



TDOT 25-YEAR LONG-RANGE TRANSPORTATION POLICY PLAN



FREIGHT LOGISTICS AND PLANNING POLICY PAPER



TN TDOT
Department of
Transportation

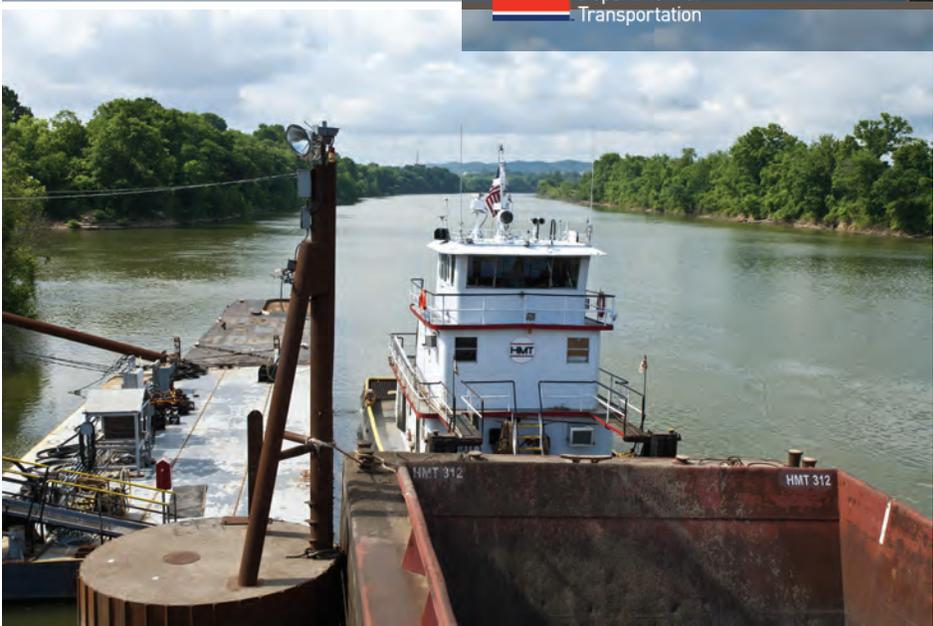
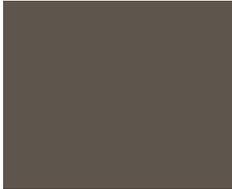
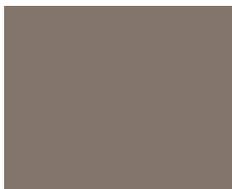


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1.0 INTRODUCTION

As with most states in the U.S., the ways in which the State of Tennessee supports an efficient freight system include the planning, design, construction, oversight, and maintenance, of its transportation infrastructure. While the freight industry reacts to rapidly changing domestic and global markets, transportation infrastructure requires more time to react and adapt. This is one of the challenges for transportation policy and decision makers where the state's freight transportation is directly influenced by the global economy and the multiple connections and attributes of the freight transportation system.

The purpose of this paper is to document the existing multi-modal policies and programs that guide Tennessee's transportation system. This policy paper provides an overview of existing freight conditions in Tennessee. It looks at all modes of transportation including air, rail, truck, water, and pipeline. Transportation Geographic Information System (GIS) data was collected along with data on economic indicators related to freight movement. As part of this planning effort, a survey was conducted of the Tennessee Department of Transportation's (TDOT's) customers with a portion of the results focused on future freight traffic.

This policy paper also investigates future growth, trends, and technologies as they relate to freight movement and freight planning by state DOTs. This includes a review of efforts underway in surrounding, peer, and other noteworthy states concerning freight logistics and planning.

The policies and programs identified in this paper follow the guidance first set forth in the National Freight Policy Goals established by the Moving Ahead for Progress in the 21st Century (MAP-21) legislation and are consistent with the Guiding Principles of the Department's 25-Year Policy Plan. The following Guiding Principles are applicable and relevant to all freight transportation modes (air, rail, truck, water, and pipeline):

- Support the State's Economy – Provide an efficient freight system that supports the State's current industries and attracts new industry to the area
- Preserve and Manage the Existing System – Consider the economic and societal impacts of maintaining the national freight system throughout and within the State (e.g., increased truck traffic, improvements to waterway locks, maintenance of short line rail capacity, avoidance of pavement damage)
- Maximize Safety and Security – Consider the safety issues that arise from increased freight travel throughout the State's multimodal network
- Provide for the Efficient Movement of People and Freight – Establish a freight system that will enhance the mobility of products and passengers for all modes of travel
- Protect Natural, Cultural, and Environmental Resources – Consider the natural, cultural, and environmental effects of the freight system to the community while building an efficient transportation system
- Build Partnerships for Sustainable and Livable Communities – Build a freight system that supports economic development in the communities throughout the State and enables growth in a way that is compatible with community sustainability and livability goals

These principles, consistent with the national freight policy goals, serve to define objectives and areas to monitor for performance over the life of Tennessee's 25-Year Policy Plan. Table 1 portrays the alignment between these goals, objectives, and performance areas.

Table 1 Relationship of Goals, Guiding Principles, and Objectives

National Freight Policy Goals	TDOT 25-Year Policy Plan: Guiding Principles	Tennessee Statewide Multimodal Freight Plan Objectives
Improving the contribution of the freight transportation system to economic efficiency, productivity, and competitiveness	Support the State's Economy	Provide facilities for freight movement that Support the State's Economy through efficient movement of goods so that productivity of companies is enhanced and competitiveness is improved by industries in the state.
Reducing congestion on the freight transportation system.	Preserve and Manage the Existing System	Preserve and Manage the Existing System through new technology that provides alternative routing.
Improving the safety, security, and resilience of the freight transportation system.	Maximize Safety and Security	Maximize Safety and Security by providing adequate, safe facilities to meet industry guidelines. Provide alternative routes in the case of an emergency, natural or manmade.
Improving the state of good repair of the freight transportation system.	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 .
Using advanced technology, performance management, innovation, competition, and accountability in operating and maintaining the freight transportation system.	Provide for the Efficient Movement of People and Freight	Consider land use when evaluating the transportation system in the state to Provide for the Efficient Movement of People and Freight .
	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 .
Reducing adverse environmental and community impacts of the freight transportation system.	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 .
	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 .

2.0 SUMMARY OF FINDINGS

The following is a brief summary of findings of existing plans, policies, and programs, future growth, trends, and technology, and recommendations related to the multimodal freight environment in Tennessee.

Summary of Findings

- Key freight industry sectors account for nearly 40% of Tennessee's total gross domestic product (GDP).
- Freight movement to, through, and within Tennessee is highly influenced by freight industries and their specific supply chains.
- Freight industry employment has seen positive gains in the number of jobs since rebounding from the global recession of 2009, which had great impacts on trade in Tennessee, the U.S., and abroad.
- Truck flow data shows that freight from Memphis and Nashville can reach many major domestic markets and coastal ports across the U.S., as well as international destinations, in less than 3 days' time.
- Tennessee ranks 20th for total freight tonnage movement (inbound and outbound) by state, while the state ranks 13th for the value of freight moved.
- The majority of inbound and outbound freight tonnage in Tennessee moves by truck.
- In Tennessee, slower truck speeds, which are often due to congestion, occur primarily in and around major metropolitan areas.
- Like many of its peer states, Tennessee has completed major modal plans over the last 10 years. The plans include highway, rail, aviation, and waterway.
- A majority of Tennessee's surrounding and peers states have taken a corridor-focused approach to freight movement.
- In 2013, TDOT established a Freight Advisory Committee (FAC) with the goal of increasing public and private sector dialog on goods freight movement.
- Much like Tennessee, surrounding states and peer states (those regarded as leaders in freight policy and programming) are either working on a statewide freight plan and/or are initiating such a study.
- Many of Tennessee's surrounding and peer states, relative to freight movements, give consideration to land use and the environment.

Recommendations

TDOT's Statewide Multimodal Freight Plan contains a comprehensive set of recommendations including both policies and projects as well as performance measures. Since the Plan evaluates Tennessee's freight transportation needs more closely, the following is a smaller set of recommendations, which are consistent with the direction of that Plan.

- Regardless of the modes, greater consideration should be given to freight movements in reaffirming/identifying Tennessee's Strategic Corridors.

- In addition to roadways, Tennessee’s Strategic Corridors should include rail, water, air, and intermodal facilities.
- TDOT should support a program for multimodal freight investments (e.g., first mile/last mile connections-air, water, rail; bottlenecks; safety; ITS; truck parking; etc.) in the 3-Year Plan.
- TDOT should support the expansion of the State Industrial Access (SIA) Program to allow for other transportation improvements (e.g., rail spurs to industrial sites).
- TDOT should have staff and technical resources to assist communities and freight partners with freight planning, land use and freight, and impacts of freight (e.g., quiet zones, idling restrictions, airport/land use compatibility, etc.).
- TDOT should revamp its current shortline program to prioritize connectivity and economic development potential.
- TDOT should continue to make available the latest planning data and tools and provide these resources to it many planning partners (e.g., Metropolitan Planning Organizations (MPOs), Rural Planning Organizations (RPOs), Tennessee Department of Economic and Community Development (ECD), etc.).
- TDOT should continue to work through Tennessee’s Freight Advisory Committees and local communities to increase knowledge of and efficiencies in freight movements in Tennessee.
- TDOT should encourage the formation of public ports and intermodal facilities to support economic development.

3.0 EXISTING TDOT PLANS, POLICIES, AND DATA ANALYSIS

3.1 SUPPLY CHAINS

Before examining the freight industries crucial to any state, the specific supply chains that drive freight-dependent aspects of the economy must be examined. This section describes those key industry supply chains in Tennessee. Understanding the supply chains can be a first step towards specifying the type and location of transportation improvements that will be the most beneficial to target industries. Detailed information about Tennessee's supply chains and the infrastructure that supports them is described in the Statewide Multimodal Freight Plan.

Agriculture

Agriculture products are typically shipped via truck from farms to food manufacturers or wholesale markets. Most agriculture products in Tennessee are shipped within the state or to surrounding states for domestic consumption. Agricultural production occurs in all corners of the state with more produce and grain farming in the flatter western portion and livestock in the middle and eastern part of state.

Automotive Industry

Typically, there are several suppliers co-located with automotive plants to streamline the processing of key component parts. However, the vast majority of parts are shipped in from outside locations. Most of these come by truck. Additionally, there also are several rail inputs connecting to automotive plants as well. After the cars are assembled, they are shipped to dealerships all over the world.

Advanced Manufacturing

The advanced manufacturing sector includes the production of motors, generators, batteries, refrigeration equipment, and heating equipment. One of the constant threads of these products is the need for precision manufacturing and continuous innovation. For these industries, transportation costs tend to be less important in relation to transportation reliability, the primary concern for receiving supplies. Therefore, air cargo and trucking modes tend to be the most commonly used. Additionally, parts suppliers tend to be dispersed throughout the country and the world. The reliable delivery of supplies is critical towards ensuring that facilities are operating at maximum capacity and optimal efficiency, which is why air cargo and truck are the dominant modes for each.

Depending on the type of manufacturing operations, rail shipments may be used for larger shipments of regularly needed supplies. Finished products are typically delivered by truck for domestic portions of shipments and then by water for international shipments. The portions of the supply chain most relevant for Tennessee are the highway corridors.

Chemical Products & Plastics

The vast majority of chemical and plastic products are derived from petroleum products. This typically requires a sophisticated network of pipelines to access chemical and plastic facilities. Other types of specialized refined petroleum products may need to be shipped by rail or truck for delivery to plastic and chemical manufacturing locations. Chemical products tend to reach their end customers via rail or pipeline, while plastics are typically transported by truck.

Transportation, Logistics, & Distribution Services

The transportation, logistics, and distribution services industry is comprised of companies that cover all modes, networks, and industries. They do not have their own supply chain, but they do help to fulfill the supply chains of other industries. All facets of transportation infrastructure are important to this industry. However, the interstate system and the Class I railroads tend to carry the highest volume of freight, while the last-mile connectors to freight facilities tend to be critical for completing shipments.

This industry also benefits tremendously from the development and expansion of intermodal rail yards in Tennessee such as the expansion of the Burlington Northern Santa Fe yard in Memphis, Norfolk Southern in Rossville, and proposed Norfolk Southern facility in New Market.

Business Services

Companies in the business services industry produce very few goods. The vast majority of their shipments are facilitated by parcel delivery. Therefore, the portions of the transportation infrastructure most important to this industry are the ones used for urban distribution.

Healthcare

Similar to business services, the healthcare industry tends not to produce a large quantity of goods. This industry does not require shipments of products or receipt of supplies beyond those that would be needed to care for patients. However, the pharmaceutical sector tends to rely on fast, reliable shipments such as that achieved through air shipments in the Memphis region. Similarly, medical device companies also tend to need high-speed, highly reliable goods movement achieved by air. They tend to ship high-value items such as subassemblies, finished plastics, metals, and electronics by air, while delivering finished devices using a combination of truck and air cargo.

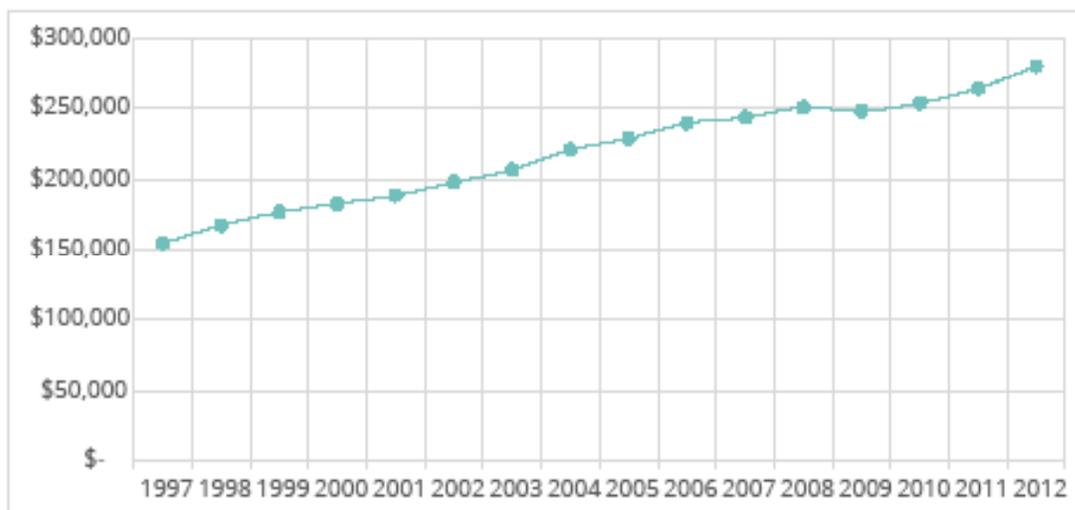
Economics and Transportation

While understanding the types of goods that Tennessee produces is crucial, it is also important to understand how those goods are shipped in, out, and through the State. Across Tennessee, freight movements are visible for each of the transportation modes: truck, rail, air, water, and pipeline. Regardless of mode, however, all freight movements affect the State's infrastructure and the lives of people that consume those goods being shipped.

3.1.1 Existing Economic Indicators (Industry) in the State Influencing the Freight System

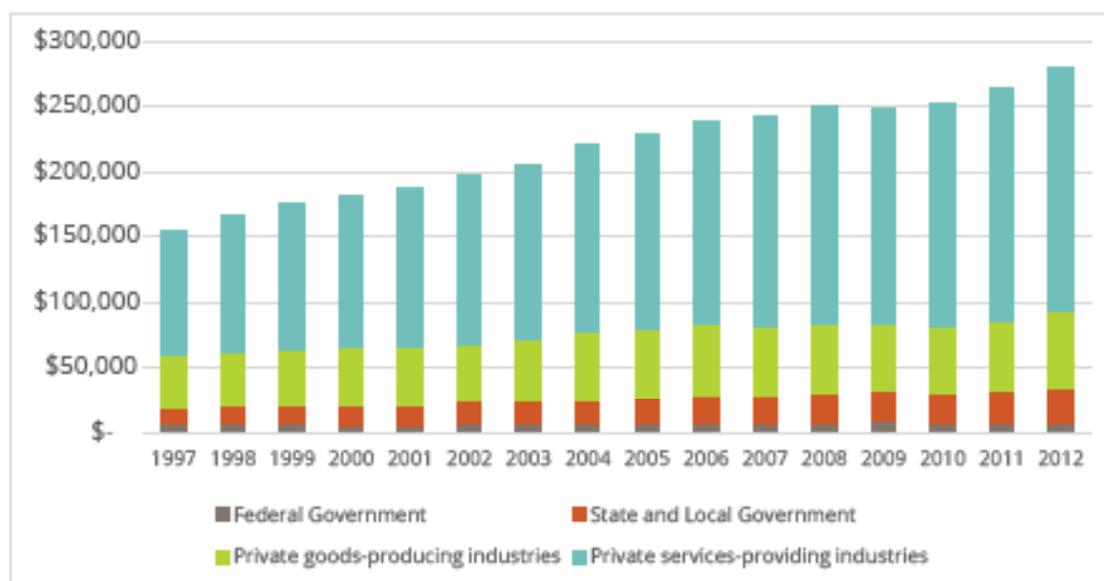
Gross Domestic Product (GDP)

Tennessee's economy has experienced steady expansion over the last 15 years. Between 1997 and 2012, the economic output of the Tennessee economy increased from just over \$150 billion to approximately \$280 billion (Figure 1). As in most states, the majority of the economy is in private sector services-providing industries (Figure 2). In 2012, this sector represented 67% of the total State's economy with \$189 billion. This sector has almost doubled in size over the 15 years and its size relative to the rest of the State's economy has grown from 61% to the 67% in 2012. The goods producing portion of the economy has grown from \$40 billion in 1997 to \$58 billion in 2012. This is growth of nearly 50%.



