo, and Optical Equip.	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
39	Miscellaneous Manufacturing Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
40	Waste or Scrap Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
41	Miscellaneous Freight Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42	Shipping Containers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
47	Small Packaged Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	390,823	100.0%	#N/A	#N/A	$3	100.0%	$7

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 29: Air Outbound, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	0	0.0%	#N/A	#N/A	$0	0.0%	$8,687
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	2,542	14.4%	#N/A	#N/A	$49	1.8%	$19,187
23	Apparel or Related Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24	Lumber or Wood Products	1	0.0%	#N/A	#N/A	$0	0.0%	$5,105
25	Furniture or Fixtures	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
26	Pulp, Paper, or Allied Products	5	0.0%	#N/A	#N/A	$0	0.0%	$8,324
27	Printed Matter	305	1.7%	#N/A	#N/A	$7	0.3%	$24,271
28	Chemicals or Allied Products	412	2.3%	#N/A	#N/A	$41	1.5%	$100,615
29	Petroleum or Coal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
30	Rubber or Miscellaneous Plastics	1	0.0%	#N/A	#N/A	$0	0.0%	$32,430
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	6	0.0%	#N/A	#N/A	$0	0.0%	$35,261
33	Primary Metal Products	0	0.0%	#N/A	#N/A	$0	0.0%	$100,042
34	Fabricated Metal Products	259	1.5%	#N/A	#N/A	$8	0.3%	$32,322
35	Machinery	399	2.3%	#N/A	#N/A	$44	1.6%	$110,815
36	Electrical Equipment	888	5.0%	#N/A	#N/A	$209	7.8%	$235,346
37	Transportation Equipment	5,748	32.5%	#N/A	#N/A	$1,849	68.8%	$321,739
38	Instrument, Photo, and Optical Equip.	1,658	9.4%	#N/A	#N/A	$361	13.4%	$218,005
39	Miscellaneous Manufacturing Products	121	0.7%	#N/A	#N/A	$83	3.1%	$688,139
40	Waste or Scrap Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
41	Miscellaneous Freight Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42	Shipping Containers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	289	1.6%	#N/A	#N/A	$35	1.3%	$120,782
47	Small Packaged Shipments	5,027	28.5%	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	17,660	100.0%	#N/A	#N/A	$2,688	100.0%	$152,227

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 30: Air Inbound, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	1	0.0%	#N/A	#N/A	$0	0.0%	$8,452
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	129	0.7%	#N/A	#N/A	$1	0.1%	$10,075
10	Metallic Ores	0	0.0%	#N/A	#N/A	$0	0.0%	$1,078,027
11	Coal	0	0.0%	#N/A	#N/A	$0	0.0%	$235
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	0	0.0%	#N/A	#N/A	$0	0.0%	$1,191
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	1	0.0%	#N/A	#N/A	$0	0.0%	$7,280
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	761	4.1%	#N/A	#N/A	$15	0.6%	$19,187
23	Apparel or Related Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24	Lumber or Wood Products	0	0.0%	#N/A	#N/A	$0	0.0%	$5,105
25	Furniture or Fixtures	1	0.0%	#N/A	#N/A	$0	0.0%	$83,057
26	Pulp, Paper, or Allied Products	0	0.0%	#N/A	#N/A	$0	0.0%	$8,324
27	Printed Matter	154	0.8%	#N/A	#N/A	$4	0.2%	$24,271
28	Chemicals or Allied Products	56	0.3%	#N/A	#N/A	$22	0.9%	$393,540
29	Petroleum or Coal Products	0	0.0%	#N/A	#N/A	$0	0.0%	$2,296
30	Rubber or Miscellaneous Plastics	229	1.2%	#N/A	#N/A	$7	0.3%	$32,430
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	1	0.0%	#N/A	#N/A	$0	0.0%	$35,261
33	Primary Metal Products	35	0.2%	#N/A	#N/A	$3	0.1%	$100,042
34	Fabricated Metal Products	122	0.6%	#N/A	#N/A	$4	0.2%	$32,565
35	Machinery	785	4.2%	#N/A	#N/A	$87	3.7%	$110,822
36	Electrical Equipment	1,443	7.7%	#N/A	#N/A	$340	14.6%	$235,440
37	Transportation Equipment	3,272	17.4%	#N/A	#N/A	$976	41.8%	$298,304
38	Instrument, Photo, and Optical Equip.	1,901	10.1%	#N/A	#N/A	$414	17.8%	$218,017
39	Miscellaneous Manufacturing Products	308	1.6%	#N/A	#N/A	$212	9.1%	$688,139
40	Waste or Scrap Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
41	Miscellaneous Freight Shipments	0	0.0%	#N/A	#N/A	$0	0.0%	$966,396
42	Shipping Containers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	228	1.2%	#N/A	#N/A	$1	0.0%	$2,969
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	2,046	10.9%	#N/A	#N/A	$247	10.6%	$120,782
47	Small Packaged Shipments	7,284	38.8%	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	18,756	100.0%	#N/A	#N/A	$2,334	100.0%	$124,425

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 31: Air Intra, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
10	Metallic Ores	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
11	Coal	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
23	Apparel or Related Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24	Lumber or Wood Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
25	Furniture or Fixtures	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
26	Pulp, Paper, or Allied Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
27	Printed Matter	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28	Chemicals or Allied Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
29	Petroleum or Coal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
30	Rubber or Miscellaneous Plastics	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
33	Primary Metal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
34	Fabricated Metal Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
35	Machinery	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
36	Electrical Equipment	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
37	Transportation Equipment	1	0.2%	#N/A	#N/A	$0	0.9%	$293,549
38	Instrument, Photo, and Optical Equip.	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
39	Miscellaneous Manufacturing Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
40	Waste or Scrap Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
41	Miscellaneous Freight Shipments	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
42	Shipping Containers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	229	49.8%	#N/A	#N/A	$28	99.1%	$120,782
47	Small Packaged Shipments	230	50.0%	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	460	100.0%	#N/A	#N/A	$28	100.0%	$60,730

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 32: Air Total, 2014

STCC2	Commodity	Tons		Units		Value (in millions)		Average Value/Ton
		Amount	Percent	Amount	Percent	Amount	Percent	
01	Farm Products	1	0.0%	#N/A	#N/A	$0	0.0%	$8,452
08	Forest Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
09	Fresh Fish or Marine Products	129	0.4%	#N/A	#N/A	$1	0.0%	$10,075
10	Metallic Ores	0	0.0%	#N/A	#N/A	$0	0.0%	$1,078,027
11	Coal	0	0.0%	#N/A	#N/A	$0	0.0%	$235
13	Crude Petroleum or Natural Gas	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
14	Nonmetallic Minerals	0	0.0%	#N/A	#N/A	$0	0.0%	$1,191
19	Ordnance or Accessories	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20	Food or Kindred Products	1	0.0%	#N/A	#N/A	$0	0.0%	$7,504
21	Tobacco Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22	Textile Mill Products	3,303	9.0%	#N/A	#N/A	$63	1.3%	$19,187
23	Apparel or Related Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
24	Lumber or Wood Products	1	0.0%	#N/A	#N/A	$0	0.0%	$5,105
25	Furniture or Fixtures	1	0.0%	#N/A	#N/A	$0	0.0%	$83,057
26	Pulp, Paper, or Allied Products	5	0.0%	#N/A	#N/A	$0	0.0%	$8,324
27	Printed Matter	459	1.2%	#N/A	#N/A	$11	0.2%	$24,271
28	Chemicals or Allied Products	468	1.3%	#N/A	#N/A	$64	1.3%	$135,732
29	Petroleum or Coal Products	0	0.0%	#N/A	#N/A	$0	0.0%	$2,296
30	Rubber or Miscellaneous Plastics	229	0.6%	#N/A	#N/A	$7	0.1%	$32,430
31	Leather or Leather Products	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
32	Clay, Concrete, Glass, or Stone	7	0.0%	#N/A	#N/A	$0	0.0%	$35,261
33	Primary Metal Products	35	0.1%	#N/A	#N/A	$3	0.1%	$100,042
34	Fabricated Metal Products	380	1.0%	#N/A	#N/A	$12	0.2%	$32,400
35	Machinery	1,184	3.2%	#N/A	#N/A	$131	2.6%	$110,820
36	Electrical Equipment	2,330	6.3%	#N/A	#N/A	$549	10.9%	$235,404
37	Transportation Equipment	9,020	24.5%	#N/A	#N/A	$2,825	55.9%	$313,236
38	Instrument, Photo, and Optical Equip.	3,559	9.7%	#N/A	#N/A	$776	15.4%	$218,011
39	Miscellaneous Manufacturing Products	429	1.2%	#N/A	#N/A	$295	5.8%	$688,139
40	Waste or Scrap Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
41	Miscellaneous Freight Shipments	0	0.0%	#N/A	#N/A	$0	0.0%	$966,396
42	Shipping Containers	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
43	Mail or Contract Traffic	228	0.6%	#N/A	#N/A	$1	0.0%	$2,969
44	Freight Forwarder Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
45	Shipper Association Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
46	Miscellaneous Mixed Shipments	2,564	7.0%	#N/A	#N/A	$310	6.1%	$120,782
47	Small Packaged Shipments	12,541	34.0%	#N/A	#N/A	#N/A	#N/A	#N/A
48	Waste	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
49	Hazardous Materials	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
50	Secondary Traffic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
60	Unclassified	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Total	36,876	100.0%	#N/A	#N/A	$5,050	100.0%	$136,944

