CAMBRIDGE SYSTEMATICS

2040 Statewide Transportation Plan / 2015 Statewide Strategic Transportation Plan: Evaluation of Future Deficiencies

Technical Memorandum 5

final technical

memorandum

prepared for

Georgia Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

GeoStats Services
Gresham, Smith & Partners
Reynolds, Smith & Hills, Inc.

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Executive Summary

This document is the fifth technical memorandum to be produced under the Georgia Department of Transportation's (GDOT) Statewide Transportation Plan/ Statewide Strategic Transportation Plan (SWTP/SSTP) project. The report builds on the Task 3 Existing Conditions and Task 4 Financial and Economic Forecast memoranda. The report documents the inventory and capacity, use, major issues and deficiencies, and future plans and projects for each of the primary modes of transportation in Georgia, including highway/truck, public transportation, rail, bicycle and pedestrian, aviation, and marine ports. Both passenger and freight transportation are addressed in the highway, rail, and aviation sections. The format of the sections varies slightly depending on the best way to present specific modal information. Mapping formats have been standardized where possible, but because of the different scale required for some topics, formats vary in some cases.

Forecasts of future demand are addressed separately in each section. The underlying economic forecasts embedded in GDOT's Statewide Travel Demand model (and documented in Technical Memorandum 4a Economic Forecasts) are used to drive the estimates of future demand for the highway system (Section 1.0). Appendix A documents the freight forecasts used to forecast the future growth in trucking and other freight modes. Each of the other sections documents the unique forecasts used for those modes, which may in some cases be a combination of quantitative and qualitative estimates. For example, the base case transit forecasts (Section 2.0) assume that transit mode share remains constant but that population (and hence ridership) will increase consistently with the statewide economic forecasts. The section then includes estimates of the impact of potential mode shift toward transit in the future based on changing societal norms, and conducts a "what if" analysis of the impacts on a small sample of transit systems. The forecasts in the bicycle/pedestrian (Section 5.0) are largely qualitative based on a discussion of changing societal norms which are increasing the popularity of these modes. Other sections rely on forecasts specific to the mode, such as Amtrak forecasts of future passenger rail ridership (Section 3.0), Federal Aviation Administration (FAA) forecasts of future commercial air travelers (Section 5.0), and Georgia Ports Authority (GPA) and other forecasts of future port traffic (Section 6.0). Most forecasts are for the plan year of 2040, but some interim year forecasts are provided for Highways and for other modes whose forecasts are targeted at shorter time periods than 2040.

A separate tradeoff analysis was subsequently developed under Task 6 to compare future funding levels and performance for several measures of highway performance (pavement and bridge maintenance, capacity, safety, and operations) and transit. These analyses are reflected in Chapters 1 and 2. Sufficient data and methodologies do not yet exist to make similar tradeoff forecasts for the other modes.

This section highlights the major issues/deficiencies, and plans and projects for each mode, as summarized at the end of each section. The more detailed technical analysis is contained in the modal sections.

HIGHWAYS

Issues and Deficiencies

VMT will grow at about 1 percent per year, which will have significant impacts on the congestion of the highway system, despite planned capacity improvements. With modest annual growth rates, the Vehicle Miles of Travel (VMT) will increase by 34 percent by 2040. While the statewide highway system will function at an average volume to capacity ratio and Level of Service (LOS) that is acceptable, and even the Interstate System will function at an average LOS of just under the upper limit of LOS D, there will be a significant increase in congestion on many roads, particularly in the Atlanta region and some other urban areas. Almost 20 percent of the mileage of the Interstate System will be over the daily capacity at a LOS F. Most roads in the Atlanta region will perform at LOS F during the peak periods. The Georgia portion of the Chattanooga urban area, which is relatively uncongested at present, is forecasted to have significant congestion on its roads in 2040, particularly on I-75 and major arterials.

The condition of roadway pavement will also deteriorate if the annual level of funding is maintained at the current levels for the 27-year period of the SWTP/SSTP (2013 to 2040) and funding is allocated to road class based on its current share of VMT. While 86 percent of the miles of pavement on the Interstate System will be in fair or better condition, only 59 percent of the rest of the National Highway System will be in fair or better condition. The non-NHS Federal Aid System owned by GDOT is projected to have less than 11 percent of its miles in fair or better condition. This is largely a function of the vast size of the Federal Aid System. The forecasting model used suggested than it may not make economic sense to maintain the current very high performance on non-NHS pavement.

The performance of the bridges, on the other hand, is expected to remain close to current performance levels at existing funding levels.

Plans and Projects

Projects were identified from TPro, GDOT's project management database in the categories of capacity, pavement, and bridge, excluding projects in the current STIP (FY 2014-2017) because those projects are assumed to be part of the existing and committed (E+C) highway system.[1] In order to provide an estimate of the magnitude of the expected changes, specific projects or dollar value were not examined.

[1] The E+C plan network includes all existing roadways and those with committed funding in the STIP.

Capacity Projects

This category included projects that add capacity, except for bridges as noted under Bridge Preservation Capital Projects section, including construction of new roads, reconstruction with added capacity, major widening. There are 741 projects in TPro with a program date for the construction phase after 2017.

Pavement Preservation Capital Projects

This category includes projects with an improvement type of reconstruction – no added capacity, restoration, rehabilitation, and resurfacing; and relocation – no added capacity. There are 74 pavement projects in TPro with a construction phase programmed after 2017. This number does not include Lump Sum projects which are typically used to fund small pavement projects, and whose funding also serves as a placeholder for specific pavement projects that are ultimately programmed once more information is known.

Bridge Preservation Capital Projects

As noted for capacity projects, this category does include Bridge Rehabilitation – Added Capacity; and Bridge Replacement – Added Capacity. These types of projects may be Capacity Added to address Functionally Obsolete issues by adding capacity to the bridge and node to equal the number of lanes/capacity on the roads approaching and leaving the bridge. Other categories include Construction of New Bridges, Bridge Rehabilitation – No Added Capacity, and Bridge Replacement – No Added Capacity. There are 233 bridge projects in TPro with a construction phase programmed after 2017.

Safety Projects

This category includes projects with Improvement Types of: Safety Improvements and Minor Widenings. (Minor widening might be for traffic purposes, but are more likely to be shoulders, etc., that are added or improved as break down lanes to improve safety. There are 325 safety projects in TPro with a construction phase programmed after 2017.

Traffic

This category includes projects that have an Improvement Type of Traffic Management and/or Engineering. There are 270 traffic projects in TPro with a construction phase programmed after 2017.

TRUCKING

Issues and Deficiencies

- The number of truck count locations with volume to capacity (V/C) ratios over 1.0 (extremely congested or failing) is forecast to double from 6 to 12 by 2040.

- Increasing congestion will result in deteriorating reliability and an increasing number of accidents.
- There is a shortage of truck parking spaces.
- Maximum truck weight limits are lower in Georgia than in some neighboring states resulting in the need for more trucks to move a given amount of freight and operational inefficiencies as trucks have to stop and unload some cargo before proceeding through the state.

Plans and Projects

The Georgia Statewide Freight and Logistics Plan (2011) identified a number of highway deficiencies and *potential* projects specifically related to trucking.

- Some long-haul Interstate Corridors may require capacity improvements to meet growing truck demand.
- Interstate Interchanges which are major bottlenecks for truck movement:
  - I-85 at I-285 (north) – Atlanta;
  - I-75 at I-285 (north) – Atlanta;
  - I-20 at I-285 (west) – Atlanta;
  - I-20 at I-285 (east) – Atlanta;
  - I-16 at I-75 – Macon;
  - I-95 at I-16 – Savannah; and
  - I-95 at SR 21 – Savannah.
- Urban Bypasses which may be desirable to facilitate truck movements:
  - A western bypass connecting I-75 roughly 30 miles north and south of the current I-285;
  - An outer western bypass which features a new route from Macon to LaGrange and four-laning the remaining two-lane pieces of U.S. 27 north of LaGrange;
  - A northern bypass connecting I-75 and I-85 roughly 10 miles north of I-285; and
  - A southern bypass around Chattanooga.
- Rural Freight Corridors (GRIP projects):
  - Completing the four laning of U.S. 84;
  - Four laning U.S. 133 between Albany and Valdosta; and
  - Four laning U.S. 441 between I-85 and I-16.

PUBLIC TRANSPORTATION

Georgia has 15 urban fixed-route and complementary paratransit public transportation systems in operation throughout the State, and numerous rural public transit operators providing demand responsive services. The urban systems are characterized based on the size of the urbanized areas (very large, large, small). Within the Atlanta region, the Metropolitan Atlanta Rapid Transit Authority (MARTA) operates an extensive bus and rail system, and the Georgia Regional Transportation Authority (GRTA), Cobb County Transit and Gwinnett County Transit operate extensive bus systems. They are directly funded through FTA grants, different than the other GDOT-funded systems, and are therefore not the focus of this analysis.

Issues and Deficiencies

Urban transit facilities:

- The Brunswick, Cartersville, Dalton, Warner Robins, and Valdosta urbanized areas lack fixed-route transit service, as does Georgia's portion of the Chattanooga urbanized area.
- Of those urbanized areas with fixed-route transit service, about 47 percent of the geographic area of these urbanized areas is not served by transit.
- Of the transit-supportive portions of urbanized areas with fixed-route transit, 10 percent is not served by transit.
- Multiple transit-supportive clusters in the Atlanta urbanized area are not served by transit.
- There appear to be clusters of unserved transit-supportive areas, combined with future population growth, to support urban fixed-route transit service in Valdosta, Brunswick, Dalton, and Warner Robins.
- The relatively low density of much of the area served by transit can inhibit the performance and effectiveness of Georgia's transit systems relative to peer systems in the Southeast and in the U.S. as a whole.

Rural transit facilities:

- Thirty-five counties do not have access to public transportation, particularly in Southern Georgia, Heart of Georgia, River Valley, Central Savannah River Area, Northeast Georgia, and Middle Georgia Regional Commissions as defined in Section 2.0.
- Over 700,000 persons remain unserved by GDOT Rural Public Transportation (RPT). This is more than 20 percent of the rural population outside of urban counties.

Park-and-Ride lot facilities: A few locations currently without a park-and-ride lot have the potential demand for a facility:

- I-85 and I-185 between Atlanta and Columbus, particularly around LaGrange;
- I-75 between Atlanta and Macon;
- I-95 near Brunswick;
- I-16 west of Augusta; and
- I-85 south of the South Carolina border.

Urban transit capacity:

- Transit systems in Georgia serving large metropolitan areas have many fewer vehicles (just over 40 vehicles) than systems serving other large metropolitan areas in the Southeast (about 100 vehicles) and U.S. (140 vehicles).
- Transit systems in Georgia serving small and very large metropolitan areas have older vehicles than those serving similarly sized metro areas in the Southeast.

Rural transit capacity:

- Additional operating funds for Rural and Human Service Transportation (RHST) are needed to meet the projected increase in demand; and
- Additional capital funds are needed to purchase new vehicles as the fleet continues to age.

Urban transit use:

- The ridership and annual passenger miles on systems serving Georgia's large and very large urbanized areas lag behind the national averages for similar systems.

Urban transit operating statistics performance:

- Transit systems in Georgia serving large urbanized areas are undersized, with between one-third and two-thirds as many vehicles, miles and hours of service, passenger miles and trips, and operating expenses as other systems in the Southeast and U.S. Even after accounting for the different populations in the large urbanized area each system serves, systems in Georgia still operate fewer miles, hours, and trips on a per capita basis than peer systems within the Southeast and U.S.
- Very large urbanized areas in Georgia are served by transit systems that operate fewer vehicles and hours and get fewer trips and passenger miles but at a lower expense than other systems in the U.S.

Urban transit performance measures:

- Operating transit systems in very large urbanized areas in Georgia tends to cost more per vehicle revenue hour than operating similar systems in the Southeast and in the U.S. Costs per hour tend to be dominated by labor cost.

- Systems serving small urban areas in Georgia have mixed cost effectiveness. The cost per trip is highest, but the cost to carry passenger miles is the lowest in the Southeast and U.S.

Plans and Projects

MPO Long-Range Transportation Plans (LRTP) and regional Transit Development Plans (TDP) have proposed projects to address deficiencies and improve the State's transit systems. Planned improvements included in the various MPO plans for the State's urban systems commonly include the following:

- **Revise Existing Routes.** Manage the existing fixed-route transit system by revising routes by rerouting, extending, eliminating, consolidating, adjusting run times, etc.
- **Improve Headways.** Improve service by adding vehicles to increase the service frequency of existing routes, either in the peak or off peak.
- **Extend Service Span.** Extend hours of operation on weekdays, Saturdays, and/or Sundays.
- **Add Service Day.** Add Saturday and/or Sunday service where none previously existed.
- **Overhaul System Design.** Overhaul the system design by adopting an alternate operational philosophy. For example, switching from hub and spoke to trunk and feeder.
- **Existing System Capital.** Increase capital expenses dedicated to maintaining the existing system, such as bus replacement or facility improvements.
- **New Service.** Add new local routes, regional/commuter/express/ intercounty/intercity service, and/or demand-responsive service.
- **New Facility.** Add new facilities such as multimodal/transfer facilities or park-and-ride lots.

Based on the combination of these individual strategies, the transit improvement approach of each system can be categorized as baseline operations and maintenance, existing system management, desired or tentative exploration of service expansion, aggressive expansion, or overhaul.

Based on recent TDPs and LRTPs, the planned improvements for each urban fixed-route system are summarized as shown:

- Small Urbanized Areas
  - **Albany.** *Existing system management and desired expansion*. Extend hours and improve headways on existing fixed-routes to 11 p.m.; add four new local routes; add two intercounty bus routes; explore intercity rail between Albany and Macon, and explore a new multimodal center.

- **Athens.** *Detailed maintenance and operations and existing system management*. Make various service improvements (including adding Saturday service on three routes; extending weekday service to midnight; extending Saturday service from 7:00 a.m. to 11:00 p.m.; improving weekday peak headways to 30 minutes; and improving off-peak evening and Saturday headways to 60 minutes); consolidate two routes; eliminate the practice of utilizing large loops in favor of two-way routing on five routes; revise two other routes; analyze schedules for improvement; eliminate "The Link" demand-responsive van service; and explore bus priority treatments where practical.
- **Gainesville.** *Desired expansion*. Expand from three to seven fixed routes with revised routing; add a demand-responsive flex route, and express bus service to Atlanta; relocate new transfer center; explore future multimodal center; and explore ITS strategies.
- **Liberty.** *Facility exploration*. Explore a possible transfer center, park-and-ride lot, and Amtrak station.
- **Macon.** *Baseline maintenance and operations and desired expansion*. Add several new routes, replace buses, and invest in capital improvements at existing operating facility.
- **Rome.** *Baseline maintenance and operations*. Replace buses and invest in capital improvements at existing operating facility.

• Large Urbanized Areas

- **Augusta.** *Revise the system design* from hub and spoke to trunk and feeder; eliminate several routes; revise several routes; add several routes; add a park-and-ride lot; and improve headways.
- **Savannah.** *Existing system management and desired expansion*. Manage existing operations by adjusting run times; extend weekend service hours; add four new fixed routes; add "Flex Zones" curbside van service; and improve peak headway.
- **Columbus.** *Desired expansion*. Study new park-and-ride lots, express bus service, feeder service, demand responsive service, new transfer center, pedestrian environment improvements; connect with Fort Benning and the Atlanta airport; make service span and headway improvements; establish service standards; conduct comprehensive operating analyses (COA); improve downtown bistate circulation; find funding; and work on governance.

• Very Large Urbanized Areas

- **Atlanta.** *Desired expansion***.** A variety of studies have suggested desired expansions and improvements to Atlanta's transit systems.

RAIL – FREIGHT

Georgia is served by two large Class I freight railroads – Norfolk Southern (NS) and CSX Transportation (CSXT), and 23 Class III and switching railroads. In 2007, Georgia's freight railroads moved 210 million tons of freight valued at $213 billion. Rail is the second most heavily used freight mode in the State after trucking. One-quarter of freight tonnage and ten percent of freight value was transported by rail in 2007. The difference in the amount of tonnage versus value carried by rail is due to the fact that rail is most attractive for the transport of high weight, low-value commodities such as coal over long distances. By 2040, it is projected that the railroads will carry more than 343 million tons of freight annually, valued at $468 billion, an increase of 64 percent by tonnage and 120 percent by value, but still accounting for about one-quarter of all freight tonnage.

Issues and Deficiencies

The following deficiencies will need to be addressed to meet anticipated increases in overall rail demand between now and 2040, and the expected transition to more intermodal service (container or trailer on flatcars) and less carload service.

- Short lines need to upgrade their track infrastructure to the current industry standard of 286,000 pound per railcar.
- In order to accommodate the anticipated increase in intermodal service, short lines need to increase vertical clearance to handle double-stack container railcars and tri-level auto carriers.
- Several major Class I subdivisions will need to be double tracked, including NS' Atlanta North, Atlanta South, and Brunswick subdivisions, and the CSXT's Etowah, Fitzgerald, and Manchester subdivisions.
- Major bottlenecks will need to be eliminated, including Howell Junction in Northwest Atlanta, the rail link between Atlanta and Macon, CSXT's rail line connecting Jacksonville, Florida, with Waycross, and rail connections in and around the Port of Savannah (the latter are addressed in more detail in the Marine Port section).

Plans and Projects

It is challenging to identify specific rail freight projects since the majority of the system is privately owned and operated. Railroads, like many private industries, tend to have shorter planning horizons than do public-sector agencies, and for competitive reasons hold these plans closely until they are ready to move forward. Although the ability of Class I railroads to raise private capital for needed investments has greatly improved in recent years, short lines tend to have limited access to capital markets. While several states have revolving loan and grant programs to sustain short-line railroads, Georgia's program remains ad hoc and

has been primarily focused on the State-owned properties. The nature of this program further limits the ability of the State to identify projects in the pipeline.

NS is moving forward with its Crescent Corridor project to provide better intermodal services among the Northeast, Mid-Atlantic, and Southeast. Phase II of the Crescent Corridor will increase intermodal travel speeds for the rail line running between Charlotte, Atlanta, and Birmingham. Phase III will include enhancements to the Austell intermodal rail yard in Atlanta.

Determining specific projects out to the 2040 horizon year of this study is outside of the normal planning process for railroads and therefore individual projects are not further specified. However, based on work done by the American Association of Railroads in its 2007 *National Rail Freight Infrastructure Capacity and Investment Study*, it was estimated in the Freight and Logistics Plan that between $4 and $6 billion of rail capacity enhancements would be needed in Georgia to meet the deficiencies identified above.

RAIL – PASSENGER

Passenger rail service in Georgia currently consists of four Amtrak long-distance intercity routes:

- *Crescent* – from New York through Atlanta to New Orleans;
- *Palmetto* – from New York terminating in Savannah;
- *Silver Service* (*Meteor* and *Star*) – from New York through Savannah terminating in Miami; and
- *Auto Train* – from Lorton, Virginia to Sanford, Florida through Savannah without stopping.

Issues and Deficiencies

- Demand on some Amtrak trains traveling through Georgia currently exceeds capacity, in particular on the *Crescent* between New York City and Atlanta. Ridership is forecast by Amtrak to double on this route by 2040.
- The current track and station alignment at Atlanta's Peachtree station makes it impossible to improve the operational efficiency of *Crescent* service and add more cars north of Atlanta to meet high ridership demand.
- The overall capacity of Amtrak's eastern long-distance trains is constrained by the number of available single-level sleeper cars, and the speed constraints of the existing cars.
- Ridership demand for the *Silver Meteor* trains currently exceeds capacity, and will exceed capacity on the *Palmetto* and *Silver Star* trains by 2040. Single track territory shared with freight trains south of Savannah will need to be upgraded to double track to increase service sufficiently to meet projected demand.

- GDOT currently does not participate in funding any rail improvements, nor has a funding source been identified for the future.

Plans and Projects

- Travel improvements planned in Virginia and North Carolina along the Southeast High-Speed Rail Corridor (SHSR) will improve travel times on the Amtrak trains which operate in Georgia.
- The planned addition of a second *Crescent* train between New York City and Atlanta, and the extension of the *Palmetto* train's southern terminus from Savannah to Jacksonville, Florida, will help to meet demand which currently exceed capacity.
- Amtrak proposes to change the operating strategy for the *Crescent* to further help meet demand by adding cars north of Atlanta. However, this can only be done either through agreement with the track's owner, NS, or if the proposed relocated Atlanta Multimodal Passenger Terminal (MMPT) is constructed. This project currently is unfunded.
- Amtrak proposes to replace aging eastern corridor sleeper cars with new Viewliner II cars which can meet the desired Northeast Corridor operating speed of 125 miles per hour, thereby standardizing train operations across the entire eastern corridor.
- Amtrak proposes to add feeder Thruway bus service connecting the *Crescent* in Atlanta to Macon, Columbus, and Chattanooga.
- As part of Amtrak's Accessible Station Development Program (ASDP), Amtrak proposes to make major improvements to the Savannah station.
- GDOT is participating in several studies of High-Speed Rail service throughout the Southeast with Atlanta as a service hub. These studies include service to Birmingham, Alabama; Macon and Jacksonville; Greenville, South Carolina and Charlotte, North Carolina; Chattanooga and Nashville, Tennessee; and Louisville, Kentucky. No funding has been identified for these projects.
- The Georgia Rail Passenger Program (GRPP) of the State of Georgia, proposed an intercity passenger rail program of seven corridors linking nine of the State's largest cities with metro Atlanta, and Chattanooga and Greenville. Peak-period commuter service would be provided along 7 lines to 45 proposed stations, starting with Atlanta to Macon. With the defeat of the T-SPLOST funding referendum in the Atlanta metropolitan region, no funding currently is available for this project.

BICYCLE AND PEDESTRIAN

There are fourteen designated bicycle routes in Georgia, and numerous other local and regional routes. Note that multiuse paths and recreational trails were not included in this analysis.

Issues and Deficiencies

- Gaps in the continuity of wide shoulders pose a challenge for some portions of the State's bicycle routes. Traffic volumes tend to increase near urban areas, heightening the need for dedicated bicycle facilities and other measures.
- The Northern Crescent, Appalachian Gateway, Little White House, Central, and March to the Sea routes top the list of the least suitable routes due to lack of shoulder space and/or high traffic volumes.
- All 30 miles of State bicycle routes within the Rome MPO are less suitable, followed closely by Chattanooga, Warner Robins, Dalton, and Augusta, all with over 90 percent.
- For one of Georgia's larger urban areas, Augusta has the fewest miles of bicycle facilities.
- Chattanooga, Rome, and Gainesville all have sidewalks on less than 10 percent of their roadway miles.
- There are several high crash rate locations particularly in the Atlanta and Savannah metropolitan areas, and the number of crashes is increasing as the volume of bicycle and pedestrian activity increases.
- The share of trips made by bicycling and walking has steadily increased in the past two decades, as have funding levels for bicycle and pedestrian facilities. The likely continued increase in demand due to improved facilities and changing demographics and societal norms will warrant further growth in investments and updating of aging plans and programs.

Plans and Projects

U.S. DOT's MAP-21's Transportation Alternatives Program (TAP) will continue to fund bicycle and pedestrian improvements through state set-aside and suballocation to areas of the State (formerly Transportation Enhancements, Recreational Trails, Safe Routes to School, etc.). There are also various regional bicycle and pedestrian plans outlining aspirational projects and programs. The goals, deficiencies, and recommendations of the various MPO and Regional Commission (RC) bicycle and pedestrian plans generally include the following elements:

- **Network.** Establish a network of designated state and regional bicycle facilities and local pedestrian facilities to address the deficiency in number and connectivity of bicycle and pedestrian networks.

- **Shoulders.** Ensure wide, paved shoulders, and outside rumble strips are provided along designated bicycle routes to address the deficiency where designated bicycle routes do not sufficiently accommodate bicyclists.
- **Signage.** Ensure route designation and wayfinding signage are provided along designated bicycle routes to address the deficiency of insufficient signage on designated bicycle routes.
- **Education.** Educate riders and drivers about rules and safety to address the deficiency in rider and driver understanding of rules and best practices.
- **Economic development.** Enhance tourism and economic development by promoting bicycling and walking.
- **Planning.** Develop local plans at the county or municipality level, and/or continue regional planning, public participation, formation of committees, etc. The Department has a "Complete Streets" policy which supports the planning, design, and construction of streets and roadways in Georgia that integrate and balance accessibility for all modes of transportation. The policy establishes standard warrants, requiring that accommodations for pedestrian, bicycle, and transit modes of transportation be provided under specific compelling conditions along transportation projects with GDOT oversight (wherever it is practical to do so).

AVIATION – PASSENGER

The aviation system in Georgia is comprised of 104 publicly owned, public use airports. Of these facilities, nine airports offer scheduled commercial service while the other 95 are general aviation airports. Each airport is classified as a Level I, II, or III facility based on the role it plays in the aviation system. There are over 2 million general aviation operations annually, and 73,000 commercial operations. The Hartsfield-Jackson Atlanta International Airport (HJAIA) is the world's busiest passenger airport and dominates air travel in the State, but is not directly under GDOT's purview so is not the focus of this analysis.

Issues and Deficiencies

Each level of airport is required to meet certain Federal Aviation Administration (FAA) standards. Of the Level I airports, the requirements which are most commonly not met are the following:

- Twenty-seven airports need medium-intensity taxiway lighting (MITL);
- Twenty-five airports require additional taxiway turnaround;
- Twenty-three airports need to expand their terminal space ranging from 100 additional square feet to 750 additional square feet;
- Twenty-two airports need limited service fixed-based operators (FBO);

- Twenty-one airports require precision approach path indicator (PAPI);
- Nineteen airports require a runway extension ranging from 100 feet at the Daniel Field airport to 1,000-1,500 feet at numerous airports, including, for example, Treutlen County, Davis Field, and Wrens Memorial;
- Fifteen airports need additional parking spaces ranging from 1 additional parking space at the Elbert County-Patz Field airport to 45 spaces at the Daniel Field airport;
- Eleven airports need the primary runway to be widened ranging from 15 feet to 25 feet; and
- Cochran airport requires a new primary 4,000-foot runway.

Of the Level II airports, the most common unmet requirements are the following:

- Fifteen airports require additional apron parking ranging from 2 to 35 spaces;
- Six airports need an extended taxiway;
- Fifteen airports require a full parallel taxiway;
- Eighteen airports need medium intensity terminal lighting (MITI);
- Seventeen airports require additional terminal space ranging from 500 square feet to 2,000 square feet;
- Nine airports need a precision approach path indicator (PAPI);
- Twelve airports require an extension to the primary runway ranging from 100 feet to almost 1,300 feet at the Griffin-Spalding airport;
- Twelve airports lack sufficient hangar spaces ranging from 2 to 77 spaces at the Clayton County Tara Field airport; and
- Twenty-one airports do not have enough visitor parking spaces ranging from 1 space to 181 spaces.

The critical requirements of the 34 Level III-GS airports include the following:

- Ten airports require a longer primary runway ranging from 145 feet to over 1,000 feet at the Habersham County, Blairsville, Heart of Georgia Regional, West Georgia Regional Gray Field, and Louisville Municipal airports.
- Six airports need the primary runway to be widened by 25 feet;
- Twenty-two airports are deficient of hangar spaces ranging from 2 spaces to 360 spaces at Peachtree DeKalb airport;
- Twenty-one airports require technology to upgrade to precision approaches;
- Twenty-two airports need to upgrade the medium intensity runway lights (MIRL) to high-intensity runway lights (HIRL);
- Five airports require a parallel taxiway and three need the primary taxiway to be extended;

- Six airports need full aircraft service maintenance; and
- The Heart of Georgia Regional airport requires a new runway.

Commercial:

- Of the eight commercial service airports, excluding HJAIA, several have deficiencies in the areas of public parking spaces, apron parking, hangar space, precision approach technology (PAPI), runway lighting intensity, and the need for arrival indicator system.
- HJAIA is facing capacity constraints in the area of terminals, ground transportation, and aircraft maintenance and storage areas.

Plans and Projects

There are several new aviation facilities that are planned. These include Level I airports in Monroe County and Rabun County and Level II airports in Effingham County and Forsyth/Dawson County. Replacement airports are planned for Level II airports in Dahlonega-Lumpkin County (Wimpy's Airport) and St. Mary's Airport.

In addition to these new and replacement airports, specific airport improvements and capital programs for continued systemwide development were calculated. As reported in the GASP, GDOT estimates that approximately $142 million is required in the next 5 years with an additional $178 million required for the following 15-year timeframe to meet the needs identified in the master plans.

The critical types of airport projects and programs are summarized below:

- **Runway Extensions –** A primary need at airports of all levels is runway expansions in order to comply with FAA regulations. Along with expansions, the layout and width of the runway, taxiway, turnarounds, and aircraft parking and maintenance areas must be considered. Smaller airports may serve as capacity reliever sites for larger airports and need to be designed accordingly.
- **Pavement Maintenance –** Aging pavements must be repaired to ensure safety at all airports. This is an ongoing need throughout the State.
- **Improved Instrument Approaches –** Airports at all levels require instrument improvements such as runway and taxiway lighting upgrades, installation of precision approach path indicator (PAPI), and automated surface observing systems for weather tracking.
- **Landside Expansions –** Many airports require expansions to their landside property, including terminal areas, parking spaces, rental car facilities, and other fixed-based operators to support the general aviation services.
- **Planning and Zoning Controls –** Municipality and community adoption of planning and zoning controls that are compatible with the airport is critical to ensure that land remains available for future expansion.

- **Connections to the Transportation System –** Airport facilities must be connected to the broader transportation system in order for airports to operate as economic engines throughout the State.

AVIATION – CARGO

There currently are air cargo operations at three of the nine commercial service airports in Georgia – HJAIA, Savannah-Hilton Head Airport, and Southwest Georgia Regional Airport in Albany. HJAIA is a major U.S. and international cargo hub, while operations at the other two airports are relatively small. While only one percent of all cargo by weight and value travels by air, air cargo is critical to economic growth as it typically carries high-value commodities involving growth industries such as services, technology, and biomedical.

Issues and Deficiencies

The major deficiencies at HJAIA are as follows but are primarily related to actions necessary to meet future as opposed to current demand levels:

- Increase the number of air cargo destinations to make the airport increasingly attractive and linked to the global air transport network.
- Increase on-airport cargo infrastructure; and
- Improve truck access.

The Savannah-Hilton Head Airport is located in proximity to the Port of Savannah and is impacted by truck traffic congestion associated with the Port.

The runway at the Southwest Georgia Regional Airport is inadequate for large commercial aircraft which constrains its future growth potential.

Plans and Projects

There are no specific air cargo projects currently in development.

MARINE PORTS

The Georgia Ports Authority (GPA) operates ocean marine terminals in Savannah and Brunswick, and inland terminals along the Apalachicola-Chattahoochee-Flint Waterway in Bainbridge and Columbus (the latter currently is inoperable due to low water levels). The Garden City terminal in Savannah is one of the largest and fastest growing container terminals in the U.S.

Issues and Deficiencies

- The Port of Savannah channel, at 42 feet, is not deep enough to accommodate the new larger container ships which will start to traverse the widened Panama Canal in 2015. This deficiency must be addressed if the Port is to retain its

preeminent position in container traffic along the East Coast and take advantage of the growth potential for receiving additional direct shipments of ocean-going goods from the rapidly growing Asian market.

- The landside capacity of the Garden City Terminal is adequate to meet the current demand of 6.5 million 20-foot equivalent (TEUs) containers, but inadequate to meet the forecast future demand after 2035.
- The growth in port traffic in recent decades, and projected future growth, has and will continue to strain the local roadway and railroad network.
- Rail access to the East River Terminal and Lanier Docks in Brunswick is constrained.
- The inland ports cannot grow until there is a positive resolution of water sharing issues among the states of Georgia, Alabama, and Florida.

Plans and Projects

- The Army Corps of Engineers and State of Georgia are moving ahead with a plan to dredge the Savannah River to a depth of 48 feet.
- The states of Georgia and South Carolina are collaborating in the early stages of a joint plan to develop a new container port in Jasper, South Carolina, across the river from Savannah, to address the future landside access constraints at the Garden City Terminal.
- Three roadway/rail projects are in the works to address capacity constraints in the vicinity of the Port of Savannah: Brampton Road Connector, Jimmy Deloach Parkway Connector, and Grange Road Upgrades.

1.0 Highways

A primary mission of the Georgia Department of Transportation (GDOT) is to plan, maintain, and operate Georgia's highway system. This responsibility includes the portion of the highway system that GDOT owns, as well as administering U.S. DOT funds for those portions of the highway system that it does not own, but which are eligible for Federal Aid Highway System (FAS) funding.

1.1 Inventory of Existing and Committed Facilities

The inventory of highways describes the public roads as defined, typically paved travel ways, and the bridges on those public roads. Technical Memorandum 3 – Existing Conditions, documented the extent and attributes of the existing highway system, as reported in GDOT's Federated Road Enhanced Database (FRED) which contains GDOT's Road Characteristics (RC) file. This SWTP/SSTP will evaluate projects to improve the highway system. However, the starting point for the evaluation of future conditions is not merely the existing system, but also the projects that already are funded and underway that will change the system. These projects plus the existing system are typically called the Existing plus Committed (E+C) network of the Statewide Travel Demand Model (SWM). This also is often called a No-Build network. The Existing plus Committed network for 2040 was recently updated and was examined to identify new roads. While other additional roads will inevitably be built to accommodate new developments, these roads will primarily be functionally classified as minor collectors or locals, and thus are by definition not part of the Federal Aid Highway System. Because the purpose of this technical memorandum is to forecast future conditions, the systemwide totals will be those reported in the SWM. While the reported roads and attributes are slightly different between FRED and the SWM, as observed in Technical Memorandum 3, the systemwide totals are substantially the same.

While the Existing Conditions technical memorandum reported mileages and other attributes by functional classification and ownership, for this analysis of future deficiencies it is proposed that the attributes and performance be reported to support the funding tradeoff analysis in subsequent tasks. The proposed categories for reporting are as follows:

1. **Interstate Highways.** these are the network of limited-access roadways that serve to connect Georgia's largest metropolitan areas with the nation. As documented in the Technical Memorandum 3 – Existing Conditions, the Interstate highways are entirely owned by GDOT and carry over 35 percent of

the existing traffic as measured by Vehicle Miles of Travel (VMT),[2] on Georgia's Federal Aid Highway System.

2. **Non-Interstate National Highway System.** The National Highway System (NHS) is a network of highways serving strategic transport facilities. It was authorized by Congress based on information submitted by GDOT and local governments, including the Metropolitan Planning Organizations (MPO), and was updated in 2013 to include all roads that had been designated as Major Arterials. It includes the entire Interstate System as well as the roads reported with a Functional Classification of "Other Freeways and Expressways" and "Other Major Arterials" in Technical Memorandum 3. The NHS is eligible for dedicated Federal funding programs. GDOT owns over 94 percent of the NHS. The roads under this category carry over 25 percent of the existing VMT. This means that the entire NHS, including the Interstates, carries over 60 percent of the existing VMT on Georgia's Federal Aid Highway System.
3. **Non-NHS Federal Aid System State-Owned.** Federal funding is available for projects on roads which are classified as Major Collectors or above. Virtually all of GDOT's road miles are part of the Federal Aid System and, as noted above, GDOT owns all of the Interstate and almost all of NHS road miles. However, GDOT owns only 49 percent of the miles on the remainder of the Federal Aid System (FAS). These GDOT roads carry almost 57 percent of the existing VMT on the remainder of the FAS that is not part of the NHS.
4. **Non-NHS Federal Aid System Not State-Owned.** These roads, which are not owned by GDOT but are eligible for Federal Aid Highway funding, represent 51 percent of the miles on the FAS, excluding the NHS. The roads in this category carry almost 44 percent of the existing VMT on the FAS excluding the NHS. While the inventories used to analyze bridge and pavement deficiencies do include all of these roads, the SWM only includes some of these roads. Therefore, while SWM volumes and capacities will be reported for this category, congestion deficiencies will combine the analysis of this category with category 3 above, as all non-NHS FAS roads. The assumption is that congestion will be similar whether the roads are owned by GDOT or Others. Historically, GDOT-controlled funds have been used for capital bridge projects on these systems, but have not been used for capital pavement projects on these systems. The reported summaries of forecast bridge and pavement conditions will acknowledge this difference.

While GDOT's state funding is used only on roads in categories 1-3, the Federal Aid funding administered by GDOT also can be used on the roads in category 4.

[2] Vehicle Miles of Travel is a customary measure of road usage. A vehicle-mile is one vehicle traveling one mile.

1.1.1 New Public Roads

As shown in Table 1.1, there have been only modest additions in the number of lanes added to the E&C SWM highway network for 2040 compared to the 2010 SWM network. Most of these changes are to roads owned by GDOT.

Table 1.1 Miles of Public Roads by Ownership and Category
Existing and Committed (New)

	GDOT		Other Owners	
Road Categories	Existing	Committed	Existing	Committed
Interstate	2,253	0	0	0
Non-Interstate NHS	9,176	79	207	0
Non-NHS FAS State-Owned	28,252	81	0	0
Non-NHS FAS Not State-Owned	0	0	815	7
Federal Aid System	39,681	160	1,022	7

Source: GDOT's 2040 E+C SWM Highway network.

In addition to the construction of new roads, the SWM was updated to include widening of existing roads. This growth can be seen by comparing the lanes miles in the 2010 network with the 2040 E+C network. This growth is shown in Table 1.2. Again, only modest changes (less than 1,000 miles) have been made by adding new lanes, and most of these additions occur on roads owned by GDOT.[3]

Table 1.2 Lane-Miles of Public Roads by Ownership and Category
Existing and Committed (New)

	GDOT		Other Owners	
Road Categories	Existing	Committed	Existing	Committed
Interstate	6,290	24	0	0
Non-Interstate NHS	16,046	370	409	0
Non-NHS FAS State-Owned	30,724	516	0	0
Non-NHS FAS Not State-Owned	0	0	970	52
Federal Aid System	53,060	920	1,379	52

Source: GDOT's 2040 E+C SWM Highway network.

1.1.2 Bridges

The inventory of existing bridges was reported in Technical Memorandum 3. Projects that Rehabilitate or Replace those existing bridges are not considered to

[3] The capacity addition represented by the managed lanes currently under construction in the Atlanta region do not appear to be included in the 2040 E+C SWM.

be new bridge commitments. No other bridges were included in the Committed program.

1.2 FUTURE CAPACITY

The capacity of the road system depends on the number of lanes that are available and the operation of those lanes. The capacity on controlled-access roads, without intersections, is available 100 percent of the time. The capacity of travel lanes on partially controlled roads (e.g., those whose opposing lanes are separated by a median), and uncontrolled access roads, depends on how often the right-of-way is given to those lanes at their intersections with other roads.

For this SWTP/SSTP, the capacity of roads will be reported as they are coded in the 2010 Existing and the 2040 E&C highway networks in GDOT's SWM. These capacities are stated in terms of vehicles per day. These capacities have been weighted by multiplying them by the length of each link in the SWM and are shown in Table 1.3.

Table 1.3 SWM Capacity Miles
Thousands

System	2010	2040	Compound Annual Growth Rate (CAGR)[a]
Interstate	124,994,343	127,886,683	0.08%
Non-Interstate NHS	181,737,719	181,998,924	0.00%
Non-NHS FAS State–Owned	224,873,022	227,026,033	0.03%
Non-NHS FAS Not State–Owned	7,242,238	7,473,681	0.10%
Federal Aid Highway System	538,847,322	544,385,322	0.03%

Source: GDOT data.

[a] CAGR equals the average annual growth rate over a period of time assuming that the growth in each year compounds in the following years, just as would interest income in a savings account.

1.3 FUTURE USE (TRAFFIC VOLUMES)

1.3.1 Roads

As documented in the Technical Memorandum on Methodology,[4] traffic volume information for highways comes from the travel demand models available to GDOT. The rationale for using the forecast of SWM volumes is that the travel demand models include capacities that also can measure congestion, and that the

[4] Cambridge Systematics, et al., Statewide Transportation Plan/Statewide Strategic Transportation Plan Update: Task 1 – Development of Study Methodology, Georgia Department of Transportation, June 7, 2013.

travel demand models can then be used to identify deficiencies and to test alternatives. This is not true of volumes in other databases. However, the volumes as reported from counts were compared with those volumes reported in the SWM to ensure that the volumes reflecting existing conditions in the SWM database are consistent with those reported from observed counts in other databases.

The SWM creates trip tables of vehicles using Socioeconomic data (SED). The forecast trip tables for 2040 were developed using the SWM and 2040 SED as described in Technical Memorandum 4a – Economic Forecasts. SED estimates were created for 2015 and 2030 using linear interpolations from the 2010 SED as used in Task 3 – Existing Conditions, and to this 2040 SED.

The SED includes data for 27 variables by each Traffic Analysis Zone in Georgia. A traffic analysis zone (TAZ) is a geographical area that encompasses residential, social, and economic activities. Each zone represents an origin and destination for a trip within the model area, and contains aggregated socioeconomic data (SED) which is used to estimate the trip generation (trip origins and destinations) for that zone. In the Georgia Statewide Model there are 3,505 TAZs representing 2,978 zones within Georgia and the balance for external trips in the other 48 states[5] and the District of Columbia. Similar to the layered network system, the TAZs are more numerous and smaller in size within Georgia to provide finer detail for analysis of travel within the State. The TAZs then progressively become larger and less detailed moving outward from the State. This also is to ensure the zone system and network is comparable in design.

The 27 variables, in addition to one variable for population and one for households, include 19 employment variables for detailed industry classifications to support the forecast freight truck trips and 6 more aggregated industry employment categories to support the forecasting of nonfreight commercial trucks. The employment categories also are aggregated and used in the passenger portion of the model.

The growth in two of those variables is shown for population by GDOT District, in Tables 1.4 and 1.5, and total employment, in Tables 1.6 (page 1-8) and 1.7 (page 1-8). The GDOT Districts are shown in Figure 1.1 (page 1-7). The SWM uses the inputs for SED as well as the expected E+C highway network, to forecast trip tables of vehicle trips that are then assigned to the highway network to forecast volumes and VMT. The growth in the trip tables that are forecast by the model using the growth in SED, is shown in Tables 1.8 (page 1-8) and 1.9 (page 1-9) for autos and in Tables 1.10 (page 1-9) and 1.11 (page 1-9) for trucks. These tables show the growth in the vehicles whose trips begin or end in TAZs in Georgia.

[5] The SWM does not include a zone for the state of Hawaii because it has no highway or rail connections to the mainland.

Table 1.4 Population SED by GDOT District

Districts	2010	2015	2030	2040
District One – Gainesville	1,834,397	1,971,062	2,381,059	2,654,390
District Two – Tennille	830,615	901,674	1,114,851	1,256,969
District Three – Thomaston	1,435,655	1,510,584	1,735,369	1,885,227
District Four – Tifton	712,377	748,514	856,924	929,197
District Five – Jesup	908,811	959,725	1,112,467	1,214,295
District Six – Cartersville	1,188,056	1,272,163	1,524,485	1,692,699
District Seven – Metro Atlanta	2,777,591	3,000,699	3,670,023	4,116,239
Statewide	9,687,502	10,364,421	12,395,177	13,749,014

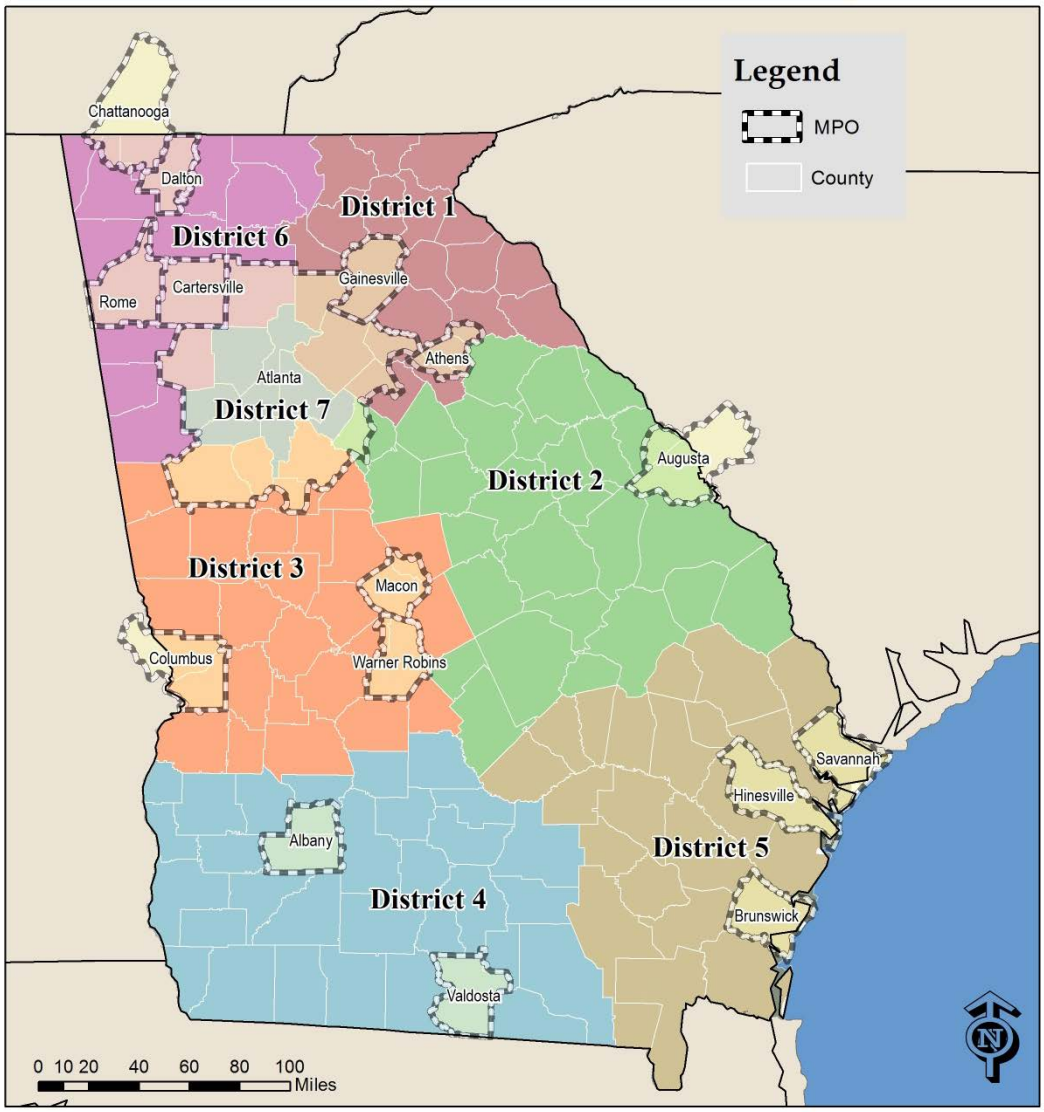
Source: GDOT data.

Table 1.5 Compound Annual Growth Rates (CAGR)
Population SED by GDOT District

Districts	2010-2015	2015-2030	2030-2040	2010-2030	2010-2040
District One – Gainesville	1.4%	1.3%	1.1%	1.3%	1.2%
District Two – Tennille	1.7%	1.4%	1.2%	1.5%	1.4%
District Three – Thomaston	1.0%	0.9%	0.8%	1.0%	0.9%
District Four – Tifton	1.0%	0.9%	0.8%	0.9%	0.9%
District Five – Jesup	1.1%	1.0%	0.9%	1.0%	1.0%
District Six – Cartersville	1.4%	1.2%	1.1%	1.3%	1.2%
District Seven – Metro Atlanta	1.6%	1.4%	1.2%	1.4%	1.3%
Statewide	1.4%	1.2%	1.0%	1.2%	1.2%

Source: GDOT data.

Figure 1.1 Georgia DOT Districts



Source: GDOT data.

Table 1.6 Total Employment SED by GDOT District

Row Labels	2010	2015	2030	2040
District One – Gainesville	851,125	946,638	1,233,178	1,424,205
District Two – Tennille	379,196	409,252	499,421	559,534
District Three – Thomaston	719,806	781,357	966,009	1,089,110
District Four – Tifton	340,464	360,743	421,580	462,138
District Five – Jesup	459,819	485,616	563,008	614,603
District Six – Cartersville	485,642	541,405	708,695	820,222
District Seven – Metro Atlanta	2,041,595	2,335,202	3,216,021	3,803,234
Grand Total	5,277,648	5,860,214	7,607,913	8,773,046

Source: GDOT data.

Table 1.7 Compound Annual Growth Rates (CAGR)
Total Employment SED Georgia by GDOT District

Districts	2010-2015	2015-2030	2030-2040	2010-2030	2010-2040
District One – Gainesville	2.1%	1.8%	1.5%	1.9%	1.7%
District Two – Tennille	1.5%	1.3%	1.1%	1.4%	1.3%
District Three – Thomaston	1.7%	1.4%	1.2%	1.5%	1.4%
District Four – Tifton	1.2%	1.0%	0.9%	1.1%	1.0%
District Five – Jesup	1.1%	1.0%	0.9%	1.0%	1.0%
District Six – Cartersville	2.2%	1.8%	1.5%	1.9%	1.8%
District Seven – Metro Atlanta	2.7%	2.2%	1.7%	2.3%	2.1%
Statewide	2.1%	1.8%	1.4%	1.8%	1.7%

Source: GDOT data.

Table 1.8 Total Georgia Auto Trip Ends by GDOT District

Row Labels	2010	2015	2030	2040
District One – Gainesville	7,972,661	8,562,557	10,333,372	11,505,413
District Two – Tennille	3,635,385	3,918,019	4,760,437	5,319,537
District Three – Thomaston	6,415,702	6,775,976	7,857,660	8,575,093
District Four – Tifton	3,164,342	3,322,043	3,797,723	4,116,846
District Five – Jesup	4,087,454	4,306,808	4,962,264	5,395,493
District Six – Cartersville	5,112,009	5,476,315	6,566,084	7,283,326
District Seven – Metro Atlanta	15,044,732	16,404,536	20,402,211	23,047,665
Grand Total	45,432,284	48,766,253	58,679,750	65,243,372

Source: GDOT data.

Table 1.9 Compound Annual Growth Rates (CAGR)
Total Auto Georgia Trip Ends by GDOT District

Districts	2010-2015	2015-2030	2030-2040	2010-2030	2010-2040
District One – Gainesville	1.4%	1.3%	1.1%	1.3%	1.2%
District Two – Tennille	1.5%	1.3%	1.1%	1.4%	1.3%
District Three – Thomaston	1.1%	1.0%	0.9%	1.0%	1.0%
District Four – Tifton	1.0%	0.9%	0.8%	0.9%	0.9%
District Five – Jesup	1.1%	0.9%	0.8%	1.0%	0.9%
District Six – Cartersville	1.4%	1.2%	1.0%	1.3%	1.2%
District Seven – Metro Atlanta	1.7%	1.5%	1.2%	1.5%	1.4%
Statewide	1.4%	1.2%	1.1%	1.3%	1.2%

Source: GDOT data.

Table 1.10 Total Georgia Truck Trip Ends by GDOT District

Row Labels	2010	2015	2030	2040
District One – Gainesville	31,481	34,595	42,370	50,165
District Two – Tennille	16,939	17,836	19,447	22,293
District Three – Thomaston	25,841	27,608	31,449	36,528
District Four – Tifton	12,623	13,022	13,472	15,557
District Five – Jesup	20,266	20,707	21,578	24,029
District Six – Cartersville	18,295	20,290	25,036	29,953
District Seven – Metro Atlanta	56,356	64,210	83,137	102,580
Grand Total	181,801	198,266	236,490	281,105

Source: GDOT data.

Table 1.11 Compound Annual Growth Rates (CAGR)
Total Truck Georgia Trip Ends by GDOT District

Districts	2010-2015	2015-2030	2030-2040	2010-2030	2010-2040
District One – Gainesville	1.9%	1.4%	1.7%	1.5%	1.6%
District Two – Tennille	1.0%	0.6%	1.4%	0.7%	0.9%
District Three – Thomaston	1.3%	0.9%	1.5%	1.0%	1.2%
District Four – Tifton	0.6%	0.2%	1.4%	0.3%	0.7%
District Five – Jesup	0.4%	0.3%	1.1%	0.3%	0.6%
District Six – Cartersville	2.1%	1.4%	1.8%	1.6%	1.7%
District Seven – Metro Atlanta	2.6%	1.7%	2.1%	2.0%	2.0%
Statewide	1.7%	1.2%	1.7%	1.3%	1.5%

Source: GDOT data.

As can be seen, the annual growth rates are fairly modest, but by the 2040 horizon year, the overall growth is substantial. Population grows at an annual rate of 1.2 percent which will result in a 42 percent increase by 2040. Employment grows at an annual rate of 1.7 percent which will result in a 66 percent increase from 2010 to 2040. The auto trip origins and destinations in Georgia grow at an annual rate of 1.2 percent which will result in a 44 percent increase from 2010 to 2040. The auto trip origins and destinations in Georgia grow at an annual rate of 1.5 percent which will result in a 55 percent increase from 2010 to 2040. As shown in Table 1.7 (page 1-8), capacity is only increasing by 0.03 percent between 2010 and 2040. Because congestion is a function of the ratio of volumes to congestion, assigning this trip table will identify how the existing congestion changes.

SWM highway networks were only available for 2010 Existing and 2040 E+C. It was not reasonable to develop 2015 and 2030 networks because that would require determination of the year in which committed projects would be completed. Instead, to develop 2015 highway volumes, the 2015 vehicle trip tables were assigned to the 2010 Existing highway network. To develop 2030 highway volumes, the 2030 vehicle trip tables were assigned to the 2040 E+C highway network. The forecast of VMT through 2040 as reported by GDOT's SWM on Federal Aid Highways in Georgia is shown in Table 1.12 (page 1-11). The resulting growth rates are shown in Table 1.13 (page 1-11). Consistent with the projected growth in the inputs reported in Tables 1.4 through 1.11 (shown previously on pages 1-6 through 1-9), the growth in VMT as reported by the SWM is modest for all time periods, across all classes of roads. However, even this modest rate of growth in VMT is a 35 percent increase from 2010 to 2040, and during this same time period, capacity is virtually unchanged.

Table 1.12 Statewide Model's 2040 E+C VMT by System

System	2010	2015	2030	2040
Interstate	79,549,270	83,512,746	98,271,543	107,150,939
Non-Interstate NHS	55,446,987	57,248,555	66,272,040	71,535,951
Non-NHS FAS State-Owned	50,544,354	53,856,167	64,412,358	71,121,653
Non-NHS FAS Not State-Owned	4,222,764	4,460,182	5,180,451	5,690,232
Federal Aid Highway System	189,765,385	199,079,665	234,138,423	255,498,775

Source: GDOT SWM.

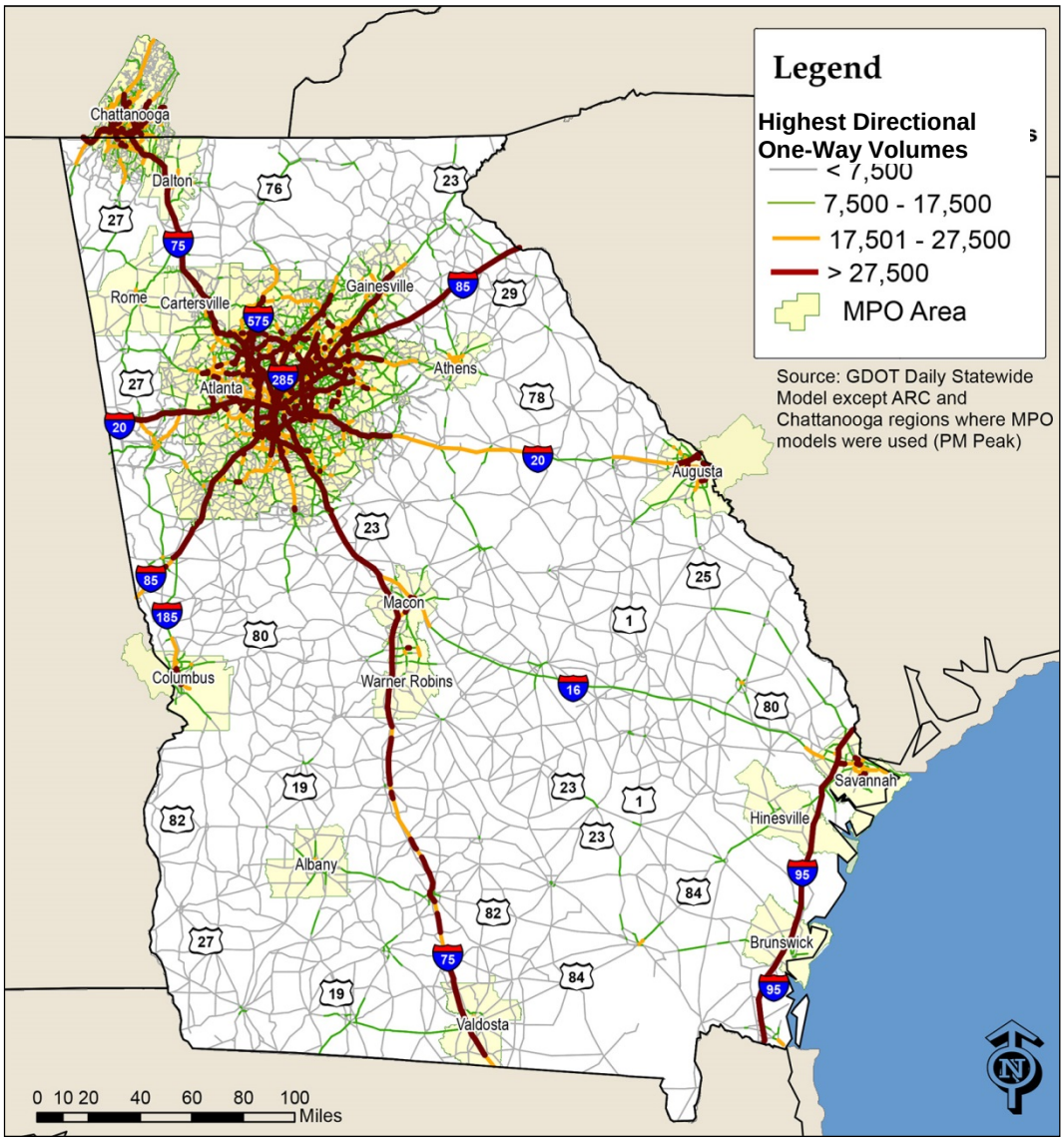
Table 1.13 Compound Annual Growth Rates (CAGR)
Statewide Model's 2040 E+C VMT by System

System	2010-2015	2015-2030	2030-2040	2010-2030	2010-2040
Interstate	1.0%	1.1%	0.9%	1.1%	1.0%
Non-Interstate NHS	0.6%	1.0%	0.8%	0.9%	0.9%
Non-NHS FAS State-Owned	1.3%	1.2%	1.0%	1.2%	1.1%
Non-NHS FAS Not State-Owned	1.1%	1.0%	0.9%	1.0%	1.0%
Federal Aid Highway System	1.0%	1.1%	0.9%	1.1%	1.0%

Source: GDOT SWM.

While the SWM incudes the most important roads in Georgia, estimates are not intended to replace the more detailed models that are operated by the MPOs in Georgia. Those models include more of the Minor Arterial and Major Collector roads than are shown above as NHS. While the SWM, and all of the MPOs with the exception of ARC and the Georgia portion of Chattanooga (Tennessee), model daily traffic only, the ARC and Chattanooga models include separate models for peak and off-peak periods and thus their volumes are more representative of road usage, especially during peak periods. The link volumes from the SWM, supplemented by those from the MPO models, are shown in Figure 1.2 (page 1-12).

Figure 1.2 2040 E+C Daily Traffic Volumes from Statewide and MPO Travel Demand Models



Source: GDOT and MPO Travel Demand Models.

As will be discussed in Section 1.4.1, the pavement conditions will be forecast using the Highway Economic Requirements System (HERS) software. The HERS software considers traffic growth that affect pavement condition using the Highway Performance Monitoring System (HPMS) data as submitted annually by GDOT to FHWA. The HPMS submittal incudes, for each highway segment, GDOT's estimates of current and future traffic and the future year in which that is expected to occur. The HERS model interpolates and extrapolates from these volumes in order to estimate performance. This update of the SWTP/SSTP uses GDOT's HPMS projections of traffic with respect to pavement.

1.3.2 Bridges

As will be discussed in Section 1.4.2, GDOT's National Bridge Inventory (NBI) file is submitted annually to FHWA. That file contains the base year Annualized Average Daily Traffic (AADT) and the future year AADT, as submitted by GDOT. The submittal indicates the year in which those future volumes are expected to be reached. The volumes and years are used to develop the growth in traffic which is applied to estimate the traffic in a given year by interpolation or extrapolation. This update of the SWTP/SSTP uses the GDOT's submitted NBI file and is making no changes to the traffic as submitted by GDOT.

1.4 FUTURE PERFORMANCE

1.4.1 Roads

Pavement Condition

The physical condition of pavements in Georgia is measured by its COPACES (Computerized Pavement Condition Evaluation System) score. The COPACES score is a numerical Rating that evaluates rutting, cracks, and other surface deficiencies on a scale of 1 to 100.

The characterization of Good, Fair, and Poor was based on GDOT's Performance Dashboard web site.[6] On that web site, "Fair" condition for non-Interstate roads is defined as an average COPACES Rating of 70 to 80. "Fair" condition for Interstates is defined as an average COPACES Rating of 75 to 80. Based on these definitions, it is assumed that a "Good" or better condition must be a COPACES Rating greater than 80 for both Interstate and non-Interstate roads, and that a "Poor" condition must be a COPACES Ratings of less than 75 for Interstate roads and less than 70 for non-Interstate roads.

