SETTS

Southeast Trade and Transportation Study

Institute for Trade and Transportation Studies

SOUTHEAST TRADE AND TRANSPORTATION STUDY

Phase 1: Freight and Trade Profile

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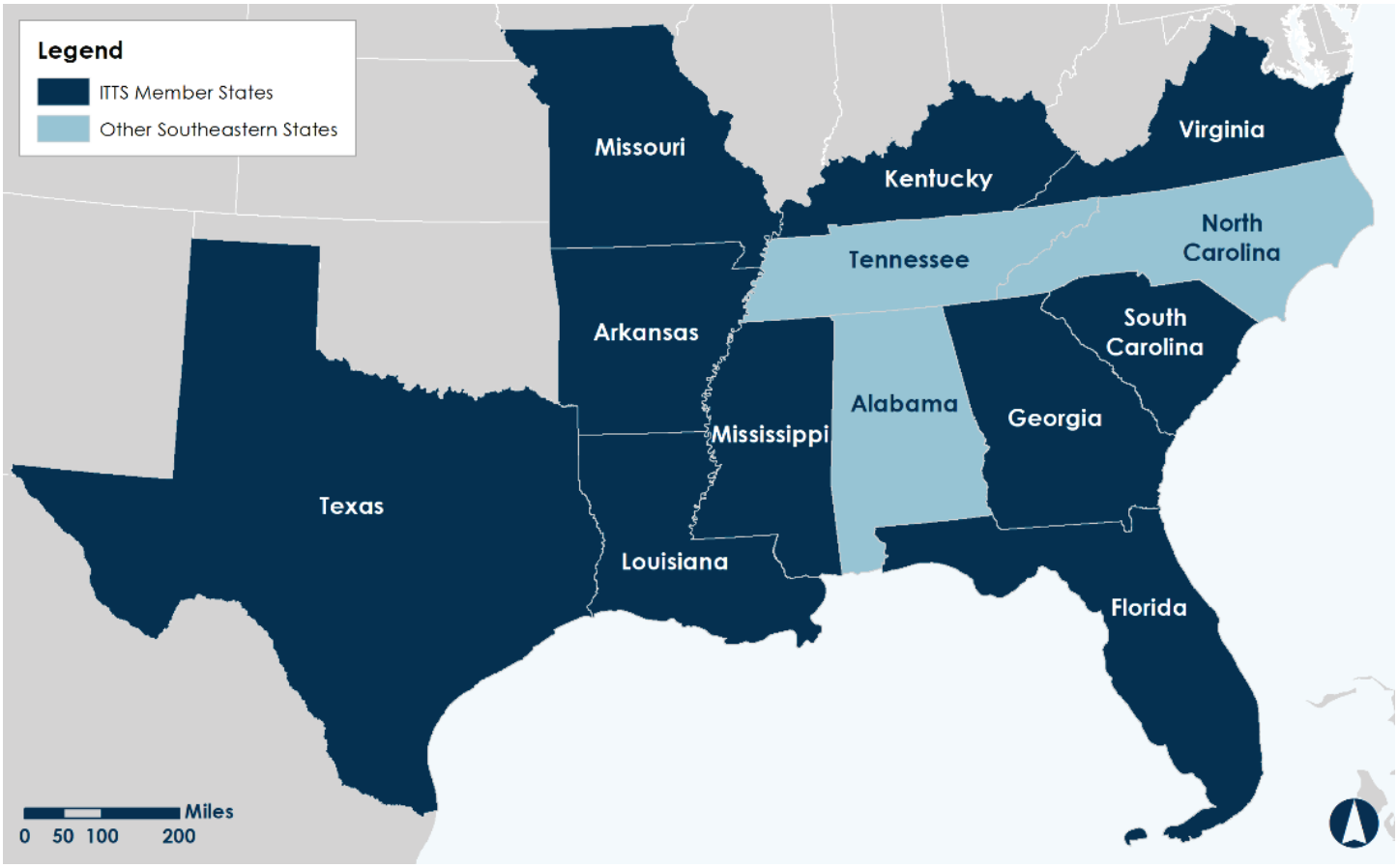
1 INTRODUCTION AND MOTIVATION

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.[1] 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 Among other developments, the NAFTA has been replaced by the United States-Mexico-Canada Agreement (USMCA), advances in motor vehicle and communications technologies have opened new opportunities for addressing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 and structured and managed. Phase I of the Southeast Trade and Transportation Study (SETTS) advances 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.

[1] New York Times. June 22, 2016. "The New Panama Canal: A Risky Bet." https://www.nytimes.com/interactive/2016/06/22/world/americas/panama-canal.html.

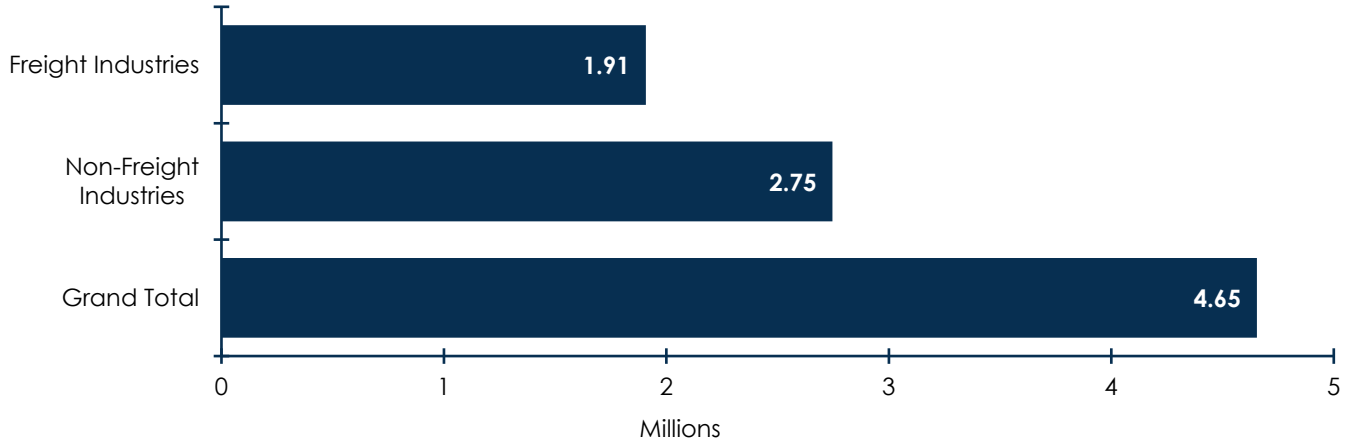
FIGURE 1 ITTS MEMBER STATES AND OTHER SOUTHEASTERN STATES



Source: Institute for Trade and Transportation Studies.

The Phase I SETTS found that in 2019 about 8.3 billion tons of freight worth over $7.6 trillion were transported to, from, or within the ITTS region. International trade accounted for over 1.3 billion tons and nearly $1.7 trillion in value. Exports account for a higher share of tonnage while imports comprise a greater share of value. In addition to investigating domestic and international trade, the 2023 SETTS also considered the economic impact of freight to ITTS member states. In 2020, total gross domestic product (GDP) for ITTS states was $4.65 trillion, of which $1.91 trillion (41 percent) were associated with industries that consume goods, produce goods, or transport goods as shown in Figure 2.

FIGURE 2 GDP ($M) FREIGHT AND NON-FREIGHT, 2020



Source: Analysis of U.S. Bureau of the Census data.

ECONOMIC IMPACT

Railroads, motor carriers, and other freight transportation service providers make a substantial contribution to the economies of ITTS states.

- **2.7 million jobs**
- **$137.3 billion in wages**
- **$206 billion in GDP**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages and Occupational Employment and Wage Statistics; U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; Association of American Railroads, State Data.

Freight transportation service providers such as railroads and motor carriers contribute significantly to the economies of ITTS member states. The freight transportation and logistics sector supports 2.7 million direct jobs. It directly contributes $137 billion of member states' total wages and generates $206 billion in annual GDP.

In addition to freight transportation service providers, freight-generating industry sectors are also important to member states' economies and are drivers of domestic and international trade. Freight-generating sectors include:

- **Agriculture** is an important sector across the coalition and represents one of the top 10 commodities imported and exported in the region.
- **Construction** employs the most workers among freight-generating sectors—over 3.3 million.
- **Energy and Petrochemicals** are the top export of the region, and the sector produces nearly $319 billion in GDP.
- **Manufacturing** represents the largest of freight-generating sector with nearly $413 billion in GDP and over 2.8 million employees.

Shifts in technology, trade, and geopolitics have recast the focus of the 2023 SETTS. The 2023 SETTS is a robust global trade profile of the member states as a trading bloc, with mapping of key supply chains across member states. Like the study in 2001, the timing of this study comes amid a new normal. In this case, the setting includes a diverse set of factors:

- The largest investment in transportation infrastructure in the U.S. through the 2021 Infrastructure Investment and Jobs Act (IIJA), which emphasizes multistate collaboration and compacts.
- E-commerce has transformed the way products are consumed globally.
- Asian nations have emerged as strong trade partners with ITTS states.
- Globalization of manufacturing is finding balance post-COVID when nations re-evaluated their supply chains.
- Technology continues to provide increased visibility of those supply chains, as well as efficiencies within the network.

This study is the first phase of uncovering opportunities for ITTS states to leverage their position in deciding on future investments and collaboration with each other.

2 TRADE TRENDS IN THE ITTS REGION

Economic and transportation conditions are changing rapidly in the ITTS states, the country, and the world at large, particularly in the areas of trade relationships and shifts, technology development and adaptation, and logistics practices including but not limited to the dramatic growth of e-commerce. One of the key investigations in SETTS was the evaluation of three primary trend "themes" that broadly impact trade trends for the member states—Supply and Demand, Transportation Logistics, and Global Factors.

- **Supply and Demand.** Since 2010, the ITTS states have added 10.2 million residents which has impacted the production, consumption, and economic structure of the region. Along with this growth, changing business and consumer practices have altered land use and logistics practices in the region as e-commerce is increasingly a preferred method for consuming goods and services. Climate change and variability is predicted to impact ITTS states' production of goods such as extreme weather interfering with crop and agricultural production and high value goods (such as electronics and machinery) being disrupted by utility outages and employee access issues. Critical transportation infrastructure—roads, rail, airport, and seaport—will be increasingly stressed by extreme temperatures, wind, flooding, and storm surge.

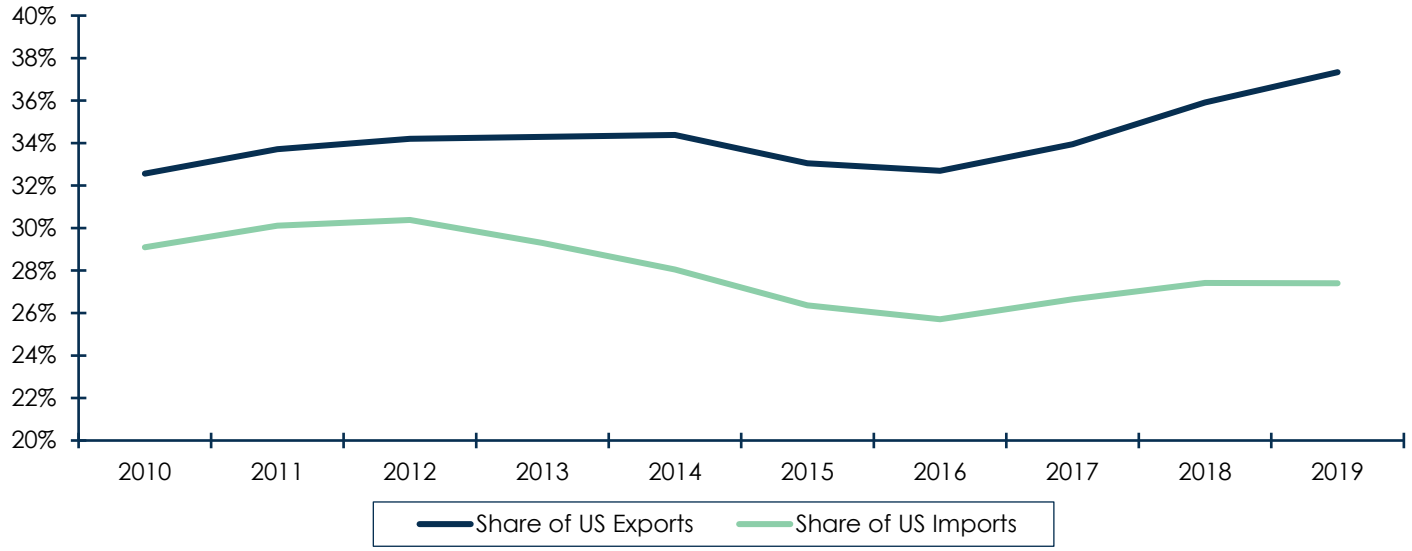
- **Transportation Logistics.** Trends impacting the ITTS region include changing logistics technologies and operations, environmental policy, and changes in modal preference and utilization. Technologies enabling the automation of certain aspects of maritime operations, railroad control systems, trucking, and warehouse operations are changing how the region's multimodal freight network is designed and operated. Regarding environmental policy, clean fuel requirements for ocean vessels and domestic vehicles are likely to generate new types of fuel generation, fueling infrastructure, and transportation facilities. Particularly, vehicle electrification is expected to be widespread and generate significant demand for electric charging infrastructure. Shifts in modal utilization are anticipated to be spurred by higher or lower demand for certain commodities, each of which has an established level of affinity for certain transportation modes. For example, the projected decline in gasoline is expected to come at the expense of trucking modal share as that is the predominant mode for this commodity.

- **Trade Partner and Global Factors.** The ITTS states have established relationships with respect to the commodities they move internally (Within ITTS) and externally to and from other state trading partners. These trading patterns are likely to change in significant ways. Weather, climate, and related factors may increase or decrease the ability of ITTS states to produce certain goods for local consumption and for shipment to other states and countries, impacting their outbound flows of goods and creating new needs to receive inbound goods from other states and countries. Economic and environmental policies in ITTS

states may actively influence market demand, and favor or discourage the production and consumption of certain types of commodities—fuels, building materials, etc. Conditions in trading states may favor or limit their ability to send goods to ITTS states or receive goods from ITTS states.

The balance of imports and exports shows ITTS states at a trade surplus. International trade was 57 percent export and 43 percent import by tonnage, and 55 percent import and 44 percent export by value, based on 2017 data. The value shares are projected to remain relatively stable through 2050, but the tonnage shares are expected to increasingly favor exports (growing from 57 percent to 63 percent), as the region continues to export more higher-weight goods than it imports. Figure 3 shows the proportion of U.S. trade that ITTS represents. Exports are on the rise and imports are on the decline.

FIGURE 3 ITTS SHARE OF U.S. TRADE, 2010–2019



Source: U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Table 1 shows the top 10 import and export commodities in the U.S compared to the ITTS states. Chemicals are in the top spot for exports, compared to third-ranked nationally, and ranks higher as an imported commodity as well. Transportation equipment and computer and electronics are ranked slightly lower than the rest of the nation, but still show strength as a top export for the region. Petroleum and coal products are ranked slightly higher compared to the rest of the nation, indicating the region's leadership in this industry. Agricultural products in the ITTS trading bloc are even with the nation as the seventh-ranked export.

TABLE 1 IMPORT AND EXPORT COMMODITIES, U.S. COMPARED TO ITTS

	All States		ITTS	
Rank	Import	Export	Import	Export
1	Oil & Gas	Transportation Equipment	Oil & Gas	Chemicals
2	Apparel & Accessories	Computer & Electronic Products	Petroleum & Coal Products	Transportation Equipment
3	Petroleum & Coal Products	Chemicals	Chemicals	Computer & Electronic Products
4	Chemicals	Machinery, Except Electrical	Primary Metal Mfg	Petroleum & Coal Products
5	Primary Metal Mfg	Petroleum & Coal Products	Fabricated Metal Products, Nesoi	Machinery, Except Electrical
6	Machinery, Except Electrical	Miscellaneous Manufactured Commodities	Machinery, Except Electrical	Oil & Gas
7	Computer & Electronic Products	Agricultural Products	Computer & Electronic Products	Agricultural Products
8	Electrical Equipment, Appliances & Components	Food & Kindred Products	Electrical Equipment, Appliances & Components	Food & Kindred Products
9	Transportation Equipment	Primary Metal Mfg	Transportation Equipment	Electrical Equipment, Appliances & Components
10	Miscellaneous Manufactured Commodities	Electrical Equipment, Appliances & Components	Miscellaneous Manufactured Commodities	Fabricated Metal Products, Nesoi

Source: U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Future trade relationships and shifts will impact ITTS member states. The United States-Mexico-Canada Agreement (USMCA) became effective in 2020 and modernized the previous North American Free Trade Agreement (NAFTA) signed 25 years earlier. USMCA aims to facilitate trade between the three countries through more coordinated practices and regulations. Mexico and Canada are both important trading partners for the ITTS states, and USMCA practices should help achieve—or possibly exceed—the base projections anticipated by the Freight Analysis Framework. The share of Asia-to-U.S. trade via west coast ports, which has been declining in percentage terms even as the volume of trade has skyrocketed, should continue to decline due to port congestion/capacity and inland transport issues on the west coast. The Port of Savannah has been a primary beneficiary of this growth and share shift. However, other ITTS states have looked to benefit from this effect, first by leveraging the improved vessel-handling dimensions from the Panama Canal expansion, and more recently during the COVID-19 pandemic by offering less-congested alternatives to west coast ports.

China's relationship with Hong Kong, Taiwan, and its other neighbors has been increasingly in question over the past two decades, especially so with recent steps to tighten control over Hong Kong. China's economic interdependence with the U.S. and Europe may dampen impulses to act in overt ways against its neighbors, or

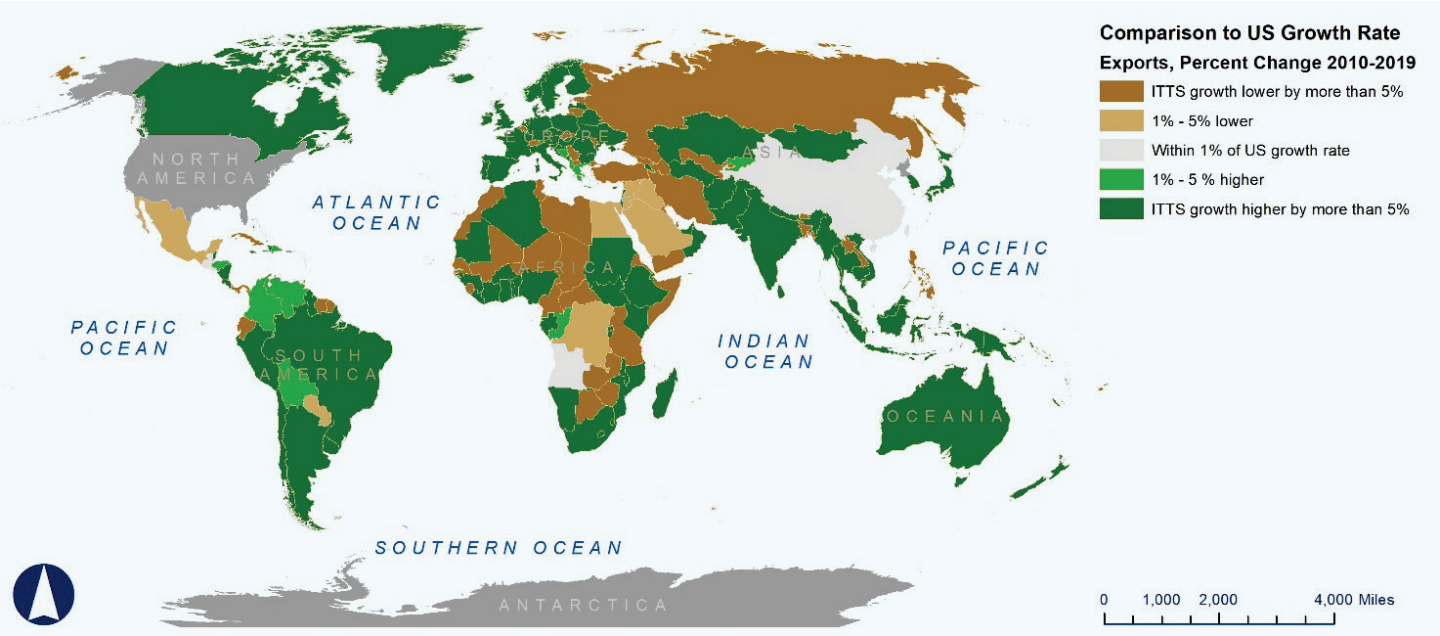
to overtly lend support to Russia's war of annexation against Ukraine. The current unstable situation could also be leveraged by bad actors in other global hotspots such as the Middle East, South America, or Africa.

2.1 Exports

Exports are growing and projected to grow in the region. Figure 4 shows that as a percentage of U.S. trade to a specific region, ITTS is performing above its average (~35 percent) in exports to South America, Central America and Caribbean, Africa, and Asia-South.

- Exports to South America have increased from 57 percent in 2008 to a peak of 66 percent in 2018 landing in 2020 at 65 percent of all US exports to that region.
- Exports to Central America and Caribbean have increased from 57 percent in 2008 to a peak of 65 percent in 2012 and have not dropped below 62 percent since resting at 64 percent in 2020.
- Exports to Africa have fluctuated between a low of 44 percent (2012) to a peak of 53 percent (2014) and rest at 46 percent in 2020.
- Exports to Asia South were at 34 percent in 2008 and have risen to a peak of 44 percent in 2020.

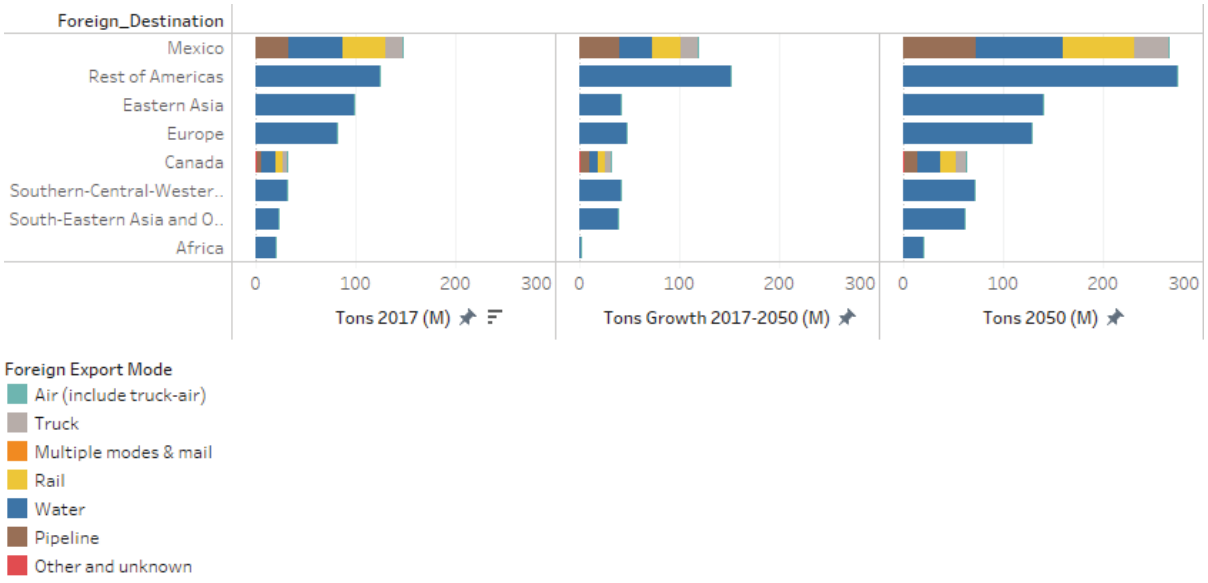
FIGURE 4 ITTS GROWTH RATE IN EXPORTS COMPARED TO U.S., 2010–2019



Source: FHWA, Freight Analysis Framework Version 5.2; Cambridge Systematics, Inc. analysis.

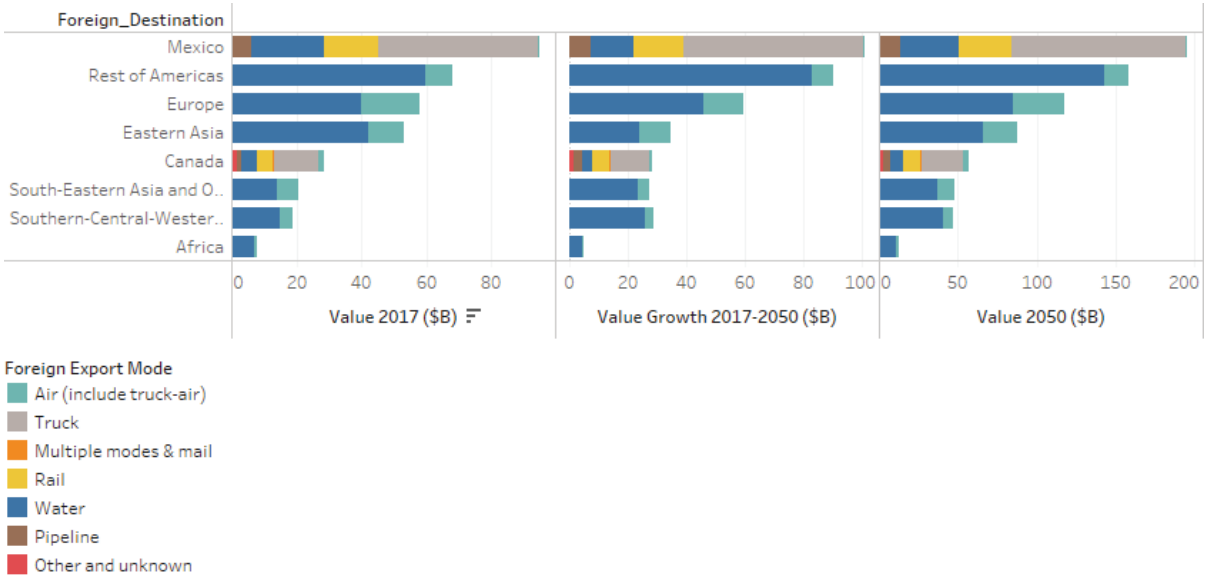
Looking at U.S. exports to Eastern Asia, ITTS member states—which include the largest bulk ports in the U.S.—have a dominant share of tonnage. The "Not ITTS related" share of tonnage exported to Eastern Asia was 33 percent in 2017, and is projected to decline to 30 percent by 2050, meaning the ITTS share will grow from 67 percent to 70 percent. Only 6 percent of this tonnage are exports from other states handled through ITTS states' facilities, so the vast majority of trade tonnage is directly between the ITTS states and Eastern Asia. The "Not ITTS related" states have a leading share of export value in 2017 (57 percent), but this is projected to decline to 50 percent in 2050, meaning the ITTS states share will grow from 43 percent to 50 percent.

FIGURE 5 EXPORTS BY TONNAGE, MODE, AND REGION, 2017–2050



Source: Analysis of U.S. DOT Freight Analysis Framework 5.2.

FIGURE 6 EXPORTS BY VALUE, MODE, AND REGION, 2017–2050



Source: Analysis of U.S. DOT Freight Analysis Framework 5.2.

2.2 Imports

Imports have dramatically declined from several countries from a peak around 2012, the percentage of imports from South America, Asia—Near East, Africa and Central America and Caribbean, have all declined from ~50 percent or more to less than 50 percent in all cases (Figure 7).

- South America has dropped from a peak of 62 percent (2012) to 45 percent in 2020.
- Asia-Near East has dropped from a peak of 61 percent (2012) to 34 percent in 2020.
- Central America and Caribbean has dropped from a peak of 54 percent (2012) to 46 percent in 2020.
- Africa has dropped from a peak 51 percent (2010) to 18 percent in 2020 with the largest drop being from 2019 to 2020 losing 7.3 percent share of US trade to Africa in those two years.

FIGURE 7 GROWTH IN IMPORTS TO ITTS STATES, 2010–2019

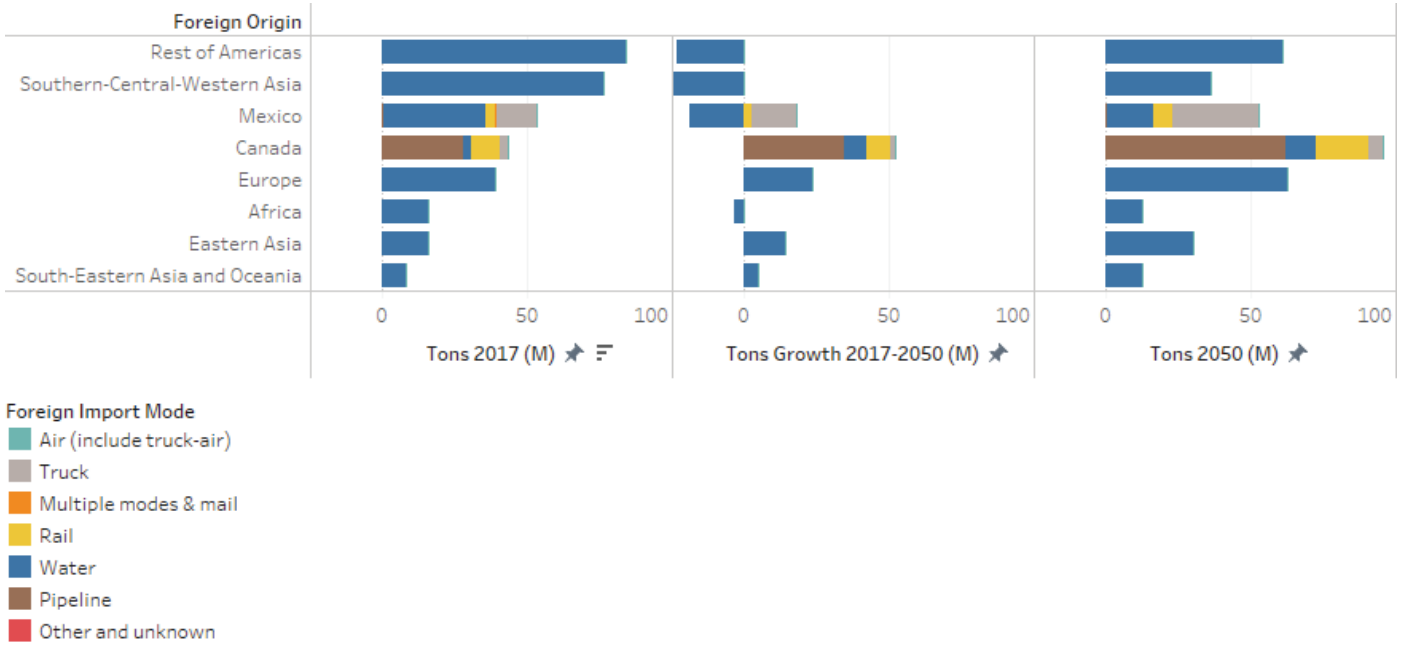
Source: Freight Analysis Framework Version 5.2.

Looking at U.S. imports from Eastern Asia, non-ITTS states had a 65 percent share of value in 2017, and this is projected to decline to 59 percent by 2050, meaning the ITTS states' share will increase from 35 percent to 41 percent (see Figure 8 and Figure 9). For value, non-ITTS states had a 69 percent share of value in 2017 and this projected to decline to 65 percent, meaning the ITTS states' share will increase from 31 percent to 35 percent.