Source: Bureau of Economic Analysis

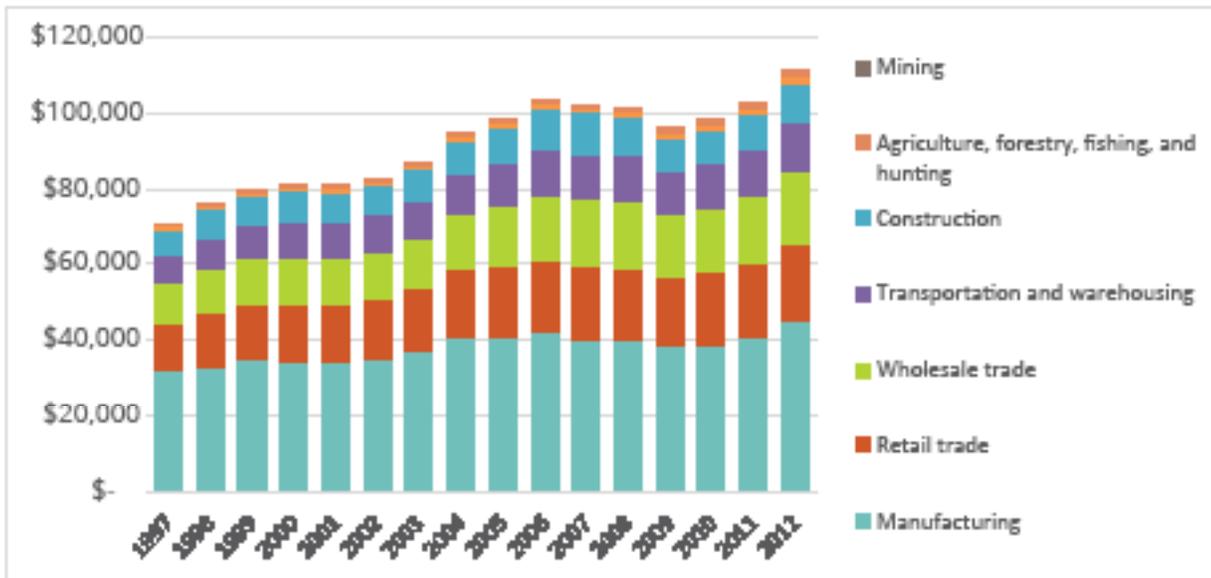
Figure 1 Tennessee Gross State Output (in Millions of U.S. Dollars), 1997-2012



Source: Bureau of Economic Analysis

Figure 2 Economic Output by Industry Category (in Millions of U.S. Dollars), 1997-2012

A large portion of Tennessee's economy is considered goods-dependent industry meaning they rely heavily on freight transportation to sell goods and receive inputs. This includes the sectors of manufacturing, construction, agriculture, and mining. The service-providing industry also includes sectors that are goods-dependent. Specifically, the wholesale, retail, and transportation/warehouse sectors also rely on the freight transportation system. Mining, which also relies on the freight system, has a small contribution to the economic output of the state. As shown in Figure 3, the size of the goods-dependent service-providing industry has grown from approximately \$70 billion in 1997 to over \$110 billion in 2012, a 57% increase.

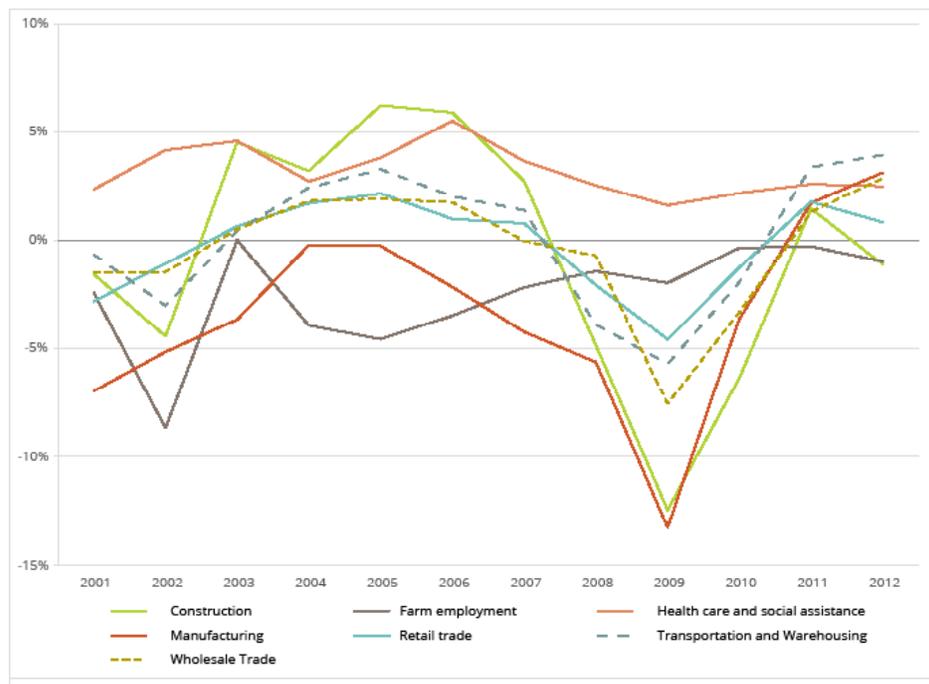


Source: Bureau of Economic Analysis

Figure 3 Tennessee Economic Output by Sector (in Millions of U.S. Dollars), 1997 - 2012

Employment

Employment growth data for key freight industry sectors, calculated from the Bureau of Economic Analysis, is presented in Figure 4 below. Most of the sectors followed a similar trend showing considerable decline at the peak of the recession (2008-2009); following the recession, these same sectors began recovering. Three of the sectors have seen a slight decrease in employment since 2011; however, the overarching increase in employment in the Tennessee freight sectors is likely indicative of increased production and consumption of commodities.



Source: Bureau of Economic Analysis

Figure 4 Annual Employment Growth by Selected Sectors, Tennessee (2001-2012)

Freight Movement

Across the nation, Tennessee ranked 20th in 2011 in total tonnage (inbound and outbound) moved through the state and 13th for the value of freight moved based on data from the U.S. Department of Transportation's Freight Analysis Tool. Of the eight states adjacent to Tennessee, four of them rank higher than Tennessee in total tonnage moved as seen in Table 2. Freight tonnage is often used as the initial point of discussion for transportation infrastructure capacity, condition and system performance. Freight value is introduced as well in Table 3, and may be more closely correlated with freight velocity and congestion impacts. Note that the italicized rows are indicative of surrounding or peer states, those states identified as near to and trading with Tennessee or possessing similar transportation programs and infrastructure.

Table 2 State Rankings Based on Tons of Freight Moved (By All Modes) through the State (2011)

Rank	State	Thousands of Tons
1	Texas	4,329,850
2	California	2,791,111
3	Illinois	1,625,148
4	Louisiana	1,535,281
5	Florida	1,317,077
6	Ohio	1,242,074
7	Pennsylvania	1,231,280
8	New York	1,182,611
9	Minnesota	981,628
10	Georgia	951,104
11	Indiana	950,905
12	Michigan	887,519
13	Missouri	844,567
14	Washington	823,135
15	Virginia	725,761
16	Iowa	721,051
17	Wyoming	719,784
18	Alabama	717,931
19	New Jersey	699,185
20	Tennessee	666,021

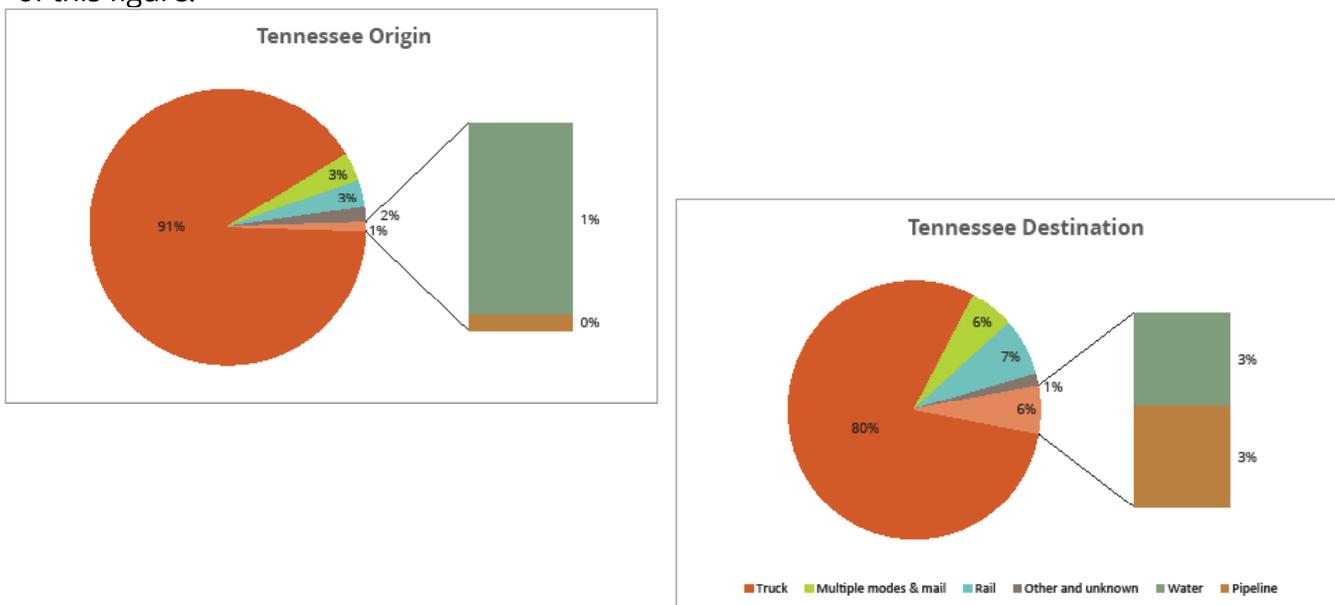
Source: USDOT, Freight Analysis Framework

Table 3 State Rankings Based on Value of Freight Moved (By All Modes) through the State (2011)

Rank	State	Value (2011 Dollars)
1	California	4,037,801
2	Texas	3,750,971
3	New York	1,811,859
4	Illinois	1,595,775
5	Florida	1,472,947
6	Ohio	1,308,116
7	Pennsylvania	1,300,088
8	Michigan	1,109,253
9	New Jersey	1,100,450
10	Georgia	1,085,518
13	Tennessee	820,945
14	Indiana	802,710
15	North Carolina	777,347
16	Virginia	676,149
17	Minnesota	613,767
18	Wisconsin	593,543
19	Missouri	563,056
20	Kentucky	546,276

Source: USDOT, Freight Analysis Framework

As shown in Figure 5, most of the inbound and outbound freight tonnage in Tennessee is moving by truck. The details for the non-truck modes are shown in the inset in the upper right quadrant of this figure.



Source: U.S. Department of Transportation's Freight Analysis Framework Tool

Figure 5 Thousands of Tons of Freight with an Origin/Destination in Tennessee by Mode (2011)

Tennessee has substantial trading links with other countries worldwide. Understanding Tennessee's foreign trade relationships will help planners identify how growth in other countries will affect the freight transportation system within the state. The U.S. Census measures Tennessee's total export and import values for exports. In 2013, Tennessee exported over \$32 billion in goods worldwide to 231 countries. Canada and Mexico receive a large share of Tennessee's international exports. Canada, in particular, accounts for goods worth about \$8.7 billion in 2013 – 27 percent of the total foreign trade value. Exports to Mexico were about \$4.3 billion in 2013, or 13 percent of total export value. They were followed by exports to China (7 percent), Japan (6 percent), and Belgium (4 percent). Detailed information on tonnage, value, modes used, and trading partners is available in the Statewide Multimodal Freight Plan.

Statewide Stakeholders, Including Operators and Users

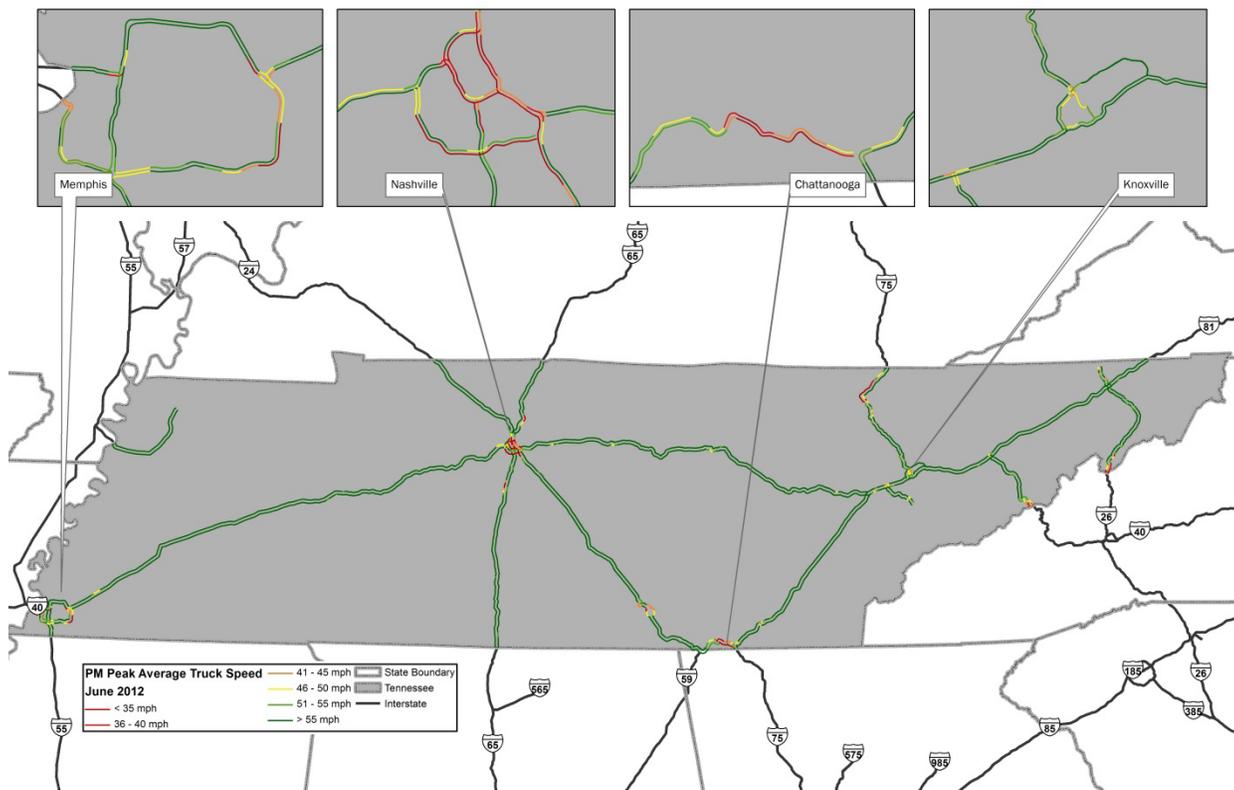
A customer survey of transportation infrastructure users was conducted in 2013 by TDOT. The groups surveyed included residents, partners, and elected officials. While the survey was not specific to freight transportation, some survey results were freight-related and provided insight into freight system performance.

