

Georgia's Freight Infrastructure:

A Business-Focused Planning Analysis

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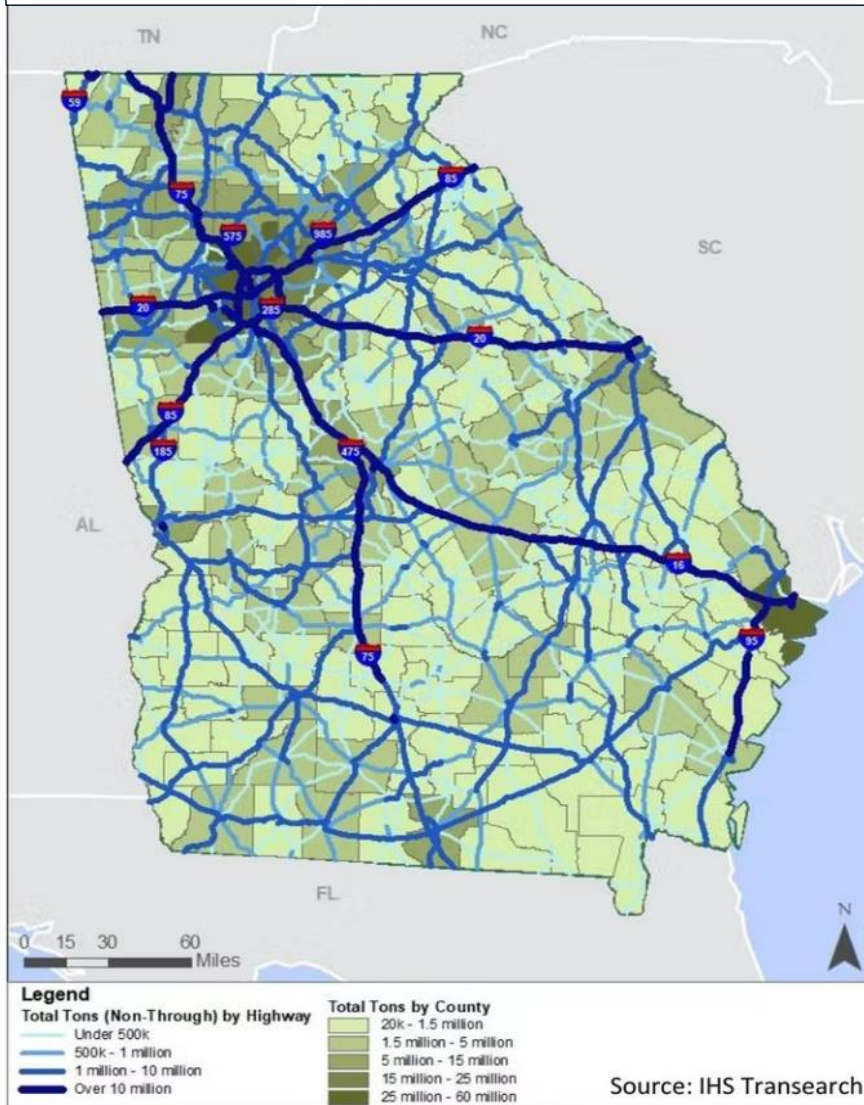
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Georgia's Freight-Driven Economy

Georgia is the premier state in which to do business and has held this spot for the last 10 years¹. In FY23 alone, Governor Kemp and Georgia Department of Economic Development announced another record-breaking economic development year with more than \$24 billion in private investments that will create 38,400 new jobs through 426 company expansions or new locations².

Figure 1: Tonnage of Freight Moving on GDOT's State Road Network (2019)



Of those, \$21.7 billion (90%) are logistics-enabled companies – businesses that require inbound and outbound transportation services to operate, employ Georgians, and generate profit. A major contributor to this success has been the strategic infrastructure investments facilitating the movement of people and goods throughout the state. Because of this robust multi-modal network, transportation costs for those doing business in Georgia are among the lowest compared to other Southeast states³. **Figure 1** maps both the total tonnage moved on Georgia's state roadway network as well as counties where tonnage originates or is destined.

Georgia's economy is strong and diversified including three primary industries that rely most on Georgia's transportation infrastructure based on the

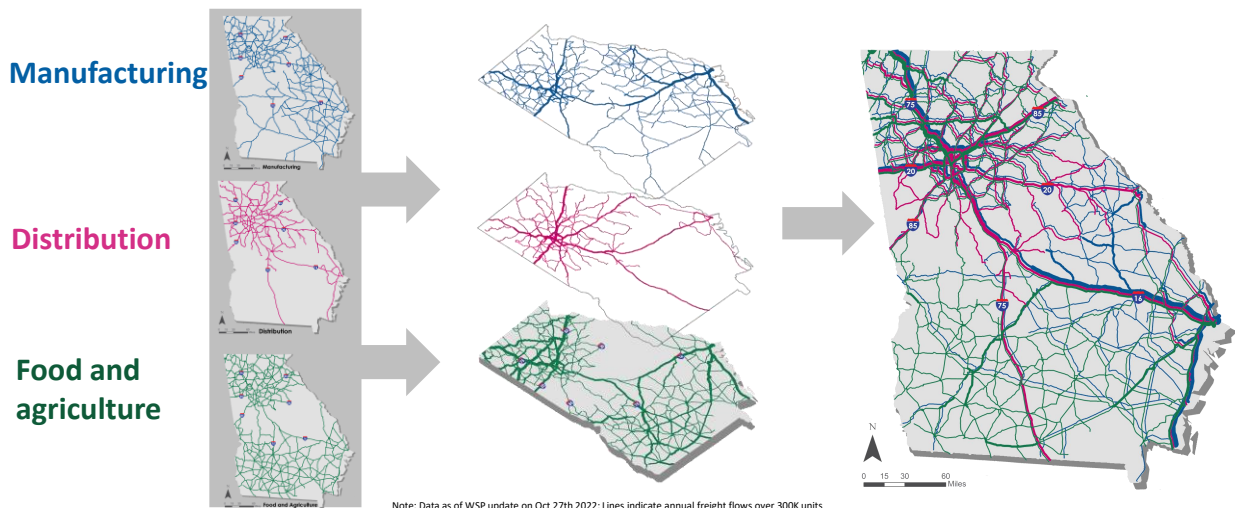
¹ Source: AreaDevelopment.com, 2022 Top States for Doing Business Provide an Environment for Business Growth

² Source: Governor Brian P. Kemp Office of the Governor August 8, 2023 Press Release Gov. Kemp Georgia Breaks Economic Development Records for Third Year in a Row

³ Ranking based on average of hourly mean wage for heavy and tractor-trailer truck drivers, monthly retail diesel prices, and state-to-state flatbed carrier spot DAT rates

amount of freight moved: distribution, manufacturing, and food and agriculture. This freight relies on trucking to transport approximately 80 percent of commodities and finished goods from origin to destination. To understand these and other cargoes moving on Georgia’s roadway network, GDOT utilized more than two dozen publicly available and procured data sources, many of which are populated by private sector business which also use these same data sources to inform their own logistics-related operational and strategic decisions. **Figure 2** below indicates the routes on GDOT’s State roadway network that are most heavily relied on by Georgia’s primary industries, indicated by these datasets.

Figure 2: Freight of Georgia’s Key Industries Moving on GDOT’s State Road Network



These industries currently make up more than 60 percent⁴ of goods movement in Georgia and are projected to see a significant increase in freight tonnage by 2050.

