

**National Economic Partnerships
Final Report**

**Project Name: Freight Movement along Freight Alley –
The Greater Chattanooga Region**



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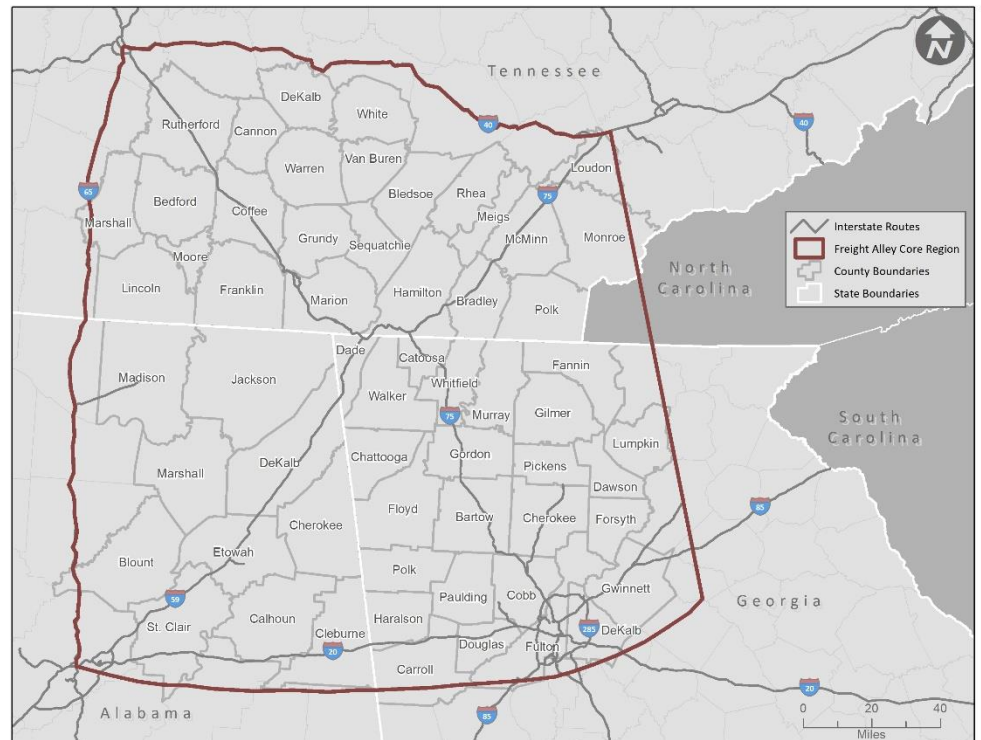
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Executive Summary

The Tennessee Department of Transportation (TDOT) was awarded a National Economic Partnership (NEP) grant for Freight Movement along Freight Alley – The Greater Chattanooga Region. The importance of freight planning has grown in recent years and the greater Chattanooga region influences a tri-state area that encompasses parts of Tennessee, Georgia, and Alabama and heavily impacts freight flows in the Piedmont Atlantic Megaregion. TDOT and over 20 consortium members set out to study two areas that impact freight planning today:

- The future of freight flows and the expansion of five key industries in the region: aerospace and aviation, agri-business and food production, automotive, trucking and logistics, wood products and flooring.
- A current inventory of public and private truck parking spaces along all interstate corridors in the region was documented in a spreadsheet by location and amenities and in a Locator Map. For the purposes of this study, the region was defined as all interstates in Alabama, Georgia and Tennessee that intersect with

58-County Tri-State Region



the 58-county tri-state region. All additional interstates in Tennessee outside the 58-county tri-state region were surveyed as well.¹

TDOT utilized the services of CDM Smith, a private consultant, and the Thrive Regional Partnership, a non-profit organization responsible for convening partners in the 16-county Chattanooga region, to complete much of the analysis for the study. Georgia Tech also served in a consultant role for the study, based on their expertise in megaregional planning.

The 18-month grant period began in June 2019 and will finish up in December 2020. Final deliverables for the grant include a Freight Flows and Industry Analysis and Truck Parking Locator Maps, part of the appendices to this report.

The goal of conducting these case studies was that we could use key deliverables and methodology as a template and a model for replicability that can be utilized in other megaregions throughout the United States. TDOT has already had requests from another Metropolitan Planning Organization (MPO), part of another megaregion which straddles Arkansas and Mississippi, to have a similar study duplicated in their area.

¹ Map taken from Appendix A: Freight Mobility and Economic Competitiveness in the Freight Alley Region.

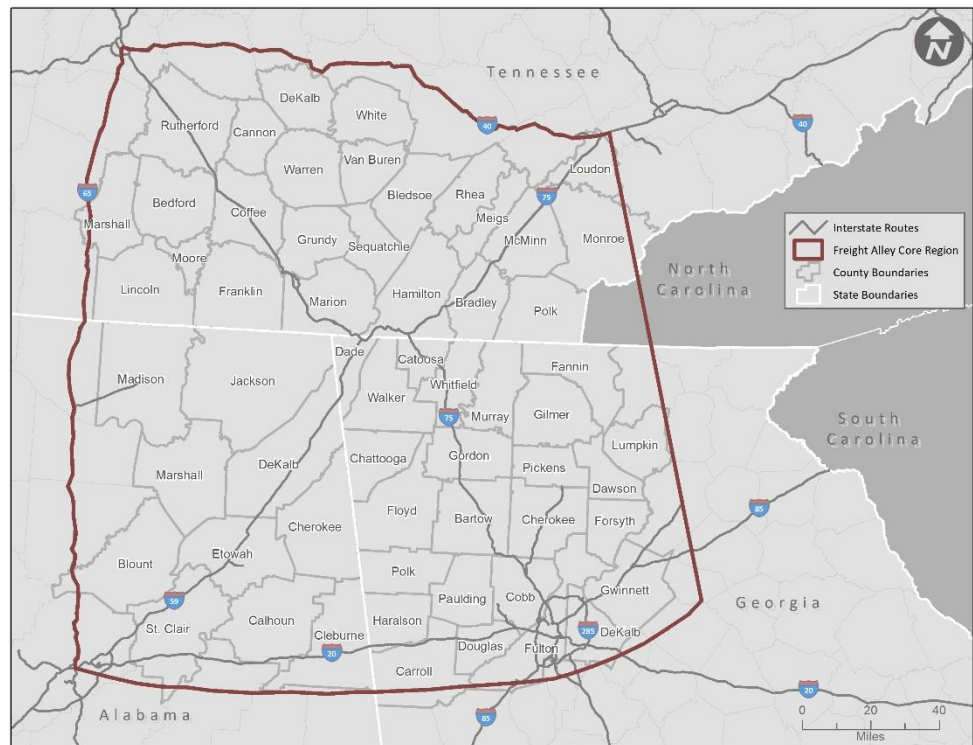
Introduction and Description of the Challenge

The importance of freight planning has grown in recent years. TDOT and consortium members conducted a study focused on two areas:

- The future of freight flows and the expansion of five key industries in the region: aerospace and aviation, agri-business and food production, automotive, trucking and logistics, wood products and flooring. With the advent of electric vehicles and Volkswagen recently deciding to produce electric vehicles at its Chattanooga location, we anticipated that freight flows will change and affect the region and the tri-state area. Much of the data summarized in *Appendix A: Freight Mobility and Economic Competitiveness in the Freight Alley Region*, indicated that many of the industries studied would grow in the future.

- A current inventory of public and private truck parking spaces along all interstate corridors in the region was documented in a spreadsheet by location and amenities and in a Locator Map. For the purposes of this study,

58-County Tri-State Region



the region was defined as all interstates in Alabama, Georgia and Tennessee that intersect with the 58-county tri-state region. All additional interstates in Tennessee outside the 58-county tri-state region were surveyed as well.²

² Map taken from Appendix A: Freight Mobility and Economic Competitiveness in the Freight Alley Region.

The region included areas located in three adjacent states, Tennessee, Georgia, and Alabama. The movement of freight is not contained by one state's economics and needs to be analyzed from a regional perspective ignoring state lines. The team believed that a coordinated regional approach, to freight and truck parking, would produce significant benefits to all the states in the region including more explicit identification of future parking, trucking, and freight demand. Consequently, the use of a multi-jurisdictional approach is a better method to reflect the increasing connectivity and interdependency between freight operations in all three states.

The goal of these case studies was that we could use key deliverables and methodology as a template and a model that can be utilized in other megaregions throughout the United States.

Partners and Roles

TDOT served as the lead agency and project manager for the grant. In this role, TDOT ensured that the project moved forward and met all tasks outlined in a statement of work approved by the Federal Highway Administration (FHWA) at the beginning of the project. TDOT also hired, from their on-call consultant list, CDM Smith who served as the overall NEP project consultant (see Task 2). TDOT held a Kick-Off Meeting on July 31, 2019 (see Task 1), monthly check-in meetings with FHWA and Georgia Tech (see Task 1), submitted quarterly reports to FHWA (Task 3), and managed all monies and invoice payments to the sub-contractors. TDOT's Data Visualization Office utilized the project consultant's survey of public and private truck parking spaces to create Truck Parking Locator Maps (Task 8). Finally, TDOT provided several presentations and updates on the grant to the American Association of State and Highway Transportation

Officials (AASHTO) Subcommittee on Megaregions. The updated occurred at the 2020 TRB Annual Meeting, and at various meetings for several of the partners on the grant (Task 9B). The collaborative nature of this grant with the various partners was the critical foundation to the success of the project that can be replicated in other regions, areas and states throughout the country.

Georgia Tech served as one of the consultants hired under this contract. They also reviewed all TDOT's major reports, provided guidance on the grant process, and conducted a complete literature review (Task 4), analyzing and assuring consistency of all MPO and state DOT freight planning and truck parking studies across the Piedmont Atlantic Megaregion (PAM). This review and data were shared with the NEP the project consultant. Georgia Tech voluntarily contributed their work on this task. A copy of the literature review can be found in *Appendix B*.

The project consultant was tasked with the freight flows and industry analysis (Task 5), a survey of all public and private truck parking spaces in the tri-state area (Task 7), and data to support TDOT in their project management role. The project consultant also partnered with the Thrive Regional Partnership on a Freight Forum (Task 9B) that was held virtually due to the COVID-19 pandemic.

The Thrive Regional Partnership organized and convened many of the partners in the region on a regular basis, since they already had a multijurisdictional partnership created through their Thrive Freight Mobility Committee. They conducted freight partner interviews (Task 6) to various groups in the tri-state area and held a Freight Forum virtually due to the COVID-19 pandemic highlighting many of the study results.

The Georgia Department of Transportation (GDOT) and the Alabama Department of Transportation (ALDOT) worked with their respective state economic developers to gather industry data to support the freight flows and industry analysis conducted by the project consultant. Both state DOTs also agreed to share the study in their respective areas so that the study could possibly be duplicated.

Other supporting partners throughout the region are included in the following list. Their support was largely related to sharing of information beneficial to the study and potential marketing of the study in the future:

- Atlanta Regional Commission
- Chattanooga-Hamilton County/North Georgia Transportation Planning Organization
- Chattanooga Metropolitan Airport Authority
- Cleveland Urban Area Metropolitan Planning Organization
- Covenant Transport
- Dalton State Community College
- Greater Dalton Metropolitan Planning Organization
- Hamilton County, Tennessee
- Lee-Smith, Inc.
- McKee Foods
- Northwest Georgia Regional Commission
- Ragan Smith Associates, Inc.
- Regional Planning Commission of Greater Birmingham
- Southeast Tennessee Development District
- Southeast Tennessee Rural Planning Organization
- Tennessee Trucking Association
- University of Tennessee, Chattanooga Geospatial Technology Lab

FHWA provided guidance and funding for the NEP grant. They also supported TDOT throughout all facets of the grant process.

Methodology and Process

TDOT structured the methodology and process around three areas of study: a freight flows and industry analysis, freight partner interviews, and a survey of all public and private truck parking spaces in the tri-state area.

The project consultant performed a freight flows and industry analysis for the aerospace and aviation, agri-business and food production, automotive, trucking and logistics, wood products and flooring industries (Task 5). The analysis was initially focused on in-depth industry clustering with innovation of technologies to include primary regionally and nationally significant industries and identify regional advantages and analyzing spatial structure of those industries and related functions for the regional economy of the Piedmont Atlantic area as a context of the megaregion. Even though the study primarily focused on the tri-state area, it also attempted to investigate the connection of industry clustering and interrelationships of those spatial structures as regional advantages within the Piedmont Atlantic Megaregion. The project consultant provided some policy implications and recommendations for the state and the region. The study included the following:

- Data collection of company locations, connecting infrastructure, intermodal connectors, and freight bottlenecks (*covered in Appendix A*).
- Development of quantitative estimates of the expected growth of freight associated with these current sectors in the study region (*covered in Appendix A*).
- Forecasting and model development of growth of these current sectors in the study region (*covered in Appendix A*).
- Analysis of how potential technologies such as the future impact electric vehicles will have on the automotive and trucking sectors (*covered in Appendix A*).
- Analysis of the regional advantages and spatial structure in the Piedmont Atlantic megaregion. This analysis attempted to examine the multiple areas and their corresponding factors below from a macro, meso, and micro level (*covered in*

Appendix A). Factors and items for in-depth analysis were originally presented as examples.

- Economy – e.g. globalization, regional trade agreement, regional competition, economic growth, price of energy, efficiency, productivity, agglomeration, industry clusters, technology and innovation, e-commerce, rising living standards, price of land, competition between municipalities, and real estate market, etc.
- Transport – e.g. cost of fuel/transport costs, spatial interactions/logistics, connected places, aerotropolis/global gateways/distribution centers, mobility/accessibility/connectivity, auto ownership, availability of roadways, public transport, and extended commuting, etc.
- Technology and Innovation – e.g. general-purpose technologies (GPT), knowledge-based economy, innovative milieu and network, and cooperative learning, etc.
- Planning/Governance – e.g. international/federal, policies and procedures, convergence, cohesion, legislation and regulations, land use planning strategies, public subsidies for home, ownership, enforcement of existing plans, development and property tax, and infrastructure/public service, etc.

Below are some summary statistics from the report:

- By 2045, solely truck-borne freight tonnage is forecast to increase 44 percent in Alabama, 42 percent in Georgia, and 34 percent in Tennessee.
- By 2045, motorized vehicles and transportation equipment is estimated to increase by 34 percent in Alabama, 59 percent in Georgia, and 38 percent in Tennessee.
- The five industry clusters examined (Aerospace and Aviation, Agri-production and Food Products, Automotive, Wood Flooring and Forest Products, and Trucking and Logistics), employ 1.2 million people in the tri-state area.

For more information on methodology from this report, please refer to *Appendix A*:

Freight Mobility and Economic Competitiveness in the Freight Alley Region.

The Thrive Regional Partnership conducted freight partner interviews (Task 6) in the tri-state region to identify the key freight issues and project needs as they relate to the respective industries and truck parking in the region. The interviews had two purposes:

- Understand the larger freight communities and stakeholders, and their issues and needs to affect megaregional policy implications and recommendations.
- Obtain industry advocates in the future megaregional policy implications and recommendations resulting from the study.

Questions were developed by Thrive and reviewed by TDOT, FHWA, and Georgia Tech before the interviews were conducted.

The project consultant conducted a truck parking survey of a .25-mile radius of all interstates in the tri-state region (Task 7), identifying all public and private truck parking spaces and the number of spaces, milepost or exit mile locations, weigh stations, rest areas, shower facilities, fuel facilities, electric charging stations, and food and drink facilities. For the purposes of this study, the region was defined as all interstates in Alabama, Georgia and Tennessee that intersect with the 58-county tri-state region. All additional interstates in Tennessee outside the 58-county tri-state region were surveyed as well. The project consultant used various data sources, such as prior truck parking surveys for the tri-state region, data provided by each state DOT giving the truck parking survey information for their respective rest areas and welcome centers, and company lists of private truck stops identified by their NAICS codes for the administering of the survey, with some slight assistance by Georgia Tech. The survey also gave an assessment where additional truck parking is needed and provided information for future policy decisions.

A full description of all tasks for the NEP grant are provided in *Appendix E* for reference.

Challenges and Solutions

As with any major project, TDOT has encountered some challenges with the NEP grant. Some of the challenges have been more logistical in nature, some have been related to methodology, and some were beyond TDOT's control.

Two logistical challenges related to the project consultant's on-call contract and the use of the Thrive Regional Partnership to conduct the freight partner interviews. The overarching on-call consultant contract expired before the project consultant's work was completed. Therefore, TDOT had to begin a new on-call consultant contract and reselect the project consultant to complete a continuation task order for the grant. Better planning and consultation of contract end dates at the beginning of the grant would have avoided the need for a continuation task order.

When the grant began, TDOT had received outside funding from the Atlanta Regional Commission (ARC) and the Birmingham MPO. TDOT chose to provide this outside funding to the Thrive Regional Partnership, a regional tri-state business, industry, and community non-profit organization located in Chattanooga region, to conduct the freight partner interviews. However, TDOT learned that they should have competitively procured this service before offering it to Thrive. New policies and procedures have been documented as a result of not procuring the service where TDOT will know that competitive procurement should occur.

Related to the methodology developed at the beginning of the grant, it was necessary to modify the outcomes from the project consultant in support of the grant. The project consultant was responsive to requests that TDOT has made and has been timely in all requests. The final report for the Freight Flows and Industry Analysis offered some

beneficial information. However, the report did not ultimately provide all the initial items envisioned at the beginning of the grant. TDOT will use the project consultant's report as a basis to move forward in developing an analysis that more closely provides all items initially envisioned.

Because of the COVID-19 pandemic that hit our nation and the world, TDOT has been limited in the efforts they had initially planned to market the study for future duplication. There have been several opportunities to share the study virtually and this has served as a good solution until more in person meetings can occur. Even with the limited opportunities to share, TDOT has already had a request for duplication of some parts of the study for other areas.

Results and Analysis

Some general observations that TDOT revealed during the grant project include the following points:

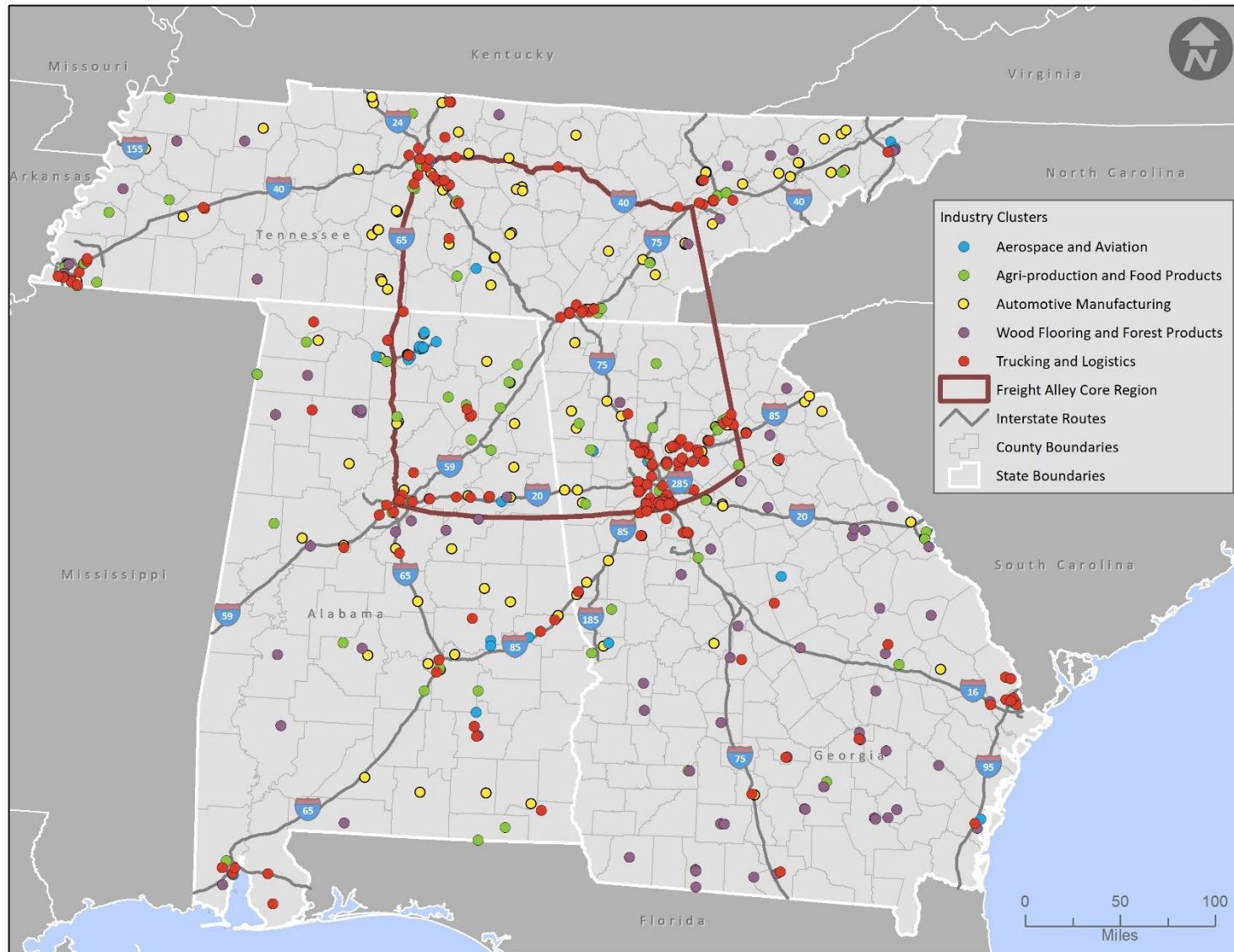
- Through seeing how the Thrive Regional Partnership conducts partner engagement, TDOT has seen the importance of each organization getting out of their respective silos to work together to develop solutions.
- Since freight knows no boundaries, the NEP grant has given TDOT a good opportunity to demonstrate how to properly conduct freight planning outside of those boundaries.
- To tackle the bigger truck parking issue, multiple states should work together to fill in the gaps where truck parking is needed.
- We can change the dynamic of freight planning by engaging industry and planners in the planning process.

Some specific data and recommendations that the project consultant presented in their final report showed that most of the industries examined are predicted to grow within the Freight Alley Region in the future.

- By 2045, solely truck-borne freight tonnage is forecast to increase 44 percent in Alabama, 42 percent in Georgia, and 34 percent in Tennessee.
- By 2045, motorized vehicles and transportation equipment is estimated to increase by 34 percent in Alabama, 59 percent in Georgia, and 38 percent in Tennessee.
- The five industry clusters examined (Aerospace and Aviation, Agri-production and Food Products, Automotive, Wood Flooring and Forest Products, and Trucking and Logistics), employ 1.2 million people in the tri-state area.

The following map highlights the value of spatial analysis of the five industry sectors.

Five Selected Industry Clusters in the Three-State Region



From the freight partner interviews, the Thrive Regional Partnership surveyed different categories of freight industry stakeholders. The majority of the stakeholders surveyed believed that the largest issues and challenges affecting freight movement in the tri-state area over the next five to ten years were road/highway congestion, truck parking, and infrastructure deterioration. More detailed information from the interviews can be found in *Appendix C: Thrive Freight Mobility Survey Report*.

From the truck parking survey, the project consultant discovered that there is a total of 12,781 private and public truck parking spaces among 223 facilities along all interstate corridors examined in the tri-state area. The project consultant's survey examined 1,700 miles of interstate. The data was then mapped by TDOT Data Visualization Office into Truck Parking Locator Maps. For more information on the project consultant's survey and a copy of the Truck Parking Locator Maps, please refer to *Appendix D: Truck Parking Information*.

Conclusions and Next Steps

The National Economic Partnership Grant has given TDOT a noteworthy guide to build on multijurisdictional planning continues in the state and the wider megaregions. TDOT will continue to promote the NEP grant to other areas and attempt to influence these areas to follow similar patterns and methodology in their freight planning efforts.

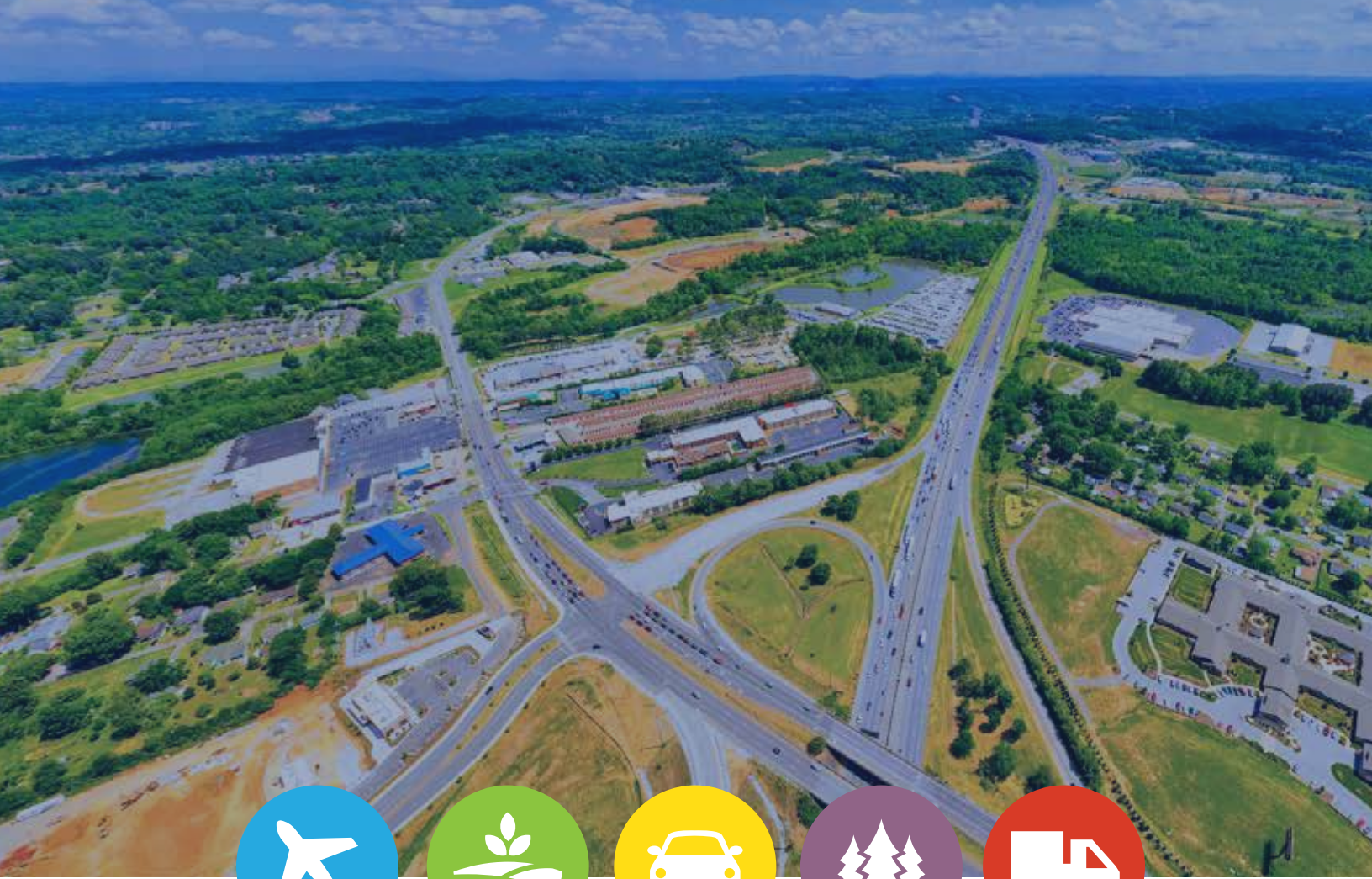
As part of this marketing effort, TDOT can encourage other regions to leverage public private partnerships by engaging industry, chambers of commerce, and multiple governments in the megaregion planning process. In order to advance these multi-state planning efforts, existing state and MPO planning processes can begin to identify

industry growth areas by region. By proactively examining industry growth, these planning processes can engage multiple partners and break down silos.

Some additional next steps that TDOT may pursue include the following:

- Create a New Economy Freight Technology Hub Focused on Best Transportation Technologies. Some of the technologies that could be a part of the hub might include truck platooning, ITS and CAV, Freight Advance Traveler Information System + Truck Parking (FRATIS+P), and alternative fuel corridors with adjacent states.
- Engage trucking community and collaborate to deploy multi-state truck parking and traveling information management application.

Whatever the next steps will be, TDOT has learned the value of multijurisdictional partnerships and megaregional planning in the planning process. We see now that there is more value when multiple jurisdictions are engaged in the planning process, since most planning efforts do not operate in a vacuum or within jurisdictional lines. These new lessons learned will be actively implemented and encouraged in TDOT's future planning processes in other areas of the state. For example, TDOT will replicate elements of this study when the new Statewide Freight Plan and Long-Range Transportation plan are updated in near future, most likely in 2021 or 2022.



Freight Mobility and Economic Competitiveness

IN THE FREIGHT ALLEY REGION

OCTOBER 2020

a National Economic Partnership Study



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THE FREIGHT ALLEY CORE REGION

Fostering economic prosperity and better options for moving goods and people are opportunities that do not begin or end at a city or state boundary. The Freight Alley Core Megaregion contains seven of the most heavily traveled interstate corridors in the U.S. (I-75, I-24, I-40, I-65, I-59, I-20, and I-85) that link five major metropolitan areas: Atlanta, Birmingham, Chattanooga, Knoxville, and Nashville (**Figure 1**). The Greater Chattanooga Region is in the center, at the crossroads of three interstates, I-75, I-59, and I-24. The region's private sector freight investments are equally impressive. Three of the nation's top 25 truckload carriers are headquartered in the Freight Alley Core Megaregion: U.S. Xpress and Covenant Transportation in Chattanooga and Western Express in Nashville.¹ Four of the top 100 private carriers have located their headquarter facilities in the region: Mohawk Industries, Shaw Industries Group, H.T. Hackney Company, and Pilot Flying J.²

Freight Alley Core Region



58 counties

Georgia, Tennessee, and Alabama



8,540,859 people

Projected 10.6 million by 2040



35% population growth

from 2000 to 2020

**2000-2040 Projected
Population Increase**

↑58%

Tennessee

↑90%

Georgia

↑19%

Alabama

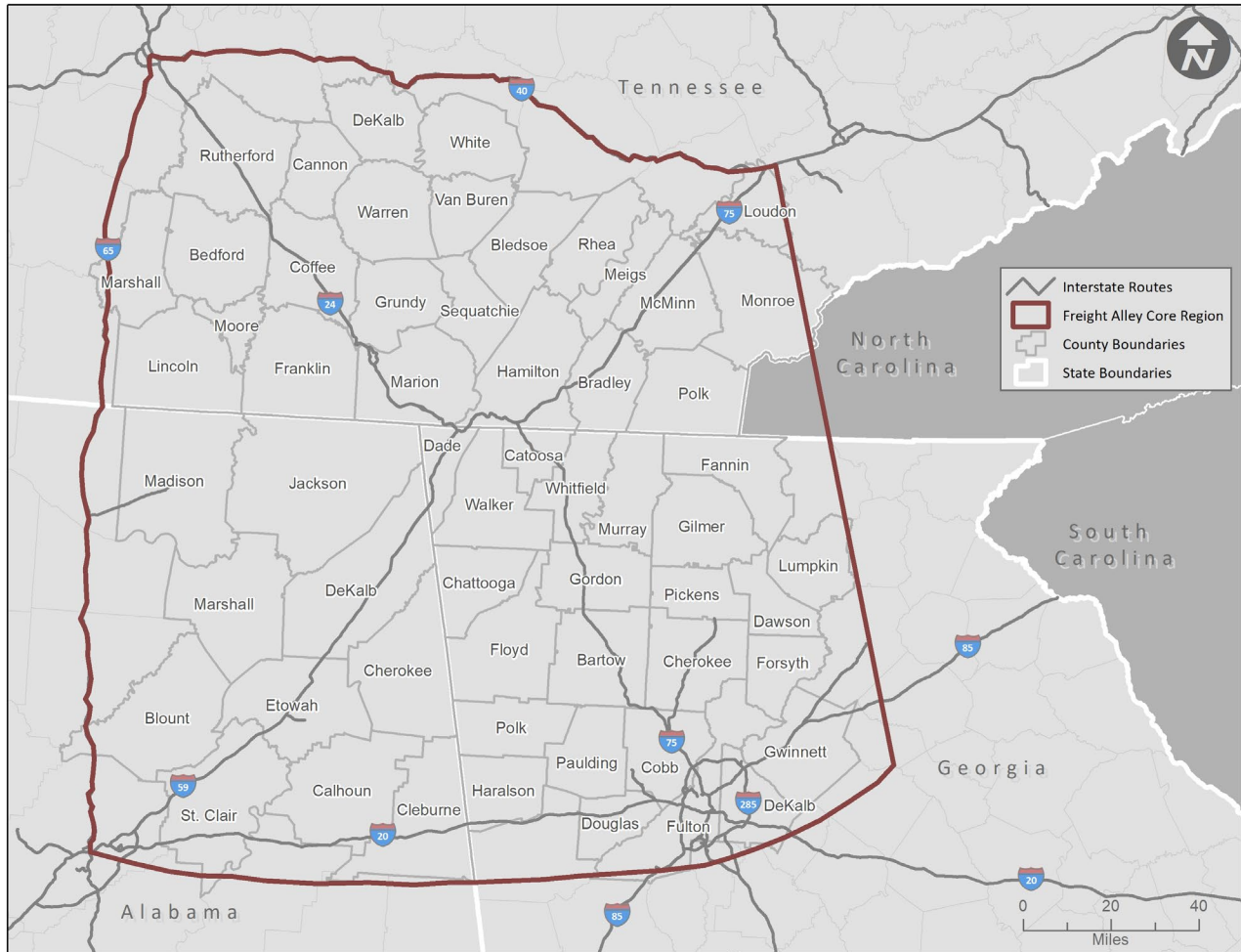
In 2040, the population will be 68 percent larger than it was in 2000

Coronavirus Disease 2019 (COVID-19) has disrupted the U.S. supply chain and the economy. The long-term economic and transportation impacts are impossible to predict at this time. The near-term impacts have been catastrophic for some businesses and travel modes. The time it may take for these impacts to subside and what the future may look like will depend on a multiplicity of factors. Much of the research and data collection for this study was collected prior to the COVID-19 shutdown.

¹ "2019 Top 50 Trucking Companies", John D. Schulz, Logistics Management, April 3, 2019

² "Top 100 Largest Private Carriers in North America 2019", Transport Topics, July 13, 2019

Figure 1: 58 Counties of the Freight Alley Core Megaregion



FREIGHT PLANNING EFFORTS

In 2011, the Chattanooga-Hamilton County North Georgia Transportation Planning Organization (CHCNGA-TPO) which includes Hamilton County in Tennessee and parts of Dade, Catoosa, and Walker Counties in Georgia, completed a freight study for the region. The study reinforced the essential importance of freight to the region’s economy including the concentration of transportation and logistics employment.³ Following the completion of the freight plan, the THRIVE 2055 study was commissioned by the Thrive Regional Partnership to develop an engaged strategic plan for the Chattanooga metro area. The study addressed a range of important issues including workforce, transportation and freight, the economy, safety, and sustainable growth for a tri-state, 16-county region in Alabama, Georgia, and Tennessee.⁴ At the heart of both of these studies was a recognition that this region was at the crossroads of an

³ “Chattanooga Regional Freight Profile Final Report”, Chattanooga-Hamilton County Regional Planning and the Chattanooga-Hamilton County North Georgia Transportation Planning Organization, July 29, 2011

⁴ “The Capstone Report, Thrive 2055”, 2015

integrated, multimodal freight network that was driving powerful economic and population growth across an even broader geography in these three states.

This study, funded by a National Economic Partnership (NEP) grant, utilized two geographies for data collection to evaluate the strategic interdependence between the region's freight and economic competitiveness: individual states, and a 58-county region surrounding the 16-county Thrive Regional Partnership. The location data shown on maps in each of the industrial cluster sections was collected statewide for Alabama, Georgia, and Tennessee. Likewise, the freight flow analysis was performed using statewide data. The traffic analysis was performed for a 58-county region shown in **Figure 1**, referred to as the Freight Alley Core Megaregion.

Since freight movement is the focus of this study, the industrial clusters selected for the study are freight dependent industries and four of the specific clusters are manufacturing businesses. (Additional information about the selection of the industrial clusters for this study can be found beginning on page 21). The fifth industry cluster, Trucking and Logistics, includes larger trucking and logistics operations with over 300 employees.

The selected manufacturing clusters have larger employment concentrations and are freight generators where raw materials, parts, component assemblies, and finished goods are shipped inbound and/or outbound to the next point in the supply chain. Evaluating the geospatial location of these freight generators relative to congested corridors, heavy truck volume corridors, and the truck parking inventory helps to “paint the picture” of the importance of freight to the region's economic competitiveness and the value of multi-state collaborative partnerships in the Freight Alley Core Megaregion.

The analysis of manufacturing locations and employment in the three-state region does not include facilities and workforce engaged in cluster-related research and development, maintenance and repairs, system operations, or other related services. The manufacturing clusters drive the demand for broader direct and indirect employment within the region. According to the National Association of Manufacturing, manufacturing accounts for 75 percent of all private-sector research and development nationally.⁵ Average annual compensation for manufacturing businesses is higher than nonfarm business compensation in all three states of the Freight Alley Core Megaregion, as shown in **Table 1**.⁶

⁵ “Facts about Manufacturing”, “2020 Alabama Manufacturing Facts”, “2020 Georgia Manufacturing Facts”, “2020 Tennessee Manufacturing Facts”, National Association of Manufacturing, 2020

⁶ Ibid.

Table 1: Average Annual Compensation for Manufacturing Businesses Compared to Nonfarm Businesses

State	% Share of Gross State Product	Average Annual Manufacturing Compensation/ Nonfarm Compensation	Percent of Nonfarm Employment
Alabama	17.18%	\$68,240/\$41,597	13.0%
Georgia	10.98%	\$71,500/\$47,654	8.9%
Tennessee	15.32%	\$70,521/\$44,406	11.5%

Source: 2020 Manufacturing Facts by State, National Association of Manufacturing, 2020

This NEP study utilizes Freight Analysis Framework Version 4 (FAF4) data to evaluate freight transportation originating or terminating within the three states to assess freight tonnage and value by mode for several industry clusters. The report focuses on the 58-county Freight Alley Core Megaregion to assess truck volumes and congested corridors.

Recommendations and policies included in the study incorporate the discussions and input from break-out sessions held after the NEP study presentations during three Thrive Regional Partnership Freight Mobility Committee meetings. Feedback from the virtual Freight Alley Freight Forum, “National Economic Partnership in Action,” held on August 14, 2020, as well as research and analysis.

POPULATION

Today, the 58 counties in the Freight Alley Core Megaregion have a population of 8.5 million people. By 2040, the population of this area is projected to exceed 10.6 million people.⁷ From 2000 to 2020, the population of this 58-county area increased by 35 percent; by 2040, the region’s population will be 68 percent larger than it was in 2000.⁸ The 24 Georgia counties in the Freight Alley Core Megaregion are forecast to realize a 90 percent population increase from 2000 to 2040. In Tennessee, the 23 Freight Alley Core Megaregion counties are projected to realize 58 percent population growth, and the 11 Alabama counties in the Freight Alley Core Megaregion are forecast to have slightly over 19 percent growth.⁹ The dramatic population growth in this region is driven in part by an extraordinary expansion of businesses and quality jobs. The congestion on the interstate corridors within this area reflects the increased demand for freight services from businesses, residents’ journeys to work, and through movements to destinations beyond this region.

The region’s multimodal transportation assets connect the Freight Alley Core Megaregion to inland and ocean ports; Atlanta Hartsfield Jackson Airport, the busiest commercial airport¹⁰ and the Memphis International Airport, the second largest air cargo operation by volume in the world¹¹ just behind Hong Kong International Airport; and several major Class 1 rail terminals (6

⁷ 2000 and 2010 Decennial Census, U.S. Census Bureau, U.S. Census American Community Survey 2018-5-year projections, GA Governor’s Office of Planning and Budget, Boyd Center for Business and Economic Research University of Tennessee, Center for Business and Economic Research University of Alabama

⁸ Ibid.

⁹ Ibid.

¹⁰ “World Traffic Report” September 2018, Airports Council International

¹¹ “Preliminary World Airport Traffic Rankings” March 2019, Airports Council International

of the 7 Class 1 railroads have operations in the three states). While the multimodal transportation connections outside the region are essential to the region's economic development, freight drives the economic competitiveness of the Freight Alley Core Megaregion.

FREIGHT FLOWS IN THE FREIGHT ALLEY REGION

The following discussion of freight flows for the three-state region provides an overview of actual and projected demand for freight transportation. A brief summary of the total tonnage and value by mode is provided as well as a profile of freight flows for several key industries. The freight tonnage and value data are derived from the FAF4 version 4.5.1 dataset developed by the Oak Ridge National Laboratory's (ORNL) Center for Transportation Analysis on behalf of the Federal Highway Administration (FHWA). FAF4 data provides estimates for tonnage, value, and ton-miles by regions of origin and destination, commodity type, and mode.

Below are several important considerations for working with and interpreting FAF4 data.

- FAF4 data is derived from multiple sources, but the principle source is the Commodity Flow Survey that is part of the Economic Census of business establishments. There is likely to be a degree of error due to self-reporting of data and respondents' different interpretations of terminology.
- FAF4 data captures freight originating or terminating in a particular geography but does not include through traffic.
- The "multiple modes" category includes shipments that travel by more than one mode between their origin and destination (e.g. rail/truck, water/truck, truck/air) but the specific modes involved are not identified. The vast majority of these shipments travel by truck for at least one leg of the multimodal trip. In the tables to follow, data for truck shipments and shipments by multiple modes are presented adjacent to one another to reflect the close relationship.

The discussion of freight flows for each state is followed by a summary of key industries by mode for each state, and an analysis of interstate truck volumes and congestion within the three-state area. The modal breakdowns in the discussion to follow reflect only domestic modes of travel. Projected dollar amounts for 2045 have been adjusted from 2012 constant dollar values, as provided by FAF4 data, to 2018 values based upon the Bureau of Labor Statistics' Consumer Price Index.

FREIGHT FLOWS BY STATE

Across each state, trucks are the dominant mode utilized for freight movement ranging from 65 percent to 81 percent of tonnage. The next largest freight mode for Alabama and Tennessee is pipeline at 21 percent and 13 percent, respectively, while Georgia's next largest freight mode is rail at 9 percent of tonnage.

Alabama Freight Tonnage and Value by Mode

In 2018, solely truck-borne freight accounted for 65 percent of the total freight tonnage originating or terminating in the state, valued at about \$444 billion. Shipments via multiple modes, which usually move by truck for some portion of the journey, constitute another 2.1 percent of tonnage. By 2045, solely truck-borne freight is forecast to increase 44 percent in tonnage and 69 percent in value. **Table 2** summarizes freight tonnage and value by mode for Alabama.

Table 2: Growth in Freight Tonnage and Value by Mode in Alabama, 2018 to 2045

Alabama	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	466,213	672,616	44.3%	\$444,511	\$750,379	68.8%
Multiple modes & mail	15,139	25,313	67.2%	\$60,258	\$136,072	125.8%
Rail	70,180	81,685	16.4%	\$34,609	\$69,338	100.3%
Water	11,414	15,978	40.0%	\$5,819	\$13,707	135.5%
Air (include truck-air)	77	378	388.8%	\$7,554	\$46,179	511.3%
Pipeline	151,995	216,730	42.6%	\$35,792	\$60,677	69.5%
Other and unknown	137	303	121.6%	\$699	\$227	-67.5%
No domestic mode	2,316	-	-100.0%	\$1,047	\$0	-100.0%
Total	717,470	1,013,002	41.2%	\$590,288	\$1,076,581	82.4%

Source: FHWA, FAF4 data version 4.5.1

Georgia Freight Tonnage and Value by Mode

In 2018, truck-borne freight accounted for roughly 81 percent of the total freight tonnage moved in the state, valued at approximately \$929 billion. Shipments via multiple modes, which usually move by truck for some portion of the journey, constitute another 3 percent of tonnage. By 2045, solely truck-borne freight is forecast to grow by 42 percent in tonnage and 93 percent in value, as shown in **Table 3**.

Table 3: Growth in Freight Tonnage and Value by Mode in Georgia, 2018 to 2045

Georgia	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	718,581	1,017,472	41.6%	\$929,018	\$1,791,184	92.8%
Multiple modes & mail	26,656	58,758	120.4%	\$144,615	\$365,926	153.0%
Rail	80,548	105,567	31.1%	\$39,067	\$88,152	125.6%
Water	6,469	13,903	114.9%	\$6,990	\$25,495	264.7%
Air (include truck-air)	354	1,630	360.6%	\$38,510	\$198,028	414.2%
Pipeline	56,928	91,139	60.1%	\$12,980	\$26,756	106.1%
Other and unknown	469	2,298	389.8%	\$12,353	\$28,257	128.7%
No domestic mode	2	-	-100.0%	\$18	\$0	-100.0%
Total	890,007	1,290,768	45.0%	\$1,183,551	\$2,523,797	113.2%

Source: FHWA, FAF4 data version 4.5.1

Tennessee Freight Tonnage and Value by Mode

In 2018, truck-borne freight was about 435 million tons or 75 percent of total tonnage, valued at around \$609 billion. Shipments via multiple modes, which usually move by truck for some portion of the journey, constitute another 3 percent of tonnage. By 2045, solely truck-borne freight is forecast to grow by about 34 percent in tonnage and 70 percent in value. **Table 4** summarizes freight tonnage and value by mode for Tennessee.

Table 4: Growth in Freight Tonnage and Value by Mode in Tennessee, 2018 to 2045

Tennessee	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	435,546	581,403	33.5%	\$608,859	\$1,032,869	69.6%
Multiple modes & mail	20,023	32,511	62.4%	\$122,044	\$270,448	121.6%
Rail	37,913	60,908	60.7%	\$24,765	\$56,897	121.6%
Water	11,151	17,721	58.9%	\$4,331	\$13,838	219.5%
Air (include truck-air)	580	2,610	349.7%	\$98,690	\$515,029	421.9%
Pipeline	77,174	172,843	124.0%	\$16,559	\$42,817	158.6%
Other and unknown	299	321	7.5%	\$4,004	\$4,022	0.5%
Total	582,686	868,317	49.0%	\$879,253	\$1,935,919	120.2%

Source: FHWA, FAF4 data version 4.5.1

KEY INDUSTRIES BY STATE

Several key commodities were also analyzed in the region using the FAF4 data. These commodities are related to the key industry clusters present in the region including the automotive, agriculture, and wood product industries. FAF4 uses 2-digit Standard Classification of Transported Goods (SCTG) codes for 43 commodity types. Using the FAF4 data, it was not possible to analyze freight movement associated with the aerospace and aviation clusters because of the broad nature of the commodity classifications. In the FAF4 data, aircraft, aircraft parts, and spacecraft are aggregated with rail and waterborne vessels under the broad classification of “Transportation Equipment, NEC” (not elsewhere classified). A brief summary of the three key industries’ mode split for each state are provided below.

Automotive Manufacturing

The tonnage and value of goods originating or terminating in each state are presented below by transportation mode to highlight how the automotive industry moves their supplies and products. In each state, the automotive industry transports automobiles, supplies, and finished product primarily by truck. The analysis below is based on FAF4 data for SCTG 36, Motorized and Other Vehicles (including parts). FAF4 data does not distinguish between automotive components and finished vehicles.



Alabama's Automotive Industry

The Alabama automotive industry transports automobiles and automobile components totaling over 16 million tons with a 2018 value of almost \$111 billion. The auto industry primarily moves supplies and finished products by truck alone which accounts for over 82 percent of the auto industry tonnage moved and \$95 billion in auto-related goods. Shipments via multiple modes account for an additional 15 percent of tonnage, with a 2018 value of around \$12 billion. Growth in total tonnage of motorized vehicle-related shipments between 2018 and 2045 is estimated at 16 percent as shown in **Table 5**. The value of motorized vehicles and related components originating or terminating in Alabama is estimated to increase around 34 percent during the same period.

Table 5: Alabama Automotive Industry Growth in Tons and Value by Mode, 2018 to 2045

Alabama	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	13,413	15,715	17.2%	\$95,112	\$122,091	28.4%
Multiple modes & mail	2,375	2,756	16.0%	\$11,959	\$18,402	53.9%
Rail	408	413	1.1%	\$2,978	\$4,645	56.0%
Water	50	13	-74.5%	\$378	\$258	-31.8%
Air (include truck-air)	5	34	599.7%	\$199	\$3,211	1513.2%
Other and unknown	48	1	-98.1%	\$224	\$8	-96.3%
Total	16,300	18,931	16.1%	\$110,850	\$148,616	34.1%

Source: FHWA, FAF data version 4.5.1

Georgia's Automotive Industry

The Georgia automotive industry transports automobiles and related components totaling over 13 million tons with a value of over \$118 billion in 2018. The auto industry primarily moves components and finished products by truck alone, accounting for 83 percent of the auto industry tonnage moved and representing almost \$91 billion in auto-related goods. Multiple modes are the second most used mode with almost 10 percent of the tonnage originating or terminating in the state, valued at \$17 billion in 2018. Growth in the motorized vehicle related tonnage between 2018 and 2045 is estimated at 21 percent as shown in **Table 6**. In terms of value, motorized vehicles and transportation equipment is estimated to increase around 59 percent during the same period.