While COPACES is GDOT's preferred system for monitoring pavement condition, it may not be the performance measure that will be used for purposes of MAP-21.

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[6] http://www.dot.ga.gov/informationcenter/statistics/performance/Pages/COPACES-NonInterstate.aspx and http://www.dot.ga.gov/informationcenter/statistics/performance/Pages/COPACES-Interstate.aspx.

Additionally, an effort was made to forecast pavement condition with the Georgia Pavement Management System (GPAMS) software. It was determined that the only way to disaggregate performance reported by GPAMS is as follows: 1) Interstate; 2) non-Interstate; and 3) total. Given that the SWTP/SSTP needs to report a finer level of stratification, for example to develop performance for NHS or FAS pavement, it was decided not to use GPAMS for the analysis of future years and instead use the Highway Economic Requirements System (HERS) and report forecasts of the International Roughness Index (IRI)[7] and Present Serviceability Rating (PSR).[8] An effort will be made to ensure that the HERS forecasts of performance on the Interstate System and the aggregate pavement condition on non-Interstate pavement will be consistent with the GDOT forecasts from GPAMS. As noted in Technical Memorandum 3 – Existing Conditions, while COPACES is the preferred system, the performance reported by IRI and PSR was very similar.

Additionally, there are other reasons why HERS is preferred over GPAMS for the SWTP/SSTP besides the level of roadway stratification, i.e., Interstate, etc., that is discussed above. GPAMS doesn't analyze concrete roadways and GPAMS doesn't include non-GDOT-owned roads. These factors were not considered significant in GDOT's Interstate Risk Assessment study which only looked at the Interstates. For the programming of projects according to the Interstate Risk Assessment, it was thought to be more important to use the tool that GDOT's own maintenance engineers use so they could employ the results in future pavement programming. The concrete issue was addressed by simply putting those Interstate segments to the side, and assigning a future funding amount based on the continuation of the trend of historical funding over the past 10 years. This funding assumption was not linked to performance measures.

In contrast, for the SWTP/SSTP, it was thought to be more important to include a wider category of roads in order to project funding and performance over the long term (25 years of a statewide plan). In other words, this analysis is intended to be used only as a planning tool, and not for programming pavement projects in the short-midterm.

HERS has been used by the Federal Highway Administration's (FHWA) Office of Legislation and Strategic Planning for much of the past decade to develop future national highway investment levels, to either improve the Nation's highway system or maintain user cost levels on the system. HERS provides cost estimates for achieving economically optimal program structures. HERS also can predict system condition and user cost levels resulting from a given level of investment.

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[7] The International Roughness Index (IRI) is reported in inches per mile. Lower IRI represents smoother riding roadways. Reference: World Bank Technical Paper Number 46, 1986.

[8] The "Present Serviceability Rating" (PSR) is a subjective, primarily ride-based system adapted from the "AASHTO ROAD TESTS" conducted in the late 1950s and early 1960s. The PSR values range from 0.1 to 5.0; higher PSR values represent smoother riding roadways. Reference: Highway Special Report 61E, 1962.

These estimates provide benchmarks from which Congress considers the highway budget. Unlike capacity, pavement performance will deteriorate with age even if demand remains the same. It is therefore necessary to specify some level of funding to properly evaluate deficiencies. For this analysis, the performance was computed using GDOT's current level of funding for pavement, projected into the future using real (noninflated) dollars for both revenue and costs. Reductions or increases in this funding will be considered as an alternative to be analyzed in subsequent tasks.

The HERS model uses incremental benefit/cost analysis to optimize highway investment. Within the HERS process, travel forecasts for each highway facility included in the Highway Performance Monitoring System (HPMS) sample database are used to predict future pavement deficiencies. HERS addresses these deficiencies by selecting a set of alternative improvements to satisfy analyst-specified performance objectives. Each potential improvement is subjected to a rigorous benefit/cost analysis that considers travel time, safety, and vehicle operating and emissions costs; the most economically attractive improvement for each facility is then tentatively selected. Given funding constraints or user-specified performance objectives, HERS minimizes the expenditure of public funds while simultaneously maximizing highway user benefits over the entire Federal Aid Highway System.

FHWA reports pavement scores by numerical ranges and these ranges were reported in Technical Memorandum 3 – Existing Conditions. To provide context for those ranges, qualitative labels have been assigned of "Excellent" through "Poor." Those reporting ranges for IRI and PSR are shown in Table 1.14. Miles by pavement condition using the percentage of miles whose IRI is projected to be in Fair or Better condition according to HERS are shown in Table 1.15 (page 1-17) for 2030 and Table 1.16 (page 1-17) for 2040.

Table 1.14 FHWA Pavement Scoring Ranges

IRI Range	PSR Range	Qualitative Labels
< 60	> 3.9	Excellent
60-94	3.5-3.9	Very Good
95-170	2.6-3.4	Good
171-220	2.1-2.5	Fair
> 220	≤ 2.0	Poor

HERS was used to compute performance for each of the road stratifications. Those curves are shown in Figure 1.3 and were used to compute the performance shown in Tables 1.15 (page 1-17) and 1.16 (page 1-17). These curves show the pavement performance for each road stratification based on the amount of annual funding. However, as shown in Tables 1.15 (page 1-17) and 1.16 (page 1-17), the systems

vary dramatically in terms of their share of pavement (as indicated by lane miles) and usage (as indicated by VMT). Additionally, the economic benefits of pavement projects on the Interstates are much greater than the benefits of pavement projects on lower road classifications. While the combined curve must be weighted based on each curve's share of pavement mileage, the amount of funding allocated to each class should match the usage and benefits of the projects.

As shown in Tables 1.15 (page 1-17) and 1.16 (page 1-17), the pavement conditions are forecast to deteriorate sharply, especially on the GDOT-owned non-NHS Federal Aid System, while the performance on Interstates and the remainder of the NHS system is expected to perform much better, particularly at higher amounts of annual funding. While an analysis was prepared for non-NHS roads owned by others than GDOT, this is not included in Tables 1.15 and 1.16. It was found that, historically, GDOT has devoted little of its own or Federal Aid funds to pavement projects on these roads, and the inclusion of the performance on these roads was distorting the analysis.

Figure 1.3 Pavement Performance in 2040 from HERS by Road Class

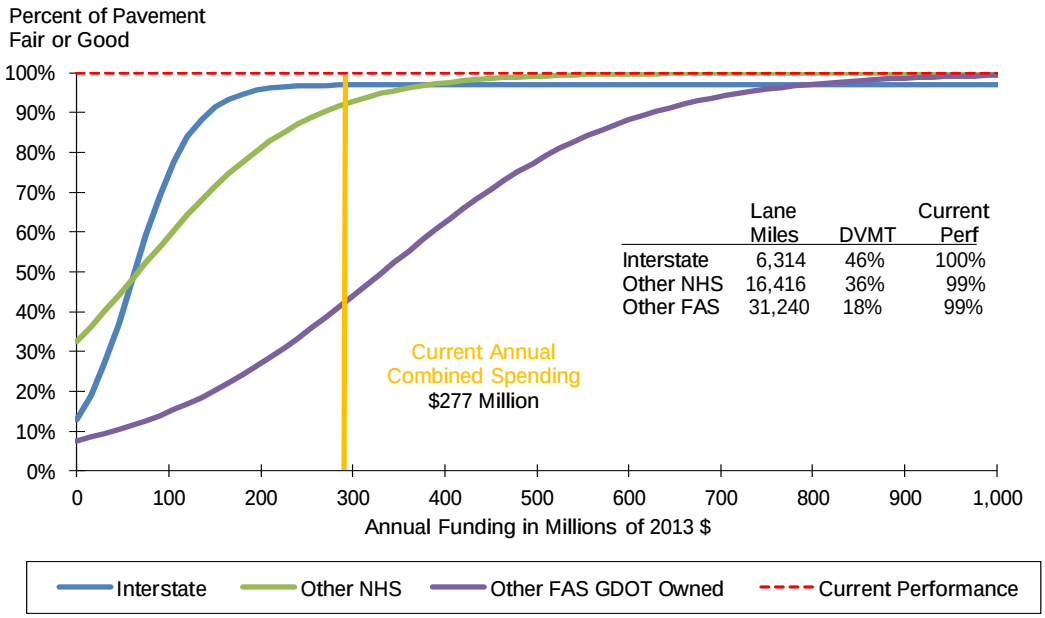


Table 1.15 Percentage of 2030 Miles in Fair or Better Pavement Condition
At Annual Budget in 2013$, Funding Allocated to Classes Based on Share of SWM VMT

Road Class	Share of Lane-Miles	Share of SWM VMT	2010	Percent of Pavement Miles in Fair or Better								
				$80	$160	$240	$320	$400	$480	$560	$600	$680
NHS Interstate	12%	46%	100%	40%	54%	67%	78%	86%	92%	95%	96%	97%
NHS Non-Interstate	30%	36%	99%	67%	72%	76%	80%	83%	85%	87%	88%	89%
Non-NHS FA GDOT Owner	58%	18%	99%	15%	16%	16%	17%	17%	18%	19%	19%	20%
GDOT Federal Aid (FA) System	100%	100%	99%	30%	32%	34%	36%	38%	40%	42%	43%	46%

Source: GDOT's 2012 HPMS and HERS.

Table 1.16 Percentage of 2040 Miles in Fair or Better Pavement Condition
At Annual Budget in 2013$, Funding Allocated to Classes Based on Share of SWM VMT

Road Class	Share of Lane-Miles	Share of SWM VMT	2010	Percent of Pavement Miles in Fair or Better								
				$80	$160	$240	$320	$400	$480	$560	$600	$680
NHS Interstate	12%	46%	100%	31%	58%	80%	91%	95%	96%	97%	97%	97%
NHS Non-Interstate	30%	36%	99%	40%	48%	55%	63%	70%	76%	81%	84%	88%
Non-NHS FA GDOT Owner	58%	18%	99%	8%	9%	10%	11%	12%	14%	15%	16%	17%
GDOT Federal Aid (FA) System	100%	100%	99%	15%	18%	21%	25%	29%	33%	37%	40%	44%

Source: GDOT's 2012 HPMS and HERS.

Level of Service (LOS)

Level of Service (LOS) of traffic differs by type and the location of the roadway and is a complex consideration of traffic density, speeds, delay, volume-to-capacity ratio, peak conditions, etc. For this SWTP/SSTP, Level of Service is computed only as a comparison of daily volumes to capacity (V/C). The Level of Service thresholds for roads that is reported in the documentation for the SWM is:

- LOS A – V/C ratio greater than or equal to 0.0 and less than 0.3;
- LOS B – V/C ratio greater than or equal to 0.3 and less than 0.5;
- LOS C – V/C ratio greater than or equal to 0.5 and less than 0.7;
- LOS D – V/C ratio greater than or equal to 0.7 and less than 0.85;
- LOS E – V/C ratio greater than or equal to 0.85 and less than 1.0; and
- LOS F – V/C ratio greater than or equal to 1.0.

As noted previously, the forecast volumes and capacities used in the SWTP/SSTP were taken from the assignment of the 2040 E+C highway network in the SWM; however, these volumes and capacities are in substantial agreement with those that could be estimated from GDOT's road inventory file. The exception is for the roads that are included in the Minor Arterials or Major Collectors that comprise the non-NHS component of the Federal Aid Highway System. This is because not all of these roads are included as links in the SWM. However, the SWM consists of roughly the same share of Minor Arterial and Major Collector roads for both volume and capacity, and thus a LOS that is based on V/C ratios is expected to be representative of these roads.

Table 1.17 (page 1-19) shows 2010 and 2040 E+C V/C ratios and LOS by functional system, where the V/C ratios are the average daily VMT to the daily capacity miles. The commonly accepted design standard for roads in rural areas is LOS C; and for roads in urban areas is LOS D. Overall, in 2040, the LOS on all Federal Aid System Highways in Georgia is forecast to average LOS B. For the Interstate System, the average will be LOS C. For the NHS roads, the average will be LOS C. It should be stressed that, as is typical of a statewide plan, these averages are based on daily volumes. Figure 1.4 (page 1-20) shows Daily LOS by individual highway link from the SWM and MPO travel demand models. While overall LOS as shown in Table 1.18 (page 1-19) is acceptable, daily LOS on certain roadways is below acceptable conditions at LOS E/F. For those MPO travel demand models that report volumes and congestion by time period, an analysis was done to show the differences between the average weekday congestion and congestion reported in the peak period. This is shown for the Atlanta MPO in Figure 1.5 (page 1-22) and for the Chattanooga MPO in Figure 1.6 (page 1-23). These figures highlight the dramatic increases in peak-period congestion forecast for these two urbanized areas.

Table 1.17 SWM Daily V/C Ratio and LOS by Functional System

	2010		2040	
Functional System	*V/C*	*LOS*	V/C	LOS
Interstate	*0.64*	*C/D*	0.84	C/D
Non-Interstate NHS	*0.31*	*A/B*	0.39	A/B
Non-NHS FAS	*0.24*	*A/B*	0.44	A/B
Federal Aid Highway System	*0.35*	*A/B*	0.44	A/B

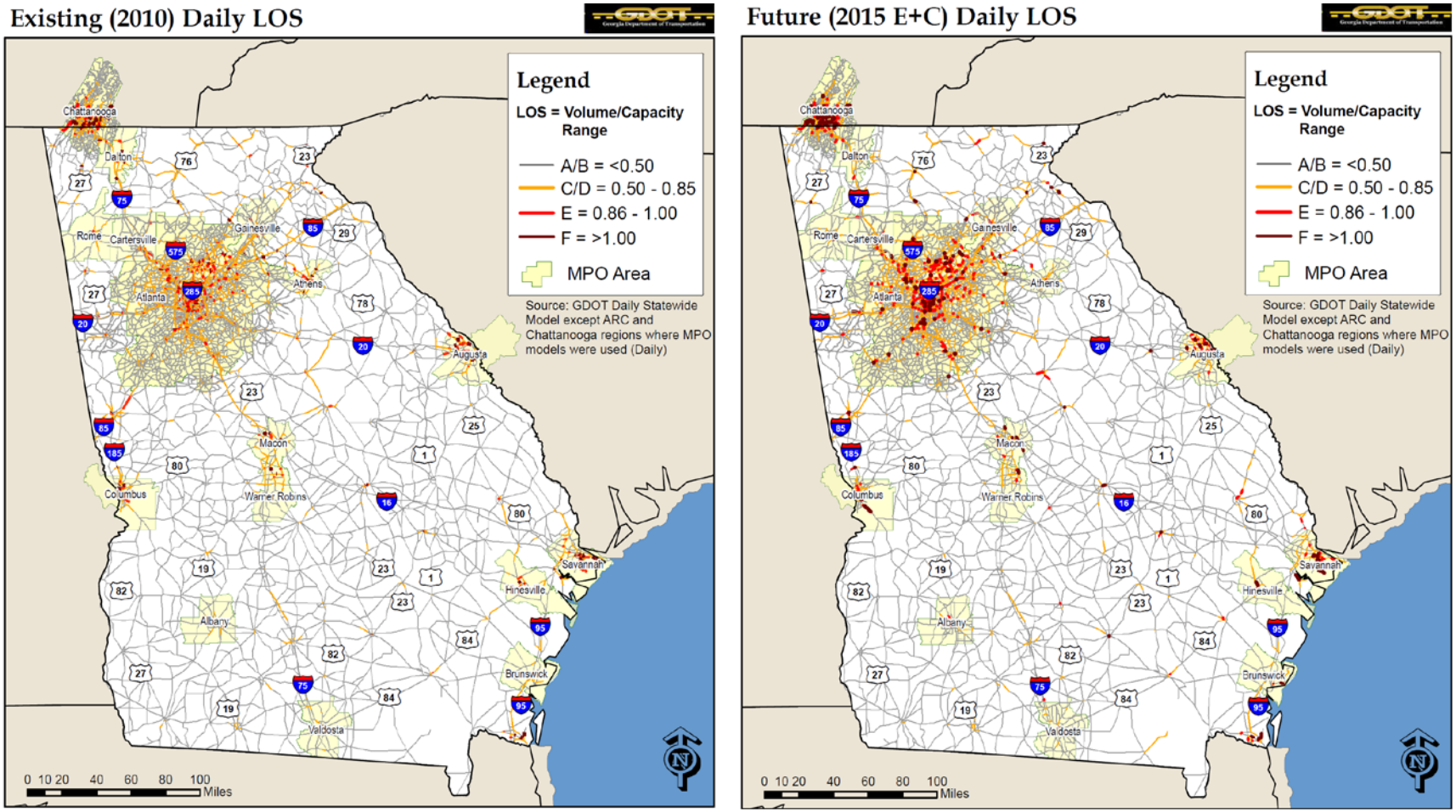
Source: GDOT SWM.

Table 1.18 SWM Percent Road Miles by Functional System and by LOS

Functional System		A/B	C/D	E	F
Interstate	*2010*	*56%*	*29%*	*6%*	*10%*
	2040	24%	48%	8%	20%
Non-Interstate NHS	*2010*	*85%*	*8%*	*4%*	*3%*
	2040	70%	2%	8%	20%
Non-NHS FAS	*2010*	*96%*	*0%*	*2%*	*2%*
	2040	91%	0%	3%	5%
Federal Aid Highway System	*2010*	*90%*	*4%*	*3%*	*3%*
	2040	82%	6%	4%	7%

Source: GDOT SWM.

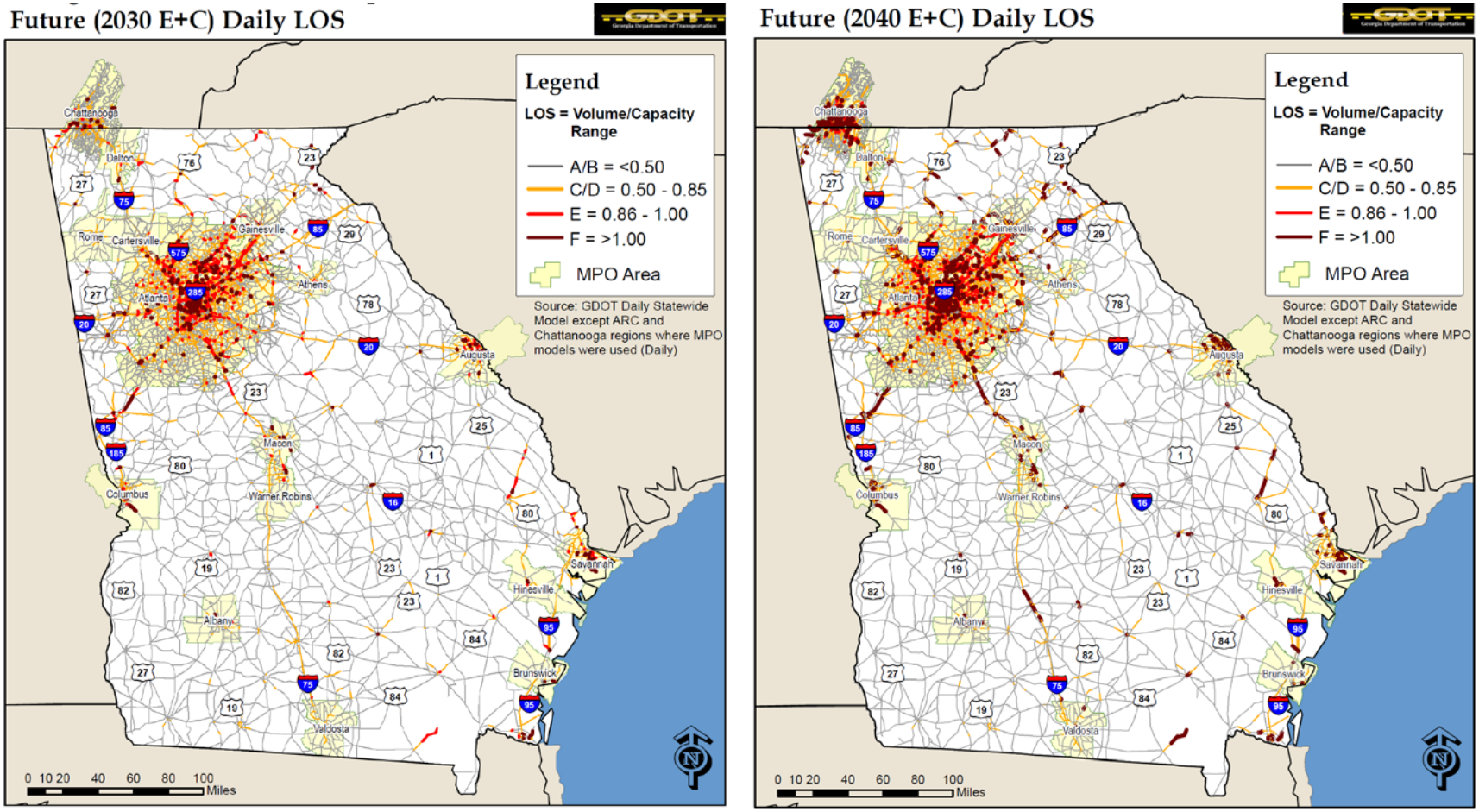
Figure 1.4 Forecast Daily LOS on Federal Aid Highways
Existing (2010 and 2015) plus Committed (2030 and 2040) Highway Projects



Source: GDOT SWM and MPO Travel Demand Models.

Note: As discussed in Section 1.3.1, using the SWM, the 2010 and 2015 vehicle trip tables were assigned to the 2010 Existing highway network while the 2030 and 2040 vehicle trip tables were assigned to the 2040 E+C highway network.

Figure 1.4 Forecast Daily LOS on Federal Aid Highways (continued)
Existing (2010 and 2015) plus Committed (2030 and 2040) Highway Projects

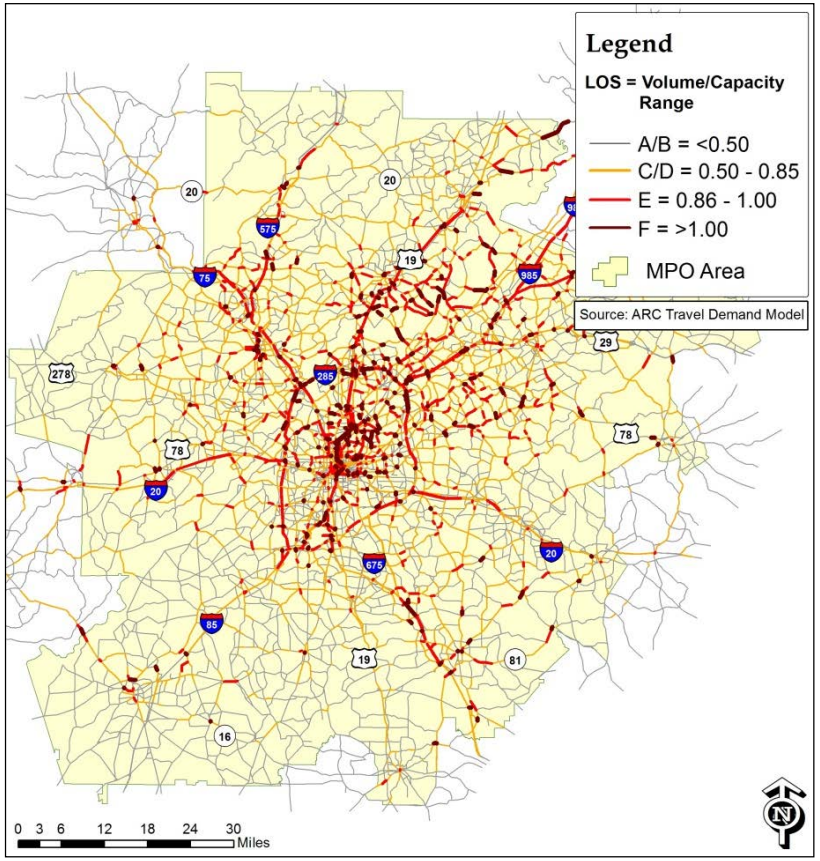


Source: GDOT SWM and MPO Travel Demand Models.

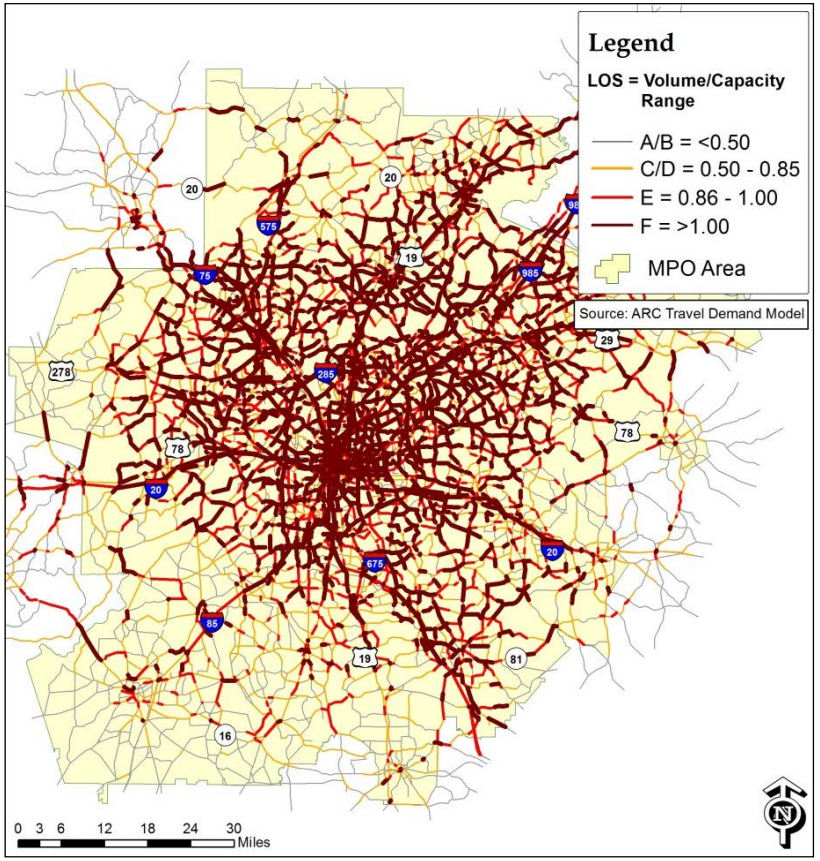
Note: As discussed in Section 1.3.1, using the SWM, the 2010 and 2015 vehicle trip tables were assigned to the 2010 Existing highway network while the 2030 and 2040 vehicle trip tables were assigned to the 2040 E+C highway network.

Figure 1.5 Atlanta 2040 Existing Plus Committed LOS from the MPO Travel Demand Model
Daily LOS PM and Peak-Period LOS

Daily LOS PM



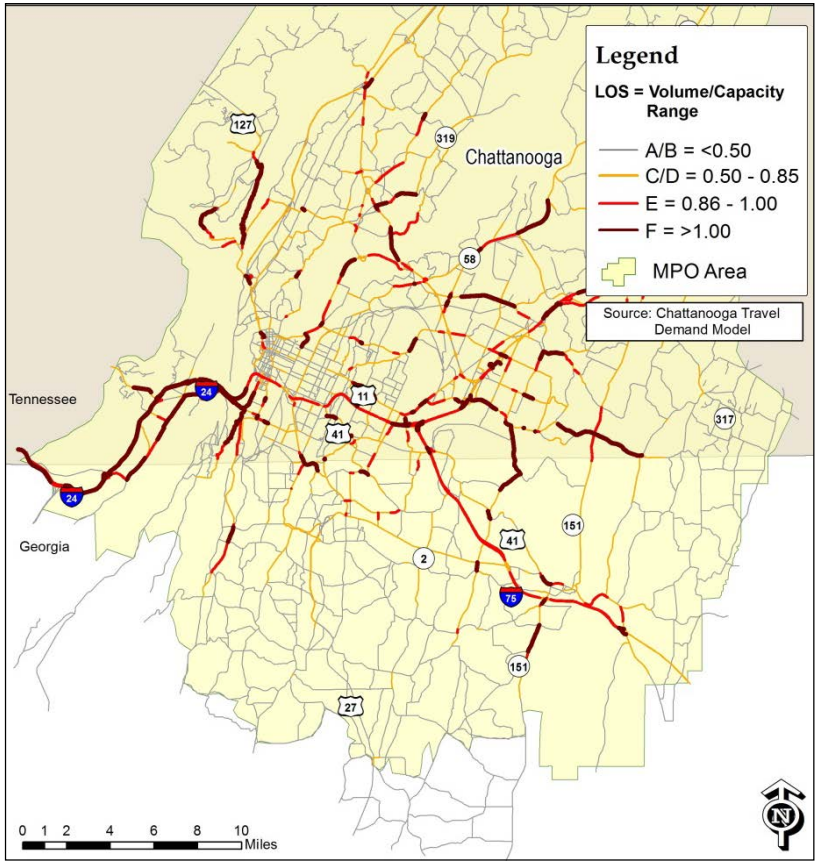
Peak-Period LOS



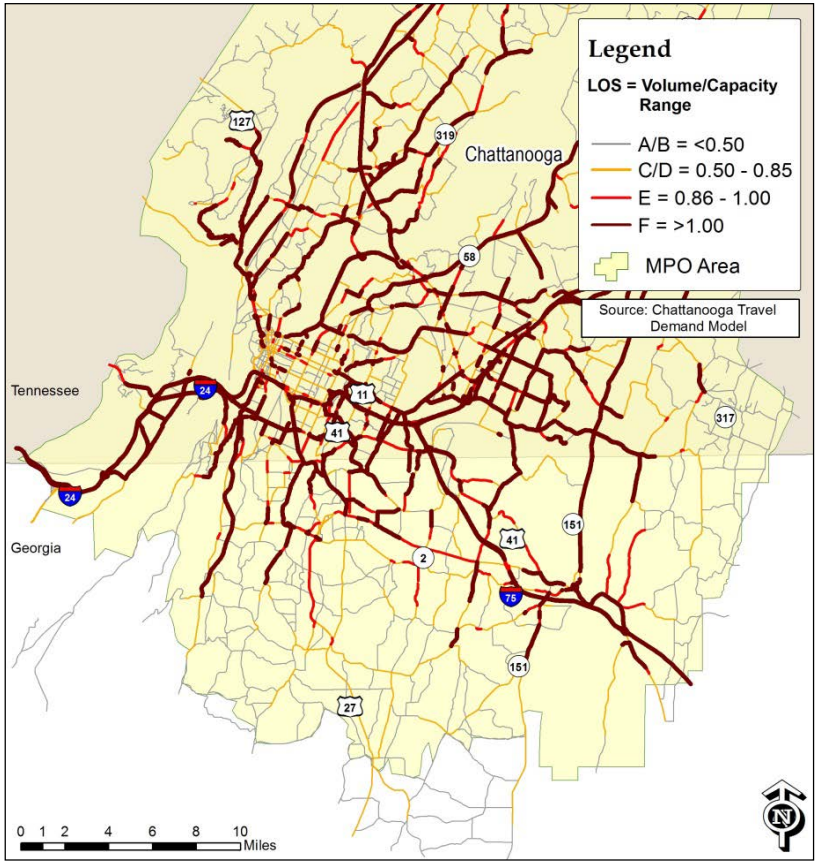
Source: Atlanta's MPO Travel Demand Model.

Figure 1.6 Chattanooga 2040 Existing Plus Committed LOS from the MPO Travel Demand Model
Daily LOS PM and Peak-Period LOS

Daily LOS PM



Peak-Period LOS



Source: CHCNGA Travel Demand Model.

1.4.2 Bridges

GDOT currently analyzes bridge condition using the computed Inventory Rating of bridges. Inventory Rating is a capacity rating that represents the load level that can safely utilize an existing structure for an indefinite period of time. GDOT has previously incorporated inventory rating tiers into its Bridge Prioritization Formula (BPF). These tiers have been adopted for this study with no changes. Inventory rating is included in the National Bridge Inventory (NBI) dataset, submitted by GDOT to FHWA, as Item 66. There are issues with this measure, including an inability to predict it out to the future. This measure is best suited for an analysis on a bridge by bridge basis, but not for a network summary. For GDOT's Interstate Risk Assessment Plan, the measure that is being used is percent deck area on bridges classified as Structurally Deficient (SD), which also is the measure suggested in MAP-21. This measure also is being used for transportation planning by the Atlanta MPO.

Bridge performance was forecast using the National Bridge Investment Analysis System (NBIAS). NBIAS is a software program that performs a system-level analysis of anticipated bridge investment needs and outcomes. The user can define the system as bridges in a district, a region, a state, or the entire U.S. It uses performance data currently collected by every state on bridges in the U.S. to calculate performance trends, financial needs for maintaining specified performance levels, and the outcomes of various funding scenarios. NBIAS analyzes policy assumptions for over 200 performance measures.

NBIAS uses National Bridge Inventory (NBI) data as a basic input. Every state collects and reports NBI data to the FHWA annually. As used by the FHWA to support development of its national bridge investment strategy, NBIAS forecasts more than 50 measures of bridge performance over a multiyear period for a range of budgeting levels. Unlike capacity, bridge performance will deteriorate with age even if demand remains the same. It is therefore necessary to specify some level of investment to properly evaluate deficiencies. For this future deficiencies analysis, the performance was computed using GDOT's current level of funding for bridges. Reductions or increases in this funding will be considered as alternatives which will be analyzed in subsequent tasks. The following bullets highlight the features in NBIAS:

- NBIAS applies the recommendations of nationally accepted preservation policies and its functional improvement models to generate preservation and improvement needs for all bridges.
- For every bridge, NBIAS combines improvement needs and preservation needs to generate a set of project alternatives.
- NBIAS screens out the alternatives with a B/C ratio less than the specified threshold (one by default).
- Valid project alternatives for all bridges are combined and the entire set is sorted by Incremental Benefit/Cost (IBC).

- NBIAS allocates funds to project alternatives, stopping either when the budget is expended or the minimum threshold for IBC Ratio (IBCR) is reached.
- NBIAS then simulates the effect of the selected projects on bridge condition.
- For the bridge network as a whole, NBIAS simulates the effect of project selection on over 200 measures of effectiveness.
- Bridge conditions are then rolled forward into the next year, following which NBIAS starts the simulation cycle again. The simulation period for the SWTP/SSTP was through 2040.

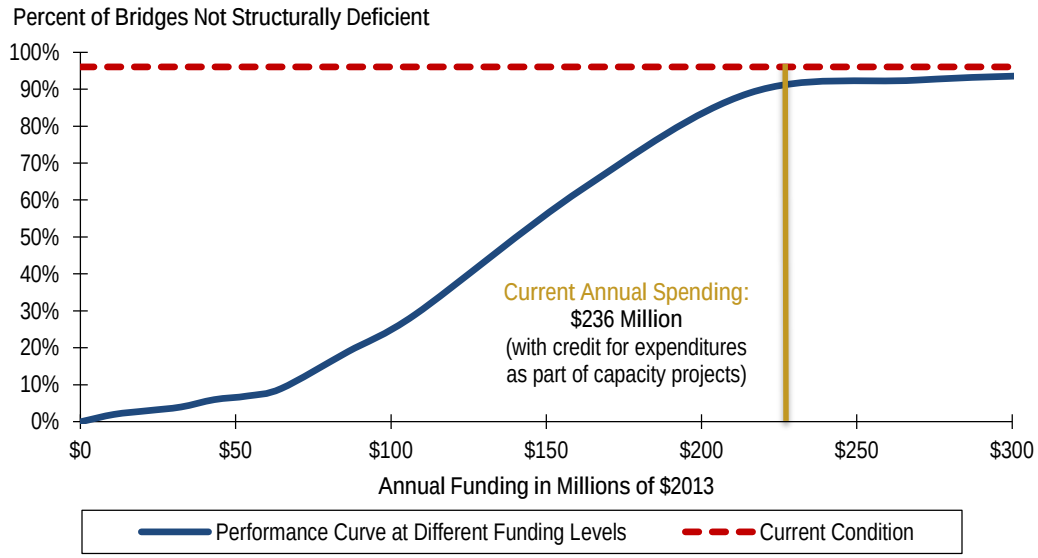
NBIAS calculates the number of bridges and the percentage of deck area classified as SD based on FHWA guidelines.

Structural Deficiency (SD)

Structural deficiencies are characterized by deteriorated conditions of significant bridge elements and potentially reduced load-carrying capacity. A "structurally deficient" designation does not imply that a bridge is unsafe, but such bridges typically require significant maintenance, repair, and operational restrictions to remain in service, and would eventually require major rehabilitation or replacement to address the underlying deficiency.

As noted previously, the expected MAP-21 performance measure, and the one used in the evaluation deficiencies in the SWTP/SSTP, is the percentage of deck area on bridges classified as Structurally Deficient (SD). NBIAS was used to create curves of bridge deck areas that are ***not*** SD for various funding levels. Those curves are shown in Figure 1-7.

Figure 1.7 NBIAS Bridge Performance Curves



The percentage of bridge decks that are ***not*** SD for a variety of annual funding levels in 2030 is shown in Table 1.19. The percentage of bridge decks that are ***not*** SD for a variety of annual funding levels in 2040 is shown in Table 1.20. The performances are for the shares of funding by bridge system that is required to meet that system's share of bridge needs.

Table 1.19 2030 E+C Percent of Deck Area Not SD
By System by Annual Budget in Millions of 2013 Dollars

System	2010 Performance	Share of Funding	$110	$150	$190	$230	$270
Interstate	98.5%	28%	31%	56%	82%	98%	98%
Non-Interstate NHS	97.0%	32%	29%	57%	86%	96%	96%
Non NHS State-Owned	99.0%	20%	29%	54%	78%	95%	95%
Non-NHS Not State-Owned	89.0%	20%	28%	52%	75%	92%	92%

Source: GDOT's 2012 National Bridge Inventory Submittal and NBIAS.

Table 1.20 2040 E+C Percent of Deck Area Not SD
By System by Annual Budget in Millions of 2013 Dollars

System	2010 Performance	Share of Funding	$110	$150	$190	$230	$270
Interstate	98.5%	28%	31%	56%	82%	98%	98%
Non-Interstate NHS	97.0%	32%	29%	57%	86%	96%	96%
Non NHS State-Owned	99.0%	20%	29%	54%	78%	95%	95%
Non-NHS Not State-Owned	89.0%	20%	28%	52%	75%	92%	92%

Source: GDOT's 2012 National Bridge Inventory Submittal and NBIAS.

At the current funding levels of approximately $236 million[9] per year (in 2013 dollars), no more than 2 percent of the deck area of Interstate bridges owned by GDOT are forecast to be Structurally Deficient in 2040. For the GDOT-owned bridges on the National Highway System, and Other Federal Aid bridges the highest percentage of Structurally Deficient bridges is forecast to be just over 5 percent. Unlike other types of projects, Federal Aid is available for all bridges, including those that are not located on roads that are part of the Federal Aid System. The bridges owned by entities other than GDOT, are forecast to have 8 percent of their deck areas that are rated as Structurally Deficient, a performance that is comparable to GDOT's non-NHS bridges.

[9] Estimated from funding per year in the 2014-2017 STIP for Bridge improvements types plus bridge work that is being funded as part of Capacity or Other projects as identified by the ISP Risk Plan, in addition to credit for the same share applied to other planned capacity projects.

1.5 SAFETY

A variety of modeling tools allow planners to reliably develop travel demand forecasts. The same is not true for forecasting traffic safety or an expected number of traffic-related fatalities, serious injuries, and crashes. Recognizing this issue, transportation planners can examine crash data to identify over represented crash types and hot spot locations and develop projects to address safety issues both at high crash locations and on facilities more prone to safety issues. The *Governor's Strategic Highway Safety Plan (SHSP)* outlines the State's strategy to reduce highway crashes, injuries, and fatalities. Traffic safety issues are sensitive to a variety of factors. For this reason, the Georgia SHSP annually reviews traffic safety data and adjusts its strategies to continue to make life-saving improvements. The data-driven emphasis areas identified in the SHSP provide a framework and direction for infrastructure and behavior-related safety improvements. The SWTP/SSTP supports these efforts and will not make forecasts of future crash-related deficiencies. However, in the tradeoff analysis that will be conducted in subsequent tasks, consideration will be given to providing sufficient funding to advance the projects identified by the SHSP.

1.6 SUMMARY OF MAJOR ISSUES/ FORECAST DEFICIENCIES

There are only very small increases in capacity committed to the existing highway system, either in the form of new roads or widening of existing roads. There are no commitments to build entirely new bridges which provide new connections.

The economy is forecast to grow at modest rates of approximately 1 percent per year. This is forecast to increase the number of vehicle trips by less than 1.5 percent per year. When these vehicles use the existing highway system, the forecast is for only a 1 percent annual increase in travel on the highway system.

This growth and the resulting highway volumes is not expected to be uniform throughout Georgia. The Interstate highways and roads within the Atlanta region will see greater increases in travel by 2040 than elsewhere in the State. This growth rate compounded over the 30 years of the Plan will produce significant increases in congestion in the Atlanta and Chattanooga urban areas.

The pavement performance is forecast to deteriorate significantly. At existing annual funding levels, the Interstate and the rest of the NHS is forecast to have only 60 to 70 percent of its pavement in fair to better condition in 2040. The rest of the Federal Aid system, both the roads owned by GDOT and by others, is forecast to experience the steepest decline in pavement performance, with less than 10 percent of their pavement in fair or better condition in 2040.

The percentage of bridge decks that are in fair or better condition also is expected to decline from the existing high levels. This decline is forecast to occur on all highway systems at current levels of allocations. However, the performance of the

bridge decks is forecast to return to existing conditions with only a $40 million annual increase in funding.

1.7 PLANS AND PROJECTS

The list of planned projects should not include projects in the STIP (FY 2014-2017) because those projects are assumed to be part of the E+C highway system. Projects were identified from TPro, GDOT's project management database. It is understood that the planned projects in the highway system will be impacted by the priorities established as part of SWTP/SSTP. In order to provide an estimate of the magnitude of the expected changes, specific projects or dollar value were not examined. Instead, the number of projects in TPro with a construction phase after 2017 (including projects with a Phase or Date specified as Long-Range) were identified and summed by Improvement Type. This summation did not include TPro projects or other investments for: Debt Service (8 percent of the $9.17 billion 2014-2017 STIP program); Intermodal/Transit (11 percent); Other (e.g., Transportation Enhancements, buildings, etc., 10 percent); or Environmental (0.03 percent).

1.7.1 Capacity Projects

This category included projects that add capacity, except for Bridges as noted in 1.7.3, including Construction of New Roads, Reconstruction with Added Capacity, Major Widening. There are 741 projects in TPro with a program date for the Construction phase after 2017.

1.7.2 Pavement Preservation Capital Projects

This category includes projects with an Improvement Type of Reconstruction – No Added Capacity, Restoration, Rehabilitation, and Resurfacing; and Relocation – No Added capacity. There are 74 pavement projects in TPro with a construction phase programmed after 2017. This low number of projects is not an indication of a lack of activity. This number does not include Lump Sum projects which are typically used to fund small pavement projects, and whose funding also serves as a placeholder for specific pavement projects that are ultimately programmed once more information is known.

1.7.3 Bridge Preservation Capital Projects

As noted for capacity projects, this category does include Bridge Rehabilitation – Added Capacity; and Bridge Replacement – Added Capacity. These types of projects may be Capacity Added to address Functionally Obsolete issues by adding capacity to the bridge and node to equal the number of lanes/capacity on the roads approaching and leaving the bridge. Other categories include Construction of New Bridges, Bridge Rehabilitation – No Added Capacity, and Bridge Replacement – No Added Capacity. There are 233 bridge projects in TPro with a construction phase programmed after 2017.

1.7.4 Safety Projects

This category includes projects with Improvement Types of: Safety Improvements and Minor Widenings. Minor widening might be for traffic purposes, but are more likely to be shoulders, etc., that are added or improved as break down lanes to improve safety. There are 325 safety projects in TPro with a construction phase programmed after 2017.

1.7.5 Traffic

This category includes projects that have an Improvement Type of Traffic Management and/or Engineering. There are 270 traffic projects in TPro with a construction phase programmed after 2017.

1.8 TRUCKING

1.8.1 Inventory of Future Facilities

Interstates are the workhorse in terms of truck movements. The capacity of the Interstate system depends on the number of lanes and the operation of those lanes. As previously discussed, for this SWTP/SSTP, the capacity of the Interstates will be reported as they are coded in the 2040 E+C highway network in GDOT's Statewide Travel Demand Model (SWM).

1.8.2 Use

The trucking mode is the dominant form of freight transportation in Georgia. As shown in Table 1.21 (page 1-30), it moves over 640 million of the 852 million tons of freight shipped in the State. The trucking mode also is forecast to grow rapidly over the next 30 years. By 2040, the trucking mode is forecast to ship over 1 billion tons of goods in Georgia, an increase of 73 percent. Figure 1.8 (page 1-31) shows that the next highest mode in terms of freight tonnage is rail, followed by air and water.

Table 1.21 Total Tonnage by Mode
2007-2040, Tons in Thousands

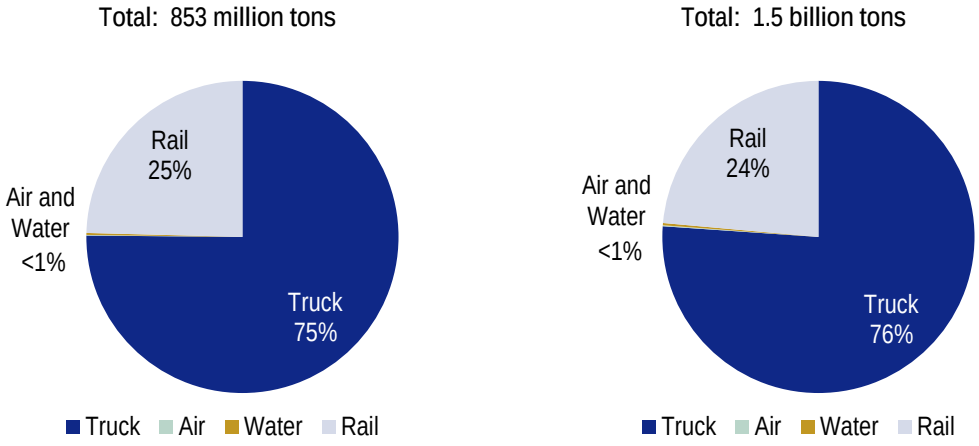
Mode	2007	2010	2040	Percent Change (2007-2040)
Truck	640,799	580,796	1,108,734	73%
Water	537	513	1,444	169%
Air	1,725	1,702	3,385	96%
Rail	209,700	193,800	343,484	64%
Total	**852,761**	**776,812**	**1,457,046**	**71%**

Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast.

When considering freight share by value, the dominance of the trucking mode becomes even more apparent. Figure 1.9 (page 1-31) shows that the truck mode moves 90 percent of the total freight by value and will continue to do so through 2040. Rail is second highest with 10 percent. Water and air shipments account for less than 1 percent of the shipments by value.

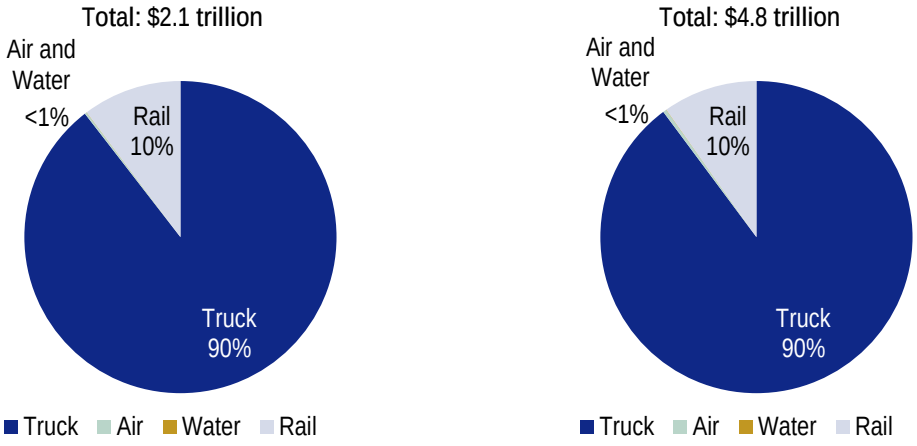
Figure 1.10 (page 1-32) shows future truck volumes on Georgia's roads. Similar to present-day volumes, truck activity is most intense on the Interstate system. Volumes are forecast to reach over 35,000 trucks per day on I-285 along with portions of I-75 and I-85 just outside of I-285 in the Atlanta metropolitan region. On the non-Interstate system, truck volumes are forecast to be as high as 15,000 trucks per day on portions of SR 316 and SR 400.

Figure 1.8 Mode Share by Weight
2007 (left) and 2040 (right)



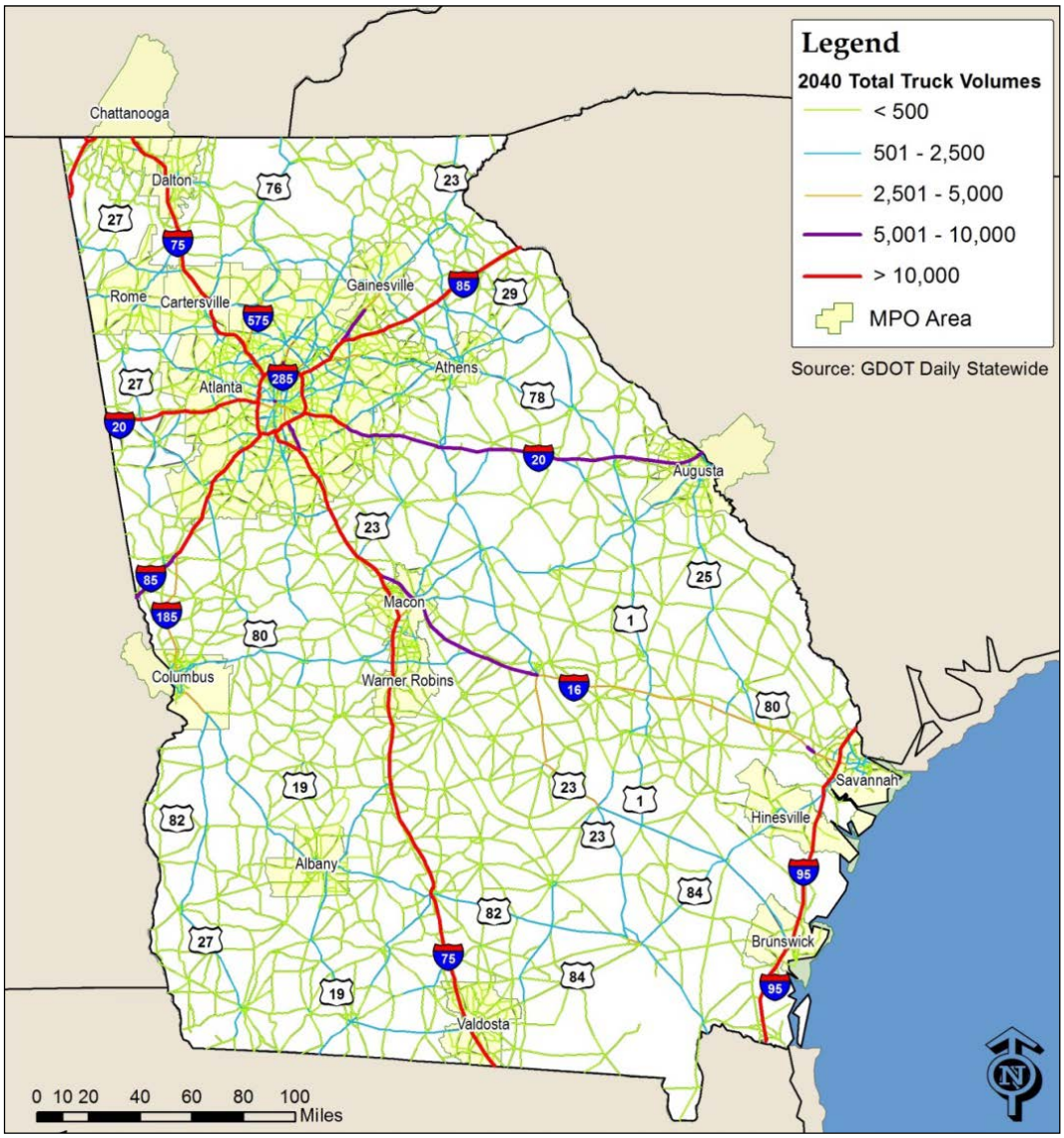
Source: IHS, Inc., 2007 TRANSEARCH data; and 2040 TRANSEARCH forecast.

Figure 1. 9 Mode Share by Value
2007 (left) and 2040 (right)



Source: IHS, Inc., 2007 TRANSEARCH data, and 2040 TRANSEARCH forecast.

Figure 1.10 2040 E+C Daily Truck Volumes from Statewide and MPO Travel Demand Models



Source: GDOT and MPO Travel Demand Models.

1.8.3 Future Performance and Needs

The performance of the highway system as it influences truck activity can be measured by examining volume-to-capacity (V/C) ratios at high truck volume locations. Figures 1.11 (page 1-34) and 1.12 (page 1-35) show the locations of the top 50 truck count locations in Georgia in 2012 in map format, while Table 1.21 (previously shown on page 1-30) shows the V/C ratio at each location in 2010 and 2040 using the GDOT statewide travel demand model. As highlighted in Table 1.22 (page 1-36), 18 of the top 50 truck count locations had over 15,000 trucks per day. Only 6 of the top 50 truck count locations had over 15,000 trucks per day and a V/C ratio over 1.0. In 2040, 12 of these top 18 locations in terms of today's truck counts will have V/C ratios over 1.0 with 5 locations having V/C ratios greater than 1.5. The high level of overlap between high truck volumes and current congestion indicates that trucking is significantly impacted by congestion today. The projected large increase in the number of locations with truck volumes greater than 15,000 and V/C ratio of 1.0 or higher indicates that the impact of congestion on trucks will get significantly worse under the E+C conditions.

Congestion has an impact on virtually all truck issues. Other issues that were identified in the trucking section of the Existing Conditions Technical Memorandum included reliability, safety, truck parking, truck size and weight regulations, and alternative fuels. Travel-time reliability becomes worse as congestion increases. In terms of safety, higher V/C ratios tend to increase the number of crashes. However, decreased speeds that are often associated with the highest of V/C ratios can decrease the severity of those crashes.

More truck parking will be needed under congested conditions, particularly along long-haul routes. The ability to reach destinations within a day will decrease as congestion increases, thereby increasing the need for truck drivers to rest and the need for both short-duration and long-duration truck parking.

Alternative fuels are perhaps the least impacted by congestion. However, as congestion increases the benefits of switching from diesel to cleaner burning fuels does increase as fuel consumption will increase for trucks stuck in congestion.

Figure 1.11 50 Highest Truck Count Locations in Georgia
2012 Statewide View

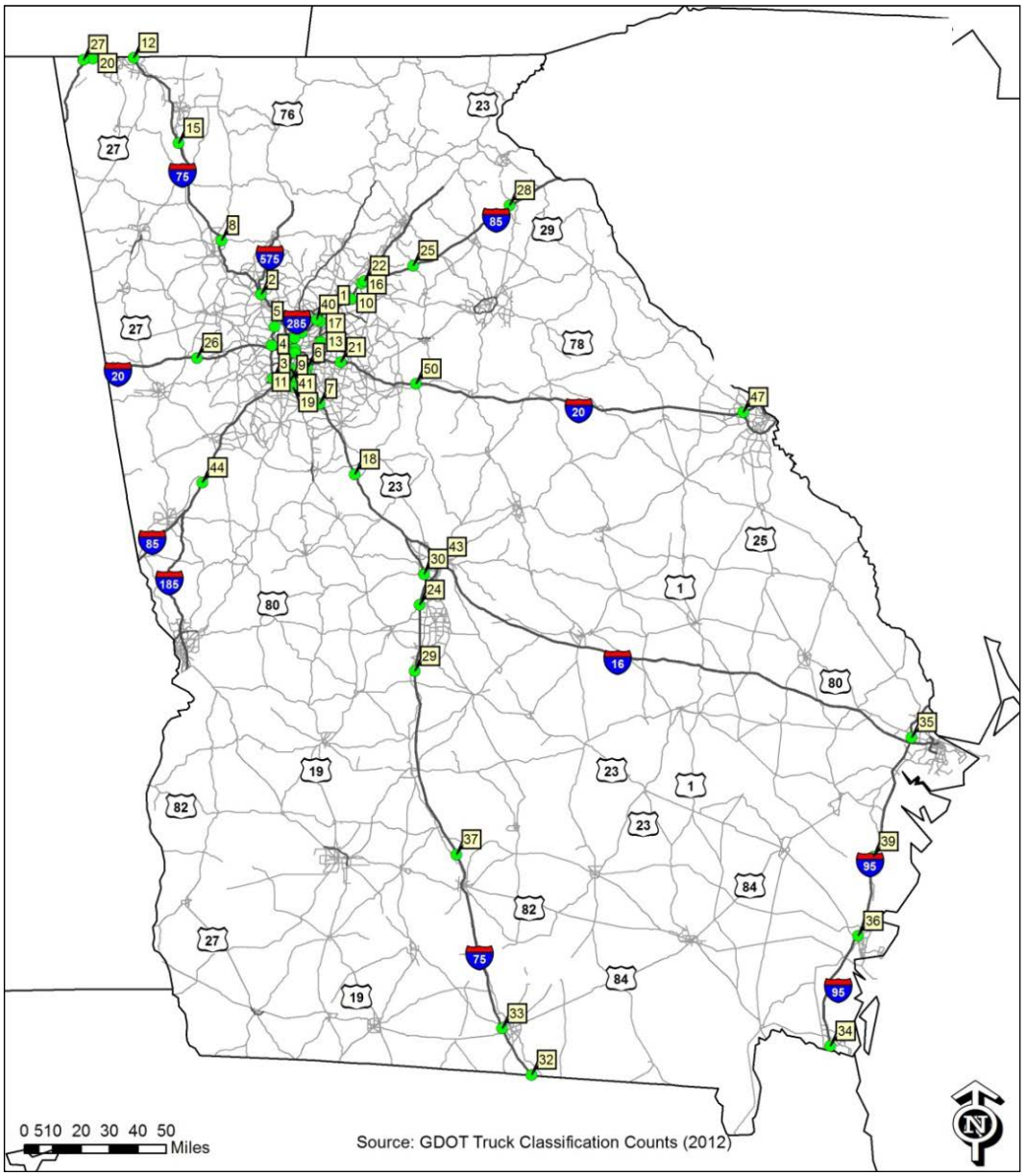


Figure 1.12 50 Highest Truck Count Locations in Georgia (Zoom in on Atlanta Metropolitan Region) *2012*

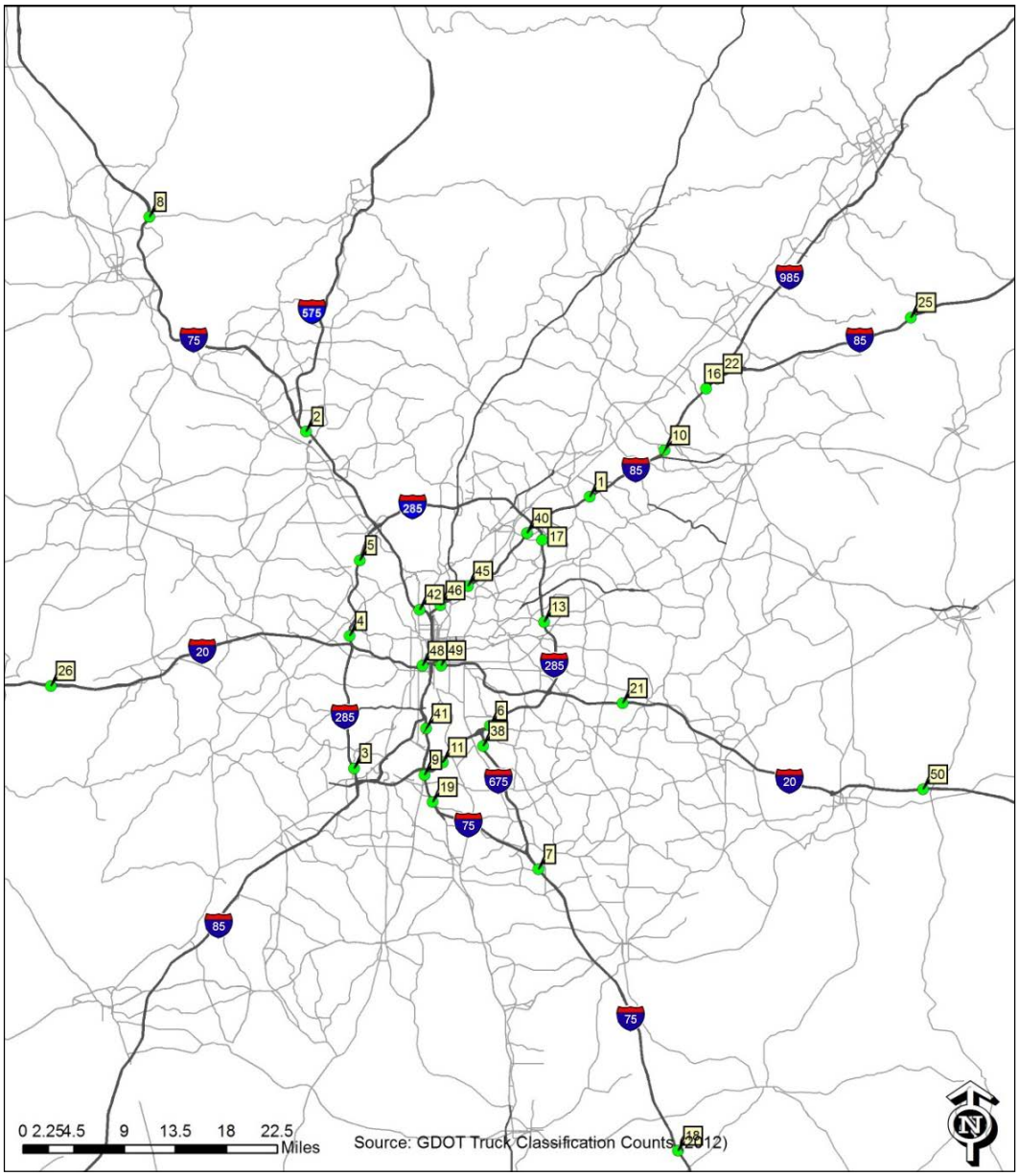


Table 1.22 2010 and 2040 V/C Ratios at High Truck Count Locations

ID	County	Interstate	2012 Truck AADT	V/C Ratio 2010	V/C Ratio 2040 (E+C)
1	Gwinnett	I-85	24,971	0.94	1.65
2	Cobb	I-75	23,715	1.26	1.45
3	Fulton	I-285	22,465	0.97	0.97
4	Fulton	I-285	21,582	1.31	1.45
5	Cobb	I-285	20,874	0.94	1.33
6	DeKalb	I-285	19,170	0.58	1.19
7	Henry	I-75	18,546	0.91	1.51
8	Bartow	I-75	18,028	0.39	0.21
9	Clayton	I-75	17,796	1.49	1.73
10	Gwinnett	I-85	17,687	1.53	1.63
11	Clayton	I-285	17,490	0.50	1.04
12	Catoosa	I-75	17,031	0.61	0.81
13	DeKalb	I-285	16,910	0.75	1.29
14	Gordon	I-75	16,762	0.49	0.60
15	Whitfield	I-75	16,490	0.62	0.67
16	Gwinnett	I-85	16,320	1.00	1.45
17	DeKalb	I-285	16,119	1.36	1.65
18	Butts	I-75	15,481	0.69	0.91
19	Clayton	I-75	14,986	1.05	1.33
20	Dade	I-24	14,300	0.96	1.13
21	DeKalb	I-20	12,624	1.04	1.59
22	Gwinnett	I-85	12,462	1.11	1.14
23	Fulton	I-75	12,287	1.32	2.41
24	Peach	I-75	12,280	0.64	0.72
25	Jackson	I-85	12,033	0.79	1.04
26	Douglas	I-20	11,728	0.68	0.84
27	Dade	I-24	11,319	0.57	0.63
28	Franklin	I-85	11,186	0.03	0.05
29	Houston	I-75	11,084	0.39	0.58
30	Bibb	I-475	9,968	0.44	0.61
31	Haralson	I-20	9,762	0.43	0.53
32	Lowndes	I-75	9,559	0.34	0.50

ID	County	Interstate	2012 Truck AADT	V/C Ratio 2010	V/C Ratio 2040 (E+C)
33	Lowndes	I-75	9,432	0.41	0.47
34	Camden	I-95	9,388	0.42	0.58
35	Chatham	I-95	9,202	0.55	0.59
36	Glynn	I-95	9,060	0.28	0.34
37	Tift	I-75	9,039	0.40	0.55
38	DeKalb	I-675	8,725	0.42	0.89
39	McIntosh	I-95	8,613	0.49	0.62
40	DeKalb	I-85	8,298	0.81	1.47
41	Fulton	I-75	8,145	0.75	1.09
42	Fulton	I-75	8,076	0.94	1.38
43	Bibb	I-16	7,818	0.46	0.52
44	Meriwether	I-85	7,676	0.79	1.11
45	DeKalb	I-85	7,483	1.27	1.13
46	Fulton	I-85	7,462	1.22	1.76
47	Richmond	I-20	7,314	0.39	0.60
48	Fulton	I-20	7,312	0.76	1.53
49	Fulton	I-20	7,078	0.83	1.78
50	Newton	I-20	6,947	0.66	0.86

Source: GDOT Office of Transportation Data, 2012.

