2 Oklahoma's Freight Story Today

This chapter summarizes current and forecast freight flows by tons and value. For truck, rail, water, air, and pipeline modes, it presents information on the systems, their utilization, their key facilities, and their issues and needs. This chapter also addresses new areas of emphasis for freight plans including commodity supply-chain analysis, accommodation of military freight movements, truck parking, and through traffic for other states.

2.1 OVERVIEW

The reliability, cost, speed, safety, and resiliency of freight transportation is critical to Oklahoma. In 2017, an estimated 435.5 million tons of freight worth **$300.1 billion** were transported into, out of, or within the state by truck, rail, water, air, and pipeline. This included critical commodities – food and agriculture products, fuels, building materials, motorized vehicles, electronics, machinery, pharmaceuticals, other chemicals, etc. – which must be moved to market by Oklahoma's industries, and which must be received by Oklahoma's businesses and residents. Between 2017 and 2045, Oklahoma freight movement into, out of, or within the state is projected to increase to 588.5 million tons worth $497.6 billion. Planning to accommodate current activity and future growth while maintaining the safety, reliability, and overall performance of the state's multimodal freight transportation system is essential for the well-being of the state's economy and people.

2.2 FREIGHT FLOWS BY ALL MODES

The combined movements of all freight – all modes, directions, commodities, and trade types – are referred to as "commodity flows." Commodity flow analysis is a key element of freight plans, as it provides a comprehensive view of the main functions and service characteristics of Oklahoma's multimodal freight system. Commodity flow estimates starting in 2017 and extending through 2045 and 2050 are available from the U.S. DOT Freight Analysis Framework (FAF) version 5.3. FAF provides estimates of total tonnage and value moving to, from, and within each state and the nation as a whole. These estimates can be further refined by trade type (domestic or international), domestic mode, foreign mode, origin/destination State or Census-designated Business Economic Area, and general commodity group.[5] FAF also provides interim year estimates, including projections covering the current year; however, given that 2017 is the original source year for survey data underlying FAF and that "normal" freight patterns have been disrupted over the past few years, 2017 data is used to represent current conditions.

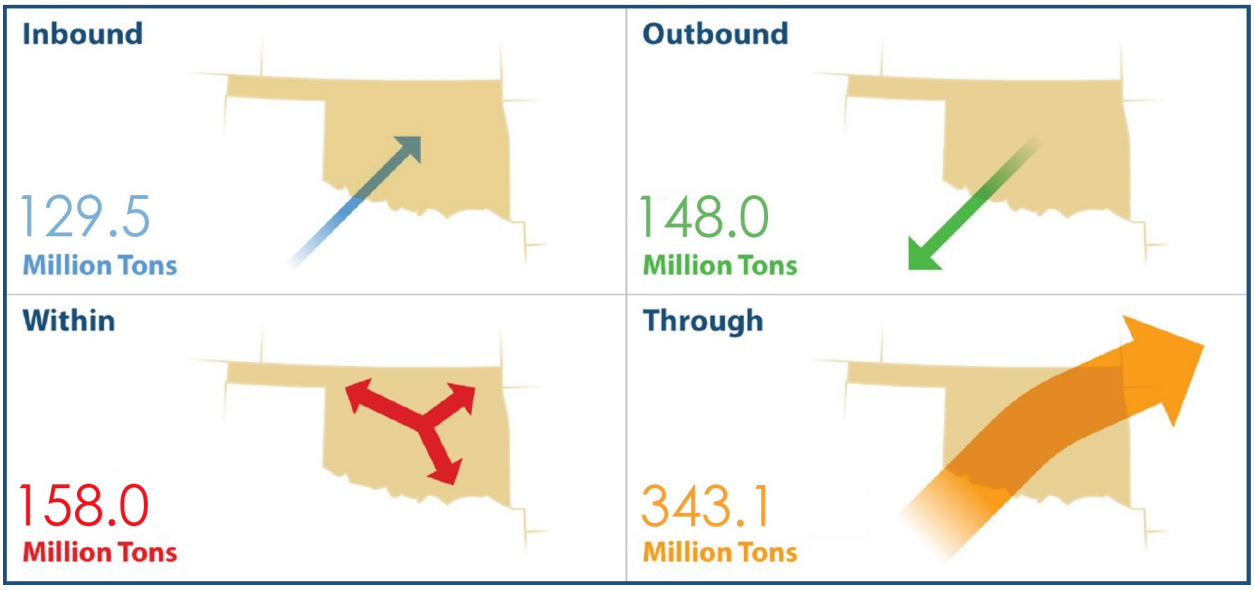
2.2.1 Freight Flows by Direction

Figure 2-1 shows total freight flows by direction (inbound, outbound, within state, and through). The inbound, outbound, and within-state estimates are directly from FAF. Through freight

[5] See current FAF documentation and tools at https://ops.fhwa.dot.gov/freight/freight_analysis/faf/.

refers to commodity moves that begin and end in other states, passing through Oklahoma and utilizing its transportation system. FAF does not estimate through freight directly, so post-processing was employed to generate this estimate.[6]

Figure 2-1. Oklahoma Freight Flows (2017) by Direction



Source: Analysis of Freight Analysis Framework 5.3 plus through estimates from WSP FAF Disaggregation (2017 data) and 2022 State Rail Plan (2019 data for pass-through rail only)

2.2.2 Freight Flows by Commodity

Oklahoma's top 10 tonnage commodities account for 76.7 percent of the state's inbound, outbound, and within-state tonnage (Table 2-1).

- The leading tonnage commodity is petroleum and coal products not elsewhere classified (n.e.c.), which includes natural gas, representing more than one-fourth of state tonnage.
- Crude petroleum is another highly significant tonnage commodity, representing 13.6 percent of state tonnage.
- Gravel represents 8.2 percent of state tonnage. Petroleum products, crude petroleum, and gravel combined represent 47.7 percent of state tonnage.

[6] Estimates for pass-through truck flows were generating using a county-to-county FAF disaggregation developed by WSP and routed over the NHS using a proportional (versus "all or nothing") route assignment process. These estimates are useful for order-of-magnitude comparison but are not based on actual counts or telematics data; corridor-specific tabulations based on origin-destination observations from GPS or similar data might show different results. Through estimates for rail flows were provided from the Oklahoma SRP based on analysis of Surface Transportation Board Waybill data. Note that estimates of through freight flows contained in previous state plans were somewhat higher, which may be due to difference in how the flow volumes were previously estimated and assigned to the national highway system.

- Other significant commodity tonnage is associated with gasoline, fuel oils, nonmetallic mineral products, cereal grains, natural sands, waste and scrap, and mixed freight. Note that waste and scrap includes both "commodity" waste (such as recyclable paper, glass, metals, or other materials with commercial value) as well as municipal waste with no commercial value. Also note that mixed freight includes combined shipments of different higher-value commodities, often moving to/from warehouse and distribution facilities, and usually in "dry van" trucks or intermodal shipping containers.

Table 2-1. Oklahoma Freight Tons by Commodity, 2017

	Tons (M)	Share of Tons	Cumulative Share
GRAND TOTAL	**435.5**		
Petroleum and coal products n.e.c.	112.8	25.9%	25.9%
Crude petroleum	59.2	13.6%	39.5%
Gravel	35.8	8.2%	47.7%
Gasoline	28.0	6.4%	54.1%
Fuel oils	24.0	5.5%	59.7%
Nonmetallic mineral products	20.6	4.7%	64.4%
Cereal grains	16.1	3.7%	68.1%
Natural sands	16.0	3.7%	71.8%
Waste/scrap	11.7	2.7%	74.4%
Mixed freight	9.7	2.2%	76.7%

Source: Freight Analysis Framework 5.3. Excludes pass-through traffic.

Oklahoma's top 10 value commodities account for 60.2 percent of the state's inbound, outbound, and within-state value. The leading commodity is mixed freight at 9.5 percent of value; mixed freight represents a much higher share of value (9.5 percent) than tonnage (2.2 percent), consistent with the high value per unit in this commodity group. Other commodity groups with high shares of value include petroleum and coal products n.e.c.; machinery; crude petroleum; electronics; gasoline; miscellaneous manufactured products; articles of base metal; and pharmaceuticals (Table 2-2).

Table 2-2. Oklahoma Freight Value by Commodity, 2017

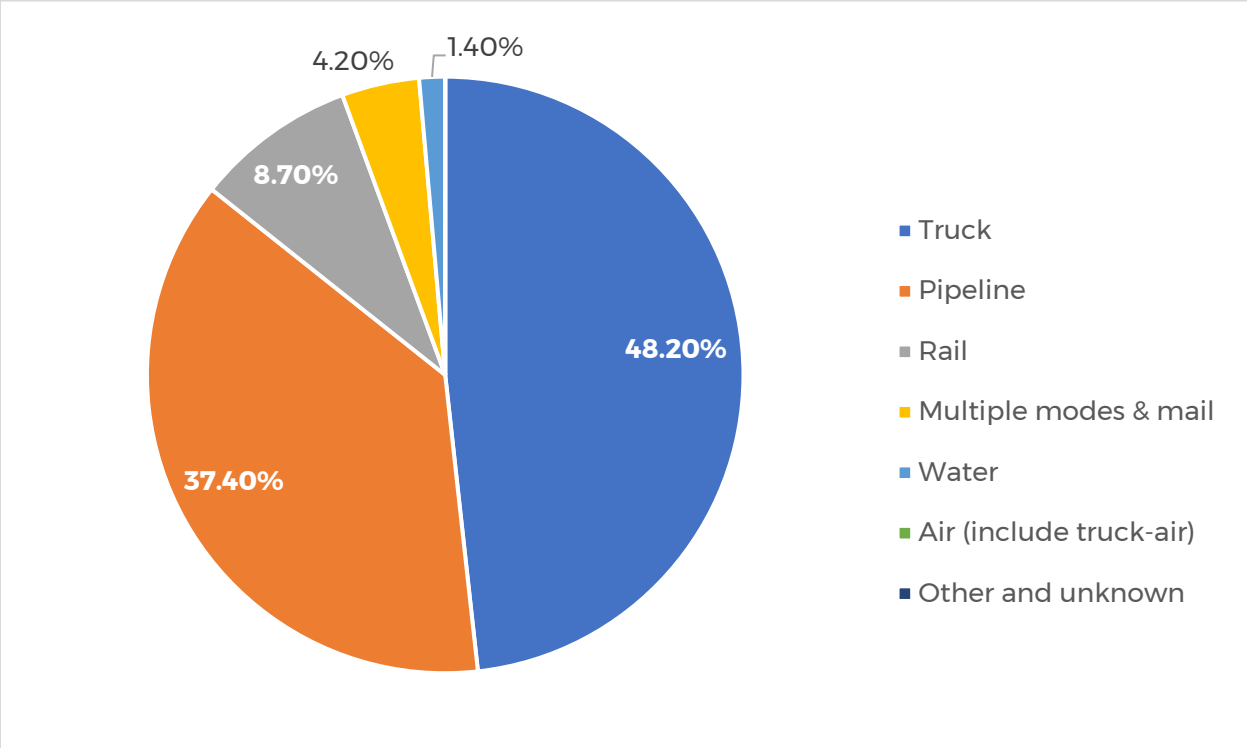
	Value ($B)	Share of Value	Cumulative Share
GRAND TOTAL	**300.1**		
Mixed freight	28.5	9.5%	9.5%
Petroleum and coal products n.e.c.	27.2	9.1%	18.6%
Machinery	21.5	7.2%	25.7%
Crude petroleum	18.8	6.3%	32.0%
Electronics	17.4	5.8%	37.8%
Gasoline	14.8	4.9%	42.7%
Motorized vehicles	14.5	4.8%	47.6%
Miscellaneous manufacturing products	13.1	4.4%	51.9%
Articles of base metal	12.7	4.2%	56.1%
Pharmaceuticals	12.1	4.0%	60.2%

Source: Freight Analysis Framework 5.3. Excludes pass-through traffic.

2.2.3 Freight Flows by Mode

Oklahoma's top domestic transportation mode by tonnage is truck (48.2 percent), followed by pipeline (37.4 percent), rail (8.7 percent), multiple modes and mail (which represents different combinations of modes, at 4.2 percent), and water (1.4 percent) (Figure 2-2).

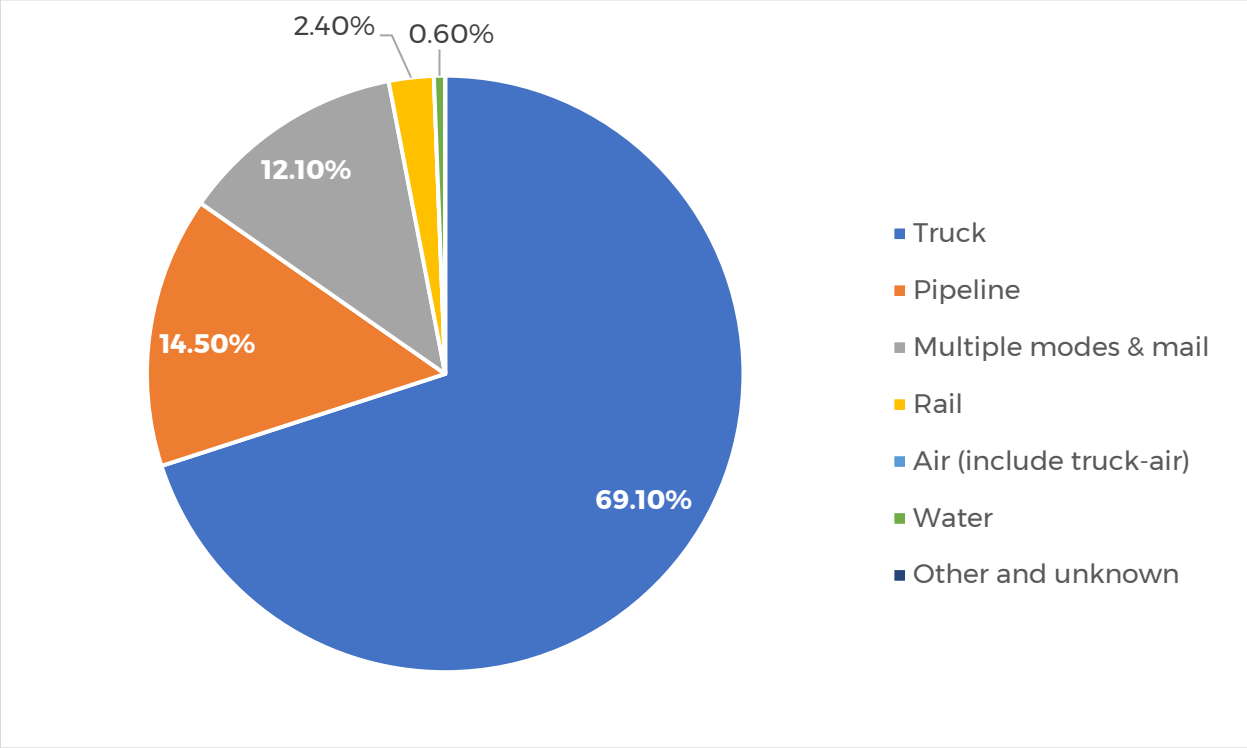
Figure 2-2. Oklahoma Freight Tons by Mode, 2017



Source: Freight Analysis Framework 5.3. Excludes pass-through traffic.

Oklahoma's top domestic transportation mode by value is truck (69.1 percent), followed by pipeline (14.5 percent), multiple modes and mail (12.1 percent), rail (2.4 percent), air (1.6 percent) and water (0.6 percent). See Figure 2-3.

Figure 2-3. Oklahoma Freight Value by Mode, 2017



Source: Freight Analysis Framework 5.3. Excludes pass-through traffic.

2.2.4 Freight Flows by Trade Type

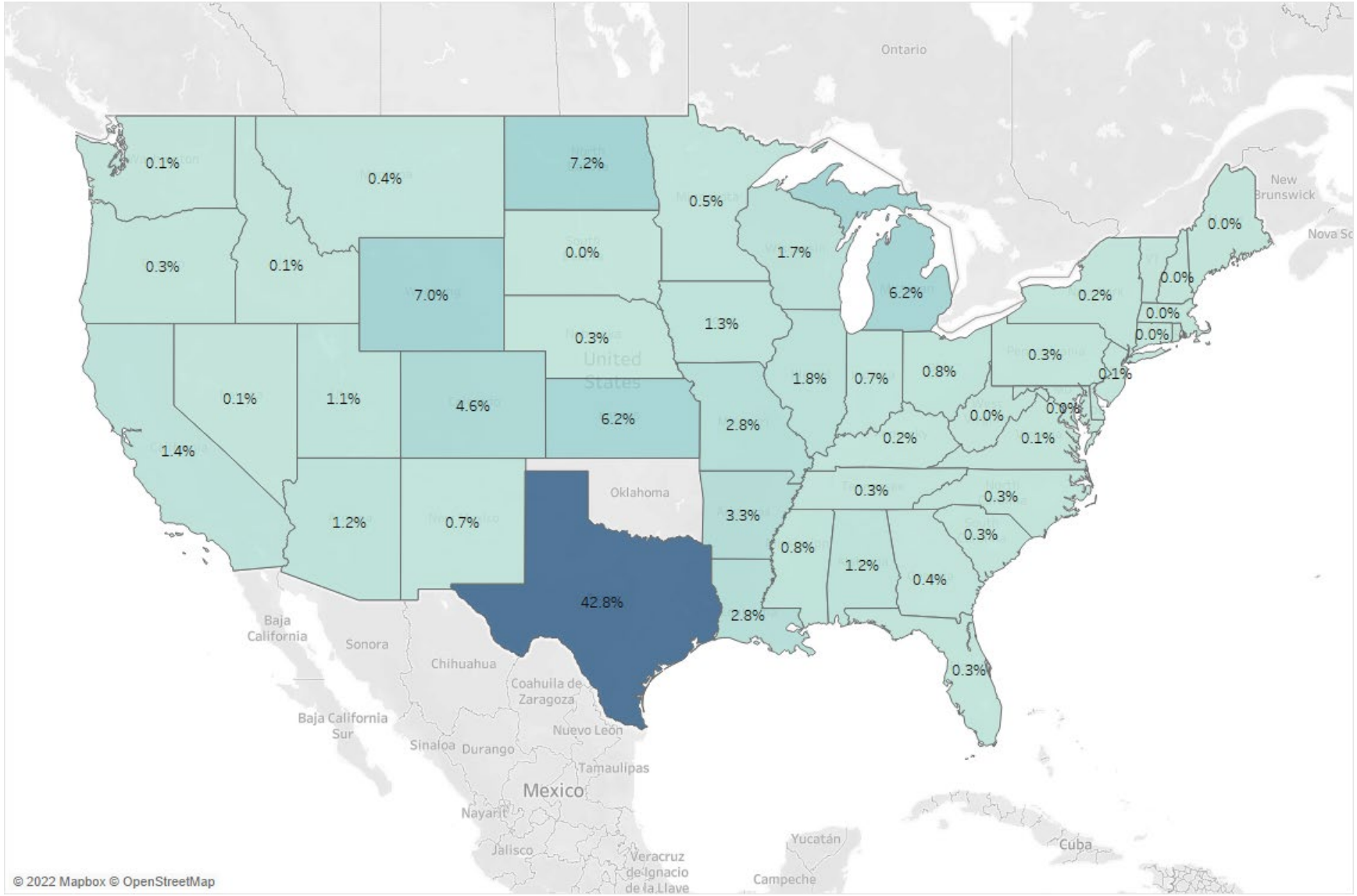
According to FAF 5.3 for year 2017, Oklahoma generated 1.6 million tons of export commodities worth **$5.5 billion** and received 16.8 million tons of import commodities worth $12.0 billion, representing around 4.2 percent of total tonnage and 5.7 percent of total value.

