SETTS
Southeast Trade and Transportation Study

Institute for Trade and Transportation Studies

SOUTHEAST TRADE AND TRANSPORTATION STUDY

Phase 2 : Final Report

EXECUTIVE SUMMARY

SOUTHEAST TRADE AND TRANSPORTATION STUDY

Phase 2: Final Report Executive Summary

Departments of Transportation

Arkansas Department of Transportation

Florida Department of Transportation

Georgia Department of Transportation

Kentucky Transportation Cabinet

Louisiana Department of Transportation and Development

Mississippi Department of Transportation

Missouri Department of Transportation

South Carolina Department of Transportation

Texas Department of Transportation

Virginia Department of Transportation

Steering Committee

Arkansas Department of Transportation

Georgia Department of Transportation

Texas Department of Transportation

Virginia Department of Transportation

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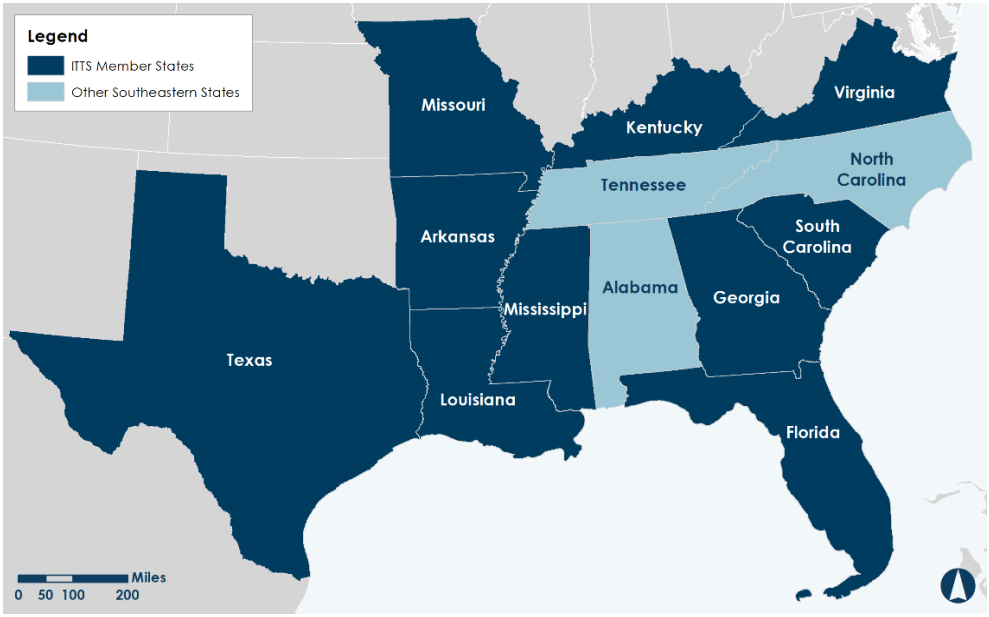
Plan Purpose and Overview

In 2001, the Institute for Trade and Transportation Studies (ITTS) updated the 1996 Latin America Trade and Transportation Study (LATTS). The timing of the report came amid increased trade with Mexico seven years after the North American Free Trade Agreement (NAFTA) went into effect in 1994. By 2000, ships were being built that could not pass through the Panama Canal and discussion about its expansion had begun. The purpose of 2001 LATTS was to "evaluate opportunities for trade with Latin America, and to determine transportation infrastructure investment needs for the Alliance to capitalize on such trade."

The ITTS region once again faces a period of change and opportunity. Among other developments, the NAFTA has been replaced by the United States-Mexico-Canada Agreement (USMCA), advances in motor vehicle and communications technologies have opened new opportunities for addressing transportation challenges, changes in manufacturing and logistics practices have impacted land use and freight traffic patterns, and a global pandemic has transformed the way the supply chains are structured and managed. Phase I of the Southeast Trade and Transportation Study (SETTS) advanced the profile of the region in updating current economic, industry, modal, and network data to set the stage for research on future regional opportunities in prioritization, funding, and planning. SETTS Phase II examined current and future freight and trade conditions for the ITTS and revisits a central question of ITTS's 2001 Latin America Trade and Transportation Study (LATTS): how can the region position itself to take advantage of emerging economic opportunities and protect its existing freight and trade advantages?

FIGURE 1 ITTS MEMBER STATES AND OTHER SOUTHEASTERN STATES



The Fixing America's Surface Transportation (FAST) Act established a national multimodal freight policy and required that U.S. DOT develop a National Freight Strategic Plan (NFSP) to implement the goals of the national policy. The NFSP serves to guide national freight policy, programs, initiatives, and investments; inform State freight plans; identify freight data and research needs; and provide a framework for increased cross-sector, multijurisdictional, and multimodal coordination and partnerships. To this end, the NFSP defined USDOT's vision and goals for the national multimodal freight system, assessed the conditions and performance of the freight system and barriers to freight system performance, and defined strategies to achieve its vision and goals.

The goals and objectives of the NFSP are the foundation for the SETTS Phase II goals. The goals and objectives presented in Table 1 follow the same three major goal areas established in the NFSP: Safety, Infrastructure, and Innovation.