Investments to capture trade opportunities in Asia have been and will remain important for ITTS states, while also being mindful of associated risk and uncertainty. For example, tariffs on trade with China may be lessened, retained, or increased in unknown ways, changing U.S. dependence on Chinese imports and/or impacting

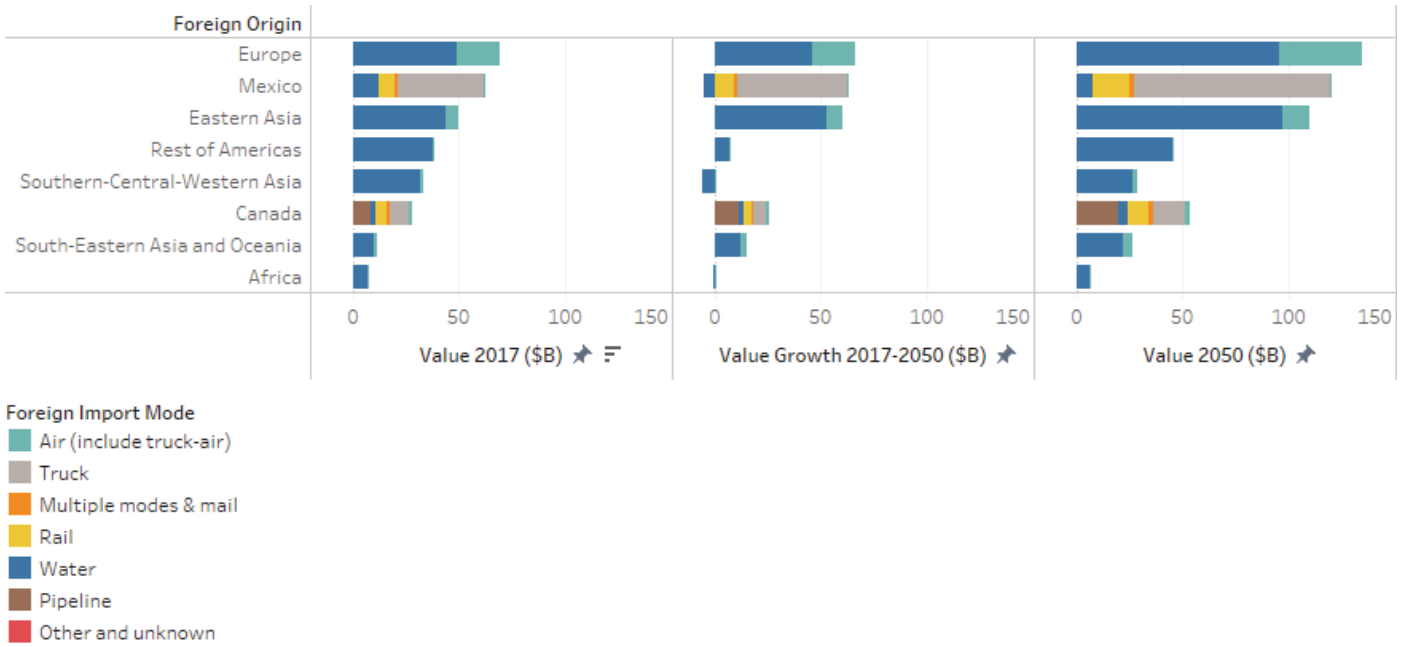
Chinse markets for U.S. goods. As the share of Asia to U.S. trade via west coast ports has been declining in percentage terms, the Port of Savannah has been a primary beneficiary of this growth and share shift though ports in other ITTS also have opportunity to benefit.

FIGURE 8 IMPORTS BY TONNAGE, MODE, AND REGION, 2017–2050



Source: Analysis of U.S. DOT Freight Analysis Framework 5.2.

FIGURE 9 IMPORTS BY VALUE, MODE, AND REGION, 2017–2050



Source: Analysis of U.S. DOT Freight Analysis Framework 5.2.

2.3 Domestic

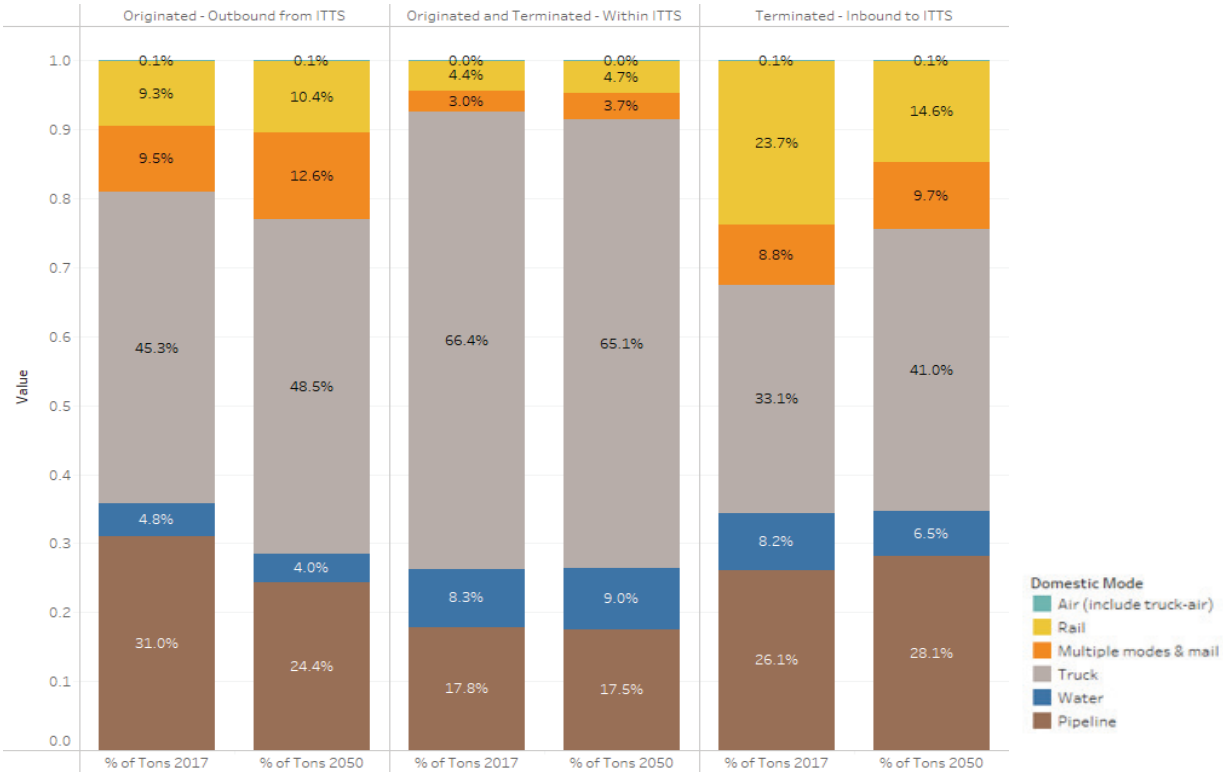
Domestically, the largest gains in tonnage are projected for Texas, Louisiana, Florida, and Georgia, and the largest gains in value are projected for Texas, Florida, and Georgia, but every ITTS state is projected to see significant increases in both tons and value of freight through 2050. Wholesale, manufacturing, transportation and warehousing, retail and construction grew from 1997 to 2020. There is changing demand for warehouse locations and sizes have exponentially grown as e-commerce drives the need for distribution closest to the consumer.

Mode shares for domestic freight are categorized as the tonnage and value of goods moving by truck, air, rail, water, and pipeline in the following ways:

- Within ITTS (originating and terminating within the ITTS states)
- Outbound freight that originates in the ITTS states but terminates elsewhere, and
- Inbound freight that starts elsewhere and terminates in the ITTS bloc.

Truck mode share is the highest overall with some nuances (see Figure 10). Freight tonnage moving within ITTS has the highest truck mode share. Inbound has the lowest and most balanced share across modes. The key take-away is that all domestic modes are important and will remain so. Freight value had a more clearly dominant truck mode share across all three types of domestic freight movements.

FIGURE 10 FREIGHT TONNAGE BY DOMESTIC MODE



Source: Analysis of U.S. DOT Freight Analysis Framework 5.2.

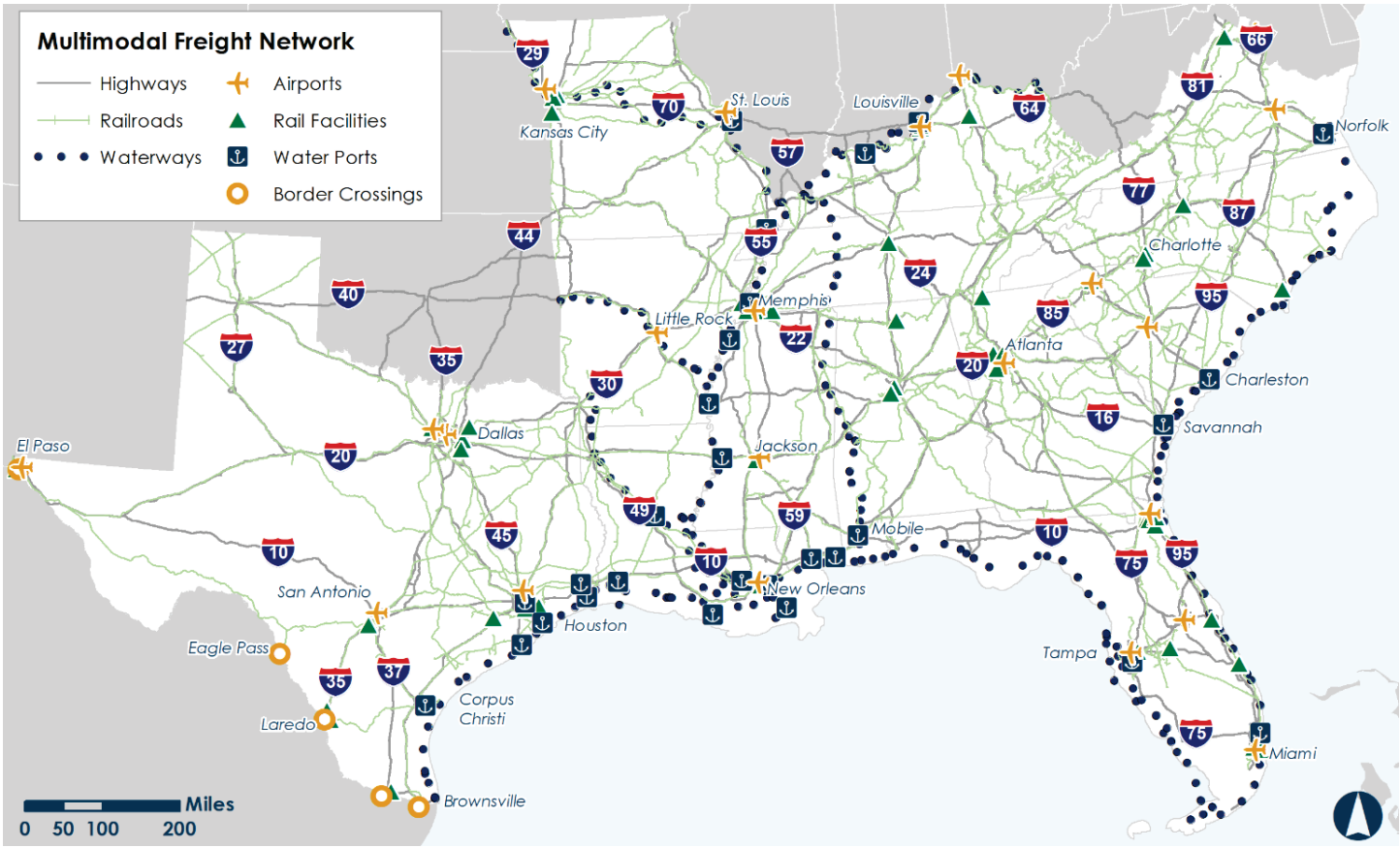
Looking at the total tonnage of goods by direction, the largest volume is moving Within ITTS (5.6 billion tons), followed by inbound (1.3 billion tons) then outbound (0.9 billion tons). In other words, around 72 percent of ITTS freight tonnage has both an ITTS origin and an ITTS destination, meaning that three-quarters of ITTS tonnage is contained within the ten-state trading bloc. Tonnage in all directions is projected to grow strongly through 2050.

Future growth in commodity tonnage and value is forecasted to be absorbed largely by trucks, with pipelines capturing growth in miscellaneous coal and petroleum products and several modes capturing growth in chemicals. The highway network accommodates the majority of the region's freight movements. However, it is anticipated that other modal operators will seek opportunities to offer cost-competitive services and capture growth currently forecast for the highway mode, especially if highway system capacity cannot keep pace with growing demand. From a resiliency perspective, greater modal options and redundancy result in a more resilient system capable of adapting to disruption a modal network.

3 STRATEGIC TRANSPORTATION SYSTEM

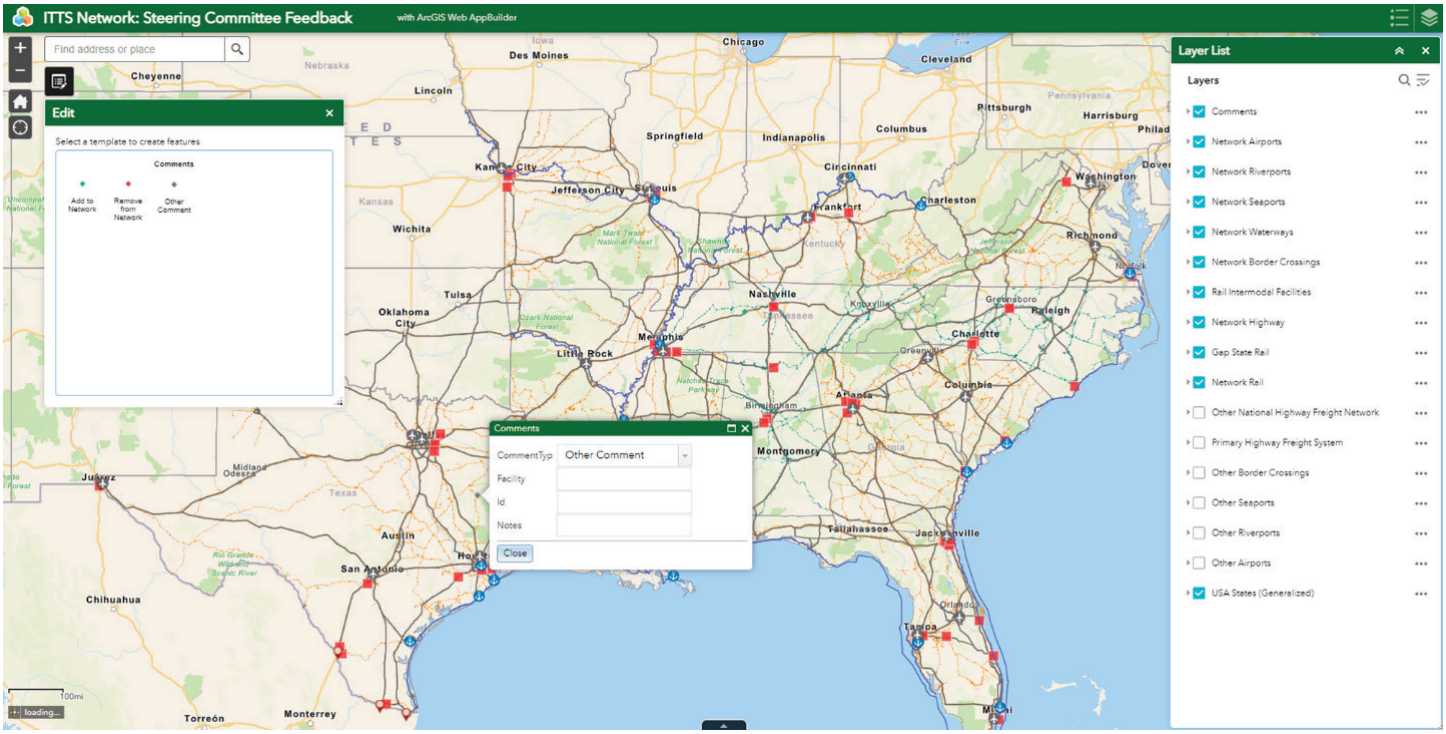
Identifying the key freight infrastructure of the ITTS region is foundational to considering freight movement across state lines and international borders. A prioritized infrastructure dataset enhances freight planning within individual states and promote collaboration among the states. Therefore, the Phase I SETTS performed an evaluation of modal infrastructure to define the key elements of the ITTS Multimodal Freight Network (MFN) which is presented in Figure 11. Figure 12 depicts a web map with documented infrastructure visible and usable for future insights.

FIGURE 11 ITTS MULTIMODAL FREIGHT NETWORK



Source: Institute of Trade and Transportation Studies.

FIGURE 12 ITTS MULTIMODAL FREIGHT NETWORK WEB MAP FUNCTIONALITY



Source: Institute of Trade and Transportation Studies.

3.1 Process and Criteria for Each Mode

3.1.1 Highways

Highways are the backbone for moving freight and facilitating trade in all ITTS states. Highway infrastructure also provides critical connectivity to other modes, to producers, and to markets. The methodology used existing networks prioritization tools to screen the infrastructure for inclusion in the ITTS Highway Freight Network. In addition, three different geographies were considered while evaluating the highway system—the ITTS region, individual states, and the gap states.

The foundational network is the Primary Highway Freight System (PHFS) and any Interstate Highway not included in the PHFS. These facilities were included in the ITTS Highway Freight Network without modification as they are already prioritized through legislation and tied to the National Highway Freight Program. For additional highways, the National Highway System (NHS) was used. Each state was considered separately so that the highest-ranking corridors in individual states rise to the top rather than compete with corridors in other states. Additionally, two other factors provide a balanced approach to consider various population densities within a state:

- Annual Average Daily Truck Traffic (AADTT), emphasizing urban areas; and
- Percent Truck, emphasizing rural areas.

Next, the analysis included mapping the segments and identifying the top quantile (the top 20 percent of the segments). Any segment in the top quantile of either factor was selected for further consideration. The selected segments were mapped using ArcGIS and then paired with the larger, corresponding corridor. The attributes of the selected group with the attributes of the corridor were then compared (including all segments regardless of ranking). The entire corridor was included in the ITTS Highway Freight Network if:

- Fifty percent or more of the corridor centerline miles are represented by the selected top-quantile segments; and
- Both corridor termini connect to either the PHFS or other Interstate or a multimodal/intermodal facility included in the ITTS key infrastructure.

Finally, gaps were identified in two phases. First, disjointed or missing roadways within the ITTS states were connected. The second step considered the states which are not members of ITTS but operate infrastructure that connects ITTS member states.

3.1.2 Rail

Railroads provide connectivity between markets and gateways, and traverse all ITTS states. While railroads historically have carried lower value bulk commodities such as coal and grains, companies are adapting service offerings and carry a variety of commodities and goods. The rail network in the United States -and subsequently the ITTS region- is predominantly privately owned. Therefore, the publicly available data on rail infrastructure and volumes are not conducive to comparison between railroads and network prioritization. Without additional data sources to evaluate the rail network, the study team leveraged the work completed by the ITTS member states and documented in their individual State Rail Plans. The network includes all Class I and II railroad networks based on similar decisions documented in statewide freight plans. This result includes all of the Strategic Rail Corridor Network (STRACNET), a subset of Class I railroads that are most essential to the nation's military and defense activities.

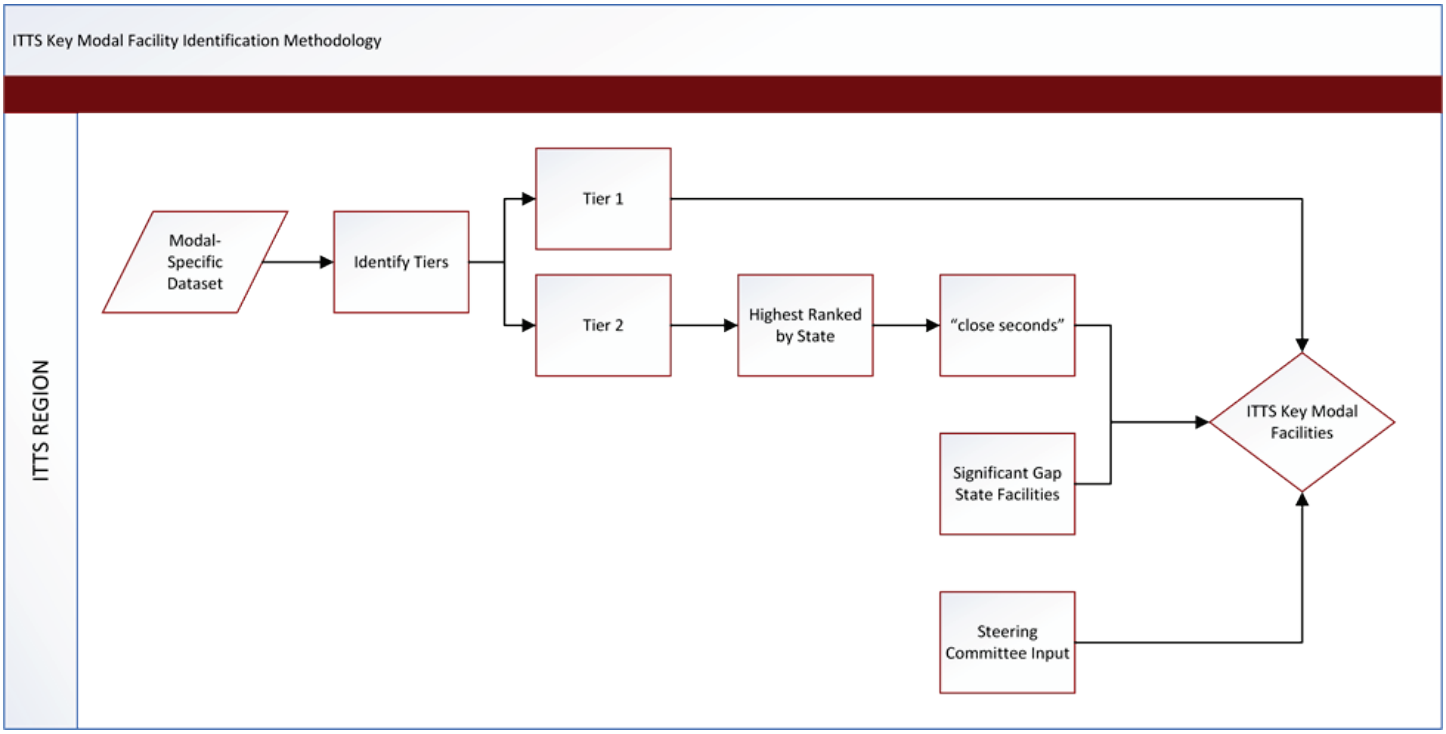
3.1.3 Waterways

Navigable waterways in the ITTS region connect seaports and riverports to both domestic and foreign markets. Waterways are located in all ITTS states as either rivers or ship channels. The Bureau of Transportation Statistics (BTS) publishes a geographic file of navigable waterways, and the latest file is based on U.S. Army Corps of Engineers (USACE) data as of 2019. All waterways connecting identified seaports and riverports were recommended for inclusion.

3.1.4 Airports, Seaports, Riverports, and Border Ports-of-Entry

The same methodology was applied to airports, seaports, riverports, and border crossings. The ITTS Key Modal Facility Identification Methodology is outlined in Figure 13.

FIGURE 13 ITTS POINT FACILITY NETWORK IDENTIFICATION METHODOLOGY



Source: Texas A&M Transportation Institute.

Each facility type was evaluated independently by tonnage, units, or both as was appropriate with the mode and the available data. The analysis for each mode uses the following datasets:

- **Airports:** Bureau of Transportation Statistics: U.S. airlines total freight and mail in tons by U.S. origin airport, geographic region, and service class. *(2019)*
- **Seaports:** U.S. Army Corp of Engineers: Waterborne tonnage for principal U.S. ports and all 50 states and U.S. territories.[2] *(2019)*
- **River Ports:** Army Corp of Engineers: Waterborne tonnage for principal U.S. ports and all 50 states and U.S. territories. *(2019)*
- **Border Crossings:** Bureau of Transportation Statistics: Border Crossing/Entry Data. *(2019)*

Using the specific variable of interest, several methods were employed to sort facilities into two tiers. Multiple methods were used due to relatively small number of facilities being evaluated. The methods used were Jenks

[2] The Army Corp of Engineers: Waterborne tonnage for principal U.S. ports and all 50 states and U.S. territories includes all port facilities whether oceanside or riverside. The data are separated for into the two port categories and analyzed independently.

natural breaks, power of 10, and the Pareto principle.[3] Facilities that fell into the top tier, using any method, were identified for the ITTS network. Of the remaining facilities, the highest-ranked facility from each state was added to the ITTS Key Modal Facility list, regardless of if that state already had facilities on the list. This approach balances the need to prioritize higher volume facilities with geographic diversity.

Finally, the list was reviewed to evaluate "close seconds." These facilities did not meet either of the first two criteria but seem comparable to others on the list. These additional facilities were added if:

- Facility ranked above at least five number-one state facilities, or
- facility ranked higher than a facility already included in the final list, and the total tonnage of the facilities was within 1 percent.

Freight moves within the ITTS region with little thought to political boundaries. Therefore, facilities in the gap states—usually close to the state line—were included as the ITTS Key Modal Facility list as deemed appropriate by the Steering Committee and Technical Advisory Committee.

3.1.5 Rail Intermodal Facilities

Rail intermodal facilities move containers between trains, trucks, and ships. These point locations serve as infrastructure supporting trade as well as point generators of freight distribution activity. BTS publishes a geographic file of container-on-flatcar and trailer-on-flatcar (COFC/TOFC) intermodal facilities. Data are not readily available to prioritize these facilities, and each serves a distinct geographic market. Therefore, all facilities were recommended for inclusion subject to input by the Steering Committee and Technical Advisory Committee.

3.2 Results for Each Mode

3.2.1 Highway

The resulting ITTS Highway Freight Network is approximately 52,000 miles, including 10,000 miles in non-ITTS states. The PHFS comprises about 37,400 miles of the network. Table 2 summarizes the mileage by functional class for included highways in the network.

[3] The Jenks natural breaks method divides the data into a given number of classes with the smallest possible variance within the class and the maximum variance between classes. The output is multiple thresholds that divide the classes. The power of 10 and the Pareto principle are closely related in theory, but they may provide different results when used in practice. Power of 10 simply classifies the tiers based on the magnitude of scale with thresholds that are multiples of 10. When using the Pareto principle, the top tier is defined as the group of ranked observations when summed from the first to the observation where the sum exceeds 80% of the sum of the entire population.

TABLE 2 ITTS HIGHWAY FREIGHT NETWORK

Functional Class	Miles
Interstate Highways	34,856
Expressway	5,219
Arterial and Other	11,865

Source: National Performance Management Research Data Set, Traffic Message Channel shapefile, 2021.

3.2.2 Rail

The ITTS region has approximately 34,000 miles of track owned by five Class I railroads. Two Class II railroads operate within the region, each completely within its respective state: Florida East Coast Railway (Florida) and Paducah and Louisville Railway (Kentucky). Table 3 lists railroads by mileage in the network including mileage in ITTS states and in Alabama, North Carolina, and Tennessee.

TABLE 3 ITTS RAIL FREIGHT NETWORK

Railroad	Railroad Class	Miles
BNSF Railway (BNSF)	Class I	6,605
Canadian National (CN)	Class I	1,669
CSX Transportation (CSX)	Class I	12,510
Kansas City Southern Railroad (KCS)	Class I	3,348
Norfolk Southern Railroad (NS)	Class I	11,188
Union Pacific Railroad (UP)	Class I	11,243
Florida East Coast Railway (FEC)	Class II	476
Paducah & Louisville Railway (PAL)	Class II	380

Source: Bureau of Transportation Statistics, 2022. Mileage includes gap states.

3.2.3 Waterways

The resulting waterway freight network consists of approximately 5,700 miles of rivers, intracoastal waterways, and ship channels. The waterways included are listed in Table 4. Five long, multistate waterways connecting to riverports and two intracoastal waterways were identified. Additionally, short ship channels and connections to ports are essential links of the waterway network.

TABLE 4 ITTS WATERWAY FREIGHT NETWORK

Waterway	Marine Highway Designation	Length (Miles)
Atlantic Intracoastal Waterway	M-95	1,217
Gulf Intracoastal Waterway	M-10 (also M-69 within Texas)	1,183
Mississippi River	M-55	1,134
Tennessee-Tombigbee River	M-65	665
Ohio River	M-70	664
Missouri River	M-29	541
Arkansas River	M-40	284
Total		**5,687**

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center, 2021.

3.2.4 Seaports

Thirty seaports servicing approximately 990 million tons of freight were evaluated for consideration into the ITTS network. Fourteen were selected for inclusion into the ITTS network using the prescribed methodology. These ports service over 905 million tons of freight in 2019 or 91.4 percent of all goods that moved through seaports. The Port of Mobile is also identified because of the volume of cargo and proximity to other ITTS infrastructure for a total of 15 seaports (see Table 5).

TABLE 5 ITTS SEAPORT FREIGHT NETWORK

Port	2019 Tonnage
Houston, TX	268,930,047
Beaumont, TX	100,244,231
Corpus Christi, TX	93,468,323
Virginia, VA	71,774,349
Mobile, AL*	58,635,622
Lake Charles, LA	56,908,344
Plaquemines, LA	56,850,137
Texas City, TX	42,682,311
Savannah, GA	41,273,947
Port Arthur, TX	39,851,706
Tampa, FL	31,006,487
Pascagoula, MS	27,358,043
Freeport, TX	25,446,078
Port Everglades, FL	25,022,351
Charleston, SC	24,822,636

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center, 2021.

*Note: *Gap State.*

3.2.5 Riverports

The ITTS region has twenty-four riverports carrying 597 million tons of goods in 2019. Using the methodology, 12 were selected for the ITTS Multimodal Freight Network. These 12 riverports service 97.7 percent of the tonnage of all riverports in the ITTS region. The Port of Memphis is also included for its tonnage and proximity to ITTS states (see Table 6).

TABLE 6 ITTS RIVERPORT FREIGHT NETWORK

Port	2019 Tonnage
South Louisiana, LA	27,5512,500
New Orleans, LA	93,332,543
Baton Rouge, LA	82,234,811
St. Louis, MO and IL	37,426,710
Memphis, TN[1]	11,055,740
Louisville, KY	6,241,476
Central Louisiana Regional Port, LA	3,211,068
Vicksburg, MS	2,962,979
Greenville, MS	2,944,932
Owensboro, KY	2,872,596
New Madrid County, MO	2,259,548
Helena, AR	1,118,011

Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center, 2021.

[1] Gap State.

3.2.6 Airports

The ITTS region has 38 airports that provide cargo service totaling 55.8 billion landed pounds (nearly 28 million tons) in 2019. Using the described methodology, 22 of those facilities were selected for the ITTS network. The selected airports serviced 92.5 percent of the air cargo within the region with 51.6 billion landed pounds (nearly 26 million tons). One additional airport located outside the ITTS region is also identified as significant: Memphis International. It services approximately 50 percent more cargo than the largest airport in the ITTS region and is geographically close to two ITTS member states (see Table 7).

