



TENNESSEE STATEWIDE MULTIMODAL FREIGHT PLAN

2023

Tennessee Statewide Multimodal Freight Plan 2023

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Vision, Goals and Objectives

Chapter 1: Vision, Goals and Objectives

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Chapter 1: Vision, Goals and Objectives

Introduction

Freight transportation, including air cargo, waterway, road, rail and pipeline systems, is a critical part of economic development, job creation, and growth for the state of Tennessee. Efficient movement of goods to, from and through Tennessee supports many jobs and employment opportunities in the state, across many diverse sectors, including manufacturing, warehousing, mineral extraction and construction. Due to the heavy reliance of the state’s economy on freight transportation, the Tennessee Department of Transportation (TDOT) established a guiding principle to provide for the efficient movement of people and freight. TDOT recognizes the importance of planning, designing, constructing, and maintaining freight-related projects to sustain mobility and accessibility for the future growth of the state’s population and industries.



Air Cargo



Waterway



Road



Rail



Pipeline

Employment growth data for key freight industry sectors, including transportation and warehousing, manufacturing and wholesale trade (as defined by the US Bureau of Economic Analysis) in Tennessee, each show consistently increasing numbers over the past three decades. Although the recession in 2007–2009 and the Pandemic in 2020–2021 negatively impacted the global, national and state economies, Tennessee’s key industries rebounded and continue to grow.

The State Gross Domestic Product (GDP) for these key freight industry sectors accounts for nearly 30 percent of Tennessee’s total GDP, which is higher than the percentage of total GDP in the U.S. for the same industry sectors (20 percent).¹ This metric further strengthens the need for TDOT to implement current and future freight projects for efficient movement of people and goods to, from and through the state.

The purpose of this freight plan is threefold:

1. Support strategic goals for the Tennessee freight system
2. Implement a strategy to achieve freight-related goals that align with TDOT’s guiding principles
3. Fulfill the continued requirements of the FAST Act through the Infrastructure Investment and Jobs Act, Public Law 117-58 (Nov. 15, 2021) (IIJA).

¹ Bureau of Economic Analysis, 2021

As an update to the June 2016 Statewide Multimodal Freight Plan, this plan updates inventories associated with existing assets of the freight transportation system, evaluates the economic benefits of the system, incorporates current freight needs and issues, anticipates future trends and economic growth and determines implementable strategies for Tennessee to improve freight movement across all modes of transportation, as well as the equally important connections between modes. This plan culminates with a list of short- and long-term projects that address future needs of the Tennessee freight system.

Relationship to the Infrastructure Investment and Jobs Act (IIJA)

In July 2012, when the Moving Ahead for Progress in the 21st Century Act (MAP-21) was signed into law, the importance of freight transportation planning on the national level was acknowledged. The requirements of MAP-21 responded to the increasing number of trucks on the roadway and the need to plan for an integrated freight transportation system that is inclusive of all modes. MAP-21 did not require states to develop a freight plan, however, freight projects were required to be identified in a state plan to qualify for an increased federal funding share. The law encouraged states to develop comprehensive freight plans to guide state investments and requires a national freight strategic plan to be developed in cooperation with states and other stakeholders. Meeting the requirements set by MAP-21, TDOT adopted the Tennessee Statewide Multimodal Freight Plan in 2016.

Since the adoption of the Tennessee Statewide Multimodal Freight Plan, Fixing America's Surface Transportation (FAST) Act was enacted on December 4, 2015, and builds on the freight initiatives that began under MAP-21. This piece of legislation, which governed funding and program requirements through fiscal year 2021, provided new requirements and guidance for state freight plans. Following the FAST Act in 2021, the Infrastructure Investment and Jobs Act (IIJA), continues the requirements laid out under the FAST Act. The IIJA provides new opportunities for funding and outlines 17 requirements for state freight plans which must be updated every four years. TDOT established a statewide Freight Advisory Committee (FAC) in 2013 to assist in developing a comprehensive state freight plan for Tennessee. The FAC is still active and meets regularly in regional and statewide groups.

The IIJA sustains the National Highway Freight Program (NHFP), which is a formula program dedicated to freight-specific projects. The FAST Act created a National Multimodal Freight Network (NMFN) with the intent of strengthening the contribution of this network to the economic competitiveness of the country. NHFP funds may be spent on the National Highway Freight Network (NHFN) portion of the NMFN, which consists of the Primary Highway Freight System (PHFS), Critical Rural Freight Corridors (CRFCs), Critical Urban Freight Corridors (CUFCs), and the remainder of the Interstate Highway System not already designated as part of the PHFS. Under IIJA, the amount of funding for eligible projects has increased from 10 percent to 30 percent, which includes freight intermodal or freight rail projects, subject to certain restrictions. By updating the Tennessee Statewide Multimodal Freight Plan to meet updated IIJA requirements, Tennessee's freight planning processes will align with goals established in the National Strategic Freight Plan. Updating the statewide freight plan to IIJA compliance will enable Tennessee to achieve National Freight Policy goals by implementing projects funded by the National Highway Freight Program.

A summary of how this statewide freight plan update meets IIJA state freight plan requirements is available in Appendix 1 (page 218).

Strategic Goals for Freight Transportation

The Federal Highway Administration's (FHWA's) National Freight Policy goals align closely with TDOT's guiding principles. These national goals are intended to guide future needs of a national freight system including Tennessee roads, rail lines, waterways and air freight movement. Similarly, TDOT's guiding principles are intended to focus the transportation system improvements on areas of importance to the residents and economy of Tennessee. Aligning Tennessee's guiding principles with the national freight goals establishes the direction of the State's freight planning and projects for efficient movement of people and goods.

National Multimodal Freight Policy Goals

As transportation planning moves towards performance-based metrics, goals are defined in a manner to measure success from current existing conditions. TDOT wants to determine if freight policies and programs are helping the department meet these established goals. The ten National Multimodal Freight Policy Goals, which Tennessee has adopted, are listed here.

1. **Identifying infrastructure improvements, policies, and operational innovations that—**
 - a. Strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States;
 - b. Reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network;
 - c. Increase productivity, particularly for domestic industries and businesses that create high-value jobs;
2. **Improve the safety, security, efficiency, and resiliency of multimodal freight transportation;**
3. **Achieving and maintaining a state of good repair on the National Multimodal Freight Network;**
4. **Using innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network;**
5. **Improving the economic efficiency and productivity of the National Multimodal Freight Network;**
6. **Improving the reliability of freight transportation;**
7. **Improving the short- and long-distance movement of goods that—**
 - a. Travel across rural areas between population centers;
 - b. Travel between rural areas and population centers; and
 - c. Travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network;
8. **Improving the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity;**
9. **Reducing the adverse environmental impacts of freight movement on the National Multimodal Freight Network; and**
10. **Pursuing the goals described in this subsection in a manner that is not burdensome to State and local governments.**

TABLE 1-1: National Freight Strategic Plan Goals and Objectives

Goal	Strategic Objective
1. Safety Improve the safety, security, and resilience of the national freight system.	Support the development and adoption of automation, connectivity, and other freight safety technologies
	Modernize safety oversight and security procedures
	Minimize the effects of fatigue and human error on freight safety
	Reduce conflicts between passenger and freight traffic
	Protect the freight system from natural and human-caused disasters and improve recovery speed
2. Infrastructure Modernize freight infrastructure and operations to grow the economy, increase competitiveness, and improve quality of life.	Fund targeted investments in freight capacity and national goals
	Improve consideration of freight in transportation planning
	Prioritize projects that improve freight intermodal connectivity, and enhance freight flows on first- and last-mile connections at major trade gateways
	Develop a methodology for identifying freight bottlenecks across modes
	Advance freight system management and operation practices
	Stimulate job growth and economic competitiveness in rural and urban communities
3. Innovation Prepare for the future by supporting the development of data, technologies, and workforce capabilities that improve freight system performance.	Support the development and adoption of automation and connectivity, including V2X technologies
	Support the safe deployment of unmanned aircraft systems (UAS) technology
	Streamline or eliminate regulations to improve governance, efficiency, and economic competitiveness
	Improve freight data, modeling, and analytical tools and resources
	Strengthen workforce professional capacity
	Invest in freight research
	Support regulatory frameworks that foster freight innovation

The National Freight Strategic Plan, released in September 2020, identified national goals for the multimodal freight system, along with specific objectives to achieve the goals as shown in **Table 1-1**.

TDOT, including the Freight Advisory Committee, will use these goals to guide projects and policies that will improve the safety of the state’s freight system, update the state’s freight infrastructure and capitalize on new technologies that will improve freight system

performance and quality of life for the state of Tennessee. By focusing on existing data and future needs, TDOT can implement freight performance measures to improve TDOT’s ability to meet the National Freight Policy Goals.

TABLE 1-2: National Highway Freight Program Goals

Goal	Goals of National Highway Freight Program	How TDOT Freight Plan will Support in Reaching the Goal
1	Invest in infrastructure and operational improvements that: <ol style="list-style-type: none"> a. Strengthen economic competitiveness b. Reduce congestion c. Reduce the cost of freight transportation d. Improve reliability, and e. Increase productivity 	The Freight Plan describes and recommends infrastructure improvements that would reduce congestion and transportation costs, and costs and improve the reliability and productivity of the state’s industries, thereby strengthening the state’s competitiveness nationally and internationally. Projects supporting these goals are discussed in Chapter 10, Recommendations and Implementation
2	Improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas	The recommended projects that improve safety, security, efficiency, and resiliency of freight transportation in both the rural and urban areas of the state are discussed in Chapter 10
3	Improve the state of good repair of the National Highway Freight Network	The recommended projects that improve the state of good repair are discussed in Chapter 10
4	Use innovation and advanced technology to improve National Highway Freight Network safety, efficiency, and reliability	The recommended projects that include the use of advanced technology are discussed in Chapter 10
5	Improve the efficiency and productivity of the National Highway Freight Network	The recommended projects that improve the efficiency and productivity of the freight network are discussed in Chapter 10
6	Improve State flexibility to support multi-State corridor planning and address highway freight connectivity	The recommended projects, programs, and policies that support multistate coordination are discussed in Chapter 10
7	Reduce the environmental impacts of freight movement on the National Highway Freight Network	Complementary to Goal 1, improvements to infrastructure that reduce congestion and bottlenecks while improving reliability also reduce the negative environmental impacts that come from vehicles idling on the freight network. Recommendations to reduce environmental impacts are discussed in Chapter 10

National Highway Freight Program Goals

The National Highway Freight Program Goals aim to improve the efficient movement of freight on the NHFN so that the nation can continue to compete in the global economy. **Table 1-2** lists the NHFP goals along with how this freight plan will improve the state’s ability to meet the goals.

Strategic Goals Related to Guiding Principles for Tennessee’s Transportation System

In 2016, TDOT developed a 25-year Long Range Transportation Policy Plan (LRTP) which identified seven guiding principles. Those principles provide guidance when making investment decisions for Tennessee’s transportation system. The seven principles are as follows:

1. Preserve and manage the existing system
2. Support the state’s economy
3. Maximize safety and security
4. Provide for the efficient movement of people and freight
5. Build partnerships for sustainable and livable communities
6. Protect natural, cultural, and environmental resources
7. Emphasize financial responsibility

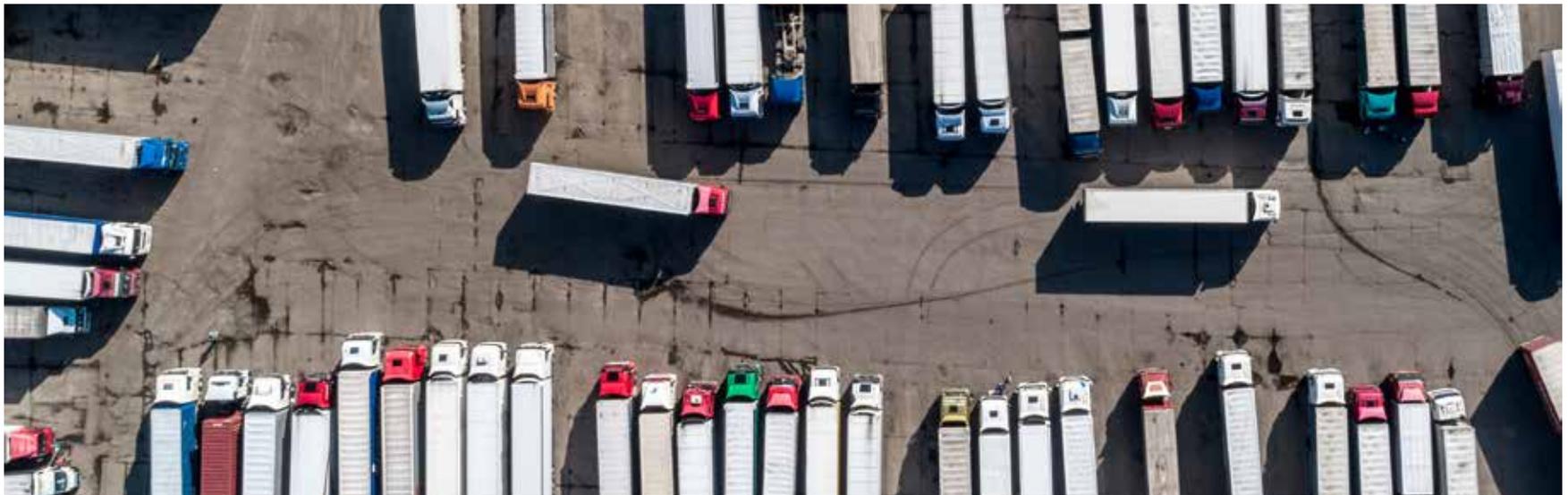
Table 1-3 shows how these LRTP guiding principles align with the National Multimodal Freight Policy Goals and form objectives for freight system development in Tennessee.

TABLE 1-3: Freight Goals Relative to Guiding Principles

Goal	National Multimodal Freight Policy Goal	TDOT Long Range Plan Guiding Principle	Statewide Multimodal Freight Plan Objectives
1	Identify infrastructure improvements, policies, and operational innovations that A) strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States	Support the State’s Economy	Provide facilities for freight movement that Support the State’s Economy through efficient movement of goods so that competitiveness is improved by industries in the state.
	Identify infrastructure improvements, policies, and operational innovations that B) reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network	Preserve and Manage the Existing System	Preserve and Manage the Existing System through strategic investments designed to reduce congestion/bottlenecks, enhance efficiency of intermodal movements, and utilize new technology to provide alternative routing.
	Identify infrastructure improvements, policies, and operational innovations that C) increase productivity, particularly for domestic industries and businesses that create high-value jobs	Support the State’s Economy	Provide facilities for freight movement that Support the State’s Economy through efficient movement of goods that enhance productivity of companies by industries in the state.

Goal	National Multimodal Freight Policy Goal	TDOT Long Range Plan Guiding Principle	Statewide Multimodal Freight Plan Objectives
2	Improve the safety, security, efficiency, and resiliency of multimodal freight transportation	Maximize Safety and Security	Maximize Safety and Security by providing adequate, safe facilities to meet industry guidelines. Mitigate safety issues that arise from increased freight movement. Provide alternative routes in the case of an emergency, natural or manmade.
3	Achieve and maintain a state of good repair on the National Multimodal Freight Network	Preserve and Manage the Existing System	Maintain the freight system so that roadway bridges, rail bridges, locks for barges, and airport runways can support the industry and Manage the Existing System .
4	Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network	Preserve and Manage the Existing System	Enhance the current system using Intelligent Transportation Systems (ITS) technology and other innovative technologies to Preserve and Manage the Existing System .
5	Improve the economic efficiency and productivity of the National Multimodal Freight Network	Support the State's Economy	Provide facilities for freight movement that Support the State's Economy through efficient movement of goods that enhance productivity of companies by industries in the state.
6	Improve the reliability of freight transportation	Provide for the Efficient Movement of People and Freight	Build better connections among different modes of transportation to Provide for the Efficient Movement of People and Freight .
		Preserve and Manage the Existing System	Manage the Existing System to provide for reliable freight transit times.
7	Improve the short- and long- distance movement of goods that A) travel across rural areas between population centers	Provide for the Efficient Movement of People and Freight	Build better connections among different modes of transportation to Provide for the Efficient Movement of People and Freight .
	Improve the short- and long- distance movement of goods that B) travel between rural areas and population centers	Provide for the Efficient Movement of People and Freight	Build better connections among different modes of transportation to Provide for the Efficient Movement of People and Freight .
	Improve the short- and long- distance movement of goods that C) travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network	Provide for the Efficient Movement of People and Freight	Provide greater access to transportation services for all people and build better connections among different modes of transportation to Provide for the Efficient Movement of People and Freight .

Goal	National Multimodal Freight Policy Goal	TDOT Long Range Plan Guiding Principle	Statewide Multimodal Freight Plan Objectives
8	Improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity	Building Partnerships for Sustainable and Livable Communities	Work with industries and communities to create a freight system that Builds Partnerships for Sustainable and Livable Communities.
		Provide for the Efficient Movement of People and Freight	Increase the ability to build better connections among different modes of transportation to Provide for the Efficient Movement of People and Freight.
9	Reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network	Protect Natural, Cultural, and Environmental Resources	Improve the freight system such that the environmental and community impacts are limited and Natural, Cultural, and Environmental Resources are Protected.
10	Pursue the goals described in this subsection in a manner that is not burdensome to State and local governments	Emphasize Financial Responsibility	Provide accountability, maximize Tennessee's share of federal transportation funding, develop alternative funding strategies, select projects based on identified regional needs, and allow flexibility in local management of projects where feasible to Emphasize Financial Responsibility.



Priority Freight Goals and Objectives

Although all the goals are important to the efficiency of freight movement and should be considered when evaluating Tennessee's freight transportation system, it is important for Tennessee to determine which goals will help the growth of industries throughout the state. Based on discussions with TDOT and freight stakeholders, the five freight goals and objectives that are mentioned as a high priority to address current and future needs of the Tennessee freight transportation system are:



Improve the safety, security, efficiency and resiliency of the freight transportation system

Objectives: Provide adequate, safe facilities to meet industry guidelines. Mitigate safety issues that arise from increased freight movement. Provide alternative routes in the case of an emergency, natural or manmade.



Improve the state of good repair of the freight transportation system

Objective: Maintain the freight system so that roadway bridges, rail bridges, locks for barges, and airport runways can support the industry and manage the existing system.



Reduce congestion on the freight transportation system

Objective: Preserve and manage the existing system through strategic investments designed to reduce congestion/bottlenecks, enhance efficiency of intermodal movements.



Incorporate innovation and technology to improve mobility and safety

Objective: Increase efficiency and maximize safety on the freight system by utilizing new technology to provide alternative routing, sustainable travel, smarter data, and enhanced communication.



Reduce the impacts of freight transportation

Objective: Improving the freight system such that the environmental and community impacts are limited and Natural, Cultural, and Environmental Resources are protected, including reducing freight related emissions to improve local air quality and design freight related infrastructure to reduce the impact upon wildlife habitats and reduce stormwater flooding.



Economic Context of Freight Transportation Planning

2

Chapter 2: Economic Context of Freight Transportation Planning

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Chapter 2: Economic Context of Freight Transportation Planning

As highlighted by the COVID Pandemic, the strength of the State's economy is linked to the ability to move freight efficiently, reliably and safely via all modes of transportation. While disruptions to supply-chains deprives local industries of the inputs necessary for production, growing consumer demands create a challenge to transport freight that meets customer needs and costs of freight transportation. As we move beyond the pandemic, it is expected that supply-chain issues will be reduced or eliminated, perhaps relying more on locally sourced inputs, and that consumer demand will normalize and become more stable. As this occurs, freight flows to continue at levels seen pre-pandemic with increases due to increased demand for products from the state's key industries, as well as a shift to more domestically (or North American) supplied inputs.

It is in this context that freight transportation planning will be discussed in this chapter.



Freight in Tennessee

The Tennessee Economy

Tennessee’s economy, as measured by the state’s total gross product, grew steadily from 2010 until the COVID pandemic hit in 2020. As shown in **Figure 2-1**, the state’s economy declined in 2020 for the first time in twenty years. In 2021, the state recovered from this slowdown as economic output was seen to increase from \$370 billion in 2020 to \$418 billion in 2021.

In the broadest terms, economic output can be classified into four component groups, or industry categories. These categories include private firms that produce a physical product or goods-producing industries; private firms that provide some form of service or services-providing industries; and public spending by either state and local governments or by the federal government.

As is common in most U.S. states and shown in **Figure 2-2**, Tennessee’s largest industry category in terms of value is the services-providing industries with goods-producing industries making up a much smaller portion of the state’s total economic output. In 2020, services-providing industries accounted for over \$252 billion, or 64 percent, of the state’s total economic output. Similarly, goods-producing industries accounted for just over \$70 billion, or nearly 18 percent.

FIGURE 2-1: Tennessee Gross State Product (billions), 2000-2021

SOURCE: Bureau of Economic Analysis

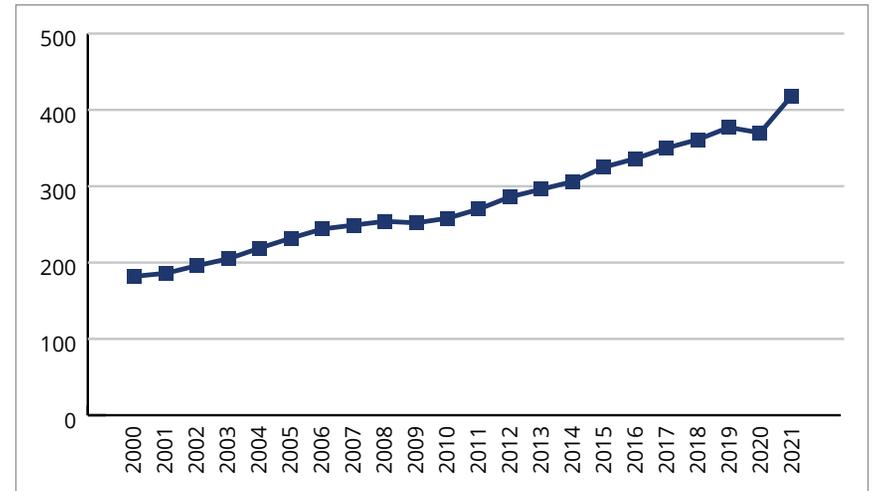
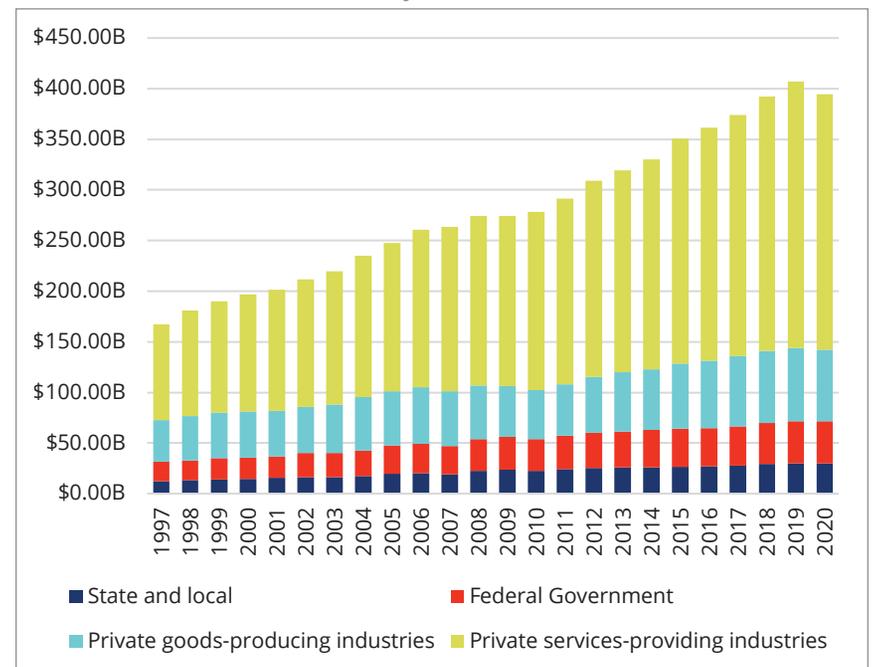


FIGURE 2-2: Economic Output by Industry Category, 1997-2020

SOURCE: Bureau of Economic Analysis



Economic Output by Industry

It is important to note that both services-providing and goods-producing industries may rely on freight transportation to conduct business. Goods-producing industries like construction, agriculture, manufacturing, and mining, may use inputs or produce outputs or both that are transported as freight. Similarly, many services-providing industries buy, sell, or transport goods that are considered freight. These services-providing industries include wholesale, retail, and transportation and warehousing. As shown in **Figure 2-3**, these ‘freight-reliant’ or ‘freight-dependent’ industries have nearly doubled in size over the last two decades. Although the economic output of these industries declined from 2019 to 2020, they had grown consistently from 2010 through 2019.

Tennessee’s manufacturing industry has the highest percentage contribution to percentage change in real GDP among all the freight-dependent industries. The industry was responsible for 1.73 percent contribution to growth in real GDP in 2021. Within the manufacturing sector, one of the most prominent sectors with highest contribution to GDP change, is the motor vehicles, bodies and trailer parts manufacturing. With automotive operations in 88 of its 95 counties and 920¹ auto suppliers, Tennessee’s automotive manufacturing industry is a major economic driver. Tennessee exported more than \$1.6 billion² worth of motor vehicles around the world in 2021. Transportation equipment is another top export of Tennessee. 12.18 percent of the Tennessee’s total global export include transportation equipment.

Goods-Producing Industries:



Construction



Agriculture



Manufacturing



Mining

Service-Providing Industries:



Wholesale



Retail



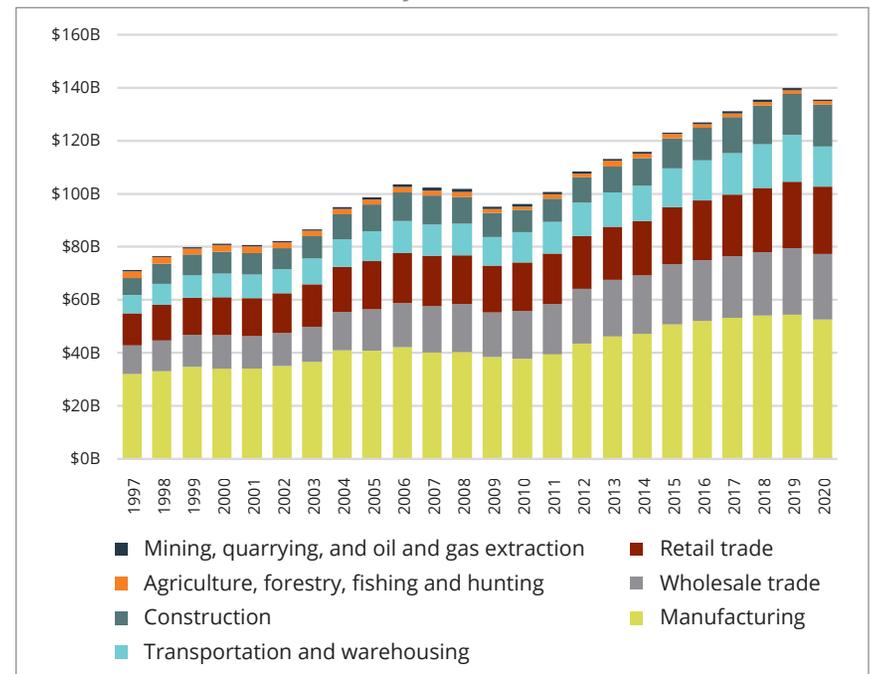
Transportation



Warehousing

FIGURE 2-3: Tennessee Economic Output by Freight-Reliant Industries, 1997-2020

SOURCE: Bureau of Economic Analysis



1 Automotive - Tennessee Department of Economic and Community Development (tnecd.com)

2 TradeStats Express - State Trade by Product

The significance of the motor vehicles industry and other Tennessee industries to the state's freight network is also captured in the data on the value of freight moved in and through the state. **Table 2-1** shows the top commodities based on value that is moved in the state. In terms of value, the motor vehicles industry ranks third in the total value of commodities moving in, out or through the state, trailing only mixed freight and machinery. Solely in terms of the value of imports and exports (not internal or through movements), the chemical industry moves the highest value of products in and out of the state

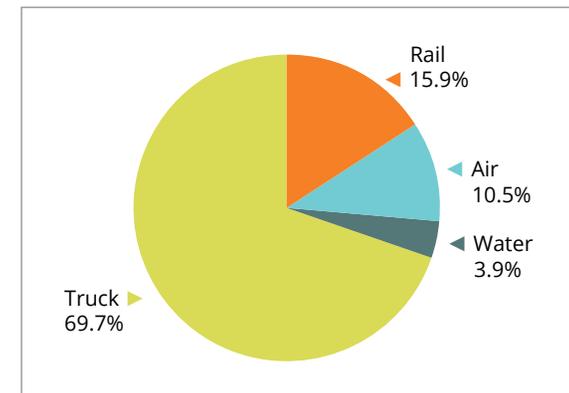
followed by machinery and motorized vehicles. Overall, basic chemicals represent more than \$30 billion worth of products moved to, from and within Tennessee.

As shown in **Figure 2-4**, nearly 70 percent of the total value of freight moved in the state is by truck. Freight moved by rail or air trailed significantly at nearly 16 percent and 11 percent respectively. The value of freight moved by water was just under 4 percent.

TABLE 2-1: Top 20 Commodities by Value Moved in Tennessee
 SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Commodity	\$ Billions				
	Imports	Exports	Internal	Through	Total
Mixed freight	0.72	1.49	0.14	646.47	648.82
Machinery	10.23	13.57	2.55	561.93	588.28
Motorized vehicles	4.46	9.69	2.62	477.68	494.45
Plastics/rubber	6.60	8.32	0.84	457.20	472.97
Gasoline	1.73	2.17	6.84	443.85	454.59
Basic chemicals	11.25	19.97	0.33	404.40	435.95
Articles-base metal	5.00	6.41	0.95	330.76	343.11
Electronics	3.23	2.50	0.38	295.99	302.10
Meat/seafood	3.00	2.60	0.33	272.70	278.62
Base metals	3.38	3.60	0.32	256.36	263.67
Other foodstuffs	2.62	3.70	0.86	251.88	259.06
Other ag prods.	3.11	2.34	0.71	236.94	243.11
Textiles/leather	2.79	1.17	0.15	211.90	216.01
Animal feed	2.19	3.01	0.30	175.81	181.31
Live animals/fish	2.90	1.92	0.37	169.51	174.71
Milled grain prods.	1.56	2.62	0.47	136.11	140.77
Nonmetal min. prods.	1.50	1.47	0.84	136.93	140.74
Chemical prods.	1.75	2.53	0.40	128.38	133.06
Waste/scrap	1.32	1.78	0.56	124.81	128.47
Coal-n.e.c.	0.67	0.27	0.14	106.47	107.55

FIGURE 2-4: Commodity Value by Mode
 SOURCE: Tennessee Transearch Data, IHS Inc. (2016)



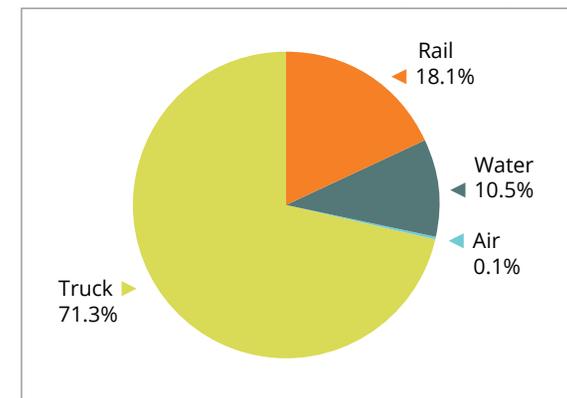
When measured in terms of weight, or tonnage, of freight being moved on the state’s freight network, the industries accounting for the most significant amounts vary significantly from those based on the value of the product being shipped. Based on IHS Transearch data, the top commodities by tonnage moved in Tennessee are shown in **Table 2-2** and the distribution by mode is shown in **Figure 2-5**.

In terms of tonnage, gravel is the top commodity that is imported from outside the state, exported from the state and internally traded within the State of Tennessee. Following gravel, other commodities with significant weight that are moved through the state include natural sands, gasoline, nonmetal minerals and coal. From an industry perspective, agriculture generally accounts for a significant amount of the freight tonnage moved in the state. When combined, commodities such as cereal grains, other agricultural products, other food stuffs and animal feed account for a significant amount of the tonnage of freight moving on the state’s freight network.

TABLE 2-2: Top 20 Commodities by Tonnage Moved in Tennessee
 SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Commodity	Millions of Tons				
	Imports	Exports	Internal	Through	Total
Gravel	20.72	19.92	26.76	1320.13	1387.53
Natural sands	7.11	3.61	7.11	1071.41	1089.24
Gasoline	3.17	4.34	13.87	884.24	905.63
Nonmetal min. prods.	7.03	7.43	6.33	738.12	758.91
Coal	11.68	0.01	0.01	618.84	630.54
Cereal grains	5.55	5.13	0.96	588.39	600.03
Waste/scrap	5.97	6.92	2.34	508.87	524.11
Other ag prods.	7.14	6.29	2.02	424.27	439.71
Coal-n.e.c.	2.33	1.27	0.39	306.89	310.87
Other foodstuffs	2.94	3.16	0.74	289.35	296.19
Animal feed	3.04	4.24	0.47	286.20	293.96
Basic chemicals	3.09	2.27	0.28	246.70	252.34
Plastics/rubber	2.02	2.65	0.27	159.91	164.85
Wood prods.	1.68	2.63	0.46	134.10	138.87
Mixed freight	0.09	0.09	0.01	125.19	125.39
Logs	2.41	0.98	0.37	116.83	120.59
Base metals	1.53	1.76	0.14	111.34	114.77
Nonmetallic minerals	2.13	0.38	0.08	110.29	112.89
Articles-base metal	1.45	1.70	0.25	89.58	92.98
Metallic ores	0.18	0.00	0.05	87.17	87.41

FIGURE 2-5: Commodity Tonnage by Mode
 SOURCE: Tennessee Transearch Data, IHS Inc. (2016)



Not surprisingly, the mode used to move freight is substantially different when based on tonnage as compared to when it is based on value. As shown in **Figure 2-5**, the total tonnage moved by air is extremely small while two of the other modes (rail and water) are used more extensively for heavier commodities as compared when measured by value. The percent of freight moved by truck is very similar whether measured by tonnage or value, 71 percent compared to 70 percent, respectively.

Mode Shares by Movement Type

Tennessee relies heavily on the movement of freight by all the modal types, however, the relative importance changes as does the characteristic of the commodity that is being measured (for example, tonnage vs. value vs. value per ton). **Table 2-3** shows the mode shares broken down by movement types. Trucks carried 66 million tons of freight to Tennessee and 66 million tons of freight outside of Tennessee. Water is the second largest mode of importing freight to Tennessee.

TABLE 2-3: Freight Mode Share by Movement Type (Millions of Tons)

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Modal Route	Inbound	Outbound	Intrastate	Through
Truck	66.34	66.34	55.44	5747.89
Water	22.73	6.04	1.37	1508.43
Rail	1.02	1.71		841.41
Air	0.42	0.58	0.01	7.75

Although it may appear that trucking dominates the transport of freight, rail, marine and air freight movements play integral roles in Tennessee's system. **Table 2-4** shows the range of value per ton carried by each of the modes from the low-end (water) to the high-end (air). Commodities carried along waterways are generally low-value, heavy commodities, whose delivery is not time-sensitive (e.g., coal). Air freight tends to be used for commodities that are high-value (e.g., pharmaceuticals) and/or require time-sensitive delivery. For this reason, air cargo has a much higher value per ton than cargo moved by the other modes.

TABLE 2-4: Modal Value per Ton of Tennessee Commodity Movement

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Modal Route	Value per ton (average)
Water	\$ 429.72
Rail	\$ 1,002.88
Truck	\$ 1,119.49
Air	\$ 113,890.08

Intermodal Facilities

Approximately 14.8 million tons of truck drayage move to and from intermodal rail annually. **Table 2-5** shows the amount of truck drayage moved by Shelby, Davidson and Fayette Counties. Shelby County is a leader in the state in intermodal traffic, which includes freight being transferred to and from the Port of Memphis and freight being transferred to and from trucks to several rail intermodal facilities.

TABLE 2-5: Intermodal Rail - Truck Drayage

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

County	Exports (Millions of Tons)	Imports (Millions of Tons)
Shelby County	12.33	12.44
Davidson County	1.83	1.90
Fayette County	1.60	0.45

In addition to the intermodal facilities within the state itself, the Union Pacific (UP) facility in nearby Crittenden County, Arkansas is a significant origin/destination for freight movement in Tennessee. Drayage to and from UP's Marion Intermodal Ramp provides access to locations throughout the Midwest and West Coast of the U.S.

Key Freight-Related Industry Supply Chains

This section describes the key industry supply chain linkages in Tennessee that drives the freight dependent aspects of the industries. On a large scale, the important corridors for key freight industry supply chains include trucking which operates primarily on the Interstate System in Tennessee and Class I railroads that operate on their own private corridors. While the bulk of materials move along these networks, local roadways and short line railroads should not be overlooked when considering freight goods movement. Local connections and short lines are important for completing the first mile/last mile connection that may not be offered by the major freight transportation facilities.

This section describes the infrastructure most heavily used by key freight industry supply chains in Tennessee: automotive, advanced manufacturing, chemical products and plastics, and agriculture. **Table 2-6** shows the tonnage of the commodities moved by highway and rail for Tennessee’s key freight industries. The automotive industry plays a key role in the economy of the state. Tennessee has three major automotive manufacturers: Nissan, Volkswagen and General Motors. There are also several automaker suppliers in Tennessee to support the major manufacturers. The advanced manufacturing industry’s primary concern is the reliable delivery and hence inbound components are supplied via combination of rail/truck or truck and supplemented by air cargo, while outbound

TABLE 2-6: Tonnage and Value of Tennessee’s Key Freight Industries (Export and Internal Trade)
 SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Supply Chain	Commodity	Tonnage (Million)	Value (\$ Billion)
 Agriculture	Cereal grains	11.64	1.41
	Milled grains	2.88	4.66
	Other ag.products	15.45	6.17
 Chemical and Plastic Products	Chemicals	5.64	31.55
	Plastics	4.94	15.77
 Automotive	Transportation equipment	0.07	0.90
	Motorized vehicles	2.01	16.77
 Advanced Manufacturing	Electronics	0.66	6.11
	Machinery	2.88	26.35
	Precision instruments	0.04	0.96

(finished automobiles) are transported to dealers via rail and trucks. Chemical products are transported primarily via rail while the plastic industry highly depends on trucks for transportation. Agriculture products are initially transported via trucks from farms to transfer facilities and are then moved via railways or barge.

Freight Origin-Destination Patterns Within Tennessee

The goods and commodities moving in Tennessee are imported from other states, exported to other states, moving between locations within the state or passing through Tennessee. A significant volume of commodities flow within the state itself. This high level of internal trade flows suggests that Tennessee businesses are transporting freight between their own facilities, purchasing needed materials or products from other Tennessee based business, or delivering a product to a customer in Tennessee. **Table 2-7** presents the top commodities transported between counties in Tennessee based on tonnage.

TABLE 2-7: Top Commodities Transported Between Counties in Tennessee Based on Tonnage
SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Commodity	Millions of Tons
Gravel	26.76
Gasoline	13.87
Natural sands	7.11
Nonmetal min. prods.	6.33
Waste/scrap	2.34

TABLE 2-8: Top Commodities Transported Between Counties in Tennessee Based on Value
SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Commodity	Billions of Dollars
Gasoline	\$ 6.84
Motorized vehicles	\$ 2.62
Machinery	\$ 2.55
Articles-base metal	\$ 0.95
Other foodstuffs	\$ 0.86

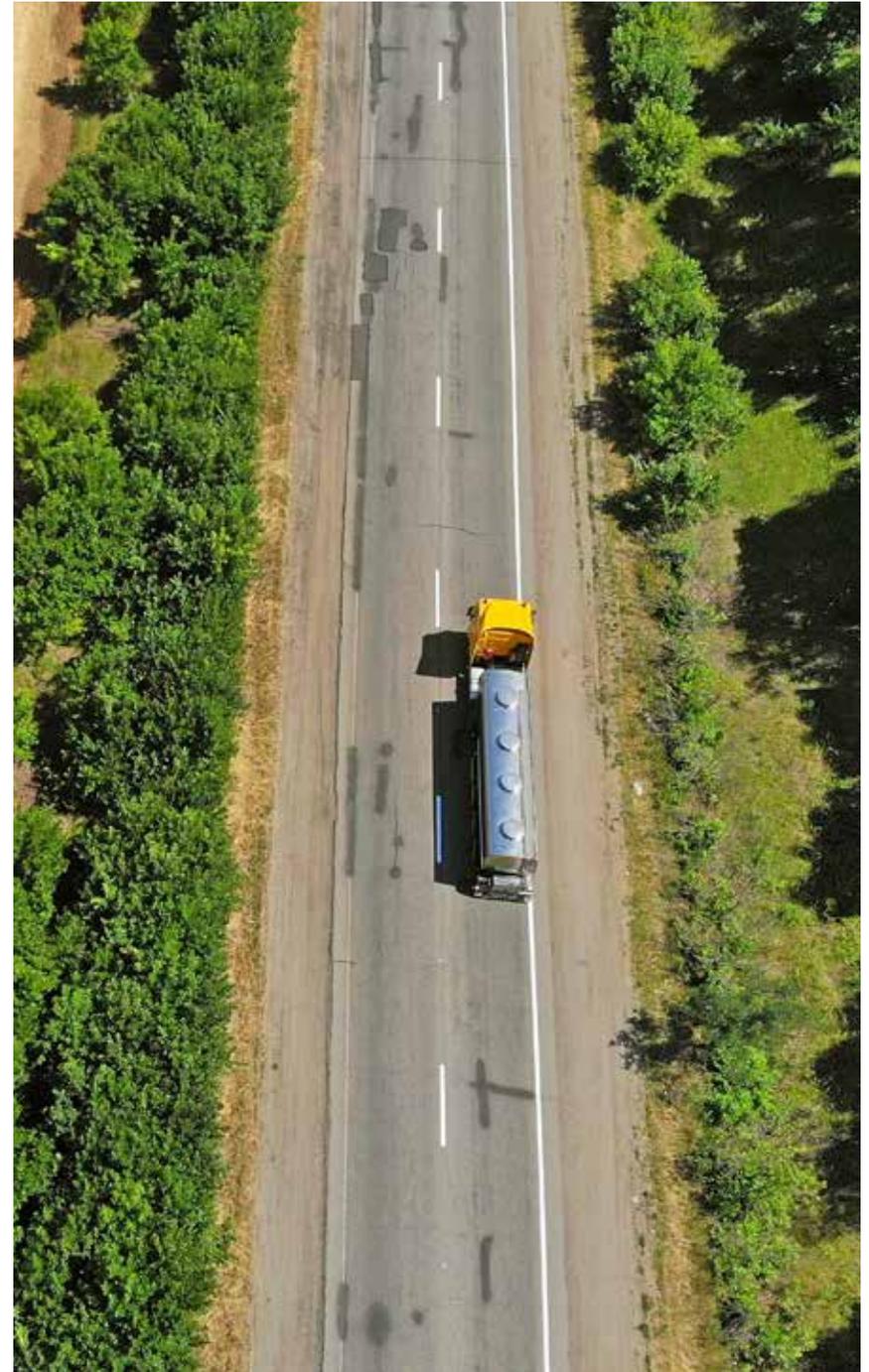
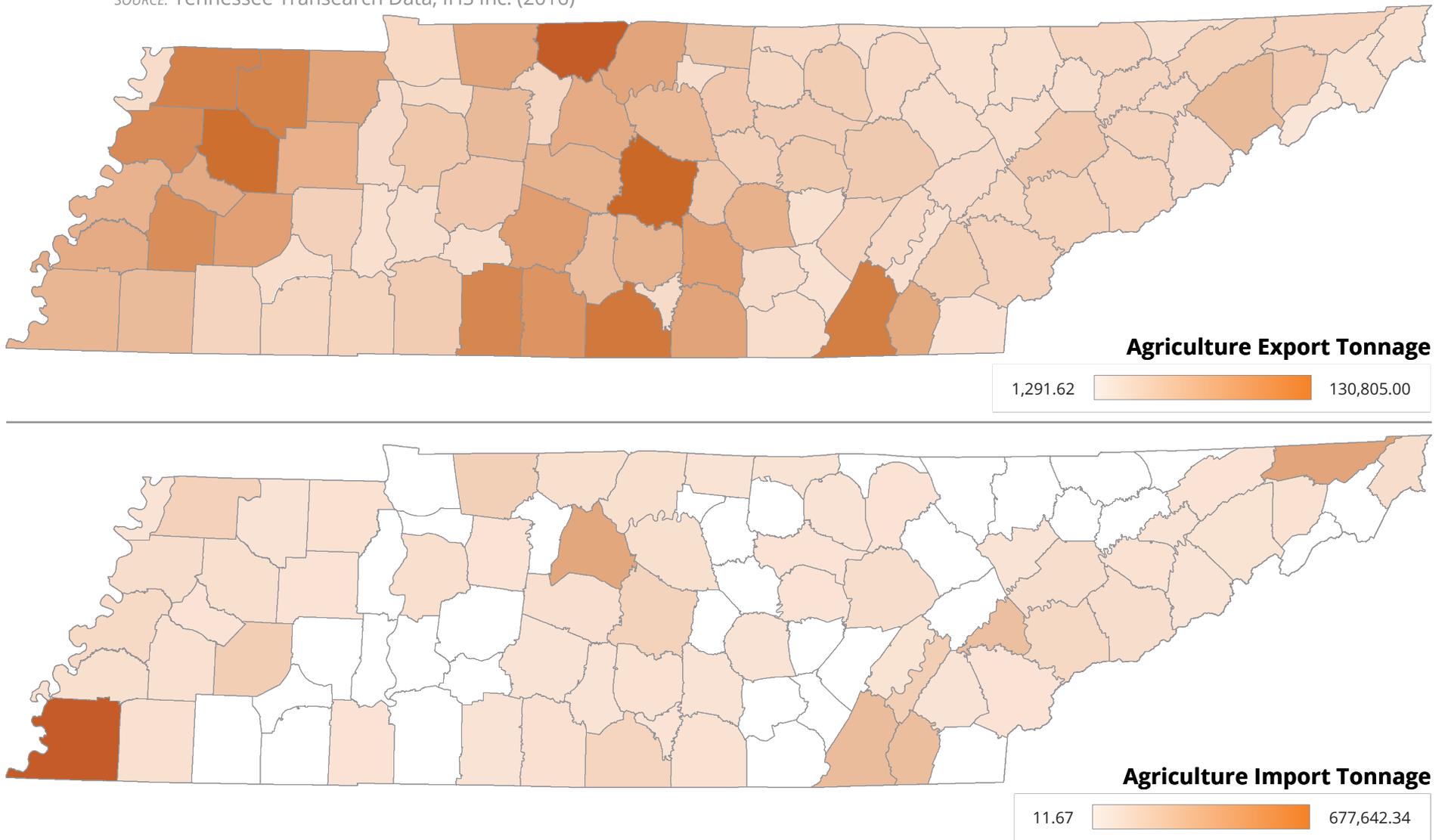


FIGURE 2-6: Agriculture Trade between Tennessee Counties (Tonnage)

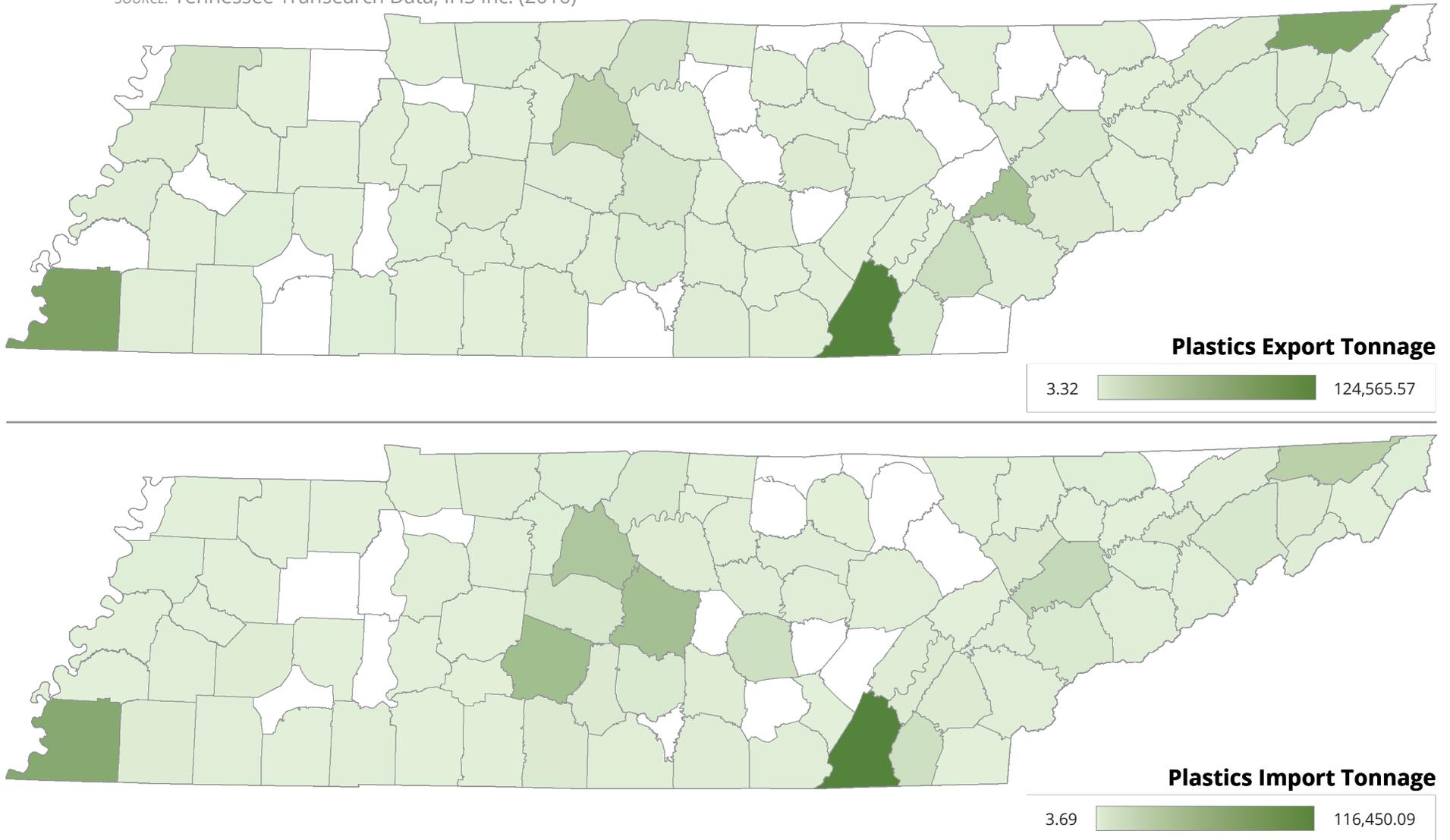
SOURCE: Tennessee Transearch Data, IHS Inc. (2016)



Agricultural trade is highly dominated by the western part of the state. Counties including Robertson, Rutherford, Gibson, Lincoln and Hamilton are the top agricultural exporters while Shelby, Sullivan and Davidson import the highest quantities of agricultural products.

FIGURE 2-7: Chemicals and Plastics Trade between Tennessee Counties (Tonnage)

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

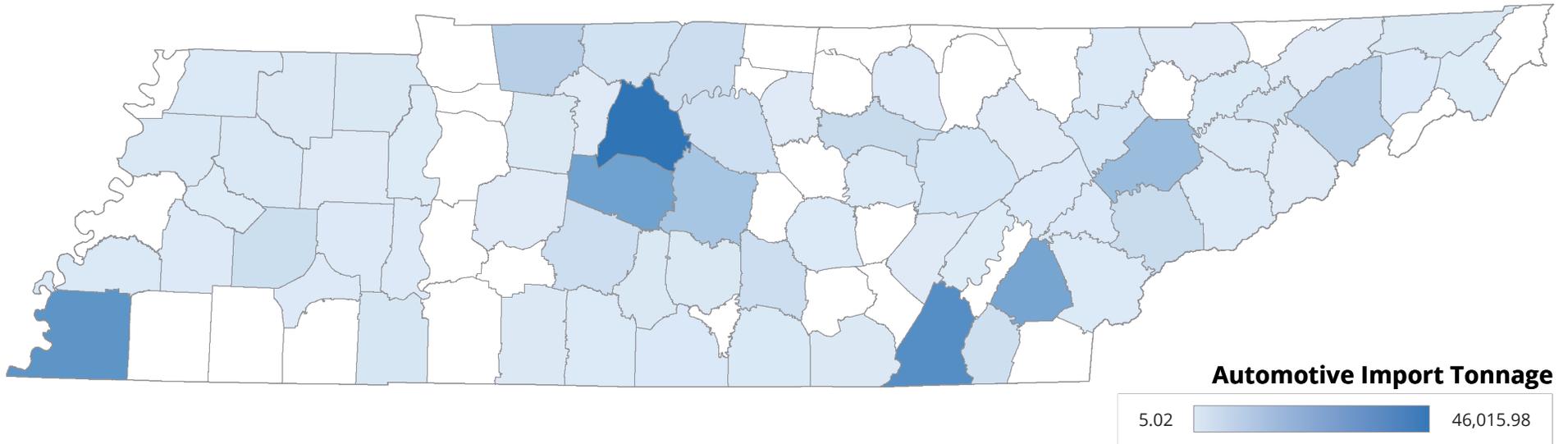
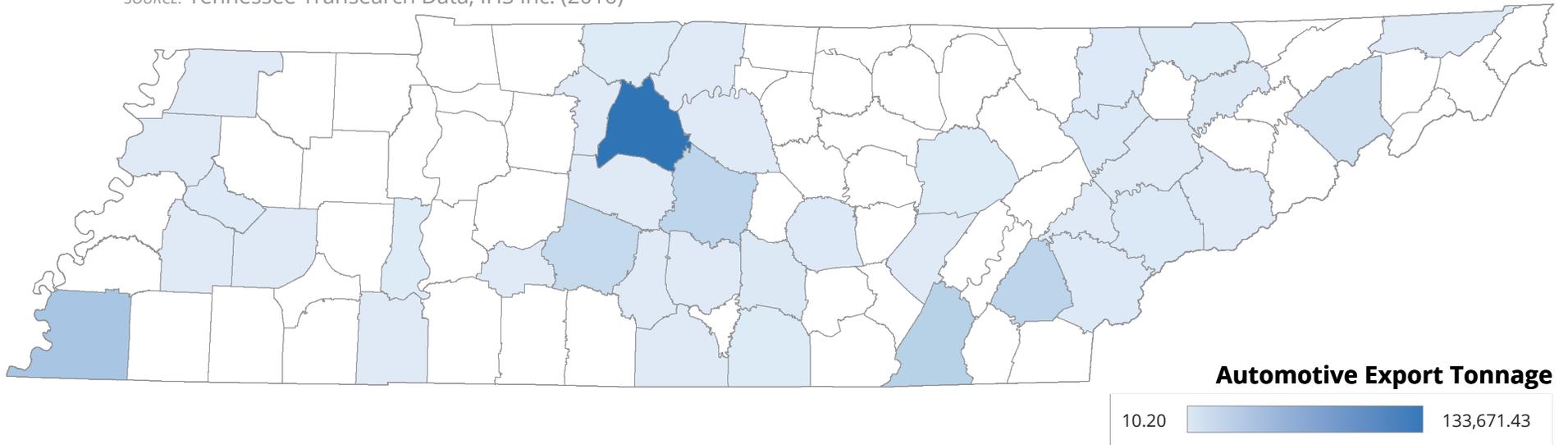


Chemical and plastics-related industries are a major component of the state's economy and accounts for a significant amount of freight moving into and out of the state. According to the Tennessee Department of Economic and Community Development, in 2021 the chemicals and plastics industry accounted for over \$4.2 Billion

in exports and employed over 17 thousand workers statewide. Chemicals and plastics production takes place in several counties. Hamilton, Shelby, Sullivan, Loudon and Davidson counties are the top five exporting counties, while Hamilton, Shelby, Maury, Rutherford and Davidson are the top importers.

FIGURE 2-8: Automotive Trade between Tennessee Counties (Tonnage)

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)



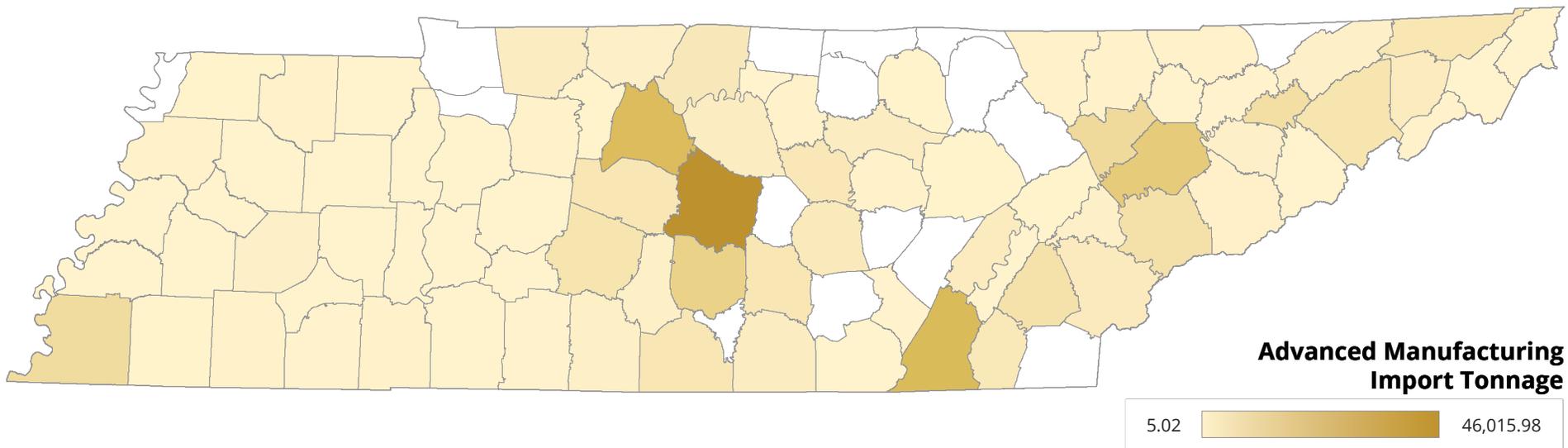
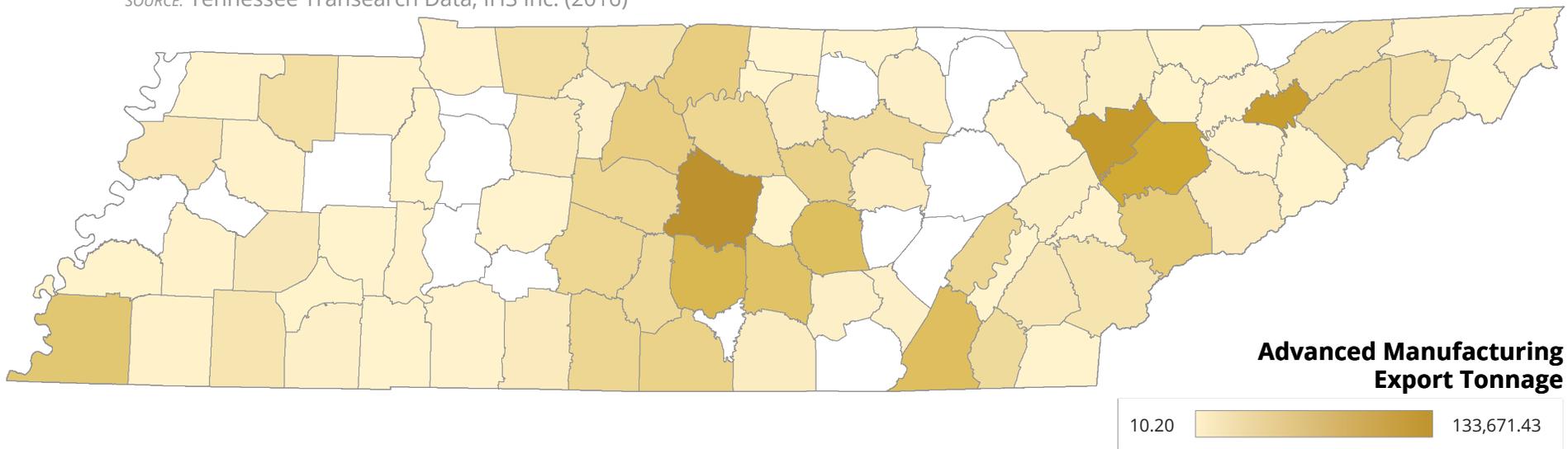
With over 920 establishments employing over 137 thousand employees in 2021,³ the automotive industry is a vital component of the state's economy. With exports over \$3.1 billion in 2021, the automotive industry is concentrated primarily in the middle and eastern parts of

the state. The volume of inbound and outbound freight generated by this production significantly impacts the freight system in those areas, especially in places such as Davidson, Hamilton, Shelby and McMinn Counties, which are the top locations for the automotive industry.

³ Tennessee Department of Economic and Community Development

FIGURE 2-9: Advanced Manufacturing Trade between Tennessee Counties (Tonnage)

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)



Advanced Manufacturing is concentrated mostly in the middle portion of the state near Nashville and Knoxville to the east. According to the Tennessee Department of Economic Community Development, the major categories of advanced manufacture goods that are exported from the state include medical equipment

and supplies, pharmaceuticals and navigational equipment. Much of the freight generated by these industries include a significant number of exporters and few importers. Rutherford, Anderson, Hamblen and Knox Counties are the top exporters of advanced manufacturing products.

Domestic Trading Partners

Outbound from Tennessee

Tennessee exports goods to every state in the U.S. In 2016, the state exported a total of 102.6 million tons of goods valued at approximately \$168 billion. **Table 2-9** presents the top commodities by tonnage exported domestically by Tennessee.

The top outbound domestic partners are Georgia, Kentucky, Alabama, North Carolina and Louisiana. Georgia received more than 16 million tons of freight from Tennessee in 2016 and is the only state to be one of the Tennessee’s top five export partners both in terms of value and tons of good exported. California, Texas and Florida are other top three export partners.

TABLE 2-9: Tennessee 2016 Domestic Exports based on Tonnage

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

Commodity	Million Tons	Billion \$
Gravel	19.92	\$ 0.20
Nonmetal min. prods.	7.43	\$ 1.47
Waste/scrap	6.92	\$ 1.78
Other ag prods.	6.29	\$ 2.34
Cereal grains	5.13	\$ 0.60

TABLE 2-10: Tennessee’s Top Outbound Domestic Partners

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

States	Million Tons
Georgia	16.59
Kentucky	9.18
Alabama	8.66
North Carolina	8.19
Louisiana	6.46

FIGURE 2-10: Tennessee’s Outbound Domestic Trading Partners

SOURCE: Tennessee Transearch Data, IHS Inc. (2016)



Top Outbound Trading Partners

- Top Domestic Export Partners by Tonnage
- Top Domestic Export Partners by Value
- Top Domestic Export Partners by Tonnage and Value



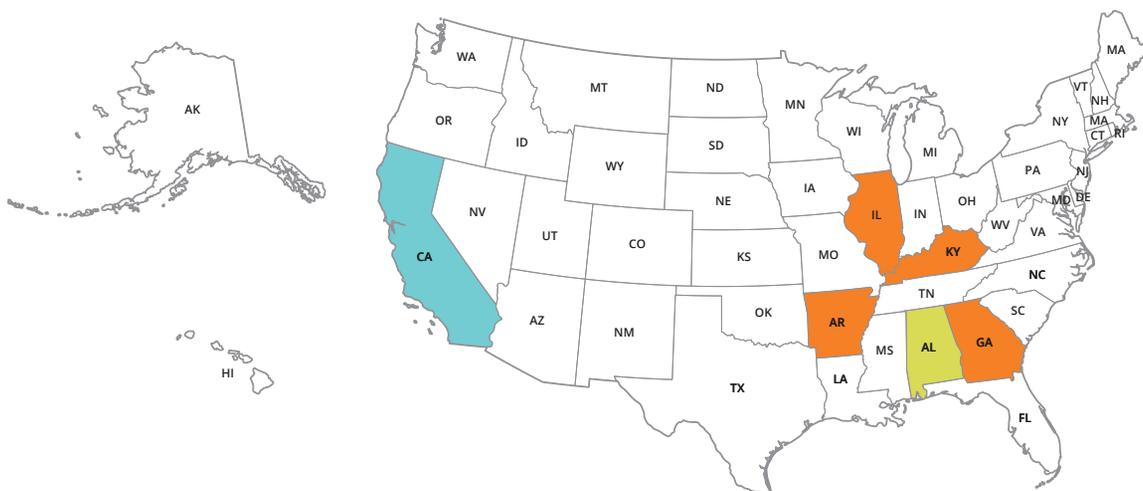
Inbound to Tennessee

Tennessee imports different types of commodities from the neighboring states and all over the country. Imported goods and commodities are a key contributor of Tennessee’s economic activities. Kentucky, Illinois, Alabama, Georgia and Arkansas are top import partners of Tennessee in terms of tonnage of imported products.