1.8.4 Highway Improvements Related to Trucking

Five types of highway improvement projects related specifically to trucking were identified in the Freight and Logistics Plan:

- Long-haul Interstate corridors;
- Interstate interchanges;
- Urban bypasses;
- Rural freight corridors; and
- Highway safety projects.

Long-Haul Interstate Corridors

Due to the long-distance nature of a large component of truck trips, long-haul Interstate corridors in Georgia are particularly important for trucks and the overall movement of goods. The above analysis of the Interstate system indicates that there will be significant long-haul bottlenecks on the highway system in 2040 if no

highway improvements are made to the system as truck and auto traffic volumes continue to grow.

Long-haul Interstates are considered to be the segments of the Interstate that are in between urban regions with the minimum number of lanes for the Interstate. For example, the I-75 Atlanta-Tennessee long-haul corridor is the Interstate segment between Atlanta and Chattanooga that is only six lanes wide. The urban portion of the corridor in the Atlanta region (South of Barrett Parkway/Kennesaw) that is more than six lanes is not part of the long-haul corridor. Similarly, the I-85 Atlanta-South Carolina long-haul corridor is the Interstate segment between Atlanta and the Georgia-South Carolina State line that is only four lanes wide. The list of the long-haul corridors examined includes the following segments:

- I-75 Atlanta-Tennessee;
- I-85 Atlanta-South Carolina;
- I-20 Atlanta-South Carolina;
- I-75 Atlanta-Macon;
- I-75 Macon-Florida;
- I-16 Macon-Savannah;
- I-85 Atlanta-Alabama;
- I-20 Atlanta-Alabama; and
- I-95 South Carolina-Florida.

Interstate Interchanges

Interstate interchanges are often the source of operational and capacity issues in the highway system. For trucks, traveling across Interstate interchanges can be particularly problematic due to the increased time required to change speeds and operational issues created as large vehicles merge. Additionally, the longer average trip length of trucks results in the average truck trip encountering more Interstate interchanges than other vehicles. Therefore, improving road geometry and bottlenecks at Interstate interchanges is beneficial to all vehicles, but particularly beneficial for truck mobility.

The American Transportation Research Institute compiles an annual list of the 250 worst truck bottlenecks in the country and these locations are typically at Interstate interchanges. In 2010, four of the worst truck bottlenecks were located on I-285 in the Atlanta metropolitan region (see Table 1.23, page 1-39). These included the I-285 interchanges with I-85 and I-75 north of downtown Atlanta, and both I-285 Interstate interchanges with I-20 east and west of downtown Atlanta.

Table 1.23 List of Georgia's Worst Truck Bottleneck Locations

Congestion Ranking Relative to Other U.S. Bottlenecks	Location Description	Average Truck Speed During Peak Periods
9	Atlanta, Georgia: I-85 at I-285 (North)	34.9
20	Atlanta, Georgia: I-75 at I-285 (North)	39.0
42	Atlanta, Georgia: I-20 at I-285 (West)	45.7
58	Atlanta, Georgia: I-20 at I-285 (East)	44.5

Source: ATRI List of Top Bottleneck Locations, 2010.

Outside of the Atlanta region, the I-16/I-75 interchange in Macon is particularly problematic. This interchange features a left lane, single-lane egress that creates significant lane changes for trucks and autos. The freight importance of this interchange is that it connects the Port of Savannah to the Atlanta metropolitan region, and it is used by thousands of trucks per day. In the Savannah region, Interstate interchanges at I-95/I-16 and I-95/SR 21 were identified in the *Chatham County Interstate Needs Analysis and Prioritization Plan* as being major issues for both trucks and autos. The I-95/I-16 interchange is used by port trucks traveling to inland destinations south of the port. The I-95/SR 21 interchange is used by port trucks traveling to inland destinations north of the port, as well as being heavily utilized by suburban commuter traffic creating significant truck-auto conflicts.

Urban Bypasses

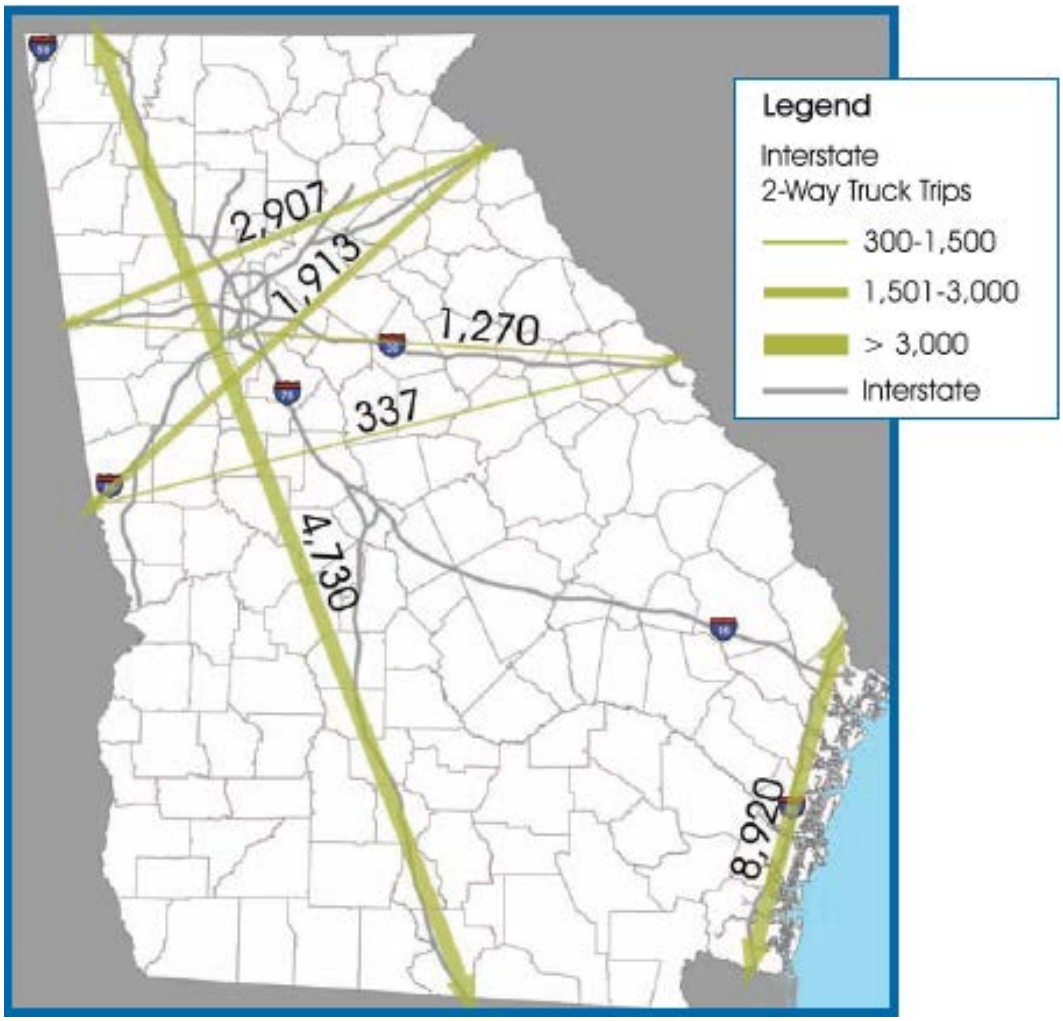
While 75 percent of the total freight tonnage in Georgia have an origin and/or a destination in the State, 25 percent of freight tonnage is comprised of "through trips" with both trip ends outside of the State (see Figure 1.13, page 1-40). This through freight traffic contributes to congestion on both the highway and rail networks in Georgia, as well as contributes to wear and tear of the physical infrastructure, increases crashes, and adds emissions. Developing alternative paths that can be utilized for this traffic can reduce travel time and preserve existing infrastructure for freight traffic that is directly tied to economic activity in the State.

This analysis led to the consideration of bypasses around urban areas as possible freight improvement projects. Additionally, the Private-Sector Advisory Committee for the Freight and Logistics Plan also identified traveling around Atlanta as a major impediment to the free flow of freight. Based on this input, several urban bypasses were added to the evaluation list:

- A western bypass connecting I-75 roughly 30 miles north and south of the current I-285.
- An outer western bypass which featured a new route from Macon to LaGrange and four-laning the remaining two-lane pieces of U.S. 27 north of LaGrange.

- A northern bypass connecting I-75 and I-85 roughly 10 miles north of I-285. Additionally, it was mentioned by the private sector that if highway bypasses are considered to be feasible, then rail bypasses also should be considered, since the additional right-of-way required may be minimal.
- A bypass around Chattanooga was identified from three previous planning efforts: the Tennessee DOT I-75 Corridor Feasibility Study, the Cleveland (Tennessee) MPO Long-Range Transportation Plan, and the Chattanooga Regional Freight Study.

Figure 1.13 Through Truck Trips



Source: GDOT Statewide Travel Demand Model, January 2011 version.

Rural Freight Corridors

Rural freight corridors are important to the State as a means to ship goods between rural locations and key freight consumption and production locations, as well as having the potential to contribute to economic growth. The Governor's Road Improvement Program (GRIP) was initiated in 1989 to facilitate economic

development in rural areas. Over the past two decades, GDOT has implemented a significant portion of GRIP, including 3,273 miles of roadway, 68 percent of which already has been four-laned.

A review of the GRIP network and an analysis of key corridors was undertaken as part of the Freight and Logistics Plan. This analysis indicated that there are three GRIP corridor improvement projects, still to be completed, which should be considered high-priority freight projects:

- **Completing the four-laning of U.S. 84.** This corridor currently has some of the highest truck volumes off of the Interstate system, and it serves east-west freight traffic originating at the ports of Brunswick and Savannah.
- **Four-laning U.S. 133 between Albany and Valdosta.** This corridor provides connectivity for freight flows from the recently expanded military facilities in the Albany region to I-75 in Valdosta. Additionally, this corridor is part of the infrastructure connecting freight flows moving from both Columbus and LaGrange to Florida.
- **Four-laning U.S. 441 between I-85 and I-16.** This corridor provides alternative access between Central Georgia and I-85 which allows the shippers in Central Georgia to more easily connect to markets in the I-85 corridor in the Carolinas, Mid-Atlantic, and Northeast. This corridor also provides an alternative route from the Atlanta region to the Port of Savannah that allows for truckers to avoid I-75, if needed.

2.0 Public Transportation

Georgia has 15 urban fixed-route and complementary paratransit public transportation systems in operation throughout the State, and numerous rural public transit operators providing demand responsive services. Within the Atlanta region, the Metropolitan Atlanta Rapid Transit Authority (MARTA) and the Georgia Regional Transportation Authority (GRTA) operate extensive bus and rail systems. They are funded through different mechanisms than the other GDOT-funded systems and are therefore not the focus of this analysis.

The evaluation of deficiencies identifies "those elements of the existing transportation system that currently perform below acceptable standards, or are expected to fall below those standards in the future."[10] Georgia has a wide variety of transit systems, including rural on-demand services, small urban systems, large systems in major cities, and very large systems in the Atlanta region. Each set of systems has its own unique characteristics and functions. The acceptable standards can be distilled by comparison with peer systems or utilizing methods applied elsewhere.

The transit facilities section evaluates deficiencies where fixed-route transit service, park-and-ride lots, and rural public transit are available. Urbanized areas that are not served by fixed-route transit, potential locations for additional park-and-ride lots, and rural populations without access to rural public transit are identified.

Vehicles are an important component of public transportation capacity. Average urban fixed-route fleet size and age of Georgia's transit systems are compared with peer systems in the Southeast[11] U.S. and the nation as a whole. For rural public transit, issues that are related to fleet age and service supply are identified.

Ridership is the primary indicator of the use of transit systems. The unlinked passenger trips and passenger miles of Georgia's fixed-route urban transit systems are compared with peer systems and with commuting patterns in urban areas. Rural ridership figures identify the extent of rural public transit utilization.

Finally, a variety of operating statistics and performance measures are evaluated to identify deficiencies in Georgia's urban fixed-route transit system performance relative to peer systems.

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[10] 2013 Statewide Transportation Plan: Development of Study Methodology, Technical Memorandum 1, Version 3, Final Technical Memorandum, Cambridge Systematics, Inc., September 2013.

[11] As mentioned in Section 2.2, the Southeast is defined as Federal Transit Administration Region IV, with the exception of The Commonwealth of Puerto Rico and the United States Virgin Islands: Alabama, Florida, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.

2.1 TRANSIT FACILITIES

2.1.1 Urban Fixed-Route Transit Systems

Analogous to highway facilities provided for vehicular travel, transit routes provide public transportation service and represent the transit facilities. Table 2.1 (page 2-5) shows Georgia's urban fixed-route transit systems, by population size of the urbanized area. For the purposes of this report, the service coverage area of Georgia's fixed-route transit systems was considered to be Census block groups that had any area within half of a mile of a route. The fixed-route service areas are shown in Figure 2.1 (page 2-6).

Urbanized Areas without Fixed-Route Transit Service

Fixed-route transit service is available in many urbanized areas throughout Georgia. However, Figure 2.2 (page 2-7) shows the urbanized areas that lack fixed-route transit systems. The six urbanized areas without access to fixed-route transit service are Brunswick, Cartersville, Dalton, Warner Robins, Valdosta, and portions of Chattanooga within Georgia. Statewide, about 47 percent of the land cover of urbanized areas is served by transit. Of those urbanized areas with fixed-route transit service, about 53 percent of their geographic urbanized areas are served by transit.

Urbanized areas are eligible for urban fixed-route transit funding and, once urbanized, are not eligible for Federal Transit Administration (FTA) Section 5311 rural transit funding. Over three-quarters of the State's population are located in urban areas. Therefore, fixed-route transit systems serve an important transportation function, and urbanized areas lacking them have reduced transportation options and mobility. Urbanized area definitions were updated after the 2010 Census. In the future, fixed-route transit systems will likely need to expand or be established to meet travel needs in these newly urbanized areas.

Transit-Supportive Areas without Fixed-Route Transit Service

Taking a closer look, fixed-route transit cannot necessarily be expected to serve the entire urbanized area. Certain population and employment densities are required to generate enough trips to support fixed-route transit. The Transit Capacity and Quality of Service Manual[12] reports that areas with household density of at least three housing units per gross acre or at least four jobs per gross acre are required to support hourly fixed-route bus service. Georgia's Census block groups meeting either of these conditions were identified as capable of potentially sustaining fixed-route transit service, or "transit supportive." These areas were compared against areas served by current fixed-route systems.

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[12] Transit Capacity and Quality of Service Manual, Third Edition, Transit Cooperative Research Program, Report 165, Transportation Research Board, 2013.

Figure 2.3 (page 2-8) shows the service coverage area relative to the area that is dense enough to support transit. Transit-supportive areas with service, shown in green, are both dense enough to support service and actually are served by transit. Areas not dense enough to support transit but that have service are shown in orange. Places that could potentially support transit but that have no fixed-route service are shown in red. Figure 2.4 (page 2-9) shows the same transit-supportive and service coverage areas, but urbanized area boundaries also are shown.

The previous subsection indicated that fixed-route transit service covers only about one-half of the geographic area of urbanized areas. If only those portions of the urbanized areas with enough density to support transit service are considered, then 90 percent is served by transit. There are multiple transit-supportive clusters in the Atlanta region not currently served by transit, including Covington, Riverdale, and Smyrna/Vinings. Further analysis is warranted to explore potential future transit service expansions and associated funding for these areas. Outside of the Atlanta urbanized area, there are no other transit service facility coverage deficiencies (unserved transit-supportive areas within urbanized area where fixed-route transit exists) in the State.

Urbanized areas without fixed-route transit service, previously shown in Figure 2.2 (page 2-7), do have some transit-supportive areas. There are large clusters of transit-supportive areas in Valdosta, Brunswick, and Dalton, which do not have transit service, and some places that do have transit, such as Rome, Gainesville, and Hinesville.[13]

There also are several transit-supportive areas in some rural parts of the State. However, further analysis would be required of any transit-supportive area to ensure that any prospective transit service would connect multiple, transit-supportive areas together, including origins and destinations.

A similar qualification could be added to the observation that much of the area served by fixed-route transit in Georgia is not transit-supportive based upon density of employment and/or population of the respective geographic areas. A transit route might run through an area itself not dense enough to support transit in order to connect other transit-supportive centers. In addition, the low density of much of the area served by transit could inhibit the performance and effectiveness of Georgia's transit systems relative to peers.

In summary, urban transit facilities deficiencies are as follow. See Section 2.1.4 (page 2-20) for a discussion of the population served used in the tradeoff analysis, which differ from the areas presented here for the Atlanta region. The analysis included in this chapter reflects all areas currently served by all modes of transit,

[13] Note that employment at Fort Stewart near Hinesville and Robins Air Force Base in Warner Robins might not be reflected in the block group data.

but the future tradeoff analysis focuses on different levels of enhanced transit services.

- The Brunswick, Cartersville, Dalton, Warner Robins, and Valdosta urbanized areas lack fixed-route transit service, as does Georgia's portion of the Chattanooga urbanized area.
- Of those urbanized areas with fixed-route transit service, about 47 percent of the geographic area of their urbanized areas is not served by transit.
- Of the transit-supportive portions of urbanized areas with fixed-route transit, 10 percent is not served by transit.
- Multiple transit-supportive clusters in the Atlanta urbanized area are not served by transit.
- There are clusters of unserved transit-supportive areas in Valdosta, Brunswick, and Dalton.
- The low density of much of the area served by transit could inhibit the performance and effectiveness of Georgia's transit systems.

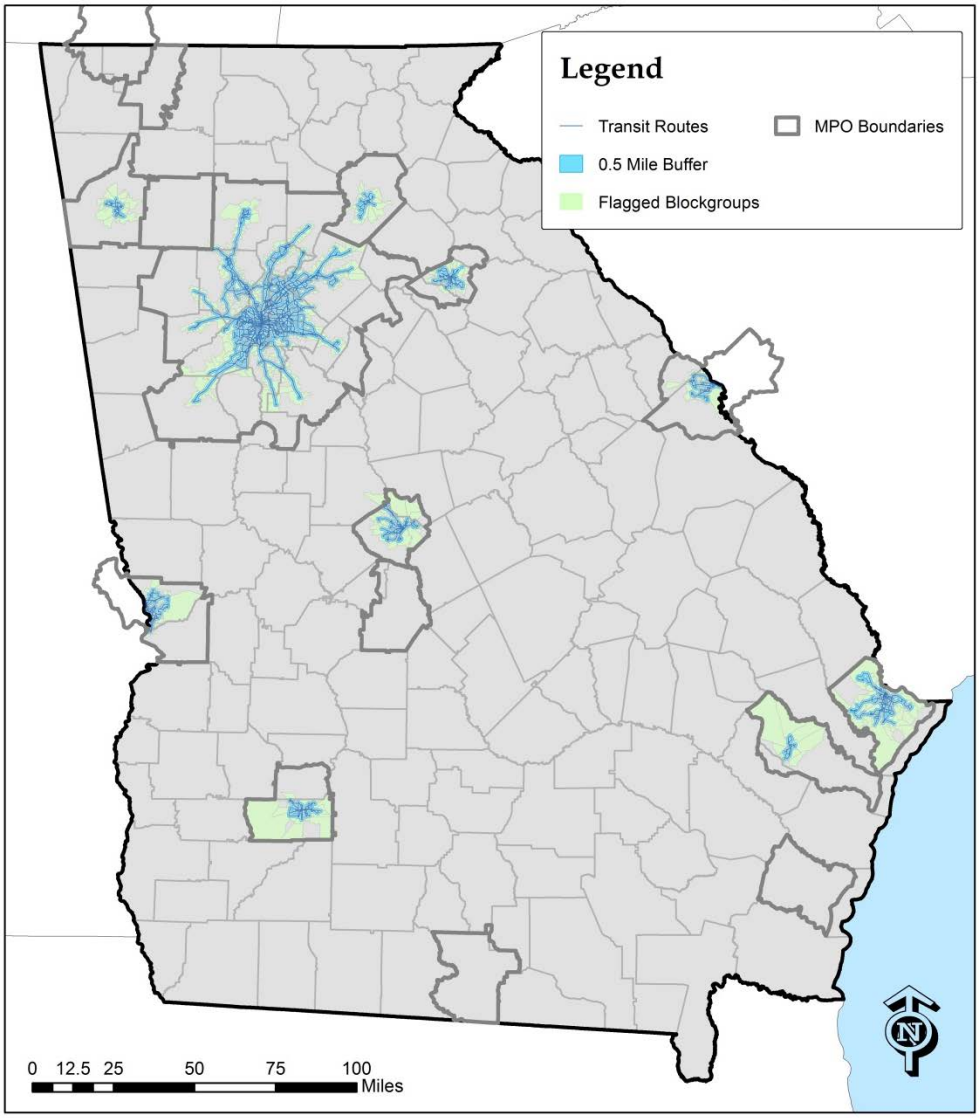
To explore possible service area deficiencies in the future, the 2040 forecast population and employment in traffic analysis zones (TAZ) in the statewide travel model were analyzed to identify transit-supportive areas. There are no major new areas projected to develop transit-supportive densities that are not already served by fixed-route transit or that are not already identified as transit-supportive but unserved. Growth will occur as infill development in areas already served by transit (see Figure 2.5, page 2-10 and Figure 2.6, page 2-11).

Table 2.1 Urban Fixed-Route Transit Systems

Size	Number ID	Fixed-Route Transit System	Acronym	Metropolitan Planning Organization (MPO)	Service Area(s) by County
Small	1	Albany Transit System	ATS	Dougherty Area Regional Transportation Study	Dougherty
	2	Athens Transit System	ATS	Madison Athens-Clarke Oconee Regional Transportation Study	Clarke
	3	Cherokee Area Transit System	CATS	Atlanta MPO	Cherokee
	4	Douglas County Rideshare	DCR	Atlanta MPO	Douglas
	5	Hall Area Transit	HAT	Gainesville-Hall MPO	Hall
	6	Liberty Transit	LT	Hinesville Area MPO	Liberty
	7	Macon-Bibb County Transit Authority	MTA	Macon Area Transportation Study	Bibb
	8	Rome Transit Department	RTD	Floyd-Rome Urban Transportation Study	Floyd
Large	9	Augusta Public Transit	APT	Augusta Regional Transportation Study	Columbia, Richmond
	10	Chatham Area Transit Authority	CAT	Coastal Region MPO	Chatham
	11	Columbus Transit System	METRA	Columbus-Phenix City Transportation Study	Muscogee
Very Large	12	Cobb Community Transit	CCT	Atlanta MPO	Cobb, Fulton
	13	Gwinnett County Transit	GCT	Atlanta MPO	Gwinnett, DeKalb, Fulton
	14	Georgia Regional Transit Authority	GRTA	Atlanta MPO	Fulton, DeKalb, Gwinnett, Cobb, Cherokee, Forsyth, Rockdale, Clayton, Henry, Coweta, Douglas, Paulding
	15	Metropolitan Atlanta Rapid Transit Authority	MARTA	Atlanta MPO	Fulton, DeKalb

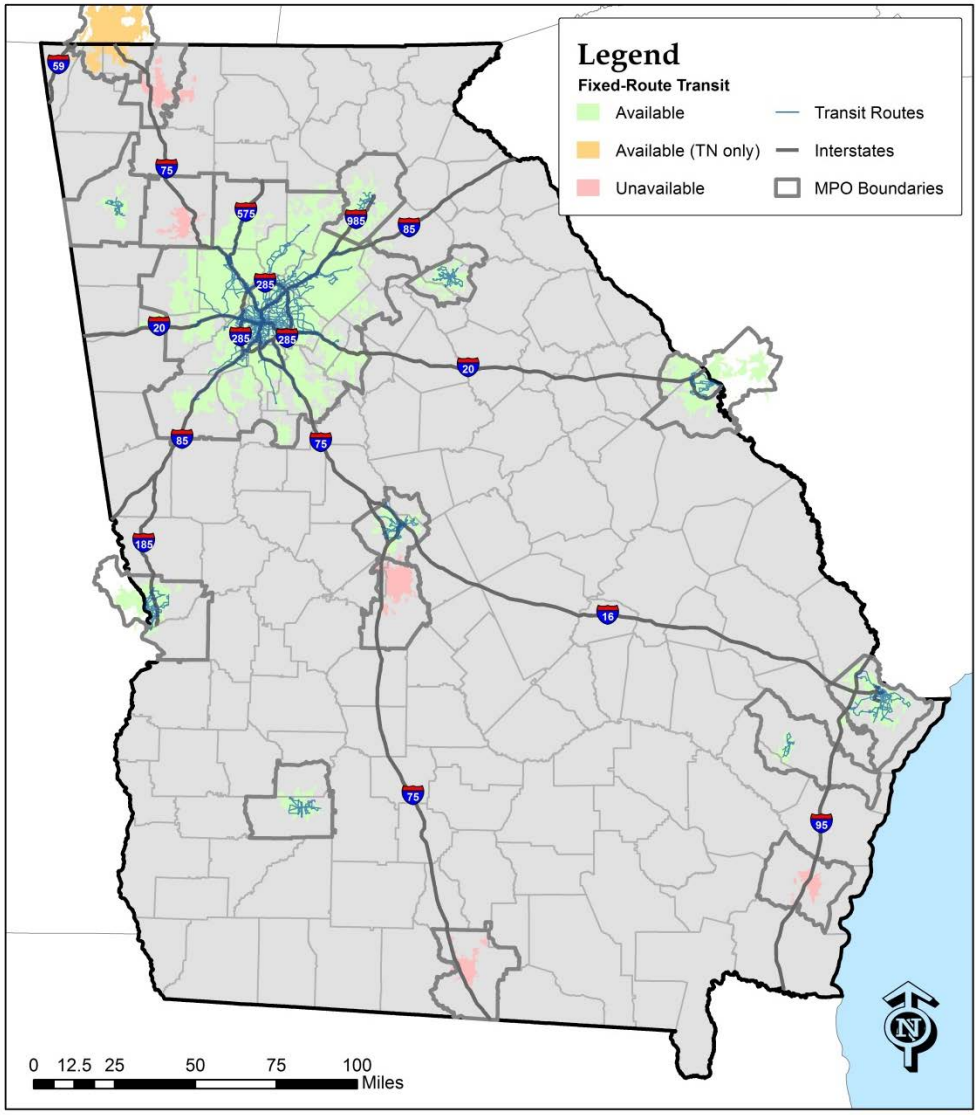
Source: GDOT Office of Intermodal Programs; Cherokee Area Transportation Study; Hinesville Area Metropolitan Planning Organization.

Figure 2.1 Fixed-Route Transit Service Areas



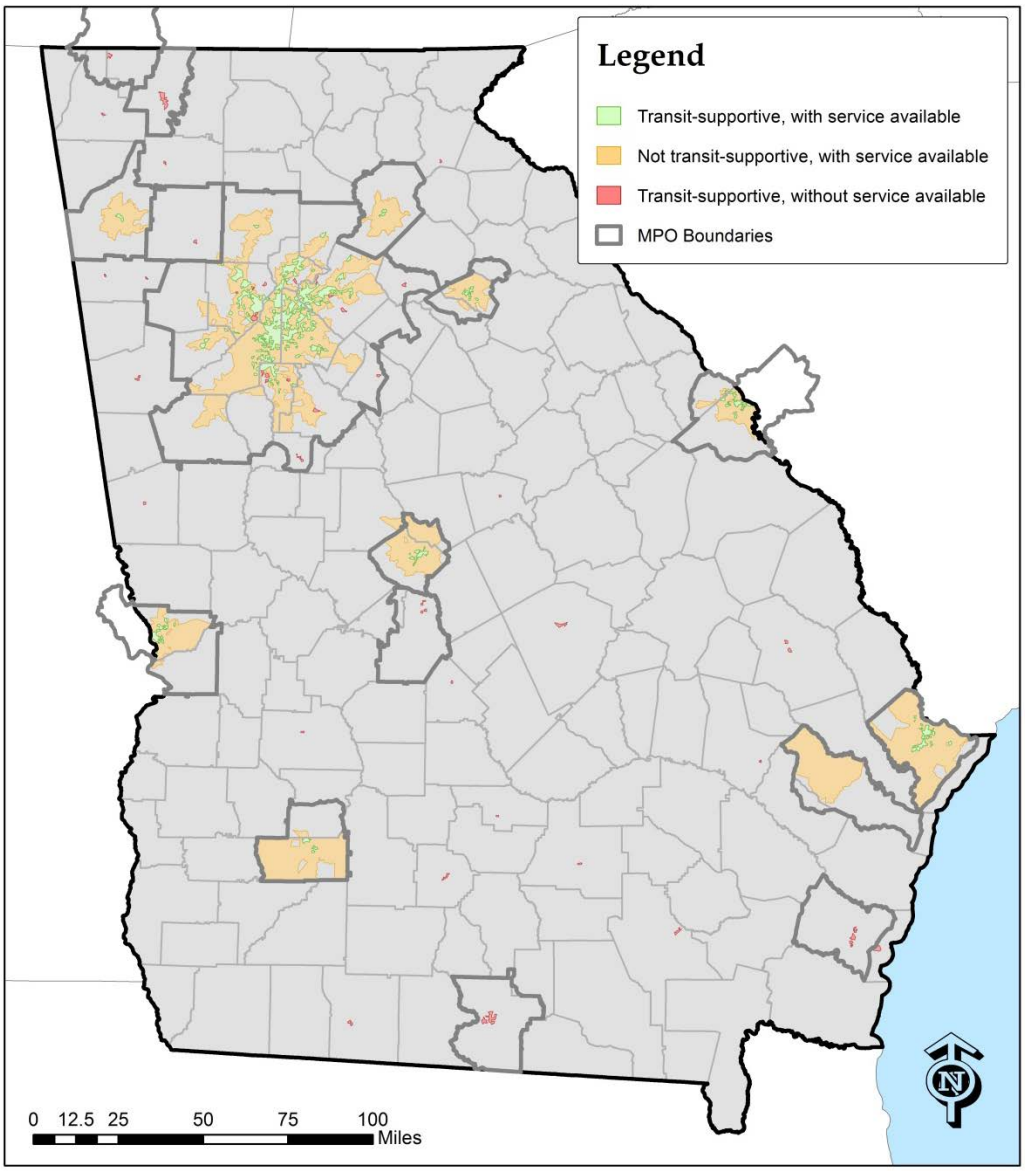
Source: GDOT, MARTA, Albany Transit System, Athens Transit System, APT, CAT, CCT, METRA, Douglas County Rideshare, GCT, GRTA, HAT, LT, MTA, RTD.

Figure 2.2 Urbanized Areas without Fixed-Route Transit Service



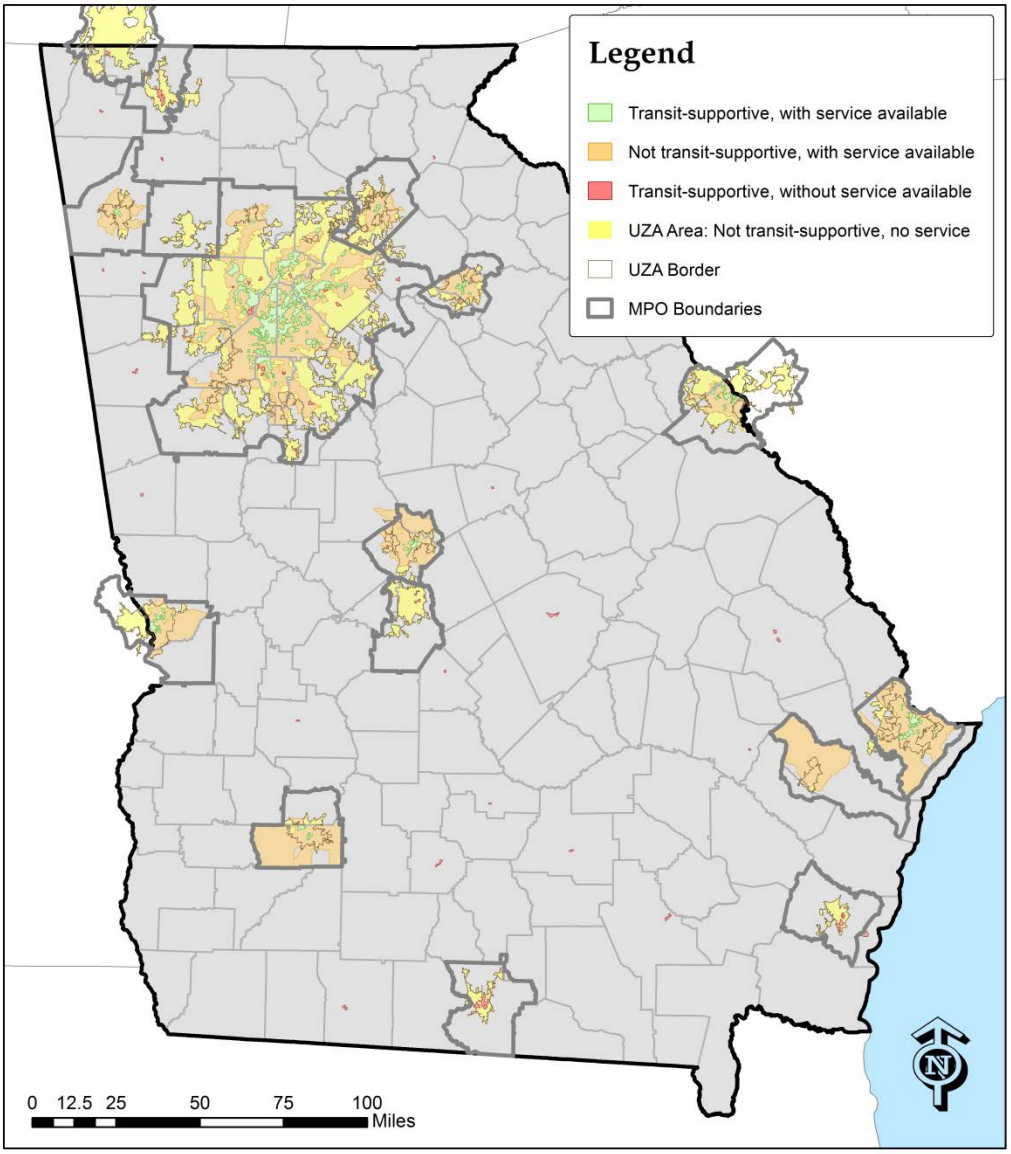
Source: GDOT, MARTA, Albany Transit System, Athens Transit System, APT, CAT, CCT, METRA, Douglas County Rideshare, GCT, GRTA, HAT, LT, MTA, RTD.

Figure 2.3 Fixed-Route Transit-Supportive Areas



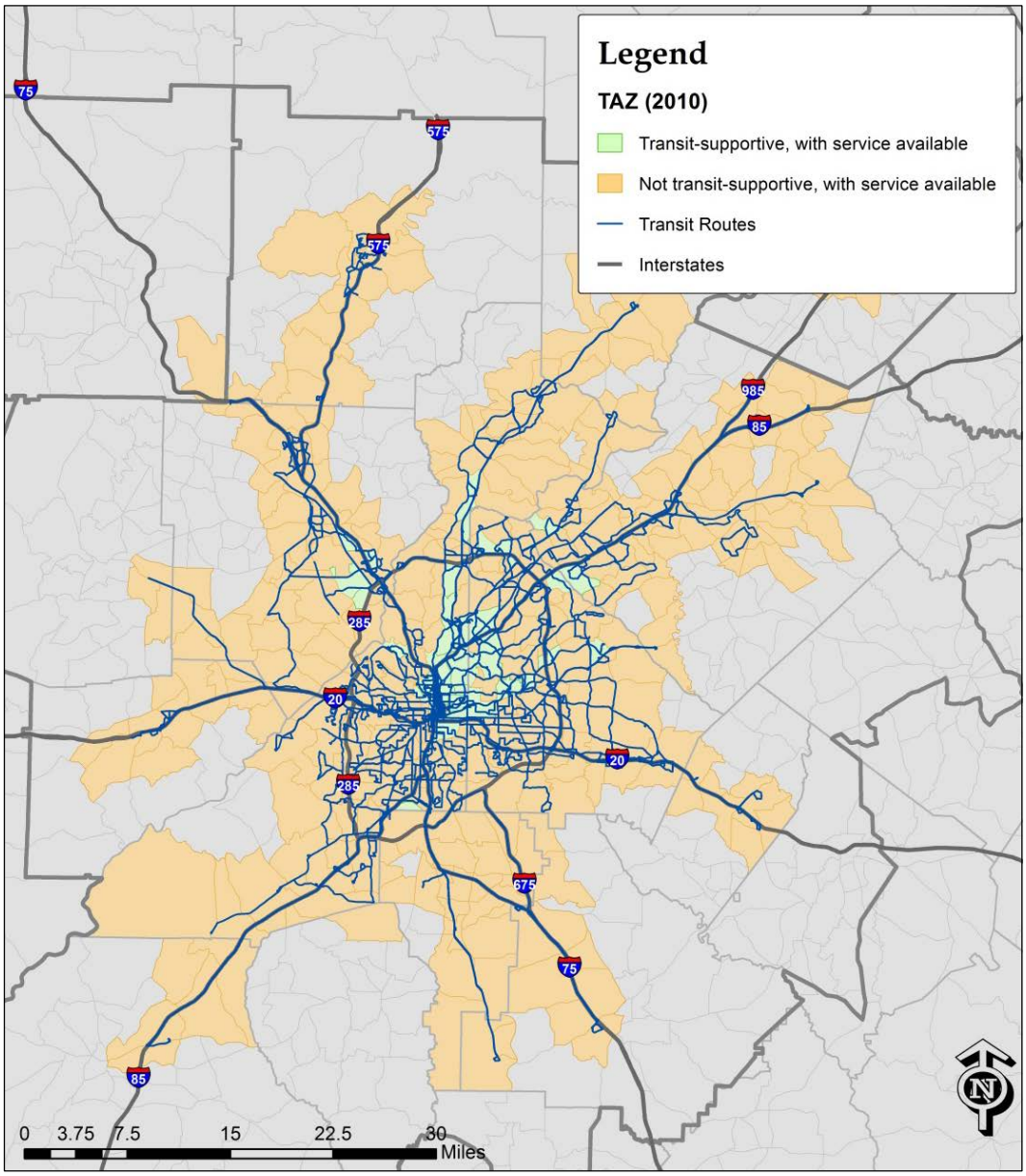
Source: GDOT, MARTA, Albany Transit System, Athens Transit System, APT, CAT, CCT, METRA, Douglas County Rideshare, GCT, GRTA, HAT, LT, MTA, RTD.

Figure 2.4 Fixed-Route Transit-Supportive Areas Relative to Urbanized Areas



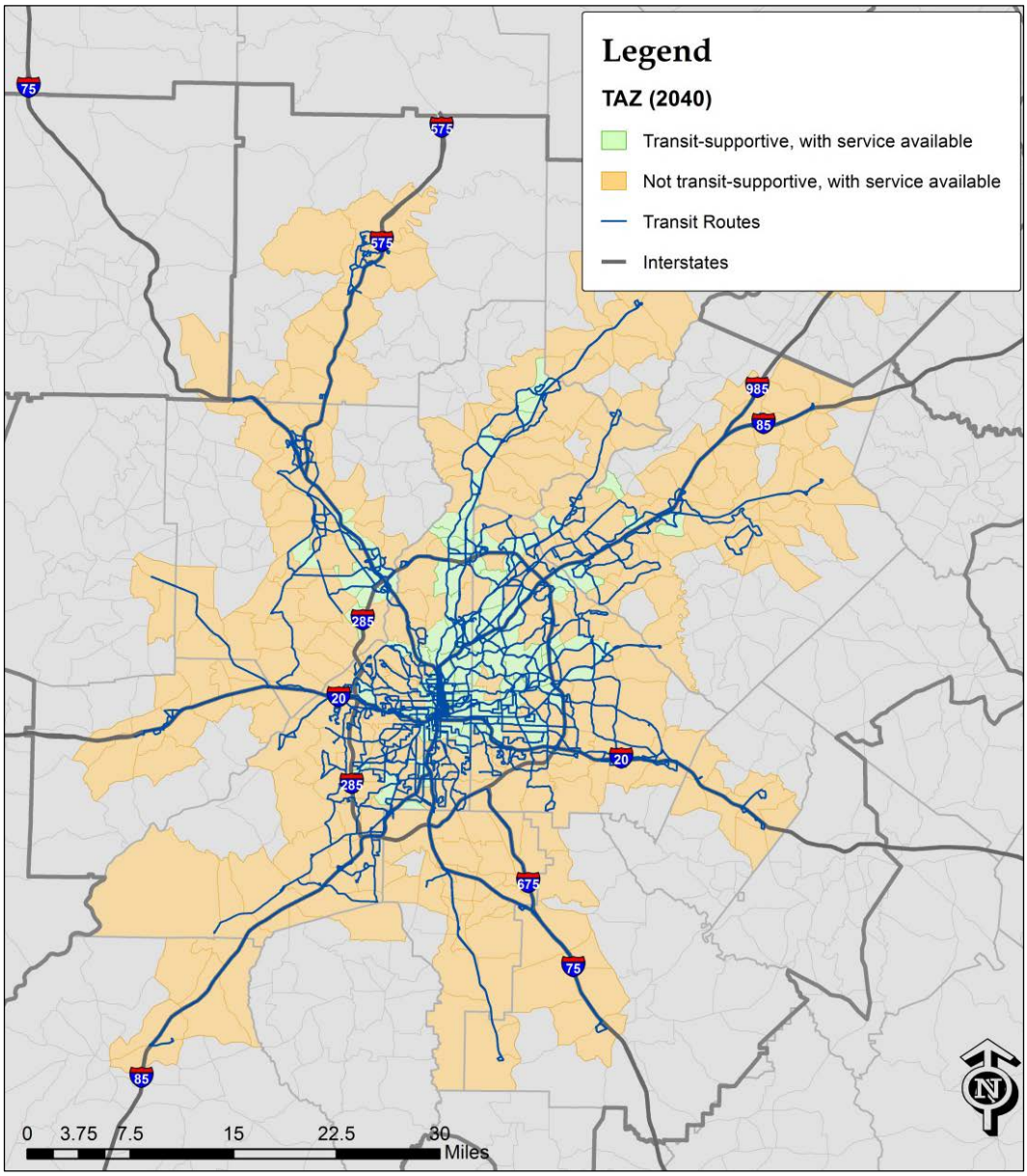
Source: GDOT, MARTA, Albany Transit System, Athens Transit System, APT, CAT, CCT, METRA, Douglas County Rideshare, GCT, GRTA, HAT, LT, MTA, RTD.

Figure 2.5 Fixed-Route Transit Supportive Areas Served by Transit (2010)
Atlanta MPO



Source: GDOT, MARTA, Albany Transit System, Athens Transit System, APT, CAT, CCT, METRA, Douglas County Rideshare, GCT, GRTA, HAT, LT, MTA, RTD.

Figure 2.6 Fixed-Route Transit Supportive Areas Served by Transit (2040)
Atlanta MPO



Source: GDOT, MARTA, Albany Transit System, Athens Transit System, APT, CAT, CCT, METRA, Douglas County Rideshare, GCT, GRTA, HAT, LT, MTA, RTD.

Note: Existing transit routes are shown.

2.1.2 Rural "On-Demand" Public Transit System Overview

Public transportation in rural areas is provided through a variety of mechanisms, including GDOT-administered Federal Transit Administration (FTA) Section 5311 rural public transportation (RPT), Department of Human Services (DHS) transportation, and the Department of Community Health (DCH)/Medicaid Non-Emergency Transportation (NET) program. This summary focuses on the RPT element of the rural transportation system, which serves the following function: "Customers can access rural public transportation with no restrictions on the purpose of the trip; they can use these services to go to work, shopping, appointments, recreational activities, and more."[14]

The RPT program provides service in 112 of Georgia's 159 counties. Urban fixed-route transit systems operate in an additional 9 counties. The remaining 38 counties do not have access to public transportation. These counties are listed in Table 2.2 (page 2-13).

As indicated in the Existing Conditions Report, the most notable deficiencies in rural on-demand service are in the rural areas of the Southern Georgia, Heart of Georgia, River Valley, Central Savannah River Area, Northeast Georgia, and Middle Georgia Regional Commission districts.

The 2013 Rural Transit Fact Book provides detailed regional and state rural transit summaries by FTA region and by state based on 2011 data from the National Transit Database (NTD).[15] According to 2011 NTD data, Georgia's 110 agencies served 69 percent of Georgia's counties. This compares with several states that serve 100 percent of their counties and Utah, which had the lowest percentage of counties served, with 21 percent. The Southeast (the entire FTA Region IV[16]) has rural transit in 82 percent of counties, compared to a minimum of 54 percent in Region III and a maximum of 91 percent in Region VII.

Table 2.2 Counties Lacking Rural Transit Service
By Regional Commission

Southern Georgia Regional Commission	
Atkinson County	Coffee County
Ben Hill County	Echols County
Brantley County	Irwin County
Charlton County	Lanier County
Clinch County	

[14] RHST GDC 2013 Report.

[15] Though 2012 NTD is reported elsewhere in this deficiencies report, 2011 is the most current year included in the 2013 Rural Transit Fact Book.

[16] FTA Region IV includes the States of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, The Commonwealth of Puerto Rico, and the United States Virgin Islands.

Heart of Georgia Altamaha Regional Commission	
Appling County	Jeff Davis County
Candler County	Johnson County
Emanuel County	Laurens County
Evans County	Toombs County
River Valley Regional Commission	
Chattahoochee County	Schley County
Harris County	Webster County
Marion County	
Central Savannah River Area Regional Commission	
Washington County	
Middle Georgia Regional Commission	
Houston County	Monroe County
Georgia Mountains Regional Commission	
Franklin County	White County
Stephens County	
Northeast Georgia Regional Commission	
Barrow County	Newton County
Jasper County	Oconee County
Madison County	Oglethorpe County
Three Rivers Regional Commission	
Carroll County	

Source: American Society of Civil Engineers (ASCE) Infrastructure Report Card for the State of Georgia (September 2013), Team Analysis.

Note: Meriwether and Tattnall counties have been removed from this table from earlier versions developed as part of the Existing Conditions Technical Memorandum because service began in Meriwether County in FY 2013 and current sources show that Tattnall County also has service.

The RPT system is intended to serve rural populations, including persons in small urban clusters (2,500-50,000 population). Of Georgia's Census 2010 population of about 9.69 million, 3.24 million (33 percent) live in rural areas outside of the nine counties with urban fixed-route service. These 3.24 million people are the target population for RPT.[17] Seventy-six percent of the target population lives in counties served by the current RPT system. This leaves a rural population of 764,784 in the 38 counties not served by RPT, or 24 percent of the intended population. Table 2.3 presents a summary of this information. Note that some of these populations might have access to DHS or DCH/NET transportation.

Table 2.3 Rural Population in Counties without Fixed-Route Transit

Area	Population	Percent
RPT Target Population	3,244,800	100%
With RPT Service	2,480,016	76%
Without RPT Service	764,784	24%

Source: GDC's Coordinating RSHST 2013 Report.

In summary, rural transit facilities deficiencies are as follows:

- Thirty-eight counties do not have access to public transportation, particularly in Southern Georgia, Heart of Georgia, River Valley, Central Savannah River Area, Northeast Georgia, and Middle Georgia RC.
- About 764,784 persons remain unserved by GDOT RPT. This is 24 percent of the rural population outside of urban counties.

See Section 2.1.4 (page 2-20) for a discussion of the assumptions applied in the tradeoff analysis regarding future transit service.

[17] The rural population of the nine counties with urban fixed-route transit service is not considered.

2.1.3 Park-and-Ride Facilities

Georgia has an extensive network of park-and-ride lots throughout the State, with a particular concentration in the Atlanta region. The 2012 Florida Department of Transportation (FDOT) State Park-and-Ride Guide establishes standards for siting park-and-ride lots of various types. The FDOT park-and-ride lot types were generalized to formulate rules-of-thumb to evaluate park-and-ride lots in Georgia at a statewide scale and in the vicinity of metropolitan Atlanta.

Lots can serve heavily used urban corridors or corridors with HOV facilities. Lots can border the periphery of employment centers or other activity locations or they can border the fringe of urban areas. Peripheral facilities are located "on the edge of an intensely developed, highly congested, or access-restrained activity center. These lots are designed to supplement parking deficiencies and include facilities that service activity centers with limited parking and/or auto access such as auto-free zones, colleges, and universities." The present study does not evaluate peripheral park-and-ride lots due to limited data, although these facilities are a potential area of future focus better suited for localized analysis.

At a statewide scale, remote (or rural) park-and-ride lots generally can be considered:

- Between 20 and 60 miles from an employment center;
- With 20,000 or more jobs; and
- Along a commuting route.

In the Atlanta metropolitan area, guidelines applied to identify park-and-ride lot locations are:

- Fifty-thousand Average Daily Traffic (ADT);
- Level of Service (LOS) E or F; and
- At least 10 miles from employment centers.

Two traffic analysis zones (TAZ) of GDOT's statewide travel demand model have more than 20,000 jobs – Robins Air Force Base and Augusta. Savannah also has a cluster of zones with at least 10,000 employees. Several other zones outside of Atlanta also have at least 10,000 employees. Therefore, concentrations of employment outside of Atlanta, include:

- Augusta;
- Robins Air Force Base in Warner Robins, and Macon;
- Fort Benning in Columbus; and
- Savannah and Fort Stewart near Hinesville.

Four or more lane roads are considered commuting routes for the purposes of the present evaluation. Atlanta employment centers are defined as ARC's 21 "regional employment centers": Atlantic Station, Buckhead, City Center,

Cumberland, Delk Road, Emory, Fulton Industrial, Georgia Tech, Gwinnett, Hartsfield, Lockheed/Dobbins, Midtown, Mountain Industrial, North Point, Northlake, Peachtree Corners, Perimeter, Sandy Springs, South Buckhead, Town Center, and Windward.

FDOT recommends at least 2,000 dwelling units within two miles, which can be estimated by viewing residential density.

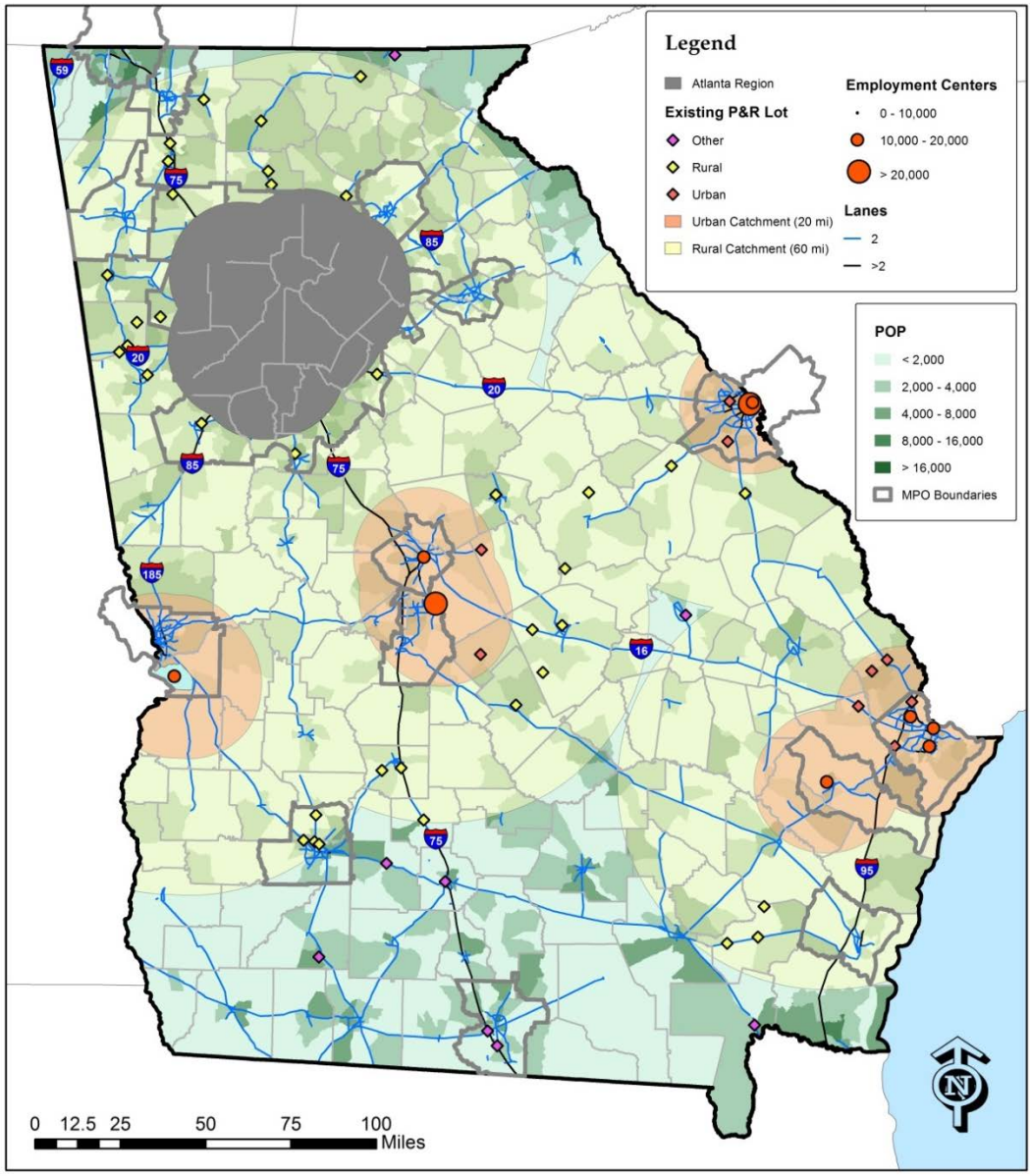
Of the State's 156 park-and-ride lots, over one-half are in the metropolitan Atlanta region (within 20 miles of a regional employment center). A few are within 20 miles of the other employment centers across the State, and a few others are in remote areas, beyond 60 miles from employment centers. The remaining 38 park-and-ride lots serve "rural" areas, between 20 and 60 miles from employment centers.

Figure 2.7 (page 2-17) shows existing rural park-and-ride lots. A few locations currently without a park-and-ride lot but that have the potential for a rural lot are:

- I-85 and I-185 between Atlanta and Columbus, particularly around LaGrange;
- I-75 between Atlanta and Macon;
- I-95 near Brunswick;
- I-16 west of Augusta; and
- I-85 south of the South Carolina border.

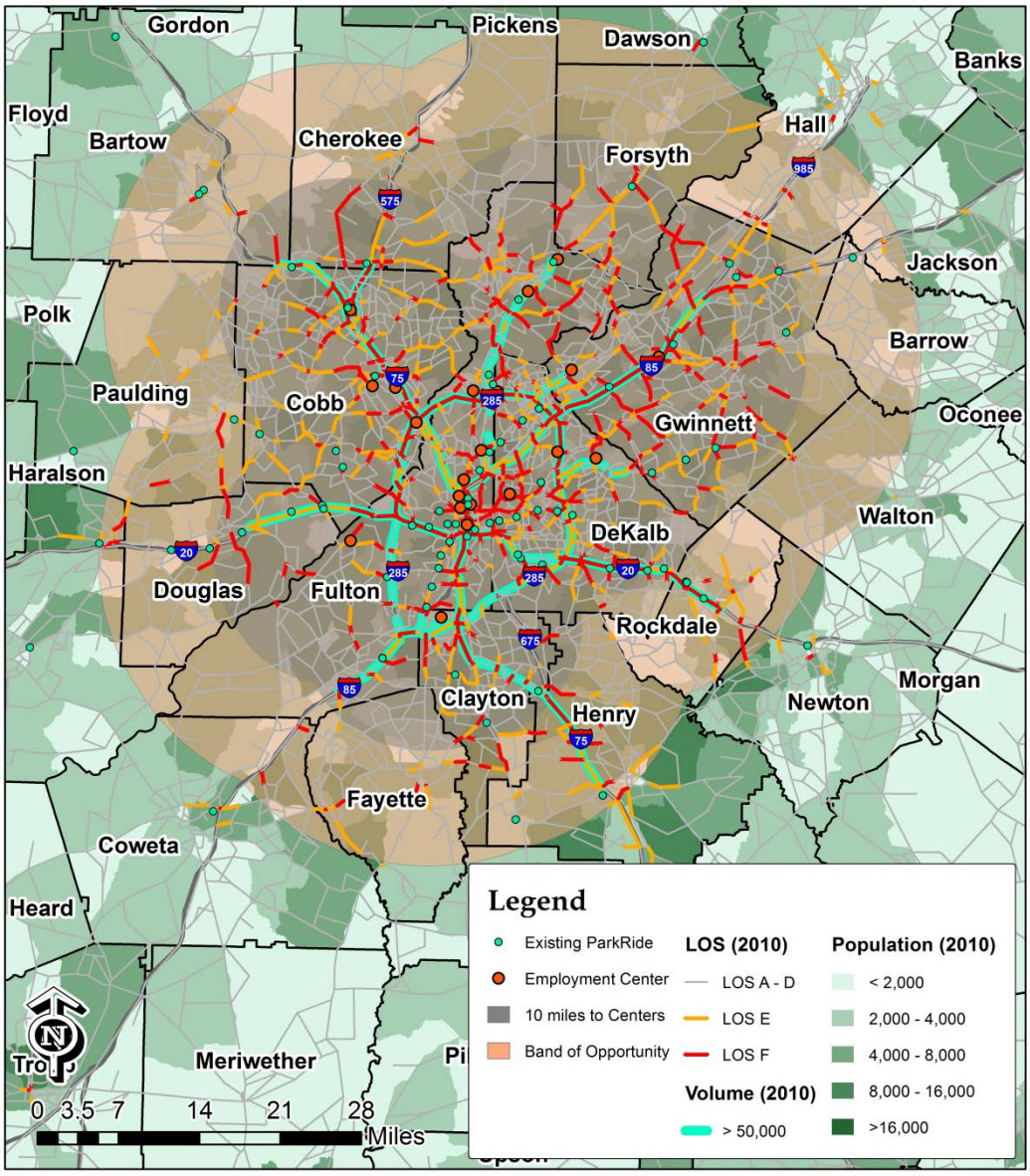
Figure 2.8 (page 2-18) and Figure 2.9 (page 2-19) show the park-and-ride lots in the Atlanta region. Within 10 miles of the employment centers, the need for new park-and-ride lots is assumed to be minimal (with the potential exception of periphery facilities). Outside of 20 miles, lots are considered rural and were addressed in Figure 2.7 (page 2-17). Therefore, the band of opportunity or need for additional urban corridor park-and-ride lots is between 10 and 20 miles. Additionally, urban corridor park-and-ride lots could relieve demand on corridors with ADT of 50,000 or higher and LOS E or worse. Figure 2.8 (page 2-18) shows that current park-and-ride lots serve existing needs according to the LOS and ADT standards. Even with forecast traffic volume and population growth and associated deterioration in LOS, urban corridor park-and-ride deficiencies are not apparent (see Figure 2.9, page 2-19).