Food and Agriculture

- Up to 10 Thousand Units
- Up to 50 Thousand Units
- Up to 100 Thousand Units

Manufacturing

- Up to 10 Thousand Units
- Up to 50 Thousand Units
- Up to 100 Thousand Units
- Up to 250 Thousand Units
- Up to 500 Thousand Units

Distribution

- Up to 10 Thousand Units
- Up to 50 Thousand Units
- Up to 100 Thousand Units
- Up to 250 Thousand Units
- Up to 500 Thousand Units

In addition to the accelerating freight tonnage growth, there are emerging trends affecting the future of freight nationally and Georgia specifically. These trends have implications for businesses and infrastructure owners and can inform how Georgia responds and stays ahead for businesses. Two of the two most notable trends are as follows:

- **E-commerce and facility expansion** which is steadily changing Georgia’s freight distribution network. E-commerce requires three times⁵ the warehouse space to move the same volume as traditional retail, resulting in additional warehouse and real-estate demand. Additionally, reverse logistics – returns of purchased goods – has unique challenges and complexities for e-commerce retailers and supply chain partners. For example, reverse logistics requires an

⁴ Georgia Statewide Travel Demand Model, S&P Global Transearch

⁵ Source: Department of Commerce; Prologis

average of up to 20 percent more space⁶. Most of the required commercial real estate is also more likely to be near population and consumption centers, as opposed to traditional remote sites, which adds to traffic volumes and congestion in metropolitan areas. Between 2012 and 2020, local and regional trips increased from 56 percent to 69 percent⁷ of all trips, and the proportion of smaller shipments has grown by 5 percent⁸, between 2007 and 2017, when comparing tonnage by shipment across the same segments.

- **The Port of Savannah as a global gateway.** As global geopolitics and pandemic supply chain volatility emerged, shifting trade patterns occurred, leading to an increased utilization of East Coast ports for imports and exports. This shift to near-shore and on-shore manufacturing stems from the Port of Savannah's competitive advantages⁹, based on the following features:
 - More than 300 miles inland from the Port of New York & New Jersey and geographically is the most westerly port on the East Coast
 - Efficiency of the single-terminal design
 - Only deepwater port on the East Coast with two Class 1 rail services (CSX and Norfolk Southern) on-terminal to enable significant, competitive intermodal connections with advanced cargo-handling equipment and refrigeration

As major retailers continue to use the "four-corner" strategy, the Port of Savannah will continue to be a critical part of their import and export logistics. The historic and projected increases in freight volume in new routes and networks, including through Georgia ports as gateways-of-the-future for nearshoring and reshoring are likely to result in increased congestion. This is anticipated to occur in the metro Savannah area as well as around intermodal terminals and distribution centers, resulting in demonstrated demand for improvements and expansion to the roadway network with integrated multi-modal infrastructure.

Freight Growth Implications to Businesses' KPIs

Over the next 25 to 30 years, total freight movement in Georgia is expected to double, increasing from 470 million tons of freight in 2019¹⁰ to a projected 900 million tons in 2050. Georgia's primary freight-generating industries will continue to rely heavily on truck movements and their tonnage is projected to experience a Compounded Annual Growth Rate (CAGR) per year ("p.a.") as shown in **Figure 3**.

⁶ Source: Freight Waves

⁷ Based on Percentage of trip types, %. Source: Commodity Flow Survey, American Transportation Research Institute - An Analysis of the Operational Costs of Trucking, CoStar

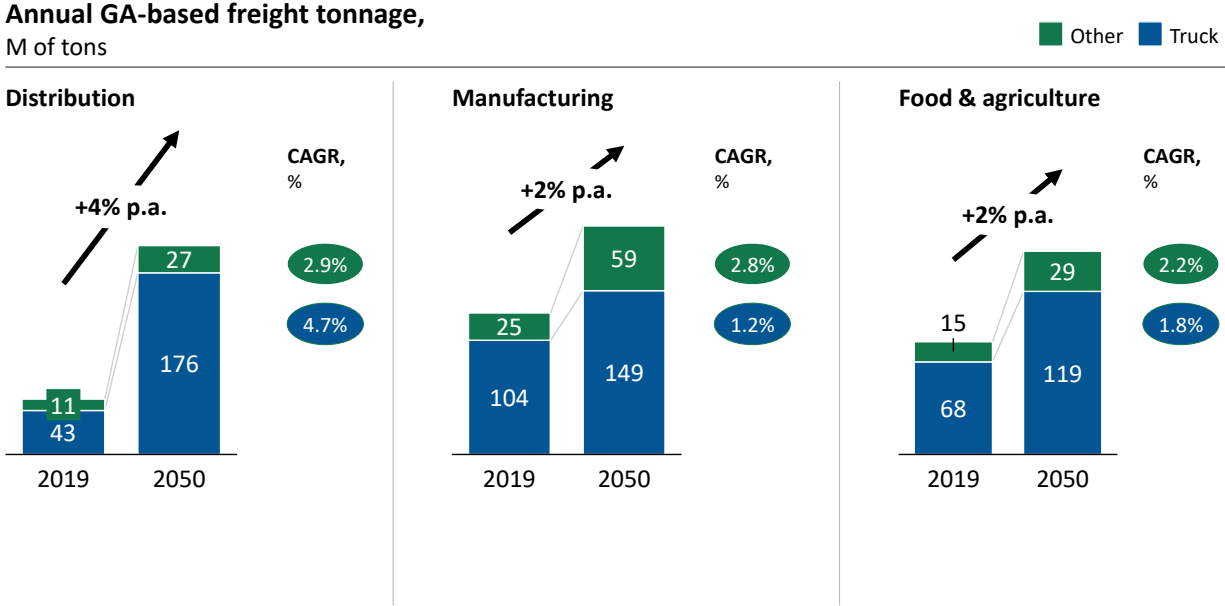
⁸ Tonnage CAGR '07-'17 by shipment weight. Source: Commodity Flow Survey, American Transportation Research Institute - An Analysis of the Operational Costs of Trucking, CoStar

⁹ Source: The Georgia Department of Transportation (The Georgia Advantage); Ports websites

¹⁰ Data from the year 2019 is the most recent available and is most reflective of normal economic and traffic conditions, considering the impacts of the COVID-19 pandemic throughout the United States.

Considering this growth, performance of logistics-enabled business in the three major industries will be impacted by the State’s ability to sustain an adequate level and most cost-effective types of transportation infrastructure investment.

Figure 3: Freight of Georgia’s Key Industries Growth by Mode through 2050



Therefore, in order to identify ways logistics-enabled businesses benefit from efficient transportation infrastructure, GDOT engaged businesses and stakeholders to understand the movement of freight in the state to identify what is most important to freight-moving businesses. Through this process, Georgia companies advised GDOT of the key performance indicators (KPIs) to measure operational success, competitive advantage, and sustained efficiencies. These business-driven transportation KPIs were then translated into infrastructure KPIs for analysis in the Georgia Statewide Transportation Demand Model (GSTDM), shown as “Modeling considerations” in **Figure 4**. This work is effective for understanding how the performance of those KPIs change over time as freight on the network continues to grow, and how investments may impact these KPIs in the future. The five KPIs most important to business are the following: safety, speed, reliability, cost, and risk.

- **Safety** is considered a foundational measure by all freight and logistics-related businesses. It is defined as no harm to the driver, no damage to cargo, and reduced incidents and liability. In transportation infrastructure metrics, one way safety can be measured as the social cost of crashes, which acts as proxy for savings through the mitigated harm to people, products, and systems. Unfortunately, truck-crash frequency and severity were on the rise from 2009

Figure 4: Key Performance Indicators for Logistics-Enabled Businesses and Corresponding Infrastructure Metrics

Factors	Business definitions	Modeling considerations
A Safety/security	Mitigated harm for people, products, and systems	Investment packages consider social cost of safety as an annual cost, as well as reduction in annual truck crashes
B Reliability	Meeting a committed delivery/pick-up window	Investment packages tested for reduction in hours spent in non-recurring traffic
C Speed	Door-to-door travel time	Investment packages target increases in average truck speed
D Cost	Shipping cost / freight spend	Investment packages tested for impact on congestion costs
E Risk	Potential for interference in operations, cost structure, market, or resource access	Investment packages increase availability of alternate routes and modal shift opportunities

Source: WSP analysis, Transearch and STB Waybill Data

to 2018 nationally and economic conditions within the insurance industry have contributed to increases in liability costs. Volatile and increasing insurance premiums have been a major industry concern. The insurance premium costs per mile increased overall by 47 percent over the last 10 years, from 5.9 cents to 8.7 cents¹¹.