Source: prepared by CDM Smith, based on TRANSEARCH® data for 2014

Table 33: Truck Forecast Growth, in Tons, 2014 to 2040

SCTG2	Commodity	2014		2040		Percent Change		Volume Δ
		Amount	Percent	Amount	Percent	Total	CAGR	Amount
01	Live Animals/Fish	7,181,825	2.8%	8,882,881	2.6%	23.7%	0.8%	1,701,057
02	Cereal Grains	69,683,835	26.9%	81,552,903	23.5%	17.0%	0.6%	11,869,068
03	Other Ag Prods.	7,567,070	2.9%	9,325,280	2.7%	23.2%	0.8%	1,758,210
04	Animal Feed	14,506,901	5.6%	22,516,629	6.5%	55.2%	1.7%	8,009,729
05	Meat/Seafood	5,040,364	1.9%	8,411,918	2.4%	66.9%	2.0%	3,371,554
06	Milled Grain Prods.	2,464,067	0.9%	3,865,768	1.1%	56.9%	1.7%	1,401,702
07	Other Foodstuffs	7,995,706	3.1%	12,233,166	3.5%	53.0%	1.6%	4,237,460
08	Alcoholic Beverages	760,379	0.3%	1,120,491	0.3%	47.4%	1.5%	360,112
09	Tobacco Prods.	22,883	0.0%	3,201	0.0%	-86.0%	-7.3%	-19,682
10	Building Stone	82,281	0.0%	162,637	0.0%	97.7%	2.7%	80,356
11	Natural Sands	10,589,194	4.1%	17,111,543	4.9%	61.6%	1.9%	6,522,349
12	Gravel	14,285,004	5.5%	17,438,058	5.0%	22.1%	0.8%	3,153,055
13	Nonmetallic Minerals	3,792,228	1.5%	5,422,443	1.6%	43.0%	1.4%	1,630,215
14	Metallic Ores	20,798	0.0%	7,456	0.0%	-64.2%	-3.9%	-13,342
15	Coal	424,660	0.2%	142,811	0.0%	-66.4%	-4.1%	-281,849
16	Crude Petroleum	183,548	0.1%	192,488	0.1%	4.9%	0.2%	8,940
17	Gasoline	10,720,372	4.1%	10,851,496	3.1%	1.2%	0.0%	131,124
18	Fuel Oils	14,966,834	5.8%	18,513,595	5.3%	23.7%	0.8%	3,546,762
19	Coal-N.E.C.	14,543,244	5.6%	17,817,074	5.1%	22.5%	0.8%	3,273,831
20	Basic Chemicals	2,080,135	0.8%	2,608,369	0.8%	25.4%	0.9%	528,234
21	Pharmaceuticals	166,705	0.1%	310,348	0.1%	86.2%	2.4%	143,644
22	Fertilizers	8,417,489	3.2%	11,362,767	3.3%	35.0%	1.2%	2,945,278
23	Chemical Prods.	2,021,719	0.8%	3,752,262	1.1%	85.6%	2.4%	1,730,543
24	Plastics/Rubber	2,499,055	1.0%	3,644,948	1.0%	45.9%	1.5%	1,145,893
25	Logs	387,673	0.1%	458,151	0.1%	18.2%	0.6%	70,477
26	Wood Prods.	2,748,794	1.1%	3,527,817	1.0%	28.3%	1.0%	779,023
27	Newsprint/Paper	944,182	0.4%	1,013,079	0.3%	7.3%	0.3%	68,897
28	Paper Articles	1,118,543	0.4%	1,503,447	0.4%	34.4%	1.1%	384,904
29	Printed Prods.	425,549	0.2%	410,690	0.1%	-3.5%	-0.1%	-14,858
30	Textiles/Leather	847,076	0.3%	826,801	0.2%	-2.4%	-0.1%	-20,276
31	Nonmetal Min. Prods.	19,738,938	7.6%	30,915,425	8.9%	56.6%	1.7%	11,176,487
32	Base Metals	2,894,841	1.1%	3,971,660	1.1%	37.2%	1.2%	1,076,819
33	Articles-Base Metal	2,050,707	0.8%	3,371,241	1.0%	64.4%	1.9%	1,320,534
34	Machinery	2,277,318	0.9%	4,506,742	1.3%	97.9%	2.7%	2,229,424
35	Electronics	1,820,189	0.7%	4,358,307	1.3%	139.4%	3.4%	2,538,118
36	Motorized Vehicles	1,759,609	0.7%	2,176,199	0.6%	23.7%	0.8%	416,590
37	Transport Equip.	221,317	0.1%	380,278	0.1%	71.8%	2.1%	158,960
38	Precision Instruments	36,649	0.0%	83,815	0.0%	128.7%	3.2%	47,166
39	Furniture	732,074	0.3%	1,106,847	0.3%	51.2%	1.6%	374,773
40	Misc. Mfg. Prods.	1,583,222	0.6%	2,408,440	0.7%	52.1%	1.6%	825,218
41	Waste/Scrap	4,448,105	1.7%	8,837,786	2.5%	98.7%	2.7%	4,389,681
43	Mixed Freight	15,403,241	5.9%	20,211,540	5.8%	31.2%	1.1%	4,808,299
99	Unknown	0	0.0%	0	0.0%	0.0%	0.0%	0
	Total	259,454,319	100.0%	347,318,796	100.0%	33.9%	1.1%	87,864,477

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

Table 34: Rail Forecast Growth in Tons, 2014 to 2040

SCTG2	Commodity	2014		2040		Percent Change		Volume Δ
		Amount	Percent	Amount	Percent	Total	CAGR	Amount
01	Live Animals/Fish	0	0.0%	0	0.0%	0.0%	0.0%	0
02	Cereal Grains	34,667,432	59.7%	44,010,804	67.9%	27.0%	0.9%	9,343,373
03	Other Ag Prods.	92,972	0.2%	211,189	0.3%	127.2%	3.2%	118,217
04	Animal Feed	401,370	0.7%	574,680	0.9%	43.2%	1.4%	173,309
05	Meat/Seafood	0	0.0%	0	0.0%	0.0%	0.0%	0
06	Milled Grain Prods.	640,093	1.1%	1,044,977	1.6%	63.3%	1.9%	404,884
07	Other Foodstuffs	1,400,145	2.4%	2,417,525	3.7%	72.7%	2.1%	1,017,380
08	Alcoholic Beverages	205,619	0.4%	202,124	0.3%	-1.7%	-0.1%	-3,496
09	Tobacco Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
10	Building Stone	0	0.0%	0	0.0%	0.0%	0.0%	0
11	Natural Sands	65,749	0.1%	106,380	0.2%	61.8%	1.9%	40,631
12	Gravel	28,360	0.0%	32,380	0.0%	14.2%	0.5%	4,020
13	Nonmetallic Minerals	388,808	0.7%	652,898	1.0%	67.9%	2.0%	264,090
14	Metallic Ores	0	0.0%	0	0.0%	0.0%	0.0%	0
15	Coal	13,669,159	23.5%	6,273,813	9.7%	-54.1%	-3.0%	-7,395,346
16	Crude Petroleum	32,812	0.1%	8,579	0.0%	-73.9%	-5.0%	-24,233
17	Gasoline	95,154	0.2%	142,140	0.2%	49.4%	1.6%	46,986
18	Fuel Oils	675,166	1.2%	687,515	1.1%	1.8%	0.1%	12,349
19	Coal-N.E.C.	313,979	0.5%	282,741	0.4%	-9.9%	-0.4%	-31,238
20	Basic Chemicals	1,090,474	1.9%	1,755,357	2.7%	61.0%	1.8%	664,883
21	Pharmaceuticals	0	0.0%	0	0.0%	0.0%	0.0%	0
22	Fertilizers	1,557,773	2.7%	2,314,763	3.6%	48.6%	1.5%	756,989
23	Chemical Prods.	33,640	0.1%	37,058	0.1%	10.2%	0.4%	3,418
24	Plastics/Rubber	305,047	0.5%	649,279	1.0%	112.8%	2.9%	344,232
25	Logs	8,644	0.0%	15,526	0.0%	79.6%	2.3%	6,881
26	Wood Prods.	198,192	0.3%	382,933	0.6%	93.2%	2.6%	184,741
27	Newsprint/Paper	205,757	0.4%	246,655	0.4%	19.9%	0.7%	40,897
28	Paper Articles	75,864	0.1%	103,412	0.2%	36.3%	1.2%	27,548
29	Printed Prods.	2,858	0.0%	3,342	0.0%	16.9%	0.6%	484
30	Textiles/Leather	12	0.0%	34	0.0%	186.3%	4.1%	22
31	Nonmetal Min. Prods.	535,552	0.9%	889,007	1.4%	66.0%	2.0%	353,455
32	Base Metals	260,755	0.4%	339,982	0.5%	30.4%	1.0%	79,227
33	Articles-Base Metal	64,948	0.1%	145,633	0.2%	124.2%	3.2%	80,684
34	Machinery	42,855	0.1%	101,503	0.2%	136.9%	3.4%	58,648
35	Electronics	4,737	0.0%	17,519	0.0%	269.8%	5.2%	12,782
36	Motorized Vehicles	152,008	0.3%	210,501	0.3%	38.5%	1.3%	58,493
37	Transport Equip.	335,018	0.6%	637,436	1.0%	90.3%	2.5%	302,418
38	Precision Instruments	0	0.0%	0	0.0%	0.0%	0.0%	0
39	Furniture	633	0.0%	3,388	0.0%	435.5%	6.7%	2,755
40	Misc. Mfg. Prods.	11,804	0.0%	23,532	0.0%	99.4%	2.7%	11,728
41	Waste/Scrap	512,812	0.9%	297,437	0.5%	-42.0%	-2.1%	-215,375
43	Mixed Freight	5,288	0.0%	5,913	0.0%	11.8%	0.4%	626
99	Unknown	0	0.0%	0	0.0%	0.0%	0.0%	0
	Total	58,081,489	100.0%	64,827,950	100.0%	11.6%	0.4%	6,746,461