Figure 2.7 Park-and-Ride Lot Needs
Statewide



Source: GDOT Office of Intermodal Programs, Atlanta MPO, Georgia Statewide Model.

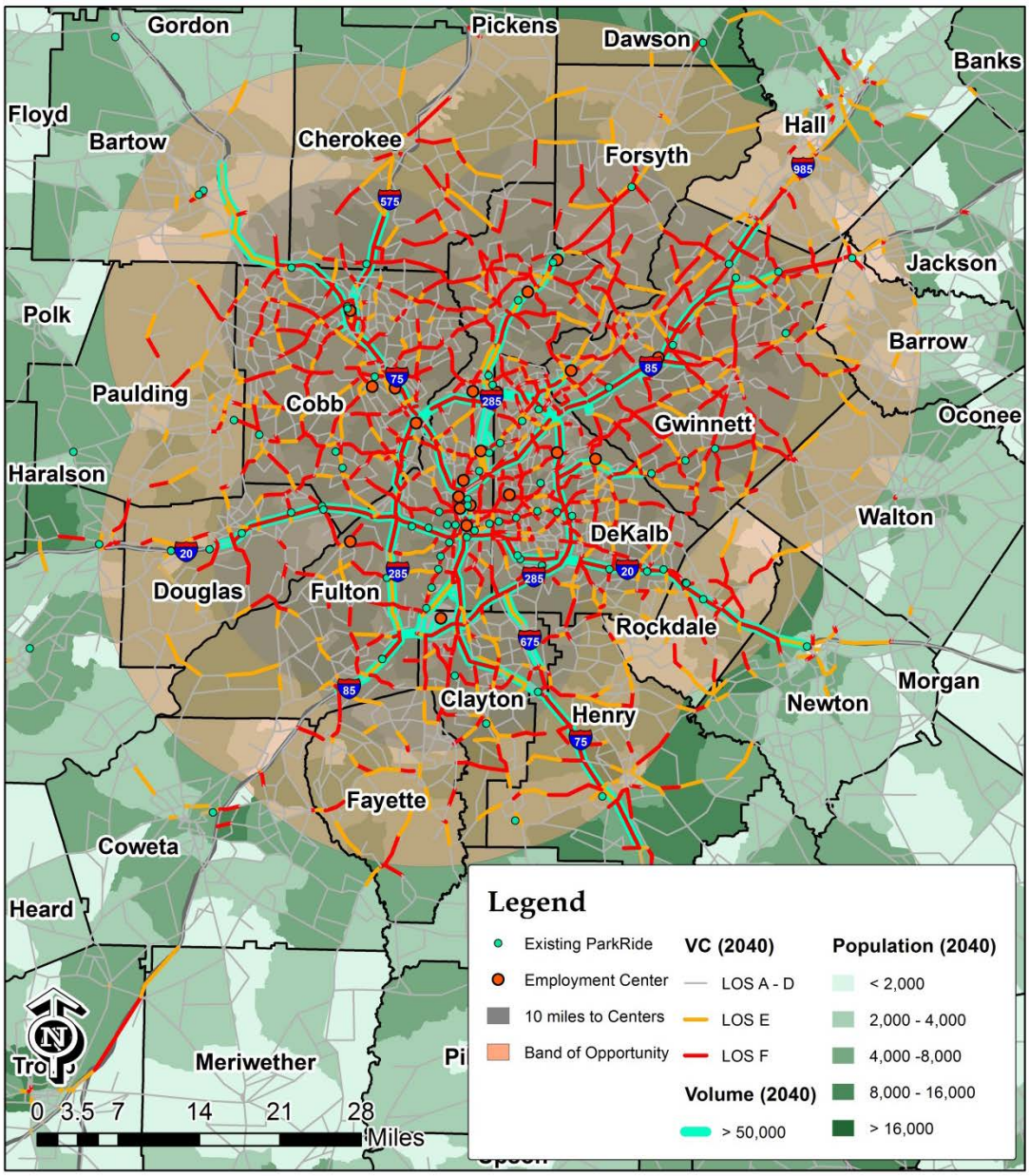
Figure 2.8 Park-and-Ride Lot Analysis
Atlanta Region (2010)



Source: GDOT Office of Intermodal Programs, Atlanta MPO, Georgia Statewide Model.

Note: Geographical information for bicycle facilities is not available in all areas.

Figure 2.9 Park-and-Ride Lot Analysis
Atlanta Region (2040)



Source: GDOT Office of Intermodal Programs, Atlanta MPO, Georgia Statewide Model.

Note: Geographical information for bicycle facilities is not available in all areas.

2.1.4 Tradeoff Analysis Summary

The tradeoffs analysis addressed the potential impacts of increased levels of funding on transportation performance across various modes. In contrast to the detailed exploratory analysis in the majority of this public transportation deficiencies chapter, the tradeoffs analysis used general funding and performance assumptions. Funding was expressed as average annual expenditures through 2040, focusing on Federal and state transit capital. Performance was quantified by the percent of Georgia's population forecast to be served by transit in 2040. The funding and performance levels are shown in Table 2.4.

Table 2.4 Transit Funding and Performance Levels for Tradeoffs Analysis

Funding Level	Funding	Percent of 2040 Population Served
High	$174M/year	89%
Medium	$121M/year	81%
Low	$73M/year	73%

Funding

Transit funding for tradeoffs analysis started with the FY 2014-2017 STIP. Average annual funding of select transit capital programs shown in Table 2.5 comprise the $121 million annually at the medium funding level. This level of funding is assumed to sustain the capital needs of status quo transit systems. The low funding level was assumed to be a reduced level below this baseline.

Table 2.5 Medium Level Transit Funding Based on the STIP

Category	Total FY 2014-2017 ($ Thousands)	Average Annual ($ Thousands)
Urbanized Area Formula Program (5307) – Capital	$359,961	$89,990
Enhanced Mobility of Seniors and Individuals with Disabilities (5310)	$11,822	$2,956
Formula Grants for Rural Areas Program (5311) – Capital	$30,472	$7,618
Intercity Bus Program (5311f)	$8,597	$2,149
Bus and Bus Facilities (5339)	$73,953	$18,488
Other Transit Projects	$588	$147
Total Apportionment	$485,393	$121,348

Source: FY 2014-2017 STIP.

The high funding level adds transit capital projects included in constrained plans; the implementation of unfunded transit development plans, including the initiation of new urban fixed-route systems (see below); and new rural transit service (see below) to reach an average annual funding level of $174 million. The constrained plans include such Atlanta projects as the Clifton Corridor Phase 1, I-20 East Transit Initiative Phase 1, Connect Cobb/Northwest Atlanta Transit Corridor BRT Phase 1, and Atlanta Streetcar Expansion Phase 1. Also included are additional park-and-ride lots in Augusta.

Implementing transit development plans includes the start of fixed-route systems in Brunswick, Dalton, Valdosta, Warner Robins, and Cartersville. The cost of fixed-route capital in Cartersville is assumed at the average transit capital planned per capita for the other four startup systems. Further, capital and vehicles from the Albany and Augusta transit development plans are included in the cost of the high funding level.

The final major component of the high funding level is the addition of on-demand 5311 rural public transportation service in the following counties currently unserved: Appling, Atkinson, Ben Hill, Brantley, Candler, Carroll, Charlton, Chattahoochee, Clinch, Coffee, Echols, Emanuel, Evans, Franklin, Harris, Houston, Irwin, Jasper, Jeff Davis, Johnson, Lanier, Laurens, Madison, Marion, Monroe, Oconee, Oglethorpe, Schley, Stephens, Toombs, Washington, Webster, and White. Capital costs for new service in these counties includes assumed new vehicles and other annual capital costs based on recent per capita costs of Georgia's existing rural transit systems. Assuming no additional Federal funding for rural transit, these costs would have to be borne by state and local sources. The only unserved portions of the State that would remain at the high funding level are the portions of the following counties outside of fixed-route service areas: Cobb, DeKalb, Douglas, Fulton, Gwinnett, Fayette, Borrow, Clayton, Newton, and Rockdale.

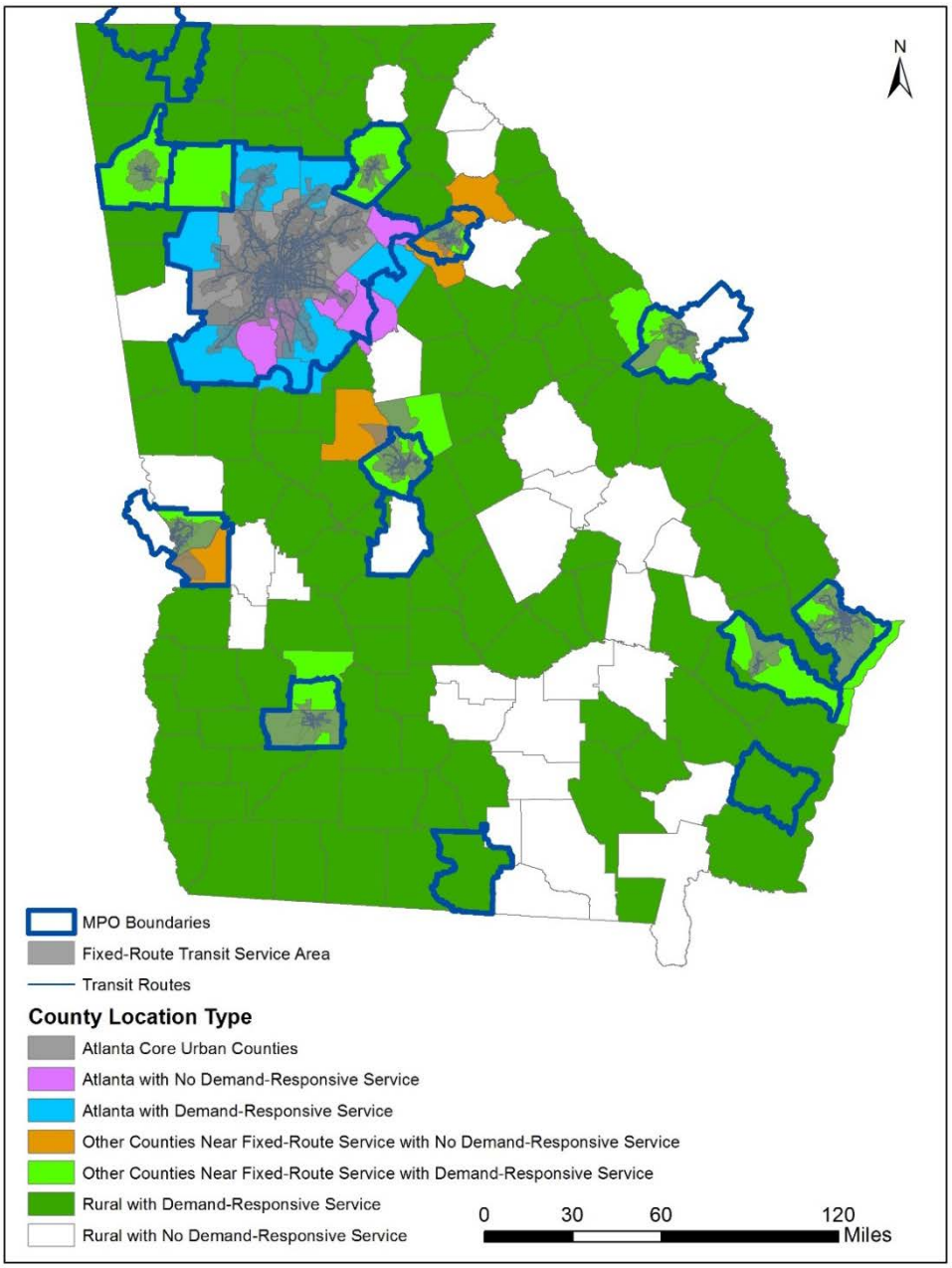
Performance

The population served by transit was summarized by counties grouped into three subareas: Atlanta MPO counties, other counties near fixed-route service, and rural counties (see Figure 2-10 for these counties overlaid with fixed-route and demand-responsive transit service). The 2040 population of transportation analysis zones (TAZ) with transit service (intersected by transit routes) was included as the estimated population served by urban fixed-route transit systems in 2040. Any county with current on-demand 5311 rural public transportation service was assumed to have its total 2040 population served by transit.

Populations served by transit in 2040 include 5.5 million in Atlanta MPO counties, 2.2 million in other counties near fixed-route service, and 3.4 million in rural counties. This 11.1 million people served by transit at the medium funding level represents 81 percent of the State's population in 2040. About one-half of the State's population served by transit is in Atlanta MPO counties.

The low performance level assumed that reduced funding would reduce the population served by 10 percent, reaching only 73 percent of the State's population, or about 10 million people. The high level included the financially constrained transit capital projects, new fixed-route systems, and new rural on-demand service. This additional transit served about 1.1 million more people than were served at the medium level, reaching a total of 12.2 million people, or about 89 percent of the State's population.

Figure 2.10 Detailed Service Areas for Population Served by Transit for Tradeoffs Analysis



2.2 TRANSIT CAPACITY

Transit performance measures were compared for Georgia, the Southeast U.S., and the entire U.S. These comparisons were made utilizing National Transit Database (NTD) data. The Southeast was defined as Federal Transit Administration Region IV, with the exception of The Commonwealth of Puerto Rico and the United States Virgin Islands: Alabama, Florida, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. Transit systems were grouped based on the size of the metropolitan area they serve, defined by urbanized area population according to:

- Small: < 200,000 population;
- Large: 200,000 – 999,999; and
- Very Large: 1,000,000+.

Summary statistics about the number of transit systems, number of urbanized, and average population of each category are given in Table 2.6. The specific systems included in each category are shown in Table 2.7 (page 2-24).[18]

Table 2.6 Summary of All Systems Included in Peer Comparison

UZA Size	Metric	Georgia	Southeast	United States
Small (< 200,000)	*Systems*	7	49	299
	UZAs	6	44	259
	Population	100,876	107,871	98,878
Large (200,000-999,999)	*Systems*	5	56	218
	UZAs	3	36	129
	Population	300,355	406,997	416,634
Very Large (1,000,000+)	*Systems*	9	25	258
	UZAs	1	7	42
	Population	4,515,419	2,477,829	3,229,505

Source: NTD 2012 Reporting Data.

[18] Note that all urban systems serving each urbanized area in the NTD are included, including vanpool providers, private operators, and systems in adjoining states.

Table 2.7 Georgia Systems Included in Peer Comparison

Urbanized Area Size	Name	Urbanized Area	Urbanized Area Population
Small	Liberty Transit (LT)	Hinesville, GA	51,456
	City of Rome Transit Department (RTD)	Rome, GA	60,851
	Albany Transit System (ATS)	Albany, GA	95,779
	Athens Transit System (ATS) University of Georgia Transit System (UGA)	Athens-Clarke County, GA	128,754
	Hall Area Transit (HAT)	Gainesville, GA	130,846
	Macon-Bibb County Transit Authority (MTA)	Macon, GA	137,570
Large	Metra Transit System (Columbus, GA) (Metra)	Columbus, GA-AL	253,602
	Phenix City Express (PEX)	Columbus, GA-AL	253,602
	Chatham Area Transit Authority (CAT)	Savannah, GA	260,677
	Augusta Richmond County Transit Department (APT) Lower Savannah COG (LSCOG)	Augusta-Richmond County, GA-SC	386,787
Very Large	Metropolitan Atlanta Rapid Transit Authority (MARTA) Cobb County Department of Transportation Authority (CCT) Douglas County Rideshare (Rideshare) Georgia Regional Transportation Authority (GRTA) Gwinnett County Board of Commissioners (GCT) vRide, Inc. – Atlanta Cherokee County Board of Commissioners (CATS) Buckhead Community Improvement District (BCID) Henry County Transit (HC)	Atlanta, GA	4,515,419

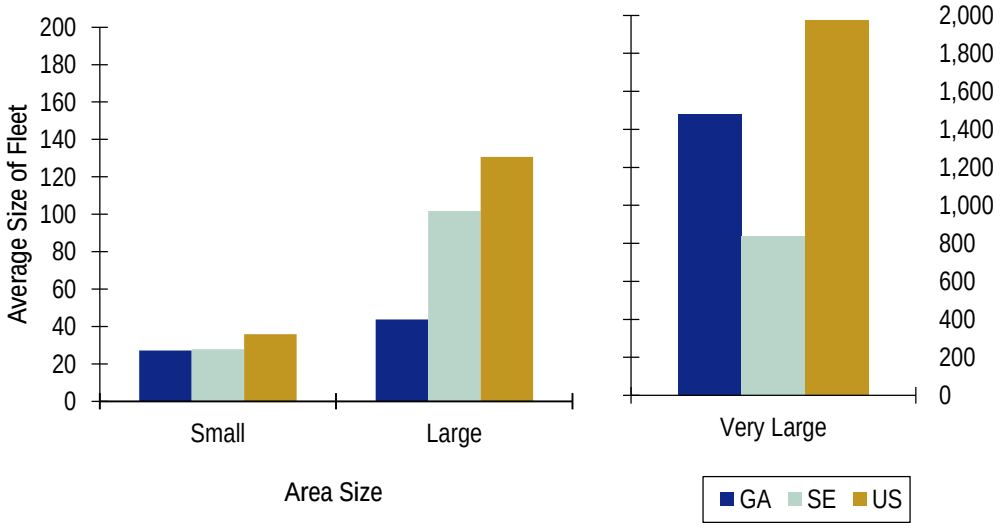
Source: NTD 2012 Reporting Data.

2.2.1 Urban Fixed-Route Public Transit Systems

The urban fixed-route transit facilities deficiencies section examined the geographic service coverage of fixed-route transit routes and identified areas not served. Looking at the vehicle fleet operating on those routes, this section identifies the deficiencies in the fleet size and age, in part by comparing Georgia with its neighbors in the Southeast and in the U.S. as a whole.

The average fleet size of Georgia's transit systems are compared to others in the Southeast and U.S. in Figure 2.11. Transit systems in Georgia serving large metropolitan areas have fewer vehicles on average (just over 40 vehicles) than systems serving other large metropolitan areas in the Southeast (about 100 vehicles) and U.S. (140 vehicles). Very large metropolitan areas in Georgia have transit systems with larger fleets than counterparts in the Southeast, but smaller fleets than those serving very large metropolitan areas across the U.S.

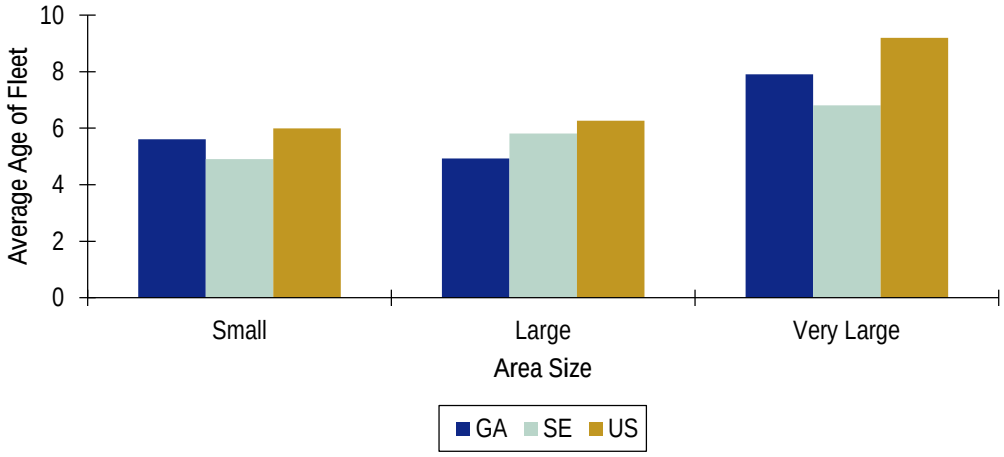
Figure 2.11 Comparison of Average Size of Fleet



Source: NTD 2012 Reporting Data.

Figure 2.12 (page 2-26) compares the average age of Georgia's fixed-route transit fleet with the Southeast and U.S., for various metropolitan area sizes. The average ages of Georgia's transit vehicles serving all sizes of metropolitan area are lower than the national averages. However, other small and very large metropolitan areas in the Southeast have newer vehicles than Georgia.

Figure 2.12 Comparison of Average Fleet Age



Source: NTD 2012 Reporting Data.

In summary, urban transit capacity deficiencies are as follows:

- Transit systems in Georgia serving large metropolitan areas have fewer vehicles (just over 40 vehicles) than systems serving other large metropolitan areas in the Southeast (about 100 vehicles) and the U.S. (140 vehicles).
- Transit systems in Georgia serving small and very large metropolitan areas in the Southeast have older vehicles than those serving similarly sized metro areas in the Southeast.

2.2.2 Rural Public Transit Systems

Coordination, fleet size, and vehicle age are important factors related to the capacity of Georgia's rural public transit systems. The Governor's Development Council's (GDC) *Coordinating Rural and Human Service Transportation in Georgia 2013 Reporting Year Final Report* states, "DHS stopped purchasing vehicles in 2007, as the DHS fleet ages and vehicles are retired, additional capital will be needed. GDOT/DOAS sell-off ("surplus") rural transit vehicles that have met their useful life; these surplus vehicles can be used for additional RHST providers. Surplus process does not currently prioritize RHST providers."

However, *The Rural Transit Fact Book* reports that as of 2011, Georgia had the youngest rural transit fleet in the U.S., with an average age of 3.5 years compared to 4.7 years in the Southeast and a maximum of 8.4 years in South Dakota. The Rural Transit Fact Book also reports that Georgia had 713 rural transit vehicles. The two states with the largest rural transit fleet were North Carolina with 1,376 and Texas with 1,345.

2.3 TRANSIT USE

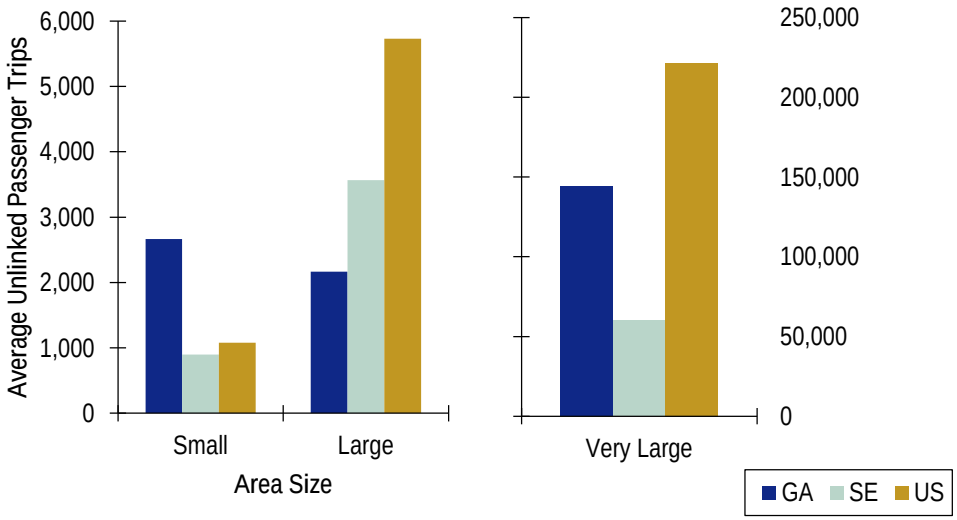
2.3.1 Urban Public Transit Systems

Figure 2.13 (page 2-28) compares Georgia's fixed-route transit ridership to that of other systems in the Southeast and U.S. by system sizes. The average ridership on transit systems serving small urbanized areas with populations between 50,000 and 200,000 in Georgia is much higher than ridership on similar systems in the Southeast and the U.S. The ridership on systems serving Georgia's large urbanized areas with populations greater than 200,000 and very large urbanized areas is much lower than in the Southeast and U.S.

Another measure of transit use, annual passenger miles, shows similar patterns (demonstrated in Figure 2.14, page 2-28). One exception is that passenger miles in small urban areas in Georgia are in line with peer systems across the Southeast and the U.S.

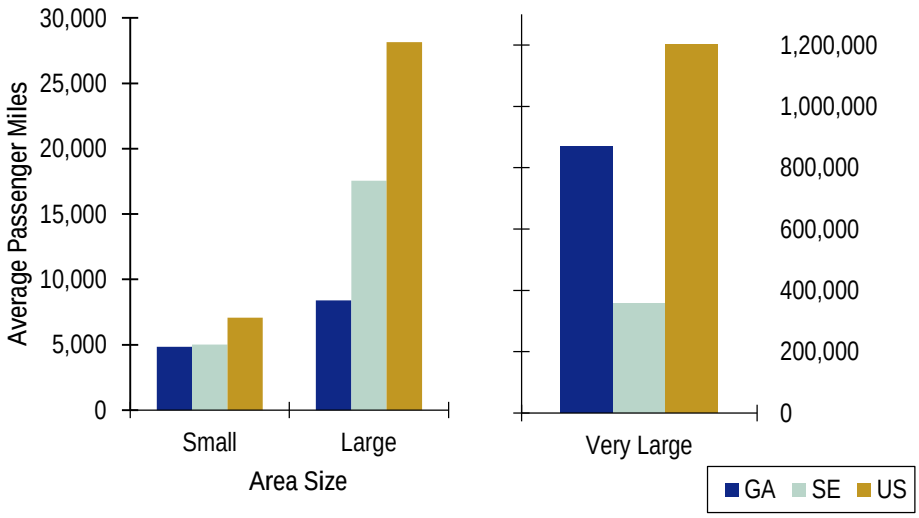
The large number of riders making short trips in Athens, due to the large number of University of Georgia students, likely drives up the average ridership in Georgia's small urbanized areas relative to peer systems while keeping its average passenger miles in line. The limited usage of Georgia's systems in large and very large urbanized areas can be related to limited amounts of service supplied by these systems, as described further in the transit performance section.

Figure 2.13 Comparison of Urban Transit System Ridership



Source: NTD 2012 Reporting Data.

Figure 2.14 Comparison of Urban Transit System Passenger Miles



Source: NTD 2012 Reporting Data.

The initiation of urban fixed-route transit service has been explored in Dalton, Warner Robins, and Valdosta. Once these areas secure funding, total annual weekday ridership is projected as shown in Table 2.8 (page 2-29).

Table 2.8 Estimated Ridership of Urban New Fixed-Route Transit Systems

	Total Annual Weekday Trips
Brunswick	255,800
Dalton	73,800
Warner Robins	382,300
Valdosta	38,220

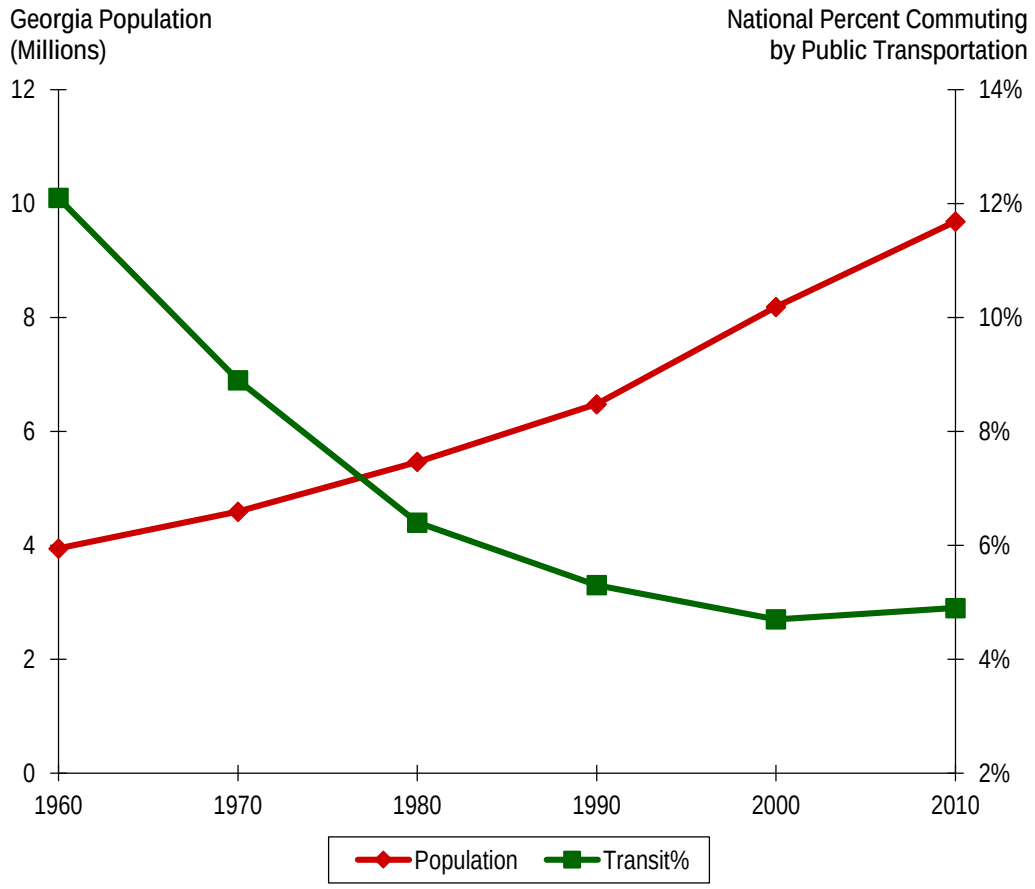
Source: Transit Development and Implementation Plan for the Valdosta Urbanized Area – Service Plan, 2009. Warner Robins Area Transportation Study Transit Feasibility Study, 2012. Greater Dalton Metropolitan Planning Organization Transit Feasibility Study, 2012, Brunswick-Glynn Transit Implementation Plan, 2009.

Note: Brunswick's estimated annual ridership is given for year 10 for all three routes and ADA paratransit and includes a five percent annual ridership increase.

Compared to Georgia's existing fixed-route transit systems in small urbanized areas, Valdosta and Dalton would be by far the smallest systems. According to the *Warner Robins Area Transportation Study (WRATS) 2012 Transit Feasibility Study* and the *Brunswick-Glynn Transit Implementation Plan*, Warner Robins and Brunswick are each projected to have higher ridership than Hall Area Transit which has an urbanized area population of approximately 131,000. All other systems in Georgia with 2012 NTD data available carry more riders than these new systems are projected to carry upon startup, both in terms of total trips and trips per capita. Achieving the estimated ridership figures might take time as citizens become familiar with the new mode choice and transition to daily users of the system. Liberty Transit, which recently started fixed-route service (and did not have data reported to the NTD in 2012) in the Hinesville urbanized area (population 51,000), saw about 25,000 trips in its first year. Brunswick, Dalton, Valdosta, and Warner Robins have the potential to surpass this level, with respective populations of 51,000, 85,000, 77,000, and 133,000.

Looking to the future, ridership is likely to increase given sufficient funding to create coherent and robust systems. Figure 2.15 (page 2-30) shows how the percentage of commuters across the country who use public transportation has declined over the past several decades. However, the decline has slowed and in fact ridership rebounded in 2010 and has continued to increase in many parts of the country since then. If more commuters continue to use public transportation, growth in transit ridership might outpace Georgia's population growth. Much of this population growth will likely be in urban areas, further increasing potential transit demand. Georgia grew from 72 percent urban in 2000 to 75 percent in 2010. Several urbanized areas grew faster than the state's overall 18 percent increase in population from 2000 to 2010, including Cartersville (56 percent), Dalton (58 percent), Gainesville (48 percent), Warner Robins (47 percent), Valdosta (34 percent), and Atlanta (29 percent). Note that the majority of these fastest growing urbanized areas do not currently have transit systems, i.e., Cartersville, Dalton, Warner Robins, and Valdosta.

Figure 2.15 Comparison of Urban Transit System Passenger Miles



Source: U.S. Census Bureau.

At the same time, the abilities of transit systems to attract riders depend on a variety of issues such as the location and style of development, walkability and other supporting infrastructure, transit service quality and reliability, and the safety and image of transit. For example, the *Transit Capacity and Quality of Service Manual* cites TCRP Report 88, which defines the areas of passenger interest of availability, service delivery, and safety and security. For a rider to choose transit, home and destination locations need to be within the service area, transit needs to operate at the time of day required, and service headways need to be frequent enough to be attractive. In addition, capacity needs to be available, and travel times need to be competitive with auto. Once on transit vehicles, passengers expect transit to be reliable, comfortable, clean, and safe.

Cost and funding are the dominant factors in the future of urban transit. The recent national resurgence in popularity of streetcar and light rail development has occurred in spite of a very constrained and competitive funding environment. For example, Charlotte, Dallas, Houston, Denver, Minneapolis, and Salt Lake City all have initiated or expanded rail transit in recent years. Success in implementing

new systems has hinged on the ability of the local and state governments to provide strong financial commitment. Planning for Atlanta's streetcar service is also the result of a partnership with the federal government.

If local and state funding are committed to match federal funding for transit capital and operations, then existing systems will be improved and maintained in a state of good repair (as required by the transit asset management provisions of MAP-21). Further, systems can be expanded and new systems can come online.

The following presents two examples of future growth forecasts for Georgia transit systems:

- **Chatham Area Transit (CAT) –** Savannah's CAT system plans to optimize its system to increase ridership. According to the *2013 Chatham Area Transit Authority Transit Development Plan*, CAT will manage existing operations (almost $5.5 million over five years) by adjusting run times, extending weekend service hours, adding four new fixed routes, adding "Flex Zones" curbside van service, improving peak headways, and continuing various capital improvements of approximately $105 million over six years. Building on recent capital expansions, CAT will need to consider reducing operations and overhead costs to increase its efficiency. With improved efficiency and reductions in debt service, CAT may be able to expand into new markets.
- **Athens Transit System –** Athens Transit System plans to improve service by consolidating two routes, eliminating the practice of utilizing large loops in favor of two-way routing on five routes, revising two underperforming routes, analyzing schedules for operational feasibility, and exploring bus priority treatments where practical. Athens will continue coordinating with the university to improve service. As university enrollment and Athens area employment continue to grow, transit service (capacity, frequency, etc.) will need to keep pace. In addition, geographic transit service coverage might need to grow to offer service to populations transitioning from rural to urban.

In summary, urban transit deficiencies are as follows:

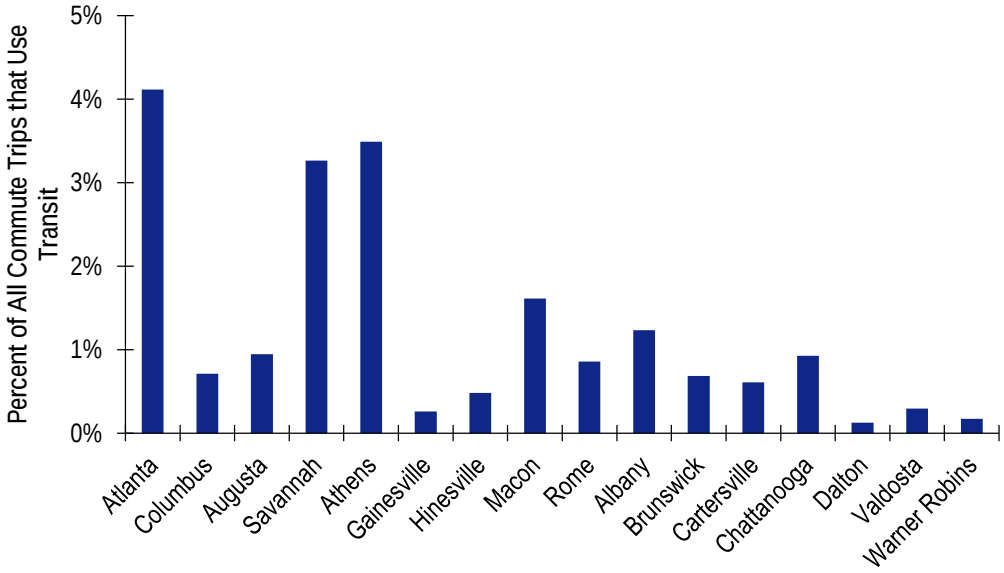
- The ridership and annual passenger miles on systems serving Georgia's large and very large urbanized areas are much lower than the national averages for similar systems.
- Funding and local commitment for implementation is needed to start new transit systems in Brunswick, Dalton, Warner Robins, and Valdosta.
- Funding is needed to maintain and improve existing transit systems to meet future demand.

2.3.2 Commuting Information

Figure 2.16 shows the commute transit mode split for urbanized areas throughout Georgia, and Figure 2.17 (page 2-33) shows percentage of trips by public transportation for metro areas by size in the U.S. Atlanta, Savannah, and Athens

have over 3 percent of commuters taking transit, while other areas in Georgia are under 2 percent. While presenting transit mode split by urbanized area size similar to the preceding comparisons is not possible based on NTD data, Atlanta's 4 percent transit mode split compares with 31 percent in New York-Newark, 17 percent in San Francisco-Oakland, and 17 percent in Washington, D.C. In the Southeast, other very large urbanized areas include Miami (3.7 percent transit mode split), Tampa-St. Petersburg (1.6 percent), Orlando (2.2 percent), Charlotte (3.1 percent), Jacksonville (1.4 percent), and Memphis (1.7 percent).

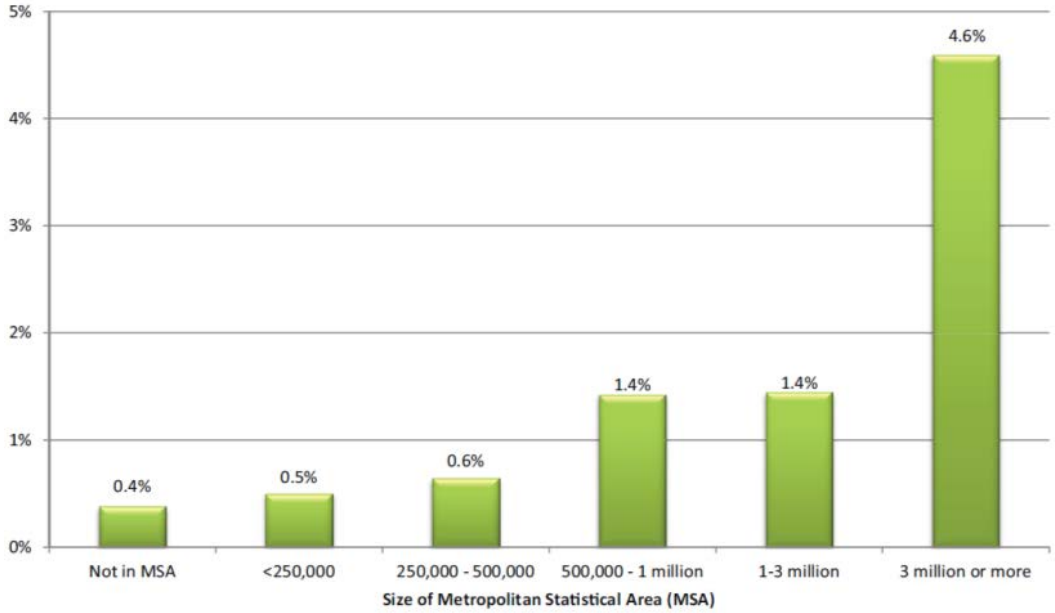
Figure 2.16 Transit Commuting Patterns by City



Source: ACS 2006-2010 five-year estimates.

Note: Transit includes bus, streetcar/trolley, heavy rail, railroad, and ferry services.

Figure 2.17 Percentage of Trips by Public Transportation in the U.S. *by Size of Metropolitan Statistical Area (MSA)*



Source: 2009 National Household Travel Survey via the 2013 Rural Transit Fact Book, July 2013, Upper Great Plains Transportation Institute.

2.3.3 Rural Public Transit System

Table 2.9 (page 2-34) shows ridership in the form of annual unlinked trips for each rural public transit system provider for 2012 as reported in the NTD. The average system ridership was 24,873 passengers. Montgomery County Transit reports the lowest number of trips (1,797), and the Southwest Georgia Regional Commission has the highest number (333,761).

Usage relative to population provides a frame of reference. Although total population is shown, the rural subset of the population is most relevant for interpreting RPT ridership. Because the ridership figures are annual, the riders/population can be understood as the number of times each person in the county took a RPT trip in a year. The number of trips ranges widely from seven trips for every 100 people up to almost seven trips per person.

Table 2.9 Rural Transit Provider Ridership
2012

Rural Transit Provider	Ridership	Population	Riders per Capita
Augusta Richmond County Commission Transit	19,120	202,587	0.09
Bacon County	8,196	11,198	0.73
Baldwin County Transit	11,079	46,367	0.24
Banks County Transit	5,096	18,316	0.28
Bartow Transit	33,456	100,661	0.33
Berrien County	7,725	19,041	0.41
Bleckley County Transit	20,530	12,913	1.59
Brooks County Transit	19,198	15,403	1.25
Burke County Transit	20,810	23,125	0.90
Catoosa County	25,723	65,046	0.40
Chattooga County Transit	12,815	25,725	0.50
Cherokee County Transit	N/A	221,315	N/A
Clay County	81,481	3,116	26.15
Columbia County Commission Transit	48,151	131,627	0.37
Cook County Transit	27,805	16,923	1.64
Coweta County	26,880	130,929	0.21
Crawford County Transit	5,803	12,600	0.46
Crisp County Transit	20,075	23,606	0.85
Dade County Transit	29,192	16,490	1.77
Dawson County Transit	9,615	22,422	0.43
Dodge County Transit	18,956	21,329	0.89
Elbert County Transit	7,198	19,684	0.37
Fannin County Transit	16,914	23,492	0.72
Forsyth County Public Transportation	20,405	187,928	0.11
Gilmer County Transit System	11,763	28,190	0.42
Glascock County Transit	8,618	3,142	2.74
Gordon County Transit	9,771	55,766	0.18
Greene County Commission Transit	22,720	16,092	1.41
Habersham County Transit	3,087	43,520	0.07
Hall Area Transit	25,066	185,416	0.14
Hancock County Transit	19,227	8,996	2.14
Haralson County Transit	12,114	28,400	0.43
Hart County Public Transit	7,873	25,518	0.31
Heard County Transit	7,595	11,633	0.65
Henry County Transit	N/A	209,053	N/A

Rural Transit Provider	Ridership	Population	Riders per Capita
Jackson County Transit	5,156	60,571	0.09
Jefferson County Transit	23,632	16,432	1.44
Jenkins County Transit	5,139	9,213	0.56
Jones County Transit	8,529	28,577	0.30
Lincoln County Transit	15,059	7,737	1.95
Lowndes County	25,136	114,552	0.22
Lumpkin County	5,399	30,611	0.18
Macon County Transit	9,137	14,263	0.64
McDuffie County Commission Transit	42,574	21,663	1.97
Montgomery County Transit	1,797	8,913	0.20
Morgan County Transit	26,132	17,881	1.46
Murray County Transportation System	27,455	39,392	0.70
Paulding County	21,286	144,800	0.15
Peach County Transit	15,331	27,622	0.56
Pickens County	16,649	29,268	0.57
Pierce County Transit	14,994	18,844	0.80
Pulaski County Transit	5,467	11,720	0.47
Putnam County Commission Transit	16,865	21,198	0.80
Quitman County Transit	16,529	2,404	6.88
Rabun County	10,779	16,297	0.66
Randolph County Transit	N/A	7,327	N/A
Talbot County Transit	34,425	6,517	5.28
Taliaferro County Board of Commissioners	6,922	1,680	4.12
Taylor County Transit	13,874	8,420	1.65
Telfair County Transit	14,029	16,349	0.86
Thomas County Transit	96,123	44,724	2.15
Tift Transit System	11,272	41,064	0.27
Towns County	7,777	10,495	0.74
Treutlen County Commission	3,798	6,769	0.56
Troup County Transit	23,410	68,468	0.34
Turner County Transit	12,874	8,410	1.53
Twiggs County Transit	11,157	8,447	1.32
Union County Transit	4,653	21,451	0.22
Walker County Transit	31,709	68,094	0.47
Ware County	15,105	35,821	0.42
Warren County Commission Transit	12,334	5,578	2.21
Wayne County Transit	38,928	30,305	1.28

Rural Transit Provider	Ridership	Population	Riders per Capita
Wheeler County Transit	5,727	7,888	0.73
Whitfield County WTS	46,104	103,359	0.45
Wilcox County Transit	10,116	9,068	1.12
Wilkes County Commission Transit	15,617	10,076	1.55
Wilkinson County Commission Transit	9,714	9,577	1.01
City of Americus	27,931	17,041	1.64
City of Cedartown	6,621	9,750	0.68
City of Unadilla	3,450	3,796	0.91
City of Vienna	18,661	4,011	4.65
Social Circle Area Transit	8,850	4,262	2.08
Coastal Regional Commission	196,294	334,714	0.59
Southwest Georgia Regional Commission	333,761	217,142	1.54
Three Rivers Regional Commission	81,241	149,886	0.54

Source: NTD 2012 Reporting Data, 2012 Census Population Estimate, Census 2010 (municipal population).

According to the Rural Transit Fact Book, the Southeast had about the lowest rural on-demand (demand-responsive) transit trips per mile (0.03) and trips per hour (0.9) of any region in the country. At a state level, Georgia's rural on-demand annual ridership of 883,000[19] is well above many states, including several that have zero ridership, and below others, including Iowa, which had 3,438,000 riders.

2.4 TRANSIT PERFORMANCE

The 2012 National Transit Database (NTD) was used as a source of performance measures for each urban fixed-route transit system.

2.4.1 Urban Public Transit System Operating Statistics

Table 2.10 (page 2-37) shows the constituent operating statistics, aggregated by urbanized area size for Georgia, the Southeast, and the U.S. The use, or demand, statistics of unlinked passenger trips and passenger miles were previously presented in the Use section. The remaining statistics are operating expenses and various indicators of transit supply.

[19] Data reported here are regular trips and do not include coordinated trips, which were included in Table 2.6.

Table 2.10 Comparison of Operating Statistics
2012

Urbanized Area Population Size	Metric (Thousands)	Georgia	Southeast	United States
Small (< 200,000)	Annual Vehicle Miles	1,023	1,417	1,581
	Annual Vehicle Revenue Miles	852	844	1,038
	Annual Vehicle Hours	83	93	104
	Annual Vehicle Revenue Hours	70	57	70
	Unlinked Passenger Trips	2,665	900	1,079
	Passenger Miles	4,829	5,011	7,077
	Operating Expenses ($)	3,893	3,020	5,034
Large (200,000-999,999)	Annual Vehicle Miles	2,010	3,728	4,685
	Annual Vehicle Revenue Miles	1,731	3,357	4,149
	Annual Vehicle Hours	165	244	315
	Annual Vehicle Revenue Hours	135	225	285
	Unlinked Passenger Trips	2,166	3,565	5,731
	Passenger Miles	8,400	17,544	28,149
	Operating Expenses ($)	8,573	17,203	25,867
Very Large (1,000,000+)	Annual Vehicle Miles	71,786	39,654	83,465
	Annual Vehicle Revenue Miles	63,424	35,315	74,301
	Annual Vehicle Hours	3,920	2,440	5,410
	Annual Vehicle Revenue Hours	3,574	2,243	4,878
	Unlinked Passenger Trips	144,090	60,179	221,375
	Passenger Miles	868,235	355,504	1,201,921
	Operating Expenses ($)	473,975	239,062	785,649

Source: NTD 2012 Reporting Data.

In summary, urban transit operating statistics performance deficiencies are as follows:

- Transit systems in Georgia serving large urbanized areas are undersized, with between one-third and two-thirds as many vehicles, miles, and hours of service, passenger miles and trips, and operating expenses as other systems in the Southeast and U.S. Even after accounting for the different populations in the large urbanized area each system serves, systems in Georgia still operate fewer miles, hours, and trips on a per capita basis than peer systems within the Southeast and U.S.

- Very large urbanized areas in Georgia are served by transit systems that operate fewer vehicles and hours, have fewer trips and passenger miles, and expend less money than other systems in the U.S.

2.4.2 Urban Public Transit System Performance Measures

Based on the above understanding of the transit service supply, demand, and expense statistics, the cost-efficiency, cost-effectiveness, and productivity of the transit systems can be analyzed. Table 2.11 summarizes the performance measures.

Table 2.11 Performance Measure Categories

Service Performance Category	NTD Performance Measure
Cost-Efficiency	Operating Expense per Vehicle Revenue Mile (VRM) Operating Expense per Vehicle Revenue Hour (VRH)
Cost-Effectiveness	Operating Expense per Passenger Mile Operating Expense per Unlinked Passenger Trip
Productivity	Unlinked Passenger Trips per Vehicle Revenue Mile (VRM) Unlinked Passenger Trips per Vehicle Revenue Hour (VRH)

The effectiveness of transit service can be measured by the ridership per distance or time of service offered. Cost-efficiency relates the operating expenses to the service provided (vehicle revenue miles or hours). Cost-effectiveness compares the operating expenses to the service consumed (either passenger mile or unlinked trip).

The standard NTD performance measures are as follows:

- **Operating Expense per Vehicle Revenue Mile (VRM).** The cost to operate a transit system is recorded and divided by every mile that a vehicle travels while in revenue service (Revenue/VRM). Operating expenses include fuel, vehicle maintenance, staff salary, facility cost/maintenance, and other expenses eligible for Federal funding. This analysis provides a per-mile cost for a transit system to operate allowing for comparison of systems that vary in size, operating hours, and other similar factors.
- **Operating Expense per Vehicle Revenue Hour (VRH).** Similar in function to the VRM calculation, this performance measure analyzes the cost to operate each transit system per hour for every hour that the system is providing revenue service.
- **Operating Expense per Passenger Mile.** This measure evaluates how much operational cost a system incurs per mile that a passenger travels. This metric is utilized to evaluate the cost-effectiveness of the system.
- **Operating Expense per Unlinked Passenger Trip.** Unlinked trips are defined as the total number of passengers boarding a bus, as mandated by government

and industry standard data collection authorities. Operating expense per unlinked passenger trip divides the total cost to operate the system by the total number of unlinked trips in order to determine the cost per trip. This metric also is used to evaluate a system's cost-effectiveness.

- **Unlinked Passenger Trips per Vehicle Revenue Mile (VRM).** This metric divides the total number of unlinked passenger trips (total boardings) by the total miles traveled during revenue service or VRMs. This analysis determines how many passengers, on average, were on each bus for every revenue mile traveled.
- **Unlinked Passenger Trips per Vehicle Revenue Hour (VRH).** Similar in function to the unlinked passenger trips per VRM, this performance measure evaluates the average number of passengers utilizing a transit system for every hour of revenue service provided. This measure is used to gauge system efficiency.

Table 2.12 compares Georgia's transit systems with those serving peer urbanized areas in the Southeast and in the U.S.

Table 2.12 Comparison of Performance of Urban Systems

		Cost-Efficiency		Cost-Effectiveness		Productivity	
		Operating Expense per		Operating Expense per		Unlinked Passenger Trips per	
	Geography	Vehicle Revenue Mile (Dollars)	Vehicle Revenue Hour (Dollars)	Passenger Mile (Dollars)	Unlinked Passenger Trip (Dollars)	Vehicle Revenue Mile	Vehicle Revenue Hour
Small	Georgia	$4.50	$58.66	$0.96	$12.19	2.01	22.70
	Southeast	$3.75	$53.51	$1.09	$9.35	0.81	10.59
	United States	$4.87	$68.53	$1.52	$8.24	0.93	12.51
Large	Georgia	$4.94	$63.51	$1.47	$4.54	1.12	14.43
	Southeast	$4.82	$70.99	$1.57	$6.11	0.95	13.71
	United States	$5.73	$82.49	$1.29	$5.88	1.17	16.49
Very Large	Georgia	$7.47	$132.60	$0.55	$3.29	2.27	40.31
	Southeast	$6.31	$100.09	$0.80	$4.49	1.47	23.51
	United States	$8.58	$124.56	$0.89	$4.66	1.93	28.36

Source: NTD 2012 Reporting Data.

Note: All modes are included in this table to provide a more complete service picture, in contrast to the individual system performance table in the Existing Conditions Report, which only included bus mode.

In summary, urban transit performance measures deficiencies are as follows:

- Operating transit systems in very large urban areas in Georgia tend to cost more per vehicle revenue hour than other systems in the Southeast and in the U.S. Costs per hour tend to be dominated by labor cost.

- Systems serving small urban areas in Georgia have mixed cost-effectiveness. The cost per trip is highest, but the cost to carry passenger miles is the lowest among the Southeast and U.S.

2.4.3 Rural Public Transit System Operating Statistics

According to the *Rural Transit Fact Book* and 2011 NTD data, Georgia had 16,305,000 annual vehicle miles and 986,000 annual vehicle hours of rural on-demand transit. Georgia's annual vehicle miles increased from 13,000,000 in 2008. In comparison, North Carolina provided the most demand-responsive rural transit service of any state, with more than twice as many vehicle revenue miles, annual vehicle miles, and annual vehicle hours than Georgia in 2011.

The Rural Transit Fact Book also presents the cost statistics of capital and operating funding by source. Table 2.13 presents Georgia's financial statistics[20] and compares them with states with the maximum funding of each category. The table shows that Georgia has substantially less rural transit funding than some states. However, several states have lower and even zero funding in each category.

Table 2.13 Rural Transit State Financial Statistics

	Capital Funding (Thousands)			Operating Funding (Thousands)		
	Local	State	Federal	Local	State	Federal
Georgia	$10	$14	$9,273	$9,766	$97	$9,128
Maximum	$4,837	$4,813	$12,638	$34,080	$27,066	$21,944
Maximum State	Colorado	California	Michigan	Washington	Michigan	Texas

Source: Rural NTD, 2011.

The 2012 Reporting Year Coordinating Rural and Human Service Transportation in Georgia Final Report by the Governor's Development Council (GDC) states, "RHST populations are expected to grow by 64 percent by 2030 compared to 24 percent growth in the general population. To meet this increase in demand RHST funding would have to increase from $136.2 million in FY 2011 to $222.9 million by 2030."

[20] In comparison to the roughly $9.3 million in Georgia rural transit capital funding of local, state, and Federal sources combined in Table 2.11 from the 2011 NTD, the 2014-2017 STIP lists the equivalent of about $7.6 million annual funds (of all sources) for Formula Grants for Rural Area Program (5311) – Capital. This $7.6 million is contained within the $121 million in annual transit funding at the medium funding level for the tradeoff analysis.

In summary, rural transit operating statistics deficiencies are as follows:

- Additional operating funds are needed for RHST to meet the projected increase in demand; and
- Additional capital funds are needed to purchase new vehicles as the fleet continues to age.

2.4.4 Rural Public Transit System Performance Measures

According to the 2013 *Rural Transit Fact Book* based on 2011 Rural NTD data, the Southeast had the highest operating expense per trip ($32.51 compared to a low of $9.54 per trip in Region VII) and yet among the best operating expense per mile ($1.70 per mile compared to a high of $5.48 per mile for Region IX). This indicates a long average trip length.

At a state level, Georgia had the lowest trips per vehicle (1.2 trips per vehicle compared to a high of 39.4 trips per vehicle in Vermont). Georgia's 22.9 miles per vehicle and 1.4 hours per vehicle were more in line with other states.

In summary, rural transit performance measures deficiencies are as follows:

- Improve trips per vehicle, which will improve operating expense per trip.

2.5 SUMMARY OF MAJOR ISSUES/ CURRENT DEFICIENCIES

Urban transit facilities:

- The Brunswick, Cartersville, Dalton, Warner Robins, and Valdosta urbanized areas lack fixed-route transit service, as does Georgia's portion of the Chattanooga urbanized area;
- Of those urbanized areas with fixed-route transit service, about 47 percent of the geographic area of their urbanized areas is not served by transit;
- Of the transit-supportive portions of urbanized areas with fixed-route transit, 10 percent is not served by transit;
- Multiple transit-supportive clusters in the Atlanta urbanized area are not served by transit;
- There appear to be clusters of unserved transit-supportive areas, combined with future population projections, which could warrant implementation of urban fixed-route transit service in Valdosta, Brunswick, Dalton, and Warner Robins; and
- The low density of much of the area served by transit could inhibit the performance and effectiveness of Georgia's transit systems.

Rural transit facilities:

- Thirty-eight counties do not have access to public transportation, particularly in Southern Georgia, Heart of Georgia, River Valley, Central Savannah River Area, Northeast Georgia, and Middle Georgia RC.
- About 764,784 persons remain unserved by GDOT RPT. This is 24 percent of the rural population outside of urban counties.

Park-and-ride lot facilities:

A few locations currently without a park-and-ride lot having the potential for a rural lot are:

- I-85 and I-185 between Atlanta and Columbus, particularly around LaGrange;
- I-75 between Atlanta and Macon;
- I-95 near Brunswick;
- I-16 west of Augusta; and
- I-85 south of the South Carolina border.

Urban transit capacity:

- Transit systems in Georgia serving large metropolitan areas have many fewer vehicles (just over 40 vehicles) than systems serving other large metropolitan areas in the Southeast (about 100 vehicles) and U.S. (140 vehicles).
- Transit systems in Georgia serving small and very large metropolitan areas have older vehicles than those serving similarly sized metro areas in the Southeast.

Urban transit use:

- The ridership and annual passenger miles on systems serving Georgia's large and very large urbanized areas lag behind the national averages for similar systems.

Urban transit operating statistics performance:

- Transit systems in Georgia serving large urbanized areas are undersized, with between one-third and two-thirds as many vehicles, miles and hours of service, passenger miles and trips, and operating expenses as other systems in the Southeast and U.S. Even after accounting for the different populations in the large urbanized area each system serves, systems in Georgia still operate fewer miles, hours, and trips on a per capita basis than peer systems within the Southeast and U.S.
- Very large urbanized areas in Georgia are served by transit systems that operate fewer vehicles and hours and get fewer trips and passenger miles but at lower expense than other systems in the U.S.

Urban transit performance measures:

- Operating transit systems in very large urban areas in Georgia tends to cost more per vehicle revenue hour than it does in the Southeast and in the U.S.
- Systems serving small, urban areas in Georgia have mixed cost-effectiveness. The cost per trip is highest, but the cost to carry passenger miles is the lowest among the Southeast and U.S.

Rural transit operating statistics:

- Additional operating funds for RHST are needed to meet the projected increase in demand.
- Additional capital funds are needed to purchase new vehicles as the fleet continues to age.

Rural transit performance measures:

- Improve trips per vehicle, which will improve operating expense per trip.

2.6 COMMITTED AND PLANNED PROJECTS

Various MPO Long-Range Transportation Plans (LRTP) and regional Transit Development Plans (TDP) have proposed projects to address deficiencies and improve the State's transit systems. See Section 2.1.4 (page 2-20) for a discussion of the assumptions applied in the tradeoff analysis regarding future transit service.

Planned improvements included in the various MPO plans for the State's urban systems commonly include the following:

- **Revise Existing Routes.** Manage the existing fixed-route transit system by revising routes by rerouting, extending, eliminating, consolidating, adjusting run times, etc.
- **Improve Headways.** Improve service by adding vehicles to increase the service frequency of existing routes, either in the peak or off-peak.
- **Extend Service Span.** Extend hours of operation on weekdays, Saturdays, and/or Sundays.
- **Add Service Day.** Add Saturday and/or Sunday service where none previously existed.
- **Overhaul System Design.** Overhaul the system design by adopting an alternate operational philosophy. For example, switching from hub and spoke to trunk and feeder.
- **Existing System Capital.** Increase capital expenses dedicated to maintaining the existing system, such as bus replacement or facility improvements.
- **New Service.** Add new local routes, regional/commuter/express/ intercounty/intercity service, and/or demand-responsive service.

- **New Facility.** Add new facilities such as multimodal/transfer facilities or park-and-ride lots.

Based on the combination of these individual strategies, the transit improvement approach of each system can be categorized as baseline operations and maintenance, existing system management, desired or tentative exploration of service expansion, aggressive expansion, or overhaul.

Based on recent TDPs and LRTPs, the planned improvements for each urban fixed-route system are summarized below.