2.2.5 Freight Flows by Origin and Destination of Oklahoma Tonnage

For tonnage moving inbound to Oklahoma, the leading origin state by far is Texas (42.8 percent) followed by North Dakota (7.2 percent), Wyoming (7.0 percent), Kansas (6.2 percent), Michigan (6.2 percent), and Colorado (4.6 percent). See Figure 2-4

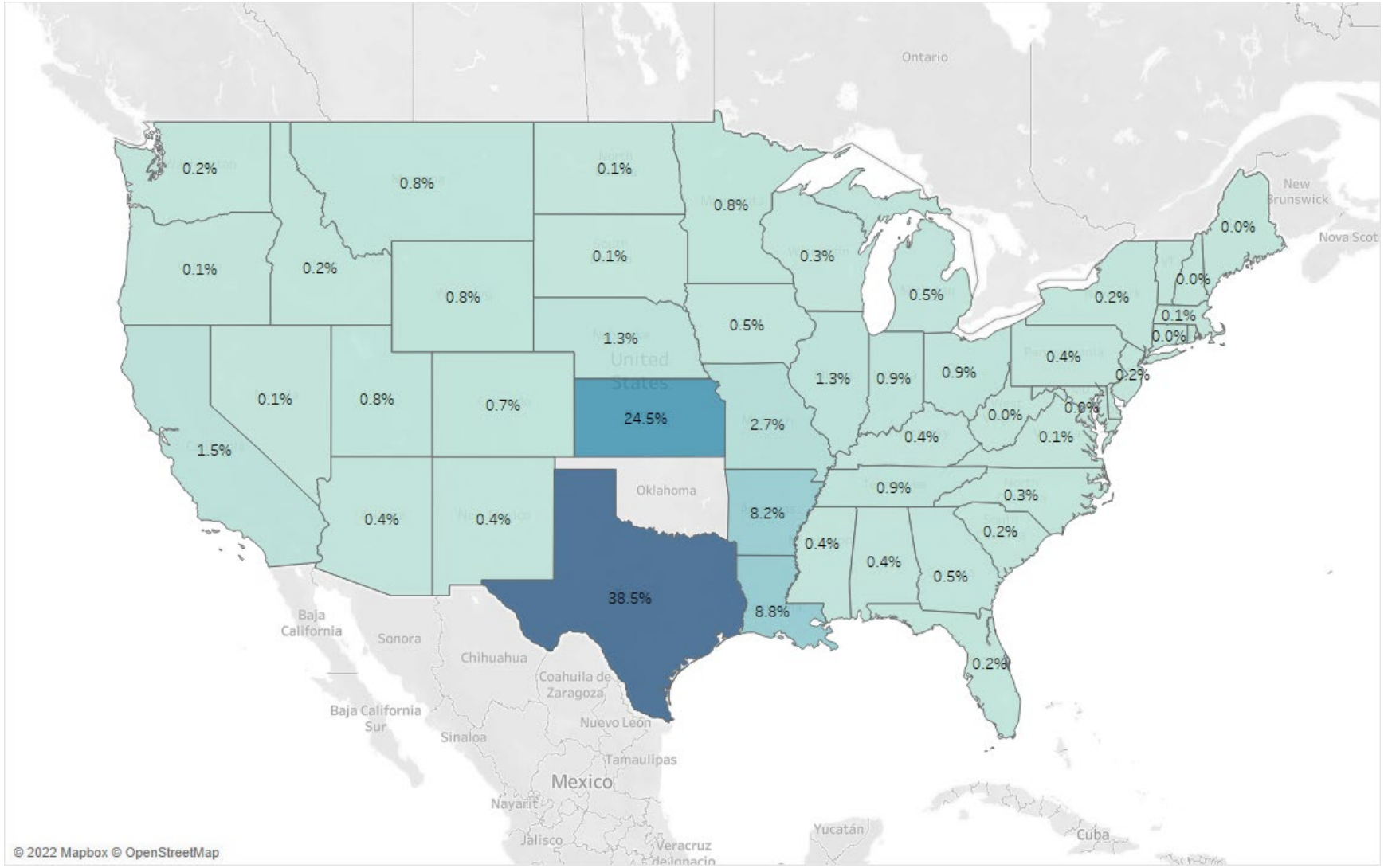
For tonnage outbound from Oklahoma, the leading destination state is Texas (38.5 percent) followed by Kansas (24.5 percent), Louisiana (8.8 percent), and Arkansas (8.2 percent). See Figure 2-5.

Figure 2-4. Origin States for Inbound Oklahoma Freight Tonnage, 2017



Source: Freight Analysis Framework 5.3. Excludes pass-through, outbound, and internal traffic.

Figure 2-5. Destination States for Outbound Oklahoma Freight Tonnage, 2017



Source: Freight Analysis Framework 5.3. Excludes pass-through, outbound, and internal traffic.

2.3 THE HIGHWAY SYSTEM

2.3.1 Oklahoma Highways and Truck Freight Flows

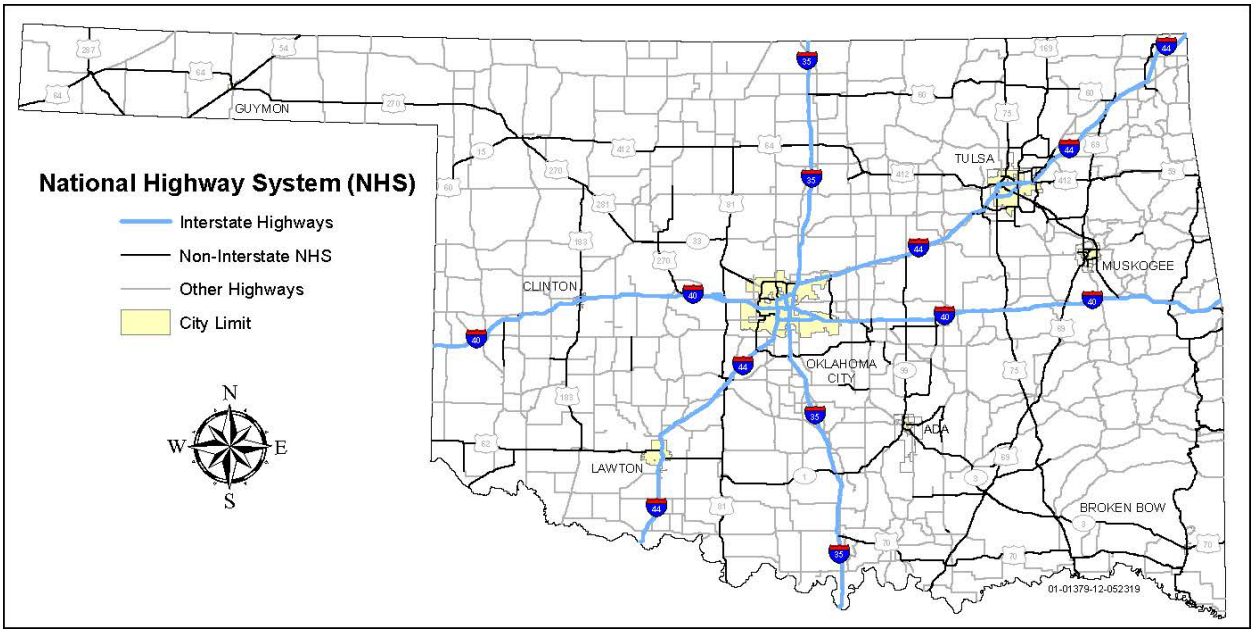
ODOT and the OTA are responsible for 12,854 highway system miles. Cities, towns, and counties are responsible for the remainder of the public road system, which are primarily minor collectors and local streets.

The State Highway System serves industries and population centers as well as freight passing through Oklahoma that originates and terminates in other states. By virtue of its location, Oklahoma is a crossroads of highway commerce. Table 2-3 summarizes the ODOT highway mileage by type. Figure 2-6 illustrates Oklahoma's National Highway System (NHS) routes.

Table 2-3. Oklahoma Highway Mileage by Classification

Year	Interstate	Other Freeways and Expressway	Other Principal Arterial	Minor Arterial	Major Collector	Total
2016	933	195	2,982	2,886	5,856	12,852
2021	933	224	2,962	2,888	5,848	12,854

Figure 2-6. Oklahoma's National Highway System Routes

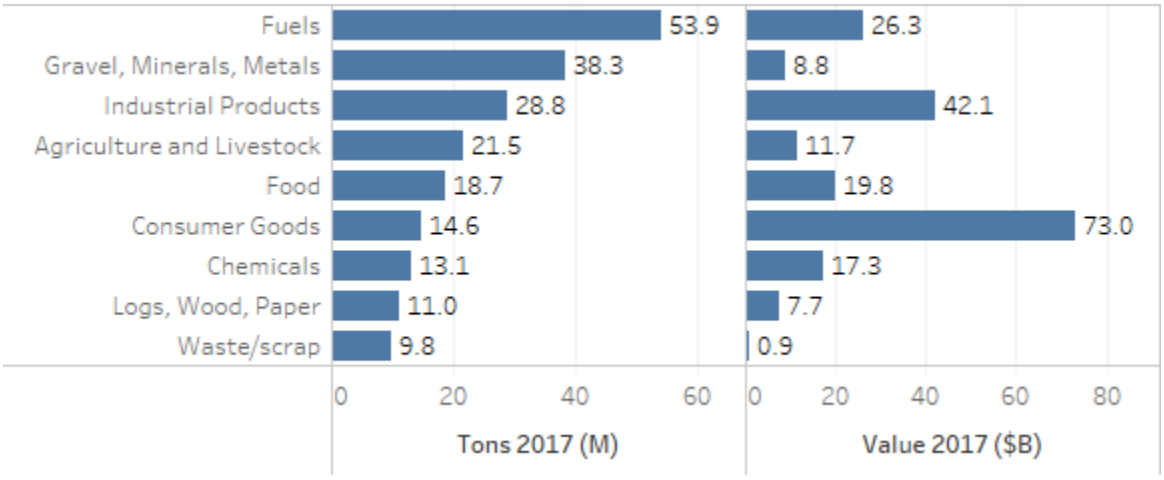


Source: Oklahoma DOT

2.3.2 Top Commodities by Truck Into, Out Of, and Within Oklahoma

The top supply-chain groups for truck tonnage and value are shown in Figure 2-7. The leading groups by tonnage are fuels; gravel, metals, and minerals; industrial products; agriculture and livestock; and food. The leading groups by value are consumer goods, industrial products, fuels, food, and chemicals.

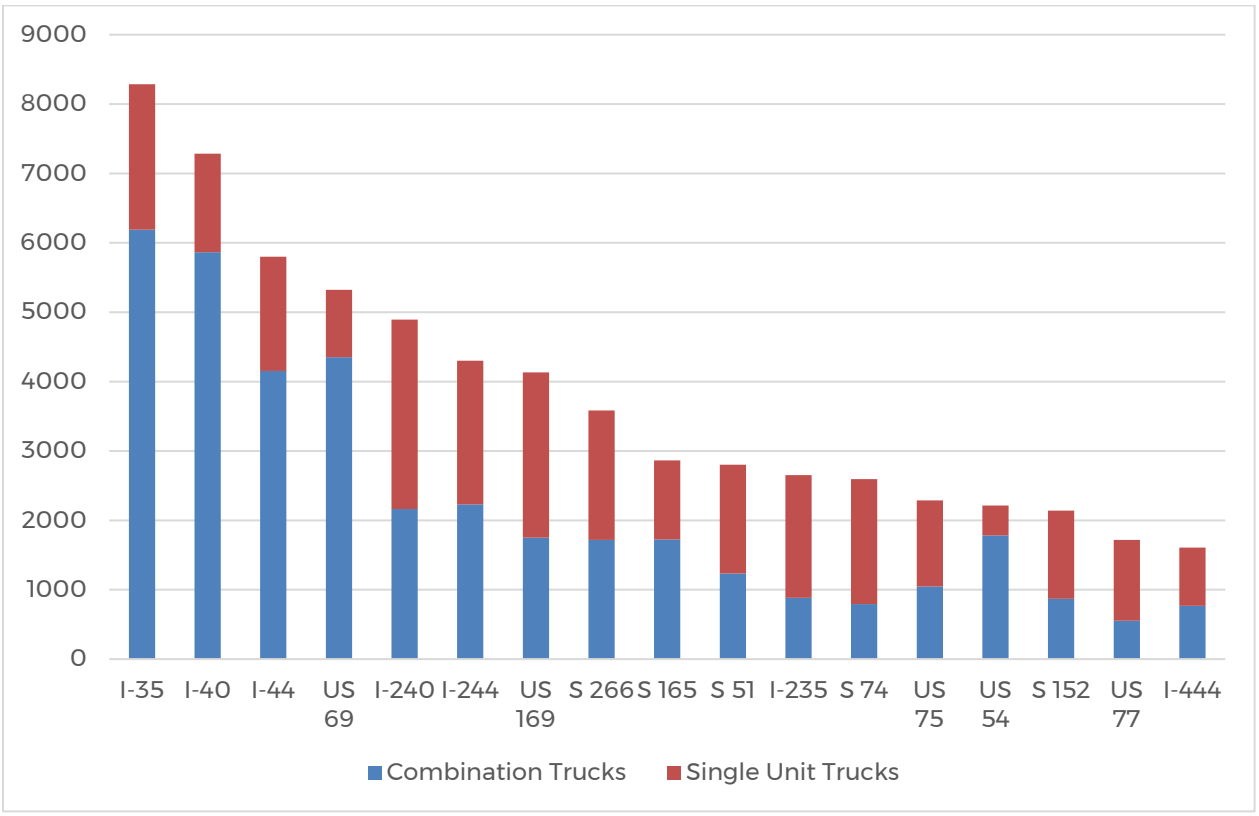
Figure 2-7. Top Oklahoma-Based Supply Chain Groups by Truck, Tons and Value, 2017



Source: Freight Analysis Framework 5.3

Figure 2-8 shows the Oklahoma highways that have the greatest truck volumes. Interstate (I-) 35 and I-40 have the most trucks, followed by I-44 and U.S. Route (US-) 69, with each of these facilities carrying more than 5,000 trucks per day. US-69 is a key north-south route that runs from Minnesota to Texas, forming an important connection between the Midwest and Dallas. It also intersects I-44 and I-40 in Oklahoma.

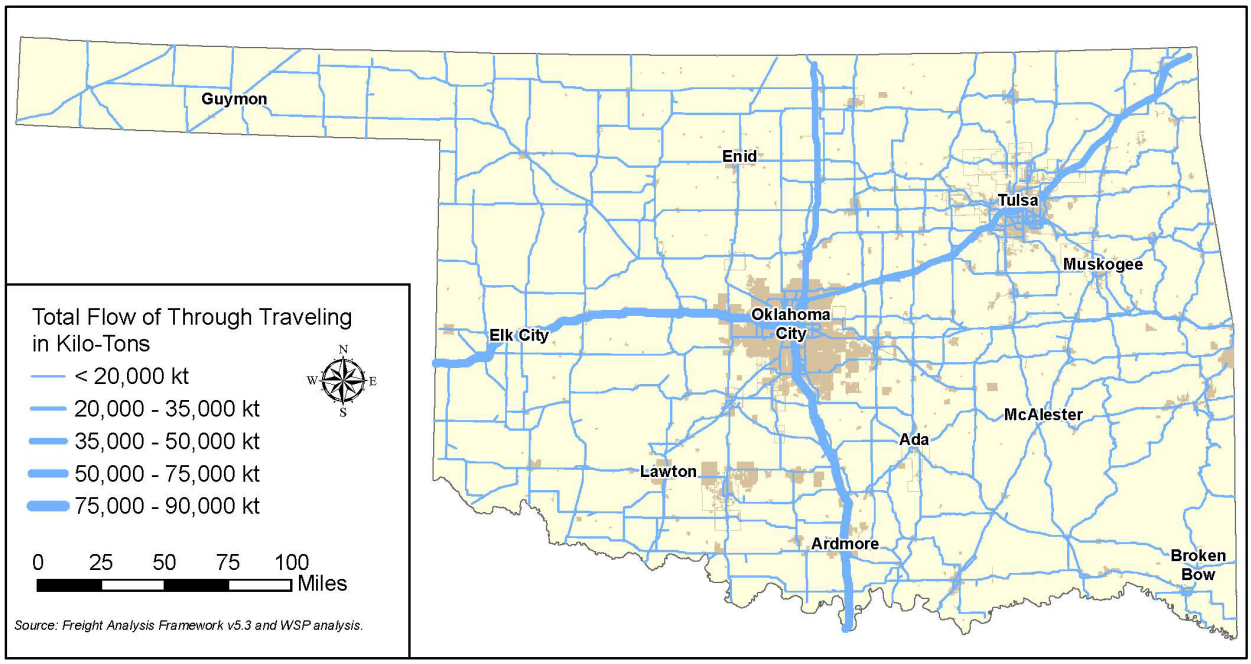
Figure 2-8. Major Oklahoma Truck Traffic Highways (2021)



Source: Oklahoma Department of Transportation, Traffic Analysis Branch, 2022

Figure 2-9 illustrates the volume of truck traffic over Oklahoma's highways.

Figure 2-9. Volume Flows on Oklahoma Highways, 2017



Source: Freight Analysis Framework 5.3, and WSP analysis.

2.3.3 ODOT Intelligent Transportation System Program

The ODOT ITS program employs and maintains technologies that benefit freight and is planning to expand its effort. This program works in parallel with project development to improve operations on the State Highway System. ITS improvements will benefit freight transportation considerably, as well as support this OFTP's goals of safety, infrastructure preservation, mobility, economic vitality, environmental responsibility, and efficient system management and operation.

The chief ITS initiatives include the following:

- Dynamic message signs (DMSs)
- Land mobile radio for first responders
- Road weather information system (RWIS)
- Bluetooth sensors to provide commercial motor vehicle origin and destination data
- Vehicle-to-infrastructure communications

ODOT manages 3,310 linear miles of fiber optics and has 66 DMSs installed statewide. While these ITS technologies help trucks and general traffic, ODOT has freight-specific applications. For example, ODOT is adding permanent full-size DMSs in both directions near the Ports of Entry around the state. The Ports of Entry personnel will be able to view and control the cameras. In addition, ODOT is installing more DMSs and cameras around the state – typically in metropolitan areas.