TABLE 1 SETTS PHASE II GOALS AND OBJECTIVES

Goal	Strategic Objectives
Safety—Improve the safety, security, and resilience of the ITTS Multimodal Freight Network (MFN).	• Support the development and adoption of automation, connectivity, and other freight safety technologies. • Reduce the rate and severity of crashes involving freight vehicles. • Support the development of safe and secure truck parking facilities. • Protect the ITTS MFN from natural and human-caused disasters and improve system resilience and recovery speed.
Infrastructure—Modernize infrastructure and enhance operations on the ITTS MFN to support supply chains, grow domestic and global trade, increase competitiveness, and improve the quality of life for the ITTS region.	• Maintain and improve bridges on the ITTS MFN. • Maintain and improve pavements on the ITTS MFN. • Modernize the ITTS MFN to ensure it operates efficiently and will meet the needs of future freight movements. • Reduce congestion and delay on the ITTS MFN. • Increase travel time reliability on the ITTS MFN. • Support projects and initiatives that increase intermodal connectivity on the ITTS MFN and that enhances freight flows across supply chains. • Support freight-related job growth and economic competitiveness in the ITTS region. • Minimize, mitigate, or eliminate adverse freight-related impacts on historically disadvantaged communities. • Reduce the environmental impacts (including emissions, flooding, stormwater runoff, and wildlife habitat loss) of building, maintaining, and operating the ITTS MFN.
Innovation—Prepare for the future by supporting the development of data, technologies, and tools that improve freight system performance and aid member states' planning and funding efforts.	• Support the development and deployment of advanced transportation technologies (including intelligent transportation systems, vehicle automation, and vehicle and infrastructure connectivity) on the ITTS MFN. • Support the development and deployment of innovative operational strategies that improve the safety and efficiency of freight movement on the ITTS MFN. • Improve the quality and breadth of freight data, modeling, and analytical tools and resources available to member states.

Source: Cambridge Systematics, Inc.

2 Freight-Intensive Industries and Supply Chains

Freight-intensive industries are those that are major producers and/or consumers of goods in the ITTS region, or industries that provide either storage or carry services for freight production and freight attractions in the region. They include industries such as agriculture, manufacturing, and transportation and warehousing, among others. SETTS Phase II found that there are multiple clusters of freight-intensive industries throughout the ITTS region that offer an opportunity for economic growth. Identifying these industry clusters provides a basis for understanding the freight transportation needs associated with these sectors and the types of investments needed to support growth. Potentially, investments that support the supply chains on which these industries rely would help the region to improve its competitive position and reap the associated economic benefits (e.g., jobs, tax revenue).

2.1 Key Freight-Intensive Industries

Key freight-intensive industries were identified using two analytical techniques: location quotient (LQ) analysis and shift-share (SS). Both techniques rely on employment data to estimate the concentration of freight-intensive industry clusters in the ITTS region, how those concentrations have changed over time, and how they compare to national performance. The information derived from these analytical techniques indicates how the region's competitive position for each freight-intensive industry cluster has changed over time.

The results of the LQ and SS analyses were combined through industry classifications to offer a quick synopsis of individual industries, which is categorized in a matrix. Table 2 presents the ITTS region freight-intensive industry classification. The results indicate the following:

- **Opportunity Industries (17 out of 35)**

  Opportunity industries are those that are relatively less concentrated regionally as compared to the U.S. but have grown at a faster rate. They have an LQ less than 1.0, and a competitive share greater than zero. As a result, they may have greater potential for economic development efforts. Examples include Pharmaceutical and Medicine Manufacturing, Other Transportation Equipment Manufacturing, Motor Vehicle Parts Manufacturing, and Medical Equipment and Supplies Manufacturing, among others.

- **Strong Industries (12 out of 35)**

  Strong industries are those that are more concentrated in the ITTS region than in the U.S., yet still managed to grow faster at the regional level than the national level. They have an LQ greater than 1.0, and a competitive share greater than zero. These represent existing clusters with potential to grow and further strengthen the region's competitive position. Examples include Motor Vehicle Manufacturing and Chemical Manufacturing (except Pharmaceutical and Medicine).

- **Weaker Industries (4 out of 35)**

  Weaker industries are less concentrated within the ITTS region relative to the national level and have experienced less growth according to national-level indicators when conducting as implied by the SS analysis. They have an LQ less than 1.0, and a competitive share less than zero. As a result, the region's competitive position for these industries is not as strong as other locations' in the U.S. Examples include Crop Production, Animal Production and Aquaculture, Food Manufacturing, and Beverage and Tobacco Product Manufacturing, among others.

- **Threatened Industries (2 out of 35)**

  Threatened industries define activities that are more concentrated regionally than at the national level but have grown less than expected by national-level factors as indicated by the SS results. They have an LQ greater than 1.0 and a competitive share less than zero. This industry might be considered at risk with potentially damaging impacts to the regional economy. Examples of threatened industries for the ITTS region include Ship and Boat Building and Petroleum and Coal Products Manufacturing.

TABLE 2 ITTS REGION FREIGHT-INTENSIVE INDUSTRY CLASSIFICATION BASED ON THE RESULTS FROM THE LQ AND SS ANALYSES COMPARED TO THE U.S., 2012-2022

Opportunity Industries	Strong Industries
• Pharmaceutical and Medicine Manufacturing • Apparel Manufacturing • Other Transportation Equipment Manufacturing • Miscellaneous Manufacturing (except Medical Equipment and Supplies) • Motor Vehicle Parts Manufacturing • Medical Equipment and Supplies Manufacturing • Primary Metal Manufacturing • Aerospace Product and Parts Manufacturing • Electrical Equipment, Appliance, and Component Manufacturing • Plastics and Rubber Products Manufacturing • Computer and Electronic Product Manufacturing • Fabricated Metal Product Manufacturing • Furniture and Related Product Manufacturing • Motor Vehicle Body and Trailer Manufacturing • Machinery Manufacturing • Printing and Related Support Activities • Railroad Rolling Stock Manufacturing	• Motor Vehicle Manufacturing • Leather and Allied Product Manufacturing • Forestry and Logging • Nonmetallic Mineral Product Manufacturing • Chemical Manufacturing (except Pharmaceutical and Medicine) • Paper Manufacturing • Support Activities for Mining • Textile Mills • Wood Product Manufacturing • Textile Product Mills • Oil and Gas Extraction • Construction
Weaker Industries	**Threatened Industries**
• Animal Production and Aquaculture • Food Manufacturing • Beverage and Tobacco Product Manufacturing • Crop Production	• Petroleum and Coal Products Manufacturing • Ship and Boat Building

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages; Cambridge Systematics.

2.2 Key Freight-Intensive Industry Supply Chains

The results of the freight industry concentration and growth analysis indicated that there are multiple industries on which the ITTS region may choose to focus when considering strategies for strengthening its trade position. To that end, a supply chains analysis was conducted for a selection of freight-intensive industries. The analysis was performed with an eye towards supporting opportunities for increasing the region's trade in goods related to those supply chains.