Table 6: Georgia Automotive Industry Growth in Tons and Value by Mode, 2018 to 2045

Georgia	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	10,775	13,282	23.3%	\$90,899	\$146,747	61.4%
Multiple modes & mail	1,318	1,553	17.9%	\$17,087	\$22,386	31.0%
Rail	712	533	-25.1%	\$5,375	\$5,977	11.2%
Water	94	128	36.1%	\$769	\$1,679	118.3%
Air (include truck-air)	48	102	114.9%	\$3,049	\$9,819	222.1%
Other and unknown	40	123	210.1%	\$1,210	\$1,108	-8.4%
Total	12,987	15,722	21.1%	\$118,389	\$187,716	58.6%

Source: FHWA, FAF data version 4.5.1

Tennessee's Automotive Industry

In 2018, the Tennessee automotive industry originated or terminated freight (automobiles and related components) totaling around 13 million tons with a value of \$84 billion. The auto industry primarily moves supplies and finished products by truck which accounts for 79 percent of the auto industry tonnage moved representing \$60 billion in auto-related goods. Multiple modes are the second most used mode with almost 15 percent of the tonnage valued at \$17 billion in 2018. Growth between 2018 and 2045 in motorized vehicle-related tonnage is estimated at 24 percent as shown in **Table 7**. In terms of value, motorized vehicle related freight originating or terminating in Tennessee is estimated to increase around 38 percent over the same period.

Table 7: Tennessee Automotive Industry Growth in Tons and Value by Mode, 2018 to 2045

Tennessee	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	10,256	13,066	27.4%	\$59,627	\$80,873	35.6%
Multiple modes & mail	1,962	2,179	11.1%	\$17,274	\$25,841	49.6%
Rail	687	710	3.4%	\$5,470	\$5,941	8.6%
Water	1	4	326.9%	\$9	\$14	55.1%
Air (include truck-air)	31	64	108.8%	\$1,083	\$2,744	153.3%
Other and unknown	30	4	-88.1%	\$138	\$32	-76.9%
Total	12,966	16,027	23.6%	\$83,601	\$115,444	38.1%

Source: FHWA, FAF data version 4.5.1

Agri-Production and Food Products Industry

The agri-production and food products sector is a key industry throughout the freight alley states. The SCGT commodity codes used for this analysis of the agriculture industry include:



01- Live Animals/Fish
02- Cereal Grains
03- Other Agricultural Products
04- Animal Feed
05- Meat/Seafood

06- Milled Grain Products
07- Other Foodstuffs
08- Alcoholic Beverages
09- Tobacco Products

Alabama Agri-Production and Food Products Industry

In 2018 the Alabama agriculture industry originated or terminated around 60 million tons of agricultural products, with a value of over \$58 billion. The agriculture industry primarily moves supplies and finished products by truck which accounts for nearly 86 percent of the agriculture industry tons moved, representing over \$55 billion in agriculture-related goods. Rail is the second most used mode with over 4 million tons (7 percent) valued at \$2.3 billion in 2018. Growth in the agricultural product tonnage is estimated at 64 percent between 2018 and 2045 as shown in **Table 8**. In terms of value, agricultural products transported to and from Alabama are estimated to increase around 84 percent between 2018 and 2045.

Table 8: Alabama Agri-Production and Food Products Industry Growth in Tons and Value by Mode, 2018 to 2045

Alabama	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045Value (Millions, 2018\$)	Percent Change
Truck	51,437	85,359	66.0%	\$55,212	\$99,818	80.8%
Multiple modes & mail	724	1,534	112.1%	\$590	\$1,532	159.5%
Rail	4,483	7,548	68.4%	\$2,275	\$4,798	110.9%
Water	3,220	3,601	11.8%	\$307	\$1,326	332.7%
Air (include truck-air)	2	5	91.1%	\$57	\$180	219.1%
Other and unknown	2	0	-100.0%	\$3	\$0	-100.0%
Total	59,868	98,047	63.8%	\$58,444	\$107,656	84.2%

Source: FHWA, FAF data version 4.5.1

Georgia Agri-Production and Food Products Industry

The tonnage and value of goods originating or terminating in Georgia are presented below by transportation mode. In 2018 the Georgia agriculture industry transported products totaling over 122 million tons with a value of almost \$150 billion. The agriculture industry primarily moves agriculture products by truck which accounts for nearly 85 percent of the agriculture industry tonnage moved representing \$113 billion in agriculture-related goods in 2018. Rail is the second most used mode with over 12 percent of the tonnage valued at \$5.6 billion in 2018. Growth between 2018 and 2045 in agricultural tonnage is estimated at about 73 percent as shown in **Table 9**. Over the same period the value of agricultural products originating or terminating in Georgia is estimated to increase over 83 percent.

Table 9: Georgia Agri-Production and Food Products Industry Growth in Tons and Value by Mode, 2018 to 2045

Georgia	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	103,561	153,574	48.3%	\$113,310	\$209,601	85.0%
Multiple Modes	2,980	5,269	76.8%	\$3,440	\$7,023	104.2%
Rail	14,999	17,615	17.4%	\$5,610	\$11,161	99.0%
Water	428	34,068	7859.8%	\$26,971	\$45,192	67.6%
Air	21	96	357.1%	\$229	\$975	325.5%
Unknown	44	2	-95.5%	\$62	\$5	-91.2%
Total	122,033	210,624	72.6%	\$149,62	\$273,957	83.1%

Source: FHWA, FAF data version 4.5.1

Tennessee Agri-Production and Food Products Industry

In 2018, the Tennessee agriculture industry originated or terminated agricultural products totaling over 87 million tons, with a value of over \$80 billion. The agriculture industry primarily moves agricultural products by truck which accounts for almost 78 percent of the agriculture industry tonnage moved representing over \$66 billion in agricultural goods. Rail is the second most used mode with 13 percent of the tonnage valued at over \$3.6 billion in 2018. Growth between 2018 and 2045 in agricultural tonnage is estimated at almost 50 percent as shown in **Table 10**. In terms of value, agricultural products are estimated to increase 72 percent over the same period.

Table 10: Tennessee Agri-Production and Food Products Industry Growth in Tons and Value by Mode, 2018 to 2045

Tennessee	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	67,973	104,447	53.7%	\$66,935	\$114,630	71.3%
Multiple Modes	5,214	8,507	63.2%	\$4,298	\$8,180	90.3%
Rail	11,141	15,141	35.9%	\$3,600	\$8,382	132.9%
Water	2,855	2,580	-9.6%	\$4,995	\$2,111	-57.7%
Air	11	43	290.9%	\$254	\$4,704	1749.6%
Unknown	14	0	-100.0%	\$26	\$0	-100.00%
Total	87,208	130,718	49.9%	\$80,108	\$138,007	72.3%

Source: FHWA, FAF data version 4.5.1

Wood Flooring and Forest Products Industry

The wood flooring and forest products industry is significant throughout the Freight Alley Region. The analysis below is based on FAF4 data for SCTG 26, Wood Products.



Alabama Wood Flooring and Forest Products Industry

The Alabama wood products industry sends or receives nearly 28 million tons annually, with a value of almost \$11 billion in 2018. The wood products industry primarily moves freight by

truck, which accounts for 93 percent of the tonnage moved representing almost \$10 billion in wood-related goods. Rail is the second most used mode, with 5 percent of tonnage with 1.3 million tons) valued at \$504 million in 2018. Growth in wood product tonnage between 2018 and 2045 is estimated at around 26 percent as shown in **Table 11**. In terms of value, wood products transported to and from Alabama are estimated to increase around 20 percent during the same period.

Table 11: Alabama Wood Product Industry Growth in Tons and Value by Mode, 2018 to 2045

Alabama	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	25,760	32,524	26.3%	\$9,951	\$11,866	19.2%
Multiple Modes	599	707	18.0%	\$360	\$441	22.3%
Rail	1,384	1,855	34.0%	\$504	\$653	29.5%
Water	13	4	-69.2%	\$8	\$16	110.1%
Air	<1	<1	-	\$2	\$8	364.4%
Unknown	2	<1	-100.0%	\$2	\$0	-100.0%
Total	27,758	35,090	26.4%	\$10,827	\$12,984	19.9%

Source: FHWA, FAF data version 4.5.1

Georgia Wood Flooring and Forest Products Industry

The Georgia wood products industry sends or receives almost 48 million tons of wood products annually, with a value of over \$20 billion in 2018. The wood products industry primarily moves freight by truck, which accounts for around 92 percent of the wood products industry tonnage moved, representing almost \$19 billion in products. Rail is the second most used mode, with around 7 percent of the tons valued at \$700 million in 2018. Growth in wood product tonnage between 2018 and 2045 is estimated at 17 percent as shown in **Table 12**. In terms of value, wood products are estimated to increase over 22 percent during that period.

Table 12: Georgia Wood Product Industry Growth in Tons and Value by Mode, 2018 to 2045

Georgia	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	44,301	51,420	16.1%	\$18,767	\$28,121	18.7%
Multiple Modes	437	807	84.7%	\$530	\$944	77.9%
Rail	3,013	3,886	29.0%	\$700	\$1,088	55.4%
Water	58	39	-32.8%	\$43	\$103	140.6%
Air	1	4	300.0%	\$28	\$107	282.9%
Unknown	6	0	-100.0%	\$5	\$0	-100.0%
Total	47,816	56,156	17.4%	\$20,073	\$24,523	22.2%

Source: FHWA, FAF data version 4.5.1

Tennessee Wood Flooring and Forest Products Industry

The Tennessee wood products industry originates or terminates wood products totaling over 19 million tons, with a value of around \$10.5 billion. The wood products industry primarily moves freight by truck which accounts for 94 percent of the tonnage moved, representing almost \$10 billion in wood products. Rail is the second most used mode, representing around 4 percent of the tonnage with an approximate value of \$312 million in 2018. Growth in the wood product tonnage between 2018 and 2045 is estimated at 31 percent as shown in **Table 13**. In terms of value, wood products are estimated to increase almost 23 percent during that period.

Table 13: Tennessee Wood Product Industry Growth in Tons and Value by Mode, 2018 to 2045

Tennessee	2018 Total Tons (1,000)	2045 Total Tons (1,000)	Percent Change	2018 Value (Millions, 2018\$)	2045 Value (Millions, 2018\$)	Percent Change
Truck	19,157	24,494	27.9%	\$9,955	\$11,578	16.3%
Multiple Modes	162	365	125.3%	\$176	\$525	198.9%
Rail	506	1,123	121.9%	\$312	\$618	97.8%
Water	<1	1	-	<\$1	\$1	-
Air	2	5	150.0%	\$17	\$116	593.9%
Unknown	6	0	-100.0%	\$5	\$0	-100.0%
Total	19,833	25,988	31.0%	\$10,466	\$12,838	22.7%

Source: FHWA, FAF data version 4.5.1

INTERSTATE HIGHWAY SYSTEM

The performance of the interstate highway system in the Freight Alley Region focuses on six heavily traveled long-haul interstate corridors in the region:

- I-40: in Tennessee from I-24 in Nashville to I-75 west of Knoxville
- I-24: from I-40 in Nashville to I-59 at the Tennessee/Georgia border
- I-59: from I-24 in Chattanooga to I-20 in Birmingham
- I-20: from I-65 in Birmingham to I-285 at the I-20 exit in southeast Atlanta
- I-75: from the I-75/I-40 interchange west of Knoxville to the I-285/I-75 interchange in south Atlanta
- I-85: from the I-285/I-85 interchange in southeast Atlanta to the eastern border of Gwinnett County, GA

These interstate segments were selected in consultation with the Tennessee Department of Transportation (TDOT).

Truck Volumes

Inputs into the truck volume development were based on the best available data from the Tennessee statewide model, the Georgia statewide model, and traffic count databases from each state. Using 2015 as a base year and 2040 as a plan horizon year, the following data sets were utilized:

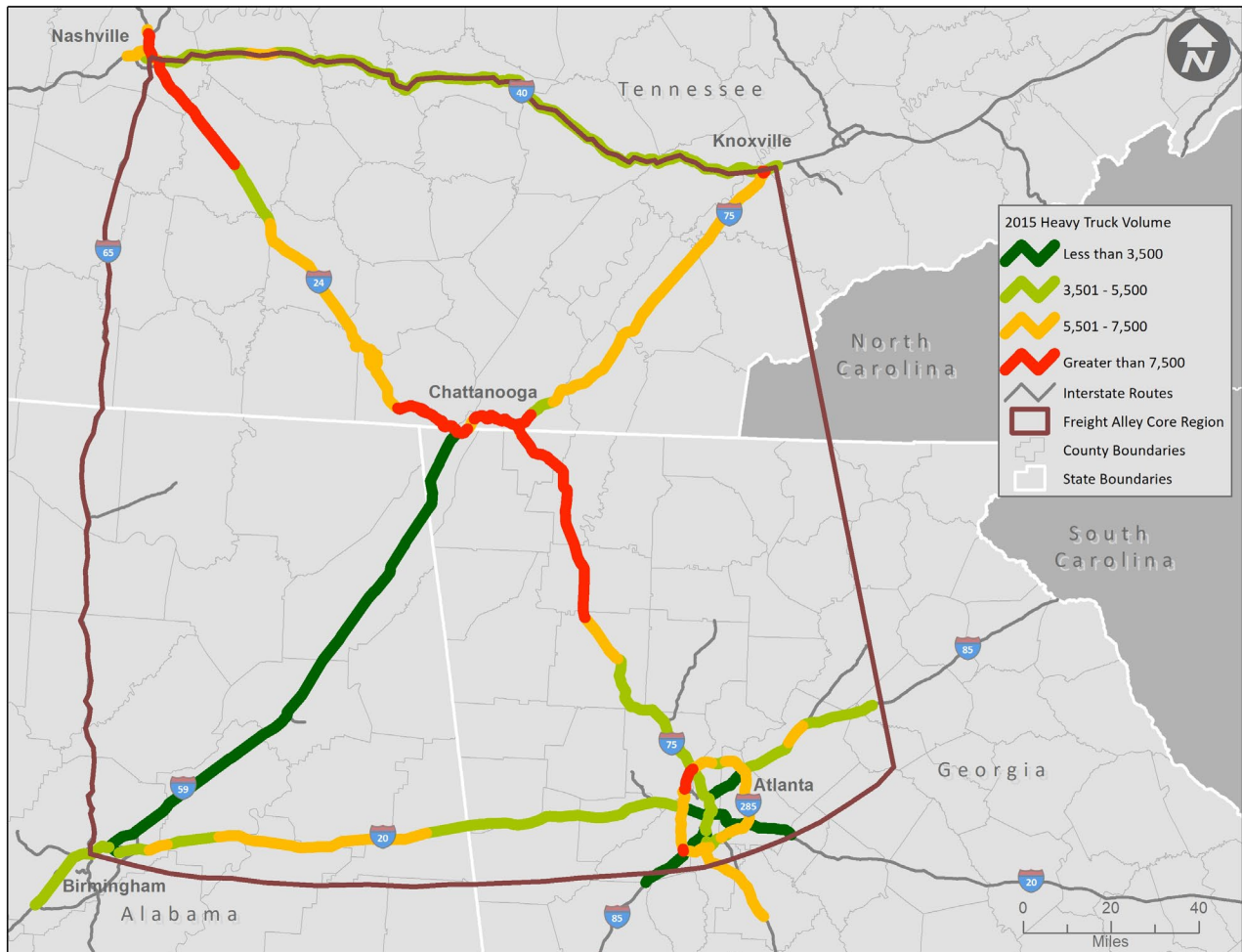
- **Georgia statewide model (GSTDMv.1.1)** – used 2015 base year and 2050 forecast year. A compound growth rate was calculated between those two years which was then multiplied by the 2017 actual traffic count to obtain the 2040 future year used for the analysis. 2040 was used for all states since the Tennessee model has a future year of 2040.
- **Georgia 2017 traffic count database** – provided by the Georgia Department of Transportation (GDOT).
- **Tennessee statewide model (TSTM_v3)** – used 2010 base year and 2040 forecast year. A 2010 to 2040 growth rate was developed and multiplied times the 2018 actual traffic count to obtain the 2040 future year volume.
- **Tennessee 2018 traffic count database** – provided by TDOT.
- **Alabama 2018 traffic count database** – Alabama did not have a statewide travel demand model, so the 2018 count database was used as the current year data. The growth rate was calculated using historical growth in Alabama with a limit of 3 percent per year. Data was provided by the Alabama Department of Transportation (ALDOT).

The methodology uses the guidelines in National Cooperative Highway Research Program (NCHRP) Report 765, Analytical Travel Forecasting Approaches for Project-Level Planning and Design, to adjust model volumes to ground counts.¹² Compound growth rates are used to expand base year ground counts for future year projections. Segments followed the model but were grouped to intersections with major highways or cities. The flow map volumes used an aggregation of model sections to keep the volumes smooth.

Existing annual volumes for heavy trucks in the Freight Alley Core Megaregion are highest on I-24 near Murfreesboro, TN and I-40 near Knoxville, TN with more than 11,500 heavy trucks daily in 2018. Volumes are forecast to increase to greater than 15,000 heavy trucks daily by 2040 near these same locations. Additional truck volume increases are anticipated on I-75 in the Atlanta area with more than 7,500 heavy trucks daily. **Figure 2** and **Figure 3** shows forecast heavy trucks volumes in 2040.

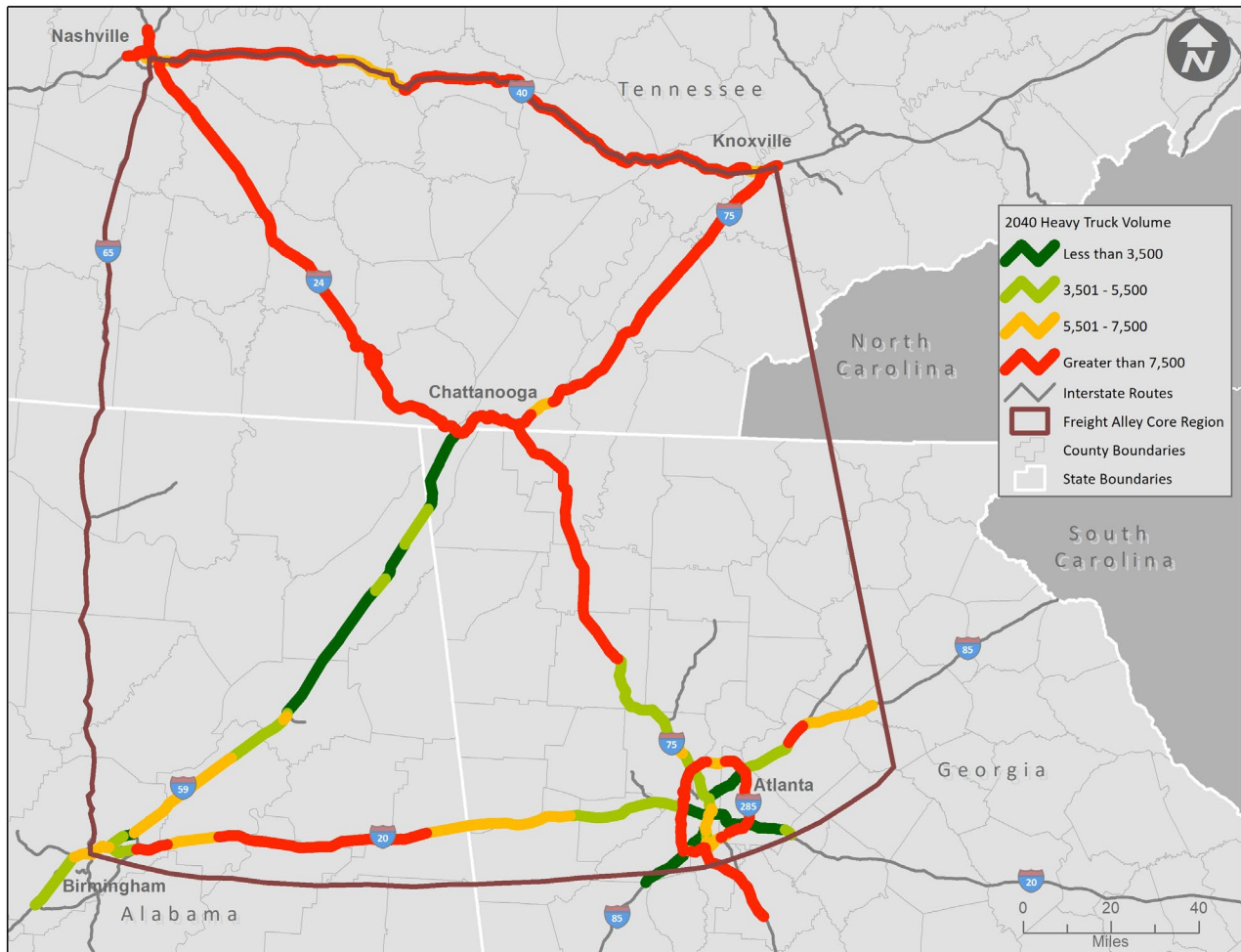
¹² National Cooperative Highway Research Program (NCHRP) Report 765, Analytical Travel Forecasting Approaches for Project-Level Planning and Design, 2014.

Figure 2: Daily Heavy Truck Volumes on Interstates in Freight Alley Core Megaregion, 2015



Source: GDOT Travel Demand Model, TDOT Travel Demand Model, Count Data from ALDOT, GDOT, TDOT, CDM Smith analysis

Figure 3: Daily Heavy Truck Volumes on Interstates in the Freight Alley Core Megaregion, 2040



Source: GDOT Travel Demand Model, TDOT Travel Demand Model, Count Data from ALDOT, GDOT, TDOT, CDM Smith analysis

Congested Corridors

The existing and future congestion analysis focuses on the most heavily traveled interstates in the region, as discussed above. Congestion is determined using level of service (LOS) thresholds derived from volume to capacity (v/c) ratios from the statewide models. Interstate segments with LOS D (0.8 v/c ratio) and LOS E (0.9 v/c ratio) are considered “heavily congested” for the purposes of this study. Existing heavily congested corridors are located within Nashville on I-24; on I-75 in western Knoxville; in the Atlanta area on portions of I-85, I-20, and I-75; and within Birmingham on I-59. These heavily congested segments are forecast to increase in miles by 2040. **Table 14** lists the LOS D and LOS E mileage of each corridor for 2018 and 2040. Additional detail on the congestion analysis is provided in **Table 15**.

Table 14: Heavily Congested Interstate Segments in the Freight Alley Region, 2018 and 2040

Interstate Segment	LOS ^a	2018		2040	
		Miles	Percent of Miles	Miles	Percent of Miles
I-40 between I-75 and I-24 in TN (155.1 miles)	LOS D or worse	0.0	0.0%	19.7	12.7%
	LOS E or worse	0.0	0.0%	6.9	4.4%
I-75 between I-40 and GA Stateline (84.7 miles)	LOS D or worse	1.7	2.0%	6.7	7.9%
	LOS E or worse	0.0	0.0%	1.7	2.0%
I-75 between GA Stateline and I-285 (116.5 miles)	LOS D or worse	49.2	42.2%	65.5	56.2%
	LOS E or worse	40.9	35.1%	55.0	47.2%
I-85 between GA State Road 53 (Green Street) and GA State Rd. 74 (Senoia Rd.) (67.4 miles)	LOS D or worse	64.4	95.5%	67.4	100.0%
	LOS E or worse	48.6	72.1%	62.5	92.7%
I-20 between I-285 and AL Stateline (66.7 miles)	LOS D or worse	32.5	48.7%	42.9	64.2%
	LOS E or worse	23.2	34.8%	32.5	48.8%
I-59 between AL Stateline and I-65 in AL (113.5 miles)	LOS D or worse	9.5	8.4%	56.7	50.0%
	LOS E or worse	7.4	6.5%	38.5	33.9%
I-24 between I-40 and I-75 in AL (138.2 miles)	LOS D or worse	11.8	8.5%	41.1	29.7%
	LOS E or worse	5.7	4.1%	24.8	17.9%

Source: ALDOT, GDOT, TDOT

^a Assumptions: LOS D Threshold Volume to Capacity Ratio = 0.8. LOS E Threshold Volume to Capacity Ratio = 0.9

Table 15: Example Calculation for I-85 from S. 138/Jonesboro Road to Senoia Road (2.91 miles)

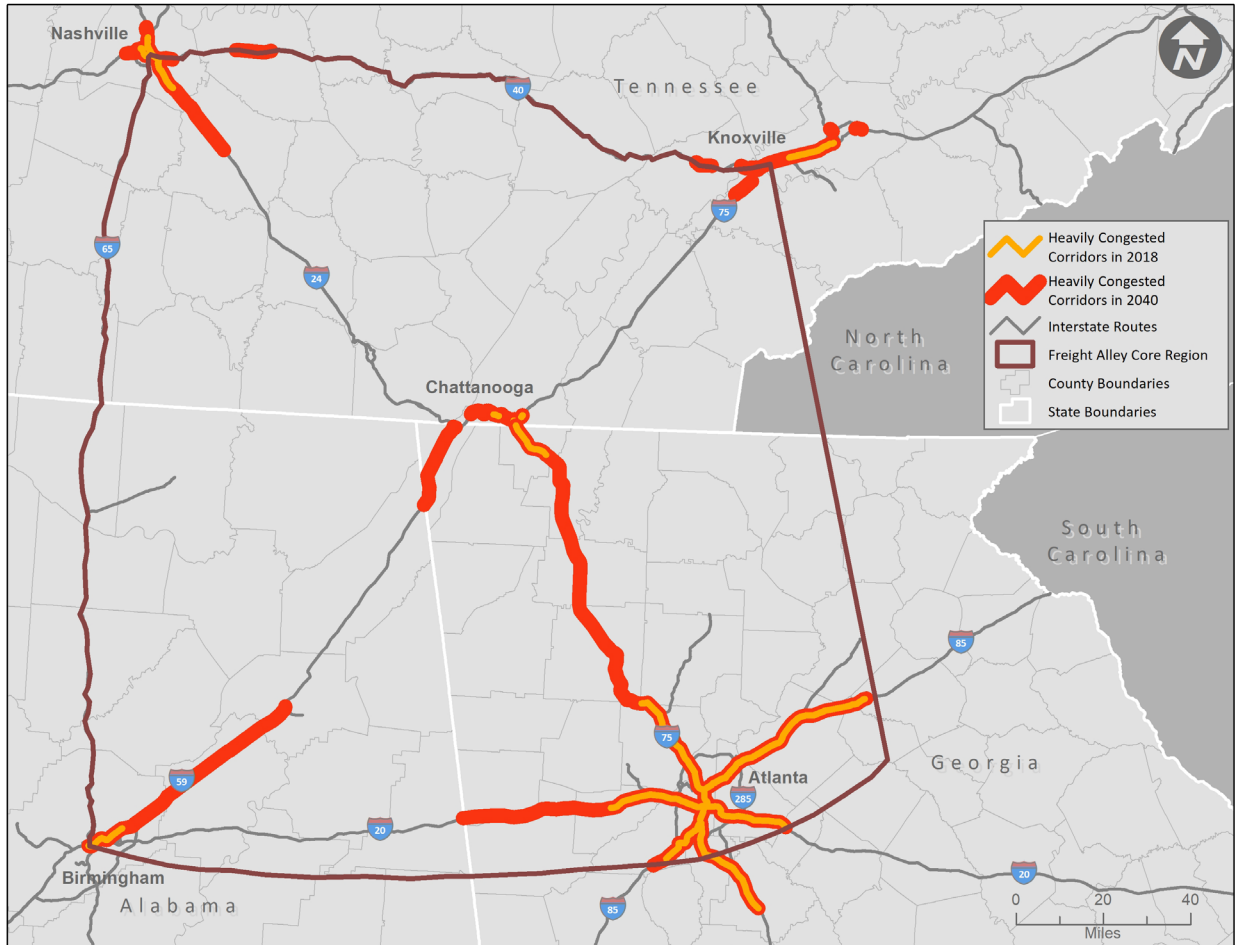
Measure	Value
2015 GA Statewide Model Total Volume	58,264
2050 GA Statewide Model Total Volume	71,480
2015 GA Statewide Model Heavy Truck Volume	5,955
2050 GA Statewide Model Heavy Truck Volume	8,007
2015 Volume to Capacity Ratio from GA SWM	0.78
2050 Volume to Capacity Ratio from GA SWM	0.91
2017 AADT Count	63,500
2017 Heavy Truck Count	2,100
Total Volume Compound Annual Growth Rate (%)	0.59%
Total Heavy Volume Compound Annual Growth Rate (%)	0.85%
2040 Total Volumes	72,630
2040 Heavy Truck Volume	2,551
2018 Volume to Capacity Ratio	0.79
2040 Volume to Capacity Ratio	0.90

Source: GDOT

Assumptions: LOS D Threshold Volume to Capacity Ratio = 0.8. LOS E Threshold Volume to Capacity Ratio = 0.9

Figure 4 illustrates the location of heavily congested interstate segments within the Freight Alley Region in 2018, and as forecast for 2040.

Figure 4: Heavily Congested Corridors on Interstates in the Freight Alley Core Megaregion, 2018 and 2040



Source: GDOT Travel Demand Model, TDOT Travel Demand Model, Count Data from ALDOT, GDOT, TDOT, CDM Smith analysis

ATRI's Annual Truck Bottleneck Analysis

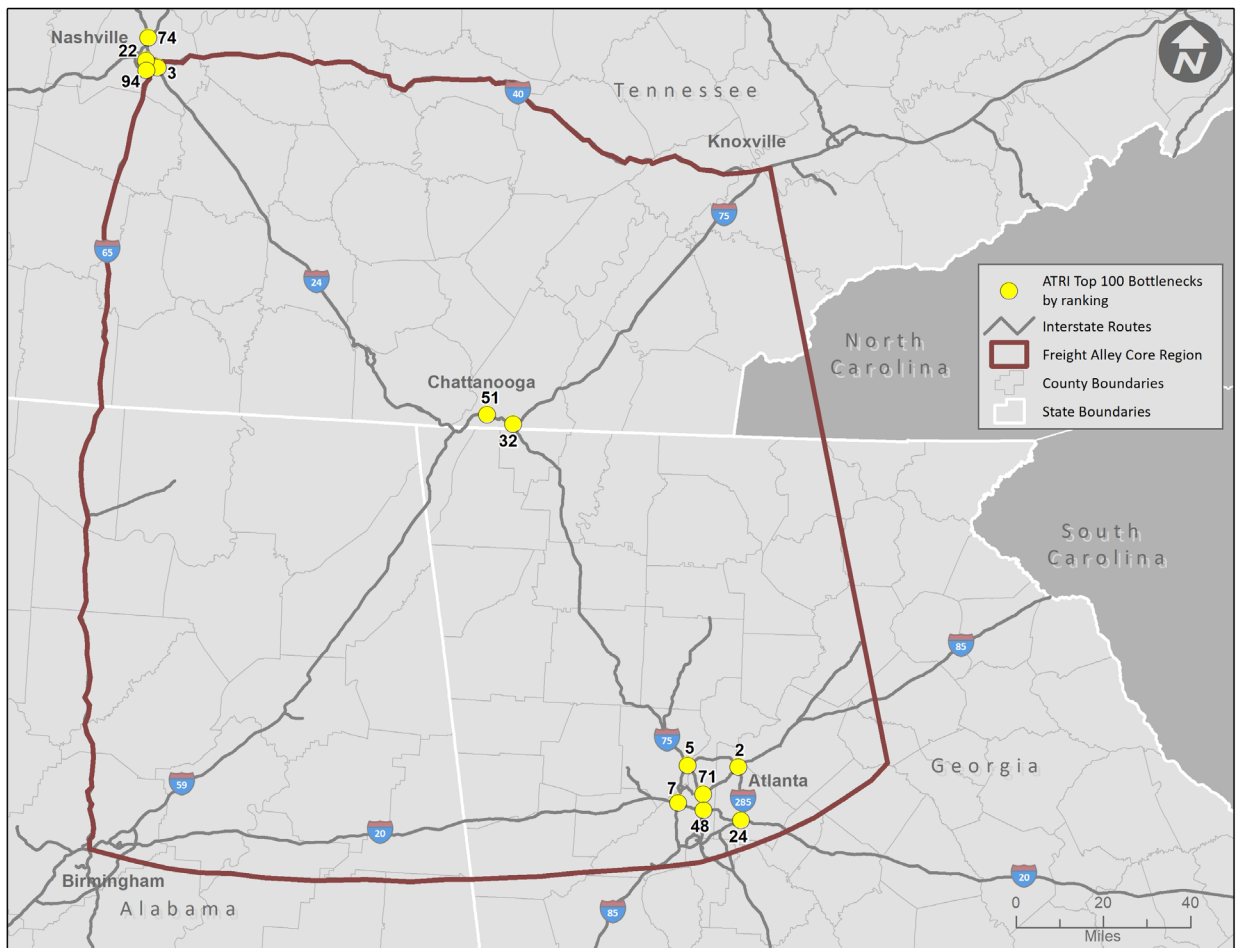
The American Transportation Research Institute (ATRI) collects and processes truck GPS data to develop and monitor key performance measures on the nation's freight transportation system. This data is used in an annual bottleneck analysis to identify locations of traffic congestion on truck-borne freight across the U.S. According to ATRI's annual truck bottleneck analysis in 2020, twelve of the top 100 truck bottlenecks in the country are located within the Freight Alley Core Megaregion as listed in **Table 16** and shown in **Figure 5**.

Table 16: ATRI's National Top 100 Bottlenecks List 2020 in the Freight Alley Core Megaregion

ATRI Congestion Rank	City, State	Bottleneck Location
2	Atlanta, GA	I-285 at I-85 (North)
3	Nashville, TN	I-24/I-40 at I-440 (East)
5	Atlanta, GA	I-75 at I-285 (North)
7	Atlanta, GA	I-20 at I-285 (West)
22	Nashville, TN	I-40 at I-65 (East)
24	Atlanta, GA	I-20 at I-285 (East)
32	Chattanooga, TN	I-75 at I-24
48	Atlanta, GA	I-20 at I-75/I-85
51	Chattanooga, TN	I-24 at U.S. 27
71	Atlanta, GA	I-75 at I-85
74	Nashville, TN	I-65 at I-24
94	Nashville, TN	I-65 at I-440

Source: "Top 100 Truck Bottlenecks - 2020", American Transportation Research Institute (ATRI), February 18, 2020

Figure 5: ATRI's National Top 100 Bottlenecks List 2020 in the Freight Alley Core Megaregion



Source: "Top 100 Truck Bottlenecks - 2020", American Transportation Research Institute (ATRI) February 18, 2020

FREIGHT ALLEY INDUSTRY CLUSTERS

DEFINING AND SELECTING THE STUDY INDUSTRY CLUSTERS

Industry clusters are generally defined as “groups of firms that gain competitive advantage through local proximity and interdependence.”¹³ Research supports the benefits to businesses and regions from clustering through the sharing of infrastructure and suppliers; worker productivity developed through deep labor markets; and the exchange of knowledge and innovations between interdependent firms. In the Freight Alley Core Megaregion, as in other regions with strong clustering, research universities and research and development centers leverage industry expertise and help to drive technology applications and innovation. For example, the Automotive Research Alliance includes members from Auburn University, University of Alabama, and the University of Tennessee providing world class automotive industry resources and support.

Research centers at NASA Marshall Space Flight Center in Huntsville (AL), Arnold Engineering Center in Tullahoma (TN), and Oak Ridge National Laboratory (TN) work collaboratively with the private sector to integrate innovation to deliver product improvements, reduce costs, and improve safety. The synergies generated among industry clusters help to drive industry-specific expertise to support important services to these clusters and attract related investments and employment. More recent cluster research also shows the importance of the connected transportation and broadband infrastructure to support economic activities within industry clusters.

In this study, the selected industry clusters are freight-dependent businesses that rely on freight movement to help drive their competitiveness domestically and globally. They may also share other traits, including the importance of workforce training, access to skilled employees, competitive labor costs, and opportunities to collaborate with state-of-the-art research facilities. As a result, improvements in freight reliability, cost efficiencies, accessibility, and safety foster stronger economic activities, well-paying jobs, and greater economic competitiveness in each of the region’s selected industry sectors.



Aerospace
and Aviation
Manufacturing



Agri-Production
and Food
Products



Automotive
Manufacturing



Wood Flooring
and Forest
Products



Trucking and
Logistics

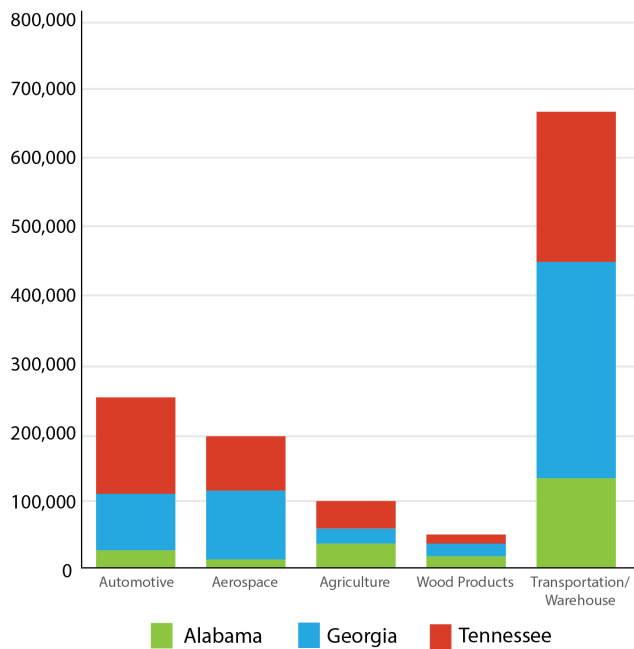
¹³ “Rethink Cluster Initiatives”, Metropolitan Policy Program, The Brookings Institute, July 2018

For this study, five significant existing freight-dependent industry clusters in the Freight Alley Core Megaregion were selected for analysis: aerospace and aviation, agri-production and food products, automotive manufacturing, wood flooring and forestry products manufacturing, and trucking and logistics. The methodology for selecting the five industry clusters is discussed in greater detail below. *Note: the research and data collection for this study was conducted prior to COVID-19. The long-term impacts to transportation and the economy due to the virus cannot be accurately predicted at this time.*

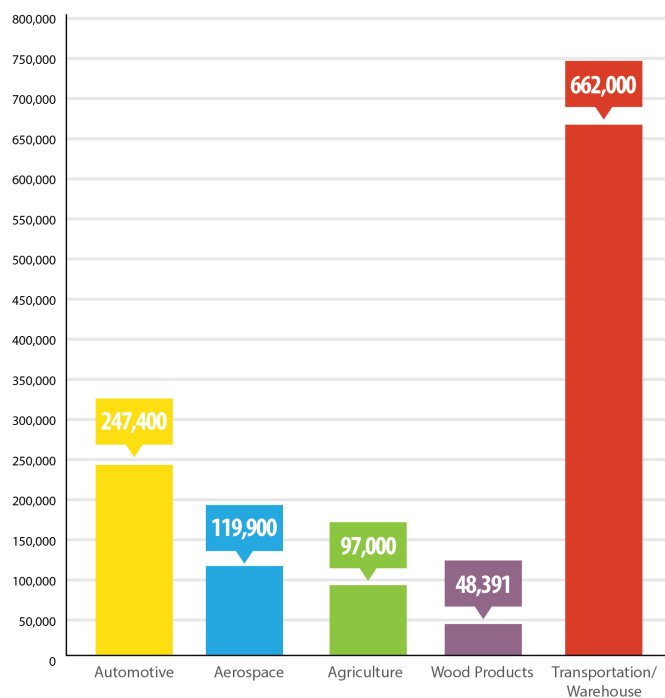
An evaluation of freight-dependent industries located in Alabama, Georgia, and Tennessee was conducted. Industry sector employment, exports, and industry sectors targeted by each state’s primary statewide economic development organizations were reviewed.

Georgia has the highest concentration of employment in four sectors: aerospace and aviation, agri-production and food products, and transportation and logistics of the three states. Tennessee has the largest number of automotive manufacturing employees including suppliers of the three states. Each of the three states have targeted these four industries for recruitment: aerospace and aviation (or defense), automotive, distribution and logistics, and agri-

Employment by State & Industry



Total Employment by Industry



Source: Georgia.org/industries; Economic Development Partnership of Alabama. Com/industries; TNECD.com/Industries, 2018

production and food products. Alabama was the only state that targeted forestry products (including wood flooring) in its economic development efforts. The recommended industry sectors were reviewed and approved by TDOT, the lead agency for this study.

To develop a map of specific business locations within each of the five selected industry sectors in the three states, TDOT reached out to the economic development agencies in each of the participating states and requested their assistance. The study team developed a specific data request for each of the industry sectors identifying North America Industrial Classification System (NAICS) codes to classify freight-dependent manufacturing business establishments and large trucking and logistics operations. Minimum employment benchmarks were developed for each industry sector to identify the most significant freight generators as in **Table 17**.

Table 17: NAICS Codes and Employment Thresholds by Sector

Study Industry Clusters	NAICS Codes	Minimum Employment at each establishment
Aerospace and Aviation	3364 and 3345	300
Agri-Production and Food Products	3111 through 3121	200
Automotive Manufacturing	3262, 3361-3363, 4231	Integrated automotive assembly manufacturing with 1,000+, employees, suppliers with 300+ employees
Wood Flooring and Forest Products	3212 through 32211	200
Trucking and Logistics	423, 424, 425, 484, 488, 492, 493	300

Source: North America Industrial Classification System

Industry cluster data for each of the five industry sectors with requisite company employment data and facility addresses were provided to the project by the State Economic Development agencies in Alabama, Georgia, and Tennessee.¹⁴ This data came from a variety of sources including state databases and commercially available private data. The study team evaluated the data and utilized GIS locational analysis to geocode and map the location of each company by industry sector that met the minimum number of employees. Because of the volume of business locations, industry locations were included in the mapping based on a minimum number of employees at the facility for each industry cluster:

- **Aerospace and Aviation** – manufacturing facilities with 300+ employees
- **Agri-Production and Food Products** – manufacturing facilities with 200+ employees
- **Automotive** – integrated automotive manufacturing facilities with 1,000+ employees and automotive supplier manufacturing with 300+ employees
- **Wood Flooring and Forest Products** – manufacturing facilities with 200+ employees
- **Trucking and Logistics** – operations with over 300+ employees

¹⁴ Tennessee Department of Economic Development Center for Economic Research, Center for Logistics Georgia Department of Economic Development, Alabama Department of Transportation Planning Studies Bureau

The industry cluster maps are statewide and include companies within the NAICS codes that met the minimum employment thresholds identified for the study. While the study's focus is on the Freight Alley Core Megaregion, each of these industry sectors is important to the economy of the three states and the transportation networks serving the Freight Alley Core Megaregion are essential to these industries throughout each of the states. *Note: The industry cluster maps reflect company location only. They are not weighted based on employment due to variations in available employment data.*

FREIGHT ALLEY AND ECONOMIC DEVELOPMENT

Businesses make strategic investment decisions about where to locate, expand, close, or consolidate their operations based on several factors; high on the list of evaluation criteria is access to and the cost of transportation. The ability to move supplies and products domestically and globally is essential to successful companies, and they use a range of transportation modes to ensure the most cost-effective and reliable deliveries to their customers. For the past 33 years, Area Development, a professional economic development journal, has conducted an annual survey of corporate executives, particularly manufacturers, about their business location decision priorities and facility plans for the coming years.¹⁵ Forty percent of the executives responding to the 2019 survey indicated they planned to open additional domestic facilities within the next five years and 50 percent of those facilities will be in the southern U.S., including locations in the Southeast and Southwest regions of the country. Of those facilities, 30 percent will be manufacturing facilities and 30 percent will be warehouse and distribution facilities.¹⁶



Based on the data from the Area Development 2019 Corporate Survey, the top seven factors companies consider in their location decisions are: 1) availability of skilled labor, 2) labor costs, 3) highway accessibility (which has been either ranked first or second for most of the past 33 years), 4) corporate tax rate, 5) tax exemptions, 6) quality of life, and 7) state and local incentives.¹⁷ The importance of rail services for corporate executives responding to the survey has increased by nearly 17 percent over the past year; however rail service only ranks 26th among all the location factors.

In a recent freight study, TRIP, a national transportation research nonprofit, calculated the projected increase in the value of freight by value for all modes for the period 2016 to 2045 by state and the increase in freight shipped by truck-only by value for the same period. **Table 18** shows the projected increases for Alabama, Georgia, and Tennessee from this study.¹⁸

Table 18: 2016-2045 Increases in the Value of Freight for all Modes and Truck-Only Shipments

State	2016-2045 Increase in Freight by Value all Mode	2016 - 2045 Increase in Freight Value Truck-Only Shipments
Alabama	81%	69%
Georgia	115%	89%
Tennessee	128%	71%

Source: Appendix "America's Rolling Warehouses: Opportunities and Challenges with the Nation's Freight Delivery System", TRIP, October 2019

¹⁵ 33rd Annual Corporate Survey, Area Development, 2019

¹⁶ Ibid.

¹⁷ Ibid.

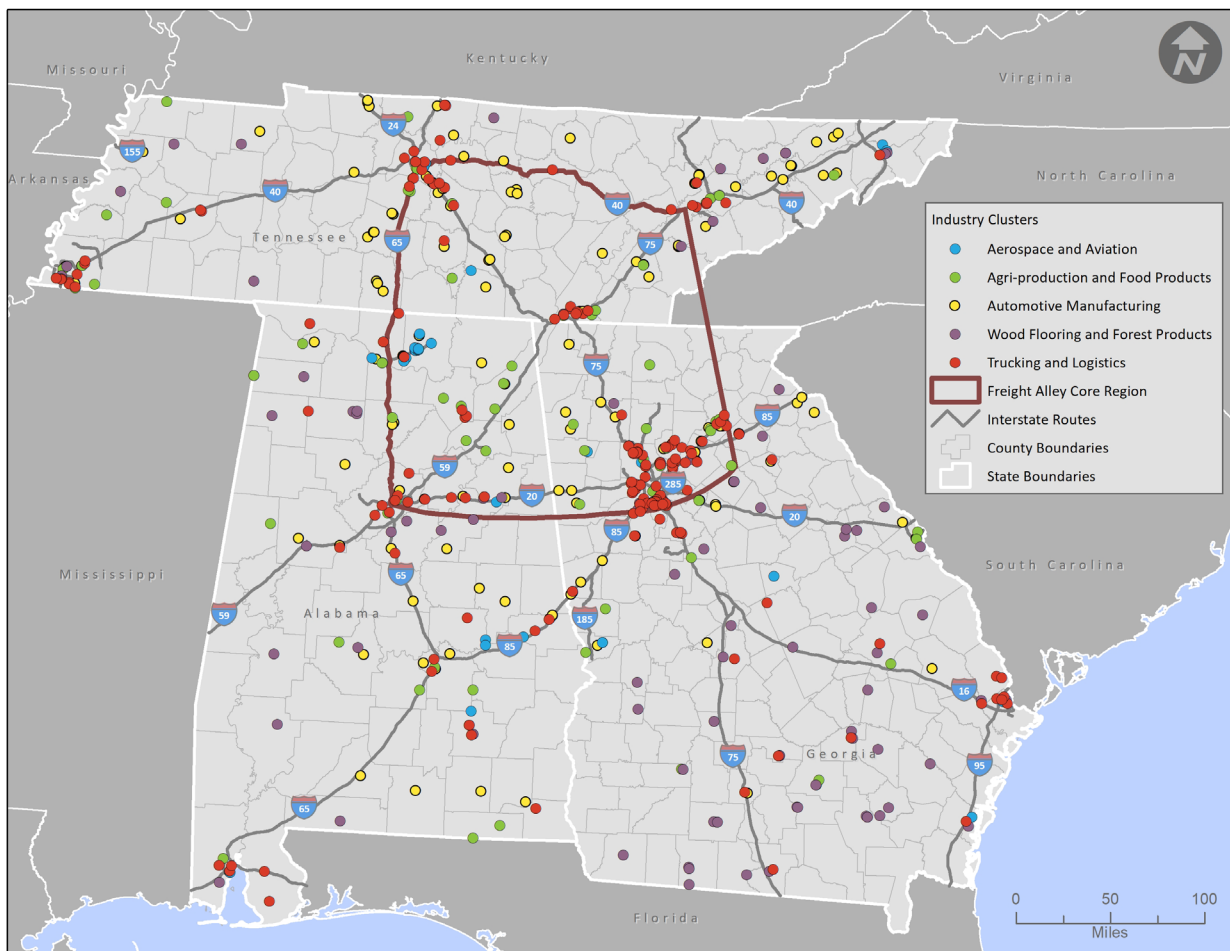
¹⁸ "America's Rolling Warehouses: Opportunities and Challenges with the Nation's Freight Delivery System", TRIP, October 2019

Freight is integral to job growth and economic development. The freight networks within Alabama, Georgia, and Tennessee accommodate the movement of a significant amount of freight. Congestion, safety concerns, issues with first and last mile connectors, and challenges with overall system operations and condition can result in substantial costs to haulers and shippers who rely on these transportation networks. As the demands of customers continue to evolve, companies find freight mobility an increasingly important factor in sustaining and enhancing their competitive position in the marketplace through reliable connections to customers and links to diverse markets to ensure timely deliveries of goods and services.