FIGURE 2-11: Tennessee’s Top Inbound Domestic Trading Partners
 SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

TABLE 2-11: Tennessee’s Top Inbound Domestic Partners
 SOURCE: Tennessee Transearch Data, IHS Inc. (2016)

States	Million Tons
Kentucky	24.76
Illinois	11.20
Alabama	9.69
Georgia	8.96
Arkansas	8.37



Top Inbound Trading Partners

- Top Domestic Import Partners by Tonnage
- Top Domestic Import Partners by Value
- Top Domestic Import Partners by Tonnage and Value

International Trading Partners

Tennessee has foreign trade relationships with several countries. In 2022, Tennessee exported more than \$29 billion worth of commodities to 205 countries across the world.⁴ Canada and Mexico are the top exporting partners followed by China, Germany and Japan. Canada accounted for \$6.8 billion worth of exports from Tennessee. Commodities that are mostly exported from Tennessee are chemicals, plastics, machinery, and metals. **Figure 2-13** shows the share of the exports.

FIGURE 2-12: Top Export Partners of Tennessee
SOURCE: International Trade Administration

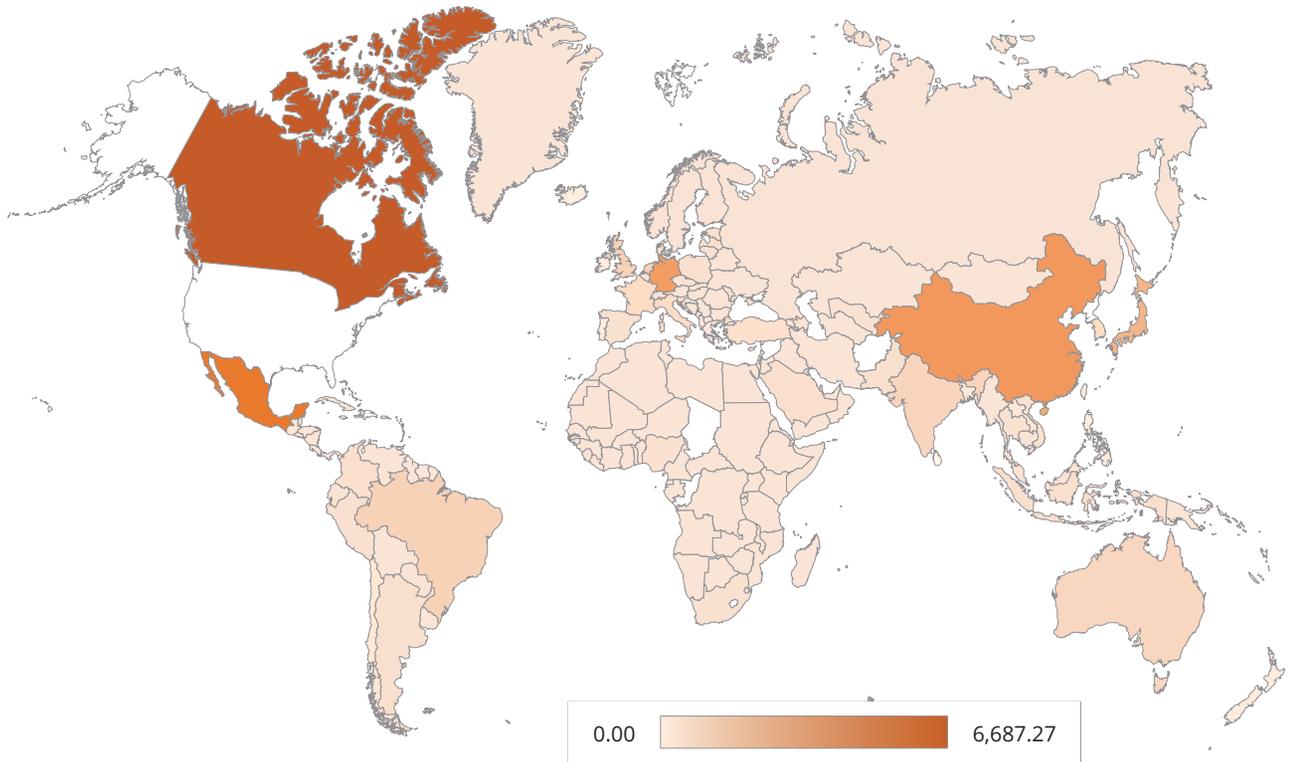
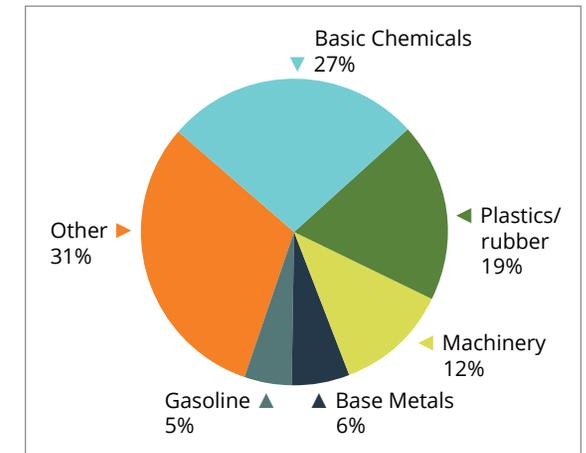


FIGURE 2-13: Tennessee Commodities Transported to Top 5 Export Partners
SOURCE: Tennessee Transearch Data, IHS Inc. (2016)



4 International Trade Administration TradeStats Express - Year-to-Date (YTD) State Trade by Product

Current Employment Per Industry Within Tennessee

In 2016, the State of Tennessee had total employment of 3,951,854. Tennessee’s mining, manufacturing, construction and agriculture industry sectors are highly freight dependent. Along with goods-providing industries like wholesale, retail and transportation/warehouse, services-providing industries also rely on freight transportation system.

Shelby County is the top county in terms of total employment as well as employment in each freight sector. In 2016, it provided the highest number of jobs in all four sectors – manufacturing, retail trade, wholesale trade and transportation and warehousing among all the counties. Shelby County is followed by Davidson, Hamilton, Knox and Rutherford Counties in terms of employment numbers.

Hamilton County has the second largest number of manufacturing employment while Davidson had higher employment numbers in the remaining three sectors after Shelby County.

Industry sectors are defined based on the North American Industrial Classification System (NAICS), including NAICS 31-33 Manufacturing. **Table 2-12** lists the number of employees and percentage of the total for each industry sector.

TABLE 2-12: Employment in Top 10 counties in Tennessee for Freight Sectors

SOURCE: US Bureau of Labor Statistics

County	NAICS 31-33 Manufacturing	Percent of Industry Total	NAICS 42 Wholesale Trade	Percent of Industry Total	NAICS 44-45 Retail Trade	Percent of Industry Total	NAICS 48-49 Transportation and Warehousing	Percent of Industry Total	Total, All Industries	Percent of Industry Total
Davidson	20,467	5.9%	21,361	19.1%	40,995	12.3%	28,732	15.7%	448,956	17.2%
Shelby	30,423	8.7%	27,421	24.5%	46,621	14.0%	62,695	34.3%	421,381	16.2%
Knox	13,478	3.9%	11,501	10.3%	30,654	9.2%	10,395	5.7%	209,121	8.0%
Hamilton	25,122	7.2%	6,855	6.1%	20,153	6.0%	13,810	7.6%	174,433	6.7%
Williamson	3,834	1.1%	4,345	3.9%	15,255	4.6%	2,041	1.1%	129,790	5.0%
Rutherford	24,756	7.1%	4,984	4.4%	16,663	5.0%	12,223	6.7%	115,296	4.4%
Sullivan	10,662	3.1%	1,997	1.8%	8,631	2.6%	2,625	1.4%	59,347	2.3%
Wilson	4,582	1.3%	-	0.0%	6,364	1.9%	13,961	7.6%	50,441	1.9%
Sumner	7,292	2.1%	2,733	2.4%	7,221	2.2%	2,705	1.5%	49,411	1.9%
Madison	9,933	2.9%	2,463	2.2%	6,598	2.0%	-	0.0%	47,153	1.8%
Rest of State	197,626	56.8%	28,448	25.4%	134,508	40.3%	33,443	18.3%	899,233	34.5%
Total	348,175	100.0%	112,108	100.0%	333,663	100.0%	182,630	100.0%	2,604,562	100.0%

Note: Industries sectors are defined based on the North American Industrial Classification System (NAICS) including NAICS 31-33 Manufacturing



Freight Policies, Strategies and Institutions

3

Chapter 3: Freight Policies, Strategies and Institutions

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Chapter 3: Freight Policies, Strategies and Institutions

Tennessee's Freight Policies and Strategies

The State of Tennessee has a history of success in attracting and retaining industries from diverse freight sectors, such as automotive, manufacturing and transportation. State initiatives in economic development and transportation have framed the freight profile for Tennessee and include multiple steps to support strategic investment in freight-related infrastructure. These initiatives are identified in the following sections.

Statewide Freight Advisory Committee (FAC)

In 2013, TDOT established the Statewide Freight Advisory Committee (FAC). The role of the Tennessee FAC is to:

- ◆ Advise the state on freight-related issues, needs, and trends
- ◆ Advise the state on policies, programs, projects and priorities
- ◆ Serve as a forum for discussion of state decisions affecting freight transportation
- ◆ Promote the sharing of information between the private and public sectors
- ◆ Participate in the development of the State Multimodal Freight Plan



Participants at the Freight Advisory Committee Meeting, September 7, 2022

Members of this committee represent both public and private sectors and include truck, rail, water, air and manufacturing industries as well as academia. Initially, three regional FAC committees (West, Middle and East Tennessee) were convened in addition to an overarching statewide group; however, since 2017, FAC activities have been consolidated at the statewide level including representatives from all freight modes, key industries and geographic regions across the state. The statewide FAC meets annually but may meet more frequently depending on the various issues of importance to the freight industry and or the state to solicit feedback to improve Tennessee's infrastructure.

Long Range Transportation Plan (LRTP)

In 2021, TDOT completed an update to the 2016 State's Long Range Transportation Plan (LRTP), which included a robust freight component. As part of the LRTP effort, a policy paper on freight logistics and planning was prepared to evaluate the current conditions of the freight system in Tennessee and review freight policies and strategies used by surrounding and peer states. In concert with the development of the LRTP, a 10-Year Strategic Investment Plan was developed based on an analysis of transportation needs across the state. This Plan proposes multiple programmatic investment categories, including freight.

Statewide Travel Demand Model

TDOT updated and officially approved the latest Statewide Travel Demand Model (TDM), the TSM V4.0, in 2021. The TDM model can be used to forecast freight movements and estimate freight travel behavior. To assist with the TSM V4.0 development, TDOT obtained American Transportation Research Institute (ATRI) data and Transearch data. The freight forecasting shows the effects of roadway congestion due to changes in freight traffic on the Tennessee statewide network. The TSM V4.0 is also capable of estimating future truck trips including short and long-haul trips and commodity flows for 43 commodity categories.

Statewide Rail Plan (SRP)

Adopted in 2020, TDOT's Freight and Logistics and Long-Range Planning Divisions updated the Statewide Rail Plan to comply with the Passenger Rail Investment and Improvement Act (PRIIA). As a supporting document to the LRTP and a companion to the Statewide Multimodal Freight Plan, the SRP focuses on rail aspects of the state's transportation system. The SRP also discusses the role of rail mobility in serving Tennessee's passenger and freight demands.

Environmental Policy

TDOT's primary environmental policy influencing freight is the National Environmental Policy Act (NEPA) of 1969 in accordance with 23 CFR Part 771. The purpose of this regulation is to prescribe the policies and procedures of the FHWA, FRA and FTA for implementing NEPA. Another policy is the Highway Traffic Noise Abatement created in accordance with 23 CFR 772 and approved in April 2011. The Policy on Highway Traffic Noise Abatement outlines the process used to decide on highway traffic noise abatement and the cost-effective expenditure of funds on the state's highway system.

Land Use Coordination

TDOT has developed Corridor Management Agreements (CMAs) that provide a framework for multi-jurisdictional coordination of transportation and land use planning efforts. Often the goals set for the CMA include the promotion of economic development as well as the preservation of community character.

Tennessee's Grant and Loan Programs for Freight-Related Infrastructure

Beyond the Federal-aid Highway Program, there are several grant programs in Tennessee at the state and regional levels for freight-related infrastructure improvements. Tennessee does not have any loan programs for freight-related transportation infrastructure.

State Grant and Loan Programs

TDOT provides grants for state industrial roadways through the **State Industrial Access (SIA) Program**, formerly known as the Industrial Highway Act of 1959. It authorizes TDOT to contract with cities and counties for the development of industrial highways throughout the state. These highways are to provide access to industrial sites or industrial parks. This program provides grants for local agencies to design or construct public access roads to these industrial areas based on project type, economic benefit, physical constraints and available funding.



The **Short Line Railroad Preservation Grant Program** is managed by TDOT and is designed to preserve rail service to local communities (mostly rural) and expand rail connectivity to sites along existing rail corridors. The primary purpose of the program is to facilitate efficient and economical movement of freight within Tennessee by strengthening the short line railroad network. The program was initiated in 1987 and funded by the rail portion of the **Transportation Equity Fund**, which collected the sales tax paid on fuel used by aeronautics, railroads, and towboats. This grant program was initially established to assist short line railroad authorities in rehabilitating tracks and bridges on rail lines that connect to lines of the major railroads.



The program is focused on two distinct elements: preservation and connectivity. Preservation efforts are targeted at maintaining current assets for short line railroads with rail authorities while connectivity efforts are often community-based and are competitive in nature. There are approximately 763 miles of track operated by short line railroads throughout the state. In late 2013, this program was put on hold pending litigation between the major (Class I) railroads and the Department of Revenue concerning how the program is funded. In 2014, the Tennessee Legislature passed, and Governor Haslam signed, the Transportation Fuel Equity Act intending to remedy the tax issue underlying the litigation. As of 2021, the short line funding continues to be available; however, the passage of the Transportation Fuel Equity Act has led to additional litigation. Based on a 2020 Short Line Railroad needs assessment, \$85 million was budgeted from the Governor's budget and is not tied to the Transportation Equity Funds. From FY22 – FY26, there will be \$20 million each year awarded to short line railroad authorities by formula allocation of the 2020 needs assessment. After the FY24 allocation a desk review will be conducted to re-assess the rail operators needs and re-allocate the dollars for FY25 and FY26.

Waterborne freight transportation efforts are coordinated by the Freight and Logistics Division at TDOT. Water Transportation Equity Funds are gathered by a similar fuel tax in the water industry. The dollars are currently used to pay the annual dues of the Tennessee Tombigbee Waterway Development Authority. Currently, there is no additional waterway funding or program. However, TDOT will continue to look at opportunities to increase the use of water transportation and to improve regional and national economic conditions by increasing the utilization of cost-effective, fuel-efficient and environmentally friendly waterway transportation.



TDOT's Division of Aeronautics administers all federal and state aeronautics grants via the Aeronautics Transportation Equity Fund. The grant applications are reviewed by the Tennessee Aeronautics Commission (a five-member board). The federal and state funding for aeronautics comes from airport user fees and not from the state's general fund.



Local communities that apply to the Tennessee Department of Economic and Community Development (TNECD) intending to improve infrastructure to create new jobs and business investment may be eligible to receive **FastTrack Infrastructure Development Program (FIDP)**



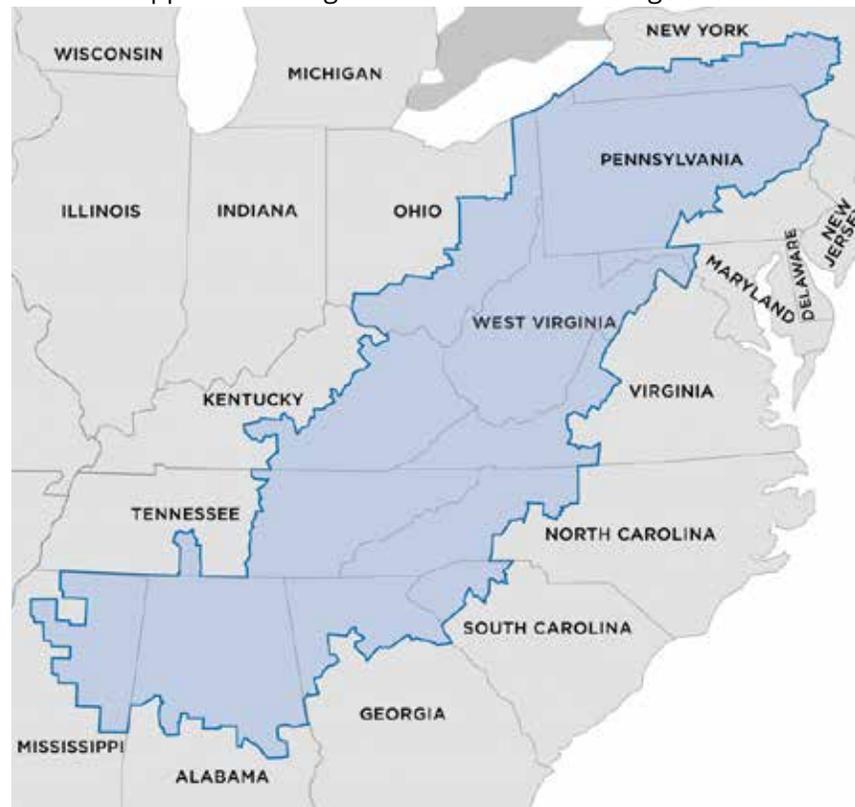
funds. This program was established as a separate fund in the state's general fund. The funds must be used for specific projects and tied to a company's commitment to create or retain a defined number of jobs. The program covers infrastructure such as rail, public roadway, port, airport, site, water, sewer, gas and telecommunication improvements that involve manufacturing or other economic activities deemed beneficial to the state of Tennessee. FIDP grants require a local community match calculated along a varying scale, based on a community's ability to pay. TNECD awards **Site Development Grants** via funding through the Rural Economic Opportunity Fund. Eligible construction projects include roadway access, turn lanes, traffic signalization, rail lines/signalization/switching and other utility infrastructure.

Regional Grant and Loan Programs

The **Appalachian Regional Commission (ARC)** is an economic development partnership agency of the federal government and 13 state governments focusing on 423 counties across the Appalachian Region. ARC's mission is to innovate, partner and invest to build community capacity and strengthen economic growth in Appalachia to help the Region achieve socioeconomic parity with the nation. In Fiscal Year 2021, ARC was awarded \$180 million from Congress.

Over half of Tennessee's counties are in the ARC. See **Figure 3-1**. Tennessee awards grants for economic and community development projects in the 52 ARC counties in middle and east Tennessee. ARC's **Area Development Program (ADP)** makes investments in

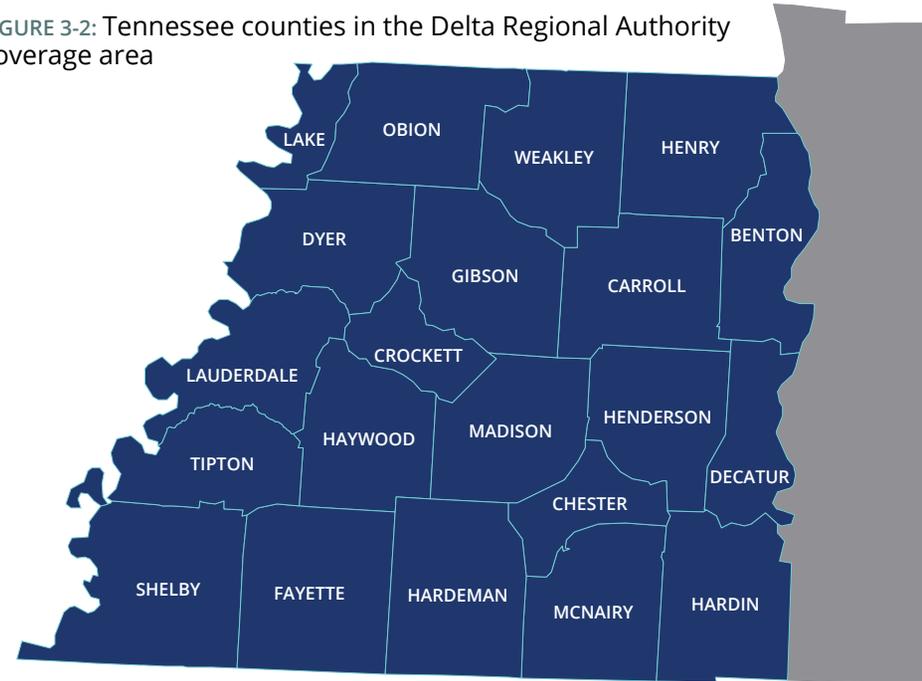
FIGURE 3-1: Appalachian Regional Commission coverage area



two general areas: critical infrastructure and business/workforce development. Specific to freight planning, the infrastructure element of ADP focuses primarily on water/wastewater systems, transportation networks, broadband and other projects anchoring regional economic development and connecting rural and urban communities. Each state establishes priorities for the funds to be distributed. Within Tennessee the Department of Economic & Community Development (TNECD) manages a grant program that annually selects and provides ARC funds to the counties in the ARC. The grants are limited to \$1 million for construction projects, \$500,000 for non-construction projects, and require cost sharing or match funding. The top priority for Tennessee is investing in entrepreneurial and business development strategies that strengthen Appalachia's economy. This includes developing infrastructure and increasing international exports.

The **Delta Regional Authority Grants** are used to improve the lives of people in 21 Tennessee Delta Region counties, located in west Tennessee. The program's mission is to advance its communities through the practical application of innovative ideas and strategies that foster inclusive communities; achieve sustained, long-term economic development; and produce meaningful opportunities for people in the Delta region. Projects are targeted toward improving workforce competitiveness, strengthening infrastructure, and increasing community capacity. The level of assistance is typically limited to \$200,000.

FIGURE 3-2: Tennessee counties in the Delta Regional Authority coverage area



Federal Discretionary and Formulaic Funding Programs

There are numerous federal discretionary funding programs, including grants that apply to freight type projects. The USDOT also provides funding to TDOT via formulaic processes from federal fuel taxes and other federal sources. These programs, primarily authorized by the Infrastructure Investment and Jobs Act (IIJA), are described and discussed in Chapter 9, Investments, Financing and Funding.

Freight Related Institutions in Tennessee

Federal Agencies

Several Administrations within the United States Department of Transportation (USDOT) and other federal agencies are involved in the planning, funding, operations and safety oversight of freight activities. Ranging in their missions and modes, the following agencies have a relationship with freight activities in Tennessee.

Federal Highway Administration (FHWA)

FHWA is a federal agency within the USDOT that supports state and local governments in the design, construction and maintenance of the National Highway System and other highways on various federally- and tribal-owned lands. FHWA coordinates highway transportation programs in cooperation with Tennessee and other partners to enhance the country's safety, economic vitality, quality of life and the environment. Major program areas include the Federal-aid Highway Program, which provides federal financial assistance to Tennessee and other states to construct and improve the National Highway System, urban and rural roads, and bridges. The FHWA also manages a comprehensive research, development and technology program in which Tennessee participates.

Federal Motor Carrier Safety Administration (FMCSA)

FMCSA is an agency within the USDOT tasked with preventing commercial motor vehicle-related fatalities and injuries. Activities of the FMCSA contribute to ensuring safety in motor carrier operations through enforcement of safety regulations; targeting high-risk carriers and commercial motor vehicle drivers; improving safety information systems and commercial motor vehicle technologies; strengthening commercial motor vehicle equipment and operating standards; and increasing safety awareness. To accomplish these activities, FMCSA works with federal, state and local enforcement agencies, the motor carrier industry, labor safety interest groups and others.

Federal Aviation Administration (FAA)

FAA is a USDOT agency responsible for the safety of civil aviation. FAA's activities include safety regulation, airspace and air traffic management, and the construction and installation of air navigation facilities. Other responsibilities include the construction or installation of visual and electronic aids to air navigation and promotion of aviation safety internationally. More recently, the FAA has assumed responsibility for the regulation of unmanned aerial vehicles (commonly known as drones) and integrating these safely into the national airspace system.

Federal Railroad Administration (FRA)

FRA is an agency within the USDOT that engages in the regulation of railroad safety, rail network development, research and development of new technologies and the management of both competitive and targeted grant and loan programs that fund rail network improvements. With the responsibility of ensuring railroad safety throughout the nation, the FRA employs safety inspectors to monitor railroad compliance with federally mandated safety standards including track maintenance, inspection standards and operating practices. Currently, TDOT has five state safety inspectors which also perform inspections on facilities in Tennessee that report to the Freight and Logistics Division. FRA conducts research and development tests to evaluate projects in support of its safety mission and to enhance the railroad system as a national transportation resource. Public education campaigns on highway-rail grade crossing safety and the danger of trespassing on rail property are also administered by FRA.

United States Maritime Administration (MARAD)

MARAD is a federal agency housed within the USDOT. MARAD supports the nation's maritime transportation infrastructure; promotes the use of waterborne transportation; and ensures that maritime infrastructure integrates seamlessly with other transportation modes. MARAD also promotes the development and maintenance of an adequate, well-balanced United States Merchant Marine sufficient to carry the nation's domestic waterborne commerce and a substantial portion of its waterborne foreign commerce, and capable of serving as a naval and military auxiliary in times of war or national emergency. MARAD seeks to ensure that the United States enjoys adequate shipbuilding and repair service, efficient ports, effective intermodal water and land transportation systems, and reserve shipping capacity in times of national emergency.

Pipeline and Hazardous Materials Safety Administration (PHMSA)

The PHMSA is a federal agency within USDOT responsible for the safety of pipelines. PHMSA's mission is to protect people and the environment by advancing the safe transportation of energy and other hazardous materials that are essential to our daily lives. To do this, the agency determines national policy, establishes and enforces standards, provides education and conducts research to prevent incidents.

United States Army Corps of Engineers (USACE)

USACE is a federal agency housed within the Department of Defense. The USACE provides engineering, design and construction management services throughout the country. In addition to other responsibilities, USACE operates the nation's locks and provides dredging for waterway navigability. It is also responsible for the maintenance dredging of ten harbors on the Mississippi River including the Wolf River, Memphis and Northwest Tennessee harbors.

United States Coast Guard (USCG)

The 8th Coast Guard District is responsible for U.S. Coast Guard operations spanning 26 states, including the Gulf of Mexico coastline from Florida to Mexico, the adjacent offshore waters and outer continental shelf, as well as the inland waterways of the Mississippi, Ohio, Missouri, Illinois and Tennessee River systems. The Coast Guard manages six major operational mission programs, which oversee 11 missions codified in the Homeland Security Act of 2002. That act delineates the 11 missions as "homeland security" or "non-homeland security" missions. Homeland security missions include ports, waterways, and coastal security; drug interdiction; migrant interdiction; defense readiness; and other law enforcement. Non-Homeland security missions relate to marine safety; search and rescue; aids to navigation; living marine resources; marine environmental protection; and ice operations. The USCG Kankakee, a 75 foot river buoy tender, is homeported in Memphis. The mariner's Regional Exam Centre and the headquarters of Sector Lower Mississippi are also located in Memphis.

TDOT

TDOT is involved in all aspects of multi-modal freight within the state, including highways, railways, waterways, air cargo and pipelines. Most of the freight-related functions are housed under the Freight and Logistics Division which is in the Environmental and Planning Bureau and includes Long Range Planning Division, Multimodal Resource Division and Environmental since they work closely together. The Aeronautics Division is under the Administration Bureau due to the large amount of financial and technical assistance they provide the 77 public-use airports. Ultimately all the various parts of the TDOT infrastructure report to the TDOT Commissioner.

TDOT Funding Sources

In Tennessee, all project funding is sourced through dedicated revenues, highway user taxes and fees, and federal funding. This is commonly referred to as a “pay as you go” system. In fiscal year 2022-2023, TDOT received over \$3.28 billion in total revenue, with \$1.9 billion coming from state revenues. The remaining TDOT budget is financed through a mix of federal and other revenue sources.

Figure 3-3 shows the distribution of overall funding sources, while Figure 3-4 displays a breakdown of state funding sources.

FIGURE 3-3: TDOT FY 2022 - 2023 Total Funding

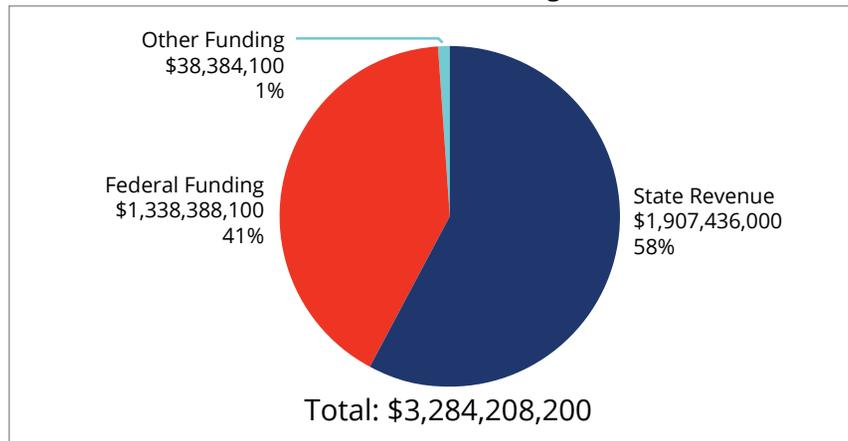
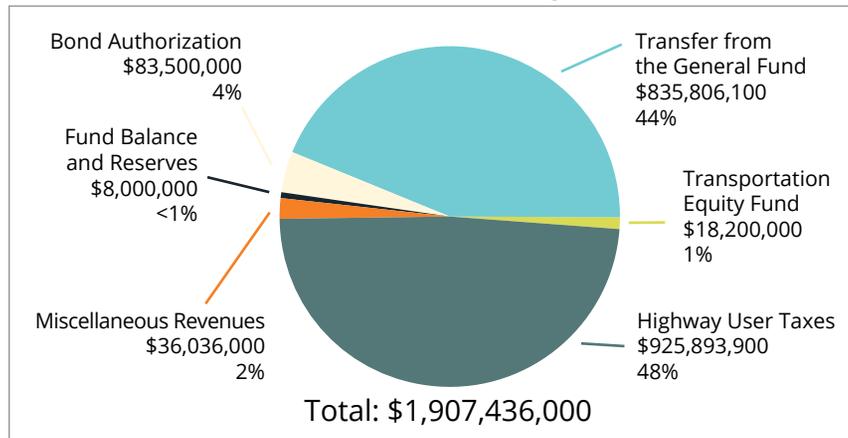


FIGURE 3-4: TDOT FY 2022 - 2023 State Funding



Other State Departments

Other state departments with a relationship with freight movement include the Tennessee Emergency Management Committee and the Department of Safety and Homeland Security.

Port Commissions

Port Commissions in Tennessee are established through legislative action, governed by a board of commissioners and funded through their operating revenues. Below is a list of the Port Commissions in the state.

Northwest Tennessee Regional Port Authority (NTRPA)

The NTRPA is a regional public authority for the counties of Lake, Dyer and Obion. It was established as a result of the Port of Cates Landing development. NTRPA has received state and federal grant funds for capital improvements at the Port of Cates Landing.

Port Commission Memphis and Shelby County, Memphis

The Port Commission is a joint jurisdiction between the City of Memphis and Shelby County. Residents of the City of Memphis and Shelby County are nominated by the mayor to compose the five-member Port Commission. The Commission is responsible for the promotional and economic development of the Port of Memphis, including leasing and selling land on Presidents Island and the Frank C. Pidgeon Industrial Park.

Nickajack Port Authority, South Pittsburg

The Port of Nickajack has plans for a public river port on 92 acres of the Tennessee River as a joint jurisdiction between New Hope and South Pittsburg.

Airport Authorities

Of the 78 airports across Tennessee, most are supervised by an airport authority or airport commission. Airport board members are generally appointed by associated jurisdiction mayors, town boards, or county commissions. Often, airport authority or airport commission members are volunteer positions.

Public and Private Research Institutions

Tennessee has several universities with research programs dedicated to the transportation industry, with one designated as an intermodal freight transportation institute. For many years, TDOT has worked closely with these institutions and continues to partner on research, planning and development in the areas of freight and transportation logistics. These partner institutions include the University of Tennessee Center for Transportation Research (CTR) and the University of Memphis Intermodal Freight Transportation Institute (IFTI).

The University of Tennessee Center for Transportation Research (CTR)

In 1970, CTR was created to foster and facilitate interdisciplinary research, public service and outreach in the field of transportation at The University of Tennessee (UT) in Knoxville. It began full-time operations in 1972 and since then has contributed greatly to the overall research needs of the state. As a research center under the auspices of UT's College of Engineering, CTR oversees various programs associated with the education, research, training, and workforce aspects of the transportation field. CTR, over the years, has assisted TDOT on several freight-related research and policy initiatives including truck lane restrictions, rail transportation research and various transportation and freight-related technology transfer activities. CTR is also an active participant in Tennessee's Freight Advisory Committee.

The University of Memphis Intermodal Freight Transportation Institute (IFTI)

In 2007, IFTI was created with funding provided in the 2005 federal Safe Accountable Flexible Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) transportation legislation. Since its inception, IFTI has brought together public, private and academic sectors to identify and address critical issues impacting freight movement across the midsouth and the nation. IFTI works to advance research and education on a wide range of topics related to the physical transfer of goods and associated information, core transportation infrastructure, technology innovations, natural and man-made hazards, business practices and policy and regulatory matters that impact one or more modes of freight transport. IFTI is also an active participant in Tennessee's Freight Advisory Committee.

Vanderbilt University Center for Transportation Research (VECTOR)

VECTOR is a research center located in Nashville that specializes in transportation research. Intermodal freight transportation, risk assessment, geographic information systems (GIS) and intelligent transportation systems (ITS) are some of VECTOR's key research areas. In past, VECTOR has conducted freight-related research on trucking operations and safety, inland marine transportation, safety, security, capacity of rail corridors and freight diversion and capacity issues in Tennessee. VECTOR is also an active participant in Tennessee's Freight Advisory Committee.

Center for Transportation Analysis (CTA)

CTA is a research center in the Energy and Transportation Science Division of Oak Ridge National Laboratory (ORNL). CTA has delivered over 20 years of research excellence in critical areas of national significance, including the fusion of security, safety, energy efficiency and transportation system performance. CTA is also an active participant in Tennessee’s Freight Advisory Committee. CTA has seven major focus areas for its research: freight and passenger flows, transportation energy efficiency, transportation safety and security, supply chain efficiency, climate change, vehicle technologies and enterprise modeling.

Tennessee State University (TSU)

Founded in 1912, TSU is the only state-funded historically black university in Tennessee. TSU is home to the Transportation Engineering, Planning and Safety Lab (TEPS-Lab), which conducts transportation research for local, state and national agencies. The TEPS-Lab has numerous areas of emphasis, including transportation planning, traffic analysis and simulations, highway safety analysis and modeling, public transportation/transit, bicycle and pedestrian transportation, incident management and application of statistics in transportation. TSU has conducted a research project for the agency evaluating freight intermodal connectors in the state.

Tennessee Tech University (TTU)

Established in 1915, TTU is a technology institute with an emphasis on fields related to engineering, technology and computer science. TTU is a leader in the state to prepare both agencies and residents for the more widespread adoption of electric vehicles and the rise of the clean energy economy. In partnership with TDOT and other organizations, TTU was awarded \$4 million in 2021 from the US Department of Energy to bring clean and affordable mobility options to underserved communities by developing needed charging infrastructure and adopting cost-effective electric vehicles in diverse applications.

The University of Tennessee at Chattanooga

The Center for Energy, Transportation, and the Environment (CETE) is a program of applied research to develop and deploy technologies that utilize clean and secure sources of energy. CETE stresses the importance of developing clean, renewable energy systems for transportation as a critical element in national and global efforts to reduce the harmful effects of engine exhaust gases while promoting energy conservation and independence. Research includes the use of alternative fuels, including electric and hydrogen powered vehicles.

Private Infrastructure Entities

In particular sectors, private interests own, manage, operate and maintain freight-related infrastructure for their purpose.

This includes:

- ◆ Railroads including Class 1 and short lines
- ◆ Pipelines
- ◆ Transfer facilities including modal and intermodal facilities
- ◆ Some waterway operations
- ◆ Trucking operations
- ◆ Warehousing

Further details associated with each of these sectors are included in Chapter 2 (page 14).

Tennessee's Involvement in Regional Freight Planning

TDOT and Tennessee's MPOs have conducted several multi-modal freight planning studies in recent years involving truck, rail, air and water freight activities. This section summarizes recent freight planning efforts at the multi-state and MPO level.

Multi-State Initiatives

Corridor K

The Corridor K study is an economic development and transportation study which follows US Highways 64 and 74, linking Chattanooga, Tennessee and Asheville, North Carolina. The corridor includes Hamilton, Polk and Bradley counties in Tennessee, as well as six counties in North Carolina and two counties in Georgia. The study emphasizes the need for east-west access for the movement of goods to and from market areas and Atlantic coastal ports.



Corridor K Study logo

Freight-related conclusions of the study, which reflect stakeholder input, are as follows:

- ◆ Deficiencies such as reliability of travel times and safety issues on US 64/74 have been identified and need to be addressed
- ◆ Better access to Atlantic coastal ports is important to businesses in the region as more companies utilize international suppliers and sell to international and national customers
- ◆ Inadequate east-west connection of the transportation system costs the region's businesses time and money and creates a barrier to growth

I-81 Corridor Coalition

Tennessee is one of six states involved in the I-81 Corridor Coalition, an organization of local and state agencies, MPOs, and other public and private stakeholders. The states traversed by I-81 recognize its importance as a regional commerce connector. The southern terminus of I-81 is in Jefferson County, Tennessee, where it connects to I-40 and spans 76 miles northeast to the Virginia border. The I-81 Corridor Coalition's goals for the corridor focus on safety, freight movement, environment, technology and infrastructure, economic development and finance. Tennessee and Virginia report that approximately 60 percent of the truck traffic on the I-81 corridor is traveling through their state to other states.



Sign for the I-81 Corridor Coalition

I-69 Corridor

The I-69 Corridor, also referred to as Corridor 18, touches the Mexican border to the south and the Canadian border to the north. The alignment of the road crosses 18 states including Tennessee and when completed will consist of approximately 1,650 miles of roadway. The road was identified in the early 1990s as an economic corridor connecting the North American Free Trade Agreement countries: Canada, United States and Mexico. The alignment in Tennessee begins in Memphis and travels north through Tipton, Lauderdale and Dyer counties before crossing into Kentucky. Outside the Memphis urban area is I-269, which will provide a connection from east of Memphis to the I-69 corridor.



Sign for the Future I-69 Corridor

The Eastern Transportation Coalition (Formerly the I-95 Coalition)

The Eastern Transportation Coalition has evolved from a small, highway-focused group to more than 200 public agencies promoting reliable, efficient and balanced intermodal transportation. The ETC is a partnership of 17 states and D.C. The Coalition supports leadership, information technology, and operations that improve intermodal freight movement. The Coalition Freight Program focuses its efforts on the movement of freight across multiple jurisdictions and multiple modes. Through the program's Freight Committee, the Coalition is actively helping states by working on transportation issues that impact goods movement to foster safety, mobility and economic vitality within states and across the Corridor.



Logo for the Eastern Transportation Coalition (Formerly the I-95 Coalition)

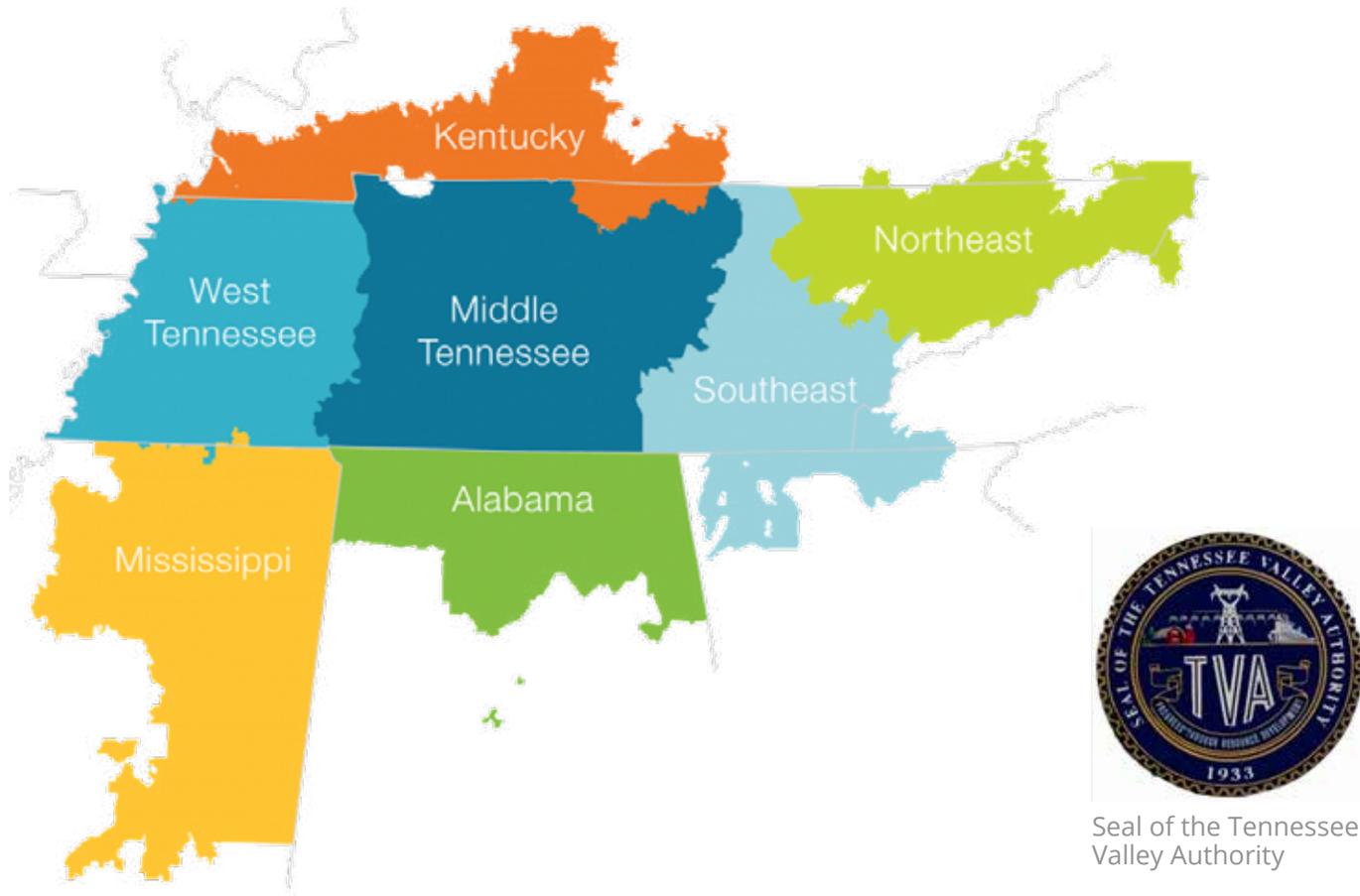
Tennessee-Tombigbee Waterway Development Authority (TTWDA)

The TTWDA was authorized by Congress to ensure the construction of the waterway. Since its completion in 1984, the TTW Development Authority is responsible for promoting economic development and trade along the waterway. The authority consists of governors from Alabama, Kentucky, Mississippi and Tennessee and five governor appointees from each state. Funding comes from the four member states and dues are paid by the Tennessee Department of Transportation.

FIGURE 3-5: Tennessee-Tombigbee Waterway
SOURCE: U.S. Army Corps of Engineers



FIGURE 3-6: TVA Service Area

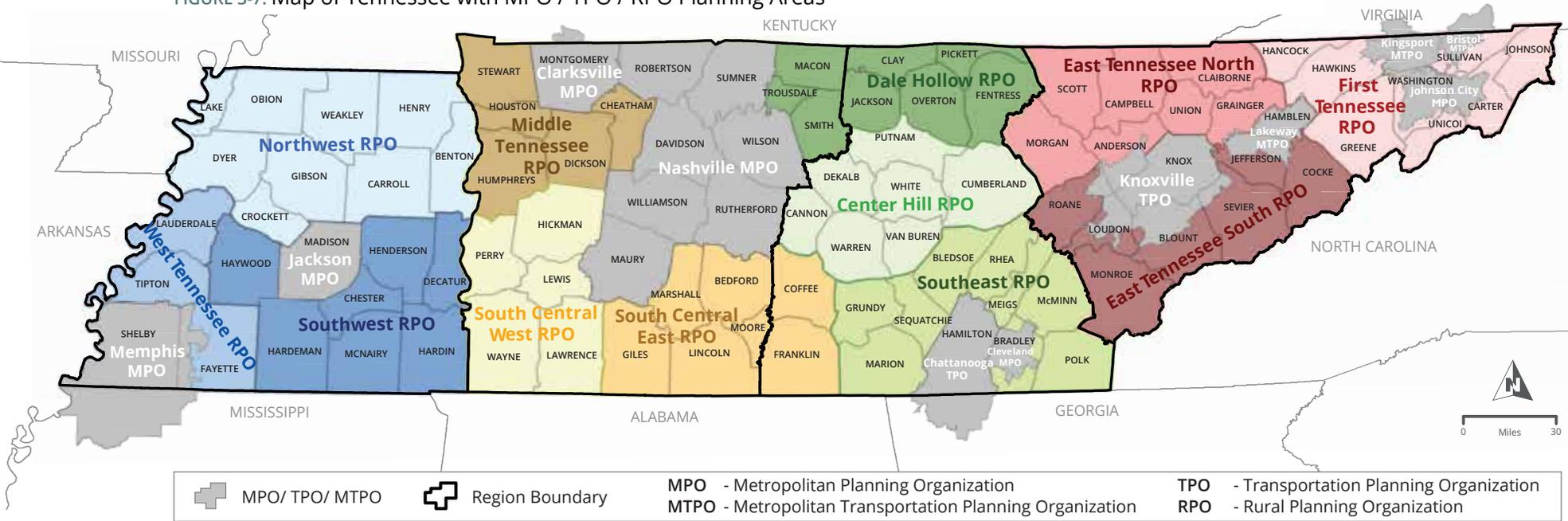


Tennessee Valley Authority (TVA)

TVA was created by an act of Congress in 1933 during the Great Depression “to improve the navigability and to provide for the flood control of the Tennessee River; to provide for reforestation and the proper use of marginal lands in the Tennessee Valley; to provide for the agricultural and industrial development of said valley; to provide for the national defense by the creation of a corporation for the operation of Government properties at and near Muscle Shoals in the State of Alabama and for other purposes.” The Tennessee Valley region spans 80,000 square miles across parts of seven states in the Southeast.

The Unified Development of the Tennessee River System, a plan approved in 1936, identified a series of dams to control flooding and produce hydroelectricity. Locks were included for commercial navigation purposes. Under the TVA Act, TVA is entrusted with the possession, operation and control of the dams and all related buildings, machinery and lands, except for the navigation locks which are operated by the USACE. While the USCG is the main agency responsible for maintaining navigation aids, TVA installs and maintains the navigational aids on about 375 miles of secondary, or recreational, channels across the TVA region.

FIGURE 3-7: Map of Tennessee with MPO / TPO / RPO Planning Areas



Tennessee Metropolitan Planning Organizations (MPOs) and Transportation Planning Organizations (TPOs)

MPOs are governmental bodies tasked with coordinating regional planning activities and distributing federal funds. MPOs conduct freight planning activities to develop a regional perspective for freight issues and needs. Regional freight planning activities can include stand-alone freight studies and plans, the inclusion of freight planning as a component within LRTPs and the inclusion of freight projects in Transportation Improvement Programs. **Figure 3-7**, depicts the geographic area for each local planning organization. The boundaries of five of the 11 MPOs in the state cross into a surrounding state which requires coordination between Tennessee and Kentucky, Georgia, Mississippi and Virginia. The freight planning activities of Tennessee’s 11 MPOs have resulted in the identification of several freight-related infrastructure improvement projects, which are discussed in Chapter 10.

Tennessee Rural Planning Organizations (RPOs)

Tennessee has 12 Rural Planning Organizations (RPOs) statewide to increase partnerships regionally and across the state for transportation planning purposes. Starting in 2018, the TDOT Long-Range Planning Division started producing Rural Regional Transportation Plans (R RTP). The R RTPs serve to increase the efficiency and effectiveness of the state’s rural transportation infrastructure investments and to increase the economic competitiveness of the state’s rural regions. The plans include sections on freight and industry flow within each RPO, the movement of goods and people, freight project recommendations and RPO goals that often include freight aspects.

Tennessee's Freight Improvement Strategy

The freight component of the 2016 LRTP includes research into the policies, programs and practices that affect freight movement in surrounding and peer states. Policy recommendations to improve the movement of freight through the state of Tennessee were based on this peer review. TDOT has implemented several freight improvement strategies that could improve freight movement for all modes in Tennessee, including:

- ◆ Increased focus on freight corridors
- ◆ Establishment of a freight and logistics office within TDOT to advance freight planning and investments in Tennessee
- ◆ Continuing development of freight-related data and planning tools
- ◆ Coordination of compatibility between freight-related land uses and the environment

Future freight improvement strategies that could also improve freight movement for all modes in Tennessee would also include expanded funding programs for modes supporting freight movement.



Primary Multimodal Freight System

Chapter 4: Primary Multimodal Freight System

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Chapter 4: Primary Multimodal Freight System

The Multimodal Freight System consists of highways, railroads, waterways, pipelines and airports supporting the movement of freight to, from, within and through the state.

Air Cargo

Air cargo typically consists of high value, time sensitive shipments where shippers and goods receivers are willing to pay the higher transportation costs than that of surface transportation modes.

Air cargo is typically transported by the following methods:

- ◆ Dedicated, all-cargo aircraft
- ◆ Carried in the belly hold of passenger aircraft (though during the COVID pandemic, passenger aircraft were used to carry cargo in the passenger cabin)
- ◆ By truck between airports, supplanting air services

The state has 78 airports according to the Tennessee Aviation System Plan. However, as shown in **Table 4-1**, air cargo activity is principally focused on six airports, while thirteen other airports have had ad hoc air cargo movements in recent years. These tables identify air cargo (freight and mail measured in pounds) handled at Tennessee airports from 2016 to 2021, extracted from the Air Carrier Activity Information System (ACAIS), an FAA database that contains revenue passenger boarding and all-cargo data.

The air cargo sector in Tennessee is dominated by the Memphis International Airport – home to FedEx’s “Super Hub” – handling 97.75 percent of Tennessee’s air cargo volume. This hub has grown from 389 employees handling 14 aircraft and 186 packages when it opened on its first night in 1973 to over 11,000 employees handling over 180,000 packages per hour today. In 2021, Memphis was ranked the second busiest air cargo hub in the world, after Hong Kong. The “Super Hub” is a key component of the hub and spoke network operated by FedEx for its domestic and international operations with flights operating from Memphis International Airport to most North American metropolitan and city areas and to international hubs including Stansted, UK; Paris, France; Osaka, Japan; and Shanghai, China.



TABLE 4-1: 2016-2021 Air Cargo at Tennessee Airports (pounds)

SOURCE: Air Carrier Activity Information System

	Nashville International	Chattanooga Airport	Memphis International	Smyrna Rutherford	Tri-Cities	McGhee Tyson	Other Airports
2016	88,395,041	21,141,946	9,188,937,697	799,377	47,670	93,119,866	77,103
2017	100,332,796	19,660,724	9,245,071,138	1,068,670	26,685	90,332,566	131,739
2018	110,771,470	18,882,177	9,863,648,755	736,002	38,603	85,215,456	49,248
2019	110,122,847	16,658,860	8,935,525,054	581,072	42,129	86,871,596	86,453
2020	103,410,010	18,721,271	10,161,050,742	580,498	12,329	85,667,004	110,778
2021	154,189,645	19,470,268	9,905,671,720	100,186	1,497	89,278,446	18,661

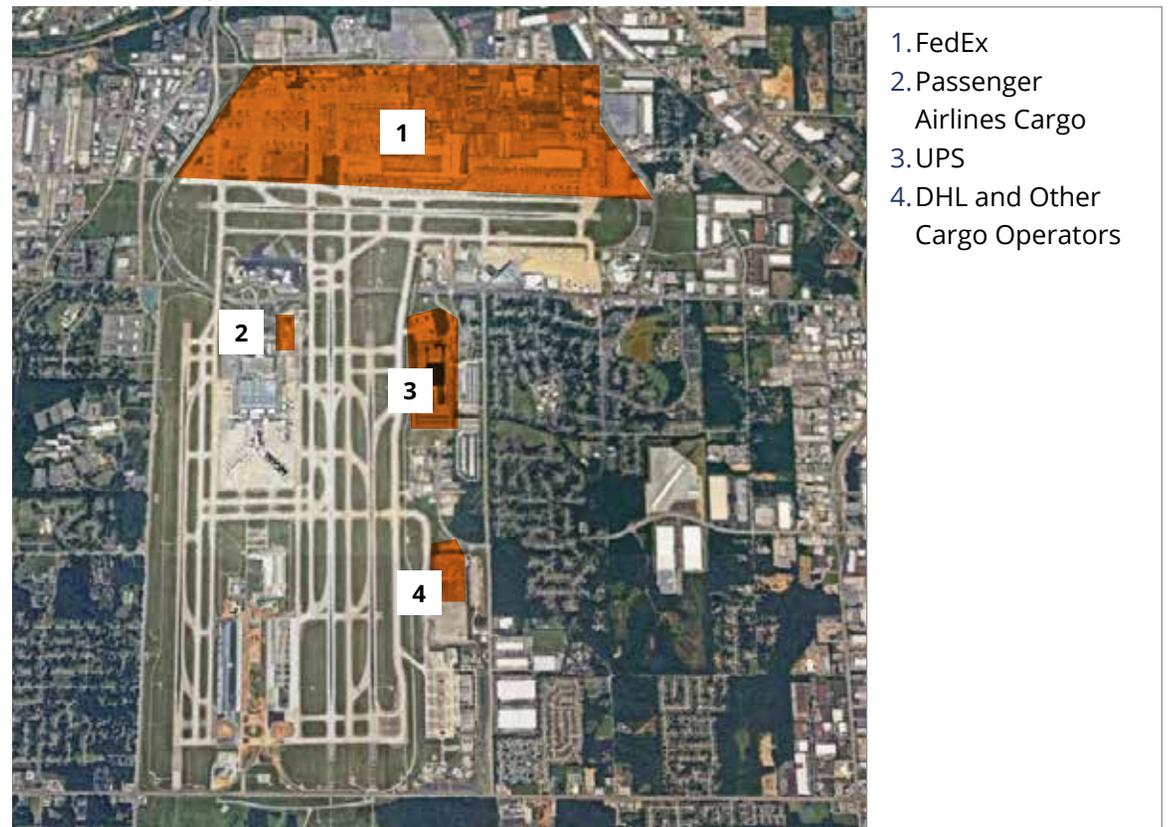
Other air cargo operations at Memphis International include:

1. UPS flights to its hub at Louisville, KY (SDF).
2. DHL flights to its North American hub in Cincinnati (CVG).
3. Air cargo carried on passenger airlines including American Airlines, Delta, Southwest and United Airlines.
4. Freighters moving ad hoc shipments or supplementing FedEx operations.

Air cargo operations are dispersed around the airport as shown in Figure 4-1.

FIGURE 4-1: Memphis International Airport Air Cargo Operations

SOURCE: HDR Analysis



Nashville International Airport (BNA) is the second largest cargo airport in Tennessee handling nearly 155 million pounds of cargo in 2021. Air cargo facilities at Nashville International Airport are shown in **Figure 4-2**.

FIGURE 4-2: Nashville International Airport Air Cargo Operations
SOURCE: HDR Analysis



- | | |
|---|---|
| <ol style="list-style-type: none"> 1. FedEx 2. Air Cargo Terminal serving passenger flights | <ol style="list-style-type: none"> 3. Air Cargo Terminal |
|---|---|

Nashville cargo operations include:

1. Cargo carried on passenger airlines with American Airlines, Delta, United Airlines, and Southwest and internationally with British Airways. In 2021, 24 million pounds of cargo were carried by passenger airlines. Cargo carried by passenger aircraft has grown by an annual compound growth rate of 13 percent, while overall cargo at the airport has grown annually by 10 percent.
2. FedEx flights to Memphis and its other hubs including Indianapolis.
3. DHL flights to Cincinnati.
4. Ad hoc freighter movements.

McGhee Tyson Airport (TYS), 12 miles south of Knoxville, is Tennessee's third largest air cargo airport. Operations include:

1. Air cargo carried by passenger airlines American Airlines and Delta.
2. FedEx flights to Indianapolis (IND) and Memphis (MEM).
3. UPS flights to Louisville (SDF).

Chattanooga Airport (CHA) is the fourth largest air cargo airport in Tennessee. Its operations consist of:

1. A FedEx flights to Memphis.
2. Air cargo carried passenger services on American Airlines and Delta.
3. Adhoc freighter movements.

Smyrna Rutherford airport (MQY) has experienced a decline in air cargo movement since 2020, when FedEx stopped operating from the airport. Operations in 2021 were mainly associated with ad hoc freighter movements and, specifically, flights from Laredo, Texas.

Tri-Cities Airport (TRI) is predominantly cargo carried on passenger aircraft with some ad hoc freighters over the last five years.

Other airports in the state also handle ad hoc and infrequent air cargo flights.



Rail



The Role of Rail in Statewide Transportation

The rail network in Tennessee includes over 2,400 route-miles of track, making Tennessee the state with the 26th-largest rail network in the United States.¹ Railroads in Tennessee provide common carrier freight rail transportation for inbound, outbound, intrastate and through movement of materials and products. The state is served by six Class I railroads and 19 Class III (short line) railroads.

Rail transportation plays a vital role in supporting Tennessee's key industries, including agriculture, construction and manufacturing. Over 458,000 carloads totaling 15.2 million tons of freight originated in Tennessee in 2019. Over 615,000 carloads totaling 26.1 million tons of freight terminated in Tennessee that same year. Intermodal freight, consisting of container on flatcar (COFC – including both international and domestic shipping containers) and trailer on flatcar (TOFC) shipments, make up the largest percentage of inbound and outbound rail traffic to and from Tennessee.² As a result of its strategic central location in the continental U.S., Tennessee has become a focal point for national distribution and fulfillment centers. Freight railroads are well-suited to accommodate long-haul shipments of high volumes of COFC and TOFC freight, linking Tennessee to distant coastal seaports that facilitate the import and export of goods. Other common types of freight moved by rail through Tennessee include coal, chemicals and food products, in addition to various other commodity groups.

The rail industry continues to be a major employer in Tennessee. As of 2019, the state's railroads employed a total of 3,305 people within the state, and the average wage and benefits per employee in Tennessee was \$136,140, according to the Association of American Railroads (AAR).³

¹ Association of American Railroads, AAR State Rankings 2019. Retrieved from: <https://www.aar.org/wp-content/uploads/2021/02/AAR-State-Rankings-2019.pdf>

² Association of American Railroads, Freight Railroads in Tennessee, January 2021. Retrieved from: <https://www.aar.org/wp-content/uploads/2021/02/AAR-Tennessee-State-Fact-Sheet.pdf>

³ Ibid.

Rail System Description and Inventory

Table 4-2 lists the categories of Tennessee’s rail owners and operators by mileage. The majority (over 55 percent) of the rail mileage in the state is owned by two Class I railroads: CSX Transportation (CSX) and Norfolk Southern (NS).

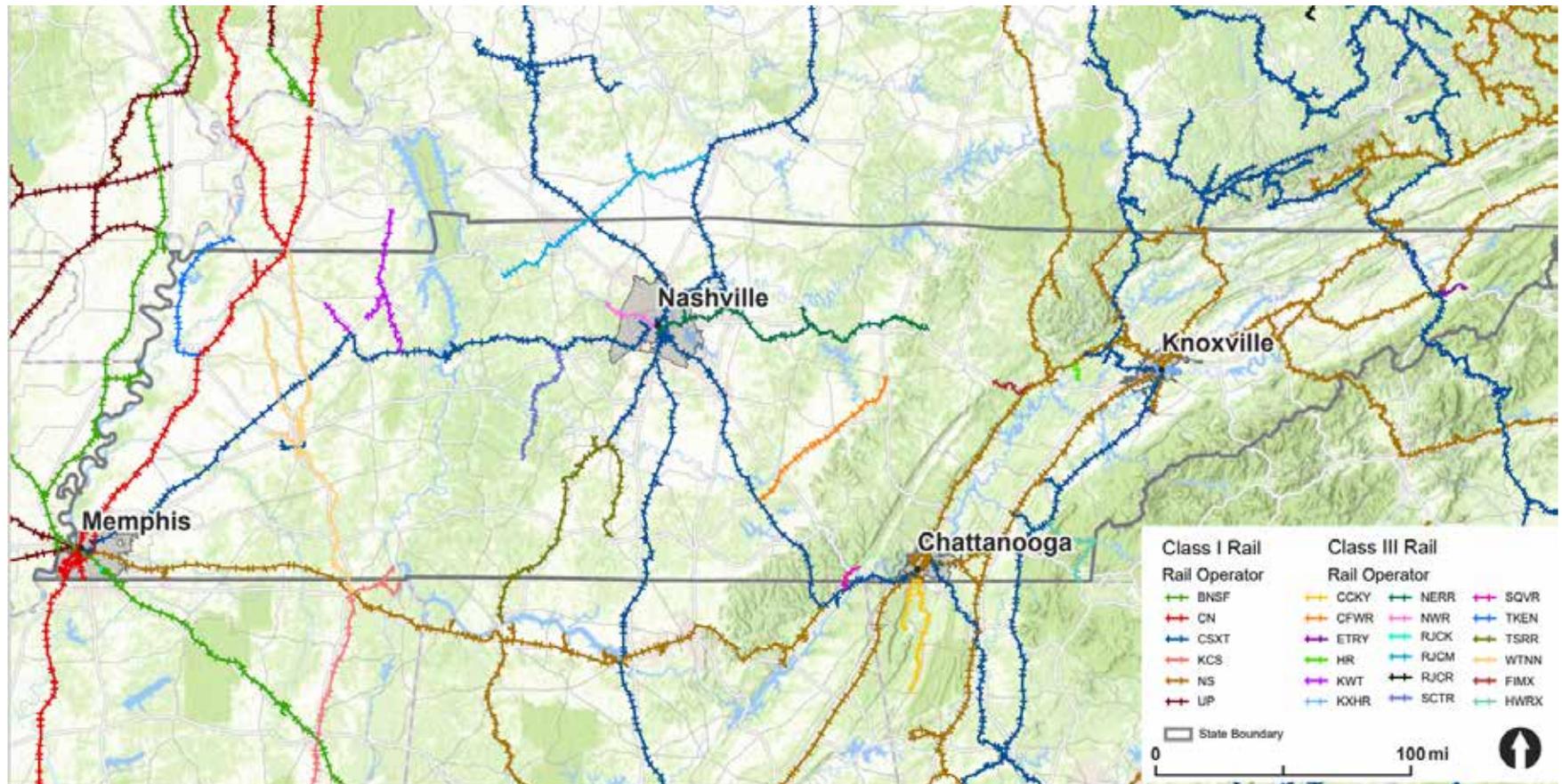
Figure 4-3 illustrates the location of railroads within the state.

TABLE 4-2: Tennessee Railroad Ownership

SOURCE: Surface Transportation Board Annual R-1 Reports (2021) and Tennessee DOT

Category	Number of Railroads	Miles Operated	Miles Owned	Trackage Rights Miles	Miles Leased
Class I Railroads	6	2,112	1,645	312	151
Class II Railroads	0	0	0	0	0
Class III Railroads	19	883	399	21	484
Non-Operating Railroad Owners	3	0	364	0	0
Other Rail Operators	9	54	16	0	38
Total	37	3,049	2,424	333	673

FIGURE 4-3: Tennessee Rail Network



Freight Rail Network

Class I Railroads

The Surface Transportation Board (STB) designates any railroad with more than \$900 million in annual operating revenue as a Class I carrier.⁴ Class I railroads operating in Tennessee are described in this section and listed in **Table 4-3**.

BNSF Railway

BNSF Railway (BNSF) is one of the most extensive Class I railroads in North America in terms of track-miles and market share. BNSF is headquartered in Fort Worth, Texas. BNSF operates 32,500 miles of track in 28 states and two Canadian provinces. BNSF handled 10.1 million carloads and invested \$2.97 billion into its network in 2021.⁵

BNSF has transfer facilities for ship-to-rail and truck-to-rail movements to facilitate intermodal movement of containers, trailers, automobiles and other freight traffic, including 26 intermodal terminals located across the system and access to more than 40 maritime ports in North America.

Historically, BNSF's rail foothold in Tennessee was constructed by the St. Louis–San Francisco Railway (SLSF – commonly referred to as the Frisco) and its predecessors as part of a principal main line route linking Kansas City, Missouri to Birmingham, Alabama. In 1980, the Frisco merged with the Burlington Northern Railroad (BN)—adding to an already vast Class I railroad network stretching from the Midwest to the Pacific Northwest and extending from Canada to the Gulf Coast.