ODOT is expanding the Land Mobile Radio system to be statewide on a mesh network of Multiprotocol Label Switching equipment. In terms of traffic incident management, ODOT is replacing its static, public facing map with one that will report the latest road and weather conditions in real-time.

The RWIS expansion project has added 15 new sites at critical bridges along I-35 (border to border) to supplement six previous sites. ODOT also plans to add RWIS at critical locations along I-40 (border to border). The system will provide pavement, bridge deck, and subsurface temperatures, as well as moisture and air temperatures. This data will be available to field divisions to inform decisions about deployment of roadway maintenance personnel. In addition to being more efficient, it will improve roadway operations and safety – a significant factor for trucking.

ODOT has a contract with state universities to explore the use of Bluetooth sensors along I-35 and I-44, and in the Oklahoma City and Tulsa metropolitan areas. This will allow determination of origin-destination for trucks. Another demonstration project will use technology applications to develop computer recognition of vehicle classification.

These technologies allow ODOT to obtain and disseminate more up-to-the-minute information about highway conditions, which improve efficiency of operations and vehicular travel.

2.3.4 Heavy Cargo, Heavy Loads

Better ways to manage heavy cargo is a growing need in every state. For the purposes of developing a federally-compliant freight plan, the definition of heavy loads includes regulation-size vehicles carrying heavy cargo, oversize/overweight loads (OSOW), and superloads. Harmonization of regulations and processes across state lines is an important topic in most states, especially those like Oklahoma that are in the middle of the country and experience a great deal of interstate transport.

Heavy Cargo

Various industries – including construction, energy, and agriculture – use fully loaded regulation-size vehicles carrying heavy cargo. Heavy cargo includes construction aggregates, fuels (including hydrogen), water furnished to well sites, and heavy farm or oil rig equipment.

Oversize/Overweight Loads

Oklahoma's highways support the movement of regular and OSOW loads in accordance with state and federal statutes. OSOW loads are trucks whose dimensions and/or weight limits exceed legal limits, and with some exceptions, cannot be split into multiple smaller loads. The Oklahoma weight threshold for the common tractor trailer combinations is 80,000 pounds on interstate highways and 90,000 pounds on non-interstate highways. Many states, including Oklahoma, have automated permit processes and capture data for reference and planning. The automated permitting and routing system in Oklahoma is managed by the Oklahoma Department of Public Safety. Known as Oklahoma Permitting and Routing Optimization System (OKiePROS8), the system speeds the approval process even for loads wide enough to

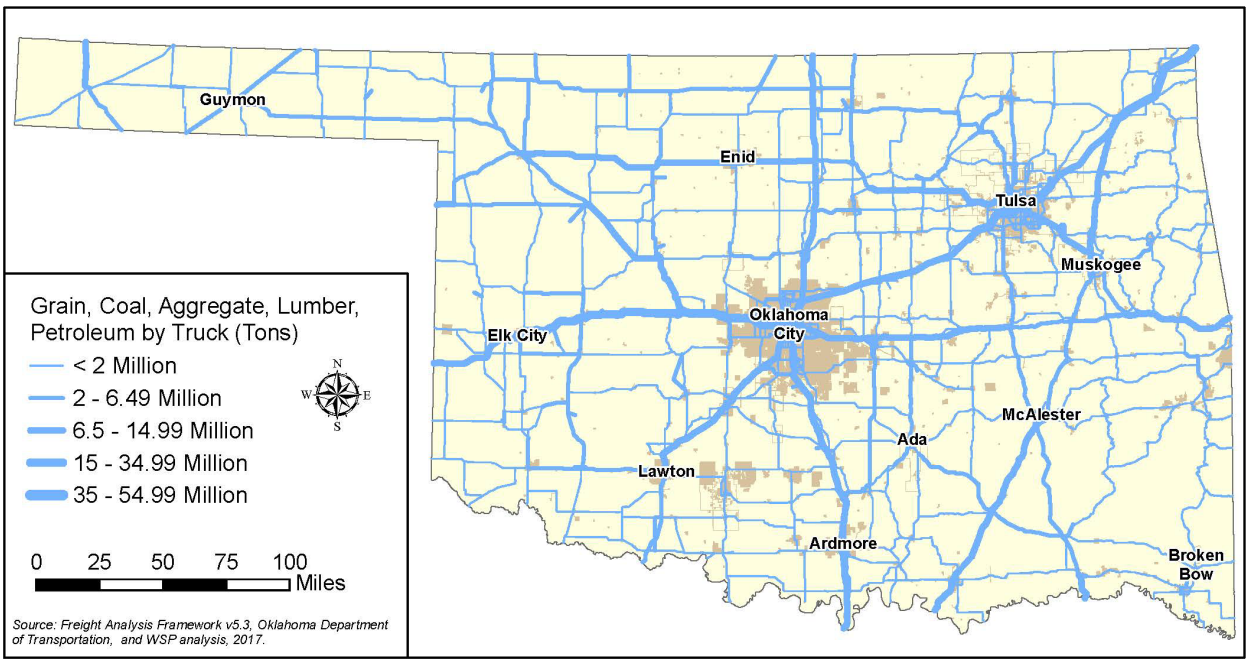
affect two lanes. Creation and maintenance of databases from such systems is an important component to improving the efficiency of interstate operations.

Superloads

Loads or vehicles that are 16 feet wide by 21 feet high and 180,000 pounds or more are considered superloads in Oklahoma. When a load extends beyond the maximum dimensions or weight of a routine single-trip permit, it is subject to additional permitting requirements. Energy-related businesses rely on this type of shipment, and wind energy components and drilling and mining equipment are moving in regions not previously traversed by this type of cargo. Agricultural equipment – implements of animal husbandry – forms a special class of OSOW requirements. The axle ratios on this equipment differ from trucks and can present special challenges for geometries, clearances, and load-bearing capacities.

Figure 2-10 maps the flow of trucks with heavy commodity types traveling over the Oklahoma State Highway System, based on FAF 5.3 volume flow assignments.

Figure 2-10. Heavy Commodity Truck Flows, 2017



Source: WSP Analysis of Freight Analysis Framework v5.3

2.3.5 Truck Parking

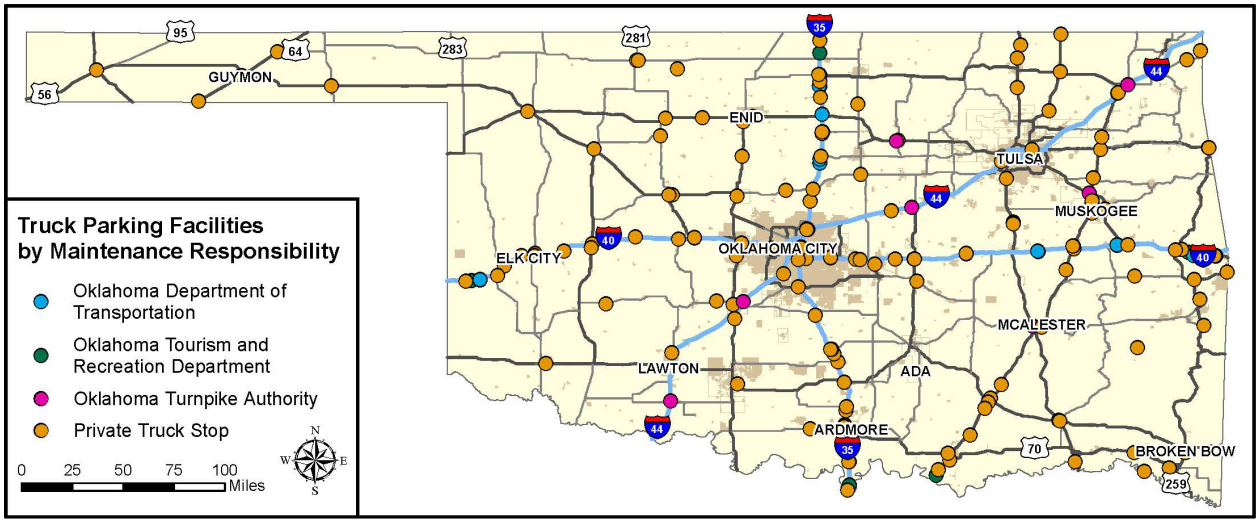
The inability to find safe parking has become one of the top issues for truck drivers nationwide. Lack of parking availability at parking facilities or commercial and industrial facilities, particularly in and around urban areas, often forces drivers to spend a considerable amount of time searching for a space, which translates directly into lost productivity and higher trucking costs. It is not uncommon for drivers to run out of hours of service (HOS) trying to find parking, forcing them to park in undesignated locations on roadway shoulders, ramps, or public lots. The sections below describe the causes of truck parking demand in Oklahoma, and how well existing facilities meets this demand.

Inventory

A technical memo was produced by the project team providing an inventory of existing truck parking spaces within the state of Oklahoma. The truck parking inventory was built upon publicly available data from the FHWA 2015 Jason's Law Report, the Trucker Path mobile app, the Park My Truck mobile app, truck stop websites, ODOT, and OpenStreetMap to develop a comprehensive list of truck parking locations. Aerial imagery and Google Street View were used to validate the number of truck parking spaces and facility amenities, such as the presence of lighting or rest rooms at parking facilities.

Truck parking facilities were categorized by maintenance responsibility. For the inventory, truck parking facilities include rest areas, welcome centers, turn outs, and truck stops which are located adjacent to highways and provide temporary parking for rest and access to restrooms, vending machines, and other basic services. Truck stops are private businesses that provide space for parking and offer a range of amenities including fuel, food, showers, and other services for truck drivers, and are generally located near the entrance and exit ramps of major interstate roads. In total, the truck parking inventory identified 7,947 spaces at 190 truck parking locations within the state of Oklahoma at the locations shown in Figure 2-11.

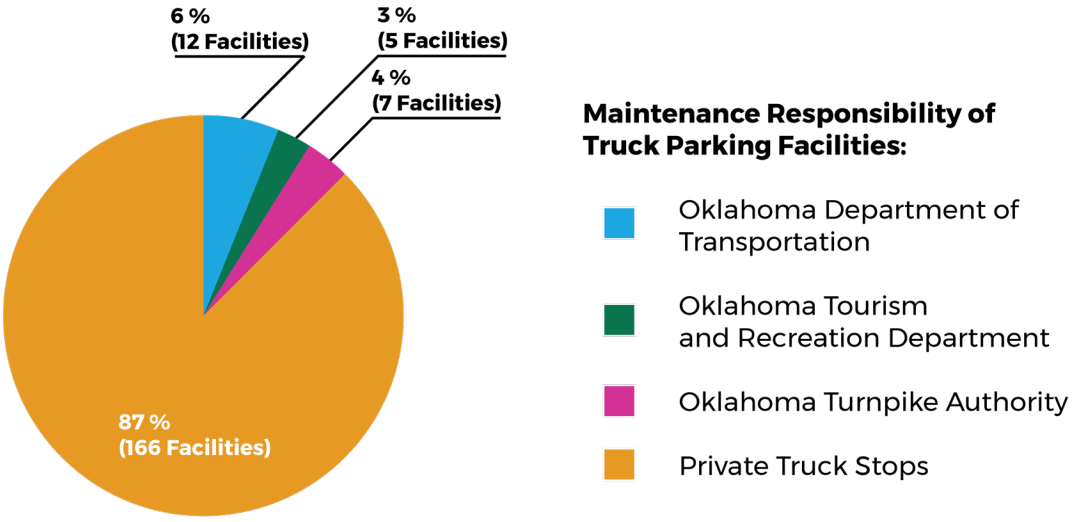
Figure 2-11. Rest Areas and Truck Stops in Oklahoma



Source: WSP analysis of public data sources including FHWA 2015 Jason's Law Report, the Trucker Path mobile app, the Park My Truck mobile app, truck stop websites, ODOT, and OpenStreetMap, aerial imagery, and Google Street View

The majority of truck parking facilities within Oklahoma are represented by private truck stops (166 facilities) compared to truck parking facilities maintained by ODOT (12 facilities), the Oklahoma Tourism and Recreation Department (5 facilities), and the OTA (7 facilities), as shown in Figure 2-12. Of the total parking spaces, 77.5 percent are striped (6,160 spaces) and 22.5 percent are unstriped or unpaved (1,787 spaces).

Figure 2-12. Total Statewide Truck Parking Locations



Source: ODOT; WSP analysis of public data sources including FHWA 2015 Jason's Law Report, the Trucker Path mobile app, the Park My Truck mobile app, truck stop websites; and OpenStreetMap, aerial imagery, and Google Street View

Truck parking locations are heavily concentrated along the Interstate system in Oklahoma, with 4,913 (61.8 percent) spaces and 98 (51.9 percent) locations along Interstates. Outside of the Interstate system, there are 2,862 (36.0 percent) spaces and 81 (42.9 percent) locations along U.S. highways.

Key corridors that connect to major trade regions and other destinations are I-40, I-35, I-44, US-69, US-412, and US-54. Table 2-4 displays the total number of truck parking spaces and locations by key corridor. Overall, there are 128 parking locations and 6,408 parking spaces located along key corridors, which accounts for 67.4 percent of total statewide parking locations and 80.6 percent of all parking spaces.

Table 2-4. Total Parking Spaces by Key Corridor

Maintenance Responsibility	I-40	I-35	I-44	US-69	US-412	US-54	Total
Oklahoma Department of Transportation	112	68	0	0	0	0	180
Oklahoma Tourism and Recreation Department	49	41	0	8	0	0	98
Oklahoma Turnpike Authority	0	0	151	32	0	0	183
Private Truck Stop	2,225	1,670	575	1,045	285	147	5,947
TOTAL	**2,386**	**1,779**	**726**	**1,085**	**285**	**72**	**6,408**

Source: WSP analysis of public data sources including FHWA 2015 Jason's Law Report, the Trucker Path mobile app, the Park My Truck mobile app, truck stop websites, ODOT, and OpenStreetMap, aerial imagery, and Google Street View

Amenities at truck parking facilities provide truck drivers with basic needs such as restrooms, showers, and food. For long-haul drivers, some facilities provide a space to park overnight in order to comply with hours-of-service regulations. Truck stops offer several more amenities or services than rest areas. Nearly all truck stops offer fuel, restrooms, convenience markets, and cell phone service. Most have a restaurant, laundry facilities, and parking lot lighting. Some of the larger truck stop chains such as Love's and Flying J, allow for drivers to reserve overnight parking spots in advance. None of the rest areas provide fuel, showers, a convenience market, restaurant, laundry machines, repair facilities, idle-reduction, or truck wash. All ODOT rest areas have basic amenities such as restrooms, drinking fountains, cell phone service, vending machines, and lighting in the parking lots. The exception is the ODOT turnout locations, which offer the fewest number of amenities.

Demand Patterns

In Oklahoma, and throughout the country, truck drivers have many reasons for needing to park. They could be loading or unloading, taking breaks per federal rest requirements, stopping for lunch or amenities, staging to avoid arriving too early to a delivery window, parking overnight, or in case of emergencies. Table 2-5 summarizes where trucks typically park for these reasons. Parking can take place at shipper or receiver facilities, or at multimodal facilities such as airport cargo or rail intermodal terminals. Parking at these locations is often strictly dependent on delivery windows and loading/unloading times. Trucks also park in rest areas or commercial truck stops. Parking at these facilities is often free (assuming drivers pay for fuel or other goods and services); however, many in and around urban areas can fill up during peak hours of the day. Fee-based reservation systems might be available, but these often represent a small share of the available parking spaces. Trucks can also park at truck terminals, if part of a fleet or agreement, often for storing vehicles overnight. Lastly, many trucks drivers decide to park in undesignated locations because of convenience or inability to find designated parking. This could be on roadway shoulders, vacant lots, public use parking lots, and other locations.

Table 2-5. Truck Parking Reasons and Locations

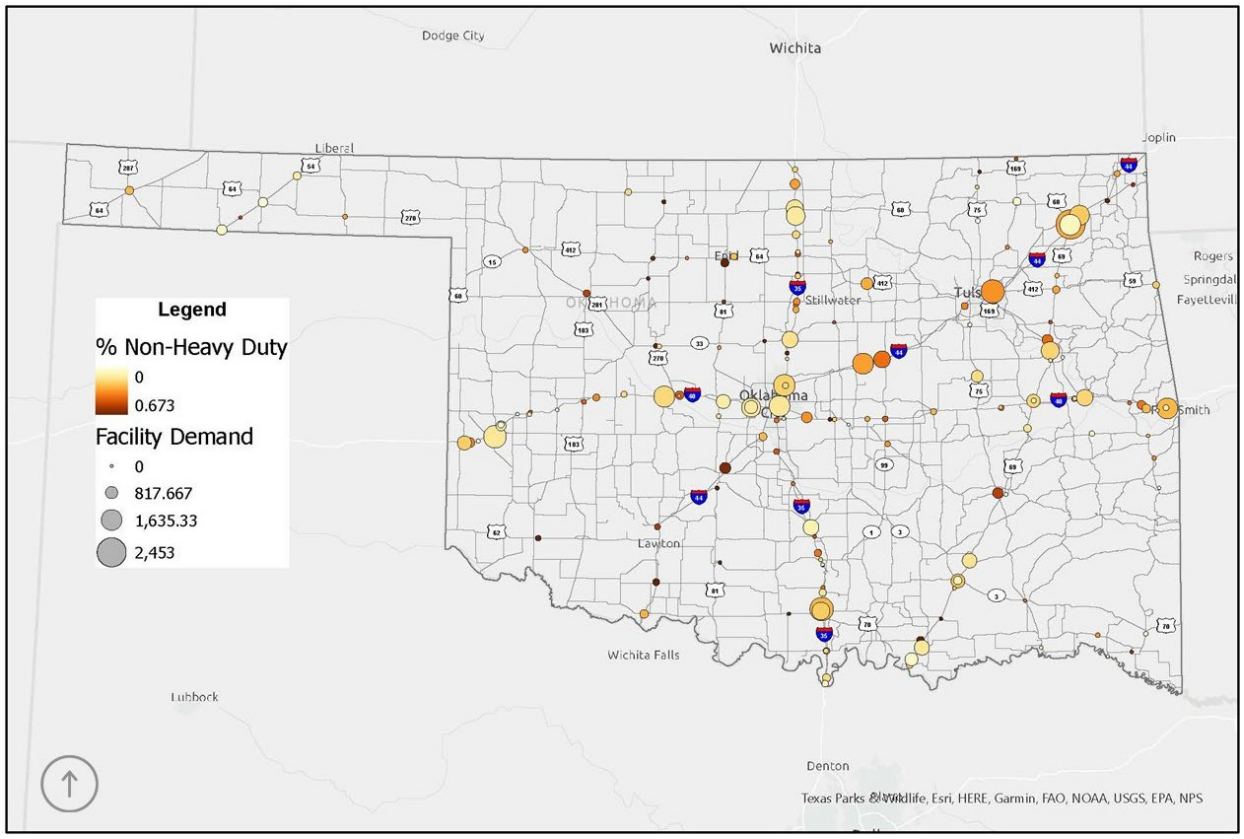
Reasons for Parking/Parking Location	Rest Area or Truck Stop	Shipper or Receiver Establish-ments	Multimodal Facilities	Undesignated Locations	Truck Terminals
Loading or unloading		X	X		
30-minute required rest break	X	X	X	X	
Overnight required rest break	X			X	
Staging	X			X	
Overnight Storage				X	X
Waiting for next load	X			X	X
Emergency	X	X	X	X	X

Source: Guerrero, S.E. et al (2022) Modeling Truck Parking Demand at Commercial and Industrial Establishments, Transportation Research Record, in-press.