ANALYSIS OF SELECTED FREIGHT ALLEY INDUSTRY SECTORS

The analysis of the selected industry clusters provides a geospatial context for evaluating each of these clusters in the Freight Alley Core Megaregion, existing and future market conditions, trends and technologies affecting industries, and challenges each industry cluster may face in the future. **Figure 6** provides the location of businesses with significant employment in each of the industry clusters within the three-state area. These five industry clusters employ 1.2 million people in the three states combined. While each of the industry clusters faced certain challenges prior to the COVID-19 pandemic, cluster analysts supported expectations of future growth within these clusters in the Freight Alley Core Megaregion. Aside from the near-term impact of the pandemic, how well these businesses succeed moving forward depends in part on how well the region’s multimodal transportation network functions. As population continues to increase, more demands are placed on the network and resources are available to address system improvements.

Figure 6: Five Selected Industry Clusters in the Three-State Region



Source: Tennessee Department of Economic Development Center for Economic Research, Center for Logistics Georgia Department of Economic Development, Alabama Department of Transportation Planning Studies Bureau, and CDM Smith

AEROSPACE AND AVIATION INDUSTRY

Air travel has been a resilient market and continued robust growth had been expected prior to COVID-19.¹⁹ The global aerospace and aviation industry reported record operating profits in 2018²⁰ while the top 100 aerospace and aviation companies experienced the highest annual growth rate of the past decade.²¹ Although the demand for commercial planes was strong prior to the pandemic, demand was expected to decline from the peak in 2018 as more companies purchase fuel efficient smaller regional jets over the next 20 years to meet changing market demands.²²



In 2018, aerospace and aviation manufacturers contributed \$151 billion in export sales to the U.S. economy.²³ This industry directly employs over 500,000 scientific and technical employees and an additional 700,000 jobs in related aerospace and aviation fields. According to the Federal Aviation Administration (FAA) Aerospace Forecast for 2018 – 2038, U.S. airline carriers anticipated passenger growth over the next twenty years. Over the previous ten-year period the airline industry made significant changes to revitalize their business models, reduce costs, eliminate routes that are no longer profitable, and make equipment changes to eliminate less fuel-efficient aircraft to respond to changing market and passenger demands.²⁴

Demand for Travel Prior to the Pandemic

Strong economies around the world have been driving aerospace and aviation growth over the past five years and growth has averaged 6.2 percent per year.²⁵ Economic and income growth in large emerging markets such as China and India have been a primary driver of global Gross Domestic Product (GDP) growth and increased demand for air travel. The middle class in China and India grew from 80 million in 2000 to 135 million in 2016, an increase of nearly 70 percent.²⁶ As a result, China has contributed significantly to world airline passenger traffic growth. China's passenger growth has increased an average of 10 percent or more per year. India's emergence as a high-growth economy has generated passenger traffic growth that exceeds 20 percent per year in its domestic market. The International Air Transportation Association (IATA) predicts India will become the third largest commercial aviation market by 2037.²⁷

Prior to the pandemic, demand in the commercial airline market was expected to more than double over the next two decades and Boeing forecast the demand for jet airplanes would

¹⁹ "Current Market Outlook 2019 – 2038" Boeing, published 2019

²⁰ "2019 Aerospace Manufacturing Attractiveness Rankings", PricewaterhouseCoopers, 2019

²¹ "The Alix Partners Global Aerospace and Defense Industry Outlook", Alix Partners, June 2019

²² 2020 Global Aerospace Industry Outlook, Deloitte

²³ "The Aerospace Industry in the United States", U.S. Department of Commerce, International Trade Administration Industry & Analysis Unit, 2018

²⁴ "FAA Aerospace Forecast Fiscal Years 2018 – 2038", Federal Aviation Administration, published 2018

²⁵ "Current Market Outlook 2019 – 2038" Boeing, published 2019

²⁶ Ibid.

²⁷ "IATA Forecast predicts 8.2 billion air travelers by 2037", IATA, October 24, 2018

nearly double to almost 44,000. Some of this increasing demand would be captured by the Boeing Alabama facilities that currently employ over 3,000 people in the state.²⁸ Single-aisle airplanes were expected to be the largest share of this growth, representing over 70 percent of new deliveries over the next 20 years.²⁹ These new airplanes are expected to continue to stimulate growth of low-cost regional carriers and provide replacement aircraft for older, less-efficient airplanes. In addition, newer wide-body airplanes are planned to be delivered, which will allow airlines to serve new markets more efficiently than in the past.³⁰

Tourism Prior to the Pandemic

In 2019, 1.4 billion international tourist arrivals in the U.S. were documented, an increase of 5 percent over the preceding year.³¹ International tourism expenditures increased 4 percent to \$1.7 trillion, the 9th consecutive year of sustained tourism growth.³² This trend was projected to continue with the contribution of tourism and travel to the global GDP expected to grow 4 percent per year over the next 10 years. The largest regional tourism growth was in Asia Pacific, followed by North America and Europe. The onset of COVID-19 has significantly affected the tourism industry. In the future, as the economy stabilizes and vaccines and treatments become available, this sector is expected to rebound. Unfortunately, in the short-term many tourism businesses in the U.S. and internationally will continue to experience serious economic losses.

Domestic Markets

U.S. airlines have transformed from a capital intensive, highly cyclical industry into an industry that generates solid returns on capital investments and sustained profits.³³ Since the end of the 2009 recession, domestic airlines have revamped their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft. The results of these efforts have been impressive as 2018 marked the ninth consecutive year of profitability for the U.S. airline industry.³⁴

Aviation demand is driven by the U.S. economy. Before the COVID-19 pandemic, the FAA forecast an average 1.9 percent annual growth over the next 20 years. The number of aircraft in the U.S. commercial fleet was forecast to increase from 7,141 in 2017 to 8,290 in 2038, which is an average annual growth rate of 0.7 percent a year. Increased demand for air travel and growth in air cargo was expected to fuel increases in both passenger and cargo fleets.³⁵ FAA projected that U.S. enplanements will continue to grow through 2038, as shown in **Figure 7**.

²⁸ "The Boeing Company", Employment Data by State, www.boeing.com, Data accessed December 16, 2019

²⁹ "Current Market Outlook 2019 - 2036", Boeing, 2019

³⁰ Ibid.

³¹ "International Tourism Highlights 2019", UN World Tourism Organization, 2019

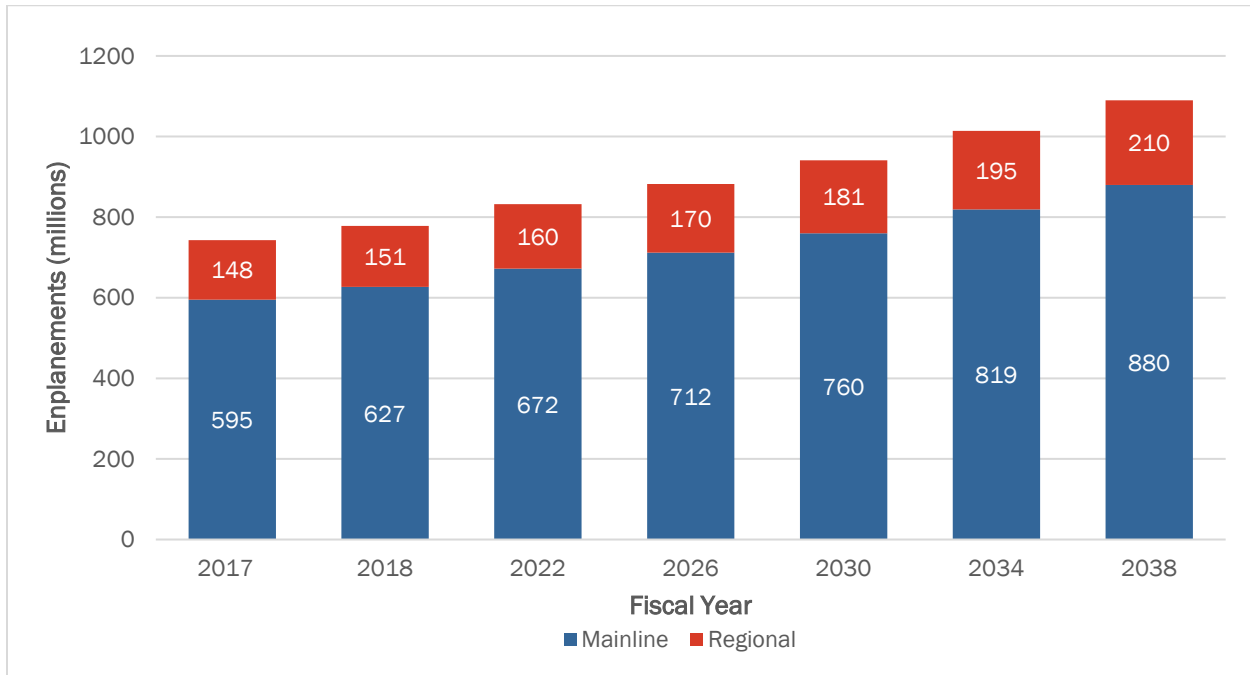
³² Ibid.

³³ "2019 Aerospace Manufacturing Attractiveness Rankings", PwC, 2019

³⁴ Ibid.

³⁵ "FAA Aerospace Forecast Fiscal Years 2018 - 2038", Federal Aviation Administration, 2018

Figure 7: FAA Enplanement Projections to 2038



Source: Federal Aviation Administration, FAA Aerospace Forecast Fiscal Years 2018-2038

The regional carrier fleet is forecast to decline from 2,131 aircraft in 2017 to 2,011 in 2038 as the fleet shrinks by 10.5 percent between 2017 and 2028.³⁶ This is a result of air carriers removing 50-seat regional jets and retiring older small turboprop and piston aircraft from the fleet, while adding 70 to 90-seat jets. In doing so the number of aircraft is reduced while maintaining the number of passenger seats. By 2030 only a handful of 50-seat regional jets are expected to remain in the fleet. The cargo carrier large jet aircraft fleet was forecast to increase from 855 aircraft in 2017 to 1,178 aircraft in 2038 driven by the growth in freight.³⁷ COVID-19 and the significant decline in passenger air travel have caused airlines to park aircraft of all sizes. While ongoing maintenance must be performed on these planes, some airlines are planning to remove some aircraft from service earlier than expected and restructure their fleets around newer planes. This would benefit the aerospace and aviation sector once air travel begins to rebound.³⁸

³⁶ “FAA Aerospace Forecast Fiscal Years 2018 – 2038”, Federal Aviation Administration, 2018

³⁷ Ibid.

³⁸ “More Iconic Planes are disappearing from the Sky”, Thomas Pallini, Business Insider, July 17, 2020

Aerospace and Aviation in the Freight Alley Region

Alabama

Alabama's aviation and aerospace industry has been integral to the U.S. space and defense programs for more than 50 years. Alabama is home to numerous aerospace, aviation, and defense-related companies supporting both government and commercial markets. The state has attracted investment from companies around the globe including Airbus, Boeing, GE Aviation, Lockheed Martin, and GKN.³⁹ Alabama ranks 12th among U.S. states for total employment in aerospace products and parts manufacturing with more than 13,200 people employed at over 70 aerospace and aviation businesses in the state.⁴⁰ Alabama companies employ over 4,660 aerospace engineers, ranking in the top 5 states in the U.S. in terms of concentration of aerospace engineers.⁴¹

12th Aerospace Employment
in the United States

70 Aerospace and Aviation
Manufacturing Facilities
Employing 13,200 people

TOP 5 Top 5 in United States
in Aerospace Engineers

Alabama's aerospace and aviation sectors include original equipment manufacturers (OEMs); maintenance, repair, and overhaul operations (MRO); material and component manufacturers; engineering and technical service providers; research and development (R&D) companies; and other product and service providers.⁴² Alabama aerospace and aviation companies exported \$2.4 billion in equipment and parts in 2018, an increase of more than 48 percent over 2017. In 2015, Airbus began production at their first U.S.-based manufacturing facility in Mobile. In 2018, Airbus announced a second production line at their Mobile facility, adding an additional \$264 million investment and creating an additional 430 new jobs.⁴³ **Figure 8** presents the location of Alabama businesses in this industry cluster with more than 300 employees.

The state has three key concentrations of aerospace and aviation business establishments: in Huntsville and Madison County, in Mobile and Southwest Alabama, and in Dothan and Southeast Alabama. Aerospace and aviation companies in these 3 regions have attracted a range of domestic and international companies and are home to a number of military and public sector research centers focused on aerospace, rockets, and next-generation space launch systems. The collaboration between these entities has helped this industry cluster to expand in Alabama, providing employers access to innovation, a pool of well-trained and skilled employees, and shared supplier expertise.

³⁹ "Key Industries: Aerospace, 2019", Economic Development Partnership of Alabama, 2019

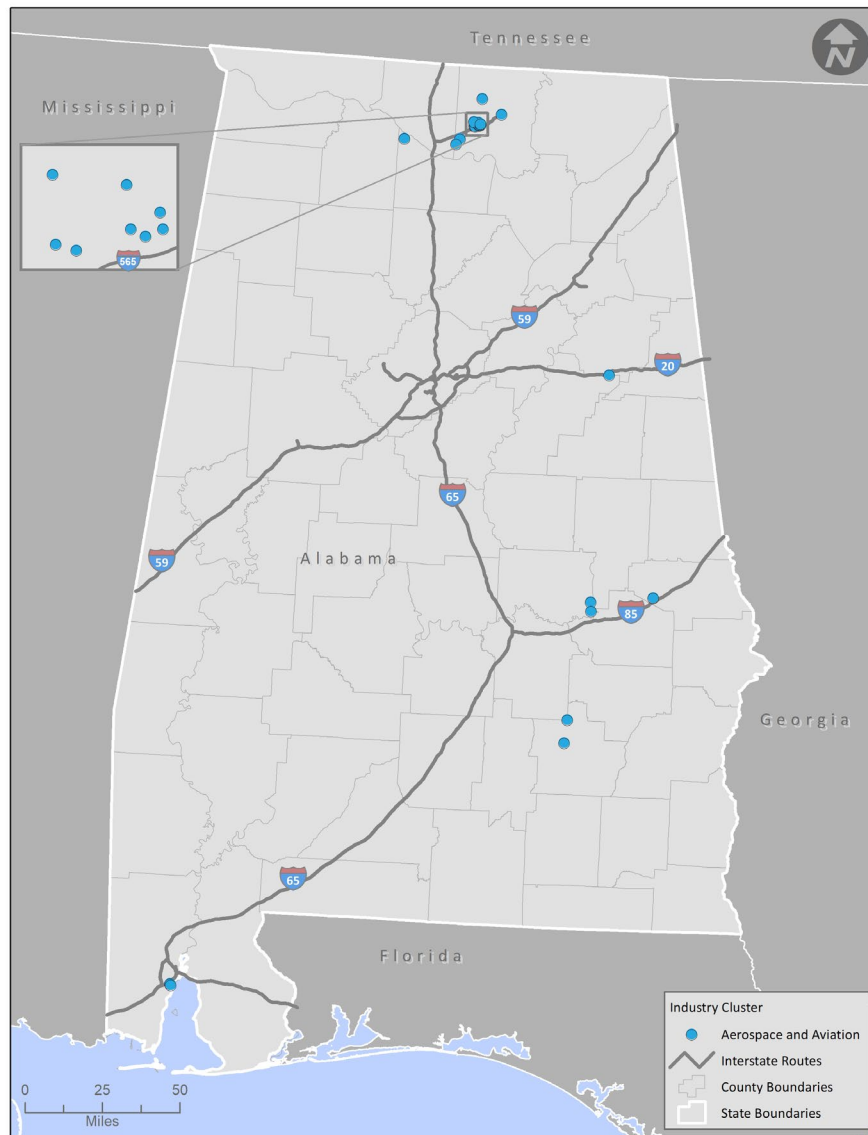
⁴⁰ "Aerospace and Aviation", Made in Alabama, Alabama Department of Commerce, Data accessed November 2, 2019

⁴¹ Ibid.

⁴² "Key Industries: Aerospace 2019", Economic Development Partnership of Alabama, Data accessed November 2, 2019

⁴³ "Alabama's Aviation/Aerospace Industry", Economic Development Partnership of Alabama 2019

Figure 8: Alabama Aerospace and Aviation Businesses with 300+ Employees



Source: Alabama Department of Transportation Planning Studies Bureau, Tennessee Department of Economic Development Center for Economic Research, and CDM Smith, 2018

The greater Huntsville area, northwest of I-59, has the largest concentration of aerospace and aerospace research and development employees in the state including 41,000 federal defense employees at Redstone Arsenal and 6,000 employees at NASA’s Marshall Space Flight Center. These highly skilled employees have developed world-class space systems, state of-the-art engineering technologies, and science for essential propulsion systems that have driven the U.S. space program for over 60 years.⁴⁴ Although they are not part of the aerospace manufacturing cluster, both of these facilities have played an important role in attracting aerospace and aviation to the state.

⁴⁴ “Marshall Space Flight Center”, NASA 2020

Cummings Research Park, strategically developed by a collaborative partnership of public, private, and university leaders in Huntsville, is the second largest research park in the country and the fourth largest in the world. Home to more than 300 technology companies and 26,000 employees, this dynamic development has helped change the economic landscape in Huntsville and Madison County.⁴⁵ Aerospace and aviation firms located in this park include Textron Systems, Sikorsky Aircraft, Collins Aerospace, and The Boeing Company.

Dothan, a community in southeast Alabama, is home to Fort Rucker and the Army Aviation Center of Excellence and the Army Aviation Center and School. The presence of the Alabama Aviation Technical College in Ozark, a major aviation and aerospace training center, has been a competitive advantage in attracting and retaining aerospace manufacturing industries to this region of the state, including Lockheed Martin, Vector Aerospace, and DRS Technologies.⁴⁶

Mobile, located on I-10, recruited Airbus, which began production in their first U.S. manufacturing facility in 2015. The company announced a new A220 assembly line in 2019 and an additional investment in the first quarter of 2020 for increased production of A320 aircraft. The company’s investment in the state exceeds \$1 billion and there are over 1,600 Airbus employees in Mobile. Hutchinson Corporation located an aerospace manufacturing center of excellence in 2019, joining VT Mobile Aerospace Engineering and UTC Aerospace Systems.⁴⁷

Statewide, over 20 aerospace and aviation companies have expanded or announced new manufacturing projects since 2016.⁴⁸ **Table 19** highlights Alabama’s aerospace manufacturing business expansions in 2018 and 2019.

Table 19: Alabama’s Aerospace Manufacturing Expansions (2018 & 2019)

Company	County	Product	Jobs Created	Investments
Aerojet Rocketdyne	Madison	Rocket Engines	700	\$137M expansion
Airbus	Mobile	A220 jets	430	\$300M expansion
Airbus	Mobile	A320 aircraft	275	\$40M expansion
Blue Origin	Madison	Rocket Engine, Mfg.	265	\$90M/new
Raytheon Company	Morgan	Space Vehicles, Mfg.	200	NA/expansion
Carpenter Technology	Limestone	Specialty alloys for lightweight aircraft	60	\$40M expansion
DynaCorp Aviation	Covington	Helicopter MRO	60	\$150M expansion
Lockheed Martin	Pike	Missiles	60	\$130M expansion

Source: Economic Development Partnership of Alabama, Key industries: Aerospace. 2019.

Carpenter Technology, a pioneer in the fabrication of premium specialty alloys essential to advanced, lightweight aircraft, opened a \$500 million manufacturing facility in Athens in

⁴⁵ “Cummings Research Park 50 Years of Collaboration, Cummings Research Park Website, 2020

⁴⁶ “Aerospace 2017” Made in Alabama, Alabama Department of Commerce, Data accessed November 2, 2019

⁴⁷ “Existing Aerospace Industries in Mobile and Baldwin County, Mobile Chamber of Commerce 2019

⁴⁸ “Key Industries: Aerospace”, Economic Development Partnership of Alabama, 2019

2014.⁴⁹ The company's Emerging Technology Center opened in December 2019 and provides the capability to atomize a range of specialty alloys into metal powder and manufacture the powder into finished parts using additive manufacturing technology. Parts manufactured in the Emerging Technology Center can be qualified for use in a range of cross-industry applications from aerospace to transportation to oil and energy.⁵⁰ Investments in research centers are another example of the benefits of cluster collaboration that continues to support the region's aerospace industry as well as other industry clusters.

Georgia

Georgia has more than 181,000 aerospace-related workers,⁵¹ the largest concentration in the 3-state region, including over 15,600 employees engaged in



Most Aerospace-Related Workers in the 3-State Region

Employing 181,000 people, including more than 21,000 workers in product and parts manufacturing, and 15,600 in aircraft manufacturing

aircraft manufacturing and more than 21,000 workers in aerospace product and parts manufacturing.⁵² Georgia employers engaged in aircraft manufacturing include Gulfstream Aerospace Corporation with over 10,000 employees, Lockheed Martin Aeronautics with 5,400 employees, and Thrush Aircraft Inc. with 280 people working in their Georgia facility. Businesses in aircraft engine and engine parts manufacturing include Pratt and Whitney's aircraft engine manufacturing facility employing over 725 people, PPC Airfoils with 522 employees, and Precision Components International Inc. with 350 employees.⁵³ Many of the aerospace and aviation companies are small businesses like McCann Aerospace Machining with 25 employees, MSB Group which manufactures interior components for business aircraft with 50 employees, and Valent Aerostructures which fabricates complex sub-assemblies for airframe manufacturers. The aerospace industry is one of the state's largest employment sectors and one of the fastest-growing within the transportation equipment manufacturing sector in the state **Figure 9** identifies the location of Georgia's aerospace and aviation businesses with more than 300 employees.

In 2019, PricewaterhouseCoopers (PwC) completed a study of aerospace manufacturing attractiveness rankings that evaluated and prioritized metrics to help aerospace companies that are considering locating or expanding an aerospace facility. Georgia ranked second among all of the states, behind only the State of Washington. According to PwC, there are over 800 aerospace companies located in the state. They are attracted to Georgia by the relatively low cost of labor, electricity, and corporate taxes, and the annual investment by Georgia universities and colleges in research and development.⁵⁴

⁴⁹ "Aerospace Pioneer Expands Alabama Plant", Business Alabama, December 10, 2019

⁵⁰ Ibid.

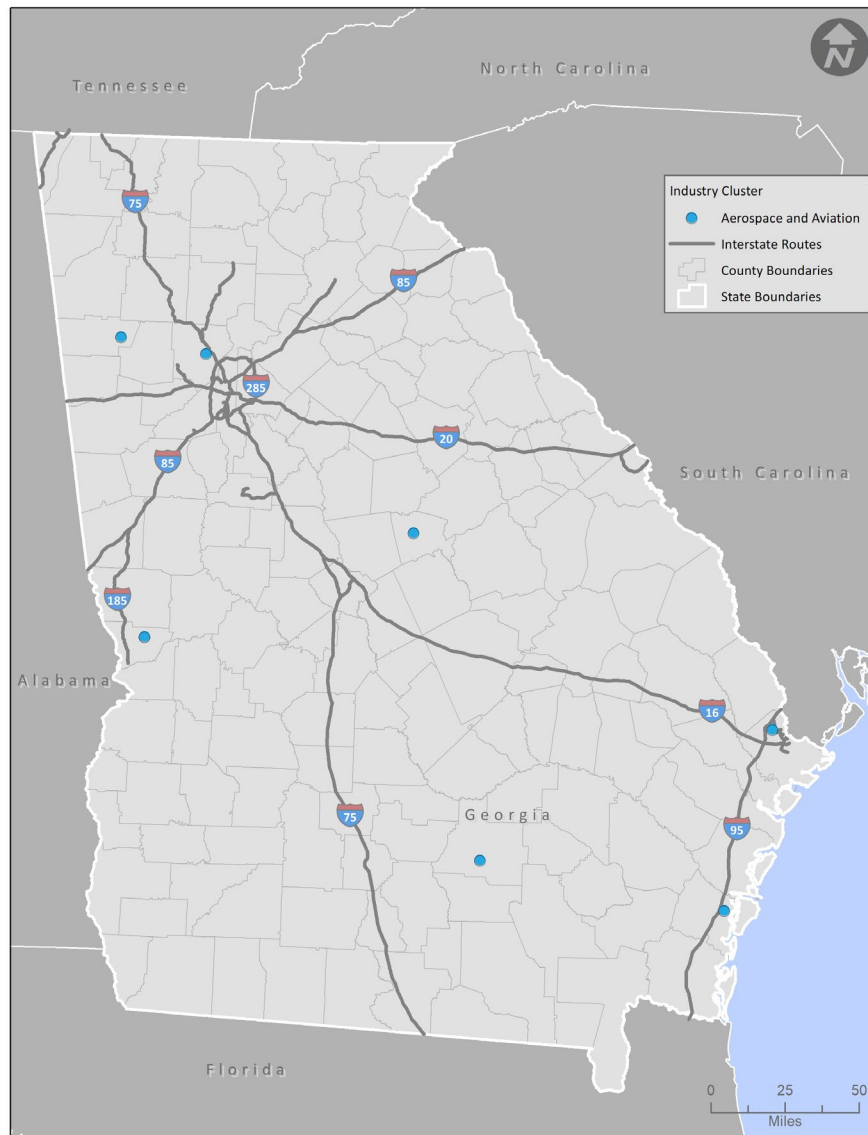
⁵¹ EMSI database 2017, 3rd quarter; Georgia Power Community and Economic Development Aerospace Manufacturing data, November 2017

⁵² "Aerospace Manufacturing: A growth Leader in Georgia", Georgia Power Community and Economic Development, 2017

⁵³ Ibid.

⁵⁴ "2019 Aerospace Manufacturing Attractiveness Rankings", PwC, 2019

Figure 9: Georgia Aerospace and Aviation Businesses with 300+ Employees



Source: Center for Logistics Georgia Department of Economic Development, and CDM Smith, 2020

There are a number of factors that continue to drive the location and expansion of aerospace and aviation firms in Georgia. Georgia ranks top among southeastern states in aerospace-related R&D expenditures according to the National Science Foundation R&D Report, 2015. Atlanta’s Hartsfield-Jackson International Airport, the world’s most traveled passenger airport, provides international access to businesses around the world, and the Port of Savannah has the largest single-terminal container facility of its kind in North America and is the 3rd fastest growing port in the nation.⁵⁵ These port and airport transportation assets are impressive; however, the state’s interstate highway network, skilled workforce, highly regarded workforce training programs, and world-class aerospace and aviation technical expertise, combined with

⁵⁵ “Impressive Infrastructure”, Savannah Economic Development Authority website, 2020 and Georgia Ports Authority website, 2020

the state’s excellent access to domestic and global markets, creates an environment to which aerospace and aviation companies continue to gravitate.

Within a 400-mile radius of Atlanta, there are over 24,000 people employed by major aerospace and aviation firms including Boeing near Charleston, SC; Airbus in Mobile, and HondaJet located in Greensboro, NC with over 1,200 employees. The synergy between these major aerospace and aviation firms has also leveraged the location of a number of smaller technology companies, engine overhaul and repair companies, subassembly manufacturers, and innovative manufacturers for composite materials and precision monolithic parts, yet another benefit of cluster collaboration and partnership.⁵⁶

There are 375 aerospace and aviation companies located throughout the state and a host of related technology centers including The Boeing Manufacturing Development Center at Georgia Institute of Technology (GA Tech), the new Pratt and Whitney Global Forging Center of Excellence, and GA Tech’s Manufacturing Institute. Georgia’s top aerospace and aviation employers are listed in **Table 20**.

Table 20: Georgia Aerospace and Aviation Employers

Company	Employment
Gulfstream Aerospace Corp.	10,250
Lockheed Martin Corp.	5,400
Pratt & Whitney Columbus Forge	1,700
Boeing	996
Meggitt Polymers & Composites	900
Triumph Aerostructures – Vought Aircraft	750
Pratt & Whitney/Columbus Engine Center	728
Mariette Power Co.	630
Northrup Grumman Corp.	576
PCC Airfoils LLC	522
JAC Products Inc.	460

Source: Center of Innovation for Logistics, Georgia Department of Economic Development, 2019 and Georgia Power Community and Economic Development Partners

Tennessee

Tennessee is home to more than 50 aerospace and aviation establishments employing 7,900 people statewide.⁵⁷ In addition, there are 32 aerospace products and parts manufacturers in Tennessee employing an additional 2,160 Tennesseans. Tennessee’s success in the aerospace and aviation industry can be attributed to skillful deployment of

50 **Aerospace Manufacturing Facilities**
Employing 7,900 people

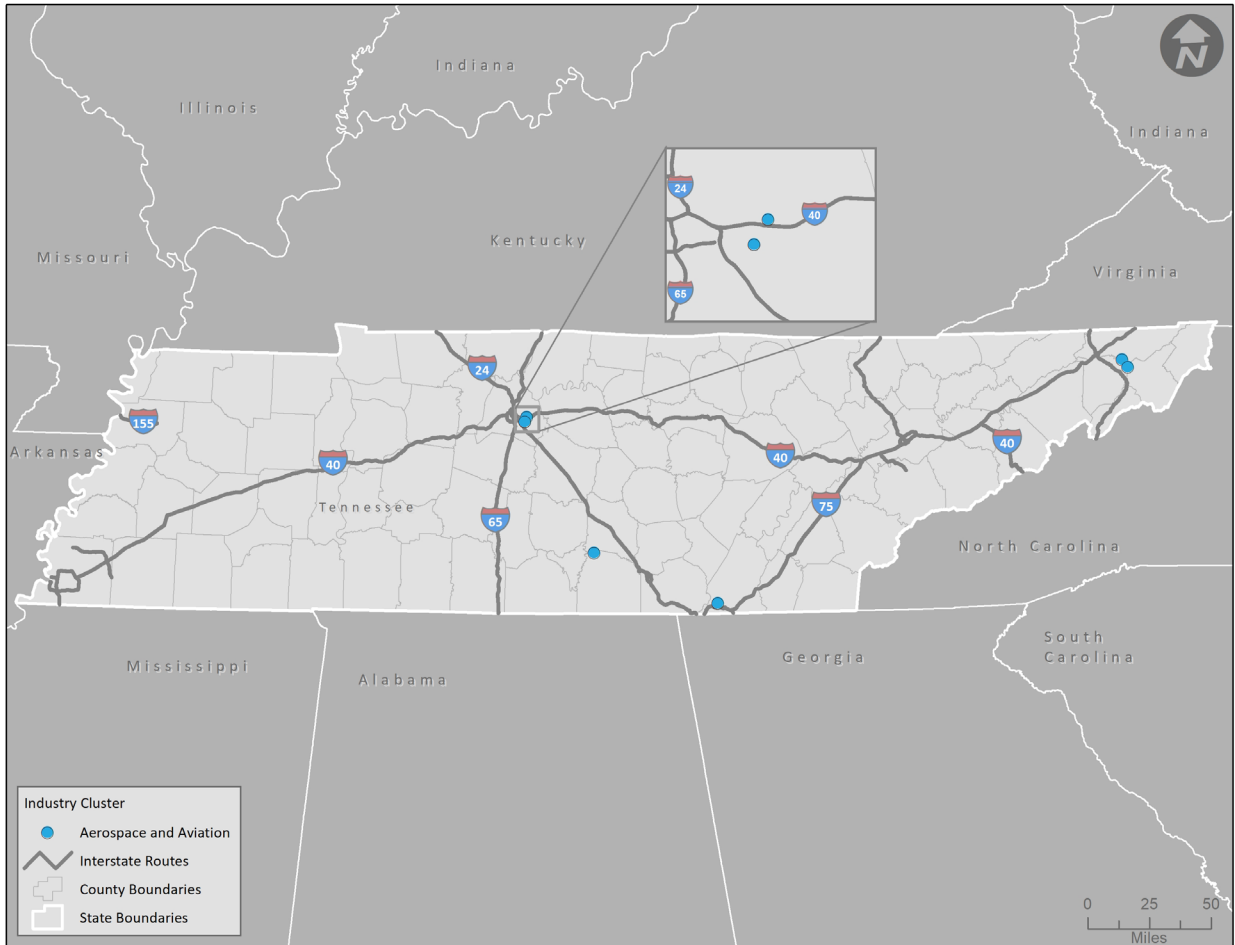
32 **Aerospace Products and Parts Facilities**
Employing 2,160 people

⁵⁶ Aerospace Database, Georgia Power Community & Economic Development, 2017 and aerospace company websites, 2020

⁵⁷ “Mastered in Tennessee: Aerospace and Defense”, Tennessee Department of Economic and Community Development, 2018

some of the state's major research assets and a skilled workforce with experience working in advanced manufacturing. The locations of these manufacturing businesses with 300 or more employees are shown in **Figure 10**. **Table 21** shows the larger aerospace and aviation employers in the state.

Figure 10: Tennessee Aerospace and Aviation Businesses with 300+ Employees



Source: Tennessee Department of Economic Development Center for Economic Research and CDM Smith, 2020

Table 21: Aerospace and Aviation Businesses in Tennessee

Company Name	Statewide Employment	Tennessee Location(s)
The Aerostructures Corp.	967	Nashville
Howmet Castings & Services	700	Hamblen County
Honeywell International Inc.	673	Nashville
Triumph Aerostructures-Vought	650	Nashville
Aeronautical Accessories, Inc.	600	Piney Flatts
Bell Helicopter Textron	350	Piney Flats
Standard AERO Alliance	350	Maryville
Cubic Transportation Systems	280	Tullahoma
Float and Fuel Cell	200	Memphis

Source: Tennessee Department of Economic and Community Development and CDM Smith, 2019

The Arnold Engineering Development Complex (AEDC) near Tullahoma could be considered ground zero for the aerospace and aviation industry and one of the most important centers of aerospace research and testing in North America. AEDC is located on a 4,000-acre complex adjacent to Interstate 24 between Chattanooga and Nashville. This research and development facility is the most advanced and largest complex of flight simulation and testing facilities in the world. AEDC houses the largest flight simulation facility in the country, operates 55 aerodynamic and propulsion wind tunnels, and conducts testing of highly advanced rocket and turbine engines, space environmental chambers, arc heaters, ballistic ranges, and other specialized units.⁵⁸

The AEDC includes 27 test units with capabilities unavailable anywhere else in the U.S. and 14 that are unique in the world.⁵⁹ Facilities at AEDC can simulate flight conditions from sea level to 300 miles and from subsonic velocities to Mach 20. Arnold Air Force Base has tested virtually every high-performance aircraft and missile system and has been heavily involved in projects including the space shuttle, space station, and the Mercury, Gemini, and Apollo space exploration programs.⁶⁰

Tennessee’s aerospace companies can also harness the innovations at the ORNL, the Department of Energy’s largest multiprogram science and energy laboratory, located north of I-40/I-75 near Oak Ridge. With \$1.5 billion in annual research and development expenditures, ORNL research efforts include applications in the aerospace, material science, unmanned aerial vehicles, electronics, and research for defense equipment and operations. The University of Tennessee Space Institute in Tullahoma and Middle Tennessee State University Department of Aerospace also provide training and research to support aerospace and aviation businesses in Tennessee.

⁵⁸ “Mastered in Tennessee: Aerospace and Defense”, Tennessee Department of Economic and Community Development, 2018

⁵⁹ Arnold Engineering Development Complex, Fact Sheet, 2018

⁶⁰ “The Aerospace Industry in Tennessee”, Tennessee Department of Economic and Community Development, July 2014

One promising development is ORNL's use of 3-D printing techniques, which have already been adopted by several private sector aerospace and aviation parts manufacturing firms. This has been particularly useful to the aerospace and automotive industries, including many operating in Tennessee.

Emerging Aerospace and Aviation Trends and Innovations

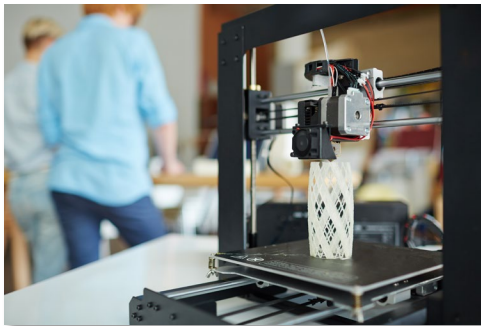
A new opportunity and a threat for the aerospace industry is the continued rise of digital technologies. These technologies can potentially help industry players to stay ahead of the competition and better anticipate customer and public needs, but they are adding another layer of complexity to an already complex business environment.

Environmental Trends

The rising awareness of the environmental impact of aviation is driving the industry towards more fuel-efficient propulsion technologies, including hybrid and electrical aircraft. Emerging sectors for growth include next generation fuel efficient aircraft, biofuels, and electric aircraft.⁶¹ The trend towards lighter and, thus, more fuel-efficient materials will help offset the projected rise in fuel costs.

In 1996, large passenger widebody airplanes accounted for 32 percent of the in-service fleet. Today, that number has declined to 11 percent.⁶² Today, 64 percent of the world jet fleet is single-aisle airplanes. Over the next 20 years, this share will increase to account for about 69 percent of the global fleet as regional aircraft move to wider body 70-90 seat aircraft replacing smaller 50 seat aircraft.⁶³ Commercial air carrier trends include adding capacity; growth in seats per aircraft; increased regional competition among low-cost airlines; and continued reliance on ancillary revenues such as baggage fees and on-board meals.

3-D Printing



3-D printing, or additive manufacturing, is one opportunity the aerospace and aviation industry cluster is aggressively pursuing to reduce the cost of manufacturing. Firms are able to reduce the time it takes to design a product and manufacture it utilizing a range of specialized materials to manufacture a complex part with tight design tolerances and production requirements. As mentioned above, 3-D printing techniques are a promising development at

ORNL. Additive manufacturing can make things from a variety of metals and composites without the expensive and energy-intensive tooling and machining traditional manufacturing requires. This has been particularly useful to the aerospace and automotive industries, bio-

⁶¹ "Aerospace Manufacturing: A Growth Leader in Georgia", Georgia Power Community and Economic Development, 2017

⁶² "Current Market Outlook 2017 - 2036", Boeing, 2018

⁶³ Ibid.

medical devices, and transportation equipment manufacturers. Lockheed Martin, for example, is working with ORNL to scale up 3-D printing to produce parts, some from 60 to 100 feet in size, for the aerospace and other industries.⁶⁴

Increase in Electric Aircraft

Fuel costs, which had been on the rise, are the largest cost associated with aerospace and aviation operations, leading firms to pursue the reduction of fuel costs by moving to more fuel-efficient aircraft. The long-term goal is to eventually move to All-Electric Aircraft (AEA).⁶⁵ Some of the significant developments in this field that show promise are detailed below.

Electric Propulsion Aircraft



While aerospace manufacturers shifted to more fuel-efficient aircraft over the last few decades, rapid growth in air travel demand has resulted in an increase in carbon emissions by the aviation industry. There are several companies globally that are developing electric propulsion systems, which would reduce carbon emissions, make flights quieter, and decrease costs.⁶⁶

Electric propulsion systems could also support the emerging urban air mobility (UAM) ecosystem, consisting of passenger drones, most of which are likely to be either electric or hybrid electric. Apart from large aerospace propulsion companies, such as Rolls-Royce and Safran, there are various technology startups also involved in the development of electric propulsion engines.⁶⁷

Urban Air Mobility



City Airbus, four-seat multicopter vehicle demonstrator

Advancements in battery capacities and electric propulsion can drive new kinds of aerial vehicles, sometimes referred to as UAM vehicles. This new innovation in multi-mobility systems is expected to accelerate over the next decade. However, there are significant challenges to the deployment of these systems. Formulation of necessary regulations will be required to achieve maximum societal benefits for pilotless vehicles; airworthiness certifications; and airspace management needed to enable air taxis, delivery

drones, and other vehicles to safely enter and share the skies. Implementing efficient energy management systems, onboard sensors, collision detection systems, and other advanced technologies will be necessary to address the unique challenges of this new generation of

⁶⁴ “Tennessee Soars in Aerospace and Defense”, Bill Lewis, Livability.com, July 12, 2017

⁶⁵ “Trends that will Transform the Aerospace Industry Outlook in 2020”, Linchpin, November 2019

⁶⁶ “2020 Global Aerospace and Defense Industry Outlook”, Deloitte Consulting, 2019

⁶⁷ Ibid.

transportation. A video clip demonstrating this technology is available at: www.airbus.com/innovation/zero-emission/urban-air-mobility.html.

The infrastructure to support this new industry will require the development of takeoff and landing zones, parking facilities, charging stations, and vertiports required for UAM operation. An entirely new air traffic management system would need to be integrated with other modes of transport to enable smooth and safe operations of UAM vehicles. Lastly, the industry would require years of testing with a flawless operational and mechanical safety record to overcome psychological challenges associated with the idea of flying in an unmanned aircraft. To address these challenges, vehicle manufacturers including Airbus are beginning to test model vehicles and have begun planning for a range of new regulations and land use requirements necessary to support UAM operations. Electric vertical take-off and landing facilities are being imagined to facilitate future usage of these types of vehicles.⁶⁸

Freight Issues for Aerospace and Aviation Industries

Freight and supply chain issues facing aerospace and aviation industries are similar in some respects to other complex manufacturing systems. There are a variety of metals used in aviation and aerospace manufacturing. Raw materials may be sourced from a number of international locations and disruptions in delivery of supplies and materials at a number of points along the production process can create serious production delays. Many aerospace and aviation manufacturers have streamlined the flow of parts and materials and created backup systems including “just-in-case” material warehousing and flexible supply chains given the complexity of international markets and delivery systems.⁶⁹

The site selection criteria used by Boeing to make their 2009 decision to locate a new manufacturing facility in North Charleston, South Carolina and the criteria used by Airbus to locate their first U.S. manufacturing operation in Mobile, Alabama were similar, with extensive focus on the transportation infrastructure required to support the planned facilities. In 2019, PwC produced a geographic assessment for aerospace manufacturing investments.⁷⁰ A detailed matrix was developed evaluating labor, infrastructure, industry cluster, geopolitical risk, economy, cost, and tax policy. Of particular significance to the Freight Alley Region are the infrastructure factors that were utilized:

- Quality of roads, road conditions
- Quality of railroads, freight railroads by class
- Quality of port infrastructure, efficiency of seaport services
- Quality of air infrastructure, public and private airports, helicopters, and seaplane bases

⁶⁸ “2020 Global Aerospace and Defense Industry Outlook”, Deloitte Consulting, 2019

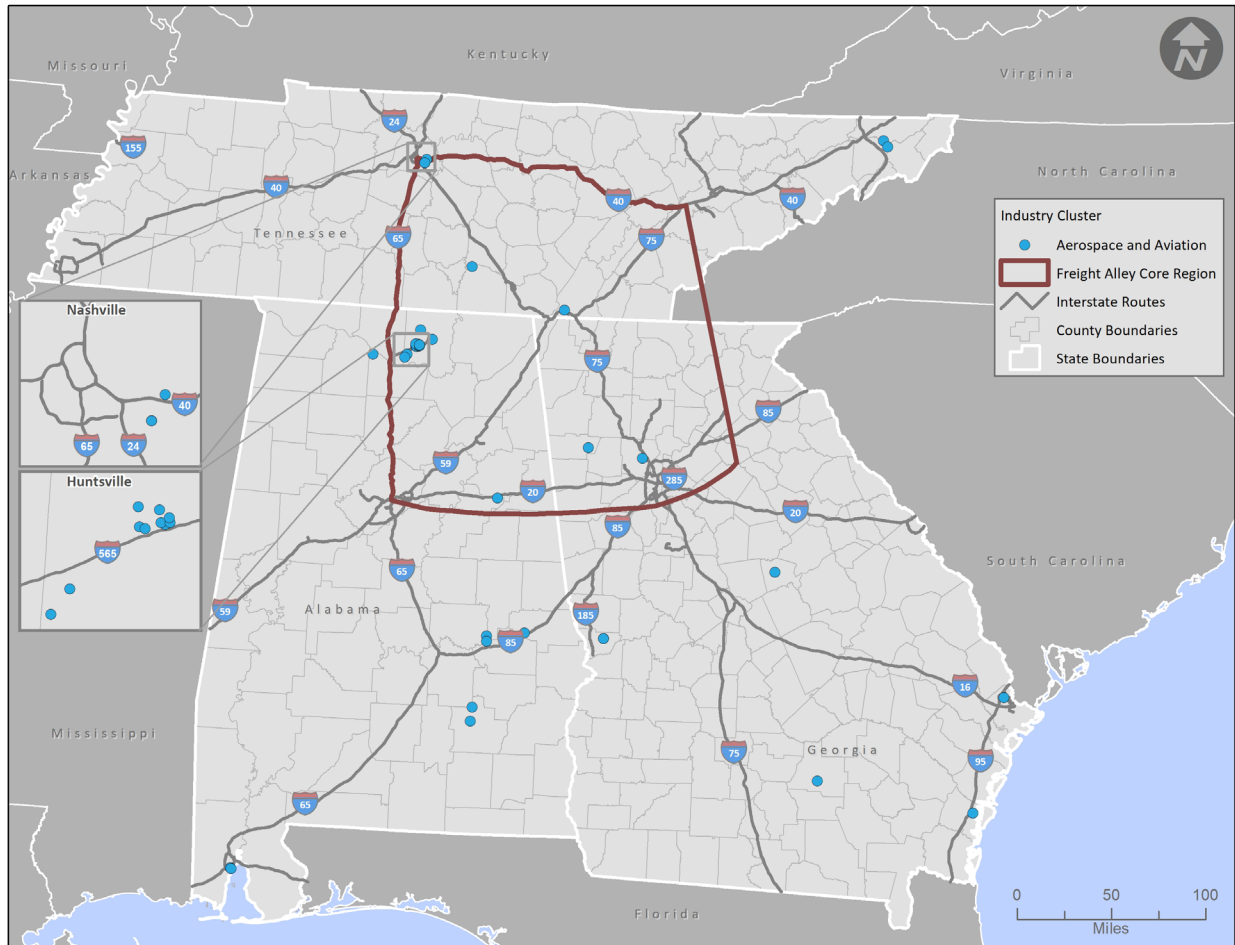
⁶⁹ Ibid.

⁷⁰ “2019 Aerospace Manufacturing Attractiveness Rankings”, PwC, 2019

- Internet usage and quality (terminology from PwC study)
- Quality of electrical supply and the power grid infrastructure, major system disruptions, and outages

The Aerospace and Aviation Industry Cluster Map (**Figure 11**) shows the location of aerospace manufacturing facilities with more than 300 employees in the three-state region. The majority of these facilities are located in close proximity to an interstate corridor.

Figure 11: Aerospace and Aviation Industry Cluster Map with 300+ Employees



Source: Tennessee Department of Economic Development Center for Economic Research, Center for Logistics Georgia Department of Economic Development, Alabama Department of Transportation Planning Studies Bureau, and CDM Smith, 2020

AGRI-PRODUCTION AND FOOD PRODUCTS

Global Markets

Food and agribusiness have a massive economic, social, and environmental footprint. This \$5 trillion industry represents 10 percent of global consumer spending, 40 percent of the world's employment, and 30 percent of greenhouse gas emissions.⁷¹ A growing world population together with greater economic prosperity in emerging markets means demand for food is projected to increase in coming years. Much of that additional food demand will originate in regions with high population growth including Africa, South Asia, and the Middle East. Prices are projected to remain at or below current levels over the coming decade as productivity improvements continue to outpace demand.



Although sizable productivity improvements over the past 50 years have enabled an abundant food supply in many parts of the world, food distribution remains a challenge for some regions, particularly countries with the highest poverty rates. By 2050, the demand for crops for human consumption and animal feed will increase by at least 100 percent if current trends continue which may exacerbate water resource constraints as well.⁷²

The U.S. agri-production industry cluster is a significant competitor in the international food and agribusiness market, contributing over \$159 billion in export sales to the U.S. economy in 2018.⁷³ This global sector includes major subsectors including agricultural chemicals, crop production, aquaculture, and livestock.

The impact of COVID-19 on agriculture and food has visible and serious economic consequences internationally. Outbreaks of the disease in many areas of the world have resulted in disruptions in production leading to risks of food shortages, particularly in areas with higher concentrations of global poverty and in rural communities.⁷⁴ While the long-term impacts of the pandemic cannot be determined yet, impacts on supply, food costs, and nutrition are expected to affect many communities globally.

Consumption

The consumption of staple foods per person is expected to be stagnant for most of the world's population. Meat demand is expected to be relatively strong in the Americas while lower incomes continue to constrain meat consumption in Africa. Fresh dairy products are expected to supply the additional demand for protein in South Asia, particularly in India and Pakistan.

⁷¹ Goedde, Lutz; Horii, Maya; and Sanghvi, Sunil. "Pursuing the Global Opportunity in Food and Agribusiness". McKinsey & Company. July 2015

⁷² "Focusing on the Fundamentals in Agribusiness," Boston Consulting Group, 2019 Agribusiness Value Creations Report

⁷³ "The Agribusiness Industry in the United States," U.S. Department of Commerce, International Trade Administration, 2019

⁷⁴ "COVID-19 Impacts on Agriculture, Food and Nutrition," William Masters, Tufts University, May 2020

Worldwide, the consumption of sugar and vegetable oils is expected to increase as a result of increased urbanization and the shift to more processed and convenience foods.

Production

Worldwide, agricultural output could increase if weather events do not disrupt growing seasons. Agricultural production is expected to increase 15 percent over the next decade while the amount of global agricultural land use remains steady.⁷⁵ The projected increase in output can be attributed to yield improvements and higher production intensity driven by technological innovation.