During the 1970s, BN had constructed new rail lines into the Powder River Basin of Wyoming to tap the massive deposits of low-sulfur sub-bituminous coal—coal that would ultimately become one of the largest sources of through and terminating rail traffic on the BNSF in Tennessee destined to electric utilities throughout the Southeastern U.S.

TABLE 4-3: Tennessee Class I Railroads

SOURCE: Surface Transportation Board Annual R-1 Reports (2021)

Railroad	Reporting Mark	Miles Operated	Miles Owned	Trackage Rights Miles	Miles Leased
BNSF Railway	BNSF	137	16	121	-
Canadian National	CN	157	157	-	-
CSX Transportation	CSX	968	812	137	15
Kansas City Southern	KCS	5	5	-	-
Norfolk Southern	NS	828	646	46	136
Union Pacific	UP	17	9	8	-
Total		2,112	1,645	312	151

⁴ Surface Transportation Board Adopts Final Rule Amending Thresholds for Classifying Rail Carriers, April 5, 2021. Retrieved from: <https://prod.stb.gov/news-communications/latest-news/pr-21-16/>

⁵ BNSF Railway, BNSF Facts. Retrieved from: http://www.bnsf.com/bnsf-resources/pdf/about-bnsf/fact_sheet.pdf

The Burlington Northern Santa Fe Railway, now rebranded as BNSF Railway, was created on September 22, 1995, from the merger of the Burlington Northern Railroad and the Santa Fe Pacific Corporation (parent company of the Atchison, Topeka & Santa Fe Railway [ATSF]), further expanding the reach of Tennessee’s rail shippers to a greater array of origins and destinations in the larger combined network. In particular, the BNSF merger enabled Tennessee shippers to better access Pacific Ocean maritime shipping through a number of California ports, including the Port of Long Beach, the Port of Los Angeles, the Port of San Diego, and the Port of Richmond. Since 2010, BNSF has been a subsidiary of Omaha, Nebraska-based Berkshire Hathaway, led by investor Warren Buffett. BNSF owns 16 route-miles of track in Tennessee, as of 2021.⁶

Canadian National Railway

Canadian National (CN) is a North American rail carrier based in Montreal, Quebec, Canada. CN operates approximately 20,000 route-miles of track spanning both Canada and the central United States.

CN gained entry to Tennessee through its 1998 acquisition of the Illinois Central Railroad (IC) which had constructed a principal main line route spanning from Chicago, Illinois to New Orleans, Louisiana via Memphis. CN owns 157 miles of track in Tennessee, as of 2021.⁷

CSX Transportation

Headquartered in Jacksonville, Florida, the CSX Transportation (CSX) network encompasses approximately 36,752 track miles in 23 states, the District of Columbia, and Canada, serving 70 ports and major markets in the eastern U.S. CSX serves thousands of production and

distribution customers through connections to more than 240 short line and regional railroads.

CSX has a large presence in Tennessee. The Tennessee portion of CSX, as it stands today, consists of lines that were once operated by the Louisville and Nashville Railroad (L&N) and the Nashville, Chattanooga, and St. Louis Railway (NC&StL). The CSX network has coverage in east, middle, and west Tennessee and serves all of the state’s major cities directly. CSX owns 812 miles of track in Tennessee, as of 2021.⁸

Kansas City Southern Railway

Headquartered in Kansas City, Missouri, the Kansas City Southern (KCS) network encompasses more than 6,400 track miles in 10 states, serving 15 ports and major markets in the central and south-central United States and international holdings in northeastern and central Mexico. KCS serves thousands of production and distribution customers and partners with 41 short line and regional railroads in North America. The KCS network provides Tennessee with access to the Gulf Coast Region of the U.S. and Mexico. KCS owns five miles of track in Tennessee, as of 2021.⁹

In December 2021, Canadian Pacific Railway (CP), headquartered in Calgary, Alberta, Canada, acquired the KCS.¹⁰ In mid-March 2023 the Surface Transportation Board approved the acquisition of the KCS by the CP. The decision includes an oversight period and multiple conditions. Both Mexican regulators and the U.S. Committee on Foreign Investment (CFIUS) have approved the merger.

6 Surface Transportation Board, Annual Report R-1 of BNSF Railway Company for the Year Ended December 31, 2021. Retrieved from: <https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/>

7 Surface Transportation Board, Annual Report R-1 of Grand Trunk Corporation for the Year Ended December 31, 2021. Retrieved from: <https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/>

8 Surface Transportation Board, Annual Report R-1 of CSX Transportation for the Year Ended December 31, 2021. Retrieved from: <https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/>

9 Surface Transportation Board, Annual Report R-1 of Kansas City Southern Railroad for the Year Ended December 31, 2021. Retrieved from: <https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/>

10 Kansas City Southern, Canadian Pacific and Kansas City Southern Close Into Voting Trust, December 14, 2021. Retrieved from: https://investors.kcsouthern.com/news-releases/2021/12-14-2021-134408199?sc_lang=en

Norfolk Southern Railroad

Headquartered in Norfolk, Virginia, the Norfolk Southern (NS) network encompasses approximately 36,119 track miles in 22 states and the District of Columbia, serving 43 ports and major markets in the eastern United States. NS has thousands of production and distribution customers through connections to more than 262 short line and regional railroads.

The Tennessee portion of the NS system, as it stands today, consists of the surviving lines that were primarily operated by the Southern Railway (SOU). NS owns the second most rail mileage in Tennessee at over 22 percent. The NS network has coverage mainly in east Tennessee, but the Memphis West End line does serve Memphis after dipping into Northern Alabama from Chattanooga. NS does not serve Middle or Northwest Tennessee. NS owns 646 miles of track in Tennessee, as of 2021.¹¹

Union Pacific Railroad

Union Pacific Railroad (UP) possesses a North American rail network that encompasses 32,452 route-miles of track in 23 states. UP's network links Pacific Coast and Gulf Coast ports with gateways in the Midwest, providing access to other rail carriers serving the eastern United States. UP also operates several routes to key Mexican and Canadian gateways. The Omaha, Nebraska-based railroad handled 8.0 million carloads in 2021 and invested \$3 billion into its network.¹²

UP has transfer facilities for rail-to-rail movements as well as intermodal transfer of containers, trailers and other freight traffic. The transfer facilities include 24 major intermodal hubs located across the system.

Historically, UP was chartered by Congress in 1862 through the Pacific Railway Act to construct the eastern portion of the first transcontinental railroad. The rail line began at Council Bluffs, Iowa, in 1865 and forged westward in stages, reaching Wyoming in 1867 and joining at Promontory, Utah, in 1869 with the Central Pacific Railroad that had built eastward from Sacramento, California.

Over the years, UP added to its route structure through mergers with the Missouri Pacific Railroad (MP) in 1982 and with the Chicago & North Western Transportation Company (CNW) in 1995. Subsequent to UP's acquisition of CNW, UP acquired the Southern Pacific Transportation Company (SP) in 1996, thereby expanding UP's market reach and taking another step towards consolidating Class I carriers in the west. UP owns nine route-miles of track in Tennessee, as of 2021.¹³

Class II Railroads

STB designates any railroad with greater than \$40.4 million but less than \$900 million of annual carrier operating revenue as a Class II carrier.¹⁴ Tennessee does not have any Class II carriers, as of 2022.

¹¹ Surface Transportation Board, Annual Report R-1 of Norfolk Southern Railroad for the Year Ended December 31, 2021. Retrieved from: <https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/>

¹² Union Pacific Railroad, System Factsheet.

Retrieved from: https://www.up.com/cs/groups/public/@uprr/@corp/el/documents/up_pdf_nateddocs/pdf_e_onevoice_who_we_are.pdf

¹³ Surface Transportation Board, Annual Report R-1 of Union Pacific Railroad for the Year Ended December 31, 2021.

Retrieved from: <https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/>

¹⁴ Surface Transportation Board Adopts Final Rule Amending Thresholds for Classifying Rail Carriers, April 5, 2021.

Retrieved from: <https://prod.stb.gov/news-communications/latest-news/pr-21-16/>

Class III Railroads

STB designates any railroad with less than \$40.4 million of annual carrier operating revenue as a Class III carrier.¹⁵ TDOT has supported short line bridge and track improvements via Tennessee's

Transportation Equity Fund in order to create a strong linkage between short line and Class I rail systems in the state. The Class III railroads operating in Tennessee are summarized in **Table 4-4**.

TABLE 4-4: Tennessee Class III Railroads

SOURCE: Tennessee Department of Transportation

Railroad	Reporting Mark	Parent Company	Miles Operated	Miles Owned	Trackage Rights Miles	Miles Leased
Chattanooga and Chickamauga Railway	CCKY	Genesee & Wyoming	6	0	0	6
Caney Fork & Western Railroad	CFWR	Ironhorse Resources, Inc.	59	0	0	59
East Chattanooga Belt Railway	ECBR	Tennessee Valley Railroad Museum	13	0	0	13
East Tennessee Railway	ETRY	Genesee & Wyoming	7	0	0	7
Heritage Railroad Corporation	HR	Energy Solutions	7	7	0	0
Kentucky West Tennessee Railway	KWT	Genesee & Wyoming	60	60	21	0
Knoxville & Holston River Railroad	KXHR	Gulf and Ohio	20	20	0	0
Mississippi Central Railroad Co.	MSCI	Pioneer Lines	5	5	0	0
Mississippi Tennessee Railroad, Inc.	MTNR	Ironhorse Resources, Inc.	1	0	0	1
Nashville & Eastern Railroad Corp.	NERR	R.J. Corman	145	0	0	145
Nashville & Western Railroad Corp.	NWR	R.J. Corman	20	0	0	20
R.J. Corman Railroad Company – Memphis Line	RJCM	R.J. Corman	113	113	0	0
R.J. Corman Railroad Company – Tennessee Terminal	RJCK	R.J. Corman	37	0	0	37
South Central Tennessee Railroad Co	SCTR	West Tennessee Rail Group	45	0	0	45
Sequatchie Valley Railroad	SQVR	Ironhorse Resources, Inc.	8	8	0	0
TennKen Railroad Company	TKEN	West Tennessee Rail Group	42	0	0	42
Tennessee Southern Railroad	TSRR	Patriot Rail	109	109	0	0
Walking Horse & Eastern Railroad	WHOE	Ironhorse Resources, Inc.	8	0	0	8
West Tennessee Railroad Co	WTNN	West Tennessee Rail Group	178	77	0	101
Total			883	399	21	484

¹⁵ Ibid.

Other Rail Operators

Other rail operators include privately-owned industrial railways, museums and tourist railroads. **Table 4-5** lists the other rail operators in Tennessee.

Non-Operating Rail Owners

Non-operating railroad owners are entities that own segments of main line rail but do not perform their own rail operations. Instead, other carriers are contracted to operate these segments as need dictates. In Tennessee, this includes local Railroad Authorities that own track and lease it to other operators. **Table 4-6** lists the non-operating railroad owners in Tennessee.

TABLE 4-5: Other Rail Operators in Tennessee
SOURCE: Tennessee Department of Transportation

Railroad	Reporting Mark	Parent Company	Miles Operated	Miles Owned	Trackage Rights Miles	Miles Leased
Franklin Mineral Railroad	FIMX	Lhoist North America	13	13	0	0
Hiwassee River Railroad	HRRC	Tennessee Valley Railroad Museum	38	0	0	38
Tennessee Valley Railroad Museum	TVRM	Tennessee Valley Railroad Museum	3	3	0	0
Total			54	16	0	38

TABLE 4-6: Tennessee Non-Operating Railroad Owners
SOURCE: Tennessee Department of Transportation

Owner	Miles Operated	Miles Owned
State of Georgia	0	6
Tri-County Railroad Authority	0	59
Tennessee Overhill Heritage Association	0	38
Mississippi Tennessee Railroad Authority	0	1
Nashville & Eastern Railroad Authority	0	145
Cheatham County Railroad Authority	0	20
South Central Tennessee Railroad Authority	0	45
Hickman River City Development Corporation	0	42
Bedford County Railroad Authority	0	8
Total	0	364

TABLE 4-7: Major Railroad Yards and Maintenance Facilities in Tennessee
 SOURCE: HDR Analysis of Aerial Imagery

Name	Location	Railroad
Tennessee Yard	Memphis	BNSF
Harrison Yard	Memphis	CN
Memphis Yard	Memphis	CSX
Radnor Yard	Nashville	CSX
Debutts Yard	Chattanooga	NS
Memphis Yard	Memphis	NS
Sevier Yard	Knoxville	NS
Melrose Yard	Memphis	UP

Major Freight Terminals

This section describes major rail facilities, including yards, maintenance facilities, intermodal terminals, interchange locations and rail-served industrial parks within the state.

Railroad Yards and Maintenance Facilities

Railroad operations are centered around yards and terminals statewide. These yards and terminals are where railroad equipment is stored and serviced, and where railroad employees report for duty. Rail switching yards facilitate the sorting of individual railcars or blocks of railcars into trains destined for specific destinations. At key terminals, facilities exist for the maintenance, repair and day-to-day servicing of railroad equipment, including both locomotives and railcars. **Table 4-7** lists the locations of major railroad yards and maintenance facilities in Tennessee.

Intermodal Terminals

Intermodal freight transportation refers to the forwarding of both international (20-foot and 40-foot length) and domestic (53-foot length) shipping containers, as well as domestic trailers on flatcar (TOFC) shipments on the rail network. Intermodal shipping is usually

TABLE 4-8: Tennessee Rail Intermodal Facilities
 SOURCE: HDR Analysis of Aerial Imagery

Terminal	Railroad	International Service	Domestic Service
Memphis	BNSF	•	•
Memphis – Harvard, AR	BNSF	•	
Memphis	CN/CSX	•	•
Memphis – Rossville	NS	•	•
Memphis – Marion, AR	UP	•	•
Nashville	CSX	•	•

reserved for imported goods shipped from overseas, exported goods being shipped to overseas, and less-than-truckload or parcel freight moving between cross-docking warehouse sites and regional distribution centers domestically.

Intermodal service in Tennessee is primarily focused on the Memphis area; however, CSX also provides intermodal service to Nashville.

Table 4-8 lists the rail intermodal facilities that exist within and directly adjacent to Tennessee.

Memphis (BNSF)¹⁶

BNSF's Memphis Intermodal Facility is located at 4814 Lamar Avenue, Memphis, TN. The facility handles both international and domestic intermodal containers.

Memphis - Harvard (BNSF)

In an effort to meet increased intermodal demand in the greater Memphis region and unlock additional capacity, BNSF Railway has re-opened its previously closed Harvard Intermodal Facility located in Marion, Arkansas, near Memphis.¹⁷ BNSF has further advised that all international intermodal shipments originating at the Port of

¹⁶ BNSF Railway, Intermodal Facility Listings. Retrieved from: <https://www.bnsf.com/ship-with-bnsf/support-services/facility-listings.page>

¹⁷ BNSF Railway, BNSF Responds to Growing Intermodal Demand in Memphis Region, August 16, 2021.

Retrieved from: <https://www.bnsf.com/news-media/customer-notifications/notification.page?notId=bnsf-responds-to-growing-intermodal-demand-in-memphis-region>

Long Beach's Pier T Terminal will now terminate at BNSF's Harvard Intermodal Facility rather than BNSF's Memphis Intermodal Facility. Other international and domestic intermodal services will continue to terminate at BNSF's Memphis Intermodal Facility. The Harvard Intermodal Facility is located at 5650 State Hwy 77, Marion, AR.

Memphis (CN/CSX)¹⁸

CN operates an intermodal terminal in Memphis. The facility is located at 3588 Paul R. Lowry Road, Memphis, TN and is also served by CSX. The facility handles both international and domestic intermodal containers.

Memphis - Rossville (NS)¹⁹

NS operates an intermodal terminal in Memphis. The facility is located at 3000 Norfolk Southern Way, Rossville, TN. The facility handles both international and domestic intermodal containers.

NS offers intermodal service between Memphis and the following destinations:

1. Jacksonville, Florida
2. Savannah, Georgia
3. Elizabeth, New Jersey
4. Charlotte, North Carolina
5. Bethlehem, Pennsylvania
6. Greencastle, Pennsylvania
7. Morrisville, Pennsylvania
8. Charleston, South Carolina

Memphis - Marion (UP)²⁰

UP operates an intermodal facility in Marion, Arkansas that serves the greater Memphis metropolitan area. The facility handles both international and domestic intermodal containers. The facility is located at 5500 Kuhn Road, Marion, AR.

Nashville (CSX)²¹

CSX operates an intermodal facility in Nashville, Tennessee. The facility is located at 3086 Sidco Drive, Nashville, TN. The facility handles both international and domestic intermodal containers.

Rail-Served Industrial Parks

While many rail-dependent industries are located along rail lines wherever suitable real estate may be available, some businesses that rely on rail for goods movement choose to locate in shovel-ready, master-planned industrial park properties with rail access where sites can be customized to suit each industry's specific needs. Numerous examples of this type of development can be found in Tennessee, with more currently under development.

Rail Transload Facilities

For industries that utilize rail but are not located directly adjacent to an existing rail line, freight can be shipped by other modes, such as truck, to or from an intermediate point along the rail network to be transferred to or from railcars. This process, known as transloading, reduces the initial cost barrier of entry to rail transportation for many shippers by allowing them to access the national freight rail network without constructing a direct rail connection or relocating core operations to a rail-served site. Transload facilities vary greatly in terms of the types of equipment and fixtures available depending on the particular commodities being handled. Some transload sites are operated or made available to shippers by railroads themselves, while other sites are operated by third party logistics firms.

¹⁸ Canadian National, Intermodal Terminals. Retrieved from: <https://www.cn.ca/en/our-services/maps-and-network/intermodal-terminals/>

¹⁹ Norfolk Southern, Memphis Intermodal Facility <http://www.nscorp.com/content/nscorp/en/shipping-options/intermodal/terminals-and-schedules/memphis-tenn-rossville.html>

²⁰ Union Pacific Railroad, Marion Intermodal Terminal. Retrieved from: <https://www.up.com/customers/premium/intmap/marion/index.htm>

²¹ CSX Transportation, Intermodal - Nashville, TN.

Retrieved from: http://www.intermodal.com/index.cfm/channel-partners/locations-served/terminal-details/?terminal_id=38&Core=true

Waterways



Tennessee has 950 miles of navigable inland waterways consisting of the Tennessee, Mississippi, and Cumberland Rivers. These waterways are an integral part of the nation's, region's and state's freight transportation system and support the movement of a diverse range of commodities and equipment including agricultural products flowing south to Louisiana ports for export to global markets; fertilizer moving north from Gulf coast producers to the state's farming community; home heating and vehicle fuels; and, equipment such as NASA's Space Launch System that traverses the State's waterways enroute to and from launch facilities in Florida and the NASA facility at Huntsville, Alabama.

Waterway facilities are shown in Figure 4-4.

FIGURE 4-4: Tennessee Waterways and Facilities



Tennessee River

The main navigation channel in the Tennessee River is 652 miles long beginning east of Knoxville and eventually joining with the Ohio River at Paducah, KY. From Knoxville, it flows southwest towards Chattanooga and then crosses into Alabama and 206 miles later crosses back into Tennessee. It then flows for 143 miles north before crossing the state line into Kentucky. Three tributaries of the Tennessee River can also support commercial navigation.

These include:

- ◆ Clinch River
- ◆ Little Tennessee River
- ◆ Hiwassee River

The Tennessee River is also designated as Marine Highway M-65, from Mobile, AL to the Ohio River in Paducah, KY.

It has a maintained depth for navigation purposes of 11 feet. In 2020, the Tennessee River (includes tonnage transported on the TN, AL and KY sections of the river) moved just over 32.1 million tons of cargo carried on 82,135 vessel trips. There has been a steady decline of cargo carried on this waterway. In 2011, coal and lignite accounted for 18.5 million tons of the volume moved and constituted 45 percent of all commodities moved. By 2020, coal and lignite accounted for only 16 percent of traffic on the waterway with 5.1 million tons transported, but it was still the largest commodity group transported on this waterway.

Figure 4-5 illustrates the trends in commodities and tonnage carried on the Tennessee River.

Locks

There are nine locks on the Tennessee River and one on its tributaries. The five locks located in Tennessee on the Tennessee River supporting navigation are the Pickwick, Nickajack, Chickamauga, Watts Bar and Fort Loudon locks.

Table 4-9 details the lock dimensions on the Tennessee River.

FIGURE 4-5: Commodities and Tonnage carried on the Tennessee River (2011-2020)

SOURCE: U.S. Army Corps of Engineers

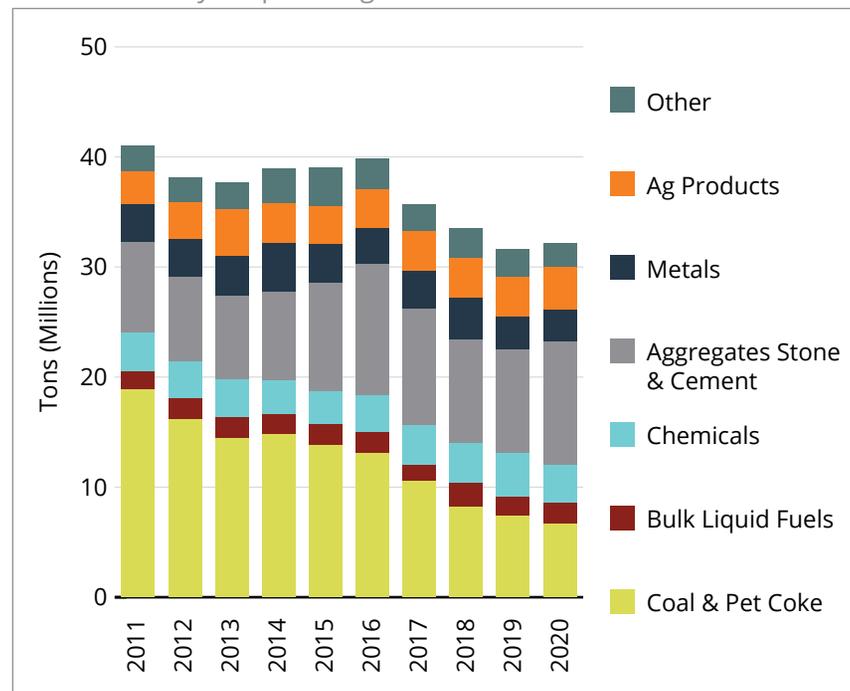


TABLE 4-9: Tennessee River Lock Dimensions

Source: U.S. Army Corps of Engineers

River	Lock	Lock Size
Tennessee River	Pickwick	110 x 600 feet
	Nickajack	110 x 600 feet
	Chickamauga	60 x 360 feet
	Watts Bar	60 x 360 feet
	Fort Loudon	60 x 360 feet
Clinch River	Melton Hill	75 x 400 feet



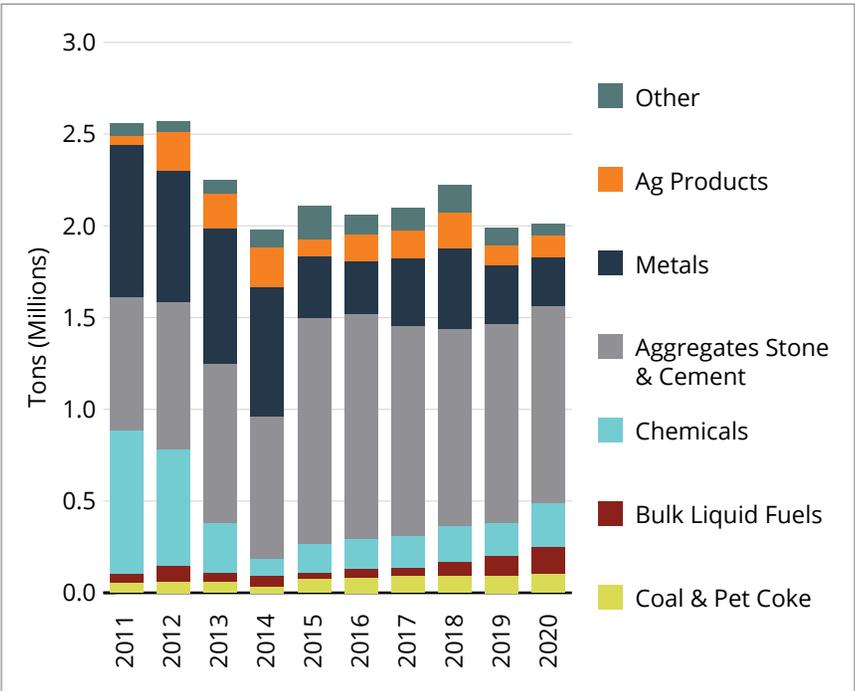
Port and Terminal Facilities

On the western section of the Tennessee River there are several barge terminal facilities clustered around New Johnsonville. These comprise facilities serving the Chemours manufacturing plant, a grain elevator and an aggregates facility. The Johnsonville Fossil power plant has extensive barge docking facilities that were used to deliver coal to the power plant, until it stopped coal powered generation in 2017. Further south in Perryville, a concentration of terminals includes two aggregate terminals and an asphalt terminal.

The Port of Nickajack operates a public river port on the Tennessee River as a joint jurisdiction between New Hope and South Pittsburg. It has approximately 64 acres available for industrial development.

Between Nickajack Lock and Chickamauga Lock, there are multiple barge terminals (in use and dormant) including aggregates, cement, scrap metal, asphalt, steel and agricultural and food products. This area represents the highest concentration of terminal and port facilities on the Tennessee section of the Tennessee River. In 2020, Chattanooga was ranked the 113th busiest port in the nation handling two million tons of cargo. The tonnage and commodities handled through the Chattanooga PSA are illustrated in **Figure 4-6**.

FIGURE 4-6: Commodities and Tonnage handled through the Chattanooga PSA (2011-2020)
 SOURCE: U.S. Army Corps of Engineers



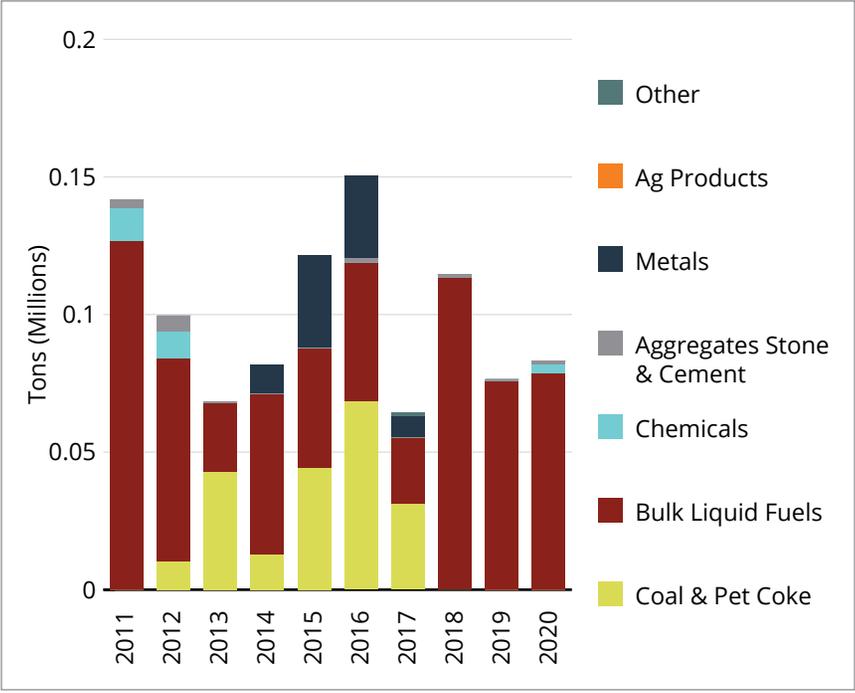


Above Chattanooga, the terminal facilities are sparse. Coal fired power stations used to receive coal by barge and barges have transported oversized and overweight power generation equipment to nuclear power stations. In Loudon, the Primient Loudon industrial plant can be served by barges and Lenoir City hosts the Fort Loudon Terminal. Knoxville has several terminals including a bulk fuel facility and the Buckhart Enterprises, Inc. barge terminal, handling bulk materials and can also accommodate oversized and overweight (OSOW) movements. The Port of Knoxville is a PSA. The tonnage and commodities handled in this PSA are shown in **Figure 4-7**. Most of the tonnage is associated with asphalt.

The Clinch River does not appear to have any active barge terminals but has been used to support the movement of OSOW loads. The Hiwassee River has a cluster of terminals in the Charleston/Calhoun region serving chemical, salt and paper facilities.

FIGURE 4-7: Commodities and Tonnage handled in the Knoxville PSA (2011-2020)

SOURCE: U.S. Army Corps of Engineers



Cumberland River

The Cumberland River is 688 miles long beginning in Kentucky and crossing the Tennessee state line near Celina. It flows southwest through Nashville thence to Clarksville, Cumberland City and crossing back into Kentucky north of Dover. The Cumberland River joins with the Ohio River at Smithland, KY. It also connects with the Tennessee River via the Barkley Canal. It has a maintained depth of nine feet from the confluence with the Ohio River to mile 300 near Carthage and eight feet to Celina.

In 2020, the Cumberland River (including TN and KY sections) supported the movement of 22.25 million tons of cargo. In 2011, coal accounted for 48 percent of cargo, but in 2020 this had dropped to 21 percent. Sand and gravel, gasoline and limestone are the commodities that have grown significantly in volume since 2011 as shown in **Figure 4-8**.

Locks

The Cumberland River has three locks located within Tennessee. Cheatham lock is 10 miles northwest of Ashland City, Old Hickory Lock is 11 miles northeast of Nashville and Cordell Hull lock is near Carthage. The lock dimensions are shown in **Table 4-10**.

FIGURE 4-8: Commodities and Tonnage handled on the Cumberland River (2011-2020)

SOURCE: U.S. Army Corps of Engineers

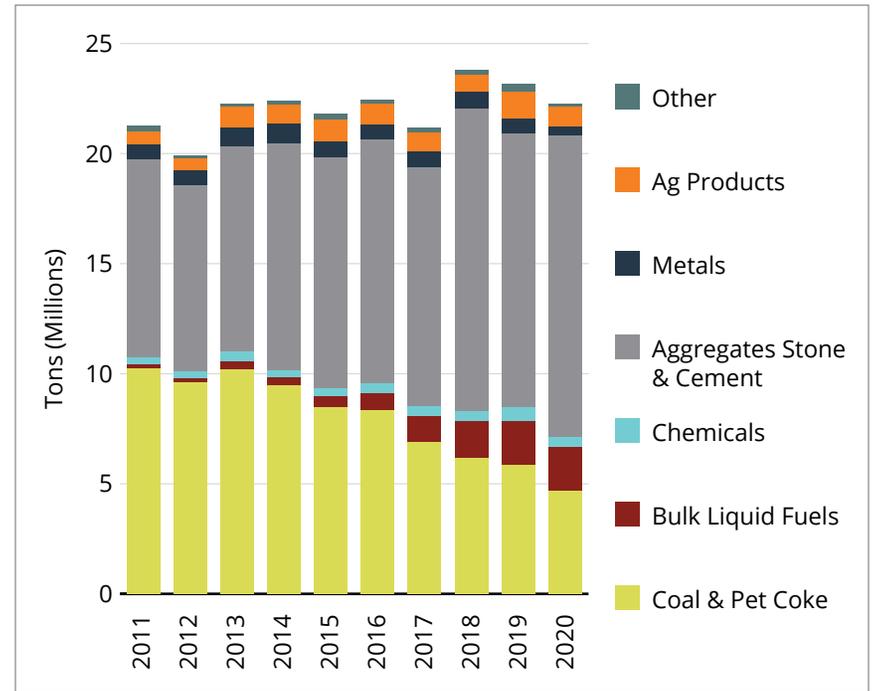


TABLE 4-10: Lock Dimensions on the Cumberland River

SOURCE: U.S. Army Corps of Engineers

Lock	Dimensions
Cheatham Lock	110' x 800'
Old Hickory Lock	84' x 397'
Cordell Hull Lock	84' x 400'

Port and Terminal Facilities

In Cumberland City there are two barge facilities serving the TVA Cumberland Fossil Plant with coal.

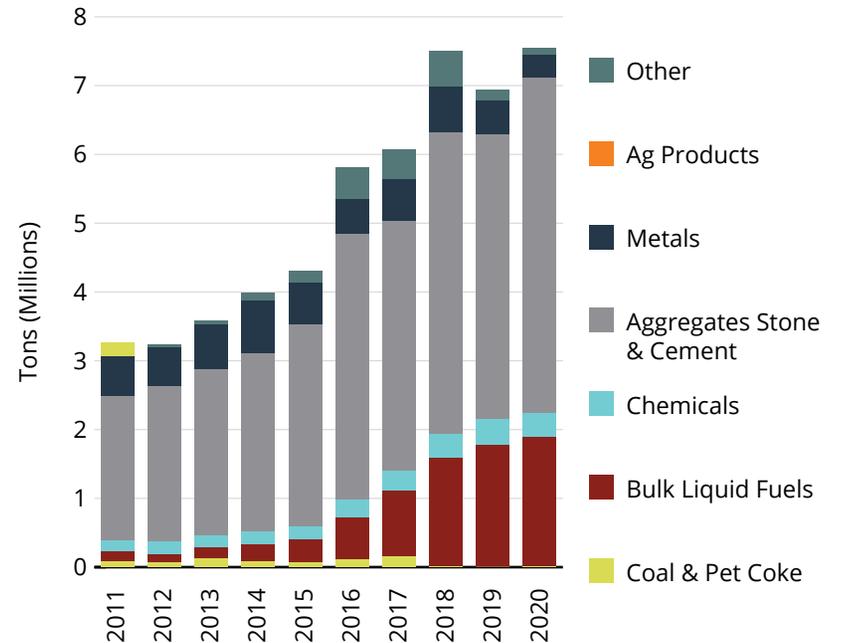
In Clarksville there are several barge terminals. One terminal supports the Nystar zinc refinery and smelter with the delivery of raw materials. Other terminals support grain elevators and aggregate facilities.

Further to the east are multiple facilities clustered in and around Nashville. Industries supported by these barge terminals include aggregate, cement and building material facilities, bulk fuel and asphalt terminals. In 2020, The Port of Nashville was ranked the 60th busiest port in the nation, handling a total of 7.5 M tons of cargo. Significant growth in tonnage handled in the Port of Nashville is associated with aggregates, namely sand and gravel as well as the receipt of distillate fuel oil as illustrated in **Figure 4-9**.

East of Nashville and southeast of Gallatin are two barge terminals, one is an aggregate facility and the other is a coal unloading facility serving the TVA Gallatin Fossil Plant. Southeast of Hartsville at mile marker 284.1 is the PowerCom Industrial Facility. The barge dock was constructed in the 1970's to support the construction of the Hartsville nuclear power plant, but in 1982, TVA cancelled two of the four reactors and indefinitely deferred two others at the site. Several feasible studies have been undertaken to determine the viability of a river terminal operation at this site.

FIGURE 4-9: Tonnage and Commodities handled at the Port of Nashville (2011-2020)

SOURCE: U.S. Army Corps of Engineers



Mississippi River

The Mississippi River forms the western boundary of the State of Tennessee. It is part of the Lower Mississippi River, a lock free section from the mouth of the Mississippi to St. Louis. Being lock free, this river is not constrained by the capacity of lock systems that are present on other commercial waterways in Tennessee. The Mississippi is designated as Marine Highway M-55 and includes the Mississippi and Illinois Rivers from New Orleans, LA, via St. Louis, MO, to Chicago, IL.

Ports and Terminal Facilities

The majority of barge terminals on the Tennessee section of the Mississippi River are concentrated in the Port of Memphis, 600 miles upriver from New Orleans.

The jurisdictional and statistical boundaries of the International Port of Memphis include the McKellar Lake/Presidents Island complex, the West Memphis Harbor, the Rivergate Harbor, the Wolf River Harbor downtown and Fullen Dock and Harbor north of downtown. However, the vast majority of barge related facilities are located in the McKellar Lake/Presidents Island complex including the multimodal (barge, rail, truck and pipeline) Valero refinery. The port includes:²²

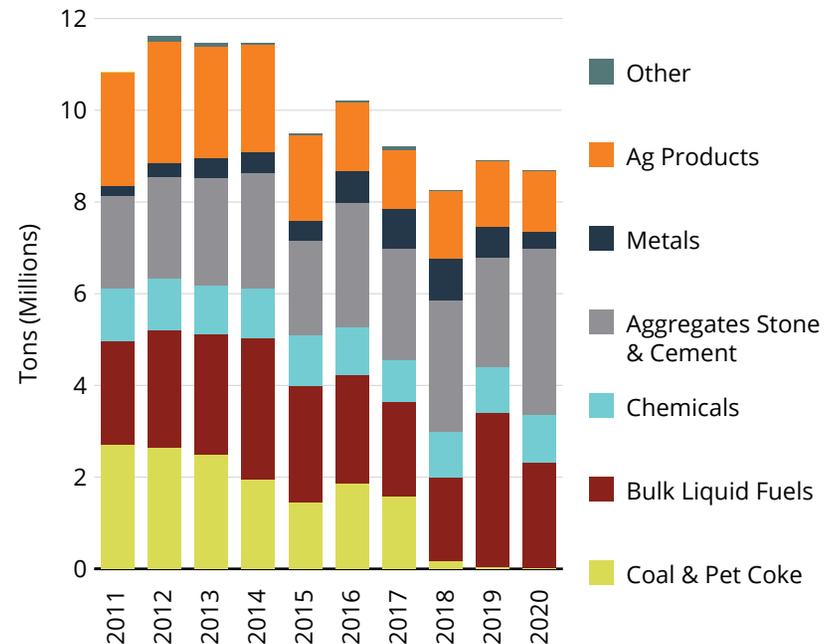
1. Six grain elevators
2. 50 concrete silos and 25 steel tanks with storage capacity of over 12.3 million bushels
3. Liquid bulk facilities with 130 storage tanks storing nearly 89 million gallons of liquids
4. Dry bulk commodities handled at eight facilities with storage capacity of 581,000 tons

In 2020, the port was the nation's 53rd busiest port by tonnage handling 8.6 million tons.

As shown in **Figure 4-10**, the volumes of product groups such as metals, bulk liquid fuels and chemicals, have remained relatively static between 2011 and 2020. Aggregates, stone and cement had a significant increase in

FIGURE 4-10: Commodities and Tonnage handled at the Port of Memphis (2011-2020)

SOURCE: U.S. Army Corps of Engineers



2020, handling an additional 1.2 million tons when compared to 2019. In 2018, the TVA Allen Fossil Plant powered by coal was retired which resulted in the reduction and eventual cessation of coal deliveries by barge.

The Port of Cates Landing is located at the 900-mile marker on the Mississippi River north of Tiptonville. It consists of a barge dock capable of accommodating six barges, a barge fleeting area, a 37,500 ft warehouse and a laydown area. It is also located within Foreign Trade Zone No. 283.

²² Port of Memphis. Retrieved from: <https://portofmemphis.com/>

Highways & Roads

Tennessee's roadways and highways are a key element in the state's freight system, serving both the long-distance movement of goods as well as last-mile connections. Virtually all freight facilities, whether they be production sites, warehouses or final destinations, are connected to the local, state or national roadway network.

State Route System

The state of Tennessee, through TDOT, maintains a State Route System that provides primary connectivity throughout the state and contains many major routes within urban areas. As of July 2022, Tennessee has approximately 13,900 centerline miles of state-maintained roadways, shown in **Figure 4-11**.

Federally designated roadways, which are maintained by the state are also included in the State Route System, including Tennessee's portions of the Interstate Highway System and designated US Highways. Of the approximately 13,900 total miles, 1,201 centerline miles are designated as Interstate Highways and 3,868 centerline miles are US Highways. Nearly all US Highways in Tennessee carry concurrent designations as State Routes, although typically these routes are principally signed as US Highways with the state designation hidden and relegated to mile marker signs and other administrative purposes.



Network Hierarchy

Roadways can be classified in several different ways. In Tennessee, roads are categorized for general use in terms of their functional classification, with freight classification based on their inclusion in the National Highway Freight Network.

Functional Classification

The general hierarchy of roadways is grouped based on the character of a given segment and how it functions. This "functional classification" ranges from roadways that provide the greatest mobility, namely controlled-access facilities, down to local-serving roadways that provide the most land access:

- ◆ Interstate Highways
- ◆ Expressways
- ◆ Principal Arterials
- ◆ Minor Arterials
- ◆ Major Collectors
- ◆ Minor Collectors
- ◆ Local Roads

Figure 4-12 shows the functional classification of roadways in Tennessee per TDOT's Electronic Traffic Information Management System (E-TRIMS). This figure shows that the principal arterial connections between urban areas are strongly correlated with the federally-designated US Highways elements of the State Route System from **Figure 4-11**.

FIGURE 4-11: Tennessee State Route System, including Interstate Highways and US Routes

SOURCE: Tennessee Department of Transportation

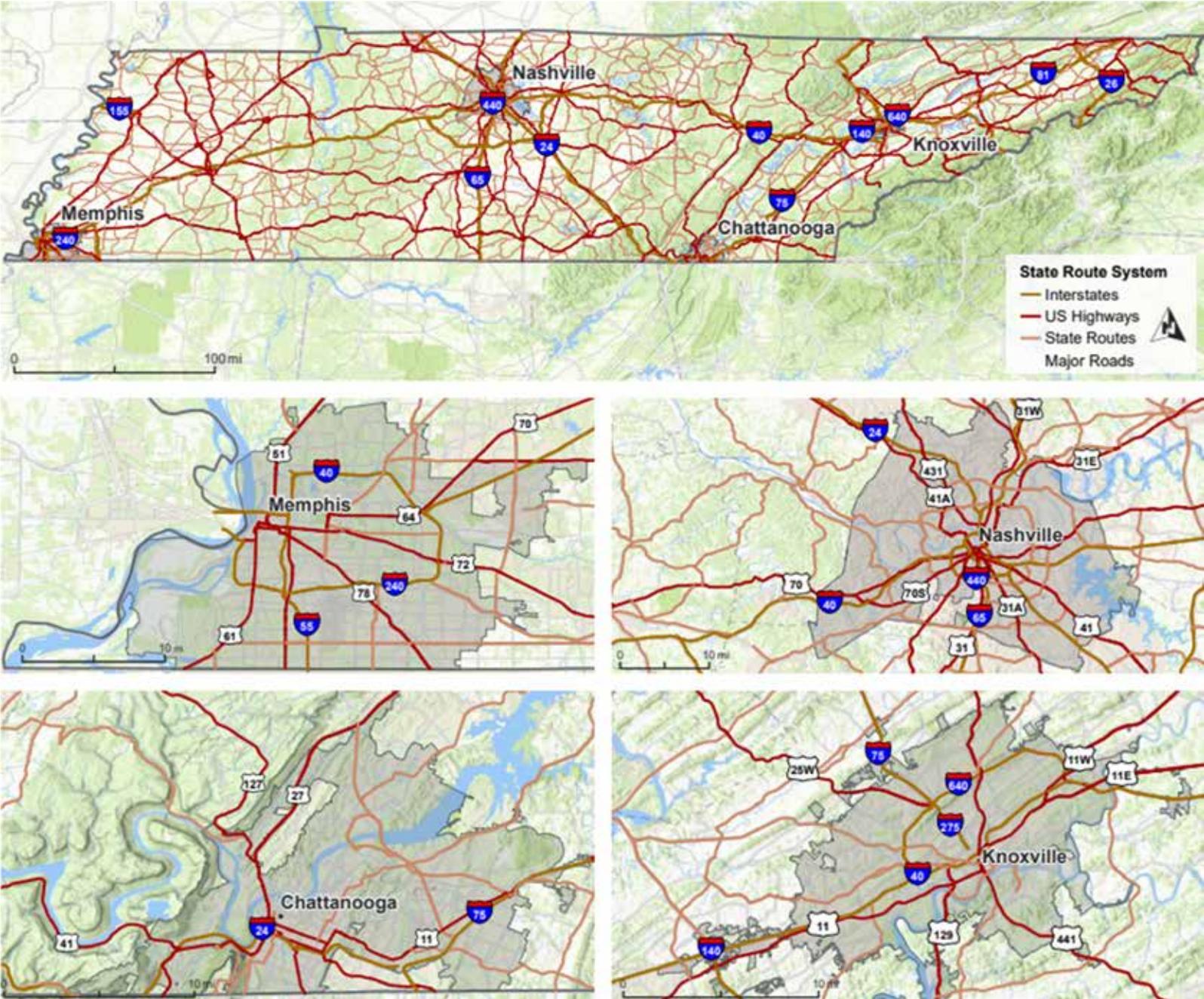
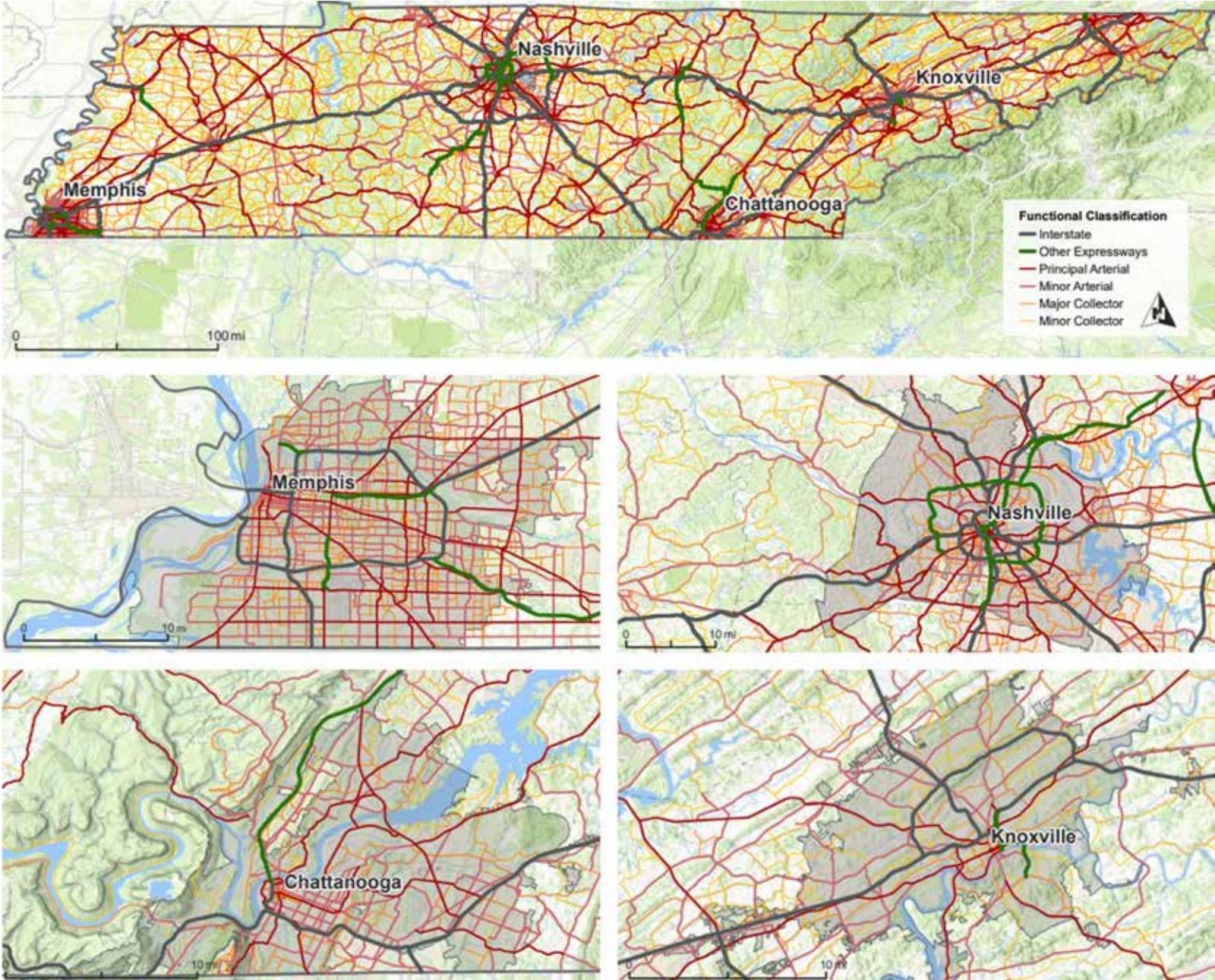


FIGURE 4-12: Functional Classification Map
SOURCE: Tennessee Department of Transportation



National Highway Freight Network

Truck designated roadways in the state of Tennessee are cataloged as part of the National Highway Freight Network (NHFN), which was established by the federal Fixing America’s Surface Transportation Act (FAST Act) to strategically direct federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system.

The NHFN in Tennessee, shown on **Figure 4-13**, includes the following elements:

- ◆ Primary Highway Freight System (PHFS)
- ◆ Critical Rural Freight Corridors (CRFC)

- ◆ Critical Urban Freight Corridors (CUFC)
- ◆ Portions of the Interstate Highway System not designated as part of the PHFS

The NHFN presently serves as the principal means of designating major freight routes on a statewide basis for Tennessee. TDOT is exploring developing a tiered network of truck freight corridors, similar to the functional classification system but specific to freight activity, in the coming years that would not be tied to federal funding designations.

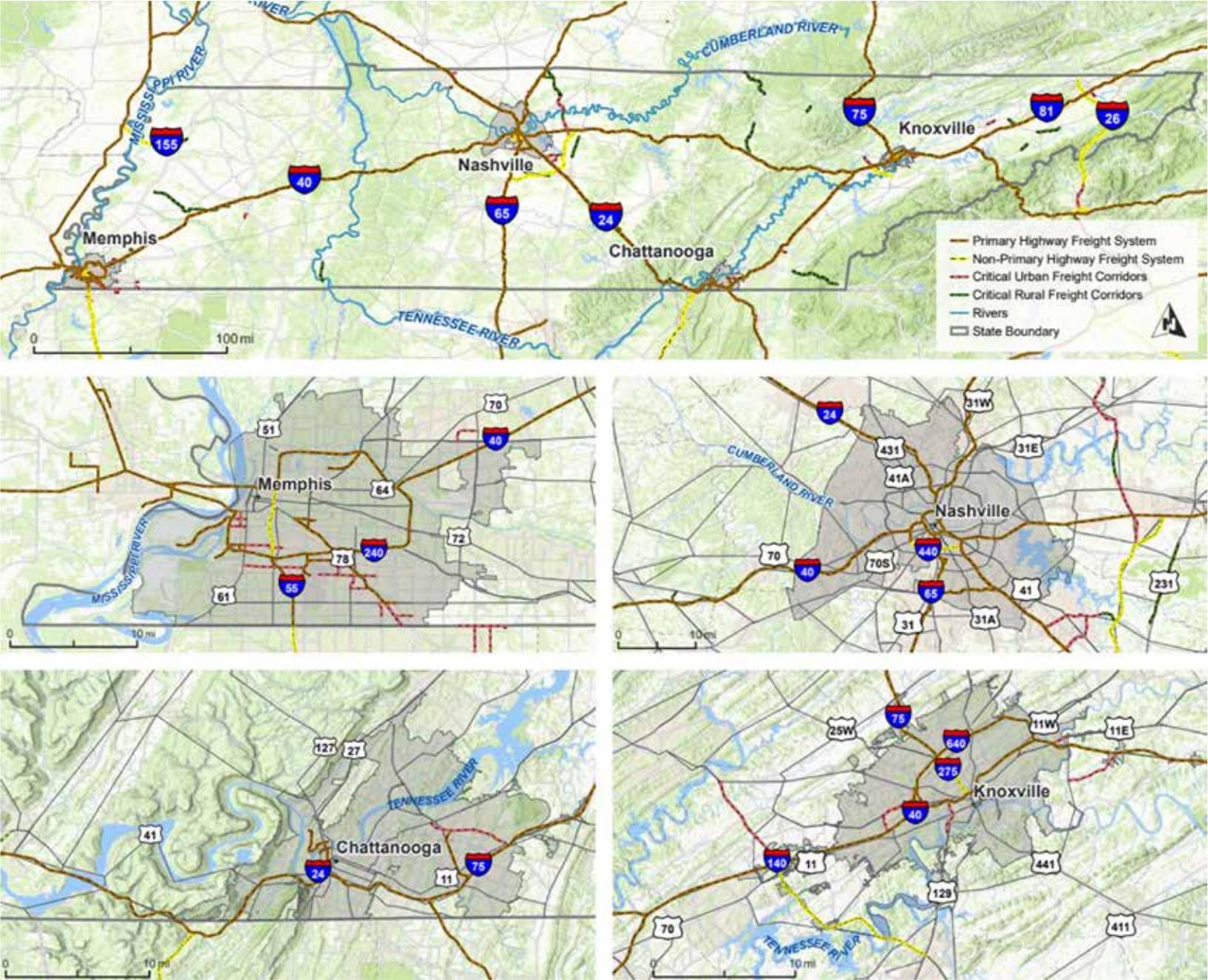
The PHFS also includes a series of highway connectors to major freight facilities. The Tennessee PHFS Intermodal Connectors are listed in **Table 4-11**.

TABLE 4-11: PHFS Intermodal Connectors
SOURCE: Federal Highways Administration

Facility ID	Facility Name	Facility Description	Length (Miles)
TN11L	Colonial & Plantation Pipeline Co. KNX	Middlebrook Pike (SR-169), 44th St, Western Ave from Terminal Entrance to I-75.	1.36
TN13R	Forrest Yards – Memphis - Norfolk Southern	Southern Ave from Lamar Ave (SR-4) to East Parkway (SR-277). Spottswood Ave from Airways (SR-277) to Forrest Yard.	2.13
TN14P	President’s Island – Memphis	McLemore Ave, Riverside Blvd, Jack Carley Causeway, Harbor Ave, Channel Ave, Jetty St BTW I55 and Port.	5.09
TN15A	Memphis International Airport	Tchulahoma and Democrat Road between Lamar Ave (SR-4) and Airways Blvd. Plough Blvd between I-1240 and Airport entrance.	4.54
TN17R	Leewood Yards – Memphis - CSX	Jackson Ave (SR-14) and Chelsea Ave between I-40 and Warford Street .	2.69
TN18R	Tennessee Yards – Memphis – BNSF	Shelby Drive between Lamar Ave (SR-4) and the Tennessee Yard.	0.72
TN19R	Johnston Yards – Memphis - Illinois Central	Mallory Ave and Riverport Road between I-55 and Rail Yard.	3.12
TN1L	Colonial Pipeline - Chattanooga	Jersey Pike from Enterprise Park Drive to SR-153.	0.44
TN22R	Radnor Yards – Nashville – CSX	Armory Ave and Sidco Drive between I-65 and Harding Place (SR-255).	2.02
TN2A	Chattanooga Metropolitan Airport	Shepherd Road (Airport Connector) between SR-153 and Airport Road.	0.00
TN3P	Mid-South Terminals	Hudson Road to Pineville Road to Moccasin Bend Road to Hamm Road to S. R. 29.	2.79
TN4P	J.I.T. Terminals - Chattanooga	Manufactures Road from SR-29 to Terminal Entrance.	0.25
TN5P	Vulcan Materials Company – Chattanooga	River Street from Evans Street to Riverfront Parkway (SR-58).	0.18
TN6P	Southern Foundry Supply – Chattanooga	West 19th Street from Riverfront Parkway (SR058) to the Port entrance.	0.30

FIGURE 4-13: National Highway Freight Network

SOURCE: Federal Highways Administration



Travel Demand

In addition to the hierarchy and classification of Tennessee’s highways and roads, it is important to understand how traffic volumes and demand patterns vary across the network.

Traffic Volumes

Overall vehicle traffic volumes on a typical day, in terms of the average annual daily traffic (AADT) volume, is available for the State Route System and other TDOT-tracked segments through E-TRIMS. This data from 2021 is mapped in **Figure 4-14**, which shows that the highest overall traffic volumes are understandably found on the Interstate Highways and in high-activity urban and suburban areas.

E-TRIMS also provides specific truck volumes through a Truck AADT, shown in **Figure 4-15** as well as the percentage of overall AADT that is made up of single-unit or combination truck traffic, in **Figure 4-16**.

Summary statistics showing the average and maximum AADT and Truck AADT for each functional classification group (from **Figure 4-12**) are included in **Table 4-12**. The busiest segment in the state for both overall and truck-specific traffic volumes, reaching a maximum AADT of 206,483 vehicles per day and a Truck AADT of 16,519 trucks per day, is located on I-240 between I-40 and SR 385 in Memphis (Shelby County).

TABLE 4-12: Statewide Average and Maximum AADT Statistics
SOURCE: Enhanced Tennessee Roadway Information Management System

Classification	AADT		Truck AADT	
	Average	Maximum	Average	Maximum
Interstate	67,755	206,483	4,671 (7%)	16,519
Expressway	35,166	174,067	2,599 (7%)	13,925
Principal Arterial	13,977	85,041	1,172 (8%)	7,594
Minor Arterial	8,082	62,524	441 (5%)	5,627
Major Collector	3,484	47,008	147 (4%)	4,118
Minor Collector	1,055	18,762	26 (2%)	664

Note: (X%) = Average Truck AADT as percent of Average AADT

Demand Patterns

As can be seen in **Figure 4-15**, the highest truck volumes in Tennessee outside of urban areas are concentrated on the Interstate Highways and a few key arterial routes.

Interstates 40, 24, and 81 are key east-west intrastate corridors, providing connectivity between all of the state’s major urban areas, as well as long-distance connections to adjacent states. Interstates 55, 65 and 75 provide north-south connections to key freight hubs in nearby states. Other Interstate Highways in Tennessee also carry significant truck volumes, namely Interstates 140, 240, 440, 640, 840, 269 and 275 in urban areas and Interstates 26 and 155 providing additional connections to other states. Portions of US 27 (SR 29) within Chattanooga are designated by FHWA as Interstate 124 but this designation is unsigned.

Alongside these Interstate Highways, key intrastate connectivity for truck traffic between cities is also provided by several US Highways, listed generally from west to east:

- ◆ US 51 (SR 3) north of Memphis (future Interstate 69 corridor)
- ◆ US 412 (SR 20) and US 45 (SR 5) near Jackson
- ◆ US 31 (SR 7), US 43 (SR 6), and US 231 (SR 10) south of Nashville
- ◆ US 31E (SR 6) northeast of Nashville
- ◆ SR 111 near Cookeville
- ◆ US 27 (SR 29) north of Chattanooga
- ◆ US 441 (SR 71), US 321 (SR 73), and SR 66 connecting to Sevierville, Pigeon Forge, and Gatlinburg
- ◆ US 11E (SR 34) and US 11W (SR 1) between Knoxville and the Tri-Cities
- ◆ US 25E (SR 32) coming south out of the Cumberland Gap

US 64 (SR 15), US 70 (SR 1) and US 79 (SR 76) all provide alternate routes to Interstate 40 for east-west traffic in the western portion of the state, but volume patterns on **Figure 4-15** indicate that the majority of long-distance east-west traffic uses Interstate 40.

FIGURE 4-14: 2021 Average Annual Daily Traffic Volumes, all vehicle types

SOURCE: Tennessee Department of Transportation

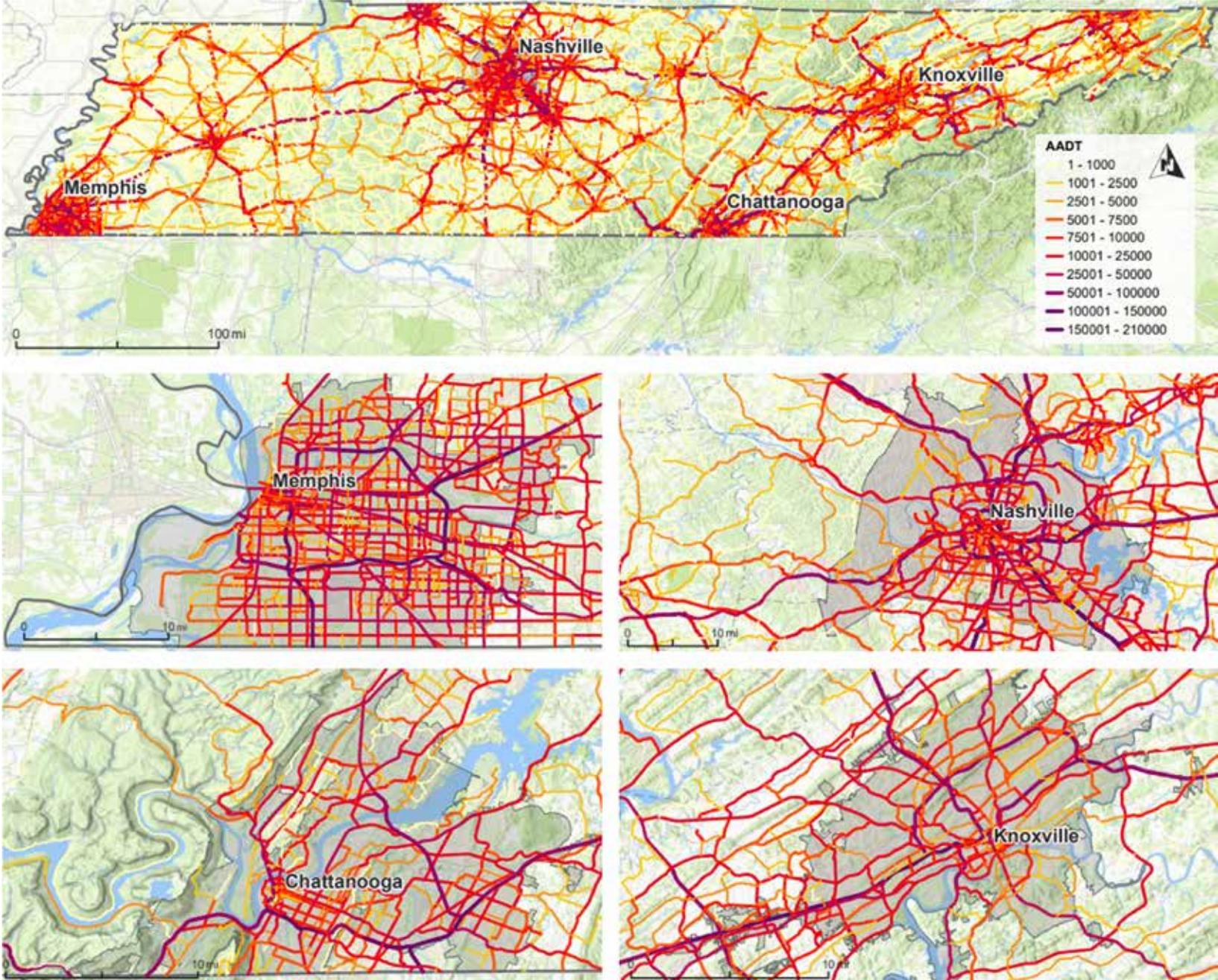


FIGURE 4-15: 2021 Truck Average Annual Daily Traffic Volumes, single-unit and combination trucks

SOURCE: Tennessee Department of Transportation

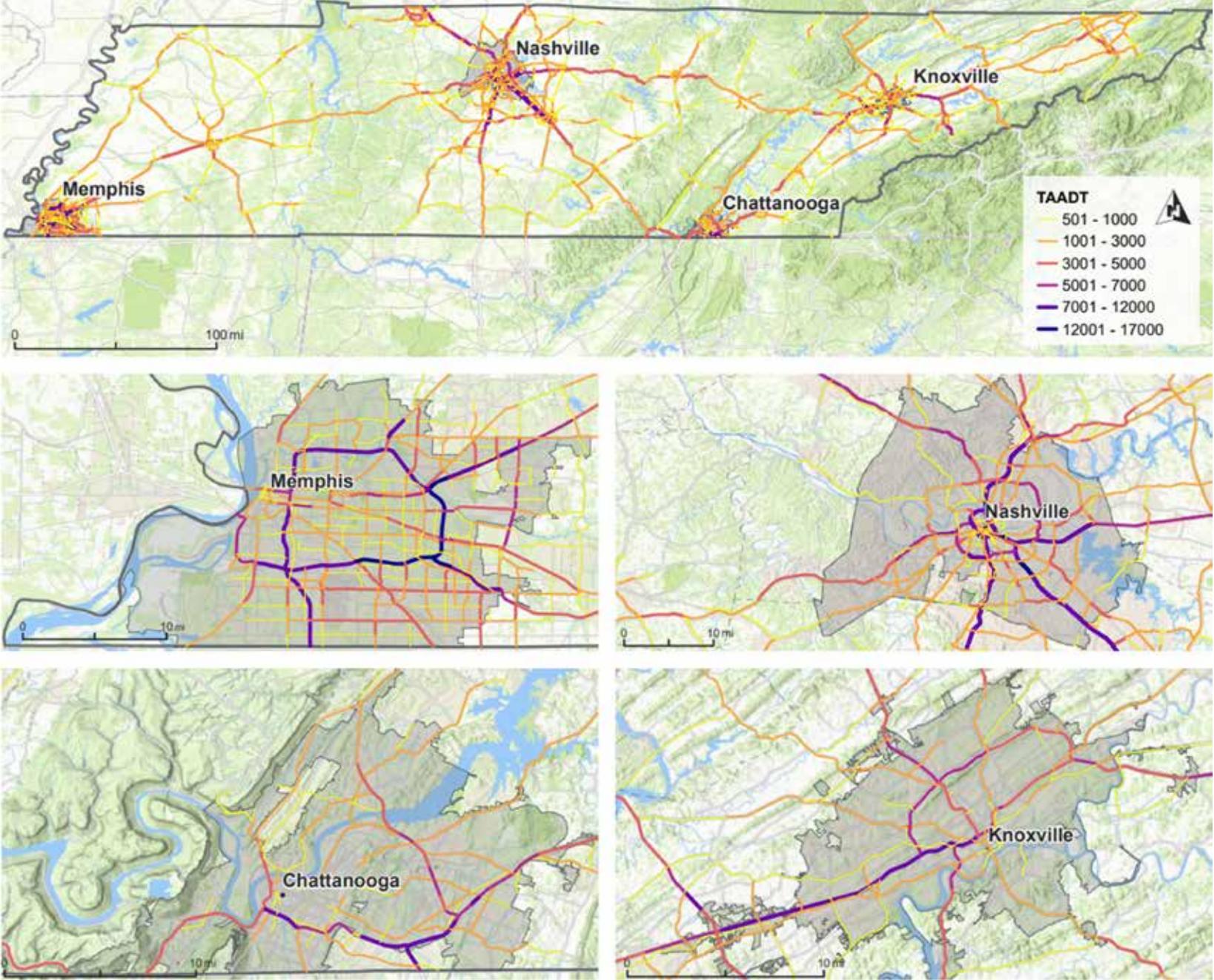
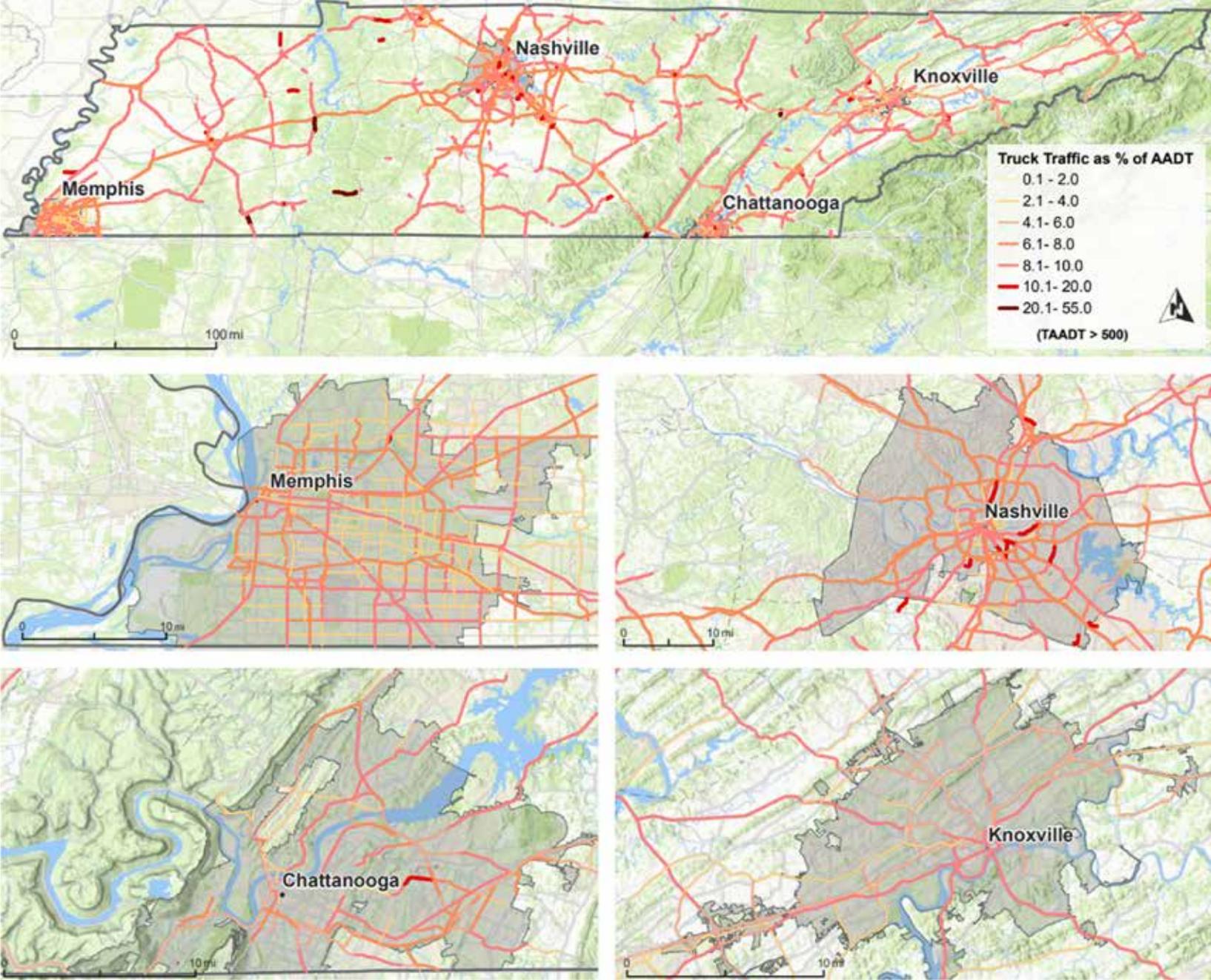


FIGURE 4-16: 2021 Truck Traffic as Percentage of AADT, segments with 500 or more daily trucks only

SOURCE: Tennessee Department of Transportation



Physical Constraints on Truck Travel

Tennessee's geography allows generally favorable north-south connectivity for surface transit modes; however, east-west travel experiences several major physical constraints due to north-south running rivers and mountain ranges.