Data was acquired from Geotab showing a sample of truck operations in Oklahoma to better understand truck parking demand in the state. The parking facilities identified in the inventory were georeferenced to isolate the trucking activity in the Geotab dataset using these facilities. This provides information about who is parking at these facilities and the function the facilities play in trucking operations. In Figure 2-13, the size of the dots represents the number of trucks that are parking at facilities throughout Oklahoma, and the color represents the percent of non-heavy-duty vehicles parking at these facilities. Overall, 92.6 percent of trucks parking at the parking facilities are heavy duty (gross-vehicle-weight rating of 26,000 pounds or higher), with 1.5 percent being medium-duty (gross-vehicle-weight rating between 10,000 pounds and 26,000 pounds), and 5.8 light-duty (gross-vehicle-weight rating under 10,000 pounds). The following findings can be drawn from Figure 2-13:

- As expected, the parking facilities with the highest demand are located on the key interstate corridors: I-35, I-40, I-44.
- The largest facilities with the highest demand tend to be used more intensely by heavy-duty trucks, as these facilities are located on interstates and cater to the needs of long-haul truckers. On the other hand, smaller facilities have higher usage by medium and light trucks. These are most likely typical gas stations or rest areas with truck parking spaces that do not offer the amenities and services that long-haul truckers need.
- Some medium-sized facilities on high volume truck corridors, such as on the interstates, have a significant proportion of non-heavy-duty usage. Heavy-duty truck drivers often complain that parking spaces are taken up by smaller trucks. Because of their smaller dimensions, these trucks could park elsewhere, freeing up capacity for heavy-duty trucks.

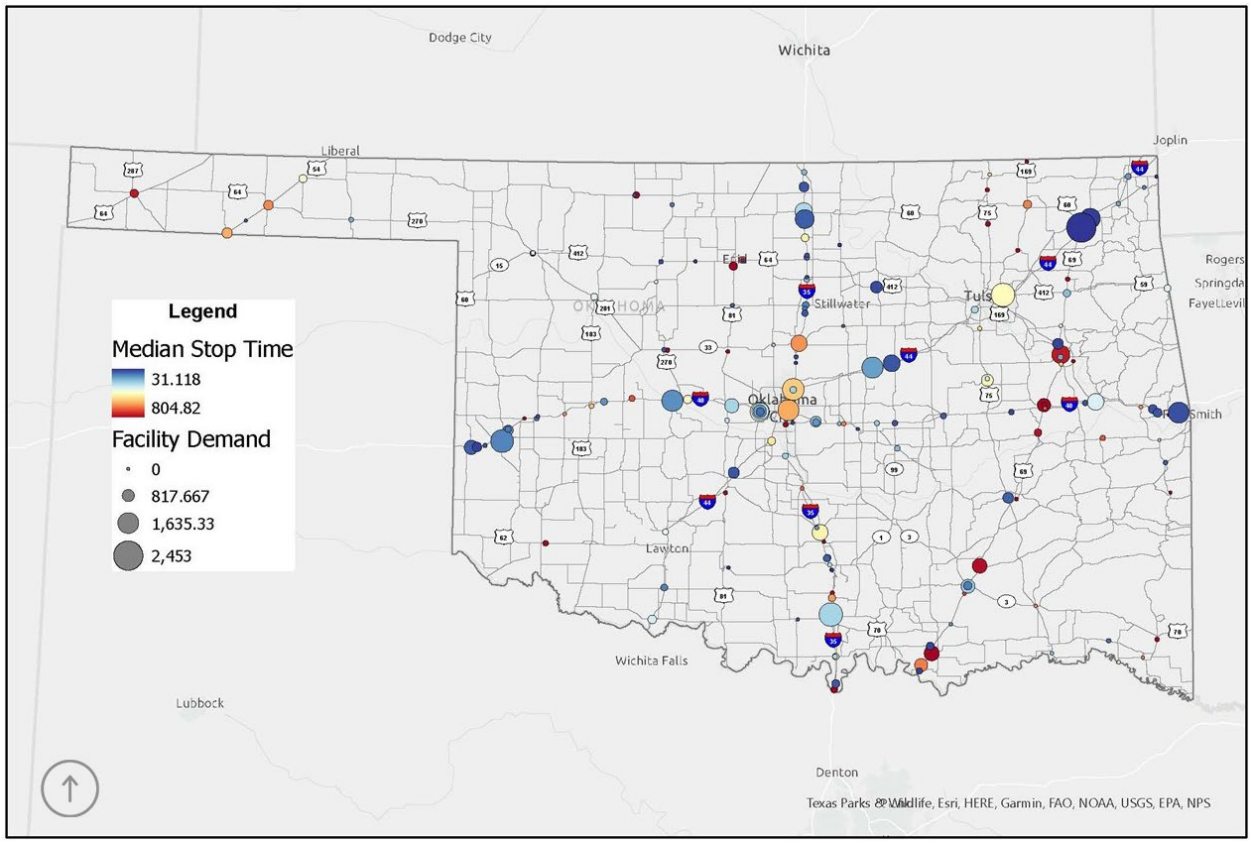
Figure 2-13. Percentage of Demand Non-Heavy-Duty



Source: Geotab Data

As described in Table 2-5, one of the key distinctions in truck parking demand is whether trucks are parking for overnight rest on long-haul shipments, or for a short time to stage to serve local demand. Figure 2-14 shows the median time that trucks are parking at facilities. The facilities with the longest stopped times are more likely to be used for overnight rests or truck storage. In rural areas away from highway corridors the long stop times are likely caused by truck storage. Many of the large truck stops on interstate corridors in rural areas have relatively short stop times, likely because of the prevalence of stops during the day for refueling and/or accessing amenities, especially meals. The large facilities in urban areas have median stop times in the middle, likely resulting from the prevalence of stopping overnight before making early morning deliveries and the use of these facilities for staging during the day.

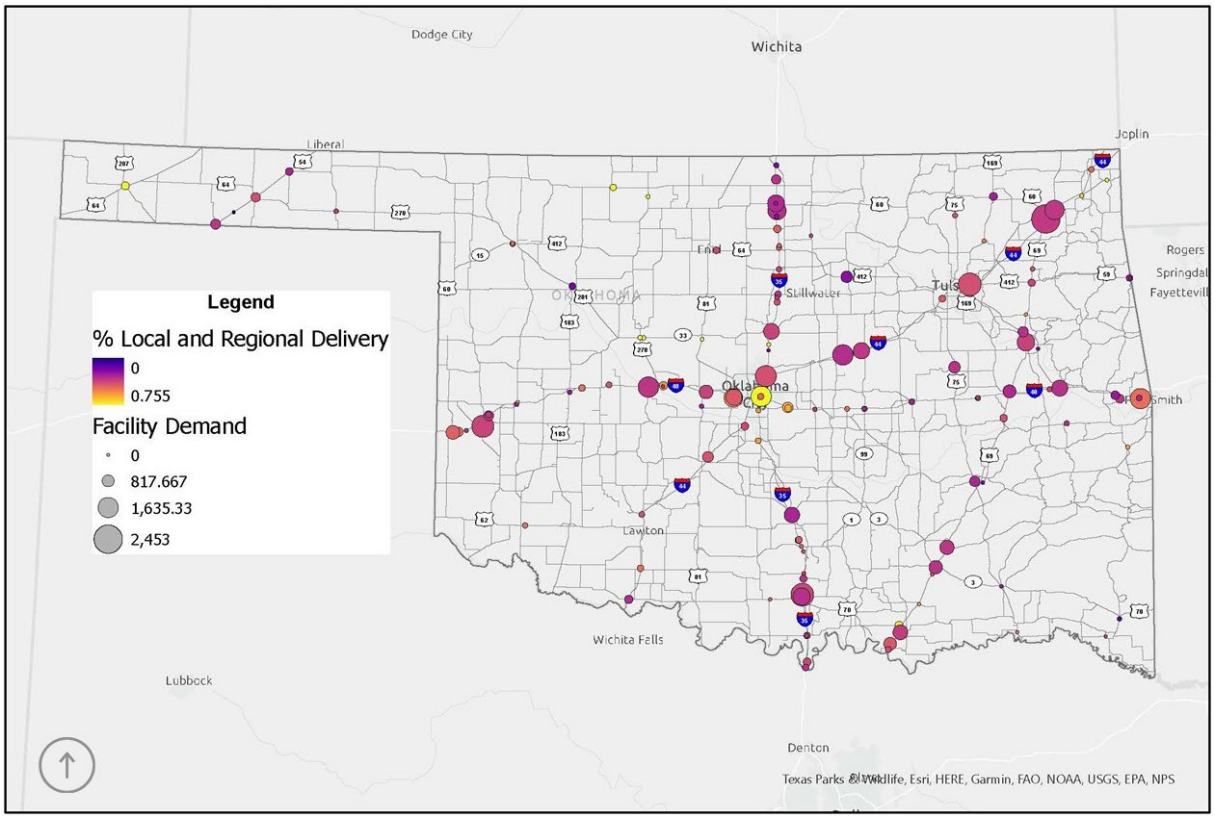
Figure 2-14. Median Stop Time



Source: Geotab Data

The Geotab data uses a proprietary process to classify trucks by the type of service they provide based on the characteristics of the vehicle and how it is operated. Figure 2-15 shows the percent of truck parking activity by trucks that perform a local or regional delivery service and are not involved in long-haul. The parking needs of local and regional trucking differ from long haul. Local and regional firms typically have a home-base where the trucks park overnight and the driver rests at home. This type of trucking uses other parking facilities during the day, in-between deliveries, or if they are likely to arrive early at a destination and are waiting for their delivery appointment. Most of this parking occurs during the day, when parking facilities are the least busy, as long-haul truckers are on the road. As expected, Figure 2-15 shows how local and regional delivery trucking is most common in urban areas, particularly in Oklahoma City.

Figure 2-15. Percent of Demand Local or Regional Delivery (Not Long Haul)



Source: Geotab Data

Availability of Spaces

The Park My Truck application was monitored for 2 weeks (June 6, 2022, to June 17, 2022) to identify if any parking facilities in the state routinely run out of availability. Even though this application only reports the availability of 13 truck stops in the state, these include some of the largest facilities and they are spread out throughout the state, so that shortages at any of these facilities is a good indicator of shortages in that area. The availability of spaces is the lowest at night (midnight to 2 a.m.), when long-haul truck drivers stop to rest for the evening; however, no facility was observed to completely run out of available spaces.

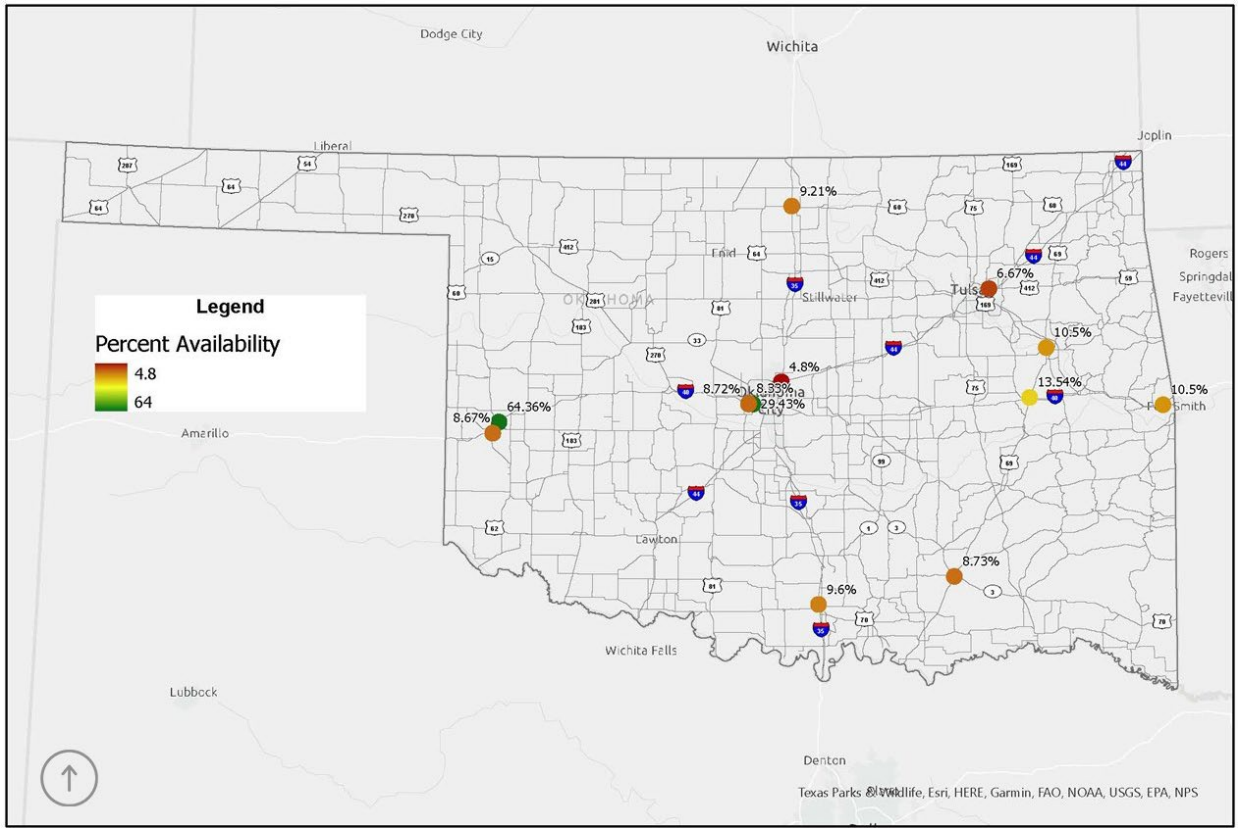
The results of this monitoring can be observed in Table 2-6. Parking availability decreases steadily from 4 p.m. until midnight, when it reaches the lowest point. However, none of the facilities monitored were found to completely run out of spaces during the monitoring period. Figure 2-16 maps the availability at midnight at these facilities. Most facilities had between 6 percent and 15 percent of spaces remaining during peak hours of the day, and some reported substantial availability at that time.

Table 2-6. Average Availability of Spaces at Different Times of the Day

Parking Facility	Location	Total Number of Truck Parking Spaces	Hours of the Day (12-hour clock)			
			4:00 PM	8:00 PM	11:00 PM	7:00 AM
Pilot Travel Center #196	Roland, OK	125	44	18	10	28
Pilot Travel Center #259	Muskogee, OK	117	44	18	10	34
Flying J Travel Plaza #702	Checotah, OK	150	53	21	13	33
Flying J Travel Plaza #706	Tulsa, OK	179	65	25	16	46
Pilot Travel Center #498	Atoka, OK	63	22	9	5	16
Pilot Travel Center #1004	Tonkawa, OK	80	28	11	7	20
Flying J Travel Plaza #704	Edmond, OK	116	26	10	6	18
Travel Centers of America #059	Oklahoma City, OK	101	54	53	49	17
Pilot Travel Center #460	Oklahoma City, OK	145	51	21	12	37
Flying J Travel Plaza #703	Oklahoma City, OK	172	61	24	15	46
Flying J Travel Plaza #701	Ardmore, OK	137	48	19	12	35
Travel Centers of America #152	Sayre, OK	101	78	70	60	26
Flying J Travel Plaza #705	Sayre, OK	150	53	21	13	50

Source: Park My Truck Application monitored 06/06/2022 to 06/24/2022

Figure 2-16. Map of Percent (%) Spaces Available at Midnight on Weekdays



Source: Park My Truck Application monitored 06/06/2022 to 06/24/2022

Truck Parking Survey

An industry-focused survey was conducted using the MetroQuest platform to collect feedback on truck parking issues and recommendations to address current and future truck parking needs. The survey was distributed to the project's stakeholder list which included local and national freight and logistics companies as well as other industry groups.

Participants could take the survey online from June 10, 2022, to July 10, 2022. During this time, there were 261 total visits to the survey website and 98 respondents completed the survey.

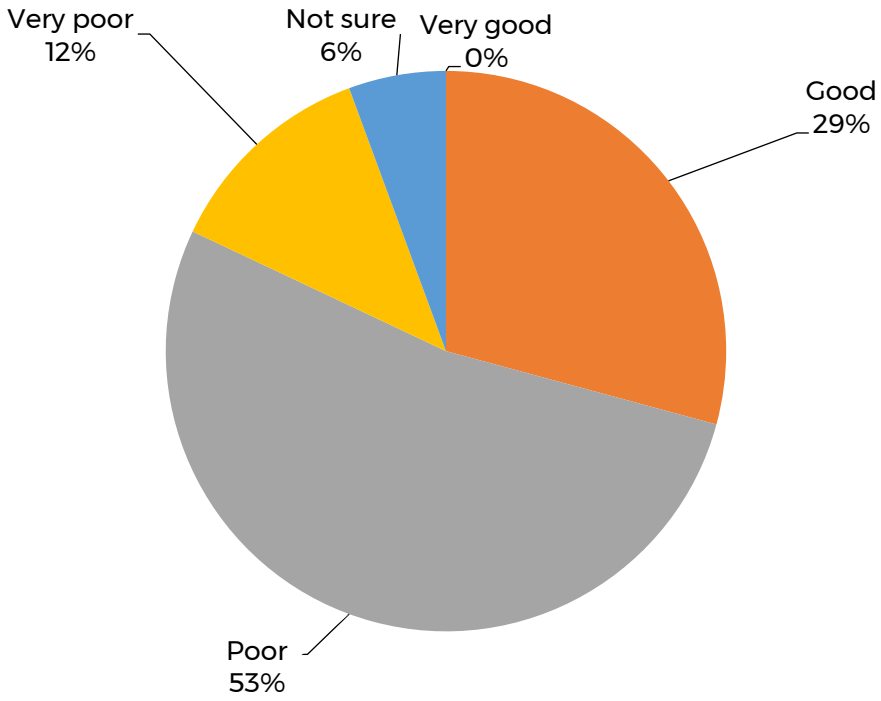
Respondents were primarily experienced truck drivers. Respondents were nearly evenly split between national and regional/local range of operations, however the vast majority travel in Oklahoma regularly and are familiar with the area. 53 percent of respondents have national operations, 39 percent selecting 'Regional', and 8 percent selecting that their usual range is 'International'. The majority of respondents (71 percent) indicate that they park in Oklahoma more than once a week.