Domestic Markets

A growing population and greater economic prosperity in the U.S. will result in an increased demand for food in the future. America produces an abundant food supply, but food distribution remains a challenge for some residents particularly those living in low- and moderate-income neighborhoods and rural communities. “Food deserts” have been identified in some urban areas where people have limited access to affordable fresh foods, particularly fresh vegetables and fruit. The geospatial relationship of the largest agri-production and food production businesses in the Freight Alley Core Megaregion to the major interstate corridors is shown in **Figure 12**. The geographic distribution of businesses demonstrates the importance of transportation infrastructure to the location of these industries to facilitate the receipt of raw materials and the distribution of finished products to consumers.

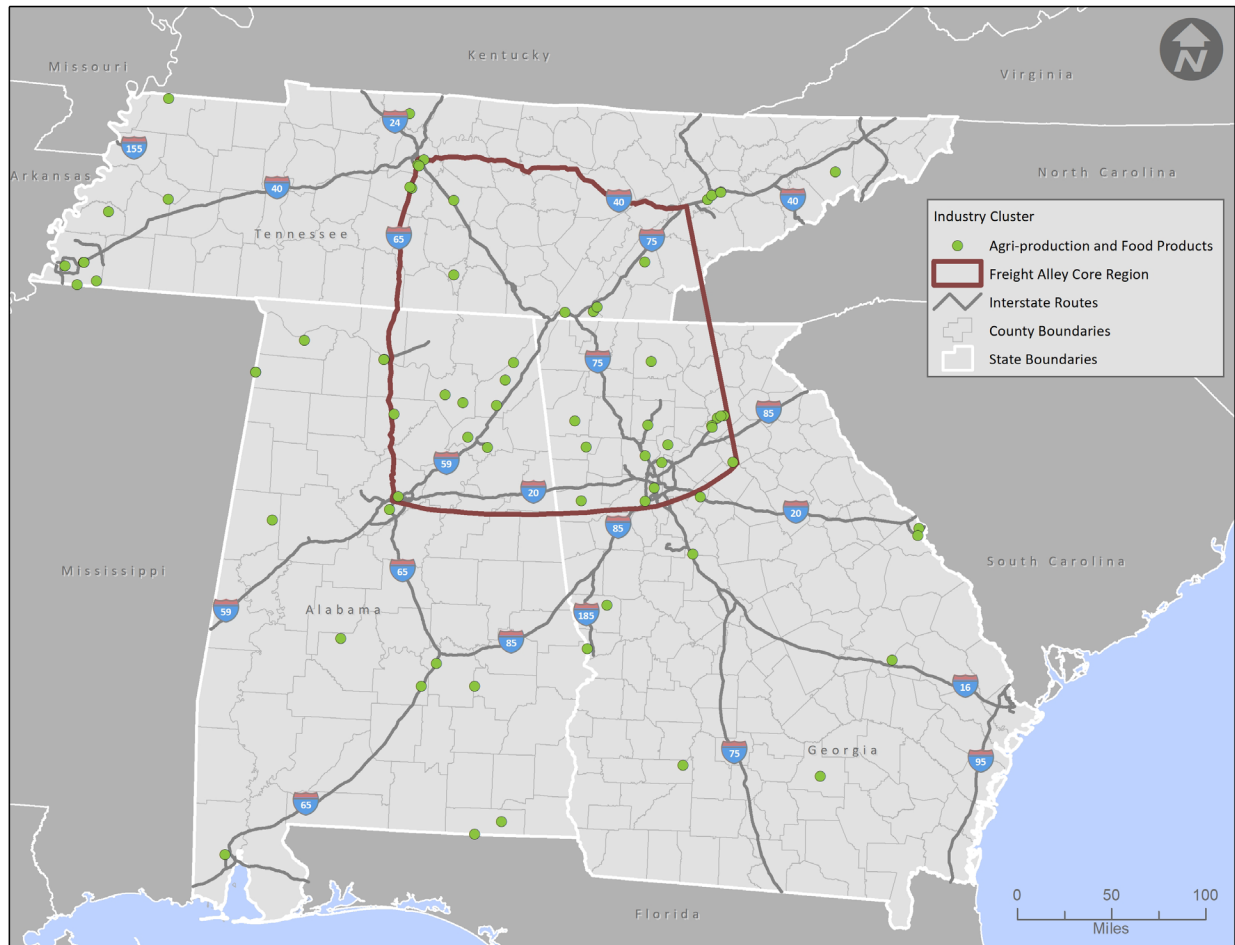
While the current outlook for U.S. farm income is more optimistic than this time last year, farm income remains below the 10-year average. One-time, trade-related market facilitation program payments will boost 2019 farm income and help farmers make debt payments. However, these are expected to be one-time payments and as a result farmers and ranchers need more market and financial certainty.

Adverse growing and harvesting conditions experienced in 2019 contributed to a smaller supply of grains and oilseeds. This may not be the case in 2020 with projections that most of the 20 million acres that went unplanted in 2019 will likely be planted in 2020.⁷⁶ In addition, crop yields are also expected to rebound in 2020. Red meat and poultry production are expected to increase by more than 2 percent and milk production is forecast to be near record-highs in the U.S., provided Mother Nature cooperates.

⁷⁵ Goedde, Lutz; Horii, Maya; and Sanghvi, Sunil. “Pursuing the Global Opportunity in Food and Agribusiness”. McKinsey & Company. July 2015

⁷⁶ “Outlook Improves for 2019 Economy, but Uncertainty Remains”, Farm Bureau. Market Intel. December 4, 2019.

Figure 12: Agri-Production and Food Products Businesses with 300+ Employees



Source: Tennessee Department of Economic Development Center for Economic Research, Center for Logistics Georgia Department of Economic Development, Alabama Department of Transportation Planning Studies Bureau, and CDM Smith, 2020

Fortunately, the impact of COVID-19 on the nation's food supply has not resulted in the lack of food in most grocery stores and markets although the economic consequences of COVID-19 have affected many of the employees who worked in the food service industry prior to the pandemic. Prior to COVID-19, Americans spent almost half of their food budget on meals away from home. The sudden shift to dining at home or ordering take-out has resulted in the loss of many food service jobs.⁷⁷ The U.S. food supply is secure at this point; however, prices on certain products have increased in some areas of the country.

⁷⁷ "COVID-19 Impacts on Agriculture, Food and Nutrition", William Masters, Tufts University, June 2020

State Snapshots

Alabama

Alabama’s top agricultural commodities include poultry, cattle and calves, greenhouse and nursery products, cotton, and soybeans. The state ranks second nationally in the production of catfish, quail, and broiler chickens; third for forestland, peanuts, and sod; and sixth for pecans. There are over 33,000 agricultural employees in the workforce and agricultural products generate \$276 million in export value annually.⁷⁸ **Figure 13** presents the location of Alabama agri-production and food products businesses. Agri-production and food products establishments tend to be less concentrated along interstate corridors than the other sectors.

Alabama Agriculture



\$276 million
33,000 agricultural employees



48,000 farms
over 9 million acres



\$70.4 billion
contributed to the state’s economy

Alabama Ranks...

2nd Chicken, Catfish, and Quail

3rd Forestland, Peanuts, and Sod

6th Pecans

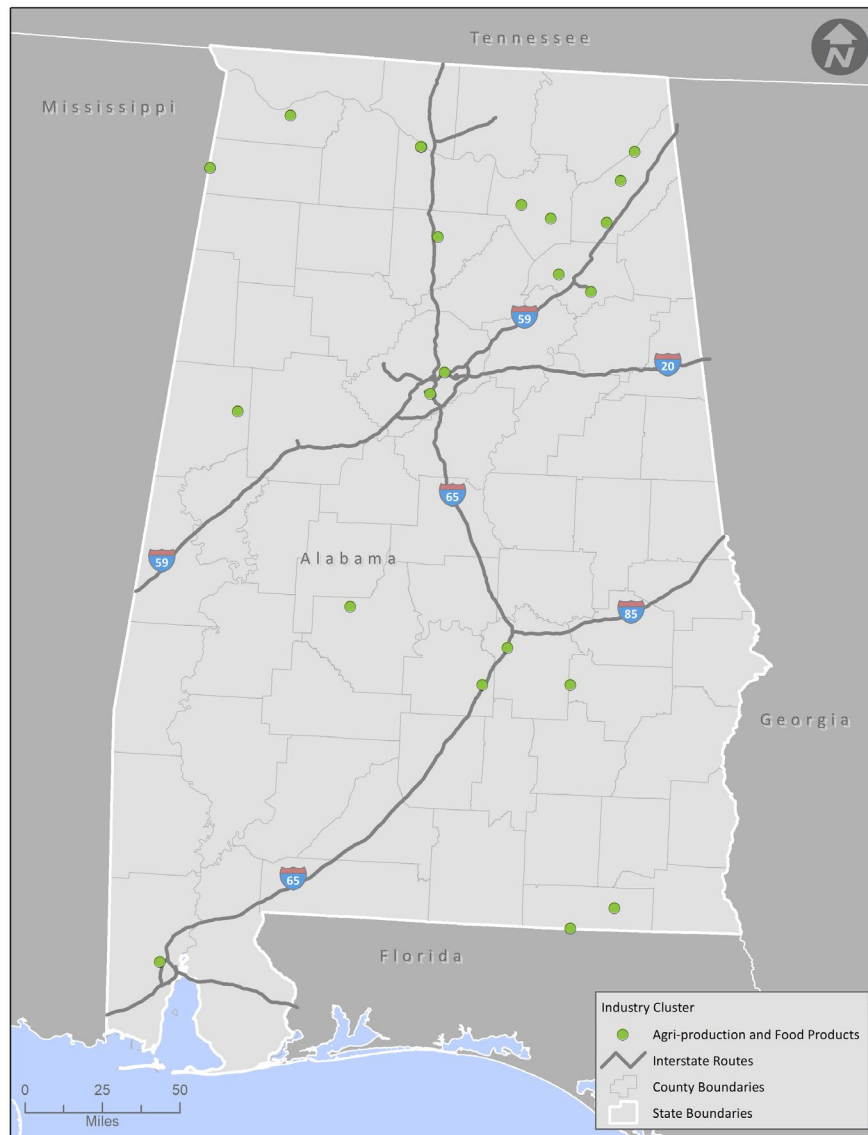
More than 48,000 farms utilize over 9 million acres in the state and contributed \$70.4 billion to the state’s economy in 2018.⁷⁹ Alabama’s “green industry” has seen tremendous growth in the past 30 years and today contributes nearly \$3 billion to the state’s economy. It’s also a major employer for the state, with more than 43,000 residents working in greenhouses, nursery operations, and sod farms.⁸⁰

⁷⁸ “Agriculture Products and Food Production Made in Alabama” Alabama Department of Commerce, 2020

⁷⁹ Alabama Department of Agriculture, “Farm Flavor 2019”

⁸⁰ Ibid.

Figure 13: Alabama Agri-Production and Food Products Businesses with 200+ Employees



Source: Alabama Department of Transportation, Planning Studies Bureau, CDM Smith

Livestock

Poultry is Alabama's top agricultural commodity. Alabama farmers raise chickens for meat, egg production, and hatcheries. Another key commodity is cattle and calves. The industry saw an increase in the number of cattle marketed in the past year reaching over \$500 million in value.⁸¹

⁸¹ Alabama Department of Agriculture, "Alabama Beef Cattle Facts", Alabama Cattlemen's Association, 2019

Food Processing

Food and beverage industries employ over 35,000 workers in Alabama, accounting for 13 percent of the food product manufacturing jobs. In addition, there are over 400 food and beverage production establishments in Alabama.⁸² Significant food production companies include Tyson Foods, Sunshine Mills, Inc., JCG Foods of Alabama, Del Monte, Mayfield Dairy Farms, and Buffalo Rock Vending.⁸³ The food and beverage industry exported over \$275 million in 2018 from Alabama. Golden State Foods plans to invest between \$40 million to \$45 million to open a state-of-the-art meat processing facility in 2020 creating over 170 jobs and making the Opelika plant the producer of roughly 25 percent of meat products for McDonald’s restaurants across the nation.⁸⁴ This industry cluster continues to expand, adding additional jobs and new investment as shown in **Table 22**.

Table 22: Recent Food Processing Expansions and New Projects

Company	New Jobs Created	Capital Investment	County	Product
John Soules Food	500	\$110 million	Chambers	Food manufacture
Bunge North America	NA	\$72 million	Morgan	Soybean processing
Southern Cold	100	\$15 million	Etowah	Frozen Foods
Whitfield Foods	14	\$10.4 million	Montgomery	Syrup and fruit juices
Blue Bell Creameries	18	\$7.5 million	Talladega	Ice Cream
Wayne Farms	20	\$6 million	Morgan	Poultry
Flowers Bakery of Montgomery	NA	\$4 million	Montgomery	Bread & Rolls
Milo’s Tea	30	\$3.5 million	Jefferson	Tea manufacture

Source: “Alabama’s Food Production Industry”, Economic Development Partnership of Alabama, 2019

With six interstates, four Class 1 railroads, and a deep-water port, Alabama has the multimodal freight infrastructure needed to move both raw agricultural products as well as processed food to domestic and international destinations. Auburn University, Alabama Agricultural and Mechanical University (A&M), and Tuskegee University offer specialized food manufacturing and food science majors at the undergraduate and graduate levels.

⁸² “Alabama’s Food Production Industry”, Economic Partnership of Alabama, 2019

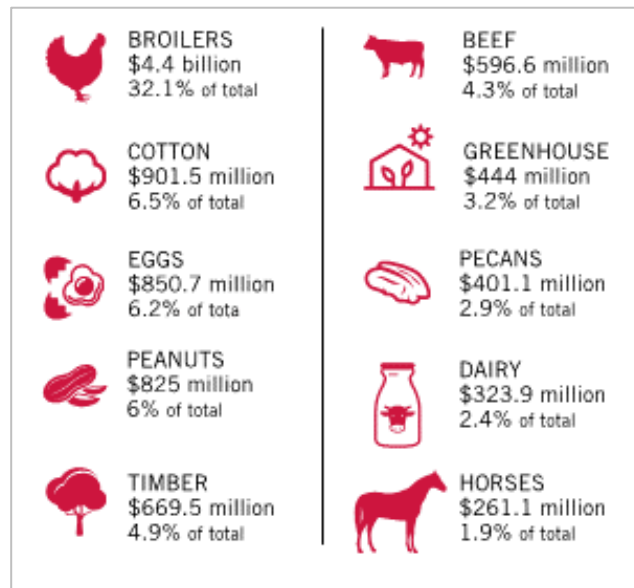
⁸³ Made in Alabama, “Appetite for Growth: Alabama Food Companies expand operations”, 2019

⁸⁴ Economic Development Partnership of Alabama. Alabama’s Food Production Industry. 2019.

Georgia

Georgia has over 42,000 farms on 9.9 million acres of farmland.⁸⁵ In 2017, agriculture directly contributed \$13.8 billion of the \$73.7 billion agricultural output in Georgia’s economy.⁸⁶ In 2016, Georgia food and beverage manufacturers exported \$2.2 billion in products destined for international markets. Meat products, especially poultry, accounted for nearly half of all exported goods, at \$1 billion in 2016.⁸⁷ The top commodities produced in Georgia are shown in **Figure 14**.

Figure 14: Top 10 Georgia Commodities by Value



Source: Kane, Sharon P., University of Georgia. Ag Snapshots 2019.

As a result of the vast array of agricultural products, Georgia’s agricultural production and processing industry employs over 70,000 Georgians in animal processing, bakeries, beverage, sugar and confectionery, dairy, grains and oilseeds, animal food, fruit and vegetables, and seafood.⁸⁸ Georgia has a thriving agri-production and food product industry and the state’s interstate corridors enable these companies to access the Southeastern U.S. markets, one of the fastest growing regions in the country. The largest agri-production and food product businesses in the state are shown in **Figure 15**. Given the nature of agri-production, these establishments tend to be less concentrated along interstate corridors than the other sectors.

Crops

Georgia ranks number one in the U.S. in peanut production, hatching eggs, and pecans; second in cotton, rye, and spring season onions, and third in sweet corn, watermelon, and squash.⁸⁹ Other primary crops include cantaloupe, blueberries, and table eggs. Georgia farmers produce

⁸⁵ United States Department of Agriculture. 2017 Census of Agriculture State Profile (Georgia). 2017

⁸⁶ Kane, Sharon P., University of Georgia. Ag Snapshots 2019.

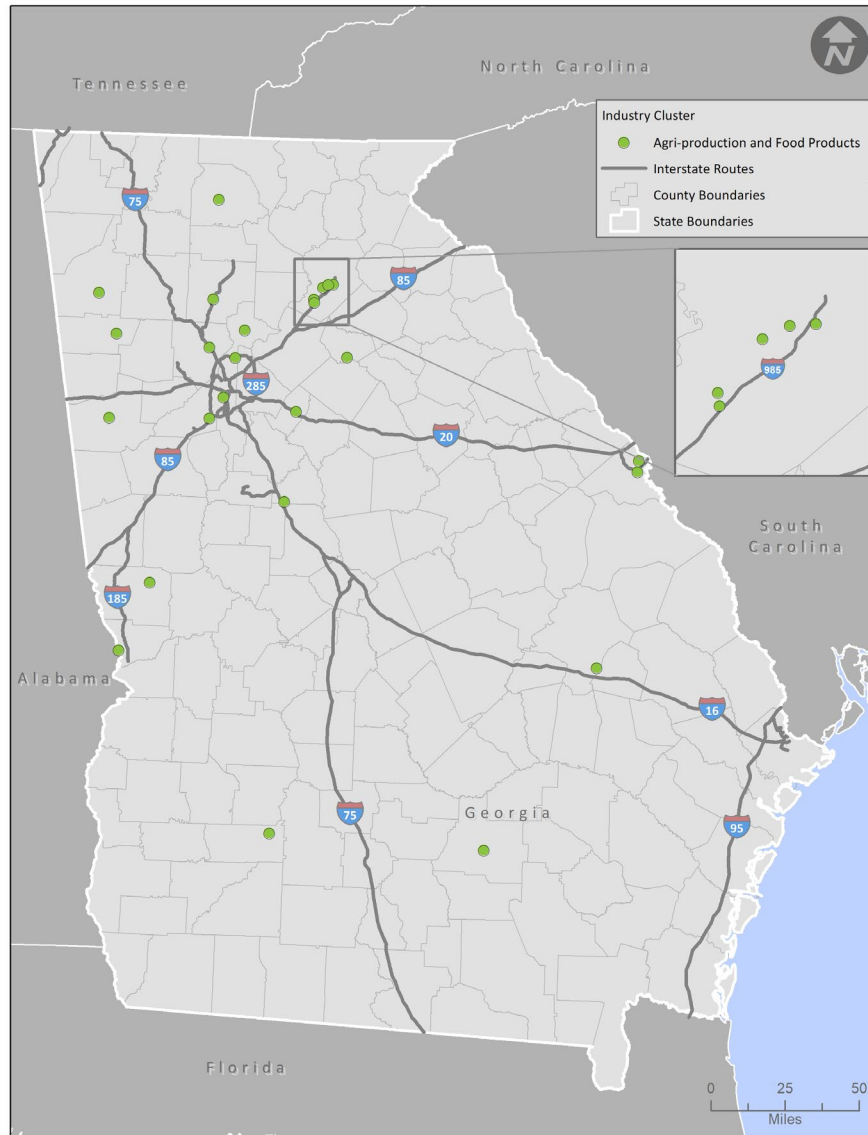
⁸⁷ Georgia Power Community and Economic Development. Food Processing. 2019

⁸⁸ “Ag Snapshots 2019”, Sharon P. Kane, University of Georgia, 2019

⁸⁹ “Ag Snapshots 2019”, The Center for Agribusiness and Economic Development, University of Georgia, 2019

33 different vegetables that are measured in the Georgia Farm Gate Value Report including sweet corn, onions, watermelon, and bell peppers.

Figure 15: Georgia Agri-Production and Food Products Businesses with 200+ Employees



Source: Center of Innovation for Logistics, Georgia Department of Economic Development, and CDM Smith, 2020

Food Processing

Over half of the top 100 food processing companies in the U.S. call Georgia home including The Coca-Cola Company, Pilgrim's, and Kellogg. Frito-Lay's Perry plant is one of their largest production facilities, employing 1,400 people and processing 1 million pounds of potatoes daily.⁹⁰ Georgia's food processing industry ranks sixth in the U.S., accounting for one quarter of

⁹⁰ "Food Processing 2019", Georgia Power, Community and Economic Development, 2019

the state’s Gross State Product (GSP).⁹¹ Georgia is home to more than 780 food processing businesses that account for \$10 billion in GSP and nearly 71,000 jobs statewide.⁹² Moody’s Economy.com forecasts that Georgia’s food processing economic output will reach \$10.5 billion by 2025.⁹³ The top food processing companies in Georgia are shown in **Table 23**.

Table 23: Georgia’s 2018 Major Food Processing Employers

Company	Employment
Coca Cola Company	7,749
Pilgrim’s	7,302
Fieldale Farms Corporation	3,940
Tyson Foods Incorporated	3,363
Perdue Farms Incorporated	2,227
Kock Foods	2,075
Keystone Foods	2,000
PepsiCo Incorporated	1,614
Frito-Lay Incorporated	1,557
Gold Creek Foods LLC	1,510
Sanderson Farms Incorporated	1,500
Claxton Poultry Farms Incorporated	1,400
Wayne Farms LLC	1,395
Victory Processing LLC	1,275
Mar-Jac Poultry Incorporated	1,265
Kellogg Company	1,220
Pro View Foods LLC	1,200
Tip Top Poultry Incorporated	1,200
Flowers Foods Incorporated	1,025

Source: “Food Processing 2018”, Georgia Power, Community and Economic Development.

Growth/Expansion

Georgia’s 780 food processing companies produce a diverse line of products and have a wide range of operation sizes.⁹⁴ The state is also experiencing momentum in indoor agriculture, also referred to as vertical agriculture. The state’s network of agribusiness technology resources at the University of Georgia’s Food Product Innovation and Commercialization Center and the Richard Russell Agricultural Research Center engage private businesses in collaborations to enhance the success of agribusiness companies and leverages the location of new food processing investments in the state. In the past five years, 10,000 new jobs have been created from company expansions and new companies making Georgia their home. Georgia food processing GSP has grown 1.1 percent annually and is outpacing the U.S. growth of 0.6 percent.⁹⁵

⁹¹ “Food Processing 2019”, Georgia Power, Community and Economic Development, 2019

⁹² Ibid.

⁹³ Georgia Power Community and Economic Development. Food Processing. 2019

⁹⁴ “Indoor Agriculture”, Georgia Power Community & Economic Development, 2018

⁹⁵ Ibid.

Tennessee

Agri-Production

In 2017, 70,000 Tennessee farms cultivated 10.9 million acres or roughly 40 percent of the state's land base.⁹⁶ Agricultural production generates more than \$3.5 billion annually and Tennessee agricultural exports of raw agricultural products exceeds \$1.4 billion per year.⁹⁷ Tennessee ranks 30th in the U.S. in cash farm receipts, and the largest cash farm commodity in 2018 was derived from soybeans. The United States Department of Agriculture (USDA) Economic Research Services expects Tennessee agricultural exports to increase in 2020 over the previous two years.⁹⁸



70,000 farms

cultivated 10.9 million acres, 40%
of the entire state of Tennessee



\$3.5 billion

Generated by agricultural production



in the United States
for cash farm receipts



**The largest cash
farm commodity in
2018 was derived
from soybeans.**

The top five Tennessee commodities are oilseed; poultry and egg products; beef cattle; grains; greenhouse, nursery, and floriculture products; and cotton. The commodities with the largest U.S. market share include tobacco, cotton, greenhouse, nursery, floriculture production, oilseeds, poultry, and eggs.

Food Processing

Food manufacturing and processing represents almost 68 percent of the food industry in Tennessee. With more than 31,000 employees, this industry sub-cluster is represented by some of the largest food processors in the world. The beverage sub-cluster employs over 7,500 people in the state and has realized over 20 percent growth in the past eight years. Many people around the world make an immediate connection between Tennessee and Jack Daniels, and other beverages produced in the state are gaining global fame as well.⁹⁹

Tennessee is an international leader in the food and beverage industry with companies engaged in everything from processing and blending raw materials to manufacturing branded food products. Goo Goo Clusters were invented in Nashville in 1912 at the Standard Candy Company, the first time a combination candy bar was produced. Today the same candy company manufactures 20,000 clusters an hour. Food businesses in Tennessee produce a

⁹⁶ Tennessee Department of Agriculture Facts, 2019

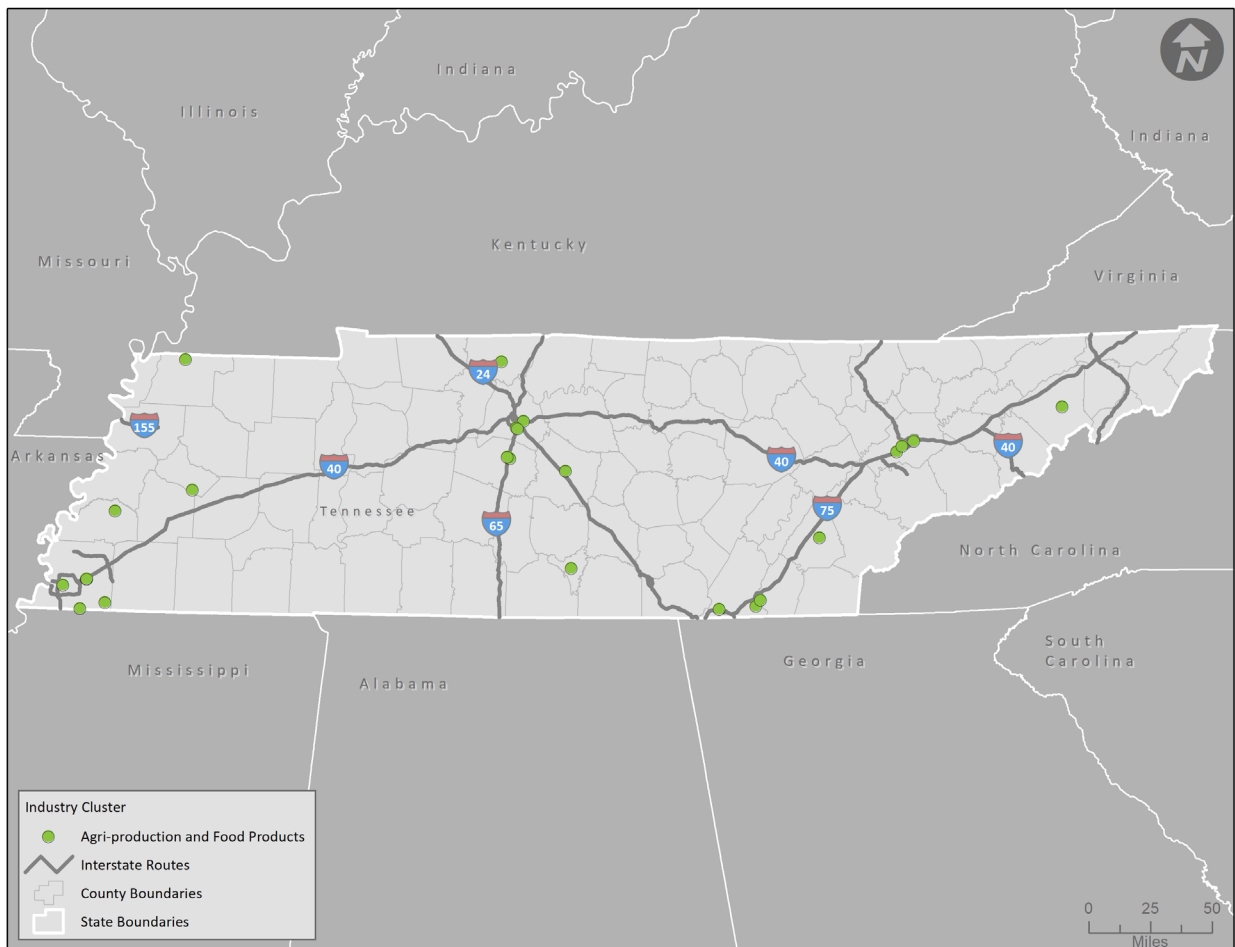
⁹⁷ Tennessee Department of Agriculture Top Agricultural Commodities", TNDQA 2019

⁹⁸ United States Department of Agriculture, Economic Research Service, Export Calculations 2018

⁹⁹ "Food and Beverage Production in Tennessee", TN Department of Economic and Community Development, December 2017

number of world-famous food and beverage products in addition to Jack Daniel’s whiskey including: Jimmy Dean sausage, Bush’s Baked Beans, M&M’s, Mars Wrigley Confectionary, and the PictSweet Company. Within the Freight Alley Region, major food and beverage employers include Green Mountain Coffee Roasters, Mayfield’s Dairy, Mars Petcare Inc., McKee Foods, Pilgrim’s Pride, Monterey Mushrooms, Conagra, and the world-famous Chattanooga Bakery Moon Pie.¹⁰⁰ Tennessee ranks in the top 10 states for several industries in the food sub-cluster, including distilleries, snack food, and confectionery production.¹⁰¹ **Figure 16** shows Tennessee’s major agri-production and food products companies with more than 200 employees.

Figure 16: Tennessee’s Agri-Production and Food Products Businesses with 200+ Employees



Source: State of Tennessee Department of Economic and Community Development, Center for Economic Research, 2020

¹⁰⁰ TNECD Industries Database, Hoovers, CDM Smith, June 2020

¹⁰¹ Tennessee Department of Economic and Community Development. The Food and Beverage Production in Tennessee. December 2017

Growth/Expansion

From 2010 through 2017, the Tennessee Department of Economic and Community Development announced 90 project commitments from the food and beverage industry creating nearly 95,000 new jobs and \$3.2 billion in capital investment. In the past three years, a number of additional food and beverage companies have located in Tennessee, some of which are listed in **Table 24**.

Table 24: New Jobs in Agri-Production and Food Products (2017-2020)

Company	New Jobs Created	Capital Investment	City/County
McKee Foods expansion	480	\$500 million	Hamilton Co.
Icee Company	200	\$10.3 million	LaVergne
NomNomNow Inc.	200	\$17 million	Nashville
Maplehurst Bakeries	90	\$53 million	Wilson Co.
Corsair Distillery	52	\$11.1 million	Davidson Co.
Black Rifle Coffee	50	\$6 million	Coffee Co.
Tyson Foods	1,500	\$300 million	Humboldt

Source: Tennessee Department of Economic and Community Development. TNECD Newsroom, June 2020.

Emerging Agri-Production and Food Products Technologies and Trends

Agri-production is changing to meet an increasing global demand for quality food while balancing the economic and environmental needs of a more urbanized marketplace. In 2020, over half the world’s urban population and more than half of global GDP growth is expected to come from emerging countries. As food demands increase and populations and incomes grow, these countries will consume more calories, protein, and processed foods similar to developed nations.¹⁰² New technologies are improving agri-production efficiencies and helping growers and food processors to cut costs and improve quality. Digital and biotechnology enables growers to communicate important information to potential future buyers, so they know the types of fertilizers being used, specific growing conditions, seed stock used, and any genetic modifications. Some buyers will pay premium prices for digitalized food supply information that includes harvesting and transportation data.

Consumer preferences are changing with a growing awareness of “clean foods,” sustainable production, and a growing demand for “farm-to-table” eating.¹⁰³ New technologies make it possible to raise produce in vertical structures within urban areas and e-commerce deliveries and improved air cargo operations transport this morning’s catch to your table for dinner this evening. There are increasing demands for better supply chain efficiencies and improved multimodal freight mobility for those consumers that can afford the cost of the best food products delivered fresh to your door.¹⁰⁴

¹⁰² “The Future of Agribusiness”, Boston Consulting Group, 2019

¹⁰³ “From Agriculture to AgTech: An industry transformed”, Deloitte, 2019

¹⁰⁴ Ibid.

The trend toward healthier diets, even in emerging markets, has resulted in a growing preference for organic/sustainably grown food and healthier functional foods.¹⁰⁵ For example, Unilever buys 55 percent of its agricultural raw materials from sustainable growers now. Dairy companies are also providing products focused towards the health-conscious consumers with omega-3 fortified milk. The significant shift in consumer food preferences continues to push ingredients with healthy, clean-label attributes such as organic, non-GMO, antibiotic-free, gluten-free, cage-free, etc.

Productivity

Some of the world's population still faces a lack of adequate food and as populations expand there is a growing need to improve yields, particularly for low-cost high food-value products. The expected protein market demand will encourage increased protein production and growth in supporting industries such as breeding, animal-health testing, feed, and vaccines. Argentinian and Brazilian beef production is expected to increase to meet global demand. Yields for crops and animals have significantly increased as a result of technological advancements, industry investments, and collaboration. R&D investments in biotechnology to develop high performance seed traits and better crop protection chemicals have expanded crop production in many areas of the world.¹⁰⁶

The world food supply will be required to produce more while continuing to deal with climate volatility. Pressure for water, land, energy, and labor resources will push the agriculture industry to continue to innovate to improve productivity including the use of high-yield seed, seeds requiring less water and new fertilizers. Emerging technologies in bio-chemicals, crop efficiency technologies, and improved supply chains will help drive increased productivity.

Food Security and Monitoring

Japan buys apples grown in the Yakima Valley in Washington State. The growers carefully package and tag the apples with radio-frequency identification (RFID) bio-identity tags that tell the buyer which farm the apples were grown on, the type of fertilizers used, the seed stock, the harvest date, and other information important to the customer. Food safety is an area of major concern for farmers and all those involved in agriculture. Farmers need to be aware of the potential for contamination as they work in the fields and as food is transported from one place to the next. A problem such as an e. coli outbreak can lead to serious costs that farmers must be prepared to absorb.¹⁰⁷ An increasing number of customers want detailed information about what they buy and are willing to pay a premium to purchase food that can be tracked throughout the growing and transportation process.

Freight Issues for Agribusiness and Food Products

The agri-production and food products industry relies on a safe, secure and efficient transportation system to provide fresh produce, processed goods, raw materials, and many

¹⁰⁵ "The Future of Agribusiness", Torsten Kurth, Boston Consulting Group, 2020

¹⁰⁶ "Nine Trends Transforming the Agribusiness Industry", Peter Walter and Mark Herther, L.E.K. Consulting's Industrial Practice, Volume XIX, Issue 62, 2017

¹⁰⁷ Linchpin Team. "Trends that will Transform the Agricultural and Farming Industry Outlook in 2020". Industry Market Trends, November 5, 2019

other goods and products. From rural roads and bridges to interstates, the farmers, producers, and end users at the family dinner table all depend on this food supply chain. According to a 2018 study by TRIP, a national non-profit transportation research organization, 13 percent of the nation's rural roads were in poor condition and 21 percent are in mediocre condition, unchanged since 2017.¹⁰⁸ In 2018, the 20 states with the highest percentage of roads in poor condition represented 32 percent of cash receipts for all agricultural commodities.

AUTOMOTIVE INDUSTRY

The United States is the second largest market for vehicle sales and production in the world, with over 17.2 million light vehicles sold in 2018.¹⁰⁹ The U.S. exported almost 2 million new light vehicles in 2018 and over 131,000 medium and heavy duty trucks to 200 markets around the world, along with automotive parts representing almost \$150 billion in exports. In March 2020, 614,000 people were employed in vehicle and automotive parts manufacturing, down from 1 million employees in this sector one year earlier.¹¹⁰ The automotive industry is dealing with new customer preferences, technology expectations, and competing mobility options. The cost of new automobiles has increased significantly, now averaging over \$35,000, primarily the result of the additional technologies that are integrated into vehicles today. As the price of a new car has increased, fewer buyers can afford to purchase and owners are holding on to existing vehicles longer.



Prior to March 2020, several people at the Thrive Regional Partnership Freight Mobility Committee meetings pondered the mobility impacts if more people choose to work from home rather than driving to their office every day. In the past five months, as a result of COVID-19, there has been a real-time demonstration of this scenario. It is too early to make assumptions about how an increase in tele-commuting will impact the automotive industry long-term.

The impact of COVID-19 on the global automotive sector has created significant disruptions, including serious delays in the import of some internationally sourced parts, shutdowns at some manufacturing plants, or temporary conversion of plants to make non-automotive products, including ventilators and masks, declines in demand for new cars, and diversion of capital to cover added costs of employee safety and shoring up ongoing operations. A central question, “When will demand be restored,” is essentially impossible to answer at this point as consumers throughout the world are choosing to save cash for an uncertain future rather than invest in big-ticket items like a new car. Analysts are developing a range of interesting scenarios, but at this point in time, there are no reliable answers.

¹⁰⁸ “Rural Roads and Bridge Conditions”, Federal Highway Administration, TRIP Study 2020

¹⁰⁹ “Foreign Direct Investment Automotive Industry in the United States”, International Trade Administration, U.S. Department of Commerce, 2019

¹¹⁰ “Automotive Industry Employment, Earnings, and Hours”, Bureau of Labor Statistics, U.S. Department of Commerce, 2020

Global Markets

Worldwide, this industry is experiencing historic changes. Car purchases are slowing in China and India. The Chinese market is beginning to reach oversaturation with predictions of a 7.5 percent decrease in car sales in 2020.¹¹¹ Even before the pandemic, “The Business Insider” reported that some experts believe a 12 to 14 percent decline in car sales in China and India is likely. The global demand for cars has been declining with rideshare and car sharing options replacing personal vehicles in densely populated areas.

Global manufacturers are under pressure to achieve scale, cut costs, and generate more cash to finance investment in technologies for electric vehicles and self-driving cars. Fiat Chrysler and Peugeot have agreed on a merger to create a trans-Atlantic manufacturer with deeper pockets to finance the rising costs of industry transformation. Nissan has begun to restructure worldwide, already cutting 6,400 jobs with an additional 6,100 positions projected to be eliminated in next three years.¹¹² Volkswagen has predicted a global slowdown as a result of the company’s profit revisions and less optimistic outlooks from General Motors Co., Ford Motor Co., and Renault SA. These companies cite a range of risks such as trade conflicts, Brexit, and economic uncertainty in China, the U.S., and Europe.¹¹³

The 2020 Global Automotive Consumer Study found a growing consumer interest in alternative powertrain technology and fewer people who desire a traditional internal combustion engine in their next vehicle, preferring a hybrid or battery electric vehicle. In Japan, 63 percent of consumers prefer a hybrid or battery electric powered vehicle, while 57 percent of buyers in China and 51 percent in Germany would buy electric over conventional engines.¹¹⁴ This change in consumer preference and new regulations will help to reshape the automotive industry in the future. The rise of electric vehicles (EV) can be a real risk for automotive suppliers. Those who manufacture exhaust systems, fuel systems, and transmissions face disruption from the EV as they become more mainstream. Agility, financial flexibility, and strong technology and innovation partners will be important to traditional suppliers, who will need to evaluate converting some of their production capacity to serve EV auto makers in the future.¹¹⁵

New technologies like lane departure monitoring and automatic breaking are changing how we drive. New mobility options like Uber or Lyft, particularly in urban areas, have changed how we get to our destinations. Robotics and Artificial Intelligence (AI) may impact manufacturing employment, and future acceptance of self-driving vehicles will create new opportunities and challenges in this industry.¹¹⁶

¹¹¹ “U.S. Auto Industry face 30% Drop by 2022”, Detroit News, June 12, 2019

¹¹² “Tennessee Nissan Plants to be Spared by Cuts”, Nashville Post, July 25, 2019

¹¹³ “Volkswagen Warns Auto Industry Downturns”, William Boston, Wall Street Journal, Oct. 30, 2019

¹¹⁴ “2020 Global Automotive Consumer Study”, Deloitte Global Automotive Research, 2020

¹¹⁵ “Merge ahead: Electric Vehicles and the impact on the automotive supply chain”, PricewaterhouseCoopers (PwC), November 2019

¹¹⁶ “The Future of the Automotive Value Chain”, Deloitte Development LLC, 2020

Domestic Markets

Sales of new and used cars, sport utility vehicles (SUVs), and light trucks are projected to decline slightly over the next few years as lenders tighten loan credit requirements due to rising default rates. Recent gains in disposable personal income, more jobs, better fuel efficiency, and the aging vehicle fleet (all powerful drivers for sales) were expected to prevent sales from declining significantly.¹¹⁷ The average light vehicle today is almost 12 years old, an all-time record.

Some U.S. auto manufacturers have cut back capacity at plants that have not maintained revenues and profit targets, and at the same time some foreign manufacturers are making new investments in manufacturing capacity. In November 2019, General Motors (GM) announced they were closing five production plants in North America and would lay off 14,000 employees. These decisions were considered necessary in light of the shifting demand away from sedans that were manufactured at these plants to SUV's.¹¹⁸ Crossover vehicles and trucks account for 70 percent of new vehicles introduced to the marketplace.

The good news is that the U.S. remains one of the largest markets in the world, second only to China. "To come here, to build here, to build brand here, and to build reputation here still makes sense" according to Wharton management professor Dr. John Paul McDuffie, the director of Vehicle and Mobility Innovation at the Mack Institute for Innovation Management at the Wharton School. Dr. McDuffie believes this is part of the reason Volkswagen decided to invest \$800 million to make electric vehicles at its plant in Chattanooga and why Toyota and Mazda have a joint venture to assemble electric vehicles in Huntsville, both in the Freight Alley Core Megaregion.¹¹⁹

There is a demand for vehicles in the U.S. and the automotive industry is expected to have a strong recovery from 2021 to 2024.¹²⁰ Employment will fluctuate across plants and companies but, overall, there are strong indications for growth in the industry and in the U.S. and world economy. This is the big picture these companies pay attention to.

The American automotive industry is one of the most powerful economic engines in the U.S. economy. This manufacturing sector is a both a customer and a producer, buying parts, component assemblies, and technology from IBM, HP, Microsoft, Intel, Oracle, and thousands of other U.S. manufacturers. The American auto industry exported \$99 billion of cars and parts from U.S. ocean ports in 2017.¹²¹ Almost 190,000 people are employed in automotive manufacturing including automotive suppliers in Alabama, Georgia, and Tennessee. They work for 2,700 automotive and supplier manufacturing businesses including Honda Manufacturing, Kam Tek, Federal-Mogul Motorparts, Mercedes-Benz USA,

¹¹⁷ "The U.S. Auto Industry in 2019-twists-turns-and-bumps", University of Pennsylvania Wharton School of Business, Jan. 29, 2019

¹¹⁸ Ibid.

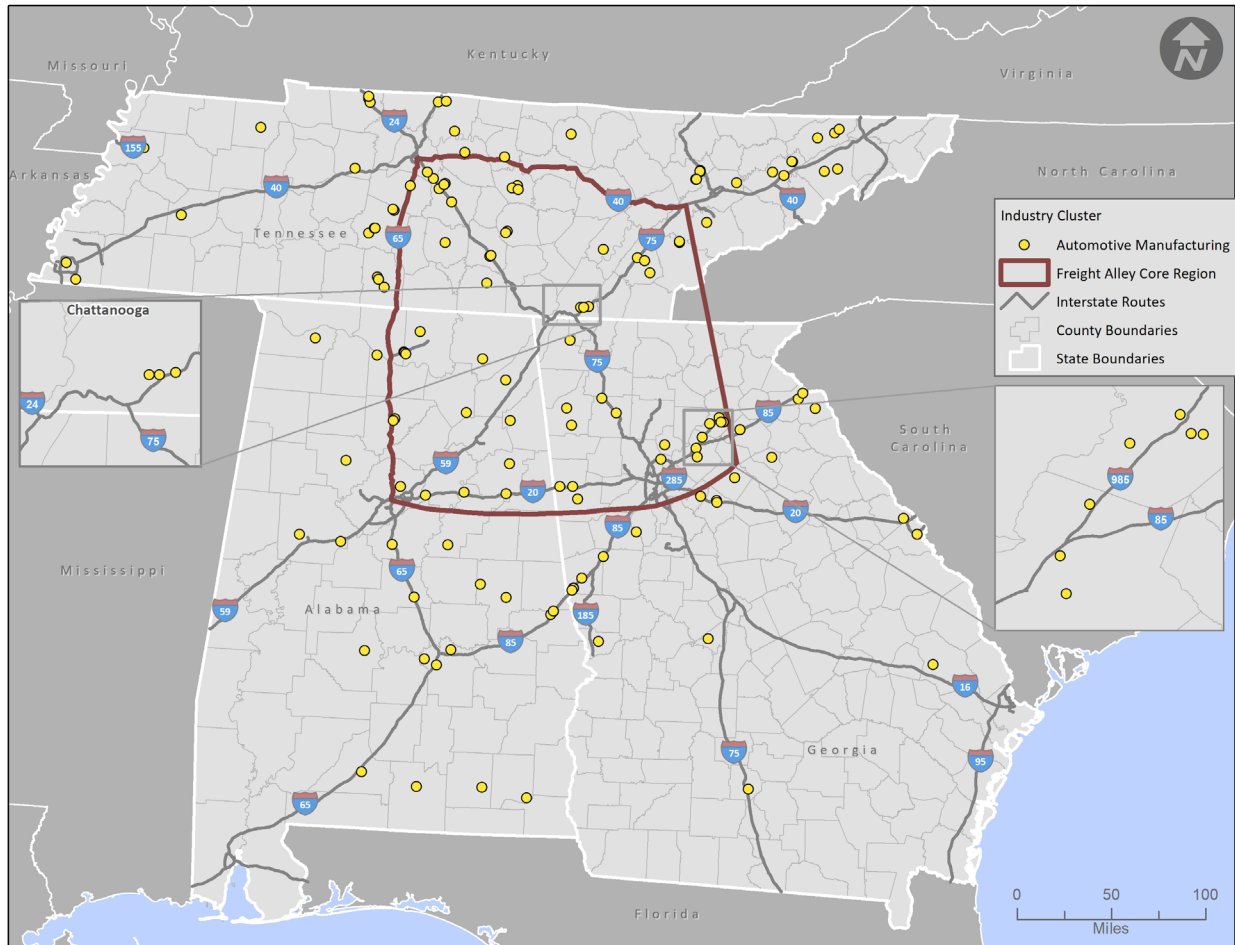
¹¹⁹ Ibid.

¹²⁰ "Automotive Industry Outlook: Managing Volatility and Leveraging Opportunities", HIS Markit, Mike Wall, February 2019

¹²¹ American Automotive Manufacturers Alliance 2018 Factsheet

General Motors Innovation Center, Hitachi Automotive Systems Americas, Bridgestone Firestone, DENSO Manufacturing, Nissan North America, and Volkswagen Group of America, all located within the Freight Alley Region.¹²² **Figure 17** illustrates the distribution of businesses with significant employment in this cluster across the three-state area.

Figure 17: Freight Alley Core Megaregion Integrated Automotive Assembly Manufacturers with 1,000+ Employees and Suppliers with 300+ Employees



Source: Alabama Department of Transportation Planning Studies Bureau, Georgia Department of Economic Development Center for Logistics, Tennessee Department of Economic and Community Development Center for Economic Research, and CDM Smith, 2020

¹²² Alabama Department of Commerce, Georgia Department of Economic Development, Tennessee Department of Economic Development, and CDM Smith

State Snapshots

Alabama

Toyota, Mercedes Benz, Honda, Mazda, and Hyundai have located automotive manufacturing facilities in Alabama. There are over 54,000 employees producing motor vehicles, parts, bodies, and trailers at 670



670 automotive manufacturing facilities

54,000 employees producing motor vehicles, parts, and body and trailers



1 million cars and light-trucks produced

and nearly 1.6 million automotive engines in 2018.



\$6.4 billion exports

in 2018 with destinations in 89 different countries around the world

automotive manufacturing businesses in the state.¹²³ Alabama automakers produced nearly 1 million cars and light-trucks and nearly 1.6 million automotive engines in 2018.¹²⁴ The value of automotive exports from the state were \$6.4 billion in 2018, with destinations in 89 different countries around the world.

The Toyota, Mazda, and Honda production facilities are located in the Freight Alley Core Megaregion. Toyota's existing motor manufacturing plants has been in operation in the Freight Alley Core Megaregion since 2001 with 1,400 team members employed.¹²⁵ Honda's manufacturing plant in Talladega County employs 4,500 and has invested \$2.6 billion in facilities since its initial location in 1999. Hyundai manufacturing facility near Montgomery opened their facility in May 2005. This \$1.1 billion investment in plant employs more than 2,000 team members and 64 suppliers have located in North American to support this new plant, and these suppliers are expected employ an additional 5,500 people. These three automotive manufacturing operations receive products and materials from over 140 suppliers, so timely deliveries and cost-effective freight transport options are absolutely essential to keeping these manufacturing plants operating smoothly to produce the vehicles and parts they provide for 15 different automobiles.¹²⁶ **Figure 18** shows the location of Alabama's integrated automotive manufacturing establishments with over 300 employees.

Recent Automotive Growth or Expansions

Existing automotive manufacturers continue to expand their operations in Alabama. In 2018, Toyota and Mazda announced a joint venture to build a \$1.6 billion manufacturing operation in Huntsville that is expected to employ 4,000 people when it opens in 2021.¹²⁷ Toyota also announced an expansion at the existing engine facility in Huntsville to increase its annual production capacity. This new \$288 million investment will add 450 new jobs and increase plant capacity by 300,000 vehicles per year. Y-tec Keylex Toyotetsu Alabama

¹²³ ESRI data, 2019

¹²⁴ "Alabama's Automotive Industry", Economic Development Partnership of Alabama, 2019

¹²⁵ Ibid.