Western Border: Mississippi River

The Mississippi River on the state's western border is a major constraint to interstate for all land-based modes. The three highway crossings in Tennessee represent the only fixed truck crossings between Cairo, Illinois and Helena, Arkansas. From south to north, these crossings are:

- ♦ Memphis & Arkansas Bridge: I-55 and US Routes 61, 64, 70 and 79 (overlaid on SR 1), Memphis, TN
- ♦ Hernando de Soto Bridge: I-40, Memphis, TN
- ♦ Caruthersville Bridge: I-155 and US Route 412, Dyersburg, TN

Memphis-Nashville Connectivity: Tennessee River

The Tennessee River, which spans the height of the state flowing from the Alabama to Kentucky state lines, is the next constraint when traveling east towards Nashville. Only eight bridges cross the river, concentrating east-west travel demand at these locations.

This constraint is particularly noteworthy in the northern half of the state, where the Tennessee River is impounded into Kentucky Lake whose width exceeds one mile for much of its length. Only three fixed crossings bridge Kentucky Lake, including the heavily traveled Interstate 40, which necessitates the use of lengthy detour routes when incidents occur along one of these routes.

Nashville-Knoxville/Chattanooga Connectivity:

Cumberland Plateau

Traveling east past Nashville, truck traffic must next cross the Cumberland Plateau, an undulating section of the larger Appalachian Plateau running generally northeast from the Alabama/Georgia/Tennessee tripoint to the Kentucky/Virginia/Tennessee tripoint. Numerous roads traverse the Cumberland Plateau, but the vast majority of truck traffic is carried by only three routes, all Interstate Highways:

- ♦ Interstate 24 crosses the plateau at a pair of escarpments colloquially known as Monteagle Mountain
- ♦ Interstate 40 crosses both the Tennessee Divide east of Cookeville and a pair of pronounced ridges near Renegade Mountain and Mount Roosevelt
- ♦ Interstate 75 traverses a series of ridges between Rocky Top and the Kentucky state line, most prominently following the crest of Jellico Mountain for approximately eight miles

Eastern Border: Great Smoky & Blue Ridge Mountains

Between Chattanooga and Knoxville and the North Carolina state line, east-west traffic finally reaches the Blue Ridge Mountains. Some roads penetrate into the foothills of the Blue Ridge and Great Smoky Mountains, most prominently US 441 (SR 71), US 321 (SR 73) and SR 66 which carry truck traffic to the travel destinations of Gatlinburg, Pigeon Forge and Sevierville. Interstate 81 continues north into Virginia along a relatively level route that follows valleys within the Ridge-and-Valley Appalachian region. However, only Interstate 40, and to a lesser extent Interstate 26, carry significant truck volumes across the mountains to North Carolina.

- ♦ Interstate 40 runs through the Pigeon River Gorge to the state line; following the Pigeon River limits the elevation gain that trucks and other traffic must contend with, but this routing comes with frequent sharp curves and areas prone to rockslides, some of which have shut the interstate for weeks or months at a time.
- ♦ Interstate 26 has a generally straighter alignment but experiences approximately 1,800' of elevation gain in its runup to Sam's Gap at the North Carolina state line, with some grades reaching six percent.

Pipelines

There are nearly 76,000 miles of pipelines in Tennessee carrying energy related products to and from consumers and producers within the state and also supporting the regional and national distribution of these products. The type of pipelines in Tennessee are described in the following sections.

Natural Gas Distribution Pipelines

These pipelines transport natural gas from local and regional storage facilities to end users such as residential and industrial customers through small-bore and low-pressure networks. These pipelines constitute the largest pipeline type in Tennessee making up 92 percent of the total pipelines in the state.

Natural Gas Transmission Pipelines

These are large bore, high pressure pipelines typically transporting natural gas over long distances from natural gas producing areas to distribution networks and large volume users such as power generating systems and large industrial users. Examples include:

East Tennessee Natural Gas. The system begins in Tennessee and extends to an area just south of Roanoke, Virginia. It consists of 1,526 miles of pipeline and is connected to several natural gas storage sites and the Kingsport liquified natural gas storage facility.

Tennessee Gas Pipeline, one of the largest pipeline systems in the US, a 11,760-mile system linking Louisiana and the Texas Gulf Coast with production facilities in the Northeast.

ANR Pipeline. This system transports natural gas from Texas, Oklahoma and Louisiana to cities and towns in Wisconsin, Michigan, Illinois and Ohio, with two major legs (one of which passes through Tennessee) of the system converging near Chicago.

Texas Eastern. An 8,580 mile pipeline connecting Texas and the Gulf Coasts with consumers in the north east.



Crude Oil Pipelines

There are 395 miles of crude oil pipelines in Tennessee. These pipelines link oil producing regions with crude oil processors such as oil refineries. Crude Oil pipelines in Tennessee include:

Mid Valley Pipeline. This pipeline originates in Longview, Texas and passes through Louisiana, Arkansas, Mississippi, Tennessee, Kentucky and Ohio, and terminates in Samaria, Michigan. It is 1,007 miles long and has a capacity of 276,000 barrels per day (Bbls/d).

Capline Pipeline. This is a 632-mile, 40-inch pipeline that was originally constructed to move crude oil north from the Louisiana Gulf Coast and the Louisiana Offshore Oil Port (LOOP) to midwestern refineries. The pipeline direction was reversed in 2021 to carry Western Canadian crude oil as well as crude oil produced in the Bakken region.

Diamond Pipeline. The 440-mile, 200,000 Bbls/d capacity pipeline links the Cushing oil hub in Oklahoma with Valero's Memphis oil refinery.

The Energy Transfer Crude Oil Pipeline (ETCOP) with a capacity of 470,000 Bbls/d transports Canadian and Bakken crude oil south to Nederland, TX. It connects with the Dakota Access Pipeline in Patoka, Illinois.

Refined Petroleum Product Pipelines

Once crude oil has been refined into its various products, pipelines remain the most cost-effective way of distributing large volumes of product from refineries to markets and consumers with pipelines terminating at distribution hubs. Products typically carried by pipeline include gasoline, jet fuel (both military JP4 and commercial JFA) and fuel oil. Refined product pipelines in Tennessee include:

Colonial Pipeline. This 5,500-mile pipeline connects refineries on the Texas Gulf Coast, with end users in the south east and the east coast extending as far as Linden, NJ. Lateral lines extend from the main pipeline system in Georgia into Tennessee, serving petroleum distribution hubs in Chattanooga, Nashville and Knoxville.

Whiting-Decatur Pipeline. Linking BP's Whiting Refinery, IN with the Indorama Ventures Xylenes chemical plant in Decatur, AL.

Enterprise TE Products Pipeline. This pipeline connects to the Magellan pipeline system in Arkansas and gives Memphis fuel consumers access to refined products from the Gulf and Midwest producers. The pipeline connects to two fuel terminals in Memphis and the WesPac Pipeline that feeds the FedEx Fuel Farm at Memphis airport.

Memphis Airport. Two pipelines distribute fuel to the airport. The Wespac pipeline serves FedEx while a second line from the Valero Refinery to the airport serves a second airport fuel farm.

Pipelines in the state are shown in **Figure 4-17**.

FIGURE 4-17: Tennessee Pipelines
SOURCE: National Pipeline Mapping System



National Multimodal Freight Network

The interim National Multimodal Freight Network (NMFN) was established in the Fixing America's Surface Transportation (FAST) Act. The objectives of the NMFN are to:

1. Assist States in strategically directing resources toward improved system performance for efficient movement of freight on the NMFN.
2. Inform transportation planning.
3. Assist in the prioritization of Federal investment
4. Assess and support Federal investments to achieve the national multimodal freight policy and national highway freight program goals.

The NMFN facilities located within Tennessee are illustrated in **Figure 4-18**.

Tennessee NMFN Highways

The highway network associated with the NMFN is also classified as the National Highway Freight Network (NHFN). This network and its various components were described earlier in the Chapter.

Non-Highway Components of the NMFN

The non-highway components of the NMFN within Tennessee include:

1. Mississippi River (M-55), Tennessee River (M-65) and the Cumberland River
2. International Port of Memphis
3. Class 1 railroad networks
4. Memphis International Airport

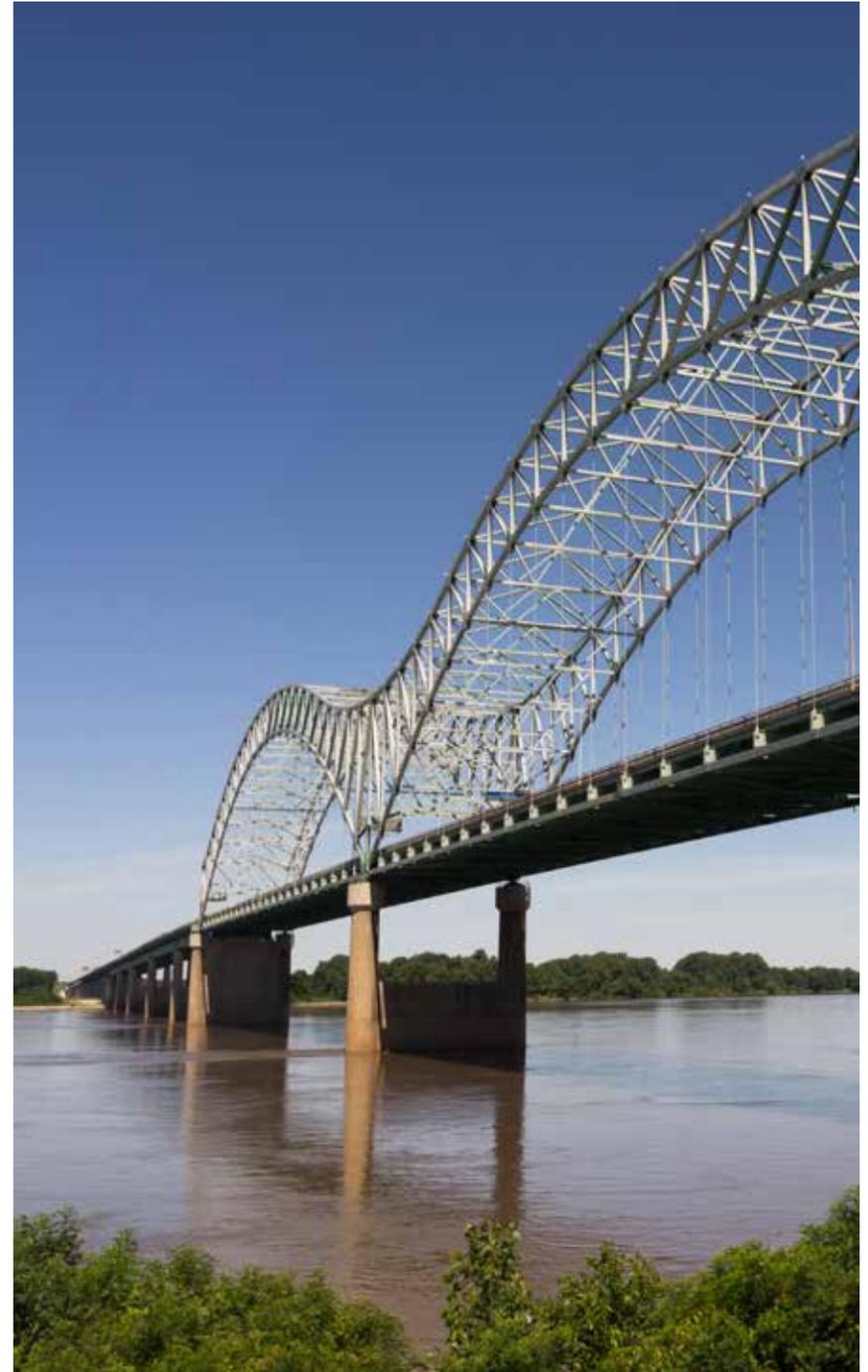
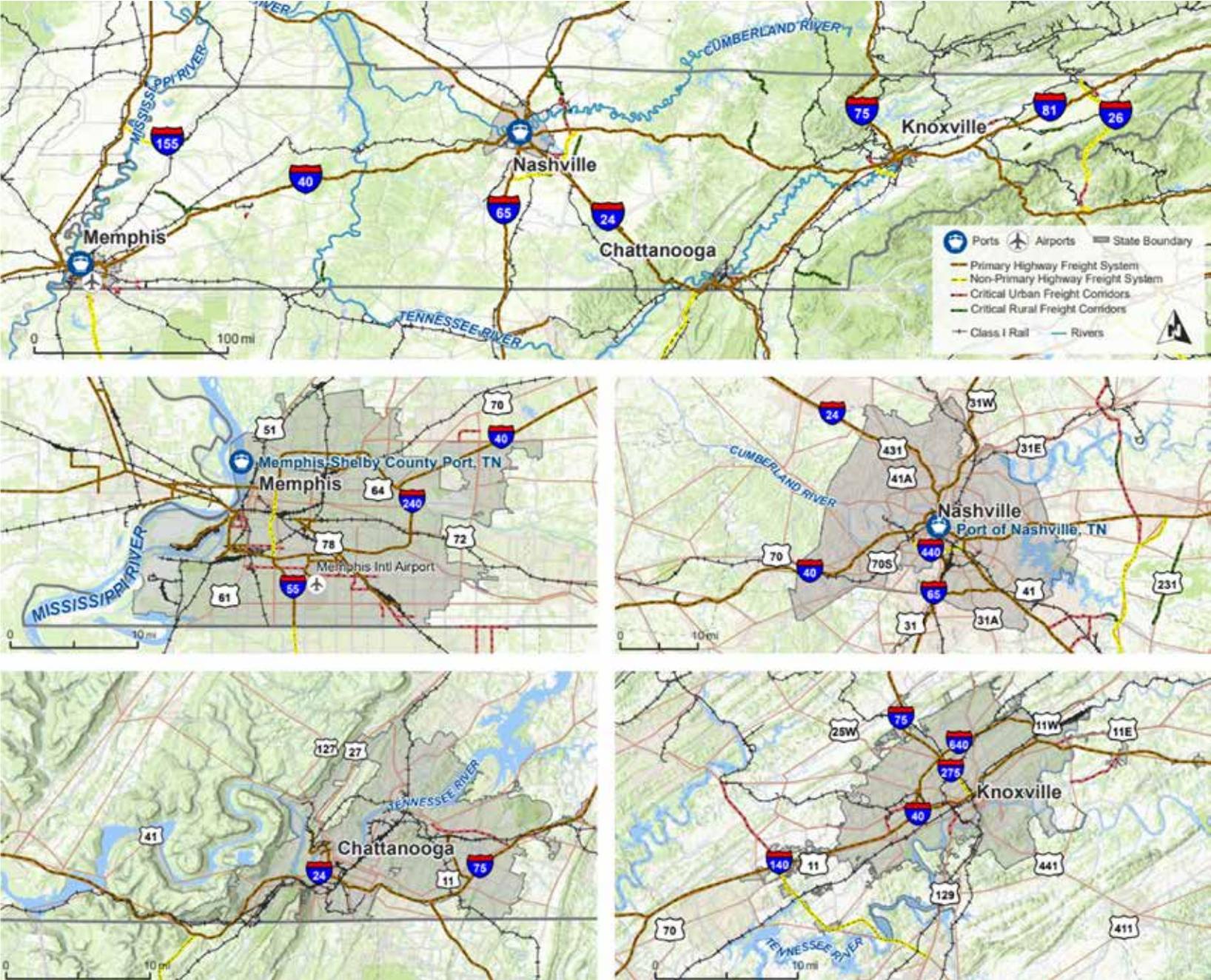


FIGURE 4-18: National Multimodal Freight Network Facilities in Tennessee

SOURCE: Federal Highways Administration



Military Facilities and Installations

The US Military has a noteworthy presence in Tennessee. The impacts and effects of the movement of all classes of military supplies requires significant logistics efforts to maintain and sustain the military's readiness requirements. The US military depends on the Tennessee multimodal freight system to move cargo to not only support the installations, but also to deploy personnel and equipment for national defense purposes.

Diverse and complex supply chains are necessary to efficiently and reliably provide logistics support to these military sites. Large amounts of fuel, food, ammunition, maintenance, equipment, materials and medical supplies are critical to maintaining these units in a combat-ready posture. Transportation infrastructure including highways, rail, and air are critical to supporting these supply chains and to support deployment of units. In addition to

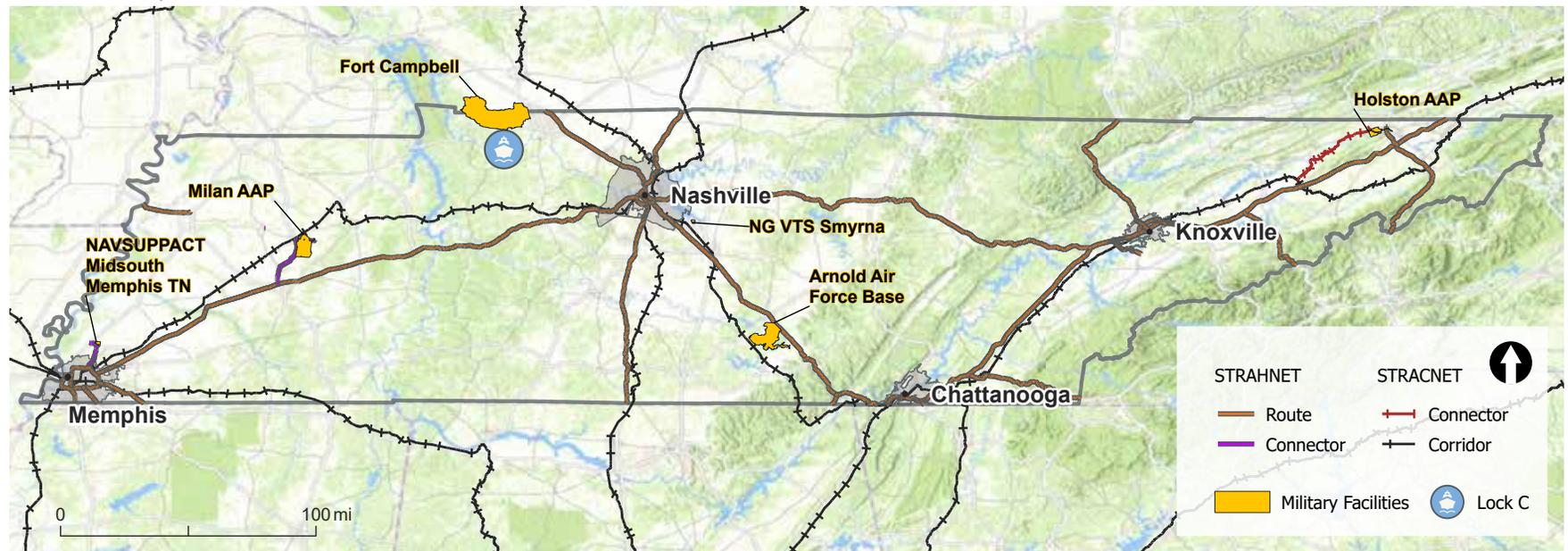
providing mainline routes for defense purposes, these lines also provide access to major defense contractors and logistics sites that are critical to national defense activities.

To meet this critical need, the Strategic Highway Network (STRAHNET) and the Strategic Rail Corridor Network (STRACNET) were developed by the US Department of Defense in coordination with FHWA and FRA. The STRAHNET and STRACNET are networks of highways and rail lines, respectively, and supports the US military with access, continuity, and emergency capabilities for defense purposes. The state's military installations serve as freight generators, consumer markets and rely on connectivity to the freight transportation system.

In Tennessee the STRAHNET system includes six interstate highways and portions of three US highways, while the STRACNET system includes multiple CSX and Norfolk Southern rail lines throughout the state.

FIGURE 4-19: Tennessee Military Facilities

SOURCE: U.S. Department of Defense



Tennessee military installations include:

1. Fort Campbell (geographically in Tennessee and Kentucky)
2. Milan Army Ammunition Plant (Milan, TN)
3. Holston Army Ammunition Plant (Kingsport, TN)
4. Arnold Air Force Base (Tullahoma, TN)
5. Naval Support Activity Mid-South Naval Base (Millington, TN)
6. Volunteer Training Site (Tennessee National Guard) (Smyrna, TN)

Tennessee military facilities are illustrated in **Figure 4-19**.

The Milan and Holston Army Ammunition Plants rely on truck and rail movements to receive and ship ammunition throughout the US to Army installations and globally to deployed and forward-based units.

As part of the Air Force Materiel Command, Arnold Air Force Base supports the research, development, testing, analysis and improvement of air component related systems for the Air Force.

The Naval Support Activity Mid-South Naval Base serves as the Navy's Human Resource Center of Excellence.

The Tennessee Army National Guard consists of various unit types which can support national and state missions. These include an Engineer Brigade, a Sustainment brigade and an Armored Cavalry Regiment. The Tennessee Air National Guard consists of three Wings with varying missions of tactical, refueling and airlift with

locations at Memphis International Airport and McGhee Tyson Airport. The Tennessee National Guard Joint Forces Headquarters is located in Nashville. In addition to command-and-control functions for statewide national guard units, the Joint Forces location includes centralized logistics activities for receiving and distributing freight.

At Fort Campbell, home of the 101st Airborne Division (Air Assault) the Campbell Rail Operations Facility (CROF), capable of accommodating ten trains, is utilized regularly for deployment of combat and support forces to Ports of debarkation (**Figure 4-20**).

Four miles northeast of Cumberland City on the north bank of the Cumberland River is Lock "C". USACE Nashville District recently completed a \$2 million project to upgrade this location, partnering with Fort Campbell. It is used to deploy vehicles from Fort Campbell to the Joint Readiness Training Center (JRTC) in Fort Polk, LA. In 2020, the 2nd Brigade Combat team at Fort Campbell deployed over 1,200 vehicles. Previous deployments to JRTC utilized rail, but by using barge transportation (**Figure 4-21**), the unit is expected to save \$2M in transportation costs for each deployment.

FIGURE 4-20: Location of Campbell Rail Operations Facility



FIGURE 4-21: Military Vehicles Transported by Barge





Conditions and Performance

5

Chapter 5: Conditions and Performance

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Chapter 5: Conditions and Performance

This chapter describes the physical condition and performance of Tennessee’s freight system including highways, railroads, waterways, airports and pipelines. Maintaining the system, addressing bottlenecks and deficiencies and above all keeping the system’s vitality for the safe, reliable and efficient movement of freight to, from, within and through the state. The chapter concludes with a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis related to the state’s freight transportation system.

Air Cargo Airports

Airports require runways, taxiways and ramps (or aprons) to be in a condition that supports the safe operation of aircraft. Airport pavements can be subject to immense forces including the acceleration and deceleration of an aircraft during takeoff and landing. Damaged pavement can produce debris which can be ingested into jet engines and have potentially life-threatening consequences. Cargo planes may be the largest and heaviest aircrafts the state’s airports accommodate, which means the pavement structures need to be designed, constructed and maintained accordingly.

Airport pavement conditions are continually assessed by airports and the Tennessee Department of Transportation – Aeronautics Division using an evaluation method of current and future conditions based on a Pavement Condition Index (PCI). The PCI procedure is the standard used by the aviation industry to visually assess pavement conditions, thereby providing engineers with a consistent objective and repeatable tool to represent the overall pavement condition. During a PCI inspection, inspectors identify signs of deterioration on the surface of the pavement. Pavement defects are characterized in terms of the type of

distress, severity level of distress, and amount of distress. This information is then used to develop a composite index (or PCI) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (good) as shown in **Figure 5-1**.



FIGURE 5-1: PCI Scale

PCI	Category
86–100	Good
71–85	Satisfactory
56–70	Fair
41–55	Poor
26–40	Very Poor
11–25	Serious
0–10	Failed

PCI information was supplied by several airports and is detailed in the following sections. Not all cargo related airports were able to supply PCI information.

Chattanooga Airport

A comprehensive PCI inspection was last completed in 2017. The 2017 area-weighted PCI of the inspected airfield network is 73. According to the 2017 Inspection report:

- ◆ Approximately 58 percent of the airport falls in the good or satisfactory (PCI score greater than 71) range, which is the range in which maintenance activities typically provide the most benefit
- ◆ About 32 percent of the area falls into the fair category (PCI between 56 and 70), which is generally the range in which pavements are triggered for rehabilitation
- ◆ Only about 2 percent of the pavements have a PCI between 41 and 55 (poor)
- ◆ However, 8 percent of the inspected pavements have a PCI below 40, (very poor) which is typically the PCI in which reconstruction is needed

If no funding is provided for pavement rehabilitation, the area-weighted PCI of the airport is projected to drop to 65 by 2022, to 58 in 2027, and to 43 by 2037.

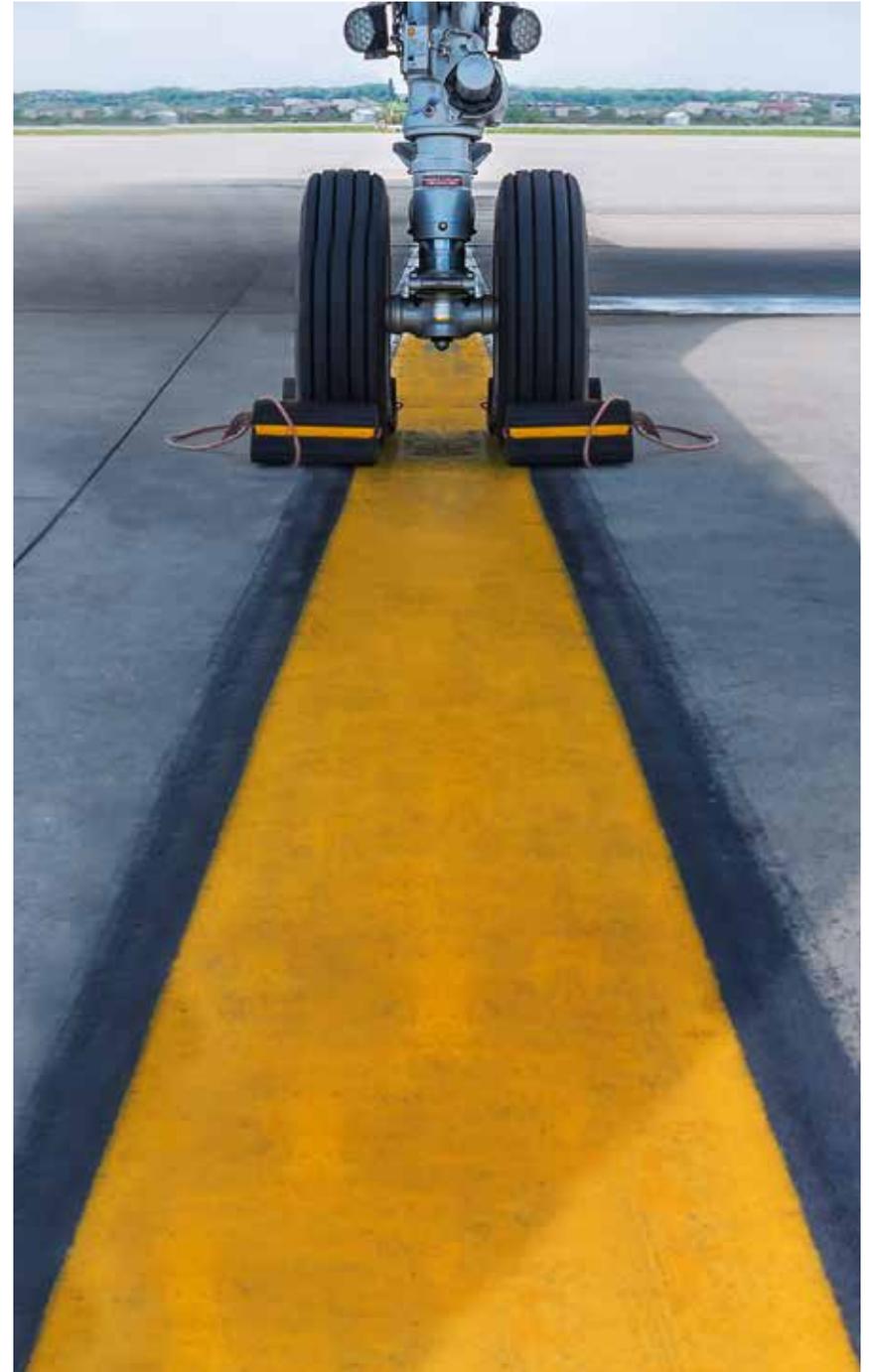
The cargo apron was recently enhanced in 2015-2017

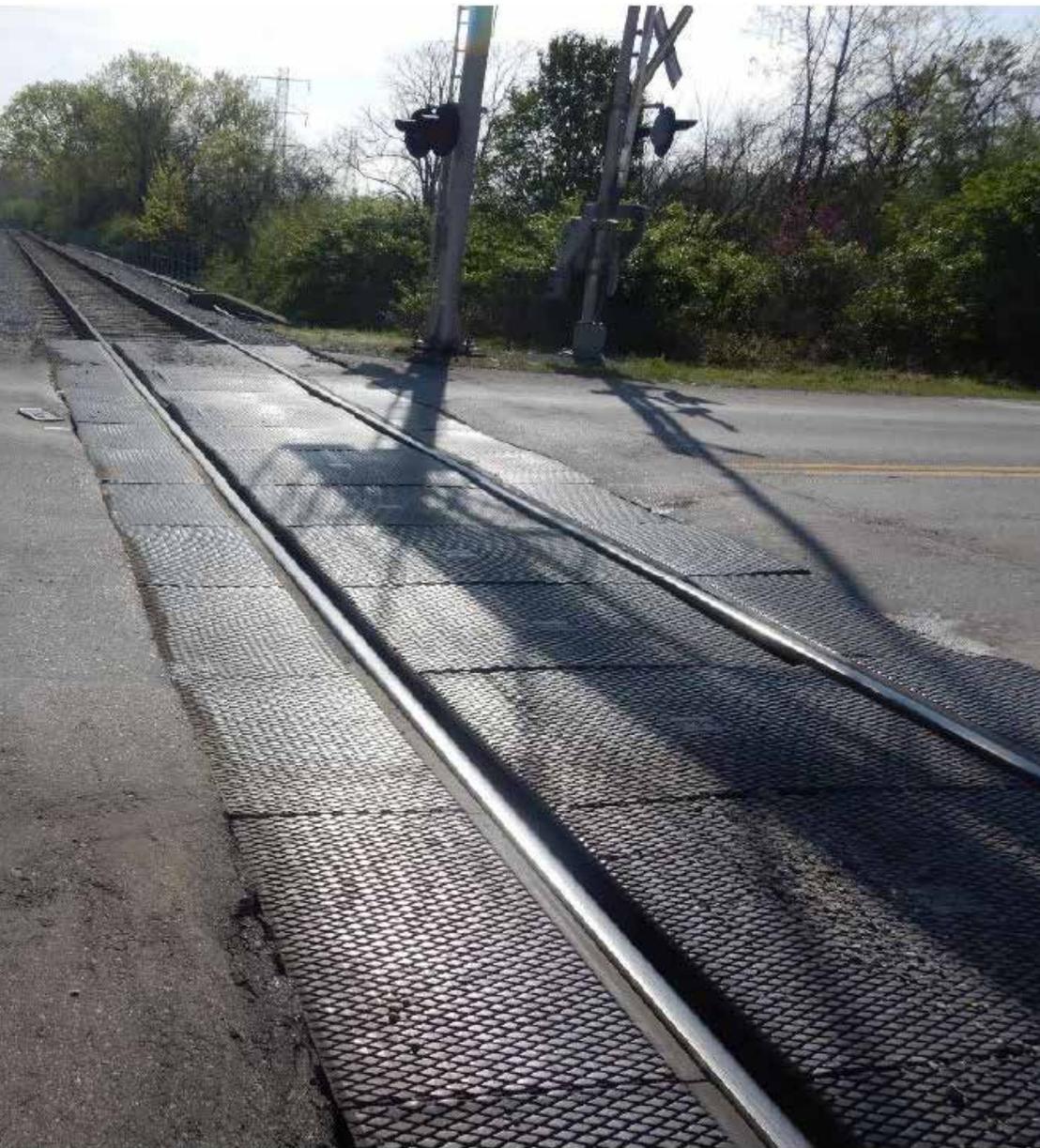
Smyrna-Rutherford

In the 2019 pavement inspection, the airport's PCI rating was 52. In 2024, it is expected to be 43.

Tri-Cities

The TRI PCI for the main runway 05/23 is rated good. One parallel Taxiway is in poor condition, scheduled for pavement rehabilitation in 2023. Additional taxiway work is included in the Airport's Capital Improvement Plan (ACIP) plan.





Rail



The rail network in Tennessee includes over 2,400 route-miles of track, making Tennessee the state with the 26th-largest rail network in the United States.¹ Railroads in Tennessee provide common carrier freight rail transportation for inbound, outbound, intrastate and through movement of materials and products. The state is served by six Class I railroads and 19 short line railroads. In 2019, railroads in Tennessee originated 15.2 million tons of freight and terminated 26.1 million tons of freight.²

State of Good Repair

As private entities, Class I railroad companies in Tennessee generally use private financing to cover the cost of equipment acquisition (such as locomotives and railcars) and infrastructure improvements aimed at renewing, upgrading or expanding the rail network (such as rail, ties, bridges and signal systems). Railroads operate with business models that provide sufficient return on investment to accommodate these capital expenditures. Funding for capital programs can vary from year to year due to fluctuations in freight demand, economic trends and other considerations.

Short line railroads (Class III in Tennessee) generally face a different set of challenges in meeting their needs than the Class I railroads, since they often do not possess the capital and technical resources, operating capacity and flexibility, nor do they have modern infrastructure as the larger Class I railroads. Short line railroads usually rely on a combination of public funding, typically in the form of competitive or proportional allocation discretionary grants, and private funding sources to cover the capital cost of upgrading or replacing outdated legacy rail infrastructure.

¹ Association of American Railroads, AAR State Rankings 2019. Retrieved from: <https://www.aar.org/wp-content/uploads/2021/02/AAR-State-Rankings-2019.pdf>

² Ibid.

Gross Weight Capacity

One of the largest constraints on many short line railroads today, both in Tennessee and nationwide, is their inability to accommodate fully loaded railcars. Many Class III rail lines have maximum allowable gross weight capacities of 263,000 pounds (263K) per loaded railcar due to existing infrastructure. This is less than the current North American rail industry standard of up to 286,000 pounds (286K) gross weight per loaded railcar. Most short line railroads have inherited legacy infrastructure that was developed to support low-density operations and lighter loads (railcars with a gross weight of 263,000 pounds or less). **Table 5-1** identifies the maximum allowable gross car weight for the state’s short line railroads.

Lines with a gross allowable weight of less than 286K end up limiting the volume of product that can be loaded onto each railcar, which can reduce the efficiency and profitability of each railcar, train and line. Railcars with greater loading capacity provide improved operating efficiency for the rail network, as a greater volume of product can be shipped in fewer railcars. To accommodate 286,000 pound cars, short line railroads must make upgrades to track (i.e., rail, ties and ballast) and bridges to handle the additional stress caused by transporting the heavier cars. Railroads that have not made the appropriate upgrades may place themselves and their customers at a competitive disadvantage and lose business to competitors.

TABLE 5-1: Tennessee Short Line Railroads Maximum Allowable Gross Weight Capacity
SOURCE: Tennessee Department of Transportation

Railroad	Reporting Mark	Maximum Allowable Gross Weight (lbs)
Chattanooga and Chickamauga Railway	CCKY	263K
Caney Fork & Western Railroad	CFWR	286K/263K
East Chattanooga Belt Railway	ECBR	263K
East Tennessee Railway	ETRY	286K
Heritage Railroad Corporation	HR	263K
Kentucky West Tennessee Railway	KWT	263K
Knoxville & Holston River Railroad	KXHR	286K/263K
Mississippi Central Railroad Co.	MSCI	263K
Mississippi Tennessee Railroad, Inc.	MTNR	286K
Nashville & Eastern Railroad Corporation	NERR	286K/263K
Nashville & Western Railroad Corporation	NWR	263K
R.J. Corman – Memphis Line	RJCM	286K
R.J. Corman – Tennessee Terminal	RJCK	286K
South Central Tennessee Railroad Company	SCTR	286K/263K
Sequatchie Valley Railroad	SQVR	286K
TennKen Railroad Company	TKEN	263K
Tennessee Southern Railroad	TSRR	286K/263K
Walking Horse & Eastern Railroad	WHOE	263K
West Tennessee Railroad Co	WTNN	286K/263K

Positive Train Control

Positive Train Control (PTC) is a rail safety technology adopted by the industry that is intended to stop a train in an emergency to prevent the following types of accidents:

- ◆ Collisions between trains
- ◆ Derailments caused by excessive speed
- ◆ Derailments caused by trains operating through switches left in the wrong position
- ◆ Trains operating beyond the limits of authority provided by a dispatcher or wayside signal

PTC is an overlay that is integrated with existing wayside Centralized Traffic Control (CTC) systems as well as Track Warrant Control (TWC) territory with or without passive wayside Automatic Block Signal (ABS) systems.

PTC is designed to determine the location and speed of trains, warn locomotive engineers in advance of the need to slow or stop the train, and take braking action if engineers do not respond to a warning in the time prescribed. Trains and on-track maintenance equipment, wayside components and back-office servers corresponding to each railroad's respective train dispatching centers are all connected by data radio systems and/or fiber-optic cable.

The Rail Safety Improvement Act of 2008³ originally required U.S. railroads to install PTC systems by December 31, 2015, and required PTC to be installed on Class I rail routes carrying over 5 million gross ton-miles of freight per mile with commuter or intercity passenger operations, or on Class I rail routes that move any amount of toxic or poison-by-inhalation hazardous materials. PTC requirements currently exclude Class II (regional) or Class III (short line) railroads that do not host passenger service. However, trains of Class II and III railroads that

operate over PTC-equipped Class I railroad lines are also required to have locomotives that are PTC-equipped for interoperability.

Ultimately, the PTC implementation deadline was extended to December 31, 2018, by the Positive Train Control Enforcement and Implementation Act of 2015.⁴ This law also enabled affected railroads to apply for an extension of up to 24 months, provided the railroad demonstrated progress toward key milestones. While Class I railroads met the December 31, 2018, deadline, many smaller railroads and transit agencies that operate commuter rail services did not have the resources necessary to complete their implementation on time. As a result, nearly every affected railroad, including each Class I railroad, has applied for an extension to accommodate adjoining railroads until full interoperability can be achieved.

³ U.S. Department of Transportation, Federal Railroad Administration, Rail Safety Improvement Act of 2008 (RISA), <https://railroads.dot.gov/legislation-regulations/legislation/rail-safety-improvement-act-2008-rsia>

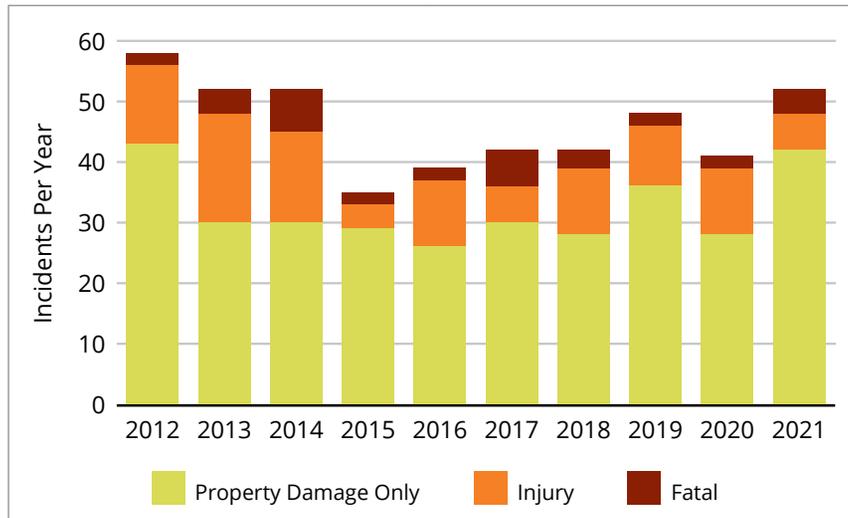
⁴ Congress.Gov, H.R.3651 - Positive Train Control Enforcement and Implementation Act of 2015. Retrieved from: <https://www.congress.gov/bill/114th-congress/house-bill/3651/text>

Highway-Rail Grade Crossing Safety

A primary focus of rail safety and security planning at the local, state and national level is highway-rail grade crossing safety. The term highway-rail grade crossing refers to all intersections of the rail network with non-rail pathways, including streets, highways, non-motorized pathways and private driveways or access roads. These intersections present an opportunity for conflict and potential collisions between trains or other on-track equipment, vehicles or pedestrians. According to the 2022 Federal Railroad Administration (FRA) Highway-Rail Crossing Database, there were 2,746 at-grade crossings on public roads.

All highway-rail accidents/incidents are reported to the FRA. **Figure 5-2** shows the number of highway-rail accidents/incidents per year in Tennessee at public highway-rail grade crossings by severity over the previous 10 full calendar years (2012-2021). This includes incidents that resulted in fatalities, injuries and property damage only (PDO).

FIGURE 5-2: Highway-Rail Grade Crossing Incidents by Severity
 SOURCE: Federal Railroad Administration, Accident Data as Reported by Railroads. Retrieved November 23, 2022.

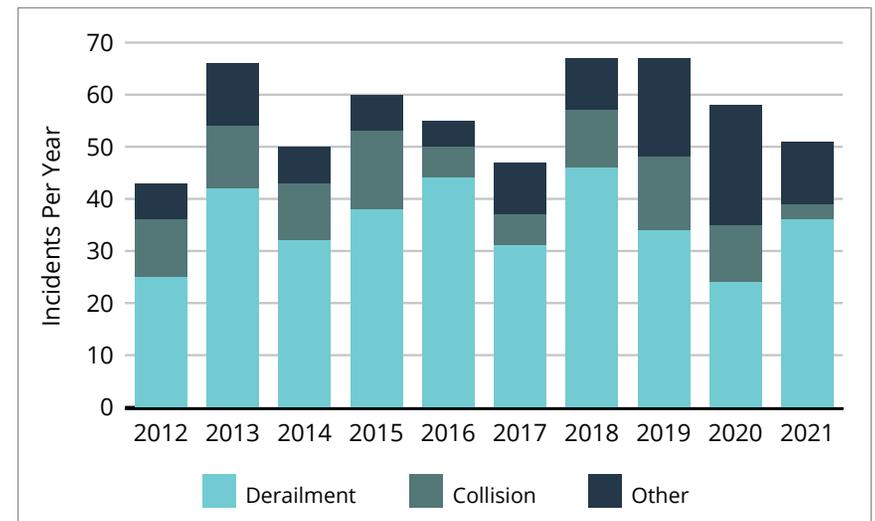


TDOT will continue to monitor and evaluate highway-rail grade crossing safety in Tennessee and will adjust the State’s priorities as needed based upon risk assessment methodology. The State is also considering projects using a corridor-based approach, systematically improving safety at crossings along specific railroad subdivisions or portions of subdivisions, or within a single city or county.

Other Rail Accidents and Incidents

Other FRA-reportable accidents include train derailments (often minor), collisions, and any injury or fatality to a person that occurs on railroad property, including minor workplace injuries. **Figure 5-3** shows the number of rail incidents in Tennessee by type over the previous 10 full calendar years (2012-2021).

FIGURE 5-3: Reported Rail Incidents
 SOURCE: U.S. Department of Transportation, Rail Equipment Accident/ Incident Data.



Waterways

Locks

The age, condition and size of locks can influence the amount of cargo passing through the lock, the overall efficiency and cost associated with inland navigation.

The standard inland waterway barge in use today is sized at 35 x 195 feet and can carry 1,500 tons of cargo. Most modern-era locks are sized at either 110 x 1,200 feet (which can accommodate up to 16 barges, though 15 barges represent a common tow) or 110 x 600 feet (up to nine barges per tow). Three locks on the upper section of the Tennessee River, Chickamauga, Watts Bar and Fort Loudon, came into operation in 1939, 1942 and 1943 respectively and were built to accommodate smaller barges. Today, only one standard barge can be processed through these locks at a time, which results in the Chickamauga Lock having the longest lockage time on the Ohio River system, taking on average eight hours for 15 barges to pass through. Two locks on the Cumberland River, the Old Hickory Lock and Cordell Hull Lock, are smaller than the standard 110 x 600-foot locks and can each accommodate four barges at a time as illustrated in **Figure 5-4**.

FIGURE 5-4: Barges in the Old Hickory Lock



Most locks on the inland waterway system within the state are in good condition. However, since Chickamauga lock was constructed in the 1930s, it has suffered from physical expansion of the concrete structure caused by a reaction between alkali in the cement and the aggregate. This threatened the structural integrity of the lock. Construction of a larger replacement lock (110 x 600 feet) began in 2004 and continued through to 2012 when funding constraints suspended construction until 2015. Project completion is estimated to be in 2027.⁵

The locks in the region also have slightly different operating hours. Chickamauga, Wheeler, Wilson, Pickwick, Kentucky and Cheatham Locks operate 24 hours a day, 365 days a year. Fort Loudoun, Watts Bar, Nickajack and Guntersville, AL, locks operate 20 hours a day from 7:00 a.m. to 3:00 a.m. Melton Hill Lock is open with notice. Old Hickory Lock is open 16 hours a day and closes between 10:00 p.m. and 6:00 a.m., and the Cordell Hull Lock requires reservations 48 hours in advance.

5 <http://www.trva-tcwc.org/wp-content/uploads/2022/10/22lrnppt.pdf>

Maintenance, both unplanned and scheduled, can also close locks for periods of time. In 2021, the Cheatham Lock was closed for a total of 57 days between April and July, with the longest duration of closure being 11 days. That maintenance project extended into 2022, where there were closures planned for six periods of 11 days between May and August. Such closures can disrupt schedules, but with sufficient notice shippers will have enough time to plan around the impact by increasing the stockholding of commodities. However, short notice and unplanned closures can create significant impacts on inland waterway users. In May 2022, a potential structural issue was noted during a dive inspection at the Pickwick Main Lock. The lock was closed to navigation until September 2022. Pickwick Lock is fortunate in having an auxiliary lock to allow passage of commercial vessels when the main lock is closed.

Channel Depth

Maintaining channel depth along the region's navigable waterways and within harbors is important for the reliability and cost-effective movement of waterborne cargoes. Reduced depth associated with navigable channels often results in light loading of vessels, which is when vessel operators do not fully load the vessel with tonnage to leave additional draft. This increases shipping costs and reduces the efficiency of freight movement. Maintenance dredging is required when sections of the waterways start shoaling. The depth of waterways can also be impacted during flooding and high-water events when large volumes of sediment are deposited. Tennessee harbors on the Mississippi River tend to have annual maintenance dredging operations to keep their navigation channels open.

Closures

During times of high water or flood conditions, commercial navigation can become hazardous, and the passage of tows can be restricted or even suspended. In 2019, nine locks were closed on the Tennessee River for several days due to higher-than-normal rainfall resulting in floods and swift river currents.



Highways & Roads

The condition and performance of Tennessee’s roadways and highways can be quantified in several ways. This section includes a discussion of the operation of Tennessee’s roadway network, the safety performance based on observed crash history, the physical condition of the roadway network and the availability of parking for long-distance truckers.

Roadway Operations

Truck Travel Delay & Reliability

TDOT conducted a comprehensive Statewide Freight Bottleneck Study (SFBS) in 2022 to identify freight bottlenecks along the Interstate Highway System in Tennessee and to develop a ranked list of the most severe bottleneck locations.

A “freight bottleneck” is considered a location where there are issues with one or both of the following measures:

- ◆ **Recurring Congestion**, as measured by vehicle-hours of delay per mile (VHD/mi), which quantifies the magnitude of truck delay along that segment
- ◆ **Segment Reliability**, measured by a ratio known as the “truck travel time reliability” (TTTR) index, which expresses how much longer travel times are during worst-case, usually non-recurring and unpredictable, congestion events

Segments were ranked based on their performance in terms of both factors, combined through a hybrid standardized score.



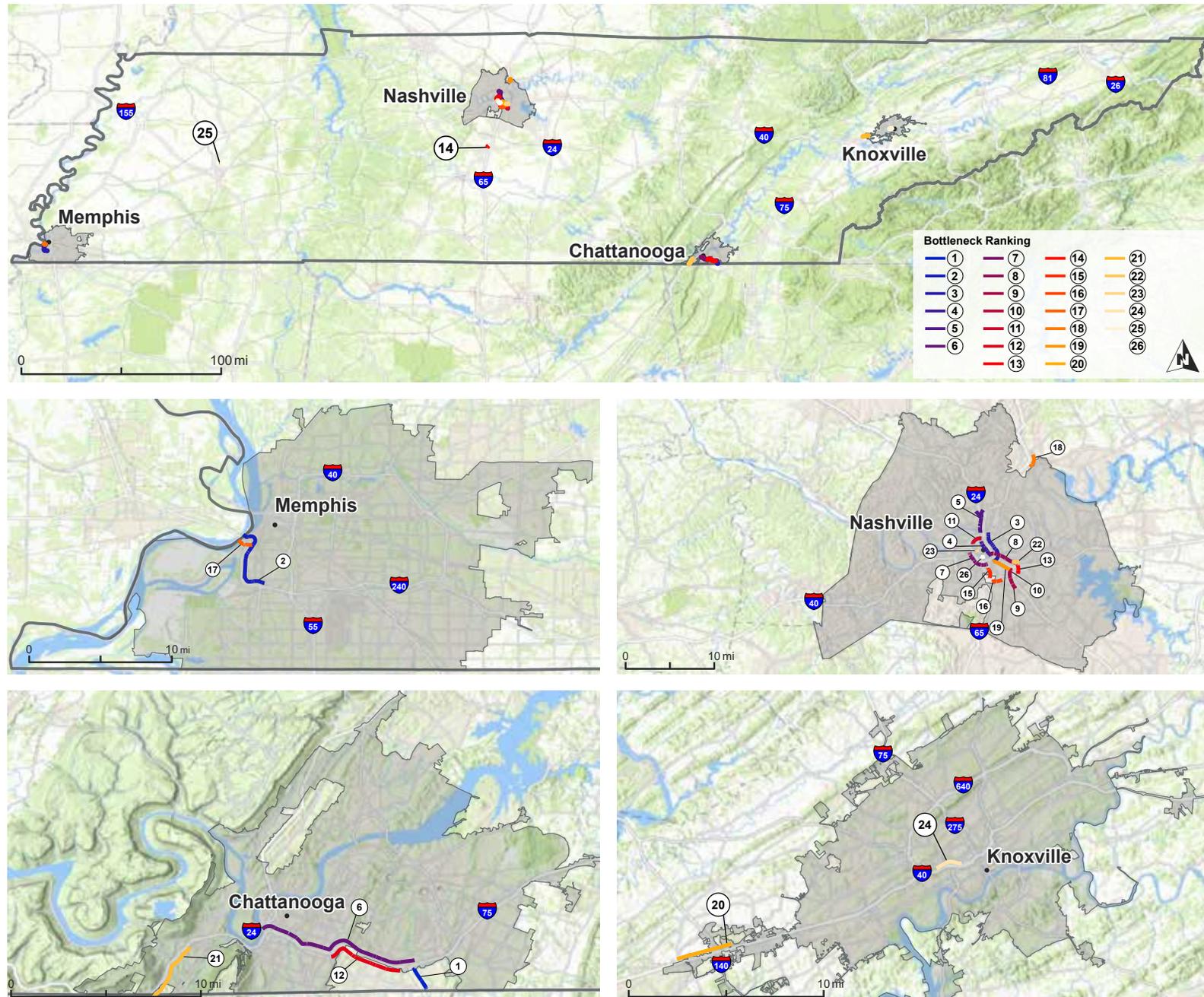
The primary data source for this assessment was the National Performance Management Research Data Set (NPMRDS), a resource containing speed and travel time data for freeway and arterial roadways across the National Highway System, which includes interstates. NPMRDS data was obtained for all 1,796 segments that comprise the Interstate Highway System in Tennessee covering the calendar year 2021 conditions, which is the most recent full year for which data is available.

Figure 5-5 shows the top 26 bottleneck segments on Tennessee’s interstates for 2021. These identified bottlenecks, which are listed in **Table 5-3**, contain the worst-performing interstate segments in the state in 2021 based on a combination of recurring congestion and segment reliability in terms of VHD/mi and TTTR, respectively.

As shown in **Figure 5-5**, the 26 bottlenecks identified are generally in urban areas, with 19 bottlenecks concentrated with 16 in Nashville, four in Chattanooga, two each in Memphis and Knoxville, and one in Jackson.

FIGURE 5-5: Identified Truck Bottlenecks on Tennessee's Interstate Highways, 2021.

SOURCE: Tennessee Statewide Freight Bottleneck Study, September 2022.



Comparison between 2022 SFBS and 2019 SFBS Bottlenecks

This section presents a comparison between the new rankings from TDOT’s 2022 SFBS, which are based on 2021 data, and the findings from Tennessee’s prior SFBS, the *Tennessee Interstate Freight Bottleneck Analysis*, which is based on 2018 data and dated January 11, 2019 (the “2019 SFBS”).

It should be noted that the 2019 SFBS was conducted using a methodology that centered candidate bottlenecks at major interchanges rather than identifying the directionality and specific extents of a given bottleneck as was done in this 2022 SFBS, which used system interchanges as breakpoints in the bottleneck segmentation. For this reason each bottleneck location identified in the 2022 SFBS should be assumed to include directly adjacent system interchanges where present. As such, an interchange identified as a bottleneck by the 2019 SFBS may touch multiple 2022 SFBS bottleneck segments and vice versa.

Table 5-2 presents a comparison between the 2022 and 2019 SFBS bottleneck rankings. As previously discussed, bottleneck locations identified in the 2022 SFBS are assumed to include directly adjacent system interchanges, and as such, may correspond to up to two bottleneck interchanges from the 2019 SFBS, noted in the rightmost columns. Table 5-3 also presents the change in ranking from 2019 to 2022, based on the worst ranking from 2019 in locations adjacent to two ranked interchanges.

TABLE 5-2: Comparison of 2022 and 2019 SFBS Bottleneck Rankings.
SOURCE: Tennessee Statewide Freight Bottleneck Study, September 2022.

2022 SFBS Ranking (2021 data)					2019 SFBS Ranking (2018 data)	
Rank	Route	County	Bottleneck Extent		Rank	Change
1.	I-75 NB	Hamilton	Georgia State Line	to I-75/I-24 Interchange	12	▲ 11 spots
2.	I-55 NB	Shelby	S 3rd Street (Exit 7)	to Arkansas State Line	<i>Unranked</i>	New in 2022
3.	I-24 WB	Davidson	I-24/I-40 Interchange (western)	to I-24/I-65 Interchange (southern)	10, 11	▲ 7 spots
4.	I-24 EB	Davidson	Spring St (Exit 47)	to I-24/I-40 Interchange (southern)	11	▲ 7 spots
5.	I-24/I-65 EB/SB	Davidson	I-24/I-65 Interchange (northern)	to I-24/I-65 Interchange (southern)	7, 10	▲ 2 spots
6.	I-24 WB	Hamilton	I-75/I-24 Interchange	to I-24/US 27 (SR 29) Interchange	1, 12	▼ 5 spots
7.	I-40/I-65 EB/SB	Davidson	Charlotte Ave (Exit 209)	to I-40/I-65 Interchange (southern)	<i>Unranked</i>	New in 2022
8.	I-24/I-40 WB	Davidson	I-24/I-40 Interchange (eastern)	to I-24/I-40 Interchange (western)	11	▲ 3 spots
9.	I-24 EB	Davidson	I-24/I-440 Interchange	to SR 155 (Briley Pkwy)	2	▼ 7 spots
10.	I-24 EB	Davidson	I-24/I-40 Interchange (eastern)	to I-24/I-440 Interchange	2	▼ 8 spots
11.	I-65 NB	Davidson	I-40/I-65 Interchange (northern)	to I-24/I-65 Interchange (southern)	5, 10	▼ 6 spots
12.	I-24 EB	Hamilton	E 23rd Street (Exit 181)	to I-75/I-24 Interchange	12	Unchanged

2022 SFBS Ranking (2021 data)						2019 SFBS Ranking (2018 data)	
Rank	Route	County	Bottleneck Extent			Rank	Change
13.	I-24 WB	Davidson	I-24/I-440 Interchange	to	I-24/I-40 Interchange (eastern)	2	▼ 11 spots
14.	I-65 SB	Williamson	I-65/I-840 Interchange	to	SR 106/Lewisburg Pike	<i>Unranked</i>	New in 2022
15.	I-65 NB	Davidson	I-65/I-440 Interchange	to	Wedgewood Ave (Exit 81)	4	▼ 11 spots
16.	I-440 EB	Davidson	I-65/I-440 Interchange	to	SR 11/Nolensville Rd (Exit 6)	4	▼ 12 spots
17.	I-55 SB	Shelby	Arkansas State Line	to	Crump Blvd/Riverside Dr (Exit 12)	<i>Unranked</i>	New in 2022
18.	I-65 NB	Davidson	Rivergate Pkwy (Exit 96)	to	SR 174/Long Hollow Pk (Exit 97)	6	▼ 12 spots
19.	I-24/I-40 EB	Davidson	I-24/I-40 Interchange (western)	to	I-24/I-40 Interchange (eastern)	11	▼ 8 spots
20.	I-40/I-75 WB/SB	Knox	I-40/I-140 Interchange	to	SR 131/Lovell Rd (Exit 374)	8	▼ 12 spots
21.	I-24 EB	Hamilton	Georgia State Line	to	US 41/Cummings Hwy (Exit 174)	<i>Unranked</i>	New in 2022
22.	I-40 WB	Davidson	Spence Ln (Exit 213)	to	I-24/I-40 Interchange (eastern)	<i>Unranked</i>	New in 2022
23.	I-40/I-65 WB/NB	Davidson	Church Street	to	Clinton Street	<i>Unranked</i>	New in 2022
24.	I-40 WB	Knox	SR 115/Alcoa Hwy (Exit 386B)	to	SR 169/Middlebrook Pike	<i>Unranked</i>	New in 2022
25.	I-40 WB	Madison	Christmasville Rd (Exit 85)	to	Old Medina Rd/Campbell St (Exit 83)	<i>Unranked</i>	New in 2022
26.	I-40/I-65 WB/NB	Davidson	I-40/I-65 Interchange (southern)	to	Division Street	<i>Unranked</i>	New in 2022
Bottlenecks from 2019 SFBS Unranked in 2022							
<i>Unranked</i>		Shelby	I-40/I-240 Interchange (eastern)			3	<i>Unranked in 2022</i>
<i>Unranked</i>		Knox	I-40/I-640 Interchange (western)			9	<i>Unranked in 2022</i>

As can be seen in Table 5-2, the more recent 2022 SFBS results show a significant reshuffling in rankings compared to the 2019 SFBS. While some portion of this reshuffling is likely attributable to the updated analysis methodology used in the 2022 SFBS, changing travel patterns due both to overall population growth and the disruption in commuter behavior, resulting from the COVID-19 pandemic, have undoubtedly had a significant effect in changing the location, duration and severity of bottleneck impacts.

It should also be noted that the locations that moved the furthest up the list from 2019 to 2022, I-75 northbound in Hamilton County (up 11 spots to #1), and I-55 northbound in Shelby County (from unranked to #2) are both likely to drop significantly or disappear altogether in subsequent SFBS analyses. As discussed in the 2022 SFBS, I-75 was undergoing a long-term interchange improvement program of which Phase 1 was completed in 2021, which is expected to improve delay and reliability in this area, and I-55 experienced significant but temporary impacts from detoured traffic during the extended closure of the parallel I-40 Hernando de Soto Bridge for emergency repairs in the summer of 2021.