Small Urbanized Areas

- **Albany.** *Existing system management and desired expansion*. Extend hours and improve headways on existing fixed-routes to 11 p.m.; add four new local routes; add two intercounty bus routes; explore intercity rail between Albany and Macon; and explore a new multimodal center.
- **Athens.** *Detailed maintenance and operations and existing system management*. Make various service improvements (including adding Saturday service on three routes; extending weekday service to midnight; extending Saturday service from 7:00 a.m. to 11:00 p.m.; improving weekday peak headways to 30 minutes; and improving off-peak evening and Saturday headways to 60 minutes); consolidate two routes; eliminate the practice of utilizing large loops in favor of two-way routing on five routes; revise two other routes; analyze schedules for improvement; eliminate "The Link" demand-responsive van service; and explore bus priority treatments where practical. While "The Bus" fixed-route transit service and "The Lift" paratransit are still available, the discontinuation of "The Link" due to low ridership and to reduce operating costs means general public demand-responsive van service is no longer available in rural areas of western and northeastern Athens-Clark County.
- **Gainesville.** *Desired expansion*. Expand from three to seven fixed routes with revised routing; add a demand-responsive flex route, and express bus service to Atlanta in the future; relocate new transfer center; explore future multimodal center; and explore ITS strategies.
- **Liberty.** *Facility exploration*. Explore a possible transfer center, park-and-ride lot, and Amtrak station.
- **Macon.** *Baseline maintenance and operations and desired expansion*. Add several new routes, replace buses, and invest in capital improvements at existing operating facility.
- **Rome.** *Baseline maintenance and operations*. Replace buses and invest in capital improvements at existing operating facility.

Large Urbanized Areas

- **Augusta.** *Overhaul*. Overhaul the operational philosophy by changing the system design from hub and spoke to trunk and feeder; eliminate several

routes; revise several routes; add several routes; add a park-and-ride lot; and improve headways.

- **Savannah.** *Existing system management and desired expansion*. Manage existing operations by adjusting run times; extend weekend service hours; add four new fixed routes; add "Flex Zones" curbside van service; and improve peak headway.
- **Columbus.** *Desired expansion*. Study new park-and-ride lots, express bus service, feeder service, demand responsive service, new transfer center, pedestrian environment improvements; connect with Fort Benning and the Atlanta airport; make service span and headway improvements; establish service standards; conduct comprehensive operations analyses; improve downtown bistate circulation; find funding; and work on governance.

Very Large Urbanized Areas

Atlanta. *Desired expansion***.** A variety of studies have suggested desired expansions and improvements to Atlanta's transit systems.

3.0 Rail

3.1 FREIGHT RAIL INVENTORY AND CAPACITY

Georgia is served by two large Class I freight railroads – Norfolk Southern (NS) and CSX Transportation (CSXT), and 23 Class III and switching railroads.

The capacity of a rail system depends in large part on the type and level of service that the system is expected to provide. Estimating the capacity and potential of the rail system in Georgia is a complex process due to the multifaceted and changing roles that the system will be called upon to play in the future. The nominal freight capacity of a network may be significantly higher than its practical capacity because, in order for the network to realize its nominal capacity, it would have to provide a level of service that would be unacceptable to many of its customers. As Georgia's railroads adapt to changing markets, the maximum physical capacity of the network will become less critical compared to the level of service that the network can provide to its current and future customer base. The following subsections outline factors that impact network capacity and level of service.

3.1.1 286,000-Pound Railcar Capacity

One of the principal strategies that is being undertaken by short-line railroads in Georgia to accommodate projected cargo growth is the upgrading of key rail corridors to handle heavier loads in accordance with current industry standards. In the mid-1990s, the standard maximum railcar weight increased from 263,000 to 286,000 pounds. Class I railroads quickly moved to handle the heavier cars on their main lines, but for short lines, the task has yet to be completed. While many short lines have long-term plans to accommodate the heavier cars, the cost of such improvements can exceed the financial capacities of these firms to make the capital investments on their own. In Georgia, the large number of rivers and small watercourses that require numerous rail bridges pose a particular financial challenge.

3.1.2 Vertical Clearance Constraints

The growth of tri-level auto carriers represents a technological change that is likely to produce a growing deficiency in the existing system due to vertical clearance limitations. Economic projections show that shipments of transportation equipment, including auto shipments, by rail are expected to increase at a rate of 2.1 percent per year through 2040. Furthermore, auto shipments are considered a key strategic industry for the State of Georgia given its role as an auto manufacturer. Thus, a lack of adequate vertical clearance for tri-level cars is expected to present a growing challenge.

Significant portions of the Class I network have restricted clearances that do not allow for the use of double-stack rail, including CSXT Etowah Subdivision and CSXT Gainesville-Midland Subdivision. These routes can accommodate single-stack containers (COFC) or trailer on flat car (TOFC), yet due to unfavorable economies the use of these arrangements in the total intermodal market continues to diminish.[21] This is not an issue that impacts the primary intermodal routes that currently are used for transporting cargo from the Port of Savannah to Atlanta, along the I-95 corridor, and in and out of the Atlanta region. Rather, clearance deficiencies could impact the system by limiting the potential expansion of double-stack service to areas of the State, which currently do not have economically efficient access. It also will limit the system's redundancy and ability to handle unexpected outages or surges in demand. For example, the Georgia Central Railroad, which provides a potential alternative reliever route between Savannah and Macon, is not double-stack capable.

3.1.3 Main-Line Track Capacity

The subdivisions that are likely to become especially constrained include the NS Atlanta North, Atlanta South, and Brunswick subdivisions; and the CSXT Etowah, Fitzgerald, and Manchester subdivisions. This projection is made due to the level of congestion on these subdivisions under current conditions, and thus would limit the ability to absorb projected traffic growth.

3.1.4 Traffic Control Systems

As discussed in the existing conditions report, the Federal mandate to install Positive Train Control (PTC) by the end of 2015 poses a substantial challenge to Georgia's rail system. This mandate largely affects Georgia's mainlines which are operated by CSX and NS, with its short lines generally unaffected. However, in the future the lack of PTC could pose as a potential barrier to entry for short lines to handle HAZMAT or passenger traffic.

3.1.5 Land Use Conflict and Encroachment

The noise and vibration associated with freight rail produces an area of influence far in excess of its physical footprint. As more land in Georgia becomes urbanized and rail facilities expand their reach, these forces are brought into closer contact with the potential for conflict. An early example of this conflict in Georgia occurred at construction of NS's Whitaker Intermodal Terminal in Austell that was nearly doomed by strong community opposition to the associated noise and truck traffic before NS agreed to significant mitigation activities.[22] As a traditionally

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[21] "Class I Railroad Statistics," https://www.aar.org/StatisticsAndPublications/Documents/AAR-Stats-2013-07-09.pdf.

[22] Norfolk Southern agreed to enhance buffers between the facility and residential areas, reconfigure lighting for the facility, and perform additional noise monitoring. http://www.envisionfreight.com/issues/pdf/Joliet_Austell.pdf.

rural State, Georgia will continue to face instances where railroad-related impacts lead to the potential for community opposition. Fortunately, Georgia's past experience in this area provides a roadmap for future mitigation activities to prevent these conflicts from inhibiting the growth of freight rail.

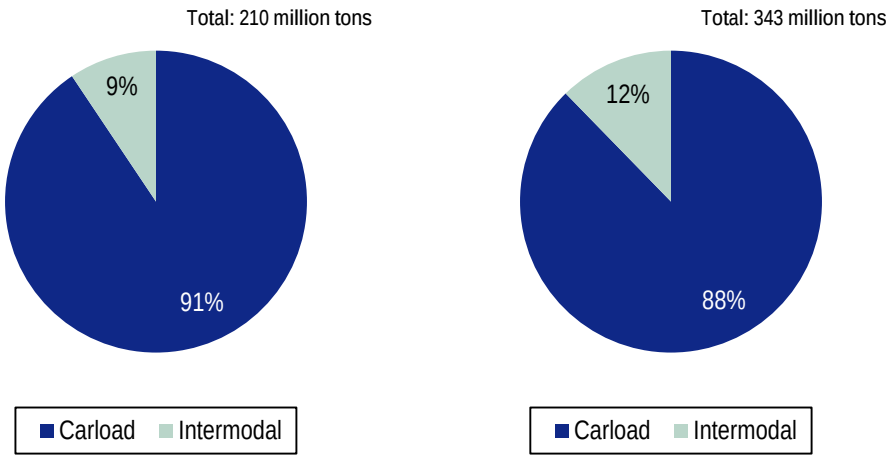
3.2 USE

In 2007, Georgia's freight railroads moved 210 million tons of freight valued at $213 billion. Rail is the second most heavily used mode in the State after trucking. One-quarter of freight tonnage and 10 percent of freight value was transported by rail in 2007. The difference in the amount of tonnage versus value carried by rail is due to the fact that rail is most attractive for the transport of high weight, low value commodities such as coal over long distances. By 2040, it is projected that the railroads will carry more than 343 million tons of freight annually, valued at $468 billion, an increase of 64 percent by tonnage and 120 percent by value, but still accounting for about one-quarter of all freight tonnage.

3.2.1 Demand by Rail Equipment Type

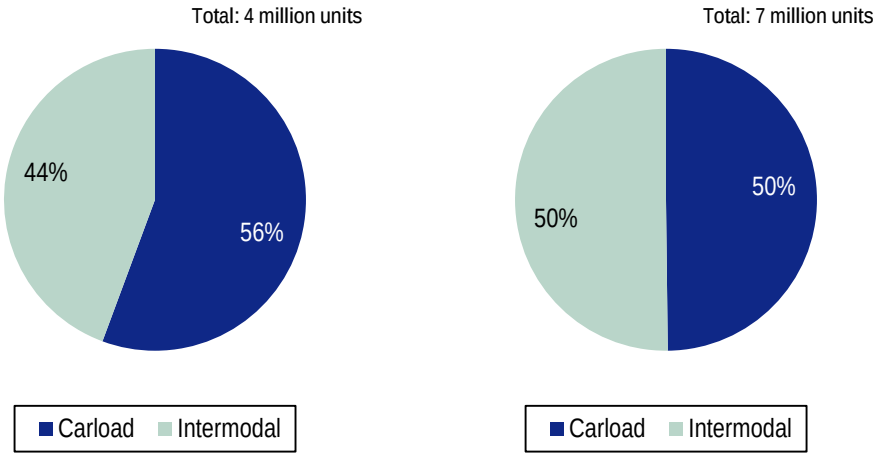
In 2007, 91 percent of tonnage was carried in railcars and 9 percent in intermodal containers, as shown in Figures 3.1 (page 3-4) and 3.2 (page 3-4). However, intermodal containers (which include both containers and truck trailers moved on flat cars) accounted for 44 percent of all rail equipment units moved in the State. The disparity between the share of intermodal tonnage and intermodal units is due to the fact that intermodal shipments tend to be higher-value and lower-weight freight (such as consumer goods that require more packaging and have a low weight-to-volume ratio), while carload shipments tend to be heavier and lower value freight (such as coal and nonmetallic minerals that require little or no packaging and have a high weight-to-volume ratio). Over the next 33 years the share of intermodal shipments is expected to increase in weight and rail equipment units. Figures 3.1 (page 3-4) and 3.2 (page 3-4) illustrate the expected intermodal and carload shares for 2040. The intermodal share is expected to grow to 12 percent of the rail tonnage and 50 percent of the rail containers.

Figure 3.1 Intermodal/Carload Rail Freight Flows by Weight
2007 to 2040



Source: IHS, Inc., 2007 TRANSEARCH data.

Figure 3.2 Intermodal/Carload Rail Freight Flows by Units
2007 to 2040



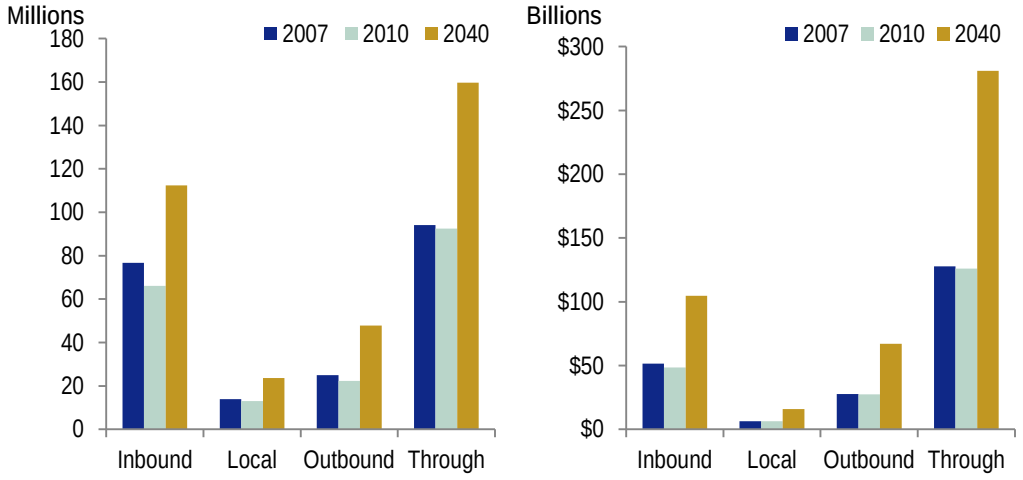
Source: 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

3.2.2 Demand by Direction

Figure 3.3 (page 3-5) shows the tonnage and value of inbound, outbound, intrastate, and through freight for 2007, 2010, and 2040. Through movements are dominant and projected to remain dominant carrying 160 million tons and $281 billion annually by 2040. Inbound movements are the second largest type of rail flow accounting for 77 million tons in 2007 and are projected to grow to 112 million tons by 2040. Outbound shipments accounted for 25 million tons in 2007 and are expected to grow to 48 million tons by 2040. Intrastate freight movements are

significantly less than other directional flows; intrastate shipments represented 14 million tons in 2007 and by 2040 these are projected to grow to 24 million tons.

Figure 3.3 Georgia Rail Freight Flows by Direction
2007 to 2040, Weight in Tons (Left) and Value (Right)



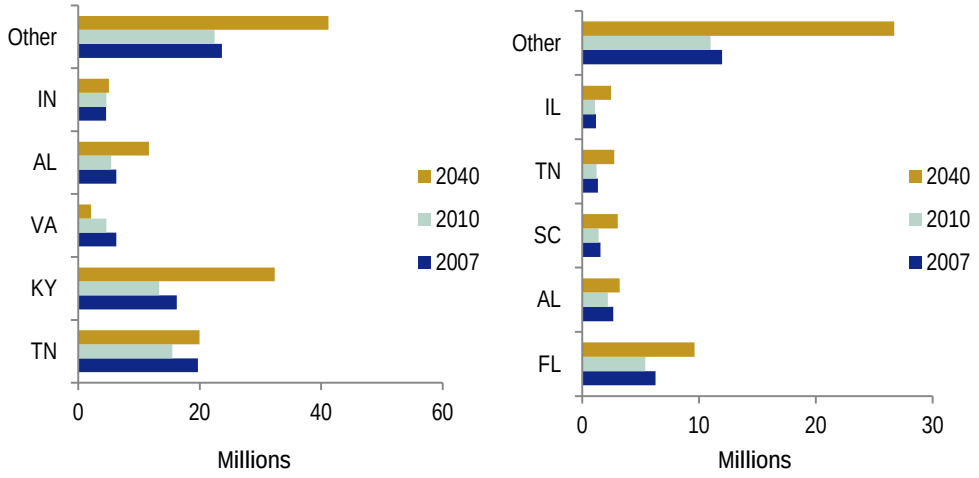
Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

3.2.3 Trading Partners

The "trading partners" (external to Georgia) consist of the states in the rest of the U.S., and the neighboring countries of Canada and Mexico. The top trading partners for freight movements into and out of the region by weight in 2007 and 2040 are shown in Figure 3.4 (page 3-6). The top five trading partners by total inbound and outbound tonnage are Tennessee, Kentucky, Alabama, Florida, and Virginia. These states account for 61 percent (62 million tons) of total inbound and outbound tonnage in 2007, and in 2040 these states will represent 56 percent (89 million tons) of total inbound and outbound flows.

Most of Georgia's rail trade with Tennessee, Kentucky, and Virginia is inbound coal. Over the next three decades, these shipments are expected to flatten out or decline. Alabama's rail shipments accounted for 9 percent of the inbound and outbound rail tonnage in 2007, and this share is expected to remain constant over the next 33 years. The top commodity groups moving to and from Alabama were clay, concrete, glass, and stone products; waste and scrap; coal; chemical and allied products; and nonmetallic ores and minerals, together accounting for 66 percent of total trade by weight in 2007 and expected to decrease to 58 percent by 2040 (driven by the decline of waste and scrap, and coal). In 2007, 78 percent of the trade between Georgia and Florida was outbound (Georgia to Florida), and this share is expected to decrease to 70 percent by 2040. The commodities shipped include nonmetallic ores and minerals, freight all kinds (miscellaneous mixed shipments), pulp, paper, and allied products, among others.

Figure 3.4 Top 5 Rail Trading Partners by Weight
2007 to 2040, Inbound Trade (Left) and Outbound Trade (Right)



Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

3.2.3 Effects of Traffic Growth

Driven by Georgia's expanding population and industrial base, key rail commodities are expected to grow significantly. Within the 2011 Freight and Logistics Plan, alternative growth scenarios were examined for rail commodities with specific case study profiles of agriculture and food processing, warehousing and distribution of consumer goods, and lumber and wood products. The plan examined three growth scenarios – low, medium, and high, with the assumption that the medium growth scenario was the most likely. It assumed that Georgia's Gross State Product (GSP) would grow by 150 percent between 2010 and 2050, or about 2.3 percent annually. Population over the same period was expected to rise by 76 percent to just over 17 million. The growth in consumer goods is most closely correlated with population growth, whereas the growth for Georgia's export products is impacted by demand from outside of the State, both domestically and internationally.

The growth in consumer goods will be handled primarily, though not exclusively, by Georgia's intermodal rail system which utilizes a modest fraction of total track mileage.

While intermodal providers can rely on a background of population growth to fuel favorable long-term projections, the forecast for individual short lines is more mixed, as many lines rely on a few specific shippers handling particular commodities. While the freight forecast shows that the vast majority of commodity types that are typically handled by Georgia's Class I and short-line network rail will see robust growth through 2040, for geographically confined short-line railroads, local growth patterns are far more significant than statewide projections.

In addition, some commodity types that have historically supported the Georgia rail system are projected to see flat or even negative growth. Lumber, for example, will see only modest growth of 0.2 percent per year, owing to constraints in the amount of land that can be dedicated to lumber production. Coal tonnage is slated to decrease at a rate of -1.6 percent per year through 2040, with this falloff particularly impacting the State's trade with Tennessee, Kentucky, and Virginia. The decrease in coal tonnage on the rail system is a national phenomenon as coal is increasingly substituted by natural gas due to cost and environmental considerations. This forecast decline in coal shipments is expected to free up substantial capacity on the rail network for alternative cargo types. Still, in Georgia coal constitutes a relatively modest share of total traffic and thus the decline will be less significant than is the case for some other states.

A challenge for Georgia's rail system will be to substitute the loss of steady coal shipments with discretionary cargoes that are geographically and modally competitive. Commodity types that are considered discretionary cargo for rail service such as furniture and textiles will see higher rates of growth. For example, food and kindred products will grow at an annual rate of 1.8 percent while furniture shipments will see a growth of 2.5 percent. The high growth rates in these commodities are closely tied with projections of analogous population and GDP growth.

Carload versus Intermodal Traffic

Intermodal traffic currently is handled primarily by the Class I system. As consumer goods are expected to grow at a faster clip than traditional carload traffic, there is a potential need for other railroads to improve their capability to handle intermodal traffic. TRANSEARCH projections show that intermodal traffic is expected to handle 12 percent of total tonnage in 2040, up from 9 percent in 2007, with a greater comparative increase in total equipment moves. Much of the network that currently handles only carload traffic is constrained by FRA speed restrictions that are not problematic for bulk cargoes such as coal but are too slow to handle truck competitive intermodal cargo. Speed restrictions are not only a constraint of the short-line system but also impact certain parts of the Class I network, as the Georgia rail network consists primarily of single-track main lines.

Impact of Shifts in Commodity Mix

Commodity types with growth rates of less than one percent per annum are less likely to serve as the impetus for new infrastructure improvements. On the main line network, the continued substantial growth in intermodal traffic will instigate investment in improved infrastructure. One unique aspect of the Georgia intermodal system is the success of short-haul intermodal service connecting the Port of Savannah with Atlanta, despite the fact that the rail distance is less than the typical 500- to 600-mile minimum distance for intermodal rail to be viable. With continued elevated energy prices, and increasing costs to ship by highway

(as a result of changes in hours of service standards, increased fuel costs, etc.), the breakeven distance for rail service is expected to fall.

Primary Rail Network

One of the principal challenges facing the State of Georgia is the centrality of Atlanta. Bottlenecks that form in Atlanta can have ramifications around the State. Furthermore, Atlanta is expected to be the most directly impacted region by capacity constraints from the statewide growth in rail traffic. Georgia's Coastal Corridor has historically experienced less significant congestion; however, the rapid growth in containerized trade at the Port of Savannah has impacted that route as well.

The most significant capacity constraints are likely to be in the immediate vicinity of the port area such as the Savannah Port Terminal Railroad. The growth in the Port of Jacksonville also presents a challenge for the Georgia rail network as the linkage between Florida and Georgia is the most intensively used route in the State outside of the Atlanta area. With major port expansions underway at Jacksonville, Tampa, and Miami, the Georgia intermodal rail network is likely to be impacted by additional rail traffic from Florida. The traffic forecast estimates that Georgia through traffic will represent the largest contributor to the State's total tonnage increase between 2010 and 2040. Of particular concern are the following rail lines and junctions:

- Howell Junction in Northwest Atlanta is considered to be one of the most significant bottlenecks in the State. It is the intersection of five rail lines owned by CSXT and NS, all of which are at the same grade.
- Two rail lines that are expected to become significantly capacity constrained in the near future are the direct rail link between Atlanta and Macon, and CSXT's rail line connecting Jacksonville with Waycross, Georgia, the latter owing in part to increased port-associated traffic.

Absent substantial capital investment, most of the current rail bottlenecks today will become significantly exacerbated, if the projected rail volumes are realized. More than 95 percent of the mainline trackage in Georgia is single track with occasional passing tracks. Passing sidings can be added and/or lengthened in order to improve the capacity of single-track rail lines. However, double tracking is, in many cases, the only way for railroads to substantially boost their capacity and operating speed. Obstacles to double tracking involve not only the associated cost but also difficulty in securing additional right-of-way, particularly since the most heavily trafficked corridors often pass through highly populated areas, which makes securing additional land very difficult.

Another key constraint that will potentially inhibit future intermodal rail growth in Georgia is a lack of capacity at existing intermodal terminals. The Cordele inland port is the most recently added terminal and connects the Port of Savannah by the Heart of Georgia and Georgia Central railroads. The locations of potential

new terminals are likely to be greenfield sites in the vicinity of Atlanta and Savannah that will require years of environmental planning prior to construction.

3.3 ISSUES AND DEFICIENCIES

The following deficiencies will need to be addressed to meet anticipated increases in overall rail demand between now and 2040, and the expected transition to more intermodal service and less carload service.

- Short lines need to upgrade their track infrastructure to the current industry standard of 286,000 pound railcar.
- In order to accommodate the anticipated increase in intermodal service, short lines need to increase vertical clearance to handle double-stack railcars and tri-level auto carriers.
- Several major Class I subdivisions will need to be double tracked, including NS' Atlanta North, Atlanta South, and Brunswick subdivisions, and CSXT's Etowah, Fitzgerald, and Manchester subdivisions.

Major bottlenecks will need to be eliminated, including Howell Junction in Northwest Atlanta, the rail link between Atlanta and Macon, CSXT's rail line connecting Jacksonville, Florida, with Waycross, and rail connections in and around the Port of Savannah (the latter are addressed in more detail in the Marine Port section).

3.4 PLANS AND PROJECTS

Since the freight railroad system is privately owned, most projects are funded by private capital. Railroads tend to have relatively short planning horizons and specific project plans are often closely held until the railroad is ready to move forward. The only exception to this pattern has been in cases where significant and broadly shared public benefit can be realized through public investment such as unique economic development potential or the possibility of dual use freight and passenger rail facilities. In recent years the Federal Transportation Investment Generating Economic Recovery (TIGER) grant program has offered a new stream of Federal funding for both short line and Class I railroads. However, while freight rail has garnered a significant portion of the funding provided thus far, budget levels have been small.

In recent years the ability of the Class I railroads to raise private capital and finance needed improvements has been greatly strengthened. However, many short lines lack access to capital markets and have consistently identified the lack of a state-supported program for the short line system as a key deficiency of GDOT's current role in freight rail planning. While several states have revolving loan and grant programs to sustain short line railroads, Georgia's program remains ad hoc and has been primarily focused on the state-owned properties. This complicates the

ability of short lines to make the necessary capital investments that ensure the long-term viability of a line and to identify specific projects.

NS has recently started the Crescent Corridor to provide better intermodal rail services between the northeast, the Mid-Atlantic, and the southeast. The Crescent Corridor will increase intermodal rail travel speeds for the rail line running between Charlotte, Atlanta, and Birmingham as part of Phase II of this program. Phase III will include enhancements to the Austell intermodal rail yard. Developing the Crescent Corridor is considered as one of the freight improvement project recommendations in the Freight and Logistics Action Plan.

Determining other specific projects out to the 2040 horizon year is outside of the normal planning process for railroads and therefore individual projects over this period are not specified as part of this Plan. However, existing literature developed by the railroads provide a sense of the magnitude of the infrastructure issues facing the railroads over the long term.

In 2007, the American Association of Railroads completed the *National Rail Freight Infrastructure Capacity and Investment Study*. This study estimated that an investment of $148 billion would be needed for freight rail infrastructure expansion between 2007 and 2035. An estimate of the costs to make these long-range improvements in Georgia was developed by adjusting the AAR report timeline to the 2012 to 2050 timeline of the Freight and Logistics Action Plan and then factoring down the costs based on the amount of rail track in Georgia relative to the rest of the U.S. Putting a reasonable lower and upper bound on this process gives us an estimate of between $4 and $6 billion of rail capacity enhancements needed in Georgia between 2012 and 2050 to accommodate likely future demand in the State.

These costs include the following improvements in the system:

- Line-haul expansion;
- Major bridges, tunnels, and clearance;
- Branch line upgrades;
- Intermodal terminal expansion;
- Carload terminal expansion; and
- Service facilities.

The AAR report estimates that 70 percent of the total national costs are for line-haul expansion and 14 percent of the national costs are for major bridges, tunnels, and clearances. These two categories are likely the largest categories of freight rail improvements needed in Georgia over the long term as well.

3.5 PASSENGER RAIL

3.5.1 Current Service Capacity and Use

Passenger rail in Georgia currently consists of four Amtrak long-distance intercity routes. Forecasts were developed for the passenger rail ridership traveling through or with a trip end in Georgia on the four Amtrak routes:

- *Crescent* – from New York through Atlanta to New Orleans;
- *Palmetto* – from New York terminating in Savannah;
- *Silver Service* (*Meteor* and *Star*) – from New York through Savannah terminating in Miami; and
- *Auto Train* – from Lorton, Virginia to Sanford, Florida through Savannah without stopping.

Forecast Assumptions

A base case forecast was created with the assumption that existing service frequencies, travel times, reliability, and other service parameters would remain constant through the 2040 planning horizon. As no route-specific long-term ridership forecasts were available for Amtrak's service through Georgia, we utilized the national system growth rate of 2 percent annually that is incorporated into Amtrak's most recent fleet strategy plan.[23] This annual growth projection is a conservative assumption, considering that overall Amtrak ridership grew by 55 percent between 1997 and 2012, an annual compound growth rate of almost 3 percent.[24] At the 2 percent compound annual growth rate (CAGR), ridership in 2040 will be 74 percent higher than in 2012, the most recent year for which ridership data was provided.

The forecasts were calculated assuming that growth would not be capacity constrained. This allowed us to evaluate how well existing and planned services could accommodate future demand. However, under real world conditions ridership will be influenced by planned infrastructure improvements along the routes north of Georgia, service extensions and additional frequencies, and competition for capacity with freight services. It was assumed that at least the current service performance (on-time performance, on-board services, etc.) will be maintained in the future.

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[23] Amtrak Fleet Strategy v3.1, p. 32. http://www.amtrak.com/ccurl/36/921/2012-Amtrak-Fleet-Strategy-v3.1-%2003-29-12.pdf Accessed March 3, 2014.

[24] *A New Alignment: Strengthening America's Commitment to Passenger Rail U.S. Passenger Rail Ridership*, Brookings Institute. 2013.

Travel Time

Track improvements planned in Virginia and North Carolina along the Southeast High-Speed Rail Corridor (SEHSR) will benefit several of the Amtrak routes operating in Georgia. The new rail alignment between Richmond, Virginia and Raleigh, North Carolina defined in the DEIS Tier II study is estimated to produce travel time savings of 69 minutes over the current alignment. Further improvements between Richmond, Virginia and Washington, D.C. are estimated to provide an additional 10 minutes of travel time savings.[25] These improvements would produce 79 minutes of travel time savings for *Silver Star* trains between Washington, D.C. and points south of Raleigh, North Carolina. The *Silver Meteor* and *Palmetto*, which would remain on the present CSX route between Richmond, Virginia; Selma, North Carolina; Florence, South Carolina; and Savannah, would gain 10 minutes of travel time savings.[26]

Not available yet are estimated travel times that would result from improvements to the Atlanta to Charlotte section of the SEHSR corridor, used by the *Crescent* service.

Service Frequency

The forecast incorporates two changes in service: adding a second *Crescent* train between New York City and Atlanta, Georgia; and extension of the *Palmetto's* southern terminal from Savannah, Georgia to Jacksonville, Florida. Otherwise, no service adjustments are anticipated, including for the *Auto Train*.

A second train between New York City and Atlanta, Georgia is a reasonable expectation because ridership demand on the *Crescent* between Atlanta and Washington, D.C. exceeds train capacity, according to the September 2011 PRIIA Section 210 report of the *Crescent* and *Silver Service*. The second *Crescent* train could operate on the same alignment or potentially be routed through Raleigh, North Carolina, to take advantage of the SEHSR improvements. In these forecasts, however, the second *Crescent* train is assumed to have the same travel time as the existing service.

The *Palmetto* route operated through Tampa, Florida to Miami, Florida until 2004, when it was truncated at Savannah, Georgia. Jacksonville, Florida currently serves

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[25] SEHSR Richmond, Virginia, to Raleigh, North Carolina Tier II Draft EIS, May 2010, Table 2-1.

[26] Not included in these estimates are savings in travel time that will accrue between Washington and New York once the new Viewliner II rolling stock is placed into service in 2015. This will permit travel times along the Northeast Corridor to be similar to *Northeast Regional* services, and produce savings of up to 30 minutes. Even though the *Auto Train* operates over the same route as the *Palmetto* and *Silver Meteor,* the existing travel time will remain after improvements between Richmond, Virginia and Washington, D.C. have been completed, due to its permissible top speed being limited to 70 mph.

almost 100,000 passengers annually, is approximately 2.5 hours beyond Savannah, and will provide connections to the *Sunset Limited*, if that service is restored.

Estimating the Impact of Changes in Travel Time and Frequency

Elasticities were applied to the forecast ridership to estimate the impact of the assumed travel time and frequency changes. The elasticity values used in these forecasts were drawn from an existing estimate for Amtrak's *Northeast Regional* services.[27]

An elasticity of -0.24 was used to estimate changes in ridership due to changes in travel time. This implies that a 1 percent decrease in travel time will result in a 0.24 percent increase in ridership. For service frequency, an elasticity of 0.34 was applied. This implies that a 1 percent increase in frequency will result in a 0.34 percent increase in ridership, and vice versa.

Forecasts are presented for each route in Table 3.1 and station in Table 3.2.

Table 3.1 2040 Annual Georgia Ridership Forecast – Route

Route	Average Annual Ridership (FY 2011-2012)	Forecast Annual Ridership (2040)	Growth
Crescent	168,635	335,000	99%
Palmetto	27,570	60,000	118%
Silver Meteor	206,477	360,000	74%
Silver Star	165,260	291,000	76%
Auto Train	262,020	456,000	74%

Average Annual Ridership Source: Amtrak.

Table 3.2 2040 Annual Georgia Ridership Forecast – Station

Station	Average Annual Passengers (FY 2011-2012)	Forecast Annual Passengers (2040)
Atlanta	109,896	230,000
Gainesville	6,054	13,000
Toccoa	3,436	7,000
Savannah	70,850	124,000
Jesup	9,998	15,000

Average Annual Ridership Source: Amtrak.

The *Crescent* and *Palmetto* route forecasts both exceeded the base 74 percent growth projected using a 2 percent annual compounded rate. These increases are

[27] New Haven-Hartford-Springfield Rail Project, Service Development Plan, High-Speed Intercity Passenger Rail Program, Connecticut Department of Transportation. 2011.

due to the assumption that service would be increased. The impacts of travel time improvements on the *Silver Service* route do not produce significant gains for Georgia-related traffic, as they represent a small percentage of the overall trip time for most origin-destination pairs.

Accommodation of Future Demand

Current ridership demand on the *Crescent* between Atlanta, Georgia and Washington, D.C. exceeds train capacity. The forecast ridership increase of 99 percent implies that 2040 demand on the *Crescent* between Atlanta and Washington will also exceed train capacity, even with a second train added.

The PRIIA report proposed dropping cars at Atlanta southbound and attaching them to the northbound train. This has not yet been implemented, in part due to the lack of facilities for switching and storing cars at Amtrak's Peachtree Station. Plans have been developed to relocate the Atlanta station about a mile south to Atlanta's Brookwood neighborhood in the area of downtown known as "The Gulch." Planning for the new Multimodal Passenger Terminal (MMPT) is currently in the EIS phase. In order to efficiently serve future demand appropriate facilities for handling cars in Atlanta are critical.

The capacity of Amtrak's eastern long-distance passenger trains has primarily been constrained by the number of available single-level sleeper cars. These cars are used on the eastern long-distance routes connecting New York City with the South and the Midwest, including the *Crescent* and *Silver Service,* because vertical clearance limits on the Northeast Corridor preclude the use of double-level cars that are utilized on most other long-distance trains. In 2010 Amtrak ordered 130 Viewliner II passenger cars to augment the sleeper cars and to increase speed from 110 mph to the desired operating speed of 125 miles per hour over the Northeast Corridor. Amtrak can thus boost the efficiency of Northeast Corridor operations by standardizing train operations across the long distance.

Similar to the *Crescent*, ridership demand for the *Silver Meteor* exceeded capacity during the summer peak travel season. In 2011, Amtrak added another coach to the *Silver Meteor* which led to a noticeable increase in ridership. The current *Palmetto* and *Silver Service* trains are not presently operating at the maximum consist length due to equipment constraints. Increasing the number of cars per train will support higher ridership in a cost-effective manner. However, by 2040 demand will exceed the capacity limit of the *Palmetto* and *Silver Service* trains, even with consists at maximum-length. If the *Palmetto's* southern terminus is extended to Jacksonville, Florida 8 trains per day (including the *Auto Train*) will be operating over CSX trackage from Savannah through Jesup, Folkston, and Jacksonville, Florida. By 2040, 1 to 2 additional train pairs will be required to meet the additional demand, thereby increasing passenger train volumes by up to 10-12 trains per day on the segment through Georgia. At present, large sections of this corridor consist of single track with passing sidings. Given the freight volumes along part of this route (particularly between Folkston and Jacksonville) construction of double track along the entire route would likely be necessary.

3.5.2 Future Service Capacity and Use

Status Quo

The four Amtrak routes that travel through or have a trip end in Georgia are long-distance trains, and thus are not subject to the provisions in Section 209 of PRIIA that shift responsibility for funding intercity services of up to 750 miles in length to host states. Additionally, today there is no regional or commuter service operating in Georgia, and, while several services have been proposed in recent years, no funds are currently allocated to be spent on any form of passenger rail. Under the Status Quo scenario, Amtrak will continue to be the only passenger service provider in Georgia and service in the State will be subject to improvements made by Amtrak.

As previously noted, in 2011 and 2012 Amtrak conducted performance audits (PRIIA Section 210 reports) of each of the routes that travel through or have a stop in Georgia. These reports provided an indication of the current service quality and developed performance improvement plans which identify improvements Amtrak will pursue to increase ridership and revenue, reduce operating costs, and/or improve on-time performance and customer satisfaction. The following sections summarize the reports and Amtrak's recommendations.

Crescent Service Recommendations

Conducted in 2011,[28] Amtrak's *Performance Improvement Plan*'s *Crescent* route recommendations are centered in Georgia and the Atlanta region, due to the challenges the infrastructure presents, as well as the fact that over 40 percent of the *Crescent's* ticket revenue is derived from passengers whose trip begins or ends in Atlanta. Amtrak's proposed improvements include:

- **Switching out cars in Atlanta to match capacity and demand.** Greater travel demand exists on the *Crescent* route north of Atlanta due to higher population density. To add capacity and lower costs, Amtrak proposes to lengthen the *Crescent* by one coach on the route segment north of Atlanta and shorten the train south of Atlanta by switching off of the train two or three coaches, the lounge car, and one locomotive. These cars would be added to the evening northbound train back to New York. This proposal is forecast to reduce operating costs while increasing capacity, ridership, and revenue north of Atlanta, where Amtrak is currently turning away customers due to lack of capacity. Switching cars in Atlanta will require agreement with the host railroad, NS. If agreement is not reached, this improvement would need to be deferred until a new (currently unfunded) Atlanta passenger station is constructed and in service (see Table 3.3).

[28] Crescent – Lake Shore Limited – Silver Service: PRIIA Section 210 Performance Improvement Plan, Amtrak, 2011.

Table 3.3 Expected Amtrak Annual Ridership and Financial Benefits – Switching Cars

Annual Ridership	Revenue	Operating Cost	Net Financial Impact
38,300	$1.2 million	-$0.3 million	$1.5 million

Source: Crescent – Lake Shore Limited – Silver Service: PRIIA Section 210 Performance Improvement Plan, Amtrak, 2011.

- **Pilot Thruway feeder bus routes will add ridership and revenue.** Amtrak proposes to establish feeder Thruway bus routes connecting the *Crescent* at Atlanta to Macon and Columbus, and Chattanooga, Tennessee (as shown in Table 3.4 and Figure 3.5 (page 3-17)). Thruway service to nearby travel markets without direct rail service has the potential to increase ridership and revenue for the train. New passengers attracted by this feeder route would utilize a portion of the newly created coach capacity north of Atlanta. This service is dependent on the increased capacity achieved through car switching noted above. If that improvement is not achieved this improvement would also be deferred until a new Atlanta passenger station is constructed and in service.

Table 3.4 Expected Amtrak Annual Ridership and Financial Benefits – Thruway Bus

Thruway Bus Routes	Annual Ridership	Revenue	Operating Cost	Net Financial Impact
Atlanta to Chattanooga; Macon; Columbus[a]	17,400	$2.3 million	$1.7 million	$0.6 million

Source: Crescent – Lake Shore Limited – Silver Service: PRIIA Section 210 Performance Improvement Plan, Amtrak, 2011.

[a] All three Thruway routes connecting in Atlanta are shown in total as station staffing is shared.

Figure 3.5 Potential *Crescent* New Pilot Thruway Buses

Source: Crescent – Lake Shore Limited – Silver Service: PRIIA Section 210 Performance Improvement Plan, Amtrak, 2011.

Silver Service and Palmetto Recommendations

Also conducted in 2011,[29] Amtrak's *Performance Improvement Plan* for the *Silver Service* and *Palmetto* routes has few recommendations that would impact service in Georgia. Key recommendations along other parts of the system include adding stops in Virginia at existing Amtrak stations that are not currently served by the service, adding new Thruway bus service in North Carolina, and adding/ modifying existing Thruway service in Florida. Amtrak's proposed improvements to these routes that may provide benefit to Georgia include:

- **Additional coach capacity.** In response to the *Silver Meteor* selling out during summer months, Amtrak began operating five coaches instead of four on the *Silver Meteor* during the June-August peak period, which generated additional ridership and revenue. Nearly 6,500 more coach passengers used the service in 2011 than did during the same three-month period in 2010. It is undetermined whether additional riders were gained in Georgia as a result.
- **State of good repair improvements at various stations.** Safe and attractive facilities are a large part of system good repair, however most stations on these

[29] Crescent – Lake Shore Limited – Silver Service: PRIIA Section 210 Performance Improvement Plan, Amtrak, 2011.

routes are not owned by Amtrak. In Savannah, Georgia, the Savannah Economic Development Authority owns the station which has a platform on the station layover track that is too short to effectively load baggage and passengers. As part of Amtrak's Accessible Stations Development Program (ASDP), approximately $8 million in ADA improvements are being pursued and expected to be complete by the first half of 2015.

Auto Train Recommendations

Conducted in 2012,[30] Amtrak's performance improvement plan for the *Auto Train* will have negligible impact on Georgia, as the train does not stop in the State.

Status Quo Summary

While Amtrak's performance improvement plans include several projects that will provide some benefits to the State of Georgia, overall the benefits of improved service and increased ridership and revenue are relatively low. Additionally, several of the benefits stated with respect to the *Crescent* service may not be realized if agreement with NS' is not reached, or if the new Atlanta passenger station is not constructed.

In the long term, it can be expected that ridership will grow organically; historically ridership has exhibited 2 percent CAGR, or better, systemwide and enhanced by the track improvements planned in Virginia and North Carolina along the Southeast High-Speed Rail corridor (SEHSR). Georgia will likely benefit and additional train frequencies may be required. However, at present, those service augmentations will only come as Amtrak and corridor states elect to invest in them.

Expanded Service with Georgia Involvement

The introduction of new passenger rail services in Georgia would significantly change the funding contribution of the State, which currently does not pay for Amtrak services provided within its borders. In the last decade GDOT has conducted and participated in several high-speed rail initiatives, and developed a long-term plan for commuter rail throughout the State.

As shown above, with assumptions of 2 percent CAGR in ridership over 2012, reduced travel time due to track improvements, adding a second *Crescent* train between New York City and Atlanta, and extending *Palmetto* service to Jacksonville, Florida passenger stations in Georgia will see significant growth, particularly those located in Atlanta and Savannah.

In order to address this growth, and to provide multimodal transportation options and congestion relief to Georgia's roadways, GDOT has led or participated in several efforts that could add and improve passenger services in the State. While

[30] Auto Train – City of New Orleans – Coast Starlight – Empire Builder – Southwest Chief: PRIIA Section 210 Performance Improvement Plan, Amtrak, 2011.

in most cases corridor services were initially deemed feasible, each has a price that would require significant financial and other investments by GDOT.

GDOT High-Speed Rail Planning Services

GDOT commissioned a study, completed in 2012, to evaluate High-Speed Rail (HSR) operations on three corridors centered on Atlanta as a high-speed rail hub (shown in Figure 3.6, page 3-20):[31]

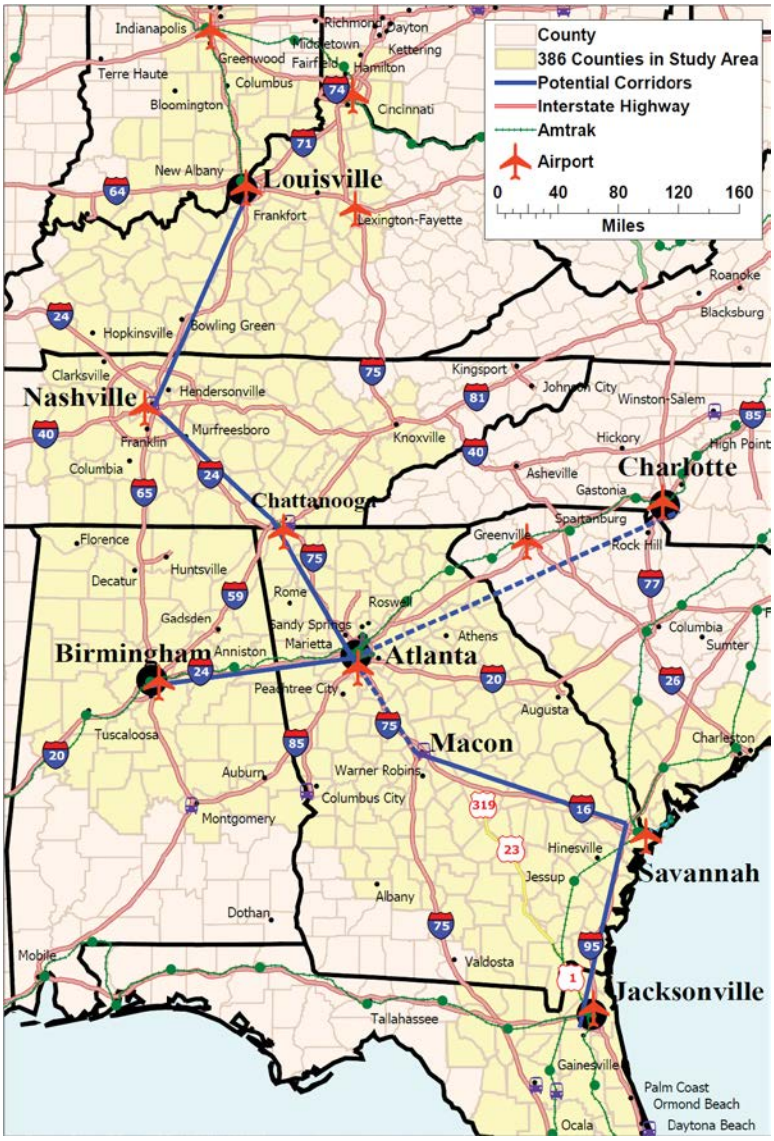
- Atlanta to Birmingham, Alabama;
- Atlanta to Macon to Jacksonville, Florida; and
- Atlanta to Chattanooga and Nashville, Tennessee, to Louisville, Kentucky.

The feasibility of implementing and operating high-speed and intercity passenger rail was examined within each corridor for different service-types: Emerging High-Speed Rail (90-110 mph) and Express High-Speed Rail (180-220 mph) in all three corridors; and Maglev (over 220 mph) in the Atlanta-Chattanooga-Nashville-Louisville corridor.

The study concluded that HSR on all three corridors is feasible and recommended that Tier I NEPA Document and Service Development Plans be pursued for each (at this time, NEPA analysis and planning has not yet begun).

[31] High-Speed Rail Planning Services Final Report, GDOT, 2012.

Figure 3.6 Georgia High-Speed Rail Study Corridors



Source: High-Speed Rail Planning Services Final Report, 2012.

Table 3.5 (page 3-21) highlights the features and results of one of the service-types examined in that study, the Emerging HSR (90-110 mph) system which uses shared track with freight railroads, in lieu of dedicated track. The study calculated operating ratios and benefit/cost ratios for three sensitivity scenarios: Conservative, Intermediate, and Optimistic reflecting variations in ridership and revenue as well as costs.

Table 3.5 Study Corridors 110 mph Diesel-Electric Shared Use Comparison
2021-2040 in 2010 Dollars

	Atlanta-Birmingham	Atlanta-Macon-Jacksonville	Atlanta-Chattanooga-Nashville-Louisville
Route Length (miles)	176.0	408.6	489.8
Travel Time (hour : minute)	2:46	5:19	6:55
Average Speed	64 mph	77 mph	72 mph
Total Ridership	37,177,000	47,430,000	101,962,000
Total Revenue	$1,077,851,000	$2,704,983,000	$4,277,336,000
Total Capital Cost	$2,937,324,000	$4,966,849,000	$11,589,054,000
Total Cost per Mile	$16,821,000	$11,492,000	$26,316,000
Total O&M Costs	$930,300,000	$2,067,000,000	$2,780,000,000
Operating Ratios			
Conservative[55]			
2021	1.15	1.25	1.49
2030	1.32	1.48	1.74
2040	1.49	1.73	2.01
Benefit-Cost			
Conservative Scenario	0.80	0.92	0.71
Intermediate Scenario	0.88	1.00	0.78
Optimistic Scenario	0.95	1.07	0.85

Source: High-Speed Rail Planning Services Final Report, 2012.

Most scenarios identified had negative benefit/cost ratios (less than one), meaning the potential costs outweigh the benefits.[32] While technically feasible, the capital investment required for a fully built out system would be significant. Capital cost estimates for such a system range from $15.0 billion for the 110 mph Shared Use system (shown in the figure), to $43.5 billion for a 180-220 mph Dedicated Use system. As such, any of the systems evaluated would need to be staged over time and would require a national funding commitment for capital expenses. State, local, and private partnerships would need to be secured for system operations.

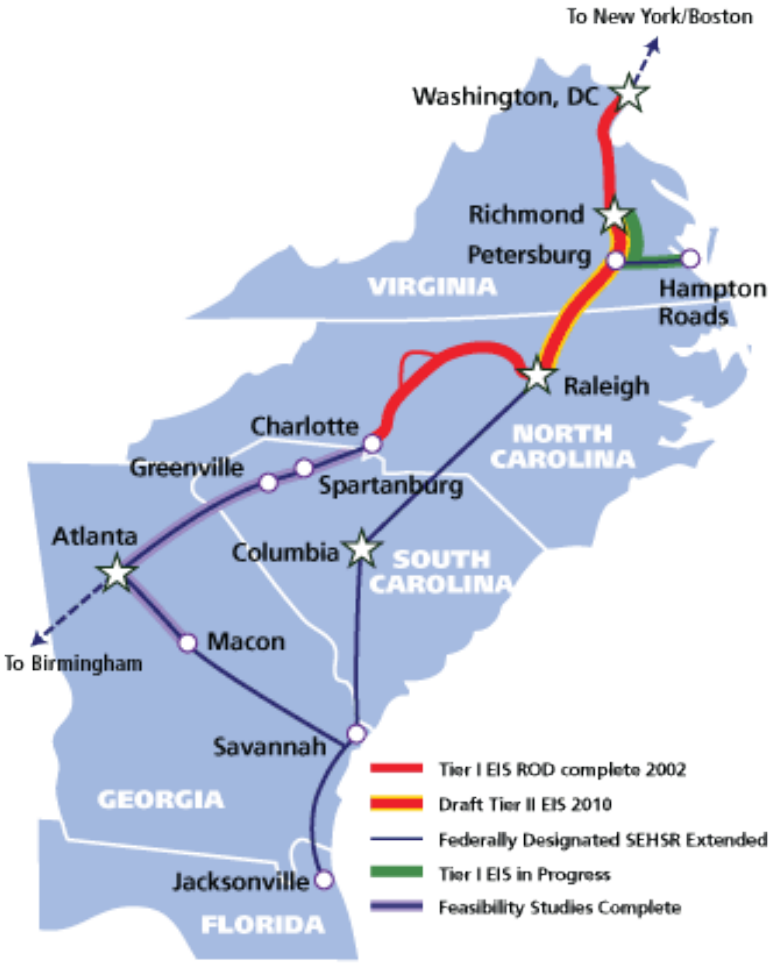
Funding for passenger rail service in the U.S. uses public sector grants and financing for capital improvements. Federal grants are usually matched with state funds. Local and private funding is typically limited to station development and instances where infrastructure improvements coincide with freight operations. In addition to capital grant opportunities, there is also Federal loan financing available to states to help fund capital costs for high-speed and intercity passenger rail programs. These financing options include low-interest direct loans, loan guarantees, and Federal interest tax expansions. In some areas, there are

[32] *Amtrak Monthly Performance Report for November 2013*. http://www.amtrak.com/ccurl/380/239/Amtrak-Monthly-Performance-Report-November-2013.pdf.

specialized financing tools such as tax incremental financing, local specialized transportation taxes, and public-private partnerships.

Georgia is part of the Southeast High-Speed Rail (SEHSR) Coalition, a multistate initiative to plan, develop, and implement high-speed rail in the Southeast (see Figure 3.7). A number of studies have resulted from this coalition, which if implemented will directly benefit passenger rail services in Georgia.

Figure 3.7 Southeast High-Speed Rail Corridor



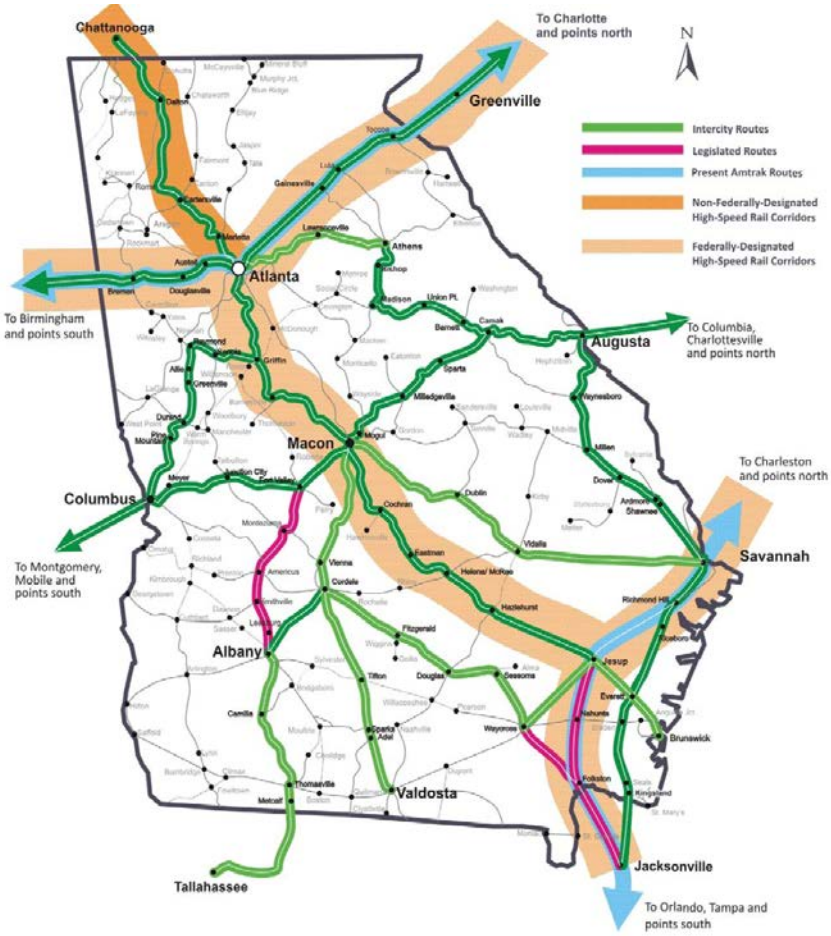
Source: www.sehsr.org

GEORGIA RAIL PASSENGER PROGRAM

The Georgia Rail Passenger Program (GRPP) proposes a two-tiered intercity passenger rail network consisting of four, first-priority corridors and three, second-priority corridors. This network would utilize over 1,000 miles of the State's railroads, linking nine of the State's largest cities with metro Atlanta, as

well as two of the largest travel markets in neighboring states. The program identified detailed capital improvement costs for the entire system and included North Georgia commuter service, statewide intercity service, and the downtown Atlanta Multimodal Passenger Terminal (MMPT). Figure 3.8 shows Georgia's proposed intercity and high-speed rail passenger lines as well as Federally designated and state legislated routes.

Figure 3.8 Georgia Intercity/High-Speed Rail Plan



Source: Georgia State Rail Plan, 2009

Estimated annual operating assistance/surplus values were based on projected fares, ridership, and other anticipated revenue sources. The scenario for passenger commuter rail is taken to be the cost of providing statewide intercity services, and commuter rail service throughout North Georgia. The scenario for intercity service would be centered on Atlanta and would provide peak-period service along seven lines to 45 proposed stations, including Macon, Griffin, Athens, Canton, Bremen, Augusta, Senoia, and Gainesville. Current estimates provide service for 10.7 million commuters and 2.1 million intercity passengers in 2030.

Intercity rail service between Atlanta and Macon is proposed to be the first phase, and initiation of the Atlanta-Macon service has been called the backbone of the State's intercity rail system. However, a transportation referendum (known as T-SPLOST) which would have raised sales taxes by 1 percent to fund this and other regional transportation projects was voted down in 9 of Georgia's 12 regional commission districts in 2012. The district containing the 10 core counties of the metropolitan Atlanta area was among those that rejected the referendum. As a result, the current future of this program is unclear.

ATLANTA MULTIMODAL PASSENGER TERMINAL (MMPT)

The most significant impediment to improving financial performance, ridership, and customer satisfaction on the *Crescent* route is the limitations of Amtrak's current Brookwood Station in Atlanta, also known as Peachtree Station. Several key station issues include:

- The station building was never intended to accommodate large numbers of passengers;
- The station has no parking;
- The station requires major upgrades for full accessibility;
- The station's platform design severely constricts train operations; and
- The station is not designed to accommodate connecting buses.

Amtrak is supporting efforts by GDOT to construct a more functional train station in Atlanta at a site to be determined along the NS Washington-to-New Orleans line over which the *Crescent* operates. Construction of a new station would provide vast improvements in passenger service and convenience that would attract additional customers. A new station would also allow trains to load/ unload passengers, and be serviced and switched, on tracks and platforms off of NS' main line, and facilitate the establishment of Thruway bus and local transit connections and switching and train servicing operations. An early estimate indicated the terminal could cost $1.2 billion,[33] however, funding for the station has not yet been identified, and time would be required for its design and construction.

EXPANDED SERVICE WITH GEORGIA INVOLVEMENT SUMMARY

In the last decade the State of Georgia has conducted and participated in numerous studies related to high-speed and intercity rail within the State, as well as connecting to key neighboring markets. The studies show that there is great potential to attract passengers from single occupant vehicles to rail; however, the plans require significant investments by the State and local jurisdictions, the Federal government, and private sector to realize the plans.

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[33] http://southeast.construction.com/southeast_construction_projects/2012/0816-1b-atlanta-intermodal-project-wins-Federal-acceleration.asp.

In most cases, establishing political consensus concerning innovative approaches for how to pay for capital costs and initial operating deficits should be a focus of GDOT moving forward. In the case of the GDOT HSR Planning Study, the result showed that there would not be sufficient operating surplus to finance capital cost bond payments, and that a dedicated funding source, such as a sales tax increment, might be required. Given the recent history of the transportation referendum (T-SPLOST), it is not likely that in the near-term this funding will be available. Public-private partnerships (P3) should seriously be pursued to augment traditional funding sources. In a P3, traditionally, government provides and owns the infrastructure and a private rail operator runs the rail service in the corridor without need for continuing subsidy.

3.5.3 Summary of Issues and Deficiencies

- Demand on some Amtrak trains traveling through Georgia currently exceeds capacity, in particular on the *Crescent* between New York City and Atlanta. Ridership is forecast to double on this route by 2040.
- The currently track and station alignment at Atlanta's Peachtree station makes it impossible to improve the operational efficiency of *Crescent* service and add more cars north of Atlanta to meet high ridership demand.
- The overall capacity of Amtrak's eastern long-distance trains is constrained by the number of available single-level sleeper cars, and the speed constraints of the existing cars.
- Ridership demand for the *Silver Meteor* trains currently exceeds capacity, and will exceed capacity on the *Palmetto* and *Silver Star* trains by 2040. Single track territory shared with freight trains south of Savannah will need to be upgraded to double track to increase service sufficiently to meet projected demand.
- GDOT does not currently participate in funding any rail improvements, nor has a funding source been identified for the future.

3.5.4 Plans and Programs

- Travel improvements planned in Virginia and North Carolina along the Southeast High-Speed Rail Corridor (SHSR) will improve travel times on the Amtrak trains which operate in Georgia.
- The planned addition of a second *Crescent* train between New York City and Atlanta, and the extension of the *Palmetto* train's southern terminus from Savannah to Jacksonville, Florida, will help to meet demand which currently exceed capacity.
- Amtrak proposes to change the operating strategy for the *Crescent* to further help meet demand by adding cars north of Atlanta. However, this can only be done through agreement with NS, or if the proposed Multimodal Passenger Terminal (MMPT) is constructed. This project is currently unfunded.

- Amtrak proposes to replace aging eastern corridor sleeper cars with new Viewliner II cars which can meet the desired Northeast Corridor operating speed of 125 mph, thereby standardizing train operations across the entire eastern corridor.
- Amtrak proposes to add feeder Thruway bus service connecting the *Crescent* in Atlanta to Macon, Columbus, and Chattanooga if the proposed MMPT is built.
- As part of Amtrak's Accessible Station Development Program (ASDP), Amtrak proposes to make major improvements to the Savannah station.
- Georgia is participating in several studies of High-Speed Rail service throughout the Southeast with Atlanta as a service hub. These studies include service to Birmingham, Alabama; Macon and Jacksonville, Florida; Greenville, South Carolina and Charlotte, North Carolina; and Chattanooga and Nashville, Tennessee, and Louisville, Kentucky. No funding has been identified for these projects.
- The Georgia Rail Passenger Program (GRPP) proposes an intercity passenger rail program of seven corridors linking nine of the State's largest cities with metro Atlanta, and Chattanooga and Greenville. Peak-period commuter service would be provided along seven lines to 45 proposed stations, starting with Atlanta to Macon. With the defeat of the T-SPLOST funding referendum in the Atlanta metropolitan region, no funding is currently available for this project.

4.0 Bicycle and Pedestrian

4.1 INVENTORY OF FACILITIES

The deficiencies of bicycle infrastructure are evaluated through an analysis of the suitability of the designated state bicycle routes, which do not include multiuse paths or recreational trails off of the state system. Table 4.1 and Figure 4.1 (page 4-2) show the 14 designated state bicycle routes. Ideally, long-haul facilities suitable for bicycling would have a shoulder of at least four feet and low traffic volumes. Figure 4.2 (page 4-3) maps the suitability of the state bicycle routes given shoulder width and traffic volume information in the GDOT Federated Road Enhanced Database (FRED). Roadways with shoulders less than four feet and of varying average annual daily traffic (AADT) are shown.