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

Table 35: Water Forecast Growth in Tons, 2014 to 2040

SCTG2	Commodity	2014		2040		Percent Change		Volume Δ
		Amount	Percent	Amount	Percent	Total	CAGR	Amount
01	Live Animals/Fish	0	0.0%	0	0.0%	0.0%	0.0%	0
02	Cereal Grains	1,371,723	53.8%	3,755,953	55.3%	173.8%	4.0%	2,384,230
03	Other Ag Prods.	146,325	5.7%	541,173	8.0%	269.8%	5.2%	394,848
04	Animal Feed	80,026	3.1%	108,457	1.6%	35.5%	1.2%	28,431
05	Meat/Seafood	8,481	0.3%	37,622	0.6%	343.6%	5.9%	29,141
06	Milled Grain Prods.	96,885	3.8%	252,022	3.7%	160.1%	3.7%	155,138
07	Other Foodstuffs	45,503	1.8%	109,688	1.6%	141.1%	3.4%	64,185
08	Alcoholic Beverages	901	0.0%	4,483	0.1%	397.7%	6.4%	3,582
09	Tobacco Prods.	4,387	0.2%	2,955	0.0%	-32.6%	-1.5%	-1,432
10	Building Stone	4,520	0.2%	24,687	0.4%	446.2%	6.7%	20,168
11	Natural Sands	0	0.0%	0	0.0%	0.0%	0.0%	0
12	Gravel	1,906	0.1%	2,472	0.0%	29.7%	1.0%	566
13	Nonmetallic Minerals	40,050	1.6%	56,383	0.8%	40.8%	1.3%	16,333
14	Metallic Ores	725	0.0%	4,637	0.1%	539.4%	7.4%	3,911
15	Coal	0	0.0%	0	0.0%	0.0%	0.0%	0
16	Crude Petroleum	116,732	4.6%	73,862	1.1%	-36.7%	-1.7%	-42,869
17	Gasoline	53	0.0%	2	0.0%	-96.3%	-11.9%	-51
18	Fuel Oils	237	0.0%	827	0.0%	249.4%	4.9%	591
19	Coal-N.E.C.	0	0.0%	0	0.0%	0.0%	0.0%	0
20	Basic Chemicals	34,915	1.4%	99,656	1.5%	185.4%	4.1%	64,741
21	Pharmaceuticals	2,047	0.1%	8,500	0.1%	315.3%	5.6%	6,453
22	Fertilizers	151,586	5.9%	243,256	3.6%	60.5%	1.8%	91,670
23	Chemical Prods.	12,146	0.5%	49,705	0.7%	309.2%	5.6%	37,559
24	Plastics/Rubber	52,972	2.1%	160,498	2.4%	203.0%	4.4%	107,526
25	Logs	340	0.0%	520	0.0%	53.0%	1.6%	180
26	Wood Prods.	7,214	0.3%	16,784	0.2%	132.7%	3.3%	9,570
27	Newsprint/Paper	3,725	0.1%	7,209	0.1%	93.5%	2.6%	3,483
28	Paper Articles	2,184	0.1%	5,131	0.1%	134.9%	3.3%	2,947
29	Printed Prods.	1,033	0.0%	2,126	0.0%	105.8%	2.8%	1,093
30	Textiles/Leather	21,658	0.8%	65,614	1.0%	203.0%	4.4%	43,956
31	Nonmetal Min. Prods.	39,633	1.6%	124,127	1.8%	213.2%	4.5%	84,494
32	Base Metals	5,342	0.2%	9,346	0.1%	74.9%	2.2%	4,004
33	Articles-Base Metal	35,211	1.4%	79,218	1.2%	125.0%	3.2%	44,007
34	Machinery	78,022	3.1%	269,280	4.0%	245.1%	4.9%	191,257
35	Electronics	83,539	3.3%	327,790	4.8%	292.4%	5.4%	244,251
36	Motorized Vehicles	25,630	1.0%	49,568	0.7%	93.4%	2.6%	23,938
37	Transport Equip.	2,158	0.1%	6,974	0.1%	223.1%	4.6%	4,816
38	Precision Instruments	3,426	0.1%	17,087	0.3%	398.8%	6.4%	13,662
39	Furniture	22,263	0.9%	123,311	1.8%	453.9%	6.8%	101,048
40	Misc. Mfg. Prods.	34,254	1.3%	113,736	1.7%	232.0%	4.7%	79,481
41	Waste/Scrap	8,584	0.3%	25,424	0.4%	196.2%	4.3%	16,840
43	Mixed Freight	5,359	0.2%	16,375	0.2%	205.6%	4.4%	11,016
99	Unknown	0	0.0%	0	0.0%	0.0%	0.0%	0
	Total	2,551,694	100.0%	6,796,457	100.0%	166.4%	3.8%	4,244,763

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

Table 36: Air Forecast Growth in Tons, 2014 to 2040

SCTG2	Commodity	2014		2040		Percent Change		Volume Δ
		Amount	Percent	Amount	Percent	Total	CAGR	Amount
01	Live Animals/Fish	1,080	1.3%	1,158	0.6%	7.2%	0.3%	77
02	Cereal Grains	24	0.0%	59	0.0%	147.1%	3.5%	35
03	Other Ag Prods.	224	0.3%	369	0.2%	65.0%	1.9%	145
04	Animal Feed	276	0.3%	421	0.2%	52.9%	1.6%	146
05	Meat/Seafood	2,279	2.7%	4,739	2.3%	107.9%	2.9%	2,460
06	Milled Grain Prods.	124	0.1%	302	0.1%	143.7%	3.5%	178
07	Other Foodstuffs	177	0.2%	401	0.2%	126.0%	3.2%	224
08	Alcoholic Beverages	1	0.0%	2	0.0%	340.0%	5.9%	2
09	Tobacco Prods.	12	0.0%	8	0.0%	-32.2%	-1.5%	-4
10	Building Stone	0	0.0%	0	0.0%	0.0%	0.0%	0
11	Natural Sands	0	0.0%	0	0.0%	0.0%	0.0%	0
12	Gravel	0	0.0%	0	0.0%	0.0%	0.0%	0
13	Nonmetallic Minerals	3	0.0%	5	0.0%	67.9%	2.0%	2
14	Metallic Ores	0	0.0%	0	0.0%	0.0%	0.0%	0
15	Coal	0	0.0%	0	0.0%	0.0%	0.0%	0
16	Crude Petroleum	0	0.0%	0	0.0%	0.0%	0.0%	0
17	Gasoline	0	0.0%	0	0.0%	-33.3%	-1.5%	0
18	Fuel Oils	24	0.0%	26	0.0%	9.4%	0.3%	2
19	Coal-N.E.C.	24	0.0%	7	0.0%	-69.0%	-4.4%	-17
20	Basic Chemicals	736	0.9%	1,615	0.8%	119.4%	3.1%	879
21	Pharmaceuticals	2,733	3.3%	7,036	3.5%	157.5%	3.7%	4,303
22	Fertilizers	0	0.0%	0	0.0%	0.0%	0.0%	0
23	Chemical Prods.	1,663	2.0%	6,037	3.0%	263.0%	5.1%	4,374
24	Plastics/Rubber	2,642	3.2%	5,448	2.7%	106.2%	2.8%	2,806
25	Logs	0	0.0%	0	0.0%	0.0%	0.0%	0
26	Wood Prods.	51	0.1%	117	0.1%	128.6%	3.2%	66
27	Newsprint/Paper	144	0.2%	262	0.1%	82.1%	2.3%	118
28	Paper Articles	96	0.1%	221	0.1%	129.4%	3.2%	125
29	Printed Prods.	1,325	1.6%	1,667	0.8%	25.8%	0.9%	342
30	Textiles/Leather	8,726	10.4%	19,387	9.6%	122.2%	3.1%	10,661
31	Nonmetal Min. Prods.	551	0.7%	1,487	0.7%	170.1%	3.9%	937
32	Base Metals	1,954	2.3%	3,039	1.5%	55.5%	1.7%	1,085
33	Articles-Base Metal	4,172	5.0%	9,646	4.8%	131.2%	3.3%	5,474
34	Machinery	9,316	11.1%	27,213	13.4%	192.1%	4.2%	17,897
35	Electronics	15,431	18.5%	50,966	25.1%	230.3%	4.7%	35,535
36	Motorized Vehicles	7,234	8.7%	6,591	3.2%	-8.9%	-0.4%	-643
37	Transport Equip.	10,376	12.4%	22,827	11.3%	120.0%	3.1%	12,451
38	Precision Instruments	6,897	8.3%	20,605	10.2%	198.8%	4.3%	13,709
39	Furniture	218	0.3%	1,203	0.6%	452.3%	6.8%	986
40	Misc. Mfg. Prods.	4,842	5.8%	9,536	4.7%	96.9%	2.6%	4,694
41	Waste/Scrap	18	0.0%	43	0.0%	143.4%	3.5%	25
43	Mixed Freight	193	0.2%	424	0.2%	120.2%	3.1%	231
99	Unknown	0	0.0%	0	0.0%	0.0%	0.0%	0
	Total	83,562	100.0%	202,866	100.0%	142.8%	3.5%	119,304