Comparison between 2022 SFBS Bottlenecks and ATRI Data

The bottlenecks identified in TDOT’s 2022 SFBS correlate strongly with those identified in the American Transportation Research Institute’s (ATRI) The Nation’s Top Truck Bottlenecks – 2022 study, which found that nine of the top 100 truck bottlenecks nationwide were in Tennessee. This number is tied with Georgia for second place behind Texas, which had 14 bottleneck locations in the top 100.

Tennessee locations in ATRI’s top 100 list and their corresponding location or locations on the TDOT 2022 SFBS are as follows:

- ◆ #10 - Chattanooga: I-75 at I-24 (SFBS #1, 6, 12)
- ◆ #11 - Nashville: I-24/I-40 at I-440 (SFBS #8, 9, 10, 13, 19, 22)
- ◆ #29 - Chattanooga: I-24 at US 27 (SFBS #6)
- ◆ #42 - Memphis: I-55 at I-40 (SFBS #2, 17)
- ◆ #49 - Nashville: I-40 at I-65 (SFBS #7, 23, 26)
- ◆ #57 - Nashville: I-65 at I-24 (SFBS #5)
- ◆ #64 - Knoxville: I-40/I-75 at I-140 (SFBS #20)
- ◆ #88 - Knoxville: I-40 at I-275 (SFBS #24)
- ◆ #95 - Nashville: I-65 at SR 386 (SFBS #18)

It should be noted that as with the 2019 SFBS comparison, the ATRI analysis also used a different methodology to identify bottleneck locations from the 2022 SFBS, hence the minor discrepancies in rankings. Unlike the ATRI list, the 2022 SFBS segments were also identified by direction and with breakpoints at all system interchanges, where two interstates meet. This practice is consistent with recent SFBS assessments conducted in peer states and provides additional detail compared to the ATRI data. This also means that each ATRI bottleneck location may consist of several 2022 SFBS bottleneck segments, of which the worst ranking is noted above, hence the omitted numbers in the 2022 SFBS rankings above.

Delay and Reliability Metrics Used in 2022 SFBS Analysis

Maps showing VHD/mi and TTTR, the two component factors in determining and prioritizing the 2022 SFBS bottleneck segments in **Figure 5-5**, are included in **Figure 5-6** and **Figure 5-7**, respectively.

Vehicle-hours of delay per mile quantifies the amount of added travel time experienced by the trucking population, on average, compared to free-flowing conditions. This value represents the magnitude of delay for a given segment and inherently favors more heavily traveled segments in and around the state’s urban areas, which is justified in order to capture impacts that affect the largest number of users. **Figure 5-6** shows a map of the calculated VHD/mi per day experienced by truck traffic across all Interstate highway segments on Tennessee’s portion of the National Highway Freight Network (NHFN).

TTTR is the ratio showing how much longer truck travel would take during an extreme congestion event compared to an average day. In this way, TTTR can capture impacts from less frequent and potentially non-recurring events that could occur in either urban or rural contexts such as construction activities, severe weather, crash/incident response, and more.

The NPMRDS provides TTTR values for AM, mid-day, PM, overnight, and weekend time periods. The maximum TTTR of these five periods is reported as the TTTR for a given segment, representing conditions during the least reliable time period for that segment over the course of the year. **Figure 5-7** shows a map of TTTR, reflecting the worst-case time period in the NPMRDS data, for all Interstate highway segments on Tennessee’s portion of the NHFN.

FIGURE 5-6: Statewide Vehicle-Hours of Delay per Mile for Truck Traffic.
 SOURCE: Tennessee Statewide Freight Bottleneck Study, September 2022.

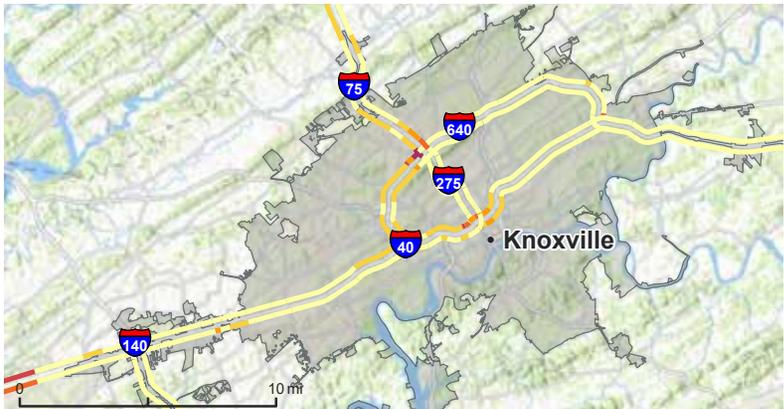
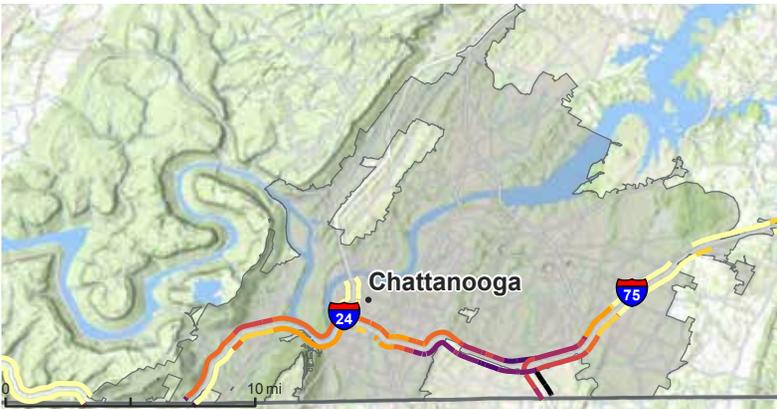
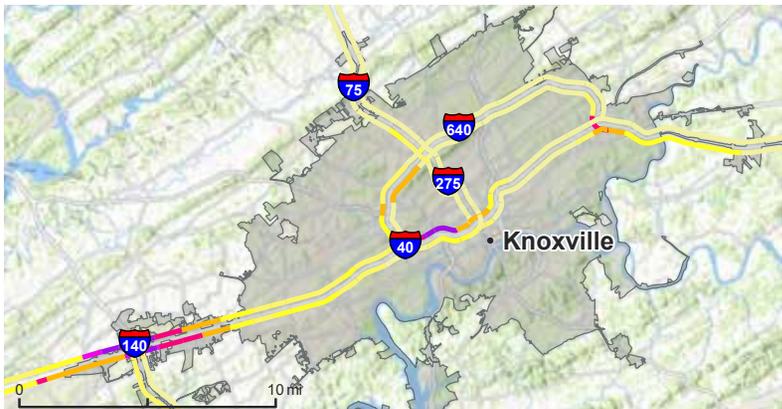
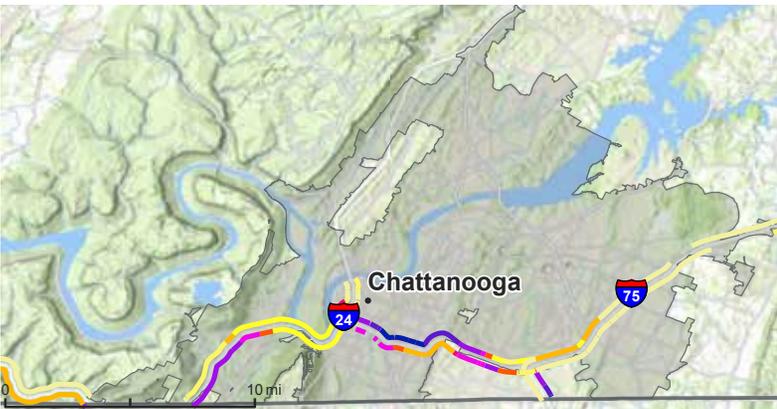
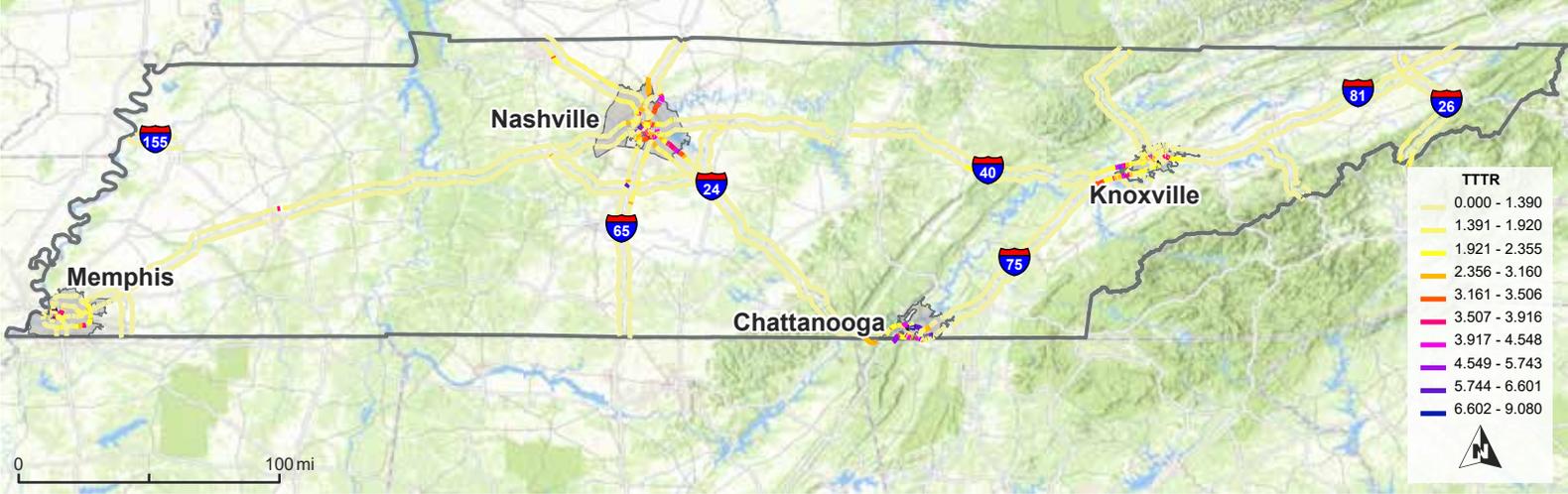


FIGURE 5-7: Statewide Truck Travel Time Reliability (TTTR) Index.
 SOURCE: Tennessee Statewide Freight Bottleneck Study, September 2022.



Travel Speeds

The NPMRDS also includes information about truck travel speeds on the interstate highway segments of Tennessee's portion of the NHFN. Specifically, NPMRDS provides the median speed for truck traffic for the year, based on the 50th percentile truck travel time, and a congested speed for truck traffic which is based on the 95th percentile truck travel time during the worst-performing of the NPMRDS' five time periods (AM, mid-day, PM, weekend, or overnight) for the year. Median and congested travel times along the interstate network during 2021 are mapped in **Figure 5-8** and **Figure 5-9**, respectively.

The congested speed data in **Figure 5-9** correlates strongly with the TTTR data in **Figure 5-7**, with the majority of rural segments operating close to full speed but with significant slowdowns for truck traffic occurring in the state's urban areas.

The median speed data in **Figure 5-8** also shows that lower speeds are often present in urban areas but shows a markedly different pattern in rural areas compared to the congested speeds from **Figure 5-9**, specifically the impact of topography and tight curves in mountainous areas. Locations where interstate highways cross major mountain features can be clearly discerned in **Figure 5-8**, including I-24, I-40, and I-75 crossing the Cumberland Plateau to the north and west of Chattanooga and Knoxville, as well as I-40 and I-26 traversing the Blue Ridge Mountains at the North Carolina state line. Both topographic features were discussed previously in Chapter 4 as significant impediments to east-west travel, particularly for truck traffic.



FIGURE 5-8: Median Truck Speed (in miles per hour, based on 50th Percentile Truck Travel Time), 2021.

SOURCE: National Performance Management Research Data Set.

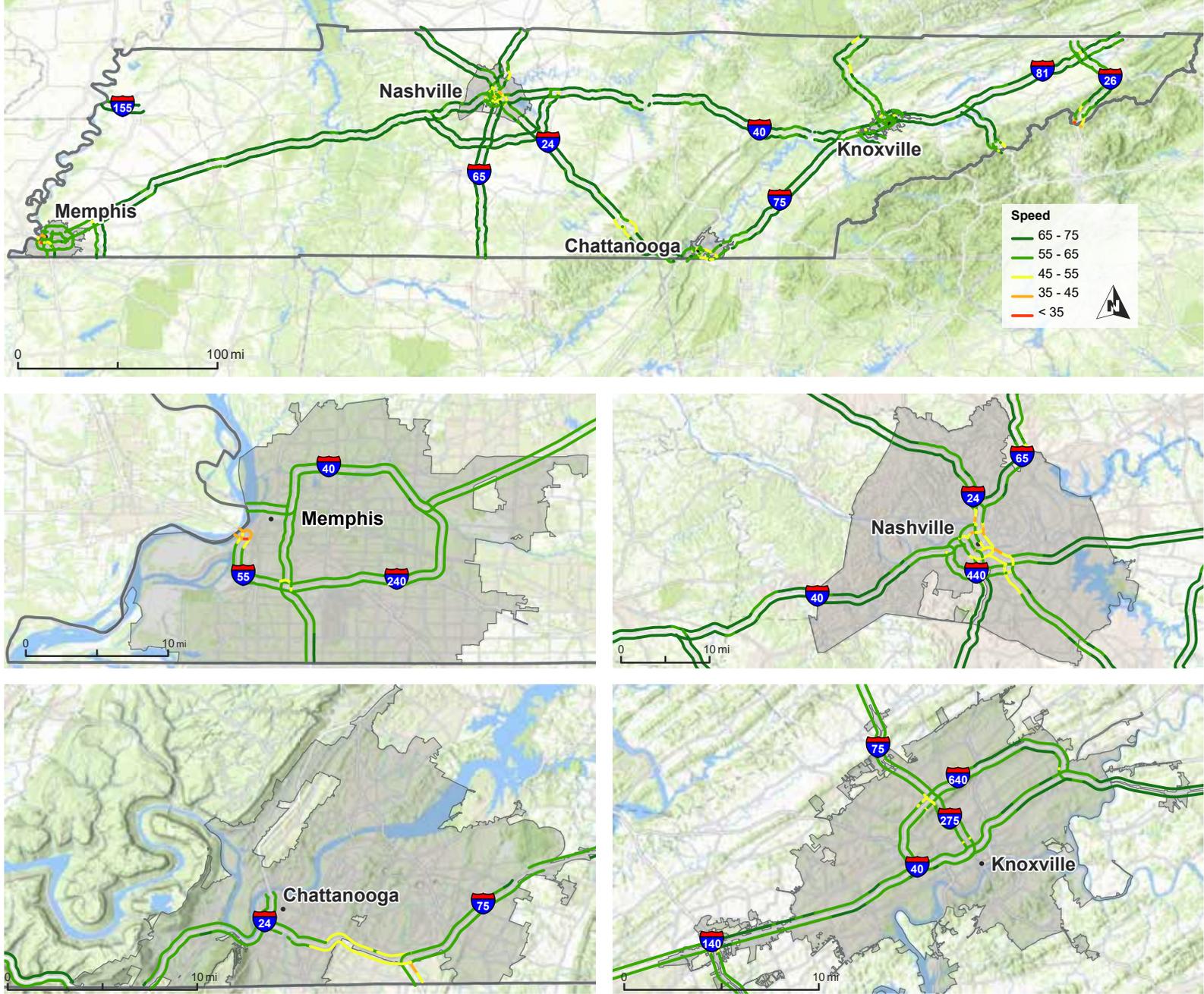
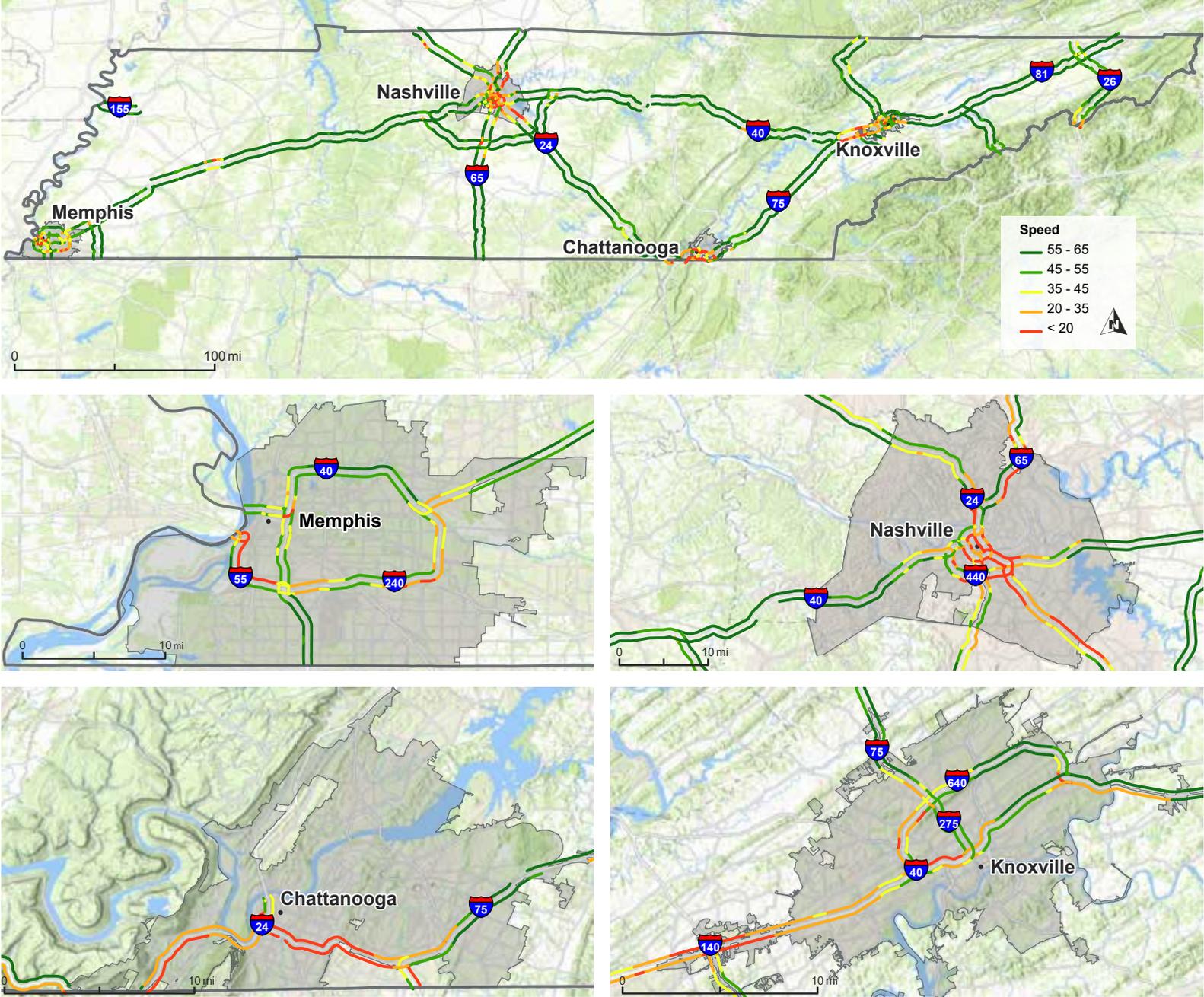


FIGURE 5-9: Congested Truck Speed (in miles per hour, based on 95th Percentile Truck Travel Time), 2021.

SOURCE: National Performance Management Research Data Set.





Traffic Safety

The safety of a highway or road is critical to its overall performance and improving safety has become an increasing focus in recent years nationwide and in Tennessee with the incorporation of a “toward zero deaths” strategy in the State’s Strategic Highway Safety Plan.

Safety performance can be determined by examining historical police crash reports, which are aggregated in TDOT’s Enhanced Tennessee Roadway Information Management System (E-TRIMS). Historical crash data was obtained from E-TRIMS covering a three-year period from 2019 to 2021, including information regarding location, collision type and collision severity.

This data shows that between 2019 and 2021 there were 3,307 truck-involved crashes in Tennessee, including 19 fatal crashes (0.6 percent) and 37 serious injuries (1.1 percent), as shown in Table 5-3.

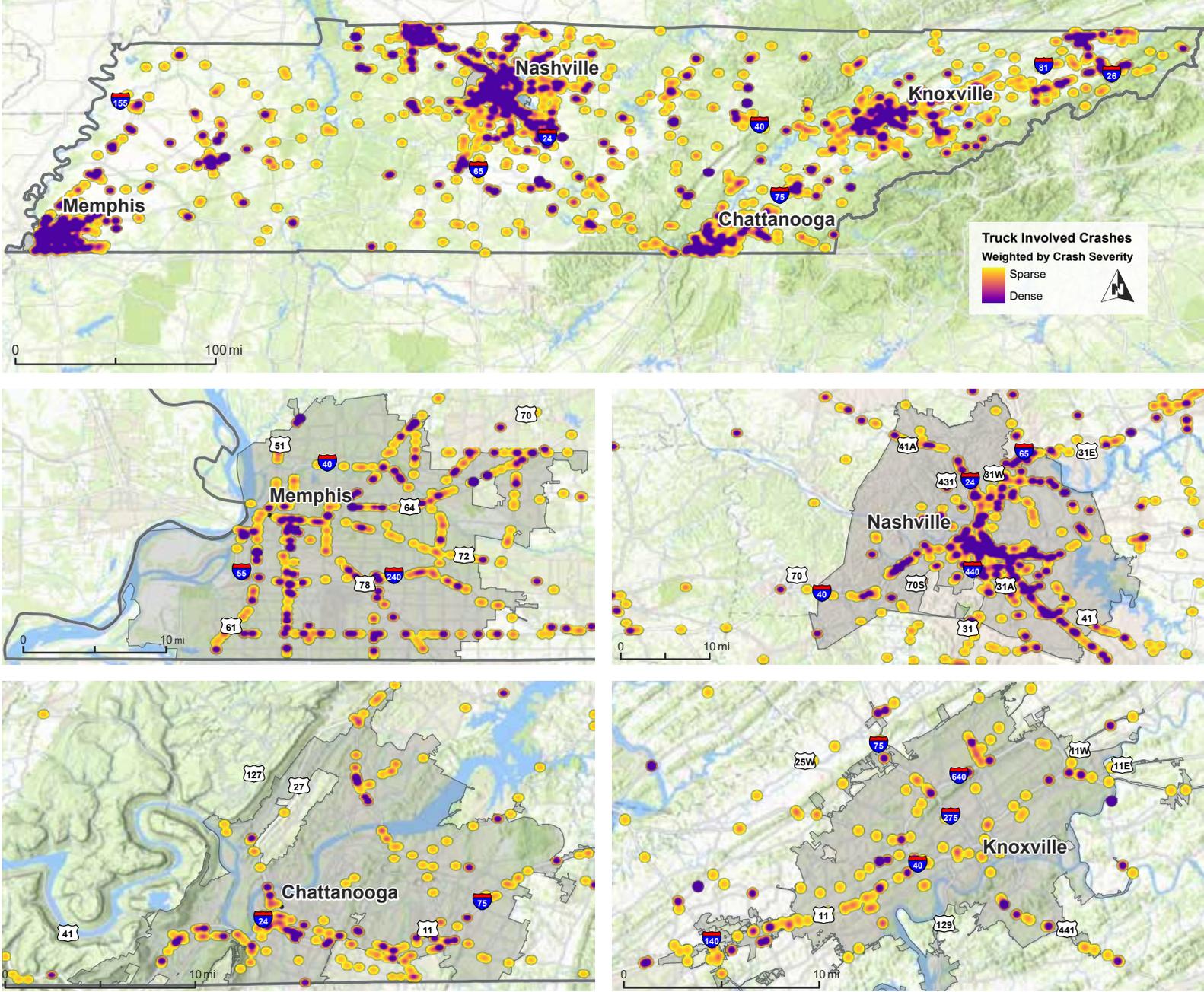
Figure 5-10 shows the density of truck-involved crashes across the state. Mapped crashes are weighted by a factor known as the severity index, meaning that fatal crashes are weighted higher than injury crashes which in turn are weighted higher than crashes that only involved property damage. The heat map in Figure 5-10 shows that the highest overall truck crashes are found on interstate highways and in high-activity urban areas. These segments carry some of the highest traffic volumes in the state, and it is recognized that this greater exposure to conflicts would result in a higher number of crashes.

TABLE 5-3: Statewide Truck-Involved Crash Statistics, 2019-2021
SOURCE: Tennessee Department of Transportation

Crash Severity	Truck-Involved Crashes	
	Number	Percentage
Property Damage Only	2,663	80.5%
Suspected Minor Injury	588	17.8%
Suspected Serious Injury	37	1.1%
Fatal	19	0.6%
Total	3,307	100.0%

FIGURE 5-10: Truck-Involved Crashes, 2019-2021

SOURCE: Tennessee Department of Transportation



Roadway Condition

Pavement Condition

Roadway surface condition in Tennessee is tracked through TDOT’s Pavement Management System (PMS) and Transportation Asset Management Plan (TAMP). Pavement condition is assessed on a scale of good, fair and poor. Statewide data is available through the PMS website.⁶ 2021 PMS data is available at one-mile segmentation and is mapped in **Figure 5-11**, with a summary table shown in **Table 5-4**.

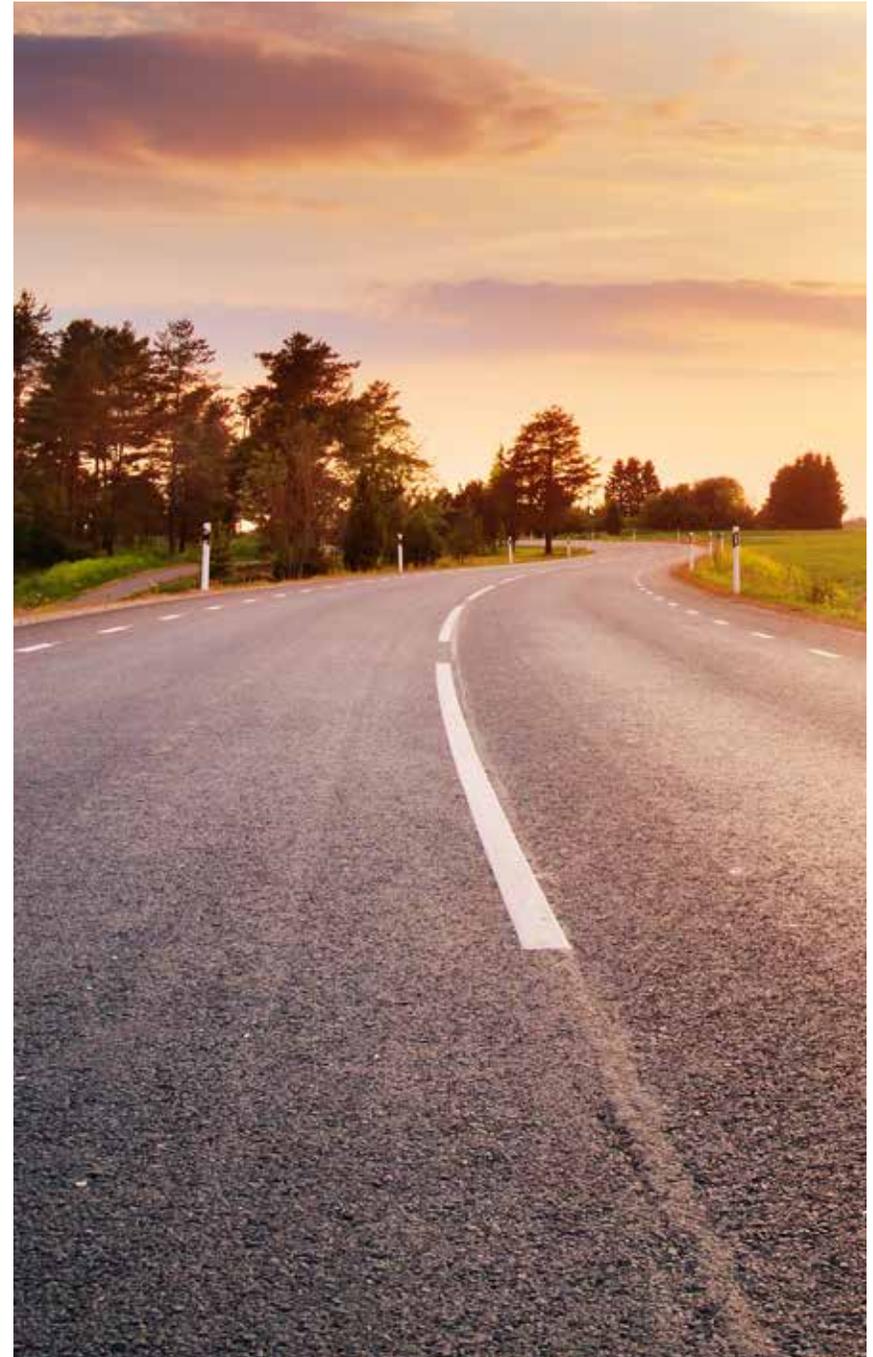
Taken together, this data shows that conditions are generally favorable along interstate highways and other major routes, whereas a higher percentage of fair and poor conditions are experienced on other roads on the State Route System.

The mapped data in **Figure 5-11** seems to show a larger percentage of poor conditions in the western third of the state. This finding is in part since the TDOT PMS data has only been expanded to include the full State Route System in TDOT Regions 3 and 4, in the western half of the state, whereas Regions 1 and 2 only include data on routes along the National Highway System. However, a noticeable difference still exists between conditions in Region 3, generally around Nashville, and Region 4 in the westernmost portion of the state.

TABLE 5-4: Summary of TDOT Pavement Management System Data, Number of Miles by Condition

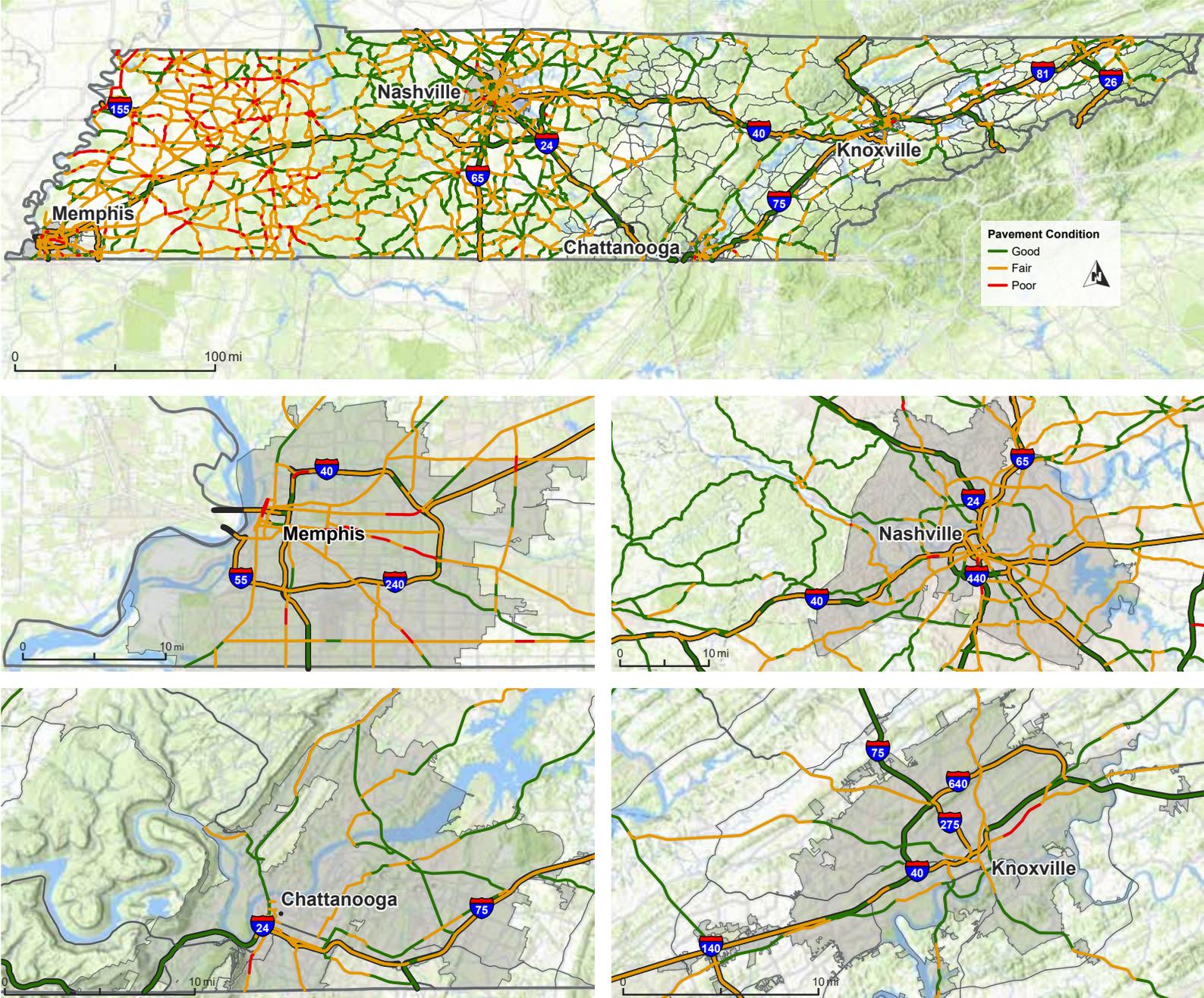
SOURCE: Tennessee Department of Transportation

Road System	Condition:						Total
	Good		Fair		Poor		
Interstates on NHFN	1,212	(50.4%)	1,190	(49.5%)	1	(0.0%)	2,403
Other Roads on SRS	3,768	(44.3%)	4,439	(52.1%)	305	(3.6%)	8,512
Entire SRS	4,980	(45.6%)	5,629	(51.6%)	306	(2.8%)	10,915



⁶ <https://www.tn.gov/tdot/maintenance/pavement-office/pavement-management.html>

FIGURE 5-11: Pavement Condition
 SOURCE: Tennessee Department of Transportation



Bridge Condition

Tracking the condition of bridges and other structures is also an important component in ensuring that Tennessee’s roadways remain in a state of good repair.

Bridge condition data was obtained from the National Bridge Inventory (NBI), a database compiled by the Federal Highway Administration, with information on all bridges and tunnels in the United States that have roads passing above or below them. The NBI database contains records for 11,220 bridges and 9,117 culverts in the state of Tennessee.

The NBI rating of bridge condition is a calculated result of the deck, superstructure, substructure and culvert condition. There are three ratings: good, fair and poor. These terms are defined in accordance with the Pavement and Bridge Condition Performance Measures final rule, published in January 2017. Bridge condition is determined by the lowest rating of NBI condition ratings for Item 58 (Deck), Item 59 (Superstructure), Item 60 (Substructure) or Item 62 (Culvert). If the lowest rating is greater than or equal to 7, the bridge is classified as Good; bridges rated 5 or 6 are classified as Fair and bridges rated less than or equal to 4 are classified as Poor.

Bridge condition data for all structures in the NBI database on Tennessee’s State Route System is mapped in **Figure 5-12**. To get a sense of conditions along routes serving freight traffic, the NBI data was also filtered to include just those structures along the NHFN; this data is mapped in **Figure 5-13**.

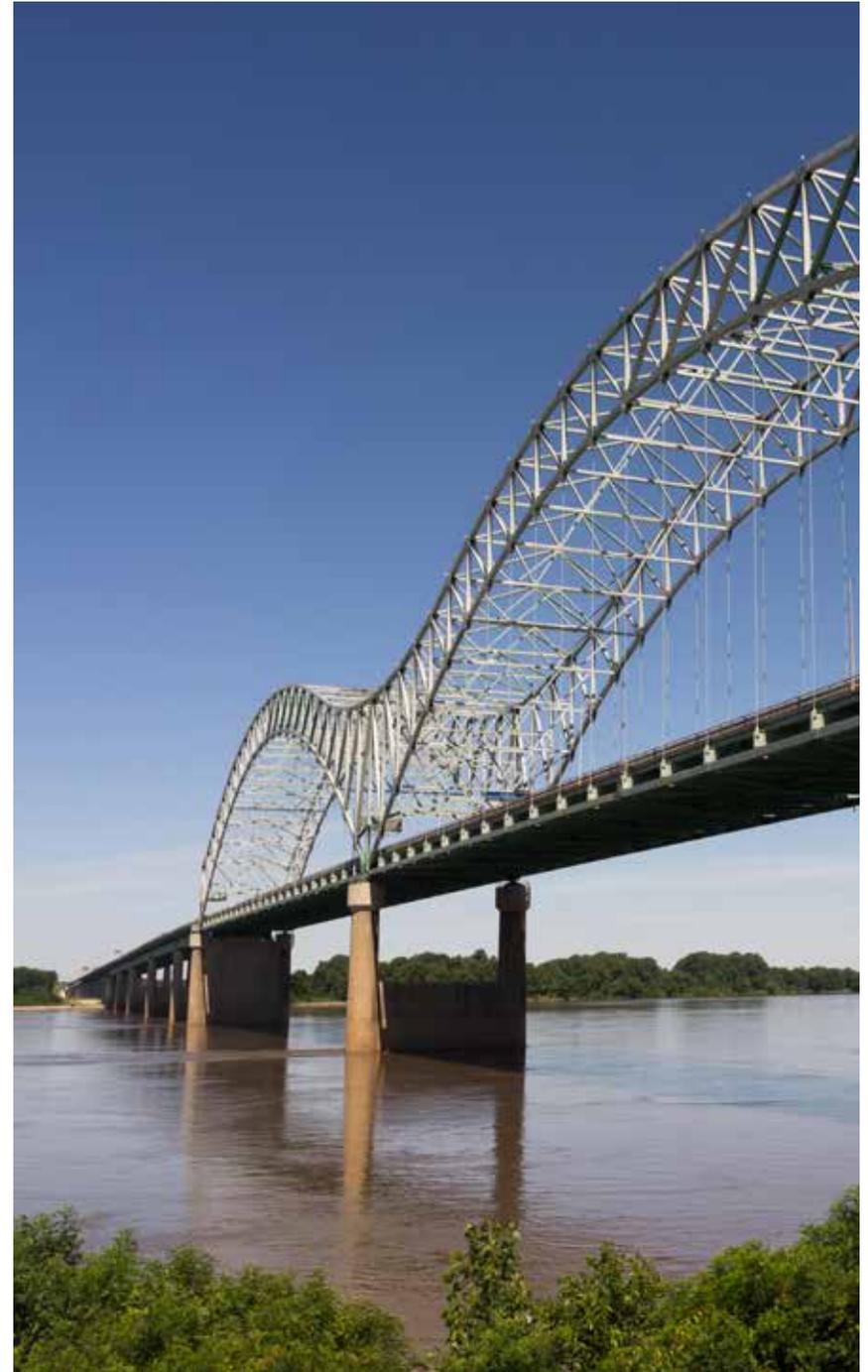


FIGURE 5-12: Bridge Condition Rating per NBI, Tennessee State Route System

SOURCE: National Bridge Inventory

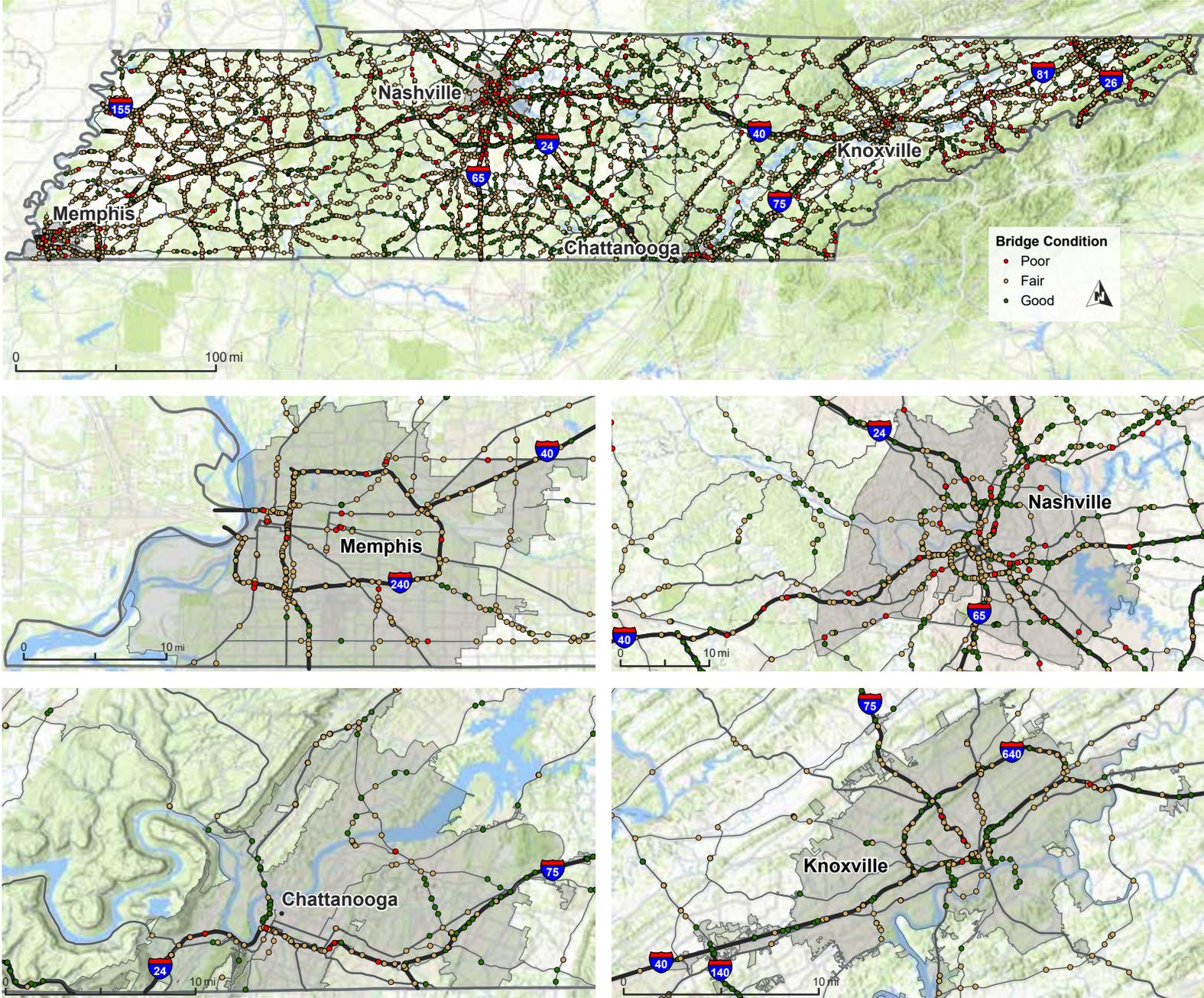


FIGURE 5-13: Bridge Condition Rating per NBI, NHFN segments only

SOURCE: National Bridge Inventory

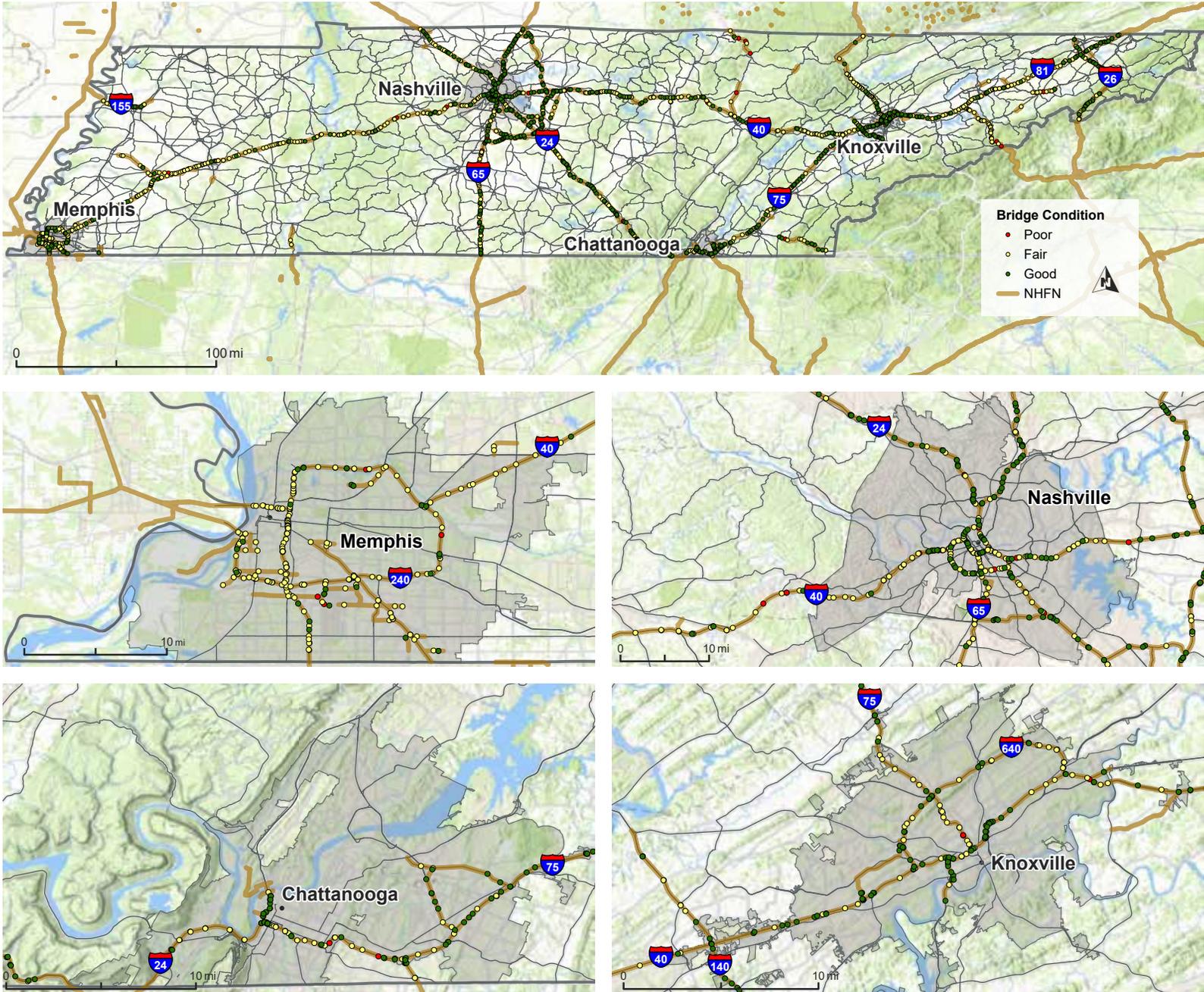


TABLE 5-5: Summary of National Bridge Inventory Condition Data, Number of Structures by Condition

SOURCE: National Bridge Inventory

Road System	Condition:						Total
	Good		Fair		Poor		
NHFN	786	(36.5%)	1,292	(60.0%)	77	(3.6%)	2,155
Bridges	636	(35.2%)	1,097	(60.7%)	73	(4.0%)	1,806
Culverts	150	(43.0%)	195	(55.9%)	4	(1.1%)	349
Other Roads on SRS	2,609	(40.0%)	3,700	(56.7%)	214	(3.3%)	6,523
Bridges	1,401	(36.7%)	2,241	(58.6%)	180	(4.7%)	3,822
Culverts	1,208	(44.7%)	1,459	(54.0%)	34	(1.3%)	2,701
Entire State	8,689	(42.7%)	10,807	(53.1%)	841	(4.1%)	20,337
Bridges	4,046	(36.1%)	6,478	(57.7%)	696	(6.2%)	11,220
Culverts	4,643	(50.9%)	4,329	(47.5%)	145	(1.6%)	9,117

Based on the NBI data, there are 20,337 structures in Tennessee. As summarized in **Table 5-5**, 42.7 percent of these structures are in good condition, 53.1 percent are in fair condition, and 4.1 percent are in poor condition. Looking specifically at the freight system, **Table 5-5** shows that fewer bridges and culverts are classified as “poor” compared to the entire state or the non-NHFN routes within the State Route System (SRS). At the same time, a lower percentage of NHFN bridges and culverts are classified as “good” compared to the entire state or other roads on the SRS. This contradictory finding is likely since routes on the NHFN are generally busier and more likely to have funding directed towards them, leading to a lower incidence of “poor” conditions, but at the same time, the higher percentage of heavy vehicles leads to more wear and tear on the roadways and a lower incidence of “good” conditions.

Height, Weight and Width Restrictions

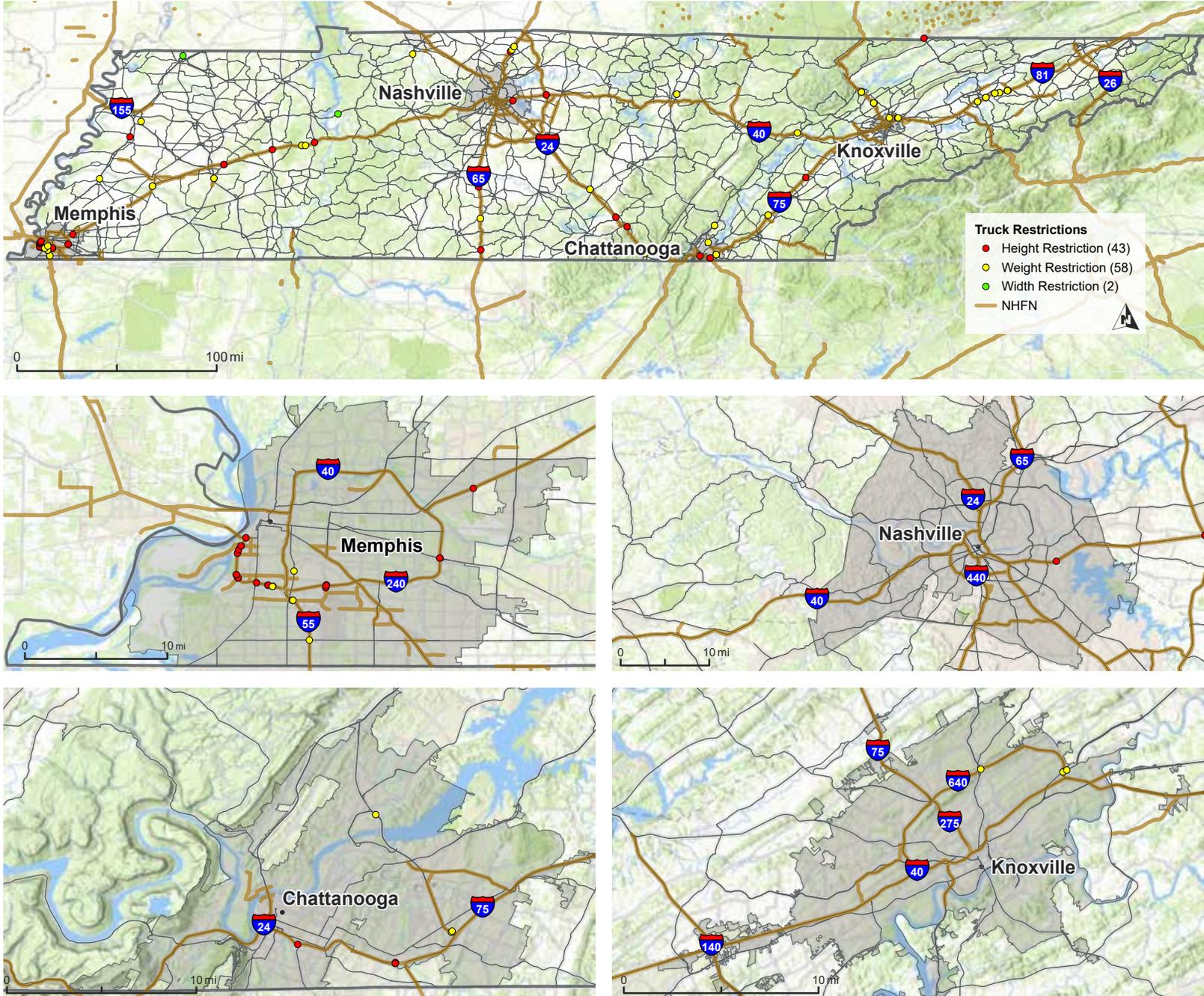
TDOT’s Oversize and Overweight (OS/OW) Permit Office maintains information about current restrictions for large vehicles in Tennessee, including bridge height, weight, and width limits. This information is made available to the public on TDOT’s website and is updated regularly. The restriction information in this section was collected from the OS/OW website on October 17, 2022⁷ and is subject to change.

All restrictions listed in the OS/OW data were geolocated based on the county, route, and location data provided by TDOT. This information is shown in **Figure 5-14**. These locations were cross-referenced with NHFN routes discussed previously to identify structures on critical freight routes.

Of the 103 total restrictions included in the OS/OW dataset, 86 structures are on the NHFN, while 17 bridges are outside the freight network. For restrictions on the NHFN network, there are 41 locations with height restrictions and 45 with weight restrictions. No width restrictions were identified along NHFN routes.

⁷ <https://www.tn.gov/tdot/central-services/oversize---overweight-permits/bridge-information.html>

FIGURE 5-14: Truck Restrictions in Tennessee per TDOT Oversize/Overweight Permit Office, as of October 17, 2022



Roadway Closures

Prolonged closures along Tennessee’s segments of the NHFN are uncommon since procedures are in place to provide prompt response to crashes and to ensure that adequate maintenance of traffic plans is prepared for long-term construction projects. However, unplanned roadway closures do infrequently occur due to structural issues or natural causes.

TDOT’s maintenance and inspection programs make structural failures extremely uncommon. The only noteworthy closure in recent years on the NHFN was when the Hernando de Soto bridge carrying I-40 across the Mississippi was closed for 12 weeks in 2021 to repair a crack in a critical structural member. Long-duration closures due to structural issues such as this are the exception rather than the rule, as this issue had been overlooked on past inspections conducted by a partner agency. However, accelerated repair plans were quickly crafted and put in place by TDOT to reopen the bridge, and in the interim, TDOT implemented active traffic management and short-term lane reconfigurations to streamline traffic flow on the detour route via the parallel I-55 Memphis & Arkansas Bridge.

Natural causes such as flooding, tornado, and rock slides are another source of unexpected and temporary roadway closures, most notably in the far eastern portion of the state where north-south mountain ranges present challenges to east-west travel. I-40 and I-26 both traverse difficult terrain through the Blue Ridge Mountains between Tennessee and North Carolina, and several noteworthy rockslides have occurred in recent years on I-40 in the Pigeon Forge River gorge in Tennessee or just across the North Carolina state line. These rockslides have caused closures, sometimes in both directions, for weeks at a time. Remedial measures have been implemented in several phases since the freeway opened, including major efforts in the 1970s and 1980s, reducing the frequency of these events. However, rockslide events still occur which impact the reliability of the roadway.



Two major rockslide events have occurred in the past 15 years, including a 2009 event at North Carolina Mile Marker 3 which closed I-40 in both directions for nearly six months, and a smaller 2012 event that only impacted westbound I-40 traffic. Both events incurred a lengthy detour via I-26 and I-81, approximately 53 miles of additional distance.

Truck Parking

There are estimated to be 8,345 truck parking spaces in Tennessee; 7,261 spaces are provided by the private sector at 127 locations⁸ and 1,084 spaces at 58 locations⁹ by the public sector, meaning 87 percent of the state's truck parking spaces are provided by the private sector. Despite this high number, demand often exceeds supply. A research study undertaken by the University of Tennessee¹⁰ identified that across the state, formal truck parking facilities are 90 percent full and along the entire I-24 corridor, there is more parking demand. The study also identified that along I-40, 75 percent of its truck parking facilities are utilized at a rate of 75 percent or more. A recent 2022 INFRA grant is funding an additional 125 new truck parking spaces on I-40 in Smith County. A potential consequence of a lack of supply is that trucks may park in illegal and unsafe locations such as on and off ramps. **Figure 5-15** identifies the locations of public parking and private truck parking spaces in the state.



FIGURE 5-15: Truck Parking Locations and Number of Spaces

SOURCE: HDR Analysis



8 Analysis based on DC Book Company Truck Stops & Services

9 FHWA – Jason’s Law Survey – 2019 data

10 Truck Parking Facilities and Ramp Parking: Role of Supply, Demand, and Ramp Characteristics.

Pipelines

Pipelines are typically the safest mode for transporting large volumes of bulk liquids and gases. The condition and performance of the pipeline network is critical to ensure the products are transported to where they are needed without incident. When incidents do occur, they can result in fatal and injury outcomes and damage the environment.

Between 2002 and 2021, there have been 48 incidents involving gas transmission, crude oil and refined product pipelines in Tennessee as reported to the US DOT Pipeline and Hazardous Materials Safety Administration (PHMSA) and shown in **Table 5-6**.



While these pipeline incidents did not result in any fatalities or injuries, the resulting total of reported costs were \$100,570,075. The largest cost incident was \$78.5M and was associated with a tornado striking a gas transmission pipeline compressor station near Hartsville in 2008 and causing a fire. A more recent incident is damage to the Mid-Valley crude oil pipeline near Henderson, which resulted in a spill of over 200,000 gallons in June 2022, reportedly the second largest spill in the state to date.

Of the 48 incidents associated with natural gas transmission, crude oil and refined petroleum product pipelines, just over 60 percent of the incidents were caused by material, weld or equipment failures. Other incident causes are also shown in **Figure 5-16**.

In 2021, the Colonial Pipeline system fell victim to a cybersecurity attack and the pipeline operating company shut down the pipeline system for several days. The incident did not result in any spillage of fuel, but did disrupt deliveries of fuel into the region.

FIGURE 5-16: Causes of Pipeline Incidents in Tennessee (2002-2021).
SOURCE: PHMSA.

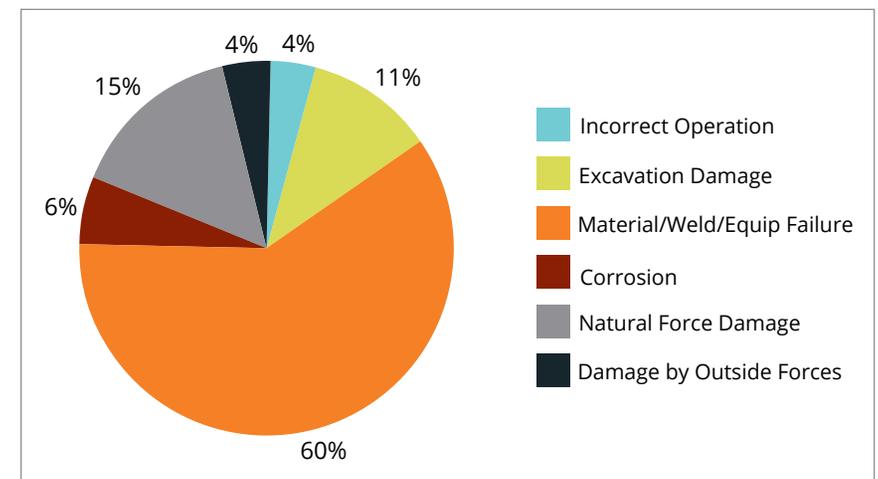


TABLE 5-6: Pipeline Incidents in Tennessee (2002-2021).

SOURCE: PHMSA

Year	Gas Transmission Pipelines		Crude Oil Pipelines				Refined Petroleum Product Pipelines				Total Pipeline Incidents	
	Number	Total Cost As Reported	Number	Total Cost As Reported	Barrels Spilled	Net Barrels Lost	Number	Total Cost As Reported	Barrels Spilled	Net Barrels Lost	Number	Total Cost As Reported
2002			1	5,300	3	0					1	5,300
2003							1	1,310,000	285	47	1	1,310,000
2004											0	0
2005											0	0
2006			1	240	4	4	1	862,000	113	0	2	862,240
2007											0	0
2008	2	78,602,500	2	504,350	13	3					4	79,106,850
2009											0	0
2010	3	238,464					1	31,019	5	0	4	269,483
2011											0	0
2012	2	439,317					1	1,285,800	86	24	3	1,725,117
2013	1	96,650	1	45,000	1	0	1	40,500	5	0	3	182,150
2014	1	64,167	2	45,798	3	0					3	109,965
2015	2	186,031	1	20,225	1	0					3	206,256
2016	3	133,508									3	133,508
2017	3	75,100	3	283,067	122	0	2	2,885,147	2	0	8	3,243,314
2018	5	3,483,584									5	3,483,584
2019	7	441,183					1	9,491,125	341	288	8	9,932,308
2020											0	0
2021											0	0
Grand Total	29	83,760,504	11	903,980	146	7	8	15,905,591	836	359	48	100,570,075

Strengths, Weaknesses, Opportunities & Threats Analysis

This section details the findings of a Strengths, Weaknesses, Opportunities and Threat Analysis (SWOT) associated with the Tennessee multimodal freight system.

Strengths

The state is served by an extensive highway network with key corridors being I-40, supporting east-west connections and I-65 supporting north-south connections. The location of the state and its access to the nation's highway network means that 70 percent of the US population is within a two-day truck drive.

Multiple Class I railroads and supporting yards, including intermodal yard facilities are located in the state, providing access points to the North American rail network for both domestic and international shippers and goods receivers.

Memphis International Airport hosts the FedEx global hub which also supports a significant cluster of logistic companies and manufacturers in the region.

Class I railroads do not have weight restrictions associated with 286,000-pound rail cars.

The state has ample access for barge traffic via an extensive inland waterway system comprising the Mississippi, Cumberland, and Tennessee Rivers.

Intermodal connectivity between truck and rail, air and truck, and rail and truck, and rail and inland waterway are efficient, reliable, safe, and available throughout the state supporting the transfer of multiple commodity types.

Weaknesses

Much of the freight activity is focused in urban areas, especially Memphis and Nashville, which affects the urban populations by the negative consequences of freight activity.

A legacy of interstate highways passing through the state's urban areas, urban development, natural features such as rivers funneling highway traffic onto a limited number of bridges and growth of freight activity has led to highway freight bottlenecks occurring in Memphis and Nashville.

Some short line railroads have infrastructure constraints that restrict the use of 286,000-pound rail cars.

The state's geographical location manifests itself as a "connector" state which is characterized by significant volumes of pass-through freight traffic of all freight modes, especially truck and rail.

Opportunities

Building upon autonomous truck trials such as the Einride demonstrator in Selmer, Tennessee, could see opportunities for expanding autonomous trucks within the state.

Regional and short haul truck traffic, including drayage from rail intermodal yards, could be repowered to more sustainable fuels, such as battery electric trucks.

Completion of I-69 in the west portion of Tennessee will likely enhance economic development and population growth along the corridor.

Threats

Several freight facilities, especially railyards in urban areas, are in constrained locations and do not have room to expand.

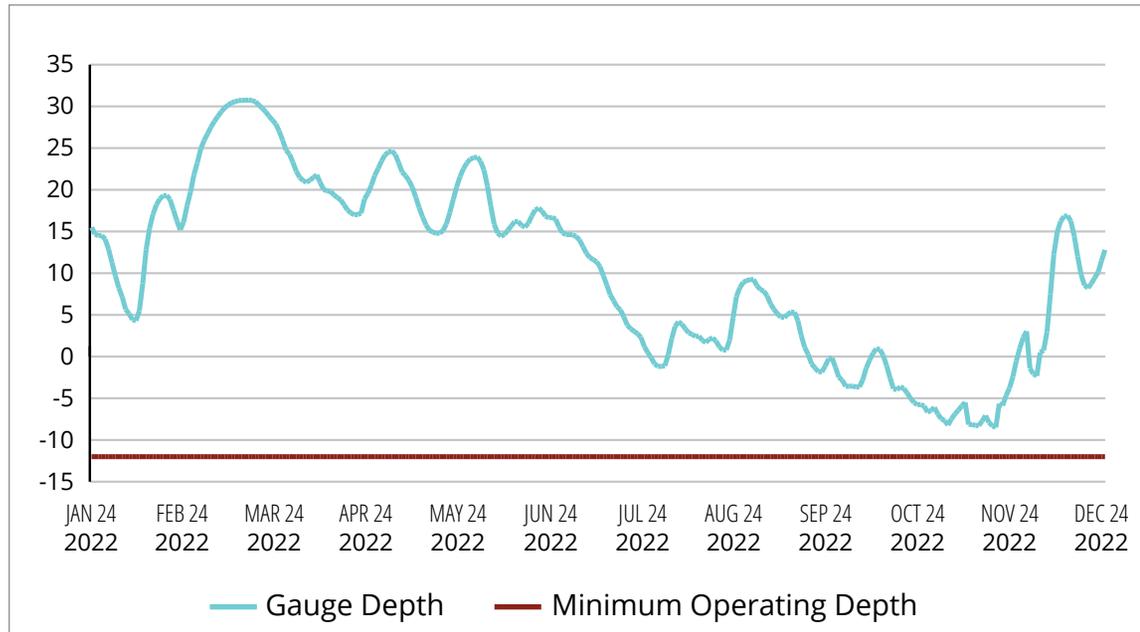
A reduction in coal powered generating stations is likely to lead to reduced barge traffic on the state's inland waterways and could impact the viability of barge companies operating in the region.