In keeping with the diverse range of operations, the drivers indicated a variety of needs for truck parking. Among respondents, the most common responses were needing to meet HOS requirements, meal/restroom breaks, and 10-hour breaks. Thirty-minute breaks and staging for picks-ups or delivery were less common responses. Within the wide range of reasons for

stopping, restrooms were the most commonly sought-after amenity. Security and safety were next in priority.

As shown in Figure 2-17, there is a serious shortage of truck parking in the region according to survey respondents, with 65 percent rating the availability as 'Poor' or 'Very Poor'. Fifty-nine percent of respondents reported difficulty finding parking in the area three or more times per month. Seven percent of respondents park outside of Oklahoma more than six times a month due to the lack of parking in the state According to participants, the top truck parking issues in Oklahoma are the overall lack of parking, lack of truck parking in certain areas, parking limitations at rest areas, and difficulty in knowing whether parking is available.

Figure 2-17. How would you rate the availability of truck parking in Oklahoma?



Participants were asked to rate various strategies and associated sub-strategies that could address truck parking issues. There were high levels of support for most strategies. 'Expansion of Facilities' was the most popular strategy followed by 'Delivery Hours', which refers to extending delivery hours at shippers and receivers. The lowest rated strategy was 'Paid parking'. The highest rated sub-strategies were 'Expand existing public rest areas' and 'Require shippers to allow parking for staging'. The lowest rated sub-strategy was 'Paid on-street truck parking'.

Based on these results, it appears that there is a significant truck parking problem for long-haul owner-operators in Oklahoma. Solutions to be considered should include expansion of designated parking facilities (both public and private), increased information, and incentivizing local businesses to allow truck parking.

Freight Advisory Committee Input

At the June 2022 FAC meeting, members were asked through Mentimeter what the top truck parking issues are in Oklahoma. The top results were as follows:

1. Lack of amenities
2. General lack of parking
3. Limited parking in specific areas
4. Parking safety issues.

Regarding amenities, according to the FAC, these should include restrooms, food service, showers, and safe/secure areas, and drivers will often bypass stops offering only fuel for those offering amenities.

Regarded lack of truck parking, the FAC noted that it is important that drivers have information about available parking and amenities (i.e., through phone apps). Major truck stops often provide parking and amenity information but smaller providers often do not.

The next Mentimeter question asked about strategies for addressing truck parking needs. The top three responses were:

5. Expand public parking
6. Encourage private investment in truck stops
7. Incentivize businesses to allow parking

In a follow up discussion, the FAC mentioned that the State has closed rest areas on interstates, and this has shifted responsibility to private truck stops. In particular, rest areas on the outskirts of metro areas are convenient for drivers to plan to avoid peak hour congestion. The FAC stated that the State could consider leasing closed rest areas to concessions so that these assets could be put to use. Members indicated that the transportation industry needs to make sure sufficient parking is available so drivers do not exceed HOS.

Other truck parking issues mentioned include:

- The Turner Turnpike is an area where undesignated parking is an issue.
- US-69 near McAlester/Atoka –has high freight volumes –ODOT should consider a freight corridor around the towns.
- US-412 now has interstate designation –there will be challenges east of Tulsa especially around Siloam Springs

Further Review of Truck Parking Needs and Solutions

The truck parking survey and FAC members identified significant concerns about truck parking availability and information that require further examination. Additional study of Geotab truck parking data will be performed in fall 2022 to identify patterns of truck parking outside of designated truck parking facilities. This data analysis, along with the truck parking survey

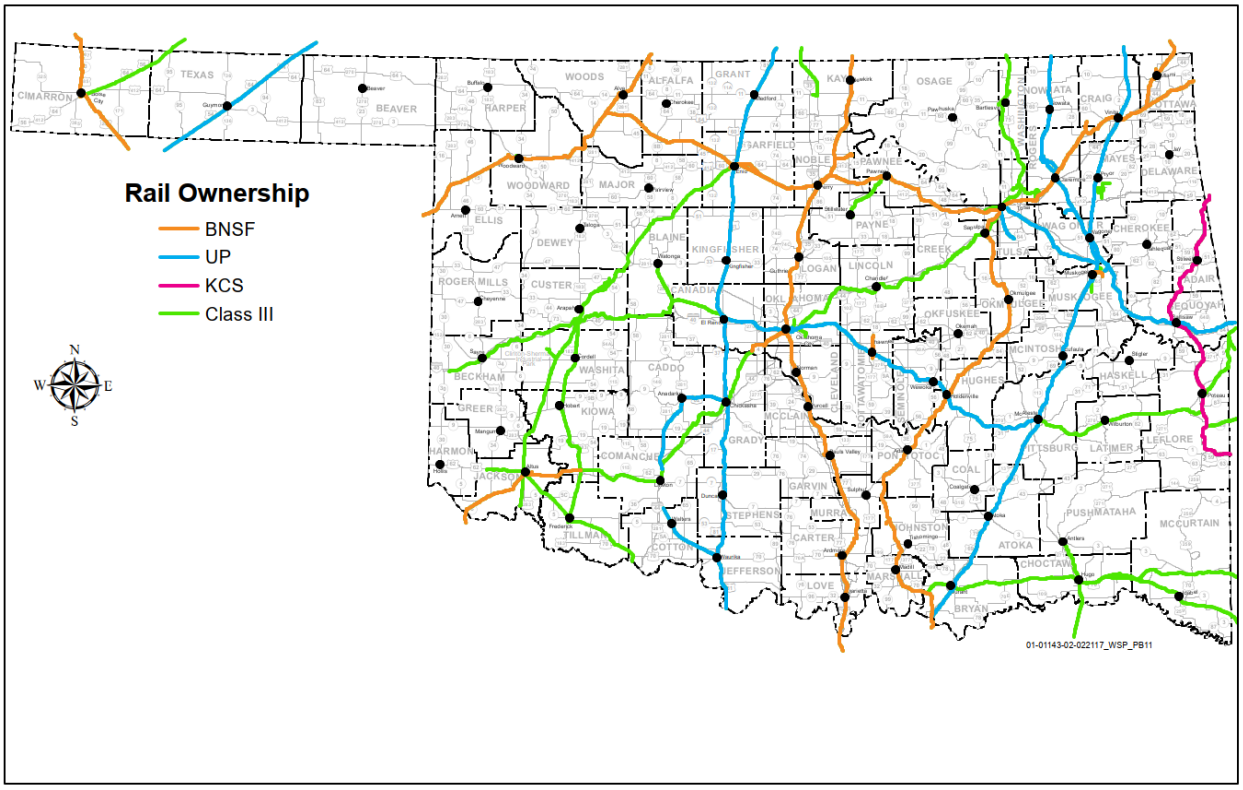
results and FAC input, will be used to identify locations of truck parking needs. Based on the additional review, ODOT will explore potential truck parking strategies to address the identified needs.

2.4 RAIL

2.4.1 Oklahoma's Railroads

Figure 2-18 shows the location of the railroads within the state. The three Class I railroads in Oklahoma are the BNSF Railway (BNSF) which owns 966 route-miles in the state, Union Pacific Railroad (UP) with 894 route-miles, and Kansas City Southern (KCS) Railway Company with 152 route-miles. Class I railroads serve multiple markets and population centers in the state as well as handling through traffic. The Federal Surface Transportation Board divides all railroad companies based on annual revenue criteria. Railroads with annual income equal to or exceeding $504,803,294 are designated as Class I, those with income equal to or more than $40,384,263 but less than $504,803,294 are designated as Class II railroads. Any Railroad with annual income below $40,388,263 is designated as a Class III railroad.[7]

Figure 2-18. Oklahoma Rail Network



Source: ODOT, 2022

[7] Income values subject to annual escalation. The numbers shown are for 2019.

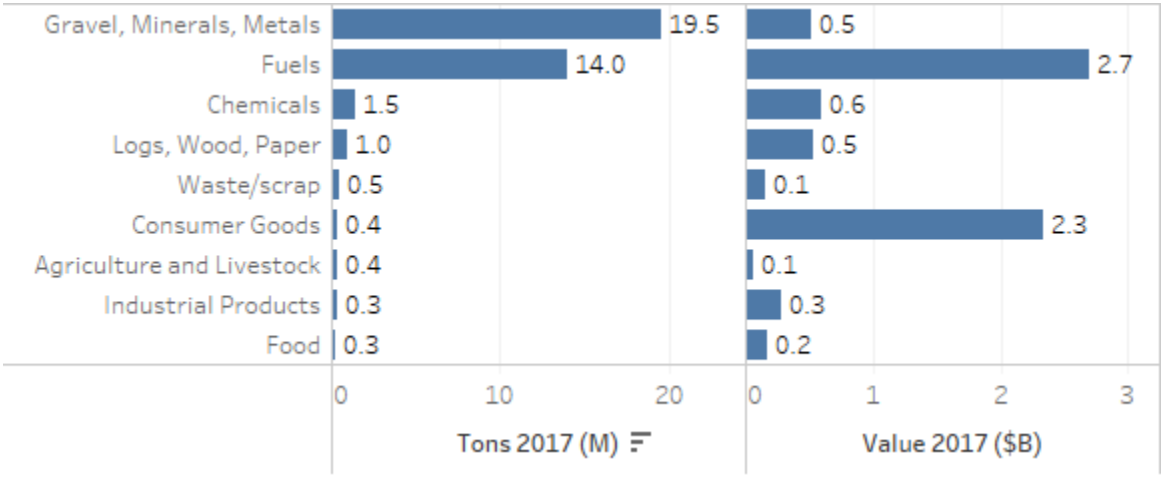
Oklahoma has 18 short-line railroads, a Federal Surface Transportation Board designation, that provide critical connection to businesses in various parts of the state and play an important role in local economies. An image of an example short-line train is shown in Figure 2-19.

Figure 2-19. Wichita, Tillman and Jackson Train

2.4.2 Commodity Flows by Rail Into, Out of, and Within Oklahoma

The top supply-chain groups for rail tons and value are shown in Figure 2-20. The leading groups by tonnage are gravel, metals, and minerals; fuels; and chemicals. The leading groups by value are fuels, consumer goods (primarily transportation equipment), and chemicals. Note that Oklahoma is also served by intermodal rail (included in multiple modes and discussed in Section 2.6) via rail-truck transfer terminals located in other states.

Figure 2-20. Top OK-Based Commodity Groups by Rail, Tons and Value, 2017



Source: Freight Analysis Framework 5.3

The Gravel, Minerals and Metals group is particularly volatile at this point because of changes in the sourcing protocols for sand. Commercial decisions on the part of the drillers to use different standards for frac sand allows for use of more locally sourced sands and reduces the reliance of the previously sourced rail-delivered sand. The FAF 2017 estimate of rail tonnage

(39.7 million) is very close to the number cited in the 2022 SRP of 38.4 million tons reported by the Federal Surface Transportation Board in 2019.

2.5 OKLAHOMA WATERWAY SYSTEM

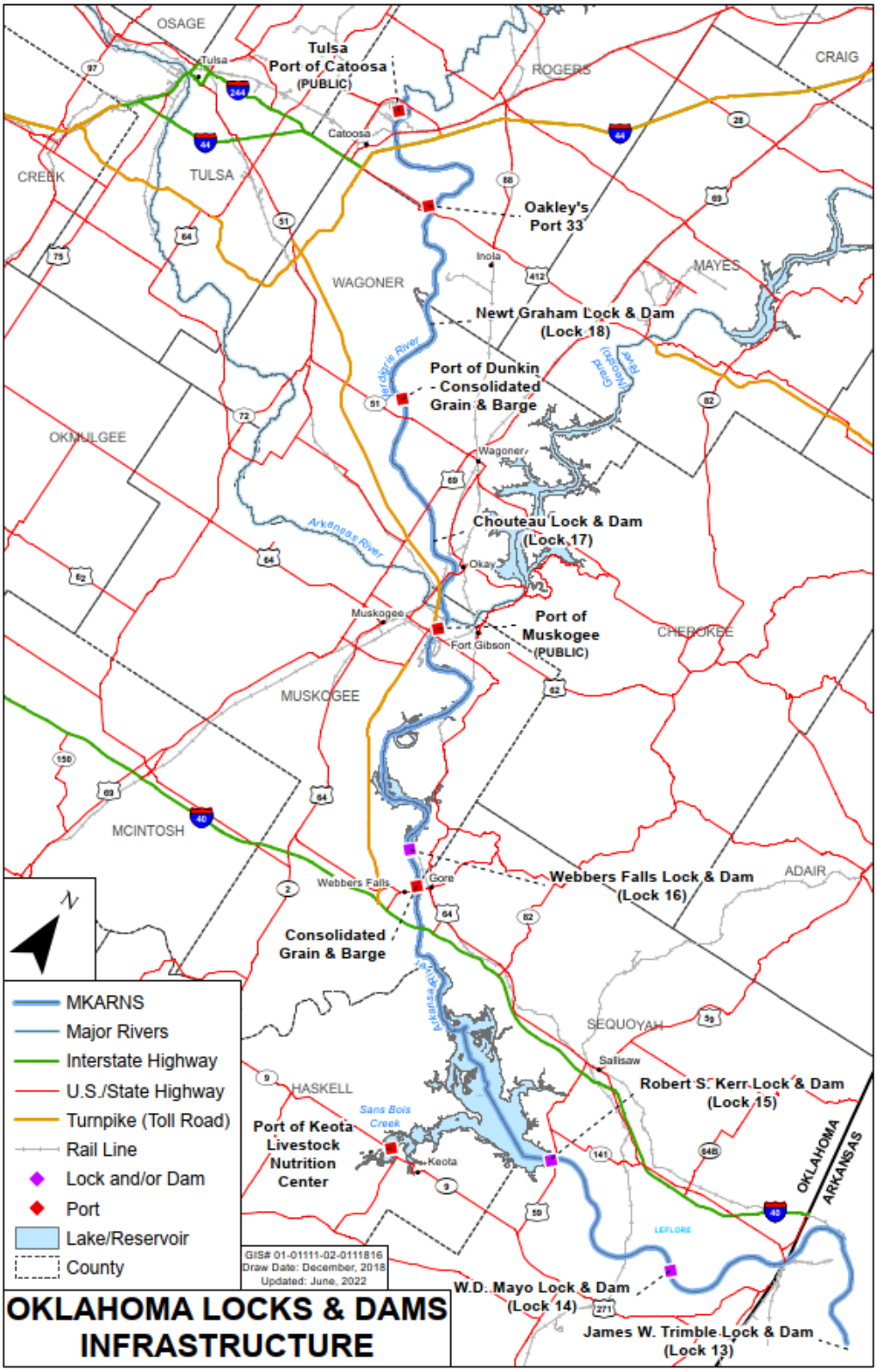
2.5.1 Oklahoma's Waterways

Oklahoma's waterborne freight traffic is handled entirely via the MKARNS, which connects Oklahoma to the Lower Mississippi River, providing access to states along the Mississippi/Missouri/Ohio river system, the Great Lakes, the Gulf of Mexico, the U.S. Intracoastal Waterway system, and deep-draft open-ocean shipping lanes, and linking Oklahoma with global waterborne trading partners. The MKARNS is a 445-mile navigation channel that includes the Verdigris, Arkansas, and White Rivers. From the Mississippi River, the channel follows the Arkansas River across the Oklahoma state line to the Port of Muskogee; from there, the navigation channel follows the Verdigris River, running 51 miles upstream to the Tulsa Port of Catoosa.

The MKARNS is an all-season, ice-free system offering high reliability. There have been no closures due to low water events. However, operations were suspended for three months in 2015 due to heavy rains, and for four months in 2019 due to historic flooding. Current navigation depths are limited to 9 feet, but planning is underway to deepen the system to 12 feet, allowing for heavier-loaded barges and greater system volume and cost-effectiveness.

Figure 2-21 displays the MKARNS system in Oklahoma and identifies each lock and/or dam.

Figure 2-21. McClellan-Kerr Arkansas River Navigation System



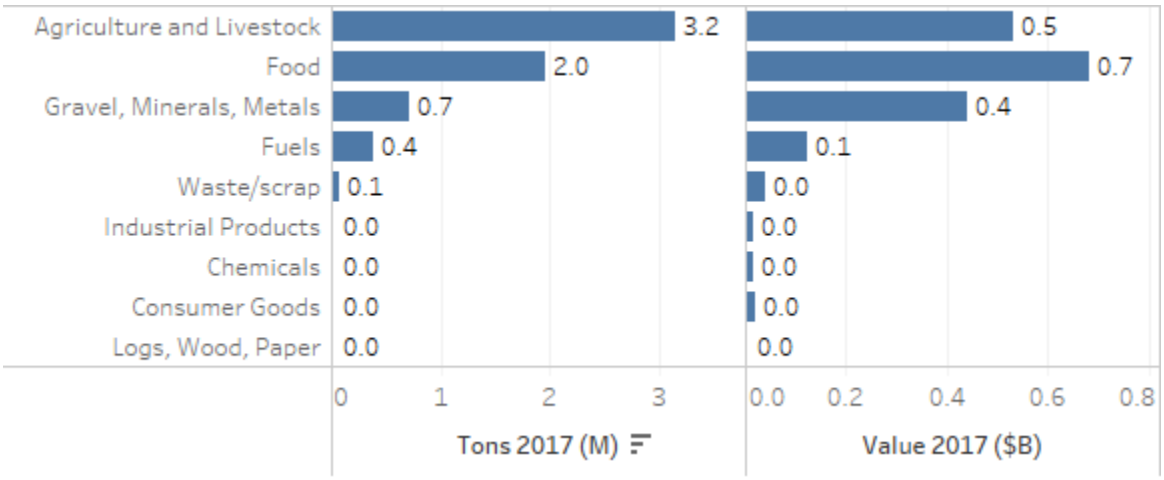
Source: Oklahoma Department of Transportation, 2022

2.5.2 Commodity Flows by Water Into, Out of, and Within Oklahoma

Waterborne transport plays a critically important role in allowing Oklahoma to ship and receive fertilizer, grain, metal products, large machinery and equipment, and other cargo that is physically or economically impractical to move by other modes. Oklahoma's ports also serve freight shippers and receivers in Kansas and other states via landside truck and rail connections.

The top supply-chain groups for water tons and value are shown in Figure 2-22. The leading groups by tonnage are agriculture and livestock; food; gravels, minerals, metals; and fuels. The leading groups by value are food; agriculture and livestock; gravel, minerals, and metals; and fuels. The top four commodity groups in both tons and value transported by waterways in Oklahoma are chemical products, agriculture, metal products, and refined petroleum products. As previously noted, Louisiana is a major destination for agriculture and food products, which are transloaded from barges to ocean-going vessels at southern Louisiana ports.

Figure 2-22. Top OK-Based Commodity Groups by Water, Tons and Value, 2017



Source: Freight Analysis Framework 5.3

2.5.3 Key Facilities

Tulsa Ports

Tulsa Ports consists of two facilities: the established Tulsa Port of Catoosa, and the new Port of Inola which is not yet operational.