For each industry listed below, the supply chains analysis examined the flow of commodities associated with those industries along with clusters of businesses within the industry sector (see Figure 2); it created conceptual diagrams of the key links and nodes that comprise the supply chains (see Figure 3); and, the analysis investigated the "freight fluidity" of the supply chains using the travel time performance (e.g., delay) of critical Interstate highway routes (see Figure 4). "Freight fluidity" is a broad term referring to the characteristics of a multi-modal freight network in a geographic area of interest, where any number of specific modal data elements and performance measures are used to describe the network performance (including costs and resiliency) and quantity of freight moved (including commodity value) to inform decision-making.[1] Corridors that are able to transport relatively high volumes of freight and exhibit good network performance are more "fluid" than those that transport comparatively lower volumes of freight and exhibit poor network performance.

- **Food Manufacturing—**Businesses in the food manufacturing industries subsector transform livestock and agricultural products into products for intermediate or final consumption.[2] The food manufacturing sector is important for economic development across the ITTS region. Data from the Bureau of Labor Statistics indicates that there were over 423,000 jobs in the food manufacturing sector in the ITTS region in 2022.
- **Plastics and Rubber Manufacturing—**The plastics and rubber products manufacturing industry make goods by processing plastics materials and raw rubber.[3] In the ITTS region, the plastics and rubber products manufacturing industry was responsible for over 184,000 jobs in 2022.
- **Motor Vehicle Manufacturing—**The motor vehicle manufacturing industry produces vehicles for the transport of people and goods. Because the automotive industry is generally associated with large numbers of high-wage jobs, the motor vehicle manufacturing industry is often a targeted industry for many states' economic development agencies. Multiple ITTS and southeastern states are home to motor vehicle assembly plants and networks of parts suppliers for those plants. In the ITTS region, the motor vehicle manufacturing industry was responsible for over 239,000 jobs in 2022.
- **Pharmaceutical and Medicine Manufacturing—**Pharmaceutical and medicine manufacturing consists of establishments primarily engaged in manufacturing biological and medical products, processing or isolating active medical principles from botanical drugs and herbs, or manufacturing pharmaceutical

[1] https://cattworks.org/projects/freight-fluidity/

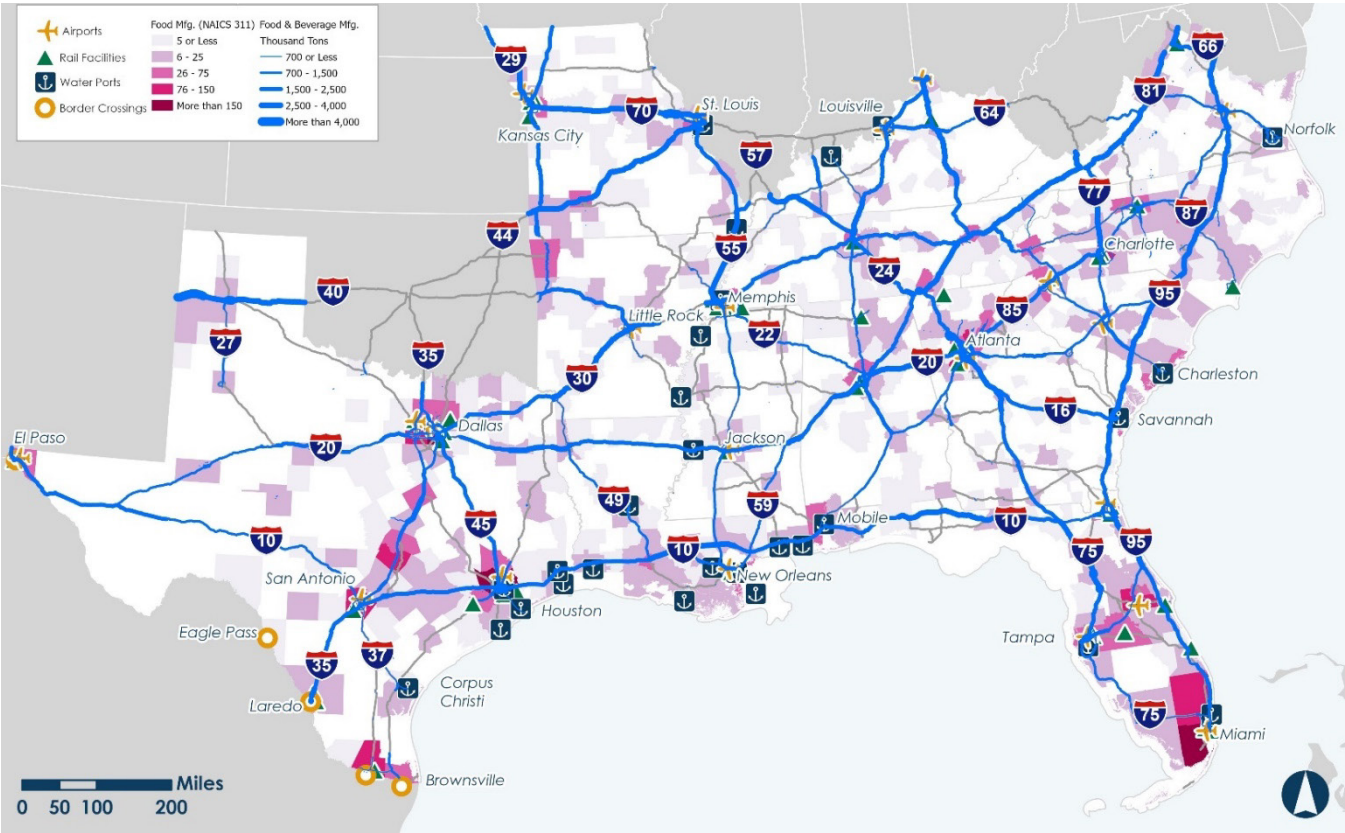
[2] https://www.bls.gov/iag/tgs/iag311.htm

[3] https://www.bls.gov/iag/tgs/iag326.htm

products intended for consumption.[4] In the ITTS region, the pharmaceutical and medicine manufacturing industry provided over 48,500 jobs in 2022.