It was estimated there were 59,290 heavy and tractor-trailer drivers in Tennessee in 2021 with an annual wage of \$50,350. Keeping and attracting truck drivers and other workers across manufacturing, distribution and logistics sectors remains a key threat for companies based in the state.

Prolonged lock closures threaten the reliability and viability of river borne transportation on locked sections of the state's waterway system.

FIGURE 5-17: Water Level (ft) at Memphis, TN

SOURCE: U.S. Geological Survey



Drought conditions both in and out of state, such as the low water levels on the Mississippi River during October 2022 (Figure 5-17), have the potential to disrupt waterborne transportation. On October 17, 2022, the river level in Memphis dropped to -10.79 feet, the lowest level recorded since the start of National Weather Service records at the site in 1954.



Issues, Needs and Trends

6

Chapter 6: Issues, Needs and Trends

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Chapter 6: Issues, Needs and Trends

Building upon the information in previous chapters, this chapter lays out the state's freight mobility issues, needs and trends. It identifies the impediments to freight and how trends may help or hinder future freight movements. The issues, needs and trends of

each transportation mode are identified along with the background of advancing Tennessee's priority freight goals and objectives as described in Chapter 1. For context these goals and objectives are:



Improve the safety, security, efficiency, and resiliency of the freight transportation system

Objectives: Provide adequate, safe facilities to meet industry guidelines. Mitigate safety issues that arise from increased freight movement. Provide alternative routes in the case of an emergency, natural or manmade.



Improve the state of good repair of the freight transportation system

Objective: Maintain the freight system so that roadway bridges, rail bridges, locks for barges and airport runways can support the industry and manage the existing system.



Reduce congestion on the freight transportation system

Objective: Preserve and manage the existing system through strategic investments designed to reduce congestion/bottlenecks and enhance efficiency of intermodal movements.



Incorporate innovation and technology to improve mobility and safety

Objective: Increase efficiency and maximize safety on the freight system by utilizing new technology to provide alternative routing, sustainable travel, smarter data and enhanced communication.



Reduce the impacts of freight transportation

Objective: Improving the freight system such that the environmental and community impacts are limited and natural, cultural and environmental resources are protected, including reducing freight related emissions to improve local air quality and design freight related infrastructure to reduce the impact upon wildlife habitats and reduce stormwater flooding.

Air



Issues

Air is statistically the safest form of freight transportation throughout the state and the nation. The industry and regulators strive toward a 100 percent safe air cargo network because the public requires it. Existing and future air cargo movements must maintain this safety record.

Technological advances in aircraft will play a large role in advancing the efficiency of air freight in the future, the extent to which is dependent on several factors including technology advancement, regulation implementation and the level of adoption.

On the ground, maintaining and making improvements to infrastructure such as runway pavement and air cargo processing facilities remains a priority for the state's airports. Improvements must be made to all six primary cargo airports in the state with regular maintenance cycles.

Needs

- ◆ Advance new technologies to be deployed at a commercial scale when FAA rules/regulations are adopted
- ◆ Increase the diversified mix of air cargo by increasing the amount of general air cargo in the express/general cargo mix
- ◆ Improve airport pavement conditions to better the PCI throughout the airports in the state

Trends

Technologies such as electrified aircraft and unmanned aerial systems (UAS) have shown their viability in pilot testing throughout the country. Rules and regulations related to their operational environment are still several years away from being completed/adopted for large-scale commercial implementation. Tennessee should take the necessary steps to ensure that companies who will utilize the technology for commercial implementation are ready when the technologies are approved for use. In addition, UAS technologies are currently limited to carrying small high-value packages due to battery weight and payload capacity. UAS manufacturers are developing higher capacity aircraft as battery technology advances to reduce weight limitations and extend range.

Electric-powered regional aircraft are currently being tested in the US for short (500-800 mile) express feeder air cargo routes. Such technologies will reduce the environmental footprint of the air cargo industry and curb the need for traditional aviation fuel. Introducing more modern freighter aircraft will also improve fuel efficiency and reduce emissions. Airlines, including all cargo operators, are exploring and trialing the use of sustainable aviation fuel (SAF). SAF is typically made from renewable biomass or waste and has lower carbon emissions compared with traditional jet fuel. Airport ground handling equipment used to move cargo between aircraft and cargo terminals can also be repowered to electric.

Rail



Issues

Shifts in cargo types such as the reduction in coal movements have required railroads to diversify their cargo mix and make changes to their operations. These changes have cascading effects such as service to existing and potential customers, short line connections, and changes to transload material handling equipment and the rail car fleet.

Class III (short line) railroads are often restricted by weight limits on their railways, thus reducing their operational efficiency. Since these railroads often move heavy bulk material, lower efficiencies reduce the competitiveness of rail for these movements.

Crossing safety is a top priority for federal, state and local officials as well as rail operators. Although incident rates have improved at highway-rail grade crossings, safety improvements are still needed to reduce conflicts along the State's rail corridors.

Needs

- ◆ Reduce the number and severity of hazardous materials rail crashes by continuing the state's inspection program
- ◆ Increase weight capacity on Class III rail lines by upgrading tracks (i.e., rail, ties, and ballast) and bridges to handle the additional stress caused by transporting heavier rail cars
- ◆ Improve congestion by reducing the number of blocked crossings through capacity, grade separations, closing crossings and operational improvements
- ◆ Reduce the number and severity of crashes at highway-rail grade crossings by improving crossing safety and reducing the number of unprotected crossings
- ◆ Improve rail grade crossing safety by considering projects through a corridor-based approach, to improve safety systematically along specific railroad subdivisions, portions of subdivisions, or within a particular city or county

Trends

Over the last decade, Class I railroads have implemented operational efficiencies that include longer trains and unit trains with fewer stops for customers. These strategies have increased the productivity of the railroads, however smaller customers and connecting short lines have seen a reduction in service options.

Implementation of positive train control (PTC) over the past decade is credited for improved safety throughout Tennessee, particularly in the number of collisions on lines with PTC technology. Due to the cost of equipping locomotives with PTC technology, railroads have implemented these improvements only where required by Federal regulations.

Over the past 10 years rail crossing safety has improved. Incidents at crossings have decreased from a total number of 78 in 2012, to 22 in 2021. This is a result of TDOT's focus on prioritizing safety needs and crossing evaluations so they can implement the appropriate projects in locations with the greatest need.

Waterways

Issues

The age and condition of locks and dams along Tennessee’s inland waterway system contributes to shipping delays and constrained capacity for waterborne cargo. As described in Chapter 5, deferred maintenance on locks and dams has required critical shipping channels to be closed for extended periods of time.

Shipping channels require on-going dredging to maintain the necessary depths for vessels loaded to capacity. Annual maintenance to these channels is vital to the operational efficiencies of the inland waterway system in Tennessee.

Often the equipment needed to load and off-load riverport cargo is older, outdated and can be unreliable. New funding grants through the IJA can provide funding for upgrading material handling equipment to be more efficient, reliable and produce fewer emissions.

Needs

- ◆ Lock maintenance and capacity improvements specifically the completion of the Chickamauga and Kentucky lock improvements
- ◆ Improve and update landside material handling equipment improvement/updating
- ◆ Increasing the navigational depth on the Tennessee River to 11 feet



Trends

There has been little change in water shipping efficiency over the past 80 years. The capacity of vessels and the system in general is limited to the capacity and throughput of locks, including those outside of Tennessee, such as the Kentucky Lock. Some locks, such as the Chickamauga and Kentucky locks, are being increased in size to improve the efficiency of barge movement. Locks that are closed for maintenance and smaller locks that require the separation of barges create throughput and delay issues for waterborne shipments.

The most significant trend on the state’s inland waterway system has seen a dramatic decrease in the shipment of coal due to many coal-fired powerplants closing throughout the region. This has changed the commodity mix that is shipped on the state’s waterways, with other cargo being explored such as containers, petroleum increases, wind turbines and machinery.

Highways & Roads

Issues

New funding is available from the passage of the IIJA legislation in the form of discretionary grants. There are several programs specifically (and tangentially) geared toward the improvement of freight safety and mobility. The law authorizes \$1.2 trillion for transportation and infrastructure spending with \$550 billion of that figure going toward “new” investments and programs, expires in 2026. The law changes the landscape of funding for projects by providing funds through a discretionary process based on project merits. With the IIJA grant opportunities being competitive, it is important that applicants submit projects that meet and exceed IIJA grant programs’ aims, merit criteria and can meet schedules in the grant.

Planning for freight growth has many different facets. The identification of areas where freight-related businesses are to be located requires good transportation system access, the availability of labor, considerations for equity and livability, future refueling infrastructure, location of truck parking/staging, ensuring safety, mitigating environmental impacts, etc.

Updated Federal hours of service regulations for commercial drivers were completed in 2011, but have been in use since 1937 to address driver fatigue and safety issues. The more recent hours of service rule permits drivers to drive a maximum of 11 hours after 10 consecutive off-duty hours within a 14 hour on-duty window. A 30-minute break must occur after eight hours of consecutive driving. The introduction of electronic logging devices (ELDs) in 2019, to more accurately record driver hours of service, has removed ambiguity on when drivers must take their breaks. These regulations have a significant impact on when and where trucks may park. Truck parking capacity has not kept pace with rising truck volumes and overall demand, requiring drivers to park in undesignedated and unsafe locations.



Congestion and bottlenecks remain issues that are not exclusive to freight movement. However, the impact reduces the velocity of freight movement and has a widespread impact on the system and economy. Reducing the impact of congestion on freight through operational and capacity improvements, and maintaining highways and bridges to a state of good repair will increase freight throughput, improve freight resiliency and reduce emissions.

In recent years, environmental regulations have increased the demand for alternative fuels to improve local air quality and reduce greenhouse gases. This has prompted the development and implementation of compressed natural gas (CNG) as a fuel source for local delivery trucks and liquefied natural gas (LNG) for long-haul trucks. Hydrogen fuel celled and electric trucks are currently being tested and deployed at a small but ever increasing scale. It is a matter of time before they become a significant part of the overall truck fleet and the total cost of ownership (including direct costs of buying, maintaining, fueling/charging and driving a commercial vehicle) for these zero emissions trucks is comparable with diesel trucks. Compared to light-duty vehicles, electric heavy-duty trucks require significant power levels to charge quickly. Large volumes of fast charging heavy-duty trucks will require power levels like large-scale industrial users. Hydrogen fuel cell trucks will require the availability of hydrogen and the introduction of a new refuelling network.

Regulations for autonomous or semi-autonomous trucks are iterative, with regulations changing as safety and proof of concept testing continues. A patchwork of regulations throughout the country will need to be assimilated to allow trucks to operate between the various states.

Needs

- ◆ Complete roadway improvements such as installing center and edge line rumble strips to help with driver fatigue
- ◆ To also reduce driver fatigue and comply with HOS regulations, maintain and expand truck parking availability
- ◆ Improve commercial motor vehicle (CMV) safety, size and weight compliance by using enhanced screening technologies
- ◆ Increase safety awareness of the general public, motor carriers and heavy vehicle drivers to the uniqueness of freight operations and related safety considerations through education and outreach activities
- ◆ Reduce and/or remove bottlenecks and overall system delay and truck travel time reliability
- ◆ Improve roadway infrastructure for heavy vehicle operation by adding turn lanes at key intersections, adding truck climbing lanes, developing safety corridors and installing intersection warning systems at at-risk locations
- ◆ Maintain highways to a state of good repair on major freight corridors, first- and last-mile highways and truck access to other strategic freight assets such as freight-served airports, rail facilities, and pipelines
- ◆ Improve and maintain the condition of highway pavement, maintain/repair existing bridges and replace bridges in poor condition with modern structures will ensure that infrastructure supports and meets the needs of Tennessee freight movement
- ◆ Improve freight resiliency by investing in protection for freight-reliant roadways from flood, landslide and other hazards
- ◆ Ensure freight-related transportation infrastructure considers stormwater runoff and wildlife habitat loss in its design and development
- ◆ Make strategic capacity improvements to meet future freight demand and avoid future bottlenecks
- ◆ Improve first and last mile connections to provide service where needed and accommodate growth in e-commerce related freight activity

- ◆ Improve truck efficiency to reduce energy consumption and reduce emissions
- ◆ Make plans and investments that improve truck travel times and reliability such as incident response, truck-oriented signal timing, variable message signs, roadway conditions information systems, etc.
- ◆ Improve truck parking information and management to better inform truck drivers as to where truck parking spaces are available and ensure that truck drivers have access to safe truck parking spaces
- ◆ Assess automation, data resources and new transportation technologies to determine needs for future freight technologies such as autonomous trucks, truck platooning and delivery robots

Trends

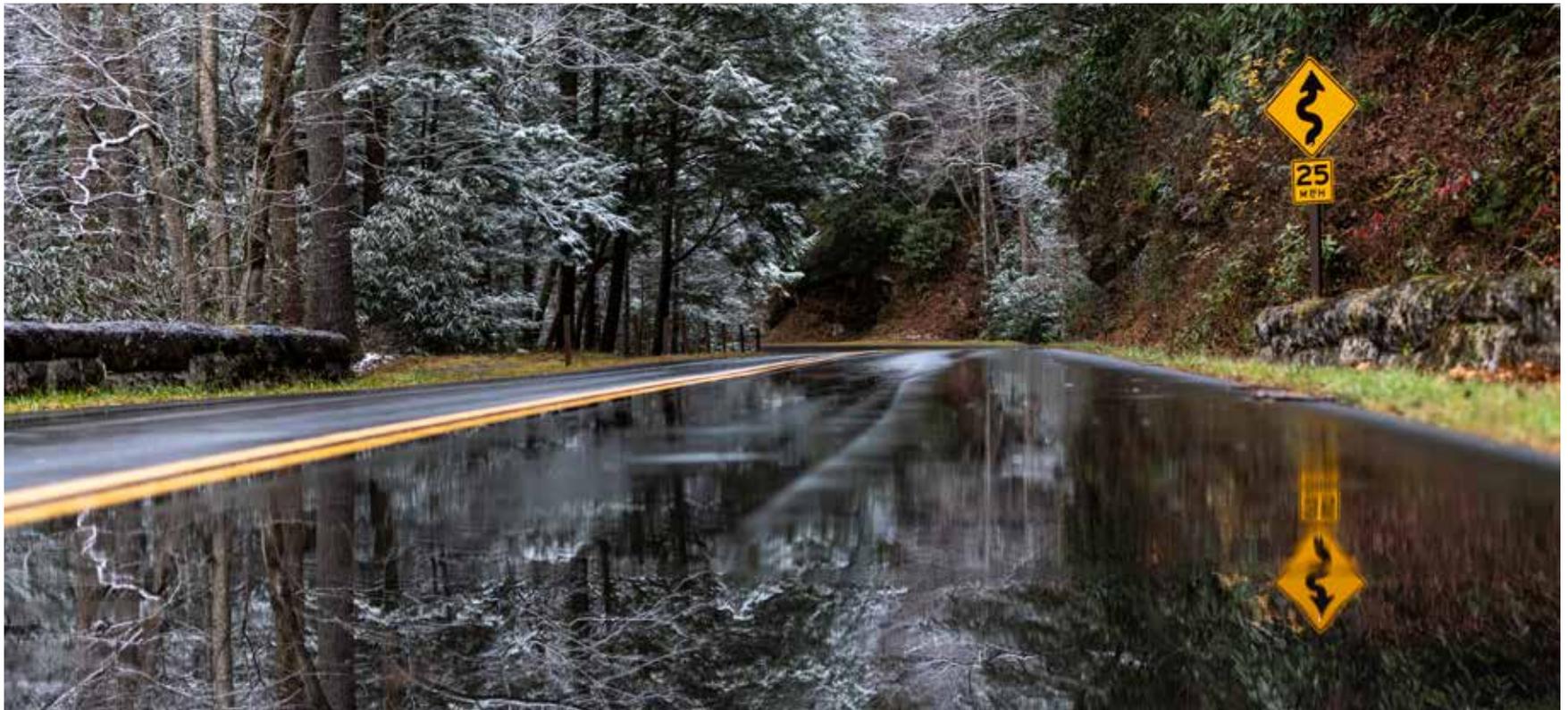
Electronic commerce (e-commerce) has increased from 5.1 percent of total retail activity in 2012 to 13.3 percent in the second quarter of 2021, spiking to almost 16 percent of total retail activity during the second quarter of 2020 because of the COVID-19 pandemic. To compete, traditional retailers have implemented new strategies like 'buy on-line, pick up in store' and have established more local distribution centers to create expedited supply chains. Online retailers have constructed a series of centralized distribution centers. Rapid e-commerce requires fast, on-time delivery, which is sensitive to distance and congestion, among other factors. A result of this trend is a higher number of delivery vehicles entering into residential neighborhoods, increasing concerns related to congestion, wear and tear to the local road network and parking.

Freight has become a growing part of EV discussions. Freight companies involved in local and short-distance shipping could develop dedicated charging infrastructure at facilities. Long-distance freight could also be served by dedicated charging infrastructure and would require substantially more power than what is needed at non-freight stations. As the IJA programs and guidance are fully rolled out, federal grant funding could become available to support the expansion of electric truck charging. In addition, hydrogen-powered trucks show promise for longer-haul moves and have spurred the development of federally designated Hydrogen Alternative Fuel Corridors.

States are beginning to tap into their intelligent transportation systems (ITS) frameworks to provide future benefits to freight movement by expanding the use of mainline and arterial dynamic message signs, cameras, communications equipment, traffic operations centers and safety patrols. These benefit the freight system by providing driver information including truck parking availability, comparative travel time information to freight specific destinations, queue warning messages, lane blockage messages and other safety-related messages. It also reduces crashes and congestion through the various strategies and deployments, which also benefits freight flows through the state.

New and emerging 'big' data sets are allowing more in depth data analytics to provide a better understanding of system operations and the identification of needs to improve those required for the

reliability of the freight system. These datasets include nearly real time truck volumes, speed data, weather, incidents, work zones, truck parking locations/ availability and traffic management, among other information. Analysis of the data provides decision making support for addressing bottlenecks, performance of connected and automated vehicles (CAV) and prioritization of infrastructure and operational investments in the future.





Forecasts and Future Demands

Chapter 7: Forecasts and Future Demands

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Chapter 7: Forecasts and Future Demands

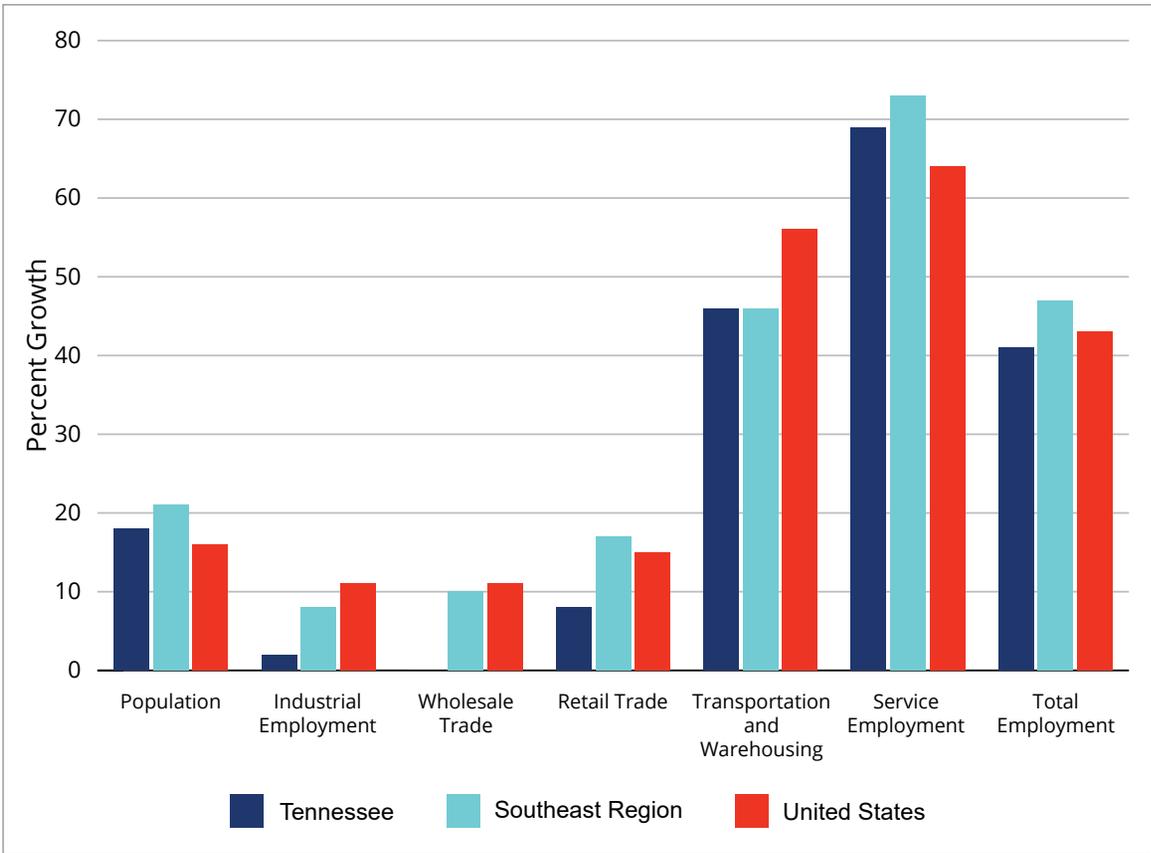
This chapter provides an overview of Tennessee’s socioeconomic trends and future forecasts related to transportation. Tennessee’s population is growing, and the trending urbanization of the state’s population is driving industrial growth in the metropolitan areas.

Socioeconomic Trends

Through 2045 Tennessee’s population is projected to increase at a slightly higher rate than the projected overall US population growth rate. Employment in Tennessee is projected to increase at a slightly lower rate than the overall US growth rate.¹ **Figure 7-1** compares population and employment growth projections for Tennessee, the 12-state Southeast region and the US. This figure shows that Tennessee’s population is projected to grow 18 percent between 2020 and 2045. Employment is projected to grow by 41 percent.

Across the Southeast region, most of the projected employment growth is expected to occur in the transportation and warehousing sector and the service sector. However, growth in industrial, wholesale and retail trade sectors in Tennessee are projected to be lower than the Southeast and US.

FIGURE 7-1: Socioeconomic Trends: 2020 to 2045.
SOURCE: Woods & Poole Economics, Inc., 2022.



¹ Woods & Poole Economics, Inc., 2022

Population

Tennessee’s statewide population is projected to grow 18 percent from 6.89 million in 2020 to 8.12 million in 2045. **Table 7-1** shows that nearly 90 percent of this growth is projected in the state’s urban counties.² While nearly one-third of the state’s counties are projected to lose population through the 2045 horizon, **Table 7-1** shows that the relative split between the urban and rural population in 2045 is expected to be similar to 2020.

TABLE 7-1: Tennessee 2020 to 2045 Urban-Rural Population Growth Projections.

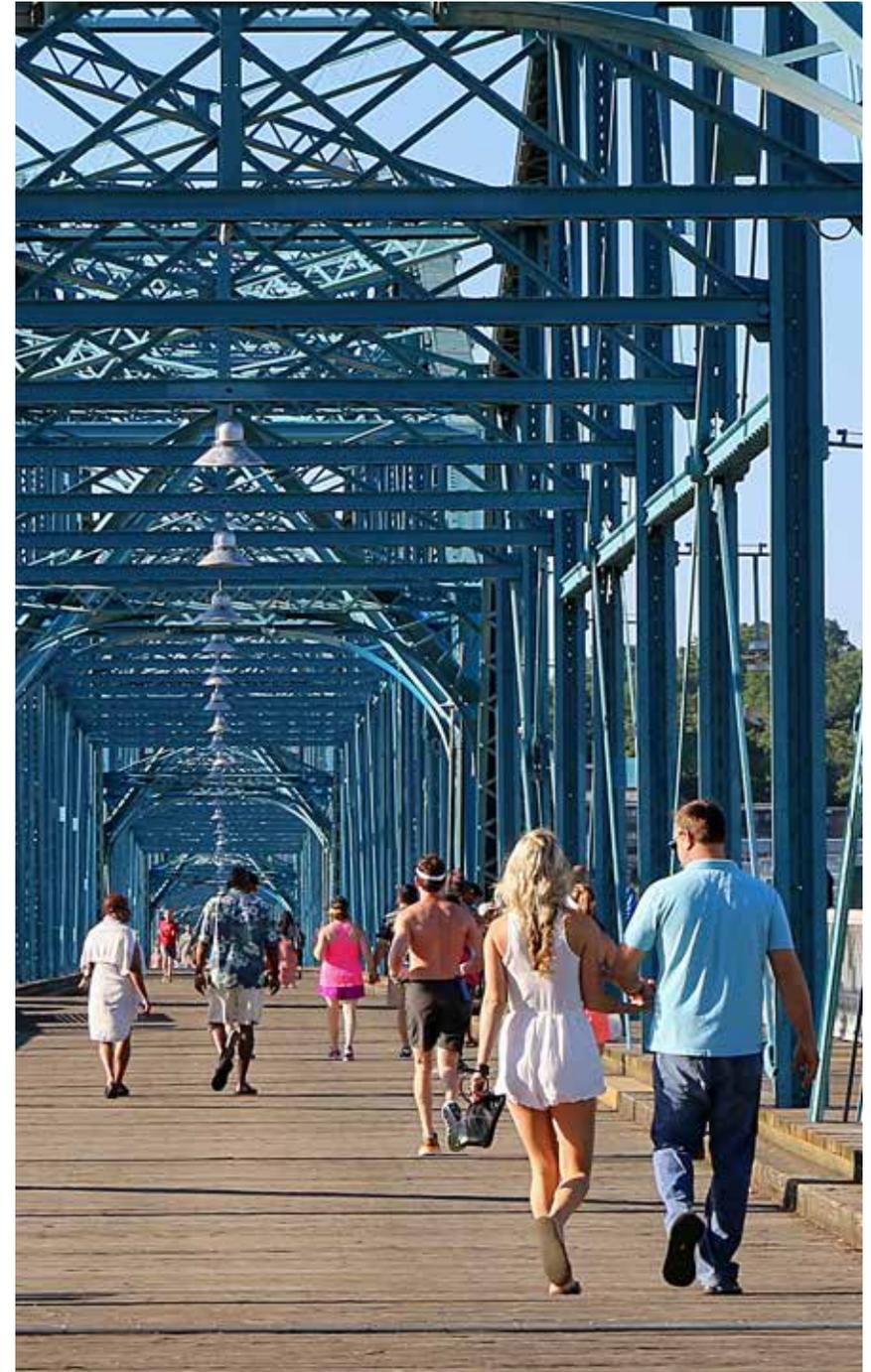
SOURCE: US Census Bureau, 2010; Tennessee State Data Center, March 2022.

County	2020	2045	Difference	Pct. Diff.
Mostly Urban	4,875,300	5,969,000	1,093,700	22%
Rural	2,022,800	2,153,200	130,400	6%
Total	6,898,000	8,122,000	1,224,000	18%
Pct. Urban	71%	73%	89%	-

Table 7-2 shows the 2045 Tennessee State Data Center population projections for each county. Urban counties with more than 50 percent of their population living in an urban (U) area are noted.

Figure 7-2 shows projected county population growth percentages between 2020 and 2045. It shows that Williamson and Rutherford Counties near Nashville are projected to grow at a faster rate.

Figure 7-3 shows 2045 county population growth projections.



² Tennessee urban and rural counties are classified based on the 2010 Census. The US Census Bureau classifies counties with more than 50 percent of the population living in urban areas as mostly urban.

TABLE 7-2: Tennessee 2020 to 2045 County Population Projections.

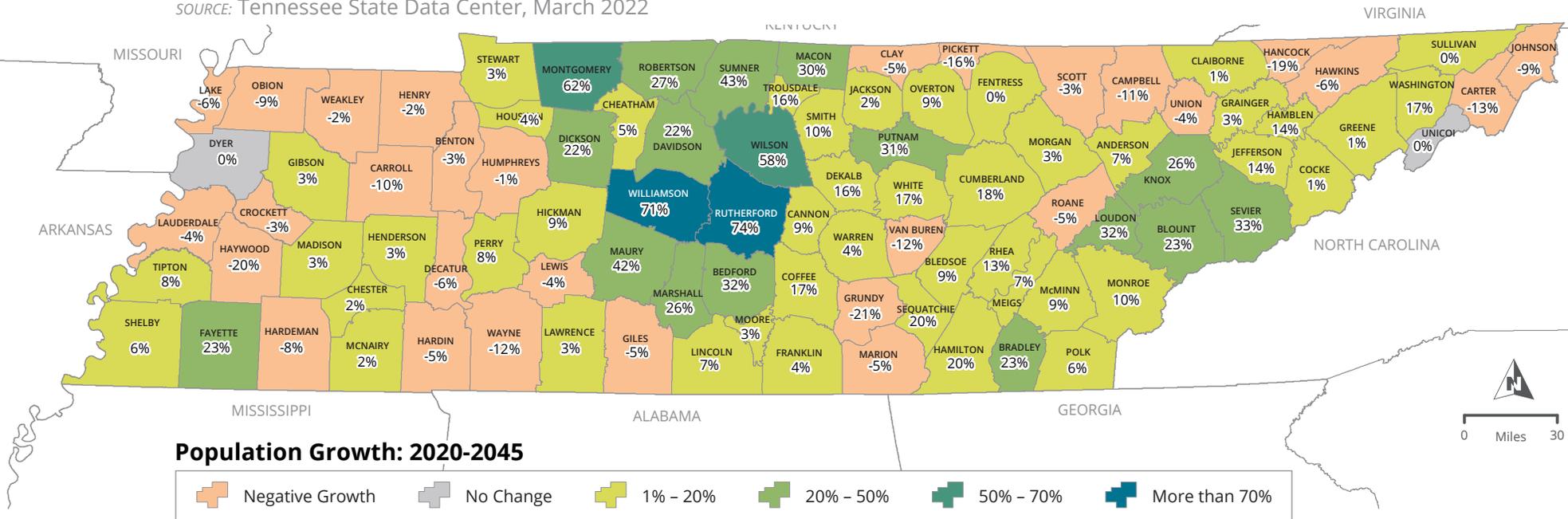
SOURCE: Tennessee State Data Center, March 2022.

County	2020	2045	Difference	Pct. Diff.
Anderson (U)	77,558	82,529	4,971	7%
Bedford	50,179	63,667	13,488	32%
Benton	16,131	15,758	-373	-3%
Bledsoe	15,223	16,605	1,382	9%
Blount (U)	134,751	160,918	26,167	23%
Bradley (U)	109,071	130,152	21,081	23%
Campbell	39,837	36,251	-3,586	-11%
Cannon	14,847	16,118	1,271	9%
Carroll	27,779	25,445	-2,334	-10%
Carter (U)	56,418	50,386	-6,032	-13%
Cheatham	41,101	43,243	2,142	5%
Chester	17,432	17,825	393	2%

County	2020	2045	Difference	Pct. Diff.
Claiborne	32,023	32,633	610	1%
Clay	7,629	7,352	-278	-5%
Cocke	36,225	36,798	573	1%
Coffee (U)	57,632	66,137	8,505	17%
Crockett	14,180	13,770	-410	-3%
Cumberland	61,603	71,725	10,122	18%
Davidson (U)	705,400	832,220	126,820	22%
Decatur	11,601	11,075	-526	-6%
DeKalb	20,837	23,744	2,907	16%
Dickson	54,376	64,818	10,442	22%
Dyer (U)	36,693	36,602	-91	0%
Fayette	41,620	49,984	8,364	23%

FIGURE 7-2: Tennessee Population Growth Projections: 2020 to 2045

SOURCE: Tennessee State Data Center, March 2022

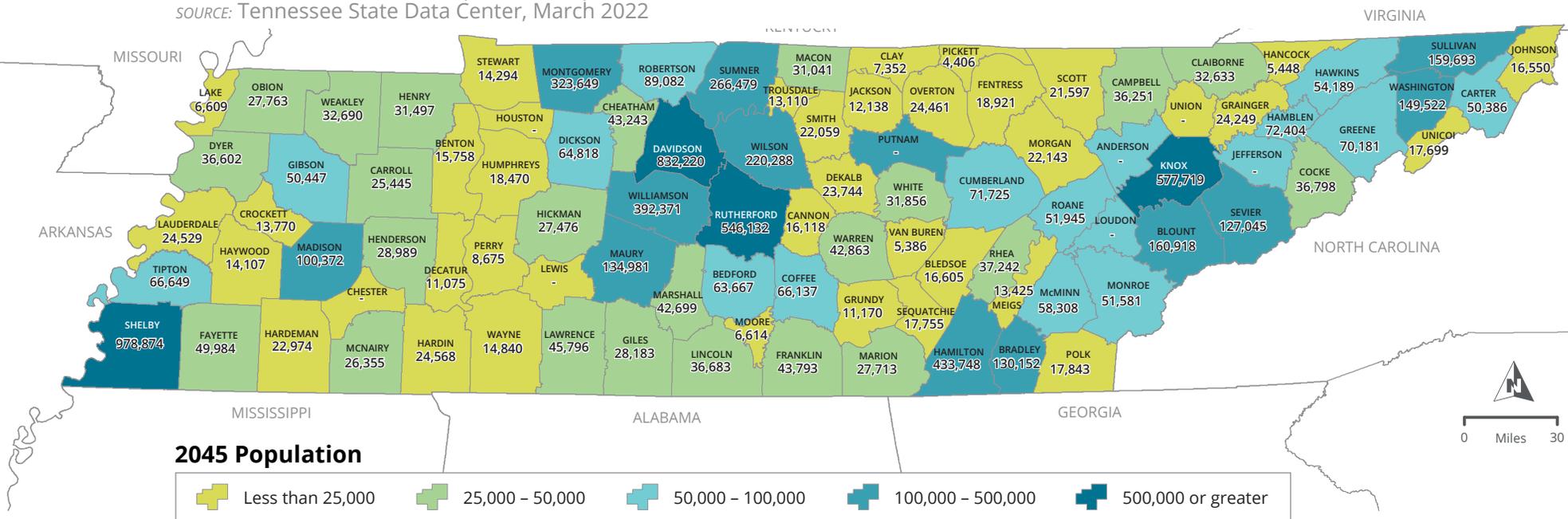


County	2020	2045	Difference	Pct. Diff.
Fentress	18,787	18,921	134	0%
Franklin	42,485	43,793	1,308	4%
Gibson (U)	49,159	50,447	1,288	3%
Giles	29,530	28,183	-1,347	-5%
Grainger	23,565	24,249	684	3%
Greene	69,571	70,181	610	1%
Grundy	13,485	11,170	-2,315	-21%
Hamblen (U)	65,110	72,404	7,294	14%
Hamilton (U)	371,662	433,748	62,086	20%
Hancock	6,493	5,448	-1,046	-19%
Hardeman	24,836	22,974	-1,862	-8%
Hardin	25,583	24,568	-1,015	-5%
Hawkins	56,775	54,189	-2,586	-6%
Haywood (U)	17,002	14,107	-2,896	-20%

County	2020	2045	Difference	Pct. Diff.
Henderson	28,076	28,989	913	3%
Henry	32,056	31,497	-559	-2%
Hickman	25,387	27,476	2,089	9%
Houston	8,292	8,597	305	4%
Humphreys	18,590	18,470	-120	-1%
Jackson	11,864	12,138	274	2%
Jefferson	55,307	62,280	6,973	14%
Johnson	17,849	16,550	-1,299	-9%
Knox (U)	475,609	577,719	102,110	26%
Lake	6,988	6,609	-379	-6%
Lauderdale	25,451	24,529	-922	-4%
Lawrence	44,432	45,796	1,364	3%
Lewis	12,363	11,969	-394	-4%
Lincoln	34,540	36,683	2,143	7%

FIGURE 7-3: Tennessee 2045 Population Projections

SOURCE: Tennessee State Data Center, March 2022



County	2020	2045	Difference	Pct. Diff.
Loudon (U)	54,910	69,483	14,573	32%
McMinn	54,208	58,308	4,100	9%
McNairy	25,696	26,355	659	2%
Macon	24,827	31,041	6,214	30%
Madison (U)	98,360	100,372	2,012	3%
Marion	28,924	27,713	-1,211	-5%
Marshall	35,016	42,699	7,683	26%
Maury (U)	99,590	134,981	35,391	42%
Meigs	12,532	13,425	893	7%
Monroe	47,177	51,581	4,404	10%
Montgomery (U)	214,251	323,649	109,398	62%
Moore	6,438	6,614	176	3%
Morgan	21,431	22,143	712	3%
Obion	30,131	27,763	-2,368	-9%
Overton	22,566	24,461	1,895	9%
Perry	8,099	8,675	576	8%
Pickett	5,061	4,406	-655	-16%
Polk	16,835	17,843	1,008	6%
Putnam (U)	80,929	101,962	21,033	31%
Rhea	33,443	37,242	3,799	13%
Roane	53,841	51,945	-1,896	-5%
Robertson	72,275	89,082	16,807	27%
Roane	339,261	546,132	206,871	74%
Scott	22,090	21,597	-493	-3%
Sequatchie	15,176	17,755	2,579	20%
Sevier	99,244	127,045	27,801	33%
Shelby (U)	936,017	978,874	42,857	6%
Smith	20,285	22,059	1,774	10%
Stewart	13,859	14,294	435	3%
Sullivan (U)	158,755	159,693	938	0%
Sumner (U)	195,561	266,479	70,918	43%
Tipton	61,918	66,649	4,731	8%

County	2020	2045	Difference	Pct. Diff.
Trousdale	11,455	13,110	1,655	16%
Unicoi (U)	17,755	17,699	-56	0%
Union	20,187	19,663	-524	-4%
Van Buren	5,947	5,386	-561	-12%
Warren	41,605	42,863	1,258	4%
Washington (U)	130,367	149,522	19,155	17%
Wayne	16,524	14,840	-1,684	-12%
Weakley	33,334	32,690	-644	-2%
White	27,707	31,856	4,149	17%
Williamson (U)	245,348	392,371	147,023	71%
Wilson (U)	148,130	220,288	72,158	58%
Total	6,898,000	8,122,000	1,224,000	18%

Note: (U) denotes a county with more than 50 percent of its population living in an urban area.

Employment

Overall, the state's employment is projected to grow by 41 percent through 2045 with the addition of over 1.6 million new jobs.

Table 7-3 shows that 86 percent of this growth is projected in Tennessee's urban counties. By 2045, urban areas will have an even greater share of the state's overall employment.

TABLE 7-3: Tennessee 2020 to 2045 Urban-Rural Employment Growth Projections.

SOURCE: US Census Bureau, 2010; Tennessee State Data Center, March 2022.

County	2020	2045	Difference	Pct. Diff.
Mostly Urban	3,191,700	4,603,400	1,411,700	44%
Rural	825,800	1,060,000	234,200	28%
Total	4,017,500	5,663,400	1,645,900	41%
Pct. Urban	79%	81%	86%	-

E-Commerce Growth

In 2019, e-commerce in the US accounted for nearly 11 percent of retail sales. Sales from e-commerce increased over 14 percent between 2018 and 2019, which outstripped the 3 percent growth in traditional retail sales.³ The global pandemic in 2020 caused an acceleration in e-commerce growth.

Table 7-4 reflects this new economy with Tennessee’s transportation and warehousing employment projected to grow 46 percent by 2045. This heightened growth in transportation and warehousing contrasts with slower growth in traditional goods-dependent industries such as agriculture, mining, construction and manufacturing.

Part of this job growth is a result of e-commerce retail sales that have created new demand for quick deliveries and new logistics strategies. Fulfillment centers and distribution hubs closer to population centers and strategic transportation facilities such as the FedEx Hub, are part of the force behind the projected growth in transportation and warehousing employment.

Table 7-5 shows employment growth projections by county. **Figure 7-4** shows that job growth will remain concentrated in the state’s urban areas.

TABLE 7-4: Tennessee 2020 to 2045 Employment by Industrial Sector.

SOURCE: Woods & Poole Economics, Inc., 2022.

Industrial Sector	2020	2045	Difference	Pct. Diff.
Farm	74,491	70,547	-3,944	-5%
Forestry, Fishing, Related Activities	10,789	12,584	1,795	17%
Mining	6,498	8,155	1,657	26%
Utilities	4,245	4,526	281	7%
Construction	229,995	245,971	15,976	7%
Manufacturing	349,119	344,954	-4,165	-1%
Wholesale Trade	129,190	128,946	-244	0%
Retail Trade	402,120	432,386	30,266	8%
Transportation and Warehousing	241,849	352,580	110,731	46%
Information	54,666	60,461	5,795	11%
Finance and Insurance	191,458	274,702	83,244	43%
Real Estate and Rental and Lease	156,981	263,986	107,005	68%
Professional and Technical Services	236,716	435,852	199,136	84%
Management of Companies and Enterprises	54,855	132,493	77,638	142%
Administrative and Waste Services	301,729	491,591	189,862	63%
Educational Services	84,731	159,745	75,014	89%
Health Care and Social Assistance	431,792	710,109	278,317	64%
Arts, Entertainment, and Recreation	79,503	184,941	105,438	133%
Accommodation and Food Services	286,370	520,196	233,826	82%
Other Services, Except Public Administration	238,915	341,859	102,944	43%
Federal Civilian Government	52,377	50,063	-2,314	-4%
Federal Military	21,110	21,261	151	1%
State and Local Government	377,943	415,481	37,538	10%
Total	4,017,500	5,663,400	1,645,900	41%

³ (US Census Bureau, 2021)

TABLE 7-5: Tennessee 2020 to 2045 Population Projections.

SOURCE: Woods & Poole Economics, Inc., 2022.

County	2020	2045	Difference	Pct. Diff.
Anderson (U)	49,961	58,095	8,134	16%
Bedford	23,236	29,731	6,495	28%
Benton	6,392	7,410	1,018	16%
Bledsoe	3,536	4,056	520	15%
Blount (U)	68,193	107,682	39,489	58%
Bradley (U)	59,427	86,171	26,744	45%
Campbell	13,570	16,406	2,836	21%
Cannon	4,881	6,076	1,195	24%
Carroll	10,615	12,583	1,968	19%
Carter (U)	17,843	22,258	4,415	25%
Cheatham	15,282	20,340	5,058	33%
Chester	6,112	7,664	1,552	25%
Claiborne	13,262	16,290	3,028	23%
Clay	2,930	3,425	495	17%
Cocke	11,020	12,883	1,863	17%
Coffee (U)	34,453	40,282	5,829	17%
Crockett	5,962	6,718	756	13%
Cumberland	26,036	35,281	9,245	36%
Davidson (U)	640,898	988,520	347,622	54%
Decatur	5,325	6,252	927	17%
DeKalb	8,968	11,488	2,520	28%
Dickson	25,651	35,749	10,098	39%
Dyer (U)	20,251	21,685	1,434	7%
Fayette	15,471	27,098	11,627	75%
Fentress	8,286	11,011	2,725	33%
Franklin	17,446	22,868	5,422	31%
Gibson (U)	20,697	20,791	94	0%
Giles	14,924	18,181	3,257	22%
Grainger	7,492	8,614	1,122	15%
Greene	34,155	39,883	5,728	17%

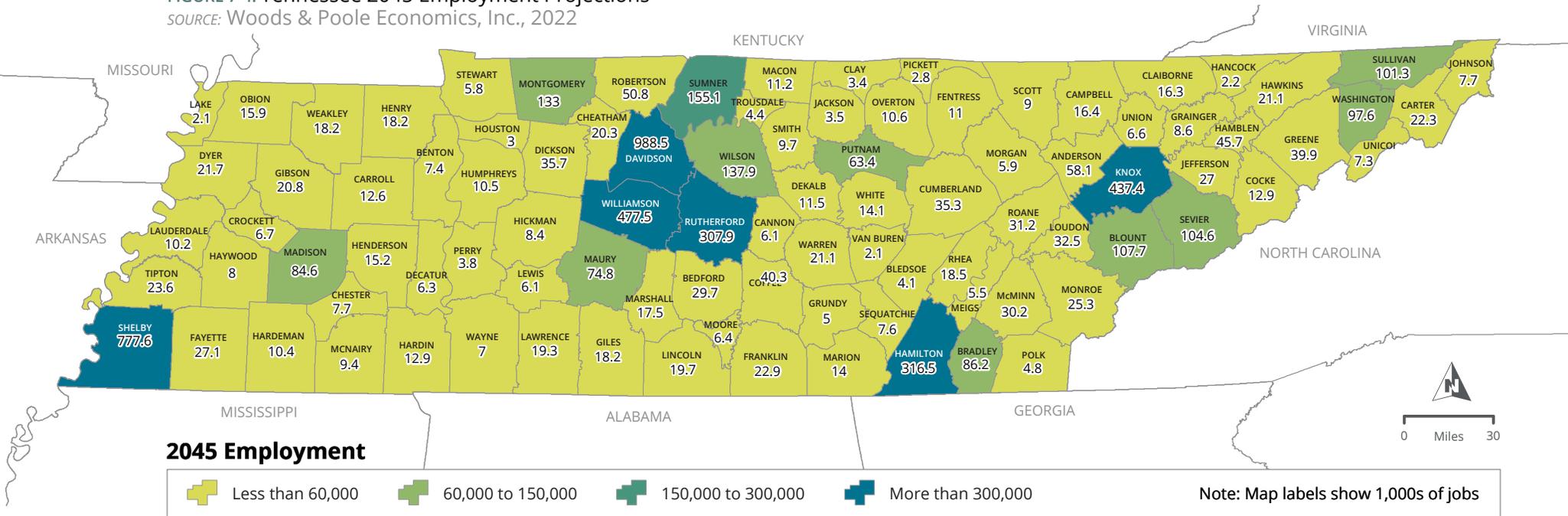
County	2020	2045	Difference	Pct. Diff.
Grundy	4,344	4,994	650	15%
Hamblen (U)	39,454	45,725	6,271	16%
Hamilton (U)	262,133	316,452	54,319	21%
Hancock	1,904	2,180	276	14%
Hardeman	9,626	10,367	741	8%
Hardin	11,592	12,941	1,349	12%
Hawkins	18,588	21,050	2,462	13%
Haywood (U)	7,724	8,036	312	4%
Henderson	11,832	15,196	3,364	28%
Henry	16,015	18,229	2,214	14%
Hickman	7,253	8,384	1,131	16%
Houston	2,626	3,020	394	15%
Humphreys	8,505	10,453	1,948	23%
Jackson	3,211	3,521	310	10%
Jefferson	20,100	27,002	6,902	34%
Johnson	6,517	7,710	1,193	18%
Knox (U)	314,408	437,368	122,960	39%
Lake	1,929	2,104	175	9%
Lauderdale	9,111	10,173	1,062	12%
Lawrence	17,566	19,343	1,777	10%
Lewis	4,786	6,081	1,295	27%
Lincoln	14,818	19,731	4,913	33%
Loudon (U)	24,329	32,534	8,205	34%
McMinn	25,048	30,160	5,112	20%
McNairy	8,706	9,398	692	8%
Macon	8,704	11,200	2,496	29%
Madison (U)	72,379	84,611	12,232	17%
Marion	10,883	13,970	3,087	28%
Marshall	14,068	17,521	3,453	25%
Maury (U)	51,653	74,794	23,141	45%

County	2020	2045	Difference	Pct. Diff.
Meigs	3,742	5,544	1,802	48%
Monroe	19,610	25,264	5,654	29%
Montgomery (U)	81,903	132,966	51,063	62%
Moore	3,573	6,449	2,876	80%
Morgan	5,086	5,864	778	15%
Obion	14,993	15,874	881	6%
Overton	8,566	10,646	2,080	24%
Perry	3,084	3,820	736	24%
Pickett	2,016	2,770	754	37%
Polk	4,262	4,776	514	12%
Putnam (U)	49,244	63,421	14,177	29%
Rhea	14,181	18,485	4,304	30%
Roane	25,881	31,196	5,315	21%
Robertson	34,036	50,805	16,769	49%
Roane	181,221	307,894	126,673	70%
Scott	8,092	9,003	911	11%
Sequatchie	4,940	7,564	2,624	53%
Sevier	61,258	104,576	43,318	71%

County	2020	2045	Difference	Pct. Diff.
Shelby (U)	652,773	777,605	124,832	19%
Smith	8,342	9,718	1,376	16%
Stewart	4,664	5,791	1,127	24%
Sullivan (U)	87,516	101,271	13,755	16%
Sumner (U)	88,436	155,089	66,653	75%
Tipton	18,659	23,640	4,981	27%
Trousdale	3,175	4,369	1,194	38%
Unicoi (U)	6,549	7,258	709	11%
Union	5,032	6,567	1,535	31%
Van Buren	1,661	2,099	438	26%
Warren	18,909	21,120	2,211	12%
Washington (U)	79,508	97,562	18,054	23%
Wayne	6,117	7,019	902	15%
Weakley	16,587	18,154	1,567	9%
White	11,031	14,122	3,091	28%
Williamson (U)	203,970	477,464	273,494	134%
Wilson (U)	76,738	137,885	61,147	80%
Total	4,017,500	5,663,400	1,645,900	41%

FIGURE 7-4: Tennessee 2045 Employment Projections

SOURCE: Woods & Poole Economics, Inc., 2022



Personal Income Growth

Personal income growth is important to state freight planning as an indicator of how the changing demand for goods and services may affect goods movement. In Tennessee, personal income is projected to grow at the same rate as the Southeast Region through 2045.

Table 7-6 shows that personal income is expected to grow faster in Tennessee and the Southeast than in the US. This analysis uses the value of a 2012 dollar without adjustment for inflation to show the projected changes in personal income between 2020 and 2045.

TABLE 7-6: Tennessee 2020 to 2045 Population Projections.

SOURCE: Woods & Poole Economics, Inc., 2022.

Industrial Sector	2020	2045	Difference	Pct. Diff.
Tennessee	\$45,674	\$67,017	\$21,343	47%
Southeast Region	\$46,944	\$68,903	\$21,959	47%
United States	\$53,178	\$76,481	\$23,303	44%

Transportation Travel Demand and Growth

System Performance

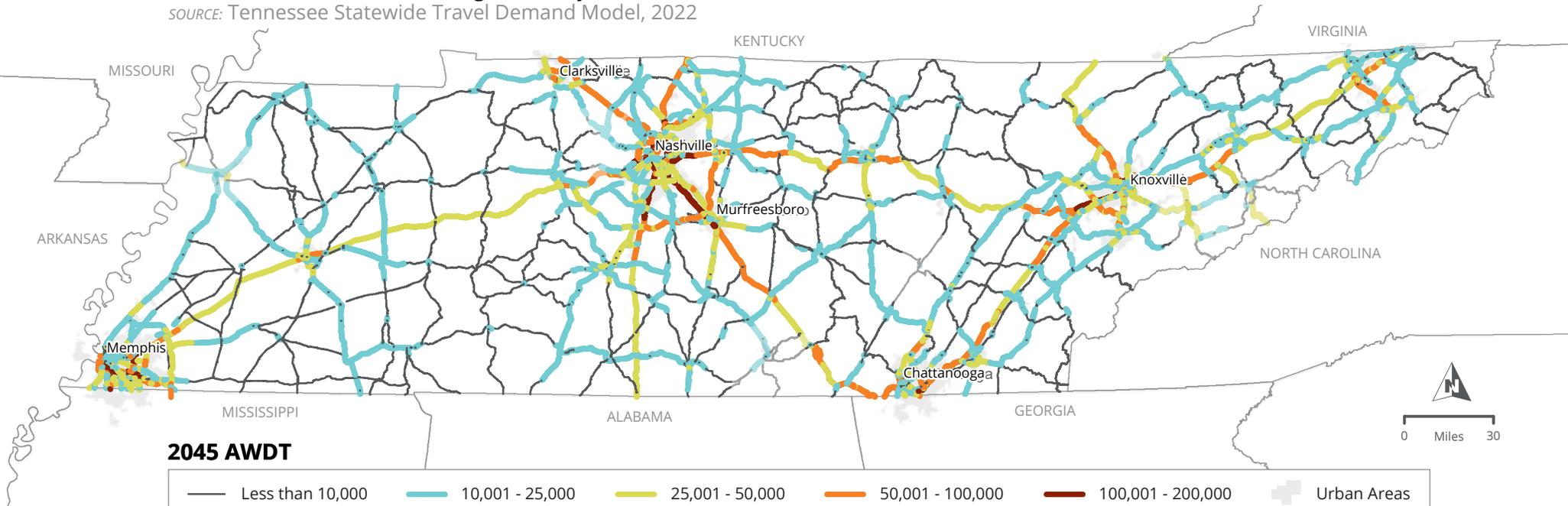
Total vehicle miles of travel (VMT) on the Tennessee highway network is forecast to grow by 4 percent between 2018 and 2031 and 19 percent between 2018 and 2045. However, commercial vehicle traffic— both single-unit trucks and multiple-unit trucks— is forecast to grow 13 percent between 2018 and 2031, and 57 percent over the 27-year period. While the state’s interstate system will continue to carry most of the commercial vehicle traffic, the forecasts show truck VMT more than doubling on Tennessee’s rural principal and minor arterial system. **Figure 7-5** shows the 2018 average weekday traffic estimates from the Tennessee statewide travel demand model. **Figure 7-6** shows the 2045 traffic forecasts. **Figure 7-7** shows traffic growth between 2018 and 2045. **Table 7-7** shows the highest growth occurring in Tennessee’s rural arterial system.

Truck traffic estimates in **Figure 7-8** from the 2018 Tennessee statewide model show that Interstate highways have the highest truck volumes. **Figure 7-9** shows that by 2045 truck volumes are forecast to increase, especially in the I-40 corridor between Nashville and Knoxville. **Figure 7-10** shows that the highest truck volume growth is expected on Tennessee’s rural arterials.

TABLE 7-7: Tennessee VMT Forecasts.
SOURCE: Tennessee Statewide Travel Demand Model, 2022.

Statewide Model Arterials		Total Vehicle Miles of Travel			Commercial Vehicle Miles of Travel		
		2018	2031	2045	2018	2031	2045
Rural	Interstate	31,128	31,793	34,122	8,708	9,607	12,754
	Principal Arterial	19,483	20,762	25,240	2,990	3,677	6,082
	Minor Arterial	14,014	15,491	20,663	1,511	2,044	3,910
Urban	Interstate	37,598	38,237	40,473	5,357	5,780	7,259
	Freeways, Expressway	7,267	7,557	8,574	811	897	1,200
	Principal Arterial	27,844	28,822	32,244	2,254	2,483	3,283
	Minor Arterial	23,892	25,368	30,531	1,458	1,550	1,875
Arterial Total		161,226	168,030	191,847	23,089	26,038	36,363

FIGURE 7-6: Tennessee 2045 Average Weekday Traffic
 SOURCE: Tennessee Statewide Travel Demand Model, 2022



Memphis



Nashville



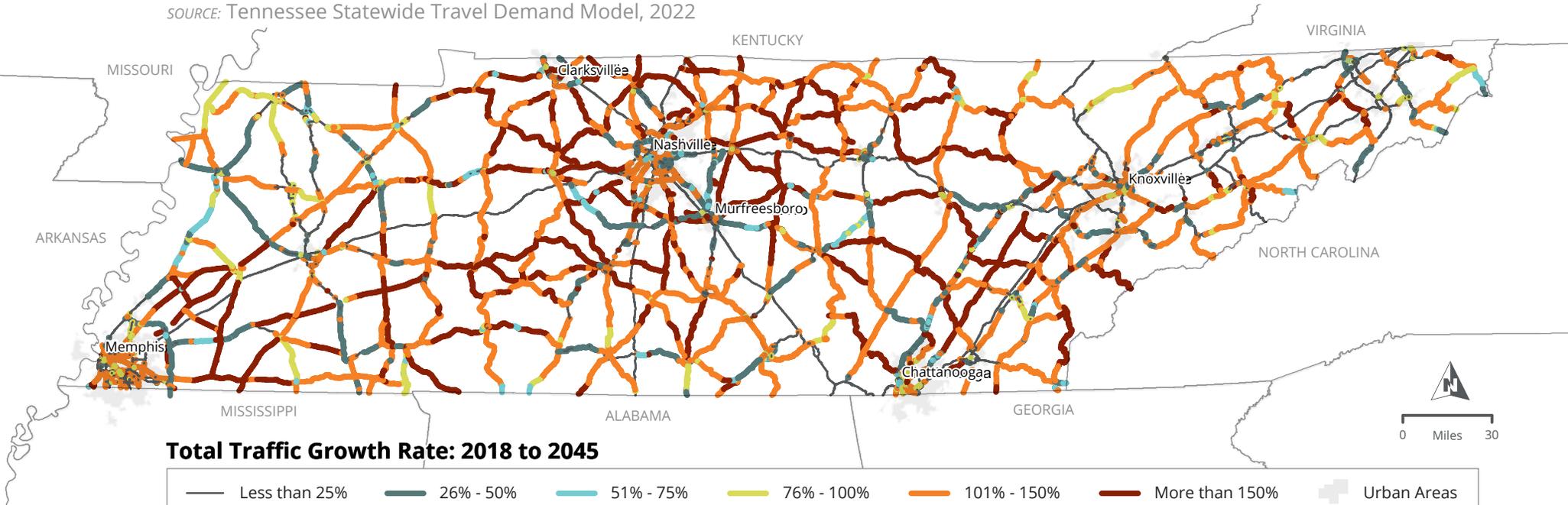
Knoxville



Chattanooga

FIGURE 7-7: Tennessee 2018 to 2045 Traffic Volume Growth

SOURCE: Tennessee Statewide Travel Demand Model, 2022



Memphis



Nashville



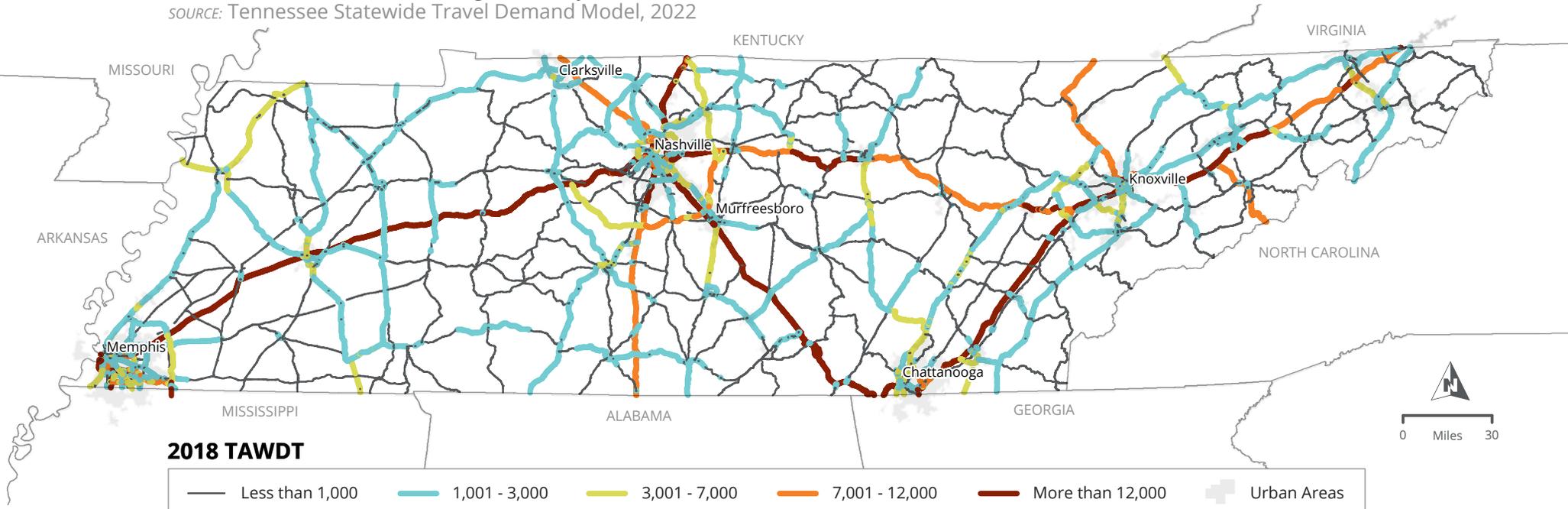
Knoxville



Chattanooga

FIGURE 7-8: Tennessee 2018 Average Weekday Truck Estimates

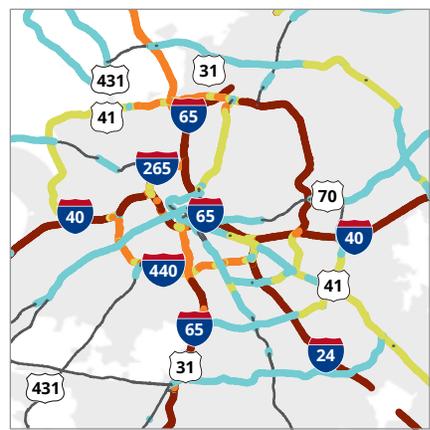
SOURCE: Tennessee Statewide Travel Demand Model, 2022



2018 TAWDT



Memphis



Nashville



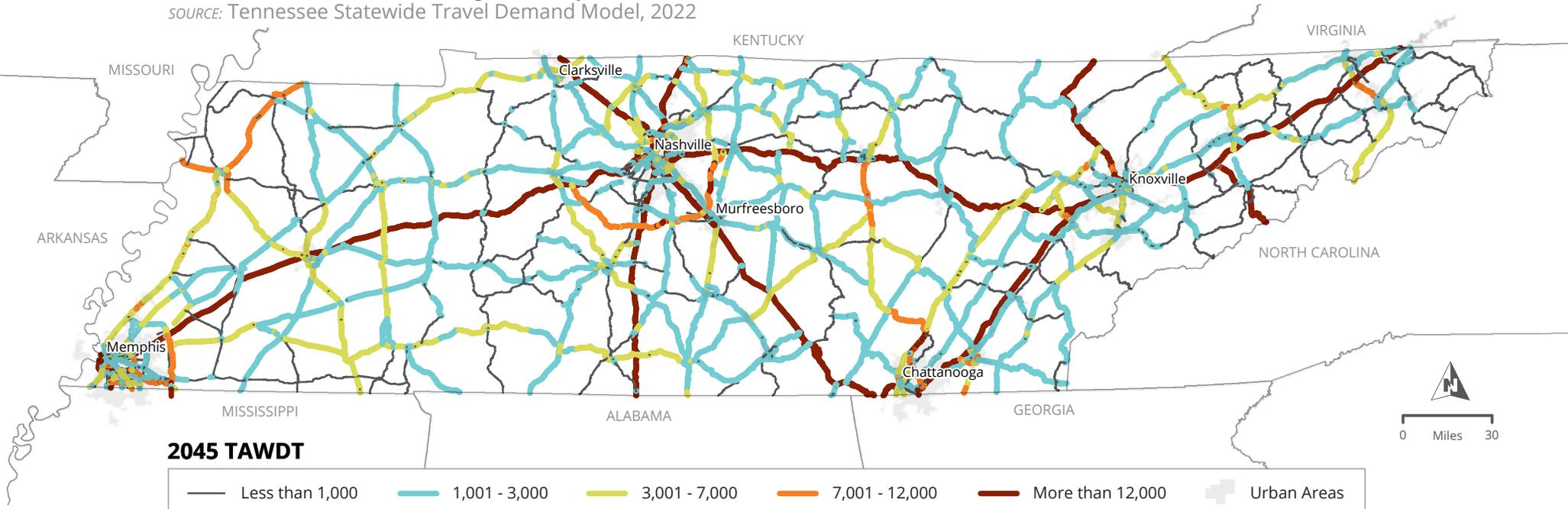
Knoxville



Chattanooga

FIGURE 7-9: Tennessee 2045 Average Weekday Truck Estimates

SOURCE: Tennessee Statewide Travel Demand Model, 2022



2045 TAWDT



Memphis



Nashville



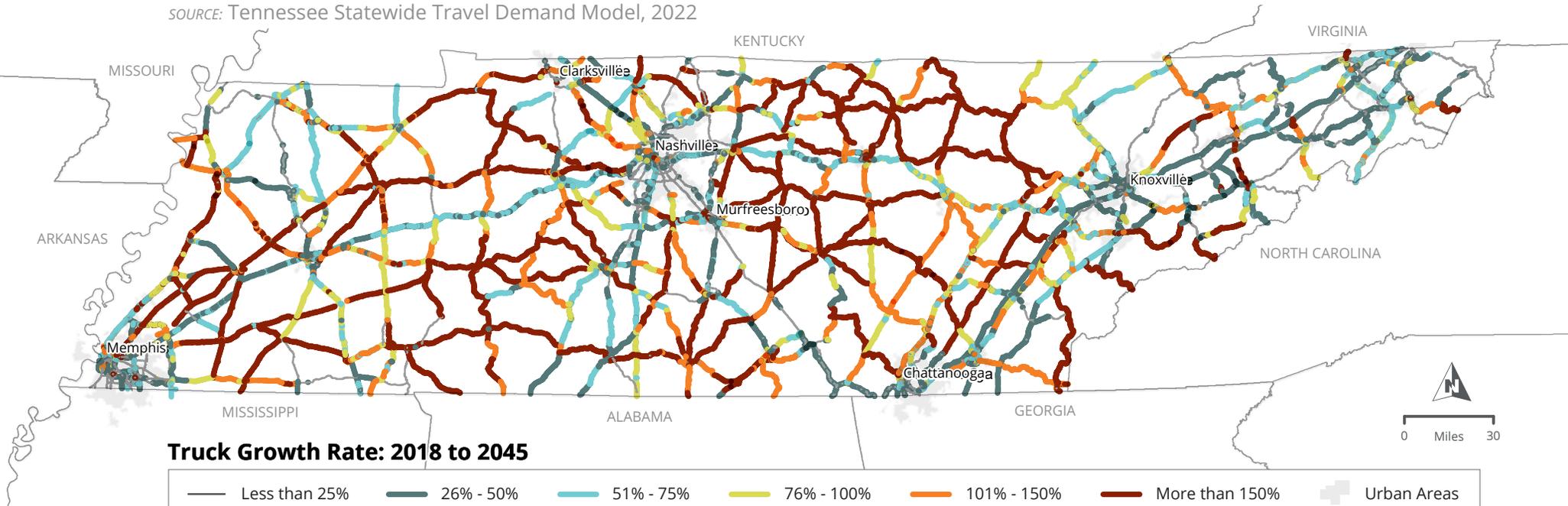
Knoxville



Chattanooga

FIGURE 7-10: Tennessee 2018 to 2045 Truck Volume Growth

SOURCE: Tennessee Statewide Travel Demand Model, 2022



Memphis



Nashville



Knoxville



Chattanooga

Recent Fuel Cost Trends

Figure 7-11 compares wholesale/resale gasoline prices for Tennessee and the United States from March 2012 through March 2022. This data from the US Energy Information Administration (EIA) shows that Tennessee's wholesale/resale gasoline prices track closely with the national average.