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

Table 37: Pipeline Forecast Growth in Tons, 2014 to 2040

SCTG2	Commodity	2014		2040		Percent Change		Volume Δ
		Amount	Percent	Amount	Percent	Total	CAGR	Amount
01	Live Animals/Fish	0	0.0%	0	0.0%	0.0%	0.0%	0
02	Cereal Grains	0	0.0%	0	0.0%	0.0%	0.0%	0
03	Other Ag Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
04	Animal Feed	0	0.0%	0	0.0%	0.0%	0.0%	0
05	Meat/Seafood	0	0.0%	0	0.0%	0.0%	0.0%	0
06	Milled Grain Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
07	Other Foodstuffs	0	0.0%	0	0.0%	0.0%	0.0%	0
08	Alcoholic Beverages	0	0.0%	0	0.0%	0.0%	0.0%	0
09	Tobacco Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
10	Building Stone	0	0.0%	0	0.0%	0.0%	0.0%	0
11	Natural Sands	0	0.0%	0	0.0%	0.0%	0.0%	0
12	Gravel	0	0.0%	0	0.0%	0.0%	0.0%	0
13	Nonmetallic Minerals	0	0.0%	0	0.0%	0.0%	0.0%	0
14	Metallic Ores	0	0.0%	0	0.0%	0.0%	0.0%	0
15	Coal	0	0.0%	0	0.0%	0.0%	0.0%	0
16	Crude Petroleum	17,429,616	17.0%	18,255,365	13.8%	4.7%	0.2%	825,748
17	Gasoline	1,913,314	1.9%	2,078,546	1.6%	8.6%	0.3%	165,232
18	Fuel Oils	0	0.0%	0	0.0%	0.0%	0.0%	0
19	Coal-N.E.C.	83,014,892	80.8%	111,765,020	84.3%	34.6%	1.2%	28,750,128
20	Basic Chemicals	329,388	0.3%	439,907	0.3%	33.6%	1.1%	110,519
21	Pharmaceuticals	0	0.0%	0	0.0%	0.0%	0.0%	0
22	Fertilizers	0	0.0%	0	0.0%	0.0%	0.0%	0
23	Chemical Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
24	Plastics/Rubber	0	0.0%	0	0.0%	0.0%	0.0%	0
25	Logs	0	0.0%	0	0.0%	0.0%	0.0%	0
26	Wood Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
27	Newsprint/Paper	0	0.0%	0	0.0%	0.0%	0.0%	0
28	Paper Articles	0	0.0%	0	0.0%	0.0%	0.0%	0
29	Printed Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
30	Textiles/Leather	0	0.0%	0	0.0%	0.0%	0.0%	0
31	Nonmetal Min. Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
32	Base Metals	0	0.0%	0	0.0%	0.0%	0.0%	0
33	Articles-Base Metal	0	0.0%	0	0.0%	0.0%	0.0%	0
34	Machinery	0	0.0%	0	0.0%	0.0%	0.0%	0
35	Electronics	0	0.0%	0	0.0%	0.0%	0.0%	0
36	Motorized Vehicles	0	0.0%	0	0.0%	0.0%	0.0%	0
37	Transport Equip.	0	0.0%	0	0.0%	0.0%	0.0%	0
38	Precision Instruments	0	0.0%	0	0.0%	0.0%	0.0%	0
39	Furniture	0	0.0%	0	0.0%	0.0%	0.0%	0
40	Misc. Mfg. Prods.	0	0.0%	0	0.0%	0.0%	0.0%	0
41	Waste/Scrap	0	0.0%	0	0.0%	0.0%	0.0%	0
43	Mixed Freight	0	0.0%	0	0.0%	0.0%	0.0%	0
99	Unknown	0	0.0%	0	0.0%	0.0%	0.0%	0
	Total	102,687,211	100.0%	132,538,838	100.0%	29.1%	1.0%	29,851,627

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

Table 38: Total (All Modes) Forecast Growth in Tons, 2014 to 2040

SCTG2	Commodity	2014		2040		Percent Change		Volume Δ
		Amount	Percent	Amount	Percent	Total	CAGR	Amount
01	Live Animals/Fish	7,182,905	1.7%	8,884,039	1.6%	23.7%	0.8%	1,701,134
02	Cereal Grains	105,723,014	25.0%	129,319,720	23.4%	22.3%	0.8%	23,596,706
03	Other Ag Prods.	7,806,591	1.8%	10,078,011	1.8%	29.1%	1.0%	2,271,420
04	Animal Feed	14,988,572	3.5%	23,200,187	4.2%	54.8%	1.7%	8,211,614
05	Meat/Seafood	5,051,124	1.2%	8,454,278	1.5%	67.4%	2.0%	3,403,155
06	Milled Grain Prods.	3,201,169	0.8%	5,163,070	0.9%	61.3%	1.9%	1,961,901
07	Other Foodstuffs	9,441,531	2.2%	14,760,779	2.7%	56.3%	1.7%	5,319,249
08	Alcoholic Beverages	966,900	0.2%	1,327,099	0.2%	37.3%	1.2%	360,200
09	Tobacco Prods.	27,282	0.0%	6,164	0.0%	-77.4%	-5.6%	-21,118
10	Building Stone	86,801	0.0%	187,324	0.0%	115.8%	3.0%	100,524
11	Natural Sands	10,654,943	2.5%	17,217,923	3.1%	61.6%	1.9%	6,562,980
12	Gravel	14,315,270	3.4%	17,472,910	3.2%	22.1%	0.8%	3,157,640
13	Nonmetallic Minerals	4,221,088	1.0%	6,131,729	1.1%	45.3%	1.4%	1,910,640
14	Metallic Ores	21,523	0.0%	12,092	0.0%	-43.8%	-2.2%	-9,431
15	Coal	14,093,819	3.3%	6,416,624	1.2%	-54.5%	-3.0%	-7,677,195
16	Crude Petroleum	17,762,707	4.2%	18,530,294	3.4%	4.3%	0.2%	767,587
17	Gasoline	12,728,894	3.0%	13,072,184	2.4%	2.7%	0.1%	343,290
18	Fuel Oils	15,642,260	3.7%	19,201,964	3.5%	22.8%	0.8%	3,559,703
19	Coal-N.E.C.	97,872,138	23.1%	129,864,842	23.5%	32.7%	1.1%	31,992,704
20	Basic Chemicals	3,535,648	0.8%	4,904,904	0.9%	38.7%	1.3%	1,369,256
21	Pharmaceuticals	171,485	0.0%	325,885	0.1%	90.0%	2.5%	154,400
22	Fertilizers	10,126,849	2.4%	13,920,785	2.5%	37.5%	1.2%	3,793,937
23	Chemical Prods.	2,069,167	0.5%	3,845,062	0.7%	85.8%	2.4%	1,775,894
24	Plastics/Rubber	2,859,715	0.7%	4,460,173	0.8%	56.0%	1.7%	1,600,458
25	Logs	396,658	0.1%	474,197	0.1%	19.5%	0.7%	77,539
26	Wood Prods.	2,954,251	0.7%	3,927,651	0.7%	32.9%	1.1%	973,400
27	Newsprint/Paper	1,153,808	0.3%	1,267,204	0.2%	9.8%	0.4%	113,396
28	Paper Articles	1,196,687	0.3%	1,612,211	0.3%	34.7%	1.2%	415,523
29	Printed Prods.	430,764	0.1%	417,825	0.1%	-3.0%	-0.1%	-12,940
30	Textiles/Leather	877,472	0.2%	911,836	0.2%	3.9%	0.1%	34,363
31	Nonmetal Min. Prods.	20,314,674	4.8%	31,930,046	5.8%	57.2%	1.8%	11,615,372
32	Base Metals	3,162,892	0.7%	4,324,026	0.8%	36.7%	1.2%	1,161,135
33	Articles-Base Metal	2,155,038	0.5%	3,605,738	0.7%	67.3%	2.0%	1,450,700
34	Machinery	2,407,511	0.6%	4,904,737	0.9%	103.7%	2.8%	2,497,226
35	Electronics	1,923,896	0.5%	4,754,582	0.9%	147.1%	3.5%	2,830,686
36	Motorized Vehicles	1,944,481	0.5%	2,442,859	0.4%	25.6%	0.9%	498,378
37	Transport Equip.	568,870	0.1%	1,047,515	0.2%	84.1%	2.4%	478,645
38	Precision Instruments	46,971	0.0%	121,507	0.0%	158.7%	3.7%	74,536
39	Furniture	755,188	0.2%	1,234,749	0.2%	63.5%	1.9%	479,561
40	Misc. Mfg. Prods.	1,634,122	0.4%	2,555,244	0.5%	56.4%	1.7%	921,121
41	Waste/Scrap	4,969,518	1.2%	9,160,689	1.7%	84.3%	2.4%	4,191,171
43	Mixed Freight	15,414,080	3.6%	20,234,252	3.7%	31.3%	1.1%	4,820,172
99	Unknown	0	0.0%	0	0.0%	0.0%	0.0%	0
	Total	422,858,275	100.0%	551,684,907	100.0%	30.5%	1.0%	128,826,632

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

Appendix D: Stakeholder Interview Questions

QUESTIONS

RAIL SYSTEM PLAN UPDATE
CLASS I and II SHIPPER INTERVIEWS

April 2017

1. Why do you use rail service for your freight movements as opposed to other modes?

2. If you are using both rail and truck for your shipments, what conditions would be necessary to convert more traffic to rail?