TABLE 7 ITTS AIRPORT FREIGHT NETWORK

Airport Code	Name	2019 Volume (Pounds)
MEM[1]	Memphis International	24,344,504,836
SDF	Louisville Muhammad Ali International	15,599,137,404
MIA	Miami International	9,235,113,239
CVG	Cincinnati/Northern Kentucky International	7,238,728,106
DFW	Dallas-Fort Worth International	4,740,849,216
ATL	Hartsfield–Jackson Atlanta International	3,107,206,086
IAH	George Bush Intercontinental/Houston	2,402,647,056
TPA	Tampa International	1,346,832,550
MCO	Orlando International	1,285,646,340
AFW	Fort Worth Alliance	1,015,138,360
SAT	San Antonio International	960,470,460
ELP	El Paso International	631,241,500
MCI	Kansas City International	576,393,776
JAX	Jacksonville International	563,739,300
RIC	Richmond International	527,243,818
CAE	Columbia Metropolitan	478,169,990
IAD	Washington Dulles International	473,885,500
GSP	Greenville Spartanburg International	415,703,869
STL	St Louis Lambert International	404,046,370
MSY	Louis Armstrong New Orleans International	392,853,180
LIT	Bill and Hillary Clinton National/Adams Field	153,696,058
JAN	Jackson-Medgar Wiley Evers International	74,899,600

Source: Federal Aviation Administration, 2019 Air Carrier Statistics.

[1] Gap State.

3.2.7 Border Ports-of-Entry

Ten border ports-of-entry connect the ITTS region with Mexico via Texas. Four of these crossings carry all the rail cargo with over a million loaded and empty containers entering the U.S. in 2019. Five crossings serviced over 95.3 percent of all trucks, over 4 million, crossing the border. The five border ports-of-entry are shown in Table 8.

TABLE 8 BORDER CROSSINGS ON THE FREIGHT NETWORK

Port	2019 Rail Volume (Containers)	2019 Truck Volume (Containers)
Laredo	464,371	1,711,670
El Paso	90,699	610,869
Hidalgo	N/A	469,777
Brownsville	99,311	287,538
Eagle Pass	336,540	179,832

Source: U.S. Bureau of Transportation Statistics. Border Crossing/Entry Data, 2021.

3.2.8 Rail Intermodal Facilities

There are 55 COFC/TOFC rail intermodal facilities in ITTS states, approximately 30 percent of rail intermodal facilities in the U.S. Rail intermodal facilities on the freight network are shown in Table 9.

TABLE 9 NUMBER OF RAIL INTERMODAL FACILITIES ON THE FREIGHT NETWORK

Railroad	Number of Facilities
BNSF	5
CN	1
CSX	9
FEC	3
KCS	3
NS	12
UP	11
Multiple Railroads	11

Source: Bureau of Transportation Statistics, 2022.

3.3 Network Conditions and Performance

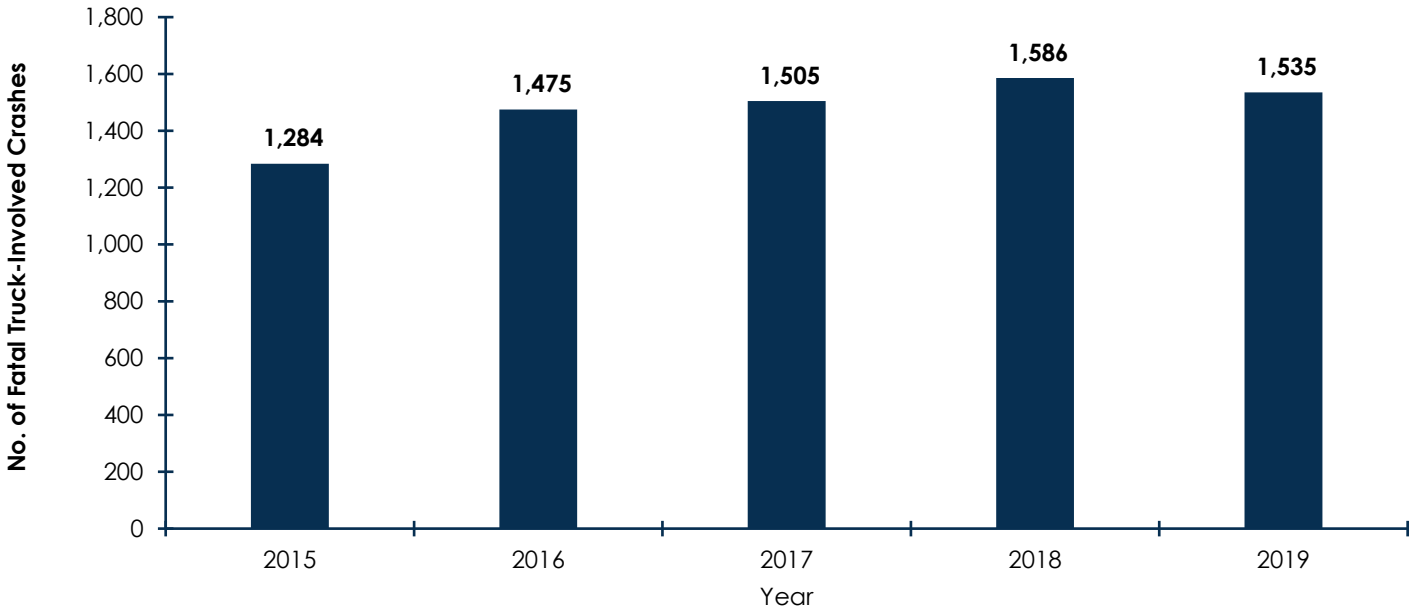
The purpose of the network conditions and performance analysis was to lay the foundation for an in-depth needs assessment as part of Phase II of the SETTS project. This analysis focuses on some of the most pressing freight challenges experienced across the ITTS region. Specifically, these include fatal truck-involved crashes and mobility and reliability challenges related to freight bottlenecks.

3.3.1 Safety

Transportation safety is extremely important and is one of the highest priorities at all levels of transportation planning and engineering—national, statewide, regional, and local. The safety analysis was conducted using 2015–2019 truck-involved fatal crash data from the Fatality Analysis Reporting System (FARS). FARS data was selected to ensure uniformity in truck crash data collecting and reporting across states. For purposes of this analysis, vehicle model types in FARS that correspond to medium/heavy truck vehicle types were considered as trucks.

There were 7,385 fatal truck-involved crashes across the ITTS region between 2015 and 2019. As shown in Figure 14, the number of truck-involved crashes generally increased over the analysis period—rising from 1,284 crashes in 2015 to 1,535 in 2019. Year 2018 experienced the highest number of fatal truck-involved crashes across the region with 1,586 incidents.

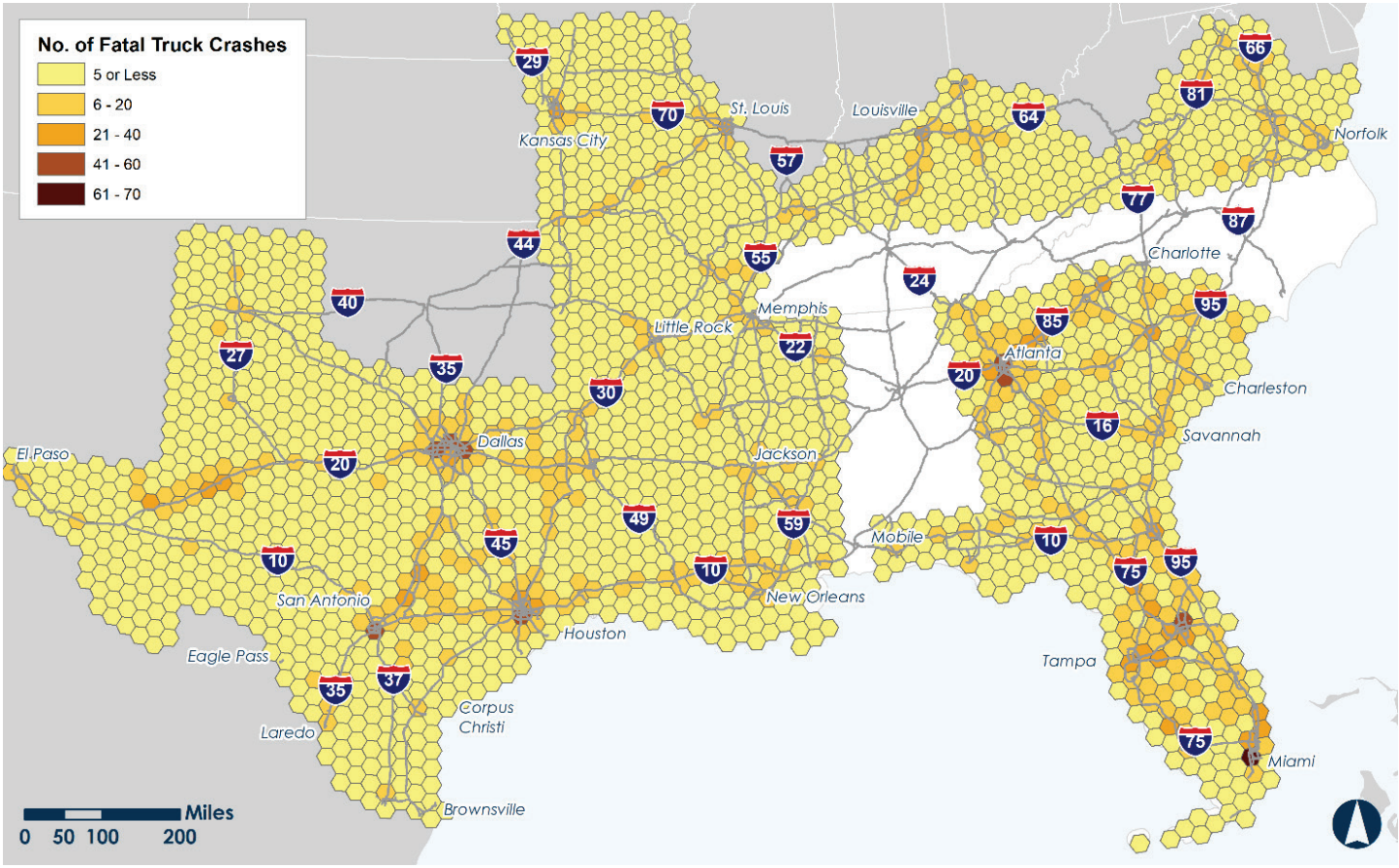
FIGURE 14 FATAL TRUCK-INVOLVED CRASHES, 2015-2019



Source: Fatality Analysis Reporting System, 2015–2019; Cambridge Systematics, Inc. analysis.

Figure 15 shows the concentration of fatal truck-involved crashes across ITTS member states. The results indicate that fatal truck crashes are generally concentrated in the metropolitan regions and along major highways. Generally, these areas have a higher exposure to crashes due to greater traffic volumes.

FIGURE 15 CONCENTRATION OF FATAL TRUCK-INVOLVED CRASHES IN ITTS MEMBER STATES, 2015–2019



Source: Fatality Analysis Reporting System, 2015–2019; Cambridge Systematics, Inc. analysis.

3.3.2 Mobility and Reliability

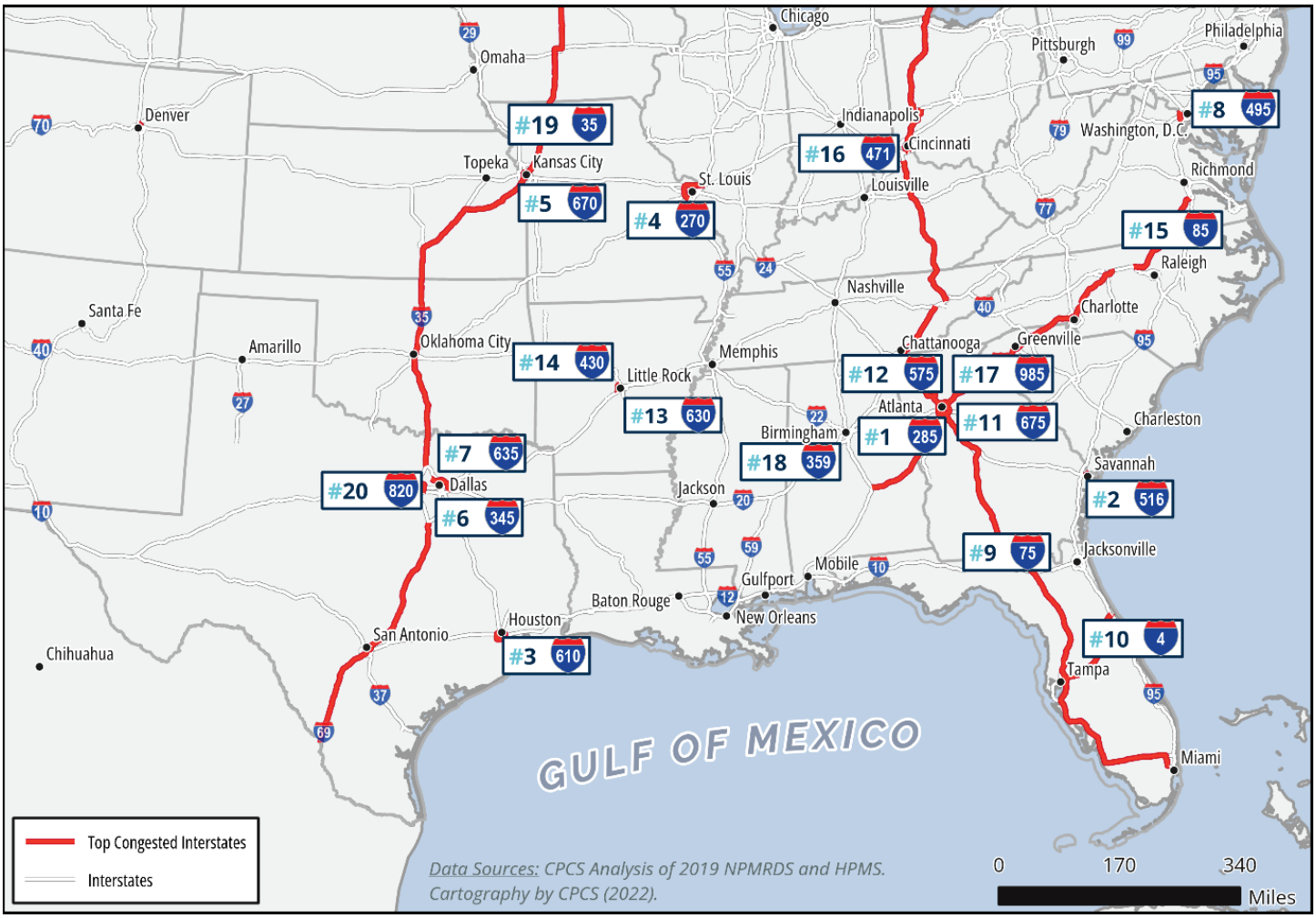
The ITTS Regional Bottlenecks Assessment for Goods Movement Study assessed the extent, duration, and severity of truck bottlenecks in the Southeast to facilitate multi-state collaboration on potential recommendations that can be undertaken to reduce top bottlenecks. Truck speed data from the National Performance Management Research Data Set (NPMRDS) and truck count data from the Highway Performance Monitoring System (HPMS) for the year 2019 data were the primary data sources. The analysis contained two main components: segment-based bottleneck analysis and trip-based bottleneck analysis. The segment-based bottleneck analysis provided a common platform for studying top bottlenecks in the Southeast and the trip-based bottleneck analysis showed how bottlenecks in a certain state affect multi-state economic competitiveness. Both analyses exemplify the need for multi-state coordination to address top regional bottlenecks.

The freight bottlenecks study calculated the following performance measures: average truck speeds, truck travel time reliability index, truck delay per mile, annual hours of truck delay, and annual cost of truck delay. Congestion was measured in three ways: by state, by interstate, and by roadways aggregated at a county level, while bottlenecks were ranked based on truck delay per mile, total hours of truck delay, and cost of truck

delay. The analysis found that in 2019, the Southeast Region experienced 271 million hours of total truck delay, amounting to 470 million gallons in wasted truck fuel and $18 billion in direct costs. Furthermore, among the thirteen member states, Georgia, Tennessee, and Louisiana experienced the highest average truck delay per mile in 2019—amounting to over 2,000 average hours of truck delay per mile. Peak-period traffic—followed by traffic incidents, work zones, and weather—was found to be the top bottleneck cause in the Southeast.

The ITTS freight bottlenecks study also identified the top congested interstates. As shown in Figure 16, the top five congested interstates by truck delay per mile are beltways or auxiliary routes: I-285, I-516, I-610, I-270, and I-670 due to the concentrated congestion levels on these relatively shorter corridors. When measured by total hours and cost of truck delay, the top five congested interstates are I-75, I-285, I-85, I-10, and I-95 due to both high truck volumes and delay.

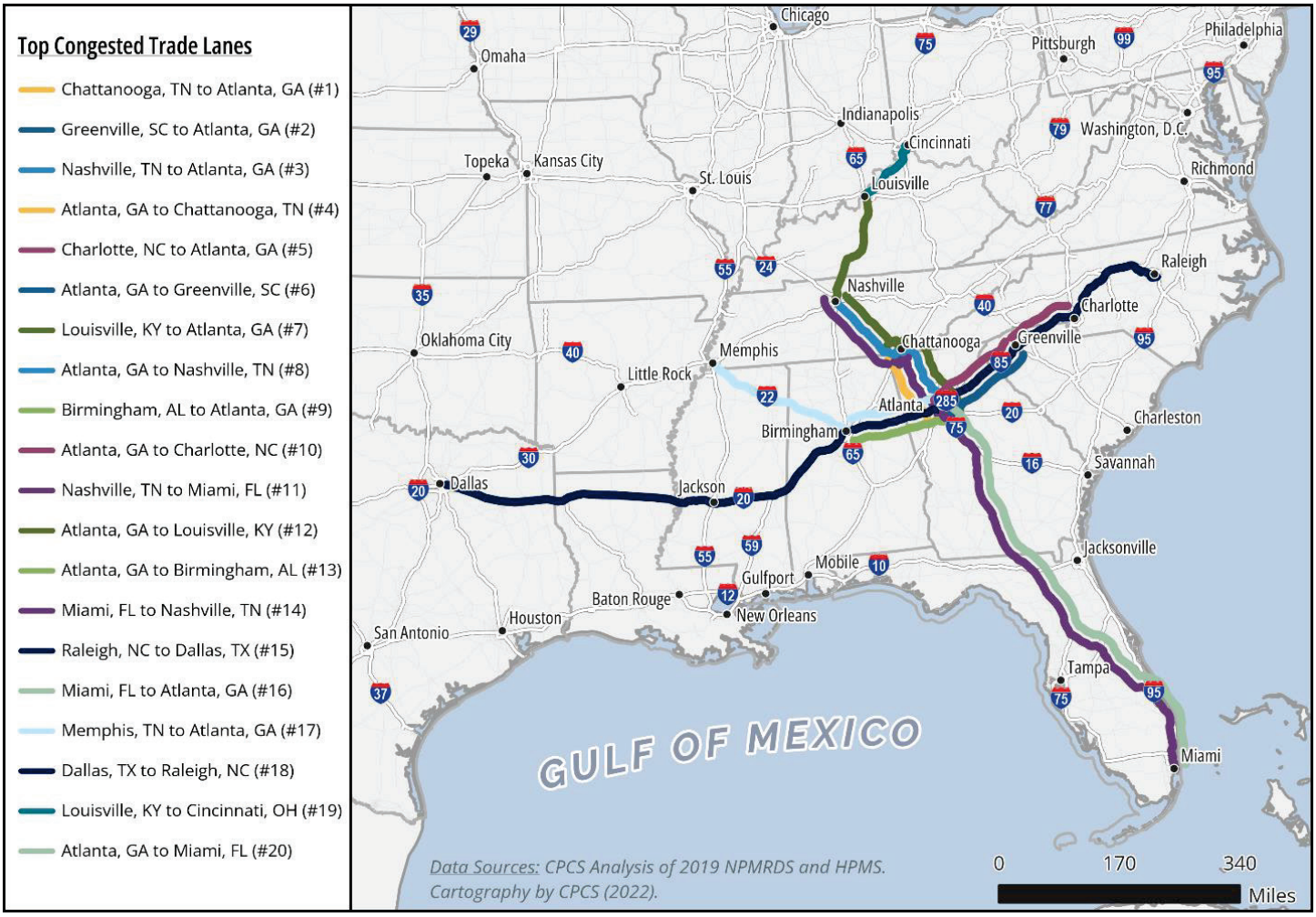
FIGURE 16 SOUTHEAST STATES—TOP 20 CONGESTED INTERSTATES BY TRUCK DELAY PER MILE, 2019



Source: Institute of Trade and Transportation Studies, ITTS Regional Bottlenecks Assessment for Goods Movement Study, 2022.

In addition to interstates, the study also identified the top congested multi-state trade lanes. The top trade lanes were determined based on multi-state commodity flows and consultations with the member states. Among these, the top twenty congested trade lanes measured by truck delay per mile are shown in Figure 17. A cluster of top congested trade lanes in the region have an origin, destination, or intersection in Atlanta, Birmingham, Chattanooga, Greenville, and Nashville.

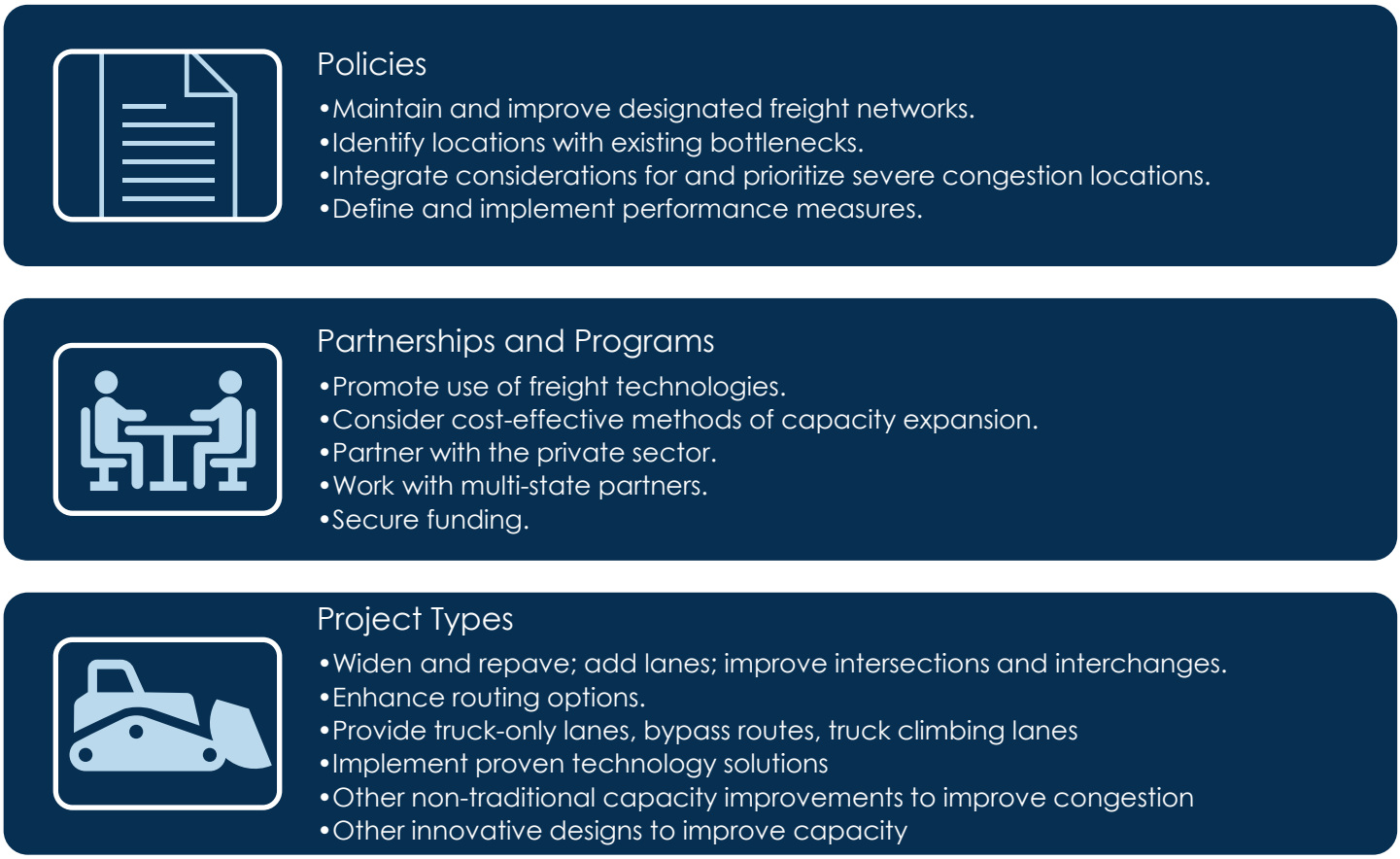
FIGURE 17 SOUTHEAST STATES—TOP 20 CONGESTED MULTI-STATE TRADE LANES, 2019



Source: Institute of Trade and Transportation Studies, ITTS Regional Bottlenecks Assessment for Goods Movement Study, 2022.

Freight congestion in the Southeast Region affects economic competitiveness, reduces safety, deteriorates roadway assets more quickly, contributes to air pollution and carbon emissions, and impacts the quality of life for over a third of the U.S. population. As a result, strategies to address freight congestion are critical to ITTS. Southeast states employ a variety of strategies to address top bottlenecks in their states including through policies, partnerships and programs, and projects shown in Figure 18. Many states expressed that collaboration with other states is key to addressing shared bottlenecks across the region from coordinated planning to infrastructure improvement projects, operational improvements, and technology deployments.

FIGURE 18 SOUTHEAST STRATEGIES TO ADDRESS BOTTLENECKS



Source: Institute of Trade and Transportation Studies, ITTS Regional Bottlenecks Assessment for Goods Movement Study, 2022.

4 KEY INDUSTRY PROFILES

Freight activity contributes substantially to the economies of ITTS member states. Freight transportation and logistics industry sectors (i.e., industries that handle goods and provide freight transportation services) as well as freight-generating industry sectors (i.e., industries that generate freight and consume freight transportation services) directly contribute to employment, labor income, and gross domestic product. While this analysis focuses on direct economic contributions, it should be noted that these industries also contribute to the region's economy indirectly in the form of consuming goods and services from other businesses and the buying power of their workers.

4.1 Freight Transportation and Logistics Sectors

To estimate the economic contribution of freight transportation and logistics sectors in the ITTS member states, a broad definition of the freight transportation sectors was utilized. The economic contribution of freight transportation and cargo handling goes beyond businesses that provide for-hire services. In addition to activities generated by freight truck, rail, pipeline, water, and air transportation, other activities included in freight transportation are in-house truck transportation carried out by businesses in which transportation is not the main economic activity (such as grocery stores or waste collection), self-employed individuals in the trucking and couriers activities, United States Postal Service (USPS), for-hire warehousing and storage, wholesale, and other cargo handling activities. The sectors that correspond to this broader definition are shown in Table 10 (based on the 3-digit NAICS codes.

TABLE 10 FREIGHT TRANSPORTATION AND LOGISTICS SECTORS

Sector	Industry Code
Merchant Wholesalers (Hand laborers and freight, stock, and material movers)	NAICS 423–424
Air Transportation	NAICS 481
Rail Transportation	NAICS 482
Water Transportation	NAICS 483
Truck Transportation	NAICS 484
Pipeline Transportation	NAICS 486
Support Activities for Transportation	NAICS 488
Postal Service	NAICS 491
Couriers and Messengers	NAICS 492
Warehousing and Storage	NAICS 493

Source: Cambridge Systematics.

4.1.1 Economic Contribution

Table 11 shows the total direct employment generated by freight transportation and logistics sectors for the ITTS member states. In 2019, almost 3 million persons were directly employed in freight transportation and logistics, of which 83 percent were salaried workers. The largest group, *hand laborers and freight, stock, and material movers*, sustained over 800,000 direct jobs and contributed 30 percent of the sector's employment. *Truck transportation* ranked second highest with 739,000 workers accounting for over 27 percent of freight transportation and logistics. Trucking also held the majority of the self-employed workers, comprising of 61 percent of the non-salaried pool. Couriers and Messengers were the third largest employer with 379,000 jobs. When combined, these top three sectors consisted of roughly 70 percent of direct jobs in freight transportation and logistics sector for ITTS states.

TABLE 11 DIRECT EMPLOYMENT FOR FREIGHT TRANSPORTATION AND LOGISTICS FOR ITTS STATES, 2019

NAICS/OEWS	NAICS Description	Salaried Workers	Non-Salaried Workers	Total Employment
53-7062	Hand laborers and freight, stock, and material movers	816,420	–	816,420
481	Air Transportation**	5,633	385	6,018
482	Rail Transportation*	50,735	–	50,735
483	Water Transportation**	20,820	2,013	22,833
484	Truck Transportation	457,673	281,469	739,142
486	Pipeline Transportation	26,101	881	26,982
488	Support Activities for Transportation**	157,215	26,711	183,926
491	Postal Service	161,721	–	161,721
492	Couriers and Messengers	234,454	145,295	379,749
493	Warehousing and Storage	347,159	7,023	354,182
	Total	**2,277,931**	**463,777**	**2,741,708**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) for Salaried Workers and Occupational Employment and Wage Statistics (OEWS) for Hand laborers and freight, stock, and material movers; U.S. Census Bureau, Non Employer Statistics (NES) for Non-Salaried Workers; Association of American Railroads, State Data for 481 Rail Transportation industry; CS Estimates when indicated with **.*

Table 12 shows the direct economic contribution (employment, wages, and GDP) of the sub-sectors in the freight transportation and logistics sector. The results indicate the following:

- Direct wage earnings from *Hand laborers and freight, stock, and material movers* and *Truck transportation* comprised of 55 percent of freight transportation and logistics' both total wages and associated GDP.

- *Hand laborers and freight, stock, and material movers* was the top performing sector for employment and GDP in 2019. In addition to being one of the largest employers, GDP from hand laborers and freight movers was valued at roughly $64 billion, contributing over 31 percentage points of total GDP generated by the freight transportation and logistics sector.

- *Truck Transportation* came second in both of these categories but led instead the sum of total wages. Earnings for the industry added up to more than $51 billion, approximately 37 percent of the wages perceived at the freight transportation and logistics sectors. Trucking's gross domestic product totaled almost $50 billion and accounted for almost a quarter of the industry group totals.

TABLE 12 ECONOMIC CONTRIBUTION FROM DIRECT EMPLOYMENT GENERATED BY THE FREIGHT TRANSPORTATION AND LOGISTICS SECTORS FOR ITTS STATES, 2019

NAICS/OEWS	NAICS Description	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
53-7062	Hand laborers and freight, stock, and material movers**	816,420	24,774	64,312
481	Air Transportation**	6,018	445	1,347
482	Rail Transportation*	50,735	6,520	11,261
483	Water Transportation**	22,833	2,220	4,240
484	Truck Transportation	739,142	51,387	49,534
486	Pipeline Transportation	26,982	3,987	12,336
488	Support Activities for Transportation**	183,926	10,842	13,743
491	Postal Service**	161,721	9,714	13,180
492	Couriers and Messengers**	379,749	12,546	15,998
493	Warehousing and Storage	354,182	14,940	20,544
	Total	**2,741,708**	**137,375**	**206,495**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; Association of American Railroads, State Data for Employment and Wages for NAICS code 482 Rail Transportation; and CS Estimates when indicated with **.*

The share of the direct economic contribution generated by the freight transportation and logistics sectors in the ITTS region relative to all sectors in the region is presented in Table 13. The freight transportation and logistics sector support 2.7 million direct jobs, equivalent to 6 percent of the region's employment. These sectors directly contribute $137 billion (or 5 percent) of these states' total wages and generate $206 billion in annual GDP, equal to a 4-percent share. The findings are not negligible at all, especially considering that only freight-specific aspects of broader industries have been kept, representing a net and tangible contribution of freight to the economy of the ITTS region.