The EIA also reports historic diesel fuel prices. Tennessee is included in EIA's 15-state Midwest region. **Figure 7-12** shows that diesel fuel prices in the Midwest region tracked closely with the national average between 2012 and 2022.

FIGURE 7-11: Total Gasoline Wholesale/Resale Price by Refiners 2012 to 2022

SOURCE: US Energy Information Administration (EIA)

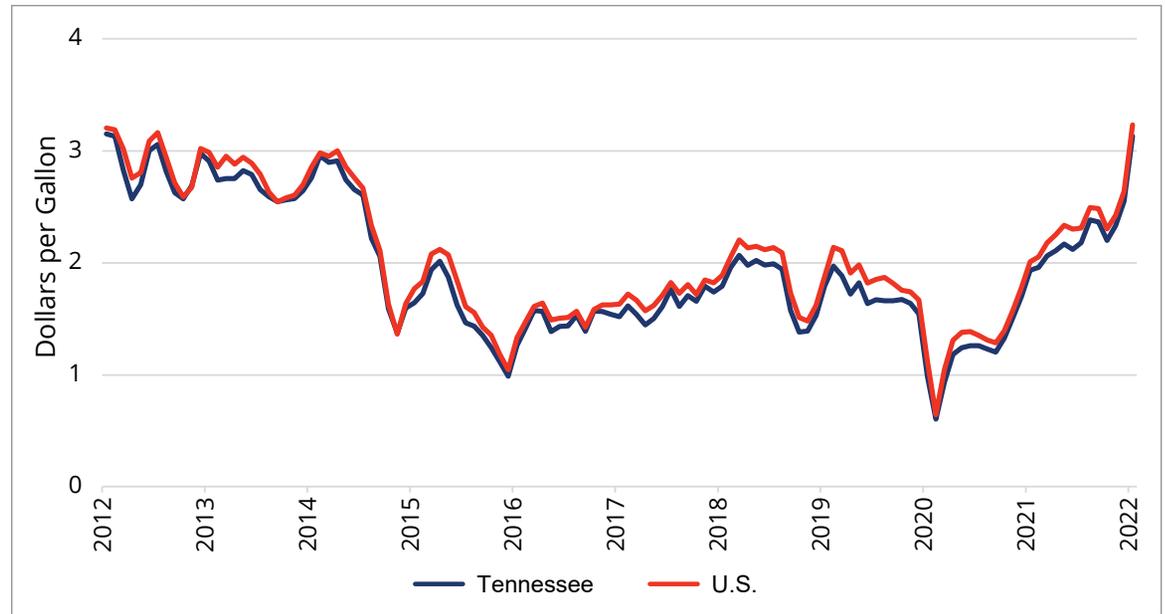
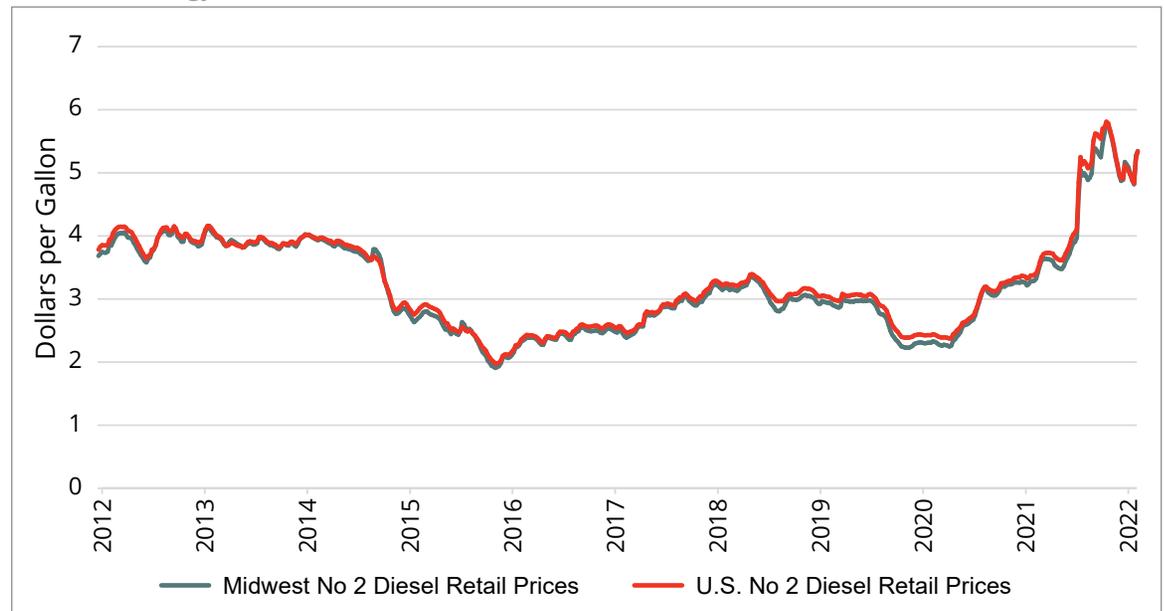


FIGURE 7-12: No. 2 Diesel Retail Prices 2012 to 2022

SOURCE: US Energy Information Administration (EIA)



Freight Modal Congestion Trends

Freight Bottlenecks

After the Tennessee Department of Transportation (TDOT) conducted its initial freight bottleneck analysis in 2019, it accelerated the identification and implementation of countermeasures to reduce delays at 12 interstate highway locations.⁴

In 2022, TDOT revisited this bottleneck analysis and found 26 locations on its Interstate Highway System with significant recurring congestion or reduced truck travel time reliability. The study assessed delays resulting from traffic congestion, crashes and incident response, roadway geometry including curves and grades, severe weather, construction delays, and weight/height restrictions. Delay at several locations corresponds to height-restricted bridges:

- ◆ I-55 Northbound – Shelby County
- ◆ I-24 Westbound – Hamilton County
- ◆ I-24 Eastbound – Hamilton County

The study showed that Interstate Highway truck restrictions increase daily truck travel statewide by nearly 21,000 vehicle-miles and 720 vehicle-hours.⁵

Rural Truck Traffic Growth

Statewide forecasts show commercial truck traffic growing by more than 50 percent by 2045. Further study is needed to identify potential bottlenecks and countermeasures on the state's rural highways where truck traffic is predicted to grow the fastest.

Impacts on Freight Movement

As discussed earlier in this chapter, sales growth in e-commerce is partly behind the projected statewide growth in transportation and warehousing employment. The growing demand for same-day delivery of retail purchases requires new transportation and warehousing infrastructure. Transportation and warehousing employment are projected to grow by 46 percent by 2045 compared to 8 percent projected growth in retail trade sector employment.

This shift is also reflected in slower employment growth in manufacturing, construction and utilities. These industrial land uses have typically been the main generators of commercial vehicle traffic. This trend appears in the travel forecasts that show commercial vehicle traffic growing the fastest on the state's rural highways.

⁴ Tennessee Department of Transportation, 2019

⁵ Tennessee Department of Transportation, 2022



The State's Decision-Making Process



Modified: May 2023

Chapter 8: The State’s Decision-Making Process

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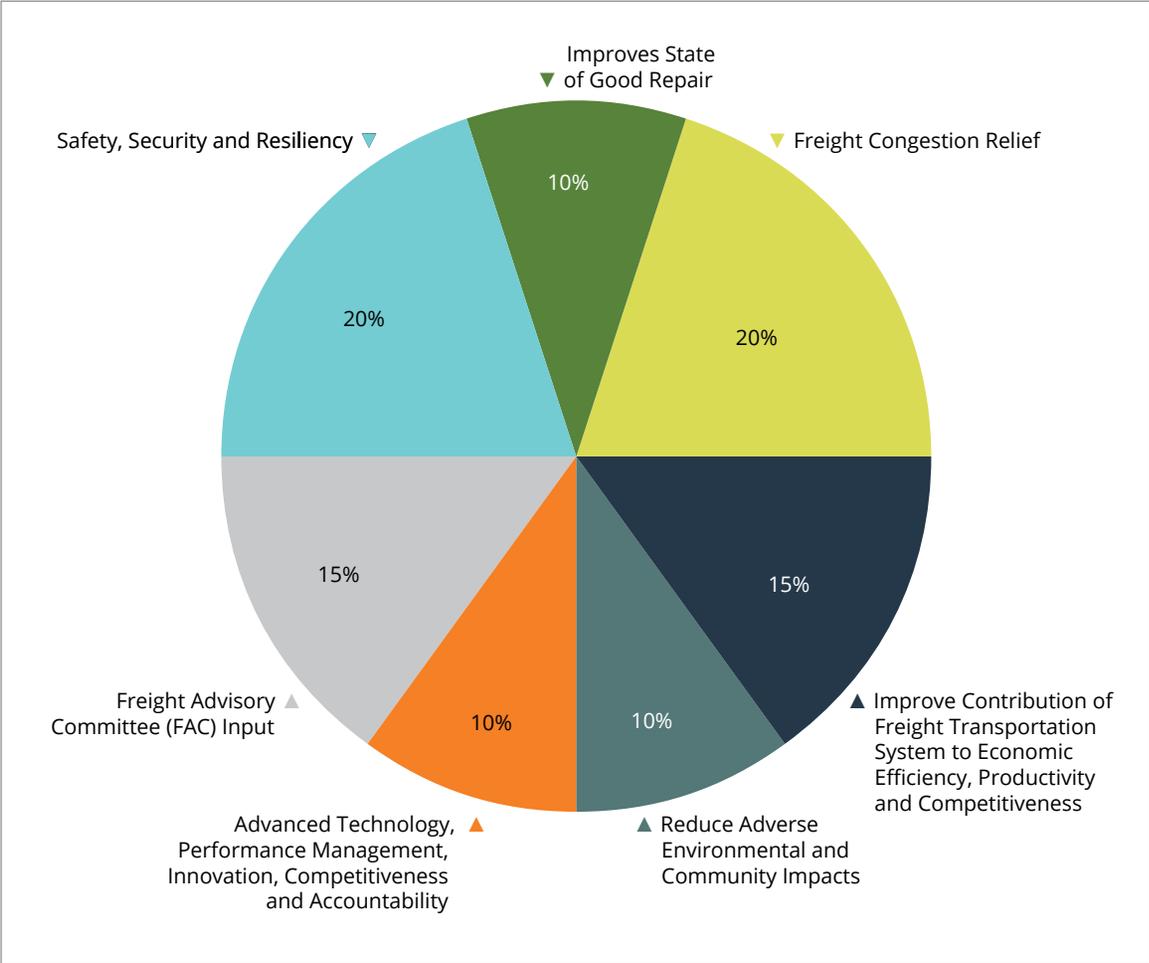
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Chapter 8: The State’s Decision-Making Process

Prioritization of Strategies, Projects and Policy Changes

Funding constraints limit the number and scope of projects which can be implemented at any one time. In order to identify short-term and long-term projects, a prioritization process was developed to assist the department in deciding which projects are of most importance in meeting Tennessee’s growing freight demands, the goals of the Tennessee Freight Plan (outlined in Chapter 1) as well as goals associated with the National Multimodal Freight Policy and the National Highway Freight Program.

FIGURE 8-1: Project Prioritization Criteria



Prioritization Methodology

The projects in this plan are evaluated using measurable criteria to show how a project will help the state achieve its goals and objectives. The points assigned to each criterion are reflective of its importance as identified through stakeholder input in the development of this plan and also previous versions of the plan.

In order to evaluate the projects across all modes, metrics had to be defined for each mode per criteria. Grouping the projects together for all modes emphasizes the intermodal focus of freight projects, which is important to the efficiency of TDOT's freight system.

The criteria chosen for evaluation pivot off the goals and objectives focused on the goods movement sector. With the growing participation in freight management by more stakeholders, additional factors are being evaluated. Along with this focus is the potential to develop additional freight attributes and performance metrics that are not currently captured or distributed widely.

Seven Project Prioritization Criteria are used in prioritizing projects as shown in **Table 8-1**. The goals described in this subsection are intended to not be burdensome to State and local governments.

TABLE 8-1: Project Prioritization Criteria

	Project Prioritization Criteria	Percentage
A	Security, Safety and Resiliency	20%
B	Improves State of Good Repair	10%
C	Freight Congestion Relief	20%
D	Improve Contribution of Freight Transportation System to Economic Efficiency, Productivity and Competitiveness	15%
E	Advanced Technology, Performance Management, Innovation, Competitiveness and Accountability	10%
F	Reduce Adverse Environmental & Community Impacts	10%
G	FAC Input	15%

Each project prioritization criteria and attribute is discussed in the following sections.

A) Safety, Security and Resiliency

Maximizing safety and security is always an important objective and as such is a goal for the Freight Plan and stated as a Guiding Principle in TDOT's LRTP. Projects receive points if:

- ◆ The project is located in a high crash location or at a rail/highway at-grade crossing and the project improves safety either by reducing congestion, improving infrastructure or diverting freight to a safer mode
- ◆ The project provides an alternative route to a supply chain. The resiliency of the system is important for freight movement if there is an incident that requires an alternate route or mode to be used for long term or short term solutions
- ◆ The project includes components to reduce the severity of impacts of extreme weather and natural disasters on freight mobility

B) Improves State of Good Repair

This project goal recognizes that maintaining transportation assets sustains the original planned benefits, as well as minimizes the long term maintenance and replacement costs that would otherwise arise from deferred maintenance. Points are awarded to projects based on the freight tonnage moved on the infrastructure because heavier tonnage will result in faster deterioration of the infrastructure.

C) Freight Congestion Relief

This goal addresses mobility of goods on Tennessee roadways. Projects designed to solve recurring congestion, which occurs daily, are designed to mitigate congestion on highway facilities during peak travel periods. Congestion relief is often addressed by adding roadway capacity, building bypasses around urban areas and providing highway traffic diversions. Projects receive points if:

- ◆ The project will effectively reduce congestion either directly (such as additional lane) or indirectly (such as providing alternative mode of transportation). Projects located in bottleneck locations will receive high priority.

Operationally, TDOT seeks to reduce the effects of project construction on traffic flows by

- ◆ Planned construction – TDOT will often keep two lanes of traffic open with forces and control measures to maintain an adequate level of throughput, working at night during non-peak hours and have enforcement, visible and prominently displayed at strategic road construction locations.
- ◆ Un-planned – Monitoring and quick action forces and techniques to open up unplanned bottleneck as quickly as possible using alternative routes, signage and the HELP program to move vehicles quickly and notify traveling public of issues.

D) Improve Contribution of Freight Transportation System to Economic Efficiency, Productivity, and Competitiveness

Freight volume, in weight or transport unit, e.g., railcars, has been a long term freight metric that often affects overall capacity and physical condition of the transportation infrastructure. The value side of freight movement has grown in importance as the freight industry is aligned with supply chains as well as the physical movement of goods. Three criteria were defined for this goal including:

- ◆ Multi-modal facility proximity to NHS, tonnage per truck/rail/barge/air on a supply chain, value per truck/rail/barge/air and project proximity to freight industry. This addresses the need to connect freight facilities with the freight infrastructure
- ◆ Projects that improve access to more freight facilities, such as warehouses, distribution centers, rail yards, air cargo airports and marine ports along with major freight generators and attractors, such as manufacturing areas, should receive higher priority
- ◆ Projects that connect to the interstate system and underserved industrial or rural areas that serve important supply chains or could serve the supply chain network.

E) Advanced Technology, Performance Management, Innovation, Competitiveness, and Accountability

This attribute addresses the Guiding Principle to “preserve and manage the existing transportation system.” System preservation is seen as an important option to consider before system expansion and is important for achieving a sustainable transportation system. Two attributes were identified for this overall technology and management assessment goal, System Management and Trip Detour for Non-Recurring and Intermittent Events. Projects receive points if:

- ◆ The project is a highway and railway maintenance and upgrade project
- ◆ The project diverts freight to other modes with the lower maintenance cost on a ton-mile basis

F) Reduce Adverse Environmental and Community Impacts

This addresses the guiding principle of protection of the environment. Projects receive points if:

- ◆ The project is an interstate project not inside an urban area. Because of right of way constraints around urban interstates, improvements to these facilities often result in adverse effects such as noise impacts or encroachment on the land use
- ◆ The project is improving an existing alignment. Improving existing facilities versus a new alignment can help avoid impacts to undeveloped natural areas and farm land
- ◆ The project reduces the impacts of freight movement on local air pollution
- ◆ The project reduces the impacts of freight movement on flooding and stormwater runoff
- ◆ The project reduces the impacts of freight movement on wildlife habitat loss

G) Freight Advisory Committee (FAC) Input

The criteria captures those projects identified by the regional and statewide FAC committees as a high priority. The FACs will consider partnerships with nearby states which would support multi-state corridor planning while improving the ability of the states to address multimodal freight connectivity. The freight advisory committees are comprised of a variety of stakeholders, including those from neighboring states. Tennessee also has several multi-state MPOs including the Bristol MPO, Chattanooga TPO, Clarksville MPO, Kingsport MTPO and the Memphis MPO.



Financing, Funding and Investments

Chapter 9: Financing, Funding and Investments

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Chapter 9: Financing, Funding and Investments

Introduction

This chapter of the Tennessee Statewide Multimodal Freight Plan (SMFP) details the funding opportunities at the federal, state and local level. Collectively, these funding programs represent tens of billions of dollars in funding available to infrastructure projects in Tennessee. The programs are a combination of competitive discretionary grants and formulaic funding. Leveraging the competitive programs and matching local projects to the formulaic apportionment programs is crucial to maximizing impact on Tennessee's infrastructure landscape. The Infrastructure Investment and Jobs Act (IIJA)¹ of 2021 greatly expanded the existing discretionary grant programs' funding as well as adding new programs available to governments and even non-governmental organizations. Competition for grant funding has risen steeply due to the increased amount of funds and number of programs available. TDOT is well positioned to apply for and execute grants through these competitive grant programs given the existing infrastructure programs available at the state and local levels.

By successfully implementing the SMFP, TDOT will be able to achieve its Strategic Goals laid out in Chapter 1 of this document and align its guiding principles with IIJA objectives. Funding presents a challenge to achieving TDOT's future capital improvement objectives and strategic goals given TDOT's conservative funding strategy.² TDOT's current funding strategy is a "pay as you go" system that supports projects as

the funding becomes available. Based on the FY2021 – 2023 workplan, Tennessee faces annual shortfalls between DOT expenses and revenues, largely made up for with federal funding. In addition, TDOT's costs have risen steeply in the past three years, particularly relating to highway construction and operational costs. As such, accessing additional federal funding through competitive grant discretionary programs will further support budget sustainability. Beyond meeting fiscal sustainability goals, it will allow TDOT to approach infrastructure investment more actively through accessing new funding sources in an already tight budgetary environment.

This chapter contains a summary of the discretionary and formulaic programs available to TDOT at the federal, state and local levels. Each program is presented with key details of applicant and project eligibility and merit criteria assessed. In addition to the inventory of available discretionary grant and formulaically apportioned programs, a schedule with future grant releases is included, which details anticipated authorizations for future years. The chapter also presents a strategy for identifying and matching infrastructure projects with relevant funding opportunities to maximize the chance of a successful application.

¹ Also called the Bipartisan Infrastructure Law (BIL)

² Gas Tax (<https://www.tn.gov/tdot/finance/gas-tax.html>)

On March 30, 2023, the Tennessee General Assembly passed the Transportation Modernization Act, which will create a new transportation strategy and invest \$3.3 billion to manage Tennessee's infrastructure development. This includes addressing congestion, new bridge construction, and implementing Choice Lanes. \$3.0 billion of the total funding will be distributed among the four TDOT regions to help accelerate projects under the IMPROVE

Act (2017) and Statewide Partnership Program, among other initiatives. The Transportation Modernization Act will expand TDOT's ability to deliver projects through alternative delivery methods, such as Public-Private Partnerships, which can reduce costs and delivery time for new infrastructure. Full details are not yet available for its implementation. As such, it is included here in anticipation of future announcements.

State of Tennessee Funding Opportunities

A summary of State of Tennessee Funding opportunities is provided in **Table 9-1**. The programs and funding amounts are based on the most recently available data for each program.

TABLE 9-1: Summary of State of Tennessee Funding Opportunities

Program	Amount of Funding	Funding Type	Administering Agency	Focus
FastTrack Infrastructure Development Program	\$239.5 million*	Discretionary	Tennessee Department of Economic & Community Development (TNECD)	Support infrastructure projects benefiting one or more companies committed to creating new jobs and/or making new capital investments
State Industrial Access Program	TBD	Discretionary	Tennessee Department of Transportation (TDOT)	Provide funding for highway access to new and expanding industries in Tennessee
Short Line Railroad Preservation Grant Program	\$20.0 million	Apportioned to Rail Authorities	Tennessee Department of Transportation (TDOT)	Preserve rail service to local communities and expand rail connectivity along the existing rail corridors
Site Development Grants	\$0.1–2.0 million†	Discretionary	Tennessee Department of Economic & Community Development (TNECD)	Support development at Select Tennessee certified sites and prepare other sites to achieve certification.

* Representative of 2021 only

† Range of grant amounts awarded

FastTrack Infrastructure Development Program³

Infrastructure improvements include the provision of, or participation in, the extension of community infrastructure to the project site. Total FastTrack funding in 2021 was \$239.1 million.

Project Eligibility

Eligible projects include:

- ◆ Site improvements
- ◆ Transportation systems
- ◆ Wastewater systems
- ◆ Water systems

Applicant Eligibility

Applicants may include local county and municipal governments, and local development agencies.

Funding Restrictions

Funding match requirements based on the applicant's ability to pay. Counties determined to be "At-Risk" or "Distressed" may be eligible for additional funding.

Project Readiness

Projects must execute a contract for the infrastructure with a local company prior to being awarded funds.

Merit Criteria

No benefit cost analysis (BCA) is required; projects are prioritized according to the following:

- ◆ Number of full-time new jobs
- ◆ Weighted average wages of new full-time jobs
- ◆ Amount of company investment
- ◆ Types of skills and knowledge that must be obtained
- ◆ Location of the project

Other Requirements

The recipient must provide a payment in lieu of tax (PILOT) for five years for onsite improvements.

³ Incentives & Grants - Tennessee Department of Economic and Community Development (tnecd.com)

State Industrial Access Program⁴

TDOT implements the Industrial Highway Act through the department's State Industrial Access (SIA) Program to provide access to industrial areas and to facilitate the development and expansion of industry within the State of Tennessee.

Project Eligibility

The proposed project is required to be eligible as an industrial highway. An "Industrial Highway" is defined as any road or street designated and located to provide access to an industry site or industrial park. An Industrial Highway must be a public road open to traffic.

Applicant Eligibility

Applicants may include either TDOT or county, incorporated city or town, public port authority or transportation authority within the state.

Funding Restrictions

TDOT required funding varies by type of cost incurred. For example, survey and design work is completed by TDOT at no cost to the local government. For typical projects, TDOT pays 100 percent of the cost of construction and 50 percent of Right-of-way (ROW).

Project Readiness

Projects demonstrate readiness through an application which consists of the following items:

- ◆ Completed application form
- ◆ Location map
- ◆ Site map
- ◆ Certified resolution or ordinance indicating the application for SIA funding is an official action by the local government.

Merit Criteria

No BCA is required; projects are prioritized according to need. No detailed project evaluation criteria are provided in the guidance documents.

Other Requirements

The recipient must submit annual reports to the USDOT that describes:

- ◆ Activities carried out with grant funds
- ◆ Lessons learned for future deployment of alternative revenue systems

⁴ State Industrial Access Program (tn.gov)

Short Line Railroad Preservation Grant Program⁵

The purpose of Tennessee's Short Line Railroad Preservation Grant Program is to preserve rail service to local communities and expand rail connectivity to sites along existing rail corridors. The focus of the program is on facilitating the efficient and economical movement of freight within Tennessee by strengthening the network of short line railroads in the state.

Project Eligibility

Various projects are eligible for this grant; a shortlist is provided below:

- ◆ Capital projects on track that actively serves rail customers located on the line
- ◆ Engineering work associated with capital projects
- ◆ Non-engineering construction administration
- ◆ Annual audit
- ◆ Administrative duties
- ◆ Railroad-highway crossings to be repaired

Applicant Eligibility

Grants from the Transportation Equity Trust Fund and any one-time state appropriations are provided to rail authorities established pursuant to state statute in order to preserve and maintain essential rail transportation. TDOT requires authorities to be actively involved in the management of grant funds. The local rail operator and owner of the track must be signatories to the grant contract.

Funding Restrictions

Projects will have a 90 percent State/ 10 percent Local funding split. The required 10 percent Local cash match can come from the Authority, the Operator and/or participating local governments.

Project Readiness

Project application must state the project location, project description, public benefits of the proposed project, expected number of months to complete the project, and evidence of local funding match source.

Merit Criteria

No BCA is required; applicants must state proposed project benefits on the grant application form. Applicants must get pre-approval from TDOT on projects to ensure eligibility.

Other Requirements

The recipient must submit annual reports to the TDOT that describes:

- ◆ Operator's Annual Report
- ◆ Authority's Annual Report
- ◆ Authority's Annual Audit
- ◆ Grantee's Contract-Specific Annual & Final Report

⁵ Guidance and Procedures for the Short Line Railroad Preservation Program (https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/FY2022_Guidance_and_Procedures_for_Short_Line_Rail_Preservation_Grants_071921.pdf)

Tennessee Department of Economic Development Site Development Grants⁶

Projects funded through the Tennessee Department of Economic Development's (TNECD) site development grants include numerous freight-related infrastructure projects.

Project Eligibility

- ◆ Construction of roadways, traffic signals, rail lines/switching/utility construction
- ◆ Property related activities
- ◆ Site must be publicly owned at the time of application
- ◆ Due diligence grants
- ◆ Rehabilitation of public-owned industrial buildings
- ◆ Property purchase additions
- ◆ Sites must be at least 20 acres in size
- ◆ Sites with open SDG projects are not eligible

Applicant Eligibility

- ◆ Governmental entity
- ◆ One application per site may be submitted
- ◆ County where site is located must meet all ThreeStar annual requirements⁷

Funding Restrictions

Due diligence grants are limited to \$100,000 maximum. The maximum SDG grant value is \$1.0 million, and \$2.0 million maximum for high impact SDGs. The required community match varies by the assessed Tier of the county and varies between 5 percent (Tier 4) to 50 percent (Tier 1).

Project Readiness

Applicants must prepare a letter of intent to confirm eligibility; they are subsequently issued login information for the application portal by TNECD. All applications and supporting documentation must be submitted by March 17, 2023.

Merit Criteria

Projects are scored based on the following criteria:

- ◆ Public benefit/impact
- ◆ Performance measures
- ◆ Leveraged resources
- ◆ Implementation
- ◆ Projects are shortlisted by the criteria at left; they must subsequently prepare a presentation that will lead to a final scoring and award determination by a committee.

Other Requirements

Short listed projects will be invited to give a presentation to selection committee members.

⁶ Site Development Grant (<https://www.tn.gov/ecd/rural-development/tnecd-site-development/select-tennessee-site-development-grant.html>)

⁷ About ThreeStar (<https://www.tn.gov/ecd/rural-development/three-star-tnecd/threestar-about.html>)

Infrastructure Investment and Jobs Act Funding

The Table 9-2 summarizes the range of funding opportunities made available in the Infrastructure Investment and Jobs Act (IIJA), or Bipartisan Infrastructure Law (BIL). The funding opportunities include both formulaic apportionment and discretionary mechanisms for federal funds appropriated through the BIL. This list is not all encompassing and other IIJA programs may be eligible as a potential funding source.

TABLE 9-2: Summary of IIJA/BIL Funding Programs

Program	Amount of Funding	Funding Type	Administering Agency	Focus
Bridge Investment Program	\$12.5 billion	Discretionary	Federal Highway Administration (FHWA)	Replacement or rehabilitation of nationally significant bridges
Carbon Reduction Program	\$6.4 billion	Formulaic	Federal Highway Administration (FHWA)	Reducing transportation emissions from on-road highway sources
Congestion Mitigation and Air Quality Program	\$13.2 billion	Formulaic	Federal Highway Administration (FHWA)	Reducing congestion and improving air quality
Consolidated Rail Infrastructure and Safety Improvements Program	\$1.4 billion	Discretionary	Federal Railroad Administration (FRA)	Improving railroad safety
Federal Lands Access Program	\$1.4 billion	Discretionary	Federal Highway Administration (FHWA)	Improving federal land access facilities
Federal Lands Transportation Program	\$2.2 billion	Discretionary	Federal Highway Administration (FHWA)	Improving federal land transportation facilities
Highway Safety Improvement Plan	\$15.6 billion	Formulaic	Federal Highway Administration (FHWA)	Improving highway safety
Metropolitan Planning Program	\$966.0 million	Formulaic	Federal Transit Administration (FTA), Federal Highway Administration (FHWA)	Provide funding for state and metropolitan planning related to transportation
National Highway Freight Program	\$7.2 billion	Formulaic	Federal Highway Administration (FHWA)	Improving highway freight corridors

Program	Amount of Funding	Funding Type	Administering Agency	Focus
National Highway Performance Program	\$148.0 billion	Formulaic	Federal Highway Administration (FHWA)	Funding for construction and maintenance on the National Highway System (NHS)
National Significant Multimodal Freight and Highway Projects	\$8.0–14.0 billion	Discretionary	Office of Multimodal Freight Infrastructure and Policy (OMFIP)	Nationally Significant Infrastructure
National Infrastructure Project Assistance	\$5.0 billion	Discretionary	Office of Multimodal Freight Infrastructure and Policy (OMFIP)	Nationally Significant Infrastructure
Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT)	\$7.3 billion	Formulaic	FHWA	Increase the resiliency of surface transportation to natural hazards
	\$0.8 billion	Discretionary	Federal Highway Administration (FHWA)	Fund projects that improve the resilience of the surface transportation system, including highways, public transportation, ports, and intercity passenger rail.
Railroad Crossing Elimination Program	\$3.0 billion	Discretionary	Federal Railroad Administration (FRA)	Improving railroad safety through grade-crossing elimination
Rebuilding American Infrastructure with Sustainability & Equity	\$7.5-15.0 billion	Discretionary	Office of Multimodal Freight Infrastructure and Policy (OMFIP)	Local or regional impact of infrastructure
Rural Surface Transportation Grant Program	\$2.0 billion	Discretionary	Office of Multimodal Freight Infrastructure and Policy (OMFIP)	Highway and freight infrastructure that impacts rural communities
Surface Transportation Block Grant Program	\$72.0 billion	Formulaic	Federal Highway Administration (FHWA)	Improvement in road and rail infrastructure

Bridge Investment Program

The Bridge Investment Program (BIP) was created as part of the IJA, and total funding allocated is \$12.5 billion between 2022-2026.

Project Eligibility

Projects are grouped by total project cost of greater or less than \$100 million; projects are eligible if they intend to replace, rehabilitate, preserve, or protect one or more bridges (i.e., a bundle of bridges) on the National Bridge Inventory (NBI).⁸

Applicant Eligibility

- ◆ State or group of states
- ◆ Metropolitan planning organization (MPO) that serves an urbanized area
- ◆ Unit of local government or a group of local governments
- ◆ Political subdivision of a state or government
- ◆ A special purpose district or public authority with a transportation function
- ◆ A federal land management agency
- ◆ A Tribal government or consortium of Tribal governments
- ◆ A multistate or multijurisdictional group of entities as described above

Funding Restrictions

No state may receive more than 20 percent of total funding, and the required match for non-federal funds is 20 percent.

Project Readiness

Projects are evaluated for readiness based on a technical assessment, environmental risk and financial suitability. These are evaluated based on local approvals processes, NEPA approvals, and appropriate commitment of funding sources to initiate construction within 18 months of the obligation of funds.

Merit Criteria

- ◆ State of good repair
- ◆ Safety
- ◆ Mobility and economic competitiveness
- ◆ Climate change
- ◆ Quality of life
- ◆ Innovation

Other Requirements

Grant recipients must complete regular reports (quarterly basis) to monitor progress and must also complete financial reporting via form SF-425.

⁸ Bridge Investment Program - Planning, Bridge Projects, and Large Bridge Project (<https://www.grants.gov/web/grants/view-opportunity.html?oppId=341050>)

Carbon Protection Program⁹

Carbon Protection Program (CRP) provides funding for projects designed to reduce transportation emissions, defined as carbon dioxide (CO₂) emissions from on-road highway sources. Between 2022-2026, \$6.3 billion in funding is available to state and local governments. Funding is available to projects that reduce transportation emissions, including transferability to projects under other formulaic or discretionary BIL programs.

Project Eligibility

There are a wide variety of projects eligible under this program. Regarding freight-specific eligible projects, the FHWA includes:

- ◆ Projects that utilize advanced technology, traffic control or alternative fuel vehicle deployments that reduce emissions
- ◆ Projects that reduce the environmental and community impacts of freight movement

Applicant Eligibility

Given that this is a formulaically apportioned program, states do not apply directly but are apportioned funds formulaically on an annual basis.

Funding Restrictions

Programs funded under the CRP generally must not exceed 80 percent funding from federal sources, per 23 US Code 120. The legislation does not mention deadlines to expend formulaically apportioned funds.

Project Readiness

Not applicable; states are apportioned funds on a formulaic basis, and certain amounts are distributed based on program needs, population density.

Merit Criteria

No BCA is required for the CRP program; as such, there is no set of Merit Criteria

Other Requirements

- ◆ The CRP requires each state to develop a carbon reduction strategy with MPOs, to support the reduction of transportation emissions and update it every four years
- ◆ The program requires annual reports following project implementation and a final report detailing the use of funds awarded and results of the project. The reports are submitted to Congress

⁹ Bipartisan Infrastructure Law - Carbon Reduction Program (CRP) Fact Sheet | Federal Highway Administration (dot.gov)

Congestion Mitigation and Air Quality Improvements¹⁰

Congestion Mitigation and Air Quality Improvement Program (CMAQ) provides funding to meet the regulations of the Clean Air Act. Between 2022-2026, \$13.2 billion in funding is available to state and local governments. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas).

Project Eligibility

FHWA Guidance on the CMAQ program broadly defines eligible projects to include those that exhibit the following:

- ◆ The project must be a transportation project
- ◆ It must intend to reduce emissions from motor vehicles; and
- ◆ It must be located in or improve a nonattainment or maintenance area defined in the Clean Air Act.

Applicant Eligibility

Funds are distributed based on a formula for each state; the funds distributed to each state are subsequently divided amongst local applicants to the program.

Funding Restrictions

No state may receive more than 20 percent of total funding, and the required match for non-federal funds is 20 percent. If states have existing nonattainment or maintenance areas, funding will be restricted for use achieving attainment for those areas. If states do not have nonattainment or maintenance areas, funding will be available for all eligible projects under the CMAQ program.

Project Readiness

States must identify the nonattainment or maintenance areas in their states prior to allocating funding. Based on the funding restrictions above, states may pursue different projects. In Tennessee, the following five nonattainment areas are eligible for CMAQ funding:

- ◆ Chattanooga
- ◆ Clarksville
- ◆ Knoxville
- ◆ Memphis
- ◆ Nashville

Merit Criteria

No BCA is required for the CMAQ program; as such, there is no set of Merit Criteria

¹⁰ Bipartisan Infrastructure Law - Congestion Mitigation and Air Quality (CMAQ) Improvement Program Fact Sheet | Federal Highway Administration
(<https://www.fhwa.dot.gov/bipartisan-infrastructure-law/cmaq.cfm>)

Consolidated Rail Infrastructure and Safety Improvements¹¹

The Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant program is allocated \$1.4 billion in the 2022 NOFO, and \$10.0 billion between 2022-2026, including both authorized and appropriated funds. The grants are administered by the Federal Railroad Administration (FRA).

Project Eligibility

- ◆ Acquisition, improvement, rehabilitation of railroad equipment, infrastructure, or facilities or to address congestion challenges
- ◆ Highway-rail grade crossing improvement
- ◆ Rail line relocation/improvement
- ◆ Deployment of rail safety technology
- ◆ Improve short-line or regional railroad infrastructure
- ◆ Preparation of regional rail and corridor service development plans
- ◆ Enhance multimodal connections or facilitate service integration with rail

Applicant Eligibility

- ◆ State or group of States
- ◆ Interstate compact
- ◆ Class II or III railroad
- ◆ Public agency
- ◆ University transportation center
- ◆ Any rail carrier or rail equipment manufacturer with another entity previously described
- ◆ Transportation Research Board (TRB)
- ◆ Non-profit labor organization representing employees of rail carriers

Funding Restrictions

No state may receive more than 20 percent of total funding, and the required match for non-federal funds is 20 percent. However, preference is given for projects that have a 50 percent non-federal funding match.

Project Readiness

Projects are evaluated based on a provided planning document for readiness through a technical assessment, environmental risk, and financial suitability. These are evaluated based on local approvals processes, NEPA approvals, and appropriate commitment of funding sources to initiate construction within 18 months of the obligation of funds. Additional consideration will be given if the proposed project is consistent with local planning and documents set forth by the USDOT.

Merit Criteria

- ◆ System and service performance
- ◆ Effects on safety, competitiveness, reliability
- ◆ Efficiencies from improved integration with other modes
- ◆ Ability to meet existing or anticipated demand

Other Requirements

Grant recipients must complete regular reports (quarterly basis) to monitor progress and must also complete financial reporting via form SF-425.

¹¹ Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program | FRA
(<https://railroads.dot.gov/grants-loans/competitive-discretionary-grant-programs/consolidated-rail-infrastructure-and-safety-2>)

Federal Lands Access Program¹²

This program intends to improve transportation facilities that provide access or are adjacent to federal lands. The program has a total of \$1.4 billion in funding allocated between 2022-2026.

Project Eligibility

- ◆ Planning, research, engineering or preventative maintenance of federal land access transportation facilities (FLATFs)
- ◆ Operations and maintenance of transit facilities
- ◆ Rehabilitation, restoration and construction of FLATFs

Applicant Eligibility

Eligible applicants are federal land management agencies (FLMAs) and are selected by Program Decision Committees (PDCs) in each state. The PDC requests project applications on an annual basis.

Funding Restrictions

Federal funding may range from 50 percent to 100 percent of total project costs, depending on the type of project. Funds made available to the project must be used within three years of when the funds are authorized.

Project Readiness

Projects are evaluated for readiness based on a technical assessment, environmental risk and financial suitability. These are evaluated based on local approvals processes, NEPA approvals and appropriate commitment of funding sources to initiate construction within 18 months of the obligation of funds. Project readiness is demonstrated with a Memorandum of Agreement (MOA) among all project partners, and includes, but is not limited to:

- ◆ Budget
- ◆ Scope of work
- ◆ Schedule
- ◆ Maintenance commitment
- ◆ Roles and responsibilities of all agreement signatories
- ◆ Match requirements

Merit Criteria

Project Criteria considers the following questions:

- ◆ Did the PDC cooperate with the applicable FLMA?
- ◆ Does the project improve safety?
- ◆ Is the project endorsed by the pertinent FLMA?
- ◆ Is the project deemed high priority?
- ◆ Does the project provide access to federal high-use recreation sites or federal economic generators?
- ◆ Can the project be completed according to the proposed scope, schedule and budget?
- ◆ Can the project sponsor meet the local match?
- ◆ Is the project consistent with the long-range transportation plan?

¹² Federal Lands Access Program (FLAP) | FHWA (<https://highways.dot.gov/federal-lands/programs-access>)

Federal Lands Transportation Program¹³

The Federal Lands Transportation Program (FLTP) is intended to improve the transportation infrastructure owned by various FLMAs. A total of \$2.2 billion is authorized from 2022-2026. The program is administered by the FHWA.

Project Eligibility

- ◆ Engineering, rehabilitation, restoration, construction and reconstruction of FLTFs
- ◆ Capital operations and maintenance of transit facilities
- ◆ Program administration, planning, research and preventive maintenance of FLTFs.

Applicant Eligibility

Projects applications are submitted by FLMAs and administered by the FHWA.

Funding Restrictions

Federal funding matching requirements are flexible and depend on the project and may be up to 100 percent. Funds made available to the project must be used within three years of when the funds are authorized.

Project Readiness

The FHWA will work with partners to implement a Project Agreement, includes, but is not limited to the following to assess project readiness:

- ◆ Project scope
- ◆ Project schedule
- ◆ Budget
- ◆ Detailed project roles and responsibilities

Merit Criteria

The FLTP is awarded on a formulaic basis as such no BCA is required.

¹³ Federal Lands Transportation Program (FLTP) | FHWA (<https://highways.dot.gov/federal-lands/programs/transportation>)

Highway Safety Improvement Program¹⁴

The Highway Safety Improvement Program (HSIP) is a core federal highway program with the mandate to significantly reduce fatalities and serious injuries on all public roads. There is a total of \$15.6 billion of HSIP funding available from 2022-2026.

Project Eligibility

Eligible projects are those that:

- ◆ Address a strategic highway safety plan priority
- ◆ Be identified through a data-driven process, and
- ◆ Contribute to a reduction in fatalities or serious injuries
- ◆ Must be included in the State Transportation Improvement Program (STIP)/State Highway Safety Improvement Program (SHIP)

Applicant Eligibility

Funding is apportioned to each state on a formulaic basis, not on an application basis. Each state then divides that amount among eligible projects.

Funding Restrictions

Funding is apportioned on a formulaic basis to every state.¹⁵ After apportionment, 2 percent of the State's HSIP apportionment is set aside for State Planning and Research.

Project Readiness

Projects must demonstrate readiness through inclusion in the STIP/SHIP. In order to be included in either the STIP/SHIP, the project must go through an identification and planning process.

Merit Criteria

No BCA is required as the funds are distributed on a formulaic basis. However, there are several performance metrics described in the IJA to ensure states appropriately expend obligated funding. Prioritized safety projects include:

- ◆ Promoting public awareness of highway safety matters
- ◆ Facilitates enforcement of traffic laws
- ◆ Provides infrastructure and infrastructure-related equipment to support emergency services
- ◆ Conducts safety-related research to evaluate experimental safety countermeasures
- ◆ Supports safe routes to school
- ◆ Non-infrastructure-related activities

¹⁴ Highway Safety Improvement Program (HSIP) | FHWA (<https://highways.dot.gov/safety/hsip>)

¹⁵ Bipartisan Infrastructure Law - Apportionment Fact Sheet | Federal Highway Administration (<https://www.fhwa.dot.gov/bipartisan-infrastructure-law/apportionment.cfm>)

Metropolitan Planning Program¹⁶

The Metropolitan Planning Program (MPP) is intended to fund multimodal transportation planning in metropolitan areas and states and is administered by the FHWA.

Total funding across the jurisdictions is \$2.3 billion over the 2022-2026 period.

Project Eligibility

Planning activities that:

- ◆ Support economic activity in a metropolitan area
- ◆ Increase the safety of the transportation system for motorized and nonmotorized users
- ◆ Increase the security of the transportation system for motorized and nonmotorized users
- ◆ Promote efficient system management and operations
- ◆ Increase the accessibility and mobility of people and freight
- ◆ Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns
- ◆ Enhance the integration and connectivity of the transportation system, across and between modes

Applicant Eligibility

State Departments of Transportation (DOTs) and MPOs are eligible applicants for this grant program. Funds are first apportioned to State DOTs.

Funding Restrictions

Along with most other federal grant programs, the federal share is not to exceed 80 percent of the total project costs. States cannot receive less than 0.5 percent of the amount apportioned. Funds are apportioned on a formulaic basis determined by urbanized area population in proportion to the total urbanized area population for the nation.

Project Readiness

As funds are awarded on a formulaic basis, there are no project readiness criteria assessed.

Project Criteria

As funds are awarded on a formulaic basis, there are no project criteria assessed.

¹⁶ Bipartisan Infrastructure Law - Metropolitan Planning Program (MPP) Fact Sheet | Federal Highway Administration
(https://www.fhwa.dot.gov/bipartisan-infrastructure-law/metro_planning.cfm)

National Highway Freight Program¹⁷

The National Highway Freight Program (NHFP) was developed to improve efficient transportation on the nation's highway network. Total funding over the 2022-2026 period is \$7.2 billion.

Project Eligibility

Eligible projects include highway, rail and intermodal freight projects. Emphasis is given to projects in Critical Rural Freight Corridors and Critical Urban Freight Corridors. Per the BIL, up to 30 percent of state funding may be used on freight intermodal or freight rail projects, subject to certain restrictions.

Applicant Eligibility

Funding is apportioned to each state on a formulaic basis, not on an application basis. Each state then divides that amount among eligible projects.

Funding Restrictions

There is no funding match requirement for the NHFP as programs are not funded on a competitive basis. There is a 2 percent set-aside for state planning and research funding.

Project Readiness

Projects must demonstrate readiness through inclusion in the STIP/SHIP. To be included in either the STIP/SHIP, the project must go through an identification and planning process.¹⁸

Merit Criteria

Given the program is distributed on a formulaic basis, no BCA is required. States may initiate competitive processes to award funding to local projects. The BIL states that projects should several goals, including:

- ◆ Investing in infrastructure, operational improvements, reduce congestion, reduce cost of freight transportation, improve reliability, and increase productivity
- ◆ Improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas
- ◆ Improve the state of good repair of the National Highway Freight Network (NHFN)
- ◆ Improve the efficiency and productivity of the NFHN
- ◆ Improve state flexibility to support multi-state corridor planning
- ◆ Reduce the environmental impacts of freight movement on the NFHN

¹⁷ National Highway Freight Program - FAST Act Fact Sheets - FHWA | Federal Highway Administration (<https://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.cfm>)

¹⁸ Tennessee STIP 2020-2023, Chapter 6 ([https://www.tn.gov/content/dam/tn/tdot/programdevelopment/stip-amendments/1.5.21_Tennessee STIP 2020-2023 Final_R.pdf](https://www.tn.gov/content/dam/tn/tdot/programdevelopment/stip-amendments/1.5.21_Tennessee%20STIP%2020-2023%20Final_R.pdf))

National Highway Performance Program¹⁹

This program provides funding for construction and maintenance projects to support the condition and performance of the national highway system (NHS). The NHS includes the entire Interstate system and all other highways classified as principal arterials. A total of \$148.0 billion in funding is provided in the 2022-2026 period.

Project Eligibility

Eligible projects include, but are not limited to:

- ◆ Project supporting progress toward national performance goals for infrastructure condition, safety, congestion reduction, system reliability or freight movement on the NHS
- ◆ Construction, reconstruction, and restoration of the NHS
- ◆ Development and implementation of a state asset management plan for the NHS

Applicant Eligibility

Funding is allocated on a formulaic basis to each state; as such, there are no individual applications.

Funding Restrictions

There is no funding match requirement for the NHPP as programs are not funded on a competitive basis. There is a 2 percent set-aside for state planning and research funding.

Project Readiness

There is no specific project readiness for the NHPP as projects are not determined on a competitive basis.

Merit Criteria

Given that the funding is apportioned on a formulaic basis, there is no BCA required. However, certain states may develop competitive processes to allocate funding from that allocated by the FHWA.

¹⁹ Bipartisan Infrastructure Law - National Highway Performance Program (NHPP) Fact Sheet | Federal Highway Administration
(<https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nhpp.cfm>)

Nationally Significant Multimodal Freight and Highway Projects Program²⁰

The Nationally Significant Multimodal Freight and Highways Projects (INFRA) Program provides funding under the Multimodal Project Discretionary Grant (MPDG) program. Between 2022-2026, there is between \$8-14 billion in funding available.

Project Eligibility

- ◆ Highway or bridge on the NHS
- ◆ Highway freight project on the NHFN
- ◆ Intermodal freight, freight rail or freight project within an intermodal facility
- ◆ Highway rail-grade crossing or grade separation
- ◆ Wildlife crossing
- ◆ Project for a marine highway corridor connected to the National Multimodal Freight Network (NMFN)
- ◆ Highway bridge or freight project on the NMFN

Applicant Eligibility

- ◆ A State or group of States
- ◆ Unit of local government
- ◆ Political subdivision of a State
- ◆ Special purpose district or public authority with a transportation function
- ◆ MPO
- ◆ Multistate corridor organization
- ◆ Tribal government or consortium of tribal governments

Funding Restrictions

No state may receive more than 20 percent of total funding, and required non-federal match is 20 percent.

Project Readiness

Projects are evaluated for readiness based on a technical assessment, environmental risk and financial suitability. These are evaluated based on local approvals processes, NEPA approvals and appropriate commitment of funding sources to initiate construction within 18 months of the obligation of funds.

Merit Criteria

A BCA is required for the INFRA grant program. The BCA is assessed against the following criteria:

- ◆ Safety
- ◆ State of good repair
- ◆ Economic impacts
- ◆ Climate change
- ◆ Quality of life
- ◆ Innovation

Other Requirements

Completion of Form SF-425 (Federal Financial Report form) on an annual basis to monitor project progress.

²⁰ The INFRA Grants Program | US Department of Transportation (<https://www.transportation.gov/grants/infra-grants-program>)

National Infrastructure Project Assistance²¹

The National Infrastructure Project Assistance (MEGA) is a program for large infrastructure projects with budgets of \$100 million and above. There is \$5 billion in funding available between 2022-2026.

Project Eligibility

Projects overlap with those on the INFRA program, with the following additions:

- ◆ Freight intermodal or freight rail project that provides public benefit
- ◆ Intercity passenger rail project
- ◆ A public transportation project that is eligible for assistance under Chapter 53 of Title 49 U.S.C. and is a part of any of the project types described above

Applicant Eligibility

- ◆ A state or group of states
- ◆ MPO
- ◆ Unit of local government
- ◆ Political subdivision of a state
- ◆ Special purpose district or public authority with a transportation function
- ◆ Tribal government or collection of tribal governments
- ◆ Partnership between Amtrak and one or more of the groups above

Funding Restrictions

No state may receive more than 20 percent of total funding, federal funding must be no more than 80 percent of total project cost, and required non-federal match is 20 percent.

Project Readiness

Project Readiness Criteria are the same as under the INFRA program.

Merit Criteria

BCA Criteria are the same as under the INFRA program

Other Requirements

Other requirements are the same as under the INFRA program.

²¹ The Mega Grant Program | US Department of Transportation (<https://www.transportation.gov/grants/mega-grant-program>)

PROTECT Program²²

Promoting Resilient Operations for Transformative, Efficient and Cost-Saving Transportation (PROTECT) provides funding for projects designed to reduce transportation emissions, defined as carbon dioxide (CO₂) emissions from on-road highway sources. Between 2022-2026, \$7.3 billion in funding is available to state and local governments. Funding is available to projects that help make surface transportation more resilient to natural hazards, including climate change, sea level rise, flooding. The PROTECT program offers both formulaic and competitive grant funding.

Project Eligibility

Eligible projects under the PROTECT program fall under four groups:

- ◆ Planning activities
- ◆ Resilience Improvements
- ◆ Community Resilience and Evacuation Route activities
- ◆ At-Risk Coastal Infrastructure activities

Applicant Eligibility

States do not apply directly but are apportioned funds formulaically on an annual basis. Under the grant program, the following entities are eligible to apply:

- ◆ State or political subdivision of a State
- ◆ An MPO
- ◆ A unit of local government
- ◆ A federal land management agency that applies jointly with a State; and
- ◆ A multi-state group

Funding Restrictions

Programs funded under the PROTECT program generally must not exceed 80 percent funding from federal sources, per 23 US Code 120.

Project Readiness

No project readiness criteria are defined for the formulaic or competitive grant programs.

Merit Criteria

No BCA is required for the PROTECT program; as such, there is no set of Merit Criteria. All projects under the competitive grant programs are prioritized based on the project's cost-effectiveness. However, 23 US Code 176 defines the following criteria for at-risk coastal infrastructure grants:

- ◆ Addresses the risks from a current or future weather event or natural disaster, including coastal flooding, coastal erosion, wave action, storm surge or sea level change; and
- ◆ Reduces long-term infrastructure costs by avoiding larger future maintenance or rebuilding costs.

²² Bipartisan Infrastructure Law - Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Formula Program Fact Sheet | Federal Highway Administration (dot.gov)

Railroad Crossing Elimination Program²³

The Railroad Crossing Elimination Program (RCE) is intended to reduce deaths and injuries on or near highway-rail grade crossing or pathway-rail grade crossings. There is \$573.0 million available in 2022, and \$3.0 billion over the 2022-2026 period.

Project Eligibility

The primary project categories include:

- ◆ Grade separation or closures
- ◆ Track relocation
- ◆ Improvement or installation of protective devices, signals, signs or other measures that improve safety

Applicant Eligibility

- ◆ A state
- ◆ Political subdivision of a state
- ◆ Unit of local government
- ◆ Federally recognized Indian Tribe
- ◆ Public port authority
- ◆ Metropolitan planning organization

Funding Restrictions

No state may receive more than 20 percent of total funding, federal funding must be no more than 80 percent of total project cost, and required non-federal match is 20 percent.

Project Readiness

Project Readiness is assessed via Project Implementation and Management Plan and Environmental Readiness study, which describes planning, contracting, risk, and the NEPA approvals process. Additional support is required to show that the project will reduce greenhouse gas emissions, in accordance with a Local, Regional, or State plan.

Merit Criteria

- ◆ Safety
- ◆ Equitable economic strength and improving core assets
- ◆ Equity and barriers to opportunity
- ◆ Climate change and sustainability
- ◆ Transformation of our nation's transportation infrastructure
- ◆ Eliminating crossings and making corridor-wide improvements
- ◆ Geographic diversity

²³ Railroad Crossing Elimination Grant Program | FRA
(<https://railroads.dot.gov/grants-loans/competitive-discretionary-grant-programs/railroad-crossing-elimination-grant-program>)

Rebuilding American Infrastructure with Sustainability and Equity Program²⁴

The Rebuilding American Infrastructure with Sustainability and Equity Program (RAISE) is a BIL funding program intended to modernize roads, bridges, transit, rail, ports and intermodal transportation to make it more affordable and resilient. There is approximately \$2.3 billion in funding available in the 2022-2026 period.

Project Eligibility

Capital Projects, including but not limited to:

- ◆ Highway, bridge or other roads
- ◆ Public transportation
- ◆ Port infrastructure improvements

Planning Projects:

- ◆ Planning, preparation or design of eligible surface transportation capital

Applicant Eligibility

- ◆ State
- ◆ Unit of local government
- ◆ Multi-state or multijurisdictional group of entities that are otherwise eligible
- ◆ Public agency (non-federal)
- ◆ Transit agency (non-federal)
- ◆ Special purpose district or public authority with a transportation function

Funding Restrictions

No state may receive more than 20 percent of total funding, federal funding must be no more than 80 percent of total project cost, and required non-federal match is 20 percent.

Project Readiness

Project readiness is assessed through environmental risk assessment via the NEPA approvals process, a technical assessment of the applicant's ability to deliver the project as advertised, and an assessment of the financial feasibility of the project. For 2023, projects will be reviewed for readiness only after passing merit review.

Merit Criteria

- ◆ Safety
- ◆ State of good repair
- ◆ Economic competitiveness and opportunity
- ◆ Mobility and community connectivity
- ◆ Environmental sustainability
- ◆ Quality of life
- ◆ Innovation areas
- ◆ Partnership and collaboration

Other Requirements

Other requirements are the same as under the INFRA program including BCA.

²⁴ RAISE Discretionary Grants | US Department of Transportation (<https://www.transportation.gov/RAISEgrants>)

Rural Surface Transportation Grant Program²⁵

The Rural Surface Transportation Grant Program (RURAL) provides discretionary grant funding for rural surface transportation infrastructure with substantial national or regional impact. 90 percent of grants awarded are made in amounts greater than \$25.0 million. Total funding available from 2022-2026 is \$2.0 billion.

Project Eligibility

Eligible projects include highway, bridge, tunnel projects under the NHFP, Surface Transportation Block Grant program (STBG) or the Tribal Transportation Program. Highway freight programs under the NHFP, or highway safety improvement projects are also eligible.

Applicant Eligibility

- ◆ State
- ◆ Regional transportation planning organization
- ◆ Unit of local government
- ◆ Tribal government or consortium of Tribal governments
- ◆ Multijurisdictional group of above entities

Funding Restrictions

No state may receive more than 20 percent of total funding, federal funding must be no more than 80 percent of total project cost, and required non-federal match is 20 percent.

Project Readiness

Same Selection Criteria as INFRA program.

Merit Criteria

Same Selection Criteria as INFRA program.

Other Requirements

Other requirements are the same as under the INFRA program.

²⁵ The Rural Surface Transportation Grant | US Department of Transportation (<https://www.transportation.gov/grants/rural-surface-transportation-grant>)

Surface Transportation Block Grant Program²⁶

The Surface Transportation Block Grant Program (STBG) is a formulaically apportioned funding program intended for state and municipal infrastructure projects. There is \$72.0 billion available over the 2022-2026 period.

Project Eligibility

Including but not limited to:

- ◆ Construction of highways, bridges and tunnels
- ◆ Ferry boats and terminal facilities, subject to certain conditions
- ◆ Infrastructure-based intelligent transportation systems
- ◆ Border infrastructure projects eligible for funding

Applicant Eligibility

Not applicable; states are apportioned funds on a formulaic basis, and certain amounts are distributed based on program needs, population density

Funding Restrictions

Generally, there is an 80 percent funding match requirement for projects under the projects.

Project Readiness

US Code 23 Section 133 stipulates the states or metropolitan planning organizations are required to develop a competitive process to allow eligible entities to submit projects for funding. As such, project readiness requirements vary by state.

Merit Criteria

States or metropolitan planning organizations may develop a competitive process to allow eligible entities to submit projects for funding.

Other Requirements

US Code 23 Section 133 stipulates the states or metropolitan planning organizations are required to develop a competitive process to allow eligible entities to submit projects for funding.

²⁶ STBG - Federal-aid Programs - Federal-aid Programs and Special Funding - Federal Highway Administration (<https://www.fhwa.dot.gov/specialfunding/stp/>)

Federal Non-IIJA Funding

Table 9-3 displays highway, air, and rail funding opportunities provided at the federal level not included in the IIJA. These funding opportunities are primarily provided through discretionary programs based on project relevance and scoring, typically with a BCA.

TABLE 9-3: Summary of Federal Non-IIJA Funding Opportunities

Program	Amount of Funding	Funding Type	Administering Agency	Focus
Airport Improvement Program	\$622.0 million	Discretionary	Federal Aviation Administration (FAA)	Improvements to passenger and air cargo infrastructure
Diesel Emission Reduction Act Grants	\$46.0 million*	Discretionary	Environmental Protection Agency (EPA)	Diesel emissions reduction
Economic Development Administration Economic Adjustment Grants	\$0.6-3 million†	Discretionary	Economic Development Administration (EDA)	Improve economic outcomes in disadvantaged communities
High Priority Grant Program	\$45.0 million‡	Discretionary	Federal Motor Carrier Safety Administration (FMCSA)	Assistance for commercial vehicle safety plans, and maintaining innovative technology
Motor Carrier Safety Assistance Program	\$463.0 million*	Discretionary	Federal Motor Carrier Safety Administration (FMCSA)	Reduce the number and severity of crashes involving commercial vehicles
Railroad Rehabilitation & Improvement Financing	\$35.0 billion	Discretionary	Federal Railroad Administration (FRA)	Extend credit assistance to eligible rail projects
Transportation Infrastructure Finance and Innovation Program	\$300.0 million*	Discretionary	Federal Railroad Administration (FRA)	Extend credit assistance to eligible infrastructure projects

* Annual funding available

† Range of grant funding amounts

‡ Representative of 2021 only

Airport Improvement Program²⁷

The Airport Improvement Program (AIP) is a discretionary grant program for public agencies intended to fund planning, development and construction of public use airport projects. In 2022, \$622.0 million in AIP grants were awarded.

Project Eligibility

- ◆ Runway construction/rehabilitation
- ◆ Taxiway construction/rehabilitation
- ◆ Apron construction/rehabilitation
- ◆ Airfield lighting
- ◆ Airfield signage
- ◆ Airfield drainage
- ◆ Weather observation (AWOS)
- ◆ Planning studies
- ◆ Environmental studies

Applicant Eligibility

Generally, eligible applicants include public-use airports, however private airports designated as reliever airports by the FAA, or those that have scheduled service and at least 2,500 annual enplanements are also eligible.

Funding Restrictions

Funding match requirements depend on the type of project pursued. For large and medium airports, 75 percent of eligible costs may be covered; for small primary, reliever or general aviation airports, the grant may cover 90-95 percent of eligible costs. Funds must be obligated four years from the date of the grant execution.

Project Readiness

Project Readiness is determined via Environmental Risk, Technical Assessment, and Financial Completeness assessment.

Merit Criteria

Projects that request more than \$10.0 million in discretionary funds must submit a BCA. Projects are ranked based on a score based on the following categories:

- ◆ Safety and security projects
- ◆ Projects that maintain existing airport infrastructure
- ◆ Projects that maintain the capacity of existing facilities to accommodate increasing passenger and cargo demand

²⁷ Airport Improvement Program (AIP) | Federal Aviation Administration (<https://www.faa.gov/airports/aip>)

Diesel Emission Reduction Act Grants²⁸

The Diesel Emission Reduction Act (DERA) Grants Program distributes discretionary grants for reducing diesel emissions. Funding available for national grants is \$46.0 million, per the 2021 Notice of Funding Opportunity (NOFO). There is a separate stream for state-run programs that is allocated on a formulaic basis. In 2021, \$350,160 was allocated to Tennessee Department of Environment and Conservation.

Project Eligibility

Diesel Reduction Projects:

- ◆ EPA verified technologies
- ◆ California Air Resources Board verified technologies
- ◆ Idle Reduction technologies
- ◆ Aerodynamic technologies

Equipment:

- ◆ School buses
- ◆ Class 5-8 highway vehicles
- ◆ Locomotive engines
- ◆ Marine engines
- ◆ Nonroad engines, equipment or vehicles used in construction or handling of cargo

Applicant Eligibility

- ◆ Regional, state, local or tribal agencies
- ◆ Port authorities with jurisdiction over transportation or air quality
- ◆ Nonprofit organizations or institutions that represent or provide pollution reduction or educational services to persons or organizations that own or operate diesel fleets

Funding Restrictions

National grant applicants may not request more than \$3.0 million. Funding matches vary widely depending on the type of project pursued.

Project Readiness

Project Readiness is assessed with an Environmental, Technical, and Financial Completeness Assessments.

Merit Criteria

- ◆ Benefits to the community
- ◆ Community engagement and partnerships
- ◆ Project sustainability
- ◆ Environmental results
- ◆ Programmatic capability
- ◆ Budget

Other Requirements

The grant requires quarterly progress reports and a detailed final report, and an Emissions Reduction Calculation that quantifies the expected reduction in emissions from the successful implementation of the project.

²⁸ National Grants: Diesel Emissions Reduction Act (DERA) | US EPA (<https://www.epa.gov/dera/national>)

Economic Development Administration Economic Adjustment Grants²⁹

The US Department of Commerce Economic Development Administration (EDA) Economic Adjustment grants are intended to provide economically distressed communities with resources to address a variety of economic needs. Grants range from \$100,000 to \$10.0 million, and total funding available is \$500.0 million.

Project Eligibility

Eligible projects include:

- ◆ Projects that support the creation of new businesses or jobs in a variety of sectors, including transportation
- ◆ Projects that strengthen or develop industry clusters
- ◆ Projects that facilitate and promote market access for goods and services

Applicant Eligibility

- ◆ Special district governments Federally recognized Native American Tribe
- ◆ State, county, city or other political subdivision of a state
- ◆ An institution of higher education or consortium thereof
- ◆ Non-profit organizations having a 501 (c) (3) status

Funding Restrictions

The amount of the grant may not exceed 50 percent of the total cost of the project.

Project Readiness

The application requires an Environmental Narrative that details the NEPA process, a Budget Narrative and documents such as Preliminary Engineering Study.