For the safety of drivers and in an effort to mitigate increases insurance premiums, claims and payouts, large and medium sized carriers are adopting newer technologies. Despite these advancements, premiums have increased across all fleet sizes and sectors, with small fleets paying more than three times as much as very large fleets on a per-mile basis. Small fleets continue to pay more than twice as much per mile in premiums as large fleets, which pay almost twice as much per mile as very large fleets. Over the last decade, Georgia has prioritized safety across the State’s network, and as a result, it currently performs above average on this metric.

Additionally, safe and readily available truck parking demand is on the rise with much of the supply being outside the State’s role. In fact, as of 2019¹², 94 percent of truck parking spaces in Georgia are provided by private-sector operators. Due to Federal regulations, truck drivers have limited choice when they are required to stop their trips to rest. The issue also affects insurance premiums due to the extra liability truck drivers are subject to as they attempt to find a safe location to pull off the road. Truck drivers must make a difficult judgment call to

¹¹ Source: The American Transportation Research Institute (ATRI)

¹² Data from the year 2019 is the most recent available and is most reflective of normal economic and traffic conditions, considering the impacts of the COVID-19 pandemic throughout the United States.

balance getting as close as possible to their destination without leaving their main route, leading many to choose locations that are not authorized for truck parking, such as the side of roads or on Interstate exit/entrance ramps. These types of unauthorized parking locations do not offer proper safety for the driver, the traveling public, nor the infrastructure itself, lacking lighting, hard shoulders, restroom facilities, and other human accommodations and asset structures.

Ninety-eight percent of drivers regularly experience problems finding safe parking. The shortage of parking exists in every state and is most acute along major freight corridors and Interstate highways with 70 percent of truck drivers in recent years forced to violate federal hours-of-service rules¹³. To ensure a safe and legal space, truck drivers spend on average 56 minutes of drive time per day that can be repurposed to actual drive time, costing the average driver about \$5,500 in direct lost compensation — or a 12 percent cut in annual pay¹⁴. Proper truck parking considerations and investments will require a multi-faceted partnership building, including with private sector carriers, cargo owners, fueling station operators, real estate developers, and local communities. As such, GDOT will soon be undertaking a new and practical set of data collection and analysis along with options the State can consider playing an effective and appropriate role in addressing the truck parking gap in Georgia.

- **Speed** is measured as the average truck travel speed across the network. With increasing congestion, the ability for businesses to offer next day shipping is reduced, and it becomes increasingly difficult to respond quickly to customer demands. With additional targeted investment in Georgia’s largest dense consumer market average network speed could decrease from 42mph to 33mph by 2050¹⁵, about a 25 percent decrease.
- **Reliability** for businesses is defined as meeting a committed delivery and/or pick-up window. Transportation reliability is critical to successful operations for logistics-enabled businesses across the state. This Freight Planning Analysis was tested for the reduction in hours spent in recurring traffic, which is one indicator of how reliable the network is for freight-moving businesses¹⁶ reliability, which could decrease by roughly 60 percent by 2050.
- **Cost** to freight owners and transportation carriers is defined as the transportation costs per vehicle mile traveled (VMT). On average, transportation costs (excluding warehousing) account for 3 to 5 percent of the cost of goods sold. For e-commerce logistics these transportation costs are much higher, at roughly 8 to 15 percent. Cost is a top consideration

¹³ Source: American Trucking Association ATA State Trucking Associations Call on Governors to Provide Truck Parking Funds

¹⁴ Source: American Trucking Associations ATA Federal Legislation Would Address Significant Challenge for Drivers.

¹⁵ Georgia Department of Transportation Georgia Freight Plan Chapter 4 Georgia Critical Freight Issues Needs Trends.

¹⁶ Other sources of freight unreliability include those seen at a port. Vessels waiting at anchor to discharge import loads, congested terminals, and delays for inland transportation all contribute to the increasing demurrage and detention charges. Apart from the demurrage and detention fees levied to shippers, other the ripple effects of delays cost shippers and carriers additional costs along the value chain, as seen in the 2X increase in the % of weekly average number of loaded intermodal cars that have not moved in 48 hours or greater compared to the total average weekly intermodal cars online from 2017 to 2022 for West Coast Class 1 railroads.

for freight owners, transportation carriers, and consumers and, as a KPI, continues to be a challenge due to fuel costs and labor and driver shortages.

Through 2050, transportation costs to businesses will almost double from \$3 to \$6 per vehicle mile traveled (VMT), if only minimal investments are constructed before then. The majority of costs to shippers are currently focused in and around metro Atlanta, yet without additional targeted investment, similar costs will expand to the rest of the state. **Figure 5** below depicts the broader impacts of traffic congestion throughout the state, especially on the Interstate highways, that will increase businesses' transportation operating costs, prices of goods to manufacturers and consumers, and ultimately to Georgia's economy.

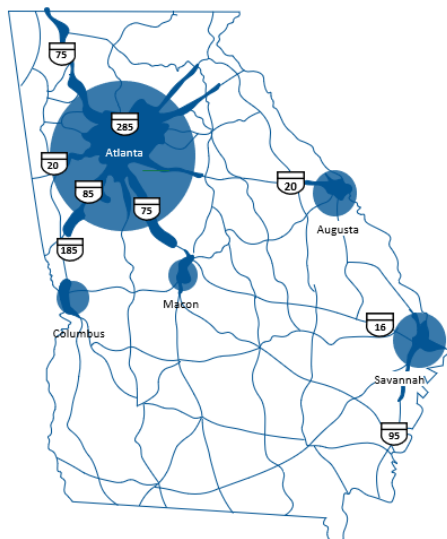
Additionally, a shortage of truck parking is having an increased impact on freight flow costs, driver safety and overall efficiency, as described earlier.

Figure 5: Key Performance Indicator: Projected Freight Transportation Costs in 2050

Source: GSTDM, S&P Global Transearch

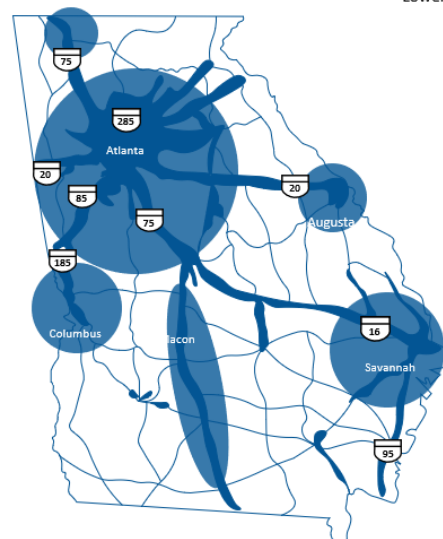
ILLUSTRATIVE

2019 Costs of GA-based freight movement



2050 Costs of Georgia-based freight movement without targeted investment

Lower cost Higher costs



- **Risk** is defined as the potential for interference in freight operations and is closely correlated to the performance in safety, speed, reliability, and cost KPI metrics. The larger risks facing logistics-enabled businesses are disruptive, systemic, and of greater scale and duration: failures across tiers of suppliers, political and social issues in regions and countries, regulatory delays, illness, and work stoppages affecting labor, rapid market and technology shifts, cyber-attacks, and severe weather events are prominent ones. Breakdowns in any of the above can cascade through supply chains, as was seen during the global COVID-19 pandemic, seaport labor relations, blockages at global canal passages, etc.

Risks from weather events have been compiled by federal and other sources, and Georgia's exposure to them in terms of geography and infrastructure is historically relatively low. Route and modal redundancy can mitigate risk and thus are important to consider in infrastructure investment decision. Although the role of state government in mitigating risk requires further research and analysis, methods to decrease risk include the availability of alternate routes and options to shift modes with minimal impact to the supply chain.