TABLE 13 SHARE OF ECONOMIC CONTRIBUTION GENERATED BY THE FREIGHT TRANSPORTATION AND LOGISTICS SECTORS FOR ITTS STATES, 2019

Item	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
All Sectors	49,799,639	2,633,462	5,465,666
Freight Transportation Sectors	2,741,708	137,375	206,495
Freight Transportation Sectors (Share)	6%	5%	4%

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and Occupational Employment and Wage Statistics (OEWS); U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and Association of American Railroads, State Data.

4.1.2 Goods Movement within the Southeast

Overall, in 2019 about 8.3 billion tons of freight worth over $7.6 trillion were transported to, from, or within the ITTS region as shown in Table 14. This represents about 41 percent of total tonnage in the U.S. and approximately 40 percent of total value.

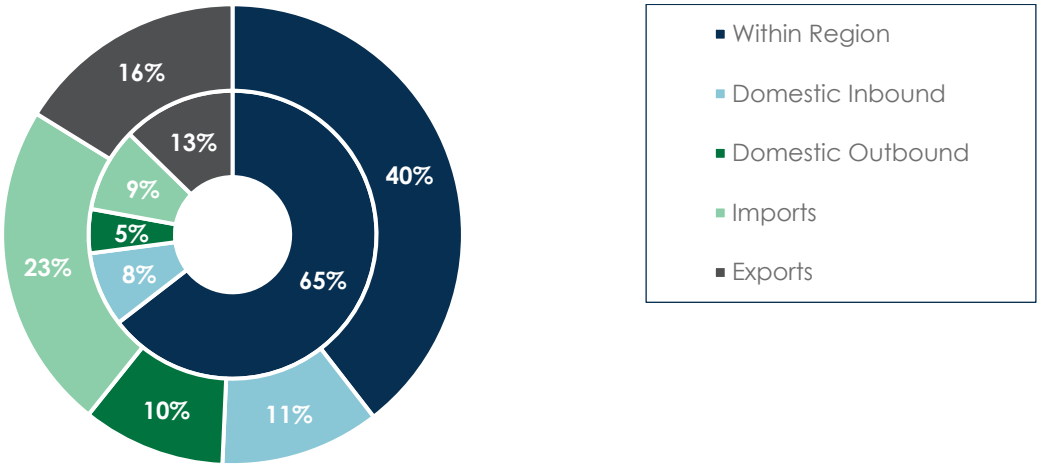
TABLE 14 PERCENT OF TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	20,228,193		18,989,964	
Southeast	10,270,756	51%	10,818,867	57%
ITTS	8,306,075	41%	7,641,564	40%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 19 shows the flow of goods by tonnage across the Southeast by direction in 2019. In 2019, almost 65 percent of all freight tonnage (about 40 percent of total value) were moved within the region. Exports comprised the next highest share of total tonnage by direction at approximately 13 percent. This corresponds to about 16 percent of total value. Interestingly, imports accounted for 9 percent of total tonnage, but 23 percent of total value. This reflects the importance of the region's international gateways for freight.

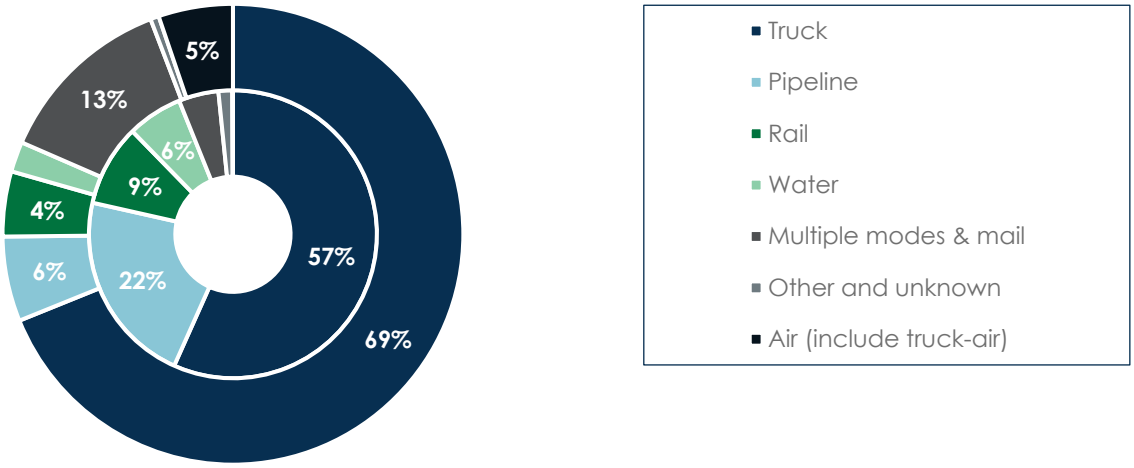
FIGURE 19 PERCENT OF TONS (INNER) AND VALUE (OUTER) BY TRADE TYPE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

In terms of mode, Figure 20 shows that the majority of goods by tonnage (57 percent) and value (69 percent) are transported throughout the region by truck. This is followed by pipeline which carries about 22 percent of the region's total tonnage, but only about 6 percent of its value. Though multiple modes and mail (which includes rail intermodal) only carries about 4 percent of the region's total tonnage, it accounts for 13 percent of total value.

FIGURE 20 PERCENT OF TONS (INNER) AND VALUE (OUTER) BY MODE IN THE SOUTHEAST, 2019

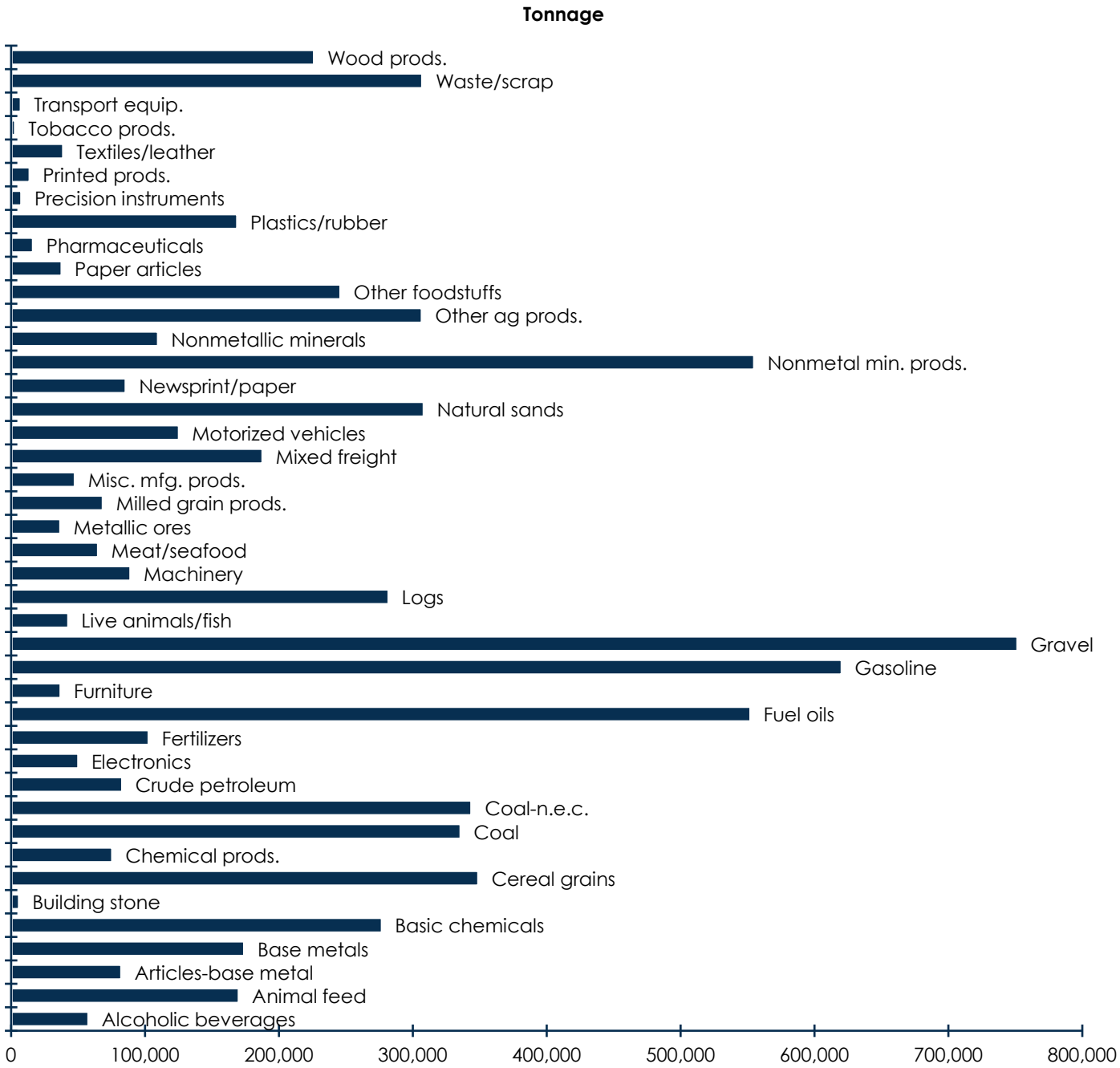


Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

The top commodities by total tonnage across all directions for 2019 are shown in Figure 21. Bulk goods including gravel, gasoline, nonmetal mineral products, and fuel oils were the largest commodity types shipped in the ITTS

region. Nearly 752 million tons of gravel was transported in the region, which accounts for about 9 percent of the total tonnage in 2019. This commodity includes goods such as meat, milk, fruits, vegetables, and flour, among others. This is followed by gasoline with about 6.2 million tons, nonmetallic mineral products (e.g., sand) with nearly 5.6 million tons, and fuel oils with about 5.5 million tons. Many of these commodities can be linked to major industry sectors throughout the ITTS region. Examples include construction and energy production.

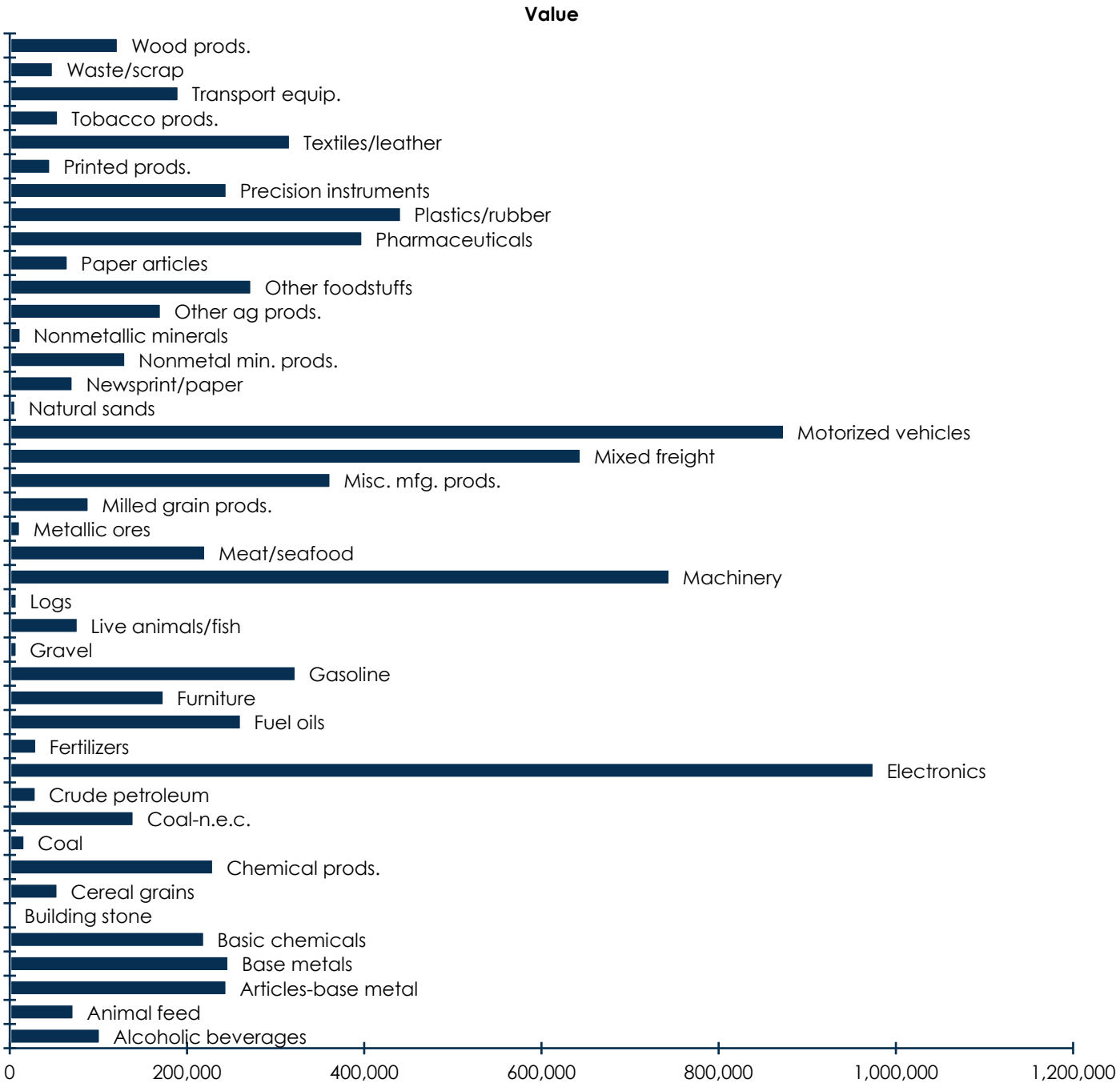
FIGURE 21 TOP COMMODITIES BY TOTAL TONNAGE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

By value in 2019 (as opposed to by weight), Figure 22 shows that the top commodity in 2019 was electronics. In 2019, electronics transported throughout the region was valued at over $973 billion. Electronics were followed by motorized vehicles as the highest value commodity in the ITTS region at over $874 billion. Machinery ($745 billion) and mixed freight ($645 billion) are also top commodities.

FIGURE 22 TOP COMMODITIES BY TOTAL VALUE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

4.1.3 Total International Trade

Over 1.3 billion tons of goods were imported into and exported out of the ITTS region in 2019 as shown in Table 15. This represents nearly 55 percent of total international trade for the U.S. In terms of value, goods imported or exported to or from ITTS states comprise nearly 44 percent of the total national value.

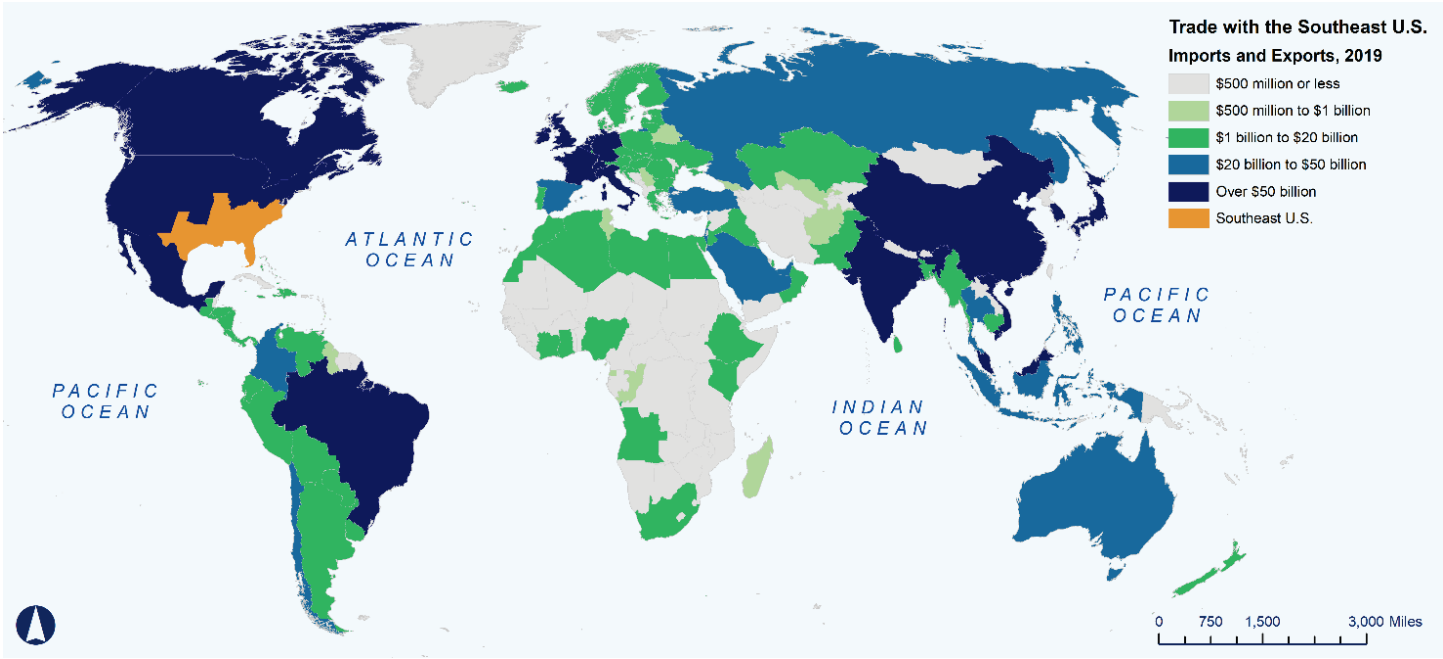
TABLE 15 INTERNATIONAL TRADE TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million$)	Percent of U.S.
US	2,403,186		3,862,651	
Southeast	1,370,218	57.0%	1,865,210	48.3%
ITTS	1,312,646	54.6%	1,688,400	43.7%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 23 depicts total international trade by value with the Southeast. Mexico, China, Canada, and Japan represent top trading partners for the Southeast. Mexico was by far the largest trading partner. In 2019, Mexico traded over $307.6 billion in goods with the Southeast. China and Canada traded over $179.2 billion and $171.4 billion with the Southeast, respectively. Japan accounted for approximately $145 billion in trade.

FIGURE 23 TOTAL INTERNATIONAL TRADE WITH THE SOUTHEAST, 2019

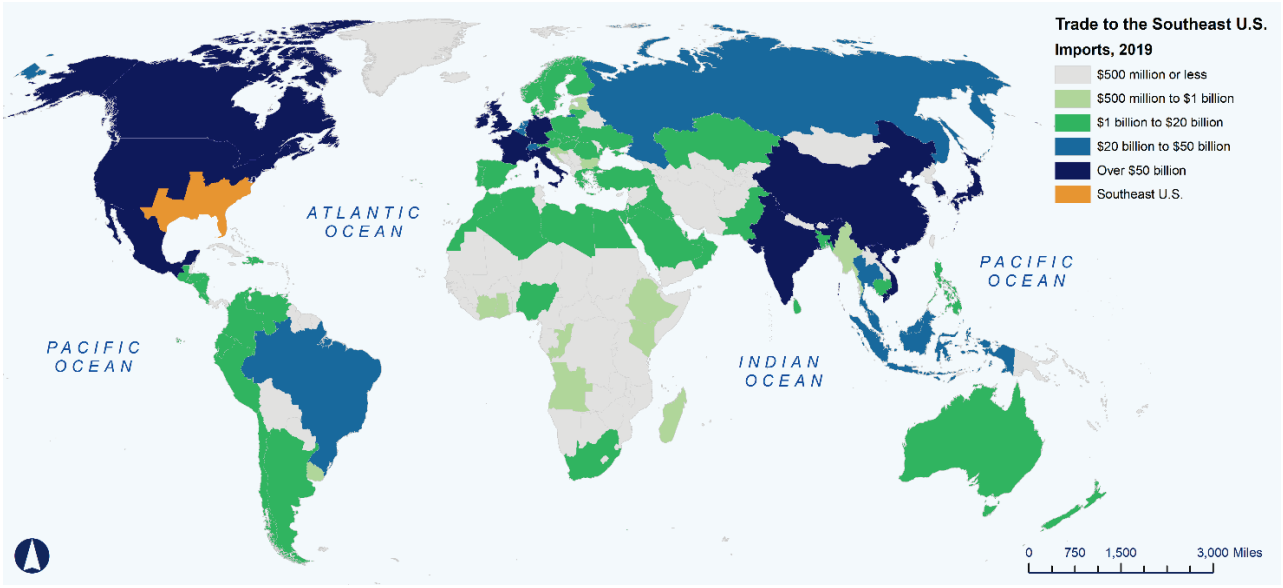


Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

International trade data for the Southeast is broken out by imports and exports in Figure 24 and Figure 25, respectively. Mexico and China were the largest source of goods imported to the Southeast as shown in Figure 24. The Southeast received over $163 billion and $133 billion of goods from those nations in 2019. Canada, Japan, and Germany also shipped substantial values of goods to the Southeast. In 2019, Canada sent nearly $62 billion of goods to the Southeast, while Japan shipped over $58 billion. About $50 billion of goods were imported from Germany.

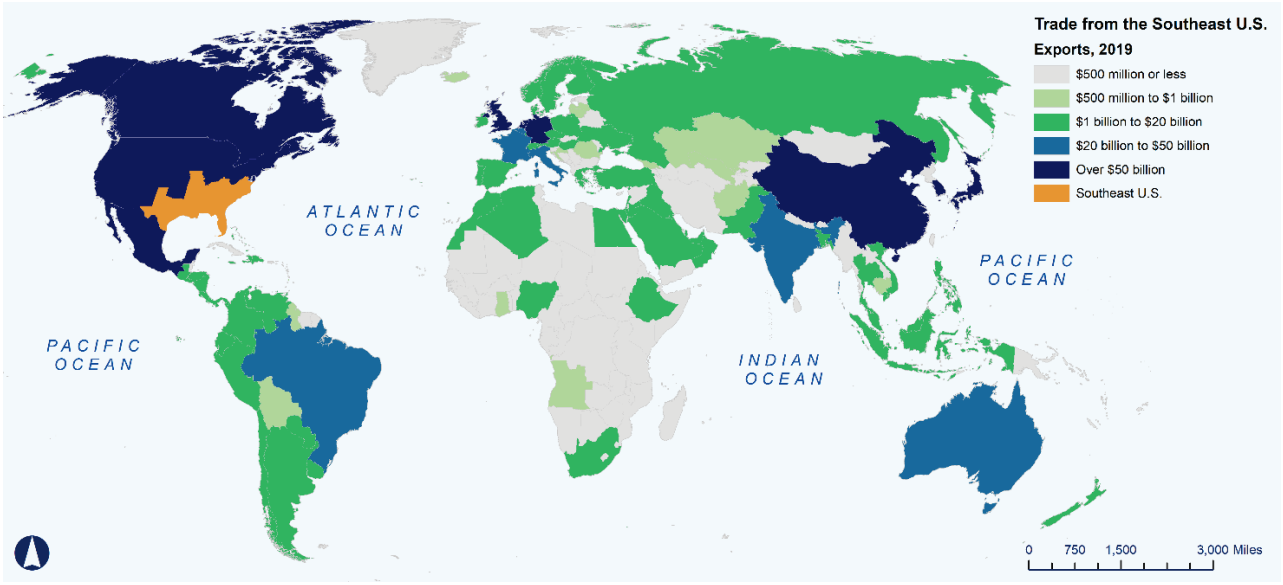
Mexico received the largest amount of goods exported from the Southeast as shown in Figure 25. In 2019, the Southeast sent over $144 billion of goods to Mexico. Canada was the second largest export destination for the Southeast at over $83 billion of goods. China was also a significant receiver of goods from the Southeast—about $45 billion.

FIGURE 24 TOTAL IMPORTS TO THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

FIGURE 25 TOTAL EXPORTS FROM THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

4.2 Freight-Generating Sectors

In addition to the freight transportation and logistics sectors, four freight-generating sectors have a large impact on the economy of the ITTS region. Freight-generating sectors are those that are major producers, consumers, or distributors of freight. This analysis classifies freight-generating sub-sectors into four broad sectors, defined in Table 16: agriculture, energy and petrochemicals, construction, and manufacturing. Table 17 presents the economic contribution of each sector in the ITTS region of over 7 million jobs and $1 trillion in GDP. The following sections discuss each sector in greater detail.

TABLE 16 FREIGHT-GENERATING SECTORS

Sector	Sub-Sector	Industry Code
Agriculture	Crop Production	NAICS 111
	Animal Production and Aquaculture	NAICS 112
	Forestry and Logging	NAICS 113
Energy and Petrochemicals	Oil and Gas Extraction	NAICS 211
	Support Activities for Mining	NAICS 213
	Petroleum and Coal Products Manufacturing	NAICS 324
	Chemical Manufacturing	NAICS 325
	Plastics and Rubber Products Manufacturing	NACIS 326
Construction	Construction	NAICS 23
Manufacturing	Food Manufacturing	NAICS 311
	Beverage and Tobacco Product Manufacturing	NAICS 312
	Textile Mills	NAICS 313

Sector	Sub-Sector	Industry Code
	Textile Product Mills	NAICS 314
	Apparel Manufacturing	NAICS 315
	Leather and Allied Product Manufacturing	NAICS 316
	Wood Product Manufacturing	NAICS 321
	Paper Manufacturing	NAICS 322
	Printing and Related Support Activities	NAICS 323
	Pharmaceutical and Medicine Manufacturing	NAICS 3254
	Nonmetallic Mineral Product Manufacturing	NAICS 327
	Primary Metal Manufacturing	NAICS 331
	Fabricated Metal Product Manufacturing	NAICS 332
	Machinery Manufacturing	NAICS 333
	Computer and Electronic Product Manufacturing	NAICS 334
	Electrical Equipment, Appliance, and Component Manufacturing	NAICS 335
	Motor Vehicle Manufacturing	NAICS 3361
	Motor Vehicle Body and Trailer Manufacturing	NAICS 3362
	Motor Vehicle Parts Manufacturing	NAICS 3363
	Aerospace Product and Parts Manufacturing	NAICS 3364
	Railroad Rolling Stock Manufacturing	NAICS 3365
	Ship and Boat Building	NAICS 3366
	Other Transportation Equipment Manufacturing	NAICS 3369
	Furniture and Related Product Manufacturing	NAICS 337
	Miscellaneous Manufacturing	NAICS 339
	Medical Equipment and Supplies Manufacturing	NAICS 3391

Source: Cambridge Systematics.

TABLE 17 ECONOMIC CONTRIBUTION FROM DIRECT EMPLOYMENT IN FREIGHT-GENERATING SECTORS FOR ITTS STATES, 2019

Sector Description	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
Agriculture	193,548	8,298	24,984
Energy and Petrochemicals	739,803	73,403	318,995
Construction	3,362,797	206,264	266,205
Manufacturing	2,851,216	180,136	430,957
Total	**7,147,364**	**468,101**	**1,041,141**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State.

4.2.1 Agriculture

Economic Contribution

Among the defined *freight-generating* or *freight-intensive* sectors, Table 18 shows total employment of each industry belonging to the Agriculture group. Results are presented at the aggregated level for the ITTS member states. A majority (53 percent) of workers under this group belong to the *Crop production* industry, with over 100,000 workers out of almost 200,000 in Agriculture for these states. Although much smaller, the *Forestry and Logging* industry shows a relatively high percentage (27 percent) of non-salaried or self-employed workers, which contrasts to the negligible size of that format for *Crop production* or *Animal Production and Aquaculture*.

TABLE 18 DIRECT EMPLOYMENT FOR AGRICULTURE SECTORS FOR ITTS STATES, 2019

NAICS	NAICS Description	Salaried Workers	Non-Salaried Workers	Total Employment
111	Crop Production	102,133	–	102,133
112	Animal Production and Aquaculture	56,517	–	56,517
113	Forestry and Logging	21,708	13,190	48,088
	Total	**180,358**	**13,190**	**193,548**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) for Salaried Workers; U.S. Census Bureau, Non-Employer Statistics (NES) for Non-Salaried Workers.

Altogether, these three industries generated almost $25 billion in GDP for the area as shown in Table 19. They also generated more than $8 billion labor earnings. *Crop production* is again the most significant stakeholder, paying 41 percent of the wages and contributing to almost 54 percent of the total output for the Agriculture group.

TABLE 19 ECONOMIC CONTRIBUTION FROM DIRECT EMPLOYMENT GENERATED BY THE AGRICULTURE SECTORS FOR ITTS STATES, 2019

NAICS	NAICS Description	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
111	Crop Production**	102,133	3,388	13,442
112	Animal Production and Aquaculture**	56,517	2,288	9,078
113	Forestry and Logging**	48,088	1,806	2,374
	Total	**193,548**	**8,298**	**24,984**

*Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and CS Estimates when indicated with **.*

Table 20 shows the direct economic contribution of the Agriculture sectors in the region. Employment, wages, and GDP shares are below 1 percent. However, the land-intensive implications of these sectors should not be overlooked since vast extensions of arable land and long corridors of freight rail infrastructure benefit from each other and have been traditionally designed to work together.

TABLE 20 SHARE OF ECONOMIC CONTRIBUTION GENERATED BY THE AGRICULTURE SECTOR FOR ITTS STATES, 2019

Item	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
All Sectors	49,799,639	2,633,462	5,465,666
Agriculture Sectors	193,548	8,298	24,984
Agriculture Sectors (Share)	0.4%	0.3%	0.4%

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and Occupational Employment and Wage Statistics (OEWS); U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and Association of American Railroads, State Data.

Goods Movement within the Southeast

Agriculture is one 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. In 2019, over 1.2 billion tons of agricultural goods worth nearly $842 billion were transported throughout the ITTS region as shown in Table 21. This represents about 31 percent of total tonnage in the U.S. and approximately 32 percent of total value.

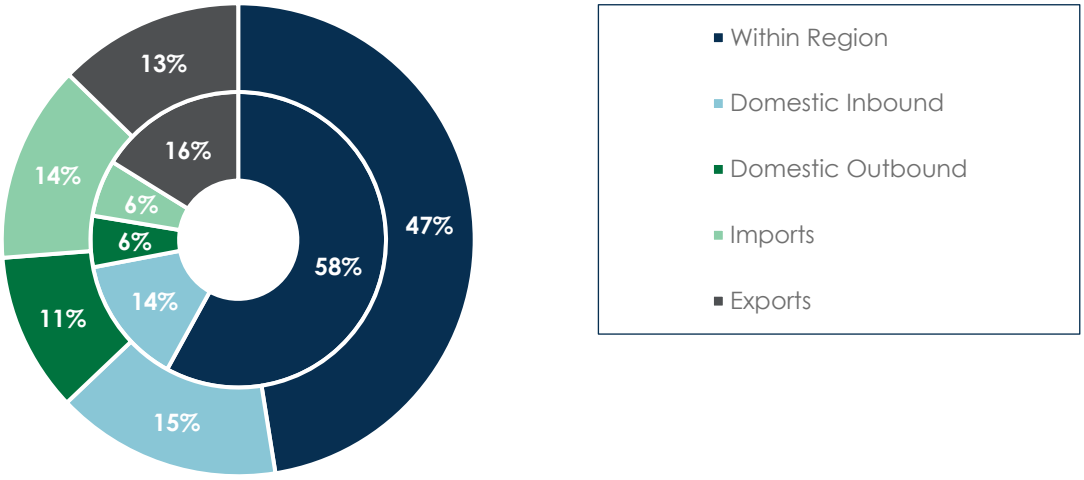
TABLE 21 PERCENT OF FOOD AND FARM TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	4,081,949		2,609,773	
Southeast	1,620,830	40%	1,155,221	44%
ITTS	1,276,865	31%	841,563	32%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

The flow of agricultural goods by tonnage and value across the Southeast in 2019 is shown in Figure 26. About 58 percent of total tonnage (representing 47 percent of total value) were moved within the region. Exports comprised the next highest share of total agricultural tonnage at approximately 16 percent. This corresponds to about 13 percent of total value. While exports comprise a greater share of total tonnage, on average imported agricultural goods are more valuable. Imports accounted for 6 percent of total agricultural tonnage but 14 percent of total value.