Much of the survey results focused on the need for maintenance of highways and bridges, which are topics that affect the freight trucking industry. One important freight finding from the survey was that two of the three survey groups identified commercial truck traffic as one of the top five transportation priorities over the next 25 years. The top two most important investment options identified by residents were repairing and maintaining existing roads and bridges and relieving congestion. Findings have been inferred to mean that increased commercial truck traffic on highways and local roads is a growing concern among Tennessee residents and communities across Tennessee.

Congestion

A high-level method of evaluating interstate travel conditions is to look at truck speed data. The American Transportation Research Institute (ATRI) provided publicly available data on interstate truck speeds between January and June 2012.

Figure 6 shows the average PM peak hour speeds for trucks along the Interstate System in Tennessee in June 2012. As shown in this figure, the slower speeds occur primarily around the major metropolitan areas. The slower truck speeds are likely indicative of congestion in and around these areas.

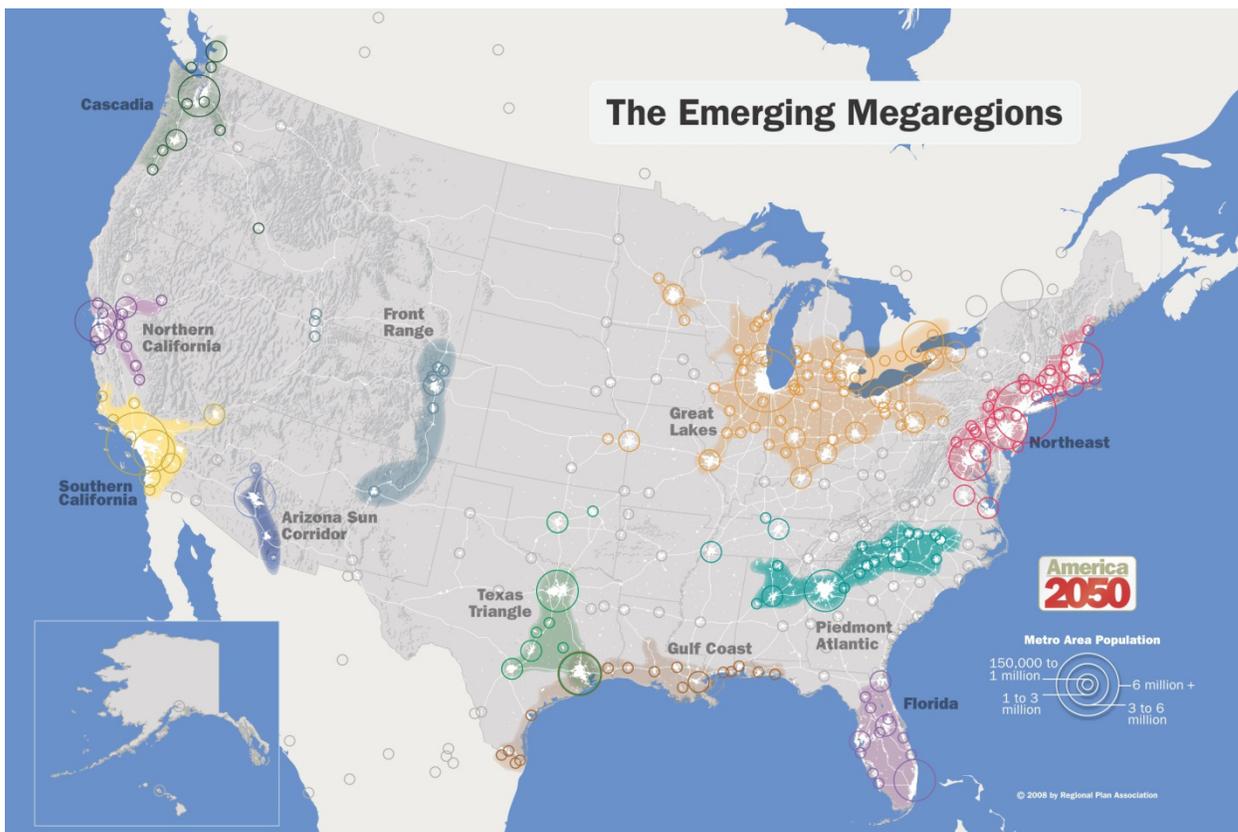


Source: ATRI

Figure 6 Average PM Peak Hour Truck Speed - June 2012

3.1.2 Major and Minor Freight Highway Corridors in Tennessee

From a trucking perspective, key freight corridors primarily include the interstate system in Tennessee (I-40, I-75, I-81, I-24, I-55, I-155, & I-65) as seen in freight flow data from ATRI data. Due in part to the topography and shape of Tennessee, there is only one major east-west interstate corridor through the state (I-40/I-81). The mountains create a natural barrier to the development of major east-west rail and roadway corridors in the state of Tennessee. Specifically, the I-40/I-81 corridor is an important corridor for the movement of goods through and around Tennessee. This corridor connects Tennessee (part of the Piedmont Atlantic Megaregion) with other Megaregions including the Texas Triangle, the Northeast, and DC-Virginia (see Figure 7). The major north-south interstate corridors (I-75, I-65 and I-155) also help connect Tennessee to the Great Lakes Megaregion. While I-24 does not specifically connect to any of the Megaregions, it joins other key corridors in connecting the Great Lakes, Piedmont Atlantic, and the Florida Megaregions.



Source: America 2050

Figure 7 Emerging Megaregions

The interstate system within Tennessee connects metropolitan regions and has been recognized as the priority for statewide freight movement. In addition, TDOT has also identified key freight corridors (Strategic Corridors identified in PlanGo), including a regional interstate corridor (I-140 in Knoxville), state route freight corridors, and the proposed I-69 corridor (see Figure 8).

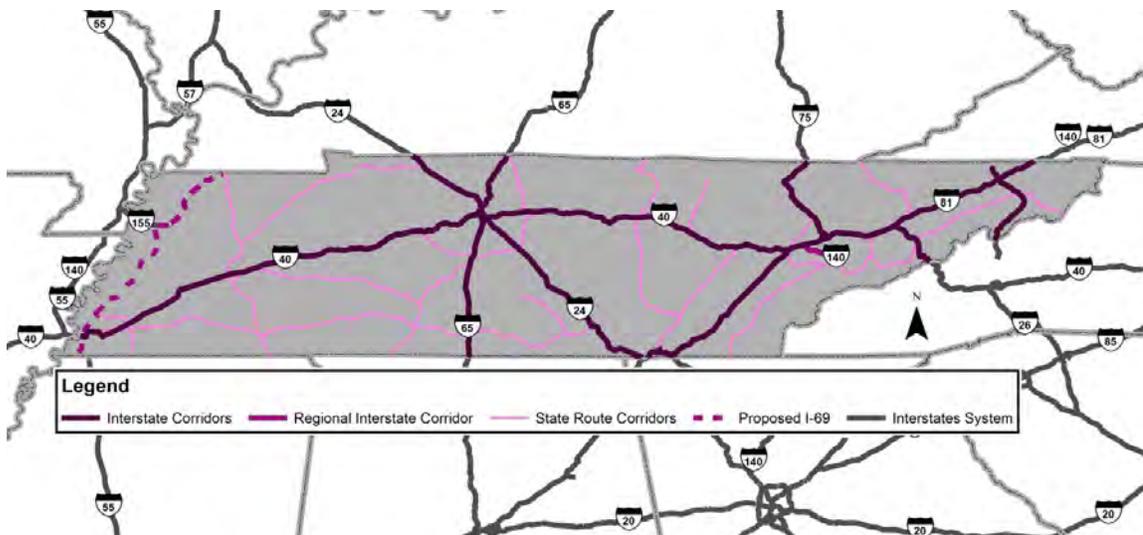


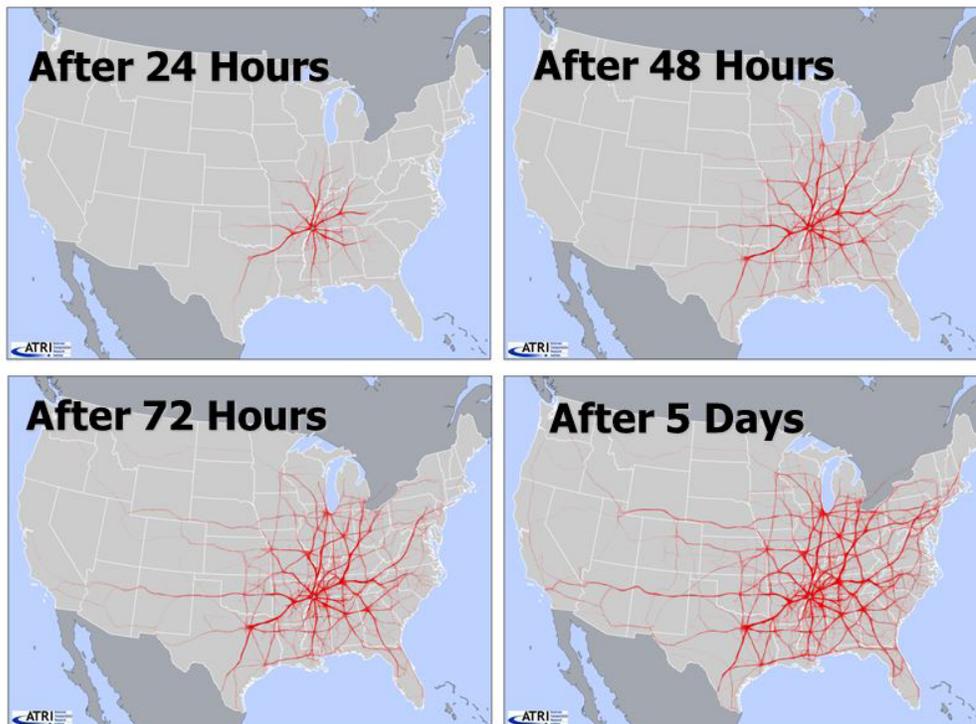
Figure 8 Key Freight Corridors in Tennessee

The I-69 corridor concept, which is envisioned to eventually connect to the Canadian border in Michigan and the Mexican border in Texas, has been partially constructed in select sections (e.g. in Indiana and Kentucky) while the overall program still awaits a complete program definition.

Once completed, the portion of I-69 through Tennessee will traverse the western portion of the state. Sections of the I-69 corridor in Tennessee are in different stages of development, however, no portion of the corridor is complete in Tennessee at this time.

Figure 9 and Figure 10 represent the travel paths of 1,000 trucks, sampled for Memphis and Nashville over four different time periods provided by ATRI. These maps highlight the major north-south and east-west highway freight corridors. The I-65 and I-40 corridors stand out as primary freight corridors for interstate commerce in Tennessee, providing connections to Midwest cities and to the Gulf of Mexico. Additionally, I-55, I-75, and I-24 provide transverse connections to southwestern and southeastern metropolitan areas.

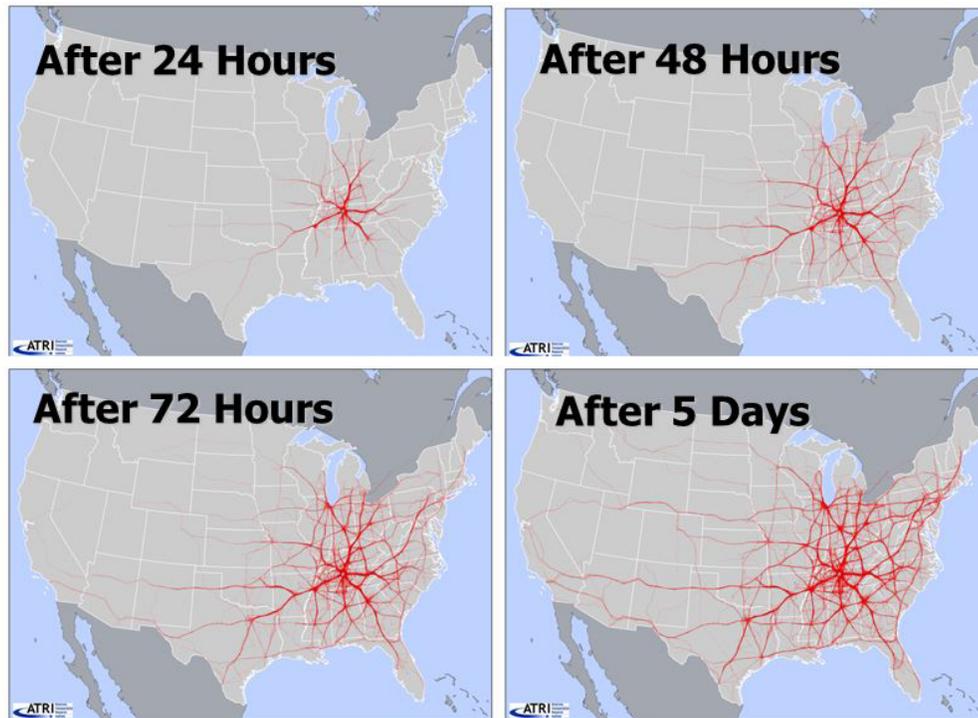
Same 1,000 Trucks - Memphis



Source: ATRI (2013)

Figure 9 Travel Patterns for 1,000 Trucks from Memphis

Same 1,000 Trucks - Nashville



Source: ATRI (2013)

Figure 10 Travel Patterns for 1,000 Trucks from Nashville

Figure 9 and Figure 10 also provide a sense of how far trucks are traveling from Nashville and Memphis within specific time periods. By the first day, trucks are reaching the edges of surrounding states. After three days, trucks are reaching coastal and international destinations.

3.1.3 Transportation Assets in Tennessee

Road

Interstates, U.S. routes, and state routes are presented in Figure 11. There are approximately 95,500 miles of roadway in the state of Tennessee, approximately 15% of which are state-maintained. Of these miles, 1,100 of them are part of the interstate system and nearly 14,000 are U.S. and State Highways. The National Highway System (NHS) consists of roadways important to the nation's economy, defense, and mobility. The National Highway System includes interstates, other principal arterials, Strategic Highway Network (STRAHNET), STRAHNET connectors, and intermodal connectors. In Tennessee, the NHS is comprised of 3,655 miles of roadways.

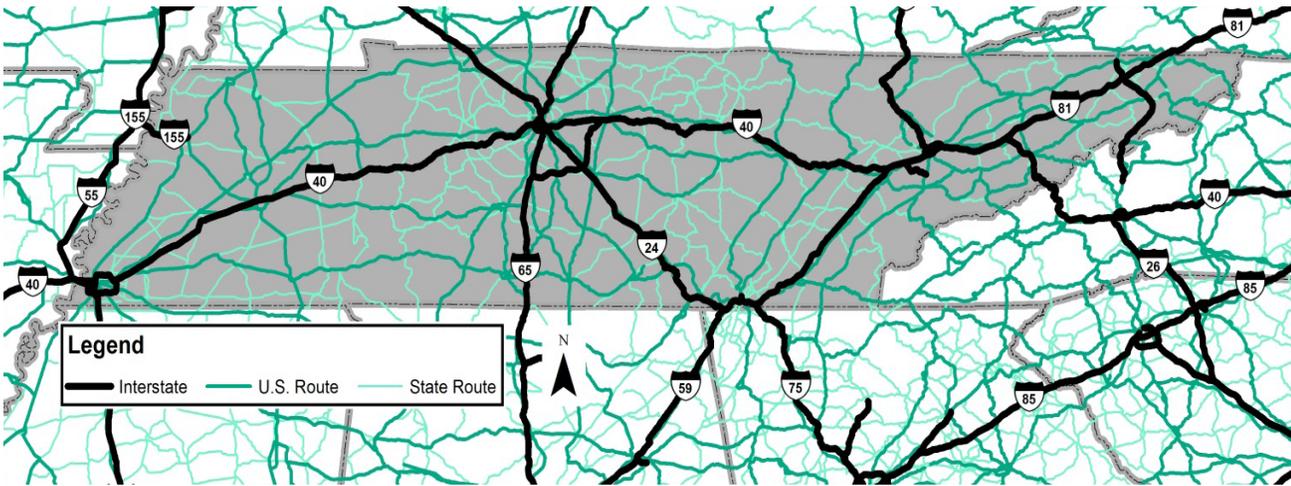


Figure 11 Major Roads in Tennessee

In addition to roadways, there are other important factors to truck freight movement. These include truck parking and enforcement facilities. Tennessee has over 42 truck parking locations and a total of 710 public spaces for trucks only. Tennessee Highway Patrol (THP) operates 6 commercial vehicle scale complexes in the state. All of the complexes offer the PrePass system, which electronically verifies the safety, credentials, and weight of commercial vehicles.