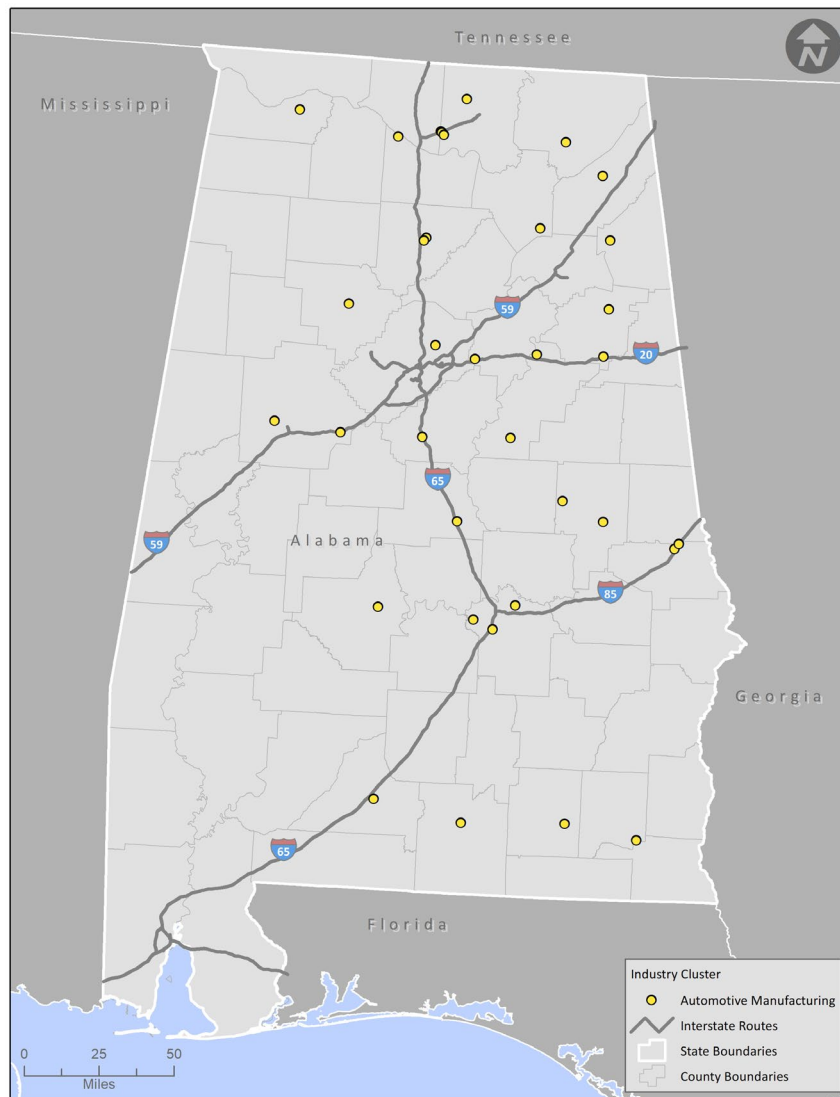
¹²⁶ Madison County Chamber of Commerce, Business Council of Alabama, Data accessed February 4, 2020

¹²⁷ "Mazda Toyota Manufacturing USA Inc", Huntsville Madison County Chamber of Commerce Press Release, March 8, 2018

(YKTA) announced a new stamping and assemblies manufacturing plant in Limestone County that will employ 650, and the company plans to invest \$200 million in in this new facility.¹²⁸

Other recent automotive expansions in Alabama include a \$338 million investment by Hyundai Motor Manufacturing to expand their production capacity. Vuteq USA will hire 200 employees for their new plastic injection plant, and Toyota Boshoku America will hire 400 people for their new seating systems facility, both located in Limestone County. Additional automotive investments in Alabama are shown in **Table 25**.¹²⁹

Figure 18: Alabama Integrated Automotive Manufacturers with 1,000+ Employees and Suppliers with 300+ Employees



Source: Alabama Department of Transportation Planning Studies Bureau, 2020

¹²⁸ “Auto Supplier YKTA to create 650 Jobs”, Made in Alabama, May 22, 2019

¹²⁹ “Alabama Automotive Industry”, Economic Development Partnership of Alabama, 2019

Table 25: Recent Automotive Manufacturing Expansions and New Projects (Partial List)

Company	New Jobs	Capital Investment	County
Toyota Boshoku America	400	\$50 million	Limestone
Vuteq USA	200	\$60 million	Limestone
Shinhwa Group	95	\$42 million	Lee
Hwashin America Corporation	50	\$26.3 million	Butler
Hyundai Motor Manufacturing	50	\$338 million	Montgomery
Hyundai Motor Manufacturing AL	50	\$338 million	Montgomery
Hwashin America Corporation	50	\$26 million	Butler
Arkal Automotive	25	\$2.5 million	Lee
Gestamp	0	\$80 million	Jefferson
Mercedes-Benz U.S. International	0	\$495 million	Tuscaloosa

Source: Economic Development Partnership of Alabama, Alabama's Automotive Industry, 2019

Georgia

Georgia has over 45,000 employees working in automotive manufacturing, including automotive supply production at 985 business locations, ranging from small operations to large integrated manufacturing plants.¹³⁰ Georgia's automotive industry exports have grown 9 percent annually since 2000 and reached \$9.8 billion in 2017. This accounts for 16.1 percent of the Southeast's automotive manufacturing export total.¹³¹

Two companies manufacture vehicles in Georgia, Kia Motor Manufacturing and Blue Bird Corporation. Blue Bird has been manufacturing a variety of buses since 1927, with over 2,400 employees. Kia Motors, a South Korean company, invested \$1.1 billion in their first North American manufacturing facility that opened in 2009 in West Point, GA. The company is the largest automotive manufacturing employer in Georgia, with 3,000 employees producing 360,000 vehicles annually.¹³² Kia works with over 33 suppliers located in Georgia and Alabama, and additional suppliers continue to make investment decisions to locate manufacturing facilities in Georgia, including Carcoustics locating in Gwinnett County and Daesol Materials in Harris County.¹³³ Additional information about Georgia automotive manufacturers can be found in **Figure 19** and **Table 26**.

¹³⁰ ESRI Database, Georgia Department of Economic Development 2019

¹³¹ "Automotive Manufacturing Georgia", Georgia Power Community and Economic Development, 2018

¹³² "Georgia Automotive", Georgia Department of Economic Development, 2019

¹³³ Ibid.



985 automotive manufacturing facilities

Employing over 45,000 people



Port of Brunswick is the 2nd busiest port in import and export of vehicles in the U.S.



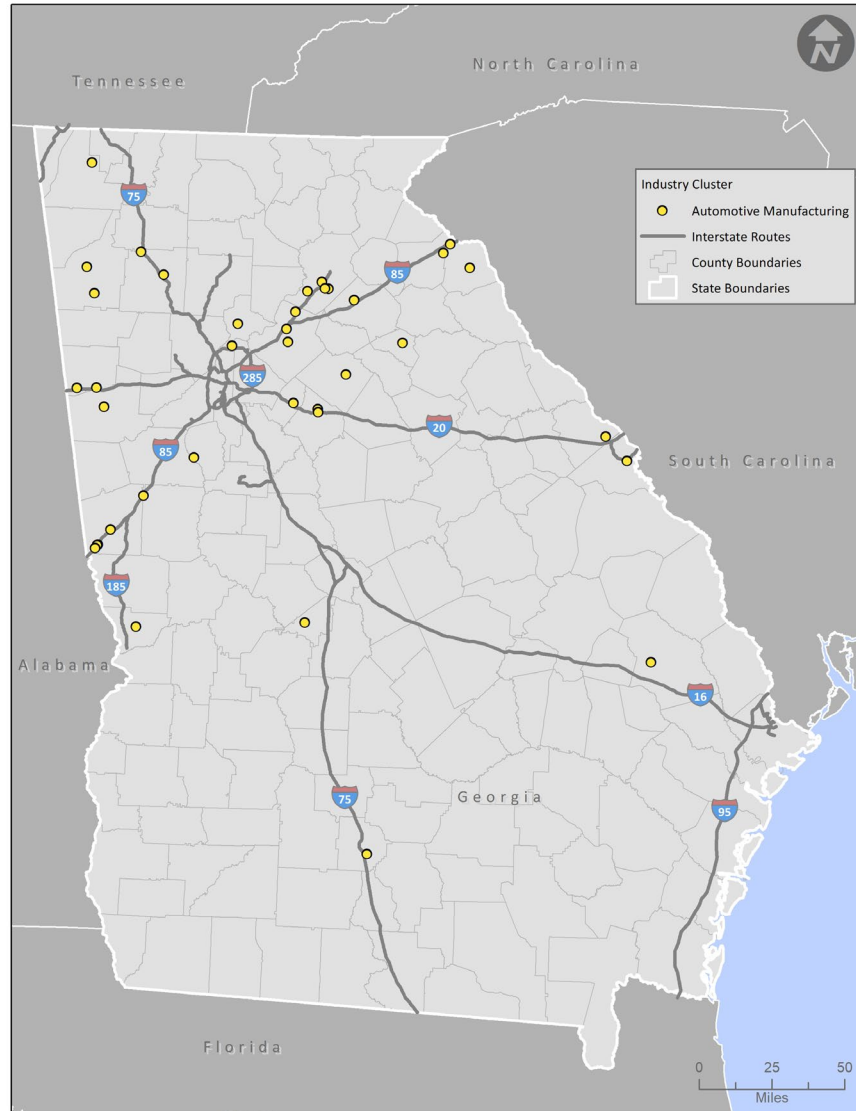
\$9.8 billion exports

In 2017, and have grown 9% annually since 2000

Georgia's multimodal transportation infrastructure plays a vital role in the location of automotive manufacturing facilities. Hartsfield-Jackson Atlanta International Airport is the busiest passenger airport in the world and the 13th largest air cargo hub by cargo volume in North America. The Port of Savannah is the 4th busiest container port in the U.S. and has two Class 1 railroads serving the port. The Garden City Terminal is the largest single container terminal in the U.S. The Port of Brunswick manages cargo for over 60 automotive and heavy equipment manufacturers and is the second busiest port for import and export of vehicles in the United States. Georgia has over 4,700 miles of rail, six interstate highways bisect the state, and 80 percent of the U.S. population can be served within two truck days.¹³⁴

¹³⁴ "Georgia Automotive", Georgia Department of Economic Development, 2019

Figure 19: Georgia Integrated Automotive Manufacturers with 1,000+ Employees and Suppliers with 300+ Employees



Source: Georgia Department of Economic Development Center for Logistics, 2020

Table 26: Georgia Automotive Manufacturing Employers (2018)

Company	Employment
Kia Motors Manufacturing Georgia (KMMG)	3,000
Blue Bird Corporation	1,900
Yamaha Motor Manufacturing Corporation	1,600
Toyo Tire North America Manufacturing	1,200
Textron Specialized Vehicles	1,100
Mando America Corporation	1,000
Honda Lock (HL-A Co.)	1,000
Decostar Industries	1,000
Freudenberg-NOK (2 locations)	935
Cottrell Inc.	900
TD Automotive Compressor Georgia, LLC	850
Mobis Alabama, LLC	842
Honda Precision Parts of Georgia	750

Source: Georgia Power Community and Economic Development. Automotive Manufacturing Georgia: The Epicenter of Growth in the Southeastern Auto Corridor. October 2018. Honda Precision Parts of Georgia website

Growth/Expansion

In the last four years, automotive-related companies have continued to locate new facilities or expanded their operations in Georgia creating 3,225 jobs, as shown in **Table 27**.¹³⁵

Table 27: Georgia's Recent Automotive Locations and Expansions

Company	Jobs Created	County	Year
Sentury Tire	1,000	Troup	2016
Valmiera Glass	425	Laurens	2016
Textron Specialized Vehicles	400	Richmond	2016
First American Resources	200	Jackson	2017
Carcoustics	200	Gwinnett	2017
Textron Specialized Vehicles	150	Richmond	2016
Voestalpine	150	Bartow	2016
Groupe PSA	120	Fulton	2018
Daesol Materials Georgia LLC	110	Harris	2017
Club Car	100	Columbia	2018
Nisshinbo Automotive Manufacturing Inc.	100	Newton	2018
Gill Industries	100	Dade	2017
Purification Cellutions	100	Burke	2016
Hollingsworth & Vose	70	Pulaski	2016
Total	3,225		

Source: Georgia Power Community and Economic Development. Automotive Manufacturing Georgia: The Epicenter of Growth in the Southeastern Auto Corridor. October 2018.

¹³⁵ "Honda Investing \$100 million in Georgia Plant", Atlanta Business Chronicle, March 6, 2017

Tennessee

The automotive industry is a driving force in Tennessee's manufacturing sector. In fact, 88 of Tennessee's 95 counties have automotive related operations.¹³⁶ Tennessee's automobile industry, which rolls out a new car every 20 seconds, generates about \$12 billion in annual tax revenue for the state. Today, Tennessee is home to 900 automotive suppliers and three major automobile manufacturing plants in Spring Hill, Chattanooga, and Smyrna. Automotive manufacturing contributes \$55.6 billion, or 19 percent of the overall \$296 billion manufacturing sector economy within Tennessee.¹³⁷ The location of Tennessee automotive-related companies is shown in **Figure 20**. In 2016, there were \$5.9 billion worth of



\$12 billion tax revenue

generated in Tennessee in 2016



\$5.9 billion exports

from Tennessee in 2016



19% of manufacturing sector

of \$296 billion economy within Tennessee

The automotive industry in Tennessee rolls out a new car every

20 SECONDS

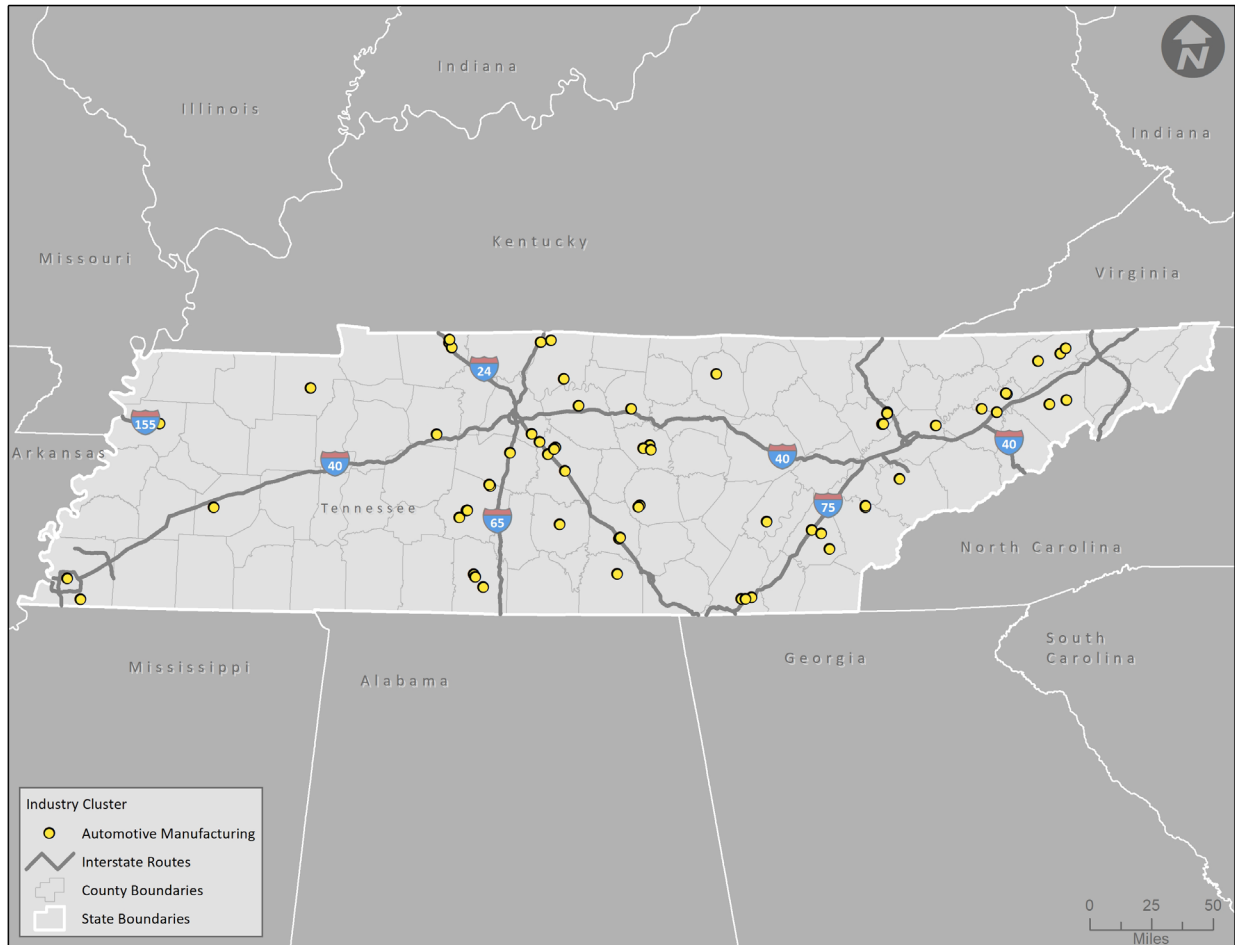


automotive exports from Tennessee. Three automotive manufacturers (GM at Spring Hill, Nissan at Smyrna, and Volkswagen at Chattanooga) have invested almost \$6 billion in their Tennessee production facilities since the late 1980s. The automobile suppliers that produce parts and components for the manufacturing plants employ 60,000 people in Tennessee.

¹³⁶ "Auto Company announces \$1 billion expansion in Tennessee", Nashville Business Journal, October 6, 2017

¹³⁷ "Tennessee's Automotive Cluster", Tennessee Department of Economic and Community Development

Figure 20: Tennessee Integrated Automotive Manufacturers with 1,000+ Employees and Suppliers with 300+ Employees



Source: Tennessee Department of Economic and Community Development, Center for Economic Research, 2019

Growth/Expansion

Automotive and parts manufacturers have continued to make significant investments in Tennessee. DENSO Manufacturing will spend \$1 billion to expand their existing manufacturing facility in Maryville creating 1,000 new jobs. DENSO, already Blount County's biggest employer with a manufacturing presence in Maryville and Athens, employs nearly 4,500 people in Tennessee. Nokian Tyres broke ground in 2018 on a new tire plant in Dayton scheduled to be in production in 2020 with 400 new employees.

In 2019, Volkswagen announced it would invest \$800 million to expand their manufacturing facility in Chattanooga and create 1,000 new jobs to begin producing electric vehicles in 2022.¹³⁸ Other recent automotive project announcements in Tennessee are shown in **Table 28**.

¹³⁸ "Tennessee's Automotive Cluster" Tennessee Department of Economic and Community Development Newsroom, 2019

Table 28: Recent Automotive Manufacturing Announcements in Tennessee

Company	New Jobs	Capital Investment	County
General Motors	1,431	\$1 billion	Williamson
Nissan	1,000	\$170 million	Rutherford
General Motors	200	\$300 million	Williamson
Faurecia Interior Systems	143	\$30 million	Williamson
Topre America Corp	51	\$63 million	Rutherford
Hirotec Group	50	\$43 million	Lincoln
Toyota	13	\$50 million	Madison

Source: Tennessee Department of Economic and Community Development, 2018

Emerging Automotive Technologies and Trends

Automakers spend over \$100 billion a year on global research and development, making the automotive industry the technology leader among industries. Today, technology can help you avoid a collision or park a car, monitor your exact location, and send you curated information about specific locations. All of this technology impacts the cost of a vehicle, with average car prices now topping \$35,000. A typical luxury car contains more software code than a single Boeing 787 airliner.¹³⁹

Manufacturers can use 3-D printing technology to build component prototypes quickly and at lower cost. Today General Motors (GM) is using AM to make lightweight versions of structural components that aren't visible to the consumer, helping to meet fuel-economy requirements and longer ranges for electric vehicles. GM is also using 3-D printing to create more unique and compelling designs for customers. The 3-D printing process can significantly streamline component production and allow the use of materials that best fit the component requirements.

Automotive manufacturers are also shifting strategies when it comes to the development of the new technologies that are expected to reshape the automobile in the years to come. BMW and Jaguar Land Rover, for example, are collaborating on the development of electrified vehicles, while Honda and General Motors are sharing autonomous vehicle development efforts. Automakers may also consider more mergers like the Fiat Chrysler with French manufacturer Renault.¹⁴⁰

Long-Term Electric and Autonomous Vehicle Trends

Vehicles will increasingly become electric. Concerns about climate change, especially with younger generations, creates the need and desire for cleaner vehicles. As technology advances and EVs realize increased mileage between charges, they are likely to see sales growth.¹⁴¹ Consumers still need to be convinced they can travel to a destination without being left on the side of the road with a dead battery. The range of EVs and a reliable charging infrastructure are two primary concerns that prevent buyers from purchasing

¹³⁹ "Ford GT Uses more Code than Boeing Jetliner", Digital Trends, May 15, 2015

¹⁴⁰ "Edmonds Warns of a Tough 2019 for Auto Industry", Paul A. Eisenstein, June 26, 2019

¹⁴¹ "Automotive Industry Current and Long-Term Future Outlook", David Zanoni, March 4, 2019

electric vehicles.¹⁴² Another challenge to broader adoption of EV is the public sector revenue issue. Many local and state governments need to maintain the significant revenue stream generated by fossil fuel taxes to maintain roads, fund state safety and security patrols, and even support non highway transportation services including trails. Although there are a number of funding alternatives currently being evaluated by states, these alternatives will likely be user fees or similar fees which are unfamiliar to the general public and not always popular.

Vehicles are increasingly utilizing more autonomous technologies. This will occur in stages. Level 4 and 5 vehicles are likely to become available in the 2020s. (Level 5 vehicles are fully autonomous and can operate on any road and during any condition under which a human could operate). However, they will probably be limited to the high-end, expensive vehicles initially. Truck and bus autonomous vehicles are also in the development stage, and various combinations of driver-assisted and autonomous technologies are being evaluated, recognizing the public's concern about fully autonomous trucks and buses.¹⁴³

There is growing utilization of shared vehicles, and that trend is expected to continue through 2030. This is likely to occur in urban areas and in Europe. Fleets of vehicles could take commonly traveled routes back and forth for commuters to get to and from work, sports events, concerts, etc. Car-sharing would allow users to pay per minute or mile without worrying about ownership. Some vehicle owners could make their vehicles available for sharing to make extra money. Sixty percent of Europeans stated they would be prepared to share their car for money.¹⁴⁴

Vehicles will become increasingly "connected" via internet and cloud. Vehicles will be connected to traffic management infrastructure and with other cars. Vehicles will also be able to detect passengers and pedestrians.¹⁴⁵

As a result of vehicle-sharing and automation, vehicle miles travelled (VMT) is likely to increase. The increased usage of vehicles creates the need for shorter 5 to 8-year replacement cycles. Vehicles are expected to travel for more miles and be used more intensively. Shorter update cycles will also increase the overall demand for the hardware and software components.¹⁴⁶

Other Trends

Vehicle inventory on the roads is expected to decrease significantly according to PwC. This could be because of the expected increase of shared vehicles on the road, decreasing the total number owned by consumers. However, vehicle sales are expected to rise because the vehicles will need to be replaced more often as a result of more frequent usage.

¹⁴² "Industry 4.0 in Automotive", Deloitte Insights Automotive News, Deloitte Development 2020

¹⁴³ Ibid.

¹⁴⁴ "The Future of the Automotive Value Chain" Deloitte, 2019

¹⁴⁵ Ibid.

¹⁴⁶ "Five trends transforming the Automotive Industry", PwC, 2018

Total VMT is expected to increase as the number of shared vehicles increases. Instead of cars sitting around in parking lots while people are at work, shared vehicles will be in use wherever driving needs arise.

- Autonomous vehicles are expected to account for 50 percent of miles driven in China, 40 percent of the miles driven in Europe, and 36 percent of the miles driven in the U.S. by 2030.¹⁴⁷
- By 2030, total mileage driven may increase by 24 percent in the United States, 28 percent in Europe, and 183 percent in China.
- Ridesharing in Europe is expected to grow at a Compound Annual Growth Rate (CAGR) of 20 percent by 2030.¹⁴⁸ This will take ridesharing from 1 percent currently to 10 percent by the mid-2020s and 25 percent by 2030.
- Ridesharing in the United States is expected to increase from 1 percent to 33.5 percent by 2030.
- The fastest growth of ridesharing is expected to be in China. By 2030, 45 percent of personal mileage in China is expected to be from shared vehicles.

Vehicle Battery Technology

Promising new battery technology may allow electric vehicle owners to recharge their batteries with a liquid. This technology is known as flow batteries.¹⁴⁹ Flow batteries can be charged in minutes with a liquid containing electrolytes, thereby addressing users' concerns about long charging time for electric vehicles. This technology has been around since the 1980s; however, old flow batteries were too heavy for vehicles. The new flow batteries are light enough for vehicles and can be filled as quickly as we fill cars with gasoline. Flow battery technology has the potential to be added quickly to existing infrastructure because a liquid-moving and storage system is already in place for gasoline. However, concerns about the cost, safety, and reliability of flow batteries still need to be resolved before this could be put into widespread use.

WOOD FLOORING AND FOREST PRODUCTS

The wood flooring and forest products sector is closely linked to trends in housing construction, home repair and remodeling, and furniture production. Prior to the pandemic, the U.S. Department of Labor predicted that employment for laborers in the construction industry would grow by nearly 13 percent through 2024. However, employment for timber cutting, logging, and sawmill workers is expected to decline by an average of 4 percent during the same period because of overseas competition, conservation efforts, and increased



¹⁴⁷ "Automotive Industry Current and Long-term Future Outlook", David Zanoni, March 4, 2019

¹⁴⁸ Ibid.

¹⁴⁹ Ibid.

mechanization.¹⁵⁰ These projections are likely to be impacted, to some degree, by the economic downturn associated with the pandemic.

Global Markets

The forest-based sector, particularly in North America and Western Europe, is facing significant structural changes. These changes result from shifts in global competitive advantages in fast-growing markets in Asia, low-cost production regions in South America, and the declining demand for paper products and other forest products.¹⁵¹ Major global suppliers of wood products include Chile, New Zealand, Brazil, and Siberia with its extensive natural coniferous resources.¹⁵²

The outlook for the timber and wood product subsector remains negative. Production capacity reductions through paper mill/machine closures or conversions were expected to exceed the demand in 2019 and will likely continue.¹⁵³ Global timber manufacturing income is expected to fall 2 to 4 percent as input costs are rising amid falling demand for paper and prices for wood product and market pulp.¹⁵⁴

Domestic Markets

The wood flooring and forest products sector is an important economic driver in small towns and rural areas of the U.S. Companies in these industry sectors are significant employers in these communities and leverage additional indirect job opportunities as well. Key manufacturers in the wood industry include Andersen, Weyerhaeuser, Shaw, Mohawk, and Armstrong. Most of the wood flooring and forest products industry subsectors are projected to experience slower growth over the next five years compared to the past five years.¹⁵⁵ There is a more positive outlook for new residential construction and remodeling that would help to drive domestic sales of wood flooring and building materials.¹⁵⁶

Global forestry issues are of considerable significance to the United States, which has 5 percent of the Earth's population and consumes an estimated 28 percent of the Earth's industrial wood products. Although domestic timber inventory is only 10 percent of the Earth's total, 96 percent of U.S. consumption of industrial wood comes from domestic supplies.¹⁵⁷

There are currently over 68,000 companies employing more than 126,600 employees in natural resources industries in the U.S.; the largest subsector is logging.¹⁵⁸ 2018-2019

¹⁵⁰ Vault.com. Forestry and Forest Products Industry Trends and Overview. <https://www.vault.com/industries-professions/industries/forestry-and-forest-products>. Accessed December 11, 2019

¹⁵¹ Hetemaki, Lauri and Hurmekoski, Elias. Forest Products Markets under Change: Review and Research Implications. August 20, 2016

¹⁵² United Nations. The North American Forest Sector Outlook Study 2006-2030. 2017

¹⁵³ Moody's. Outlook for the Global Paper and Forest Products Changed to Negative. March 21, 2019

¹⁵⁴ Ibid.

¹⁵⁵ Camoin Associates. Recent and Emerging Trends in Forestry and Lumber. July/August 2019 edition

¹⁵⁶ U.S. Home Builders Association and Catalina Research, 2019

¹⁵⁷ Camoin Associates. Recent and Emerging Trends in Forestry and Lumber. July/August 2019 edition

¹⁵⁸ Ibid.

revenues in natural resources industries totaled \$19.8 billion in the United States. Increasing competition from foreign markets, new products like vinyl plank flooring that looks like wood, and regulations affecting the production of wood laminate flooring will impact the domestic forest product industries. Key export destinations for U.S. forest products are China, Japan, and Canada.¹⁵⁹ Growth in China's middle class has created an increased demand for homebuying and for U.S. wood products. As a result of the trade dispute with China, U.S. hardwood exports to China dropped by \$794 million between June 2018 and June 2019.¹⁶⁰

There were expectations that improvement in new housing starts in 2020 that would lead to increased activity in the forest products industry.¹⁶¹ The impacts of COVID-19 have created challenges for this industry. The global wood products market is expected to decline by almost 3 percent in 2020 from 2019 growth rates.¹⁶² This decline is primarily driven by the economic slowdown globally and measures taken in various countries to try and contain the pandemic.

Working from home has allowed some industry sectors to continue to operate; however, for most of the wood flooring and forest products industry, remote work isn't an option. Although some new residential construction and remodeling work continues, the pace of new starts is significantly slower and problems obtaining some building materials such as plumbing parts have delayed projects in some regions of the country. One bright spot has been an increase in home improvement projects as evidenced by increased sales at Lowe's, Home Depot, and Menards.

In the Freight Alley Core Megaregion, the wood flooring and forest products industry cluster is geographically diverse and less dependent on proximity to interstate highway than the other selected clusters. **Figure 21** provides the location of establishments in this industry cluster with over 200 employees.

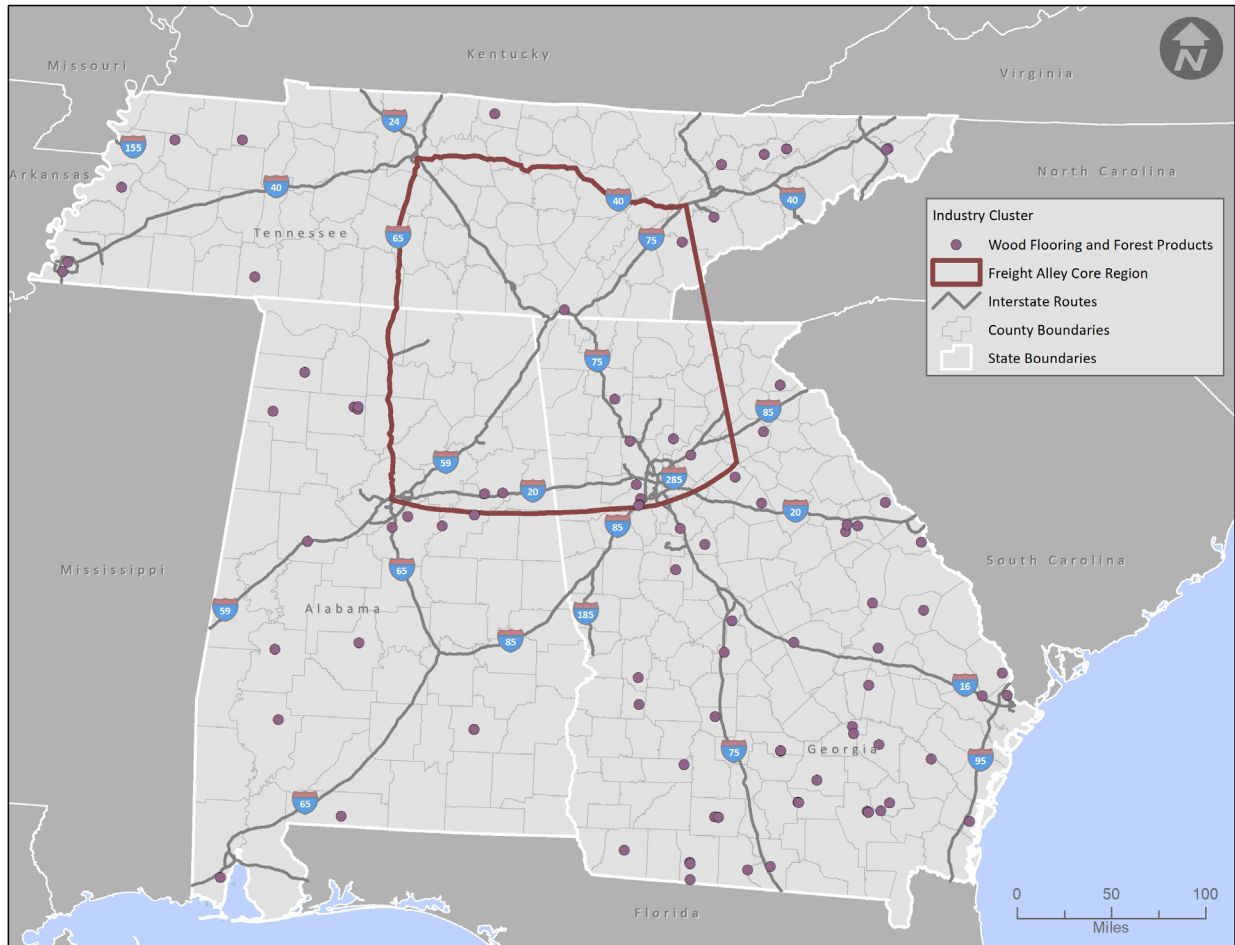
¹⁵⁹ Ibid.

¹⁶⁰ Ibid.

¹⁶¹ Forest2Market. Lumber Demand: What to Expect over the Next Five Years. March 6, 2019

¹⁶² "Wood Product Market with COVID-19 Impact Analysis 2020, Georgia Pacific Corporation, June 2020

Figure 21: Freight Alley Core Megaregion Wood Flooring and Forest Product Manufacturing Business with 200+ Employees



Source: Tennessee Department of Economic Development Center for Economic Research, Center for Logistics Georgia Department of Economic Development, Alabama Department of Transportation Planning Studies Bureau, and CDM Smith, 2020

State Snapshots

Alabama

Alabama has the third largest commercial forest land base in the U.S., trailing only Georgia and Oregon,¹⁶³ with nearly 23 million acres of timberland accounting for 69 percent of the state's total land area.¹⁶⁴ Private landowners own 87 percent of Alabama timberland. Pine plantations are the largest segment, comprising approximately 31 percent of Alabama's timberland.¹⁶⁵

¹⁶³ Alabama Forest Producers. Fact Sheet: Forestry

¹⁶⁴ Economic Development Partnership of Alabama (EDPA). Alabama's Forest Products Industry. 2019

¹⁶⁵ Alabama Forest Producers. Fact Sheet: Forestry

There are more than 650 forest manufacturing companies employing nearly 26,000 people and \$16.3 billion of Alabama forest products exported in 2016.¹⁶⁶ The top forest products include pulp and paper products industries that generated an estimated \$8.8 billion of products, followed by lumber and wood products industries, furniture, and other secondary wood industries.¹⁶⁷ The forestry industry accounts for 20 percent of the manufacturing jobs in Alabama.¹⁶⁸

Alabama's forest industry continues to attract new capital investment. During 2018, 54 new or expansion investments were announced generating \$1.3 billion in new investments in the state.¹⁶⁹ Alabama's wood flooring and forest products establishments with over 200 employees are shown in **Figure 22**. Recent development projects in this industry cluster are listed in **Table 29**.

Some of Alabama's largest forest product companies include:

- Boise Cascade
- Georgia Pacific
- International Paper
- Cascades Sonoco
- WestRock
- Kronospan
- Brown-Forman Cooperage
- Louisiana-Pacific
- Weyerhaeuser

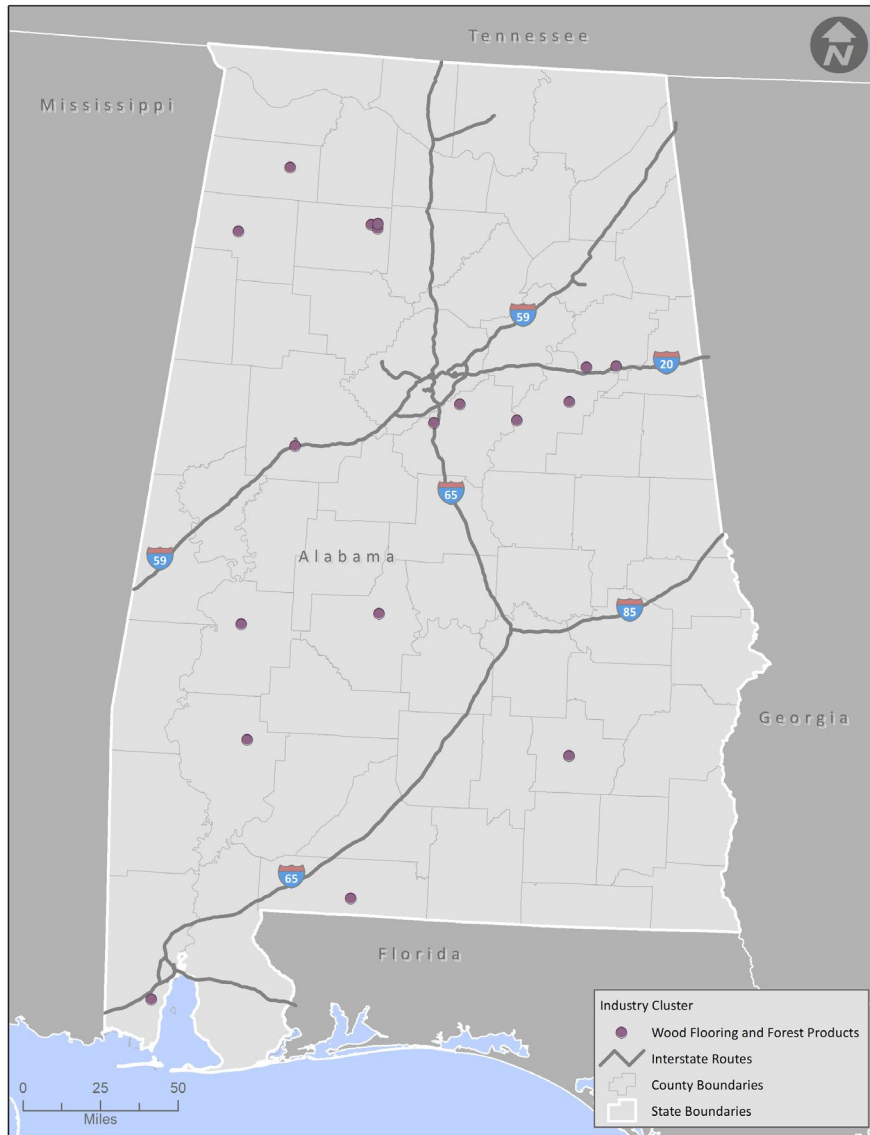
¹⁶⁶ Economic Development Partnership of Alabama (EDPA). Alabama's Forest Products Industry. 2019

¹⁶⁷ Ibid.

¹⁶⁸ Ibid.

¹⁶⁹ Ibid.

Figure 22: Alabama's Wood Flooring and Forest Product Manufacturing Companies with 200+ Employees



Source: Alabama Department of Transportation Planning Studies Bureau, 2019

Table 29: Recent Alabama Wood Flooring and Forest Product Manufacturing Projects

Company	Jobs	Investment	County
Enviva	85	\$175 million	Sumter
KyKenKee Inc.	70	\$28.2 million	Tuscaloosa
Zilkha Biomass Selma	63	\$20 million	Dallas
Essity	10	\$9.2 million	Colbert
Overseas Hardwoods Company, Inc	21	\$2.3 million	Baldwin

Source: Economic Development Partnership of Alabama, Alabama's Forest Products Industry, 2020

Georgia

Georgia has one of the most important forestry sectors in the U.S. with 24.4 million acres of forest land, more than any other state. The Georgia forests are home to approximately 250 tree species available for timber production and over 90 percent of forestland is privately owned.¹⁷⁰ The forestry industry provides \$3.8 billion in salaries and employs 148,000 people.¹⁷¹ **Figure 23** illustrates the distribution of wood flooring and forest product businesses across the state.

Georgia's commercial timberlands grow 19 million tons more wood each year than is harvested, resulting in growth exceeding removals by 38 percent.¹⁷² Within Georgia, the forestry industry continues to grow and expand as highlighted by the recent new mill construction and expansions. In 2018, Georgia Pacific began construction on a \$135 million-dimensional lumber mill in Warrenton. The state-of-the-art plant is 340,000 square feet. Canfor, a Canadian based lumber manufacturer, also began development of a \$120 million sawmill in Washington. Canfor acquired two lumber mills in Moultrie and Thomasville and announced a \$28 million expansion to the Moultrie mill.¹⁷³

Interfor, a forest products company, has acquired seven mills in Georgia since 2013 and moved its Southern Regional Headquarters to Peachtree City. The company has invested nearly \$500 million in Georgia in the past seven years.¹⁷⁴ Graphic Packaging, a pulp and paper company headquartered in Sandy Springs, GA, announced last year that it would invest \$136 million to modernize its Macon Mill and retain 460 manufacturing jobs. In 2019, West Fraser, a British Columbia company, bought three softwood lumber mills from the Gilman Foundation investing \$430 million in the state.¹⁷⁵

¹⁷⁰ Price, Karsen. Georgia Forestry Industry is Seeing the Wood for the Trees. October 6, 2016

¹⁷¹ All on Georgia. Forest Industry Continues to Boost Georgia Economy. December 18, 2019

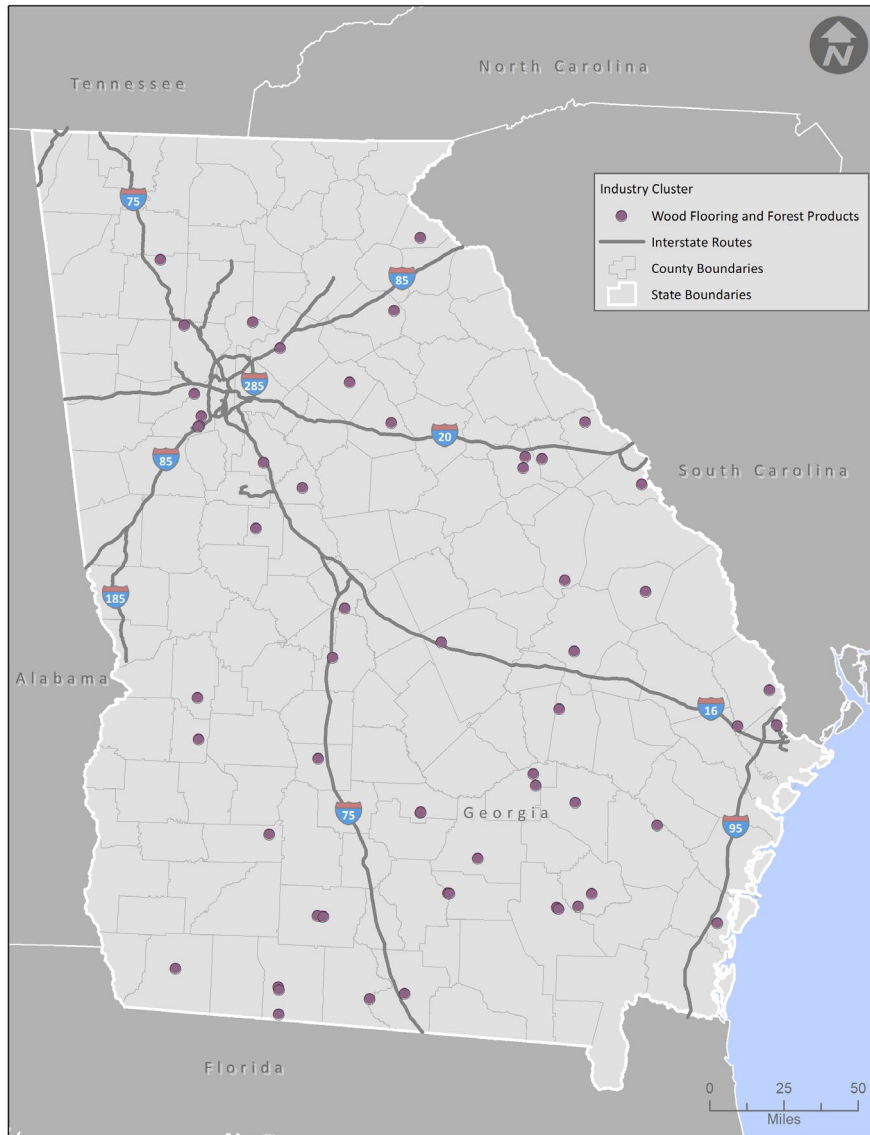
¹⁷² Ibid.

¹⁷³ Villages, Andres. Georgia's Working Forestry Industry Benefits "Both Georgias". March 24, 2018

¹⁷⁴ Ibid.

¹⁷⁵ "Georgia's Working Forest Industry Benefits Both Georgia's", Andres Willages, March 24, 2018

Figure 23: Georgia's Wood Flooring and Forest Product Manufacturing Companies with 200+ Employees



Source: Georgia Department of Economic Development Center for Logistics, 2020

Tennessee

Forests cover 52 percent of Tennessee with over 120 different tree species.¹⁷⁶ Those 14 million acres produce wood products, create jobs, and generate exports, which make the forest industry nearly \$13 billion business in Tennessee.¹⁷⁷ Secondary products, such as flooring, cabinetry, manufactured homes, and paperboard, add to the economic impact of the forestry industry, as does the \$2.5 billion in wages paid to the nearly 42,300 Tennesseans who work in the industry.¹⁷⁸ **Figure 24** provides the location of major employers in the wood flooring and forest products industry in Tennessee. Hardwood flooring employs 29,500 across Tennessee.¹⁷⁹ In 2017, the top forest product exports from Tennessee included oak lumber, hardwood lumber, wooden casks, and ash lumber. The top export markets for the state's forest products were China, Canada, Mexico, Vietnam, and Italy.¹⁸⁰

¹⁷⁶ "Tennessee Ag and Forestry Stats 2019, Agri-Industry Modeling and Analysis Group (AIM-AG)

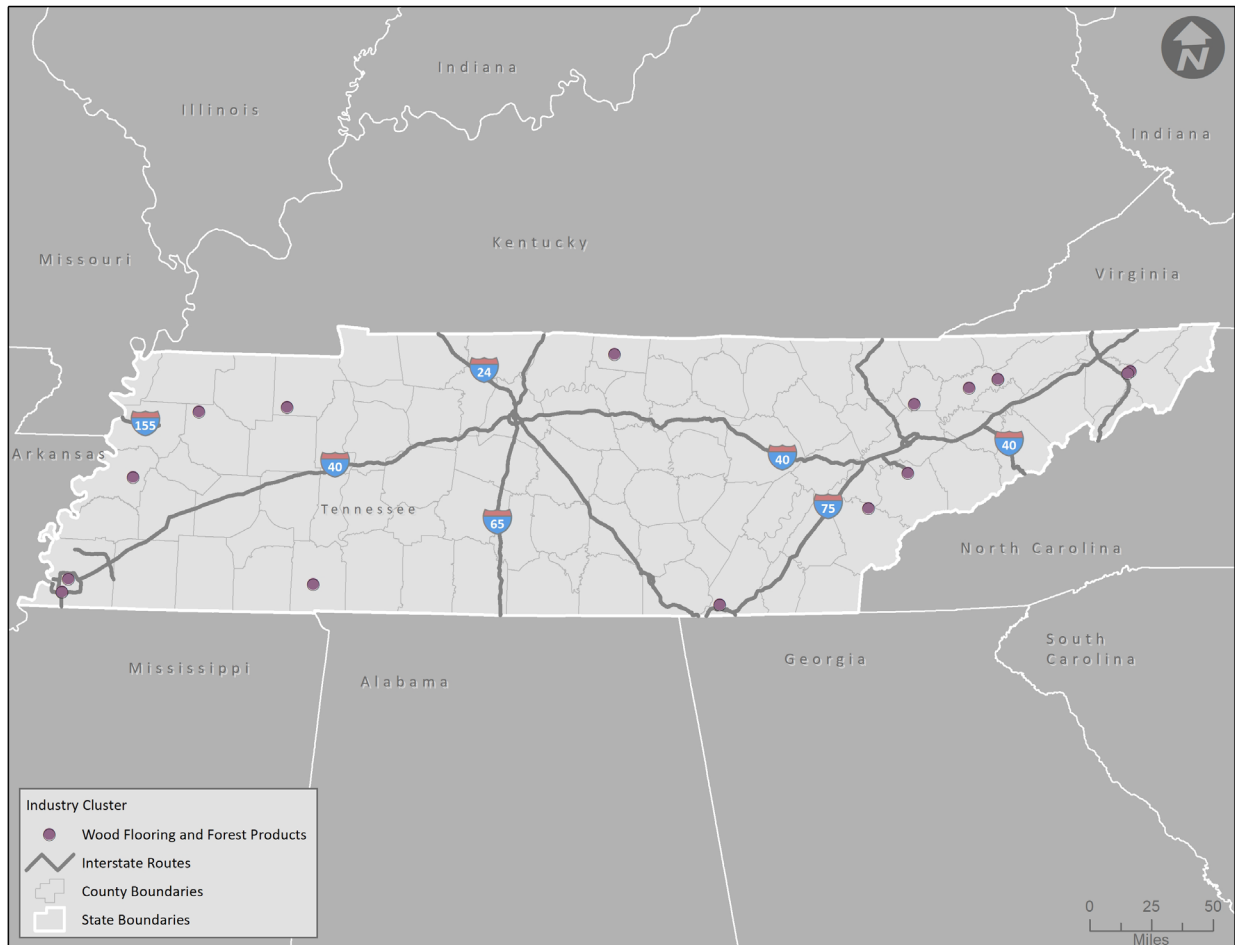
¹⁷⁷ Lockman, Cathy. Forestry Industry Stands Tall in Tennessee Economy. March 1, 2012

¹⁷⁸ Ibid.