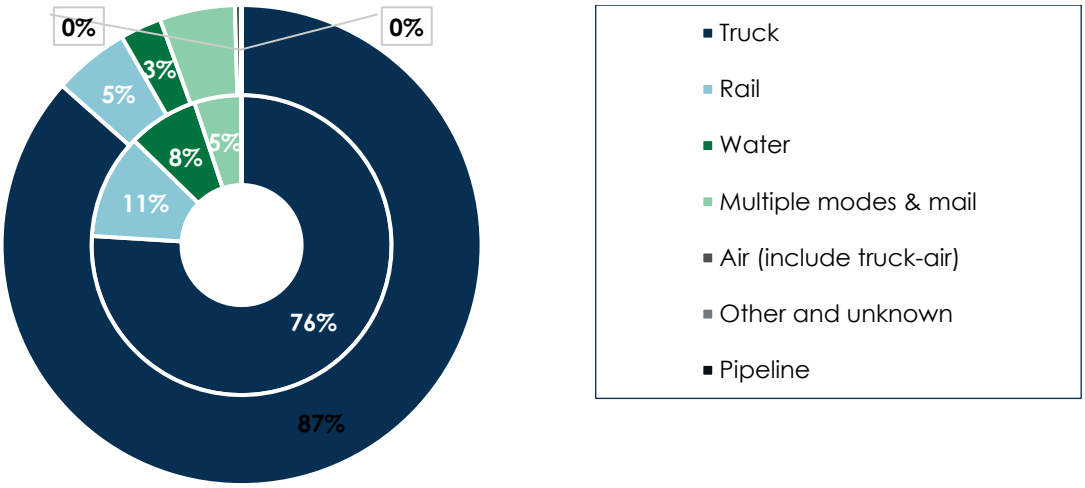
FIGURE 26 PERCENT OF FOOD AND FARM TONS (INNER) AND VALUE (OUTER) BY TRADE TYPE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

By mode, the overwhelming majority of agricultural goods transported throughout the Southeast are carried by truck. As shown in Figure 27, trucks carried 76 percent of agricultural goods by tonnage and 76 percent by value. This is followed by rail, which carries about 11 percent of the region's total agricultural tonnage, but only about 5 percent of its value. About 8 percent of agricultural tonnage is transported by water, representing approximately 3 percent of value.

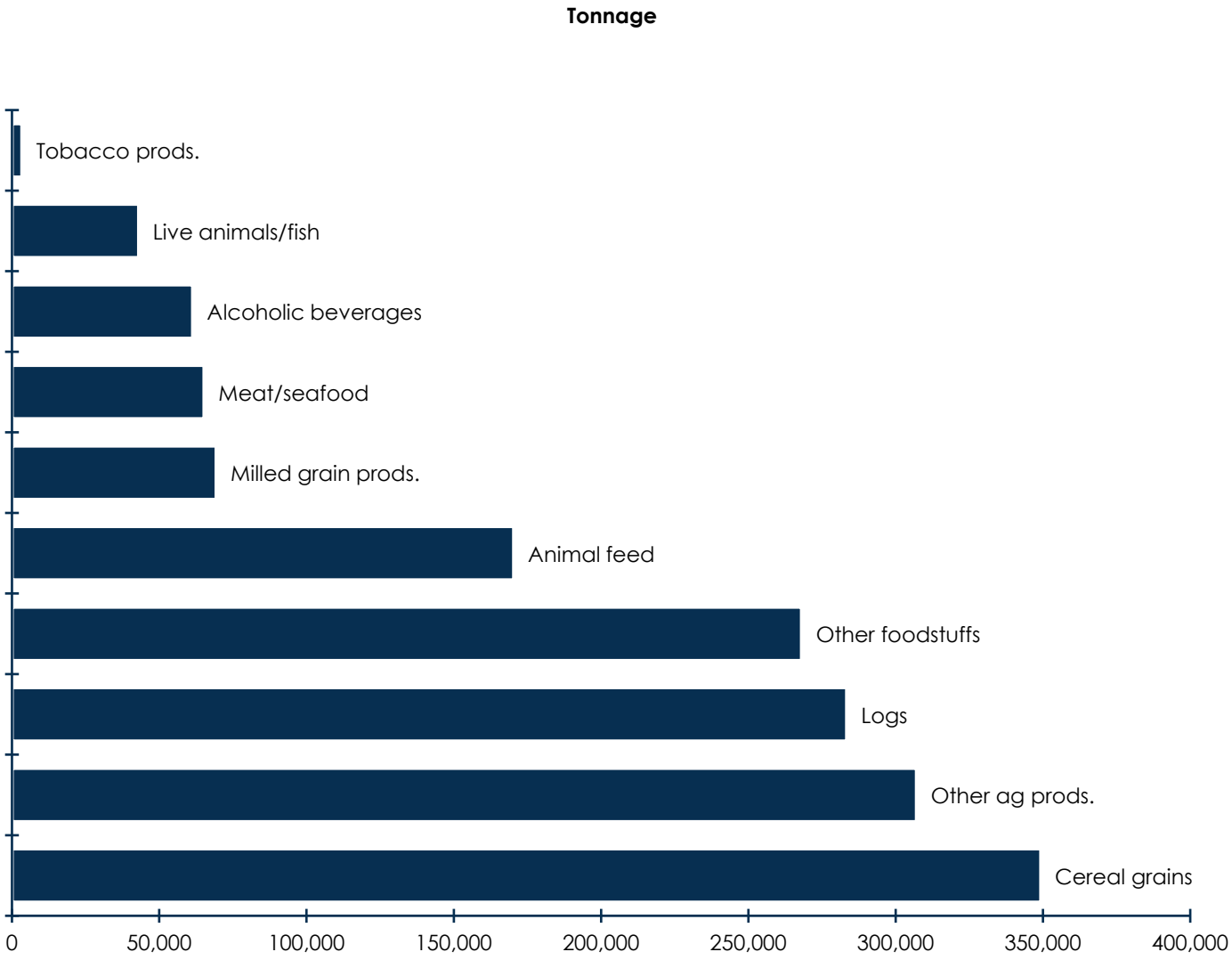
FIGURE 27 PERCENT OF FOOD AND FARM TONS (INNER) AND VALUE (OUTER) BY MODE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 28 shows the top agricultural commodities by total tonnage in 2019. Cereal grains, other agricultural products, and logs were the largest agricultural commodity types shipped in the Southeast. Over 349 million tons of cereal grains were transported in the region, which accounts for about 27 percent of the total agricultural tonnage in 2019. Cereal grains were followed by other agricultural products with about 307 million tons—about 24 percent of total agricultural tonnage. Logs, other foodstuffs, and animal feed also comprised large shares of agricultural tonnage—about 13 percent to 22 percent each.

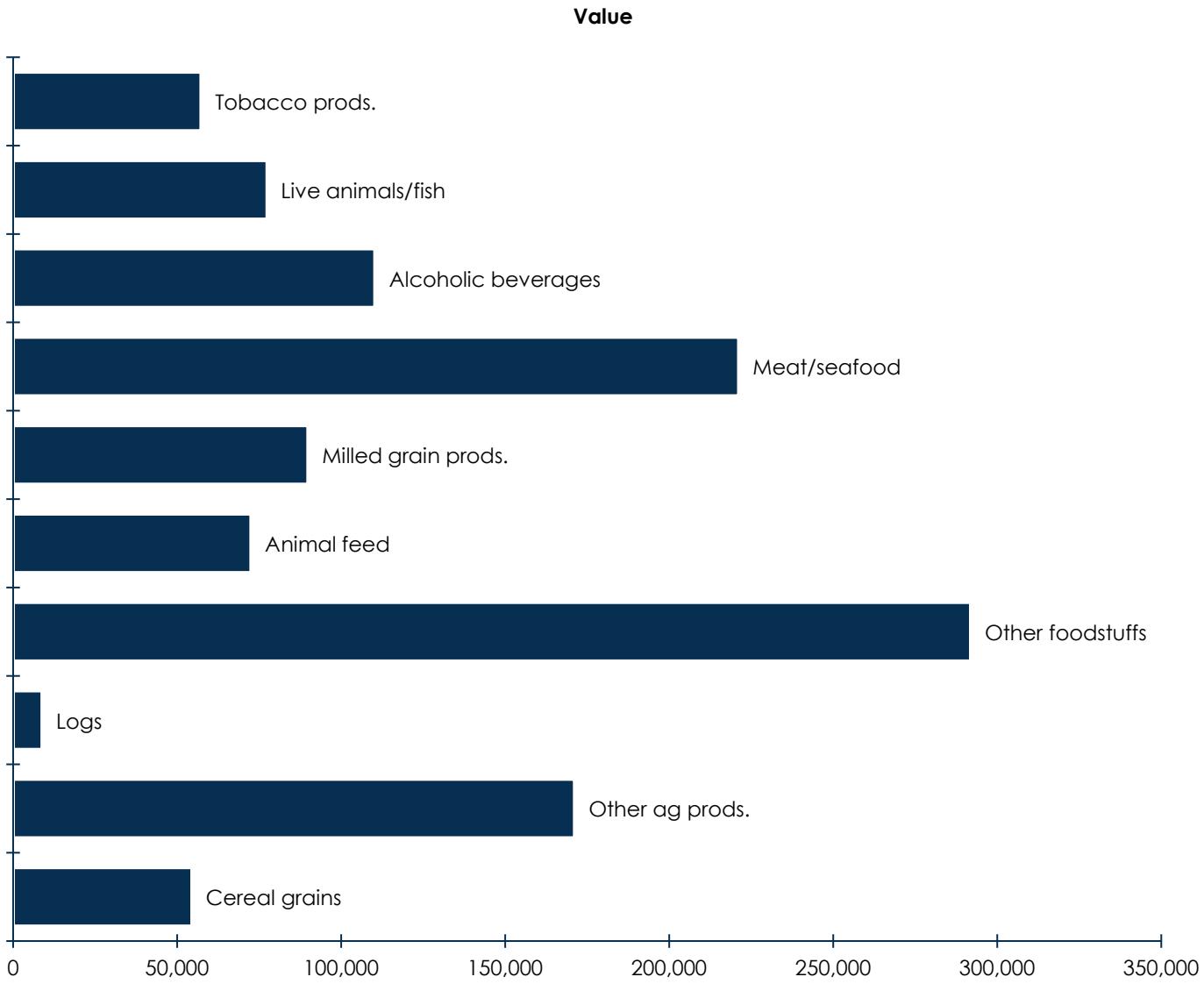
FIGURE 28 TOP FOOD AND FARM COMMODITIES BY TOTAL TONNAGE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

By value, other foodstuffs were the top commodity in 2019 as shown in Figure 29. They accounted for nearly $292 billion of agricultural goods transported throughout the region. Other foodstuffs are followed by meat/seafood and other agricultural products as the highest value commodities in the Southeast at over $221 billion and $171 billion, respectively. Alcoholic beverages ($110 billion) and milled grain products (nearly $90 billion) are also top agricultural commodities.

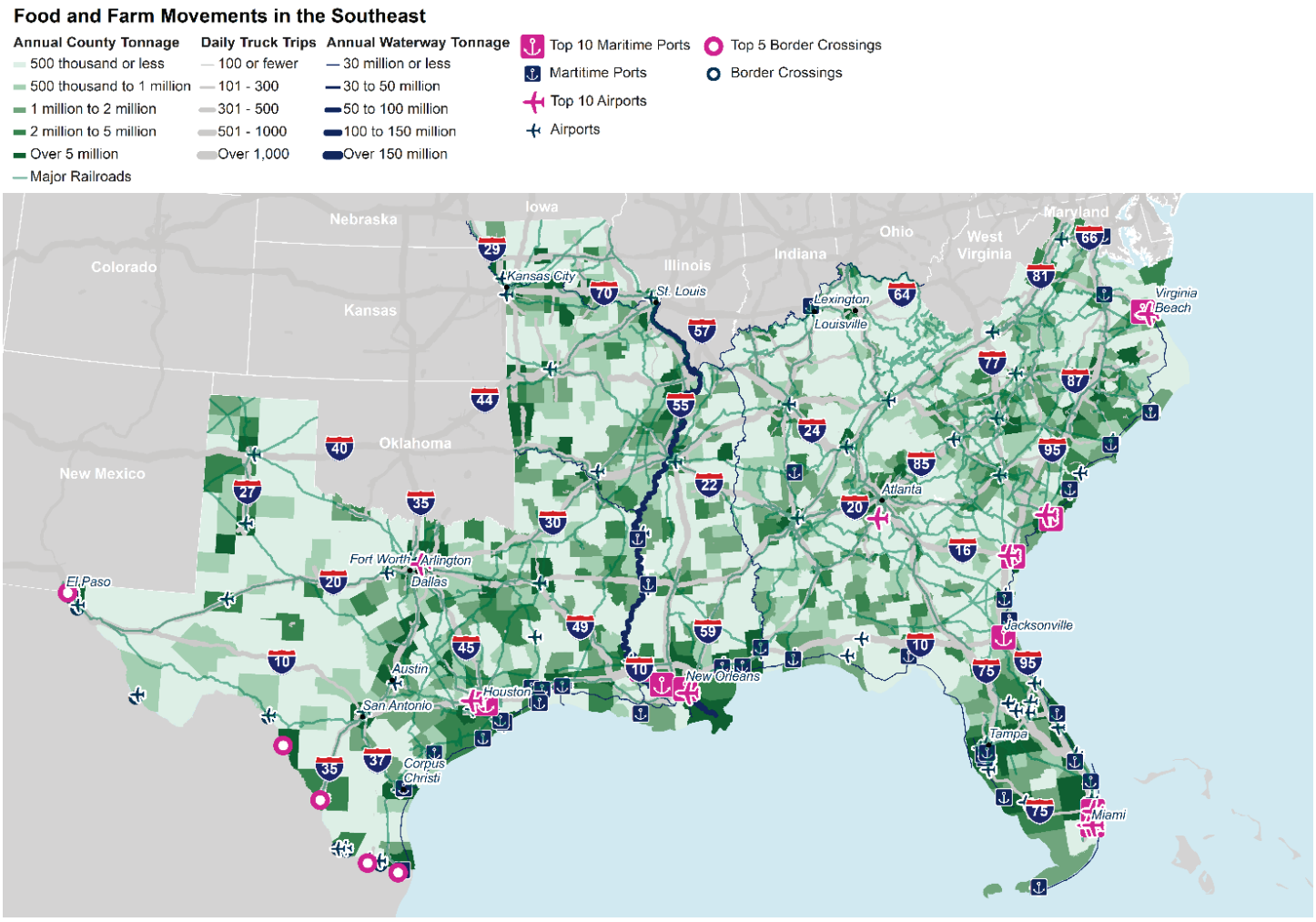
FIGURE 29 TOP FOOD AND FARM COMMODITIES BY TOTAL VALUE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 30 shows the spatial distribution of agricultural commodity movements across the Southeast at the county level. It also shows the volume of these movements by highway and waterway corridor. Overall, Figure 30 highlights how agricultural productivity is broadly distributed throughout the region. Notably, the Mississippi River features prominently as a freight corridor. The Port of New Orleans serves as a major gateway for international agricultural trade via barge for multiple Southeast and Midwest states.

FIGURE 30 FOOD AND FARM MOVEMENTS IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Total International Trade

Over 173 million tons of agricultural goods were imported into and exported out of the ITTS region in 2019 as shown in Table 22. This represents almost 60 percent of total international trade for agricultural goods for the U.S. In terms of value, agricultural goods imported or exported to or from ITTS states comprise nearly 41 percent of the national total.

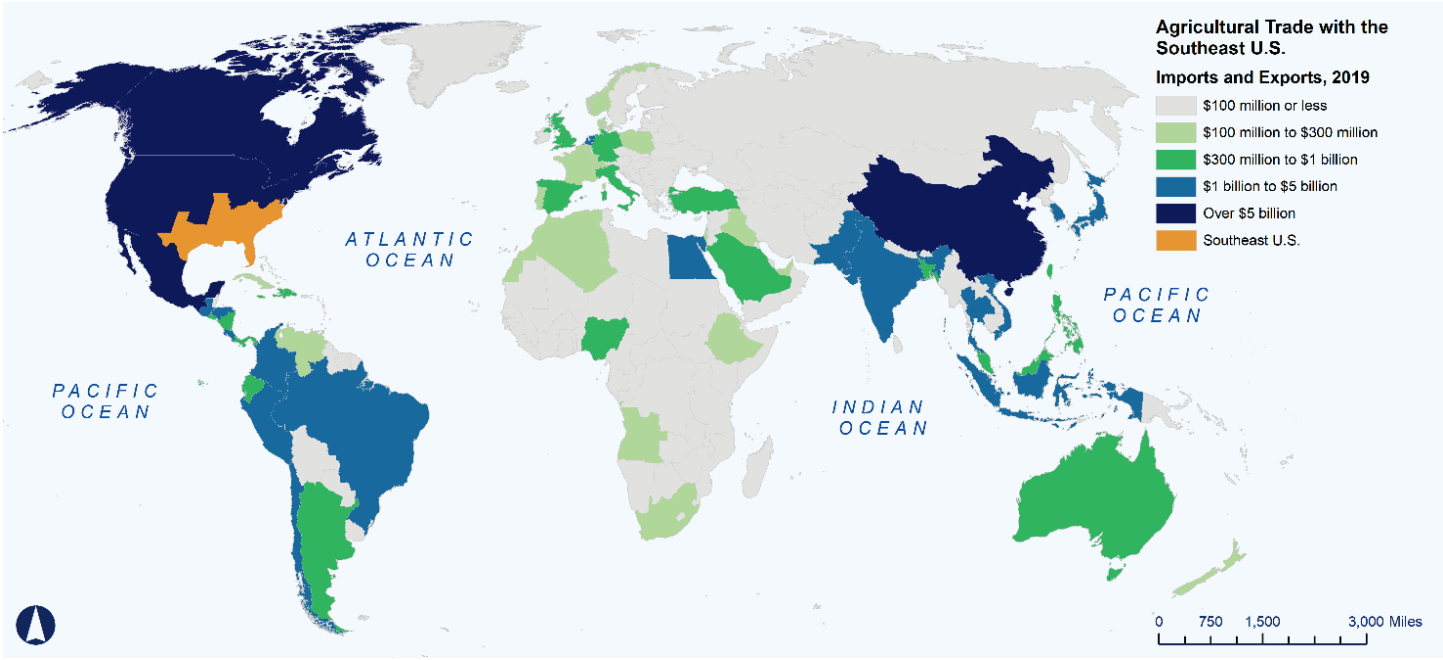
TABLE 22 INTERNATIONAL AGRICULTURAL TRADE TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	290,194		$201,283	
Southeast	174,842	60.2%	$84,213	41.8%
ITTS	172,963	59.6%	$81,900	40.7%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 31 depicts total international agricultural trade by value for the Southeast. Mexico, Canada, and China represent top trading partners. Those nations traded approximately $15 billion, $7.5 billion, and $6.8 billion in agricultural goods with the Southeast in 2019. Additionally, Singapore and Colombia also represent large agricultural trading partners by total value.

FIGURE 31 TOTAL AGRICULTURAL INTERNATIONAL TRADE WITH THE SOUTHEAST, 2019

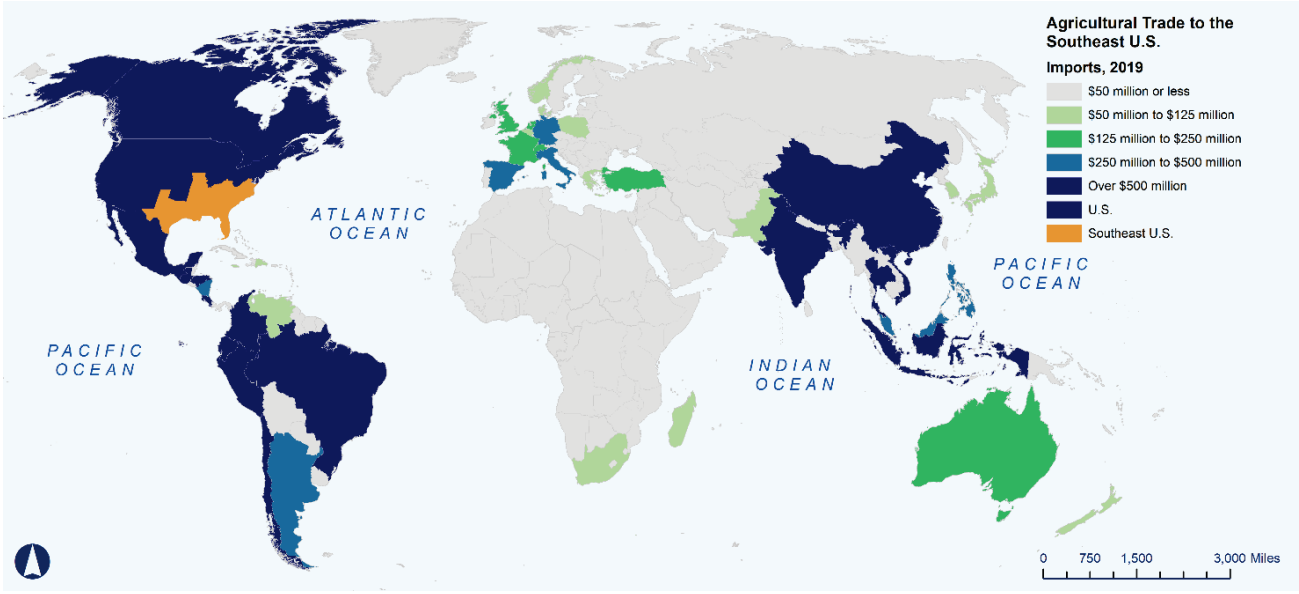


Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 32 and Figure 33 break out agricultural international trade data for the Southeast by imports and exports, respectively. Mexico was the largest source of goods imported to the Southeast as shown in Figure 32. The Southeast received over $8.2 billion of agricultural goods from Mexico in 2019. Canada, Singapore, and Chile also sent substantial amounts of goods to the Southeast when measured by total value. In 2019, Canada sent over $3.6 billion of agricultural goods to the Southeast. Singapore and Chile shipped over $2.9 billion and $2.1 billion in agricultural goods, respectively.

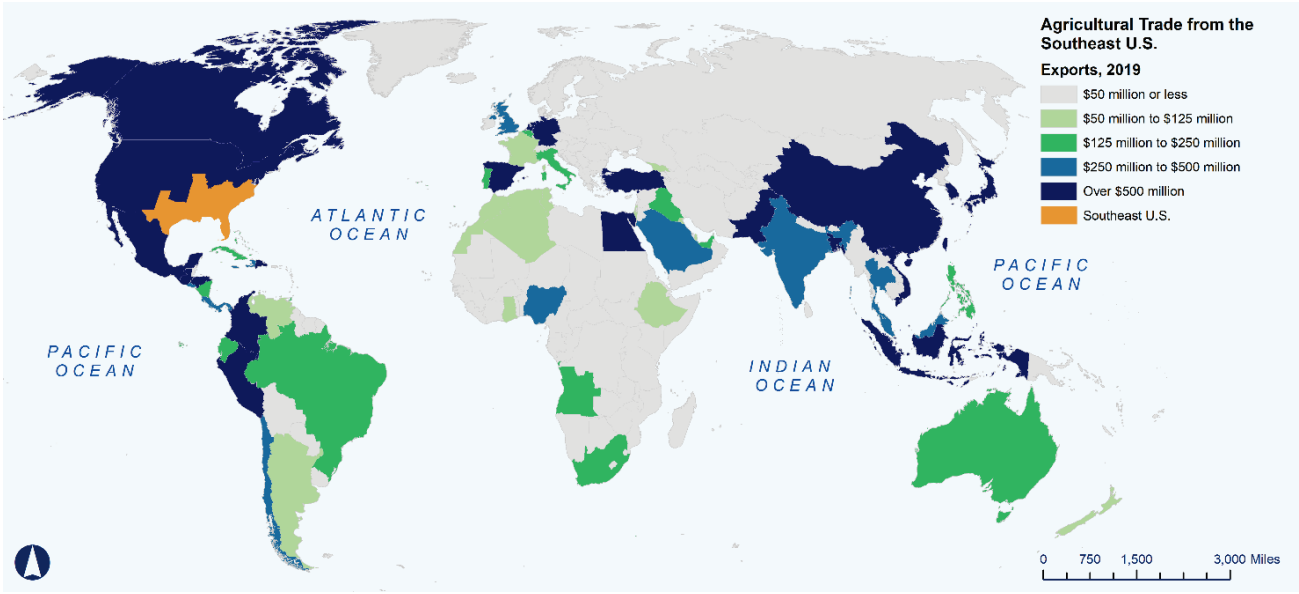
Mexico was also the largest receiver of agricultural goods exported from the Southeast as shown in Figure 33. In 2019, the Southeast sent over $8.3 billion of agricultural goods to Mexico. China was the second largest export destination for the Southeast at over $5.7 billion of agricultural goods. Canada was also a significant receiver of goods from the Southeast at $3.8 billion.

FIGURE 32 AGRICULTURAL IMPORTS TO THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

FIGURE 33 AGRICULTURAL EXPORTS FROM THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

4.2.2 Construction

Economic Contribution

Construction represents a heavy freight user and generator. Regardless of the type of construction, voluminous materials need to be transported to produce and deliver. Extended practices like the hiring of contractors might explain how non-salaried workers represent 30 percent of total employment (see Table 23). The latter was well beyond 3 million workers in 2019.

TABLE 23 DIRECT EMPLOYMENT FOR CONSTRUCTION SECTORS FOR ITTS STATES, 2019

NAICS	NAICS Description	Salaried Workers	Non-Salaried Workers	Total Employment
23	Construction	2,347,137	1,015,660	3,362,797
	Total	**2,347,137**	**1,015,660**	**3,362,797**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) for Salaried Workers; U.S. Census Bureau, Non-Employer Statistics (NES) for Non-Salaried Workers.

Construction is also relevant for added-value metrics (Table 24), representing $206 billion in wages (more than any other of the considered groups) and $266 billion in GDP (greater than, for example, the whole freight and logistics group). It is true however, that the way the size of the workforce translates into total output is not as straightforward as in high-unit-value industries like the aforementioned related to petroleum and its derivatives. Construction consists of 7 percent of total employment in the region, and 8 percent of the labor earnings (Table 25). As indicated, related GDP does not keep this performance proportionally, but still represents a more than relevant participation rate of 5 percent.

TABLE 24 ECONOMIC CONTRIBUTION FROM DIRECT EMPLOYMENT GENERATED BY THE CONSTRUCTION SECTOR FOR ITTS STATES, 2019

NAICS	NAICS Description	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
23	Construction	3,362,797	206,264	266,205
	Total	**3,362,797**	**206,264**	**266,205**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State.

TABLE 25 SHARE OF ECONOMIC CONTRIBUTION GENERATED BY THE CONSTRUCTION SECTOR FOR ITTS STATES, 2019

Item	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
All Sectors	49,799,639	2,633,462	5,465,666
Construction Sector	3,362,797	206,264	266,205
Construction Sector (Share)	7%	8%	5%

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and Occupational Employment and Wage Statistics (OEWS); U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and Association of American Railroads, State Data.

Goods Movement within the Southeast

In 2019 about 8.3 billion tons of construction goods worth over $7.6 trillion were transported to, from, or within the ITTS region as shown in Table 26. This represents about 41 percent of total tonnage in the U.S. and approximately 40 percent of total value.

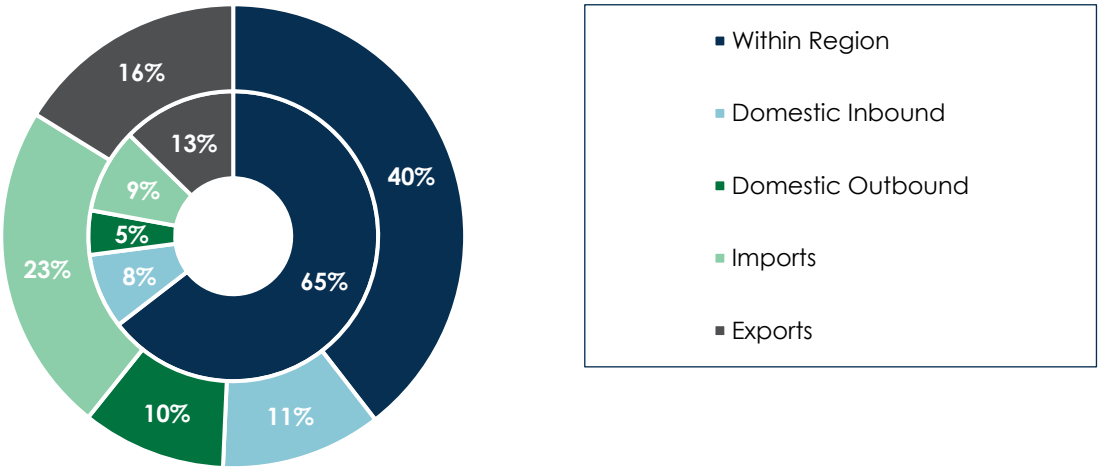
TABLE 26 PERCENT OF CONSTRUCTION TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	20,228,193		18,989,964	
Southeast	10,270,756	51%	10,818,867	57%
ITTS	8,306,075	41%	7,641,564	40%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 34 shows the flow of construction goods by tonnage across the Southeast by direction in 2019. In 2019, almost 65 percent of all freight tonnage (about 40 percent of total value) were moved within the region. Exports of construction goods comprised the next highest share of total tonnage by direction at approximately 13 percent. This corresponds to about 16 percent of total value. Interestingly, imports of construction goods accounted for 9 percent of total tonnage, but 23 percent of total value.