The Tulsa Port of Catoosa is located at the head of the MKARNS in northeast Oklahoma. The port is situated on approximately 2,500 acres, accommodating an industrial park with 70 facilities, primarily including manufacturing, distribution, and goods processing companies. An aerial image of the Tulsa Port of Catoosa is shown in Figure 2-23. Along its 1.5-mile channel, the port offers a diversified set of cargo handling facilities, including unique capabilities for the handling of OSOW project cargo. Port facilities handled more than 1.5 million tons of waterborne freight in 2021.

Figure 2-23. Tulsa Port of Catoosa

Source: Port of Catoosa

The Port of Inola consists of 2,000 acres in Inola, Oklahoma, acquired as part of a land transfer from the Public Services Company of Oklahoma, and is being master planned to attract large-scale economic development projects. There is currently no waterborne cargo activity at the site.

Port of Muskogee

The Port of Muskogee is located near the confluence of the Arkansas, Verdigris, and Grand Rivers. The port is situated on approximately 450 acres. The port also owns the John T. Griffin Industrial Park, which consists of 527 acres. In 2021, the port handled 539,000 tons of cargo. An aerial image of the Port of Muskogee is shown in Figure 2-24.

Figure 2-24. Port of Muskogee

In addition to terminals, mooring and dock facilities, and a 94,000-square-foot warehouse, the port has overhead and mobile cranes for transloading between barge, rail, and truck, including a 100-metric-ton marine travel lift. The Port of Muskogee provides extensive rail service (via UP)

to its users. In 2021, the port was served by 1,939 railcars handling 173,673 tons of freight. The port cannot accommodate unit trains due to track curvature issues and has submitted a Transportation Investment Generating Economic Recovery grant application to extend tracks and reduce curvature.

Oakley's Port 33

Oakley's Port 33 is a privately owned port located in Catoosa, southeast of the Tulsa Port of Catoosa and east of Tulsa, just north of the US-412 bridge over the Verdigris River. Formerly named Johnston's Port 33, Bruce Oakley purchased the port in 2014. The original facility consisted of 35 acres and includes six transfer docks and warehousing for 10 different fertilizer companies. In 2009, a 90-acre expansion area (Port 33 South) was added, which will allow the port to double its capacity. Collectively, Port 33 offers eight docks and five 70-foot truck scales, with fleeting for around 100 barges. Port 33 is entirely truck-served; there is no direct rail service to the site. The nearest rail service is BNSF, which is seven miles away in Catoosa. An aerial image of Oakley's Port 33 is shown in Figure 2-25.

Figure 2-25. Oakley's Port 33

2.6 OKLAHOMA'S AIR CARGO SYSTEM

Access to reliable air freight services is important to many businesses with high-value products or those requiring rapid transport. This includes medical instruments and advanced manufacturing components as well as many other commodities. Many manufacturers also utilize air freight for repair parts and stock outs. Adequate air service is an integral part of the capabilities necessary to support robust supply chains in the state. Oklahoma is fortunate to have air cargo access through Tulsa and Oklahoma City, and through its proximity to Dallas-Fort Worth, Texas.

There are four primary commercial service airports in Oklahoma: Lawton-Fort Sill Regional in Lawton, Will Rogers World in Oklahoma City, Tulsa International in Tulsa, and Stillwater Regional in Stillwater. Table 2-7 shows the freight and mail through these airports in pounds. A

primary service airport enplanes more than 10,000 people annually with scheduled service. There are two secondary commercial service airports at Enid and Ponca City. There are numerous regional and small private airports throughout the state for general service aviation and chartered freight service.

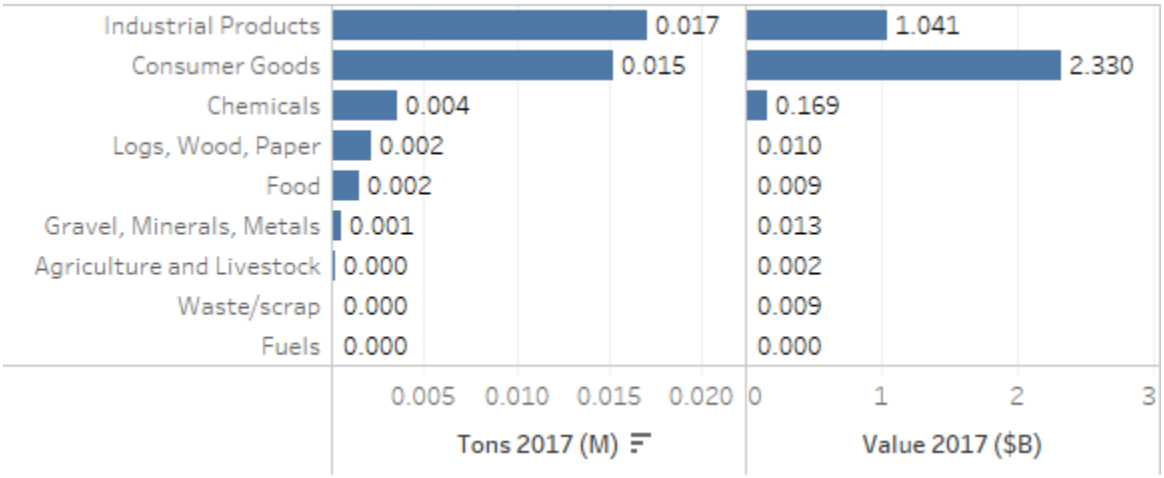
Table 2-7. Freight and Mail (pounds) through Oklahoma Airports

Airport	2020	2021
Tulsa	132,000,000	131,000,000
Will Rogers World	84,000,000	80,000,000
Stillwater	46,000	55,000
Lawton	996	1,255

Source: Bureau of Transportation Statistics

The top supply-chain groups for air tons and value are shown in Figure 2-26. The leading groups by tonnage are industrial products and consumer goods. The leading groups by value are consumer goods and industrial products.

Figure 2-26. Top OK-Based Commodity Groups by Air, Tons and Value, 2017



Source: Freight Analysis Framework 5.3

2.7 OKLAHOMA PIPELINE SYSTEM

According to the U.S. Energy Information Administration:[8]

- In 2021, Oklahoma was the nation's fifth-largest producer of marketed natural gas and the sixth-largest producer of crude oil. Overall, the state consumed only one-third of the energy it produced.
- As of January 2021, Oklahoma had five operable petroleum refineries with a combined daily processing capacity of almost 522,000 barrels per calendar day. That is nearly 3 percent of the total U.S. crude oil refining capacity.

[8] United States Energy Information Administration. (19 May 2022). Oklahoma: State Profile and Energy Estimates. Retrieved 17 June 2022, https://www.eia.gov/state/print.php?sid=OK.

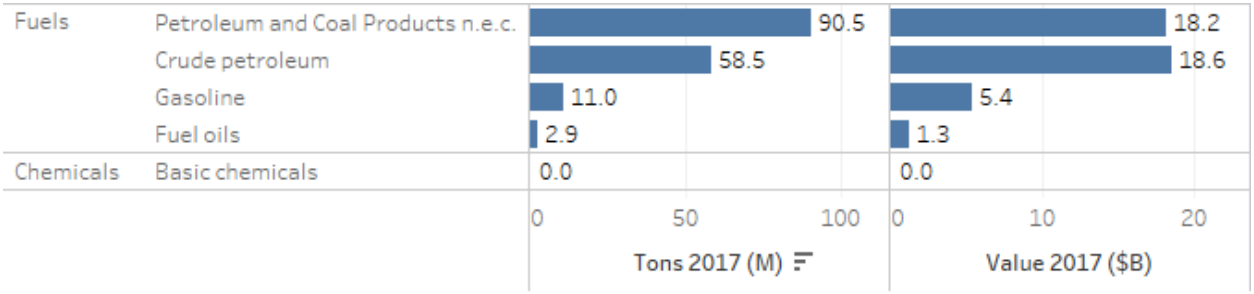
- In 2021, wind supplied 41 percent of Oklahoma's total electricity net generation, surpassing natural gas' share for the first time. Wind accounted for 91 percent of the state's renewable generation, and the state ranked third in the nation in total electricity net generation from wind.
- The benchmark price in the domestic spot market for the U.S. crude oil known as West Texas Intermediate is set at Cushing, Oklahoma, which is home to about 14 percent of the nation's commercial crude oil storage capacity.
- In 2020, Oklahoma was the nation's fourth-largest consumer of natural gas on a per capita basis. The electric power sector and the industrial sector together use slightly more than four-fifths of the natural gas delivered to consumers in Oklahoma.

In 2022, Oklahoma announced it would be joining with Arkansas and Louisiana to create a regional hub to produce hydrogen for use as a fuel and for manufacturing feedstock, expanding the state's energy activity in this emerging market sector.

Oklahoma's energy industry is supported by an expansive pipeline network consisting of 14,949 miles of liquid product pipelines and 48,606 miles of gas product pipelines.[9]

The top supply-chain groups for pipeline tons and value are shown in Figure 2-27.

Figure 2-27. Top OK-Based Commodity Groups by Pipeline, Tons and Value, 2017



Source: Freight Analysis Framework 5.3

2.8 OKLAHOMA MULTIMODAL FREIGHT ASSETS

An important element of the freight system is the multimodal freight transfer of commodities. These are facilities where freight is transferred from one mode to another. The facilities may also provide storage capacity as well as services that add value to the product being shipped.

Oklahoma is fortunate to have options for several modes of freight transportation, including truck, rail, air, and waterways. In addition, multiple modes are often involved in goods movement by using transload facilities. Transload of freight occurs because of delivery or financial advantages for the shipper or receiver and constitutes a growing trend for freight

[9] U.S. DOT Pipeline and Hazardous Materials Safety Administration, 2021, Gas Pipeline Miles by System Type, Portal Data as of 6/22/2022, https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-mileage-and-facilities

shipments in Oklahoma. In particular, there is an increasing demand for shipments that travel on Oklahoma rail or water systems and use truck for "last-mile" transport.

For purposes of this OFTP, three types of multimodal assets are addressed:

- Truck-rail container and trailer-transfer terminals (hereafter referred to as "intermodal terminals")
- Transload terminals
- Grain elevators

2.8.1 Intermodal Terminals

Freight transportation planning has historically been mode oriented. Increasingly, planning is shifting to a supply-chain focus with network connectivity being as important as the individual modal structure. Oklahoma's ability to reach markets outside the state and the nation depends on the efficient interaction of the different modes and the way in which shippers can access the network.

Oklahoma has not had an intermodal terminal since 2005, when BNSF closed its intermodal terminal near Oklahoma City due to lack of demand. Container service for Oklahoma shippers and receivers is provided outside the state by way of facilities in Dallas, Texas, Kansas City, Missouri, or Memphis, Tennessee, depending on the location of the shipper in the state and the direction of the shipment. While some state development agencies might hope for new container services within the state, the realities of logistics and market costs make that nearly impossible. With relatively short distances to three major intermodal terminals, Oklahoma is, in the view of the railroads and intermodal service providers, better served by utilizing the three nearby hubs than by stopping intermodal trains at a location in Oklahoma.

The railroads and the asset-based intermodal service providers are engaged in efforts to increase the productive use of their equipment and improve levels of service in selected markets. This is true of all intermodal equipment but particularly for domestic, 53-foot containers. This need for efficiency in turning equipment pushes the services away from areas with a lower density of freight traffic. This is generating movement toward consolidating service to key hub terminal locations. The current intermodal service network fostered by this trend toward consolidation determines service offerings for Oklahoma intermodal shippers.

2.8.2 Transload Terminals

Transloading of commodities is another form of transfer of freight from one mode of transportation to another; however, it pertains to non-containerized freight. It is used by railroad customers who wish to consolidate freight, utilize a railroad public delivery track, do not have direct access to a rail line, or who want a competitive option to a railroad that directly serves the shipper.

Transload operations can involve products shipped in liquid or dry bulk or as break-bulk, dimensional cargo. Dry bulk commodities are shipped in unpackaged quantities. When direct truck-rail transfer is not possible, dry bulk commodities can be stored in an open stockpile

(aggregates, minerals, ore, etc.) or in covered storage such as silos (agricultural products). Liquids (petroleum, chemicals) are stored in tanks.

Oklahoma has over 40 transload terminals that handle a spectrum of products including sand, aggregates, agricultural products, bulk, and dimensional products.

2.8.3 Grain Elevators

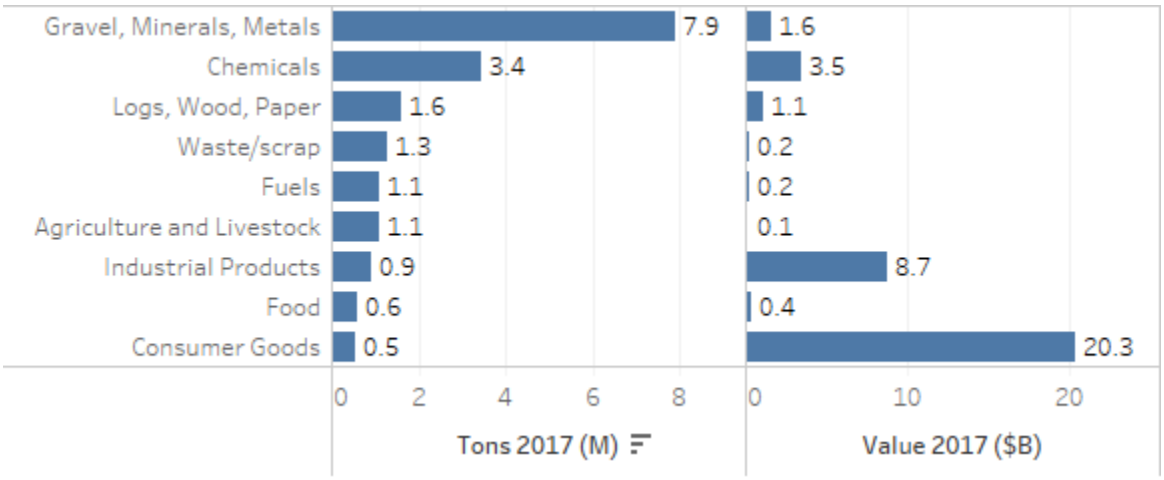
Grain elevators are a special form of a transload facility. Grain is delivered to the elevator by truck, stored, and then loaded into grain cars. The elevator provides storage capacity not available on the farm, but also aggregates smaller shipments into larger, often train-sized, blocks. Large blocks or unit trains provide economies of scale that in turn result in reduced transportation costs to the shipper.

There are 101 grain elevators, located in 29 of Oklahoma's 77 counties. Garfield County, with Enid as the County Seat, has the largest number with 12 elevators. This is no surprise since western Oklahoma produces the state's largest crop (wheat), and Enid sits at the intersection of the UP, BNSF, and Grainbelt railroads. The 2022 SRP covers the topic of elevators and rail service in greater detail.

2.8.4 Commodity Flows by Multiple Modes Into, Out of, and Within Oklahoma

The top supply-chain groups for air tons and value are shown in Figure 2-28. The leading groups by tonnage are gravel, minerals, and metals; chemicals; and logs, wood, and paper. The leading groups by value are consumer goods; industrial products; and chemicals.

Figure 2-28. Top OK-Based Commodity Groups by Multiple Modes, 2017



Source: Freight Analysis Framework 5.3

2.9 CURRENT CONDITIONS AND CHALLENGES

This section describes current needs and issues. Trends affecting the future demand for freight transportation are further detailed in Chapter 4.

2.9.1 Truck Operations Concerns and Needs

There are some specialized concerns affecting truck freight operations that warrant further consideration.

Military Use

Oklahoma is home to six military installations, including three Air Force bases (AFBs), two Army installations, and one Air National Guard Base. These installations serve as traffic generators for both inbound and outbound freight in order to provide the necessary materials for manufacturing military equipment as well as the consumer goods required to support the base population. The U.S. military relies on the Oklahoma freight system for the movement of cargo to both serve military installations and deploy national defense.

The Strategic Highway Network (STRAHNET) is a 62,000-mile system of roads deemed necessary for emergency mobilization and peacetime movement of heavy armor, fuel, ammunition, repair parts, and other commodities to support U.S. military operations. All STRAHNET facilities are also classified as part of the NHS. Maintaining connectivity from the STRAHNET to military installations is critical.

McAlester Army Ammunition Plant (MCAAP) is a critical base for sending and receiving supplies for weapons manufacturing and is the largest ammunition storage facility in the nation. The facility relies on deliveries by truck and rail to receive supplies and goods. US-69, a nationally significant corridor part of the National Highway Freight Network (NHFN) and STRAHNET, travels northwest through MCAAP from Texas and connects to I-40 to the north. US-75 also travels north-south adjacent to the facility and connects to Tulsa to the north. Safety due to the transport of hazardous materials to and from the base is a critical concern.

Oklahoma AFBs, including Vance AFB, Tinker AFB, and Atlus AFB, serve as hubs for aviation maintenance and require large amounts of materials to be imported by truck for distribution. Located southeast of Oklahoma City, Tinker AFB is accessed on the northern boundary of the base by I-40 (apart of the NHFN) and on the southern end by I-240. Tinker AFB is among the military facilities of high importance due to the U.S. Navy tenants and the multiple missions of the Department of Defense. Due to its proximity to Oklahoma City, oversized freight loads maintaining access to the base alongside increasing traffic volume on I-40 and I-240 is a concern for operational efficiency and national security. Atlus AFB, located in southwest Oklahoma is accessed by US-62, which travels east-west and connects to Fort Sill AFB and I-40 to the east. Fort Sill AFB is the largest military base in the state. Fort Sill is bisected by I-44, which travels north-south through the base connecting to Oklahoma City to the north and the Texas border to the south. Due to its focus in artillery training, large amounts of ammunition are delivered and stored at the base.

All the installations have rapid deployment needs that require a surge in capacity from commercial providers. A deployment surge would severely push the limits of the connecting highways by requiring multiple flatbeds around the clock for possible interstate deliveries of parts, equipment, and ammunition. The movement of trucks is highly likely from MCAAP to Tinker AFB Airport, utilizing US-69 and I-40 as main routes, for ultimate aerial delivery of supplies.