Georgia's Freight-Reliant Industries

As mentioned above, three industries are responsible for more than 60 percent of goods movement in Georgia and represent approximately 14 percent of the state's GDP: food and agriculture, manufacturing, and retail/distribution. **Figure 6** below depicts the projected growth in tonnage of each industry that will be transported in Georgia from 2019¹⁷ to 2050.

- **Food and agriculture** production is mostly concentrated in Northeast Georgia and South Georgia across the Coastal Plains, with significant movement of goods occurring between rural areas and into and through metro Atlanta. Georgia-based food and agriculture freight tonnage is set to continue growing at 2 percent annually through 2050, increasing its tonnage from 80 million to 150 million tons¹⁸. The strength of the food and agriculture industry in Georgia and significant agricultural production results in intra-Georgia traffic as an effect of this industry group's supply chain. Georgia's key agricultural commodities include poultry (broilers), cotton, peanuts, and timber.

By volume moving across the state, peanuts and cotton are top commodities, as well as timber commodities moved over the state lines into Alabama, South Carolina, and Florida to be processed. Ninety (90) percent of the cotton is exported via Savannah after it is ginned (first point of processing) – most going there by truck or rail through Cordele intermodal port. Also, agriculture is similar to natural resource extraction in that slow, oversized equipment may be required to move commodities from the field to the first point of processing. Then after being processed, most commodities move via truck or rail. Although many farmers and agribusinesses are reliant on two-lane, local roads, state highways and the Interstate system are also required by the producers and processors alike to move goods to market.¹⁹

- **Retail and distribution** industry is estimated to have the fastest freight growth of any Georgia industry through 2050 and is projected to move the second highest annual tonnage in Georgia²⁰. Georgia-based retail and distribution freight tonnage is set to grow from 54 million to 203 million tons, with a 4 percent CAGR to 2050, around double the growth per year of Georgia's other key industries. Retail and distribution flows are centered around the Atlanta

¹⁷ Data from the year 2019 is the most recent available and is most reflective of normal economic and traffic conditions, considering the impacts of the COVID-19 pandemic throughout the United States.

¹⁸ Source: Georgia Statewide Travel Demand Model, S&P Global Transearch

¹⁹ University of Georgia College of Agricultural & Environmental Sciences Ag Snapshots 2023

²⁰ Source: GSTDM baseline output, Transearch freight forecast

region and along the regional retail and distribution routes, where transportation costs are highest. As customers increasingly expect rapid and same-day arrival of goods delivered to their homes, a robust surge in e-commerce has disrupted supply chains and transformed logistics networks. To meet demand, companies are looking for a faster and more efficient way to ship goods to consumers who reside in cities and urban areas of the state. In Georgia, areas around metro Atlanta and metro Savannah are some of the most significant retail and distribution centers in the country, in part because of the proximity to other major markets—increasing the importance of an effective multimodal network.

- **Manufacturing** commodities are concentrated around the Northwest portion of the state and the ports along the East Coast. Georgia-based manufacturing freight tonnage is projected to grow 2 percent annually through 2050, increasing its current 2019²¹ tonnage from 130 million to 210 million tons. Georgia is a primary source of manufactured products to the nation and the world. The outbound traffic utilizes all components of Georgia’s robust transportation system. Georgia’s ports play a significant role in international trade, particularly as many companies are choosing to use East Coast ports as a replacement or complement of the ports on the West Coast. Hence, speed and reliability of the road networks around the ports are critical.

A prominent portion of the manufacturing industry growth in the Southeast is the automotive sector. Georgia has automotive manufacturers within the state such as KIA Georgia, Blue Bird, as well as major facilities now under construction in the electric vehicle space, Rivian, and Hyundai Motor Group Metaplant America. This impressive group of manufacturers has leveraged Georgia’s many benefits, including the state’s central location in the burgeoning Southeastern United States and a critical supplier-base including SK Battery America, Honda Precision Parts, Novelis, ZF Gainesville, Kumho Tire, Hitachi Fryer Battery, and others. This has spawned a booming opportunity, creating new jobs and new small businesses. The South has seen a 17 percent growth in U.S. automotive manufacturing jobs between 2001 and 2018, while other regions across the U.S. have experienced a decline. In 2023, Georgia alone has seen a significant increase in job creation across the automotive industry, with a growth rate of 324 percent compared to FY21.²² through state-worked economic development projects. Georgia’s transportation infrastructure has been a key factor in securing new private investment. It is aided by the fact that Georgia is a right-to-work state, with 3.1 percent of private manufacturing workers being unionized, which is well below the national and Southeast states’ average.²³

In addition to the automotive manufacturing sector, Georgia has a significant manufacturing footprint across the state that produces machinery, electrical equipment and components,

²¹ Data from the year 2019 is the most recent available and is most reflective of normal economic and traffic conditions, considering the impacts of the COVID-19 pandemic throughout the United States.

²² DAS Corp. to Bring 300 Automotive Jobs to Metter | Georgia Department of Economic Development

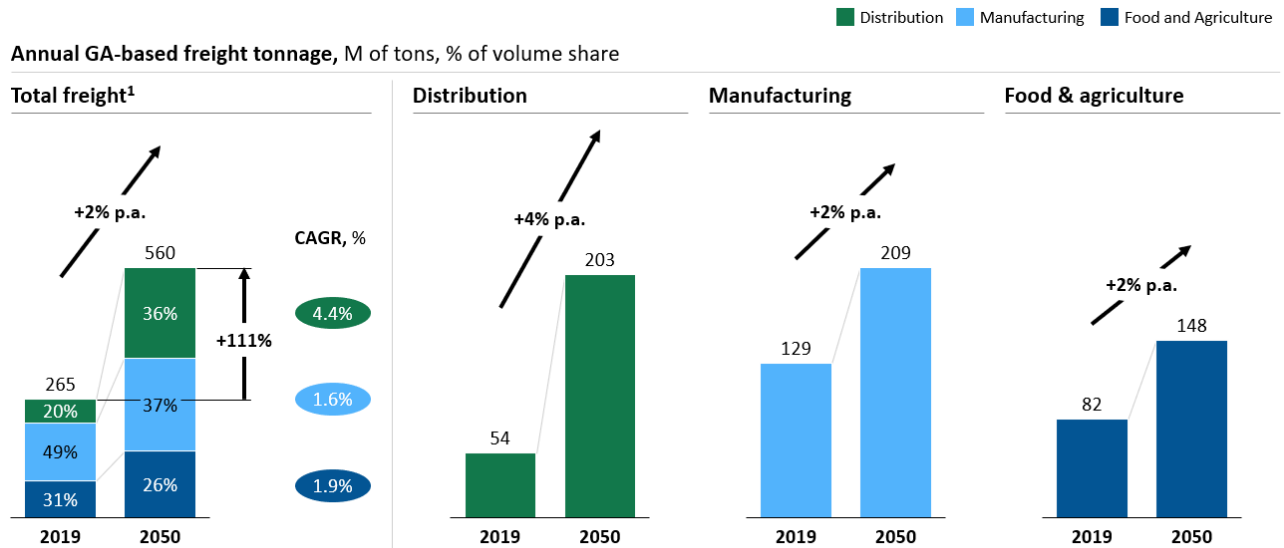
²³ Automotive_Industry_2023 Automotive Manufacturing Georgia: The Epicenter of Growth in the Southeastern Auto Corridor

and fabricated metals that also requires a strong network linking them to cities and other consumer centers.

Figure 6 below indicates the near-doubling of Georgia-based freight tonnage of these three primary freight-reliant industries, with most of the demand on roadways as well as congestion costs, which are projected to more than double. Georgia’s food and agriculture and manufacturing sectors will bear about two-thirds of the costs in 2050, while costs in the retail and distribution sector climb the fastest and account for most of the remaining third. Data shows that the Interstate highway system are the primary corridors for freight travel for multiple

Figure 6: Tonnage Growth in Georgia’s Primary Industries

Source: GSTDM, S&P Global Transearch



industries throughout the state and feature many bottlenecks, which are congestion concentrations and prime generators of elevated costs in areas of growing traffic volumes²⁴. These projected increases in traffic volumes in Georgia and throughout the Southeast without corresponding capacity increases will ultimately result in more roadway delays from traffic congestion, that therefore increases costs to cargo owners and trucking companies.