Rail

Six Class I railroads operate 2,768 miles of track within Tennessee: Burlington-Northern Santa Fe (BNSF), Canadian National (CN), CSX Transportation (CSXT), Kansas City Southern Railway (KCS), Norfolk Southern (NS), and Union Pacific (UP). The 2010 Annual Report prepared by TDOT's Multimodal Transportation Resource Division identifies 24 Class III's, Short lines, operating within Tennessee though only 20 are currently eligible for funding through the Transportation Equity Fund. The 24 short line railroads in Tennessee consist of approximately 1,011 track miles in the state. The majority of these short line railroads are in the western and middle portions of the state. Figure 12 shows the Class I railroads along with the Class III railroad tracks in Tennessee. Detailed information on Tennessee's railroads is available in the Statewide Rail Plan.

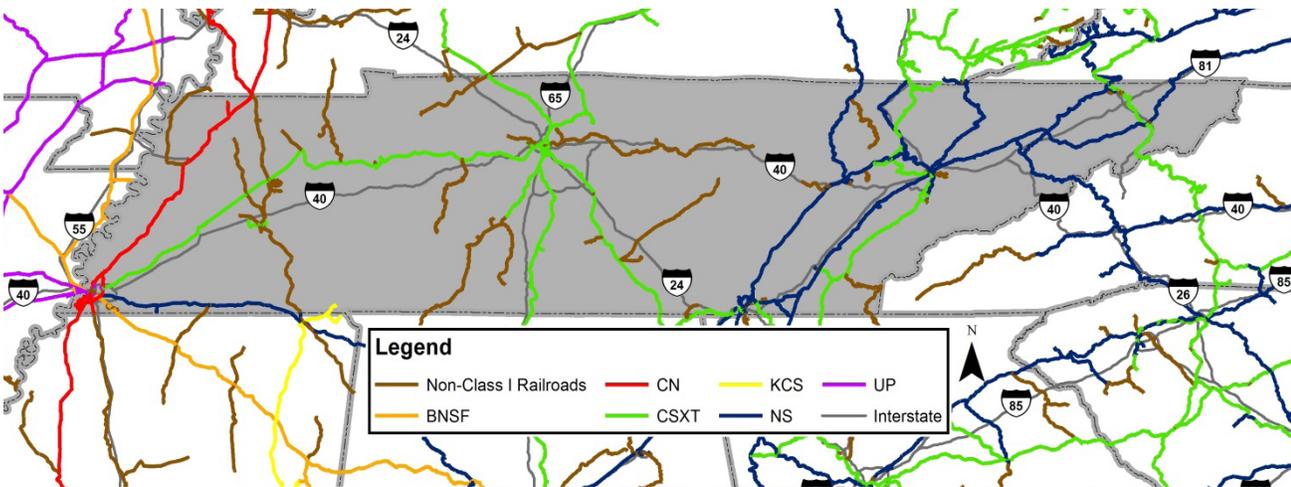


Figure 12 Railroads in Tennessee

Water

Primary inland waterway commerce in Tennessee occurs along the Mississippi River, Tennessee River, and Cumberland River. According to the 2010 Annual Report prepared by TDOT's Multimodal Transportation Resource Division, there are 949 miles of navigable waterways within Tennessee. Of this length, 887 miles, or 93%, of navigable rivers exist on the three main rivers in Tennessee:

- Tennessee River: 401 miles (42.3% of navigable waterway miles in the state)
- Cumberland River: 310 miles (32.7% of navigable waterway miles in the state)
- Mississippi River: 176 miles (18.5% of navigable waterway miles in the state)

Within Tennessee, there are over 230 river ports. Four of the major public ports in operation are along these rivers. Two are in Chattanooga, along the Tennessee River: Port of Nickajack and Centre South River Port. The other two are along the Mississippi River: Port of Memphis, in Pidgeon Industrial Harbor and Port of Cates Landing, in Tiptonville.

There are five locks and four lock and dams located within the state. The majority of these assets are located along the Tennessee and Cumberland Rivers with one lock and dam located along the Clinch River. In addition to the locks and dams located within Tennessee, there are several locks and dams upstream of Tennessee's inland waterway system as shown in Figure 13.

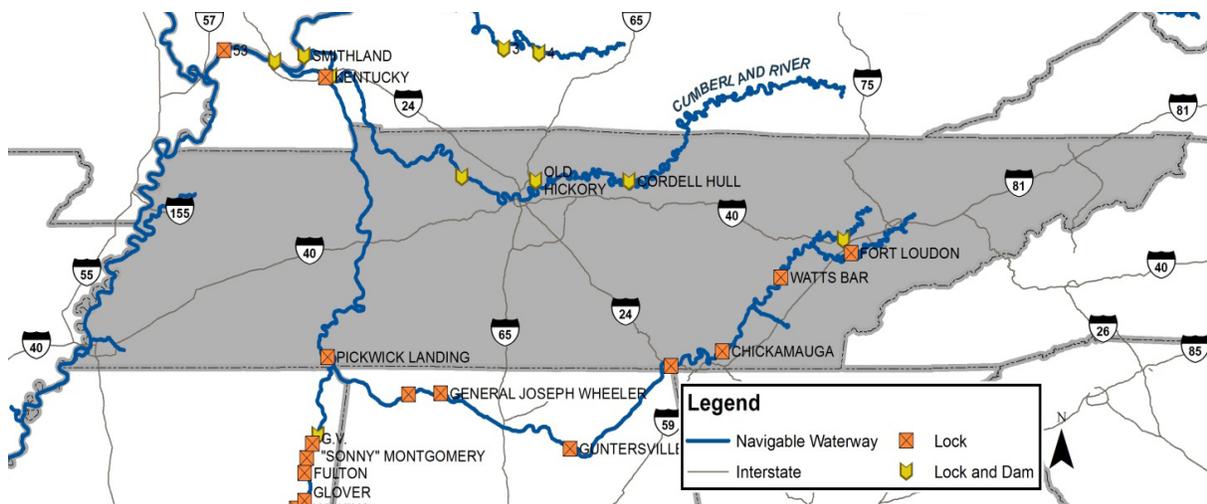


Figure 13 Locks and Dams (USACE)

Air

Tennessee is home to 79 public use airports (see Figure 14). This includes six commercial service airports, two of which are international airports. The remaining facilities are regional or local service (e.g. county or municipal) airports. In addition to the public airports, there are 132 private air facilities throughout Tennessee. Public facilities are managed through the TDOT Aeronautics Division, making use of Department and Federal Aviation Administration (FAA) Block Grant Funds for maintenance costs. New infrastructure plans are first included in the airport master plans as reviewed and approved by the FAA.

The majority of cargo shipped by air in Tennessee is shipped from/to three cargo service airports including Memphis International (MEM), Knoxville's McGhee- Tyson (TYS), and Nashville International (BNA). Cargo Service Airports are airports that, in addition to any other air transportation services that may be available, are served by aircraft providing air transportation of only cargo with a total annual landed weight of more than 100 million pounds. According to the

Tennessee Department of Economic and Community Development, the world's second busiest cargo airport is located in Memphis. The Federal Aviation Administration reported that in 2012 Memphis International Airport landed the greatest weight of cargo in the U.S. The FedEx Express World Hub, located there, connects customers to more than 220 countries and territories on six continents. In addition to Memphis, Nashville International Airport, and Knoxville's McGhee Tyson Airport, Smyrna Airport (MQY) south of Nashville, Chattanooga (CHA), and Tri-Cities Regional (TRI) also ship significant amounts of cargo.

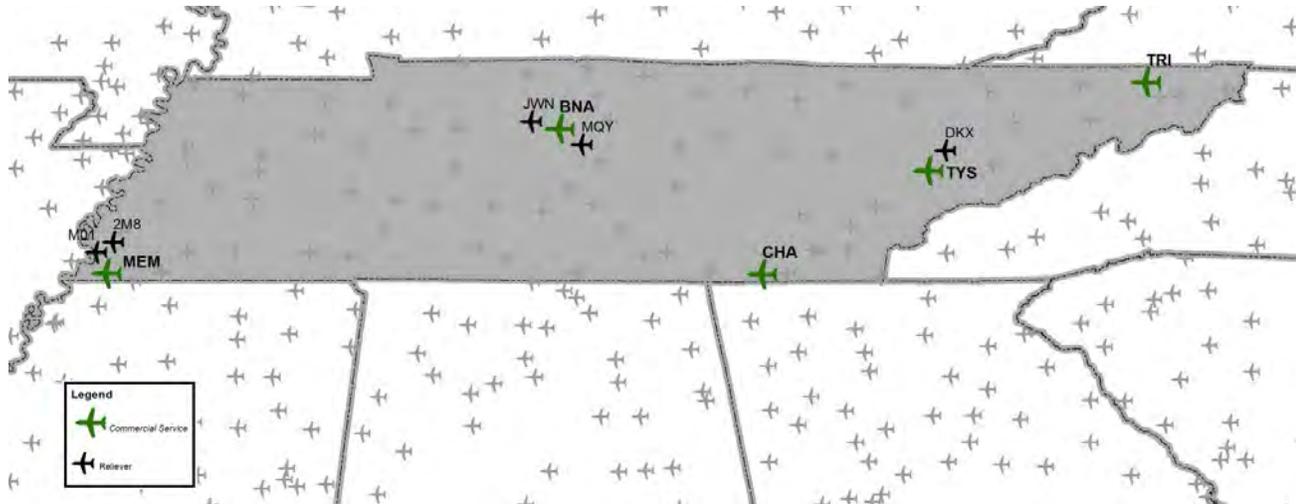


Figure 14 Public Use Airports

Intermodal Facilities

Within Tennessee there are a number of intermodal facilities (e.g. rail-truck, truck-air, rail-barge) (see Figure 15). The intermodal facilities are generally concentrated around the urban areas. Each of the main airports within Tennessee also supports some form of freight cargo operation. The location of the FedEx Express Hub in Memphis contributes to the dense concentration of intermodal facilities in this area. Changing traffic levels from all sources and intermodal activity will create a need to continually track system performance.

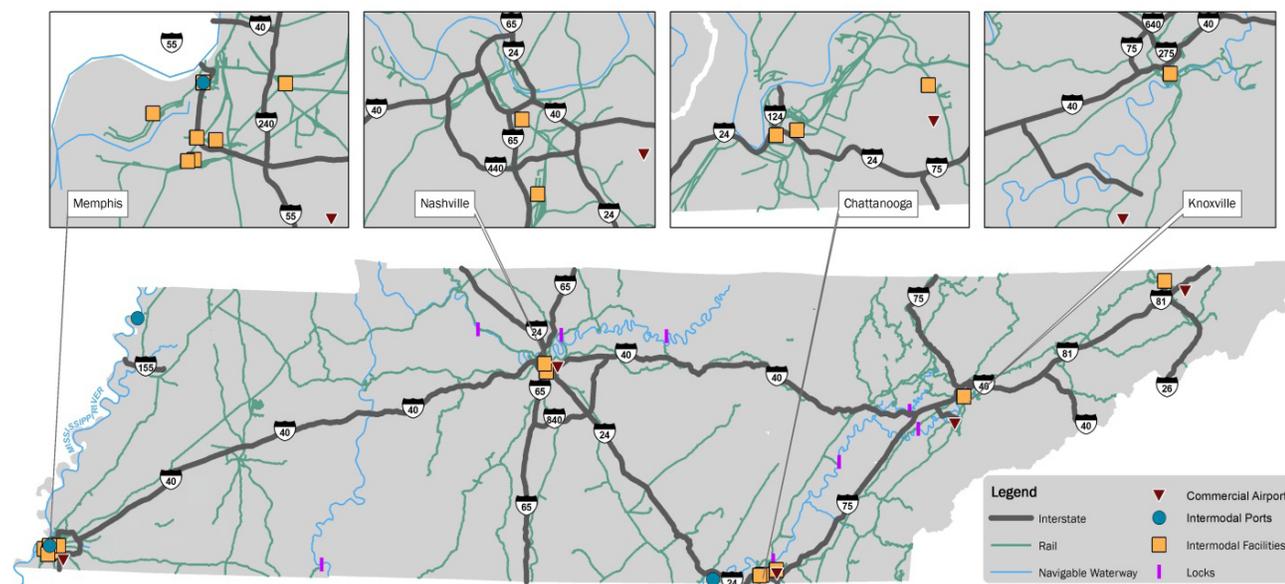


Figure 15 Intermodal Facilities in Tennessee

Pipelines

There are pipelines for the transmission or distribution of several different commodities within Tennessee as shown in Table 4. The natural gas pipelines represent the majority of pipeline miles (81%) within Tennessee. Figure 16 shows the approximate location of petroleum product, crude oil, and natural gas pipelines, which is available from the U.S. DOT Pipeline and Hazardous Materials Safety Administration (PHMSA).

Table 4 Transmission Mileage by Commodity (2012)

Commodity	Pipeline Miles	%
Highly-Volatile Liquid (HVL)	12	0.2%
Crude Oil	277	4.5%
Refined and/or Petroleum Product (Non-HVL)	866	14.1%
Landfill Gas	7	0.1%
Natural Gas	4,998	81.1%
Totals	6,160	100%

Source: U.S. DOT Pipeline and Hazardous Materials Safety Administration

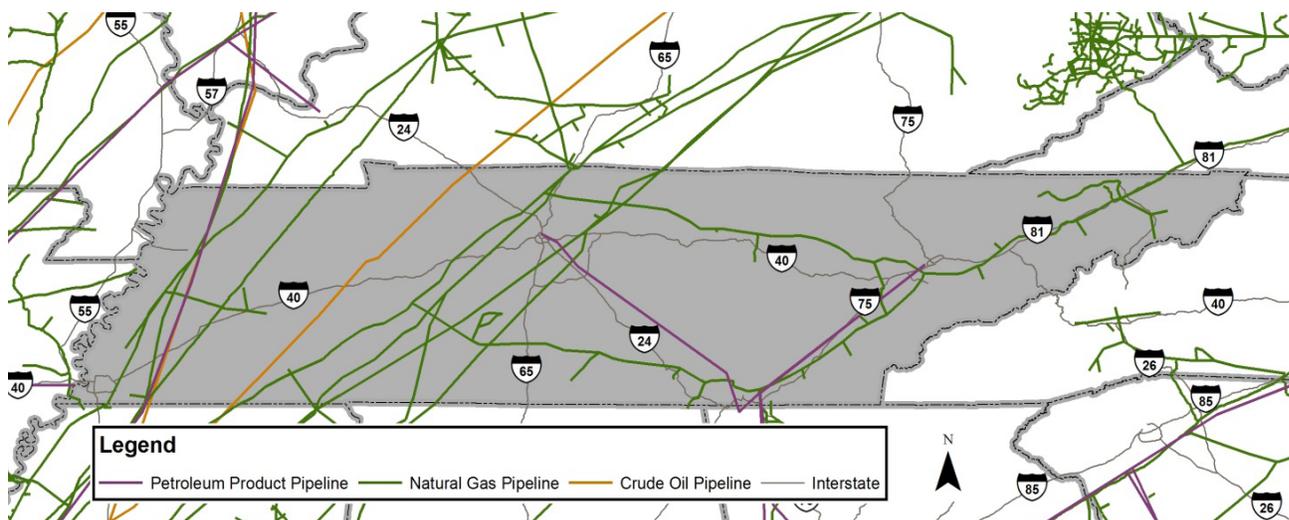


Figure 16 Approximate Pipeline Locations in Tennessee

3.1.4 Summary of Existing Policies and Plans

For TDOT to excel as a leader in multimodal freight infrastructure, a greater shift will need to occur from reactive to proactive policy and infrastructure investing. TDOT currently tracks their progress against several performance measures related to freight transportation and implements the State's programs to facilitate freight transportation. These measures and programs are described in the Tennessee Statewide Multimodal Freight Plan as well as different plans and reports, which are broken down by mode in this section.

Corridor Coalitions and Studies

TDOT and Tennessee's MPOs have conducted several multi-modal freight planning studies in recent years involving truck, rail, air, and water freight activities. These include multistate corridor coalitions (I-81, I-95, and Corridor K), statewide multimodal corridor studies (I-40/81, I-24, and

I-75), and regional MPO freight studies (Nashville, Memphis, and Chattanooga).

Tennessee Department of Transportation, Fiscal Year 2012 Measurement Report

This report, produced by TDOT each year, contains all of the performance measures tracked by the Department as a means to follow progress and deficiencies throughout the transportation system. Many of these measures have indirect effects on the freight highway system, specifically for the trucking industry. Some of the reported measures, however, directly measure system performance for freight infrastructure. These are the number of fatal crashes occurring at highway and rail grade crossings and the mileage of short line rail tracks with capacity over 286,000 pounds. The policy paper on Travel Trends & System Performance builds upon this report and contains additional information on the tracking of freight-related performance measures.