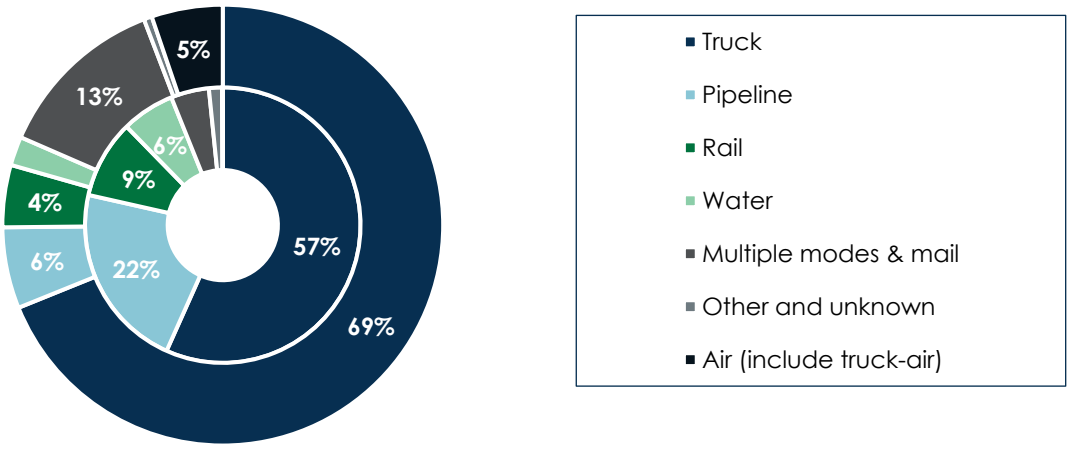
FIGURE 34 PERCENT OF TONS (INNER) AND VALUE (OUTER) BY TRADE TYPE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

In terms of mode, Figure 35 shows that the majority of construction goods by tonnage (57 percent) and value (69 percent) are transported throughout the region by truck. This is followed by pipeline which carries about 22 percent of the region's total tonnage of construction-related goods (e.g., fuel, chemicals), but only about 6 percent of its value. Though multiple modes and mail (which includes rail intermodal) only carries about 4 percent of the region's total tonnage, it accounts for 13 percent of total value.

FIGURE 35 PERCENT OF TONS (INNER) AND VALUE (OUTER) BY MODE IN THE SOUTHEAST, 2019

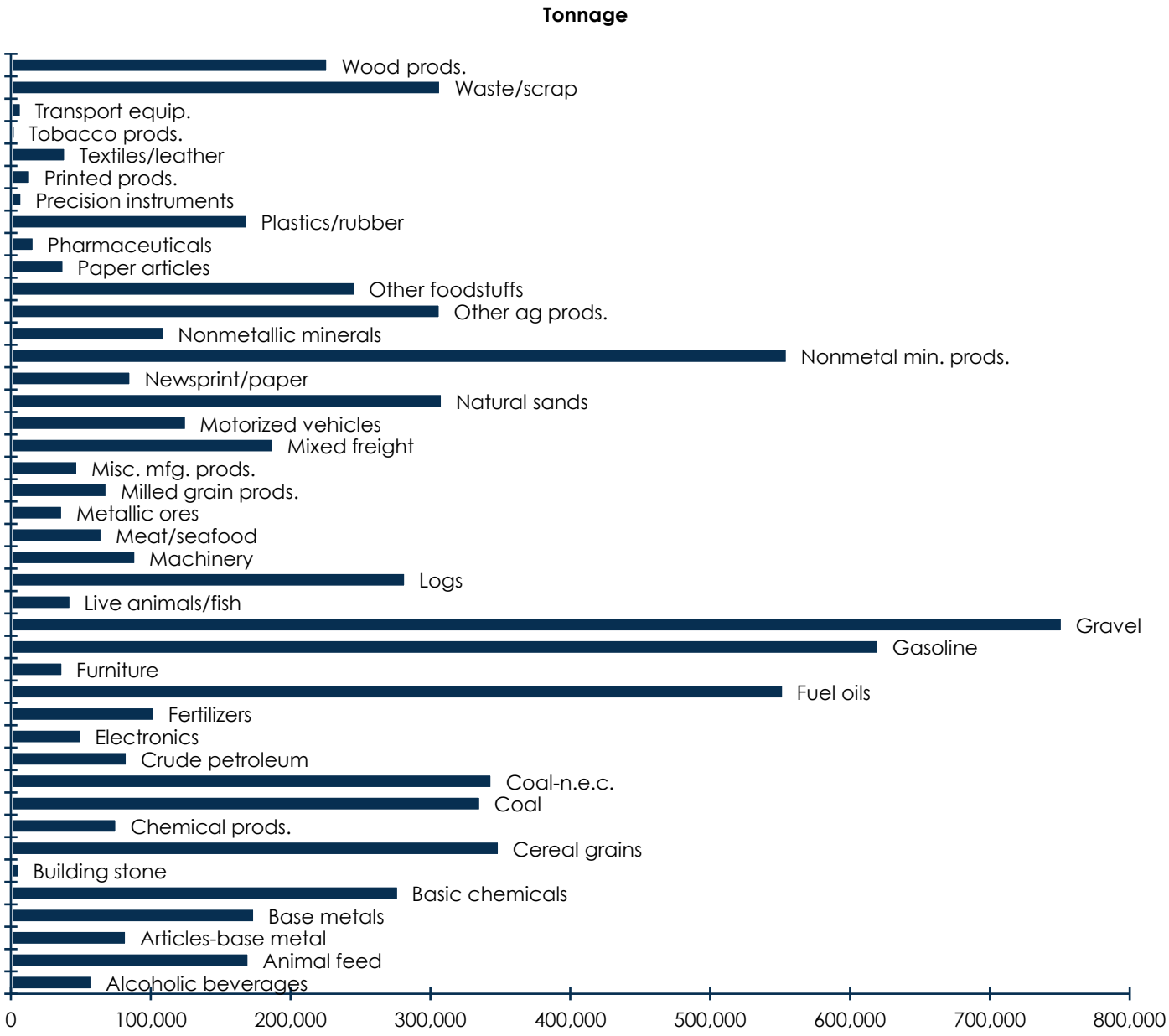


Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

The top construction commodities by total tonnage across all directions for 2019 are shown in Figure 36. Bulk goods including gravel, gasoline, nonmetal mineral products, and fuel oils were the largest commodity types shipped in the ITTS region. Nearly 752 million tons of gravel were transported in the region, which accounts for

about 9 percent of the total tonnage in 2019. This was followed by gasoline with about 6.2 million tons, nonmetallic mineral products (e.g., sand) with nearly 5.6 million tons, and fuel oils with about 5.5 million tons.

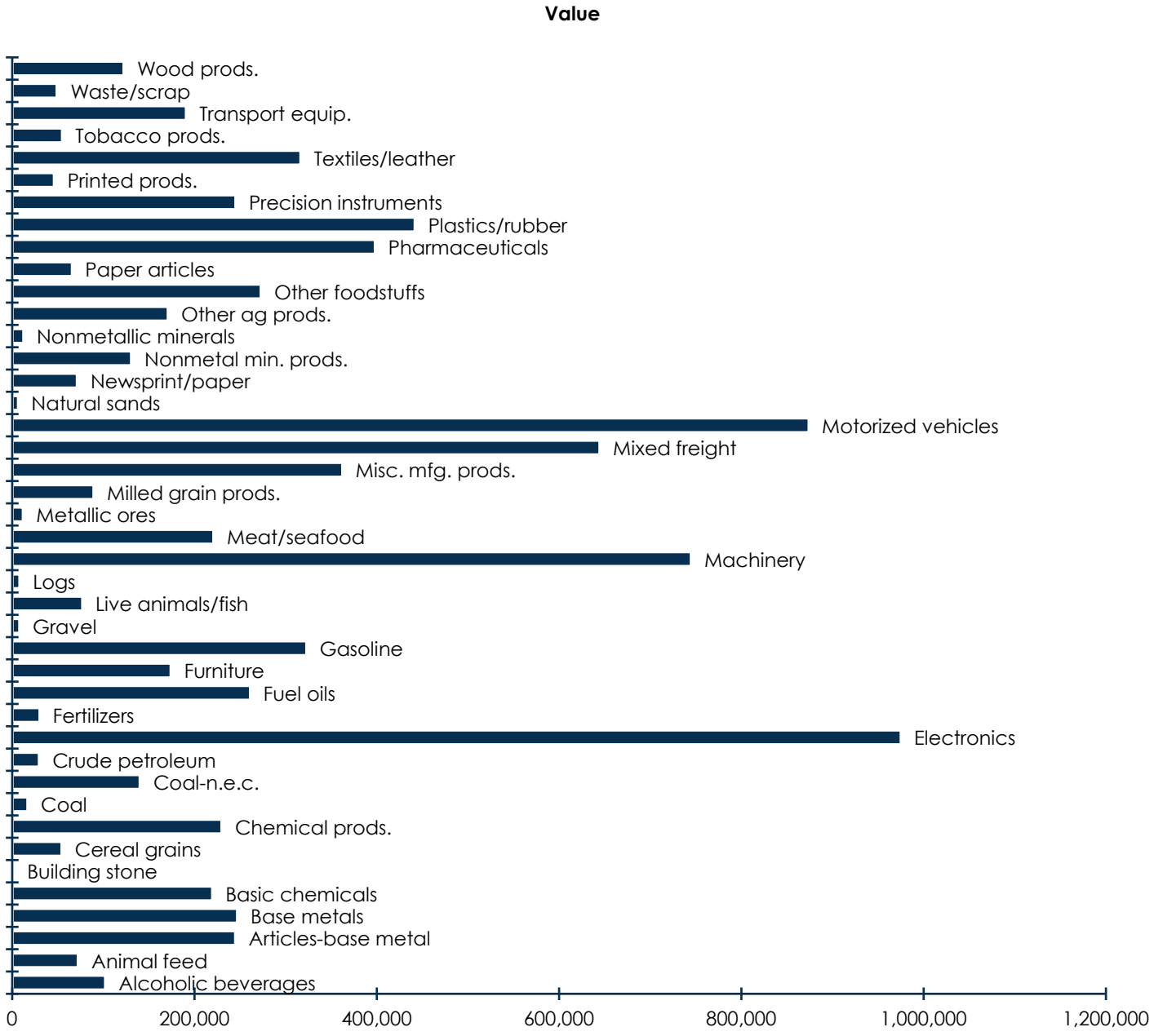
FIGURE 36 TOP COMMODITIES BY TOTAL TONNAGE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

By value in 2019 (as opposed to by weight), Figure 37 shows that the top construction-related commodity in 2019 was electronics. In 2019, electronics transported throughout the region were valued at over $973 billion. Electronics were followed by motorized vehicles as the highest value commodity in the ITTS region at over $874 billion. Machinery ($745 billion) and mixed freight ($645 billion) were also top commodities.

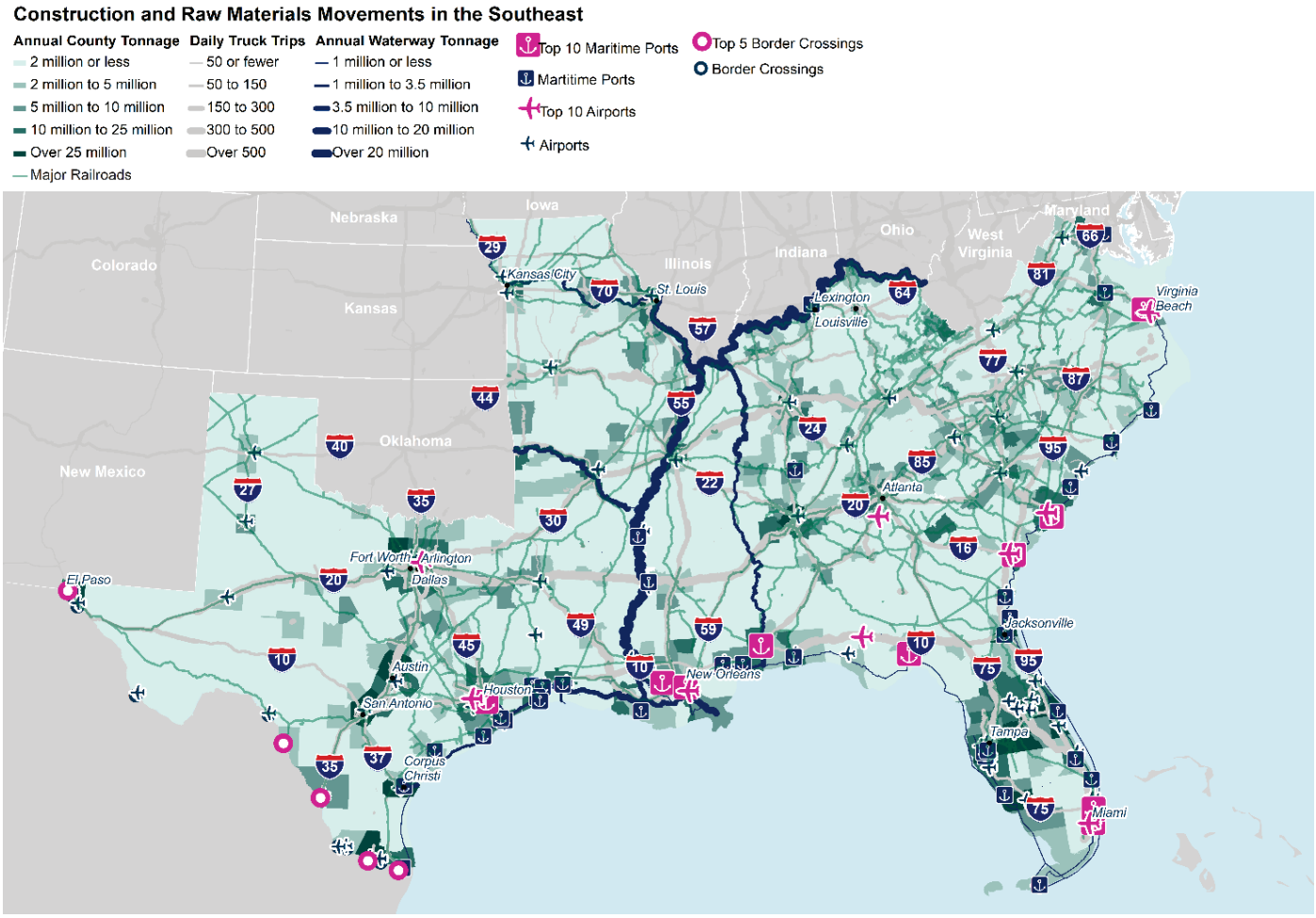
FIGURE 37 TOP COMMODITIES BY TOTAL VALUE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 38 shows the spatial distribution of construction commodity movements across the Southeast at the county level. It also shows the volume of these movements by highway and waterway corridor. Central Florida, Metro Birmingham, Metro Atlanta, Greenville-Spartanburg, and the Texas Triangle (i.e., the megaregion formed by the Dallas-Fort Worth, Houston, Austin, and San Antonio regions) are all centers of freight activity for these commodities. Additionally, the Mississippi River, Arkansas River, and the Tennessee-Tombigbee Waterway carry substantial volumes of construction commodities.

FIGURE 38 CONSTRUCTION AND RAW MATERIALS MOVEMENTS IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Total International Trade

Over 1.34 billion tons of construction goods were imported into and exported out of the ITTS region in 2019 as shown in Table 27. This represents nearly 55 percent of total international trade for the U.S. In terms of value, construction goods imported or exported to or from ITTS states comprise nearly 44 percent of the total national value.

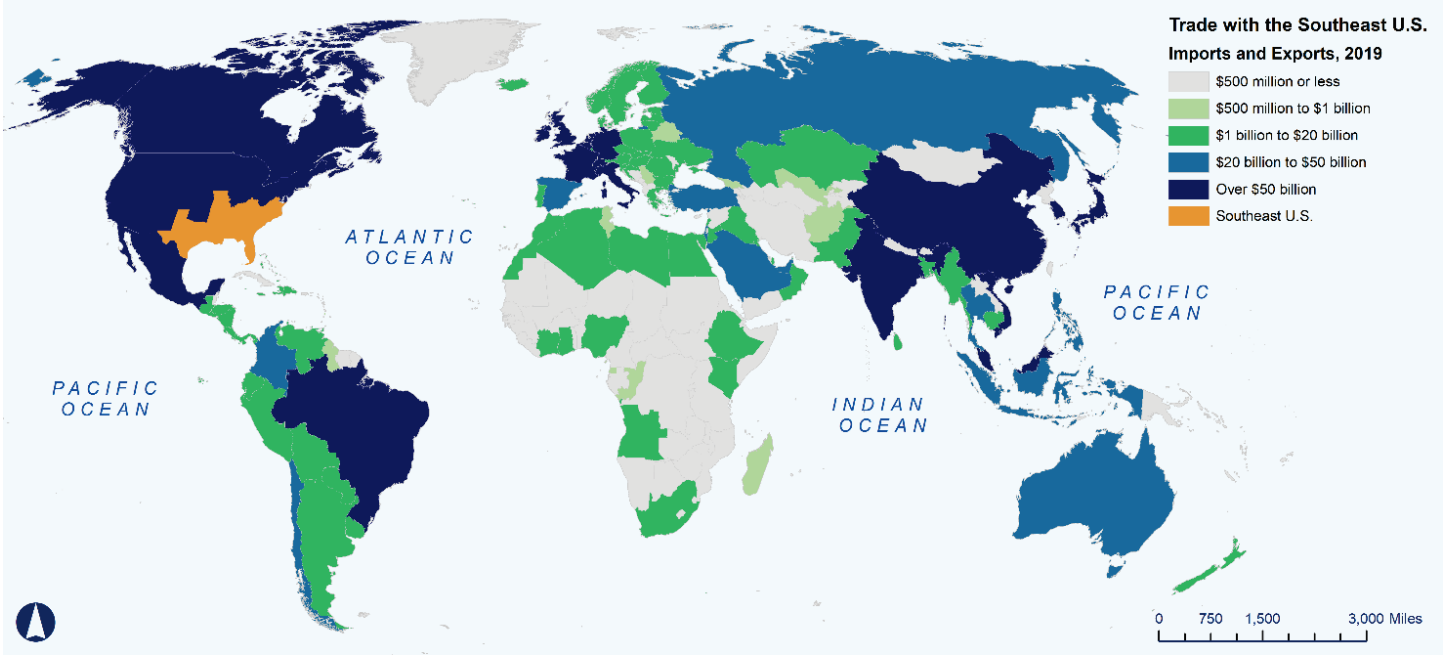
TABLE 27 INTERNAITONAL CONSTRUCTION TRADE TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	2,403,186		3,862,651	
Southeast	1,370,218	57.0%	1,865,210	48.3%
ITTS	1,312,646	54.6%	1,688,400	43.7%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 39 depicts total international trade of construction goods by value with the Southeast. Mexico, China, Canada, and Japan represent top trading partners for the Southeast with Mexico being largest trading partner. In 2019, Mexico traded over $307.6 billion in goods with the Southeast. China and Canada traded over $179.2 billion and $171.4 billion with the Southeast, respectively. Japan accounted for approximately $145 billion in trade.

FIGURE 39 TOTAL INTERNATIONAL CONSTRUCTION TRADE WITH THE SOUTHEAST, 2019

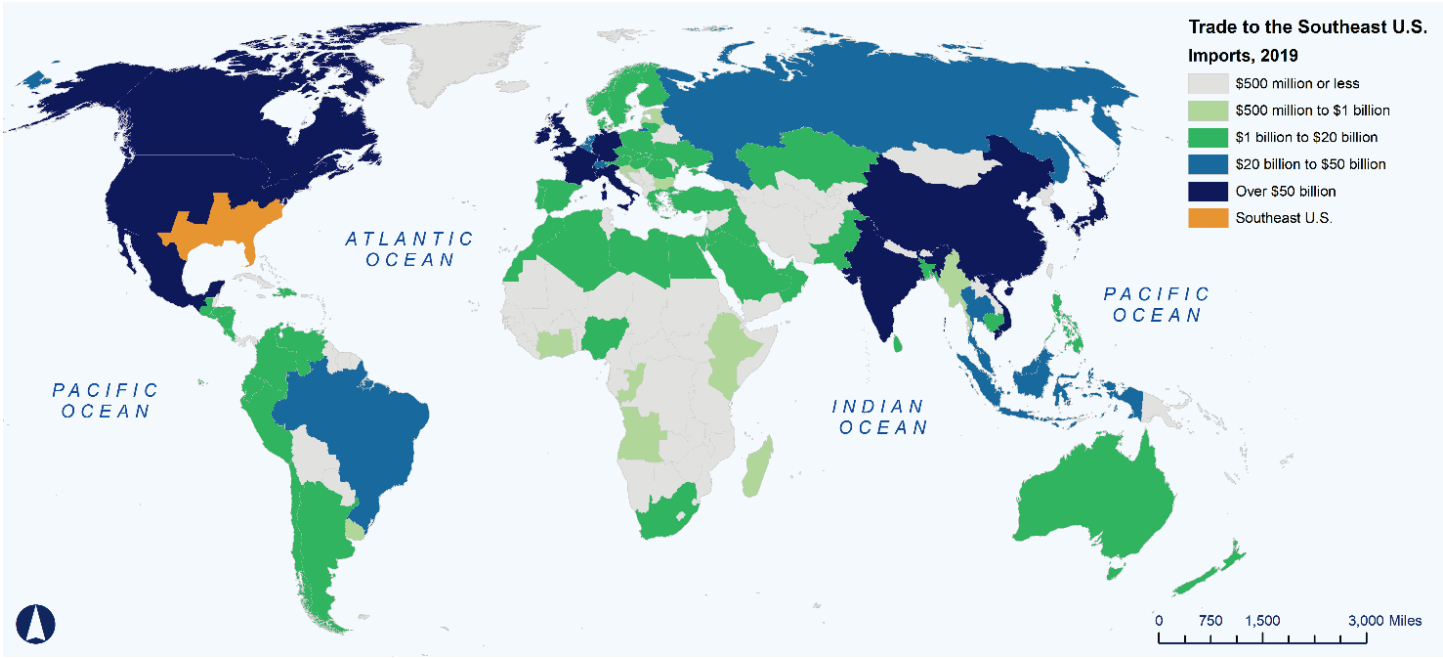


Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

International trade data for the Southeast is broken out by imports and exports in Figure 40 and Figure 41, respectively. Mexico and China were the largest source of construction goods imported to the Southeast as shown in Figure 40. The Southeast received over $163 billion and $133 billion of construction goods from those nations in 2019. Canada, Japan, and Germany also shipped substantial values of goods to the Southeast. In 2019, Canada sent nearly $62 billion of goods to the Southeast while Japan shipped over $58 billion. About $50 billion of goods were imported from Germany.

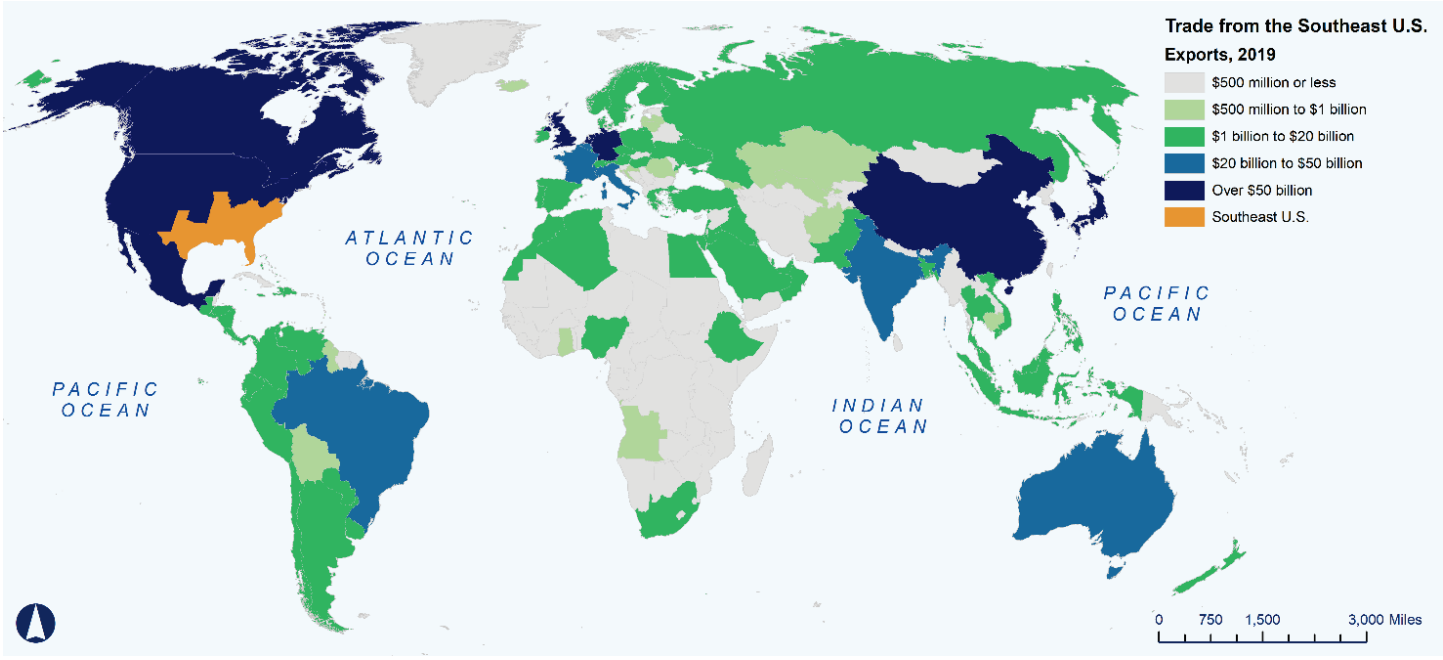
Mexico received the largest amount of construction goods exported from the Southeast as shown in Figure 41. In 2019, the Southeast sent over $144 billion of goods to Mexico. Canada was the second largest export destination for the Southeast at over $83 billion of goods. China was also a significant receiver of goods from the Southeast—about $45 billion.

FIGURE 40 TOTAL CONSTRUCTION IMPORTS TO THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

FIGURE 41 TOTAL CONSTRUCTION EXPORTS FROM THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

4.2.3 Energy and Petrochemicals

Economic Contribution

Regarding the Energy and Petrochemicals group, *Support activities for mining* and *Chemical manufacturing* (excluding *Pharmaceutical and medicine manufacturing*, which has been grouped under the Manufacturing group) contributed almost equally to employment under this category: about 27 percent points each (Table 28). Another 24 percent of total employment belonged to *Plastics and rubber products manufacturing*. *Oil and gas extraction* was the only industry were non-salaried workers had an unusually high participation rate. Overall, the group employed more than 700,000 people.

TABLE 28 DIRECT EMPLOYMENT FOR ENERGY AND PETROCHEMICAL SECTOR FOR ITTS STATES, 2019

NAICS	NAICS Description	Salaried Workers	Non-Salaried Workers	Total Employment
211	Oil and Gas Extraction	84,179	24,962	109,141
213	Support Activities for Mining	193,492	11,098	204,590
324	Petroleum and Coal Products Manufacturing	46,716	1,079	47,795
325	Chemical Manufacturing (except 3254)	197,177	11,138	202,074
326	Plastics and Rubber Products Manufacturing	175,009	1,194	176,203
	Total	**696,573**	**43,230**	**739,803**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) for Salaried Workers; U.S. Census Bureau, Non-Employer Statistics (NES) for Non-Salaried Workers. 325 Chemical Manufacturing ignores sub-industry 3254 Pharmaceutical and Medicine Manufacturing, included as part of the Manufacturing Sectors.

With regard to labor earnings and GDP, industries proved to have different ways of adding value, with more or less linearity as compared to employment (Table 29). Besides the previously highlighted *Support activities for mining* and *Chemical manufacturing*, *Oil and gas extraction* produced nearly as much in wages ($19 billion) with approximately half of the workforce. The respective shares of the latter were about 15 percent of total employment but over a quarter of the labor earnings. GDP, in turn, showed these differences even more exacerbated: *Oil and gas extraction* generated $118 billion out of a total of $319 billion for the group altogether (37 percent). After *Chemical manufacturing*'s second place ($78 billion or 25 percent), *Petroleum and coal products manufacturing*, which had been smallest in terms of employment, came third by contributing $69 billion or 22 percent of the Energy and Petrochemicals sectors' total output.

TABLE 29 ECONOMIC CONTRIBUTION FROM DIRECT EMPLOYMENT GENERATED BY THE ENERGY AND PETROCHEMICAL SECTOR FOR ITTS STATES, 2019

NAICS	NAICS Description	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
211	Oil and Gas Extraction	109,141	18,591	118,076
213	Support Activities for Mining	204,590	20,195	32,059
324	Petroleum and Coal Products Manufacturing	47,795	5,970	68,849
325	Chemical Manufacturing (except 3254)**	202,074	19,021	78,238
326	Plastics and Rubber Products Manufacturing	176,203	9,626	21,773
	Total	**739,803**	**73,403**	**318,995**

*Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and CS Estimates when indicated with **.*

The direct economic contribution from Energy and Petrochemicals sectors is visible at Table 30. In spite of its workforce consisting of only 1 percent of that across the 10 states, wages raise to 3 percent indicating how rewarding these industries are. Moreover, GDP share doubles to 6 percent of the whole economy, showing even higher benefits for non-labor factors in these sectors.

TABLE 30 SHARE OF ECONOMIC CONTRIBUTION GENERATED BY THE ENERGY AND PETROCHEMICAL SECTOR FOR ITTS STATES, 2019

Item	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
All Sectors	49,799,639	2,633,462	5,465,666
Energy and Petrochemicals Sectors	739,803	73,403	318,995
Energy and Petrochemicals Sectors (Share)	1%	3%	6%

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and Occupational Employment and Wage Statistics (OEWS); U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and Association of American Railroads, State Data.

Goods Movement within the Southeast

As shown in Table 31, in 2019 over 4.3 billion tons of energy and petrochemical goods worth over $2 trillion were transported throughout the ITTS region. This represents about 50 percent of total tonnage in the U.S. and approximately 49 percent of total value.

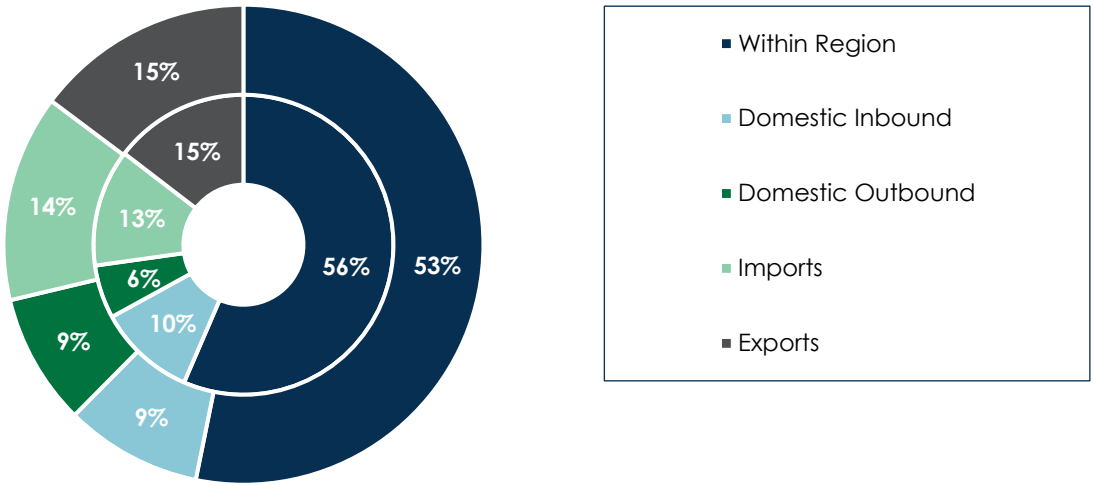
TABLE 31 PERCENT OF PETROCHEMICAL TONS AND VALUE BY REGION

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	8,668,968		4,197,466	
Southeast	5,147,958	59%	2,573,715	61%
ITTS	4,340,306	50%	2,077,358	49%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 42 shows the flow of petrochemicals (tonnage and value) across the Southeast by direction in 2019. About 56 percent of petrochemicals (comprising about 53 percent of total value) were moved within the region. About 15 percent of petrochemicals, both tonnage and value, were exported from the Southeast. Approximately 13 percent of petrochemicals were imported into the region representing about 14 percent of total value.