3. Are you served by more than one railroad?

4. Do you see a value in expanded transload or intermodal opportunities such as rail-to-truck or rail-to-barge? If so, please explain.

5. Tell us about your experience in potential future growth of your work with steamship companies and movement of containers from ship to intermodal facilities and empty containers from intermodal facilities to ship.

6. Are there commodities which used to be moved by rail but no longer are? If so, why the change?

7. Are there any specific rail service improvement projects that would help you? If so, what are they, and how would they help? Please describe the projects.

8. Are there any state regulations impacting your freight movements or rail service? What changes would you suggest?

9. Are there other means in which the public sector might assist you increase your use of rail service?

10. Are you optimistic, neutral, or pessimistic about the future of your rail freight use, and why?

QUESTIONS

FREIGHT PLAN UPDATE
TRUCKING INTERVIEWS

May 2017

1. What percentage of your freight travels via truck?

2. How much of your freight is shipped via containers? (Domestic and International)

3. If you are using both rail and truck for your shipments, what conditions would be necessary to convert more traffic to rail?

4. What is the most significant issue that trucking experiences in serving your needs?

5. Do you see a value in expanded transload or intermodal opportunities such as rail-to-truck or rail-to-barge? If so, please explain.

6. How often do you experience truck capacity issues? What are the reasons?

7. Are there any specific highway improvement projects that would help you? If so, what are they, and how would they help? Please describe the projects.

8. Are there any state regulations impacting your freight movements? What changes would you suggest?

9. Are there other means in which the public sector might assist you to be more competitive (i.e. faster service or lower costs)?

10. Are you optimistic, neutral, or pessimistic about the trends you see and options you have to move your goods and commodities in the freight?

Appendix E: KFAC Members

Appendix E: 2016 Kansas Freight Advisory Committee Members

First Name	Last Name	Title	Business
Richard	Carlson	Secretary of Transportation	Kansas Department of Transportation
Catherine	Patrick	State Transportation Engineer	Kansas Department of Transportation
Steve	Hewitt	Chief Executive Officer	Kansas Turnpike Authority
David	Jacobson	Director of Engineering	Kansas Turnpike Authority
Merrill	Atwater	Director of Aviation	Kansas Department of Transportation
Steve	Kelly	Lawrence Chamber of Commerce	Kansas Department of Commerce
Susan	NeuPoth Cadoret	Business and Community Development	Kansas Department of Commerce
Jackie	McClaskey	Secretary of Agriculture	Kansas Department of Agriculture
Josh	Roe	Assistant Secretary	Kansas Department of Agriculture
Tom	Catania	Troop I - MCSAP	Kansas Highway Patrol
Jeff	Stewart	KDOT District 3 Engineer	Kansas Department of Transportation
Tom	Whitaker	Executive Director	Kansas Motor Carrier Association
Rick	Backlund	Kansas Division Administrator	Federal Highway Administration
Paul	Cristina	Director, Public Private Partnerships	BNSF Railway
Lindsey	Douglas	Director of Public Affairs (KS/MO)	Union Pacific Railroad
Pat	Cedeno	Senior Vice President Sales & Marketing	WATCO Companies
Jerry	Vest	Senior Vice President Government & Industry Affairs	Genesee & Wyoming Railroad
Kevin	McIntosh	Assistant Vice President - State and Local Relations	Kansas City Southern
Mike	Kelley	Chief Sustainability Officer	YRC Worldwide
John	Prather	Vice President Corporate Relations, Retired	Groendyke Transportation, Inc.
Kimberly	Bonhart	Vice President of Government Affairs	UPS
Joe	Pimple	President/General Manager	Sauder Fabrication
Edward	Cross	President	Kansas Independent Gas and Oil Association
Patrick	Robinson	Vice President of Development	NorthPoint Development
Ron	Seeber	Senior Vice President of Government Affairs	Kansas Grain and Feed Association
Ron	Achelpohl	Director of Transportation and Environment	Mid-America Regional Council
Phil	Nelson	Interim Director	Wichita Area Metropolitan Planning Organization
Bob	Temple	Chief Operating Officer	Wind River Grain
Karyn	Page	President/CEO	Kansas Global Trade Services
Carolyn	Dunn	Executive Director	Stafford County Economic Development
Chris	Gutierrez	President	KC Smartport
Sally	Chope	Transportation and Logistics Director	Siemens USA
Ashley	McMillan-Hutchinson	Executive Director	Cloud County Economic Development
Tom	Palace	Executive Director	Kansas Petroleum Marketers and Convenience Store Assoc of KS
Mark	Augustine		Triplett, Inc.
Jim	Beason	Policy Chairman	Chautauqua County Farm Bureau
Taylor	Nebel		TSSCC Technologies
Kasi	Morales	Executive Director	McPherson Industrial Development Company

Appendix F: Public Comment Summary

Appendix G: Prioritization Process

Appendix G – Freight Project Prioritization Process

This appendix describes the highway and rail project scoring rubric, data sources, and results in detail. 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 a truck to rail mode shift.

For ranking purposes, project scores were weighted using the weights assigned by the KFAC for each goal area during the November 15, 2016 prioritization exercise. These weights are: Mobility, 36 percent; Safety, 30 percent; Economic Development, 22 percent; and Environment, 12 percent.

The following sections describe the ranking criteria and scoring rubric by mode, followed by the prioritized/tiered freight project lists and maps.

Highway

The highway analysis utilized GIS and manual methods to acquire metrics used in project scoring. The analysis relied on the Highway Performance Monitoring System (HPMS) for the physical network data necessary to calculate volume to capacity ratios and vehicle miles traveled and the TRANSEARCH network data for link economic impact estimates, supplemented with KDOT data as available. The highway scoring criteria are described below.

Mobility

Mobility was assessed through four metrics:

- **Freight bottlenecks** were identified by reviewing the Long-Range Transportation Plans of Kansas MPOs. This list was then cross-referenced with the freight network to assess whether each project relieves a freight bottleneck. Capacity projects that address an identified bottleneck received two points; others received no points.
- **Substandard bridges** were identified with the 2016 National Bridge Inventory. Projects that improve or replace a bridge in Kansas with vertical clearance of less than 15 feet or that are load restricted to less than 120,000 pounds received two points; all others received zero points.

- If a project **enhances multimodal freight connections** between the freight network and other modes or improves/constructs truck parking capacity, it received two points. Truck parking areas were identified using the *Kansas Statewide Freight Network Truck Parking Plan*.

- **Capacity projects** that are located on a segment of roadway that is congested (as measured by the road's volume to capacity or V/C ratio) received two points, while those on less congested segments received zero points. V/C ratios were calculated using the number of lanes, average annual daily traffic (AADT), and Functional Classification of the highway. Capacity projects are defined as projects that improve the capacity of the network, including additional lanes, passing lanes, shoulders, Super-2 upgrades, or similar.

Safety

Safety was assessed by calculating truck-involved crash rates per 100 million vehicle miles traveled (VMT). This normalizes highway segments so that different segments can be compared directly against one another regardless of traffic volumes. The crash rates were sorted into quintiles, with projects located on segments with the highest truck-involved collision rates (top quintile) receiving eight points, those in the fourth quintile receiving six points, projects in the third quintile receiving four points, projects in the second quintile getting two points, and projects in the bottom quintile getting zero points.

Economic Development

The economic development impacts of highway freight projects were evaluated via three metrics:

- **Improved access to freight generators –** This metric awarded points to projects that improve road access to key freight generators. Freight generators was identified using the Kansas Rail Plan (for grain elevators) and web research combined with the InnovateKansas 'ExpertFinder' tool which is maintained by Kansas State University.[1] ExpertFinder businesses were filtered by industry to identify freight-dependent industries such as manufacturing, warehousing and distribution, and wholesale/retail trade. The tool also lists freight-intensive land uses such as industrial parks, and these were included in the assessment. To isolate large freight generators, results from the ExpertFinder tool were filtered to only include firms that employ 500 or more people, or have revenues greater than $200 million. Projects that are in economically distressed counties[2] and are likely to improve access to these generators received two points; those that are not in economically distressed counties receive one point; and those that do not improve access to a freight generator receive zero points. The likelihood that a project would improve access to a freight generator was based on a ZIP code assessment.

- **Economic impact –** The freight highway network segments were economically ranked using freight flow information from the TRANSEARCH database. This was accomplished by

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[1] The ExpertFinder tools is available at http://innovatekansas.org/expertfinder/.