¹⁷⁹ Agri-Industry Modeling and Analysis Group (AIM-AG). Tennessee Ag and Forestry Stats. 2019

¹⁸⁰ "Tennessee Ag and Forestry Stats 2019, Agri-Industry Modeling and Analysis Group (AIM-AG)

Figure 24: Tennessee Wood Flooring and Forest Product Manufacturing Companies with 200+ Employees



Source: Tennessee Department of Economic Development, Center for Economic Research, 2019

The vast majority (89 percent) of Tennessee’s forests are made up of hardwood species (such as oak, hickory, maple, ash, and tulip poplar). A smaller percentage is softwood (including loblolly pine, Virginia pine, red cedar, and shortleaf pine¹⁸¹) that is mostly used for construction and paper making. Tennessee timber is known for its quality, color, and texture.¹⁸² Tennessee produces more than 800 million board feet of hardwood lumber each year, ranking second in the nation for hardwood and lumber production.¹⁸³

Wood manufacturing is an important industry in Tennessee. Primary manufacturers include sawmills, commercial logging, pulp, and papermills; secondary manufacturers make wood flooring, wood furniture, manufactured homes, paperboard, molding, and other wood products.¹⁸⁴ The Tennessee Department of Agriculture credits the success of the forest product industry to the state’s major highways, rail systems, and access to ocean ports, as

¹⁸¹ Agri-Industry Modeling and Analysis Group (AIM-AG). Tennessee Ag and Forestry Stats. 2019

¹⁸² “Let’s Talk Tennessee Timber”, Jessica Mozo, March 25, 2015

¹⁸³ Ibid.

¹⁸⁴ Ibid.

well as the high quality hardwoods harvested in the state. Total forest product exports from the state are valued at \$740 million annually.

Emerging Trends

Population growth and construction are two primary drivers of the demand for wood flooring and forest products. According to the Chief Economist with the National Association of Home Builders (NAHB), nearly 4.2 million new single-family homes and 1.8 million new multi-family units were constructed in the U.S. from 2016 to 2020.¹⁸⁵ Within the NAHB South Atlantic and East South Central Regions, 456,702 new single-family and multi-family units were constructed in 2019, a 14 percent year-to-date increase in the East South Central Region (includes TN and AL) and a 10 percent year-to-date decrease in the South Atlantic Region (includes GA). However, 80 percent of the residential construction in both regions occurred in the South Atlantic. In Alabama, Georgia, and Tennessee, there were 110,654 new residential units constructed in 2019.¹⁸⁶ The NAHB economists project an additional 1.9 million new single-family and multi-family units to be constructed nationally from 2021 through 2022.

Emerging Opportunities

One of the most profound opportunities for the forestry industry lies in the emerging bioenergy industry, where Georgia is considered a leader.¹⁸⁷ By separating wood into its chemical components, new technologies are being utilized to create biofuels, biochemicals, and bio-materials as alternatives to petroleum-based products. The new technologies enable the industry to maximize the use of and minimize the waste of wood being harvested. These technologies will allow the industry to achieve greater production scale and overcome cost disadvantages when compared to their petroleum-based competitors.¹⁸⁸ Wood products face increasingly stiff competition from plastics and other wood substitutes. Combining wood with other materials to form composite materials and engineered wood products is also advancing in the market. This includes laminated veneer lumber which is multiple thin wood layers combined with adhesives to create a more structurally reliable building material.

Additional opportunities in the forest and lumber industry includes the use of GIS mapping, satellite imaging, big data, 3-D simulation, and digitalization of the supply chain to manage forests, harvest lumber, produce products, and ship to end users. This presents tremendous opportunity for both sustainability as well as increased efficiency and productivity.¹⁸⁹

¹⁸⁵ National Association of Home Builders 2020-2022 Forecast, “Housing and Interest Rate Forecast”, June 4, 2020

¹⁸⁶ “Building Permits by State and MSA through 4/30/20”, U.S. Census

¹⁸⁷ Georgia Forestry Commission. “How Does Forestry Impact Georgia?” <https://gfgrow.org/about/numberone/>. Accessed December 27, 2019

¹⁸⁸ Camoin Associates. Recent and Emerging Trends in Forestry and Lumber. July/August 2019 edition

¹⁸⁹ Ibid.

TRUCKING AND LOGISTICS INDUSTRY

The four industry sectors discussed above are freight-dependent, as they require the movement of raw materials and finished products as an integral part of their operation. The trucking and logistics industry is freight-dependent in a difference sense. The industry provides services to arrange for the movement of freight for other parties. There are no raw materials or finished products associated with the industry. Businesses in this sector include trucking companies, logistics services, air cargo services, railroads, ocean and river barge or container services, and multimodal third-party logistics services.

Global Markets

At the close of 2017, U.S. businesses had spent \$1.5 trillion on shipping and costs for transportation and logistics continued to increase into 2018.¹⁹⁰ Rising e-commerce sales grew more than 15.5 percent driving up delivery costs and shifting logistics resources away from traditional delivery operations. As capacity became more constrained, prices continued to rise, and the ongoing truck driver shortage left motor carriers turning down business due to the lack of qualified drivers. Globally, ocean cargo container costs in 2018 continued to increase with some carriers adding “emergency surcharges” to help cover fuel cost increases.¹⁹¹



The global transportation industry is dependent on international trade and a positive global economic environment. Global transportation and logistics realized nearly \$140 billion of investment, an increase of 19 percent over 2018.¹⁹² Supply chain and logistics services continue to expand into a broader array of services, integrating information, transportation, inventory, warehousing, material handling, packaging, and security. The global logistics industry has grown significantly as logistics has become an important part of the business economic model in recent years. The logistics industry has transformed from a service provider to an end-to-end supply chain solutions provider to serve the needs of their customers.

The Asia-Pacific region accounts for the largest share of the global logistics market followed by North America and Europe. Asia-Pacific is expected to grow at the highest CAGR through 2023.¹⁹³ This region’s growing imports/exports and demand for logistics services support economic growth and urbanization within this region. China, Japan, India, Australia, and Indonesia make up the major markets of the Asia-Pacific region. Of these, China is by far the largest given its significant population and large manufacturing base.

¹⁹⁰ “Companies Spent \$1.5 Trillion on Shipping in 2017”, WSA Logistics Report, Wall Street Journal, June 19, 2018

¹⁹¹ “29th Annual State of Logistics Report”, Logistics Management, 2019

¹⁹² “Global Transportation and Logistics deals insight 2019 recap and 2020 outlook”, PricewaterhouseCoopers, Transportation -Logistics, 2019

¹⁹³ Market Research Future. Global Logistics Market Research Report – Forecast 2023

<https://www.marketresearchfuture.com/reports/logistics-market-5076>. Accessed January 2020

Total revenue for the top global transportation firms increased by 9.2 percent from 2018 to 2019 to \$815 billion.¹⁹⁴ Revenues were driven by a strong global economy, anticipation of a potential trade war between the U.S. and China, and threats of tariffs.¹⁹⁵ As a result many cargo owners chose to increase shipments anticipating impacts for both exports and imports from China building up inventories in advance of tariffs.

Domestic Markets

Trucking

As shown in **Figure 25**, business establishments in trucking and logistics tend to be located along interstate corridors with higher concentrations in urbanized areas. Regional fleet managers remain concerned about the availability of experienced drivers and safety and security.¹⁹⁶ There was agreement among regional fleet managers surveyed by Thrive Regional Partnership that the future of the trucking industry was evolving primarily due to population growth and job growth regionally and the resulting demand for freight and logistics services. Nationally, population in the U.S. is expected to increase by 79 million people over the next 40 years from 326 million to 404 million people.¹⁹⁷ Growth trends will not be uniform across the country, with more significant population growth in several megaregions in the Southeast, Mountain West, and the West Coast. According to a recent study from the Transportation Research Board, *Critical Issues in Transportation 2019*, “Megaregions are emerging as the engines of the national economy.” Unfortunately, the job and population growth in megaregions also helps to drive increases in traffic congestion, reducing reliability for deliveries, and increasing fuel consumption and emissions.¹⁹⁸



¹⁹⁴ Armstrong & Armstrong Logistics Research Firm, 2019

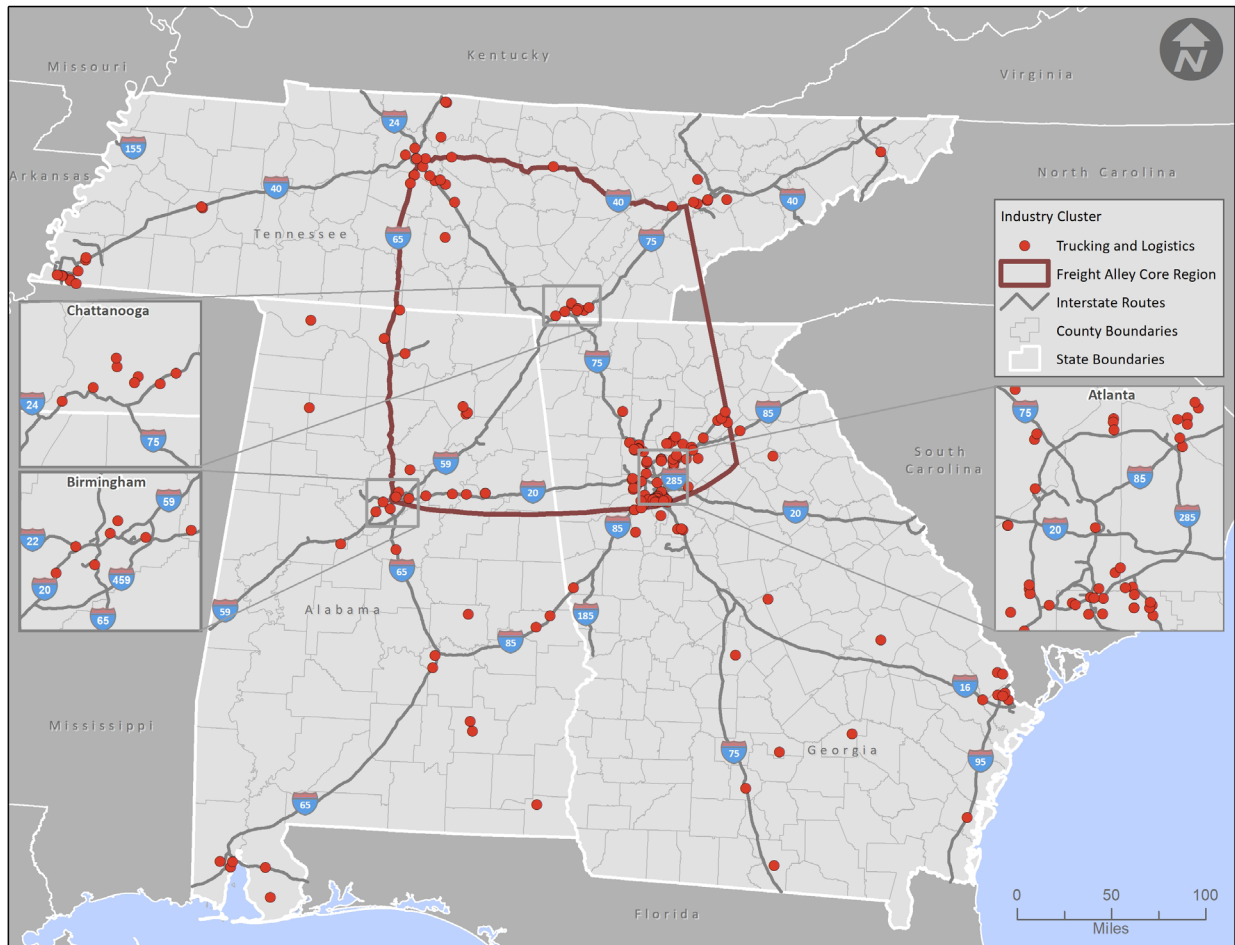
¹⁹⁵ Mark D'Amico, Senior Analyst SJ Consulting Group, revenue study prepared for JOC.Com

¹⁹⁶ Discussions with private industry representatives at Thrive Partnership Mobility Committee meetings and discussions with regional trucking and logistics managers, 2019 and 2020

¹⁹⁷ “Population Projections 2020 – 2060”, U.S. Census Bureau, 2019

¹⁹⁸ *Critical Issues in Transportation 2019*, Transportation Research Board National Academy of Science, pg. 9, 2019

Figure 25: Freight Alley Core Megaregion Trucking and Logistics Operations with 300+ Employees



Source: Tennessee Department of Economic Development Center for Economic Research, Center for Logistics Georgia Department of Economic Development, Alabama Department of Transportation Planning Studies Bureau, and CDM Smith, 2020

The overall freight tonnage in the U.S. is projected to grow from 16 billion tons in 2019 to nearly 21 billion tons by 2030, an increase 25.6 percent.¹⁹⁹ Trucking’s share of total freight tonnage is projected to reach 69 percent in 2030 down from 71 percent in 2019. Freight growth is the result of a strong economy, increased international trade, and evolving business models that reflect changing consumer expectation for quicker deliveries of more frequent packages. Projections indicate that from 2016 to 2045 truck freight movements in the U.S. will increase by 91 percent by value and 41 percent by weight. Many factors will affect the industry’s ability to manage this growth: availability of qualified truck drivers, condition of highway infrastructure, highway congestion, and rising costs including insurance, fuel, and labor.

¹⁹⁹ Berman, Jeff. Logistics Management. ATA’s “Freight Transportation Forecast” Provides Positive Overview for Trucking’s Future. August 26, 2019

Rail

Moody's Investors Service downgraded its outlook for the North American freight rail industry from stable to negative based on the expectations that overall freight volumes could fall up to 3 percent over the next 12 to 18 months.²⁰⁰ Moody's also forecasted that coal and intermodal shipments would decline in 2020. Intermodal shipments do not provide any relief, with forecasts to be flat or fall by 2.5 percent in 2020.²⁰¹ Coal shipments could decline faster than the recent 9 percent downturn and reach the low teens in 2020 because of falling thermal coal demand from U.S. utilities averaging about 7 percent per year over the next 10 years.²⁰²



Coal is not the only commodity moved by rail facing a serious downturn. There is uncertainty in grain export markets, problems in the steel sector, and falling sand shipments are forecast to influence rail volume declines in 2020, although petroleum products and chemicals are expected to see some growth.

Air Cargo

Looking ahead to 2020, the IATA is optimistic about a modest air cargo recovery as a result of better domestic and world economic trends. GDP is forecast to expand by 2.7 percent in 2020. Global trade is expected to reach 3.3 percent, up from 0.9 percent in 2019, as U.S. election year pressures reduced trade tensions.²⁰³



IATA projects freight volumes are expected to increase by 2 percent year over year in 2020 to reach 62.4 million tons following a 2019 decline to 61.2 million tons.²⁰⁴ IATA warned that air cargo yields will continue to slide for a third straight year with a 3 percent decline forecast for 2020 (an improvement from the 5 percent decline in 2019). 2020 revenues are expected to total \$101.2 billion.²⁰⁵

COVID-19 and Freight and Logistics

When the COVID-19 pandemic initially began, units of government implemented various measures in an effort to limit the spread of the virus. Some businesses were forced to cut back production, and many service businesses were forced to close, but the freight industry was identified as an essential service. In the face of unknown health risks, the freight industry kept America going and helped to keep the fear of absolute collapse at bay. There was food on most shelves most of the time. Medicines and medical equipment were moved, and temporary hospital facilities were shipped to various destinations to meet critical needs. The freight industry worked overtime to deliver materials and goods to businesses that were

²⁰⁰ Marsh, Joanna. Freightwaves. Moody's lowers Freight Rail Industry Outlook to Negative for 2020. November 4, 2019

²⁰¹ Ibid.

²⁰² Ibid.

²⁰³ CEP-Research. "Air Cargo Volumes Could Bounce Back at Lower Prices in 2020", <https://www.cep-research.com/news/air-cargo-volumes-could-bounce-back-at-lower-prices-in-2020>. December 12, 2019

²⁰⁴ Marsh, Joanna. Freightwaves. Moody's lowers Freight Rail Industry Outlook to Negative for 2020. November 4, 2019

²⁰⁵ Ibid.

still in operation and make sure consumers had those precious paper products that seemed in constant short supply for a few weeks.

While there was a 46 percent drop in national personal VMT in the early months of the pandemic, freight movement fell only 13 percent. Commercial trucking remained resilient during COVID-19 and continues to be a key component of the efforts to recover economically and medically.²⁰⁶ These are difficult times for freight and logistics. U.S. gross domestic product declined by 1.2 percent in the first quarter of 2020 and unemployment rose to nearly 15 percent in April. The rule of thumb that freight growth tracks economic growth after a crisis, as it did following the 2009 recession, isn't always the case. Recently findings from the ATRI include the following:²⁰⁷

- Long-haul trips are down significantly as container imports at ports dry up.
- Also, 50 percent of survey respondents described freight levels as “somewhat” to “much” lower due to COVID.
- Almost 70 percent of specialized and tank truck operations were negatively impacted.
- More than 40 percent of respondents said that truck parking was not any worse due to COVID, but by fleet size, the larger fleets did describe truck parking as more difficult to find during the pandemic.

State Snapshots

Alabama

Alabama is home to six interstates (I-10, I-20, I-22, I-59, I-65, I-85), providing roughly 1,000 interstate miles on which to move goods across the state and nation.²⁰⁸ Trucking is a dominant mode for freight transport across Alabama, with 86 percent of Alabama communities dependent solely on trucks to move freight.²⁰⁹ **Figure 26** illustrates the location of major trucking and logistics employers in Alabama.

Alabama's trucking industry supports 104,060 jobs at the 10,120 trucking companies located in the state.²¹⁰ The Economic Development Partnership of Alabama indicates the wholesale industry (NAICS 42) accounted for nearly 74,000 jobs at 9,756 businesses while the transportation and warehousing industry (NAICS 48-49) accounted for nearly 59,000 jobs at nearly 4,000 businesses in 2018.²¹¹

²⁰⁶ “COVID-19s Impact on Freight”, Bob Pishue, Transportation Analyst, INRIX, April 2020

²⁰⁷ “Joint Research Confirms COVID-19 Impact on Trucking”, ATRI and OOIDA, May 2020

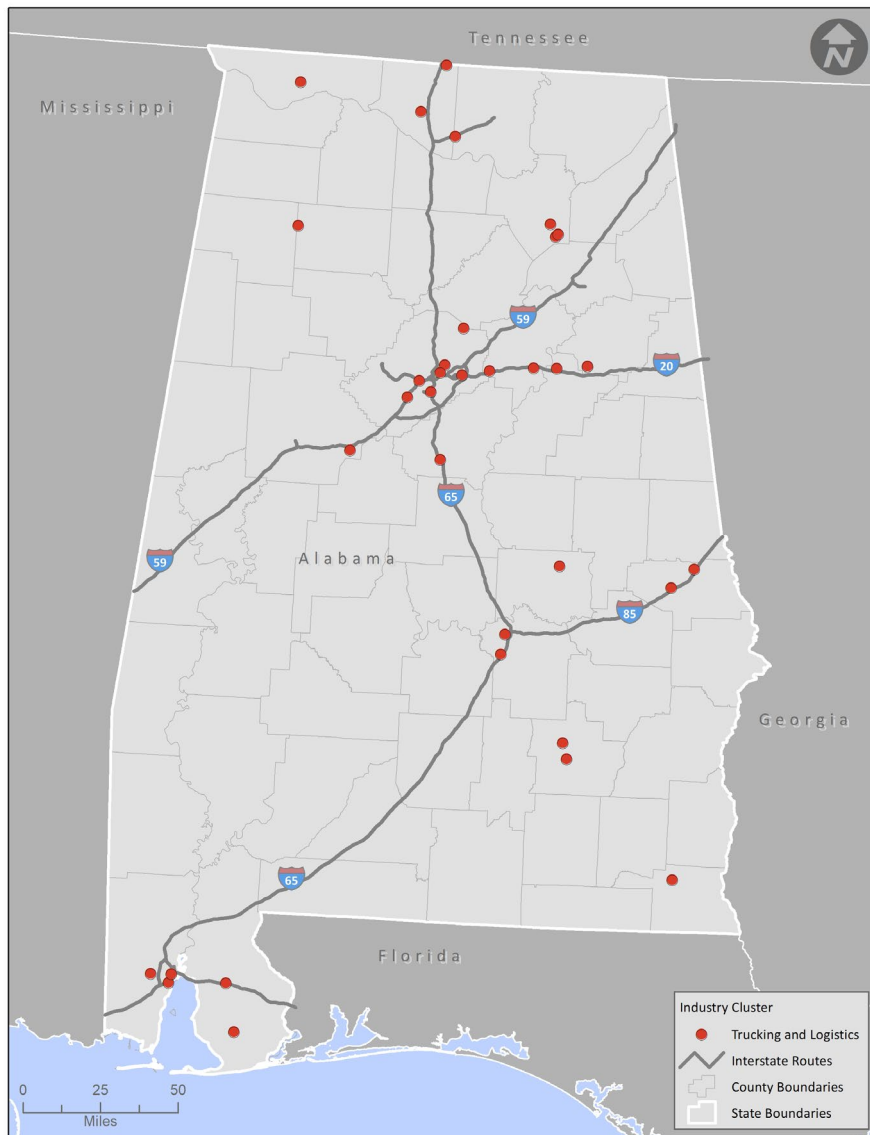
²⁰⁸ Alabama Department of Transportation. 2017 Alabama Statewide Freight Plan. 2017

²⁰⁹ Arab Cartage and Express. Alabama Trucking Industry Fast Facts. ac-an.com/alabama-trucking-industry-fast-facts/. December 4, 2017

²¹⁰ Ibid.

²¹¹ Economic Development Partnership of Alabama. Alabama's Distribution, Logistics & Transportation Industry. 2018

Figure 26: Alabama Trucking and Logistics Operations with 300+ Employees



Source: Alabama Department of Transportation Planning Studies Bureau, 2019

Rail

There are nearly 4,000 freight rail miles streaming across Alabama from 28 railroads. Five Class I railroads serve the state: BNSF Railway (BNSF), Canadian National Railway (CN), CSX Transportation (CSX), Norfolk Southern Railway (NS), and Kansas City Southern (KCS). KCS does not own track in Alabama but has access via leasing and trackage rights agreements. The Class I railroads account for 72 percent of rail track.²¹²

²¹² Alabama Department of Transportation. 2017 Alabama Statewide Freight Plan. 2017

Inland Waterways

Alabama's navigable waterways provide water access to 23 states through 15,000 miles of inland waterways.²¹³ The Port of Mobile is the most significant freight facility in Alabama. Alabama has 18 other river ports and the Alabama State Port Authority operates 11 of these facilities.²¹⁴ Outside of the Port of Mobile, navigable waterways in Alabama can be found on the Mobile River, the Tombigbee River, the Alabama River, the Black Warrior River, the Tennessee-Tombigbee Waterway, and the Tennessee River. Alabama is home to Parker Towing Company, one of the largest barge lines in the Southeast.

Aviation

Although air cargo is a small portion of freight moved in Alabama, it occurs at the five major airports across the state including: Birmingham, Huntsville, Mobile, Montgomery, and Tuscaloosa.

Intermodal Container Terminals

Facilitating freight movement in Alabama are several intermodal container facilities supporting truck/rail, rail/water, and water/truck transfers. The major facilities include:

- Norfolk Southern's Birmingham Regional Intermodal Facility (McCalla) is adjacent to the Jefferson Metropolitan Logistics Park and is a critical piece of Norfolk Southern's multi-state Crescent Corridor initiative.
- CSX's Central Alabama Intermodal Container Transfer Facility (Bessemer) is an intermodal container transfer facility, with service to international customers via the Atlantic Ocean ports of Charleston and Savannah.
- Port of Huntsville (International Intermodal Center) includes Huntsville International Airport, International Intermodal Center, and Jetplex Industrial Park. This operation is a U.S. Customs and Border Protection Port of Entry.
- The Port of Mobile is served by five Class 1 railroads CN, CSX, BNSF, NS and KCS and 2 short-line railroads.
- Port of Mobile's APM Terminal was opened in 2008 and is served by four ship-to-shore gantry cranes and near-dock rail service on the Canadian National Railroad.
- Port of Mobile's Intermodal Container Transfer Facility at Garrows Bend opened in 2016 and has three wide-span gantry cranes and on-dock rail.
- The Port of Mobile's cargo handling area is over 5 million square feet and provides 3 roll-on-roll-off (RO-RO) terminals, a grain elevator, a freezer/refrigerated cargo terminal, heavy lift terminals, and a 900T barge-

²¹³ Ibid.

²¹⁴ Ibid.

mounted heavy-lift crane capable of lifting 400 tons from the center of a Panamax ship.

Marine Transportation

The Port of Mobile is a 4,000-acre deep-water port with immediate access to two interstates, three Class I railroads, inland waterways, and a rail ferry operated by Genesee & Wyoming between Port of Mobile and Coatzacoalcos, Mexico. In 2019, the Port handled almost 417,000 twenty-foot equivalent units (TEUs), 26 million tons of freight, and over 164,000 rail cars.²¹⁵

Georgia

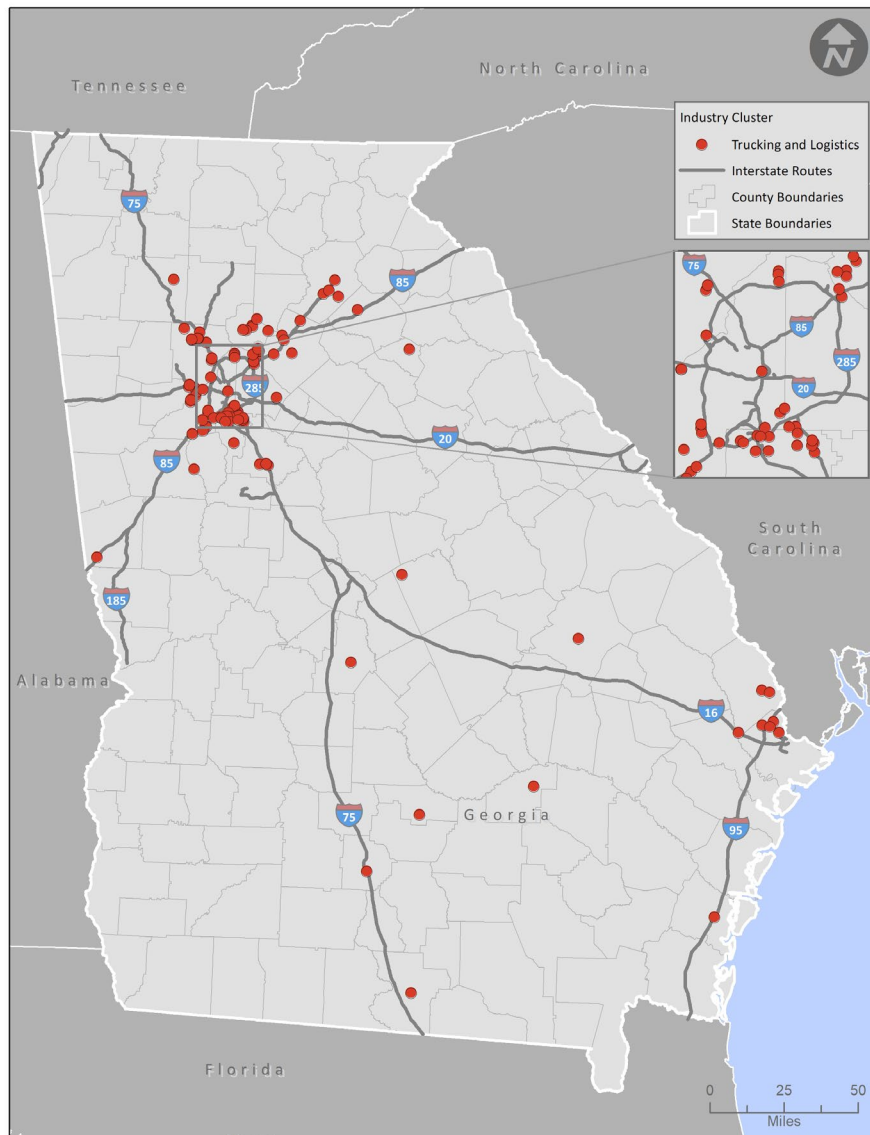
In a typical week in 2020, 5.9 million tons of freight move across Georgia's 1,200 mile of interstate highways on I-75, I-85, I-95, and I-20 and on 20,000 miles of federal and state highways that serve the state's freight and logistics industry.²¹⁶ 85 percent of the world's top third party logistics firms operate in Georgia and 80 percent of the U.S. market is within a 2-hour flight or a 2-day truck drive. The freight that moves along Georgia's highways is valued at \$620 billion annually.²¹⁷ A map of the state's trucking and logistics operations with more than 300 employees is shown on **Figure 27**.

²¹⁵ Alabama State Port Authority. Port Facts. <http://www.asdd.com/portfacts.html>. Accessed October 2020.

²¹⁶ "Logistics Gateway to the World", Georgia Department of Economic Development, 2020

²¹⁷ Ibid.

Figure 27: Georgia Trucking and Logistics Operations with 300+ Employees



Source: Georgia Department of Economic Development Center for Logistics, 2020

Rail

Georgia has over 4,600 freight rail miles across the state. There are two Class I railroads in Georgia: CSX and NS. NS has 4,585 employees and 1,778 rail miles while CSX has 2,750 employees and 1,621 rail miles in Georgia.²¹⁸ When fully completed, the Port of Savannah's Mason Mega Rail facility will be the largest on-dock intermodal rail terminal at any North American port authority.²¹⁹

²¹⁸ Georgia Department of Transportation, Office of Planning. Georgia Statewide Freight and Logistics Plan: Rail Freight Modal Profile

²¹⁹ Georgia Ports Authority, <https://gaports.com/rail/megarail/>, Accessed October 2020.

Ports

The Port of Savannah is the fastest growing container port in the U.S. and the state's two deep-water ports in Savannah and Brunswick are gateways to the world and some of the busiest ocean ports in the U.S. Two high-speed truck routes run from the Port of Savannah terminal to I-95 and I-16 providing access to Atlanta and beyond and the eastern seaboard. Georgia's two Class 1 railroads, NS and CSX, are located on the terminal.

In 2023, the GPA will complete a major project to deepen the river to the Port of Savannah from 42 feet to 47 feet to accommodate large, new Panamax cargo ships. This project is expected to save Georgia businesses an estimated \$174 million annually. Georgia ports support more than 369,000 jobs and provide \$20.4 billion in income.²²⁰

Air Cargo

Georgia has three airports that handle air cargo including Hartsfield-Jackson Atlanta International, Savannah Hilton Head international, and Southwest Georgia Regional.²²¹ Hartsfield represents 95 percent of Georgia air cargo, with 3 cargo complexes with more than 2 million square feet of warehousing and the only USDA approved on-terminal perishables complex in the Southeast. The Hartsfield cargo operation also has an on-site foreign trade zone.²²²

Intermodal

The State's rail intermodal terminals are clustered primarily in the Atlanta and Savannah areas. In the Atlanta area, NS maintains intermodal facilities at Austell, East Point, and Inman Yard and CSX operates intermodal terminals at Fairburn Yard and Hulsey Yard in southeast Atlanta. Together, the Atlanta area completes more than 900,000 lifts annually at the NS and CSX Intermodal facilities.²²³ Intermodal facilities in the Savannah area primarily serve port traffic and include the Mason Intermodal Container Transfer Facility (ICTF) served by NS, the Chatham ICTF served by CSX, the NS Dillard Yard, and the CSX Savannah Yard. Currently, roughly 20 percent of container volumes at the Port of Savannah are moved by rail.²²⁴

GPA recently opened the Appalachian Regional Port, a GPA and CSX intermodal cargo operation located east of I-75 near Dalton. This facility provides direct rail services to Savannah and diverts some truck traffic away from Atlanta and onto rail, providing a number of environmental and economic benefits. Another inland port facility providing NS rail service from the Port of Savannah is being developed near Gainesville and will open in 2021.

²²⁰ Georgia Department of Economic Development. Logistics Your Gateway to the World

²²¹ Georgia Department of Transportation, Office of Planning. Georgia Statewide Freight and Logistics Plan: Air Freight Modal Profile

²²² Georgia Department of Economic Development. "Logistics Your Gateway to the World" <https://online.flowpaper.com/79590748/LogisticsBrochure/>. Accessed December 2019

²²³ Georgia Department of Transportation, Office of Planning. Georgia Statewide Freight and Logistics Plan: Rail Freight Modal Profile

²²⁴ Ibid.

Tennessee

Transportation and logistics is one of Tennessee's largest industrial clusters with more than 220,000 employees working around the state. Tennessee is served by an outstanding transportation network with a number of key interstates that cross the state, including I-40, I-65, I-75, I-24, I-26 and I-81, with a total of 1,182 miles of interstate in Tennessee.²²⁵

Tennessee ranks sixth in the nation for employment in truck transportation and 10th for warehousing and storage employment.²²⁶ Tennessee businesses employ more than 265,000 people in the transportation, logistics, and distribution industry according to the Tennessee Department of Economic and Community Development. The trucking industry accounts for more than 180,000 jobs, including nearly 75,000 truck drivers.²²⁷ **Figure 28** presents the location of trucking and logistics operations in Tennessee with more than 300 employees.

Memphis is home to Federal Express, and the Memphis International Airport is the busiest air cargo airport in North America and the second busiest in the world behind the Hong Kong Airport.²²⁸ Businesses in this industrial cluster realized revenues over \$16.6 billion in 2017.²²⁹ In 2018, average wages in Tennessee for General Freight Trucking was \$60,912, the highest in the Southeast and almost \$10,000 greater than the national average.²³⁰

Rail

The Tennessee rail system contains nearly 3,780 track miles throughout the state. The Class I railroads own 2,768 track miles (73.2 percent) of the total track mileage in the state. The six Class I railroads serving the state include BNSF, CN, CSX, NS, UP, and KCS.²³¹

²²⁵ Tennessee Department of Transportation. Tennessee Statewide Multimodal Freight Plan. February 27, 2018

²²⁶ East Tennessee EDA. Distribution and Logistics. <https://www.eteda.org/business-sectors/distribution-and-logistics/>. December 12, 2019

²²⁷ McElroy, Jack. USA Today. "10 ways transport industry had Tennessee on a roll" <https://www.knoxnews.com/story/money/business/journal/2017/06/05/10-ways-transportation-industry-has-tennessee-roll/337385001/>. June 5, 2017

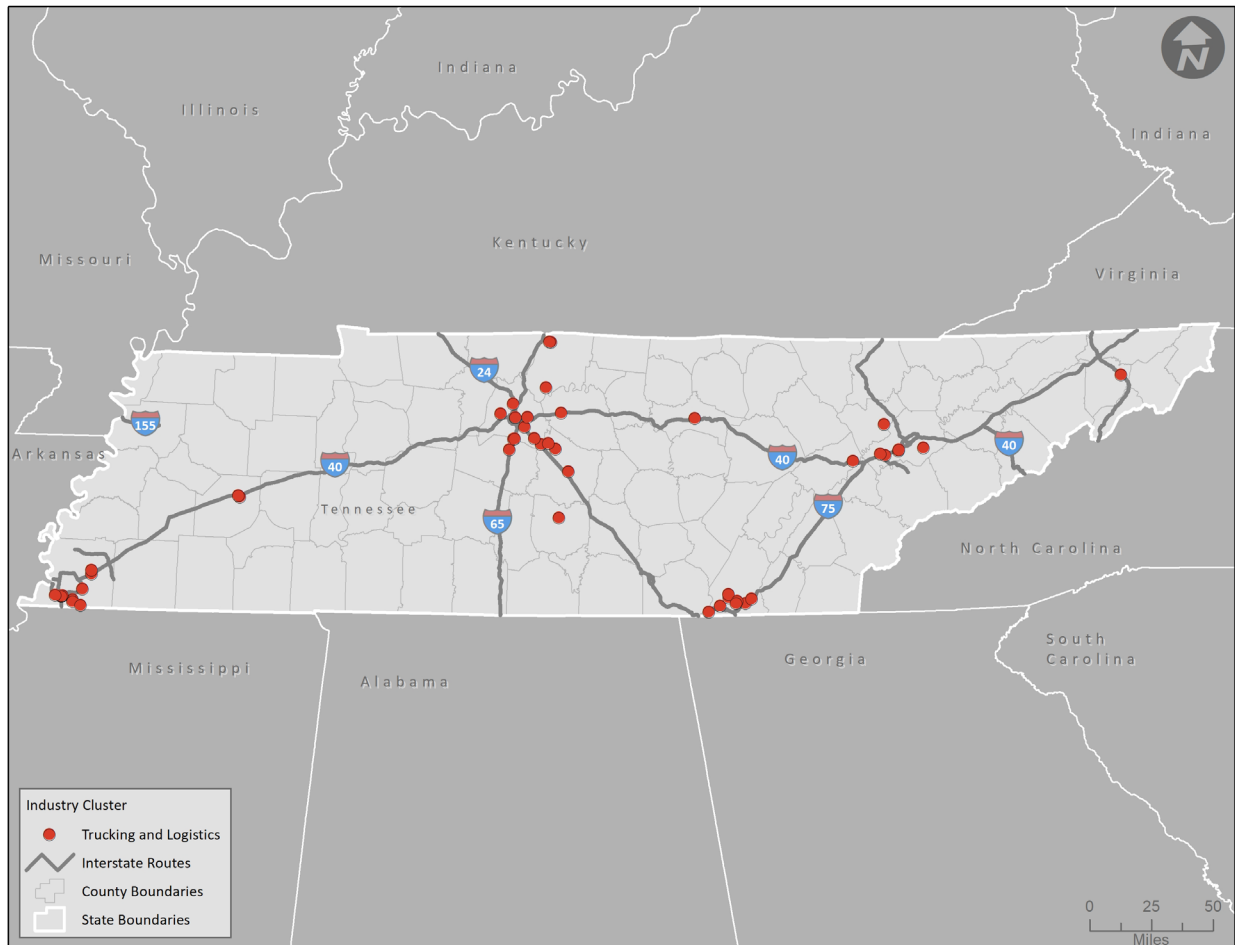
²²⁸ "Top 20 Busiest Passenger and Air Cargo Airports in the World", Airports Council International, May 2020

²²⁹ "Transportation, Distribution and Logistics Cluster, Center for Economic Research in Tennessee, TN Department of Economic and Community Development 2018

²³⁰ TN Department of Economic and Community Development Center for Economic Research in Tennessee, "Transportation, Distribution, and Logistics Cluster", 2018

²³¹ Tennessee Department of Transportation. Tennessee Statewide Multimodal Freight Plan. February 27, 2018

Figure 28: Tennessee Trucking and Logistics Operations with 300+ Employees



Source: Tennessee Department of Economic Development, Center for Economic Research, 2019

Waterways

There are 949 miles of navigable waterways in Tennessee on three main rivers: the Tennessee River (401 miles), Cumberland River (310 miles), and the Mississippi River (176 miles).²³² Two of the public ports, Port of Memphis and Port of Cates Landing, are located along the Mississippi River and two are located on the Tennessee River, the Port of Nickajack and Centre South River Port.

Tennessee Tombigbee Waterway is a 234-mile man-made facility connecting the Tennessee River to the junction of the Tombigbee River System in Alabama. This allows commercial navigation from the nation's mid-section to the Gulf of Mexico and connects inland ports from Paducah, Kentucky to Knoxville, Tennessee. Tennessee has water access to 22 states and to deep water ports on the Gulf of Mexico through this system.²³³

²³² Tennessee Department of Transportation. Tennessee Statewide Multimodal Freight Plan. February 27, 2018

²³³ East Tennessee EDA. Distribution and Logistics. <https://www.eteda.org/business-sectors/distribution-and-logistics/>. December 12, 2019

Another important water-related project is the replacement of the Chickamauga Lock on the Tennessee River, a project the U.S. Army Corps of Engineers (USACE) expects to complete in 2024. There are significant economic benefits that will be realized once the expanded lock is completed. According to an economic impact study of the lock, there are a number of businesses that will benefit from completion of the project and additional economic development that could be realized in the future.

Aviation

Memphis International is the busiest cargo airport in the western hemisphere and the world's second busiest according to Tennessee's Department of Economic and Community Development. The FedEx World Hub, located at this airport, houses 196 gates to serve its plane fleet. This site alone accounts for 63 percent of statewide air freight tonnage.²³⁴ FedEx produces more than \$50 billion in revenue on its over 862 acres.²³⁵

In addition to Memphis, Tennessee has five other airports that ship cargo including Nashville, Knoxville, Tri-Cities, Chattanooga, and the Smyrna Airport.

Intermodal

Tennessee has several intermodal facilities to facilitate the movement of goods between different modes. Intermodal facilities tend to be located within the urban areas where freight industries are concentrated. Major intermodal facilities in the Memphis area include the BNSF facility in south Memphis and the NS facility at Rossville, Tennessee. The CN and CSX entered into a public-private partnership with the City of Memphis and Shelby County to develop and operate the Memphis Super Terminal, a 155-acre railroad and truck intermodal facility in southwest Memphis. The Union Pacific (UP) also has an intermodal terminal in Marion, AR, 10 miles across the Mississippi River from Memphis.

CSX has limited capacity to transfer containers in Radnor Yard in Nashville.

²³⁴ Tennessee Department of Transportation. Tennessee Statewide Multimodal Freight Plan. February 27, 2018

²³⁵ McElroy, Jack. USA Today. 10 ways transport industry had Tennessee on a roll
<https://www.knoxnews.com/story/money/business/journal/2017/06/05/10-ways-transportation-industry-has-tennessee-roll/337385001/>. June 5, 2017

TRUCKING AND LOGISTICS ISSUES AND TRENDS

TRUCKING

Regulations

The Federal Motor Carrier Safety Administration's Hours of Service (HOS) Final Rule decreases the average work week for truck drivers. The rule dictates driver re-start time and requires a 30-minute break during the first eight hours of a driver's shift. In addition, the electronic logging device (ELD) mandate requires drivers to use ELDs and has reduced the trucking industry capacity by 4 percent at a time when the trucking market did not have the ability to absorb the capacity reduction.²³⁶

Driver Shortage

Baby-boomer retirements and younger workers seeking a better "work-life" balance contribute to a nationwide driver shortage. The workforce needed in this industry cluster is changing, requiring more skills than those needed in the past including reliance on new technologies, computing skills, and more complex operating systems. According to several members of the Thrive Regional Mobility Partnership that work in the trucking industry, some companies are using state-of-the-art tools to help streamline work process such as paperless bills of lading. Using this technology will allow drivers to eliminate having to write out bills of lading and provide better security for loads. Private businesses, state departments of transportation, economic development organizations, and a number of associations are working together to address the transportation workforce challenges and opportunities.

The average age of truck drivers is rising rapidly and the number of young people choosing truck driving as a career is declining. It is especially accurate for over-the-road trucker drivers. In response, the Federal Motor Carrier Safety Administration (FMCSA) is moving forward with a proposed pilot program to allow 18, 19, and 20 -year-old non-military drivers to operate commercial motor vehicles in interstate commerce. There are currently 48 states and the District of Columbia that already allow 18, 19, and 20-year-old Commercial Driver's License (CDL) holders to operate commercial motor vehicles (CMVs) in interstate commerce.²³⁷

Truck Parking

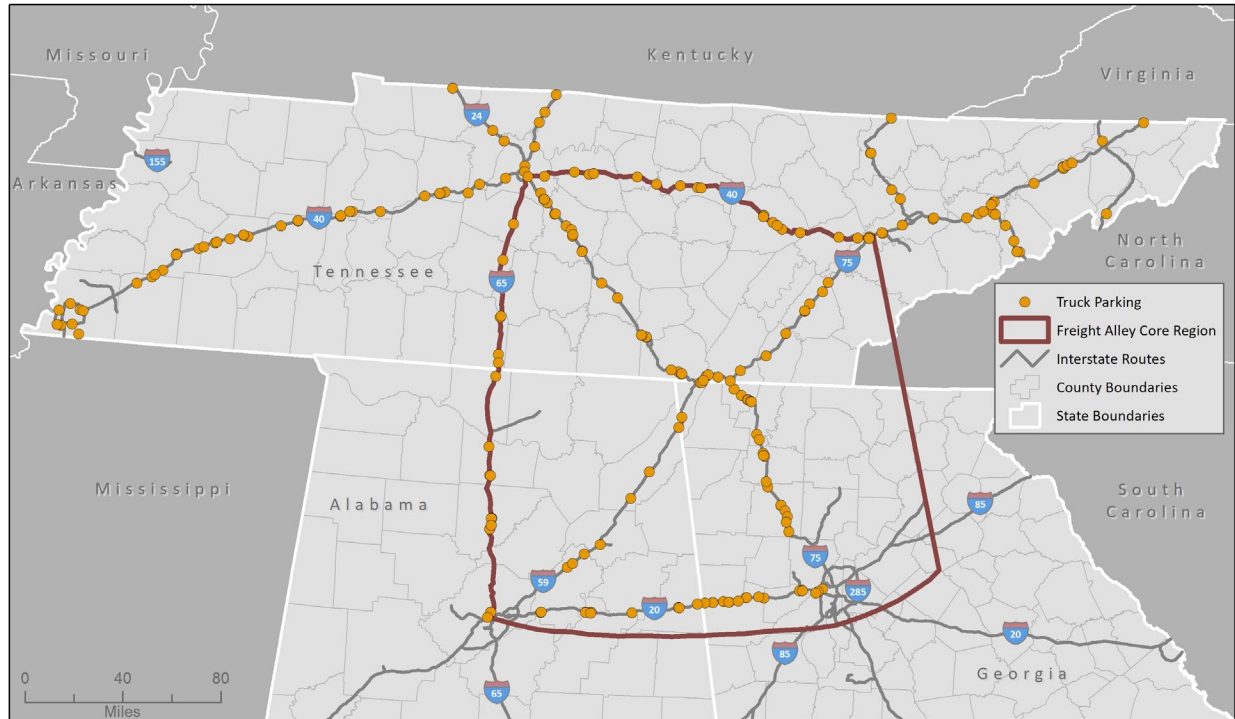
A truck parking inventory for the Freight Alley Core Megaregion was completed as part of the NEP Freight Alley Study. The inventory was developed by surveying private truck parking facilities as well as public truck parking areas. The truck parking database contains 308 truck parking facilities or legal truck parking areas including information about the location, number of parking spaces, amenities such as restaurants, internet access, shower facilities,

²³⁶ Brown, Greg and Bardwell, Thomas K. BR Williams. Logistics and Trucking Industry Report, Q3 – Q4 2019

²³⁷ Ibid.

laundry, and site lighting and security. A map of the truck parking areas included in the inventory are shown on **Figure 29**.

Figure 29: Freight Alley Core Megaregion Truck Parking Inventory



The Thrive Regional Partnership conducted a survey of fleet companies and freight stakeholders in February 2020 for this NEP Freight Alley Study. At least half of the truck drivers who responded to the survey identified congestion and truck parking as the biggest issues affecting freight movement in the Chattanooga region over the next five to ten years. Over 51 percent of drivers said they had experienced safety concerns as a result of inadequate truck parking, and 40 percent of respondents said they spend more than 1 hour finding truck parking in this region.

Truck parking continues to be a significant issue for truck drivers because compliance with HOS and ELD regulations has placed extra demands on truck parking. There needs to be adequate truck parking available along major interstates. In some cases where adequate parking is not available, drivers park on interchange ramps to avoid violating HOS regulations but that leads to further safety issues.

Bottlenecks/Congestion

Twelve of the top 100 2020 ATRI bottlenecks in the U.S. are located in the Freight Alley Core Region. Highway bottlenecks are generally caused by recurring congestion, highway capacity, or geometric design issues. Urban areas are more prone to congestion than rural portions of the states. The impacts on trucks can dramatically cut into a truck drivers' HOS limits thus reducing a driver's productivity.

Autonomous Trucks

This emerging technology is being tested today; however, fully autonomous trucks without a driver in the truck cab are likely many years away. TuSimple, the largest and most advanced autonomous truck technology company in North America, has recently partnered with four major transportation companies to launch a logistics network for their highly automated trucks.²³⁸ The network will be deployed in phases; the second phase includes corridors in the Freight Alley Core Megaregion. Partners in this project include U.S. Xpress based in Chattanooga, Penske Truck Leasing, UPS Inc., and McLane Co.

The autonomous freight vetting process will be implemented in stages beginning with Advanced Driver Assistance Systems (ADAS) technology that includes self-driving software with updated radar, power steering, cruise control, and automated gear changing, while still having a trained driver in the cabin. When full automation arrives, the expected benefits include improved safety and a new strategy to address the driver shortage issue facing the trucking industry.