- **Aerospace Product and Parts Manufacturing—**Businesses in the aerospace product and parts manufacturing industry manufacture aircraft, aircraft components (including engines), spacecraft, and missiles.[5] Across the ITTS region, businesses in this industry sector were responsible for over 134,000 jobs in 2022.
- **Computer and Electronic Product Manufacturing—**Businesses in the computer and electronic product manufacturing industry sector manufacture computers, computer peripherals, communications equipment, and similar electronic products, and they produce components for such products.[6] In the ITTS region, businesses in the computer and electronic product manufacturing industry sector provided over 197,000 jobs in 2022.

FIGURE 2 FOOD MANUFACTURING BUSINESSES AND FOOD AND BEVERAGE COMMODITY FLOWS, 2022



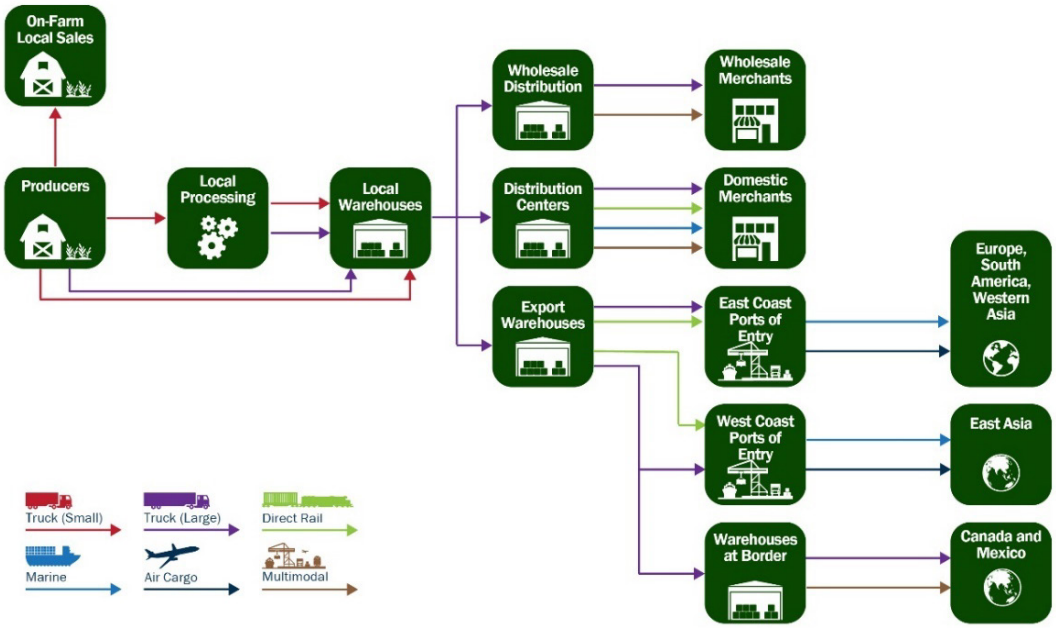
Source: Federal Highway Administration, Freight Analysis Framework version 5.5.1; U.S. Census Bureau, County Business Patterns; Cambridge Systematics.

[4] https://www.epa.gov/regulatory-information-sector/pharmaceutical-and-medicine-manufacturing-sector-naics-3254

[5] https://comptroller.texas.gov/economy/economic-data/manufacturing/2016/naics3364-3369-aerospace.php

[6] https://www.bls.gov/iag/tgs/iag334.htm

FIGURE 3 FOOD MANUFACTURING BLOCK DIAGRAM



Source: WSP Global.

FIGURE 4 FOOD MANUFACTURING SUPPLY CHAIN FLUIDITY—DELAY

Source: National Performance Management Research Data Set; Texas A&M Transportation Institute; WSP Global; Cambridge Systematics.

Table 3 summarizes the findings of the supply chain analysis. It lists the key nodes and freight modes that comprise each supply chain. It also highlights the critical infrastructure and challenges of each supply chain within the ITTS region.

TABLE 3 SUMMARY OF KEY INDUSTRY SUPPLY CHAIN CHALLENGES

Industry	Key Supply Chain Nodes (Freight Modes)	Supply Chain Fluidity, Critical Infrastructure, and Challenges
Food Manufacturing	• Farms (Truck) • Local Processing Facilities (Truck) • Local Warehouses (Truck) • Wholesale Distribution, Distribution Centers, or Export Warehouses (Truck) • Wholesale (Truck and Multimodal) or Domestic Merchants (Truck, Multimodal, Direct Rail, and Marine) • East and West Coast Ports of Entry (Rail or Truck), or Warehouses at Border Points of Entry (Truck)	• **I-75 between Atlanta and Knoxville.** Up to 5.9 million tons of food and beverage related commodities are transported annually along the I-75 corridor. Both travel time reliability and delay are elevated on this corridor indicating less supply chain fluidity. • **I-95 between Jacksonville and Washington, D.C.** Portions of this corridor carry over 4 million tons of food and beverage related commodities annually. • **I-10 between San Antonio and New Orleans.** Much of I-10 through Texas has relatively high buffer time index and delay values, indicating worse performance. This corridor carries 1.2 to 3.6 million tons of food manufacturing-related goods on an annual basis. • **I-44 in Missouri.** Over 5.5 million tons of food and beverage related commodities are transported annually along the I-44 corridor. It links food manufacturing hubs in Missouri (i.e., St. Louis and Joplin areas) to those in Arkansas (e.g., Bentonville and Fayetteville). • **I-81 between Knoxville and Virginia State Line.** The I-81 corridor is one of the busiest corridors for food manufacturing related goods. Over 7.5 million tons of food manufacturing-related goods are transported annually on this corridor. It connects food manufacturing hubs in western ITTS states (i.e., Mississippi, Arkansas, Louisiana, and Texas) with large consumer markets in the Mid-Atlantic and Northeast.
Plastics and Rubber Manufacturing	• Oil Refineries (Pipeline, Truck, and Marine) • Gas Processing and Crackers (Pipeline, Truck, and Marine) • Converters and Chemical Plants (Pipeline, Truck, and Marine) • Pellet Bagging Facilities (Truck and Marine) • Product Factories (Truck, Direct Rail, Intermodal Rail, and Marine) • Seaport (Marine, Intermodal Rail, and Truck) • Warehouses at Border Points of Entry (Intermodal Rail and Truck)	• **I-10 between Houston and New Orleans.** This segment handles approximately 10 million tons of chemical products annually. The surrounding area is home to most of the nation's refining capacity, and private terminals handle additional input materials outside of reported marine port data. This segment of I-10 is the least reliable of the I-10 corridor, with a buffer time index between 12–14 percent. • **I-40 between Knoxville and Arkansas-Oklahoma State Line.** Over 10 million tons of consumer products—the outputs of the plastics and rubber supply chain are transported on I-40 in Arkansas and Tennessee. • **I-81 between Knoxville and Virginia-Maryland State Line.** Nearly 13 million tons of consumer products are transported on I-81 in Virginia annually. • **I-65 in Tennessee and Kentucky.** Nearly 12 million tons of consumer products are transported by I-65 in Kentucky, and more than 7.5 million tons are transported by I-65 in Tennessee. These two states are critical distribution points for the southeast and the nation due to the location of the UPS Worldport in Louisville.