[2] Economic distress was determined using Economic Development Administration criteria: a 24-month average unemployment rate that is at least one percent higher than the national average, or 2015 per capita money income or per capita personal income that is less than 80 percent of the national average.

estimating the aggregate employment ratio per value of economically relevant Kansas freight movements by direction[3],then applying those ratios to the directional freight values per TRANSEARCH highway link to develop employment impact estimates by link. This was then matched to highway project data in GIS to identify project freight-related impacts. Impact estimates for projects that included two or more highway segments were weighted by the proportion of the project falling within each link. Projects were sorted into bins using their "natural breaks" and scored accordingly.[4]

- **Improved access to targeted industry sectors –** The Kansas Department of Commerce has identified several industries as targeted sectors for the state economy. These include alternative energy (wind, renewable fuels, and solar power); warehousing and distribution; bioscience (animal and human health, bio-energy, and agricultural and bio-based products); advanced manufacturing (aerospace and advanced materials); and value-added agriculture and food processing.[5] Targeted industry data for dairy producers, food processors, and food storage firms was provided by the Kansas Department of Agriculture. Biofuel refining facilities were located using the National Renewable Energy Resources (NREL) Biofuels Atlas.[6] These businesses were cross-referenced with the project list to identify those that were likely to improve access to these industries, using their ZIP codes or actual locations where GIS data were available. Those that do received two points; others received zero points.

Environmental Impacts

Impacts to air quality were assessed qualitatively by reviewing project descriptions. Projects that address a freight bottleneck were assumed to reduce emissions and received eight points; those that do not received zero points.

Table G.1 provides detailed descriptions of the highway freight project prioritization filters, scoring factors, and data sources.

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[3] Economically relevant freight excludes through movements and freight with zero value such as scrap and empty shipping containers. Directionality accounts for the differing impacts of products made in Kansas vs. those that are shipped to the state for sale/consumption.

[4] "Natural breaks" refers to a data clustering method that classifies data points in a series by minimizing each class's deviation from the class mean while maximizing each class's deviation from the means of other classes. It therefore sets boundaries between classes where there are relatively large differences in the data values, i.e. the natural breaks.

[5] http://kansascommerce.com/index.aspx?nid=451

[6] https://maps.nrel.gov/biofuels-atlas/#/?aL=yilN7K%255Bv%255D%3Dt&bL=groad&cE=0&lR=0&mC=40.21244%2C-91.625976&zL=4

Table G.1: Highway Project Scoring Metrics

Freight Plan Goal Area	Prioritization Filter	Project Scoring Factors	Data Source(s)
Mobility	Address Freight Bottlenecks	Addresses freight bottlenecks identified from MPO Long Range Transportation Plans. ▪ Project identified in proximity to bottleneck – 2 points ▪ Project not in proximity to freight bottleneck – 0 points	▪ MPO Long Range Transportation Plans ▪ NPMRDS
Mobility	Reduce Number of Substandard Bridges	Improves or replaces bridge on Kansas Freight Network with vertical clearance of less than 15 ft. or weight restricted to less than 120,000 pounds. ▪ Yes – 2 points ▪ No – 0 points	▪ National Bridge Inventory
Mobility	Enhance Multimodal Freight Connections	Improve/construct connection from freight network to freight rail, intermodal facility, port, or airport or improve/construct truck parking areas for freight network. ▪ Yes – 2 points ▪ No – 0 points ▪ Manual check for truck parking areas, received 2 points also	▪ FHWA Intermodal Facility and Intermodal Connector files ▪ Kansas Rail Plan (shuttle grain elevators) ▪ Manual assessment for rail intermodal facilities ▪ Kansas Statewide Freight Network Parking Plan
Mobility	Improve Freight Network Capacity	Capacity projects that address congested highway segments. ▪ V/C ratio equal to or above .80 – 2 points ▪ V/C ratio less than .80 – 0 points	▪ HPMS
Safety	Improve High Crash Locations	Addresses high truck crash location. Projects were binned by crash rate and scored accordingly. ▪ Top quintile – 8 points ▪ 4th quintile – 6 points ▪ 3rd quintile – 4 points ▪ 2nd quintile – 2 points ▪ Bottom quintile – 0 points	▪ HPMS ▪ KDOT crash data
Economic Development	Improve Access to Freight Generators	Projects improve access route to a freight generator. ▪ Yes, and project is in an economically distressed county – 2 points ▪ Yes, but project is not in an economically distressed county – 1 point ▪ No – 0 points	▪ Kansas Rail Plan (large grain elevators) ▪ InnovateKansas ExpertFinder tool ▪ Economic Development Administration (county level distress indicators)
Economic Development	Economic Impact	Projects were binned by estimated employment impacts using a natural breaks classification and scored accordingly. ▪ Top class – 4 points ▪ 4th class – 3 points ▪ 3rd class – 2 points	▪ TRANSEARCH

Freight Plan Goal Area	Prioritization Filter	Project Scoring Factors	Data Source(s)
		▪ 2nd class – 1 point ▪ Bottom class – 0 points	
Economic Development	Improve Access to Targeted Industry Sector	Project improves access to a Kansas Department of Commerce targeted industry sector. ▪ Yes – 2 points ▪ No – 0 points	▪ Kansas Department of Agriculture (food processing facilities) ▪ National Renewable Energy Laboratory (biofuels facilities) ▪ Kansas Corporation Commission (Wind power)
Environmental Impacts	Reduce Impacts to Air Quality	If a project addresses a freight bottleneck, it will have a positive impact on air quality as a result of less congestion and stop and go traffic. ▪ Yes – 8 points ▪ No – 0 points	▪ Manual Assessment

Results

Tables D.2, D.3, andD.4 provide the Tier 1, 2, and 3 highway freight project lists respectively. Figures D.1, D.2, and D.3 show the locations of the projects on maps.

Table G.2: 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	Interchange Improvements in Wyandotte County	KDOT	Urban
7	I-70	K-7 Interchange	Interchange Improvements in Wyandotte County	KDOT	Urban
8	US-24	K-7 Interchange	Interchange Improvements in Wyandotte County	KDOT	Urban
9	US-24	K-7 Interchange	Interchange Improvements in Wyandotte County	KDOT	Urban
10	I-70	K-7 Interchange	Interchange Improvements in Wyandotte County	KDOT	Urban
11	I-70	K-7 Interchange	Interchange Improvements in Wyandotte County	KDOT	Urban
12	I-70	K-7 Interchange	Interchange Improvements in Wyandotte County	KDOT	Urban
19	I-70	Polk/Quincy Viaduct & approach roadway	Polk/Quincy Viaduct & approach roadway	KDOT	Urban
20	I-70	Polk/Quincy Viaduct & approach roadway	Polk/Quincy Viaduct & approach roadway	KDOT	Urban

Project ID	Route	Location	Improvement	Source	Urban/Rural
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 G.1: Map of Tier 1 Highway Freight Projects