Active Traffic Management Systems (ATMS)

Active Traffic Management is a method of communicating real-time traffic conditions, travel times, lane closures, and traffic pattern changes to drivers through overhead variable message signs, traffic cameras, sensors, and other technologies. For example, on I-75 in Atlanta, overhead variable sign boards could be used to advise truck drivers of the proper lane to use to exit onto I-285 east well in advance of the ramp.

LOGISTICS

Blockchain Technology

Blockchain technology allows logistics companies to increase the efficiency and transparency of supply chains, and is expected to impact everything from warehousing to delivery. From the time an order is placed to when it is delivered, there may be up to 40 documents exchanged.²³⁹ The use of this upcoming technology allows manufacturers, suppliers, customers, auditors, warehouse managers, and others to create a transparent and efficient system for recording transactions, tracking assets, and managing all logistics process documents including failsafe digital contracts.²⁴⁰

²³⁸ "TuSimple Partners with Major Fleets to Launch Autonomous Freight Network", Transport Topics, July 1, 2020

²³⁹ Pessutti, Paul. Digitalist Magazine. Transportation Industry: "Ripe for Change". <https://www.digitalistmag.com/future-of-work/2018/04/18/transportation-industry-ripe-for-change-06084573>. Accessed December 2019

²⁴⁰ Technavio Blog. Top 10 Logistics Trends transforming the Global Logistics Market in 2019. March 14, 2019. Accessed January 2020

FREIGHT ALLEY RECOMMENDATIONS

COLLABORATION AND PARTNERSHIPS TO OPTIMIZE THE FREIGHT ALLEY CORE MEGAREGION

Pursue strategic opportunities to build stronger multi-jurisdictional collaborative partnerships, evaluate best practices and facilitate solutions to improve freight movement and economic prosperity for the Freight Alley Core Megaregion

Multi-state freight planning provides an opportunity to view complex freight and economic competitiveness issues from a different geospatial perspective, and as a result, to envision some challenges differently and conceive transformational solutions that might not be “visible” from our traditional viewpoint. The partnership between FedEx and the U.S. Postal Services is an example of players working together and considering new ways of solving their respective problems. New opportunities exist today for multiple jurisdictions to collaborate using new technologies, sharing data and information, and synthesizing data to create benefits for all the partners. Collaboration and partnerships can create new opportunities to structure funding for multi-state initiatives too.

Effective multi-state partnerships are not easy to create. However, the Freight Alley Core Megaregion has a unique opportunity to build on an existing multi-regional partnership, the Thrive Regional Partnership. Thrive is an independent 501(c)(3) non-profit corporation established to advance long-term, sustainable growth in the 16 member counties in Alabama, Georgia, and Tennessee. The Partnership facilitates regular communication among its members, and has effectively engaged and sustained diverse freight stakeholders that includes representatives from major businesses, transportation organizations, public officials from state and local government, regional planning organizations, economic developers, and non-profits.

The Thrive Regional Partnership Freight Mobility Committee has been very successful engaging leaders and stakeholders to work collaboratively on freight and freight-related issues to identify solutions to problems that impact freight movement in the region. The Partnership effectively promotes ongoing consultation, communication, and collaboration leading to problem solving. The Freight Mobility Committee has been an active partner in this study, willingly sharing their knowledge, insights, and experience to work toward improving freight movement for the greater good of the entire region. This kind of ongoing engagement and communication with a working partnership leads to effective solutions that achieve results.

The genesis of the Thrive Regional Partnership emerged soon after Volkswagen’s decision to locate their new automotive manufacturing facility in Chattanooga. The Chattanooga Chamber arranged a meeting with public and private sector leaders in Greenville, South Carolina who had first-hand experience after the BMW location. The advice of the business and community leaders in Greenville was to *take a regional approach*. Leaders from the

Greater Chattanooga Region made a commitment to the broader region to reflect the values and goals of the entire area and focus on strategies that produced shared prosperity, quality of life, and a place where people wanted to live and work now and into the future.

While the 16 counties of the Thrive Regional Partnership may not encompass the entire geography of the Freight Alley Core Megaregion, it is a great place to build from. Business leaders in the Thrive Partnership are actively engaged in freight issues and are driven to realize results from their efforts. They also recognize the importance of communication and education. At one Freight Mobility Committee meeting, members discussed the process of securing federal funding for a freight project and the steps required to move a project forward. Private industry members were not familiar with the required steps that can include detailed environmental and feasibility studies. While the process seems to take a long time, now they have a better understanding of what the process entails. Communication, consultation, and collaboration can lead to better understanding and help keep people engaged to achieve the desired results.

The success of the Eastern Transportation Coalition provides a potential roadmap and peer learning opportunity for enhancing collaboration and partnership for the Freight Alley Core Megaregion. The Eastern Transportation Coalition, formerly known as the I-95 Corridor Coalition, was started 25 years ago to address highway incidents that affected travel across state lines. Today, this coalition brings together 17 states and 100 public agencies including Alabama, Georgia, and Tennessee to address a range of challenges facing the eastern corridor. The Eastern Transportation Coalition offers training opportunities, shares research and data, and provides ongoing communication and information for members.

Next Steps

- The first step in this broader multi-regional collaborative partnership is to identify those recommendations that resonate with the Thrive Regional Partnership Freight Mobility Committee and merit future actions. The Committee can further define the steps needed to move a specific project or policy forward in the region.
- There are existing state laws that will impact the deployment of transportation technologies in the region. Working with each state's department of transportation(DOT), it would be advantageous to align technologies with state and local laws so that future efforts to pursue transportation technology projects and funding could progress quickly.
- When it is appropriate, conduct a multi-state Freight Summit to bring together DOTs, Metropolitan Planning Organizations (MPOs), freight and logistics businesses, public officials, economic developers, and other stakeholders to discuss freight challenges and opportunities and potential multi-jurisdictional/megaregional freight projects as a starting point for future pursuits and multijurisdictional funding opportunities.

PLANNING RECOMMENDATIONS

By design, the planning and programming of federally-supported infrastructure projects takes place within the geographies that correspond to federal formula funding – states and metropolitan planning organizations (MPOs). While the federal planning requirements have provided a structure for evaluating competing investment opportunities within these geographies as well as between states and MPOs, there is little formal structure for coordination and consensus building at a megaregional or multi-state scale. Bi-state MPOs such as the Chattanooga/Hamilton County/North Georgia Transportation Planning Organization (CHCNGA TPO), must engage with both TDOT and the GDOT, and the corresponding FHWA units, but that coordination remains primarily local. Statewide planning is subject to requirements for consultation and coordination, but often such efforts are superficial courtesies. The structure of planning and programming often lacks a robust examination of the operating impacts of major transportation projects at a megaregional scale.

The Transportation Investment Generating Economic Recovery (TIGER) grant program, which evolved into the Better Utilizing Investments to Leverage Development (BUILD) program, originated primarily as a replacement for the practice of congressional earmarks. The use of a competitive award process and the requirement to perform benefit-cost (B/C) analysis on proposed projects has been a positive shift toward merit-based project selection at the federal level. It has also opened the door to federal funding for projects that physically cross state lines or collections of individual projects that, as a group, contribute to an overall improvement in system performance at a megaregional or larger scale. An early TIGER-funded project that serves as perhaps one of the best examples of this is the Crescent Corridor. Pennsylvania served as the lead applicant for the TIGER II grant with participation by Alabama, Virginia, Tennessee, Mississippi, and North Carolina, and extensive private sector participation by Norfolk Southern. The program has also been used to fund projects that are physically located in a single state, while having benefits that extend to multiple states. The Chicago Region Environmental and Transportation Efficiency Program (CREATE) is a notable exception. While the CREATE projects were all located in the Chicago metro area, improving rail operations in Chicagoland, the collection of projects also produced benefits across the nation's rail system. The six railroads that serve Chicago all partnered in this ambitious program of 70 interrelated rail projects in the Chicago area. The projects have been funded by a variety of sources, and some have not yet been constructed.

The program guidelines encourage applicants to take a national-interest perspective on projects, noting that improving one state's competitiveness relative to another is not a compelling justification for federal investment. Despite this encouragement, the realities of state politics and the inherent difficulties associated with executing a major infrastructure project dampen the number of multi-state applications received by USDOT. States are, in fact, in economic competition with one another, and even if a state DOT were armed with compelling evidence that expending funds in a neighboring state would have a high return on investment at home, spending state dollars elsewhere would be extremely difficult.

Although challenges exist, the states participating in this study stand to gain from strategic partnerships with one another. The three states have integrated economies, both in terms of the markets they serve and the supply chains on which they depend. While states are in competition with one another, they can also potentially benefit by marshalling their resources to advance the Freight Alley Region as a player in the global marketplace.

Freight Mobility from a Megaregional Perspective

Adoption of a megaregional perspective on freight mobility is a critical starting point for fostering collaborative partnerships between states to advance a project of regional or national significance. At a high level, improving producers' (whether agricultural or industrial) access to global markets is beneficial for the study area, the Freight Alley Megaregion as a whole, and the entire Southeast. As the region seeks to view the transportation system through a megaregional lens, it may be helpful to explore the growing body of literature on megaregions. Relevant work prepared by a partner in this NEP grant, the Georgia Institute of Technology, includes "The Architecture of Megaregions" and "Freight Movement, Port Facilities, and Economic Competitiveness."^{241, 242}

Since the emergence of the intermodal container and the subsequent development of massive vessels carrying ever-larger number of containers, much of the freight moving between East Asia and the United States has moved via the "landbridge" from West Coast ports. The term "landbridge" was coined as part of a marketing effort to promote shipping a container under a single bill of lading that covered both the steamship journey and cross-country rail. The practice of using the landbridge facilitated tremendous growth in the amount of freight originating in East Asia that accessed the United States East Coast via the United States West Coast ports and rail rather than arriving at East Coast seaports. In addition to its use for freight originating or terminating in the United States, the landbridge across the U.S. also enabled freight moving between East Asia and Europe to limit land transportation to a single country, thereby reducing complexities and delays associated with multiple customs interactions.²⁴³

With the expansion of the Panama Canal and its ability to accommodate vessels up to 51.25 meters wide, newer, very large container ships can now transit the Canal. The largest ship to date to transit the Canal is Evergreen's Neo-Panamax Triton, which can carry over 14,000 TEUs. With the expansion of the Panama Canal, East Coast ports and Gulf Coast ports are eager to attract additional intermodal freight. To that end, East Coast ports have invested in expansion of their intermodal facilities and connecting transportation infrastructure. GPA currently has an effort, dubbed the "Mid-American Arc Initiative," to expand its reach into the hinterlands as shown in

²⁴¹ The Architecture of the Megaregion. U.S. Department of Transportation/ Federal Highway Administration. 2013

²⁴² "Freight Movement, Port Facilities, and Economic Competitiveness", presented at the University Transportation Center (UTC) Conference for the Southeastern Region in Atlanta, Georgia, March 24-25, 2014

²⁴³ Washington Post, 1978. <https://www.washingtonpost.com/archive/business/1978/08/20/use-of-landbridge-cuts-containerized-cargo-travel-time/ff1bc2de-c2ad-489a-bba9-c66e7e5cad69/>. Accessed August 2020.

Figure 30. Expanding the Port’s reach into the Midwest is in direct competition with the West Coast and the landbridge.

GPA has significant investments both underway and planned to increase on on-dock rail capabilities at the Port of Savannah (\$3B in investment to increase the capacity of the Port from 5 million TEUs to 8 million TEUs annually by 2028). Outside the immediate vicinity of the Port but within Georgia, GPA has advanced this initiative through the development of the Appalachian Regional Port in Chatsworth, GA providing access to the I-75 corridor, and is planning a second intermodal port, the Northeast Georgia Regional Port, in Gainesville Georgia, that will offer access to the I-85 corridor when completed in 2021.

Figure 30: Georgia Port Authority’s Mid-American Arc Initiative



Source: Georgia Ports Authority. <https://gports.com/rail/mid-american-arc/> Accessed August 2020

To the extent that GPA is successful in its initiative to rail freight out of southeast Georgia into the hinterland, the Freight Alley Megaregion benefits in two ways: (1) access to global markets via East Coast ports (rather than the West Coast ports and the landbridge) enhances the region’s overall competitiveness; and (2) to the extent that freight currently leaving the Port of Savannah by truck can shift to rail for a significant portion of its journey, the interstate system benefits from reduced congestion and maintenance costs.

Advancing Multi-State Freight Planning Efforts

Advancing bi-state or multi-state freight planning can take place through existing structures or ad hoc efforts by the interested parties. There are several existing venues for advancing conversations about major freight investments and it is likely that GDOT, ALDOT, and TDOT are already participating in these forums, though the degree to which participation yields concrete action steps may vary widely.

Existing Forums for Multi-State, Multi-MPO Collaboration

Existing processes and forums that could facilitate collaboration include the following:

- State and MPO Planning Processes. Within existing federal requirements for state and MPO plan development are requirements for multi-jurisdictional consultation. As mentioned above, at times these consultations represent little more than is needed to “check the box” on the federal compliance checklist, but that does not have to be the case. Collaboration at the level of these fundamental building blocks of project planning and programming (state and MPO plans) can provide a foundation for larger projects with benefits shared across multiple political geographies within and beyond the megaregion. States’ ability and willingness to allocate sufficient staff time in cross-jurisdictional collaboration is key to meaningful participation in these planning processes.
- American Association of State Highway Transportation Officials (AASHTO) Committees. Several modal AASHTO Committees could serve as forums for multi-state discussion of freight mobility (Rail Council, Water Council, Council on Highways and Streets) though the Committee best suited for multimodal freight planning collaboration would be the Special Committee on Freight, chartered in 2018. One of the goals of the committee is to “Improve urban, rural, multi-state, and cross-border freight mobility.”²⁴⁴ Strategies toward that end include the following, all of which are pertinent to the Freight Alley study area:
 - *Strategy 4a: Foster increased collaboration between State DOTs, MPOs, RPOs, and industry stakeholders to address freight issues*
 - *Strategy 4b: Support research, information sharing, and advocacy for improving planning and programming for truck parking, in coordination with FHWA’s National Coalition for Truck Parking.*
 - *Strategy 4c: Build and strengthen multi-state and regional corridor coalitions and partnerships.*

²⁴⁴ AASHTO. *Strategic Plan for the AASHTO Committee on Freight*. <https://www.transportation.org/wp-content/uploads/2019/03/Freight-Strategic-Plan-2018-Approved.pdf>

- *Strategy 4d: Promote improvements in efficiency of international freight movements*
- Southeast Rail Commission. The FY 2017 Consolidated Appropriations Act Explanatory Statement directed Federal Railroad Administration (FRA) to allocate \$1 million to establish the Southeast Rail Commission. The legislation did not include guidance on the membership of this entity or the scope of its mission. Charter documents were circulated for signature among several states that were participating at the time in FRA’s Southeast Regional Rail Planning Study (a long-term passenger rail planning effort). Currently, Tennessee and Georgia are members of this commission.
- Eastern Transportation Coalition (ETC). Formerly known as the I-95 Corridor Coalition, the ETC is a partnership of 17 states and the District of Columbia that connects public agencies across several modes in a common effort to increase transportation safety and efficiency. Agencies in Alabama, Georgia, and Tennessee are all current participants in ETC.

Ad Hoc Collaboration

While any of the organizations/processes above could facilitate conversations about collaborative efforts, the process of actually planning, funding, and delivering a major multi-state project is more likely to occur in an ad hoc fashion. Key to success of this effort would be support, if not active participation, of the top executives/officials or participating DOTs and MPOs. In many circumstances with the close proximity of the Freight Alley Megaregion with the three states, what benefits one state with an industry has additional benefits across state lines with the others.

Specific actions that could propel megaregional planning efforts forward could include the following:

- **Partnerships:** Establishing intentional relationships between key participants in a megaregional freight project can serve as a starting point. An example of such a partnership is the alliance formed between the Port of Savannah and the St. Louis Regional Freightway, announced in 2019 for the purpose of increasing access to global markets via the East Coast ports, particularly Port of Savannah.
- Conducting a Regional Freight Summit
- Developing regional or multi-state planning/feasibility studies that lay the groundwork for future infrastructure grant applications
- Pursuing joint federal discretionary grants opportunities

TRANSPORTATION INFRASTRUCTURE RECOMMENDATIONS

There are a number of existing planning documents that identify infrastructure improvements that will benefit overall system performance and/or freight mobility in particular. Various planning documents for each state are identified in **Table 30**.

Table 30: Relevant Transportation Planning Documents

Planning Document	Alabama	Georgia	Tennessee
TIP/STIP	<ul style="list-style-type: none"> Alabama STIP Birmingham TIP 	<ul style="list-style-type: none"> Georgia STIP Atlanta TIP Chattanooga TIP (GA/TN) 	<ul style="list-style-type: none"> Tennessee STIP Chattanooga STIP (GA/TN)
Long Range Transportation Plans	<ul style="list-style-type: none"> ALDOT LRTP Birmingham Long Range Transportation Plan 	<ul style="list-style-type: none"> ARC Long Range Transportation Plan GA LRTP 	<ul style="list-style-type: none"> Tennessee LRTP
Freight Plans	<ul style="list-style-type: none"> Alabama Freight Plan Birmingham Regional Freight Plan Alabama Rail Plan 	<ul style="list-style-type: none"> Atlanta Freight Plan Georgia Freight Plan Georgia Statewide Freight & Logistics Action Plan 	<ul style="list-style-type: none"> TDOT Multimodal Freight Plan Chattanooga Regional Freight Study Cleveland Long Range Transportation Plan TN State Rail Plan

The purpose of the infrastructure recommendations provided in this report is not to duplicate the efforts that produced the plans listed above, but to identify examples of potential projects (or sets of projects) that could benefit from a megaregional approach, due to the far-reaching nature of project benefits, the needs for coordinated efforts to optimize the multiple benefits of such projects, and/or the elements of the overall project which could benefit more than one state.

Truck Parking Development

The presence of trucks parked illegally on interstate ramps is an indicator that there is an insufficient supply of truck parking in this specific area. In addition to development of an inventory of truck parking as part of this NEP grant, TDOT is working with University of Memphis to determine where additional truck parking facilities are most needed. Following completion of that study, it would be beneficial to conduct a feasibility study of the development of one or more parking sites within the target areas identified by University of Memphis. The study could also explore alternatives for public sector involvement in the provision of truck parking, ranging from direct provision of services (such as at rest areas), to providing incentives for private sector provision of truck parking, or structured public-private partnerships to develop facilities in target areas.

In addition to general consideration for truck parking needs, special attention is warranted for locations that can serve as staging areas outside metropolitan areas where trucks can wait until the appropriate time to depart in order to arrive at an urban destination within the delivery time window.

There are also significant needs related to provision of real-time information about the availability of truck parking. This will be discussed in the section on Technology Recommendations below.

Inland Intermodal Terminal Development/Expansion

The development of additional inland ports should be explored. Having developed the Appalachian Regional Inland Port in Chatsworth, GA, the GPA is developing a second inland port to serve intermodal traffic, the Northeast Georgia Regional Port, planned to open in Gainesville, GA in 2021. The new inland port will be served by Norfolk Southern and will enhance access to the Gainesville area and the I-85 corridor. These facilities extend the Port of Savannah's reach inland and bypass traveling on the highway system to reduce congestion and reduce highway maintenance cost when these intermodal containers move via port to rail instead of truck.

Georgia's State Freight Plan identifies a need for expansion of intermodal terminals. It would be beneficial to conduct a feasibility and siting study for new or expanded terminals within region in consultation with GPA. A suitable location for a new or expanded terminal would require compatible surrounding land uses, good interstate access, and a sufficient distance away from the connecting railroad's other intermodal terminals to be operationally efficient.

Highway Capacity Improvements

The statewide and MPO plans for the study area include numerous planned and illustrative highway improvements. Several that stand out as having potential for collaboration are briefly discussed below. The first two projects referenced are "on the books" in terms of having funds programmed.

1. I-24 from US-27 to I-59 The CHCNGA TPO TIP, the TDOT STIP, and the Tennessee Multimodal Freight Plan all call for expansion of I-24 between US-27 and I-59 from four to six lanes. The project is scheduled for right-of-way acquisition in FY2022.
2. I-75/I-24 Interchange Improvements. Construction is currently underway for improvements to the interchange of I-75 and I-24.
3. I-20 from Atlanta to Alabama. Expansion of the I-20 corridor from Atlanta to the Georgia State line was modeled as part of the Georgia State Freight and Logistics Action Plan. Between Birmingham and the Georgia State line, the majority of I-20 is six lanes, except for approximately 27 miles. At the time of the analysis the B/C ratio for the project was estimated to be 1.71 under a medium-growth scenario and 6.1 under a high growth scenario.²⁴⁵
4. Study Feasibility of a Bypass around Chattanooga. The Chattanooga Regional Freight Study recommended study of a potential bypass around Chattanooga. This was

²⁴⁵ Georgia Statewide Freight & Logistics Action Plan; Task 5 Freight Improvement Project Recommendations; <http://www.dot.ga.gov/IS/GeorgiaFreight>

analyzed as part of the Georgia Statewide Freight and Logistics Plan, along with several other potential urban bypasses. The analysis yielded a B/C ratio of 3.89 under a medium-growth scenario and 10.59 under a high-growth scenario.²⁴⁶ The project was included in the plan's list of recommended projects.

TRANSPORTATION TECHNOLOGIES AND INNOVATION

Consumers and businesses are becoming more freight dependent. Today we expect faster deliveries and real time information about the location and status of our products. Shippers are moving an ever-increasing number of shipments to more delivery locations, as the business of freight becomes more complex. Funding for physical transportation infrastructure is evolving, and congestion continues to increase on many U.S. interstate corridors and roadways including those in the Freight Alley Core Megaregion. According to the USDOT Bureau of Transportation Statistics, vehicle miles traveled is growing three times faster than new road construction, and the resulting congestion costs freight companies \$90 billion a year.²⁴⁷ New technologies are helping private transportation industries to drive down costs and improve efficiencies. The public sector must find opportunities to deploy technologies to generate near-term benefits for freight movement as well.

Freight is a dynamic partnership between the public sector, private carriers, industry, and consumers. Some multimodal freight infrastructure assets are publicly owned, such as highways, airports, ports, and some truck parking areas. The private sector typically owns the trucks, warehouse and distribution centers, railroads, and many truck parking facilities. Businesses and industries that rely on goods movement to survive and prosper generate demand for freight mobility. Collaborative partnerships between these players are essential to identifying and deploying the most effective new technologies spanning multiple state boundaries for the future.

Understanding transportation conditions and freight user needs in the Freight Alley Region is essential to determining the technologies that could generate the greatest benefits for the system and users. This is not a “one-size-fits-all” proposition. Deployment of the right technologies can result in real cost savings, improved productivity, and enhanced safety.

Over the last 20 years container ships have almost doubled their capacity creating significant problems at ports around the world. As container ships have grown in size significantly increasing the volume of goods they carry, the vessel dwell times in port have increased as well. Larger capacity container ships mean longer times to unload, and the longer dwell times at ports can create major gridlock. These longer dwell times can cost ship owners more than \$80,000 per hour per ship.²⁴⁸

One interesting example of the benefits of collaborating on new transportation technologies can be found in the ocean shipping sector. Two ocean ports in Germany, Hamburg and

²⁴⁶ Georgia Statewide Freight & Logistics Action Plan; Task 5 Freight Improvement Project Recommendations; <http://www.dot.ga.gov/IS/GeorgiaFreight>

²⁴⁷ “Cost of Congestion to the Trucking Industry 2018 Update”, Transportation Research Board, October 18, 2018

²⁴⁸ “Hamburg and Rotterdam lead the way calling for data sharing among ports”, Gavin van Mare, Loadstar, June 12, 2018

Rotterdam, have worked together to develop integrated data platforms that allow them to connect and share important information across both of their networks in real time. This data includes a range of factors including ship arrival and departure times, adjustments to ship speeds, and routes, which can be used to modify arrivals in loading and unloading. This has helped these two ports optimize their facility assets and manage schedules much better. By working collaboratively to share this digital information and better optimize their operations, the two ports have realized a 20 percent reduction in port dwell times which helps the ship owners and goods movers save money.²⁴⁹ The right technology applications can improve decisions, optimize the deployment of assets, reduce congestion and costs, and increase safety.

Freight Alley Core Megaregion Technologies

Evaluate transportation technologies that could provide near-term improvements for freight movement on the Freight Alley Core Megaregion corridors.

Determine public and private funding options to support multi-jurisdictional freight technology projects that would lead to the deployment of the most effective technologies to benefit freight movement in the Freight Alley Core Megaregion. Any evaluation and deployment of technologies must actively engage regional freight industries, freight dependent businesses, existing freight organizations, public transportation partners, and local and state leaders in a collaborative decision-making partnership. Together, these partners can identify and deploy the technologies that will generate the greatest transportation system and user benefits on selected multi-jurisdictional interstate corridors in the Freight Alley Core Megaregion.

Goal

Create a nationally recognized New Economy Freight Technology Hub in the Freight Alley Core Megaregion and identify, evaluate, prioritize, and deploy the best transportation technologies for the regional multimodal network conditions and user needs that will generate near term freight transportation benefits, provide a test bed for deployed technologies, and help to foster greater regional economic competitiveness.

Vision

Bring together the Thrive Partnership Freight Mobility Committee and other Freight Alley Core Megaregion freight carriers, business leaders, research institutions, existing transportation organizations including MPOs and the North Georgia Transportation Club, State transportation officials, economic developers, and local and state leaders representing rural, suburban, and urban environments to work collaboratively across jurisdictional boundaries to deploy freight transportation technologies that will help to solve complex freight movement issues, improve the operation and safety of strategic regional transportation networks, and achieve greater economic competitiveness for the region.

²⁴⁹ "Hamburg and Rotterdam lead the way calling for data sharing among ports", Gavin van Marel, Loadstar, June 12, 2018

As previously discussed, recently TuSimple announced a partnership with four major transportation carriers including U.S. Xpress, located in Chattanooga. The partnership will create a phased logistics network for TuSimple's highly automated trucks, all with a driver behind the wheel. The Freight Alley Core Megaregion is part of the Phase 2 network, creating a unique opportunity to incorporate this existing partnership into a technology grant application.

With a diverse range of outstanding private industries, research facilities, and universities in the region, there are opportunities for cutting-edge collaborations between research and businesses as part of a technology funding application.

New Economy Freight Technology Hub Objectives

- Focus on specific interstate corridors in the Freight Alley Core Megaregion experiencing heavy congestion, frequent delays, truck safety issues, growth in truck flows particularly from freight dependent industry clusters in the region, and other operational challenges.
- Build a long-term, multi-state collaborative partnership among public and private sector partners to support existing and future improvements to the freight network, and align broad regional funding strategies to support priority projects.
- Involve Auburn University Highway Research Center, University of Alabama Transportation Center, the University of Georgia Transportation Institute, the Georgia Institute of Technology Center for Transportation Research, Vanderbilt Center for Transportation and Operational Resiliency, and the University of Tennessee Center for Transportation Research.
- Involve ORNL Transportation Research Center, Geographic Information Science and Technology Center, Vehicle Systems Research, Transportation Analysis and Visualization Laboratory, and other ORNL transportation research programs.
- Engage local and regional economic development organizations, transportation clubs, and regional planning organizations to encourage public and private participation in technology deployment and communication to promote public understanding and acceptance.

Why the Freight Alley Core Megaregion

- The Freight Alley Core Megaregion contains seven of the most heavily traveled interstate corridors in the U.S., I-75, I-24, I-40, I-65, I-59, I-20, and I-85, that link five major metropolitan areas: Atlanta, Birmingham, Chattanooga, Knoxville, and Nashville. Twelve of ATRI's top 100 freight bottlenecks are located in this core region.
- The Thrive Regional Partnership, a tri-state 16-county partnership is at the center, at the crossroads of three interstate corridors I-75, I-59, and I-24.

- The region's private sector freight investments include three of the nation's top 25 truckload carriers headquartered in the region: U.S. Xpress and Covenant Transportation in Chattanooga; Western Express in Nashville; and P & S Express in Birmingham, and six of the top 100 private fleet carriers are headquartered here: Mohawk Industries, Shaw Industries Group, McKee Foods, H.T. Hackney Company, and Pilot Flying J.
- TuSimple has already formed a partnership with U.S. Xpress to launch an autonomous freight network and the Freight Alley Region is in Phase 2 of the roll-out.
- Heavily congested interstate corridors in the region will increase dramatically by 2040.
- Regional presence of a National Laboratory with a significant and long relationship with transportation and geographic information system (GIS) research along with a number of nationally recognized University and private sector transportation research facilities.
- Evidence of new business locations and continued job growth in freight dependent industry clusters in the region.
- The Freight Alley Interstate Corridors links the region to multimodal transportation assets including: the largest air cargo operation in the world at the Memphis International Airport, the busiest commercial airport in the U.S. at Atlanta's Hartsfield Jackson Airport, major rail terminal operations, and ocean and inland ports.

Potential Transportation Technologies to Evaluate in the Freight Alley Core Megaregion

- Autonomous Truck Freight Networks Society of Automotive Engineers (SAE) level 4
- Driver Assistive Truck Platooning in rural, suburban, and urban environments SAE levels 1, 2, 3, and 4
- Intelligent Transportation Services (ITS) and Connected and Automated Vehicle (CAV) Services
- Active Traffic Management
- Freight Advanced Traveler Information System + Truck Parking (FRATIS+P)
- Traffic Data Analytics

New Economy Freight Technology HUB in the Freight Alley Core Megaregion Funding Strategies

- Designate an organization or partners to serve as the initial application champion and convene a multi-jurisdictional, public-private partner working group to discuss the benefits of evaluating technologies that could generate near-term benefits for

freight movement in the region. The working group should identify a broad range of funding opportunities for the evaluation and deployment of beneficial technologies in the region. The application concept and funding strategies should be discussed with State Department of Transportation Officials to determine if a multi-jurisdictional application could be developed and the potential for supporting leverage and/or matching funds for such an application.

- Convene state transportation officials from AL, GA, and TN to evaluate support for the New Economy Freight Technology Hub concept, options for project funding including grant applications, and potential for leverage or matching funds.
- Convene private sector freight carriers, freight dependent businesses, freight transportation businesses, and other private sector stakeholders to evaluate support for the New Economy Freight Technology Hub, funding applications, and financial support that could be available.
- Based on input from the state departments of transportation, local governments, and private stakeholders, develop strategies for creating a multi-state partnership to identify, evaluate, prioritize, and deploy freight transportation technologies in the Freight Alley Core Megaregion.
- Convene a multi-jurisdictional meeting to decide on application process and steps to complete competitive funding applications within a schedule agreed to by the working group and partners.
- The Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Program was established in the FAST Act to provide competitive grants for the deployment of large-scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance, and infrastructure return on investment. This program has been reauthorized through Fiscal Year (FY) 2021. Grants can be used to evaluate best available technologies and deploy technology applications designed to improve transportation performance. Past grants have provided \$6- 8 million for analysis and deployment of technologies.

Work Collaboratively to deploy an Advanced Multi-State Truck Parking and Traveler Information Management Application in the Freight Alley Core Megaregion.

The lack of sufficient truck parking facilities has been well document in the Freight Alley Core Megaregion. A recent survey conducted by the Thrive Regional Partnership for this study found that 77 percent of the respondents needed truck parking on a regular basis, and the majority said it takes more than an hour to find truck parking in the greater Chattanooga Region. Ninety-two percent of those responding to the survey move freight through I-75, I-24, and I-59 multiple time per day, daily, or almost every day. The I-55/75/26 Multimodal Corridor Study also identified insufficient truck parking between Chattanooga and Knoxville.

The 2018 Atlanta Regional Truck Parking Assessment identified the lack of truck parking as one of the most significant challenges facing truck drivers in the 20-county metro region.²⁵⁰ The majority of truck drivers, over 51 percent, stated it takes more than one hour to find truck parking. Based on the study, there are 3,561 truck parking spaces in the Atlanta metro area. However, a number of metro counties have no truck parking spaces, and the assessment found significant deficits will exist by 2040 with the greatest deficits on I-285, I-75, I-85, and I-20.

TDOT is completing a Truck Parking Needs Study for Tennessee. This study will provide guidance on truck parking issues and opportunities by identifying parking needs, developing information on truck parking violation rates, and developing a methodology to identify candidate locations (or expand current state-owned parking sites) for future truck parking facilities to address the gap in supply vs. demand. This research will be completed at the end of 2020.

Eight states, including Kentucky, Indiana, Iowa, Kansas, Michigan, Minnesota, Ohio, and Wisconsin, have deployed the Truck Parking Information Management System (TPIMS) initially awarded through a 2015 TIGER Grant. There are several other models for Multi-State Parking strategies including the Truck Parking Availability System (TPAS) being developed by Florida Department of Transportation and the Eastern Transportation Coalition application that has been deployed at several test locations in Virginia.

Freight Alley Core Megaregion Truck Parking Goal

Discuss the potential of developing a multi-state partnership to pursue funding to support the deployment of a truck parking application for the Freight Alley Core Megaregion with the Alabama, Georgia, and Tennessee Departments of Transportation.

Freight Alley Core Megaregion Truck Parking Vision

Bring together the Thrive Regional Partnership Freight Mobility Committee, state DOTs, regional MPOs, and other Freight Alley Core Megaregion and multi-state freight carriers, business leaders, existing transportation organizations including the North Georgia Transportation Club, state transportation officials, economic developers, and local and state leaders (representing rural, suburban, and urban environments) to identify the best option for a Megaregional Truck Parking Information application. Submitting a discretionary federal funding application from a multi-state partnership could be a very competitive application. Depending upon the tools to be deployed, project deliverables could potentially be shared with other states, creating an even stronger B/C ratio for the project.

Freight Alley Core Megaregion Truck Parking Objectives

- Build a multi-state collaborative partnership among public and private sector partners to evaluate, select, and deploy a Regional Truck Parking Information System application to provide truck drivers access to information to find safe,

²⁵⁰ "Atlanta Region Truck Parking Assessment," Atlanta Regional Commission, 2018

- secure parking areas with the amenities they want. The partnership could work across jurisdictions and with public and private partners to align broad funding strategies to support this application and other priority truck parking projects.
- Convene a Peer Exchange with MAASTO, the Eastern Transportation Coalition, and other multi-jurisdictional organizations that have developed truck parking applications, for the purpose of best practices.
 - Engage freight industry expertise, private truck parking owners, truck drivers, fleet owners and managers, and other public and private partners in the development of the funding application.
 - Engage the Thrive Partnership Freight Mobility Committee members, regional transportation clubs, and other stakeholders to develop advocacy for the funding strategy that may include public and private resources.
 - Facilitate the preparation of a competitive funding package to support the deployment and enhancement of a truck parking information management system that addresses user needs and public safety.

ECONOMIC DEVELOPMENT RECOMMENDATIONS

The business of economic development is constantly evolving to adapt to changing economic conditions globally and domestically, new technologies and workforce skill requirements, and the importance of continuing to achieve broadly shared economic prosperity. As the economy evolves, communities and regions must adapt faster and utilize their assets as effectively as possible to create the best possible environment for businesses and job growth. The economic success of the Freight Alley Core Megaregion depends upon freight movement, and the way we move goods and people is being transformed as well.

How can economic developers in the Freight Alley Core Megaregion better understand how freight and transportation is changing? How are these changes likely to impact the region's economy and more specifically these freight dependent industry clusters? How will changes and adaptations in the region's businesses change freight needs? To continue to flourish as change occurs more rapidly, economic developers must trust the value of communication, collaboration, and partnership to better understand the most logical path ahead. Creating more opportunities for collaborative discussion between freight and economic development leaders can make a real difference in the region's economic future.

- Develop a Freight and Economic Competitiveness white paper to share insights on key multi-regional freight issues and how they can impact economic development and competitiveness in the future within the Freight Alley Core Megaregion. Topics to consider might include freight supportive land use strategies, aligning transportation technologies with state and local laws, site design and mitigation strategies to support freight and industrial development, freight workforce issues, and defining truck parking and staging areas for urban

operations (truck staging areas provide short-term parking for trucks to meet shifting pick-up and delivery times at businesses where on-site parking may not be available.)

- Convene a multi-state Freight and Economic Summit to bring together transportation, freight, and economic development leaders from the public and private sectors to discuss key freight challenges, opportunities for megaregional collaboration to address certain critical freight projects, and start a dialogue to consider future joint funding opportunities.
- Evaluate the potential opportunities of pursuing a U.S. Department of Commerce Economic Development Administration planning grant to assess specific benefits for regional businesses that could be achieved from the completion of the Chickamauga lock improvements; the benefits for regional freight dependent industry clusters that could result from the deployment of certain freight transportation technologies; and other freight movement improvement efforts to help the region prioritize future multi-jurisdictional projects and funding pursuits.
- Include freight sessions in future multi-regional economic development meetings to provide a platform for state and regional freight officials to discuss freight challenges and opportunities within economic development organizations.
- Identify multi-jurisdictional opportunities to engage economic developers in efforts to integrate freight planning activities with industrial park and business development activities, intermodal projects, and related planning opportunities.

APPENDIX A: COUNTIES IN THE FREIGHT ALLEY CORE MEGAREGION

Alabama Counties	Georgia Counties	Tennessee Counties
Blount	Bartow	Bedford
Calhoun	Catoosa	Bledsoe
Cherokee	Chattooga	Bradley
Cleburne	Cherokee	Cannon
DeKalb	Cobb	Coffee
Etowah	Dade	DeKalb
Jackson	Dawson	Franklin
Madison	DeKalb	Grundy
Marshall	Douglas	Hamilton
St. Clair	Fannin	Lincoln
	Floyd	Loudon
	Forsyth	Marion
	Fulton	Marshall
	Gilmer	McMinn
	Gordon	Meigs
	Gwinnett	Monroe
	Haralson	Moore
	Lumpkin	Polk
	Murray	Rhea
	Paulding	Rutherford
	Pickens	Sequatchie
	Polk	Van Buren
	Walker	Warren
	Whitfield	White

APPENDIX B: GLOSSARY

Acronym	Term
ATMS	Active Traffic Management Systems
ADAS	Advanced Driver Assistance Systems
ATCMTD	Advanced Transportation and Congestion Management Technologies Deployment
ALDOT	Alabama Department of Transportation
AEA	All-Electric Aircraft
AASHTO	American Association of State Highway Transportation Officials
ATRI	American Transportation Research Institute
AEDC	Arnold Engineering Development Complex
AI	Artificial Intelligence
B/C	Benefit-Cost
BUILD	Better Utilizing Investments to Leverage Development
CHCHGA-TPO	Chattanooga-Hamilton County-North Georgia Transportation Planning Organization
CREATE	Chicago Region Environmental and Transportation Efficiency Program
CDL	Commercial Driver's License
CMV	Commercial Motor Vehicle
CAGR	Compound Annual Growth Rate
CAV	Connected and Automated Vehicle
COVID-19	Coronavirus Disease 2019
DOT	Department of Transportation
ETC	Eastern Transportation Coalition
EV	Electric Vehicles
ELD	Electronic Logging Device
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FY	Fiscal Year
FRATIS+P	Freight Advanced Traveler Information System + Truck Parking
FAF4	Freight Analysis Framework Version 4
GM	General Motors
GIS	Geographic Information System
GDOT	Georgia Department of Transportation
GA Tech	Georgia Institute of Technology
GPS	Georgia Ports Authority GPA
GDP	Gross Domestic Product
GSP	Gross State Product
HOS	Hours of Service
ITS	Intelligent Transportation Services

Acronym	Term
IATA	International Air Transportation Association
LOS	Level of Service
MRO	Maintenance, Repair, and Overhaul operations
ICTF	Intermodal Container Transfer Facility
MPO	Metropolitan Planning Organizations
MAASTO	Mid America Association of State Transportation Officials
NAHB	National Association of Home Builders
NCHRP	National Cooperative Highway Research Program
NEP	National Economic Partnership
NAICS	North America Industrial Classification System
OEM	Original Equipment Manufacturer
PwC	PricewaterhouseCoopers
RFID	Radio Frequency Identification
R&D	Research and Development
RO-RO	Roll-on-Roll-off
SAE	Society of Automotive Engineers
SUV	sport utility vehicles
SCTG	Standard Classification of Transported Goods
TDOT	Tennessee Department of Transportation
FMCSA	the Federal Motor Carrier Safety Administration
TIGER	Transportation Investment Generating Economic Recovery
TPAS	Truck Parking Availability System
TPIMS	Truck Parking Information Management System
TEU	twenty-foot equivalent units
USACE	U.S. Army Corps of Engineers
UP	Union Pacific
USDA	United States Department of Agriculture
UAM	Urban Air Mobility
VMT	Vehicles Miles Traveled
V/C	Volume to Capacity
YKTA	Y-tec Keylex Toyotetsu Alabama

Literature Review

**National Economic Partnerships:
Freight Movement Along Freight Alley – The Greater
Chattanooga Region**

By

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Center for Quality Growth and Regional Development
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Contract with

ICF Incorporated, LLC.

In cooperation with

Federal Highway Administration
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Summary

This literature review summarizes all freight planning and truck parking studies conducted by MPOs and state DOTs within the Piedmont Atlantic megaregion. For each study, the summaries below describe the data sources and methodology used and resulting products. Where applicable, comparisons are drawn across the different MPO and DOT studies.

On the state level, Alabama, Georgia, and Tennessee DOTs have all published freight plans in the last ten years. Of these, only TDOT sponsored a study that focused specifically on truck parking facilities, including an analysis of illegal parking on ramps. For freight forecasting, the Tennessee Statewide Multimodal Freight Plan relied on Transearch data to predict commodity flows while the Alabama Statewide Freight Plan used the FHWA's Freight Analysis Framework (FAF). GDOT drew from both of these data sources in producing the Georgia Statewide Freight and Logistics Plan. From their analyses, all three states produced forecasts including breakdowns by movement type (inbound, outbound, internal, through traffic, etc.) and commodity.

Seven MPOs in Georgia, eight in Tennessee*, and only one in Alabama have conducted some level of freight planning study. Six of these studies were smaller and included as part of the MPO's long-range transportation plan while the remaining twelve were standalone freight plans. Over half of these studies relied on FAF data, with varying levels of modification, to produce their freight forecasts. Among the remaining studies, key data sources were the Georgia Statewide Freight Plan, Transearch freight flow data, and MPO and statewide travel demand models. Of the two project objectives, freight planning and truck parking, almost all of the MPO studies focused on the former. Only the Atlanta Regional Commission produced a separate assessment of truck parking, while the Gainesville-Hall and Memphis Urban Area MPOs included truck parking inventories as part of their freight plans.

For organizational purposes, each state's DOT studies are described, followed by that state's MPO-level freight studies. This is done to place the MPO-level studies in the context of statewide goals and analyses, as many MPOs drew on prior state DOT freight plans in conducting their own studies. The accompanying database also summarizes these studies in tabular form.

**Note – Only seven of the eight MPO-level studies in Tennessee are included in this document, as the Knoxville Regional Freight Movement Plan was unavailable on the TPO website as of September 2019.*

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Georgia

Georgia Department of Transportation (GDOT)

Georgia Statewide Freight and Logistics Plan: Truck Modal Profile (2011)

The GDOT statewide plan includes chapters describing truck-related infrastructure, economic forecasts for the state of Georgia, and truck parking needs, as well as multiple analyses of truck demand and forecasts. For the truck freight forecasts, GDOT relied on a combination of TRANSEARCH and Freight Analysis Framework data and the statewide travel demand model to produce two different forecasts for the year 2050. The forecasts are broken down by county, commodity, and direction of freight flow to offer more specific outlooks. The plan also describes a truck parking study with an assessment of truck parking demand and supply, including both public and private parking facilities.

Related objectives: Freight Planning, Truck Parking

Key data sources: FHWA Freight Analysis Framework, Global Insight TRANSEARCH data, American Transportation Research Institute, previous GDOT studies

Dougherty Area Regional Transportation Study MPO

Albany/Dougherty Freight Profile (2008)

The Dougherty Area Regional Transportation Study MPO used the Georgia Statewide Freight Plan to estimate freight tonnage for Dougherty County based on statewide data on freight tonnage and value combined with county-level data on freight value. The plan also estimates truck AADT for the year 2030 on each truck route in the area.

Related objective: Freight Planning

Key data sources: GDOT vehicle classification counts, Georgia Statewide Freight Plan, truck surveys from previous MPO studies

Atlanta Regional Commission

Atlanta Regional Freight Mobility Plan Update (2016)

The Atlanta Regional Commission (ARC) produced a Freight Mobility Plan in which it estimated freight tonnage for the region in 2040. The forecast was based on the FHWA Freight Analysis Framework version 3.5, but the study methodology is not described in detail.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework version 3.5, TRANSEARCH 2013 data

Atlanta Regional Truck Parking Assessment Study (2018)

ARC also conducted a study specifically focused on truck parking needs in the region. The study assembled truck parking data for the Metro Atlanta region from various sources, using online maps to address discrepancies between data sources. ARC conducted stakeholder interviews and truck driver surveys to locate privately-owned facilities that allow truck parking but have other primary uses as well as unauthorized truck parking locations. The parking facilities were sorted into tiers based on facility ownership and legality of parking locations, resulting in a truck parking inventory and GIS database. The FHWA truck parking demand model was used to estimate demand on all freight corridors in Metro Atlanta in 2045.

Related objective: Truck Parking

Key data sources: FHWA Jason's Law survey report, GDOT, Georgia Environmental Protection Division survey, private truck stop websites, truck parking smart phone apps (including Trucker's Friend National Truck Stop Directory and ATRI's Park My Truck)

Coastal Region MPO

CORE MPO Freight Study - Final Report (2015)

The Coastal Region (CORE) MPO conducted a freight study that disaggregated data from the FHWA Freight Analysis Framework to limit the scope to the CORE MPO area. Additionally, the study incorporated the MPO's travel demand model, Longitudinal Employer Household Dynamics data, and County Business Patterns. This data was used to identify freight districts within the MPO based on industry types and estimate freight tonnage and flows for the year 2040.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework version 3, US Census Bureau Longitudinal Employer Household Dynamics and County Business Patterns

Columbus-Phenix City Metropolitan Planning Organization (CPCMPO)

Columbus-Phenix City 2040 Long Range Transportation Plan (2014)

The CPCMPO incorporated freight planning and forecasting into its long range transportation plan using methods similar to those of the ARC. CPCMPO also modified the FHWA's Freight Analysis Framework data to produce 2020 and

2040 freight volume forecasts specific to the MPO, though the plan does not describe the details of this modification.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework

Gainesville-Hall Metropolitan Planning Organization

Gainesville-Hall Regional Freight Study Final Report (2018)

Gainesville-Hall MPO (GHMPO) completed a regional freight study similar to the ARC and CORE MPO. The report does not describe the details of the methodology for producing a truck parking inventory or freight flow forecasts but does note the choice to aggregate freight flow zones outside the state of Georgia into “super-regions.” GHMPO’s study uses GDOT’s statewide travel demand model and 2010 TRANSEARCH freight flow data to produce 2040 freight flow forecasts by tonnage for each regional trading partner. The report also includes a list of truck parking sites within the MPO but does not describe the data sources for this inventory.

Related objectives: Freight Planning, Truck Parking

Key data sources: GDOT Statewide Travel Demand Model, 2010 TRANSEARCH data

Hinesville Area Metropolitan Planning Organization

Hinesville Area MPO Regional Freight Plan (2017)

The Hinesville Area MPO (HAMPO) based its freight plan on the Freight Analysis Framework (FAF). Using methods similar to the ARC and CORE MPO, HAMPO disaggregated the FAF data to the county level to produce commodity flow forecasts specific to the MPO area for 2040. These forecasts include truck freight tonnage and value relative to rail and other freight modes, as well as a table of top trading partners. The plan does list truck parking as an MPO need, but no studies have been done to quantitatively assess inventory or demand.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework version 4.2

Macon Area Transportation Study

2040 Long Range Transportation Plan Update (2017)

The Macon Area Transportation Study MPO included a brief survey of Freight and Goods Movement in its long range transportation plan. The survey was sent to 43 freight companies in the county.

Related objective: Freight Planning

Key data sources: Freight and Goods Movement Survey

Tennessee

Tennessee Department of Transportation (TDOT)

Tennessee Statewide Multimodal Freight Plan (2018)

The Tennessee Statewide Multimodal Freight Plan offers freight flow forecasts for the year 2040, including a breakdown of mode and direction of the flows. The plan also describes top trading partners based on tonnage and value, as well as top import and export commodities. The methodology for these forecasts is not described in detail but is based on historical trends in commodity flows and employment in freight-related industries and includes consideration of global freight changes. Additionally, the plan cites a parking study completed by the University of Tennessee and Clemson University over ten years ago. This study produced a description of the parking supply along Tennessee interstates and estimated the parking shortfall at 1,460 spaces.

Related objectives: Freight Planning, Truck Parking

Key data sources: 2012 TRANSEARCH data, Woods & Poole employment data

Truck Parking Facilities and Ramp Parking: Role of Supply, Demand, and Ramp Characteristics (Cherry et al. 2016)

The research conducted by Cherry et al. included a manual inventory of truck parking on all non-urban interstates in the state, as well as an analysis of the correlation between different ramp characteristics and the prevalence of illegal truck parking. The manual parking inventory was completed between 12:00am and 5:00am on typical weekdays and included trucks parked in authorized and unauthorized locations. To collect data on the ramp characteristics, Cherry et al. used TDOT's Enhanced Tennessee Roadway Information System (E-TRIMS) and online sources such as Google Earth. Ramp characteristics used in the analysis included lane and shoulder widths, shoulder material, and the presence of lighting and No Parking signs. Additionally, a survey of 500 truck drivers was conducted to assess their perceptions of parking.