U.S. Army Corps of Engineers and Tennessee Department of Transportation, Tennessee Waterway Assessment Study, Phase I, 2007 and Phase II, 2008

The Mississippi, Cumberland, and Tennessee Rivers form the core inland waterway transportation assets for Tennessee. The Tennessee – Tombigbee Waterway connects the Tombigbee and Tennessee Rivers allowing for traffic to move between the Gulf of Mexico and Tennessee. The Mississippi River is free flowing south of St. Louis, with a periodic need for dredging and channel control. The other rivers require the continued operation and maintenance of locks and dams to provide river freight transportation.

The major conclusions from this study mainly focused on the programs Tennessee employs with regard to its waterways. Of utmost concern is that even with its prime proximity to inland waterways, the State has no dedicated grant or loan programs to assist ports in any way. In fact, TDOT uses a very small amount of fuel tax (approximately \$100,000 at the time of the study) to fund port feasibility studies and waterway-related investigations. Tennessee does, however, provide technical assistance in the form of research studies, such as the Tennessee Waterway Assessment Study, Phases I & II.

Tennessee Department of Transportation, Tennessee State Airport System Plan, 2001

The Tennessee State Airport System Plan recommended a number of performance measures for the safety, reliability, and efficiency of the aviation system while considering environmental effects. The following measures may have indirect or direct impacts on freight transportation by air.

- Percentage of airports meeting Federal and State design and safety criteria
- Number of airspace/procedural changes resulting in increased capacity
- Percentage of airports with approaches meeting FAA Runway Protection Zone (RPZ) and Part 77 criteria
- Number of system airports with an instrument approach with minimums at least 400 feet and 1 mile
- Number of system airports with a pavement management plan
- Percentage of business with 10 or more employees within 25 miles or 25 minutes of an airport with an instrument approach minimum of at least 400 feet and 1 mile

In addition to performance measures, this plan reports on TDOT's Airport Priority Ranking System (APRS) program, developed by the University of Tennessee, which can be used to prioritize airport

needs and project funding recommendations. This system uses project selection criteria that prioritize projects based on the type of project (i.e., safety, capacity, etc.), the degree of airport management in a project (i.e., land use, licensing, zoning, etc.), and the degree of airport usage.

This plan also recommends ongoing coordination between TDOT, specifically the Aeronautics Division, and freight industry leaders in Tennessee to keep the State economically competitive in terms of freight movement. Additionally, the plan deduces that intermodal connections and improvements for airports are also needed to keep pace with continued growth and economic development.

Aviation System Plan Update Element, 2004

The 2004 Updated Aviation System Plan, running concurrently with the development of the Tennessee Long-Range Transportation Plan, PlanGo, was undertaken to extend the analysis of the 2001 Tennessee Airport System Plan while providing a longer planning horizon to account for changes in the industry following events of September 11, 2001 (i.e. 9/11).

The update primarily focuses on the State's 6 commercial service airports and 14 regional airports and includes an inventory of facilities, aviation industry review, review and update of previous system plan forecasts, and development plans for each of the 20 airports included in the study. The Aeronautics Division continues to manage FAA formula driven programs while making use of local matching provisions. The Department continues to track economic impacts and current activity linked to airport strategies, such as passenger reliever airports.

Tennessee Department of Transportation, Tennessee Rail System Plan, 2003

The Tennessee Rail System Plan was developed in 2003 by TDOT to better understand the role that rail could play in the transportation of both passengers and freight. Based on a FHWA predictive model for freight traffic, the study concluded that the efficient movement of freight by rail would be essential to the economic competitiveness of the State. It also identifies certain strategic investment opportunities such as the much needed east-west connection for the Class I rail lines. The Class I and regional railroads have continued to invest in the state with significant investments in and around Memphis. Low-volume rail lines with adjacent rail served industries will remain a management issue if rail volumes fall below traditional break-even volumes.

Tennessee Department of Transportation, Waterway Development Program

This program will be administered through TDOT's Division of Multimodal Transportation Resources, Office of Freight & Rail Section in partnership with the US Army Corps of Engineers. The program will provide available resources to benefit the waterways enterprise, offering technical assistance to industry participants, information on legislative developments, and a public involvement plan. The program will pursue development of a loan and grant that will enhance the waterway industry in Tennessee.

Memphis Aerotropolis Airport City Master Plan, 2014

The U.S. Department of Housing and Urban Development (HUD) and the City of Memphis have partnered through the FY 2010 HUD Community Challenge Grants Program to fund preparation of a comprehensive Master Plan for the Memphis Aerotropolis, Airport City target site. This effort recognizes that the region's growth and prosperity are intimately tied to the Memphis International Airport. The Airport City Master Plan presents a well-considered and coordinated plan of action to support reinvestment and guide future airport area development. Its implementable strategy will reinforce Memphis' position as the leading logistics and distribution center for the Mid-South

Region, attracting business, creating employment opportunities, enhancing neighborhoods, and providing other benefits that address deficiencies in the community's social and physical infrastructure.

3.2 FREIGHT AND LAND USE

Similar to the dual relationship between the transportation system and land use, freight as a specific type of transportation movement is affected by both industry and the respective supply chain economics. Development of freight facilities impacts surrounding land uses and vice versa. Because planning, designing, and constructing a freight transportation system occurs at the state and regional level, and land use decisions are completed at the local level, coordination of freight movement and land use balance may become more challenging at times. There are, however, aspects of the transportation system that are under the Department's control that can greatly affect the freight industry. For industries, many of these transportation-related issues pertain to their ability to produce and ship goods and include some of the following¹:

- Ability to access key markets in a timely manner suitable for the goods shipped;
- Interaction with the transportation network in terms of capacity, speed, safety and congestion;
- Modal Choice and Modal Connectivity as needed;
- Labor and Workforce.

TDOT's involvement is essential, as goods production and consumption are vital to the State's economy. With regard to accessing key markets, Tennessee has access to eight interstates, making the majority of the U.S. markets approximately within a one- to two-day's drive. Efficient access to the freight transportation system is one factor for businesses to consider when selecting the location of their operations. Thus, Tennessee's central location helps drive the State's economic competitiveness.

Access to out-of-state markets is one dimension for freight movement. Access to the transportation system on a local level is also an important land use component and is probably most evident in first and last mile connections. The land use composition surrounding freight industries can make it difficult for cargo arriving or departing by any mode, be it truck, rail, water, or air, with constraints and competition from other users to access the main arteries of the transportation system. As described in the National Cooperative Freight Research Program (NCFRP) Report 13, properties traditionally used by freight industries are being converted to other land uses, such as commercial, institutional and in some cases residential, making it more difficult for freight industries to locate at sites along important corridors such as waterways, etc. In order to preserve the efficient movement of freight in Tennessee, TDOT will need to begin evaluating first and last mile connections and strategies to mitigate congestion, reduce bottlenecks, and enhance intermodal connectivity to the State's industries.

3.3 PUBLIC AND PRIVATE SECTOR COORDINATION IN FREIGHT PLANNING

The private sector continues to focus on the reliability and cost of freight movement as critical factors in determining the alignment of their needs and performance. Schedule, speed, and congestion effects are borne out in their assessment of the role of the transportation system in

¹ Transportation Research Board, National Cooperative Freight Research Program (NCFRP), Report 13: Background Research Material for Freight Facility Location Selection: A Guide for Public Officials, May 2011, p. 41 and p. 55

their sustained freight operations. Each company balances their suppliers and customers with their individual operating characteristics that vary between and within the industry sectors seen in Tennessee. The Tennessee freight system is affected by the through traffic volumes as well. In order to provide an effective multimodal freight system for private industries, TDOT has formed Freight Advisory Committees (FACs) for each grand division of Tennessee (East, Middle, and West). The FAC is made up of public representatives from TDOT, Metropolitan Planning Organizations (MPOs), counties, cities, chambers of commerce, port authorities, airports, and universities. The private industry representatives include rail, trucking, waterway, air freight distribution and logistics, and industrial manufacturing and processing companies. The goal of the FAC is to help assist in the direction of freight planning in the State as seen through the eyes of the public and private sectors, as well as academic members of the freight community. The following section describes other private and public sector coordination in freight planning.

3.3.1 Private Sector Infrastructure Investment

In looking across the various transportation modes, trucking may be the most responsive to changing factors and freight flows. The trucking industry, comprised of private sector companies making use of public transportation infrastructure investments, is adapting to growing freight volumes while implementing the most recent industry requirements promulgated with federal transportation legislation. The trucking industry is adjusting to changes in “hours of service” regulations, which will require additional driver breaks and rest, administration, and driver logs. In response, the public sector may need to provide sufficient facilities and truck parking rest areas to accommodate the changes required of the trucking industry.

The extensive public roadway network within Tennessee and the rest of the U.S. allows the trucking industry greater flexibility in their response to a shift in freight flows. However, because they operate on public infrastructure, traffic congestion is an influencing factor on their operations.

Each Class I railroad continues to examine their network for capacity, connectivity, and freight flows across their respective networks. For example, the NS Intermodal Facility has recently opened east of Memphis as a new intermodal point of connection. Public transportation agencies in Tennessee and Mississippi have been and will continue to monitor the traffic movement across local roads to the facility as trucks move to and from the interstate roadway network. The facility is an example of the railroad industry’s continual evaluation of its facilities, operations, and changing service demands over time.

Class II and Class III railroads focus on service to their individual customers and support industrial locations and siting. For these railroads, there must be sufficient industry located along their line to sustain operations and enough investment from the railroads to sustain track classification. The Class II and Class III railroads may be able to leverage their position in the supply chain for construction material. It is important to note that in the past, track and bridge rehabilitation in shortline transportation (Class III rail lines) has been funded, in part, by TDOT through the Short Line Equity Fund. The dollars for this program were originally collected through a fuel tax imposed on the Class I railroads. Recently, ongoing litigation by the Class I rail lines against the Tennessee Department of Revenue has resulted in a temporary halt in the funding for shortline transportation. Despite whether TDOT or the private industry is making the investment, connectivity and economic value are two of the most important measures that should be examined when prioritizing investments in shortline transportation.

All modes operating in Tennessee continue their operations into adjacent states. A freight transporter will look at their network holistically and determine where best to implement their infrastructure solution. Operations that take place in adjacent states are very important because

solutions may arise in Tennessee for another state or vice versa. Equally important in public and private infrastructure solutions is the placement of ports and intermodal facilities, which have far-reaching impacts across all freight modes and can play a significant role in economic development.

3.3.2 Public and Private Research Institutions

Tennessee has a number of 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) - 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 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 a number of 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 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 mid-south 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 the past VECTOR, has conducted freight-related research on trucking operations and safety, inland marine transportation, safety, security, and capacity of rail corridors, and freight diversion and capacity issues in Tennessee. VECTOR is also an active participant in Tennessee's Freight Advisory Committee.

4.0 FUTURE GROWTH, TRENDS, AND TECHNOLOGY

Freight operates through corridors that cross varying geographic and political boundaries. For this reason, it is important to look at surrounding, peer, and other noteworthy states in relation to Tennessee through different lenses. Table 5 shows the points of comparison detailed in this section for the surrounding, peer, and other noteworthy states shown in Figure 17.

The freight policies of the eight states surrounding Tennessee are important within the freight discussion because different political jurisdictions and policies can result in barriers to freight movement. The peer states shown in Figure 17 were chosen to align with those identified as peers in TDOT's 2013 Customer Survey, as they were similar to Tennessee in the areas of geographic size, demographics, growth trends, and/or DOT practices. For the purposes of this discussion, other noteworthy states are those states, which are not peer or surrounding states, but have freight performance metrics, programs, or policies that could be adapted to Tennessee.

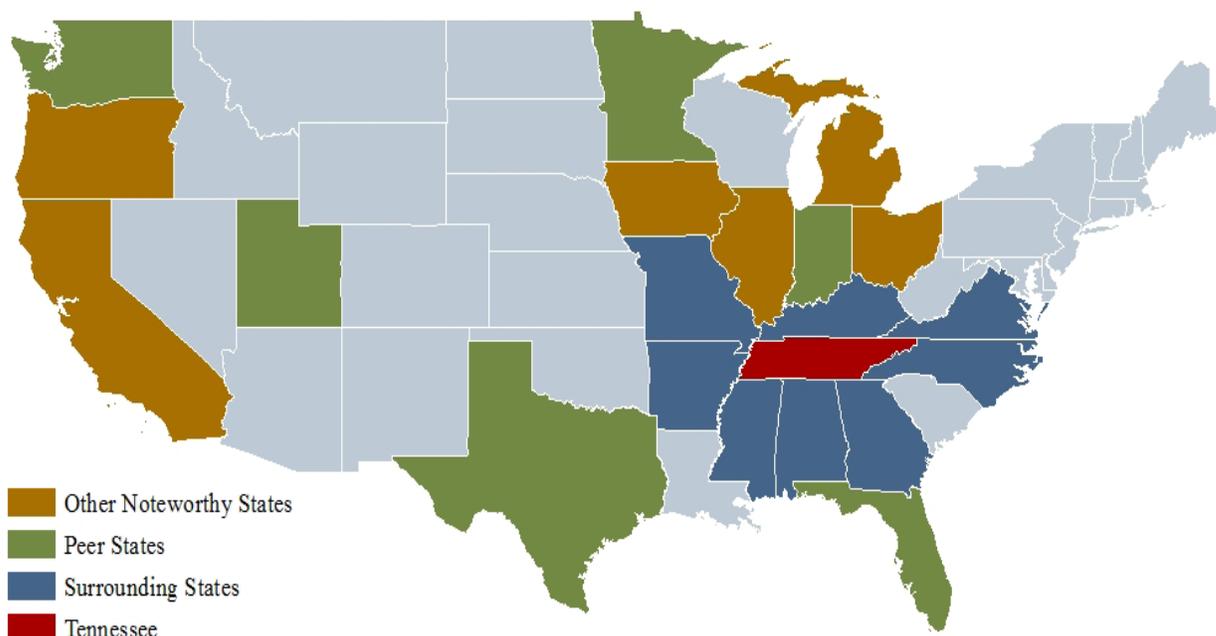


Figure 17 Surrounding, Peer, and Other Noteworthy States

Table 5 Surrounding and Peer State Comparison

Plans, Policies, and Programs	Tennessee	Alabama	Arkansas	Florida	Georgia	Indiana	Kentucky	Minnesota	Mississippi	Missouri	North Carolina	Texas	Utah	Virginia	Washington
Freight Plans															
Statewide Freight Plan	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rail Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Aviation Plan	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Waterways Plan	✓		✓	✓				✓		✓	✓	✓		✓	
Truck Hwy Plan															✓
Freight Resiliency Plan												✓			✓
Freight Implementation															
Freight Project Selection Consideration										✓					✓
Dedicated Multimodal Freight Funding Program				✓					✓			✓		✓	
Industrial Access Program	✓	✓									✓			✓	
Corridors Emphasis	✓			✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
Bottlenecks & Congestion						✓		✓		✓				✓	✓
Truck Parking Initiatives				✓		✓		✓		✓			✓		✓
Freight-Related Performance Measures				✓				✓		✓	✓		✓	✓	✓
Other Freight-Related Activities															
Freight Advisory Committee	✓			✓				✓				✓	✓	✓	✓
Land Use & Environmental (Policies/Programs)	✓	✓		✓		✓	✓	✓			✓		✓	✓	✓
Freight Related Technology Initiatives/Programs						✓		✓				✓	✓	✓	✓
Technical Assistance/Resources			✓				✓			✓					
Data & Planning Tools	✓			✓			✓	✓					✓	✓	✓
DOT Freight Division				✓				✓	✓					✓	✓

4.1 SURROUNDING STATES

The eight states surrounding Tennessee include Alabama, Arkansas, Georgia, Kentucky, Mississippi, Missouri, North Carolina, and Virginia as shown in Figure 17. Freight planning practices in surrounding states are briefly discussed below, although more specific and relevant attributes may be found in the original documents. Individual state practices and programs may also reflect their respective institutional and legislative alignments, as well as enabling statutes and jurisdictions. TDOT's activities in support of the emerging I-69 corridor may be extended to other corridors, such as I-40 and I-65, and modes such as the inland waterways and the Upper Mississippi Council of Mayors. Many states are in the early stages of developing their respective freight programs, in addition to the capture of performance metrics and sustained implementation.

Alabama

The Alabama Department of Transportation (ALDOT) prepared the Alabama Statewide Freight Study and Action Plan in 2010. ALDOT uses a Comprehensive Project Management System, which includes a program of projects designed to address deficiencies identified in the plan.