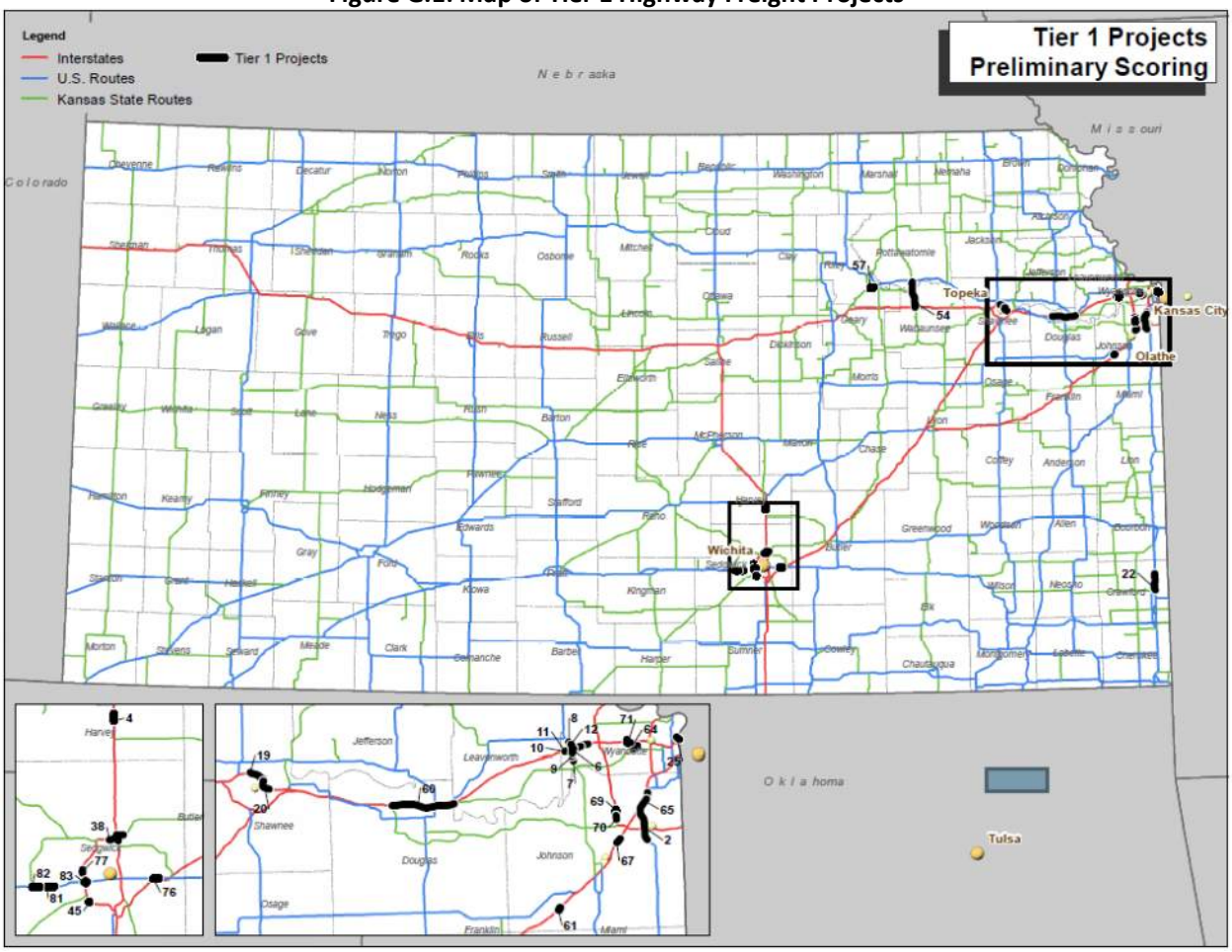


Table G.3: Tier 2 Highway Freight Projects

Project ID	Route	Location	Improvement	Source	Urban/Rural
1	US-54	K-14 west junction to existing 4-lane east of Kingman	Kingman bypass	KDOT	Rural
5	I-70	West of K-25(Colby) to southeast of RS-886(Mingo)	Pavement Replacement in Thomas County	KDOT	Rural
16	US-83	north of Haskell/Finney county line to south junction of US-83/US-83B	Pavement Reconstruction in Finney County	KDOT	Rural
21	US-69	3 miles north of Arma to CR/BB county line	Construct upgradeable expressway in Crawford County	KDOT	Rural
27	US-169	Highway Improvement in Montgomery County	Highway Improvement in Montgomery County	KDOT	Rural
28	US-400	East of US-400/K-7, east for 2 miles	Passing Lanes on US-400 in southeast Kansas	KDOT	Rural
29	US-169	1.5 mile south of RS 11 to north junction of US-169/US-59	Road Reconstruction in Anderson County	KDOT	Rural
32	US-54	US-83 to northeast of RS 1987	Construct 4-lane in Seward County	KDOT	Rural
33	US-54	US-83 to 0.6-mile northeast RS 1987	Construct 4-lane in Seward County	KDOT	Rural
34	I-35	Bridge #001 on I-35 in Johnson County (Sunflower Road)	Bridge Replacement in Johnson County (Sunflower Road)	KDOT	Urban
36	I-235	Bridges #104, #105, #106, #107, #355, #109 & #110 in Sedgwick County	I-235 Bridges Improvements in Sedgwick County (west of I-135)	KDOT	Urban
37	I-435	State Avenue Interchange in Wyandotte County	State Avenue Interchange in Wyandotte County	KDOT	Urban
39	US-50	US-50 in Ford County	Mill, overlay, and passing lanes in Ford County	KDOT	Rural
40	US-50	3rd St. to east junction US-83	Road Reconstruction in Finney County	KDOT	Rural
41	US-169	North of Allen/Neosho County Line to south of US-54	Highway Improvement in Allen County	KDOT	Rural
42	US-169	5 miles north of Allen/Neosho County line north for 7.1 mile	Highway Improvement in Allen County	KDOT	Rural
43	US-169	3 miles north of K-47 to 1.7 miles north of Neosho/Allen County Line	Roadway Reconstruction in Neosho County	KDOT	Rural
49	US-69	Bridge #004 on US-69 in Crawford County	Bridge Replacement in Crawford County (north of US-160)	KDOT	Rural

Project ID	Route	Location	Improvement	Source	Urban/Rural
53	US-54	Intersection Improvements at Barber Drive	Intersection Improvements in Sedgwick County	KDOT	Urban
58	K-18	Wildcat Creek Drive to I-70		Flint Hills	Urban
59	K-10/South Lawrence Trafficway	US-59/Iowa W to I-70/Kansas Turnpike	Widen to 4 lanes with a New Interchange at Wakarusa	Lawrence	Urban
62	K7, Dennis to Santa Fe Turn Lane additions	K7, Dennis to Santa Fe Turn Lane additions	Add turn lanes on K-7 (Parker St.) between Dennis Ave and Santa Fe	MARC	Urban
68	191st Street	191st Street, Gardner Road to Four Corners	Improve 191st Street to asphalt 40-foot roadway and curb and gutter	MARC	Urban
75	SW Wanamaker Rd./SW Huntoon St/I-470 Ramps		Roadway/Repair/Replace	Topeka	Urban
78	KTA bridge - 159th St. E.	KTA bridge - 159th St. E.	Bridge	WAMPO	Urban
79	KTA Bridge - Prairie Creek Rd.	KTA Bridge - Prairie Creek Rd.	Bridge	WAMPO	Urban
80	61st St. N.	Broadway west 1/2 mi to W-VCF Bridge	Road	WAMPO	Urban
85	K-15	I-135 to 71st Street S (Meadowlark Blvd)	Signal Coordination/Interconnect	WAMPO	Urban

Figure G.2: Map of Tier 2 Highway Freight Projects

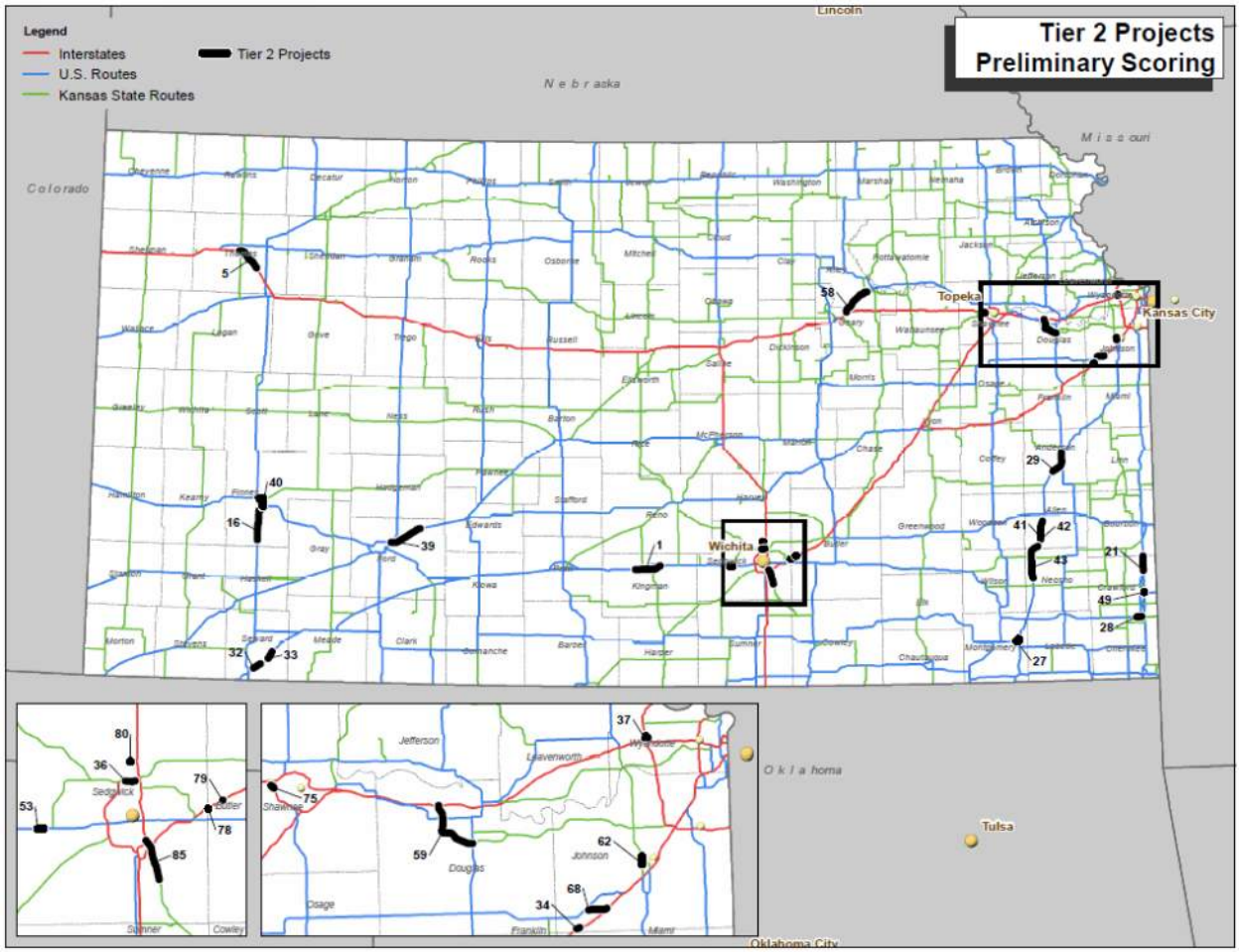
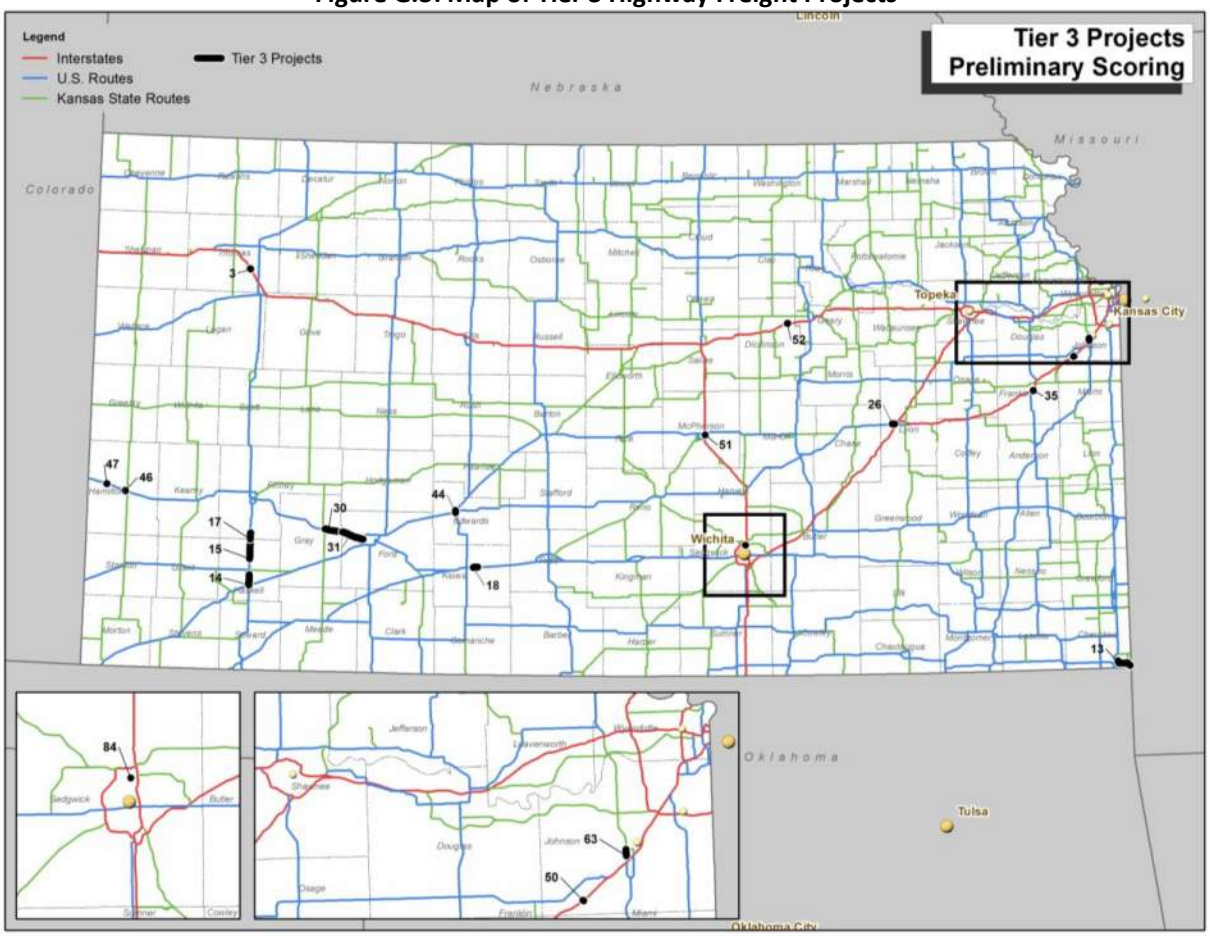