Industry	Key Supply Chain Nodes (Freight Modes)	Supply Chain Fluidity, Critical Infrastructure, and Challenges
Motor Vehicle Manufacturing	*Vehicle Parts* • Domestic and International Tier 3 Suppliers (Air, Marine Truck, Direct Rail, and Intermodal Rail) • Domestic and International Tier 1 and 2 Suppliers (Air, Marine, Truck, Direct Rail, and Intermodal Rail) • U.S.-Canada and U.S.-Mexico Borders (Truck, Direct Rail, and Intermodal Rail) • International and Domestic Original Equipment Manufacturers (OEMs) (Truck, Direct Rail, and Intermodal Rail) *Vehicle Assembly* • Domestic and International Tier 1 and 2 Suppliers (Air, Marine, Truck, Direct Rail, and Intermodal Rail) • U.S.-Canada and U.S.-Mexico Borders (Truck, Direct Rail, and Intermodal Rail) • Domestic OEMs (Truck, Direct Rail, and Intermodal Rail) • Domestic and International Dealerships (Direct Rail and Truck)	• **I-35, I-35W, and I-35E in Texas and Missouri.** Nearly 4 million tons of motor vehicle related commodities are transported annually along this corridor. There are motor vehicle assembly plants near these routes in Austin, Arlington, San Antonio TX, and Kansas City, KS. • **I-30 in Texas and Arkansas.** Nearly 3.4 million tons of motor vehicle related commodities are transported annually along the I-30 corridor. • **I-65 from Alabama to Kentucky.** This route carries 3.7 million tons of motor vehicle related commodities. I-65 serves a significant number of automobile manufacturing plants, including those in Madison, Lincoln, Vance, and Montgomery, AL, in Spring Hill, TN, and in Bowling Green and Louisville, KY. • **I-75 between central Florida and Chattanooga, TN, and on to Knoxville, TN.** Over 4 million tons of motor vehicle related commodities are transported annually along the I-75 corridor. I-75 has significant delay in Tennessee, with more than 15 minutes of delay per 100 miles of travels, and it is one of the least reliable segments in the region.
Pharmaceutical and Medicine Manufacturing	• International and Domestic Active Pharmaceutical Ingredient (API) Suppliers (Truck, Intermodal Rail, Multimodal, Air, Marine) • Manufacturing and Packaging Facilities (Truck, Multimodal, Air, and Marine) • International and Domestic Wholesale and Repackaging (Truck and Multimodal)	• **I-10 between Texas and Louisiana.** The I-10 corridor moves nearly 9.7 million tons of chemical and pharmaceutical commodities. This stretch of I-10 between San Antonio, TX and New Orleans, LA is also highly congested, with an average delay of nearly nine minutes per 100 miles. • **I-45 in Texas.** Between Houston and Dallas, I-45 moves nearly 7.8 million tons of chemical and pharmaceutical commodities, placing it in the top three corridors by volume for this commodity type. • **I-610 in Texas.** The I-610 corridor in Houston carries the majority of tonnage, over 16 million tons, for chemical and pharmaceutical manufacturing commodities in the region.

Industry	Key Supply Chain Nodes (Freight Modes)	Supply Chain Fluidity, Critical Infrastructure, and Challenges
Aerospace Products and Parts Manufacturing	• International Suppliers (Air and Marine) • Domestic Suppliers (Truck) • Domestic Manufacturers (Truck and Air)	• **I-40 in Texas and Arkansas.** I-40 carries as much as 2.5 million tons of high-tech goods with the greatest concentration in Texas and Arkansas. • **I-10 in Texas.** The I-10 corridor in Texas handles approximately 2.3 million tons of high-tech products annually. This segment is the least reliable segment of I-10 and one of the least reliable segments analyzed (11 percent buffer time). Average delay per 100 miles on this segment is nearly 9 minutes, slightly above average for the corridors analyzed. • **I-44 in Missouri.** Over 2.1 million tons of high-tech goods travel on I-44 in Missouri annually. • **I-35 between Laredo and San Antonio.** Over 2 million tons of high-tech goods are transported annually on I-35.
Computer and Electronic Product Manufacturing	• Regional Vendor Management Warehouse (Air, Marine, and Truck) • Factory or Foundry (Air and Truck) • Domestic Assembly, Packaging, and Testing (Air and Truck)	• **I-40 in Texas and Arkansas.** I-40 carries as much as 2.5 million tons of high-tech goods with the greatest concentration in Texas and Arkansas. • **I-10 in Texas.** The I-10 corridor in Texas handles approximately 2.3 million tons of high-tech products annually. This segment is the least reliable segment of I-10 and one of the least reliable segments analyzed (11 percent buffer time). Average delay per 100 miles on this segment is nearly 9 minutes, slightly above average for the corridors analyzed. • **I-44 in Missouri.** Over 2.1 million tons of high-tech goods travel on I-44 in Missouri annually. • **I-35 between Laredo and San Antonio.** Over 2 million tons of high-tech goods are transported annually on I-35.