Merit Criteria

- ◆ Equity
- ◆ Recovery & Resiliency
- ◆ Workforce development
- ◆ Manufacturing
- ◆ Technology-based economic development
- ◆ Environmentally sustainable development
- ◆ Exports & Foreign Direct Investment (FDI)

Other Requirements

Recipients must submit financial, performance and impact reports at least on an annual basis.

²⁹ EDA Economic Adjustment Opportunity | GRANTS.GOV (<https://www.grants.gov/web/grants/view-opportunity.html?oppId=321695>)

High Priority Grant Program³⁰

The High Priority grant program is a competitive discretionary funding process administered by the FMCSA. It is intended to provide funding to enhance MCSAP commercial vehicle safety plan (CVSP) activities, maintain technology, or other projects that will improve commercial motor vehicle (CMV) safety. A total of \$45.2 million in HP funding was awarded in 2021, the most recent year for which data is available.

Project Eligibility

Including but not limited to:

- ◆ Projects that increase public awareness on CMV safety
- ◆ Reduce unsafe driving of CMVs and non-CMVs in high-risk corridors
- ◆ Improve the safe and secure movement of hazardous materials
- ◆ Improve safe transportation of goods and persons in foreign commerce
- ◆ Demonstrate new technologies to improve CMV safety
- ◆ Enhance data collection and quality

Applicant Eligibility

Eligible applicants include:

- ◆ A state agency
- ◆ Local government
- ◆ Institution of higher education
- ◆ Non-profit organization

Funding Restrictions

There is a 15 percent funding match for all HP-funded projects.

Project Readiness

All projects must designate a lead State agency to administer the grant, and demonstrate readiness with:

- ◆ Technical review
- ◆ Suitability (risk) review
- ◆ Past performance review
- ◆ Budget/cost analysis

Merit Criteria

Program-Specific Priority areas:

- ◆ Traffic enforcement
- ◆ Human trafficking
- ◆ CMV safety in work zones
- ◆ CMV safety on rural roads

³⁰ High Priority (HP) Grant - Overview | FMCSA
(<https://www.fmcsa.dot.gov/grants/mcsap-high-priority-grant/motor-carrier-safety-assistance-program-mcsap-high-priority-grant>)

Motor Carrier Safety Assistance Program³¹

The Motor Carrier Safety Assistance Program (MCSAP) is intended to reduce the number and severity of commercial motor vehicle (CMV) crashes. Total funding in 2022 was \$463.0 million.

Project Eligibility

Eligible activities reimbursable under the MCSAP include:

- ◆ Driver and vehicle inspections
- ◆ Traffic enforcement
- ◆ Compliance reviews, carrier investigations, safety audits
- ◆ Public education and awareness
- ◆ Data collection and quality

Applicant Eligibility

Eligible applicants include all states, the District of Columbia, Puerto Rico, the Commonwealth of the Northern Mariana Islands, American Samoa, Guam and the US Virgin Islands. The grants are administered by the state's MCSAP lead agency.

Project Readiness

No BCA is required for this program. All projects must designate a lead State agency to administer the grant and demonstrate readiness with:

- ◆ Technical Review
- ◆ Suitability (Risk) Review
- ◆ Past Performance Review
- ◆ Budget/Cost Analysis

Project Criteria

Basic Funds are distributed proportionately on a formulaic basis using the following equally weighted factors:

- ◆ 1997 Road miles as defined by the FHWA
- ◆ All VMT as defined by the FHWA
- ◆ Population – annual census estimates as determined by the US Census Bureau
- ◆ Special fuel consumption as defined by the FHWA.

Incentive funds may be awarded if the lead MCSAP agency can show improvement in:

- ◆ Reduction in large truck involved fatal accidents
- ◆ Reduction in the rate of large truck involved fatal accidents and maintenance of accident rate that is among the lowest 10 percent of such rates for MCSAP recipients
- ◆ Upload of CMV accident reports in accordance with FMCCSA policy guidelines
- ◆ Verification of Commercial Driver's Licenses during all roadside inspections
- ◆ Upload of CMV inspection data in accordance with FMCSA guidance

³¹ Motor Carrier Safety Assistance Program (MCSAP) Grant | FMCSA

(<https://www.fmcsa.dot.gov/grants/mcsap-basic-incentive-grant/motor-carrier-safety-assistance-program-mcsap-grant>)

Railroad Rehabilitation & Improvement Financing³²

The Railroad Rehabilitation & Improvement Financing (RRIF) program is intended to provide loans and loan guarantees to improve national rail infrastructure. In total, there is \$35.0 billion in loans and loan guarantees available to the program. It is administered by the USDOT's Surface Transportation and Innovative Finance Bureau.

Project Eligibility

- ◆ Refinance outstanding debt incurred for eligible projects
- ◆ Develop or establish new rail or rail-related intermodal facilities
- ◆ Acquire, improve or rehabilitate rail-related intermodal equipment/facilities

Applicant Eligibility

- ◆ Railroads
- ◆ State or local governments
- ◆ Government sponsored authorities and corporations
- ◆ Joint ventures that include at least one railroad
- ◆ Limited option freight shippers (project must include new rail connection)

Funding Restrictions

The loan may represent up to 100 percent of project cost. The maximum repayment period is 35 years from the date of execution of the loan agreement and interest rates equal to the cost of borrowing to the government.

Project Readiness

Project Readiness is assessed through an Environmental Review, an Engineering Review, and a Safety Review.

BCA Criteria

No BCA is required for this program. However, applicants must submit a Letter of Interest, which is evaluated according to:

- ◆ Applicant's creditworthiness
- ◆ Safety-improving merits of the project
- ◆ Significance of the project on a local, regional, or national level in terms of generating economic benefits.
- ◆ The project's intended direct or indirect environmental improvements
- ◆ The project's merits related to capacity or service increases for the rail system

³² Railroad Rehabilitation & Improvement Financing (RRIF) | Build America (<https://www.transportation.gov/buildamerica/financing/rrif>)

Transportation Infrastructure Finance and Innovation Program³³

The Transportation Infrastructure Finance and Innovation Program (TIFIA), administered by the Build America Bureau within USDOT, distributes funding for surface transportation projects in the form of loans, lines of credit or loan guarantees. There is approximately \$300.0 million in annual funding available.

Project Eligibility

A shortlist of eligible projects include:

- ◆ Highway projects
- ◆ Transit and intermodal projects
- ◆ Surface transportation infrastructure modifications
- ◆ Passenger rail projects
- ◆ Private rail facilities providing public benefit to highway users
- ◆ Intelligent transportation systems out of a port terminal

Applicant Eligibility

Eligible applicants include:

- ◆ States
- ◆ State infrastructure banks
- ◆ Private firms
- ◆ Special authorities
- ◆ Local governments
- ◆ Transportation improvement districts

Funding Restrictions

TIFIA loans may not exceed 49 percent of eligible project costs; TIFIA lines of credit may not exceed 33 percent of project costs. The maturity date of a TIFIA loan must be no later than 35 years after the date of the substantial completion, or useful life of the project, whichever is less.

Project Readiness

Completed applications and demonstrated Selection Criteria precede an oral presentation to the USDOT, and included in the STIP.

BCA Criteria

- ◆ National or regional significance
- ◆ Creditworthiness
- ◆ Private participation
- ◆ Use of new technologies
- ◆ Consumption of budget authority
- ◆ Environmental benefits
- ◆ Reduced federal grant assistance

Other Requirements

The creditworthiness review is only conducted after the project sponsor submits \$250,000 to the USDOT to cover the legal and financial advisors engaged to conduct the creditworthiness review.

³³ TIFIA Credit Program Overview | Build America (<https://www.transportation.gov/buildamerica/financing/tifia/tifia-credit-program-overview>)

Regional Grant and Loan Programs

There are several grant programs available at the regional level for infrastructure projects in Tennessee. These programs are administered by governmental or non-profit organizations, generally with public funding. The opportunities are summarized in **Table 9-4**.

TABLE 9-4: Regional and Local Grant and Loan Funding Opportunities

Program	Amount of Funding	Funding Type	Administering Agency	Focus
Partnerships for Opportunity and Workforce and Economic Revitalization	\$368.1 million*	Discretionary	Appalachian Regional Commission (ARC)‡	Create opportunities for self-sustaining economic development and improved quality of life
Local Access Road Program	Not available	Discretionary	Appalachian Regional Commission (ARC)	Supporting upgrades and safety improvements to local access roads.
States' Economic Development Assistance Program	\$1.6 billion†	Discretionary	Delta Regional Authority (DRA)	Support economic development activities in the Mississippi River Delta and Alabama Black Belt Regions

* Total funding awarded since 2015

† Representative of 2021; Tennessee only

‡ ARC grants are only available to counties within the Appalachian region - Appalachian Counties Served by ARC - Appalachian Regional Commission (<https://www.arc.gov/appalachian-counties-served-by-arc/>)

Appalachian Regional Commission (ARC) – POWER Initiative³⁴

The Appalachian Regional Commission (www.arc.gov) is a federal-state partnership that works with the people of Appalachia to create opportunities for self-sustaining economic development and improved quality of life. Under the POWER initiative, \$368.1 million has been funded since 2015.

Project Eligibility

There are a variety of projects eligible. Economic development projects including rail connectivity to a new or expanding industry. “Opportunity projects” is the ability of the governor to respond to unique problems or opportunities that are presented by a community.

Applicant Eligibility

- ◆ Local development districts
- ◆ Indian tribes or a consortium of Indian tribes
- ◆ States, counties, cities or other political subdivisions of a state
- ◆ Institutions of higher education
- ◆ Public or private nonprofit organizations or associations

Funding Restrictions

Funding provided may be up to \$1 million for construction projects, \$500,000 for non-construction. Funding match requirements vary by the economic status of a given county as assessed by the ARC.

Project Readiness

Applicants must reach out to the ARC state program managers³⁵ in order to begin the entire application process. In Tennessee, ARC funding is funneled through the Tennessee Department of Economic and Community Development. The next full round of applications is due June 2023. Applications must include:

- ◆ Form SF424A/C
- ◆ Project Budget Form
- ◆ Funds Matching Form and Match Commitment Letters
- ◆ Budget Narrative

Merit Criteria

Projects must align with state economic development priorities, and POWER initiative investment priorities of Workforce Development, Industry Clusters, SUD Response and Broadband.

Other Requirements

The ARC provides several grant applications workshops and videos, available on their website.

³⁴ ARC’s POWER Initiative - Appalachian Regional Commission (<https://www.arc.gov/arcs-power-initiative/>)

³⁵ State Program Manager - Appalachian Regional Commission (https://www.arc.gov/state_partner_role/state-program-manager/)

Appalachian Regional Commission – Local Access Road Program³⁶

The Local Access Road Program provides funding for roads in several streams. Access Roads may serve industrial, commercial, and service areas, and timber areas to satisfy the freight demand.

Project Eligibility

Eligible projects include:

- ◆ Preliminary engineering, purchase of rights-of-way and construction
- ◆ Upgrading or safety improvements on ARC access roads

Applicant Eligibility

Eligible applicants include:

- ◆ Local development districts
- ◆ Indian tribes or a consortium of Indian tribes
- ◆ States, counties, cities or other political subdivisions of a state
- ◆ Institutions of higher education
- ◆ Public or private nonprofit organizations or associations

Funding Restrictions

The funding match requirement for ARC Local Access Road program varies depending on the economic status of the applicant county.

Project Readiness

The applicant must provide:

- ◆ ARC Form 2
- ◆ Design criteria
- ◆ Itemized cost estimate
- ◆ Letter from the State DOT³⁷
- ◆ Project status and schedule

Merit Criteria

Projects working on critical infrastructure must:

- ◆ Ensure that communities have adequate basic infrastructure to implement their community and economic development objectives
- ◆ Support the construction and adaptive reuse of business-development sites and public facilities to generate economic growth and revitalize local economies.

³⁶ Local Access Road Program - Appalachian Regional Commission (<https://www.arc.gov/local-access-road-program/>)

³⁷ Additional details: APPALACHIAN REGIONAL COMMISSION | ARC (<https://www.arc.gov/wp-content/uploads/2020/07/LocalAccessRoadsProjectGuidelines01-2020.pdf>)

States' Economic Development Assistance Program³⁸

The Delta Regional Authority administers the States' Economic Development Assistance Program (SEDAP) to support economic development activities in the Mississippi River Delta and Alabama Black Belt Regions. In 2021, there was \$14.8 billion available in SEDAP funding, including \$1.6 billion in Tennessee.

Project Eligibility

Projects may include:

- ◆ Basic public infrastructure
- ◆ Transportation infrastructure
- ◆ Business development
- ◆ Workforce development

Applicant Eligibility

Eligible applicants include state and local governments, public bodies, and non-profit organizations.

Funding Restrictions

50 percent of SEDAP funding must be spent on infrastructure projects

Project Readiness

Applications are submitted to the DRA via the Local Development District following these procedures.³⁹

Merit Criteria

Projects should align with at least one Regional Development Plan goal, and one federal priority goal to be considered.

Regional Development Plan Goals:

- ◆ Improved workforce competitiveness
- ◆ Strengthened infrastructure
- ◆ Increased community capacity

Relevant Federal priority Criteria for SEDAP include:

- ◆ Regional impact
- ◆ Multiple funding partners
- ◆ Infrastructure

³⁸ States' Economic Development Assistance Program (SEDAP) | Delta Regional Authority
(<https://dra.gov/funding-programs-states-economic-development/states-economic-development-assistance-program/>)

³⁹ SEDAP Application Guidelines | Delta Regional Authority
(<https://dra.gov/funding-programs-states-economic-development/states-economic-development-assistance-program/sedap-application-guidelines/>)

Known Opportunities & Strategy

Schedule of Known Opportunities

Table 9-5 summarizes 2023 deadlines for grant award applications and the expected future availability of programs. The 2023 dates are based on 2022 program schedules unless otherwise specified.

Discretionary Funding Strategy

The following section provides strategies for maximizing the funding for freight and rail projects in Tennessee through federal discretionary grant programs. These programs were summarized in Infrastructure Investment and Jobs Act Funding and Federal Non-IIJA Funding with a synopsis of the key attributes of each program — the eligible projects, the merit criteria, the funding available and the timelines involved. It should be noted that these programs continue to evolve from one Notice of Funding Opportunity to another; the information presented here reflects what is known at the time of preparing this report.

The funding or financing strategy excludes the practices and protocols already established through the Tennessee Transportation Improvement Program (STIP).

TABLE 9-5: Funding Schedule of IIJA, Non-IIJA, State, Regional, and Local Opportunities for Freight Infrastructure*

	Program	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024	2025	2026
IIJA Funding Programs	BIP			✓		✓	✓	✓
	TP	✓				✓	✓	✓
	CRP					✓	✓	✓
	CMAQ [‡]					✓	✓	✓
	CRISI				✓	✓	✓	✓
	HSIP			✓		✓	✓	✓
	FLAP					✓	✓	✓
	FLTP					✓	✓	✓
	MPP					✓	✓	✓
	NHFP [‡]					✓	✓	✓
	NHPP [‡]				✓	✓	✓	✓
	INFRA		✓			✓	✓	✓
	MEGA		✓			✓	✓	✓
	PROTECT					✓	✓	✓
	RCE				✓	✓	✓	✓
	RAISE	✓			✓	✓	✓	✓
	RURAL		✓			✓	✓	✓
STBG [‡]				✓				
TTP			✓		✓	✓	✓	
Other Federal Programs	AIP		✓					
	DERA				✓			
	EDA EA		✓					
	HP			✓				
	MCSAP			✓		✓		
	RRIF					✓	✓	✓
	TIFIA					✓	✓	✓

Project Prioritization

To optimize the amount of funding through discretionary grant programs, TDOT must select the best project to put forth for a particular funding program. In some instances, it may make sense to submit the same project to multiple funding programs, while in other instances different projects may be submitted for different programs in any one year.

Similar to TDOT's Decision-Making Process described in Chapter 8, a decision-making process should be followed to prioritize what freight projects provide the State the best opportunity for securing discretionary grant funding. The general process to identify the best projects for potential discretionary grant funding is outlined below.

	Program	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024	2025	2026
State Funding Programs	FastTrack [†]	✓				✓	✓	✓
	State Industrial Access [‡]					✓	✓	✓
	Short Line Preservation [†]			✓		✓	✓	✓
Regional Funding Programs	ARC – POWER [†]	✓				✓	✓	✓
	ARC – Local Access Roads [†]					✓	✓	✓
	SEDAP [†]		✓			✓	✓	✓

* Dates are approximate based on prior year award schedules and published authorizations for future years

† Future years are assumed in certain cases when authorization/apportionment is not explicitly stated by administering agencies

‡ These programs either do not have a submission date as they are formulaic apportionment programs, or no date is available



Step 1: Screen Out Projects That Do Not Meet Specific Mandatory Requirements

Each discretionary grant program requires certain criteria to be met to ensure that the project is technically ready (e.g., “Project Readiness Review”) to be constructed. Generally, these requirements relate to environmental permitting, technical readiness and financial completeness.

Each project can be screened across the various requirements under each program:

- ◆ Is the project an eligible⁴⁰ project under the program requirements?
- ◆ Is the project technically ready to be considered under this discretionary grant proposal?
 - What is the history of the project proponent delivering a project of this scope and scale?
 - Are the required environmental and other permits in place or will be in place by the time specified in the grant program requirements?
 - Is the project ready to start construction and/or be completed in the time specified?
 - Is at least the minimum funding match available as specified under the program?
 - Is the project part of the State Transportation Improvement Plan (STIP) (if a requirement)?

The projects that pass all the screening mechanisms can move on to Step 2. Projects that are screened out can still be considered for discretionary grants in future years as the project planning and environmental processes are further developed.

Step 2: Assess Projects relative to the program merit criteria

All remaining projects should be assessed relative to the merit or evaluation criteria for the program(s). The merit criteria are broadly consistent across the discretionary grant programs although some programs have specific areas of focus (e.g., the Grade Crossing Elimination Program or the Bridge Investment Program for example) and different levels of emphasis on the various merit criteria. Furthermore, some programs have rather prescriptive project evaluation criteria (e.g., RAISE) while others have more general requirements.

Regardless, each project should be evaluated against the merit criteria for the program(s). As an example, for RAISE in 2023 the merit criteria are:

1. Safety
2. Environmental sustainability
3. Quality of life
4. Improves mobility and community connectivity
5. Economic competitiveness and opportunity
6. State of good repair
7. Partnership and collaboration
8. Innovation

Each project should be qualitatively assessed relative to the merit criteria to ensure that there is strong alignment. In the RAISE 2023 example,⁴¹ a project is rated “Highly Recommended” if six or more of the eight merit criteria ratings are “high” and none of the merit criteria ratings are “non-responsive.”

⁴⁰ There are applicant eligibility requirements as well. However, state Departments of Transportation are generally eligible applicants for all programs.

⁴¹ Other programs would have different merit criteria and these criteria can change over time.

Step 3: Quantitative Assessment – What Evidence is Available to Support our Qualitative Rankings

In the prior step, projects were assessed relative to the merit criteria. A critical next step is assessing what concrete evidence can be put forth to support that the project scores well relative to the merit criteria. One of the common pitfalls of grant applications is the lack of data to support a specific claim of a project benefit (such as safety benefits). To achieve a “High” score on a merit criteria, the criterion must include “clear, direct, data-driven and significant benefits in support of the claim”.⁴²

As an example, for safety:

- ◆ Are recent accident statistics available for the facility that is to be improved?
- ◆ Are accident rates on the facility relatively high?
- ◆ Is there evidence that the specific project improvement will improve safety, either from existing studies or evidence related to Crash Modification Factors?

Another criterion that is key in many discretionary grant applications is “partnership and collaboration.” The willingness of project stakeholders to demonstrate their commitment to the project is critical. Additionally, committed financial support from partners demonstrates the local importance to the project and the commitment to the project of various stakeholders. Projects that demonstrate this broad-based financial support tend to score well under discretionary grant programs. The current RAISE 2023 NOFO provides an excellent summary of what is required to score at “High” rating for each criterion.⁴³

If there is strong evidence to support the merit criteria ratings, then these projects could be considered for potential submission under the program(s). If the evidence does not exist at the time, then TDOT may want to consider collecting additional data or studies to develop the evidence for the project— for the current or a future year program.

Step 4: High Level Benefit-Cost Analysis (BCA)

For the programs that require it, it is advisable to use the quantitative data from Step 3 and conduct a high level or a “back-of-the envelope” BCA. Most of the discretionary grant programs require a BCA to be submitted as part of the grant funding application. Generally,⁴⁴ to secure discretionary grant funding, the project should be able to demonstrate a BC Ratio of at least 1.0.

The high-level BCA analysis would monetize some of the highly rated benefits where the quantitative data exists and assess what the monetary value of the benefits would likely be relative to the project cost. Where the data seems to support a favorable BCA outcome, the project would be a good candidate for a discretionary program grant.

Through the prioritization process described above in Steps 1 to 4, the projects that rank highest are best candidates to be considered for a discretionary grant program. Projects that should be considered for a discretionary grant application will:

- ◆ Satisfy project readiness review – environment, technical and financial
- ◆ Rate highly relative to the merit criteria
- ◆ Have strong quantitative evidence to support the project benefits
- ◆ Likely have a BC Ratio of greater than 1.0

The number of projects to be submitted will be further narrowed down based on the funding that TDOT is able to commit.

⁴² Notice of Funding Opportunity for the Department of Transportation’s National Infrastructure Investments (i.e., the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Program) under the Infrastructure Investment and Jobs Act (“Bipartisan Infrastructure Law”), Page 38. (<https://www.transportation.gov/sites/dot.gov/files/2022-12/FY%202023%20RAISE%20NOFO%2012.14.2022.pdf>)

⁴³ FY 2023 RAISE NOFO, Pages 40 to 45. ([https://www.transportation.gov/sites/dot.gov/files/2022-12/FY 2023 RAISE NOFO 12.14.2022.pdf](https://www.transportation.gov/sites/dot.gov/files/2022-12/FY%2023%20RAISE%20NOFO%2012.14.2022.pdf))

⁴⁴ There are some exceptions but generally to be competitive projects require a BCA of at least 1.0. It is mandatory for some programs.

Grant Application Development

For projects that have been short listed to be submitted under an upcoming discretionary grant funding application, the pre-submission activities including the development of a compelling grant application, are important.

Some of the key activities project sponsors should initiate/complete before the Notice of Funding Opportunity (NOFO) is announced:

- ◆ Be prepared for when the NOFO is expected to be published
- ◆ Share information about the project to ensure local support
- ◆ Have discussions about the project and its benefits with key stakeholders, potential project partners, and your Congressional delegation, etc. Garnering letter of support from these can be included in the grant application itself and prove stakeholder support
- ◆ Have discussions with federal agency regional representatives and USDOT on the project. If the project was submitted previously and was unsuccessful, request a debrief to understand how the appropriate federal agency viewed the application, where it rated highly, and where it did not. Many projects that ultimately secure funding are not successful on the first submission. If this is the first submission for the project, discussions with federal counterparts will provide useful information and perspectives for subsequent grant submissions

The period from NOFO to submission can be as short as 60 days. As such, having the resources lined up to prepare the full grant application— up to a 30-page narrative, the BCA write-up and model, letters of support, supporting technical evidence, etc.— is essential in developing the actual grant submission:

- ◆ Ensure that the overall grant application is compliant with the current program requirements as they can change from year to year and program to program. USDOT has a variety of resources available after the NOFO is released including webinars, BCA Guidance documents, etc.
- ◆ Make the grant narrative compelling, telling a story as to why the project should receive funding. The content must be summarized in only 30 pages (potentially less than that with some grants). It is important for the merit criteria that the project ranks highest, and the evidence is provided in the narrative to support that claim (as opposed to any technical appendix like the BCA appendix). Write the documents to the strengths of the merit criterion. Easy to read text, graphics and maps can help make the narrative effective

Given the magnitude of transportation funding available through IJA, a well-structured prioritization and grant development strategy is essential for securing future discretionary grant funding.

Arrange a Debrief on Unsuccessful Grant Applications

When a TDOT discretionary grant application is unsuccessful, USDOT will, if requested, provide a debrief on the application. These debriefs provide a summary of how the application scored by merit criterion and the overall grant application rating (e.g., highly recommended, recommended, acceptable or unacceptable) with a rationale for each rating. The intelligence from these debriefs can be quite beneficial for improving the application for a future opportunity or deciding not to pursue in future rounds of funding.

Potential Projects for Grant Funding

The list below identifies potential projects for grant funding opportunities.

Region 1

- ◆ I-75 Interchange at I-640/I-275 (Sharps Gap)
- ◆ I-40 Bridge over French Broad River
- ◆ I-40 Bridge over Clinch River
- ◆ Relocation of weigh stations along I-40/I-75 in Knoxville

Region 2

- ◆ I-24 from I-59 to US27
- ◆ Corridor K (U.S. Highway 64) completion

Region 3

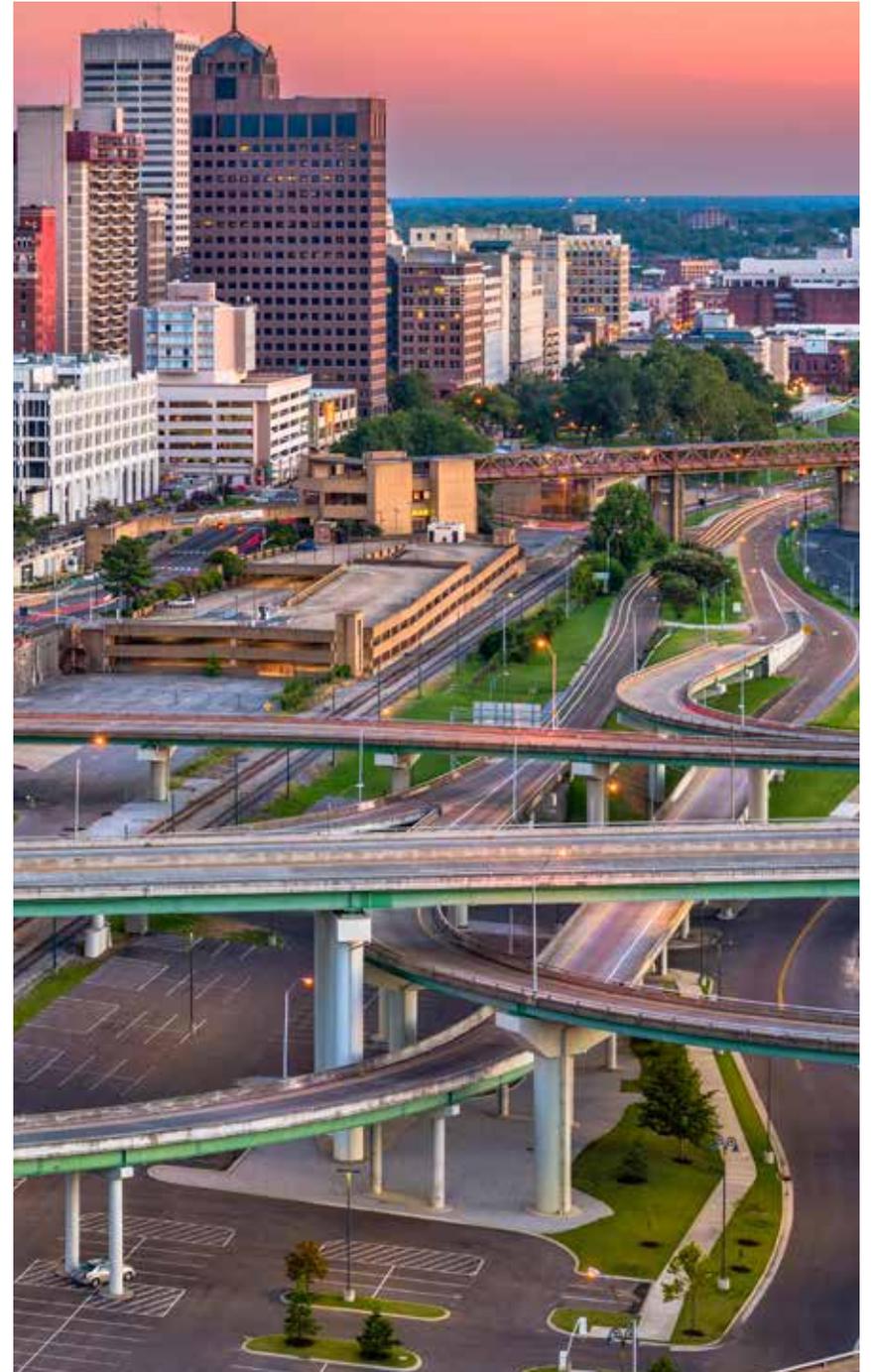
- ◆ I-65 from Nashville to KY Stateline
- ◆ I-24 from Nashville to KY Stateline

Region 4

- ◆ I-69 from Memphis to KY Stateline
- ◆ I-55 Mississippi River Bridge
- ◆ I-240 Interchange at Airways Blvd
- ◆ Lamar Ave from Shelby Drive to Raines/Perkins Rd interchange

Statewide

- ◆ Rural Interstate Expansion and Truck Climbing Lanes along I-24, I-26, I-40, I-65, I-75, & I-81
- ◆ Short-Line Railroad needs as listed in Needs Assessment for track and bridge improvements





Freight Recommendations and Implementation

Chapter 10: Freight Recommendations and Implementation

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Chapter 10: Freight Recommendations and Implementation

Coordination with Other Freight and Transportation Plans

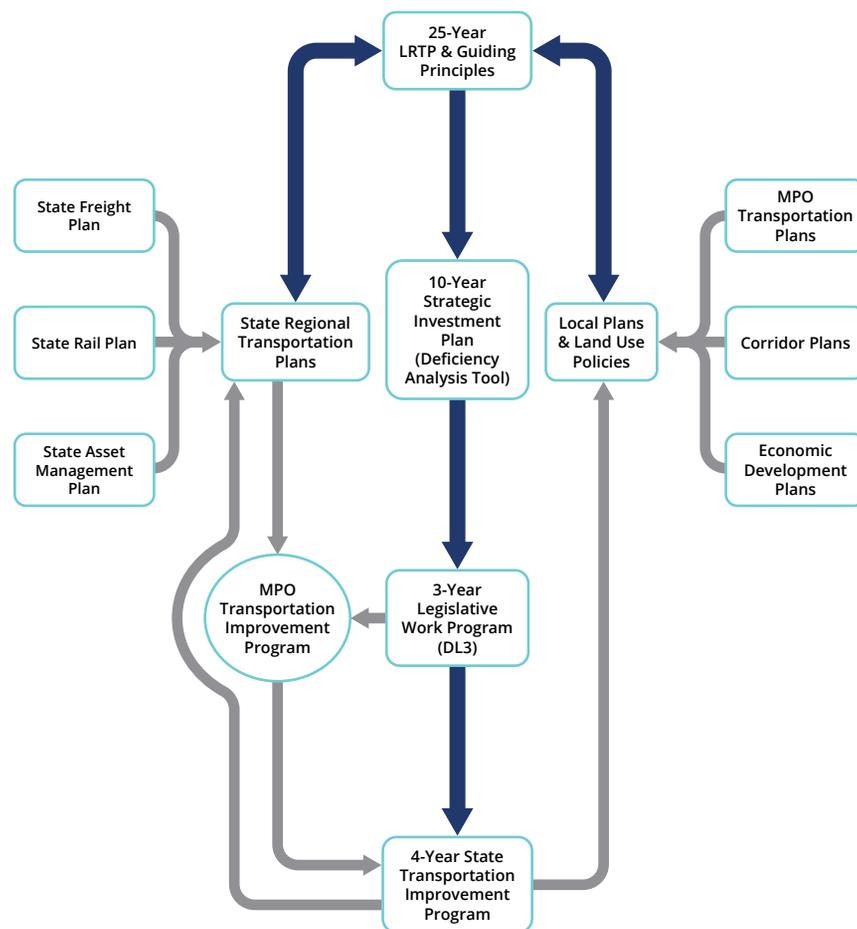
TDOT developed a 25-Year Long-Range Transportation Policy Plan and a 10-year Strategic Investment Plan in 2016, and a Statewide Rail Plan compliant with the Passenger Rail Investment and Improvement Act (PRIIA) in 2019. Each have a substantial freight component and provides policy and program recommendations promoting a more efficient, safe, and reliable freight network in Tennessee.

At the regional level, TDOT developed studies for major interstate freight corridors including I-75 (2010), I-24 (2015), I-65 (2017), I-55/75/26/155 (2020) and I-40/81 (2022) that identified short- and long-term solutions for managing congestion and improving safety along each corridor.

The Tennessee Statewide Multimodal Freight Plan (SMFP) is built upon information gathered from MPOs, RPOs and other freight stakeholders. TDOT continues to work with these stakeholders, surrounding states and others to optimize freight mobility to, though and within Tennessee. The diagram in **Figure 10-1** explains TDOT's integrated planning process and provides consistency between plans, programs and projects.

TDOT has also conducted several strategic freight research projects and maintains a list of current research studies tackling a variety of

FIGURE 10-1: Coordination of Tennessee's Planning Process



freight topics. A small sample of these freight projects include but are not limited to:

- ◆ Identifying Cost-Effective, High Return, and Quickly Implementable Improvements to Address Freight Congestion and Mobility Constraints in Tennessee
- ◆ Improving Resilience of Freight Networks in West Tennessee
- ◆ The Use of Freight Advisory Committees in Responding to Freight Supply Chain Disruptions
- ◆ Multimodal Freight Transportation System Capacity and Diversion Assessment for Middle Tennessee
- ◆ Cyber-Physical Applications for Freight Transportation Systems
- ◆ Truck Parking Facilities and Ramp Parking: Role of Supply, Demand, and Ramp Characteristics
- ◆ Tennessee's Short Line Railroads – Programs, Policies, and Perspectives
- ◆ The Economic Impact of Chickamauga Lock Closure
- ◆ Truck Parking Needs in Tennessee
- ◆ Comprehensive Planning Guidebook for Commodity and Freight Movement in Tennessee
- ◆ Evaluating Freight Intermodal Connectors (FICs) in Tennessee
- ◆ Freight Flows and Incident Management
- ◆ Automated Plate Recognition and Truck Trip Tracking
- ◆ Alternative Vehicles in Last Mile Freight



Freight Policy and Program Recommendations

The following section lists freight policy and program recommendations according to the State's five priority freight goals and objectives identified in Chapter 1.

Goal 1: Improve the safety, security, efficiency and resiliency of the freight transportation system

- ◆ Address highway freight bottlenecks, mostly in the urban areas of the state
- ◆ Expand Tennessee's Strategic Corridors to include rail, water and intermodal facilities including joint use of corridors and terminals
- ◆ Work with stakeholders to assess the severity of impacts and develop strategies to reduce the impacts of extreme weather and natural disasters on freight mobility
- ◆ Designate a tiered, statewide highway freight network to reflect the importance of different highways supporting national, regional, intrastate and local or first/last mile connections, to better support decision making associated with priorities and allocating resources

Goal 2: Improve the state of good repair of the freight transportation system

- ◆ Improve the rail infrastructure of short line railroads
- ◆ Establish a funding program with a dedicated revenue source for multimodal freight investments
- ◆ Expand the State Industrial Access Program to allow for other transportation improvements

Goal 3: Reduce congestion on the freight transportation system

- ◆ Continue communication and collaboration with railroads for updates on network developments and capacity improvements
- ◆ Implement policies to mitigate the impact of freight activity on populations in urban areas



Goal 4: Incorporate innovation and technology to improve mobility and safety

- ◆ Continue the development of freight-related data and planning tools
- ◆ Integrate additional technology-oriented strategies into plans and implement workforce training strategies accordingly
- ◆ Develop and maintain a statewide commodity flow-based travel demand model and acquire and maintain Transearch data, travel time data, ATRI truck flow data and other freight data as needed
- ◆ Employ truck parking technology solutions for detection and communication
- ◆ Repower regional and short haul truck haulage to battery electric trucks
- ◆ Develop public-private partnerships for highway projects in both rural and urban areas
- ◆ Expand TDOT's ITS and incident management program (HELP) coverage and capabilities to respond to growing freight demands on Tennessee's highways
- ◆ Improve the efficiency, utilization and capacity of the truck parking system in Tennessee through innovative technologies, including:
 - **Truck Parking Information Management System (TPIMS)** to identify truck parking availability and deliver real-time availability information to drivers
 - **Vehicle to Infrastructure (V2I)** technology through the wireless exchange of data between road vehicles and road infrastructure. This could be a data source within the TPIMS system
 - **Truck Parking Notification/Reservation System** using mobile technology to enhance parking space availability, increase awareness and help drivers better plan their trips

Goal 5: Reduce the Impact of Freight Transportation

- ◆ Ensuring freight-related infrastructure projects evaluate measures to reduce flooding, stormwater runoff and reduce the impact upon wildlife habitat
- ◆ Partnering with other agencies and the freight industry to scope projects and seek funding to reduce the impacts of local air pollution from freight movement
- ◆ Overlay the tiered highway freight network with locations of disadvantaged communities to better understand the relationship of freight movement and its negative impacts upon disadvantaged communities
- ◆ Identify friction points and negative impacts to communities and livability needs and pursue policies, programs and projects to solve these conflicts

The State of Tennessee is committed to supporting freight electrification and alternative fuel vehicles to reduce energy costs, increase efficiency of the transportation sector and reduce emissions. With the new Ford electric truck manufacturing facility under construction in Stanton, Tennessee, scheduled to begin production in 2025, a statewide shift to zero-emissions and alternative fuel vehicles will occur. Multiple state agencies, local governments, electric utilities and other private entities and groups consorted to establish the DriveElectric Tennessee¹ (DET) initiative. DET's main objective is to develop a shared vision for electric transportation in the state, including policies and program recommendations. TDOT and its partners are also currently in the process of funding the installation of EV charging station infrastructure through the Tennessee Electric Vehicle Infrastructure (TEVI) Program.²

¹ <https://www.driveelectrictn.org/>

² <https://www.tn.gov/tdot/long-range-planning-home/air-quality-planning/tevi.html>

Funding

TDOT's FY 2023 work program is forecast to be \$3.284 Billion. Funding for this program is from several sources, with state funds contributing 59 percent of the total and Federal funds 41 percent. Most state funds come from Highway User taxes (\$926M) and the State General Fund (\$836M).

In 2017, the IMPROVE Act, officially titled "Improving Manufacturing, Public Roads and Opportunities for a Vibrant Economy," was enacted. This act included Tennessee state fuel tax increases, increasing the gas tax by six cents, diesel tax by 10 cents and natural gas tax by eight cents over three years as part of a plan to fund 962 road and bridge projects. It also added a \$100 annual registration fee for electric cars.

Tennessee's growth is far outpacing roadway capacity investments. This is becoming more prominent throughout Tennessee, not just in urban areas. Addressing congestion is fundamental to efficient freight movement to, from and within the state and the economic competitiveness of those companies that base their manufacturing, distribution and freight related operations within the state. \$26 billion is needed over-and-above the 2017 IMPROVE Act to address both urban and rural congestion in Tennessee. This includes nearly \$14 billion in the four major urban areas — Nashville, Memphis, Chattanooga and Knoxville — and over \$12 billion on Tennessee's rural highways. Of that total, only \$3.6 billion is already contemplated as part of the 2017 IMPROVE Act projects list. Of TDOT's \$1.2 billion budget for annual construction and maintenance, only \$500 million per year is available for the construction of projects that would address congestion.

Statewide Transportation Improvement Program

Tennessee's Statewide Transportation Improvement Program (STIP) is developed every three years to provide a statewide listing of transportation projects, covering a period of four years, that is consistent with the state's 25-Year Long-Range Transportation Plan and the metropolitan transportation plans for which TDOT intends to provide funding. The STIP is a focal point for implementing strategic goals from both the federal and state levels, which pursue the desire for improving the state's transportation network while preserving the livability of communities.

The STIP is a fiscally constrained document, meaning that sufficient funds are reasonably expected to be available with which to implement the proposed improvements, as well as to operate and maintain the entire system. MPO's are responsible for compiling their own Transportation Improvement Plans for their respective areas.

TDOT plans for the operations of the transportation system in multiple ways; many factors affecting the operations are part of the project selection process for the State Transportation Improvement Plan (STIP). Locations that commonly experience bottleneck or congestion problems, that see heavy truck traffic, or that experience traffic growth due to new developments are all issues that receive priority as part of the selection process.

The 2023-2026 Draft STIP includes projects that support freight movement. These projects typically enhance the highway system's functional capacity by eliminating issues that create freight bottlenecks and delays, improve highway safety and improve the efficiency of existing infrastructure.

Freight Investment Plan

Table 10-1 identifies the 2023-2027 fiscally constrained Freight Investment Plan and details the potential candidate projects for National Highway Freight Program funding.

TABLE 10-1: Tennessee Freight Investment Plan

County	TDOT PIN	Route	Project	Total Project Cost (M)	Funding	FY 2023 (M)	FY 2024 (M)	FY 2025 (M)	FY 2026 (M)	FY 2027 (M)
Hamilton	114171.0	I-75/ I-24	Phase 2 I-75/I-24	\$183.38	NHFP	\$31.74	\$19.88	-	-	-
					State	\$3.53	\$2.21	-	-	-
Knox	12443.00	I-640/ I-75	Interchange at I-640/275 (Sharps Gap)	\$304.6	NHFP	-	-	\$7.06	\$3.02	\$17.27
					State	-	-	\$0.78	\$0.34	\$1.92
Smith	124706.00	I-40	Smith County Truck Parking and Bridge Replacement	\$4.2	NHFP	-	-	-	-	\$3.83
					State	-	-	-	-	\$0.42
Shelby	107913.00	I-240	Interchange Modification at Airways Blvd	\$126.68	NHFP	-	-	\$23.42	\$28.07	\$10.0
					State	-	-	\$2.61	\$3.2	\$1.11
Statewide	40597.28	Multiple	Add mainline Weigh-in-Motion (WIM) systems upstream of all 6 existing truck weigh stations along Interstates I-24, I-40, I-65, I-75, and I-81 and at other locations throughout Tennessee.	\$13.1	NHFP	-	\$10.0	-	-	-
					State	-	\$2.5	-	-	-
Total				\$631.96	NHFP	\$31.74	\$29.88	\$30.48	\$31.9	\$31.1
					State	\$3.53	\$4.71	\$3.39	\$3.54	\$3.45



Appendices

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Appendix A: Freight Advisory Committee Engagement Summary

Tennessee Statewide Multimodal Freight Advisory Committee Meeting

Sept. 7, 2022 – 8:30 a.m. – 11:30 a.m.

In Person:

TDOT Region 3 Headquarters
6601 Centennial Boulevard
Nashville, TN 37243-0360

Online:

Microsoft Teams

Meeting Agenda

8:30 a.m. – 8:45 a.m.	Welcome/Opening, Butch Eley, Commissioner
8:45 a.m. – 9:45 a.m.	State Freight Update, Keith Bucklew and Peter Kauffmann, HDR
9:45 a.m. – 10:05 a.m.	Break
10:05 a.m. – 10:25 a.m.	Freight updates, Dan Pallme, TDOT Assistant Chief of Environment and Planning Bureau, Freight and Logistics Director
10:25 a.m. – 10:45 a.m.	Weight in Motion Update, Dan Pallme
10:45 a.m. – 11:05 a.m.	Department-wide updates, Preston Elliott, TDOT Deputy Commissioner, Bureau Chief of Environment and Planning
11:05 a.m. – 11:25 a.m.	Wrap-up/Next steps, Dan Pallme

Meeting Summary

The Freight Advisory Committee meeting was held in person and via Microsoft Teams Wednesday, September 7, 2022. A total of 125 attendees participated – 85 online and approximately 20 people attended in person. Attendees included FHWA, FMCSA, TDOT, motor carrier industry representatives, waterways partners, Class I and short-line rail partners, consultants and Tennessee Department of Safety.

Speakers included:

- ◆ Butch Eley (TDOT Commissioner)
- ◆ Dan Pallme (DOT Assistant Chief of Environment and Planning Bureau and Freight and Logistics Director)
- ◆ Preston Elliot (TDOT Deputy Commissioner, Bureau Chief of Environment and Planning)
- ◆ Keith Bucklew (HDR Freight Plan Project Manager)
- ◆ Peter Kauffman (HDR Senior Traffic Engineer)

Meeting Purpose

The role of the Freight Advisory Committee (FAC) is to advise the TDOT Freight and Logistics Division and their project team on freight-related priorities, issues, projects and funding needs. The purpose of the meeting was to provide and discuss updates to the Statewide Multimodal Freight Plan (SMFP) and to have discussions on the following topics:

- ◆ SMFP update, with Mentimeter activity to facilitate interaction and seek stakeholders' freight perspectives and issues
- ◆ Department-wide updates
- ◆ Weigh-in-Motion implementation update

The SMFP is important, as it guides the advancement of multimodal freight transportation, assesses all freight modes and intermodal connectivity, and identifies freight needs. It also creates recommendations for policies, programs and projects, serving as a roadmap for future investment. The plan supports the Tennessee Long Range Transportation Plan (LRTP).

Meeting Kickoff

Preston Elliott, TDOT's Deputy Commissioner and Bureau Chief of Environment and Planning, started the meeting by reviewing the agenda and history of the Freight Advisory Committee. He introduced TDOT Commissioner Butch Eley, who called for the meeting to be informal and conversational. Topics from Commissioner Eley's introduction:

- ◆ Safety is TDOT's top priority
- ◆ Growth in Tennessee presents opportunities and challenges
- ◆ IMPROVE Act projects are behind schedule where they need to be
- ◆ Need to invest in infrastructure to support growth
- ◆ Growing gap in funding between what we have and what we need
- ◆ Questions from the audience
 - Increased use of electric vehicles lessens the amount of money collected through gas taxes. Is the state exploring options to make EV owners pay for roadway usage? Preston responded with information about the \$100 registration fee for EVs, but further stated it was not sufficient.
 - The state is in the interim steps of reviewing and reassessing registration fees for EVs and is exploring other options such as VMT.

Statewide Freight Plan Updates

Keith Bucklew and Peter Kauffmann, HDR

Purpose of Statewide Multimodal Freight Plan

- ◆ Guides advancement of a multimodal freight transportation system, assesses all freight modes and intermodal connectivity, identifies freight needs and issues, creates recommendations for policies, programs, projects, and processes, serves as roadmap for future investment
- ◆ Role of Freight Advisory Committee: to advise the project team on freight-related priorities.

Freight Vision and Goals

Tennessee's goals are to:

- ◆ Improve safety, security, efficiency and resiliency of the system
- ◆ Improve the state of good repair of the system
- ◆ Reduce congestion
- ◆ Improve mobility and safety with innovation and technology

Freight Planning and Demand Trends

Several factors drive freight planning, including federal regulations and state legislation. Other factors can involve transportation funding shortfalls, private sector investment potential and demands or economic development. Some trends that are influencing freight demand include demographics, technology or trade/industry growth.

Supply chains are key to the state's economic vitality and are designed with service and cost criteria. Several economists are going through a Tennessee goods and commodity flow analysis, which the Freight Plan will reference.

Bottlenecking

The plan will address existing issues in the state, including the condition of roadways and their maintenance and expansion. Finding (truck) bottlenecks along the state's interstate system is a federal requirement. 26 areas were identified. The top locations were Chattanooga's Northbound I-75 from the state line to the I-24 Interchange, Memphis' I-55 to Arkansas and multiple freeway segments in Nashville. Two aspects establish bottlenecking – absolute delay (truck delay) and reliability. Congested, urban areas impact the most people.

Supply Chain Disruptions

Supply chain disruptions include the pandemic and post-pandemic recovery, where there will likely be continuous outbreaks and inflation. Truck and rail capacity is limited and it's a bad time to negotiate labor contracts. There are regional, national and global impacts, as well (i.e. Russia-Ukraine war).

Open Discussion on Needs and Issues

There will be a comment map on the TDOT Freight Planning webpage¹ in addition to this meeting for participants to respond.

Stakeholders raised several subjects in the meeting:

- ◆ There will be 85,000 new jobs in Tennessee. There is more demand than supply currently. Blue Oval is 8,000 more jobs.
- ◆ Concerning the area from Nashville to the east coast, service point of view for CSX and a shortage of trucks is also an issue. There are also traffic issues for truck parking, a CSX shortage of containers and an extended length of trains to two miles.
- ◆ Intermodal service from Montana to Nebraska
- ◆ BNSF Railway in Memphis – Provided comments about how chassis are used and managed. The railroad companies do not own chassis. Rather, there are multiple private and public chassis providers in Memphis.
 - Janey Camp mentioned that her organization at Vanderbilt has an ongoing project funded through the USDOT supported University Transportation Center called MarTREC (University of Arkansas). The group is -l studying the Memphis port and the chassis issues. She encouraged anyone with an interest to reach out.
- ◆ A port is opening on September 28 (adjacent to the Arcosa barge plant) and another port for 63 barges, which will help relieve some needs.

Mentimeter Survey Activity

1. **Which Grand Division do you represent (in Tennessee)?**
 - Out of 49 responses, Middle Tennessee had the most representation in the meeting (21) whereas West Tennessee had the least (8). East Tennessee was represented by 20 people at the meeting.
2. **Regarding freight transportation, what are the top three issues that concern you most?** Eleven options were presented to the group, with 59 persons responding.
 - Participants responded that the top priorities of concern are:
 - » The condition of the state’s roadway network (28 votes)
 - » Shortage of labor (23 votes)
 - » Funding to maintain and expand the state’s roadway network (24)
 - » Remaining issues and vote counts can be found in the Appendix- Mentimeter Results.
3. **Please rate the following statement from 1 (Very Poor) to 10 (Very Well): “The current multimodal freight system supports economic development in Tennessee.”**
 - Participants’ average collective rating of the statement was 6.8.
4. **Focusing on transportation safety, what are top three issues that concern you most?**
 - Participants responded that the top three safety issues are:
 - » Operator issues (speed, distractions, etc.): 40 votes
 - » Roadway geometry: 36 votes
 - » Condition and at-grade rail crossings: 22 votes
 - This question yielded 55 votes total.

Remaining issues and vote counts can be found in the Appendix – Mentimeter Results.

¹ <https://www.tn.gov/tdot/transportation-freight-and-logistics-home/freight-planning.html>

Freight Topics

Dan Pallme began his presentation with an overview of the departments in the Freight and Logistics Division of TDOT:

- ◆ Rail Safety and Inspection – five employees to review each crossing in the state, and to address employee issues
- ◆ Rail Engineering – \$5.3M budget, manages the state’s Highway-Railroad Grade Crossing Program (also referred to as the Section 130 Program) which was updated this year
- ◆ State Safety Oversight – Program required by Federal Transit Administration (FTA), applies to all transit agencies not regulated by the Federal Railroad Administration (FRA)
- ◆ Freight Planning/Grants – staff of four, manages the Tennessee Short Line Railroad Preservation grant and applies for federal grants
- ◆ Multimodal Transportation Division – includes and Bike/Ped Planning; focus on safety

The Freight Planning Strategic Plan Objectives:

- ◆ Collaboration with staff to determine a fair chance for advancement by 12/31/25
- ◆ Planning process that is timeline and data driven by 12/31/23
- ◆ Maximize collaboration for safety and economic benefits by 12/31/24

Highlights Since 2021

- ◆ Memphis Freight Flows – Duplication of NEP project and the draft is being reviewed in 2022, based on a Chattanooga project (THRIVE) that explored a regional employment and freight despite state boundaries
- ◆ Bottleneck Analysis (HDR) – reviewing draft, will be sent to FHWA this month
- ◆ University of Memphis – Understanding Freight Impacts on Tennessee Communities completed September 2022
- ◆ Water Research Project – University of Memphis – and investigation on the location of prime sites along waterfronts; literature review due November 1, 2023
- ◆ Blue Oval City – Transit study
 - Goal is to have 50% of employees to take transit of any type
 - RFP will be released later this month with a quick timeline (study completed April 2023)
- ◆ Safety perspectives in Freight – National EV Infrastructure Plan, hydrogen truck program, platooning legislation (two wirelessly connected trucks following each other) and autonomous vehicles

Statewide Weigh-in-Motion

The Statewide Weigh-in-Motion program has been in development since 2019 and changes the current weigh-in-motion system by scaling the loads as they go. Its purpose is to enforce trucks that bypass scales. The project is slated to really be implemented in February 2023. The scale will evaluate the safety ratings of the driver and trucking company. If the truck is overloaded, it will automatically route it into the scales and the driver will be ticketed. 30 locations will undergo this change, which the installation of new sensors.

TDOT Updates

The normal fiscal year budget is \$2.6B and IIJA added 30 percent to budget. The current budget is \$3.1B, which includes \$600M (one time) from the general fund, where the traditional revenue is primarily gas tax. However, inflation has eroded some of the additional budget's capacity to deliver work, noting the Improve Act did not index for fluctuations in fuel costs. The IIJA bill is like the previous federal bill, but places more emphasis on equity, sustainability, technology and provides more discretionary opportunities for investment in communities. TDOT will continue to partner with communities, MPO's and industries in pursuit of grant funding under the bill. Tennessee was awarded three RAISE grants, totaling \$63M.

The Integrated Program Delivery (IPD) is speeding up project delivery with a goal of typical delivery in five years.

TDOT is also starting an internal initiative, Empower People and Influencing Culture (EPIC), for leadership and project management. It is designed to allow staff to advance in their careers through multiple tracks – leadership, project/program Internal organizational changes are planned to be implemented in January 2023.

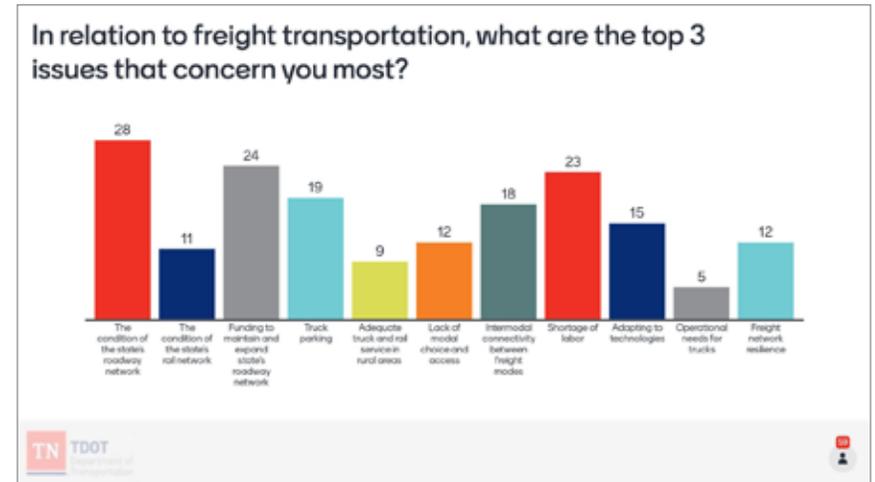
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Mentimeter Results



Question one: Which Grand Division do you represent?

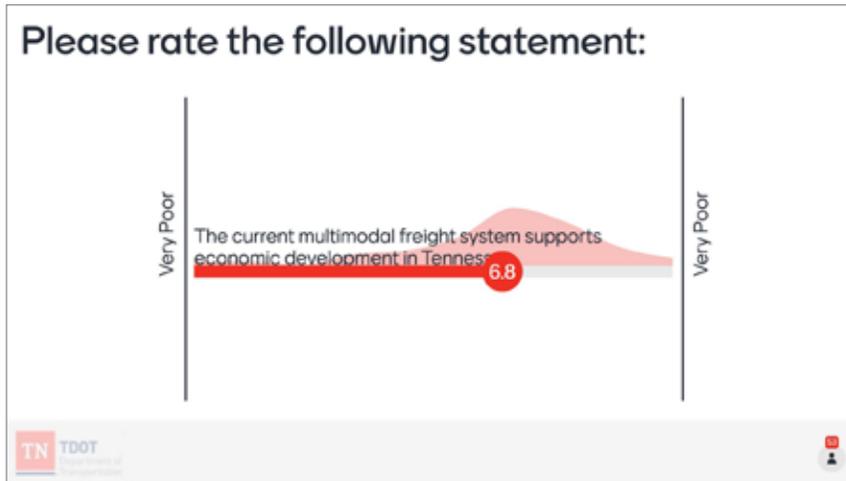
49 participants answered the question, with eight persons representing West Tennessee, 21 for Middle Tennessee, and 20 for the east.



Question two: In relation to freight transportation, what are the top three issues that concern you most?

Issues listed:

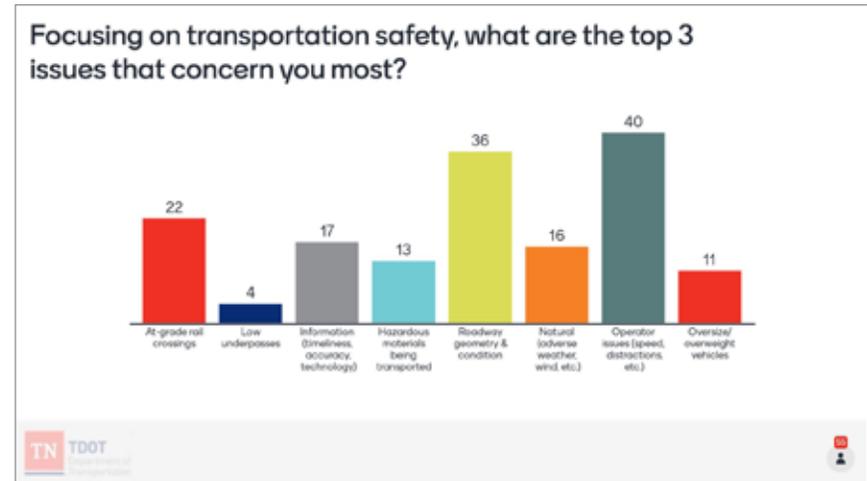
- ◆ The condition of the state's roadway network – 28
- ◆ The condition of the state's rail network – 11
- ◆ Funding to maintain and expand state's roadway network – 24
- ◆ Truck Parking – 19
- ◆ Adequate truck and rail service in rural areas – 9
- ◆ Lack of modal choice and access – 12
- ◆ Intermodal connectivity between freight modes – 18
- ◆ Shortage of labor – 23
- ◆ Adapting to technologies – 15
- ◆ Operational needs for trucks – 5
- ◆ Freight network resilience – 12



Question Three: Please rate the following statement:

The score is a weighted average of 52 votes.

Score	1	2	3	4	5	6	7	8	9	10
Number of Votes	1	1	0	3	4	8	16	12	5	2



Question Four: Focusing on transportation safety, what are the top three issues that concern you most?

Issues Listed:

- ◆ At-grade rail crossings – 22
- ◆ Low underpasses – 4
- ◆ Information (timeliness, accuracy, technology) – 17
- ◆ Hazardous materials being transported – 13
- ◆ Roadway geometry and condition – 36
- ◆ Natural (adverse weather, wind, etc.) – 16
- ◆ Operator issues (speed, distractions, etc.) – 40
- ◆ Oversize/overweight vehicles – 1

List of Attendees

Andy Alden
Tausha Alexander
Veronica Allen
Tim Andrews
Gina Anzaldua
Bruce Applegate
Joe Arbona
Glenn Berry
Mary Butler
Janey Camp
Meredith Cebelak
Grant Chaney
Phillip Christian
Michelle A. Christian
David B. Clarke
Mike Conger
Mary Connelly
Jeffrey Cornett
Jennifer Coulter
Lisa Cross
Gene Davis
Gilberto Deleon
Rich DesGroseilliers
William Downey
John Dudas
Troy J. Ebbert
Julie Ellis
Allen England
Mavrick Fitzgetald
Ignatious Fomunung
David C. Freeman
Lindsay Frilling
Michael Garriga

Michail Gkolias
Diego Guadalupe
Brian Hall
Lee D. Han
Stephanie R. Hargrove
Robbie Hayes
Steve Hiatt
Karen Hjerpe
Wayne Hoffman
Lynda Hogue
Bruce Hohorst
Marc Holcomb
Lydia Holmes
Richard R. Holt
Benny Hopkins
Sajid Hossain
Liza Joffrion
Cline Jones
Peter Kauffmann
Asad Jan Khattak
Holly Kirby
Pam Kordenbrock
Boris Kort-Packard
Amy Kosanovic
Elizabeth Lawlor
Kevin Layne
David Lee
Xiaoming Li
Vasileios Liatsos
Don B. Loftis
Stephanie Mann
Chris McPhilamy
Shannon Millsaps

Chase Milner
Sabyasachee Mishra
Kenny Monroe
Amy Moore
Steven Peterson
Shahram Pezeshk
Craig Phillip
Elliott Pinson
Ian Preston
Sammy Reid
Stephanie Roberts
Henry Seaton
Pragati Srivastava
Ryan Swindell
Thiera Taylor
Richard Teubner
John Tompkins
Trung Trinh
Connie Vaughan
Kevin Walker
Jacob Weir
Stan Williams
Perry Wilson
Melissa Ziegler
TDOT Staff
Erik Anderson
Ben Bolton
Brooxie Carlton
Joe Deering
Troy J. Ebbert
Butch Eley
Preston Elliott
Allen England

Lizzy Gaviria
Antoine Hawkins
Jonathan E. Haynes
Chanel Hippix
Amy Kosanovic
Casey Langford
Kevin Layne
David Lee
Chris McPhilamy
Melanie Murphy
Andrea Noel
Ashley Owens
Daniel Pallme
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Appendix B: State Freight Plan Checklist

IIJA Review Item (§21104)	
Plan Content	Plan Location
Identification of significant freight system trends, needs, and issues with respect to the State	Chapter 6, Chapter 7
A description of the freight policies, strategies, and performance measures that will guide the freight-related transportation investment decisions of the State;	Chapter 8
Multimodal critical rural freight facilities and corridors designated within the State under section 70103 of this title	Chapter 4
Critical rural and urban freight corridors designated within the State under section 167 of title 23	Chapter 4
A description of how the plan will improve the ability of the State to meet the National Multimodal Freight Policy Goals described in section 70101(b) of this title and the national highway freight program goals described in section 167 of title 23;	Chapter 1
A description of how innovative technologies and operational strategies, including intelligent transportation systems, that improve the safety and efficiency of freight movement, were considered	Chapter 6, Chapter 8, Chapter 10
In the case of routes on which travel by heavy vehicles (including mining, agricultural, energy cargo or equipment, and timber vehicles) is projected to substantially deteriorate the condition of roadways, a description of improvements that may be required to reduce or impede the deterioration;	Chapter 6
An inventory of facilities with freight mobility issues, such as truck bottlenecks, within the State, and for those facilities that are State owned or operated, a description of the strategies the State is employing to address those freight mobility issues;	Chapter 5, Chapter 6, Chapter 7
Consideration of any significant congestion or delay caused by freight movements and any strategies to mitigate that congestion and delay;	Chapter 5, Chapter 7
A freight investment plan that, subject to subsection (c)(2), includes a list of priority projects and describes how funds made available to carry out section 167 of title 23 would be invested and matched; and	Chapter 10
The most recent commercial motor vehicle parking facilities assessment conducted by the State under subsection (f);	Chapter 5
The most recent supply chain cargo flows in the State, expressed by mode of transportation;	Chapter 2

IJA Review Item (§21104)	
Plan Content	Plan Location
An inventory of commercial ports in the State;	Chapter 4
If applicable, consideration of the findings or recommendations made by any multi-State freight compact to which the State is a party under section 70204;	Chapter 3
The impacts of e-commerce on freight infrastructure in the State;	Chapter 6, Chapter 7
Considerations of military freight;	Chapter 4
Strategies and goals to decrease —	
(A) the severity of impacts of extreme weather and natural disasters on freight mobility;	Chapter 8,
(B) the impacts of freight movement on local air pollution;	Chapter 8, Chapter 10
(C) the impacts of freight movement on flooding and stormwater runoff; and	Chapter 8, Chapter 10
(D) the impacts of freight movement on wildlife habitat loss; and"; and	Chapter 8, Chapter 10
Freight Advisory Committee	
Consultation with the State freight advisory committee, if applicable.	Chapter 3,
Relationship with Long Range Plan	
"(1) INCORPORATION. ---A freight plan described in subsection (a) may be developed separate from or incorporated into the statewide strategic long-range transportation plan required by section 135 of title 23.	Chapter 1, Chapter 10
"(2) FISCAL CONSTRAINT. ----The freight investment plan component of a freight plan shall include a project, or an identified phase of a project, only if funding for completion of the project can reasonably be anticipated to be available for the project within the time period identified in the freight investment plan.	Chapter 10
Planning Period	
A State freight plan described in subsection (a) shall address a 8-year forecast period.	Chapter 7
Commercial Motor Parking Facilities	
(1) the capability of the State, together with the private sector in the State, to provide adequate parking facilities and rest facilities for commercial motor vehicles engaged in interstate transportation;	Chapter 5
(2) the volume of commercial motor vehicle traffic in the State; and	Chapter 5
(3) whether there exist any areas within the State with a shortage of adequate commercial motor vehicle parking facilities, including an analysis (economic or otherwise, as the State determines to be appropriate) of the underlying causes of such a shortage.	Chapter 4, Chapter 5
Priority	
(1) enhance reliability or redundancy of freight transportation; or	Chapter 6, Chapter 8
(2) incorporate the ability to rapidly restore access and reliability with respect to freight transportation.	Chapter 6, Chapter 8