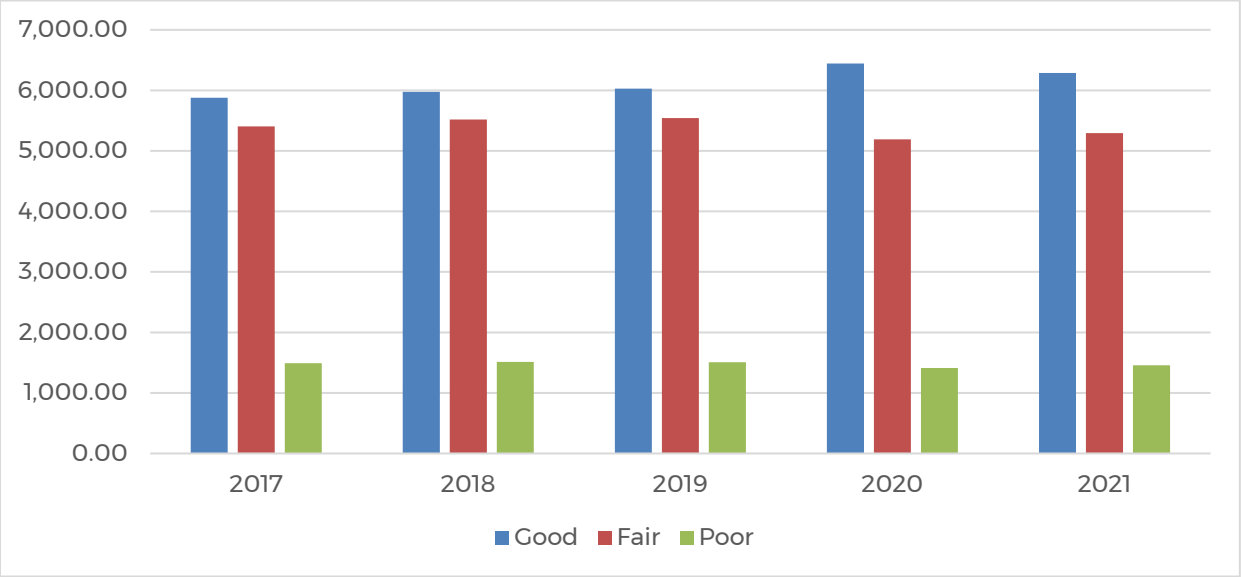
Other Specialized Uses

- Oversize/Overweight Cargo. The agricultural bulk-transport sector has long been a proponent of higher weight limits, as have the logging and steel industries. Oklahoma has most of these commodity groups at the top of its economy. The higher weight limits reduce the number of trucks and improve hauling capacity. However, as weight increases, so does roadway deterioration. It is important that states plan for and develop effective infrastructure on a network of routes that can accommodate the OSOW needs. This includes incorporating bridge limits and height restrictions. In Oklahoma, superload permits often trigger additional requirements, and can be more expensive than routine OSOW permits.
- Agriculture. As small family farms have given way to larger agricultural operations, equipment size has grown. It is necessary for this equipment to travel on local roads in order to move from field to field, or to deliver commodities to other locations, such as grain elevators, using farm trailers and trucks. Off-highway equipment, such as combines, has different axle ratios that do not necessarily match that of regular trucking equipment. Load-posted bridges can require equipment to travel significant out-of-route miles to move on a single property. Given that agriculture is one of Oklahoma's largest industries, this situation requires full consideration in infrastructure planning. One particular issue is the lack of shoulders on rural two-lane highways, which makes passing less safe, and affords no provision to pullover when breakdowns occur.
- Hazardous Materials. Just as OSOW cargo is increasing in volume, so is the amount of hazardous material, which includes chemicals and petroleum products that are part of the Oklahoma economy. Railroads are limiting their availability for some commodities, thereby pushing the haulage to truck. In Oklahoma, US-69 is heavily used by the military to transport explosives. This is another example of the need for planning for hazardous routing and public safety.

Pavement Condition

Reducing the amount of poor-quality pavement is important for both freight and passenger mobility. In 2021, 89 percent of Oklahoma highway centerline mileage was rated in good or fair condition using the International Roughness Index. Between 2017 and 2021, the amount of mileage in good condition increased from 5,878 to 6,287, while the amount in poor condition decreased from 1,491 to 1,457 (Figure 2-29).

Figure 2-29. Pavement Condition, 2017-2021

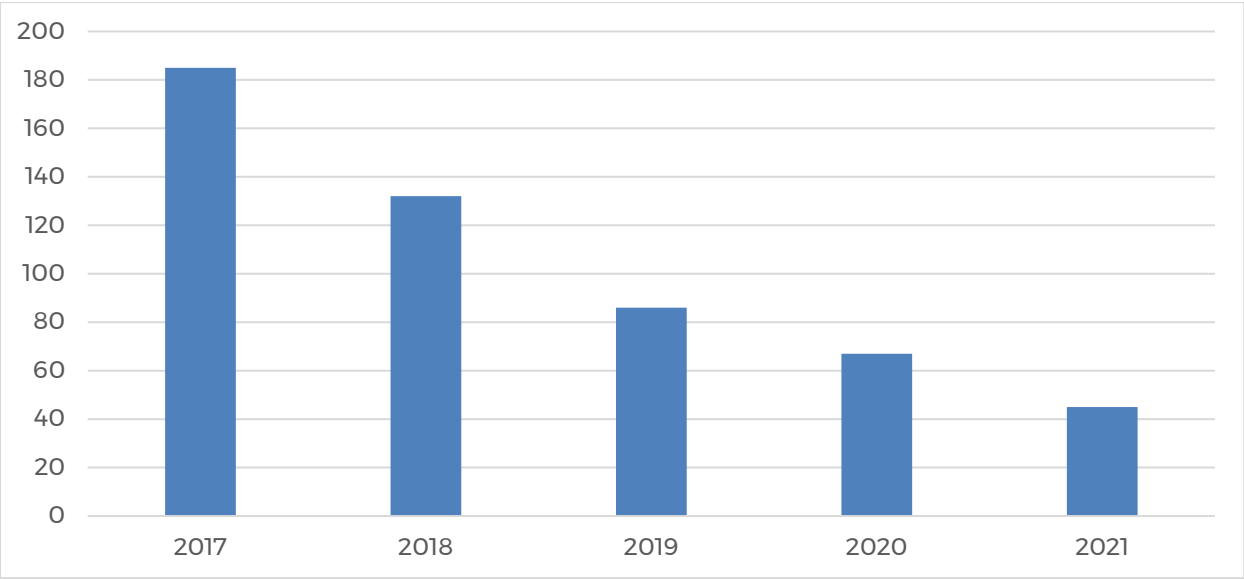


Source: Oklahoma DOT

Bridge Condition

ODOT has a very aggressive bridge repair program in place. The number of structurally deficient bridges in the state has dropped from 185 in 2017 to 45 in 2021 (Figure 2-30).

Figure 2-30. Structurally Deficient Bridges, 2017-2021



Source: Oklahoma DOT

Reliability

Congestion has a direct economic impact on business. More equipment is required when transport times are longer, inventory requirements increase when deliveries are unreliable, and additional distribution centers are needed to quickly meet market demand. Restricted traffic

flow in the highway network contributes to a higher cost of goods for business and consumers. Congestion affects transport time in two ways: reducing speed and decreasing reliability. The reliability of travel time is more important to the planning of capacity and on-time service than is overall speed. More details on reliability are presented in Chapter 5.

Truck Parking

Based on extensive new analysis, truck parking needs in Oklahoma can be summarized as follows.

- While no major truck parking shortfalls appear to exist statewide, continued investments in truck parking capacity are needed to accommodate expected increases in truck volumes. The lower population density and greater availability of land has led Oklahoma to currently have adequate truck parking capacity overall. Moreover, if parking facilities start getting full, there is typically a place nearby, often a gravel lot, where trucks can park. Relatively affordable land prices have allowed for significant parking facility development, both in quantify and size, that appears to largely serve the current needs of the trucking sector. However, additional investments in truck parking infrastructure will be required in the coming decades to accommodate the expected increase in trucks on the roads. A truck parking survey is being conducted that will help determine what ODOT can do to improve the quality of parking facilities, by investing in greater amenities in public rest areas and encouraging development of additional facilities in particular areas. This would help improve the quality of life of drivers, particularly those involved in long-haul trucking, helping ease the driver shortage pressure currently being faced throughout the country.
- Undesignated parking on interstate corridors and urban areas – One of the main truck parking challenges in Oklahoma is the frequency of undesignated parking, particularly in urban areas. This type of parking occurs on interstate corridors, as shown above, but also off the highway system, on vacant lots, public parking lots (where expressly allowed, such as at Walmart and Home Depot, but also at other retailers), and sometimes on the right-of-way. As described above, parking in these locations is undesirable for safety, security, and traffic operations reasons.
- Solutions to parking in undesignated locations require a carrot-and-stick approach. Enforcement should be ramped-up, especially in locations where trucks pose a clear safety issue to pedestrians, other vehicles, and themselves. The capacity of the truck parking system should also be expanded via smaller parking facilities distributed throughout the area instead of at large facilities where designated parking is currently concentrated. This will increase the chance that parking is available for staging reasons in convenient locations for drivers.
- Lack of information about parking availability – One of the main challenges often brought up by truck drivers is the inability to know in real-time where there are parking spaces available. There are currently two ways that truck drivers ascertain availability information in Oklahoma, and both of them have significant drawbacks:

  - The Park My Truck application reports the availability of spaces at parking facilities; however, it only covers 13 out of the 190 facilities in the state.
  - The Trucker Park application reports the availability of more facilities; however, the application reports availability only in the broad categories of "some availability" and "full," which are crowdsourced and not entirely reliable.

- Encouraging participation in these applications could benefit drivers through finding available spaces. Better information about the location, amenities, and capacity of these parking facilities will help drivers have confidence about their parking decisions, rather than resort to parking in undesignated locations. This will be particularly helpful for newer drivers who are not familiar with the region.
- Truck parking is a regional issue, where the decisions and investments made in neighboring states have a significant impact on truck parking needs in Oklahoma. Closer coordination with neighboring states on parking issues is recommended, particularly given the high volume of truck traffic that travels through the state.

2.9.2 Freight Railroad Concerns and Needs

The 2022 SRP discusses needs and opportunities related to freight-rail service which were identified through ODOT's efforts to determine strategic activities. Needs specified in the plan are listed below:

- The need to support and promote rational growth of the short-line industry and passenger rail service in the state
- The need to find new sources of funds to replace lease revenues lost as rail lines owned by the state revert to the rail operators as part of the lease-purchase program
- The need to leverage the economic and public benefits of rail transportation
- The need to inform the public of the benefits of rail transportation

Need to Support Companies Served by the Short-Line Rail Industry

Oklahoma's short-line railroads are important to the economy of the state. They provide rail service to many of the state's smaller economic centers and communities. Several needs have been identified to preserve the companies that rely on rail and allow the short-line railroads to relieve pressure on local infrastructure:

- Track Upgrades – Upgrading all critical lines to accommodate the higher capacity freight cars will permit Oklahoma's rail customers to remain competitive in the national and global marketplace. A number of Class III (short-line) railroads within the state are unable to accommodate industry-standard 286,000-pound gross weight railcars. In some cases, track infrastructure limits railcar allowable weight on rail; at other times, bridges are inadequate to withstand the weight of these heavier railcars.

  An additional consideration to the issue of bridge renovations is the matter of horizontal and/or vertical clearance. Correcting clearance envelope issues allows dimensional traffic

(sometimes referred to as "high and wide") to move over more of the Oklahoma state network. This impacts the ability to adequately serve, among others, the energy sector.

- Rail Infrastructure sized/designed to meet current rail operations models – In the last century the American architect Frank Lloyd Write famously said, "Form follows function." That advice can be applied equally well when viewing railroad infrastructure. As relates to traffic to and from Oklahoma, there are two distinct types of traffic, each of which requires a different type of rail yard/infrastructure:
  - Unit Train Capacity – The rail industry has shifted toward handling certain commodities, such as coal, frac sand, and grain in unit trains. Currently, the typical unit train includes at least 110 cars of a single commodity moving between a single origin-destination pair. However, not all of Oklahoma's rail infrastructure can accommodate unit trains. For example, connections between Class I (large) railroads and the regional Class III railroad at Enid, Oklahoma, limits train size to 50 cars, which is far smaller than most unit trains.
  - The other common train type is "manifest" trains, which are assembled at classification yards with railcars of multiple origins and destinations. This is a mixed freight containing various types of cars and commodities grouped in blocks based on destination to allow the train to efficiently set off and pick up blocks of cars at various locations along the route.

    Simply put, each of these functions defines the required form of infrastructure. This is ultimately driven by the needs of the businesses, farmers, and other rail customers in the state. The evolution of rail infrastructure, whether it be to handle heavier capacity cars, oversize shipments, unit trains, or increased manifest freight is entirely a function of meeting those end user needs.
- Rail Corridor Preservation – A rail corridor preservation program to retain abandoned rail lines for future rail use (even in those instances where the tracks have been removed) should be considered. Some Oklahoma rail lines are underutilized, which is a cause for concern.

Need for Rail-Served Industrial Parks

The need to establish more rail-served industrial parks has been identified. The industrial parks would generate new rail business not only for the short-line and Class I railroads but also additional economic development in smaller communities. There is need for rail spurs and industrial rail leads connecting Oklahoma's industrial properties to the Oklahoma rail network.

Both Oklahoma City and Tulsa have been cited as areas where additional transload facilities could enhance economic development. Additional team tracks would provide alternatives to shippers that are not directly served by rail in rural areas. In some cases, multimodal facilities need to be upgraded. For example, the track geometry at the Port of Muskogee prevents use by six-axle locomotives and long blocks of 286,000-pound railcars. Since corrective action would require changing the radius of one or more curves, this improvement involves assessing land use issues and may provide additional development opportunities. As opportunities for new industries arise, rail improvements need to be addressed.

Highway-Rail Grade-Crossing Improvement

When asked about freight bottlenecks for the "Oklahoma State Rail Plan: 2018–2021 stakeholders cited impeded highway freight mobility attributable to at-grade highway-rail crossings. These included crossings in Claremore, Moore, Owasso, and Thomas, as well as the BNSF Red River Subdivision in Oklahoma City.

Elimination of Bottlenecks and Other Impedances

A critical need, which will be examined and addressed in more detail in later sections, is the elimination of operating hindrances due to capacity restrictions or physical obstructions. Capacity restrictions include track and facility capacity. Physical obstructions limit the ability to use larger profile freight cars, particularly in transporting containers or automobiles. These impedances must be addressed both as they relate to horizontal clearance (adjacent structures and obstructions) and vertical clearance (overhead bridges, etc.)

2.9.3 Waterways Concerns and Needs

MKARNS Maintenance Backlog

While the MKARNS offers strong performance and high reliability, it also faces a significant maintenance backlog. Although Oklahoma's ports have different individual plans and needs, there is agreement that the single most important priority is to preserve the safe, reliable, and productive operation of the MKARNS itself.

Like the rest of the U.S. Inland Waterway system, the MKARNS has a substantial list of unfunded "critical backlog" projects, above and beyond routine maintenance. "Critical backlog" is defined as an estimated 50 percent chance of component or asset failure within a five-year period. The current total of needed expenditures to address critical backlog on the MKARNS is $301.7 million systemwide, with $160.4 million of that amount on the Oklahoma segment.

MKARNS Deepening

The MKARNS has a 9-foot controlling navigation depth, while most of the Inland Waterway system offers at least 12-foot depths. The shallower 9-foot depth means that barges cannot be as heavily loaded. This, in turn, means that the costs of barge shipment must be spread over less tonnage, producing higher cost-per-ton rates for shippers.

Long-discussed, unadvanced plans to deepen the MKARNS to 12 feet received a significant boost from the Bipartisan Infrastructure Law (BIL), which allocated an additional $168.5 million for the USACE Little Rock District, of which $62.7 million is for operations and maintenance to provide reliable navigation and $92.6 million is for the 12-foot channel deepening project. The deepening, when completed, would provide a significant cost savings for port customers, leading to maintained and expanded waterborne cargo volumes over the system and through Oklahoma's ports.

Port-Identified Needs

Each of Oklahoma's ports has specific needs, which are described in more detail in Chapter 5. General concerns include:

- MKARNS operability and state of good repair
- Flood protection
- Mooring structure condition and capacity
- Dockside rail improvements
- Truck access improvements
- Land development and Foreign Trade Zone opportunities

Freight Advisory Committee Input

At the June 2022 FAC meeting, the members were asked about the biggest challenges for freight in Oklahoma. Responses included:

- Increasing congestion on highways and in metro areas
- Need for funding
- Rising costs of fuel
- Rising costs of goods and materials
- Staffing issues/driver shortages
- Truck rest areas/parking
- Air quality issues – if congestion continues and accidents continue air quality will be affected. Would be nice to see electrical hookups at truck stops rather than trucks needing to idle.
- Preparing for connected vehicles (CVs)
- System maintenance
- High and wide loads
- Hazardous materials transportation in populated areas

Discussion of these responses revealed additional issues including:

- Long trains block vehicle traffic at at-grade intersections (e.g., 76th Street N. in Owasso)
- Highway ramps that do not provide enough merging/weaving distance for trucks – Oklahoma should identify and prioritize these areas
- Intermodal needs around Tulsa – including Port of Catoosa, BNSF, and near the airport
- SRP documented rail and intermodal concerns
- Driver shortages

2.9.4 Accommodation of Critical Supply Chains

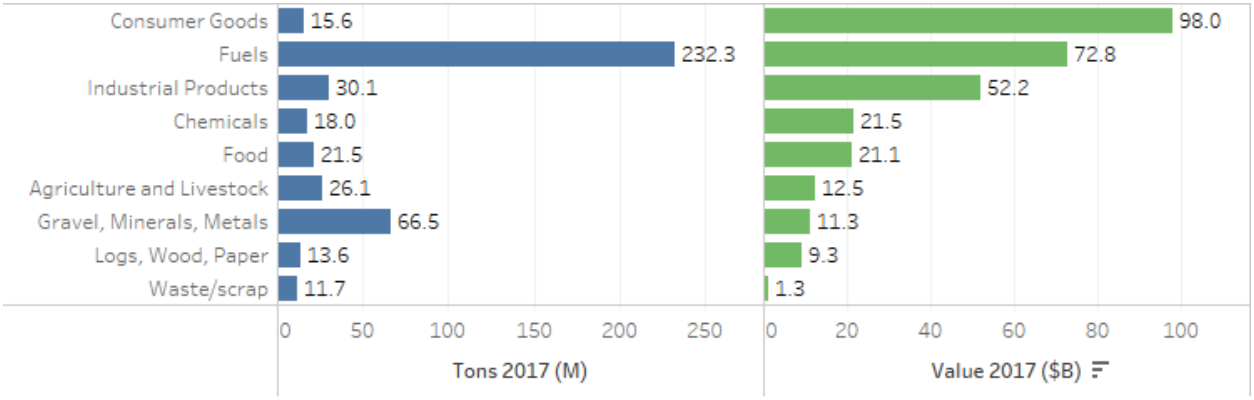
Freight flows over Oklahoma's freight transportation system are generated by its producing industries, consuming industries, and consuming population. Different industries use the system in different ways, organizing their movement of commodities in terms of structured "supply chains" based on the commodity type, origin-destination, transportation mode, and other factors.

Every industry supply chain is unique, but at a high level, industries handling similar commodities tend to have similar or related needs. Oklahoma's most important supply-chain clusters include:

- Consumer Goods
- Fuels
- Industrial Products
- Food
- Chemicals
- Agriculture and Livestock
- Gravel, Minerals, Metals
- Logs, Wood, Paper
- Waste and Scrap

By value, the most important supply chains are consumer goods, fuels, and industrial products, followed by chemicals and food. Fuels account for by far largest share of tonnage, followed by gravel, minerals, and metals (Figure 2-31).

Figure 2-31. Oklahoma Supply Chain Group Commodities – Tons and Value, 2017



Source: Freight Analysis Framework 5.3

Details for each of these supply-chain clusters are presented in Figure 2-32 through Figure 2-37, and key findings are summarized below.