As a follow-up to the 2010 Plan, ALDOT is in the process of creating a Statewide Freight Plan that is expected to be completed in December 2014. The plan will include truck, rail, water, and air. In September 2013, ALDOT completed a Draft Rail Plan. In addition to offering compliance with the Passenger Rail Investment and Improvement Act (PRIIA) and FRA guidelines, the Plan also recognizes the importance of public-private partnerships for rail infrastructure.

The Alabama Statewide Airport System Plan, completed in 2005, provides tools for evaluating airports needs as they serve statewide goals. Each airport files an Airport Master Plan with the FAA that includes future airside expansions.

Much like Tennessee, ALDOT has a state industrial access program to provide adequate public access to new or expanding distribution, manufacturing, and industrial firms. Like Tennessee, this program is limited to public highway access improvements.

Similar to many other states, ALDOT has a noise policy pertaining to construction and transportation projects that meets 23 Code of Federal Regulations (CFR) 772 legislation.

Arkansas

The Arkansas State Highway and Transportation Department (AHTD) has not completed a statewide freight plan; however, in 2007 an update to the Arkansas Statewide Long-Range Intermodal Transportation Plan² was completed. The plan included a summary of freight movements within the state. Arkansas prepared the Arkansas State Rail Plan³ in 2002. Arkansas is currently undertaking an update to the State Rail Plan. Within the AHTD's Intermodal Transportation Planning division, a number of site-specific freight-related studies have been conducted, such as railroad access studies and port studies.

In 1997, Arkansas' legislature enacted the Regional Intermodal Facilities Act (Act 690), which authorized the creation of Regional Authorities "for the purpose of acquiring, equipping, constructing, maintaining, and operating regional intermodal facilities (Arcode 14-143-103)." These intermodal authorities, as well as local agencies, are provided technical assistance by the state; they also receive assistance with freight transportation planning through the provision of freight data for use in travel demand models.

² Arkansas Statewide Long-Range Intermodal Transportation Plan, 2007 Update

³ Arkansas State Rail Plan, 2002

As the state lies along the Mississippi River, waterways are of great importance to Arkansas freight movement. The Arkansas State Public Riverport Study and Needs Assessment (2005) identifies strategies to counteract the issues threatening future growth and development of the State's public river ports including the establishment of grant and loan programs, public/private partnerships, and marketing activities.

Georgia

In 2013, the Georgia Department of Transportation (GDOT) updated their Statewide Freight & Logistics Plan, which serves as the state's multimodal freight plan and as a guide to freight investments to increase potential economic growth in Georgia. With regard to truck traffic, Georgia adopted an official Freight Corridor Network that presents a cohesive map of roads for freight movement and highlights the strategic routes for flow of freight to and from locations. In addition to the Statewide Freight & Logistics Plan, GDOT's 2014-2018 Transportation Asset Management (TAM) Plan⁴ includes a redirection of agency focus from costly full replacement of poor functioning assets to lower cost-preventative measures. The performance measure identified in the plan, which relates to the freight needs, is the percentage of interstate routes and non-interstate state-owned routes in "fair" or "better" condition (includes pavement conditions and drainage structure conditions).

With regard to multimodal freight planning, the Georgia State Rail Plan completed in 2009 combined passenger and freight planning into one document that complies with PRIIA guidelines. The Georgia Aviation System Plan was last updated in 2003. Additionally, Georgia's Airport Aid Program (GAAP) uses a project priority ranking system, which allocates funding for airport improvement projects based on several factors including type of airport, runway type, and economic impact.

Kentucky

In 2014, Kentucky initiated an update of their Statewide Freight Study, which will replace their current intermodal freight plan. The Kentucky Transportation Cabinet (KYTC) prepared the current Statewide Intermodal Freight Plan, which was last updated in 2007. The plan provides context for the movement of freight in and through Kentucky, identifies strategies for categorizing freight projects, locations of congestion and bottlenecks, and compares investments between transportation modes. This plan requires that KYTC perform several activities associated with freight including:

- Review Public Riverport Applications
- Provide Oversight on Development Activities Involving Riverport Authorities
- Review Railroad Annual Reports
- Utilize the Highway Performance Monitoring System
- Develop a Statewide Transportation Plan
- Report Coal Haul Tonnages
- Review Highway Routes for the National Truck Network (NTN)

The current prioritization schedule of statewide transportation projects includes freight as a decision point. Prioritization among freight projects, however, is defined through the Intermodal Freight Plan process. The Freight Plan states that eligible projects should meet select criteria including those listed below to be considered:

⁴ Georgia Department of Transportation (GDOT), 2014-2018 Transportation Asset Management Plan

- The project needs to be located on the Kentucky Freight Focus Network.
- The project needs to relieve congestion, improve transportation safety, and/or include projects for the development and construction of intermodal freight distribution and transfer facilities. It should aim at increasing the mobility of freight.
- The project should have a benefit/cost ratio > 1 (<http://transportation.ky.gov/Planning/Pages/Freight-Planning.aspx>)

The 2002 Kentucky Statewide Rail Plan was prepared with the goal of identifying system-wide strategies and policies as a way to identify future rail issues to meet FRA requirements for federal funding. In 2008, the Kentucky Aviation System Plan was completed. Also in 2008, KYTC conducted the Kentucky Riverport Improvement Project. The purpose of the project was to study Kentucky's riverports and learn from other states' initiatives to develop a plan to increase the competitiveness of the riverports.

Overall, KYTC has several freight-related initiatives:

- KYTC along with the Kentucky Planning Division of FHWA host a Kentucky Freight Conference every two years with the most recent one held in 2013.
- In 2014, the Division of Planning plans to work to address air quality issues including diesel retrofits on locomotives and emission reduction best practices at rail yards and ports.⁵
- In 2014, the Division of Planning will determine freight performance measures for tracking annual hours of truck delay and a truck reliability index.
- Kentucky has a statewide traffic model (KySTM) and uses the Kentucky Economic Development Information System to evaluate freight data.
- KYTC developed the coal haul highway system because of this commodity's importance in the state's economy. The system designation is based on the public highways used to transport coal in the previous year.⁶

Mississippi

The Mississippi Department of Transportation (MDOT) completed a freight study in 2012, the Mississippi Goods Movement and Trade Study. The study recommended corridor-based improvement strategies and performance measures. The Mississippi State Rail Plan was completed in June 2011. The purpose of the plan was to meet federal requirements and to establish a state vision for the future of rail in Mississippi. The Aviation System Planning Study for Mississippi was prepared in 1998. The plan inventoried the state's aviation assets, identified project needs, and measured the economic output of the aviation industry.

In addition to the strategies outlined in the Mississippi Goods Movement and Trade Study, MDOT supports freight transportation through other efforts.

- MDOT's 2035 Long-Range Transportation Plan outlines next steps for implementing a multimodal corridor approach to transportation planning.
- Mississippi has a multimodal funding program, the MultiModal Capital Improvement Fund (MCIF). The funding is split between aeronautics, ports, freight rail, and transit. No funds have been appropriated by the state legislature for the program with MDOT funding it from

⁵ Kentucky Work Program, 2014

⁶ Kentucky Coal Haul Highway System, <http://transportation.ky.gov/Planning/Pages/Coal-Haul.aspx>

the state fuel tax revenue.

MDOT includes the Office of Intermodal Planning.⁷ In addition to planning efforts, MDOT also has a Multimodal Transportation Improvement Program, which funds improvements to infrastructure for airports, ports, railroads, and transit systems.

Missouri

The Missouri Department of Transportation (MoDOT) is currently in the process of developing a statewide freight plan with an expected completion date of September 2014. The Missouri State Rail Plan was completed in 2012 and the Missouri State Airport System Plan was completed in 2005. In 2008, MoDOT prepared the Freight Optimization and Development in Missouri: Ports and Waterways Module. This document assessed current waterborne freight movements in Missouri to understand how the state can strengthen its role as a national freight center. MoDOT also prepared the Missouri River Freight Corridor Assessment and Development Plan in 2011 with the intent of redeveloping the river as a freight corridor.

MoDOT has addressed implementation of freight policies and projects through their Multimodal Operations Division and Planning Division.

- MoDOT's Engineering Policy Guide, Section 121.5, outlines MoDOT's project selection process, which includes several freight criteria (e.g. compliance with regional or local land use-plans, intermodal freight connectivity; safety concern, strategic economic corridor, truck usage, and truck volume).
- MoDOT's website currently provides a listing of the location of truck parking facilities and the number of truck parking spots provided at each location.
- MoDOT prepares an annual report Tracker: Measures of Departmental Performance. The report includes freight-related performance measures, including freight tonnage by mode, annual hours of truck delay, and goods movement competitiveness.
- MoDOT provides technical assistance to airports when requested and also administers grants for aviation projects through the State Aviation Trust Fund Program.
- State Transportation Assistance Revolving (STAR) Fund can provide loans on favorable terms for the planning, acquisition, development and construction of passenger and freight rail facilities. The STAR Fund is a revolving loan program where loan payments and any interest earned go back into the fund for additional transportation projects.
- Missouri Transportation Finance Corporation (MTFC) provides loans to all transportation modes (including highway projects) with the same terms as the STAR Fund. However, the MTFC is a larger program and has the ability to fund larger projects than the STAR Fund.

In addition to the freight-related studies, Missouri's Long-Range Transportation Plan *Moving Forward* includes a strategy for identifying the statewide freight network to serve the needs of Missouri businesses. The purpose of this strategy is to aid in identifying overall needs and assist with the project prioritization process.

North Carolina

The North Carolina Department of Transportation (NCDOT) developed their last freight plan in 2008, *Statewide Logistics Plan for North Carolina*, to evaluate the state's long-term economic, mobility, and infrastructure needs. To do this, the plan identifies priority commerce needs, ⁷ Mississippi Department of Transportation, http://mdot.ms.gov/portal/intermodal_planning.aspx

enumerates needed transportation infrastructure actions, and a timetable to meet these identified needs. Additionally, NCDOT is preparing a rail plan to evaluate the current passenger and freight rail needs and determine the needs for future economic growth. The North Carolina Maritime Strategy was drafted in 2011 as a plan to connect maritime goods with economic development in the state.

Implementation tools NCDOT uses for freight include a variety of programs, policies, collaboration efforts, and performance measures.

- The Industrial Access Program funds construction of roads that provide access to new or expanded industrial facilities.
- NCDOT has a rail access program that ensures tracks are available to transport freight and materials for companies wanting to locate or expand their facilities. It provides state funds (contingent upon a local match) to assist with improving rail tracks required by a new or expanding industry.
- NCDOT also has the Sealed Corridor Program, a project to minimize highway and rail conflicts by using enhanced traffic control devices, crossing closures, and grade separations.
- The North Carolina freight network consists of interstate routes and state highways. Some of the roads on the network have weight and /or lane restrictions on trucks.
- NCDOT has twice-yearly meetings with the Class 1 railroads to review lists of projects.
- NCDOT has six performance measures under the goal of moving people and goods efficiently in their Annual Performance Report. Of the six, three pertain to freight including average statewide accident clearance time, travel time index for surveyed interstates, and percentage change in port authority cargo movements.
- North Carolina also has a Heavy-Duty Vehicle Idling Restriction code (15A NCAC 02D.1010) that restricts commercial trucks from idling for more than 5 minutes; however, their code does have some exemptions and no fines are currently associated with it.

Virginia

The Virginia Department of Transportation (VDOT) completed the Virginia Statewide Multimodal Freight Plan based upon earlier efforts, including the previous Virginia Multimodal Freight Study, which was completed in two phases. Phase I (2009) of the study focused on collecting baseline and forecasting information as well as stakeholder outreach. Phase II (2011) involved developing tools and evaluating freight needs, infrastructure investments and policy. In conjunction with the Virginia Statewide Rail Plan (2013), Virginia prepared a Rail Resource Allocation Plan, which includes project selection and prioritization, funding, and implementation schedules for both public and private freight and passenger rail projects. The Virginia Department of Aviation is in the process of updating the 2003 Virginia Air Transportation System Plan. It's updated every five to 10 years to stay current with changes in the aviation industry. The Virginia Port Authority 2040 Master Port Plan (2013) outlines a strategy for the port to continue to bring economic benefits to the state.

The responsibility for freight planning is distributed amongst several entities in Virginia including VDOT, the Office of Intermodal Planning and Investment, the Virginia Port Authority, the Department of Rail and Public Transportation, and Virginia Department of Aviation. Together, the policies, performance measures, and programs from these entities help define the future of freight infrastructure and movement in Virginia.

- The Virginia Freight Transportation Advisory Committee (VFTAC) is comprised of members from the private sector, led by the Chief Operating Officer of the Virginia Port Authority, and includes participation by the Secretary of Transportation or the Deputy Secretary.
- The Virginia Department of Rail and Public Transportation oversees the Rail Enhancement Fund, which was created in 2005 as Virginia's first dedicated revenue stream for rail infrastructure investments.
- Virginia also prioritizes and develops corridor master plans and studies for their Corridors of Statewide Significance.
- In addition to the transportation system performance measures tracked in Virginia, the Office of Intermodal Planning and Investment worked with VDOT to develop measures of accessibility and mobility for intermodal centers, activity centers, and Corridors of Statewide Significance.
- Virginia participated in the I-81 Corridor Coalition, a six-state partnership, which includes Tennessee, to improve freight and passenger movement along I-81. The I-81 corridor is used as an alternate to I-95.
- Port of Virginia Economic and Infrastructure Development Zone Grant Program (POV Zone Grant) provides grants to qualified companies to incentivize companies to locate new maritime-related employment centers or expand existing centers in specified localities in order to encourage and facilitate the growth of the Port of Virginia.
- Port of Virginia has several environmental initiatives for improving air quality, water quality, habitat creation, green operator trucks, and switching fuels of commercial containerships to alternative/hybrid technology.
- The Rail Industrial Access Fund fosters rail development and access to freight rail service for new or expanding business and industries.
- The Air Service Development and Enhancement Program provides funding to assist airport sponsors attract new air service and maintain or improve existing air service.

4.2 PEER STATES

Florida

The Florida Department of Transportation (FDOT) began the process of creating a Freight Mobility and Trade Plan in 2012. The plan is being created in two phases with both a policy and an investment element. The policy element was adopted in June 2013, while the investment element is expected to be completed in July 2014. Similar to the Statewide Freight Plan effort, FDOT completed a rail plan in 2009 that also consisted of a policy and investment element. The Florida 2025 Aviation Plan was created in 2009 to plan for the 129 public airports in the state of Florida. The plan looks at the economic development expected in the state and the need for airports to accommodate the changing global economy. The 2010 Florida Seaport System Plan was created to address the future needs of the seaports using a strategic system-wide approach. The plan evaluates the needs of the ports to accommodate expected growth in Florida's supply chains.

Florida has addressed implementation of freight policies and projects through several programs including dedicated funding, evaluation of bottlenecks and congestion, truck parking, and freight performance measures.

- In 2012 Florida's legislature enacted statute 311-101 and ILC Rule 14-118 that supports Intermodal Logistics Center (ILC) development through a grant program, as well as inclusion of ILCs as part of the state's Strategic Intermodal System (SIS).
- Florida's Multimodal Mobility Performance Measures 2013 Source Book includes 12 freight related measures that are tracked. The measures include combination truck miles travelled, freight travel time reliability and variability, combination truck hours of delay and speed, and aviation, rail, and seaport tonnage.
- Florida has a Rail Stakeholder Advisory Committee established to assist with development of the rail plan; this committee helped identify rail system needs and prioritize the recommendations.
- Florida Multimodal Analysis Tool (FMAT) is being developed using Transearch data to establish multimodal freight flow patterns on the Freight Model Network (FMN). These freight flow patterns will, in turn, be helpful in maintaining a state of good repair along the network. The network contains roadways, rail lines, waterways, airway linkages, and intermodal facilities.
- The FDOT Office of Freight Logistic and Passenger Operations was created to connect, develop, and implement a freight planning process that maximizes the use of existing facilities and integrates and coordinates various modes of transportation, including public-private partnerships.
- A truck parking study has recently begun in an effort to identify problems arising with illegal truck parking and to find technological solutions that can collect and transmit information to drivers.
- Florida is also planning for the interaction between freight and the land uses that may facilitate freight movement or impede it. Specifically, freight villages are designed as more fully contained developments beyond single properties, and oriented in such a way that provides for efficient modal shifts between freight carriers, spurred economic activity through active freight facilities (i.e., no container storages), support to freight carriers (i.e., truck stops and rest areas, retail, hotels, etc.), and on-site management of the village's operational attributes.