Transportation Infrastructure Investment Types and Potential Benefits for Logistics-Enabled Businesses

GDOT’s first-of-its-kind, business-focused freight planning analysis was conducted to explore options for long-range transportation infrastructure investments that could have the most

²⁴ Georgia Department of Transportation Georgia Freight Plan Chapter 4 Georgia Critical Fright Issues Needs Trends

benefits for moving cargo in Georgia and stemming the projected degradation of KPIs for Georgia’s logistics-enabled businesses. The analysis entailed reviewing and sorting more than two dozen publicly available and procured data sources, inserting such data into the Georgia Statewide Travel Demand Model (GSTDM), and projecting freight growth on the statewide roadway network through 2050. The GSTDM was also modified to accommodate growth in freight as shown earlier in this report and very rough planning-stage cost estimates were assumed for such improvements. Investment options were categorized into three classes, in alignment with GDOT’s Statewide Strategic Transportation Plan: Foundational, Catalytic, and Innovative. See **Figure 7** for example project types.

Foundational investments address asset management activities for cost-efficient freight operations. These investments will maintain a state of good repair on the existing statewide freight movement system and maintain and/or improve safety KPIs for the current network as freight volumes increase across Georgia. These investments focus on reconstructing, rehabilitating, and improving existing physical assets that support logistics-enabled industries to meet customer expectations. Potential foundational investment types include Interchange and bridge improvements, increased truck parking and availability systems, grade crossing safety enhancements, local assistance programs, and signalization. Interchanges are one of the primary locations of truck bottlenecks, especially urban interchanges, and therefore interchange rehabilitation or reconstruction is also considered foundational.

Catalytic investments build upon the Foundational to support and develop key industries throughout Georgia, as well as to maintain or improve current network performance as freight

Figure 7: Foundational, Catalytic, and Innovative Investment Categories, per Georgia’s Statewide Strategic Transportation Plan

		Project types	
	3 Innovative investments	R&D Implementing transportation innovations to entice new industries to Georgia and give existing industries a first-class freight experience	Safety technologies Freight collaboration systems CAV implementation* Alternative fuels
	2 Catalytic investments	Grow the business Strategic expansion to support economic development and expand the customer base	Road capacity CV lanes* Truck parking, private Inland ports Rail capacity Rail grade crossings Airport capacity Assistance programs
	1 Foundational investments	Run the business Maintaining a state of good repair for GA’s existing transportation system; meeting customer expectations	Road, non capacity Truck parking, public Rail grade crossings (safety) Assistance programs Signalization Maintenance

* GDOT’s Statewide Strategic Transportation Plan (SSTP) was approved by Governor Brian Kemp and adopted by the State Transportation Board in 2021. See <https://www.dot.ga.gov/GDOT/Pages/SSTP.aspx>.

movement increases. This category of potential investments focuses on strategic infrastructure expansions to aid economic development and increase the customer base for business. Catalytic investments can be made in road highways and multi-modal. The highway investments feature initiatives for roadway capacity, especially for last-mile freight movement. The multi-modal investments feature advancement-based initiatives that improve modal choice and redundancy, and support highway relief through alternative rail, water, and air networks. Potential Catalytic investments could include road capacity expansions to roads, rail, and airport project facilities, such as additional lanes and access points on Interstate highways and double-tracking of railroads.

While roadway improvements for freight movements statewide would predominantly be the responsibility of GDOT, local governments may also own some facilities that would benefit truck transportation. Railroad improvements would mostly be made by private sector railroad infrastructure owners and operators, though GDOT receives appropriations that can also support a limited amount of railroad investments in partnership with the private sector.

Innovative investments focus on developing, piloting, and deploying new and emerging technologies and business practices for freight and logistics. Some examples of innovative investments include safety technologies, freight collaborative systems, and Connected and Autonomous Vehicle (CAV) Implementation. While many of these activities may be driven by the private sector, GDOT can play a role by leading the effort to develop new technologies for transportation asset management and advanced freight operations, supporting research and pilots, sharing public data, and facilitating roadside technology infrastructure - notably broadband connectivity. Other investments, including increased truck parking will also be driven by the private sector, through increased opportunities for Public-Private Partnerships (P3s). GDOT can also partner with local governments and the private sector to seek federal grant funds.

The testing of roadway capacity added to Georgia's state routes in the Georgia Statewide Travel Demand Model indicates meaningful KPI benefits would result from significant investment, were all construction fully funded and completed by the year 2050. The modeled cost reduction to freight owners and transportation carriers is projected to be an estimated \$820 billion by improving business performance across their most important KPIs. These modeled capacity expansions would also have network effects that would improve freight KPIs on State routes that would not actually require capacity additions. Each package in **Figure 8** below includes some investments already identified by GDOT through other planning efforts as well as new additions identified in this analysis of freight flow demand.

Beyond impact to KPIs and a calculation of return-on-investment (ROI), each capacity expansion was also considered within the broader context of existing and emerging freight trends in the state, risks and vulnerabilities in the freight network, and the unique needs of critical industries. This consideration can inform the next steps of prioritizing investments that may have higher KPI impacts or return-on-investment and bolster other GDOT priorities that are not captured by these freight-specific measures.

Note however that, while the findings of this investment analysis shown in **Figure 8** below finds the potential for significant benefits for freight moving in Georgia, this early planning work is an initial step of a multi-stage, multi-faceted set of evaluations. As conducted to-date, these findings are illustrative of a future scenario as generated by a computer model of roadway capacity expansions, and do not indicate specific location or types of infrastructure improvements that

Figure 8: Foundational, Catalytic, and Innovative Investment Options, as Generated by the Georgia Statewide Transportation Demand Model

	Investment Options Generated Travel Demand Model ¹	Initial Cost Estimates ²	Potential Benefits for Freight in Georgia ³
Foundational	Interstate	\$1,440,000,000	\$70 billion
	Highways	\$1,230,000,000	
	Rail Improvements	\$690,000,000	
	Truck Parking	\$30,000,000	
	Assistance Programs	\$185,000,000	
	Technology	\$28,000,000	
	Total	\$3.6 billion	
Catalytic	Interstate	\$30,555,000,000	\$180 billion
	Highways	\$22,410,000,000	
	Managed Capacity	\$22,900,000,000	\$300 billion
	Rail Improvements	\$2,745,000,000	
	Truck Parking	\$200,000,000	
	Airports	\$850,000,000	
	Ports	\$4,500,000,000	
	Assistance Programs	\$1,300,000,000	
Total	\$85.5 billion		
Innovative	Safety Technologies	\$385,000,000	\$270 billion
	Freight Collaboration Systems	\$85,000,000	
	CAV Implementation	\$195,000,000	
	Alternative Fuels	\$34,000,000	
	Total	\$700 million	
Totals	\$90 billion	\$820 billion	

Note: Estimated total costs (\$B) for innovative type of investments are not modeled as relatively smaller GDOT investments paired with investments in the private sector will have high overall benefits in positioning GA well for the future

Source: Transearch 2019; GSTDM 2019

would (1) most effectively yield freight efficiencies based on the KPIs nor (2) satisfy engineering requirements for roadway design.

Additionally, this computer analysis does not indicate essential considerations of the realities of transportation project development, such as community impacts, land ownership rights, historic and environmental permitting, wetlands mitigation requirements, ultimate right-of-way and construction cost and other factors. Corridors must be further assessed against these project development considerations to determine which are priority based on benefit-cost analysis and availability of funds.