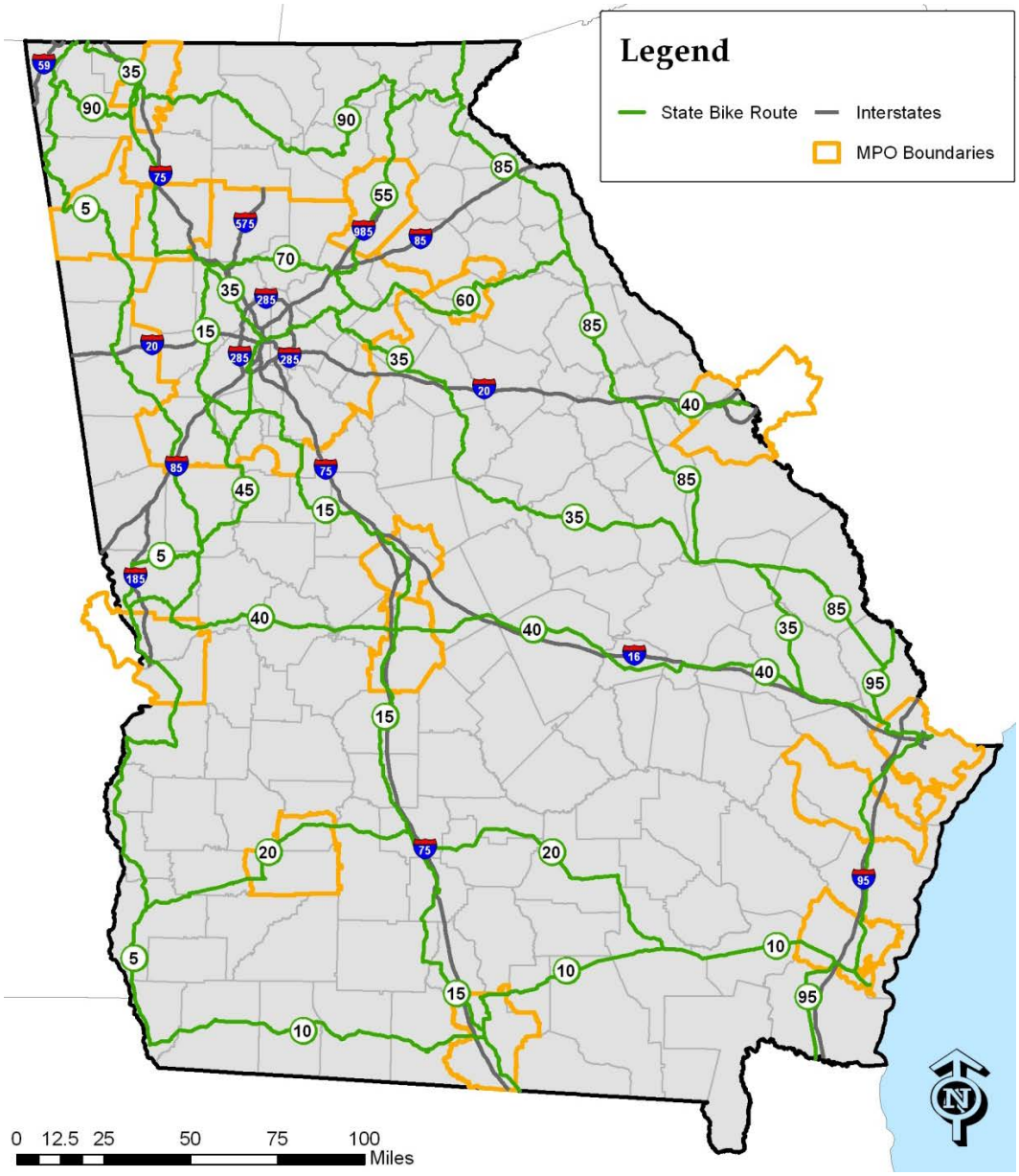
Gaps in the continuity of wide shoulders pose a challenge for some portions of the state bicycle routes. Volumes tend to increase near urban areas, heightening the need for dedicated bicycle facilities and other measures.

Table 4.1 Georgia State Bicycle Routes

Direction	Route Number	Route Name
East-West	10	Southern Crossing
	20	Wiregrass
	40	TransGeorgia
	50	Augusta Link
	60	Athens Link
	70	Northern Crescent
	90	Mountain Crossing
North-South	5	Chattahoochee Trace
	15	Central
	35	March to the Sea
	45	Little White House
	55	Appalachian Gateway
	85	Savannah River Run
	95	Coastal

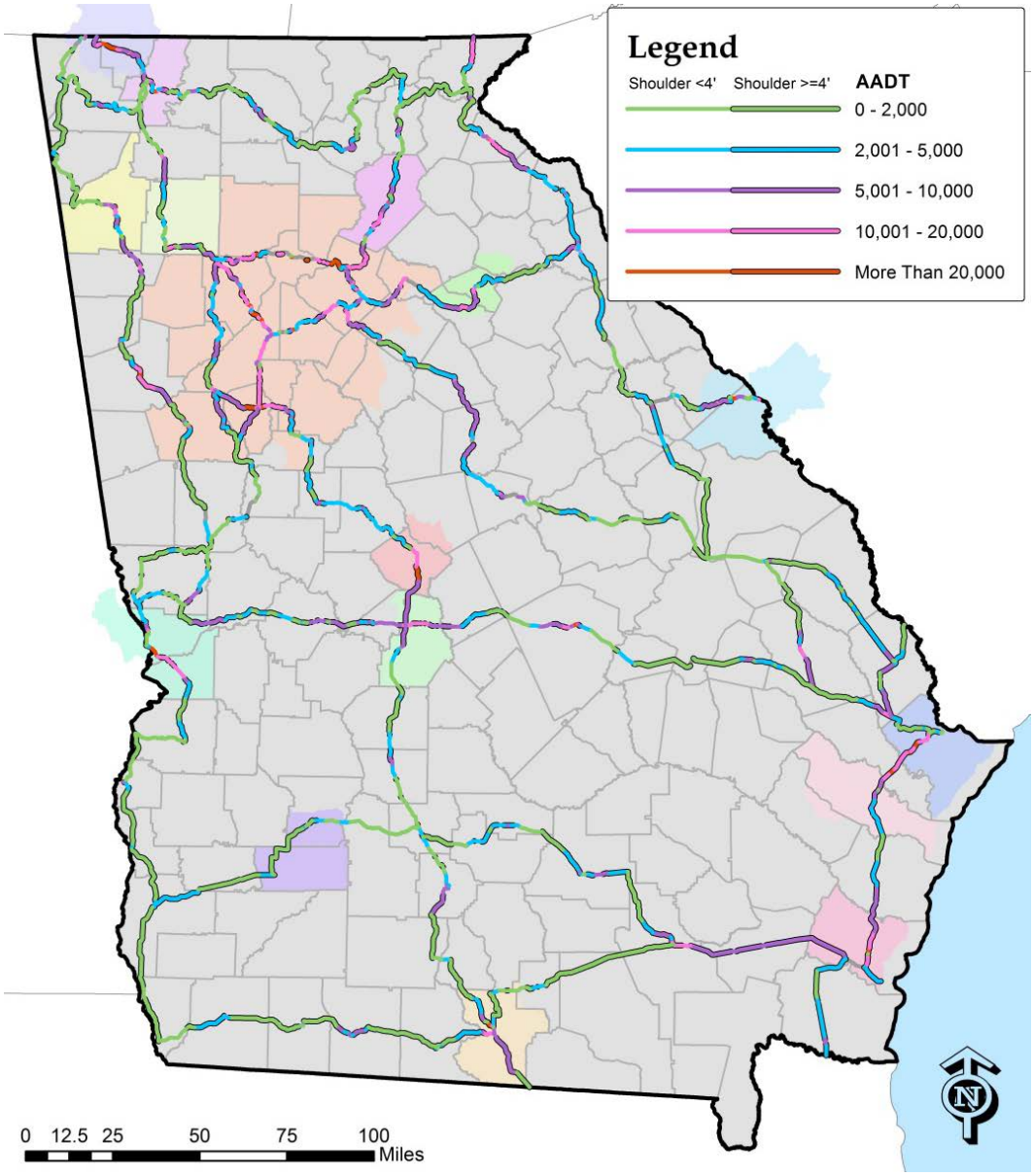
Source: GDOT Complete Streets Policy.

Figure 4.1 Georgia State Bicycle Routes



Source: GDOT.

Figure 4.2 Suitability of Georgia State Bicycle Routes



Source: GDOT Federated Road Enhanced Database (FRED).

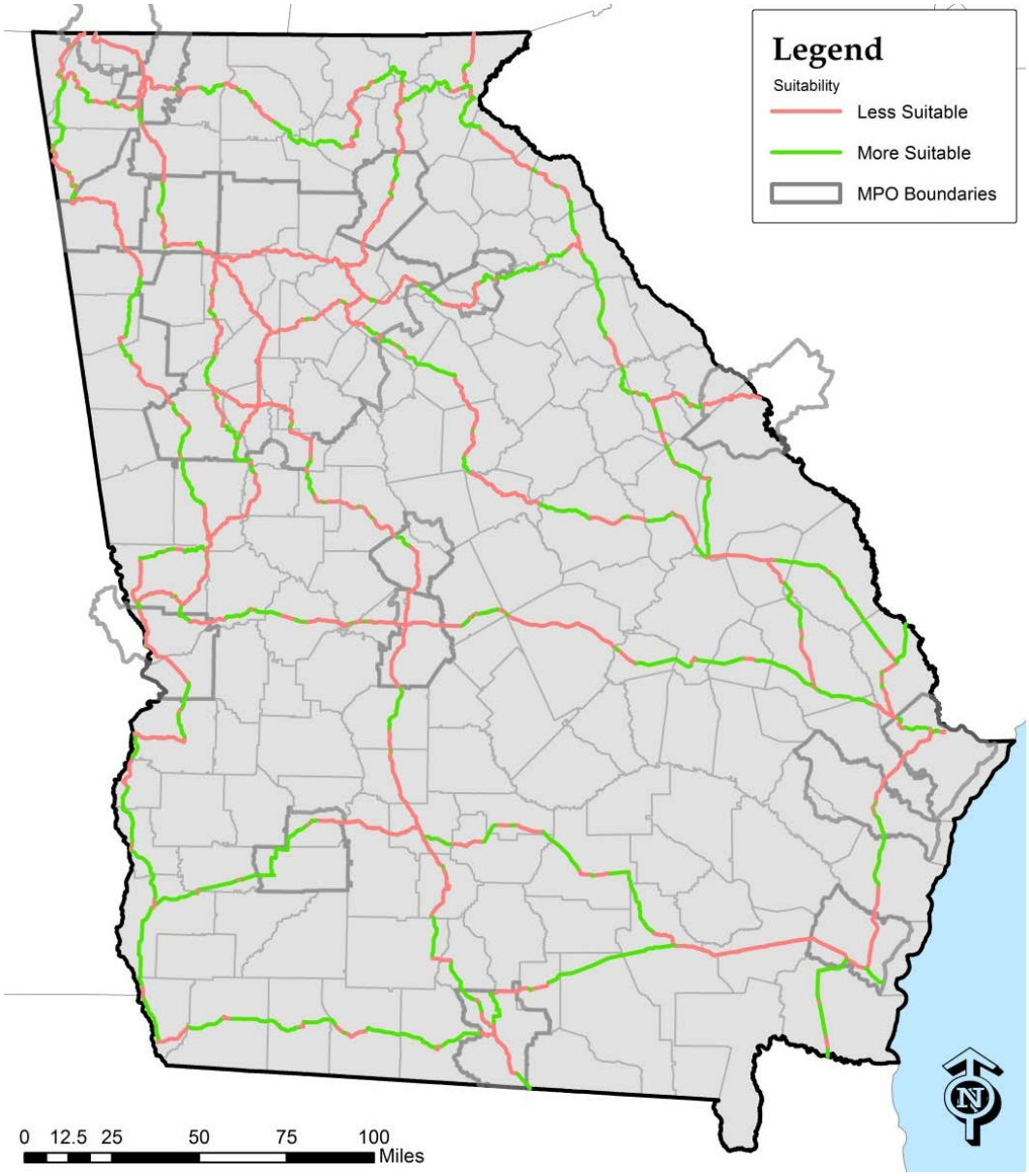
Note: Geographical information for bicycle facilities is not available in all areas.

Though various conventions are used around the country to define bicycle suitability of roadways, Figure 4.3 (page 4-5) shows roadways less suitable for bicycling that have a shoulder of less than four feet or that have AADT greater than 5,000 vehicles per day. Table 4.2 (page 4-6) ranks the 14 designated state bicycle routes with those least suitable first. The Northern Crescent, Appalachian Gateway, Little White House, Central, and March to the Sea routes top the list of the least suitable routes.

Table 4.3 (page 4-6) ranks the suitability of the state bicycle routes by mileage within each MPO area. All 30 miles of state bicycle routes within the Rome MPO are less suitable, followed closely by Chattanooga, Warner Robins, Dalton, and Augusta, all with over 90 percent.

One common element within MPO and regional bicycle and pedestrian plans is the need to ensure the suitability of state bicycle routes, including sufficient shoulder width and signage.

Figure 4.3 More or Less Suitable Georgia State Bicycle Routes



Source: GDOT Federated Road Enhanced Database (FRED).

Note: Geographical information for bicycle facilities is not available in all areas.

Table 4.2 Least Suitable State Bicycle Routes

Route	Route Name	Total Miles	Less Suitable (Miles)	Less Suitable (Percent)
70	Northern Crescent	65	63	98%
55	Appalachian Gateway	62	51	83%
45	Little White House	131	105	80%
15	Central	332	240	72%
35	March to the Sea	435	299	69%
40	TransGeorgia	259	157	61%
60	Athens Link	87	47	54%
95	Coastal	145	74	51%
90	Mountain Crossing	209	107	51%
5	Chattahoochee Trace	415	206	50%
10	Southern Crossing	249	108	43%
20	Wiregrass	192	74	38%
85	Savannah River Run	265	95	36%
	All Routes	2,843	1,626	57%

Table 4.3 Least Suitable State Bicycle Route Mileage by MPO

MPO	Total Miles	Less Suitable (Miles)	Less Suitable (Percent)
Rome	30	30	100%
Chattanooga	26	25	99%
Warner Robins	45	44	98%
Dalton	35	33	95%
Augusta	21	20	95%
Atlanta	355	285	80%
Brunswick	45	36	80%
Columbus	45	36	79%
Macon	21	15	72%
Gainesville	32	23	70%
Cartersville	40	26	66%
Athens	33	22	66%
Valdosta	70	43	62%
Savannah	33	18	53%
Non-MPO	1,955	952	49%
Hinesville	19	9	47%
Albany	39	10	25%
State Total	2,843	1,626	57%

Beyond this designated state bicycle route system, there are numerous bicycle facilities, many of which are bicycle routes that are designated by local governments, MPOs, and Regional Commissions.

4.2 USE

4.2.1 Current Use

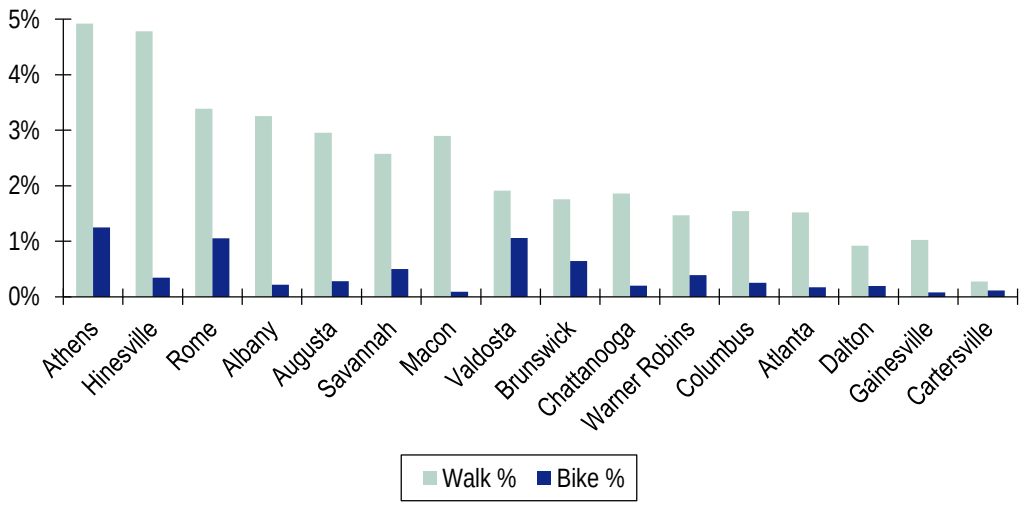
Table 4.4 and Figure 4.4 (page 4-8) show the bicycle and pedestrian mode split for urbanized areas throughout Georgia based on information from the American Community Survey, 2006-2010. The table and chart are sorted by percentage of commuters in each urbanized area bicycling or walking. Atlanta has the most sidewalks and many bicycle facilities and yet has one of the lowest combined bicycle/pedestrian commute shares in the State (1.7 percent). The highest bicycle mode shares in the State are in Athens, Rome, and Valdosta, surpassing 1 percent. Athens, Hinesville, Rome, and Albany all have over 3 percent of commuters walking. Athens is the home of the University of Georgia and has the highest combined bicycle/walk percentage of 6.17 percent.

Table 4.4 Bicycling and Walking Commuting Patterns

UZA	Total Commuters	Percent Bike or Walk	Percent Bike	Percent Walk
Athens	52,540	6.17%	1.25%	4.92%
Hinesville	21,750	5.13%	0.34%	4.78%
Rome	23,310	4.44%	1.05%	3.39%
Albany	36,890	3.47%	0.22%	3.25%
Augusta	151,540	3.23%	0.28%	2.95%
Savannah	91,265	3.07%	0.50%	2.57%
Macon	50,735	2.99%	0.09%	2.90%
Valdosta	28,765	2.97%	1.06%	1.91%
Brunswick	23,385	2.39%	0.64%	1.75%
Chattanooga	169,530	2.06%	0.20%	1.86%
Warner Robins	46,415	1.85%	0.39%	1.47%
Columbus	106,150	1.79%	0.25%	1.54%
Atlanta	1,871,315	1.69%	0.17%	1.52%
Dalton	28,310	1.11%	0.19%	0.92%
Gainesville	44,425	1.10%	0.08%	1.02%
Cartersville	18,125	0.39%	0.11%	0.28%

Source: ACS 2006-2010 Five-Year Estimates.

Figure 4.4 Bicycling and Walking Commuting Patterns



Source: ACS 2006-2010 Five-Year Estimates.

4.2.2 Trends and Future Use

Figure 4.5 (page 4-10) shows the increase in bicycle and pedestrian funding over the past decades, in the form of state-reported obligations according to the FHWA Fiscal Management Information System. Federal funding for bicycle and pedestrian facilities and programs has increased steadily over the last several transportation authorization legislations, from the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 to the Transportation Equity Act for the 21st Century (TEA-21), and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005. The American Recovery and Reinvestment Act (ARRA) contributed to the sharp increase in 2009. Moving Ahead for Progress in the 21st Century (MAP-21) consolidated several bicycle and pedestrian programs (Transportation Enhancements, Recreational Trails Program, and Safe Routes to School) into the Transportation Alternatives Program (TAP) at a slightly reduced level.[34] Despite decreases in recent years, funding has been well above pre-2009 levels, resulting in further investment in bicycle and pedestrian facilities. Georgia obligates 2.9 percent of funding for larger transportation projects to bicycle/pedestrian elements, compared to a nationwide average of 2.1 percent. Georgia ranks tenth nationally and second only to Florida in the Southeast in this category.

[34] https://www.fhwa.dot.gov/environment/transportation_alternatives/overview/presentation/#s4.

As a result of recent investments in programs, facilities, and encouragement, and changing societal norms, more and more people are traveling by bicycling and walking. Latent demand is evident in certain locations across the State where easy bicycling and walking options did not previously exist.

Figure 4.6 (page 4-10) shows the increase in the number of trips taken by bicycling or walking according to the National Household Travel Survey (NHTS). Walking trips increased from 7.9 percent of all trips in 1990 to 10.9 percent in 2009. Bicycling trips comprised 0.7 percent of all trips in 1990 compared to 1 percent in 2009.

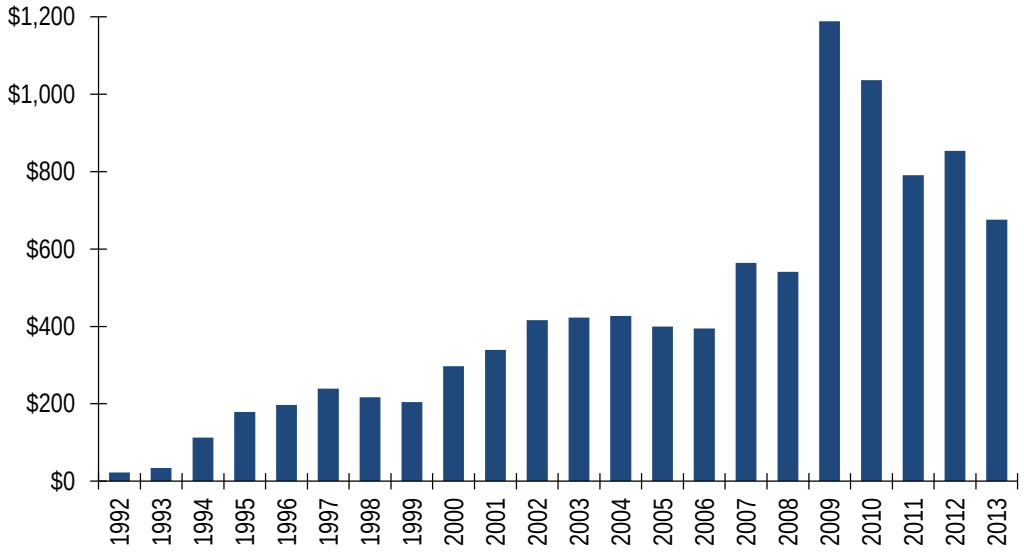
More detailed data is available from the League of American Bicyclists, which publishes bicycle commute mode percentages from the Census Bureau's American Community Survey (ACS) for the 70 largest cities for bike commuting. The League also recognizes cities that accommodate bicyclists by bestowing Bicycle-Friendly Community (BFC℠) designations on a scale from platinum to bronze. Elements involved in evaluating communities include the 5 Es: engineering, education, encouragement, enforcement, and evaluation and planning. Communities in Georgia that have received designation are Jekyll Island, Savannah, Tybee Island, Roswell, Athens-Clarke County, and Decatur, all at the Bronze level. According to the League, communities that proactively accommodate bicyclists can double the bicycle commute mode share over a decade or two.

Coupled with increased demand for bicycling and walking, densification of many urban and suburban areas, the tendency of young people to embrace bicycling as a mode of travel and not just recreation, and the aging of baby boomers, Georgia will likely need to continue to improve facilities and programs to accommodate the demand for the bicycle and pedestrian modes. To meet this demand, GDOT implemented a Complete Streets Design Policy in 2013 that will need to include amenities for pedestrians and bicyclists in projects or retrofits of existing facilities. Other GDOT bicycle and pedestrian documents include:

- Georgia Bicycle and Pedestrian Plan – Statewide Route Network (Approved 1997, Updated 1998);
- Georgia Pedestrian and Streetscape Guide (2003);
- Georgia Guidebook for Pedestrian Planning (2006); and
- Georgia Bicycle and Pedestrian Safety Action Plan (2007).

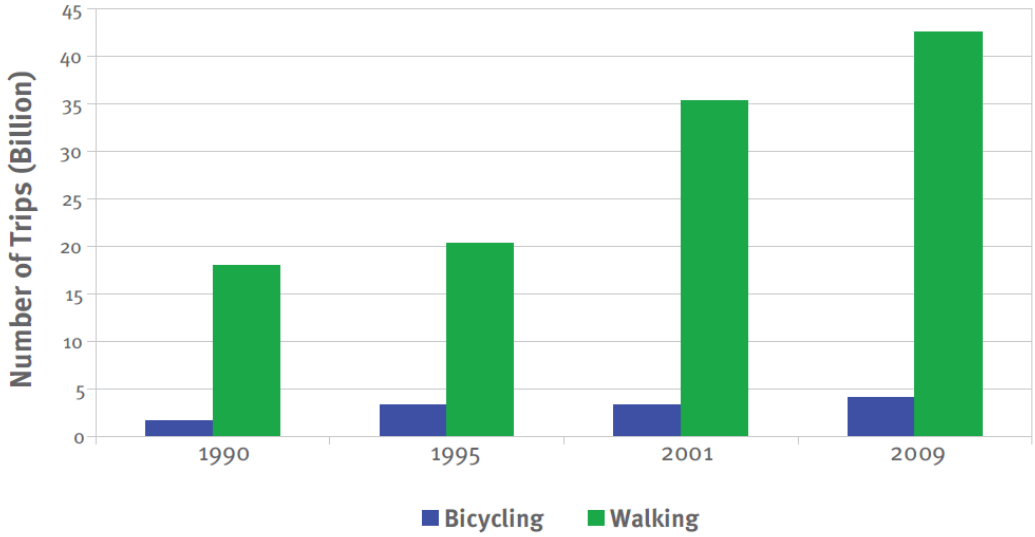
The integration of bicycle and pedestrian needs with transit will likely become more important in the future with densification of urban and suburban areas of the State. This includes pedestrian and bicycle trips to/from origins and destinations connecting to fixed-route transit systems. With these measures in progress, Georgia's transportation system will be able to meet the growing demand and mode shift toward bicycling and walking.

Figure 4.5 Federal U.S. Pedestrian and Bicycle Funding
1992-2013



Source: Federal Highway Administration Fiscal Management Information System.[35]

Figure 4.6 Number of U.S. Trips Taken by Bicycling and Walking
1990-2009



Source: National Household Travel Survey via The National Bicycling and Walking Study: 15-Year Status Report, May 2010, Federal Highway Administration.

[35] http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/bipedfund.cfm.

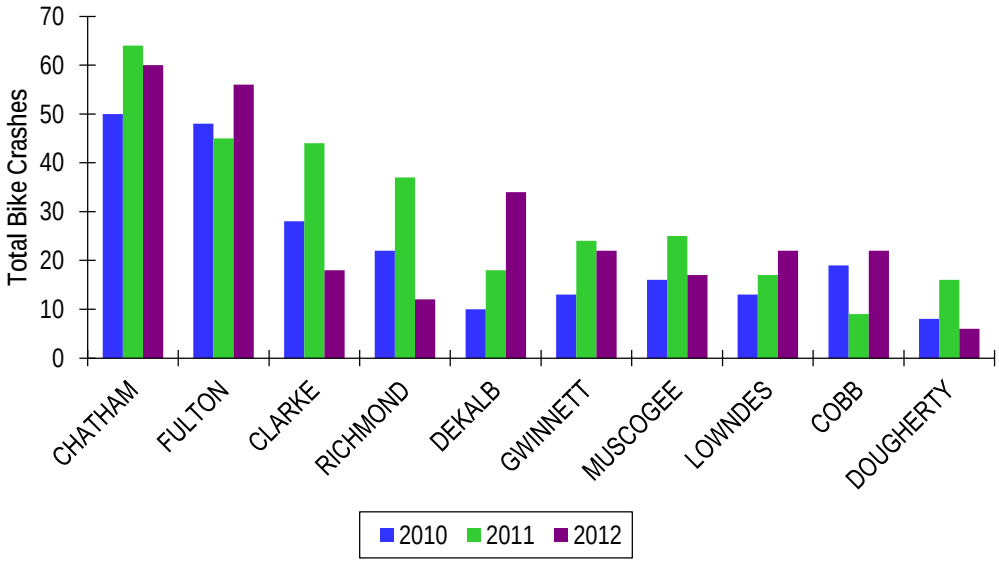
4.3 PERFORMANCE

The deficiencies of bicycle and pedestrian safety performance is based on roadway crash data from the Office of Traffic Operations, which does not include multiuse paths or recreational trails.

4.3.1 Crash Trends over Time

Figure 4.7 displays trends over time between 2010 and 2012 in the number of bicycle crashes. The counties with the most total crashes in the three-year period are shown. DeKalb and Lowndes counties have experienced consistent increases in the number of bicycle crashes, although there are fluctuations in the number of crashes each year. In general, there were more bicycle crashes in 2011.

Figure 4.7 Bicycle Crash Trends over Time for Top Counties

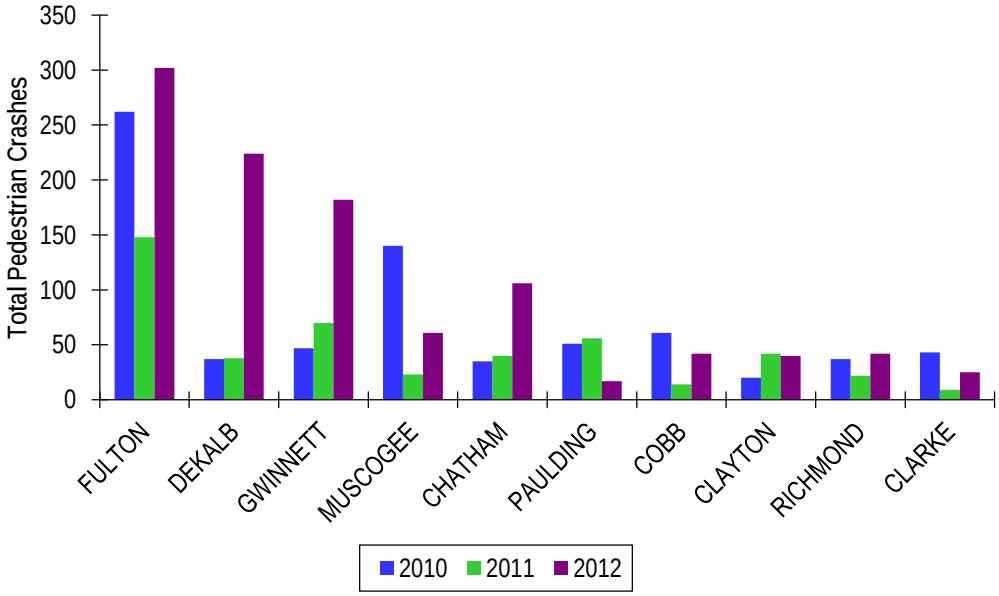


Source: GDOT Office of Traffic Operations.

The numbers of pedestrian crashes each year, shown in Figure 4.8 (page 4-12), vary even more than the bicycle crashes. Pedestrian crashes have been increasing in DeKalb, Gwinnett, and Chatham counties, with generally more pedestrian crashes occurring in 2012.

The most likely cause of the increase in both bicycle and pedestrian crashes is an increase in the use of these modes.

Figure 4.8 Pedestrian Crash Trends over Time for Top Counties

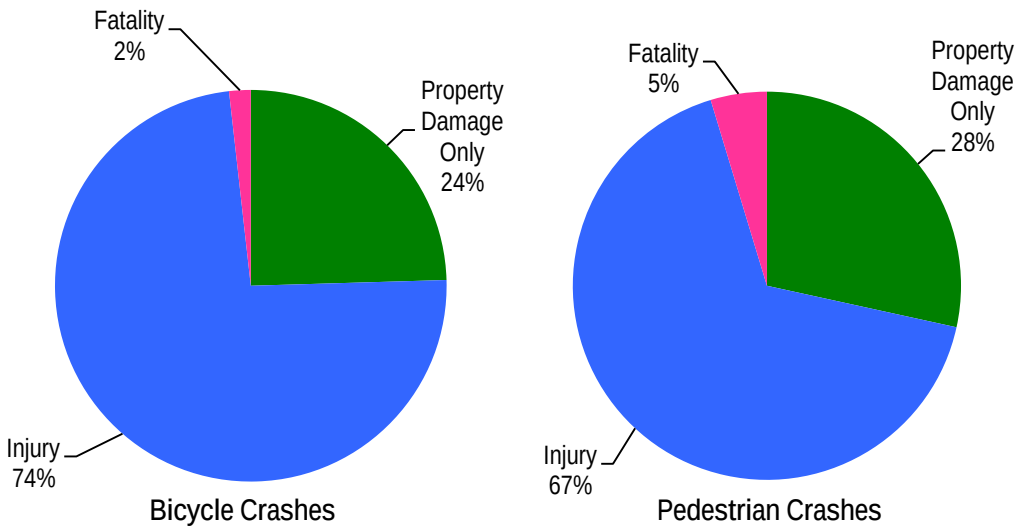


Source: GDOT Office of Traffic Operations.

4.3.2 Crash Severity

Figure 4.9 (page 4-13) shows the distribution of bicycle and pedestrian crashes by severity. Most crashes involve an injury (74 percent of bicycle crashes and 67 percent of pedestrian crashes). About a quarter of the crashes involve property damage only. Two percent of bicycle crashes and 5 percent of pedestrian crashes involve a fatality.

Figure 4.9 Distribution of Severity of Bicycle and Pedestrian Crashes

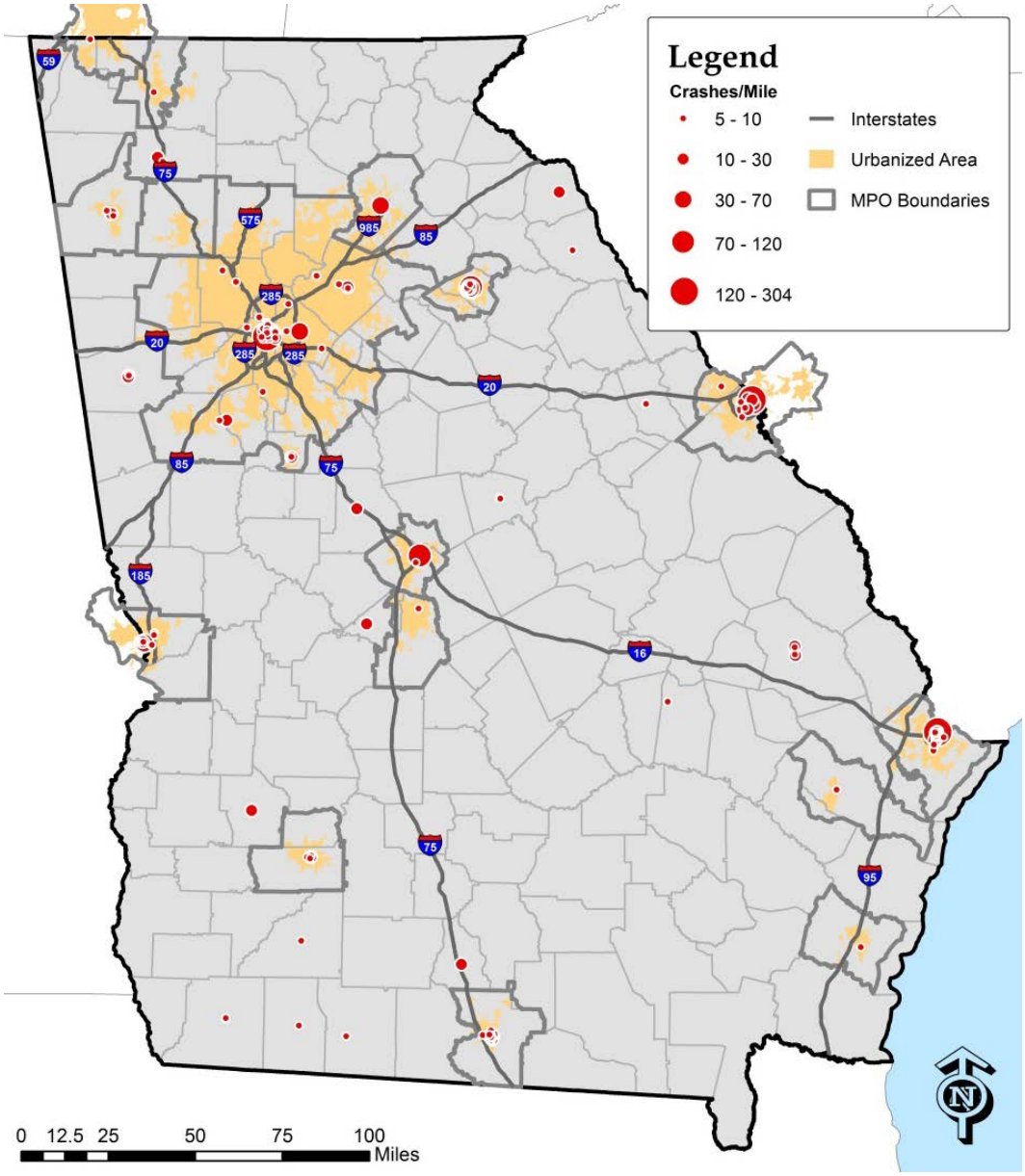


Source: GDOT Office of Traffic Operations, 2010-2012.

4.3.3 High-Crash Locations

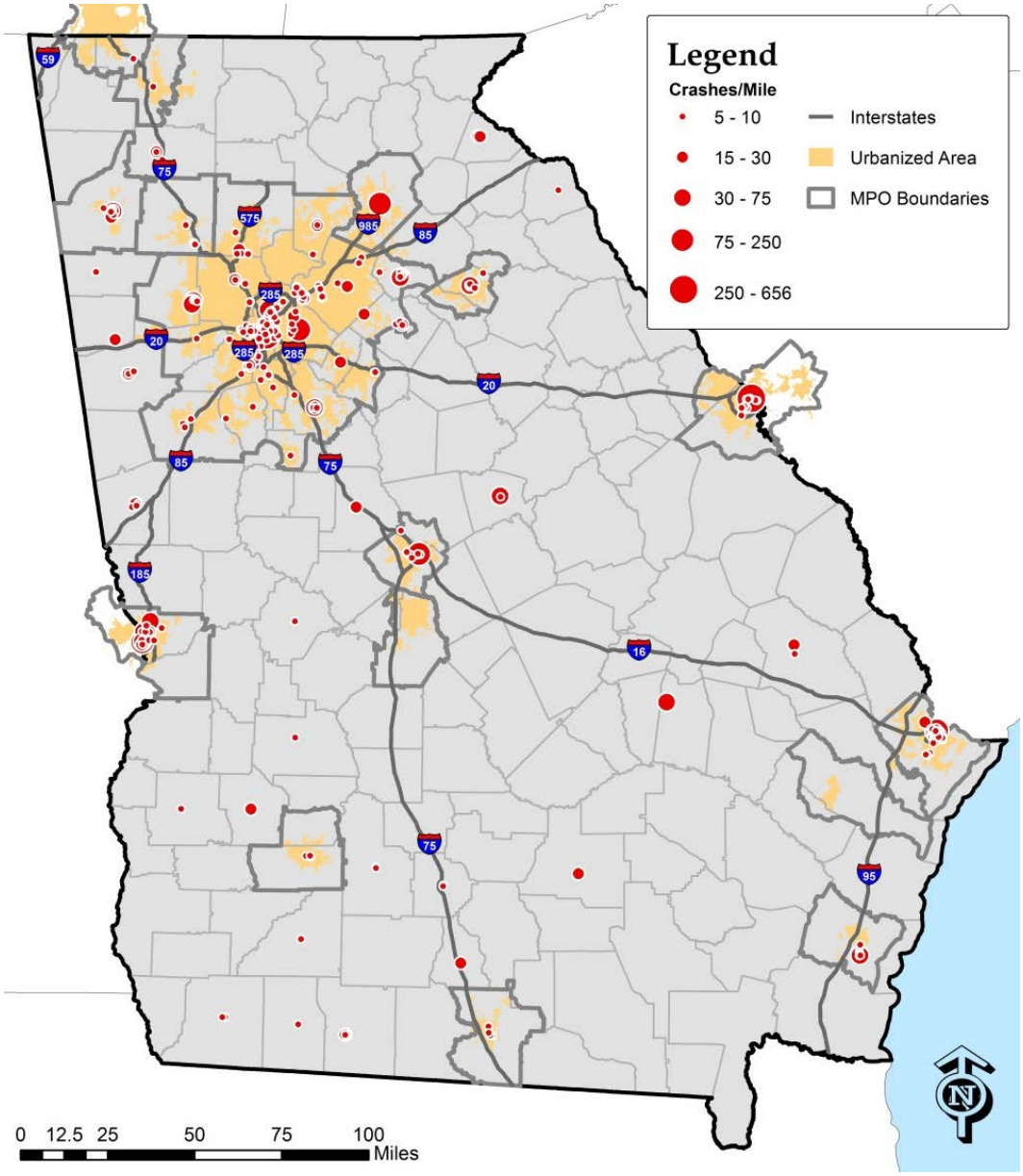
The GDOT Complete Streets Design Policy contains a bicycle warrant for the consideration of bicycle accommodation, "where there is an occurrence of reported bicycle crashes which equals or exceeds a rate of five for a one-mile segment of roadway, over the most recent three years for which crash data is available." Figure 4.10 (page 4-14) shows road segments (at least 250 feet in length) that had five or more crashes per mile over 2010-2012. Figure 4.11 (page 4-15) shows the same data for pedestrian crashes. Table 4.5 (page 4-16) summarizes the results of both by MPO.

Figure 4.10 Bicycle Crashes per Mile



Source: GDOT Office of Traffic Operations.

Figure 4.11 Pedestrian Crashes per Mile



Source: GDOT Office of Traffic Operations.

Table 4.5 Number of Locations with Five or More Crashes per Mile by MPO

MPO	Bike Locations	Pedestrian Locations
Atlanta	46	205
Savannah	32	34
Columbus	9	19
Augusta	11	11
Athens	10	9
Valdosta	13	4
Rome	3	9
Macon	2	9
Albany	5	4
Brunswick	1	7
Gainesville	1	2
Cartersville	0	2
Chattanooga	1	1
Dalton	1	1
Hinesville	1	0
Warner Robins	1	0
Non-MPO	27	46
Total	164	363

Source: GDOT Office of Traffic Operations, 2010-2012.

Of the 164 high-crash bicycle locations, 32 (about 20 percent) are on state bicycle routes.

Table 4.6 (page 4-17) summarizes these deficient segments by state bicycle route. The March to the Sea has the most deficient segments, but it is also the longest route. The average number of miles between deficient segments normalizes by distance. The Athens Link has the most deficiencies per mile, with 17 miles between deficient segments. This reflects the fact that most deficient segments are located in urban areas (see Figure 4.12, page 4-18). These high-crash locations can be used to guide the consideration of bicycle accommodation for future projects in conjunction with the other bicycle warrants in the GDOT Complete Streets Design Policy, which include route designation, linkage to other bicycle facilities, and relation to trip generators and destinations.

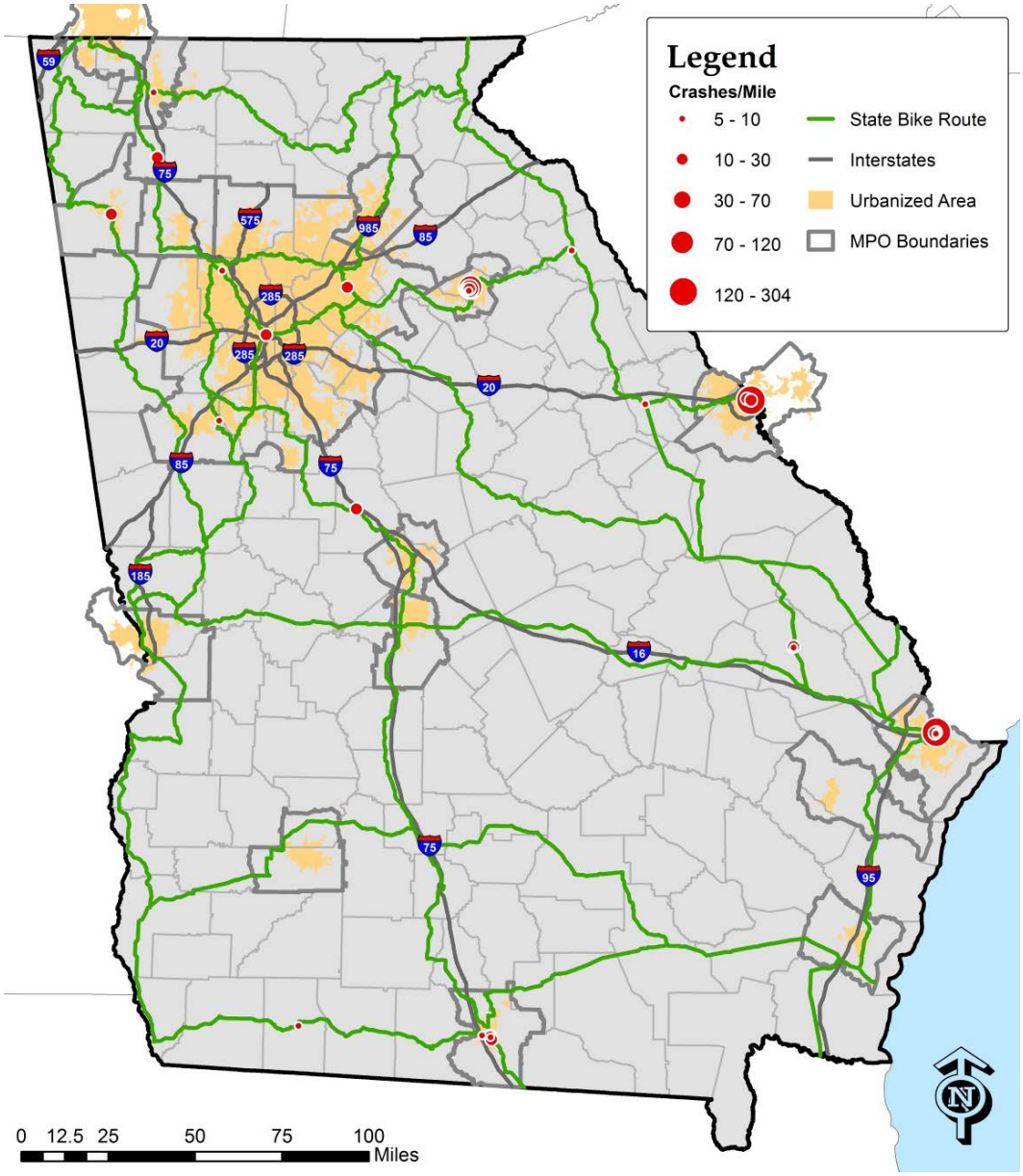
Table 4.6 Number of Locations with Five or More Crashes per Mile on State Bicycle Routes

Route	Route Name	Number of Deficient Segments	Total Miles	Average Miles between Deficient Segments
5	Chattahoochee Trace	1	415	415
10	Southern Crossing	2	249	124
15	Central	5	332	66
20	Wiregrass	0	192	–
35	March to the Sea	11	435	40
40	TransGeorgia	4	259	65
45	Little White House	1	131	131
55	Appalachian Gateway	0	62	–
60	Athens Link	5	87	17
70	Northern Crescent	1	65	65
85	Savannah River Run	1	265	265
90	Mountain Crossing	1	209	209
95	Coastal	0	145	–
	All Routes	32	2,843	89

Source: GDOT Office of Traffic Operations, 2010-2012.

Note: Deficient segments include those with greater than 5 crashes per mile within 250 feet of state bicycle routes in 2010-2012.

Figure 4.12 Locations with Five or More Crashes per Mile on State Bicycle Routes



Source: GDOT Office of Traffic Operations.

4.4 MAJOR ISSUES/DEFICIENCIES

Major deficiencies are summarized below and in Table 4.7 (page 4-20).

- Gaps in the continuity of wide shoulders pose a challenge for some portions of the state bicycle routes. Volumes tend to increase near urban areas, heightening the need for dedicated bicycle facilities and other measures.
- The Northern Crescent, Appalachian Gateway, Little White House, Central, and March to the Sea routes top the list of the least suitable routes.
- All 30 miles of state bicycle routes within the Rome MPO are less suitable, followed closely by Chattanooga, Warner Robins, Dalton, and Augusta, all with over 90 percent.
- For one of Georgia's larger urban areas, Augusta has the fewest miles of bicycle facilities.
- Chattanooga, Rome, and Gainesville all have sidewalks on less than 10 percent of their roadway miles.
- There are several high-crash locations particularly in the Atlanta and Savannah metropolitan areas, and the number of crashes is increasing as the volume of bicycle and pedestrian activity increases.
- The likely increases in bicycle and pedestrian use in coming decades will need to be met with increased supply of facilities and programs that directly and safely meet the needs of bicyclists and pedestrians.

Table 4.7 Summary of Bicycle and Pedestrian Deficiencies

		Facilities			Use		Crashes	
		State Bike Routes	MPO Bike Routes	Sidewalks	Bike	Walk	Bike	Pedestrian
Type	Area	Percent Less Suitable	Miles	Percent Coverage	Mode (Percent)	Mode (Percent)	Locations	Locations
Very Large	Atlanta	80%	655	20%	0.2%	1.5%	46	205
Large	Columbus	79%	44	27%	0.2%	1.5%	9	19
	Augusta	95%	21	21%	0.3%	3.0%	11	11
	Savannah	53%	130	21%	0.5%	2.6%	32	34
Small	Albany	25%	27	14%	0.2%	3.3%	5	4
	Athens	66%	30	18%	1.2%	4.9%	10	9
	Brunswick	80%	72	21%	0.6%	1.8%	1	7
	Cartersville	66%	27	N/A	0.1%	0.3%	0	2
	Chattanooga	99%	N/A	6%	0.2%	1.9%	1	1
	Dalton	95%	108	16%	0.2%	0.9%	1	1
	Gainesville	70%	32	9%	0.1%	1.0%	1	2
	Hinesville	47%	26	16%	0.3%	4.8%	1	0
	Macon	72%	43	21%	0.1%	2.9%	2	9
	Rome	100%	34	9%	1.1%	3.4%	3	9
	Valdosta	62%	45	11%	1.1%	1.9%	13	4
	Warner Robins	98%	54	13%	0.4%	1.5%	1	0

4.5 BICYCLE AND PEDESTRIAN PLANS

MAP-21's Transportation Alternatives Program (TAP) will continue to fund nonhighway projects, including bicycle and pedestrian improvements through state set-aside and suballocation to areas of the State (formerly Transportation Enhancements, Recreational Trails, Safe Routes to School, etc.). In conjunction with these nominal lump sums, the various bicycle and pedestrian plans outline aspirational projects and programs. Table 4.8 (page 4-22) lists recent bicycle and pedestrian plans. The goals, deficiencies, and recommendations of the various MPO, Regional Development Center (RDC), and Local bicycle and pedestrian plans generally include the following elements:

- **Network –** Establish a network of designated state and regional bicycle facilities and local pedestrian facilities to address the deficiency in number and connectivity of bicycle and pedestrian networks.
- **Shoulders –** Ensure wide, paved shoulders, and outside rumble strips are provided along designated bicycle routes to address the deficiency where designated bicycle routes do not sufficiently accommodate bicyclists.
- **Signage –** Ensure route designation and wayfinding signage are provided along designated bicycle routes to address the deficiency of insufficient signage on designated bicycle routes.
- **Education –** Educate riders and drivers about rules and safety to address the deficiency in rider and driver understanding of rules and best practices.
- **Economic Development –** Enhance tourism and economic development by promoting bicycling and walking.
- **Planning –** Develop local plans at the county or municipality level, and/or continue regional planning, public participation, formation of committees, etc.

Table 4.8 Recent Bicycle and Pedestrian Plans

Organization Type	Plan Type	Organization	Publication Year
MPO	Bicycle/Pedestrian Plan	Atlanta MPO	2007
		Augusta Regional Transportation Study	2003
		Chattanooga Urban Area	2002
		Dougherty Area Regional Transportation Study	2011
		Gainesville-Hall County	2006
		Valdosta and Lowndes County/South Georgia RDC	2007
	Trail Facilities Plan	Rome-Floyd County Planning Department	2004
	LRTP	Dougherty Area Regional Transportation Study	2009
		Athens-Clarke County Planning Department	2009
		Macon Area Transportation Study	2003
RDC	Bicycle/Pedestrian Plan	Central Savannah River Area RDC	2005
		Coastal Georgia RDC	2005
		Georgia Mountains RDC	2005
		Heart of Georgia Altamaha RDC	2005
		Lower Chattahoochee RDC	2005
		Middle Flint RDC	2005
		North Georgia RDC	2005
		Southeast Georgia RDC	2005
		South Georgia RDC	2004
		Chattahoochee-Flint RDC	2005
		McIntosh Trail RDC	2005
		Middle Georgia RDC	2005
	Rail-to-Trail Feasibility	Middle GA RDC	2007
RC	Bicycle/Pedestrian Plan	Northeast Georgia RC	2010
		River Valley RC	2005

5.0 Aviation

5.1 INVENTORY AND CAPACITY

5.1.1 Overview

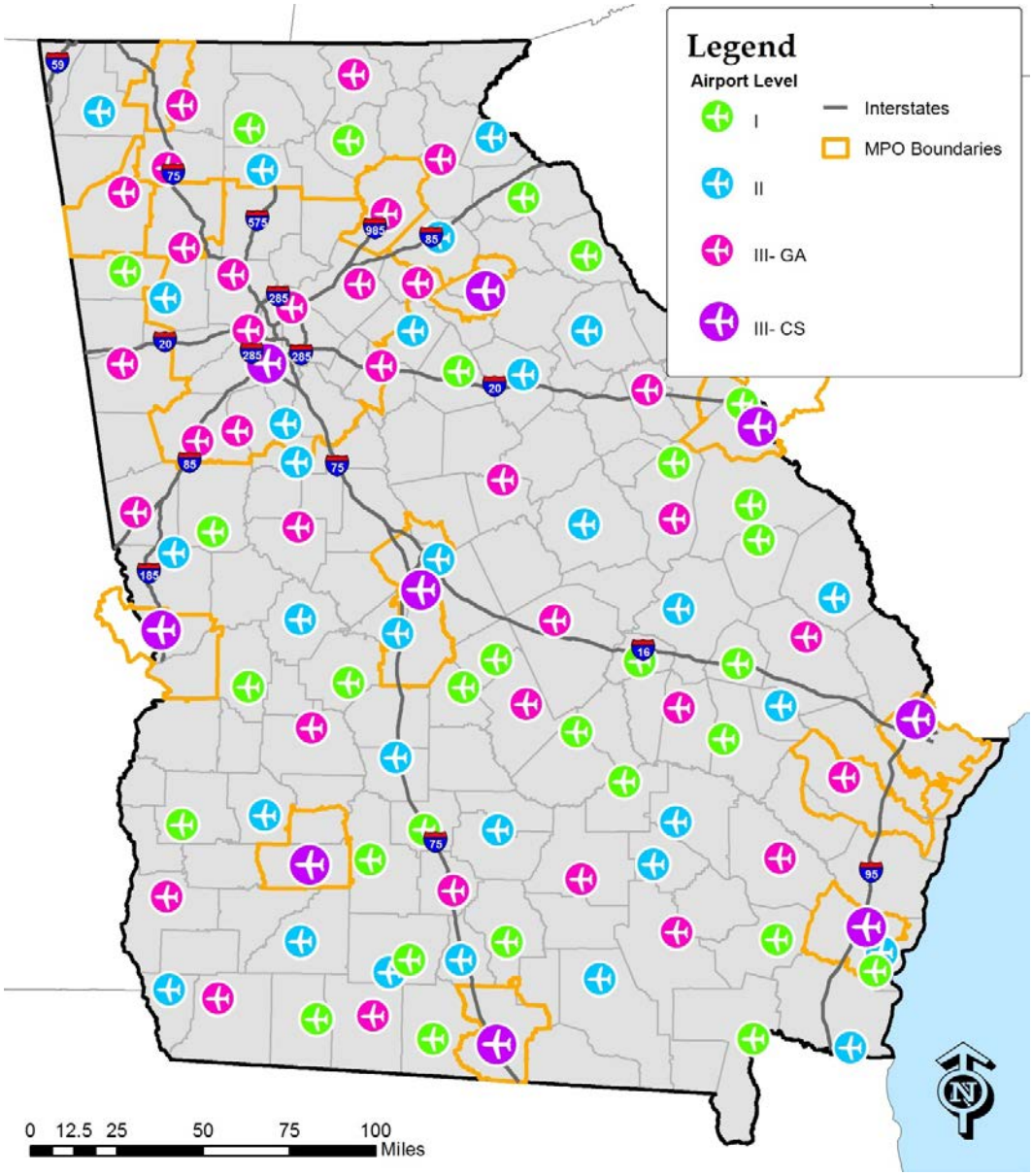
The aviation system in Georgia is comprised of 104 publicly owned, public use airports. Of these 104 facilities, nine airports offer scheduled commercial service while the other 95 are general aviation airports. Each airport is classified as a Level I, II, or III facility based on the role it plays within the aviation system. Collectively, these 104 airports play a vital role in the State's transportation system and economic vitality with over 2 million general aviation operations (take-offs and landings) and 73,000 commercial operations.

As defined by the Federal Airport Administration (FAA), the three levels of airports have the following characteristics:

- Level I airports are minimum standard general aviation airports. These facilities accommodate all single-engine and some small twin-engine aircraft. A minimum runway length of 4,000 feet has been set as a standard for these airports. Operations at Level I airports should be aided by nonprecision instrument approach.
- Level II airports are business airports that have a local, economic impact. These facilities can accommodate all business aircraft and personal use single and twin engine general aviation planes. A minimum runway length of 5,000 feet has been set as a standard for these facilities. Operations at Level II airports should be aided by nonprecision instrument approach.
- Level III airports are business airports of regional impact. These facilities accommodate commercial aircrafts and a variety of business and corporate jets. A minimum runway length of 5,500 feet has been set as a standard for these airports. Operations at Level III airports should be aided by precision instrument approach. The nine Level III airports which provide commercial service are distinguished from the other Level III airports.

Figure 5.1 (page 5-2) shows the locations of the Level I, II, and III airports across the state. The Level III airports are shown as III-GS, general service, and III-CS, commercial service, airports. It is important to note that Hartsfield Jackson Atlanta International Airport (HJAIA) is the world's busiest passenger airport. The commercial service airports do not receive funding from GDOT and are thus not focused on in-depth in this section but are discussed in Section 5.4. Also, HJAIA and to a lesser extent the Savannah-Hilton Head and Southwest Georgia Regional Airport handle air cargo which is discussed in Section 5.5.

Figure 5.1 Overview of Public Airports by Level of Service



Sources: GDOT, FAA.

The GDOT *Georgia Aviation System Plan (GASP)*, originally adopted in 2003 and updated in 2013, was written to identify the strengths and weaknesses of the statewide aviation system. The analysis upon which the GASP was written is strategic and performance based. In addition to the GASP, the 2014 *Georgia Infrastructure Report Card* prepared by the American Society of Civil Engineers (ASCE), includes five performance measures: Facilities and Services; Flexibility; Standards; Accessibility; and Capacity. Each of these performance measures is discussed in this report. The ASCE report assigned a grade to each measure, and

a grade of "B+" was given to the statewide aviation program as a whole. Additionally, each airport is required to have a master plan (also called a service plan). The master plans are in a standard format and contain information as to the airport's location, size, FAA level, current and forecast demand, and facility and service needs. These three documents were used as the basis to identify deficiencies in the statewide aviation program at each level.

The 2014 Georgia ASCE report identifies facility and service standards for the Level I, II, and III airports which address compliance related to FAA safety and design requirements and are important measures of airport performance. Certain elements of the design criteria were established after the construction of many of the airports across the State. Thus, there are numerous airports that require significant modification in order to bring them up to the current standards. These projects will require capital funding. The three most significant facility and service standards are the following:

- The Runway/Taxiway Separation Standard. This standard is the amount of separation between the primary runway centerline and any full or partial parallel taxiway centerline. Eighty-two percent of Georgia's airports meet this standard which is a decrease from 89 percent in 2008.
- The Runway Safety Area (RSA) Standard for Primary Runways. This standard measures the ability to meet the required dimensions of runway safety areas on each end of the primary runway. Ninety-one percent of Georgia's airports meet this standard which is a slight increase from 90 percent in 2008.
- The Pavement Condition Index (PCI) Standard measures the ability of airports to meet a PCI rating of 70 or greater for the primary runway. Eighty-four percent of Georgia airports meet this standard which is a slight decrease from 2008. However, nearly 30 runways were extended between 2003 and 2008 and additional extensions are planned. Reduced funding levels and aging pavements have contributed to the recent decrease in this measure.

5.1.2 Facility and Service Objectives by Airport Level

In addition to these three high-priority standards, the airport master plans detail numerous other criteria which are important to the safety and efficiency of airports at each classification level. As listed in the airport master plans, these criteria fall into three categories: Airside Facilities, General Aviation Facilities, and Services.

Table 5.1 (page 5-4) shows the Georgia Aviation System Plan Minimum Service and Facility Requirements by Airport Level.