Table G.4: Tier 3 Highway Freight Projects

Project ID	Route	Location	Improvement	Source	Urban/Rural
18	US-54	US-54 in Greensburg Area	Construct Interchange on US-54 in Kiowa County	KDOT	Rural
3	I-70	South Fork Solomon River (Bridge #027)	Replace Bridge on I-70 in Thomas County	KDOT	Rural
13	US-400	Pittsburg Bypass to Kansas/Missouri Line	Highway Improvements on US-166 in Cherokee County	KDOT	Rural
14	US-83	Sublette to South of US-160	Pavement Reconstruction on US-83 in Haskell County	KDOT	Rural
15	US-83	4.5 miles north of US-160 to Haskell/Finney County Line	Pavement Reconstruction on US-83 in Haskell County	KDOT	Rural
17	US-83	Haskell/Finney County Line north for 2.5 miles	Pavement Reconstruction on US-83 in Finney County	KDOT	Rural
26	US-50	4.5 miles east of Lyon/Chase County Line to existing 4-lane	Construct 4-Lane Expressway US-50 in Lyon County	KDOT	Rural
30	US-50	Cimarron east limits to Gray/Ford County line	Roadway Reconstruction in Gray County	KDOT	Rural
31	US-50	Gray/Ford County line to 1.7 miles east of US-50/US-400	Construct 4-lane Expressway on US-50 in Ford County	KDOT	Rural
35	I-35	Bridge #025 on I-35 in Franklin County	Bridge Replacement in Franklin County (Montana Rd)	KDOT	Rural
44	US-183	Kinsley to US-56	Roadway Reconstruction in Edwards County	KDOT	Rural
46	US-50	Bridge #019 on US-50in Hamilton County	Bridge Replacement on US-50 in Hamilton County (Warner Rd)	KDOT	Rural
47	US-50	Bridge #010 on US-50in Hamilton County	Bridge Replacement on US-50 in Hamilton County (E Bridge Creek)	KDOT	Rural
50	I-35	Bridge #007 on I-35 in Johnson County (199th Street)	Bridge Replacement in Johnson County (199th St)	KDOT	Urban
51	I-135	Bridge #025 on I-135 in McPherson County	Bridge Replacement on I-135 in McPherson County (Kiowa Rd)	KDOT	Rural
52	I-70	Bridge #030 on I-70 in Dickinson County	Bridge Replacement on I-70 in Dickinson County (Chapman Creek)	KDOT	Rural
63	Lone Elm Rd old 56 Hwy to 151st St	Lone Elm Rd old 56 Hwy to 151st St	Widen from 2-lane to a 4-lane divided arterial	MARC	Urban

Project ID	Route	Location	Improvement	Source	Urban/Rural
84	29th St. N. & Broadway Intersection	29th St. N. & Broadway Intersection	Intersection Improvements	WAMPO	Urban

Figure G.3: Map of Tier 3 Highway Freight Projects



Rail

Rail project scoring relied on more manual techniques since GIS data are not as widely available. The rail scoring criteria and methodology are described below.[7]

Mobility

- **Improves freight rail bottlenecks or adds capacity to rail freight network –** Projects were evaluated manually to assess whether they improve a freight rail bottleneck or add capacity to the rail network. This includes projects to improve track to 286,000 lb. standard. Those that do received two points, while those that do not received no points.

- **Improves rail access to freight generators –** This metric used the same definition of freight generators as in the highway mode. Projects received two points if they are proximate to a Kansas freight generator, as measured by a ZIP code analysis in GIS.

Safety

Rail crossing safety projects were assessed by compiling Federal Railroad Administration (FRA) grade crossing data by county for the most recent five years. Grade crossing projects were awarded four points if they are in a county with more than 10 grade crossing accidents during this period, while those in counties with between five and 10 incidents got one point and those in counties with fewer than five accidents received no points.

Economic Development

Economic development impacts were evaluated based on probable truck traffic delay at grade crossings. The TRANSEARCH highway link data developed in the highway scoring process was used to identify roadway links that cross Class I rail lines. Intersections that are already grade separated were excluded since they are not creating truck delay. Projects that are proposing grade separations for the remaining crossings received scores by quintile ranging from zero to four points based on the link economic impact factors calculated for the highway assessment.

Environmental Impacts

Rail freight projects were assessed to determine whether they address a bottleneck or if they are likely to shift freight from trucks to rail; if they meet either criteria, they received four points.

Table G.5 lists the proposed freight rail project prioritization filters, scoring factors, and data sources.

[7] Note that rail projects were not scored or ranked since only 12 of them were identified for the prioritization process. However, the proposed method is described here as a reference for future prioritization efforts.

Table G.5: Proposed Freight Rail Project Scoring Metrics

Freight Plan Goal Area	Prioritization Filter	Project Scoring Factors	Data
Mobility	Improves Freight Rail Bottlenecks or Adds Capacity to Network for Freight	Adds capacity through double tracking, improved signalization, and/or new or expanded passing sidings or addresses other rail bottlenecks, or improves track to 286,000 lb. standard. ▪ Yes – 2 points ▪ No – 0 points	▪ Manual
Mobility	Improve Rail Access to Freight Generators	Project is proximate to a Kansas freight generator. ▪ Yes – 2 points ▪ No – 0 points	▪ InnovateKansas ExpertFinder tool
Safety	Improves Rail Safety	Address crash locations reducing rail/vehicle interfaces. County-level crash data from the FRA was converted to points as follows: ▪ Counties > 10 accidents during period - 4 points ▪ Counties with 5-10 accidents during period – 2 points ▪ Counties <5 accidents during period – 0 points	▪ Federal Railroad Administration
Economic Development	Reduces Delays to Truck Traffic at Grade Crossings	Cross-reference grade separation projects with highway link network data from TRANSEARCH to identify locations where rail traffic is delaying truck traffic. ▪ Top quintile – 4 points ▪ 4th quintile – 3 points ▪ 3rd quintile – 2 points ▪ 2nd quintile – 1 point ▪ Bottom quintile – 0 points	▪ TRANSEARCH
Environmental Impacts	Reduces Impacts to Air Quality or Promotes Mode Shift from Truck to Rail	If a project addresses a freight bottleneck or encourages mode shift from trucks to rail, it will have a positive impact on air quality. ▪ Yes – 4 points ▪ No – 0 points	▪ Manual

Results

Table G.6 shows the Tier 1 rail freight projects (i.e., all 12 rail projects identified during the prioritization process). Figure G.4 depicts the location of each project, except for the more general project needs that could not be mapped since they do not apply to a specific location.

Table G.6: 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
****	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.

Figure G.4: Map of Tier 1 Rail Freight Projects