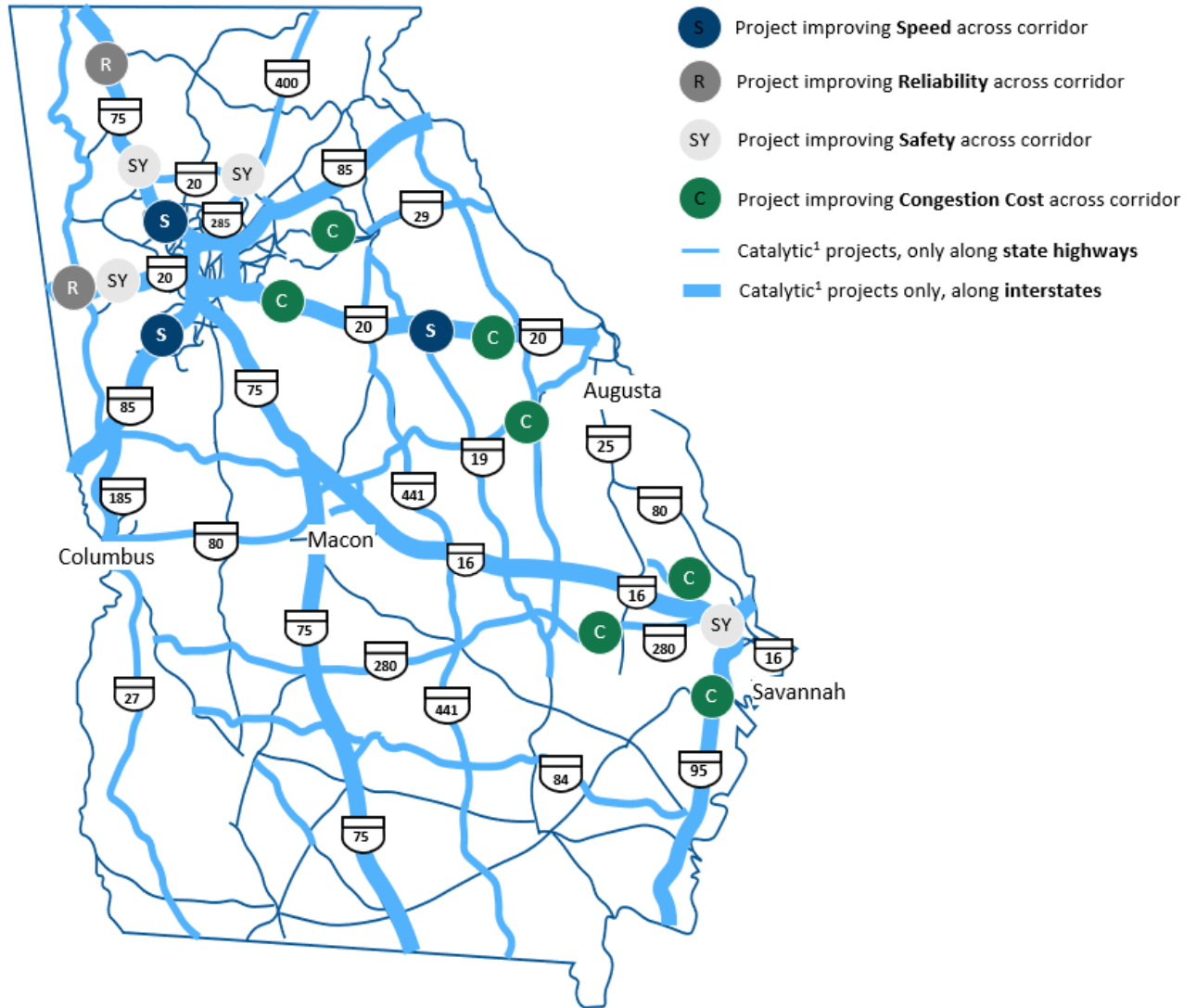
According to actual traffic data as well as the Georgia Statewide Transportation Demand Model, the Interstate highway network is the highest-performing, most utilized set of corridors, the modeling exercise indicated they would continue to be the primary carrier of freight, therefore would require more than \$50 billion of investment over the coming decades, in all three categories of foundational, catalytic, and innovative.

- **Safety:** In 2019, the social cost of crashes was \$0.07 per ton-mile for businesses in Georgia but would increase to \$0.09 per ton-mile by 2050. When the full set of projects were modeled, the social cost of crashes decreased compared to the 2019 base year value by 31 percent, to \$0.05 per ton-mile. The Interstate highway corridors stand out as an opportunity for investment, but there are also state highways such as US 441 and US 82 where investments would be beneficial. From a safety perspective, controlling access and creating grade separations are the type of projects that were tested.
- **Speed:** In 2019, the average network speed was 42 mph and could decrease by 21 percent to 33 mph by 2050. When the full set of projects were modeled, the average speed improved by approximately 5 mph from the 2050 projection to 37 mph. Project types that improve speed include adding additional freight capacity with strategic management of such new lanes.
- **Reliability:** Reliability was measured as an index, with performance in 2019 set as “100.” Compared to 2019, the index decreased by 61 percent when looking out to 2050. When including the investments laid out in this Freight Planning Analysis, future reliability outcomes are improved by 30 percent. This results in estimated savings of approximately 29 million hours per year – the equivalent of having an extra 10,000 full-time truck drivers on the road.
- **Cost:** Between 2019 and 2050, costs could nearly double, from \$3.16 per vehicle mile traveled (VMT) to \$6.14 per VMT. When the full set of projects were modeled, the costs improved by two-thirds compared to the 2050 case, increasing by only 35 percent, compared to today even with growing freight volumes. Projects that reduce congestion best include adding freight capacity, making operational improvements, modifying interchanges, and creating grade separations.
- **Risk:** The Risk KPI can be defined as the percentage of routes without an alternative or redundant path and is at the nexus of Safety, Speed, Reliability and Cost KPI metrics. The impacts seen across these KPIs provide a view on the Risk metric for businesses across the State. Increasing the availability of alternate routes and modes of shipping, as well as

expanding intermodal capacity and improving connectivity, can help mitigate both operational and risks facing supply chains.

Figure 9 below highlights Interstate and other highway corridors included in the future modeling scenario of Catalytic Investment options and their impact to KPIs.

Figure 9: Candidate Freight Corridors for Investments by 2050



Note: Freight planning process includes potential projects grouped along a FCI (foundational, catalytic, and innovative) framework. Only Catalytic highway projects are included in map.

Source: GSTDM, S&P Global Transearch

Proposed I-14 and Fall Line Freeway Completion: Further Evaluation Needed

The completion of Fall Line Freeway (Macon Bypass) and I-14 were included in the Catalytic Investment option. I-14 demonstrated moderate benefits, including reduced congestion costs per freight vehicle miles traveled (VMT) and a decrease in vehicle hours of delay, however, it is not projected to yield the same degree of positive impacts as other Interstate highway projects such as I-75, I-20, I-95, and segments of I-16, especially considering the project's initial cost estimate of more than \$5 billion. Additionally, for a total investment between \$5 billion and \$10 billion, the return-on-investment would be less than one, with I-14 likely only carrying an average of 3,000 trucks per day, whereas the major Interstate highways are carrying between 11,000 and 18,000 trucks per day on average, demonstrating less dependence on this corridor for freight mobility.

Note that I-14 would include the completion of the 17-mile section of the 200-plus mile long Fall Line Freeway that spans from I-75 in Peach County to SR 57 in Twiggs County. The computer model testing of this segment located just south of Macon does not indicate a positive return-on-investment, especially considering major east-west truck movements would be carried by I-75 and I-16 in central Georgia, as well as SR 96.

While both projects are incorporated as Catalytic Investment options, neither are a high priority in the next decade based on the above data analysis and relatively low benefit-cost ratio. However, because the I-14 project shows some benefit under the KPIs, a corridor study to further evaluate its feasibility would enable a more comprehensive understanding of the construction practicalities as noted above, as well as more specific project costs.