- The Consumer Goods cluster (15.6 million tons worth $98 billion) includes electronics, furniture, mixed freight, motorized vehicles, pharmaceuticals, precision instruments, printed material, textiles/leather, tobacco, and transportation equipment. Tonnage of consumer goods is transported within, into, and out of the state primarily by truck. A larger dollar amount of consumer goods is transported into the state than is transported internally or out of state; nevertheless, a substantial value of goods move in all directions by truck, multiple modes, rail, and air. The leading outbound and inbound tonnage move is to Texas by truck. The leading outbound value moves are to Texas by truck and multiple modes, and Kansas, California, and Arkansas by truck. The leading inbound value moves are from Texas by multiple modes including from Ohio by rail (primarily auto and

transportation); from California by truck and multiple modes; and from Mississippi, Kansas, and Arkansas by truck.

- The Fuels cluster (232.3 million tons worth $72.8 billion) includes coal, crude petroleum, fuel oils, gasoline, and other petroleum and coal products, including liquid natural gas. Pipelines transport the majority of the tonnage of fuel into and out of the state while truck, rail, and multiple modes transport lower but still significant tonnage. Trucks are used for most of the tonnage transported within the state, but rail and pipeline are also used. A similar modal split is observed for the dollar amount (value) of fuel transported across the three directions except for trucking, which transports a larger share of the value amount of fuel as trucks handle higher-value commodities. The leading outbound tonnage moves are to Texas by pipeline and truck and to Kansas, Arkansas, and Louisiana by pipeline. The leading inbound tonnage moves are from Texas by pipeline and truck, Wyoming by carload rail (primarily coal), and North Dakota, Michigan, Colorado, and Louisiana by pipeline. The leading outbound value moves are to Texas by pipeline and truck, and Kansas, Louisiana, and Arkansas by pipeline.
- The Industrial Products (30.1 million tons worth $52.2 billion) cluster includes articles of base metal, building stone, machinery, misc. manufactured products, and nonmetallic mineral products. Around half the tonnage of industrial products is transported internally, and largely by truck while smaller amounts are transported by rail and multiple modes. The value picture is different as a similar dollar amount of industrial products are transported within, into, and out of the state, and because a higher share of moves are fulfilled by multiple modes. The leading outbound and inbound tonnage moves are to and from Texas by truck. The leading outbound and inbound moves of industrial products are to and from Texas by truck.
- The Chemicals cluster (18.0 million tons worth $21.5 billion) includes basic chemicals, chemical products, fertilizers, and plastics/rubber. The tonnage of chemicals transported across all three directions is similar in quantity and is primarily by truck, with support from rail and multiple modes. A larger dollar amount of chemicals is transported out of the state than is transported within or into the state. The majority of the dollar amount of chemicals across all directions is transported by truck, while some is transported through multiple modes, rail, and water. Inbound and outbound tonnage is diversified across many different trading partners; inbound and outbound value is primarily truck to and from Texas.
- The Food cluster (21.5 million tons worth $21.1 billion) includes alcoholic beverages, meat/seafood, milled grain products, other agricultural products, and other foodstuffs. The tonnage of transported food is relatively similar between inbound, outbound, and within-state moves, and is mostly by truck, but water also plays an important role. The dollar amount of food transported is also similar between inbound, outbound, and within-state moves and is also largely transported by truck. The leading outbound tonnage moves are to Texas and Kansas by truck and Louisiana by water. The leading inbound tonnage move, inbound value move, and outbound value move is to/from Texas by truck.
- The Agriculture and Livestock cluster (26.1 million tons worth $12.5 billion) includes animal feed, cereal grains, and live animals/fish. The amount of tonnage of agriculture and

livestock transported within, into, and out of the state is similar between the three directions. Outbound direction moves are primarily by truck and some water, while inbound direction moves are primarily by truck and partially by multiple modes. The dollar amount of transported agriculture and livestock show similar direction and modal split patterns. The leading outbound tonnage and value moves are to Kansas and Texas by truck and to Louisiana by water. The leading inbound tonnage move is from Kansas by truck.

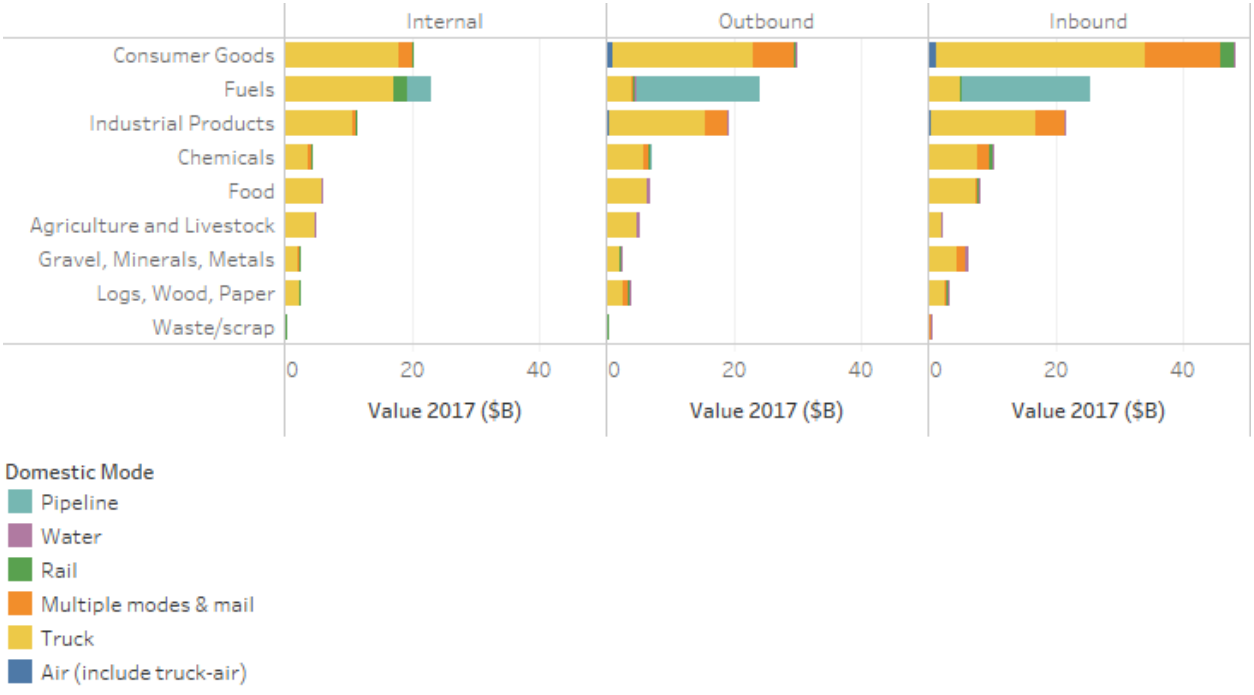
- The Gravel, Minerals, Metals cluster (66.5 million tons worth $11.3 billion) includes base metals, gravel, metallic ores, natural sands, and nonmetallic minerals. Tonnage for this cluster is primarily transported internally, with smaller outbound and inbound moves, and is largely transported by truck; however, there are very substantial shares of conveyance by rail, multiple modes, and water. A larger dollar amount of gravel, minerals, and metals are transported into the state than are transported internally or out of state, suggesting that higher-value commodities within the cluster are being imported as indicated by low tonnage. The leading outbound tonnage moves are to Texas by rail and truck and to Missouri by truck. The leading inbound tonnage and value move is from Texas by truck.
- The Logs, Wood, Paper cluster (13.6 million tons worth $9.3 billion) includes logs, newsprint/paper, paper articles, and wood products. The total tonnage of logs, wood, and paper transported within, into, and out of the state is relatively similar with slightly larger amounts of internal movement. Movements across all three directions are primarily by truck with some rail, multiple modes, and water. The value of logs, wood, and paper transported across the three directions is more balanced and uses similar split of transportation modes.
- Waste and Scrap (11.7 million tons worth $1.3 billion) consists of waste or scrap metal, glass, paper, or other materials or products with commodity resale value. Tonnage is largely transported within the state by truck with small amounts of waste and scrap imported through multiple modes and water and some exported by rail. The value waste and scrap transported within, into, and out of the state is extremely low compared to other clusters.

Understanding and accommodating the performance requirements – reliability, speed, cost, safety, connectivity, resiliency, etc. – of these key supply chains is essential to the health and growth of the state's economy and the needs of its residents.

Figure 2-32. Supply-Chain Group Tons, Directions, and Modes, 2017

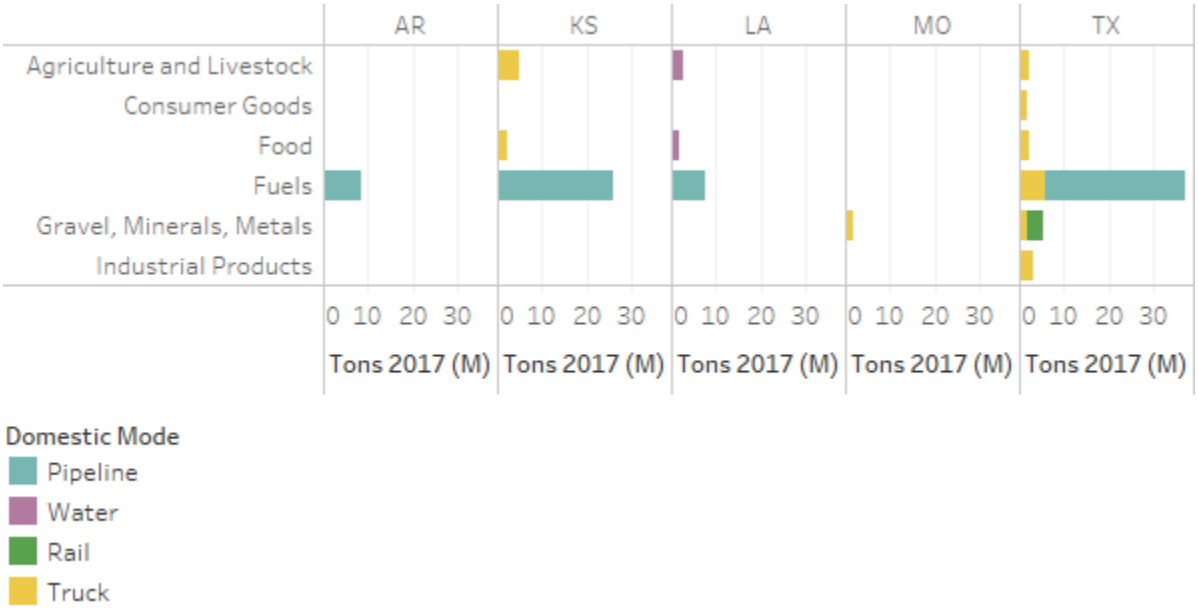
Source: Freight Analysis Framework 5.3

Figure 2-33. Supply-Chain Group Value, Directions, and Modes, 2017



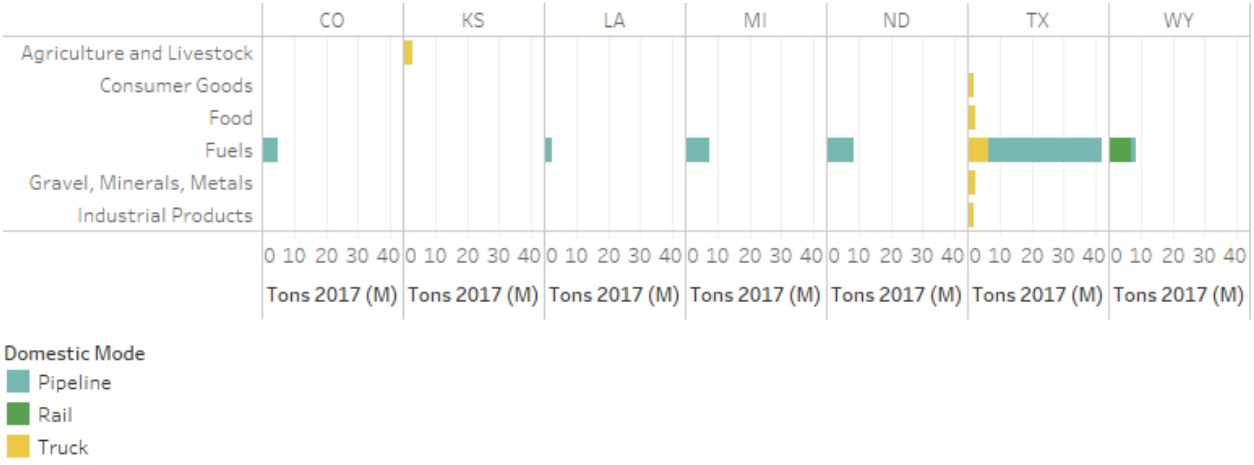
Source: Freight Analysis Framework 5.3

Figure 2-34. Leading Outbound Tonnage Moves by Supply-Chain Group, Mode, and Destination State, 2017



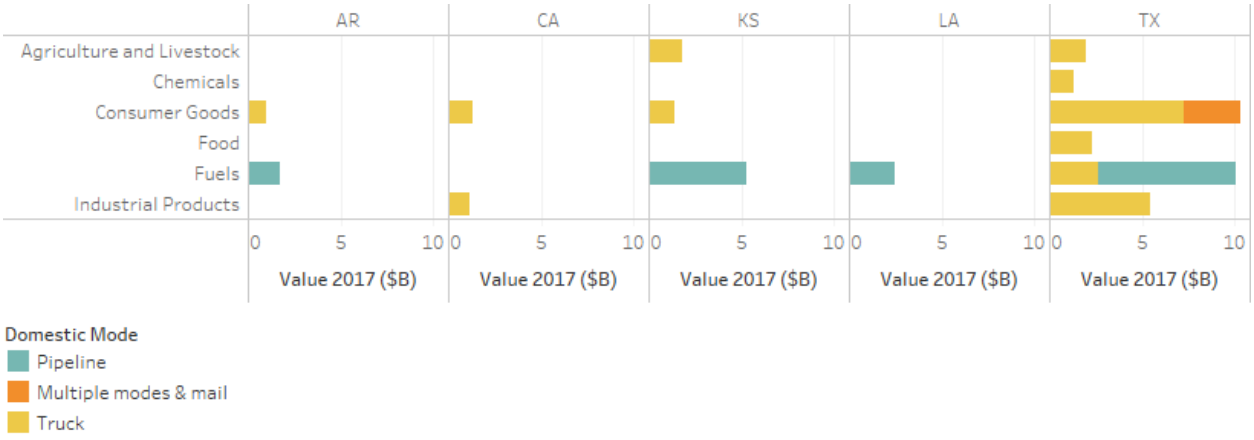
Source: Freight Analysis Framework 5.3

Figure 2-35. Leading Inbound Tonnage Moves by Supply-Chain Group, Mode, and Origin State, 2017



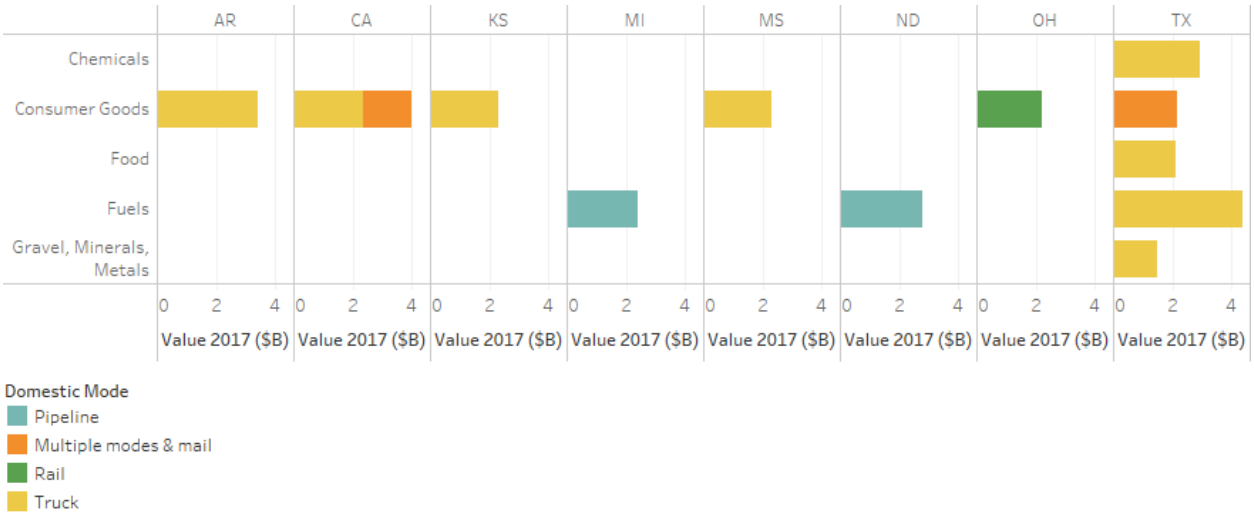
Source: Freight Analysis Framework 5.3

Figure 2-36. Leading Outbound Value Moves by Supply-Chain Group, Mode, and Destination State, 2017



Source: Freight Analysis Framework 5.3

Figure 2-37. Leading Inbound Value Moves by Supply-Chain Group, Mode, and Origin State, 2017



Source: Freight Analysis Framework 5.3

2.9.5 Financial Challenges

Freight transportation requires smooth pavement, structurally sound bridges, and ongoing railroad and waterway infrastructure improvements to deliver products safely and efficiently. Highways need to be maintained and interchanges need to be reconstructed. Growth needs to be accommodated without deterioration in freight service performance. Freight-rail systems require track repair and bridge rehabilitation, and rail-highway crossings must be safe. The MKARNS needs to address deferred maintenance on its locks and dams.

Revenue to address these needs has increased for state fiscal year 2023. The budget for state fiscal year 2023 is $2.2 billion, and the highway program is $2.0B or 88 percent of the budget The Highway program revenue is comprised of:

- Federal — $897 million, or 45 percent
- State Motor Fuel Taxes — $ 363 million, or 18 percent
- Other — $748 million, or 37 percent, from a combination of Motor Vehicle Collections, Income Taxes, TIFIA loans, anticipated Bond issuance and deposits for third-party match.

However, financial challenges for ODOT are increasing as it seeks to maintain and improve the state transportation system. The infrastructure plan is currently being impacted by increased cost of materials, supply-chain disruptions, and an increasingly tight labor market. Price hikes are anticipated to diminish the value of the increases to the infrastructure plan.

With vehicle fuel efficiency increasing, and accelerating demands on the system, Oklahomans must address transportation funding issues. Oklahoma's 2020 through 2045 LRTP shows that the expected funding gap averages $284 million per year over 25 years, if current trends continue.[10] Needs exceed expected available revenues by nearly 20 percent annually. Clearly a major component of addressing Oklahoma's freight needs is the challenge of finding additional funding.

[10] https://static1.squarespace.com/static/5cd1d280f9df7d00015c6297/t/5f5bbbb6785a5f69c44e3d04/1599847366823/Oklahoma+2045+LRTP+Final+August+2020.pdf