Source: WSP Global; Texas A&M Transportation Institute; Cambridge Systematics, Inc.

2.3 Positioning the Region to Grow

A key finding from SETTS Phase II was that there are multiple opportunities for the region to position itself for growth through the support and enhancement—through investments in operations, infrastructure conditions, capacity, and regional coordination—of the supply chains. Those findings are summarized in the subsections below.

2.3.1 Food Manufacturing

Food manufacturing and related industries, namely agriculture, are some of the largest industries across the ITTS region. As a result, the transport of food and farm goods over the multimodal freight network is essential to the economies of multiple ITTS member states. The perishability of farm and food manufacturing products makes them particularly sensitive to travel time delays and unreliability. Globally, about 14 percent of the world's food (valued at more than $14 billion) is lost between harvest and the retail market.[7] Highway links providing access to critical food and agricultural trade gateways—such as the Ports of Houston, New Orleans, Savannah, and Virginia—experience relatively high levels of delay and unreliability. Strategies that are focused on reducing the risks associated with the harvest-to-gateway link in the supply chain could help to improve the region's competitive position. While reducing highway travel time delays would be a key component of such a strategy, improving access to alternative modes would also be an important factor. For example, railroads carry more than 60,000 carloads of food and agriculture products per week. This includes fresh fruits and vegetables, meat, and poultry transported via refrigerated rail cars. Rail could serve as an alternative mode for the ITTS region's food manufacturing industry with improved access.

2.3.2 Plastics and Rubber Manufacturing

The plastics and rubber supply chain is integrated deeply with the oil and gas industries as byproducts of oil and gas refining serve as the base inputs of plastic and synthetic rubber products. This implies that addressing transportation challenges on the components of the region's multimodal freight network that connect to its oil and gas producing states and the metropolitan regions in which plastics/rubber manufacturing is concentrated—the Texas Triangle (i.e., Austin, Houston, Dallas-Ft. Worth, San Antonio), Central Florida (i.e., Tampa and Orlando), Miami-Ft. Lauderdale, Metro Atlanta, Greenville-Spartanburg, and Metro Charlotte—are critical for positioning the region for growth.

Some transportation issues impacting the plastics/rubber industry and the ITTS region include the following:[8]

- **Captive Rail.** Rail is a key component of the plastics/rubber supply chain, particularly for exports. Plastics/rubber rely on rail for a significant portion of its supply chain due to the bulk nature of the product. As a result, any increases in rail rates increase the cost of exporting plastic resin.

[7] Food loss and waste | Nutrition | Food and Agriculture Organization of the United Nations (fao.org)

[8] Prozzi, J. and M. Kenney. *Moving Texas Exports: Examining the role of transportation in the plastic resin export supply chain*. March 2016. https://static.tti.tamu.edu/tti.tamu.edu/documents/TTI-2016-5.pdf

- **Rail Capacity.** Related to the challenge of plastics/rubber reliance on rail, these commodities are also sensitive to rail capacity shortages. Strategic investments in sidings and yard capacity can mitigate this challenge.

- **Trucking Challenges. Labor, Overweight/Oversize Regulations, and Last-Mile Congestion.** Despite its dependence on rail, a significant share of plastics/rubber commodities are moved by truck. The trucking industry is challenged by high driver turnover and low retention which translates to less service availability for customers (including the plastics/rubber industry) at higher rates. Additionally, plastics/rubber commodities are exposed to the same types of last-mile challenges as other goods—including at-grade rail crossings, commuter congestion, and others. The identification and development of multi-state heavy-haul corridors where trucks may exceed federal gross vehicle weight limits is one option for improving the fluidity of this supply chain and positioning the region for growth. Also, member states can further position the region for growth by improving operations at at-grade rail crossings (and where possible separating highway-rail crossings) along corridors that provide access to ports.

- **Port Capacity.** Several of the member states' ports that handle plastics/rubber exports have experienced significant growth in recent years—including Houston, Freeport, and Savannah, among others. [9,10] Enhancing capacity at the region's ports is essential to improving the fluidity of the plastics/rubber supply chain and positioning the region for growth. For exports, ITTS ports operate at a disadvantage to West Coast ports as those ports have more frequent service to China and other Asian nations which are large consumers of plastics/rubber commodities. Improving capacity at ITTS ports helps to mitigate this disadvantage.

2.3.3 Motor Vehicle Manufacturing

One consideration for increasing the region's competitiveness is generally improving the network level performance across the region's multimodal freight network. The motor vehicle supply chain is very complex and encompasses multiple modes as well as domestic and international suppliers. Because of this, general corridor-level investments that decrease travel times, increase reliability, and improve access to truck parking will improve the fluidity of this supply chain and the economic competitiveness of the region. Particularly, Michigan and Indiana are significant contributors to both inbound and outbound flows of motor vehicles and parts into the ITTS region. This suggests that corridors such as I-65 and I-69 through Kentucky are critical for this trade for the entire ITTS region.

More specific to the motor vehicle manufacturing industry, a unique element of its supply chain is a high-level of integration between manufacturing facilities in Texas and Mexico. Often, partially assembled components cross the Texas-Mexico border multiple times in the binational shared production of motor vehicle parts. As a result, for the ITTS region capacity and operational investments that reduce delays at border crossings would improve the fluidity of this supply chain and regional economic competitiveness.

[9] Ibid.

[10] https://gaports.com/blog/port-of-savannah-doubles-plastic-resin-exports/

2.3.4 Pharmaceutical and Medicine Manufacturing

The vast majority of pharmaceuticals and medicines are transported via truck. Furthermore, they are high-value, time-sensitive goods that in some cases require refrigeration as they are perishable. As such, pharmaceuticals and medicines are particularly sensitive to highway congestion and unreliability. Because of this, strategies to address travel time performance on the region's shared corridors—particularly 1-10, I-45, and I-30—would strengthen its competitiveness for trade in this industry.