Indiana

The Indiana Department of Transportation (INDOT) completed a Multimodal Freight and Mobility Plan in 2009 to assist the state in creating future freight policy and making knowledgeable investments relative to freight movement. The Indiana State Rail Plan was completed in 2011 to evaluate the role of freight and meet Federal Regulations set by the Passenger Rail Investment and Improvement Act (PRIIA). Rail is an important part of the transportation system in Indiana since it provides an important connection to Chicago and St. Louis from the east. In 2012, Indiana completed an Aviation System Plan to establish goals for maintaining and improving public airports in the state.

INDOT has also established a variety of policies and programs through its Office of Freight Mobility to help implement and evaluate freight projects.

- The INDOT website provides an interactive map with rest areas and welcome centers that will give the location of the rest area and the number of spaces provided.
- The Indiana noise policy applies to all multimodal projects that require FHWA approval, that

are administered by INDOT or local public agencies, or are projects on roadways leased by Indiana.

- The State of Indiana has several innovative operations that affect freight such as On-the-Move weigh stations and the use of social media for travelers, a rapidly evolving application technology.
- The Annual Program Development Process (APDP) is a six-step process used to develop projects on the state highway system. The six steps are geared toward presenting, reviewing, prioritizing, and programming projects with input from agencies outside of INDOT.

Minnesota

In June 2014, the Minnesota Department of Transportation (MnDOT) began creating a Statewide Freight System Plan that is expected to be complete in June 2015. It will guide policy and provide a framework for public and private sector stakeholders as well as guide planning and investments in Minnesota's freight system. The Minnesota Freight and Passenger Rail Plan, updated every five years, is currently being updated with completion expected in February 2015. The rail plan will establish rail corridors, programs, and projects to help guide the state's passenger and freight rail travel into and out of Minnesota. MnDOT's Statewide Ports and Waterways Plan Draft was completed in November 2013. This was the state's first port and waterway plan and identifies economic competitiveness initiatives for MnDOT including helping ports and terminal operators identify opportunities for expanding types of commodities moved on the waterway, improving logistics, and expanding use of containers on the waterway system. The MnDOT also has an Aviation System Plan, which has a user friendly design – including a planning toolbox – aimed at generating input from the aviation community, regulatory and funding agencies, the general public, and lawmakers. The intent of the plan is to provide the tools necessary to make cost-effective, informed decisions regarding Minnesota's airport system.

Implementation of freight projects are guided by several programs and policies established by the state of MnDOT.

- In 2013, Minnesota legislature started the Corridors of Commerce, a bonding effort to fund freight projects aimed at improving roadways where there are bottlenecks and barriers to freight movement and commerce.
- An Interregional Corridor System has been developed to provide efficient connections between regional trade centers to facilitate the movement of people and goods.
- Annually the state prepares a Congestion Report to identify locations currently over capacity, plan for growth, allocate resources, plan for construction zones, and report performance measures.
- An automated truck stop management system is used by MnDOT to determine the number of occupied spaces. Cameras are used to monitor real-time parking availability with notification provided to drivers via a website, in-cab messaging, and variable message displays.
- The annual performance report prepared by MnDOT contains freight specific performance measures that track tonnage and value of shipment by mode and the number of lifts at intermodal yards.
- Minnesota's Port Development Assistance Program (PDAP) provides matching state funds to public port authorities to upgrade facilities and infrastructure and to rehabilitate and

expand port capacity.

Other freight-related activities that MnDOT conducts to assist with the implementation of freight are listed below.

- MnDOT has a Freight Advisory Committee consisting of public and private members that meet quarterly to discuss policies and actions.
- A Noise Policy established by MnDOT was updated in 2011, which conforms to 23 CFR 772 (Procedures for Abatement of Highway Traffic Noise and Construction Noise).
- The Minnesota Guidestar Program guides ITS projects including the evaluation of the truck Priority System for Two-lane signalized roadways to reduce user delay by reducing platoons formed by commercial vehicles at isolated signalized intersections. The Virtual Weigh Station is also part of the Guidestar Program and is intended to preserve the Minnesota roadways and bridges by limiting damage caused by overweight trucks.
- MnDOT uses the Freight Analysis Framework (FAF) Network to evaluate origins and destinations of major freight flows; ATRI data is used for freight performance measures.
- MnDOT has a Freight and Commercial Vehicle Operation division that works with truck, rail, and water programs and policies to improve safety of their operations. The division has a webpage dedicated to answering questions from passenger transportation providers, property transportation providers, and for commercial vehicles.
- MnDOT's Airport Land Use Compatibility Manual documents different strategies and zoning regulations to help protect airports from surrounding land uses and, in turn, protect adjacent properties from the airport.
- With its connection to the Great Lakes, Minnesota has developed itself as a leader in inland ports and waterways as well as for its statewide multimodal freight network. The following multimodal freight-related performance metrics are from MnDOT's Annual Transportation Performance Report (2012)⁸:
 - Total freight tonnage shipped to, from, or between Minnesota locations by mode
 - Total freight value shipped to, from, or between Minnesota locations by mode
 - Heavy commercial vehicle miles traveled on the Minnesota highway system
 - Annual rail shipment tonnage
 - Annual container lifts in intermodal yards
 - Freight moved by water based on tonnage on commodity
 - Annual port shipment tonnage

Texas

The Texas Department of Transportation (TxDOT) is currently preparing the first Mobility Freight Plan for the state and is expected to be completed in November 2014. The Texas Rail Plan was completed in 2010 to address passenger and freight rail in the state. The Texas Airport System Plan (TASP) was last updated in 2010. The objective of the plan is to direct resources to the airports that will support the plan's goals to increase system capacity, provide air access to population, industry, 8 Minnesota Department of Transportation, Annual Transportation Performance Report, 2012

agricultural, and natural resource centers, and foster economic development. The Waterborne Freight Corridor Study, unique to the Texas position along the Gulf Coast, international trade and the petrochemical industries, was prepared in two phases in 2010; the plan serves as an avenue to begin addressing the issues of waterway freight chokepoints with all freight stakeholders. TxDOT prepared a Statewide Freight Resiliency Plan in 2011 with the key purpose of identifying freight infrastructure corridors and strategies to identify resiliency of the network.

One tool TxDOT has created to help implement freight projects is the Unified Transportation Program. The Unified Transportation Program is used to enable funding across highway, aviation, public transportation, and state and coastal waterways projects. It is approved prior to August 31st annually in accordance with Texas code TAC 16.105.

Other freight initiatives the State of Texas has implemented include the establishment of the Texas Freight Advisory Committee to serve as a forum to address freight issues in the state. In addition to this committee, TxDOT has many other freight programs and initiatives⁹, which are described below:

- TxDOT acquired the South Orient Rail Line (SORR) in 2001 and rehabilitated the freight rail line. A private entity operates the rail line through a long-term lease agreement with TxDOT, a strategy used by several states to help sustain rail service while preserving the long term value to the state.
- The Rail Relocation and Improvement Fund can be used to relocate, rehabilitate, construct, acquire, or improve public or private rail facilities; however, there is no currently identified revenue stream for this fund the program at this time.
- TxDOT's TASP identifies improved system capacity for airports as one of the goals of their program. This includes improving reliever airports to handle larger aircraft to help manage the congestion at primary airports.
- The Routine Airport Maintenance Program provides financial assistance for maintenance programs such as utilizing the services of TxDOT local districts and their contracts for maintenance items at airports (e.g., crack sealing, striping).
- The FAA's Airport Terminal Grant Program provides matching funds for construction on new or existing terminal buildings, vehicle parking, and entrance roads.
- Texas formed a Port Authority Advisory Committee to work with TxDOT on the development of Texas maritime ports.
- The Port Access Account Fund is a way for the state to help fund the expansion and upgrading of Texas public port facilities; however, no funding stream has been identified for the fund.
- TxDOT utilizes INRIX speed data to identify congested freight corridors throughout the state. Texas has begun forming Regional Mobility Authorities (RMAs) that serve many of the same functions as the DOT. Comprised of various counties and municipalities, these political subdivisions have the ability to finance, acquire, design, construct, operate, maintain, expand or extend transportation projects, including freight-related projects, such as intermodal hubs, airports, rail tracks and facilities, and ports. Utilization of this concept helps to bring projects to life quicker and gives local governments more of a say in transportation planning.

Utah

⁹ Texas Department of Transportation, <http://www.txdot.gov/inside-txdot/division.html>

The Utah Department of Transportation (UDOT) began working on its Statewide Freight Plan in 2013, which is expected to be complete in late 2014. Utah's State Rail Plan (USRP) was adopted in 1996. Recently, UDOT has started reviewing the USRP in an effort to update it and reflect changes in the freight and passenger rail systems, as well as bring the plan into PRIIA compliance as a precursor for funding eligibility.

Freight planning at UDOT is focused on UDOT's four strategic goals: (1) Preserve Infrastructure, (2) Optimize Mobility, (3) Zero Fatalities, and (4) Strengthen the Economy. The following are freight-related initiatives employed by the Department.

- UDOT developed Utah's Primary Freight Network (PFN), which are primary highways that move freight within and through Utah.
- Utah established a Freight Commission with representation from MPOs, the Utah Trucking Association, UDOT, the Union Pacific Railroad, and other agencies.
- UDOT uses PrePass 2013 and Drivewyze Bypass Technology to allow commercial drivers to bypass the Ports of Entry.
- One of the recommendations from the 2007 Utah Statewide Rest Area Plan was for UDOT to investigate opportunities to provide truck-only parking areas. The plan inventoried truck parking supply at rest areas and defined insufficient truck parking as a greater than 10 space difference between the calculated demand and the current supply.
- UDOT initiated and maintains an interactive online state rest area map including information on locations and amenities (e.g. truck/RV stalls). It does not indicate the number of truck parking stalls nor real-time availability information. UDOT prepared a graphic depicting the locations and number of truck parking spaces and other amenities at public rest areas along interstates.
- Through social media sites such as Twitter, Facebook, and YouTube, as well as UDOT's traffic app, UDOT is able to provide real-time traffic information to travelers.
- Utah also participates in the I-80 Winter Operations Coalition, a multi-state initiative that also includes California, Nevada, Wyoming, and Nebraska. The I-80 corridor is recognized by the coalition as a major freight corridor for the area. The coalition prepared a Freight Coordination and Action Plan for the I-80 corridor to determine how best to link multi-state operational processes and data to maximize winter mobility along this corridor.
- UDOT also prepared the Utah Continuous Airport System Plan (UCASP)¹⁰, which was last updated in 2007. The UCASP identified pavement preservation and land use compatibility as important areas of focus for airports.

Washington

The Washington Department of Transportation (WSDOT) has recently published a statewide freight plan for public review. In addition, a State Rail Plan (Dec. 2009) and Aviation Plan (July 2009) were completed by WSDOT. Although a waterway plan has not yet been completed, economic waterway corridors have been identified and classified based on the tonnage carried on each waterway. The state also updates their Highway System Plan every 2 years and is used to guide development and prioritization of the Capital Improvement and Preservation Program. As part of this report the freight transportation system is evaluated and the deficiencies are noted along with specific projects that target the three components of the transportation network that are

10 Utah Department of Transportation, Utah Continuous Airport System Plan, 2007

noted as essential to the State of Washington. The WSDOT has also developed a Freight System Resiliency Plan, which is intended to complement emergency response plans by anticipating and planning how WSDOT should monitor, manage, and control its transportation network assets and work with private sector partners to improve resiliency of the entire network.

WSDOT has several unique aspects to implementing freight projects, corridors, truck parking, and performance measures.

- The project selection process used for the Surface Transportation Program (STP) project list was created by the WSDOT in conjunction with the state's MPOs and county regions. Each of the MPOs or county regions determines the priorities of the area, which allows for different selection criteria in rural counties and metropolitan areas. A majority of the MPOs and county regions include some aspect of freight in the project selection process such as economic development, bottlenecks and chokepoints, or freight mobility.
- To help with project identification and selection for freight, WSDOT has created a series of maps that identify freight corridors per mode based on the tonnage of commodities shipped for truck, rail, and air.
- Truck parking is provided at Safety Rest Areas (SRA) in 48 locations throughout the State of Washington with 28 locations on interstates. Parking is allowed for up to eight hours at all the interstate SRAs and most of the State Routes SRAs. The state website also provides a link to a truck stop website that lists gas stations providing truck parking and the number of parking spaces at the stations.
- Performance measures for the WSDOT are published in the Gray Notebook¹¹ and include freight specific measures for truck, water, and rail. The rail measures include funding, carload shipped, tonnage shipped by rail, and the amount shipped by specific rail companies. The truck measures include bottleneck identification projects, evaluation of the commercial vehicle system, transponder usage, economic corridors, truck speeds on specific interstates, and truck volumes and tonnage on specific corridors.

The state of Washington has several other programs and activities implemented to address freight.

- Similar to other states, WSDOT has a Freight Advisory Committee that has worked closely with the DOT in development of the statewide freight plan.
- In 1998, the Washington State legislature created House Bill 1487, which addressed Coordination of Transportation and Growth Management Planning. This was passed to enhance planning for transportation facilities of a statewide importance.
- WSDOT has a freight program designed to allow Commercial Vehicles the ability to use detour routes when major freight highways are closed called the Commercial Vehicle System Detour Pass. When major freight highways are closed or severely restricted and a limited capacity detour is available nearby, the Commercial Vehicle pass will be issued based on the detour's capacity and the priority of the goods being moved.
- WSDOT also utilizes a Statewide Freight GIS Network Model. The DOT also considered using GPS data to verify routing choices that occur within the model, but it found GPS data is not useful in an urban setting.
- WSDOT has a Freight Systems Division that provides strategic planning for all state freight investments and directly manages the state freight rail program, including joint projects with Class I and regional railroads.

¹¹ Washington State Department of Transportation, The Gray Notebook, Issue 49, May 30, 2013

- The Commercial Vehicle Information Systems and Networks (CVISN) program uses weigh-in-motion technology, transponders, and Automated License Plate Recognition (ALPR) to electronically screen trucks as they approach open weigh stations. If truck passes the screening, it is allowed to bypass the weight station, saving time.
- The 2012 Truck Performance Measurement (TPM) program developed criteria for identifying different types of truck freight bottlenecks. For Washington, these included restricted access bottlenecks (vertical clearance or weight restrictions), resiliency bottlenecks (roadways that have a high probability of facility failure in the event of severe weather or natural disasters), slow speed, and reliability bottlenecks.

4.3 OTHER NOTEWORTHY STATES

In addition to Tennessee's surrounding and peer states, there are a number of other noteworthy practices occurring throughout the nation as each state undertakes freight planning efforts aligned with their respective administrative and institutional capabilities. Table 6 lists the noteworthy states documented in this section their freight-related programs, policies, funding, performance measures, and even some multi-state agreements. Some features may be common to these and other states, such as the formation of councils, to serve as a forum for discussion between public/private freight stakeholders so that improvements can be seamless between all modes and industries. Many states have programs in place to support, preserve and land bank underutilized and abandoned branchlines from legacy railroad programs.

Table 6 Other Noteworthy State Practices

Plans, Policies, and Programs	California	Illinois	Michigan	Ohio	Oregon
Freight Plans					
Statewide Freight Plan	✓	✓	✓	✓	✓
Rail Plan	✓	✓	✓	✓	✓
Aviation Plan	✓	✓	✓	✓	✓
Waterways Plan					✓
Truck Highway Plan					✓
Freight Resiliency Plan					
Freight Implementation					
Freight Project Selection Consideration				✓	✓
Dedicated Multimodal Freight Funding Program					✓
Industrial Access Program			✓		
Corridors Emphasis			✓	✓	✓
Bottlenecks & Congestion	✓			✓	✓
Truck Parking	✓		✓		
Freight Related Performance Measures	✓		✓		
Other Freight-Related Activities					
Freight Advisory Committee	✓	✓			✓
Land Use & Environmental (Policies/Programs)	✓	✓			✓
Freight Related Technology Initiatives/Programs	✓	✓	✓		✓
Technical Assistance/Resources					✓
Data & Planning Tools	✓		✓	✓	✓
DOT Freight Division	✓				✓

California

The California Department of Transportation (Caltrans) Preliminary Draft Freight Mobility Plan was released in June 2014 for public review and comment. The plan recognizes that freight touches everyone’s lives and as such, identifies goals, objectives, strategies, performance measures, and high-priority projects to facilitate freight movements through California. Future work on the California Freight Mobility Plan will include finalizing performance measures. The California State Rail Plan was finalized in May 2013, which assessed the passenger and freight rail system. California Aviation System Plan was completed in September 2010. The following initiatives, projects, and practices illustrate some of California’s freight-related efforts.