Table 5.1 Airport Minimum Service and Facility Requirements by Airport Level

		Level I Airports	Level II Airports	Level III Airports
Airside Facilities	Runway Length	4,000 feet	5,000 feet	5,500 feet
	Runway Width	75 feet	100 feet	100 feet
	Taxiways	Full parallel desirable; turnarounds at each end minimum objective	Full Parallel	Full Parallel
	Lighting System	MIRL and MITL[a]	MIRL and MITL[a]	HIRL[a] for precision approaches and commercial service airports; MITL and approach lights
	Approach	Nonprecision	Nonprecision	Precision
	NAVAIDs/Visual Aids	Rotating beacon, segmented circle and wind cone; PAPIs, and other aids as required for nonprecision approach	Rotating beacon, segmented circle and wind cone; PAPIs, and other aids as required for nonprecision approach	Rotating beacon, segmented circle and wind cone; PAPIs, and other aids as required for precision approach
	Ground Communications	Public Telephone/GCO[a] as needed	Public Telephone/GCO[a]	Public Telephone/GCO[a]
	Weather Reporting	AWOS or ASOS[a] desirable	AWOS or ASOS[a]	AWOS or ASOS[a]
General Aviation Facilities	Hangared Aircraft Storage	60% of based aircraft fleet	60% of based aircraft fleet	70% of based aircraft fleet
	Apron Parking/Storage	40% of based aircraft fleet plus an additional 25% for transient aircraft	40% of based aircraft fleet plus an additional 50% for transient aircraft	30% of based aircraft fleet plus an additional 75% for transient aircraft
	Terminal/Administration	750 square feet enclosed space for public use	1,500 square feet enclosed space for public use, including restrooms, conference area, and pilot's lounge	2,500 square feet enclosed space for public use, including restrooms, conference area, and pilot's lounge
	Auto Parking	One space for each based aircraft plus an additional 25% for visitors/employees	One space for each based aircraft plus an additional 50% for visitors/employees	One space for each based aircraft plus an additional 50% for visitors/employees
Services	Fuel	AvGas and/or Jet Fuel as required	AvGas and/or Jet Fuel	AvGas and/or Jet Fuel
	FBO	Limited Service	Full Service	Full Service
	Maintenance	N/A	Limited/Full Service	Full Service
	Rental Cars	N/A	Available	Available

Source: Georgia Aviation System Plan, 2003.

[a] MIRL = Medium Intensity Runway Lighting; MITL = Medium Intensity Terminal Lighting; HIRL = High-Intensity Runway Lighting; GCO = Ground Communication Outlet; AWOS = Automated Weather Observing System; ASOS = Automated Surface Observing System.

5.1.3 Flexibility and Regional Planning Context

As identified in the ASCE report, the flexibility performance measure relates to an airport's ability to meet current and future demands while maintaining compatibility with surrounding communities. Of the airports that have current master or layout plans, only 40 percent have plans that were created within the last five years. This percentage has decreased from a reported 64 percent in 2008. A large percentage of Georgia airports updated their plans between 2003-2008 in anticipation of large capital improvement projects, including runway extensions and landside improvements.

The adoption of land use and zoning controls that are compatible with the airport is critical to ensure that land is available for future expansion. This expansion area includes space for airside facilities, as well as general aviation facilities, such as terminal space and vehicle parking. The Peachtree DeKalb Airport is a good example as it has reached capacity and cannot expand due to the proximity of surrounding neighborhoods. As of 2012, 58 percent of the airports have not included land use or zoning in their master plans or coordinated with the local government on adopting land use and zoning controls. Only 50 percent of the communities surrounding airports had adopted land use and zoning controls that take the airport into consideration.

Correlating to the land use and zoning issues, the master plans should also include a consideration of airplane noise on surrounding neighborhoods, particularly in light of the expected increases in operations. Overlay and clear zones also need to be established to manage height restrictions that can adversely impact aviation operations and safety. Tall buildings in proximity to the airport could result in the airport's need to purchase property to ensure safety for existing flights, as well as for any airport and operational expansions.

In addition to the operational and coordination issues, the landside transportation system connecting to the airport must be considered as an element of the overall mobility system. The linkages to the airport facilities with the various modes are critical components of the economic vitality of the region as airports are recognized as economic engines for the region and the State. These goals need to align with high-priority initiatives established by the State.

5.2 USE

Operations at the general service airports are critical for the livelihood of the statewide aviation system. Systemwide operations are analyzed in terms of the following metrics for Level I, Level II, and Level III general service airports:

- The number of aircraft;
- Airport operations (takeoffs and landings); and
- The demand/capacity ratio.

This information will set the stage for a discussion of deficiencies at the end of the section.

5.2.1 Number of Based Aircraft

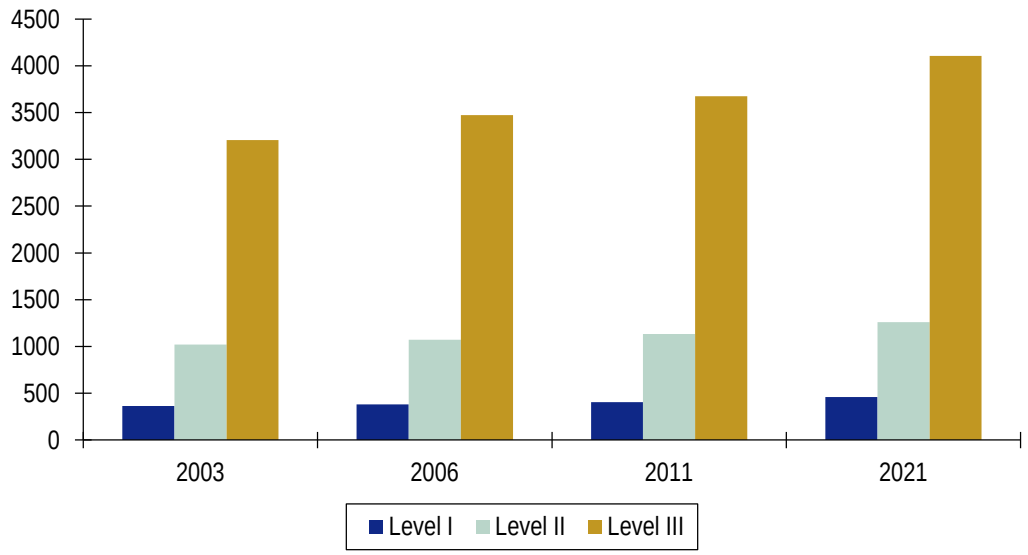
The number of based aircraft at general aviation airports is a significant factor in planning for future facility and service needs. The number of aircraft is related to various operational elements, such as operational demands on runways, lighting, hangar facilities, and aircraft maintenance and repair services. Table 5.2 and Figure 5.2 (page 5-7) show the number of aircraft by airport level as reported in the airport master plans. The 2011 and 2021 data is projected, and the percent change between 2003-2011 and 2003-2021 has been calculated. By 2021, the number of based aircraft is expected to increase by 21 percent at Level I airports, 19 percent at Level II airports, and 22 percent at Level III general aviation airports.

Table 5.2 Number of Based Aircraft at Airports by Airport Level

	2003	2006	2011	2021	Percent Change 2003-2011	Percent Change 2003-2021
Level I	362	379	404	460	10%	21%
Level II	1,020	1,071	1,132	1,261	10%	19%
Level III	3,205	3,475	3,674	4,105	13%	22%

Source: GDOT, Airport Master Plans.

Figure 5.2 Number of Based Aircraft by Airport Level



Source: GDOT, Airport Master Plans.

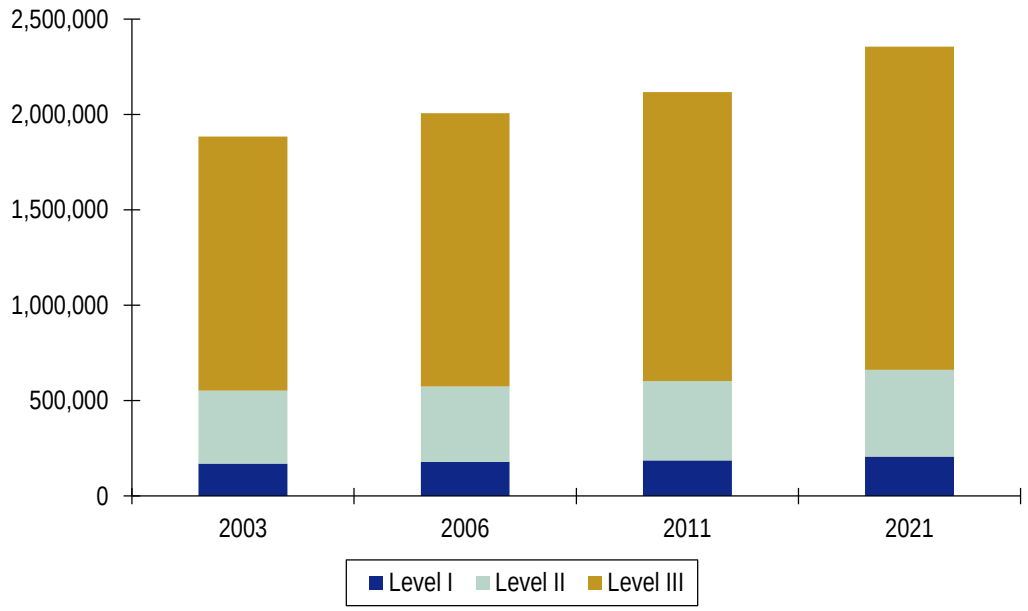
It is important to note that there are large variations in number of aircraft at the various facilities statewide. Of the Level I airports, the minimum number of planes in 2003 was 1, and the maximum was 75 at the Daniel Field airport. Most Level I airports plan to add between one and three planes during the 18-year time period.

The minimum number of planes for Level II airports in 2003 was 4 and the maximum was 143 at the Clayton County Tara Field airport. Most Level II airports project an additional 5 to 15 planes between 2003 and 2021. A few airports plan to add over 20 planes, including the Griffin-Spalding and Paulding Northwest Atlanta Airports. Typically, the Level III airports house a higher number of planes than the other airports. The minimum number in 2003 was 4, and the Peachtree DeKalb Airport is projected to have the highest number with 608 planes. In 2021, the Level III airports are projected to have 4,105 based aircraft. Peachtree DeKalb, Cobb County McCollum Field, and Gwinnett County Briscoe Field are planning to add 142, 195, and 98 planes, respectively.

5.2.2 Take Offs and Landings

Similar to the based aircraft changes, aircraft operations (takeoffs and landings) at general service airports provide information as to how much activity an airport will handle in the future. According to the ASCE report, general aviation service has seen a decrease of close to 20 percent since 2008 which is due to the global recession. The operations data reported in the airport master plans paints a slightly different picture as it was created before the downturn of the economy. This information is shown in Figure 5.3 (page 5-8) and Table 5.3 (page 5-8).

Figure 5.3 Number of Takeoffs and Landings by Airport Level



Source: GDOT, Airport Master Plans.

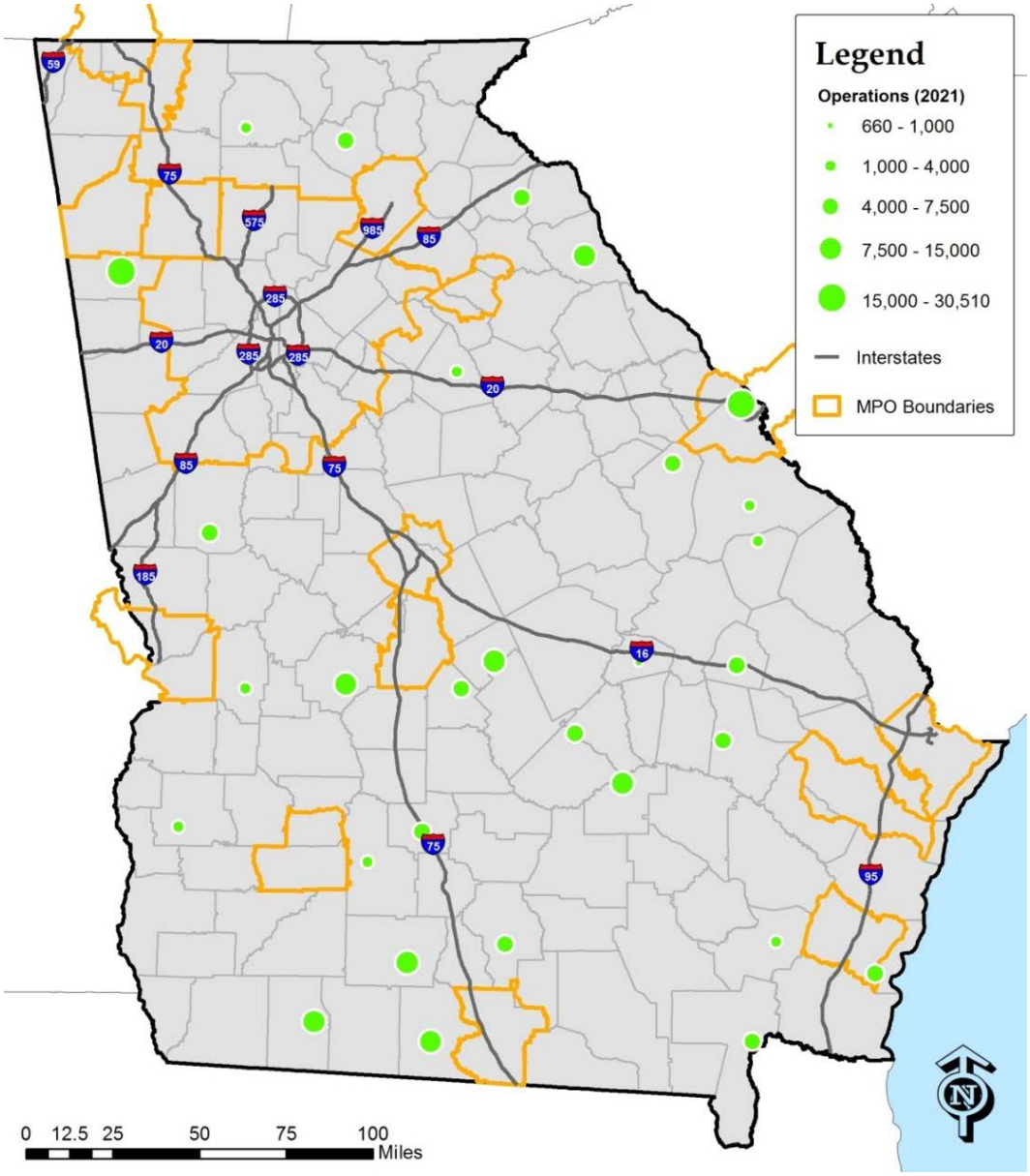
Table 5.3 Number of Takeoffs and Landings by Airport Level

	2003	2006	2011	2021	Percent Change 2003-2011	Percent Change 2003-2021
Level I	170,300	178,036	187,066	205,879	9%	17%
Level II	381,845	395,804	414,739	454,602	8%	16%
Level III	1,331,595	1,433,710	1,515,150	1,694,505	12%	21%

Source: GDOT, Airport Master Plans.

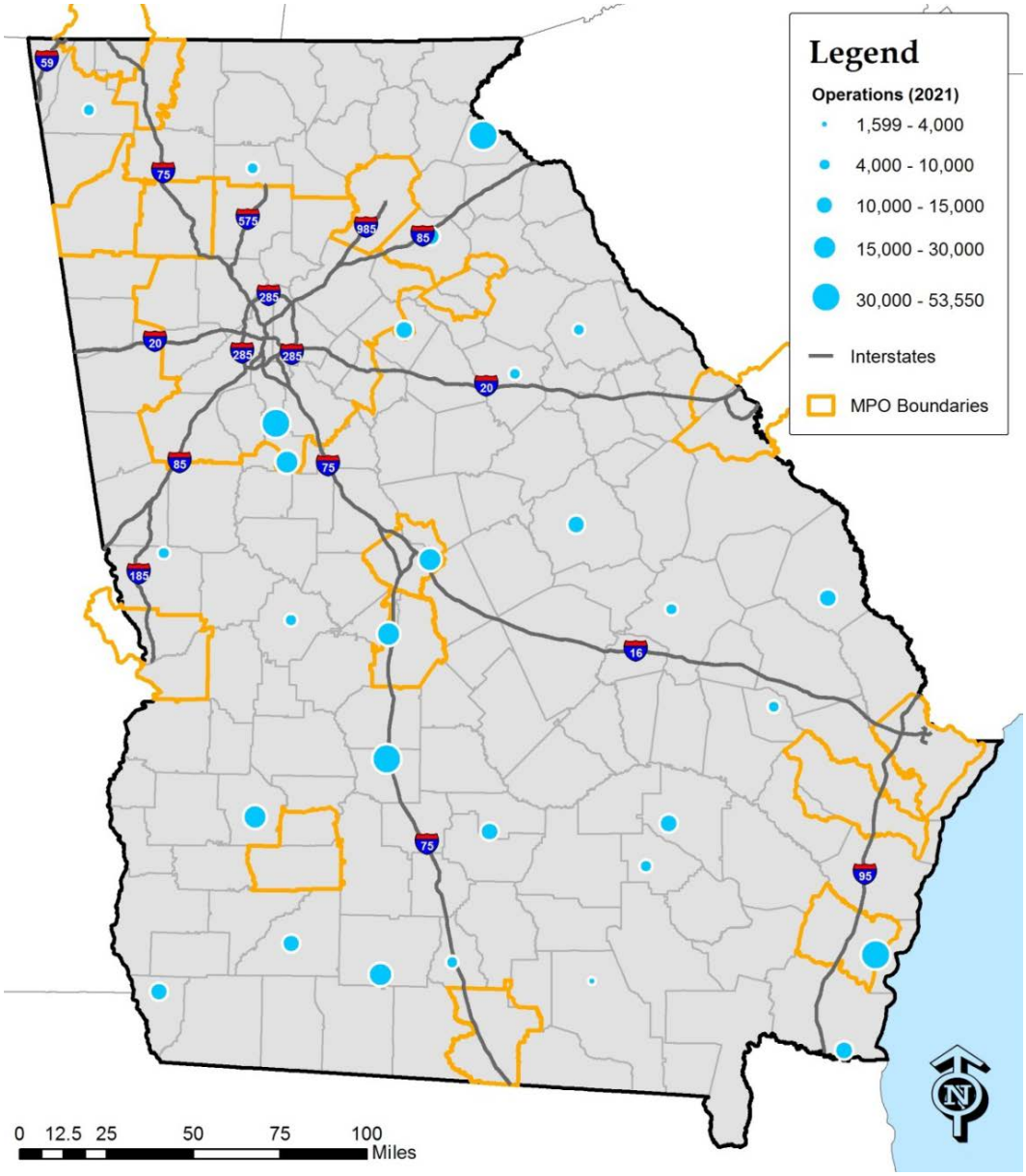
The majority of the Level I airports project the addition of approximately 200 takeoffs and landings per year between 2003 and 2021. The notable exceptions to this are the few airports that are expecting an increase of 2,000 or more takeoffs and landings per year in this time period. These airports include the Marion County, Cochran, Dr. C.P. Savage Sr., Jekyll Island, Cornelius-Moore Field, Hazlehurst, and Daniel Field airports. Most of the Level II airports plan to add between 1,000 to 3,000 operations, with the exception of Malcolm McKinnon, Crisp County-Cordele, Toccoa RG Letourneau Field, and Clayton County–Tara Field airports. Similarly, the operations are expected to increase at Level III general service airports between 549 at Jesup-Wayne County airport and 70,727 at the Cobb County McCollum Field airport. Most Level III airports project an increase in takeoffs and landings in the 2,000 to 10,000 range. The projected operational data is illustrated in Figures 5.4 (page 5-9), 5.5 (page 5-10), and 5.6 (page 5-11).

Figure 5.4 Total Operations at Level I Airports
Projected 2021



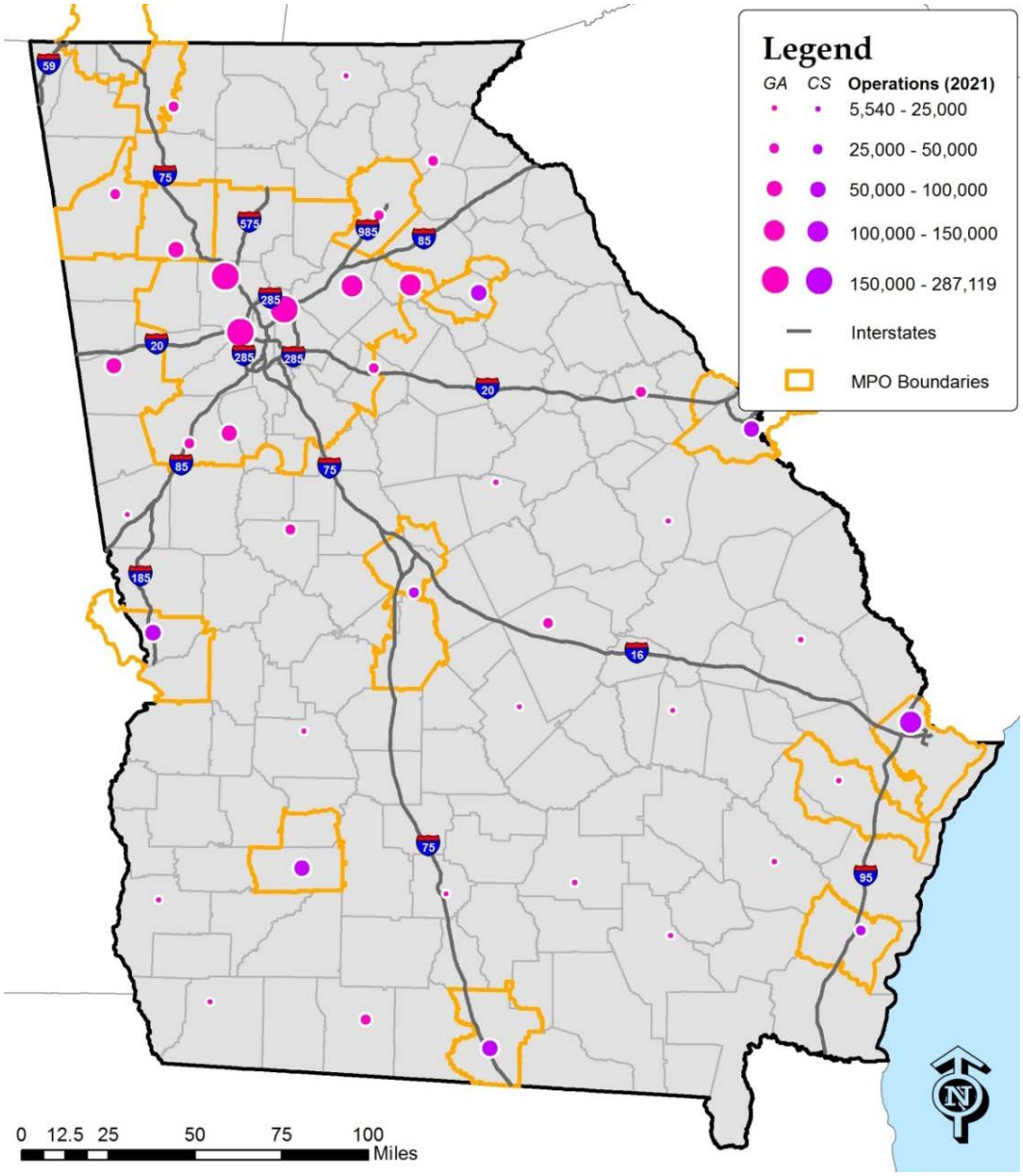
Sources: GDOT, FAA.

Figure 5.5 Total Operations at Level II Airports
Projected 2021



Sources: GDOT, FAA.

Figure 5.6 Total Operations at Level III Airports
Projected 2021



Sources: GDOT, FAA.

5.2.3 Forecast Growth

Based on information from the Georgia Aviation System Plan (GASP), the 2014 American Society of Civil Engineers (ASCE) Report Card, and the airport master plans, we analyzed growth forecasts for the general aviation industry in Georgia. Population and employment are expected to continue to rise, which will impact the anticipated aviation traffic. According to current population growth trends reported by the U.S. Census Bureau, the State of Georgia's population is growing at a median rate of 1.6 percent annually, with urbanized areas growing at a faster rate in comparison to nonurbanized areas. Georgia grew from 72 percent urban in 2000 to 75 percent in 2010 with larger metropolitan areas growing at a faster rate than the state average. General aviation airports located within proximity to urbanized areas are likely to have additional capacity demands associated with increased population and employment. Based on GDOT's GASP, general aviation operations are projected to reach 2.9 million annually by 2021, which is up from the current 2.3 million, and Georgia's airports are expected to add over 1,000 aircraft by 2021.

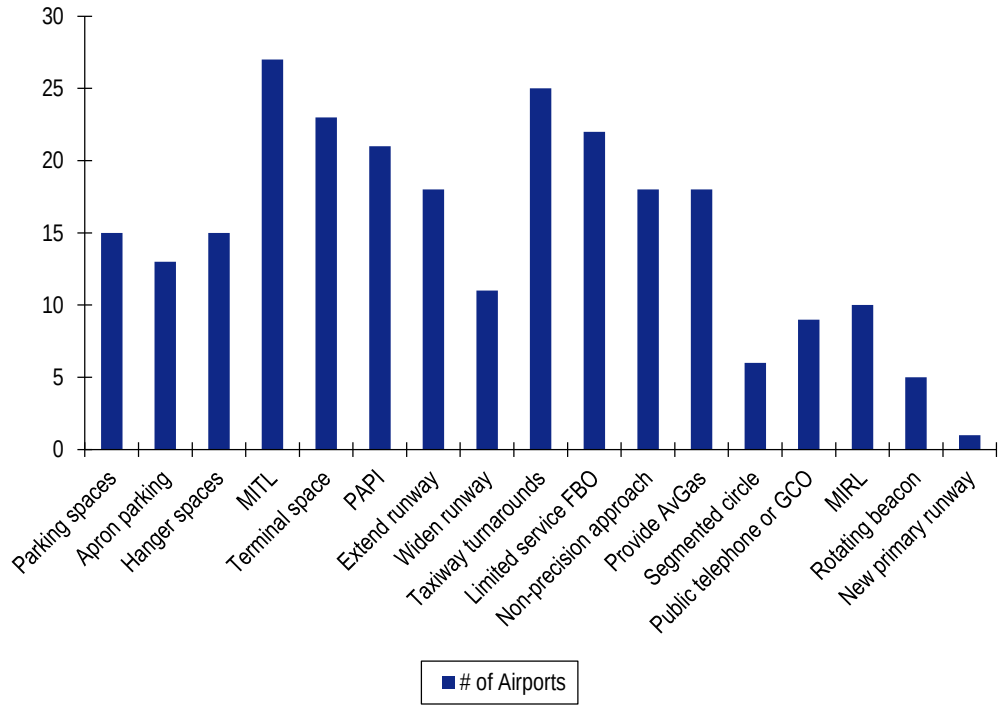
5.3 ISSUES AND DEFICIENCIES

5.3.1 Overview

One section of the airport master plans identifies the unmet requirements listed in Table 5.2 (previously shown on page 5-6). If the requirement has not been satisfied, in most cases, the level of deficiency is noted. For example, if runway length is identified as a deficiency, the length necessary to bring the runway up to the minimum standard is listed (such as "Extend Runway 500 feet"). If hanger space is shown to be short of the requirement, the amount of additional spaces is provided (such as "5 spaces"). It is imperative that Georgia airports at all levels continue to update their master plans to incorporate current performance and deficiencies and to identify future projects that will improve aviation operations and safety for the State.

Figures 5.7 (page 5-13), 5.8 (page 5-14), and 5.9 (page 5-15) show the deficiencies identified at general service airports by airport Level I, II, or III. The numbers shown on the vertical axis represent the number of airports reporting each deficiency. Discussion follows each table regarding the levels of deficiency for key requirements.

Figure 5.7 System Deficiencies Identified for Level I Airports
By Number of Airports



Source: GDOT, Airport Master Plans.

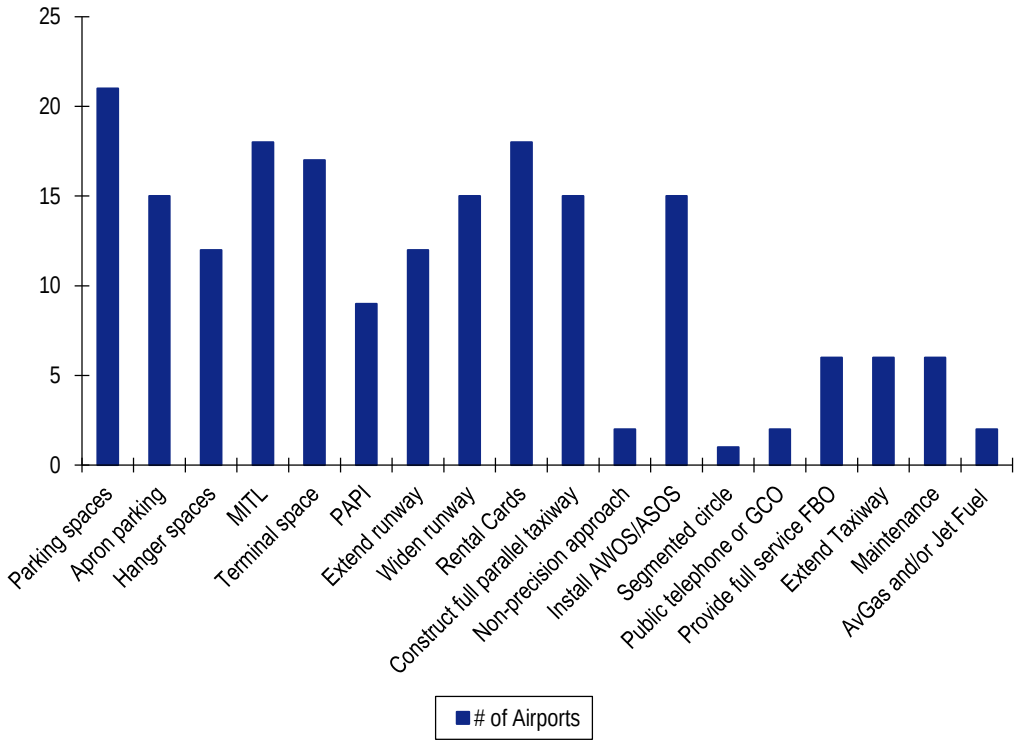
Of the Level I airports, the requirements which are most commonly not met are the following:

- 27 airports need medium intensity taxiway lighting (MITL);
- 25 airports require additional taxiway turnaround;
- 23 airports need to expand their terminal space ranging from 100 additional square feet to 750 additional square feet;
- 22 airports need limited-service fixed-based operators (FBO);
- 21 airports require precision approach path indicator (PAPI);
- 19 airports require a runway extension ranging from 100 feet at the Daniel Field airport to 1,000-1,500 feet at numerous airports, including, for example, Treutlen County, Davis Field, and Wrens Memorial;
- 15 airports need additional parking spaces ranging from 1 additional parking space at the Elbert County-Patz Field airport to 45 spaces at the Daniel Field airport;

- 11 airports need the primary runway to be widened ranging from 15 feet to 25 feet; and
- Cochran airport requires a new primary, 4,000-foot runway.

Figure 5.8 identifies the improvements that have been identified at Level II airports.

Figure 5.8 System Deficiencies Identified for Level II Airports
By Number of Airports



Source: GDOT, Airport Master Plans.

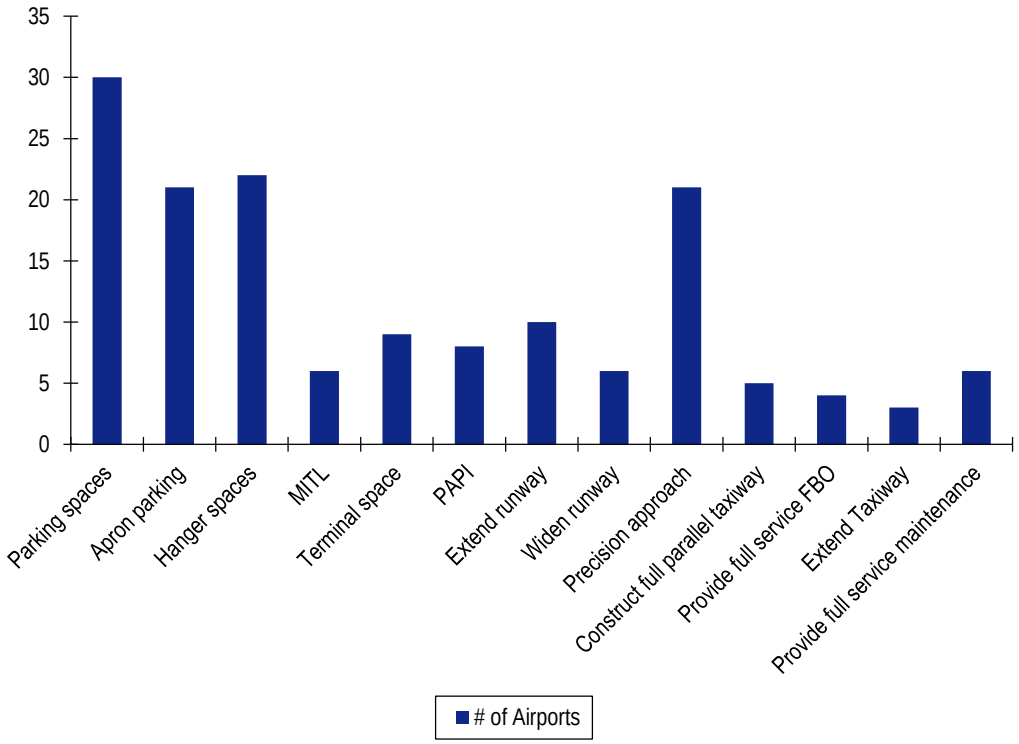
Of the Level II airports, the most common unmet requirements are the following:

- 15 airports require additional apron parking ranging from 2 to 35 spaces;
- 6 airports need an extended taxiway;
- 15 airports require a full parallel taxiway;
- 18 airports need medium intensity terminal lighting (MITI);
- 17 airports require additional terminal space ranging from 500 square feet to 2,000 square feet;
- 9 airports need precision approach path indicator (PAPI);

- 12 airports require an extension to the primary runway ranging from 100 feet to almost 1,300 feet at the Griffin-Spalding airport;
- 12 airports lack sufficient hangar spaces ranging from 2 to 77 spaces at the Clayton County Tara Field airport; and
- 21 airports do not have enough visitor parking spaces ranging from 1 space to 181 spaces.

Figure 5.9 shows the significant improvements that are needed at Level III airports.

Figure 5.9 System Deficiencies Identified for Level III General Service (GS) Airports
By Number of Airports



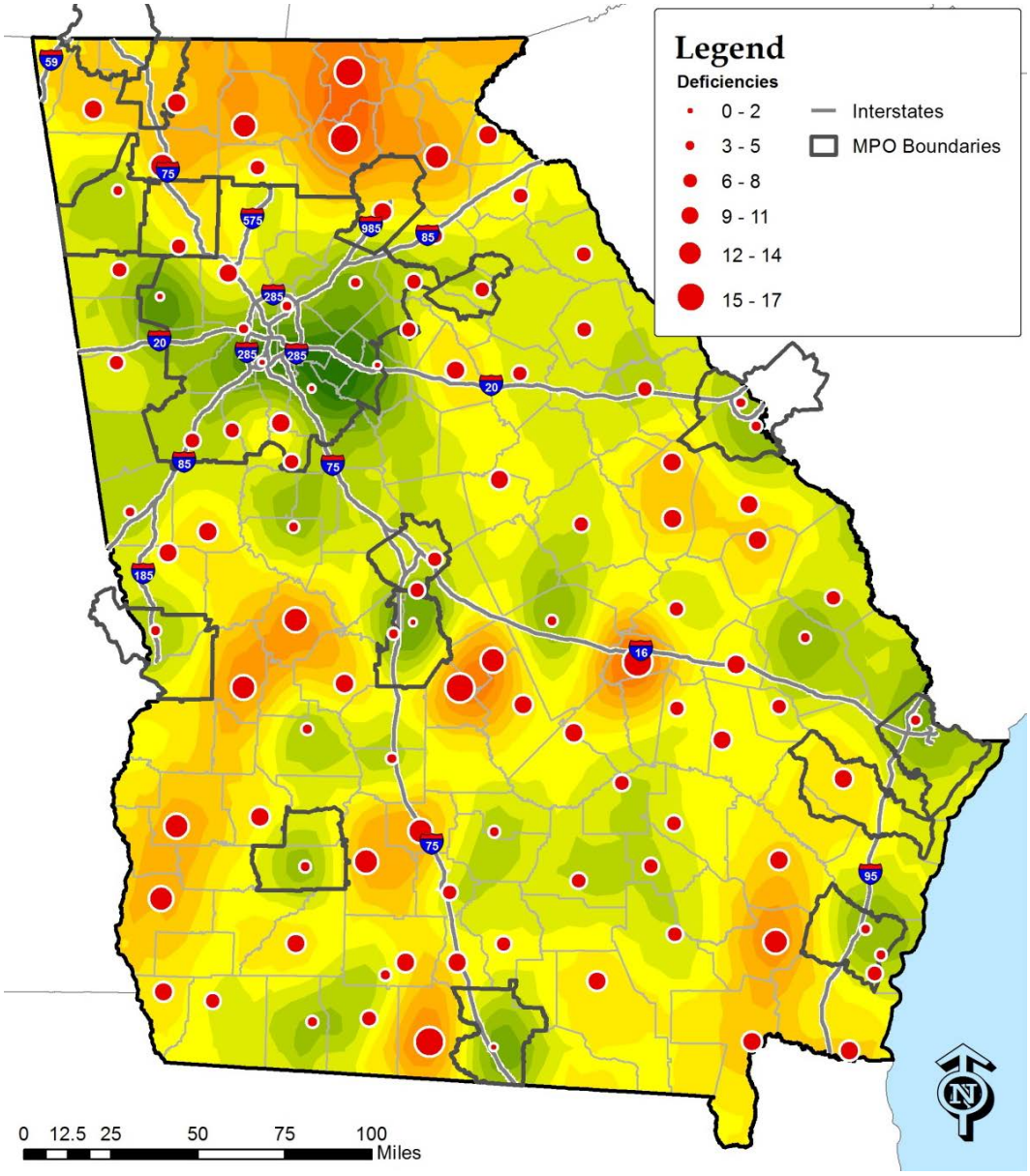
Source: GDOT, Airport Master Plans.

There are 25 deficiency types/improvements required for the Level III General Service airports. Approximately one half of the major deficiencies are shown in Figure 5.9 (previously shown on page 5-15). A summary of the critical requirements of the 34 Level III-GS airports include the following:

- 10 airports require a longer primary runway ranging from 145 feet to over 1,000 feet at the Habersham County, Blairsville, Heart of Georgia Regional, West Georgia Regional Gray Field, and Louisville Municipal airports. Additional runway length will enable these airports to meet their capacity goals, as they have already met the FAA runway requirements for their class.
- 6 airports need the primary runway to be widened by 25 feet;
- 22 airports are deficient of hangar spaces ranging from 2 spaces to 360 spaces at Peachtree DeKalb airport;
- 21 airports require technology to upgrade to precision approaches;
- 22 airports need to upgrade the medium intensity runway lights (MIRL) to high-intensity runway lights (HIRL);
- 5 airports require a parallel taxiway and 3 need the primary taxiway to be extended
- 6 airports need full aircraft service maintenance; and
- The Heart of Georgia Regional airport requires a new runway.

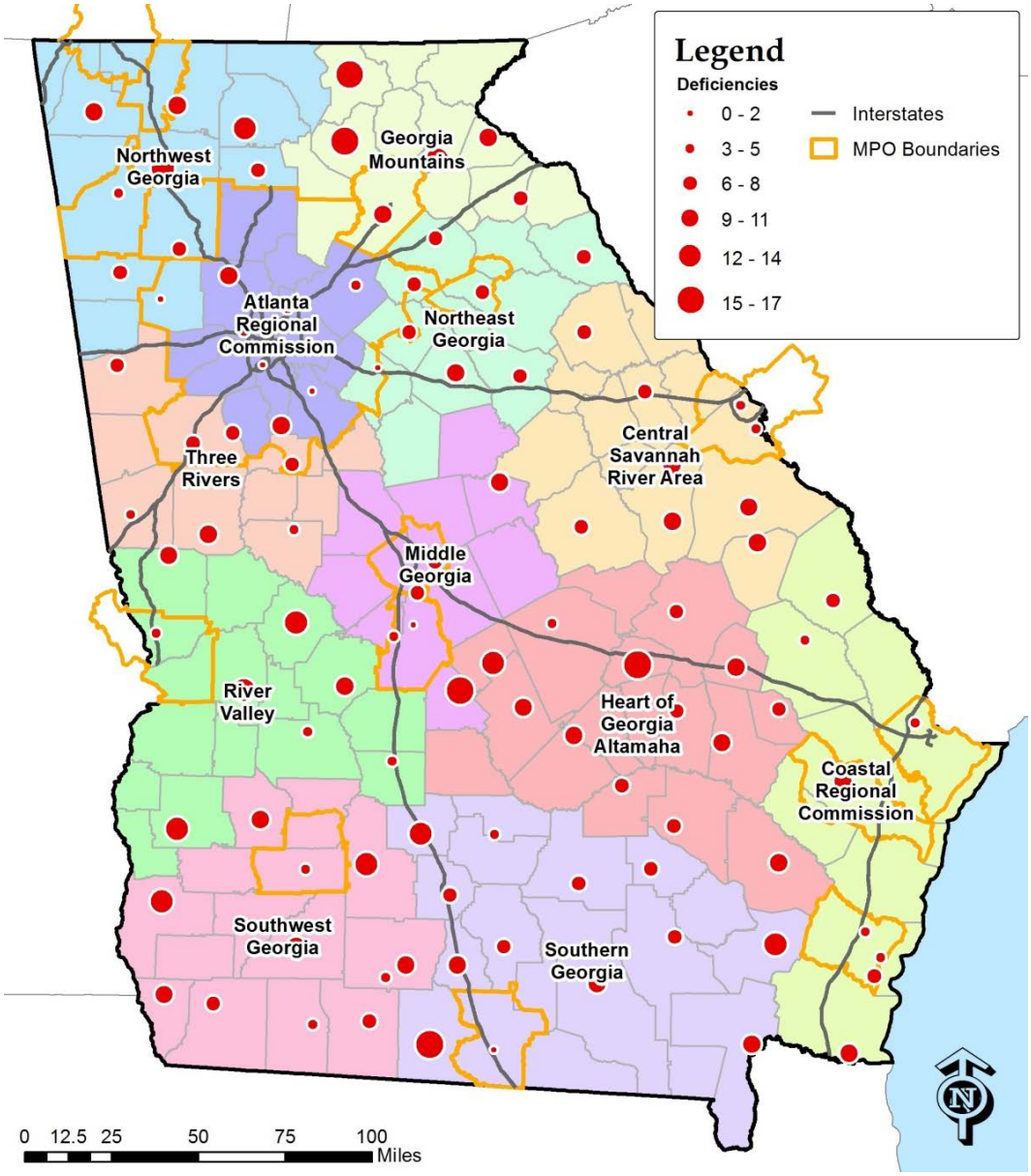
The map in Figure 5.10 (page 5-17) provides an intensity scale of deficiencies based on the number of deficiencies reported in the airport master plans. This map illustrates the locations of airports with the highest number of deficiencies. Figure 5.11 (page 5-18) shows these airports by Regional Commission.

Figure 5.10 Airport Deficiency Intensity Map



Sources: GDOT, FAA.

Figure 5.11 Airport Deficiency Intensity Map by Regional Commission



Sources: GDOT, FAA.

Table 5.4 provides information as to the number of deficiencies by Regional Commission area. The minimum, maximum, and mean numbers of deficiencies are also shown. The Regional Commissions with the greatest number of airport deficiencies are the Georgia Mountains, Heart of Georgia, Southern Georgia, and Southwest Georgia. The latter three Regional Commissions have airports located in proximity to Interstates, making these sites potentially important for business and economic development activities.

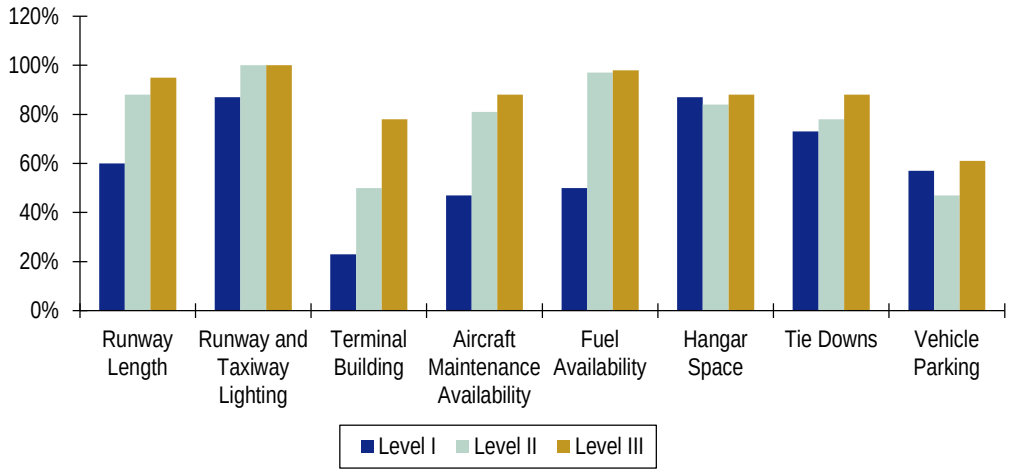
Table 5.4 Airport Deficiencies by Regional Commission

Regional Commission	Deficiencies	Minimum	Maximum	Mean
Atlanta MPO	39	0	11	5.57
Central Savannah River Area	69	3	11	7.67
Coastal Regional Commission	48	3	11	6.00
Georgia Mountains	70	8	16	11.67
Heart of Georgia Altamaha	114	3	17	8.77
Middle Georgia	40	0	15	8.00
Northeast Georgia	53	1	11	6.63
Northwest Georgia	72	1	13	8.00
River Valley	73	4	14	9.13
Southern Georgia	111	2	15	8.54
Southwest Georgia	91	3	13	8.27
Three Rivers	39	4	10	6.50

Source: GDOT, Airport Master Plans

In summary, as reported in the 2014 ASCE Report Card, 61 percent of Level I airports met the facility and service objectives in 2012; 78 percent of Level II airports; and 90 percent of Level III airports met the objectives. As shown in Figure 5.12 (page 5-20), these numbers increased from 2008 when only 49 percent, 70 percent, and 89 percent of Level I, II, and III airports met these criteria, respectively.

Figure 5.12 Percentage of Airports That Met Facility and Service Objectives in 2008 and 2012
By Airport Level

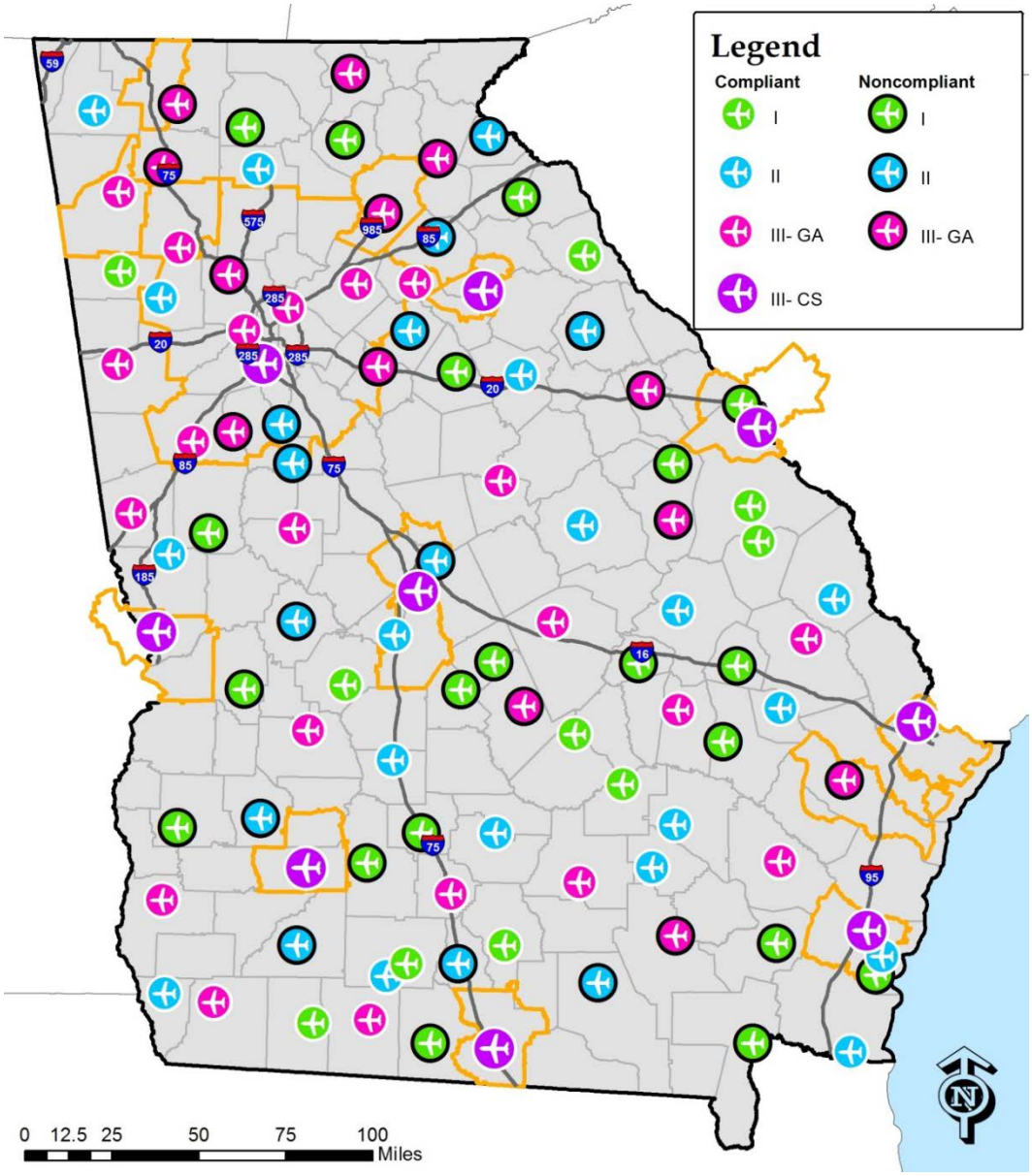


Source: GDOT ASCE 2014 Georgia Infrastructure Report Card.

5.3.2 Runway Length

Runway length is one of the critical factors that determine the level of each airport throughout the State. The runway length standard for Level I airports is 4,000 feet or greater. Level II airports require a runway length of 5,000 feet or greater; and Level III airports are required to have a runway length of 5,500 feet or greater. Figure 5.13 (page 5-21) shows all of the airports in the State and identifies those that are compliant with the minimum length for their operational level and those that are not in compliance. Currently, 62 percent of Level I airports, 88 percent of Level II airports, and 100 percent of Level III airports meet the minimum runway length.

Figure 5.13 Airports by Runway Length and Deficiencies



Sources: GDOT, FAA.

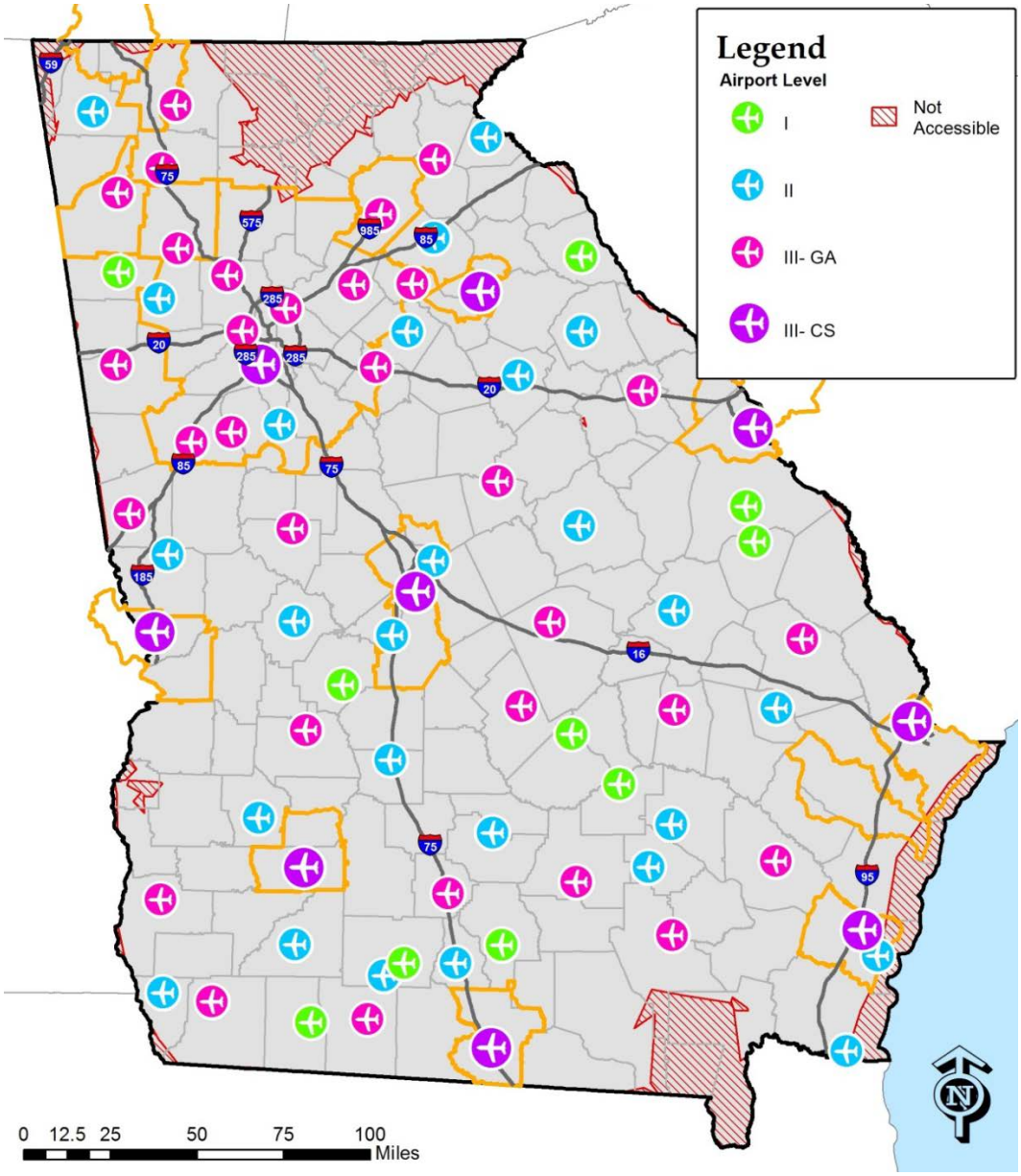
5.3.3 Airport Accessibility

In addition to runway length, the GASP established five performance measures with specific targets for each measure. This section looks specifically at accessibility or the ability for Georgia residents, visitors, and businesses to travel to the airport in specific time intervals. These targets are as follows:

- Airports with a runway of 4,000 feet/Level I airports should be within a 30-minute drive time of 96.1 percent of the statewide population. According to the ASCE 2014 Report Card, 99 percent of the existing population is located within a 30-minute drive. This is an increase from 93 percent in 2008.
- Airports with a runway of 5,000 feet/Level II airports should be within a 30-minute drive time of 89.5 percent of the statewide population. According to the ASCE 2014 Report Card, 90 percent of the existing population is located within a 30-minute drive. This is an increase from 86 percent in 2008.
- Airports with a runway of 5,500 feet/Level III airports should be within a 45-minute drive time of 98.1 percent of the statewide population, and a 60-minute drive time for the commercial service airports. According to the ASCE 2014 Report Card, 98.1 percent of the existing population is located within these drive times. This percent is the same as reported in 2008.

Figure 5.14 (page 5-23) shows the areas of the State that are not accessible based on the above criteria. As the graphic illustrates, there are very few portions of the State that do not have reasonable access to airport services. With that said, it is important to look at the population and employment data for the areas which are underserved.

Figure 5.14 Areas of the State Not Accessible Based on Airport Runway Length and Drive Time Targets



Sources: GDOT, FAA.

Based on 2010 U.S. Census data, there are 159,820 Georgia residents spread over 4,075 square miles who are not able to access airports in the State's target drive time thresholds. This data also shows that there are 98,088 housing units and 33,820 businesses that are not within the defined reasonable access to airport services. This number correlates to the area shown previously in red on the map in Figure 5.10 (previously shown on page 5-17).

Additionally, there are 185,838 residents, 115,010 housing units, and 38,774 businesses that cannot reach an airport with a 5,000-foot runway in the target drive time. This number is illustrated by the orange area on the map. The areas shown in light blue are accessible to airports of all runway levels from 5,500 feet commercial service to airports with 4,000-foot runways. Table 5.5 provides these statistics for each runway length.

Table 5.5 Socioeconomic Statistics by Airport Runway Length

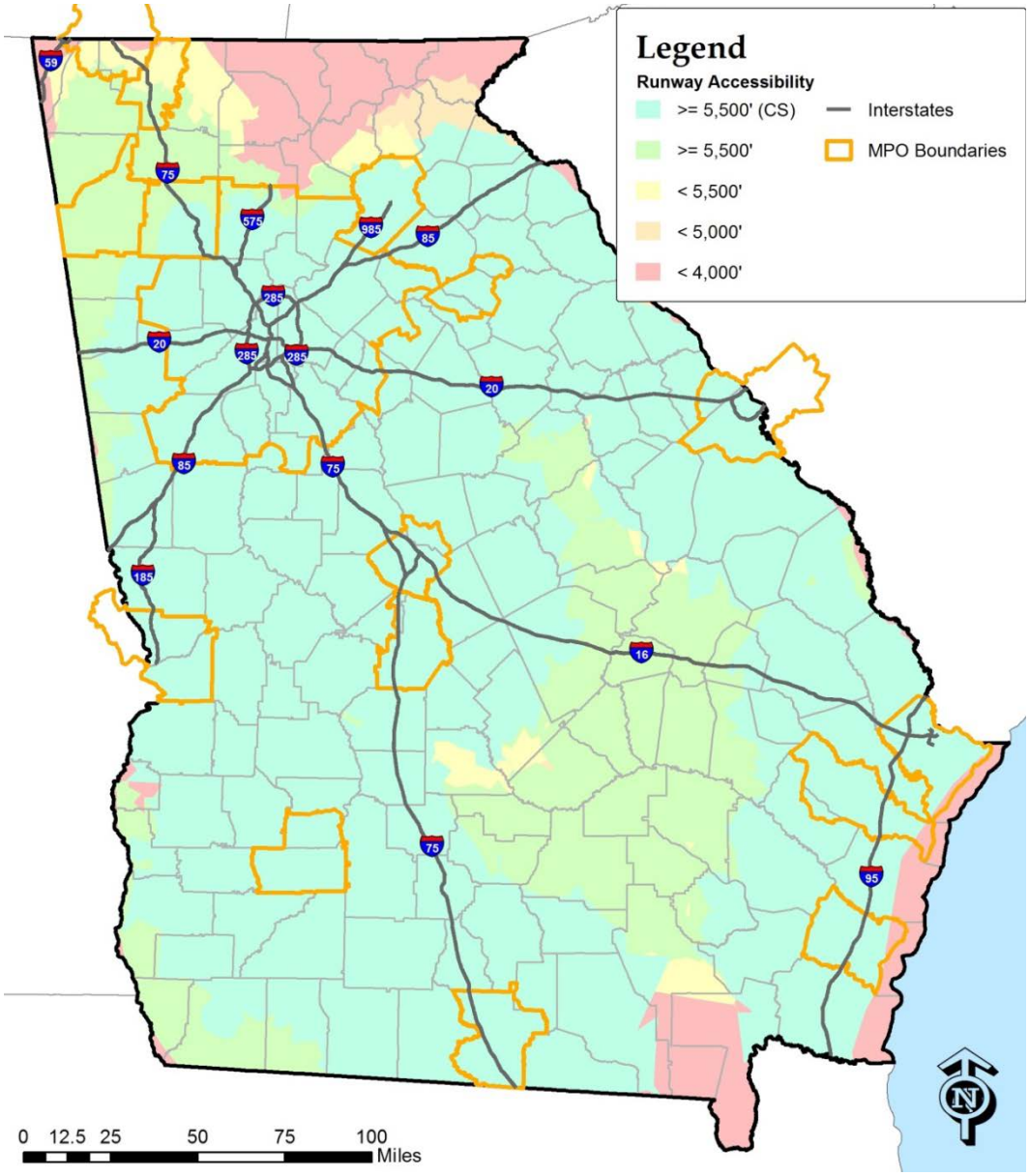
Airport Runway Length	Population	Housing Units	Employment	Area (Square Miles)
≥5,5000-Foot Runway (Level III Airport – CS)	1,152,617	526,632	323,764	17,001
≥5,5000-Foot Runway (Level III Airport – GS)	401,598	207,888	85,879	5,990
≥5,000-Foot Runway (Level II Airport)	185,838	115,010	38,774	4,487
≥4,000-Foot Runway (Level I Airport)	159,820	98,088	33,820	4,075
Statewide Totals	9,687,653	4,088,801	3,690,131	59,414

Source: 2010 U.S. Census.

Figure 5.15 (page 5-25) shows the locations which have the least access. The most significant of these is the northwest corner of the State. It is important to correlate the locations that have the least access with the statewide goals. According to the 2012 *Georgia Competitiveness Initiative Report,* the northwest corner of the State's number two highest ranking issue is to further multimodal transportation and link regional transportation options to increase access, commerce, and better connect the northeast and northwest areas of the State.

Although showing as deficient, the southeast corner of the State is located in proximity to Jacksonville, Florida and can be served by that airport. In addition, a large proportion of the area is included in the Okefenokee Swamp, which is uninhabited. The coastal areas highlighted are the marshlands located in the region.