2.3.5 Aerospace Product and Parts Manufacturing

The aerospace product and parts manufacturing industry already has a significant and growing presence in multiple ITTS states. For example, Boeing has operations in Missouri and recently expanded operations in the state; in 2023, Gulfstream Aerospace Corporation expanded its operations in Georgia near the Port of Savannah; Lockheed Martin has a production facility in South Carolina. [11,12,13] The highway and rail networks, in particular, are essential to operating the supply chain on which the aerospace product and parts manufacturing relies and facilitating continued growth and investment. Because of this, improvement to multimodal network level performance, including trade gateways, is critical to increasing the region's economic competitiveness. More specifically, the ITTS region will need to ensure sufficient capacity and reliability for the following elements of the multimodal freight network:

- Higher tonnage critical corridors such as I-40 in Texas and Arkansas, I-10 in Texas, I-44 in Missouri, I-30 in Arkansas, and I-81 in Virginia.
- Intermodal rail ramps and intermodal rail mainline corridors and service tracks connecting to manufacturing facilities.
- Seaports, particularly the Ports of Charleston, Savannah, Houston, Freeport, and Galveston as much of the region's export activity for transportation equipment is centered in the States of South Carolina, Georgia, and Texas based on FAF5 data.
- Last-mile truck routes in the metropolitan regions in which aerospace production is clustered—such as Houston, St. Louis, Greenville-Spartanburg, and Savannah.

2.3.6 Computer and Electronic Product Manufacturing

The production of semiconductors, computer components, and other electronics is a significant and expanding sector of the region's economy. It is hastened by the region's growing motor vehicle manufacturing sector, as modern vehicles are increasingly relying on computers and electronics for core functions. The recent

[11] https://ded.mo.gov/press-room/missouri-prepared-support-boeing-st-louis-county-considered-location-18-billion

[12] https://www.gulfstreamnews.com/en/news/?id=dc65881c-4255-497d-ace5-40872af39d1c

[13] https://www.sccommerce.com/industries/aerospace-industry

global shortage in semiconductors illustrates this as the shortage resulted in large-scale disruptions to automotive supply chains.[14]

One strategy to address computer and electronic supply chain challenges is federal and state efforts to reshore the production of semiconductors and other critical components. The CHIPS and Science Act for Research, Development, and Workforce is an example as this initiative, among other goals, seeks to increase the amount of domestically produced semiconductors.[15] While this and similar strategies address production-side supply chain challenges, there is still potential to mitigate challenges on the multimodal freight network that links these production nodes. Specifically, corridors such as I-81 in Virginia, I-30 in Arkansas, and I-40 in Texas are among the busiest highways for transporting high-tech durable goods which include computer and electronics products. Improving network-level performance on these corridors through reducing and improving the reliability of travel times would strengthen the region's competitive position.

Rail intermodal plays a significant role in the computer and electronics supply chain for the ITTS region as a substantial share of these goods are transported via rail. Furthermore, California is among the region's top trading partners for computer and electronics goods. This suggests that in addition to highways, intermodal rail links are critical for this supply chain—especially those mainlines and intermodal terminals providing access to southern California.

[14] https://www.spglobal.com/mobility/en/research-analysis/the-semiconductor-shortage-is-mostly-over-for-the-auto-industry.html

[15] https://www.whitehouse.gov/briefing-room/statements-releases/2024/02/09/fact-sheet-biden-harris-administration-announces-over-5-billion-from-the-chips-and-science-act-for-research-development-and-workforce/

3 NEEDS ASSESSMENT

A critical element of SETTS Phase II was the development of a region-wide needs assessment. The needs assessment described the physical, operational, and policy/regulatory issues that are most significantly affecting the performance and efficiency of the ITTS region's multimodal freight system. It incorporated multi-state condition and performance data available from the member states to develop a comprehensive understanding of needs including current and future capacity constraints, including identifying bottlenecks; asset preservation deficiencies; truck involved crashes; truck parking deficiencies; and connectivity and accessibility gaps.

Overall, the SETTS Phase II needs assessment indicated that safety, bottlenecks, infrastructure conditions, resiliency, multimodal connectivity (including truck parking), and funding are among the region's most pressing needs. Those needs were categorized as modest, moderate, and acute across the ITTS regional freight network as shown in Table 4. However, it should be noted that the ratings presented in in Table 4 are qualitative and are intended to guide future collaborative initiatives on shared concerns across the region. Each ITTS member state has performed its own detailed needs assessment as part of their state freight plans which determine individual state freight investment needs and priorities.

TABLE 4 NEEDS ASSESSMENT

Need or Opportunity	Condition Rating	Discussion
Safety	🟡	Ensuring a safe transportation network for people and goods is central to ITTS's mission. Safety was listed as a need in every ITTS member state's most recent state freight plan. Furthermore, the analysis of fatal truck-involved crash data indicated that the amount of fatal truck crashes has been increasing throughout the region. As a result, safety was identified as a moderate regional priority. Both safety programs and infrastructure improvements can help to improve safety. Areas with high crash rates may coincide with aspects of the road such as curvature, visibility, speeds, pavement conditions, or other factions.
Bottlenecks	🔴	Fast and reliable freight transportation is critical to supply chains. The ability of the ITTS region to support the supply chains that rely on its freight infrastructure has implications economic competitiveness across the region. The need to address congestion and poor reliability was observed across state freight plans for the member states. The ITTS Regional Bottlenecks Assessment for Goods Movement Study found that truck bottlenecks resulted in substantial costs to the region in the form of wasted time and fuel. As a result, needs related to congestion, unreliability, and bottlenecks is an acute freight transportation planning priority for the region.