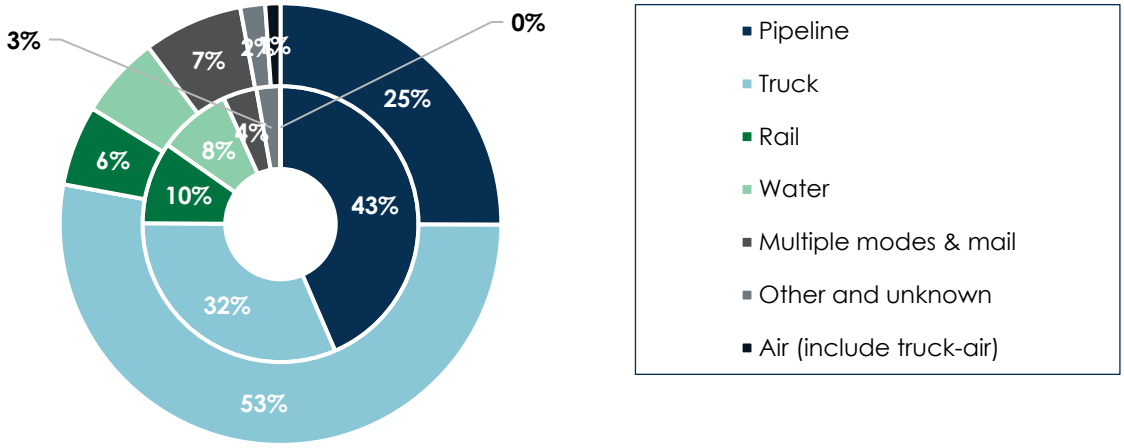
FIGURE 42 PERCENT OF PETROCHEMICAL TONS (INNER) AND VALUE (OUTER) BY TRADE TYPE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 43 shows the distribution of petrochemicals by mode in 2019. Pipeline and truck are the predominant modes for these commodities. About 43 of the total tonnage of petrochemicals are transported by truck, which corresponds to approximately 25 percent of total value. Truck was the next highest mode carrying approximately 32 percent of total tonnage. Interestingly, petrochemicals transported by truck are generally more valuable than those transported by pipeline. Those shipped by truck represented about 53 percent of total value. Rail and water also carry substantial shares of petrochemicals throughout the Southeast. They carry about 10 percent and 8 percent of petrochemicals by tonnage, respectively. This corresponds to 6 percent each of total value.

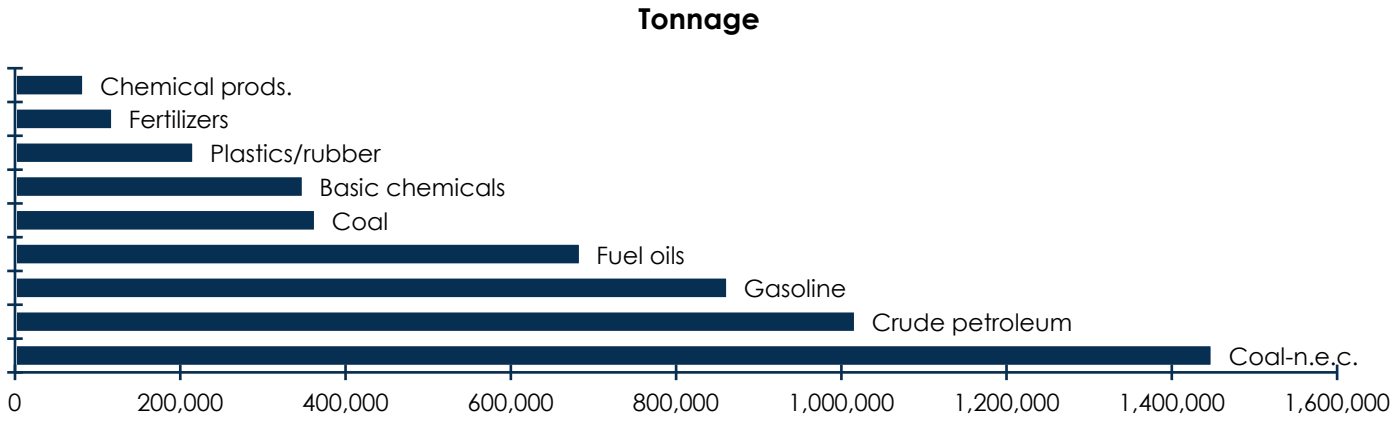
FIGURE 43 PERCENT OF PETROCHEMICAL TONS (INNER) AND VALUE (OUTER) BY MODE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

The top petrochemical commodities by total tonnage for 2019 are shown in Figure 44. Coal—n.e.c.[4], crude petroleum, and gasoline were the largest petrochemical commodity types shipped in the Southeast. Over 1.4 billion tons of coal—n.e.c. was transported in the region, which accounts for about 33 percent of the total petrochemical tonnage. This is followed by crude petroleum with over 1 billion tons (23 percent of total tonnage), gasoline with about 863 million tons (20 percent of total tonnage), and fuel oils with nearly 685 million tons (16 percent of total tonnage).

FIGURE 44 TOP PETROCHEMICAL COMMODITIES BY TOTAL TONNAGE IN THE SOUTHEAST, 2019

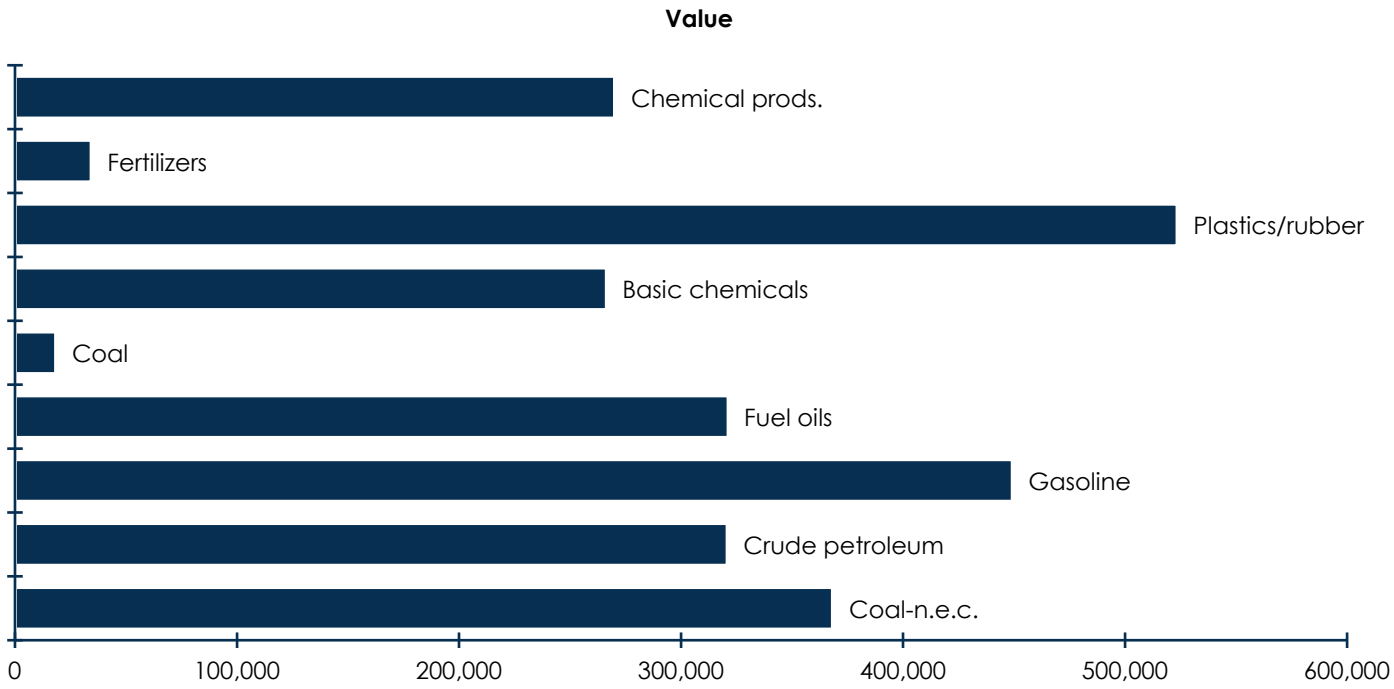


Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

[4] The coal n.e.c. (not elsewhere classified) commodity group consists of petroleum products refined petroleum oils, liquefied natural gas, liquefied propane, gases, and other products derived from coal and petroleum.

By value in 2019, Figure 45 shows that the top petrochemical commodity in 2019 was plastics/rubber. Plastics/rubber transported throughout the Southeast was valued at over $523 billion (25 percent of total value). Plastics/rubber was followed by gasoline as the highest value commodity in the Southeast at over $449 billion (22 percent of total value). Coal—n.e.c. ($368 billion, 18 percent of total value) and fuel oils ($321 billion, 15 percent of total value) were also top commodities.

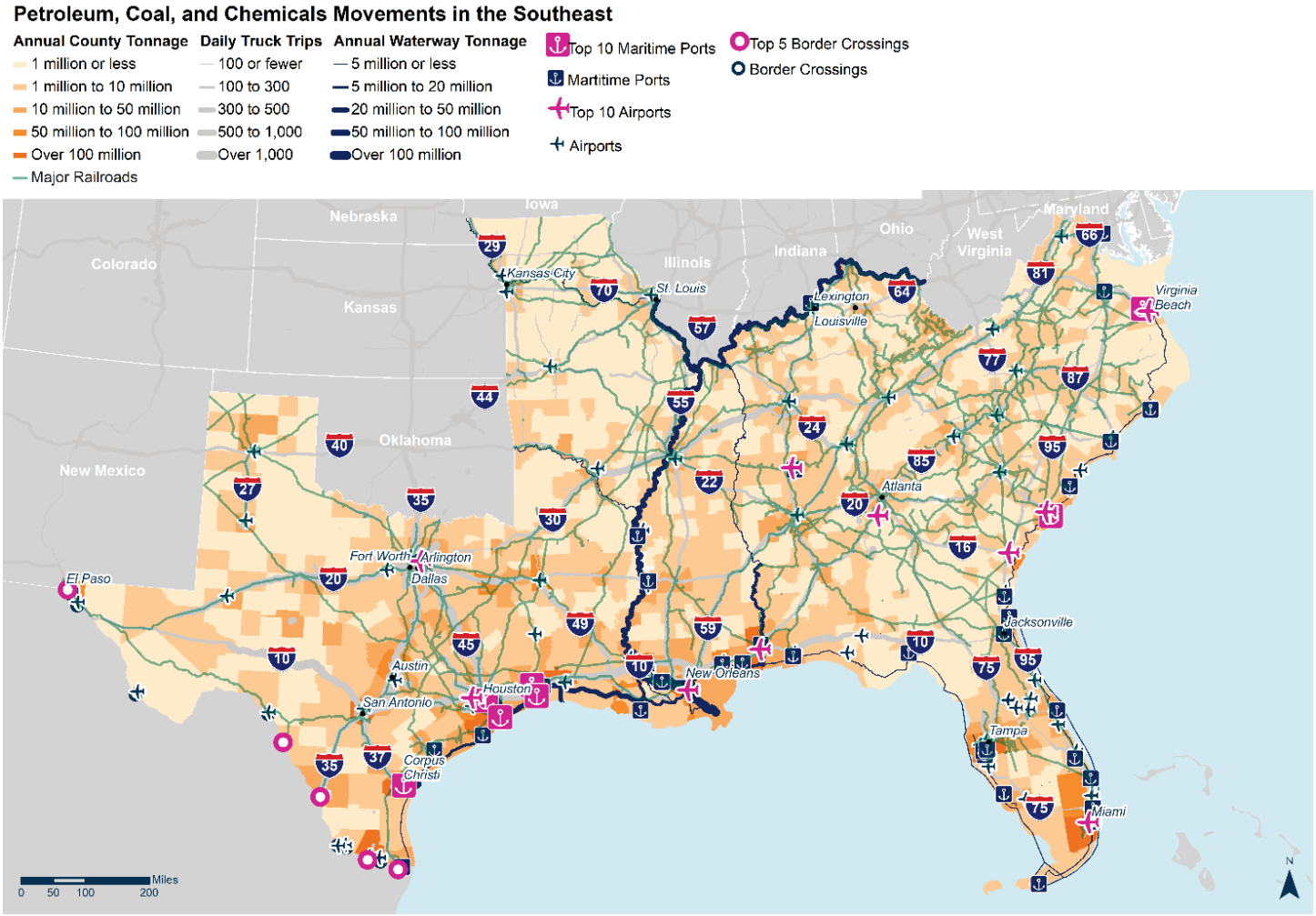
FIGURE 45 TOP PETROCHEMICAL COMMODITIES BY TOTAL VALUE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 46 shows the spatial distribution of petrochemical movements across the Southeast at the county level. Petrochemical movements are most active in west Texas, the Gulf Coast, and near the Tampa and Miami seaports. Barge movements along the Mississippi River and the Tennessee-Tombigbee Waterway are also prominent as these are major freight corridors for petrochemicals.

FIGURE 46 PETROLEUM, COAL, AND CHEMICAL MOVEMENTS IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Total International Trade

Over 1.4 billion tons of petrochemical goods were imported into and exported out of the ITTS region in 2019 as shown in Table 32. This represents over 58 percent of total international trade for petrochemical goods for the U.S. In terms of value, petrochemical goods traded with ITTS states comprise nearly 54 percent of the national total.

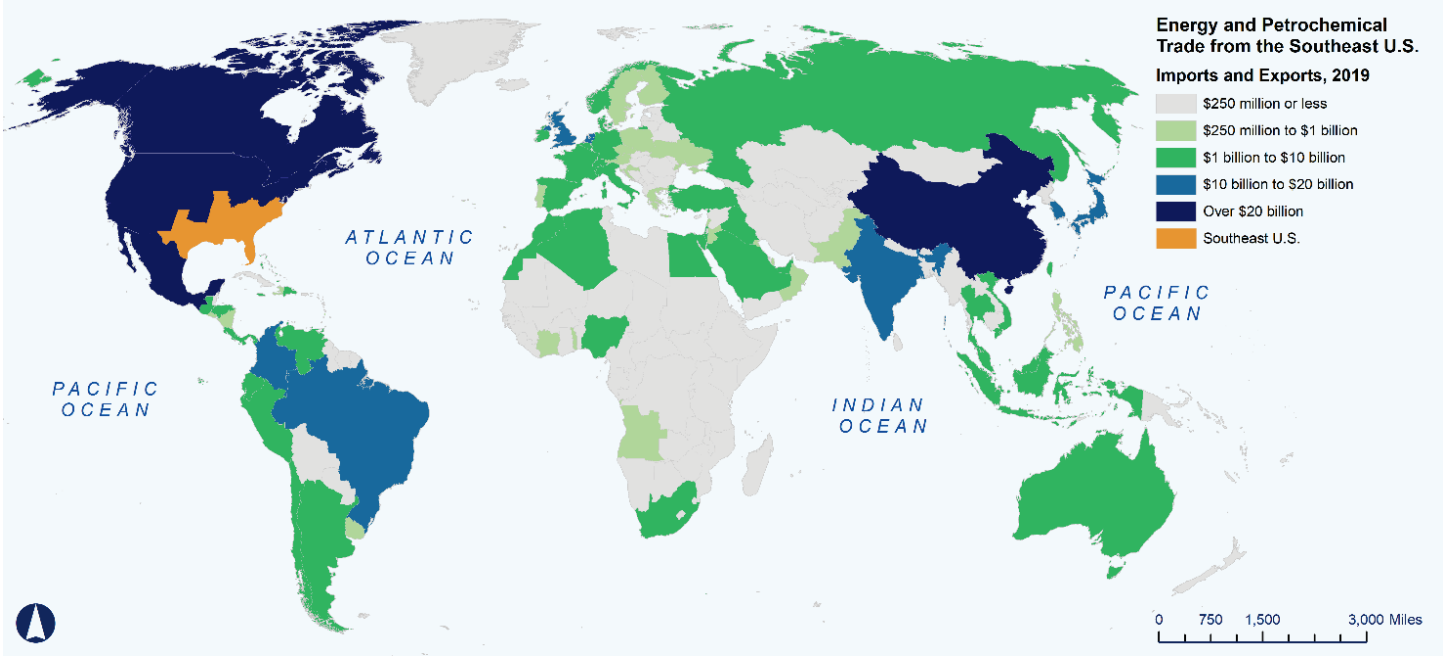
TABLE 32 INTERNATIONAL PETROCHEMICAL TRADE TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	1,401,698		$739,088	
Southeast	847,058	60.4%	$415,599	56.2%
ITTS	817,936	58.4%	$395,089	53.5%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Mexico, Canada, and China are the Southeast's top trading partners for petrochemicals by value as shown in Figure 47. Those nations traded approximately $66 billion, $42 billion, and $20.7 billion in petrochemical goods with the region in 2019, respectively. In addition to these nations, South Korea and Brazil also represent top trading partners.

FIGURE 47 INTERNATIONAL PETROCHEMICAL TRADE WITH THE SOUTHEAST, 2019



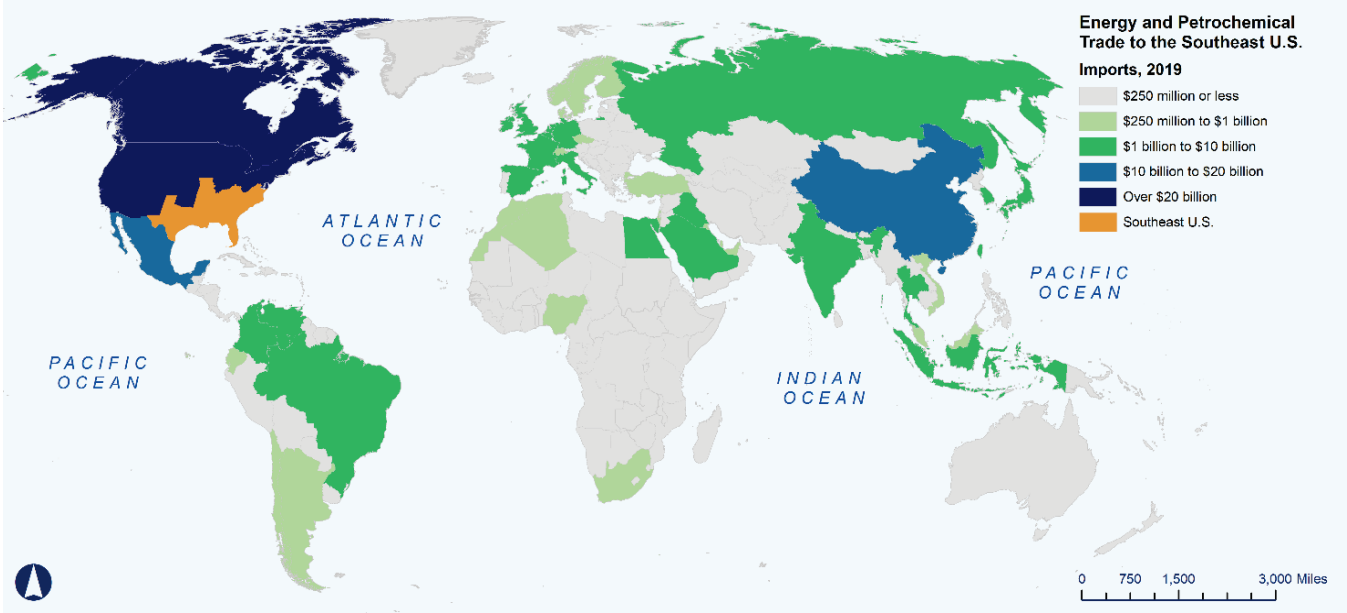
Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 48 and Figure 49 show trade data for petrochemical goods for the Southeast by imports and exports, respectively. Canada, Mexico, and China were the largest sources of petrochemical goods shipped to the Southeast. Canada was the largest source of petrochemical goods by value for the Southeast at nearly $20.3 billion in 2019. Canada was followed by Mexico at nearly $16.9 billion of petrochemical goods shipped to the Southeast. China accounted for $11.2 billion in petrochemical goods.

Mexico and Canada were the largest export destinations for the Southeast's petrochemical goods. As shown in Figure 49, Mexico received over $49 billion of petrochemical goods from the Southeast. Canada was the

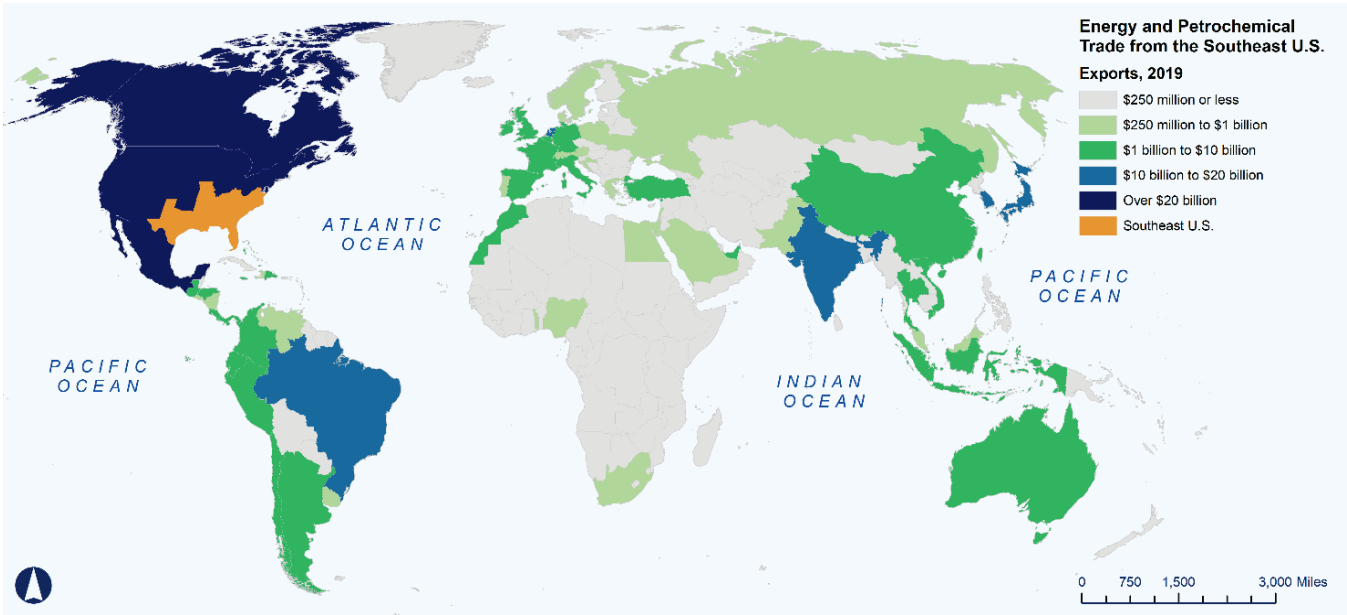
second largest receiver for the Southeast at nearly $21.6 billion of petrochemical goods. Brazil and South Korea also received significant amounts of the Southeast's petrochemical goods at approximately $16.1 billion and $15.3 billion, respectively.

FIGURE 48 INTERNATIONAL PETROCHEMICAL TRADE TO THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

FIGURE 49 INTERNATIONAL PETROCHEMICAL TRADE FROM THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

4.2.4 *Manufacturing*

Economic Contribution

Manufacturing encompasses a variety of industries where both inputs and outputs are moved across considerable distances to follow their specific supply chains. As shown in Table 33, the three most significant industries in terms of employment were *Food manufacturing*, *Fabricated metal product manufacturing*, and *Machinery manufacturing*. Their respective number of workers were 426,000 (15 percent), 358,000 (14 percent), and 278,000 (10 percent), accounting altogether for approximately 38 percent of the group's total employment of 2.8 million people.

TABLE 33 DIRECT EMPLOYMENT FOR THE MANUFACTURING SECTOR FOR ITTS STATES, 2019

NAICS	NAICS Description	Salaried Workers	Non-Salaried Workers	Total Employment
311	Food Manufacturing	408,981	17,338	426,319
312	Beverage and Tobacco Product Manufacturing	67,013	1,330	68,343
313	Textile Mills	42,538	537	43,075
314	Textile Product Mills	50,182	1,226	51,408
315	Apparel Manufacturing	19,276	7,574	26,850
316	Leather and Allied Product Manufacturing	8,547	1,467	10,014
321	Wood Product Manufacturing	126,398	6,209	132,607
322	Paper Manufacturing	102,867	345	103,212
323	Printing and Related Support Activities	96,769	8,700	105,469
3254	Pharmaceutical and Medicine Manufacturing	42,231	673	42,904
327	Nonmetallic Mineral Product Manufacturing	121,316	2,552	123,868
331	Primary Metal Manufacturing	80,862	1,267	82,129
332	Fabricated Metal Product Manufacturing	346,539	11,565	358,104
333	Machinery Manufacturing	273,335	4,741	278,076
334	Computer and Electronic Product Manufacturing	189,358	2,514	191,872
335	Electrical Equipment, Appliance, and Component Manufacturing	99,579	2,101	101,680
3361	Motor Vehicle Manufacturing	69,907	–	69,907
3362	Motor Vehicle Body and Trailer Manufacturing	36,346	–	36,346

NAICS	NAICS Description	Salaried Workers	Non-Salaried Workers	Total Employment
3363	Motor Vehicle Parts Manufacturing	127,900	–	127,900
3364	Aerospace Product and Parts Manufacturing	135,778	–	135,778
3365	Railroad Rolling Stock Manufacturing	5,435	–	5,435
3366	Ship and Boat Building	84,044	–	84,044
3369	Other Transportation Equipment Manufacturing	9,460	–	9,460
337	Furniture and Related Product Manufacturing	94,075	5,944	100,019
339	Miscellaneous Manufacturing (except 3391)	61,887	14,651	76,538
3391	Medical Equipment and Supplies Manufacturing	57,608	2,251	59,859
	Total	**2,758,231**	**92,985**	**2,851,216**

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) for Salaried Workers; U.S. Census Bureau, Non-Employer Statistics (NES) for Non-Salaried Workers. 339 Miscellaneous Manufacturing ignores sub-industry 3391 Medical Equipment and Supplies Manufacturing, which is separately included in the table.

Food manufacturing is the most prominent industry for GDP generation, where its $63 billion totaled 15 percent among a group consisting of over 25 sectors (see Table 34). However, the industry that followed it was *Computer and electronic product manufacturing*, proving to represent a capital-intensive market and producing almost $46 billion (11 percent) in added value. Wages had this same industry as its leader, with 12 percent of the market share (or almost $22 billion in earnings out of more than $180 billion total). Similar amounts were earned at *Fabricated metal product manufacturing*, *Machinery manufacturing*, and again *Food manufacturing*. These four industries altogether accounted for 45 percent of total wages among this group.

TABLE 34 ECONOMIC CONTRIBUTION FROM DIRECT EMPLOYMENT GENERATED BY THE MANUFACTURING SECTOR FOR ITTS STATES, 2019

NAICS	NAICS Description	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
311	Food Manufacturing**	426,319	19,002	63,408
312	Beverage and Tobacco Product Manufacturing**	68,343	4,083	13,624
313	Textile Mills**	43,075	1,948	3,597
314	Textile Product Mills**	51,408	2,213	4,087
315	Apparel Manufacturing**	26,850	966	1,039
316	Leather and Allied Product Manufacturing**	10,014	385	414
321	Wood Product Manufacturing	132,607	6,262	12,396

NAICS	NAICS Description	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
322	Paper Manufacturing	103,212	7,334	18,869
323	Printing and Related Support Activities	105,469	4,851	8,836
3254	Pharmaceutical and Medicine Manufacturing**	42,904	3,971	20,593
327	Nonmetallic Mineral Product Manufacturing	123,868	7,248	18,934
331	Primary Metal Manufacturing	82,129	5,658	14,283
332	Fabricated Metal Product Manufacturing	358,104	20,920	38,101
333	Machinery Manufacturing	278,076	19,520	42,215
334	Computer and Electronic Product Manufacturing	191,872	21,879	45,790
335	Electrical Equipment, Appliance, and Component Manufacturing	101,680	6,759	15,904
3361	Motor Vehicle Manufacturing**	69,907	6,008	17,782
3362	Motor Vehicle Body and Trailer Manufacturing**	36,346	1,753	5,189
3363	Motor Vehicle Parts Manufacturing**	127,900	6,884	20,377
3364	Aerospace Product and Parts Manufacturing**	135,778	13,961	30,139
3365	Railroad Rolling Stock Manufacturing**	5,435	384	830
3366	Ship and Boat Building**	84,044	5,563	12,008
3369	Other Transportation Equipment Manufacturing**	9,460	565	1,219
337	Furniture and Related Product Manufacturing	100,019	4,260	7,127
339	Miscellaneous Manufacturing (except 3391)**	76,538	3,830	7,008
3391	Medical Equipment and Supplies Manufacturing**	59,859	3,929	7,188
	Total	**2,851,216**	**180,136**	**430,957**

*Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages; U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and CS Estimates when indicated with **.*

The diverse industries grouped under Manufacturing add up to 6 percent of the total employment in the area, 7 percent of the total wages, and 8 percent of the GDP (see Table 35). These ratios mean that the encompassed sectors have slightly better paid workers than the average of the economy, and that there is even more added value beyond the labor factor of production.

TABLE 35 SHARE OF ECONOMIC CONTRIBUTION GENERATED BY THE MANUFACTURING SECTOR FOR ITTS STATES, 2019

Item	Employment	Wages (Millions of 2019$)	GDP (Millions of 2019$)
All Sectors	49,799,639	2,633,462	5,465,666
Manufacturing Sectors	2,851,216	180,136	430,957
Manufacturing Sectors (Share)	6%	7%	8%

Source: Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) and Occupational Employment and Wage Statistics (OEWS); U.S. Census Bureau, Non-Employer Statistics; U.S. Bureau of Economic Analysis, GDP by State; and Association of American Railroads, State Data.

Goods Movement within the Southeast

In 2019, about 576 million tons of manufacturing goods worth nearly $4 trillion were transported throughout the ITTS region as shown in Table 36. This represents about 39 percent of total tonnage and value in the U.S.