- While California does not have a dedicated multimodal freight funding program, some of the funding from the Proposition 1B Transportation Bonds was made available for freight-related projects through the Trade Corridor Improvement Fund, Goods Movement Emission Reduction Program, and Port, Harbor, and Ferry Terminal Security Account.
- In 2012, Caltrans in partnership with other public, academic, and private entities and

sponsorship by the FHWA initiated a Smart Truck Parking test program along I-5. The program is currently testing truck sensing technologies to provide real-time parking availability at truck stops.

- Weigh-in-motion data, a statewide travel demand model, other real-time information data collection through Caltrans' Performance Measurement System (PeMS)¹² is used to improve freight reliability.
- Caltrans evaluates transportation congestion data to develop statewide and district-level bottleneck maps. The performance data is also documented in their Mobility Performance Reports.
- In 2011, California conducted a preliminary investigation of programs to preserve abandoned or underutilized rail lines.
- The California Freight Advisory Committee (CFAC) meets quarterly to advise on freight-related initiatives as a timely response to freight program developments in the State.
- The Alameda Corridor¹³ is often mentioned as an early example of an innovative approach to resolving changes in transportation infrastructure requirements. The project separated freight trains from street traffic and passenger trains through a series of bridges, underpasses, overpasses, and street improvements. It is notable because it challenged local rail network and infrastructure conditions, reduced congestion, improved air quality, and retained growth potential, which might have otherwise been lost.

California is generally proactive in their standards related to environmental issues, including freight-centered issues.

- Caltrans's 2050 vision includes transitioning the freight industry to a zero, or near zero, emissions status.
- The California Air Resources Board (CARB), the California Energy Commission (CEC), regional air districts, and other public agencies provide competitively based funding for freight projects, particularly projects that address air quality, greenhouse gas emissions, alternative energy, new engine technologies, and more efficient freight operations.
- The Caltrans' Division of Aeronautics developed the California Airport Land Use Planning Handbook to improve the compatibility of California airports and the surrounding land uses.

Illinois

The Illinois Department of Transportation (IDOT) prepared its Freight Mobility Plan in December 2012. Similarly, the Illinois State Rail Plan was also completed in 2012. This plan included some aspects of the rail freight system, but primarily focused on passenger rail due to the multi-state high speed rail emphasis for passenger service. IDOT regularly updates the State Aviation System Plan; the latest is the FY 2012-2014 Illinois State Aviation System Plan. IDOT has also established the following programs and practices to help implement freight projects.

- IDOT offers the Economic Development Program, the Truck Access Route Program (TARP), and the Rail Freight Assistance Program (RFP) to assist with funding for freight access to industrial properties.
- IDOT has implemented a weigh-in-motion system.

12 Performance Measurement System (PeMS), <http://pems.dot.ca.gov/>

13 Alameda Corridor Transportation Authority, http://www.acta.org/projects/projects_completed_alameda.asp

- In 2003, the CREATE (Chicago Region Environmental and Transportation Efficiency) Program was announced to help alleviate the congestion experienced by freight and passenger rail in Chicago. It is a focused partnership between the U.S. DOT, State of Illinois, City of Chicago, Metra, Amtrak, and the freight railroads. The major hurdle for the CREATE program, as well as most transportation projects, was funding. The \$1 Billion invested to date has completed 20 projects while \$2.5 Billion is still needed to fund the remaining projects. CREATE has also seen a great integration of railroad dispatch and operations across the region.
- In a joint effort with INDOT, IDOT is studying the Illiana Corridor, which would connect I-55 in Illinois to I-65 in Indiana. The freight benefits would include the Illiana Corridor serving as a bypass for trucks around the congested metropolitan highways, providing access to one of the largest inland port intermodal freight areas in the U.S. and the proposed South Suburban Airport, supporting economic development in this area, and the potential for substantial job creation.
- The Illinois State Freight Advisory Council consists of public and private sector representatives and provides an avenue to discuss multimodal freight planning, similar to the FACs established in other states.
- In reaction to changing land use and vehicular traffic patterns, numerous communities throughout Illinois have undertaken the study and installation of Quiet Zones to eliminate horn sounding at rail crossings.

Michigan

The Michigan Department of Transportation (MDOT) completed their Freight Plan in 2013. This plan did not establish freight performance goals, but instead integrated the national performance measures into the plan and continues to integrate them as they are established. The Michigan State Rail Plan and the Airport System Plan were completed in 2011 and 2008, respectively. Michigan is currently completing studies for a new bridge to augment the existing Ambassador Bridge, one of the most congested international gateways in the United States. The following plans, programs, and performance measures are part of Michigan's freight-related efforts:

- Michigan's Long-Range Transportation Plan 2005-2030 focuses on corridors of highest significance. The purpose of corridor-based approach used in the LRTP was to evaluate multimodal travel conditions and needs on each economically important corridor.
- Michigan has several grant and loan programs that provide financial assistance to freight-related projects that provide access to industrial land uses such as:
 - Transportation Economic Development Fund
 - Freight Economic Development Program
 - Michigan Rail Loan Assistance Program
 - State Infrastructure Bank Loans
 - Office of Aeronautics Loan Program
- The freight economic development program provides low-interest loans for up to 50% of rail infrastructure costs at new or expanded businesses to help them connect to the rail line.
- MDOT is piloting a real-time parking availability program along the southwestern I-94 corridor.
- MDOT, along with multiple other DOTs and agencies, work together in the Transportation

Border Working Group to implement technological solutions at border crossings so that freight and people move across national borders as efficiently as possible.

- Michigan’s current freight plan makes use of IHS Transearch data to forecast freight demands over a 20-year horizon.
- MDOT’s report on transportation performance measurements, *Driven By Excellence*¹⁴, outlines the following freight-related performance measures:
 - No more than 25% of freeway closures lasting longer than 120 minutes
 - Increase the percentage of railroad crossings (trunk line) rated in fair or better condition
 - Maintain 100% of all Tier 1 airport primary runway pavements in good condition
 - 95% of business centers located within 30 minutes travel time to a Tier 1 airport

Ohio

The Ohio Department of Transportation (ODOT) issued the Final Ohio Statewide Freight Study in November 2013 as a means of informing and guiding the state transportation plan. The purposes of the plan were two-fold, to plan and prioritize investments in Ohio’s freight infrastructure and to guide future economic development activities to best utilize freight infrastructure. The Ohio Statewide Rail Plan was issued in May 2010. It meets federal requirements and includes strategies for the future vision of rail in the state of Ohio. A benefits calculator of investment in railroad improvements is in development to assist with the rail funding decision-making process. The Ohio State Air System Plan was completed in 2006.

- Since 1997, Ohio has had a Transportation Review Advisory Committee (TRAC) to develop and oversee a project selection process for new major transportation capacity projects (Ohio Revised Code 5512.02). The TRAC developed a project scoring methodology that can score projects across all modes or only projects within a specific mode and includes criteria for freight transportation.
- Recognizing that transportation corridors with the highest volumes of passengers, the greatest volume of freight traffic, and the highest value of freight commodities are highly important economic corridors, ODOT’s Long-Range Transportation Plan (Access Ohio 2040) included a corridor analysis.
- ODOT’s Division of Planning supports the development of the statewide travel demand model as well as urban area models.
- ODOT conducts analyses of bottlenecks and chokepoints on the highway system. In addition, they completed the Ohio Railroad Choke Point Study (September 2007) to identify, locate, and quantify the 30 most severe rail chokepoints in the state.
- ODOT documents their performance measures in their strategic planning document, *Results Over Resources Report*. The performance measures that can be related to highway freight transportation are a travel time reliability index and the number of state priority routes not reaching expected speeds within 2 hours of a snow event.

Oregon

¹⁴ Michigan Department of Transportation, *Driven By Excellence: A Report on MDOT Accomplishments*, 2010

In response to Oregon's 2006 Statewide Transportation Plan, the Oregon Department of Transportation (Oregon DOT) developed the state of Oregon Freight Plan (OFF). The OFF identifies goals, policies, and strategies for a multimodal transportation system. The 2014 Oregon State Rail Plan was released in the spring of 2014 for public review and comment; it includes goals, policies, and strategies as well as a statewide investment and decision-making frameworks to determine project funding. The main issues related to freight include items such as shortline maintenance and preservation, safety projects, and intermodal connectivity. The 2007 Oregon Aviation Plan addressed specific aviation needs as well as the goals of the Oregon Transportation Plan. Oregon also developed the Oregon Highway Plan (1999) with updates to the freight route map conducted in 2012. Ports 2010: A New Strategic Business Plan for Oregon's Statewide Port System was prepared by the Oregon DOT to identify port needs and strategies for the port system to best serve the state and its residents.

The Oregon DOT recognizes the importance of freight to the state's economy and, as such, has conducted a number of studies as well as implemented some of the following policies and programs aimed at improving freight modal connections and keeping freight moving efficiently through the state.

- The 2013 Oregon Ports & Airports Freight Chokepoints Study was completed to identify multimodal chokepoints. The study was a direct result of the Oregon Freight Plan, which identified transportation system constraints as having a negative impact on freight movement.
- *ConnectOregon* is a state-funded competitive grant program intended to improve connections between the highway system and other transportation modes.
- The Oregon Freight Advisory Committee (OFAC) advises the Oregon DOT on freight-related issues, policies, and programs. This includes identifying high-priority freight mobility projects for consideration in ODOT's Statewide Transportation Improvement Programs (STIP) and for the *ConnectOregon* program.
- Oregon legislature passed the Oregon Administrative Rule 731-012-0010 (Reduction of Vehicle-Carrying Capacity) to preserve the carrying capacity of freight routes.
- The Oregon DOT supports local agencies in freight-related efforts such as assisting with the designation of local truck routes.
- The Oregon DOT participates in the public review of a land use application and may make recommendations about how a land use approval may be conditioned to protect state transportation interests.
- To reduce delays and improve safety for trucks, the Oregon DOT uses the Green Light Preclearance Program to allow trucks to bypass weigh stations.
- Like many other states, Oregon uses IHS Transearch data to examine current and forecasted commodity flows.

Kentucky-Indiana

- The state pair of Kentucky – Indiana needed to address equitable and effective techniques in financing major river crossing bridges. For the Ohio River Bridges near Louisville, KY, Transportation Infrastructure Finance and Innovation Act (TIFIA) Loans and Private Activity Bonds (PAB) available through federal programs were selected. For the Ohio River Bridges in Kentucky and Indiana, Kentucky pursued a TIFIA loan for the downtown bridge and Indiana pursued a PAB approach for the East Side Bridge.

- The TIFIA loan provides Federal credit assistance to eligible surface transportation projects of a regional and national significance, including highway, transit, intercity passenger rail, some types of freight rail, and intermodal freight transfer facilities. The support may be in the form of a loan, loan guarantee, or for operating costs during the first 10 years.
- The TIFIA and Railroad Rehabilitation & Improvement Financing (RRIF) federal financing strategies each have significant funding capacity available. Tennessee will need to have in place or establish state institutions to capture revenue from fees or operations following construction.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

Freight transportation has experienced significant growth over the past few decades with economic forecasts promising more of the same. This growth and change has occurred within physical systems including highways, rail lines, ports, waterways, and airports. Consequently, TDOT is devoting increasing effort to understanding and dealing with freight transportation issues. The purpose of this policy paper is to describe current policies and programs of the State with regard to multimodal freight movement by highways, waterways, rail, air, and pipelines. Additionally, this paper provides recommendations for plans, policies, and programs consistent with the Guiding Principles of TDOT's 25-Year Policy Plan. The Summary of Findings presents existing plans, policies, programs, future growth, trends, technology, and recommendations related to multimodal freight in Tennessee.

Road

With highways as its major asset, TDOT relies heavily on these facilities to carry a large quantity of freight into, out of, and through Tennessee. Furthermore, Tennessee's strategic central location makes it critical to trade flows throughout the country. While freight traffic is typically indicative of economic development within a state, increased truck volumes on the transportation system bring issues such as congestion, air quality, and safety to the forefront of the Department's freight discussions.

Rail

With six Class I and 24 Class III railroads running throughout the state, Tennessee has a great deal of potential when it comes to moving freight by rail. Unfortunately, funding shortfalls have made it difficult for the Department to invest in track improvements and maintenance while geographical barriers continue to hinder east-west rail possibilities. Nonetheless, rail continues to be one of the most cost-effective methods of shipping bulk goods today, and, as such, is expected to carry an increasing amount of goods in the future as congestion on the nation's highway system continues to worsen.

Water

As one of the most environmentally conscious and cost-effective ways to transport goods, waterway freight movements continue to be a stable form of transporting goods. Tennessee's prime access to one of the largest inland waterway systems makes the state ripe for economic development as industries can use this natural resource to provide a near seamless link in their supply chains. While this valuable resource is at TDOT's fingertips, there are many maintenance issues that have recently become of utmost importance that will need to be addressed to keep the navigable waterways functioning (e.g. locks, dams, ports, etc.). In order to use this resource to the fullest potential, continued degradation of these facilities will likely necessitate major investments.

Air

Air transport is a vital component of Tennessee's freight system as it offers reliability and speed that other modes cannot. Additionally, two of Tennessee's airports offer opportunities for international freight movements. While air cargo is critical to the state's consumption and production of goods, airports generate unique impacts on surrounding land uses and the transportation system. Specifically, TDOT must be able to plan for and accommodate traffic generated around and through the airports to facilitate the efficient movement of people and goods.

Pipeline

The pipeline network within Tennessee is crucial to the transport of a few commodities, but primarily natural gas. This method of transport is important particularly for energy sources that are needed 24 hours a day, 365 days a year, as it is one of the most reliable forms of transporting similar goods. Natural gas markets and distributions will likely change as new fields are developed across North America. The transportation of these goods will need to respond accordingly.

In conclusion, the following is a brief summary of findings of existing plans, policies, and programs, future growth, trends, and technology related to the multimodal freight environment in Tennessee.

- Key freight industry sectors account for nearly 40% of Tennessee's total gross domestic product (GDP).
- Freight movement to, through, and within Tennessee is highly influenced by freight industries and their specific supply chains.
- Freight industry employment has seen positive gains in the number of jobs since rebounding from the global recession of 2009.
- Truck flow data shows that freight from Memphis and Nashville can reach many major domestic markets and coastal ports across the U.S., as well as international destinations, in less than 3 days' time.
- Tennessee ranks 20th for total freight tonnage movement (inbound and outbound) by state, while the state ranks 13th for the value of freight moved.
- The majority of inbound and outbound freight tonnage in Tennessee moves by truck.
- In Tennessee, slower truck speeds, which are often due to congestion, occur primarily in and around major metropolitan areas.
- Freight planning in Tennessee over the last 10 years has been inclusive with major modal plans (highway, rail, aviation, and waterway) being completed during that time, as do many of its peers
- A majority of Tennessee's surrounding and peers states have taken a corridor-focused approach to freight movement.
- In 2013, TDOT established a Freight Advisory Committee (FAC) with the goal of increasing public and private sector dialog on goods freight movement.
- Much like Tennessee, surrounding and peer states are either working on a statewide freight plan and/or are initiating such a study.
- Many of Tennessee's surrounding and peer states, relative to freight movements, give consideration to land use and the environment.

5.2 RECOMMENDATIONS

TDOT's Statewide Multimodal Freight Plan contains a comprehensive set of recommendations including both policies and projects. Since the Plan evaluates Tennessee's freight transportation needs more closely, the following is a smaller set of recommendations, which are consistent with the direction of that Plan. In conclusion, the following recommendations are proposed as they relate

to the multimodal freight environment in Tennessee.

- Regardless of the modes, greater consideration should be given to freight movements in reaffirming/identifying Tennessee's Strategic Corridors.
- In addition to roadways, Tennessee's Strategic Corridors should include rail, water, air, and intermodal facilities.
- TDOT should support a program for multimodal freight investments (e.g., first mile/last mile connections-air, water, rail; bottlenecks; safety; ITS; truck parking; etc.) in the 3-Year Plan.
- TDOT should support the expansion of the State Industrial Access (SIA) Program to allow for other transportation improvements (e.g., rail spurs to industrial sites).
- TDOT should have staff and technical resources to assist communities and freight partners with freight planning, land use and freight, and impacts of freight (e.g., quiet zones, idling restrictions, airport/land use compatibility, etc.).
- TDOT should revamp its current shortline program to prioritize connectivity and economic development potential.
- TDOT should continue to make available the latest planning data and tools and provide these resources to its many planning partners (e.g., MPOs, RPOs, ECD, etc.).
- TDOT should continue to work through Tennessee's Freight Advisory Committees and local communities to increase knowledge of and efficiencies in freight movements in Tennessee.
- TDOT should encourage the formation of public ports and intermodal facilities to support economic development.