Need or Opportunity	Condition Rating	Discussion
Infrastructure Conditions	🔴	Poor pavement and bridge conditions can increase delays, increase wear and tear on vehicles, cause damage to goods in transit, and potentially impact safety. Stakeholders recognized aging infrastructure conditions as a threat to the region. Building and maintaining the region's multimodal freight network to a condition that facilitates the efficient movement of goods is an acute regional need.
Resiliency	🟡	Stakeholders observed that portions of the region, especially coastal areas, are susceptible to natural disasters that disrupt supply chains. Hurricanes, flooding, tornadoes, and other weather events have damaged and disrupted the region's multimodal freight network. Several ITTS member states have performed dedicated resiliency studies and/or resiliency analyses as part of their state freight plans further noting the challenges that extreme events pose to the region. Improving the resiliency of the region's freight network is a moderate need.
Multimodal Connectivity and Truck Parking	🟢	Efficient connections between freight modes via multimodal freight facilities (e.g., intermodal rail terminals, ports, bulk transfer terminals, etc.) are critical for supporting supply chains and the economic activity associated with the industries they serve. Stakeholders viewed the region's multimodal network as a strength due to its diversity of freight modes as shippers have multiple modal options available to them for managing their supply chains. Furthermore, the ITTS region's robust network of highways, Class I rail, ports, and other modes also make for a more redundant and thus resilient network. As a result, improving multimodal connectivity is a modest need. Related to multimodal connectivity needs is the need for improved access to truck parking. Increased demand for goods and services along with changes in the Federal Motor Carrier Safety Administration's Hours of Service (HOS) regulations are among several contributing factors to growing truck volumes and the associated need for truck parking. Commercial drivers seeking to comply with HOS regulations may be forced to park in unauthorized locations when authorized parking is unavailable or the location of authorized parking is unknown. This potentially impacts safety for both truck drivers and the traveling public as fatigue is a contributing factor to truck-involved crashes.
Funding	🟢	Funding is an ongoing need for the region as investment needs exceed the financial resources available to address them. The passage of the 2021 Infrastructure Investment and Jobs Act (IIJA), or Bipartisan Infrastructure Law (BIL), substantially increased the amount of transportation funding available to the multimodal freight system both in terms of formula and discretionary dollars. However, funding remains a weakness and represents a modest need.

Source: Cambridge Systematics; Texas A&M Transportation Institute.

🟢 Modest Need

🟡 Moderate Need

🔴 Acute Need

4 Summary

The ITTS region has prospered, in part, due to the economic benefits that stem from its extensive and diverse multimodal freight network. In addition, the region has successfully leveraged its strengths to become a logistics and manufacturing hub. However, this success has also created challenges in the form of freight-induced congestion, safety, and aging infrastructure conditions, among others.

SETTS Phase I was the region's first step to comprehensively address the challenges and opportunities brought by recent and emerging trends and developments at the multi-state level. These include the implementation of United States-Mexico-Canada Agreement (USMCA); new opportunities brought on by freight vehicle, infrastructure, and data technology; the impacts of changes in manufacturing and logistics to land use, transportation, and distribution patterns; and transformations in supply chain practices brought on by a global pandemic. SETTS Phase II took the next step with a focus on freight-related industry growth, understanding the region's role in facilitating key industry supply chains, and the needs associated with supporting supply chains and goods movement generally.

SETTS Phase I made several recommendations for continued collaboration across the ITTS region. The development of SETTS Phase II fulfills one of those recommendations, but several others are still valid. Specifically, as next steps in building upon the findings of the SETTS Phase I and II, ITTS should take the following actions:

- **Identify and Pursue Multi-State Investment Opportunities on Major Highway Trade Corridors—**This recommendation from SETTS Phase I is still relevant and should be pursued. Many states are working collaboratively to make investments on shared corridors to improve freight performance and safety. For example, the I-10 Corridor Coalition (which includes Texas, New Mexico, Arizona, and California) have developed a truck parking availability system along I-10. As noted in the supply chains analysis presented in Section 3 of this report, corridors such as I-20, I-75, I-55, and I-95 carry significant volumes of freight and are shared across multiple ITTS states. The ITTS should identify a set of potential shared corridor investments that would enhance trade opportunities across the region, determine their feasibility and priority for implementation, and encourage its member state DOTs to adopt and pursue the chosen investment. Truck parking should be one of the considered investments as it is a challenge shared across the entire coalition and is amenable to multi-state investment strategies.

- **Identify and Pursue Public-Private Investment Opportunities for Multimodal Assets—**SETTS Phase I found that the region's non-highway freight assets, particularly the rail and waterway networks, carry significant volumes of freight across the region and are essential to supporting supply chains. SETTS Phase II further

confirmed this finding and determined that multimodal connectivity is a pressing need for the region as stakeholders viewed the breadth and efficiency of the region's freight modes as a competitive advantage. As a result, identifying and pursuing public-private investment opportunities to benefit the region is still a relevant recommendation.

- **Identify and Pursue Growth Opportunities for Domestic and Global Trade—**SETTS Phase I quantified the economic contribution of the freight-generating sectors and investigated freight flows associated with those industries. SETTS Phase II identified supply chains that offer an opportunity for the region to increase its share of trade associated with the industries those supply chains support. As a next step, ITTS should identify the actions and investments needed to capture those trade opportunities and define the risks and uncertainty associated with them. For example, as the share of Asia to U.S. trade via west coast ports has been declining, ports throughout the ITTS region can potentially benefit from this share shift given specific port, rail, and other investments. Railroads, port authorities, and other modal operators are key partners to include in identifying the specific strategies, actions, and investments for benefitting the region.

- **Conduct a Supply Chain Resiliency Study—**Both SETTS Phase I and II noted the importance of resiliency to the multimodal freight network. Freight resiliency entails the ability of the multimodal freight network to withstand disruptions with minimal impacts to safety and the economy. As large-scale disruptions to the freight network and associated supply chains have become more common, resiliency has become a much more important component of freight transportation planning. This observation was reflected in ITTS member states' freight plans as supply chain resiliency was a common theme. As a next step, ITTS should perform a supply chain resiliency and risk study that identifies the risks to which the region's key supply chains are exposed, the freight assets that are vulnerable to those risks, and strategies for mitigating those risks and minimizing supply chain disruptions.

Southeast Trade and Transportation Study