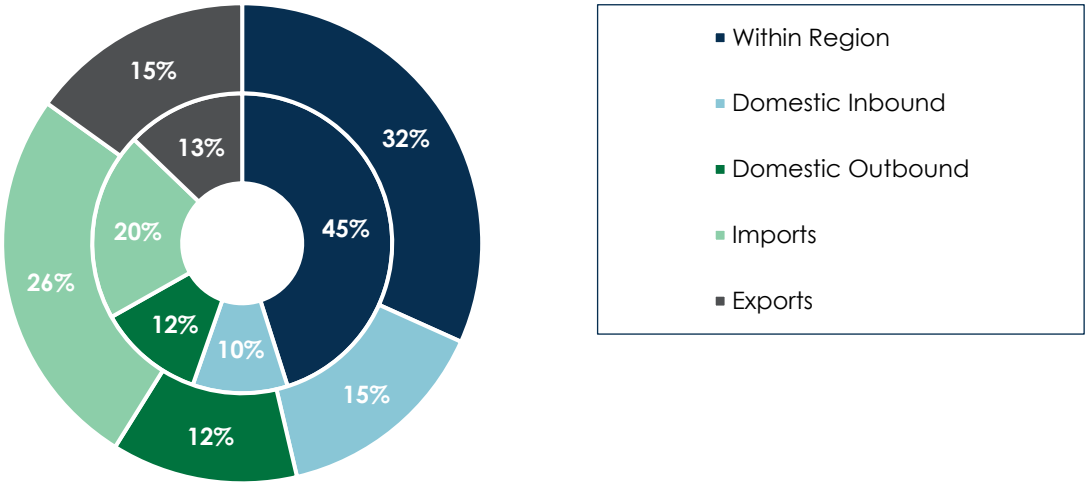
TABLE 36 PERCENT OF MANUFACTURING TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	1,467,468		10,450,740	
Southeast	816,223	56%	6,174,409	59%
ITTS	576,042	39%	4,073,784	39%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

As shown in Figure 50, about 45 percent of manufacturing goods by tonnage were moved within the Southeast. This represents about 32 percent of total value. Imports was the next largest direction, comprising 20 percent of total tonnage and 26 percent of total value. Exports accounted for 13 percent of total tonnage and 15 percent of total value.

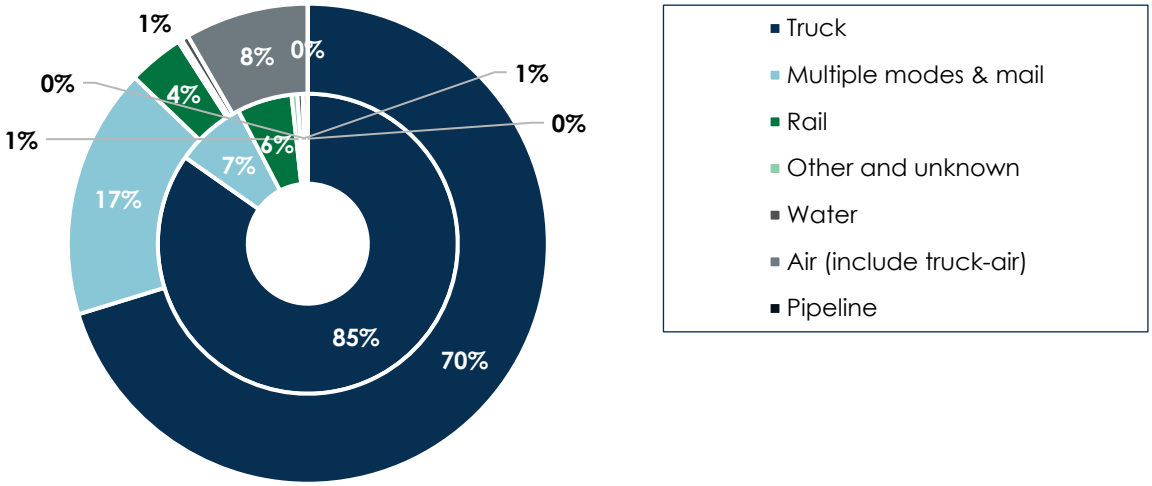
FIGURE 50 PERCENT OF MANUFACTURING TONS (INNER) AND VALUE (OUTER) BY TRADE TYPE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

By mode, the majority of manufacturing commodities are transported by truck as shown in Figure 51. About 85 percent of these goods by total tonnage are transported by truck, representing approximately 70 percent by value. Multiple modes and mail and rail are the next highest modes. They carry about 7 percent and 6 percent of manufacturing goods by tonnage, respectively, in the Southeast. Though less than 1 percent of manufacturing in the Southeast are transported by air, they account for about 8 percent of total value.

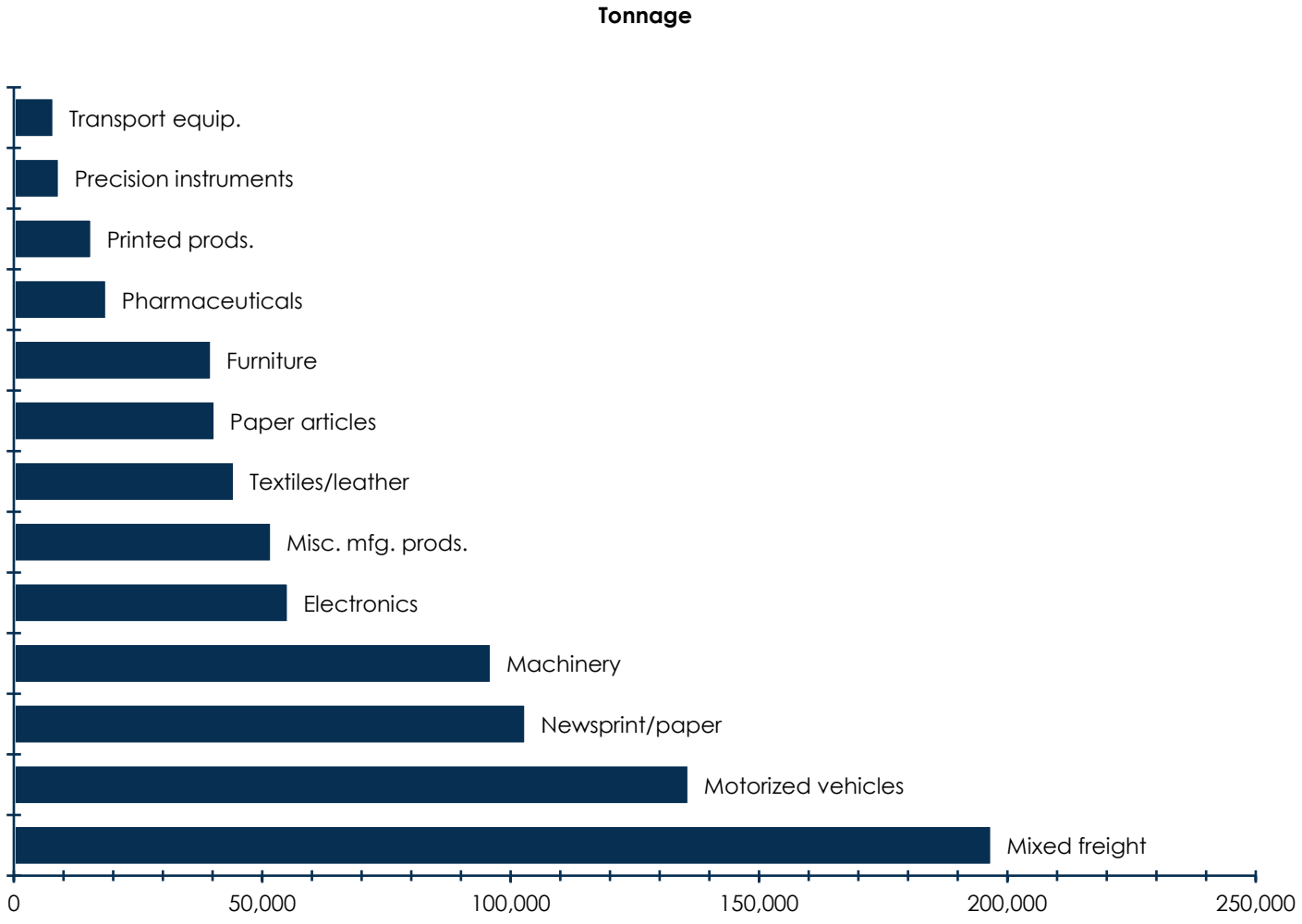
FIGURE 51 PERCENT OF MANUFACTURING TONS (INNER) AND VALUE (OUTER) BY MODE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

The top manufacturing commodities by total tonnage for 2019 are shown in Figure 52. Mixed freight, motorized vehicles, and newsprint/paper were the largest manufacturing commodity types shipped in the Southeast. Over 196 million tons of mixed freight was transported in the region, which accounts for about 34 percent of the total construction commodity tonnage. This was followed by motorized vehicles with nearly 136 million tons (about 24 percent of total tonnage) and newsprint/paper with over 103 million tons (about 18 percent of total tonnage).

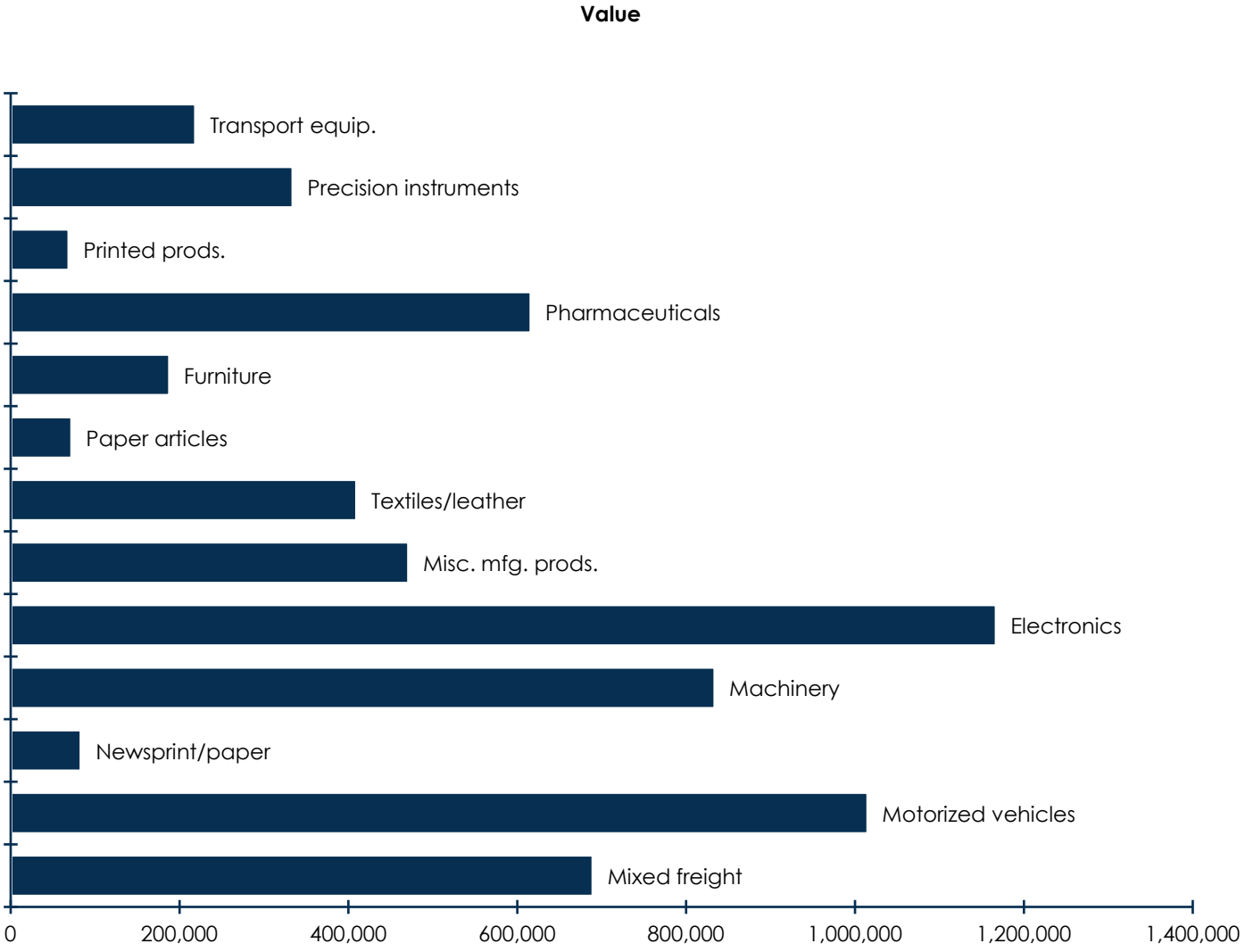
FIGURE 52 TOP MANUFACTURING COMMODITIES BY TOTAL TONNAGE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

By value in 2019, Figure 53 shows that the top manufacturing commodity are electronics as they accounted for over $1.1 trillion. Following electronics, motorized vehicles were the next highest value commodity in the Southeast at over $1 trillion. Machinery ($834 billion) and mixed freight ($690 billion) were also top commodities.

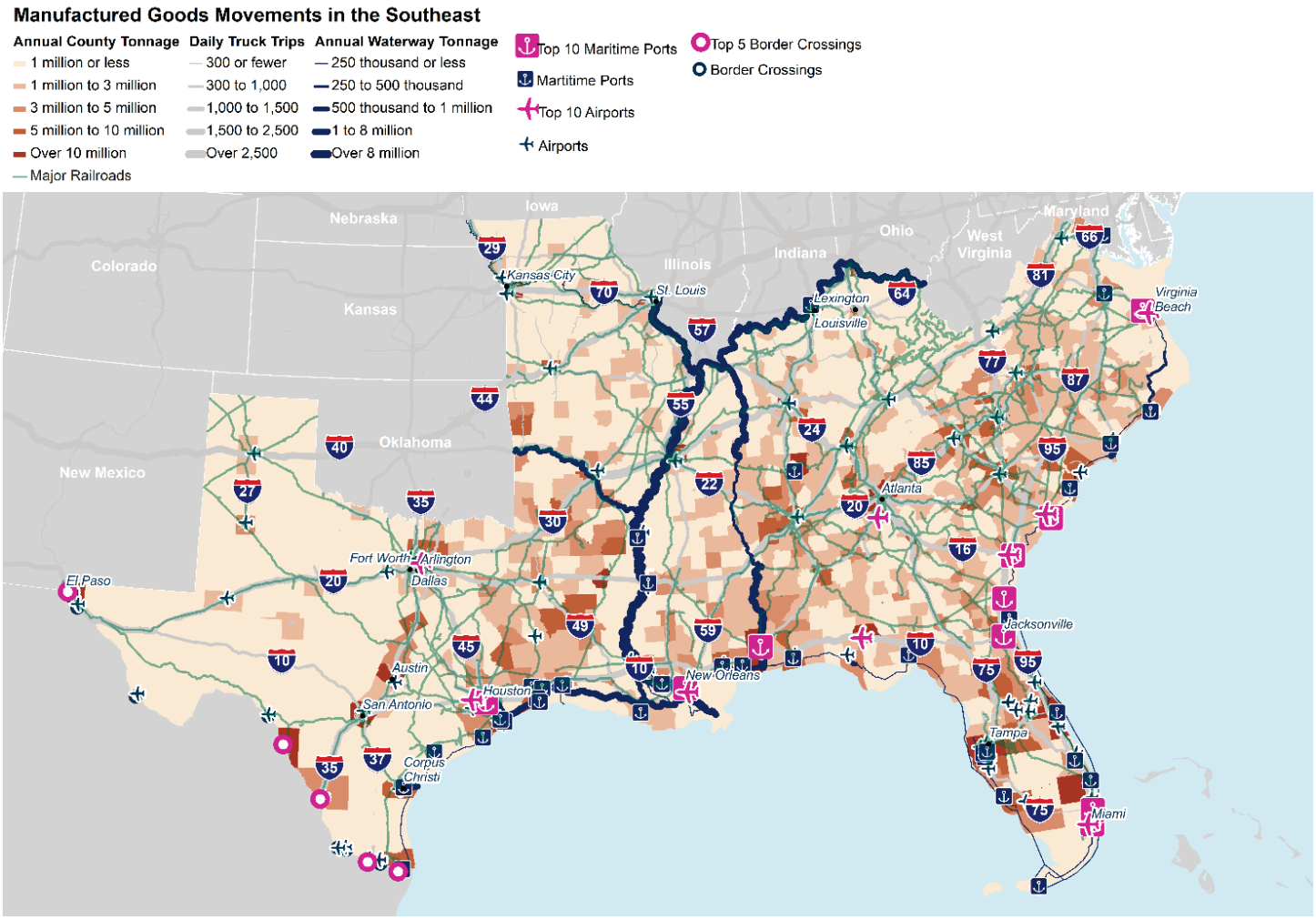
FIGURE 53 TOP MANUFACTURING COMMODITIES BY TOTAL VALUE IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 54 shows the spatial distribution of manufacturing commodity movements across the Southeast at the county level. Overall, Figure 54 highlights how manufacturing freight activity is broadly distributed throughout the region. It also shows the prevalence of the Southeast's interstate highways and principal arterials in facilitating these movements.

FIGURE 54 MANUFACTURED GOODS MOVEMENTS IN THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Total International Trade

Nearly 309 million tons of manufacturing goods were traded with the ITTS region in 2019 as shown in Table 37. This represents over 45 percent of total international trade for energy and petrochemical goods for the U.S. In terms of value, these goods comprise over 43 percent of the national total.

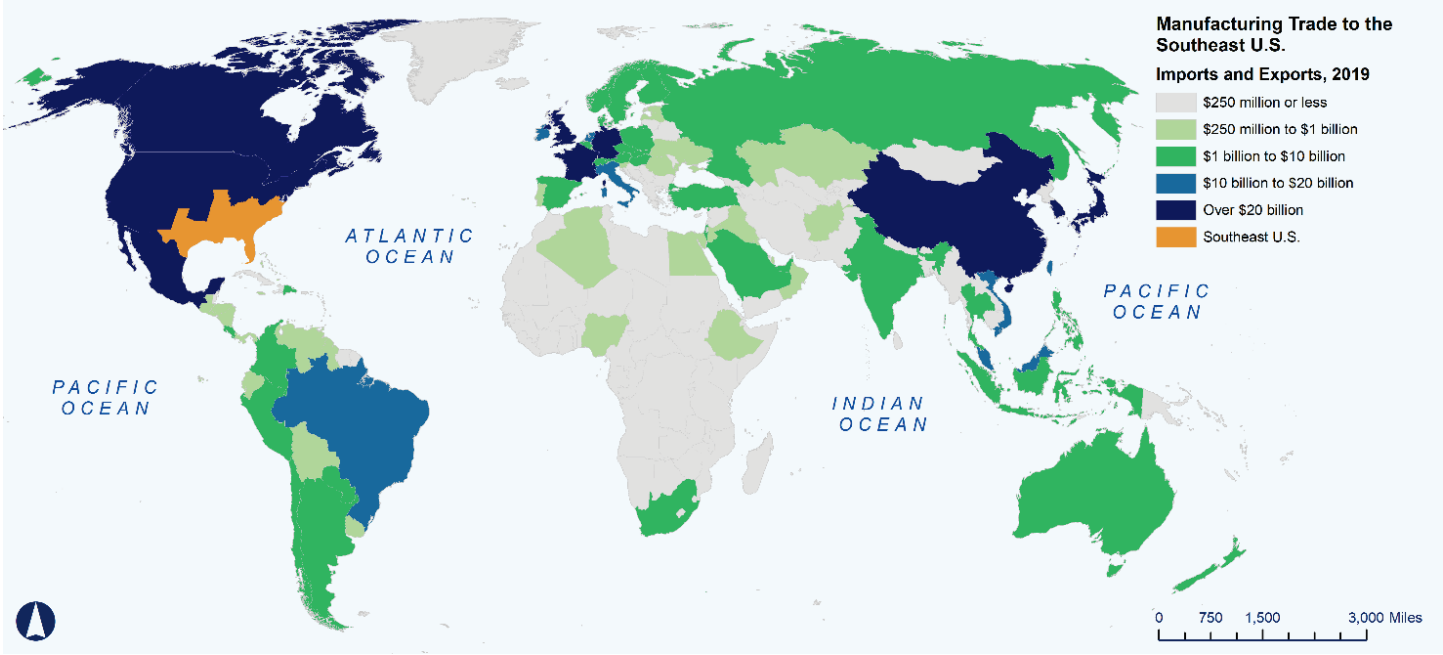
TABLE 37 INTERNATIONAL MANUFACTURING GOODS TRADE TONS AND VALUE BY REGION, 2019

Area	Tons (Thousands)	Percent of U.S.	Value (Million $)	Percent of U.S.
US	308,958		$2,383,423	
Southeast	151,868	49.2%	$1,170,020	49.1%
ITTS	140,055	45.3%	$1,034,637	43.4%

Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 55 shows total international manufacturing trade by value for the Southeast. Top trading partners include China, Canada, and Mexico. Those nations traded approximately $180 billion, $98.7 billion, and $65 billion in manufacturing goods with the Southeast in 2019.

FIGURE 55 TOTAL MANUFACTURING INTERNATIONAL TRADE WITH THE SOUTHEAST, 2019



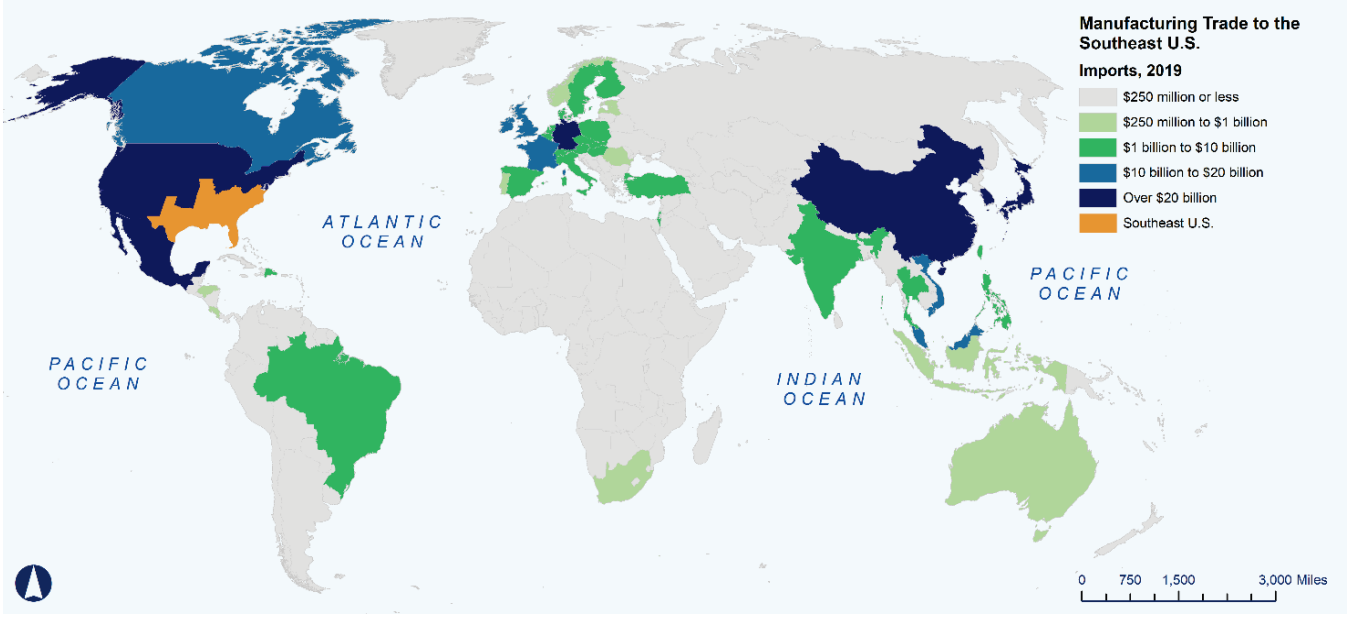
Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

Figure 56 and Figure 57 show trade data for manufacturing goods for the Southeast by imports and exports, respectively. Mexico was by far the largest source of manufacturing goods by value for the Southeast. In 2019, Mexico sent nearly $113 billion of manufacturing goods to the Southeast. China and Japan also shipped substantial volumes of manufacturing goods to the Southeast. The Southeast received nearly $75 billion of manufacturing goods from China and nearly $50.3 billion from Japan.

Mexico, Canada, and China were the largest export destinations for the Southeast's manufacturing goods. As shown in Figure 57, Mexico received over $67.2 billion of manufacturing goods from the Southeast. Canada

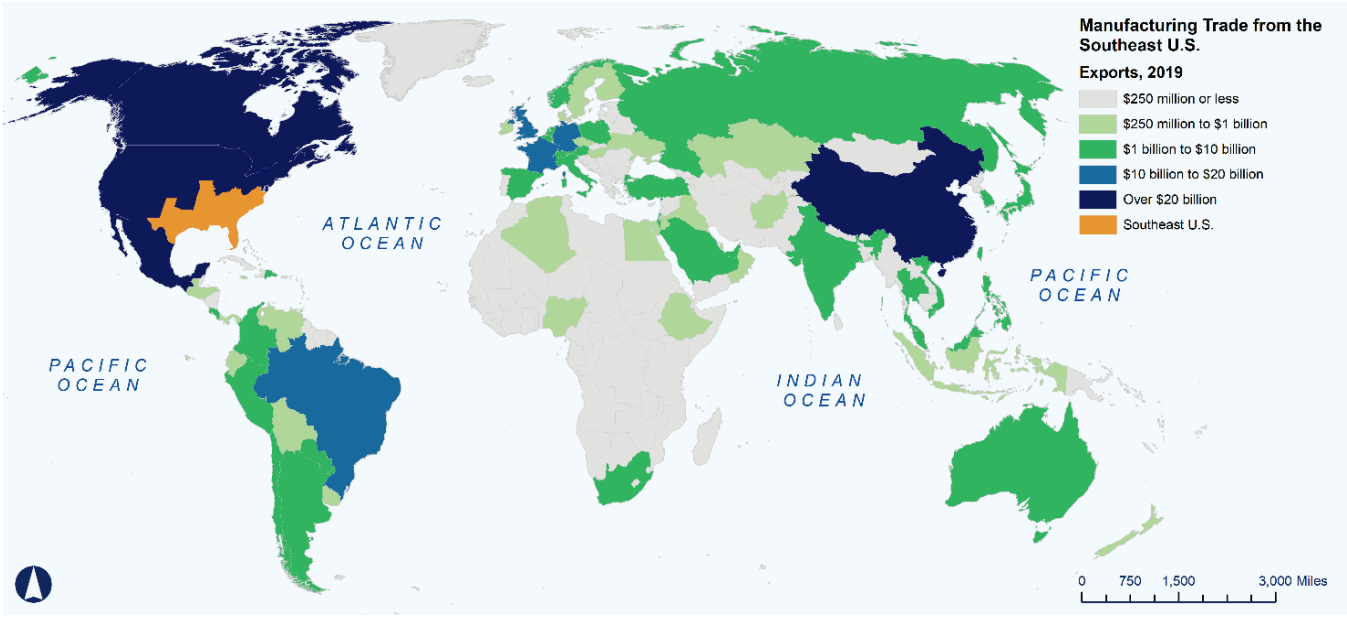
was the second largest receiver for the Southeast at nearly $45 billion of manufacturing goods. Nearly $23.8 billion in manufacturing goods from the Southeast were shipped to China in 2019.

FIGURE 56 TOTAL MANUFACTURING INTERNATIONAL TRADE TO THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

FIGURE 57 TOTAL MANUFACTURING INTERNATIONAL TRADE FROM THE SOUTHEAST, 2019



Source: FHWA, Freight Analysis Framework Version 5.2; U.S. Census Bureau, USA Trade Online Database; Cambridge Systematics, Inc. analysis.

5 OPPORTUNITIES AND NEXT STEPS

As at the dawn of the millennium, the ITTS region once again faces a period of change and opportunity: the North American Free-Trade Agreement (NAFTA) has been replaced by the United States-Mexico-Canada Agreement (USMCA); freight vehicle, infrastructure, and data technology have opened new opportunities; changes in manufacturing and logistics practices have impacted land use, transportation, and distribution patterns; a global pandemic has transformed the way the private sector, public sector, and general public understand supply chains; and while freight-dependent industries like agriculture have remained staples of the southeastern United States, industries such as advanced manufacturing have also emerged as regional strengths. The Phase I SETTS represents the region's first step to comprehensively address the challenges and opportunities brought by these trends at the multi-state level.

The Phase I SETTS developed a freight and trade profile, identified critical infrastructure, quantified the economic impacts of freight, and investigated current and anticipated trends that impact freight in the region. It found that the current and forecasted trade surplus for ITTS states is an economic boon to the region. In addition, the trends and other insights developed as part of the Phase I SETTS emphasize the significance of maintaining a safe, efficient, and competitive multimodal freight network to support anticipated growth, especially on the highway network which accommodates the majority of the region's freight movements. It also identified a subset of the region's freight network, the ITTS Multimodal Freight Network, which is essential to domestic and international trade. Though future growth in commodity tonnage and value is forecasted to be absorbed largely by trucks, the entire ITTS Multimodal Freight Network will be critical for accommodating freight demand and enhancing the region's economic competitiveness.

Overall, the Phase I SETTS provides a strong foundation for developing strategies and implementable recommendations that provide safety, freight mobility and reliability, and economic benefits across the entire coalition. As next steps in building upon the findings of the Phase I SETTS, ITTS should take the following actions:

- **Conduct Phase II of the SETTS Study** – The next step ITTS should take is to conduct Phase II of the SETTS Study. Phase II will perform a more detailed needs assessment for the region as well as advance the region's scenario planning capabilities by incorporating alternative freight flow forecasting functionality into version 2.0 of the SETTS tool. Overall, Phase II SETTS will enhance ITTS' ability to identify and develop multi-state strategies to support its freight-based economy as well as communicate those opportunities to decision-makers.

- **Identify and Pursue Multi-State Investment Opportunities on Major Highway Trade Corridors** – Some states are working collaboratively to make investments on shared corridors to improve freight performance and safety. For example, a coalition of Texas, New Mexico, Arizona, and California has started developing a truck parking availability system along I-10. The Mid-America Association of State Transportation Officials MAASTO) conducted a feasibility study for dedicated truck lanes on I-70, a shared corridor across much of the MAASTO region. From a trade perspective, these types of investments lower supply chain costs for the region's existing freight-intensive industries and make the region more attractive for future private sector investment. 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** – The analysis of commodity flow data demonstrated that the region's non-highway freight assets, particularly the rail and waterway networks, are essential to supporting supply chains. Furthermore, several ITTS member states emphasized in their state freight plans the need for greater coordination and more partnerships among the public and private sectors to increase the capacity of agencies to deliver system improvements. Opportunities to improve rail operations and access, particularly short lines, were frequently provided as examples of an area for increased public-private partnership. The ITTS should identify and pursue public-private investment opportunities that benefit the region. Partnering with one of the region's railroads to construct sidings to improve capacity along shared rail corridors is an example.

- **Identify and Pursue Growth Opportunities for Domestic and Global Trade** – Phase I SETTS quantified the economic contribution of the freight-generating sectors and investigated freight flows associated with those industries. As a next step, ITTS should identify supply chains that offer an opportunity for the region to increase its share of trade associated with the industries those supply chains support. Furthermore, 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 state economic development agencies are some of the key stakeholders to include in this strategy.

- **Develop and Conduct a Workshop Series on Supply Chain Impacts at the Local Level** – Though goods movement is an essential component of the ITTS region's economy creating widespread benefits in the including jobs and tax revenue, it also creates burdens that are often localized in communities. This can result in local pushback to logistics-related investments which may pose a risk for opportunities to grow trade. ITTS should develop and conduct a series of workshops with counties, metropolitan planning organizations (MPOs), and other local agencies aimed at mitigating supply chain impacts to local communities. The workshops would focus on local strategies for mitigating supply chain impacts such as conducting traffic impact assessments for distribution centers so that the appropriate transportation infrastructure investments are made. Another example would be a workshop focused on truck parking and strategies for limiting impacts to communities such as trucks parked in commercial lots or roadway

shoulders. The Federal Highway Administration (FHWA) and ITTS member state MPOs are potential partners for implementing this recommendation.

- **Conduct a Supply Chain Resiliency Study** – 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