Focused Analysis of Savannah Area Freight: Coastal Empire Study

As a component to this Freight Planning Analysis, GDOT also recently completed a unique and robust assessment of the four counties around the Port of Savannah – Bryan, Bulloch, Chatham, and Effingham – known as the Coastal Empire. The goal of this assessment was to understand the impacts of population and freight growth in this region which is critical to Georgia's growing economy.

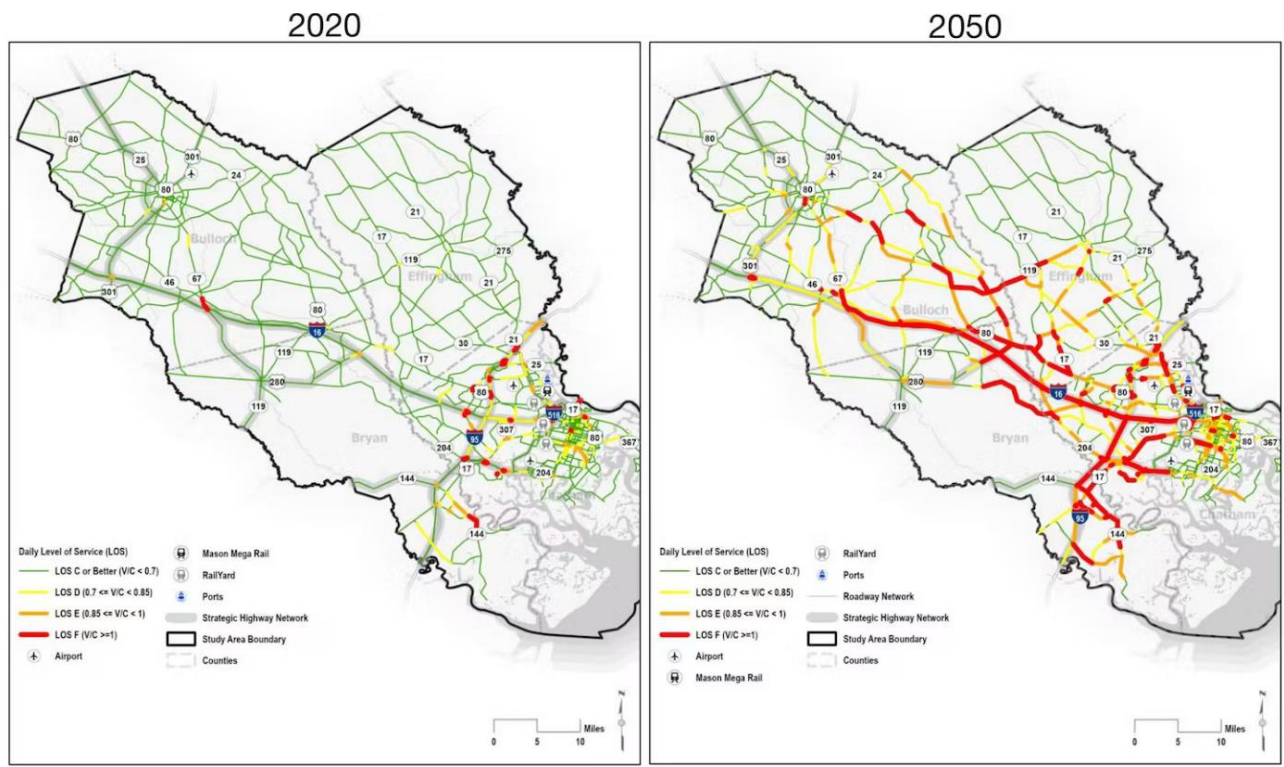
This important study found that up to 75 percent of the truck trips generated by cargo flow at the Port of Savannah is at one of the industrial sites within the region²⁵, in these four counties, and because of population growth in the Southeast United States as well as the burgeoning economy in Georgia, industrial space in the form of distribution centers are projected to double there in the next decade. Therefore, the study indicates that traffic will grow beyond the current

²⁵ Georgia Department of Transportation GDOT Studies Coastal Empire Study CED Final Report

roadway network’s capacity and that by 2050 only 5 percent of available industrial space would be accessible within a 20-minute drive from the Port and 40 percent would be more than a one-hour drive from the nation’s fastest growing Port. **Figure 10** indicates traffic congestion by level-of-service in 2020 versus 2050, if no additional roadway improvements are made.

The study also identified nearly two dozen roadway and intersection improvement projects that would address these growth impacts and have significant benefits for the Coastal Empire and therefore for the entire state²⁶. These improvement recommendations were incorporated into the statewide plan as a subset of the overall freight planning analysis.

Figure 10: Projected Traffic Congestion in the Coastal Empire by 2050



State Government Efforts to Respond to the Call-To-Action for Freight Transportation Infrastructure Investment

GDOT currently has several initiatives underway, including its Major Mobility Investment Program (MMIP), in which the Department is investing in capacity improvements in Georgia’s most heavily traveled Interstate highway corridors over the next decade. Completion of MMIP projects will expand capacity, enhance safety, and improve reliability for Georgia’s businesses

²⁶ Georgia Department of Transportation GDOT Georgia Freight

and residents. While not solely intended to improve freight mobility, many MMIP projects will benefit truck movements in key corridors, especially I-285 and I-75. Some MMIP projects are specifically designed to enhance freight mobility, including new commercial vehicle lanes on portions of I-75, capacity additions to I-85 to serve the industrial and retail and distribution hubs in Northeast Georgia, and expansion of the I-16 trade corridor serving Port of Savannah, including an improved interchange with I-95²⁷. Several of the initiatives currently underway include the following:

I-285 at I-20 East Interchange Reconstruction

- Improving traffic flow and enhancing safety at a major freight bottleneck on one of Georgia's heavy freight corridors.
- Project includes westbound connecting lanes that will run parallel to I-20 to help improve traffic flow, speed, and safety, and adds auxiliary lanes.

I-16 at I-95 Interchange Reconstruction

- Reconstructed of Georgia's busiest freight corridors, which is also the gateway to the nation's fastest-growing container port in Savannah.
- Project included the interchange at I-16 to I-516, improving traffic flow with 32 percent reduction in delays, and enhancing safety and operational efficiency.

I-285 at I-20 West Interchange Reconstruction

- Project proposes improvements to the I-285/I-20 West Interchange and the addition of lanes along I-20 in Fulton, Cobb, and Douglas counties.
- Will improve traffic flow, reduce congestion, and enhance operations at this system to-system interchange.

I-85 Planning-Environmental Linkages (PEL) Study

- Studying comprehensive data and options along 18 miles of I-85, primarily located within Gwinnett County.
- This corridor is heavily used by commercial vehicles, with approximately 45 percent of freight passing through this critical corridor without an origin or destination in Gwinnett County.

Savannah River Crossing Feasibility Study

- Examining more than two dozen alternatives and put forward feasible alternatives that best meet the needs of Savannah, the region, and State.
- The study is now in the conceptual phase where feasible alternatives will be evaluated under a more intense microscope, with further assessments of impacts (e.g., environmental) as well as the opportunity for public review and feedback.

²⁷ 2021 Statewide Strategic Transportation Plan: 2050 Statewide Transportation Plan, page 54

Freight Signal Priority

- Installing radio technology at signalized intersections around ingress/egress routes at the Port of Savannah. These technology deployments at the intersections with SR307 will broadcast information from the infrastructure directly to equipped trucks running the route to grant priority to a green light at the traffic signal.
- Freight vehicles in Savannah area were also equipped to request signal priority and receive information regarding blocked at-grade rail crossings.

SR 365 Planning Study

- Focusing on freight-specific movement and how the future Northeast Georgia Inland Port will impact freight operations along SR 365.
- The study will evaluate current and future year travel conditions along and adjacent to SR 365 in Hall County from I-985 to Belton Bridge Road. It will develop and evaluate transportation improvement recommendations and strategies to accommodate future travel growth.