Related objective: Truck Parking

Key data sources: Jason's Law database, Google Earth imagery, Google Maps Street View, TDOT's Enhanced Tennessee Roadway Information System (E-TRIMS), ArcGIS Network Analyst Tool, comprehensive and short-form surveys

Chattanooga-Hamilton County/North Georgia Transportation Planning Organization

Chattanooga Regional Freight Profile (2011)

The Chattanooga Regional Freight Profile offers freight forecasts for commodity flows into and out of the MPO area for 2035, including a breakdown by mode, though the methodology and sources for these forecasts are not described in detail. Truck congestion hotspots in the area are identified by comparing congested segments in the overall roadway network with the truck route network. The profile also includes an assessment of freight impacts specifically due to the new Volkswagen plant in the area.

Related objective: Freight Planning

Key data sources: Prior planning studies (does not specify), Freight Forum, Transportation Club Luncheon

Bristol Tennessee/Virginia Urban Area Metropolitan Planning Organization

The Regional Multimodal Transportation Plan 2040 (2016)

The Bristol MPO included freight forecasts in its long range transportation plan but did not conduct its own analysis. Instead, it uses the 2040 statewide and national forecasts from the 2013 Freight Analysis Framework to provide context for the Bristol Tennessee/Virginia Urban Area.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework

Clarksville Urbanized Area Metropolitan Planning Organization

2040 Metropolitan Transportation Plan (2014)

Like the Macon Area Transportation Study MPO and the CPCMPO, the Clarksville Urbanized Area MPO included freight forecasting as part of its long range transportation plan. The area's freight forecasts are also based on the Freight Analysis Framework, but the plan does not describe the details of the analysis, offering only a qualitative description of the FAF forecasts.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework version 3

Jackson Area Metropolitan Planning Organization

Jackson 2045 Long Range Transportation Plan (2017)

The Jackson Area MPO incorporated freight forecasts into its long range transportation plan. The forecasts were based on the MPO's travel demand model, which divides the area into TAZs, forecasts population and employment for each, and then estimates traffic based on trip production and attraction for each zone. The model uses data from the Tennessee Statewide Model and Tennessee Roadway Information System, among others, and produced AADT truck forecasts for key routes in the MPO for the year 2045.

Related objective: Freight Planning

Key data sources: Tennessee Roadway Information System, Highway Performance Monitoring System, 2015 American Community Survey, Jackson-Madison County Schools System, and Tennessee Statewide Travel Demand Model

Kingsport Metropolitan Transportation Planning Organization

2040 Long Range Transportation Plan (2017)

The freight planning portion of the long range plan produced by the Kingsport Metropolitan Transportation Planning Organization (KMTPO) is similar to that of the Clarksville Urbanized Area. The forecasts are based on the FHWA Freight Analysis Framework, but the plan does not describe how the FAF data is disaggregated to the MPO level. The analysis resulted in 2045 AADT truck forecasts for the MPO, allowing for the identification of key freight corridors.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework version 3

Memphis Urban Area Metropolitan Planning Organization

Greater Memphis Regional Freight Plan (2017)

Like many other MPOs, including HAMPO in Georgia and KMTPO in Tennessee, the Memphis Urban Area MPO relied on the FHWA Freight Analysis Framework to study freight flows in its area. The FAF Data Tabulation Tool was used to study trends in freight tonnage and value by mode through 2025, which were combined with an analysis of external trends that could impact regional freight flows. The plan also included a survey of truck drivers and a preliminary count of

truck parking capacity at truck stops and rest areas in the region, resulting in a map and table of a basic truck parking inventory.

Related objectives: Freight Planning, Truck Parking

Key data sources: FHWA Freight Analysis Framework version 4

Nashville Area Metropolitan Planning Organization

Regional Freight and Goods Movement Study - Phase III (2014)

The Nashville Area MPO conducted a Regional Freight and Goods Movement Study in which it produced 2040 freight tonnage forecasts for the region by commodity. The analysis was based on the IHS/Global Insight TRANSEARCH database, but the study does not describe the methods for disaggregating this data to the MPO-level.

Related objective: Freight Planning

Key data sources: TDOT (not specified), IHS/Global Insight TRANSEARCH database

Alabama

Alabama Department of Transportation (ALDOT)

Alabama Statewide Freight Plan (2017)

The Alabama Statewide Freight Plan offers an analysis of the existing and future freight network and truck parking needs, as well as commodity flow projections for the state. The freight network analysis includes maps and descriptions of roadway classifications and the locations of intermodal connection points, freight generators, and existing and projected bottlenecks. Freight generators were identified based on ALDOT data on agricultural, forestry, and energy facilities and longitudinal employer-household dynamics workforce data. The truck parking inventory combined data on public rest stops and welcome centers with a web search to identify private parking facilities, resulting in a truck parking map and table noting the presence of some facility amenities. Finally, the commodity flow projections were based on the Freight Analysis Framework. These projections included the top freight modes by tonnage and top commodity flows for each mode for 2012 and 2040. The plan also takes into consideration the impact of environmental regulations on coal demand and what this could mean for Alabama's freight industry.

Related objectives: Freight Planning, Truck Parking

Key data sources: FHWA Freight Analysis Framework version 4.3, ALDOT Highway Performance Monitoring System, US Census Bureau Longitudinal Employer Household Dynamics, state data on public rest stops and welcome centers

Regional Planning Commission of Greater Birmingham

Birmingham Regional Freight Plan (2019)

Like the Alabama Statewide Freight Plan, the Birmingham Regional Freight Plan also relied on the Freight Analysis Framework to study freight flows in the region. The analysis used FAF data for the Birmingham-Hoover-Talladega CSA and produced a graph of the top commodities and a map of the top trading partners for the CSA. The plan also recommends a truck parking study for the region, but no such study has been completed to date.

Related objective: Freight Planning

Key data sources: FHWA Freight Analysis Framework version 4

References

- 2040 Long Range Transportation Plan
2017. Kingsport Metropolitan Transportation Planning Organization.
- 2040 Long Range Transportation Plan Update
2017. Macon Area Transportation Study. <http://mats2040.org/lrtp/chapter-9-freight-transportation-network-trucks-rail-aviation-ports/>.
- 2040 Metropolitan Transportation Plan
2014. Clarksville Urbanized Area Metropolitan Planning Organization.
- Alabama Statewide Freight Plan
2017. Alabama Department of Transportation.
- Albany/Dougherty Freight Profile
2008. Dougherty Area Regional Transportation Study MPO.
http://dartsmo.org/wp-content/uploads/2015/10/Albany_Final_Report_04-03-08.pdf.
- Atlanta Regional Freight Mobility Plan Update
2016. Atlanta Regional Commission. <https://cdn.atlantaregional.org/wp-content/uploads/2017/03/atlanta-regional-freight-mobility-plan-update-2016.pdf>.
- Atlanta Regional Truck Parking Assessment Study
2018. Atlanta Regional Commission.
- Birmingham Regional Freight Plan
2019. Regional Planning Commission of Greater Birmingham.
- Chattanooga Regional Freight Profile
2011. Chattanooga-Hamilton County/North Georgia Transportation Planning Organization.
- Cherry, Christopher, Alexandra Boggs, Nicolo Franceschetti, Ziwen Ling, and Shashi Nambisan
2016 Truck Parking Facilities and Ramp Parking: Role of Supply, Demand, and Ramp. Tennessee Department of Transportation.
- Columbus-Phenix City 2040 Long Range Transportation Plan
2014. Columbus-Phenix City Metropolitan Planning Organization (CPCMPO).
- CORE MPO Freight Study - Final Report
2015. Coastal Region MPO.
<https://www.thempc.org/docs/lit/corempo/plans/freighttransportation/2015/dec/finreport.pdf>.

- Gainesville-Hall Regional Freight Study Final Report
2018. Gainesville-Hall Metropolitan Planning Organization.
- Georgia Statewide Freight and Logistics Plan: Truck Modal Profile
2011. Georgia Department of Transportation.
- Greater Memphis Regional Freight Plan
2017. Memphis Urban Area Metropolitan Planning Organization.
- Hinesville Area MPO Regional Freight Plan
2017. Hinesville Area Metropolitan Planning Organization.
- Jackson 2045 Long Range Transportation Plan
2017. Jackson Area Metropolitan Planning Organization.
- Regional Freight and Goods Movement Study - Phase III
2014. Nashville Area Metropolitan Planning Organization.
- Tennessee Statewide Multimodal Freight Plan
2018. Tennessee Department of Transportation.
- The Regional Multimodal Transportation Plan 2040
2016. Bristol Tennessee/Virginia Urban Area Metropolitan Planning Organization.



INSPIRING RESPONSIBLE GROWTH

FREIGHT MOVEMENT ALONG FREIGHT ALLEY THE GREATER CHATTANOOGA REGION

FEBRUARY 2020



THRIVE
Regional Partnership

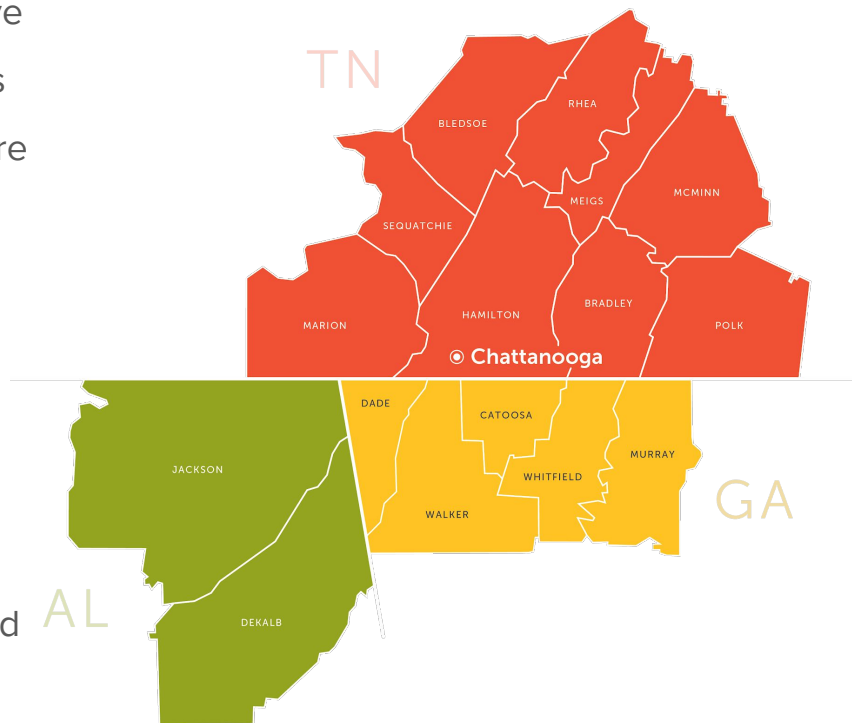


Thrive Regional Partnership (Thrive), an independent 501(c)(3) nonprofit corporation, inspires responsible growth through conversation, connection, and collaboration in the tri-state, greater Chattanooga region.

About Thrive

Thrive is an unprecedented, collaborative organization uniting stakeholders across the greater Chattanooga region to ensure that as we grow in industry, prosperity, and population, we also preserve community and natural character for generations to come.

Our footprint encompasses one million people from three states, 16 counties and 79 municipalities across 6,648 square miles.



Freight Movement Along Freight Alley

The Greater Chattanooga Region

FREIGHT PARTNER INPUT SUMMARY REPORT

Prepared for:
Tennessee Department of Transportation
Nashville, TN 37243

and

Federal Highway Administration
Washington, D.C. 20590

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on behalf of

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P.O. Box 1008
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February 2020

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Appendix B: Suggestions for Inclusion in the Regional Freight Planning Process

Appendix C: Comments Regarding Additional Focus Areas

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EXECUTIVE SUMMARY

As part of the *Freight Movement Along Freight Alley - The Greater Chattanooga Region* study led by the Tennessee Department of Transportation (TDOT), Thrive Regional Partnership engaged with dozens of public and private sector partners to gather qualitative data on key freight issues and project needs as they relate to specific industry categories and truck parking in the region.

Six categories of freight industry stakeholders were identified, and partners within the identified categories were asked to complete a survey. With respect to content, the survey was designed to address questions that relate to the movement of goods through the greater Chattanooga and the Piedmont-Atlantic megaregion, as well as truck parking availability. This report presents a top-level synopsis of the survey findings.

KEY RESULTS

The majority of those surveyed believe the **largest issues and challenges** affecting freight movement in the tri-state, greater Chattanooga region over the next five to ten years are:

- Road/Highway Congestion
- Truck Parking
- Infrastructure Deterioration

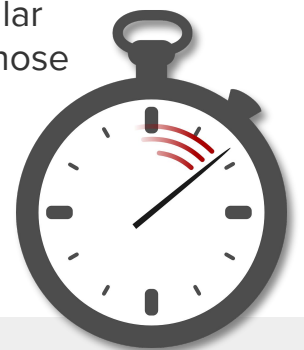
The majority of respondents agree the **greatest strengths** of the current freight transportation system in the greater Chattanooga region are:

- Geographic Location
- Access to Interstates
- Business Base

**MORE THAN
92%**

of respondents say they move freight through the I-75/I-24/I-59 corridor of the greater Chattanooga area multiple times per day, daily, or almost every day.

Roughly 77% of those surveyed need truck parking on a regular basis. The majority of those say it takes them **more than an hour** to find truck parking in the greater Chattanooga region.



“There’s effective synergy in this team representing the public and private sector. Together, we’re able to leverage our combined spheres of influence. I believe such a partnership will result in solutions that alleviate congestion, as well as enhance safety, productivity, and quality of life.

- Debra Anne Stone
Thrive Freight Mobility Coalition Chair

BACKGROUND

FREIGHT MOBILITY COALITION

In early 2018, Thrive convened a group of freight users, trucking industry representatives, political leaders, and transportation planning officials to identify and address key freight problems in the region.

Today, Thrive's Freight Mobility Coalition is built of more than 40 public and private stakeholders - State DOTs, Local MPOs, and private freight industry partners - from across the tri-state region.

“By partnering with public and private partners across our tri-state area, TDOT was able to leverage a vision for multi-state, regional collaboration that resulted in securing these federal dollars to the benefit of the entire region.

- Bridgett Massengill
Thrive President/CEO

NATIONAL ECONOMIC PARTNERSHIP

The National Economic Partnerships for Innovative Approaches to Multi-Jurisdictional Coordination is a program led by the Federal Highway Administration to encourage areas of the country to work together and collaborate on issues that span across jurisdictional boundaries, such as freight, safety, congestion, infrastructure, economic development; all of which are often complex in nature.

Regional leaders in freight and transportation, such as TDOT, GDOT, and ALDOT, have been convening under Thrive's Freight Mobility Coalition to set the foundation for future collaboration and progress towards common goals. This recognition of the need to address freight as a region led to the greater Chattanooga region being one of only four megaregions nationwide selected to receive this grant.

SURVEY GOALS

- Understand the shared issues and needs of freight communities/stakeholders, in order to affect mega-regional policy implications and recommendations
- Obtain industry buy-in in future mega-regional policy implications and recommendations resulting from the study

METHODOLOGY

THRIVE OBJECTIVES

- Finalize questions with TDOT, Georgia Tech, and FHWA.
- Engage 30 freight industry partners to gather qualitative input on key freight issues and truck parking needs in the region.
- Produce a summary report of all feedback obtained for inclusion in the final project deliverables.

TARGETED INDUSTRY CATEGORIES

- Private Fleet
- Truck Load
- Less Than Truck Load (LTL)
- Third Party Logistics (3PL)
- Intermodal
- Stakeholder/Manufacturer

DATA COLLECTION CRITERIA

A minimum of 30 freight industry partners was established as a data collection target for the survey.

Those eligible to be surveyed conduct business in the greater Chattanooga area and/or the Piedmont-Atlantic megaregion and rely on the transportation system as part of their business model.



RESULTS

Thrive's Freight Mobility Survey exceeded the stated participation goal by 30% with responses logged from 39 partners including a mix of Drivers, Owner/Operators, Fleet Managers, and Executives.

It is important to note that survey responses were not weighted or expanded so that inferences could be made beyond the current scope of work.

INDUSTRY SECTOR PARTICIPATION

Respondents were presented with six industry sector categories.

Figure 1 provides the list of categories along with a breakdown of partner participation in each category. The number in parentheses next to each category represents the number of respondents that provided an answer.

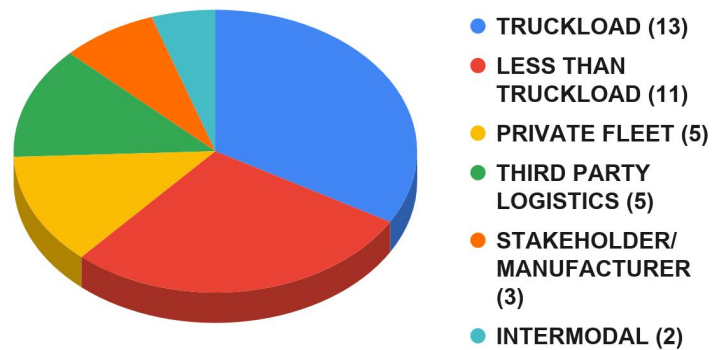


Figure 1. Survey Participation by Category

PRIMARY GOODS HAULED

Respondents were next asked to identify the primary goods they or their drivers typically haul. The responses are listed below. The number in parentheses represents the percentage of total responses received.

- General/Freight All Kinds (30.7%)
- Agriculture, Food and Beverage (23.1%)
- Automotive and Parts (12.8%)
- Textiles and Garments (7.7%)
- Chemicals, Plastics, and Rubber (7.7%)
- Fabricated Metal (5.1%)
- Electrical Appliances (5.1%)
- Furniture, Apparel (2.6%)
- Paper Printing (2.6%)
- Pharma/Medical Supplies (2.6%)

It is noteworthy that respondents' answers show **General/Freight All Kinds** and **Agriculture, Food and Beverage** together make up nearly 54% of the primary goods they haul. Figure 2 charts the totals for each type of primary good chosen. Two types of goods did not receive any responses, Aviation and Electronics and Telecommunication Equipment.

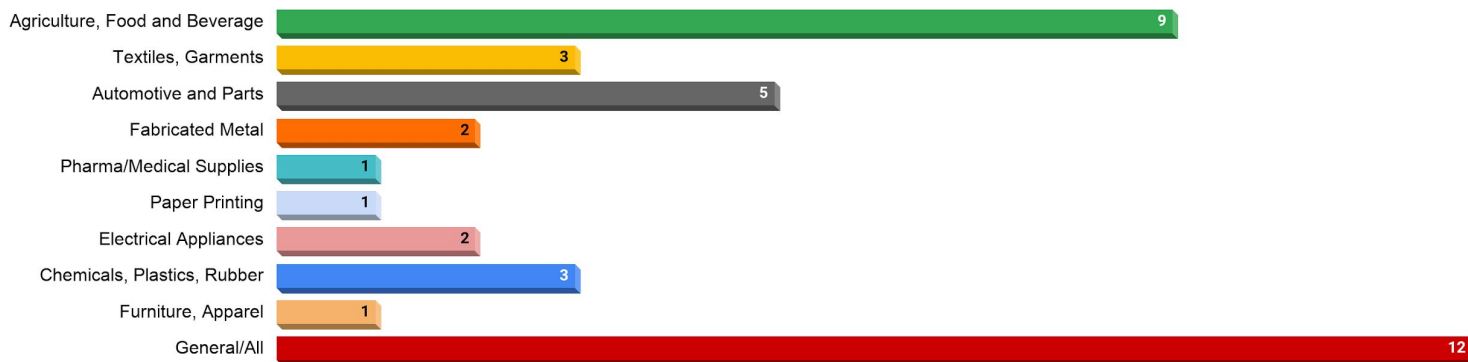


Figure 2. Primary Goods Hauled by Type

AVERAGE LENGTH OF HAUL

The next section of the survey asked respondents to indicate their average length of haul.

Options included:

- Local (less than 100 miles)
- Regional (100-400 miles per trip)
- Inter-regional (500-999 miles per trip)
- Long-haul (1,000+ miles per trip)

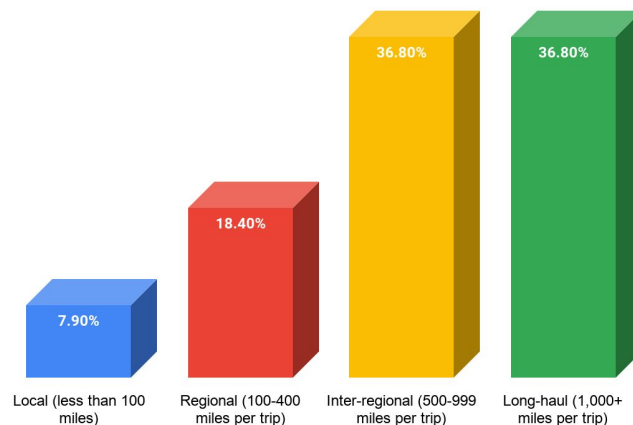


Figure 3. Length of Average Haul by Trip

Figure 3 provides a summary of respondents' answers. Fourteen of those surveyed (36.8%) chose Regional to best describe their average trip length. Fourteen others selected Inter-regional, while 18.4% reported long-haul trips. Three respondents (7.9%) qualified their trip averages as Local, or less than 100 miles.

FREIGHT FREQUENCY ALONG THE I-75/I-24/I-59 CORRIDOR

Survey respondents were asked how often they or their customers move freight through the **I-75/I-24/I-59 corridor** of the greater Chattanooga region. **36 respondents** said they **move freight daily**, or almost every day. Several of those said they move freight multiple times per day. The remaining three respondents are moving freight much less often, just a few times per month.

FREIGHT ROUTE USAGE ALONG THE CORRIDOR

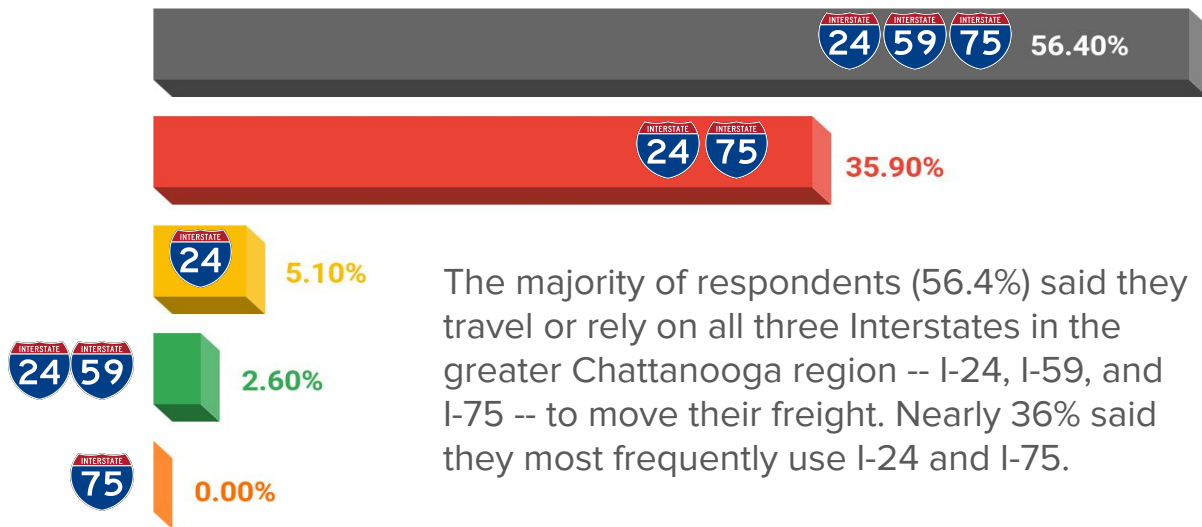


Figure 4. Percentage of Freight Routes Used

TIMING OF FREIGHT MOVEMENT

Figure 5 presents the total number of respondents moving freight through the region at each of six potential time periods. The survey indicates 9am-3pm as the busiest time period.

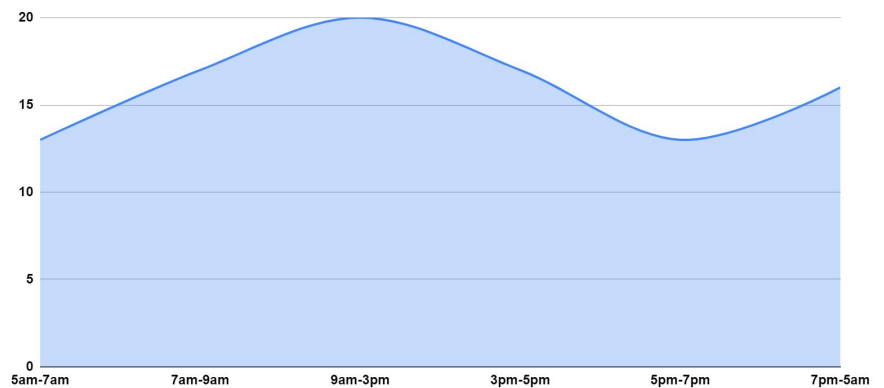


Figure 5. Freight Movement by Time of Day

CONGESTION AND BOTTLENECKS

Respondents were asked if they typically experience travel delays (20+ minutes) due to congestion in the greater Chattanooga region. The overwhelming majority (92.3%) said yes.

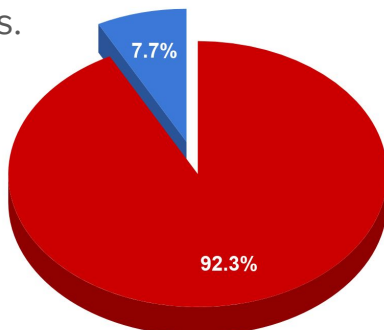


Figure 6. Travel Delays Greater Than 20 Minutes

When asked, if given the option, if they would avoid the I-75/I-24/I-59 interchanges altogether, 41% said no, they must go through Chattanooga.

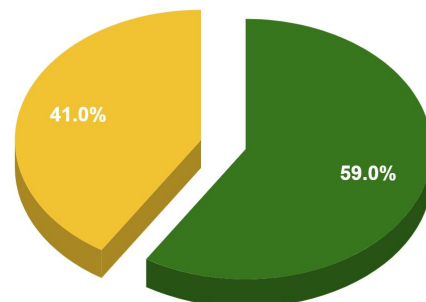


Figure 7. Preferred Avoidance of Interchanges

TRUCK PARKING ANALYSIS

Respondents were asked a series of questions specific to truck parking availability and usage within the greater Chattanooga region.

Do you often have to find temporary parking within the region for staging before or after a scheduled pick-up/drop-off?

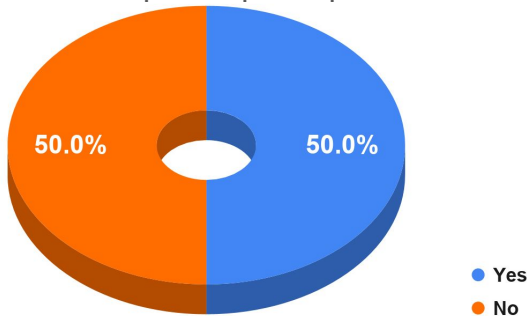


Figure 8. Temporary Parking Needs
(36 responses)

How often do you need truck parking in the greater Chattanooga region?

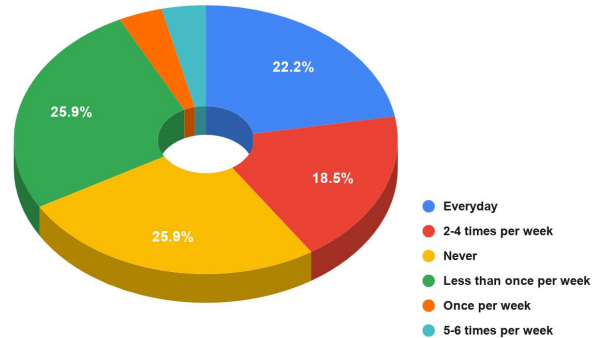


Figure 9. Frequency of Truck Parking Needs
(37 responses)

How do you usually plan to find parking?

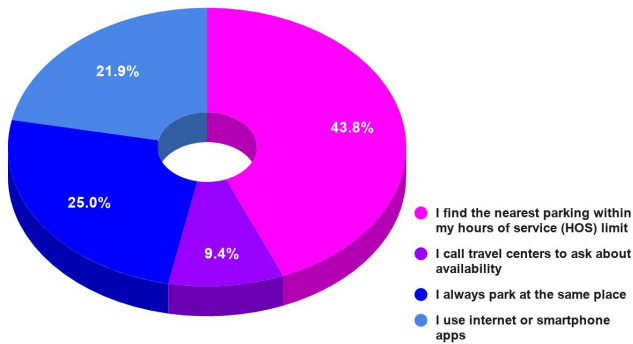


Figure 10. Methods for Finding Available Parking
(31 responses)

Does your company allow non-company trucks to park overnight on your property?

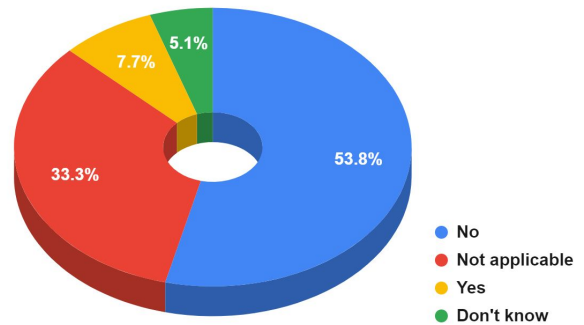


Figure 11. Percentage of Companies Sharing Parking Space

How far in advance do you plan your parking location?

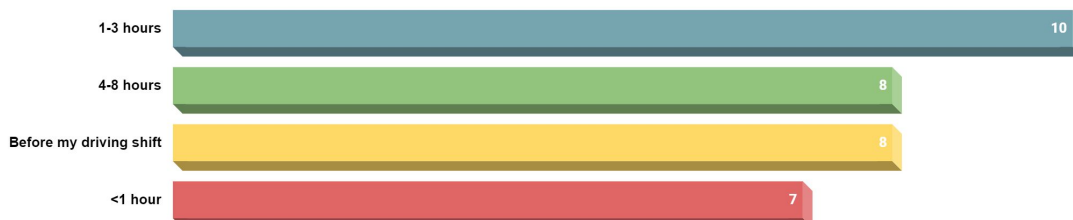
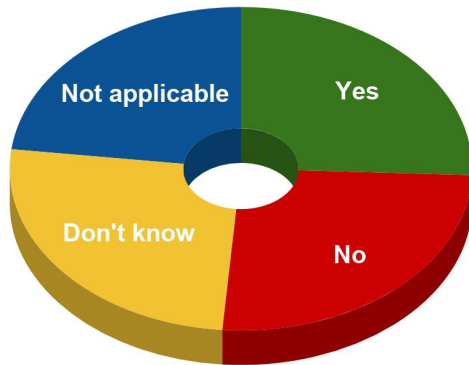


Figure 12. Planning Time to Locate Parking
(33 responses)

When you are making deliveries or picking up within the greater Chattanooga region, do those locations allow you to take your HOS break on their property?



- **Yes (25.6%)**
- **No (25.6%)**
- **Don't know (25.6%)**
- **Not applicable (23.1%)**

Figure 13. Percentage of Properties Allowing Hours of Service (HOS) Breaks

On average, how long does it take for you to find truck parking in the greater Chattanooga region?

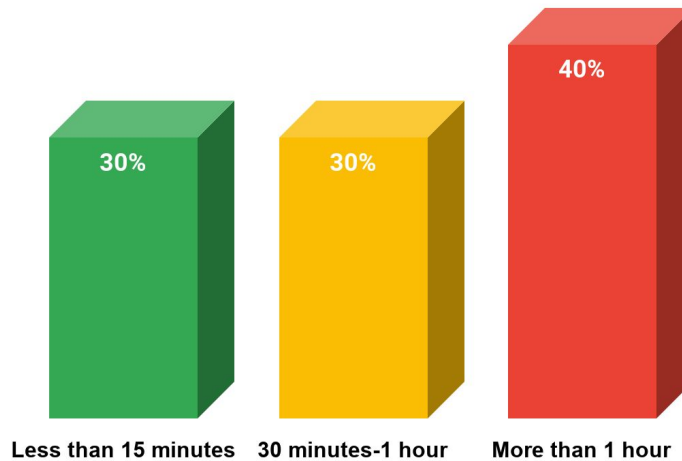


Figure 14. Time Commitment to Find Available Truck Parking (30 responses)

Have you or your company experienced economic loss as a result of inadequate truck parking?

- 13 respondents said **YES** (37.1%)
- 13 respondents said **NO** (37.1%)
- 9 said **DON'T KNOW** (25.7%)

Have you or your company's drivers experienced safety concerns as a result of inadequate truck parking?

- 18 respondents said **YES** (51.4%)
- 7 respondents said **NO** (20%)
- 10 said **DON'T KNOW** (28.6%)



EMPLOYEE DRIVERS

18 out of 39 respondents describe themselves as an 'employee driver'.

At least half of drivers surveyed say **congestion** and **truck parking** are the biggest issues affecting freight movement in the greater Chattanooga region in the next five to ten years.

89% of responding drivers say they move freight through the I-75/I-24/I-59 corridor of the greater Chattanooga region **almost every day**.

50% of participating drivers say a **regional vision for freight transportation** is one of the greatest strengths of the current freight transportation system in the greater Chattanooga region

Employee drivers **unanimously agree** that they typically experience **travel delays (20+ minutes) due to congestion** in the region.

ADDRESSING FUTURE FREIGHT FLOW

Respondents were asked to choose three preferred options to address future freight flow needs in the greater Chattanooga region. **Widening I-75 and I-24 by at least one lane** in each direction were the top two options, netting 76.9% and 74.4% of the votes respectively. **Managed lane strategies**, like HOV or Express lanes, was the third most chosen option, with 56.4%. Other options included: improved commuter options, toll lanes routing freight around bottlenecks, intermodal facilities, and rail efficiency.

FREIGHT ALLEY'S TOP CHALLENGES

Respondents were asked to choose the three (3) largest issues and challenges affecting freight movement in the greater Chattanooga region in the next five to ten years. The following rankings are based on total votes.

1. Road/Highway Congestion
2. Truck Parking
3. Infrastructure Deterioration
4. Freight Corridor Planning
- Population Growth
6. Funding for Infrastructure Improvements
7. Changing Economy
- Government Regulations
9. Fuel Costs
- Access to Infrastructure
11. Political/Jurisdictional Cooperation
- Multiple Organization Cooperation
- Land Use
- Rail Capacity
- Construction
- Distracted Driving

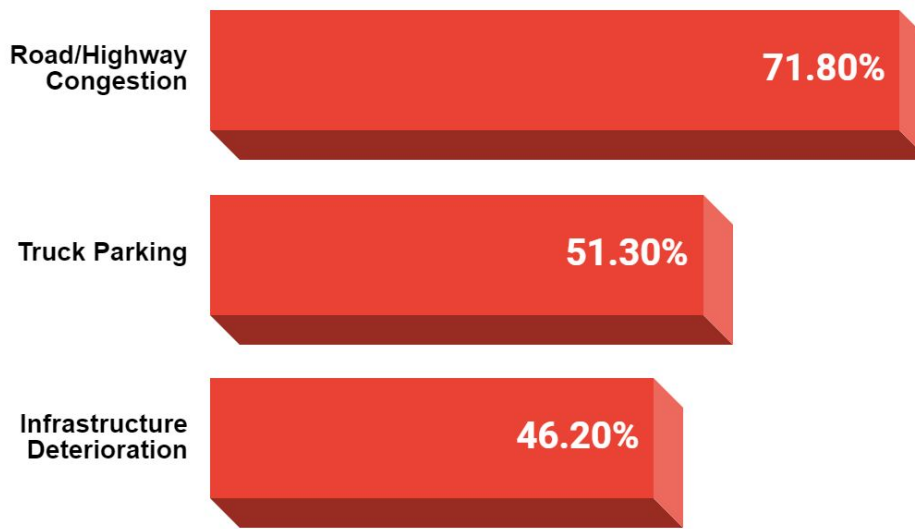


Figure 15. Percentage of Votes for Top Three Identified Issues/Challenges

MOST IMPORTANT FREIGHT ISSUE

Respondents were asked to choose the most important freight issue to their organization over the next five to ten years. The majority of survey responses indicated **reducing congestion**.

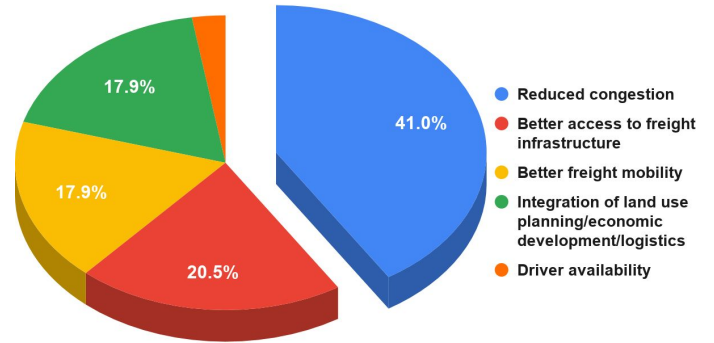


Figure 16. Vote Percentage for Most Important Issue

FREIGHT ALLEY'S GREATEST STRENGTHS

Respondents were asked to choose the three (3) greatest strengths of the current transportation system in the greater Chattanooga region. The following rankings are based on total votes.

1. Geographic Location
2. Access to Interstates
3. Business Base
4. Regional Vision for Freight Transportation
5. Variety of Accessible Modes
6. Regional System of Infrastructure Modes
7. Regional Cooperation
Access & Railroad Capacity
9. Intermodal Facilities
10. Access to Ports
Airport

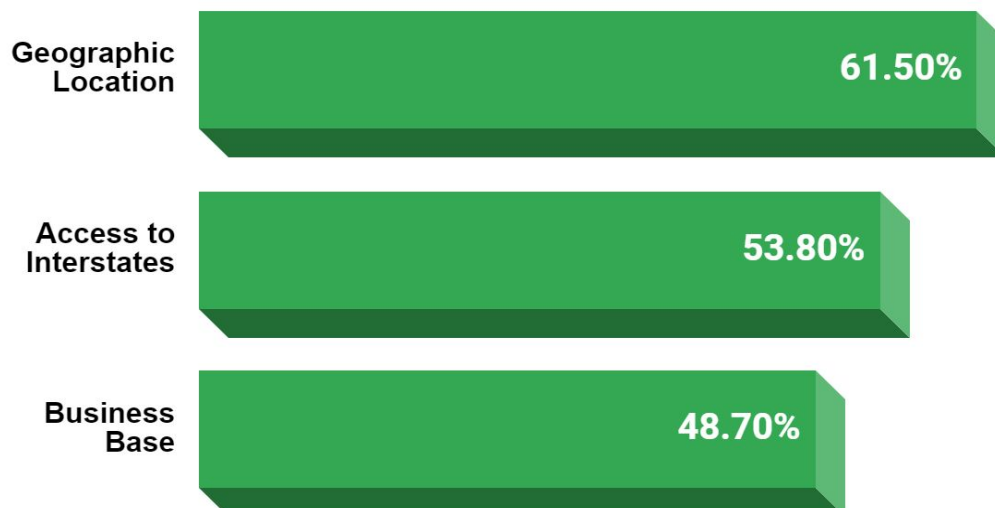


Figure 17. Percentage of Votes for Top Three Greatest Strengths

OPPORTUNITIES TO SUPPORT ECONOMIC GROWTH

Respondents were presented with a list of seven potential opportunities in the greater Chattanooga region to support economic growth through freight mobility. They were asked to choose as many as apply. Below are their rankings along with the percentage of votes received.

1. Freight Corridor Development **(61.5%)**
2. Investment in Infrastructure **(51.3%)**
3. Regional Collaboration & Partnerships **(43.6%)**
4. Presence of Private Sector in Planning Process **(25.6%)**
5. Intermodal Connections **(17.9%)**
6. Location of Development **(15.4%)**
7. Access to Rail **(12.8%)**

CRITICAL ACTIONS FOR SUCCESS

Respondents were presented with a list of 11 potential actions or decisions and asked to choose the three they believe most critical for the future freight flows and a truck parking plan to be successful in the greater Chattanooga region. Below are respondents' rankings along with the percentage of votes received.

1. Long-range Vision & Planning **(51.3%)**
2. Long-term Commitment to Plan Updates **(46.2%)**
3. Key Freight Corridor(s) Identification **(38.5%)**
4. Regional Coordination/Cooperation of Public & Private Sectors **(33.3%)**
5. Implementation Strategies **(25.6%)**
6. Funding plan **(23.1%)**
7. Identification of Development Growth Areas **(20.5%)**
8. Investment Plan for All Modes **(17.9%)**
9. Commitment from Public & Private Sectors **(15.4%)**
10. Stewardship of Plan for Implementation **(10.3%)**
11. Adoption by Local Governments **(2.6%)**

CONCLUSION

Safe and efficient freight movement along Freight Alley, specifically in the tri-state, greater Chattanooga region, is not contained by one state's economy. This region is a manufacturing powerhouse and major distribution and logistics linchpin for the Southeast and North America.

Current conditions lead to congested freight corridors, bottlenecks, and limited truck parking. Trends suggest these concerns will become more significant in the future. To improve mobility and strengthen economic development, regional strategies spanning across state lines need to be implemented to manage freight and infrastructure issues.

By standing as a model for multi-jurisdictional collaboration, this group has the potential to establish standards, best practices, and a framework by which other areas can follow, in order to plan and prioritize multi-state projects that best serve the needs of their communities and regions as a whole.

Thrive will continue to serve as the convening arm of the consortium of public, private, and nonprofit partners across the tri-state, 16-county Chattanooga region.

“We know building connectivity through communication and nurturing unconventional relationships will have positive effects on future growth decisions in Thrive’s region, the Southeast, and the nation as a whole.

- Shannon Millsaps
Thrive Operations Manager



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APPENDICES

Appendix A

Recommendations Submitted Regarding Improvements to ELD Requirements

In the course of Thrive's engagement with freight industry partners around the region, we asked respondents if they had any specific recommendations to improve the effectiveness of the ELD requirements of truck drivers. Fourteen individuals, roughly 36%, chose to respond. Their answers are presented below as they were received. No changes have been made.

flexibility in the sleeper berth
There needs to be a provision in place so that loading and unloading would not count on the drivers total time.
FMCSA has offered some reasonable adjustments. They need to be implemented.
Split sleeper
Get rid of the 30 minute break
split sleeper berth time
Do away with the movement of the truck that's put you on drive at 5mph
Go back to aobr. Let drivers have some room for movements
Paper log
I would like to see a 70 hour, 7 day week
Go back to paper logs
Make thirty minute break more flexible
Split sleeper berth
Extend HOS by one hour.

Appendix B

Suggestions for Inclusion in the Regional Freight Planning Process

Survey respondents were given the option to suggest specific groups or individuals who they felt should be included in the regional freight planning process. Nine individuals, approximately 23%, responded. Their answers are presented below as they were received. No changes have been made.

Thrive Regional Partnership
Trucking companies and shippers
Trucking companies
Drivers
Over the road trucking companies
Local business, and Company Representative's
More companies and fewer gov't. entities
Motor Carriers, Freight Brokers, Rail and Water Carriers and Shippers
As many drivers as possible

Appendix C

Comments Regarding Additional Focus Areas

The final question presented to survey respondents was simply, 'What should we know that we haven't asked?' Eight individuals, just over 20%, responded. Their comments are presented below as they were received. No changes have been made.

Existing State Routes - should be "modernized" to encourage more commuter travel to avoid the interstates

The impact of distracted driving is still not completely known and needs to be continually addressed.

Should a connector be built connecting I 75 to I 59? YES
--

There is almost no parking

Nashville and Memphis traffic

Talk with the people who drive it

Overall thru out the Country I see 3 lane Highways during rush hour traffic. And with HOV lane restrictions and far right lane for on and off traffic your chocked down to one travel lane with minimal resistance. Are HOV lanes as relevant as when first designed, could they be opened up to all traffic to help flow ?

Driver input



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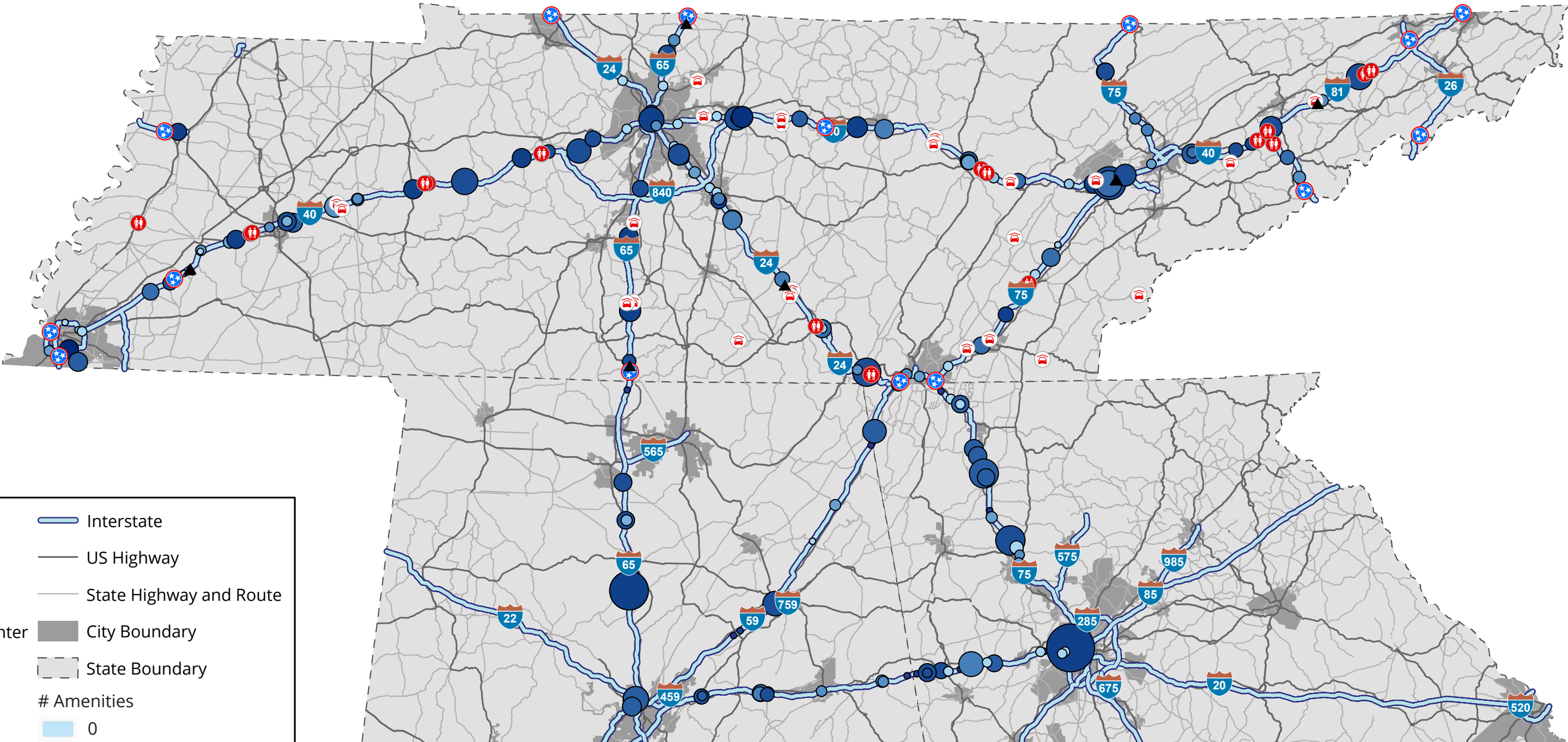
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Parking locations are represented by a dot and the amount of parking spaces are depicted by the size of the dot. Location amenities are shown by shades of blue, a darker shade means a higher number of amenities.

Tennessee Truck Parking

Including major corridors in Georgia and Alabama

70 Miles



▲ Weigh Scale	— Interstate
🚚 Parking Area	— US Highway
🚻 Rest Area	— State Highway and Route
🌟 Welcome Center	■ City Boundary
	▬ State Boundary
# Parking Spaces	# Amenities
● ≤10	0
● ≤50	0-12
● ≤100	12
● ≤200	
● ≤411	

N

Appendix E: NEP Project Tasks

Task 1: Project Management and Kick-Off Meeting
Task 2: Consultant Selection
Task 3: Quarterly Reporting
Task 4: Literature Review
Task 5: In-Depth Industry Clustering Analysis, Regional Advantages and Spatial Structure
Task 6: Freight Partner Interviews
Task 7: Truck Parking Survey
Task 8: Truck Parking Locator Maps
Tasks 9A and B: Validation of the Study, Transferability of Proposed Work as a Resource, and Marketing of the Study
Task 10: Final Report

TDOT Completed
A Combination of Georgia Tech and Consultant Completed
Thrive Regional Partnership Completed
Georgia Tech Completed
A Combination of TDOT, Consultant, and Other Partners Completed