I-285 West Wall Full Depth Reclamation (FDR)

- Rehabilitating concrete on an approximate 12-mile section of I-285 on the west side between I-75 southward to I-85.
- FDR is an in-place recycling method for reconstruction of existing flexible pavements using the existing pavement section material as the base for the new roadway-wearing surface. This process can include treating the base layer to increase its strength capacity and provide a stronger foundation for present and future traffic. This process effectively produces a cost-effective solution that maximizes limited budgets.

I-16 at I-75 Interchange Reconstruction

- Investing \$550 million to widen and reconstruct the interchange, enhance safety and mobility, improve operational efficiency for trucks and commuters and reduce traffic congestion.
- I-16 is designated as an evacuation route and is on the network of the U.S. Armed Forces Defense, Continuity, and Emergency Routes

Truck Parking

- Assessing existing rest area locations for possible expansion of truck parking capacity and potential technology upgrades, including at state-owned Visitors Centers and Weigh Stations.
- Collecting data for a business-driven analysis of the location and timing aspects of the truck parking gap, as well as generating options the State can consider to play an effective and appropriate role in addressing the issue statewide.

Millen Advanced Warning System

- Installed advanced warning Intelligent Transportation System (ITS) equipment at seven locations to alert drivers when crossings are closed. This includes changeable signs and

cameras with smart signal tech. The Millen system can quickly communicate and display messages to inform drivers.

State-Owned Short Line Railroad Upgrades

- Investing an average of about \$10 million per year to upgrade state-owned rail lines to Class II standards, which would better integrate the lines with the national rail network and allow faster speeds.
- Upgrading the lines will provide more unified operations with other private short lines and Class I railroads. It also would reduce speed restrictions on lines serving underserved industries, shippers, and rural Georgia communities.

SR 316 Grade Separations

- Completing a series of reconstruction projects along the SR 316 corridor from SR 20 in Gwinnett County to SR 10 in Oconee County.
- The projects are proposed to reduce potential crash frequency and severity and will also improve operations and reliability along the corridor.

GDOT will continue the evaluation of the operational impacts of the computer model findings, to understand which additional corridor investments will achieve the greatest benefits to freight moving in Georgia based on the freight KPIs, as well as the feasibility of projects from a development and deliverability perspective.

These investments in Georgia’s freight-carrying infrastructure will be made over multiple decades, with GDOT’s Office of Planning prioritizing these roadway investments with available and otherwise appropriated fund sources, though one-time, short-range resources would enable GDOT to develop and design roadway projects.

Activities to Address Challenges to Efficient Infrastructure Investment

Given the additional corridor and project evaluations to be completed as well as the components that contribute to the availability, cost, quality, and pace of infrastructure development, the State could consider employing multiple levers to determine the best timing to deploy infrastructure investments as well as maximize the impact of those investments. GDOT and the State continues to explore and collaborate on other partnership options. Below are examples activities the State is implementing. Additionally, GDOT will continue seeking opportunities to partner with private sector partners for larger industry and ecosystem support.

To address the labor challenges for planned and future infrastructure investments, the State is focusing on broad categories increasing the labor supply.

- **Increase talent pipelines.** Work with contractors, educational institutions, and other relevant organizations to increase talent pipelines and develop a larger workforce pool. These could be achieved through deploying targeted initiatives for the different target demographics.
 - Currently, the State administers several workforce development programs unique to Georgia and designed to help with the pipeline, such as the newly unveiled Georgia MATCH program, which is an automatic acceptance to Georgia higher education institutions for graduating seniors. Each graduate will receive a letter and notice showing them which institutions they are already accepted at and allowing those students to claim a spot there for the next Fall semester. This effectively take the guesswork out of having to apply and go through the college admittance process, meaning more students will be able to be more successful in getting to a college or university and on track for gainful employment right out of high school.
 - Other Georgia workforce pipelines are Georgia QuickStart, HOPE Scholarship and Grant, Dual Enrollment, College and Career Centers, Service Loan Repayment Programs, and more. All these programs are designed to help eliminate the debt that many higher education students face.²⁸
 - Launch a marketing campaign (including on social media) to re-brand the construction industry as a dynamic and impactful career path for younger generations.
 - Collaborate with educational institutions and organizations to play an active role in recruitment. Develop apprenticeship programs to attract potential workers early in their professional careers. For critical roles, evaluate job descriptions and credentialing requirements, match true industry and role needs to shorten workforce development timelines and broaden potential talent pools.
 - Develop collaborative outreach strategies to attract workers from other industries (e.g., retail, hospitality).
 - Develop strategies and initiatives with labor and community organizations to train and attract non-traditional workers.

- **Provide workforce development support.** Collaboration among State agencies and/or community organizations to provide services and resources to the workforce.
 - Deploy targeted upskilling/re-skilling. GDOT is exploring a partnership with the Technical College System of Georgia (TCSG)'s Quick Start Program to launch reskilling programs, for both existing and new talent, to develop the skills and capabilities required to fill the acute labor gap.
 - Additionally, the Governor's Title III Workforce Innovation and Opportunity Act transfer from the Georgia Department of Labor to TCSG in 2022, further aligning the workforce pipeline by improving the efficiency of getting any and all available Georgian's back into the workforce.
 - Lastly, the Office of Workforce Development at TCSG and in collaboration with the other agencies and stakeholders created a list of 22 "High Demand Careers," these careers have

²⁸ Governor Brian P. Kemp Office of the Governor October 5, 2023, Press Release Gov. Kemp Announces GEORGIA MATCH Direct College Admissions Initiative

been identified to be the most in need here in Georgia, and through TCSG and the Georgia Student Finance Authority allow those students in those career pathway course to take advantage of the HOPE Career Grant which covers most if not all of their tuition to take those courses.²⁹

Conclusion: Future State of Freight in Georgia and Action Items to Continue Georgia’s Economic Success

The State of Georgia is in the tenth year of being considered best state for business³⁰, which has been achieved as a result of multiple critical factors including a favorable business climate, a top-notch workforce, and superior infrastructure, including world-class transportation facilities. To sustain high-performing connectivity, capacity, and capability of the Georgia’s roads and multi-modal assets that businesses can continue to rely on in the coming decades, GDOT undertook a unique, data-intensive, private-sector driven analysis of Georgia’s transportation network, seeking to understand future demands on transportation infrastructure that will result from the projected doubling of freight moved around and through the state in the coming 25 to 30 years.

To address this estimated growth in freight movement, infrastructure maintenance and expansion through focused investment will be required, using existing financial resources as well as additional funding appropriations and strategic partnerships with other government agencies and private-sector stakeholders. Implementation of advanced technologies, pursuing creative solutions, and sustaining and enhancing policies will also be critical to continued success for Georgia’s primary freight-reliant industries including agriculture, manufacturing, and retail/distribution.

Considering the findings of the analysis, continued and increased investment in Georgia’s transportation network has the potential to deliver significant benefits on key performance indicators that are important to freight owners and carriers, including reduced costs, increased safety, and improved reliability. However, the innovative and insightful analysis to-date is the first of many necessary activities to determine which corridor segments, interchanges, intersections, and multi-modal facilities should be prioritized due to benefits to the public and to the economy, as well as feasibility from the standpoints of project delivery and funding eligibility.

Actions GDOT is taking to address the increasing demand for freight infrastructure include (1) prioritizing deployment of existing funds to construct known roadway projects that will move trucks more efficiently and safely, (2) determining which additional projects identified in the initial data-intensive, computer-generated recommendations are feasible to deliver, and (3) developing methods to effectively partner with private-sector businesses to invest in supportive infrastructure such as truck parking and railroads. Additionally, as described above, State

²⁹ Technical College System of Georgia HOPE Career Grant for the High Demand Career Initiative

³⁰ Area Development Magazine, September 2023, 2023 Top States for Doing Business, Meet the Needs of Site Selectors

agencies for increasing training options to improve the availability of labor to construct transportation projects through workforce recruitment and development.

Maintaining and improving the connectivity, capacity, and capabilities of Georgia's transportation network with optimal investments and deployment of funding resources will remain GDOT's focus and will continue to result in impactful benefits for Georgia's current and future logistics-enabled businesses.