Figure 5.15 Areas of the State Which Do Not Meet Drive-Time Accessibility Targets by Runway Length



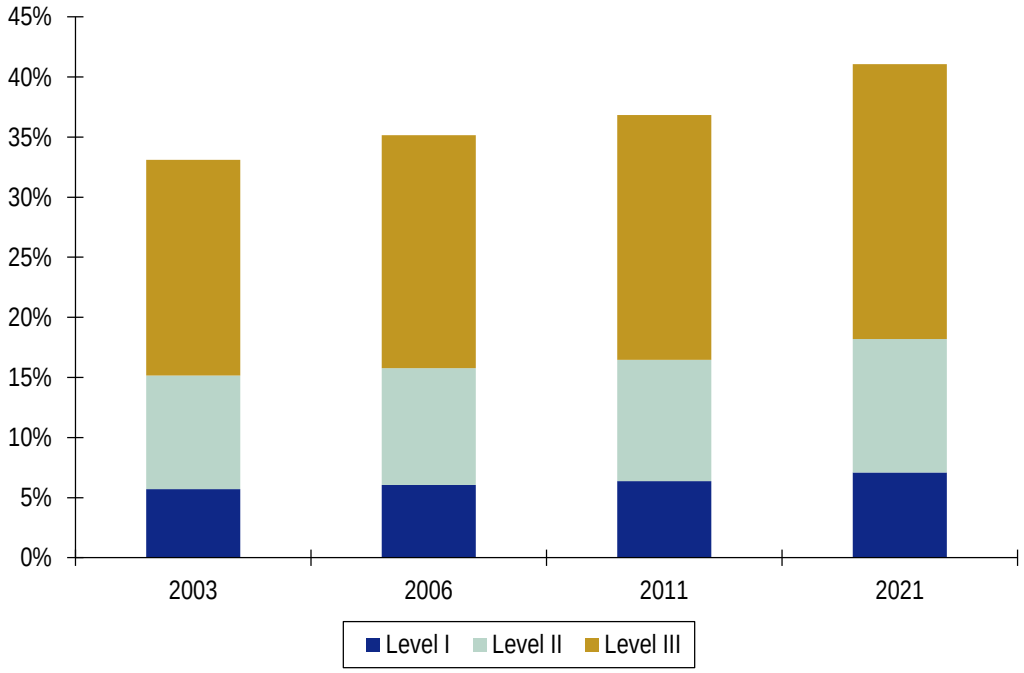
Sources: GDOT, FAA.

5.3.4 Demand/Capacity Ratio

The demand/capacity ratio provides information about capacity limitations and can assist in bridging the gap between existing capacity and future demand. According to FAA Order 5090.3B *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS),* once demand has reached 60 percent of operational capacity, an airport will see significant delays in its operations. The State has also adopted the 60 percent threshold as a benchmark for capacity in the GASP report. Capital improvement projects need to be evaluated and funded before the 60 percent threshold is reached.

As shown in Figures 5.16 (page 5-27) and 5.17 (page 5-28) and Table 5.6 (page 5-27), the overall demand/capacity ratios at all airport levels are well below the 60 percent target. The Level I airports are projected to be at 7 percent capacity by 2021. There are several airports that are expected to have a higher ratio, such as the Hawkinsville-Pulaski County and the Cornelius-Moore Field airport, but still well under the target. The demand/capacity ratio for Level II airports is expected to change by 15 percent between 2003 and 2021, but will still be well below the threshold. There are a few Level III airports that were approaching or over the 60 percent threshold in 2003, including Peachtree DeKalb Airport (85 percent), Cobb County McCollum Field (57 percent), and Fulton County Airport Brown Field (54 percent). In 2021, these three airports are projected to have ratios at a level that may cause delays. Several other airports, including Winder-Barrow and Gwinnett County Briscoe Field, are expected to be at the capacity threshold.

Figure 5.16 Demand/Capacity Ratios by Airport Level
2003-2021



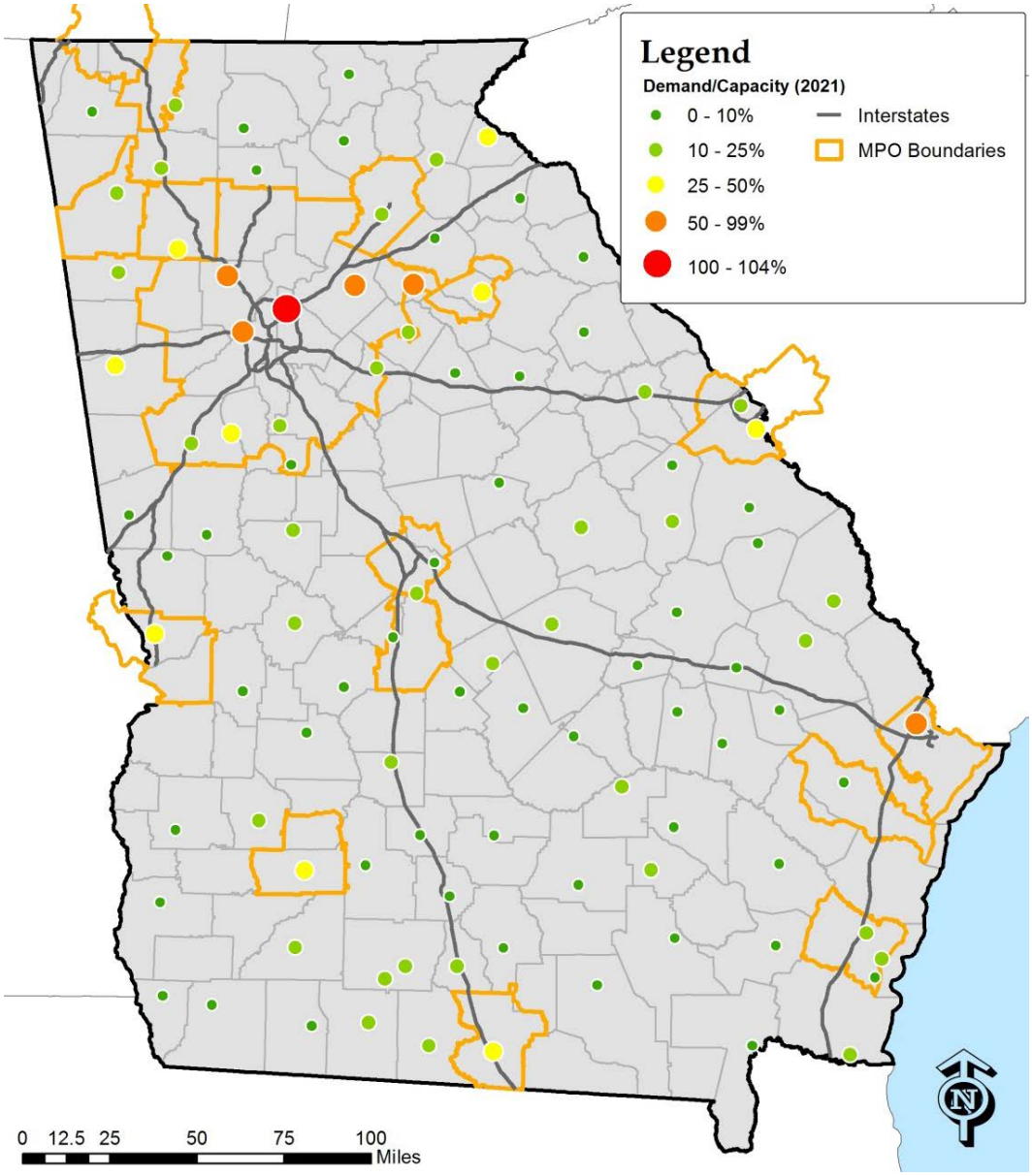
Source: GDOT, Airport Master Plans.

Table 5.6 Demand/Capacity Ratios by Airport Level
2003-2021

	2003	2006	2011	2021	Percent Change 2003-2011	Percent Change 2003-2021
Level I	6%	6%	6%	7%	10%	20%
Level II	9%	10%	10%	11%	6%	15%
Level III	18%	19%	20%	23%	12%	21%

Source: GDOT, Airport Master Plans.

Figure 5.17 Demand/Capacity Ratio at All Airports
Projected 2021



Sources: GDOT, FAA.

5.3.5 Deficiencies by Airport Level

According to the 2014 ASCE report card, only 61 percent of Level I airports met the facility and service objectives in 2012. Seventy-eight percent and 90 percent of Level II and III airports met the objectives, respectively.

Level I Airports

FACILITY AND SERVICE UPGRADES

- 27 airports need medium intensity taxiway lighting (MITL);
- 25 airports require additional taxiway turnaround;
- 23 airports need to expand their terminal space ranging from 100 additional square feet to 750 additional square feet;
- 22 airports need limited service fixed-based operators (FBO);
- 21 airports require precision approach path indicator (PAPI);
- 19 airports require a runway extension ranging from 100 feet at the Daniel Field airport to 1,000-1,500 feet at numerous airports, including, for example, Treutlen County, Davis Field, and Wrens Memorial;
- 15 airports need additional parking spaces ranging from 1 additional parking space at the Elbert County-Patz Field airport to 45 spaces at the Daniel Field airport;
- 11 airports need the primary runway to be widened ranging from 15 feet to 25 feet; and
- Cochran Airport requires a new primary, 4,000-foot runway.

POLICY AND FUNDING ISSUES

- Consideration that Level I airports could transition to Level II airports;
- There is a wide discrepancy in use among the Level I airports. With limited funding, potential capital projects and expansions at airports should include an assessment of the demand, such as the number of aircraft takeoffs and landings; and
- Total cost of facility and service improvements identified in the master plans will cost $44,180,482 by 2021.

Level II Airports

FACILITY AND SERVICE UPGRADES

- 15 airports require additional apron parking ranging from 2 to 35 spaces;
- 6 airports need an extended taxiway;

- 15 airports require a full parallel taxiway;
- 18 airports need medium intensity terminal lighting (MITI);
- 17 airports require additional terminal space ranging from 500 square feet to 2,000 square feet;
- 9 airports need precision approach path indicator (PAPI);
- 12 airports require an extension to the primary runway ranging from 100 feet to almost 1,300 feet at the Griffin-Spalding airport; and
- 12 airports lack sufficient hangar spaces ranging from 2 to 77 spaces at the Clayton County Tara Field airport.

POLICY AND FUNDING ISSUES

- There is a wide discrepancy in use among the Level II airports. With limited funding, potential capital projects and expansions at airports should include an assessment of the demand, such as the number of aircraft takeoffs and landings; and
- Total cost of facility and service improvements identified in the master plans will cost $97,391,759 in 2021.

Level III General Service Airports

FACILITY AND SERVICE UPGRADES

- 10 airports require a longer primary runway ranging from 145 feet to over 1,000 feet at the Habersham County, Blairsville, Heart of Georgia Regional, West Georgia Regional Gray Field, and Louisville Municipal airports.
- 6 airports need the primary runway to be widened by 25 feet;
- 22 airports are deficient of hangar spaces ranging from 2 spaces to 360 spaces at Peachtree DeKalb airport;
- 21 airports require technology to upgrade to precision approaches;
- 22 airports need to upgrade the medium intensity runway lights (MIRL) to high-intensity runway lights (HIRL);
- 5 airports require a parallel taxiway and 3 need the primary taxiway to be extended;
- 6 airports need full aircraft service maintenance;
- The Heart of Georgia Regional airport requires a new runway; and
- Several airports are over the demand/capacity 60 percent threshold with additional airports projected to be near or over the threshold by 2021.

POLICY AND FUNDING ISSUES

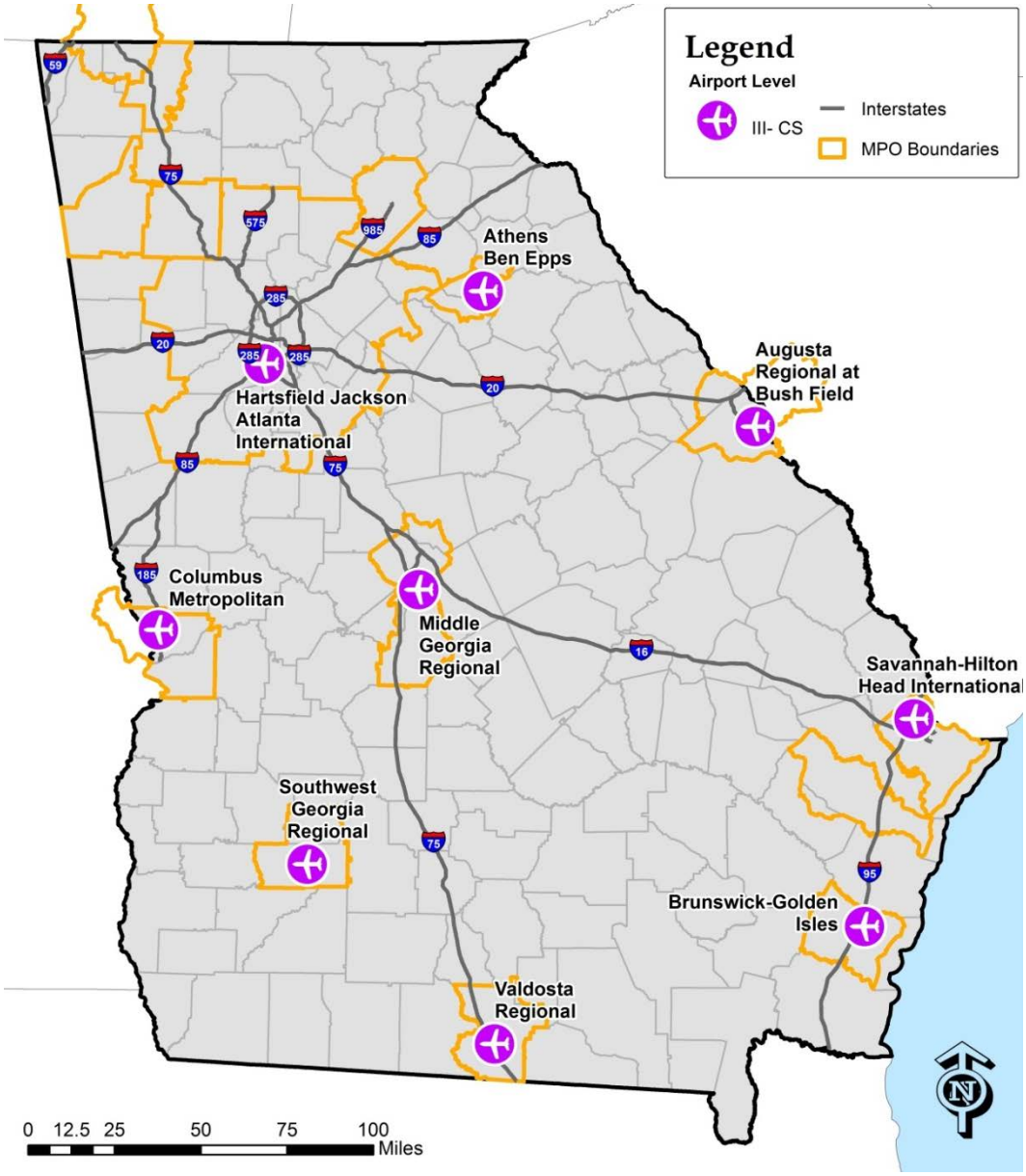
- With limited funding, potential capital projects and expansions at airports should include an assessment of the demand, such as the number of aircraft takeoffs and landings;
- Consider using Level II airports to help offset demand at Level III airports that are exceeding capacity thresholds; and
- Total cost of facility and service improvements identified in the master plans will be $105,941,180 in 2021.

5.4 COMMERCIAL SERVICE AIRPORTS

5.4.1 Inventory of Facilities

There are currently nine commercial service airports in Georgia: Hartsfield Jackson Atlanta International; Southwest Georgia Regional; Athens Ben Epps; Augusta Regional at Bush Field; Brunswick-Golden Isles; Columbus Metropolitan; Middle Georgia Regional; Savannah-Hilton Head International; and Valdosta Regional. The Federal Aviation Administration's (FAA) standard for a commercial service facility is that there is scheduled passenger service with at least 2,500 passenger boardings each calendar year and precision approach landing technology. Additionally, GDOT requires that these airports have a runway that is at least 5,500 feet in length and 100 feet in width. These facilities must support the business economy in their region in a significant manner. These nine airports are shown on the map in Figure 5.18 (page 5-32).

Figure 5.18 Public Commercial Service Airports



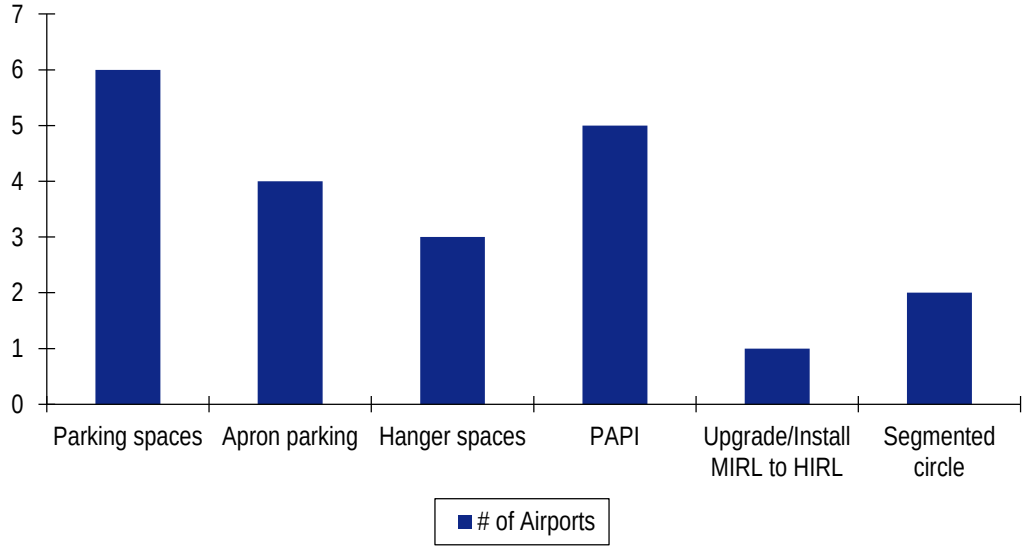
Sources: GDOT, FAA.

5.4.2 System and Facility Deficiencies

Similar to the general service airports, the commercial service airports are required to have an up-to-date master or service plan. One section of these plans identifies minimum service and facility requirements as listed in Figure 5.19 (page 5-33). If the requirement has not been satisfied, in most cases, the level of deficiency is noted. For example, if apron parking space is shown to be short of the requirement, the amount of additional spaces is provided (such as "10 Spaces"). There are six categories of system and facility deficiencies for the Level III

commercial service airports (excluding HJAIA) which relate to aircraft and vehicle parking, precision approach technology (PAPI), runway lighting, and a visual indicator landing system for the airports without an operating control tower.

Figure 5.19 System Deficiencies Identified for Level III Commercial Service Airports by Number of Airports
Excluding HJAIA



Source: GDOT, Airport Master Plans.

Six of the eight airports require additional vehicle parking ranging from 2 spaces to 204 spaces at the Columbus Metropolitan airport. The Savannah-Hilton Head International Airport requires 166 additional parking spaces; and its aircraft parking, apron, and hanger spaces were also reported to be deficient of the number required to support the based aircraft. The Middle Georgia Regional airport and the Southwest Georgia Regional airport both require 4 additional apron spaces. The Athens Ben Epps airport and the Columbus Metropolitan Airport require 16 and 59 additional apron spaces, respectively. The Athens Ben Epps, Middle Georgia Regional, and Brunswick-Golden Isles airports lack 27, 49, and 18 hanger spaces respectively.

Based on FAA guidelines, all commercial service airports are required to have precision approach path indicator (PAPI) technology. The PAPI is a visual aid which assists pilots in maintaining a correct approach during landing. The PAPI is typically located beside the runway about 300 meters beyond the landing strip. In spite of this requirement, six of the eight airports did not have PAPI at the time their master plan was written. The airports which already have this technology are the Savannah-Hilton Head International Airport and the Columbus Metropolitan Airport.

Additional system and facility deficiencies include a required upgrade from medium-intensity to high-intensity runway lighting at the Athens Ben Epps Airport, and the need for a segmented circle visual indicator system at the Middle Georgia Regional and Columbus Metropolitan airports.

The master plan for HJAIA is referred to as the Demand/Capacity Analysis and Facility Requirements Summary for the Hartsfield-Jackson Atlanta International Airport. This report was completed in September 2013 and is based on data collected in 2012 and other recent information. The format of this master plan differs from that used by the other airports, making a direct comparison difficult. With that said, key deficiencies noted for HJAIA include the following:

- Numerous terminal areas are already at capacity or will be at capacity in future years, including, but not limited to, domestic security checkpoint and queuing areas, domestic and international baggage claim, concourse holding rooms where passengers wait to board plans, Plane Train, and concession shops.
- Roadway, parking, and ground transportation areas currently are experiencing low levels of service, especially the south departure terminal curb, the domestic passenger parking lots, the employee parking lot, and curbside taxi and shuttle parking.
- Aircraft maintenance and storage areas as well as flight kitchens will require additional space for increased capacity as early as 2016. Cargo facilities will require expansion by 2031.

5.4.3 Use

Operations at the commercial service airports are vital to the State's economy and are analyzed in terms of the number of aircraft, operations, enplanements, and demand/capacity ratios.

Based on information in the master plans, the number of based aircraft is expected to increase by around 20 percent from 2003 to 2021 (excluding HJAIA). This projection results in an additional 21 to 169 airplanes at the eight commercial service airports. Augusta Regional Airport is expected to have the fewest number of planes and Savannah-Hilton Head International, Athens Ben Epps, and Columbus Metropolitan will have 143, 145, and 169 planes, respectively, in 2021.

According to the master plans, the number of takeoffs and landings is expected to increase by close to 150,000 from 2003 to 2012 (excluding HJAIA). All of the airports except Middle Georgia are projected to increase operations by at least 27 percent. Operational data from Middle Georgia shows an increase of only 10 percent during this time period. Operations at these airports declined between 2008 and 2012 because of the recession. However, given the resurgence of the economy, there is no reason to believe that an increase in operations going forward is not possible.

The demand/capacity ratio ranges between 14 and 66 percent in 2021 with several of the commercial service airports showing a ratio around 30 percent. Savannah-

Hilton Head is at 66 percent which is above GDOT's 60 percent target. A demand management strategy could make better use of underutilized, smaller airports. Airport expansions, where feasible, may be another option.

5.4.4 Regional and National Comparison of Enplanements

Georgia's nine commercial airports handled approximately 1.2 million aircraft operations and more than 47 million enplaned passengers in 2012. This total includes over 44 million passengers at Hartsfield Jackson International Airport (HJAIA) which is the world's busiest airport. Table 5.7 shows the number of enplanements in 2012 at the nine commercial airports, including at HJAIA.

Table 5.7 Commercial Service Airport Enplanements
2012

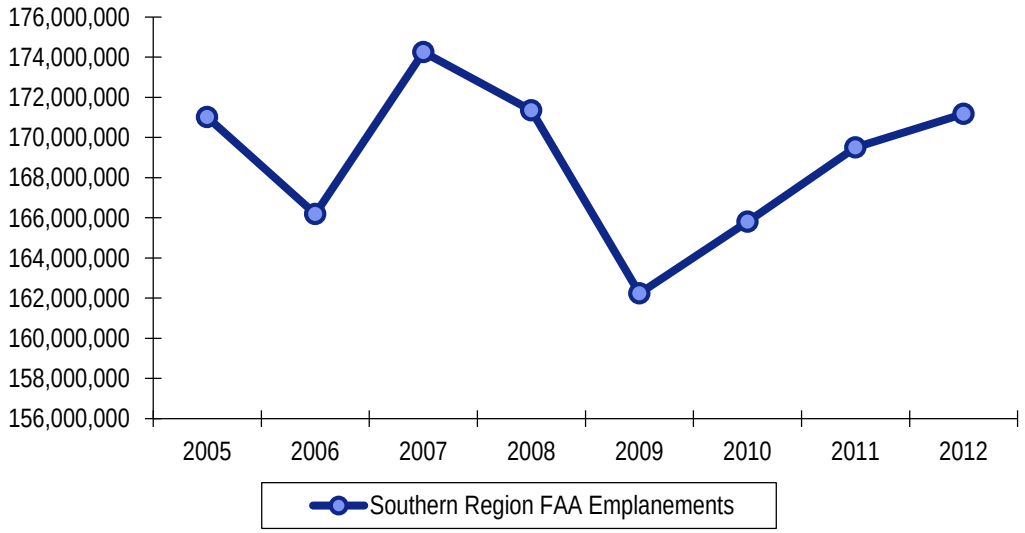
Airport Name	2012 Enplanements
Hartsfield-Jackson Atlanta International	45,798,809
Southwest Georgia Regional Airport	33,494
Ben Epps	1,694
Augusta Regional at Bush Field	271,691
Brunswick-Golden Isles	31,284
Columbus Metropolitan	74,336
Middle Georgia Regional	843
Savannah-Hilton Head International	789,256
Valdosta Regional	37,030
Total	47,038,437

Source: FAA Passenger Enplanements Report.

A comparison of FAA national enplanement data shows that The Southern Region, comprised of Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, and Virginia, is performing consistently with the national performance trends. As shown in Figures 5.20 (page 5-36), 5.21 (page 5-36), 5.22 (page 5-37), and 5.23 (page 5-37), trends indicate that the average growth nationwide in enplanements from 2005 to 2006 was approximately 4 percent; however, the Southern Region's enplanements were down by nearly 3 percent. From 2006 to 2007, a significant increase in enplanements and airport performance occurred with growth reported for every region in the U.S. Following this significant growth period, the earliest signs of the economic downturn became evident in the nationwide decline of reported enplanements in 2008. The dramatic decline continued in 2009 reaching the industry's lowest level of enplanements in the past decade. The industry has begun a slow upward trend in enplanements with the Southern Region showing growth for three consecutive years. The State of Georgia recovery trends are

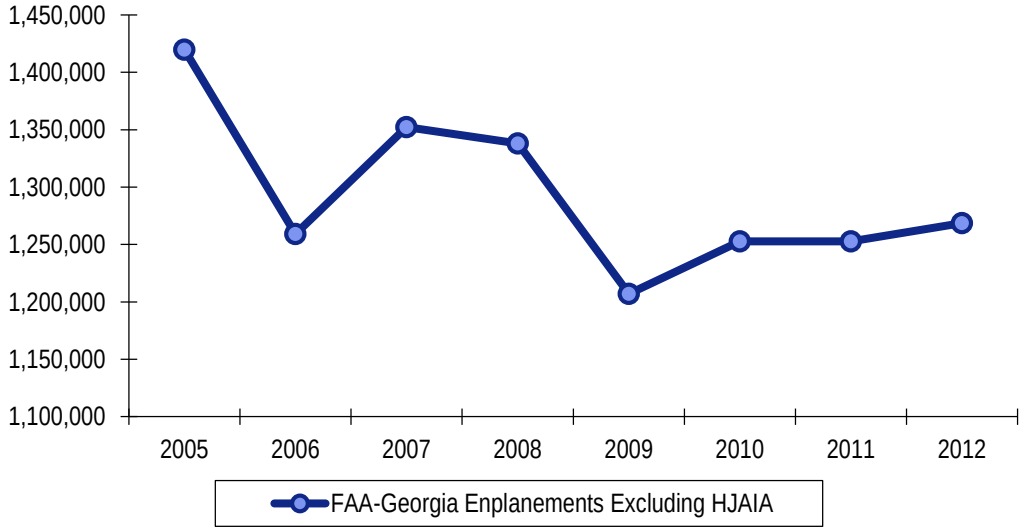
consistent with the national trends with the exception of Hartsfield Jackson Airport which is reporting greater-than-average recovery rates from 2010 to 2012.

Figure 5.20 FAA Southern Annual Regional Annual Enplanements



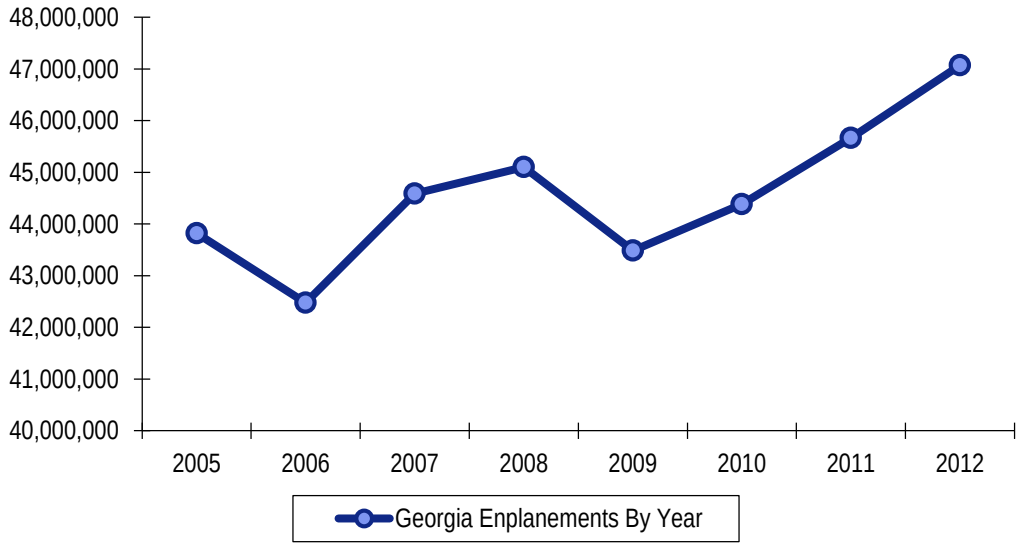
Source: FAA Enplanement Data, 2005-2012.

Figure 5.21 FAA Georgia Annual Enplanements
Excluding HJAIA



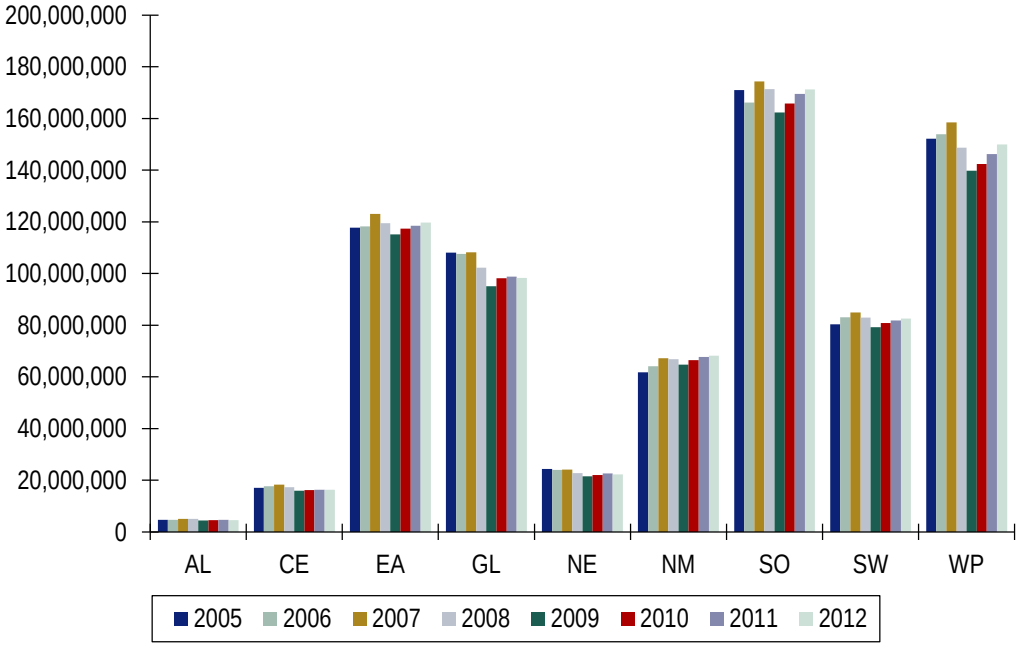
Source: FAA Enplanement Data, 2005-2012.

Figure 5.22 FAA Georgia Annual Enplanements
Including HJAIA



Source: FAA Enplanement Data, 2005-2012.

Figure 5.23 FAA Georgia Annual Enplanements
Including HJAIA



Source: FAA Enplanement Data, 2005-2012.

Key: FAA Region Codes: AL (Alaska); CE (Central); EA (Eastern); GL (Great Lakes); NE (New England); NM (Northwest Mountain); SO (Southern); SW (Southwest); and WP (Western Pacific).

5.4.5 Forecast Growth

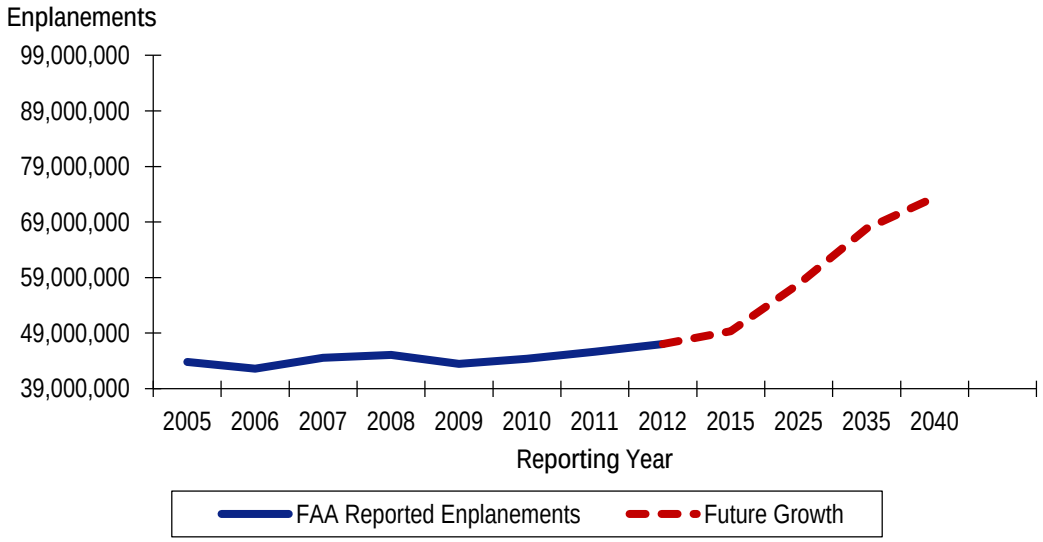
Based on FAA enplanement data, projections of demand growth for the commercial aviation sector can be grouped into three scenarios utilizing reported enplanement data from 2005 to 2012.

- Scenario 1 – Straight-line projection from 2005 to 2012 assumes an average growth rate of 0.1 percent nationally and 0.9 percent for the State of Georgia;
- Scenario 2 – Median growth rate projection from 2005 to 2012 at a rate of 0.5 percent nationally and 1.6 percent for Georgia; and
- Scenario 3 – Trending recovery growth from 2010 to 2012 at a rate of 1.8 percent for the U.S. and 2.7 percent for Georgia, assuming another economic downturn is not likely to occur.

Scenario 1 is the most conservative and assumes that projecting into the year 2040 there will be a global economic downturn at some point in time. This results in a relatively flat growth projection for both the State of Georgia and the U.S. Scenario 3 projects over 25 years of postrecession levels of enplanement growth resulting in a high rate of growth for the aviation industry. This scenario is not considered likely due to historic trends of recovery followed by periods of sustained levels of performance and some periods of decline.

Scenario 2 appears to be the most realistic as it shows a median growth rate that recognizes the historic levels of the recent decline, but is most consistent with the overall historic system performance. If the Georgia aviation system follows the median growth scenario, it will likely show an increase in enplanements of 1.6 percent annually. Figure 5.24 shows this growth trend.

Figure 5.24 Commercial Service Enplanement Projections Given a Median Growth Rate
1.6% Annually



The National Plan of Integrated Airport Systems (NPIAS) is a report developed by the FAA biannually and identifies all commercial service, reliever, and selected general aviation airports in the United States that are considered significant to the national air transportation system and eligible for Federal grants under the AIP. It also includes estimates of AIP funding needed to advance infrastructure and development projects to bring airports up to current design standards and increase capacity at airports experiencing congestion. The 2013-2017 NPIAS report utilized enplanement data from 2010-2011 and identified over $42.4 billion in development costs needed to advance the national aviation system. Georgia airports have identified over $2.2 billion in projects that are considered critical to improving safety and performance of airports throughout the State over the next five years. The most significant component to continued growth of the Georgia Aviation System is a strong economy and continued State and Federal funding for capacity and safety projects.

5.5 AIR CARGO

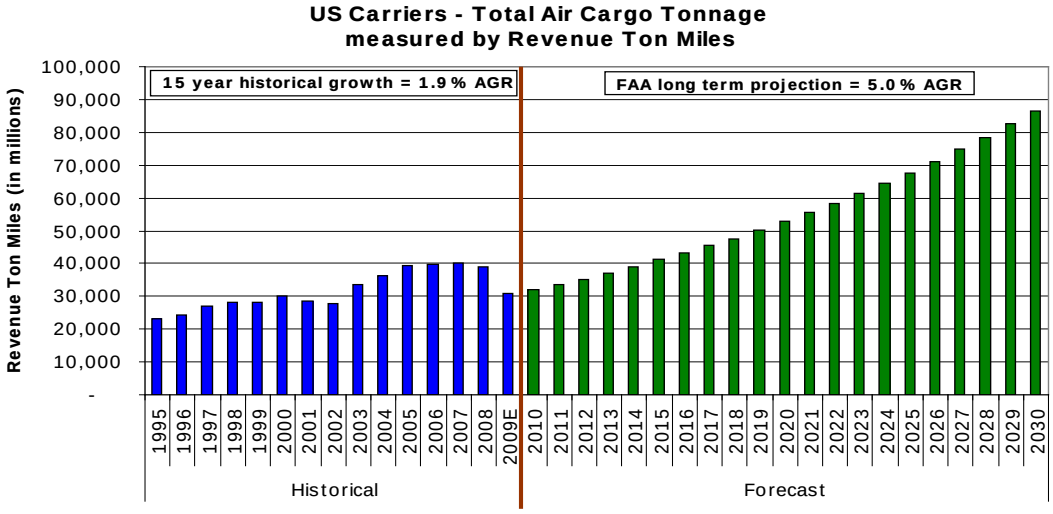
5.5.1 Inventory of Facilities

There are currently air cargo operations at three airports in Georgia – Hartsfield-Jackson Atlanta International Airport (HJAIA), Savannah-Hilton Head International Airport, and Southwest Georgia Regional Airport in Albany. HJAIA is a major U.S. and international cargo airport, while operations at the other two airports are relatively small.

5.5.2 Use

Air cargo accounts for only about 1 percent of total freight moved in Georgia as measured by both weight and value. While this overall share is not projected to change through 2040, forecasts predict a tripling of air cargo volumes over the next 25 years. Air cargo tends to be high-value, time-sensitive material which can be critical to growth industries such as services, technology, biomedical, and others. The Federal Aviation Administration (FAA) data in Figure 5.25 (page 5-40) depicts historic and forecast air cargo growth in the U.S. The historical aggregate growth rate (AGR) from 1995 to 2009 was 1.9 percent annually. This historic growth rate was tempered by the 9/11 incidents and the severe economic recession of 2008 to 2009. The FAA forecasts annual AGR from 2010 to 2030 to be 5.0 percent nationwide. The growth could be slightly greater or less for Atlanta, but it is a reasonable planning guide. The long-term FAA growth forecast is also in the range of the International Air Transport Association (IATA) and Boeing forecasts for cargo growth of 4 percent to 6 percent.

Figure 5.25 FAA Forecast Cargo Growth



Source: FAA Aerospace Forecasts.

5.5.3 Air Cargo Deficiencies

Hartsfield-Jackson Atlanta International Airport (ATL)

The deficiencies of the Atlanta airport in regard to current and future air cargo volumes at the airport can be categorized into the following three topics:

- Need for increasing the number of air cargo destination options;
- Capacity of on-airport infrastructure and facilities; and
- Truck access to the airport.

Need for Increasing the Number of Air Cargo Destination Options. The expansion of Delta's international passenger operations and the acquisition of Northwest's routes provide expansion opportunities in the global market and make the Airport increasingly attractive. Additionally, the purchase of Airtran by Southwest Airlines will also increase the number of air cargo destinations as Airtran did not have air cargo operations, but Southwest Airlines does. However, significant growth is most easily achieved through the addition of dedicated freighter operations by the various cargo carriers such as FedEx and UPS. One additional daily Boeing 747-400 freighter could add as much as 40,000 tons a year to the airport's total cargo volume (a seven percent increase based on 2009 figures). A related issue raised by the regional cargo community is a need for additional wide-body aircraft international lift capacity to Europe and Asia.

Capacity of on-airport infrastructure and facilities. The existing airport infrastructure and facilities can accommodate a 20 to 30 percent growth in volumes minimizing the need for near-term capital investment. There are, however, issues with the on-airport roadways and landside infrastructure for cargo.

Atlanta's South Cargo Complex was developed to provide the facilities and services that the recent growth in air cargo operations has required. However, with 75 percent of the development in place, the following deficiencies have emerged:

- Truck traffic is congested in part by the layout of the landside infrastructure.
- There is virtually no space available for truck queuing. This deficiency, together with the layout limitations, frequently results in delays for trucks accessing the facilities.
- There is insufficient ramp capacity to effectively handle future peak requirements of the international freight carriers, proximate to the cargo facilities. As the market recovers and grows, and assuming that the market focus remains the same, the lack of available apron for cargo aircraft could hamper future business growth. The identification of a new development site on the Airport's south side for both cargo buildings and aircraft ramps should be given strong consideration over the coming years.

The roadway congestion at the FedEx facility on the Airport's north side will constrain FedEx growth and operational efficiency, and increase its costs. There is insufficient road and parking capacity at this location creating a 1,500-foot queue of holding trucks on the local road network. Modification of the access road to the North Cargo Complex (FedEx) would have an immediate benefit on operations, safety, and emissions and should be evaluated and considered for implementation. It should be noted, however, that this has not been raised by the airport management or by FedEx, the primary tenant at the location.

Delta is using only about 50 percent of its facility's capacity for cargo operations. There is sufficient room in and proximate to the South Complex for the addition of new facilities and aeronautical infrastructure, as will be needed based on the long-term forecast for air cargo growth. No improvements to the South Complex should be considered until there is a clear market demand. The reduced freighter traffic has mitigated this need for the present. Additionally, the lead time to build new on-airport facilities is significantly shorter than the lead time needed to build a new roadway. Therefore, it is appropriate to wait for demand to materialize prior to construction of new on-airport facilities. The actual amount of future demand for aircraft parking will depend on future demand, aircraft size, and carrier scheduling. Assuming a 50 percent increase in freighter demand, this could be as much as 13 positions and 800,000 square feet of apron over the next 40 years.

Additionally, according to the 2014 *HJAIA Master Plan Demand/Capacity Analysis and Facility Requirements Summary,* long-term requirements for on-airport integrator/express facilities will exceed existing capacity and need to be addressed.

Truck access to the airport. The transport vehicles for delivering air cargo to their final origins and destinations are trucks that can range from specialized vans to

70-foot tractor-trailers. The state and local roadways nearby the Atlanta airport were considered satisfactory by the cargo community. There are no reported choke points nor were there issues raised about roadway geometry. The main concern for truck operators is adequate queuing space for trucks at the cargo facilities as they wait for drop-offs and pick-ups.

However, if cargo volumes grow at the FAA forecast rate, there will be a substantial increase in truck traffic over the next 40 years. New facilities with improved landside capacity will be essential. This will require additional capacity on the access roads to the Atlanta airport, Loop Road, Aviation Boulevard, and Henry Ford Avenue. Modifications to the North Loop Road and the entire Loop Road in general are difficult given the surrounding roadway infrastructure of the North and Midfield Cargo Complexes. Additionally, the ability to accommodate long-term airport access issues will be impacted due to anticipated passenger growth at the airport. The primary access roads to the Airport could be faced with substantial growth in automobile traffic. This will occur primarily at Exits 71 (Riverdale Road) and 72 (Camp Creek Road) off of I-85 and Exit 61 (Atlanta Airport/Montgomery) off of I-285. One of the primary challenges of airports today is the delay factor caused by regional traffic.

Savannah-Hilton Head International Airport

Because of the proximity of this airport to the Port of Savannah, the roadways surrounding the Savannah International Airport are sometimes congested. This is particularly true for Bourne Avenue which serves as an access road for both the airport and the marine port. However, staff at the Savannah airport believe that the implementation of the many last-mile projects for the Port of Savannah will significantly reduce the occurrence of congestion along the local roadways in the near term. These projects are currently included in the Chatham County Metropolitan Planning Commission's Long-Range Transportation Plan for the Savannah region.

The Savannah airport currently has sufficient facility and infrastructure capacity to accommodate near-term growth. Additionally, there is the capability to handle any unanticipated surges in air cargo volumes. There is also no near-term need to extend the runways at Savannah, because international air cargo in Georgia is handled only through HJAIA. Savannah's role as a domestic airport (from a cargo perspective) is likely to remain unchanged. The airport management has expressed interest in expanding its cargo operations, but has not yet implemented any specific strategies to increase cargo, and was not currently in a position to provide details of potential expansion plans.

The primary aircraft for the Savannah airport is the regional jet which does not have the cargo space to handle large volumes of belly air cargo. About 95 percent of the total cargo volumes at the airport are carried by FedEx. Representatives of FedEx stated that they are comfortable in their operation and expect to continue to experience modest growth. It is likely that this growth will be fairly closely tied to rates of growth in the population and business sector in the greater Savannah

region. Ensuring that FedEx has the facilities and necessary apron for aircraft over the long-term should be the primary concern of the airport, but there appear to be no issues with either currently.

Over the longer term, the Savannah airport is likely to experience growth slightly less than the 4 to 6 percent that the FAA has forecast for air cargo across the U.S. This is due in large part to the fact that the Savannah airport primarily carries domestic air cargo, and international air cargo generally has had a higher growth rate than domestic air cargo. The airport is also likely to be able to easily handle this long-term growth based on its current 40 percent vacancy in the larger of its two air cargo buildings. Additionally, there are multiple location options to expand the on-airport storage and aircraft parking needed to accommodate significant growth at the airport.

The larger long-term concern for the airport would be the operation of access routes to handle increased truck and auto volumes as the airport expands. In particular, the airport is located within two miles of the main entrance gates for the Port of Savannah which currently generates over 5,000 truck trips per day and is also forecast to have rapid growth over the next 40 years. Both the airport and the marine port are located within a small subarea bounded by I-95 to the north and west, I-16 to the south, and the Savannah River to the east. The subarea also includes several million square feet of distribution center facilities which also generate a large volume of truck and auto traffic onto the local network. The number of trucks from the Savannah airport is not likely to significantly increase local congestion. It is estimated that the Savannah airport generates no more than 20 trucks per day. However, congestion from the other activities in the subarea has the potential to significantly reduce the accessibility of the airport for trucks handling air cargo. Additionally, the lack of a truck route network in the subarea complicates the process of identifying ideal routes for truck traffic to get in, out, and around the subarea.

Southwest Georgia Regional Airport

The cargo operations at the Albany airport primarily consist of a small UPS operation combined with a smaller military shipping presence. The length of the runway is inadequate for large commercial aircraft, but meets the current needs of these two customers. UPS has expressed interest in flying larger planes to this airport, and based on this request the Albany airport is considering lengthening the runway to allow for this capability.

Representatives of UPS in Albany have indicated that they are satisfied with the facilities and infrastructure. There are no strategic issues related to the air cargo activity at the airport. The cargo operation is considered to be successful and should continue to be so unless there is a strategic shift on the part of UPS to move to a ground operation for the region. There are no indicated access issues, and given the relatively small volumes of ground traffic associated with the air operation, there is no perceived need for roadway improvements in the near term.

Over the long term, there is the potential for significant growth of both the general cargo and the military cargo based on the national air cargo forecasts. However, given the low levels of truck volumes currently served by the airport, even a tripling of air cargo would result in only 50 more trucks per day accessing the facility. This volume can be easily handled by the local access roads. The on-airport footprint of the airport also provides ample room for expansion of warehouse space and parking of aircraft. One concern which may need to be addressed in the Albany region is the routing of these trucks through downtown and residential areas in Albany. The airport is currently located on the southwest side of Albany, and trucks that access the airport via I-75 will need to travel through residential or commercial areas. To ensure that conflicts between the airport truck traffic and local use is minimized, the local transportation agencies may want to consider proactively developing a truck route network for trucks accessing the airport. The 2005 *Albany-Dougherty County Regional Freight Plan* provided recommendations for a truck route network for consideration by the region.

5.6 PLANS AND PROJECTS

There are several new aviation facilities that are planned. These include Level I airports in Monroe County and Rabun County and Level II airports in Effingham County and Forsyth/Dawson County. Replacement airports are planned for Level II airports in Dahlonega-Lumpkin County (Wimpy's Airport) and St. Mary's Airport.

In addition to these new and replacement airports, specific airport improvements and capital programs for continued systemwide development were calculated. As reported in the GASP, GDOT estimates that approximately $142 million is required in the next 5 years with an additional $178 million required for the following 15-year timeframe to meet the needs identified in the master plans.

The critical types of airport projects and programs are summarized below:

1. **Runway Extensions –** A primary need at airports of all levels is runway expansions in order to comply with FAA regulations. Along with expansions, the layout and width of the runway, taxiway, turnarounds, and aircraft parking and maintenance areas must be considered. Smaller airports may serve as capacity reliever sites for larger airports and need to be designed accordingly.
2. **Pavement Maintenance –** Aging pavements must be repaired to ensure safety at all airports. This is an ongoing need throughout the State.
3. **Improved Instrument Approaches –** Airports at all levels require instrument improvements such as runway and taxiway lighting upgrades, installation of precision approach path indicator (PAPI), and automated surface observing systems for weather tracking.

4. **Landside Expansions –** Many airports require expansions to their landside property, including terminal areas, parking spaces, rental car facilities, and other fixed-based operators to support the general aviation services.
5. **Planning and Zoning Controls –** Municipality and community adoption of planning and zoning controls that are compatible with the airport is critical to ensure that land remains available for future expansion.
6. **Connections to the Transportation System –** Airport facilities must be connected to the broader transportation system in order for airports to operate as economic engines throughout the State.

6.0 Marine Ports

6.1 INVENTORY, CAPACITY, AND USE

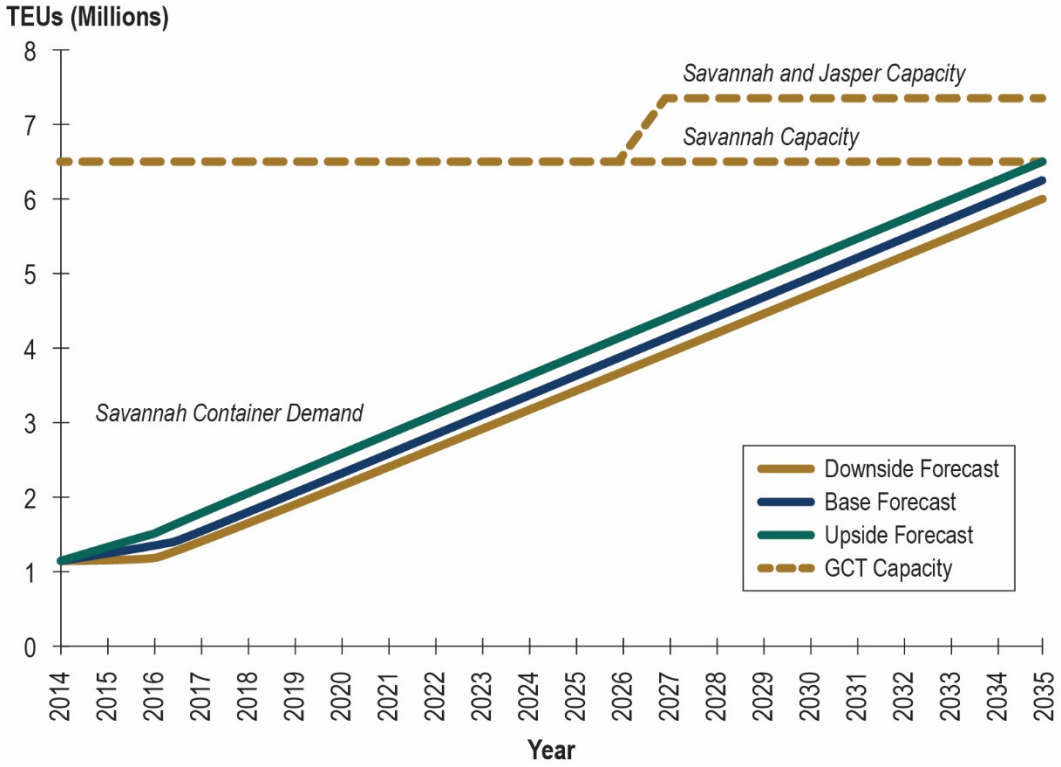
The vast majority of marine tonnage moves through publicly owned terminals, which are operated by the Georgia Ports Authority (GPA). GPA's port facilities include the following:

- **The Port of Savannah –** The terminals at this port specialize in the handling of container, refrigerated, break-bulk, and roll-on/roll-off (RoRo) cargoes. The Garden City terminal primarily handles containers. It is the located on the Savannah River about seven miles northwest of downtown Savannah. This is the largest of all GPA facilities and the fastest growing container port in the U.S., handling nearly 3 million 20-foot equivalent units (TEU) today. The port has an upside capacity of 6.5 million TEUs given current landside configurations and constraints.
- **The Port of Brunswick –** The terminals at this port specialize in the handling of break-bulk, agri-bulk, and RoRo cargoes, and provide service for importers and exporters of forest products, paper products, bulk commodities, and automobiles.
- **Inland Ports –** The Port of Bainbridge is located along Georgia's inland waterways on the Apalachicola-Chattahoochee-Flint Waterway, and handles primarily bulk commodities that are shipped by barge such as gypsum, cottonseed, and cypress bark mulch. The Port of Columbus is also located along the Chattahoochee Intracoastal Waterway, but has been inoperable for several years due to low water levels.

6.2 ISSUES AND DEFICIENCIES

For Georgia and particularly the Port of Savannah, containerized trade is a significant percentage of the total volume of imports and exports. Based on the most recently available information from the Georgia Ports Authority, it is anticipated that by 2035 there will be a demand of approximately 6.0 million TEUs as the base forecast with a ceiling of 6.25 million TEUs for the upside forecast. As Figure 6.1 (page 6-2) shows, the current capacity of the Garden City Terminal is 6.5 million TEUs. Extrapolating the forecast indicates that additional container capacity would be needed in Georgia by 2038 under the base case forecast and as early as 2035 using the upside forecast. The proposed Jasper Port Terminal Complex can accommodate this additional demand. It should be noted that the Savannah forecast is the current draft working forecast for the port, but subject to change based on future additional analysis that is routinely undertaken at the port.

Figure 6.1 Savannah Demand versus Capacity



Deepening the Savannah harbor is the most critical need not only for the Garden City Terminal but also for many terminals up and down the Savannah River. The project includes the deepening of the harbor from the current 42-foot depth to a depth of 48 feet and additional improvements that would increase the efficiency and safety of cargo vessel operations. As vessels within the industry continue to get larger, there is the potential for the port's access to be regarded as a bottleneck in the transportation supply chain if the harbor is not deepened. This downside threat to the State's ports will increase further once the Panama Canal expansion is completed in 2015 when the maximum size of the ships able to use the transit waterway will increase substantially, from around 5,500 TEUs up to 12,000 TEUs.

As a result of the significant long-term growth in container traffic forecast in the Savannah region, the road and rail access networks also will have significant long-term needs. The last-mile projects and the dredging of the Port of Savannah address container growth needs through 2020. However, to address access issues through 2040, a long-term vision of road and rail access needs to be developed and implemented. A more comprehensive study of truck trip patterns from the port needs to be conducted which will accomplish the following:

- Update truck trip travel patterns from the port. The existing data are now nine years old.
- Gather more comprehensive information on truck trips to and from the warehouses and distribution centers nearby the port facilities.

- Incorporate land use data and economic development data into understanding the likely locations of future warehouses and distribution centers.
- Develop a truck route network in the port subregion that matches with the long-term growth forecast of the port.
- Gain a more thorough understanding of the long-term rail access needs in Savannah along with available land use to accommodate increased usage.
- Incorporate future plans for SR 21 which currently is under study by the Coastal Region Metropolitan Planning Commission.

The Port of Brunswick, which is comprised of the East River Terminal, Lanier Docks, Mayor's Port Terminal and the Colonel's Island Terminal has an infrastructure network consisting of both rail and roadway. The infrastructure at the Colonel's Island Terminal is sufficient to meet the current freight volumes and it is anticipated that the roadway infrastructure will also be adequate to meet future volumes. However, the rail spurs and storage yards will need to be upgraded in the future to accommodate anticipated increases in volume.

One particular concern at the East River Terminal and Lanier Docks is the rail access. Currently, there is only one rail access route which goes through downtown Brunswick. This route is poorly maintained, includes multiple at-grade crossings, and is shared by NS and CSXT from the City yard to the Mayor's Point Terminal. To accommodate future demand at the East River Terminal, it is anticipated that additional upgrades will need to be implemented on the rail access corridor. The roadway access into the East River Terminal is sufficient with southbound I-95 traffic accessing the terminal via SR 25 and Highway 17 and northbound I-95 traffic accessing the terminal via Highway 17. The last half-mile of roadway prior to entering the gate passes through a residential neighborhood. This routing has the potential to cause future conflicts between rail movement and residential activities.

Mayor's Point Terminal has sufficient roadway access off of Bay Street and provides direct access to I-95 via Highway 25. The rail access has similar challenges as the East River Terminal.

The primary need for the inland ports and waterways is a positive resolution of the water issues among Georgia, Alabama, and Florida. The inland ports do not have sufficient water to operate efficiently, but they do have the potential to handle additional traffic and support nearby businesses if water can be restored at these locations. The inland ports at Columbus and Bainbridge currently have a sufficient roadway and railroad network to meet the current and projected volumes.

6.3 PLANS AND PROJECTS

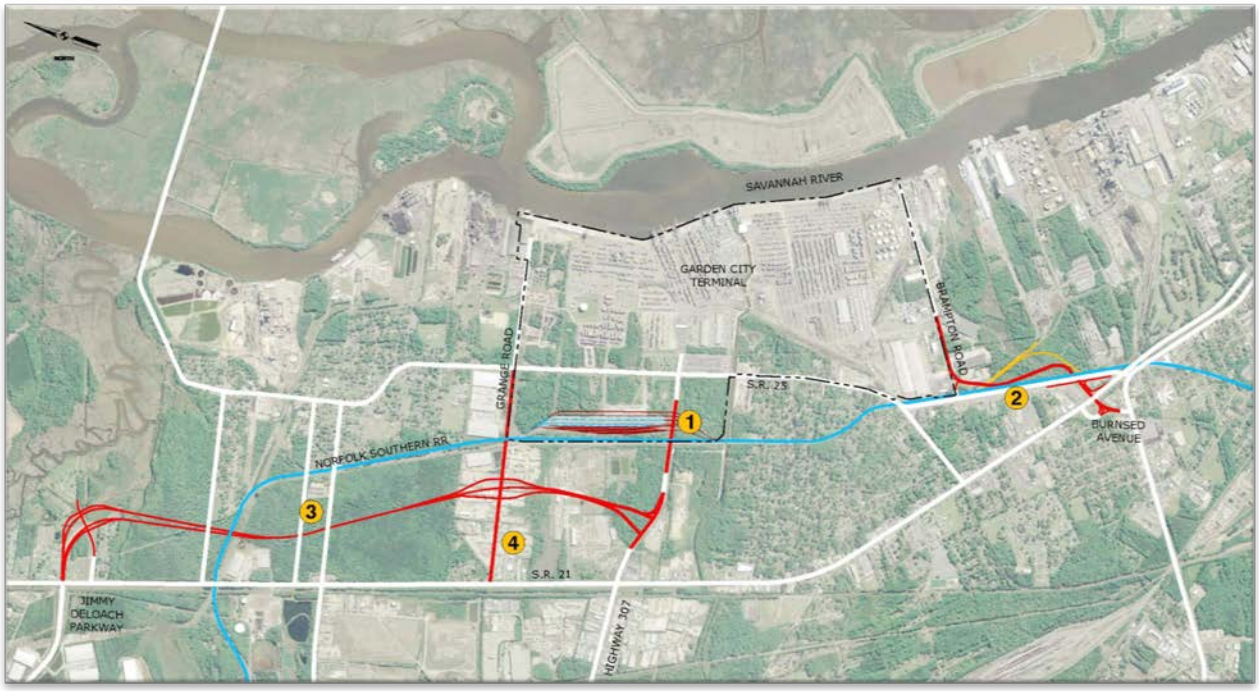
Deepening the Port of Savannah so as to accommodate the new larger ships which will be able to traverse the Panama Canal is the top priority for marine port

improvements. In July 2010, the U.S. Army Corps of Engineers Savannah District selected a 47-foot dredging depth for the Port of Savannah. The State of Georgia requested consideration of a Maximum Authorized Plan of 48-foot depth and agreed to pay 100 percent of the additional costs to dredge and maintain the extra foot. A final recommended plan agreed to by the Secretaries of the Army, Commerce and Interior and the Administrator of the EPA was included in the final *General Reevaluation Report* (GRR) and *Environmental Impact Statement* (EIS). In general, the total project is estimated to cost approximately $652 million with 70 percent funded by the Federal government and the remaining 30 percent provided by Georgia.

In order to address the future landside capacity issues at the Port of Savannah, the states of Georgia and South Carolina are in the conceptual planning phase for the Jasper Ocean Terminal, which could accommodate the potential growth in container demand beyond 2035. The Jasper Ocean Terminal is the most significant new facility that is planned for moving marine cargo in Georgia. This proposed new container port would actually be located on the South Carolina side of the Savannah River. It will be jointly owned by South Carolina and Georgia. This project is very early in the development cycle and would not come on-line until 2030 at the earliest.

As identified in the Georgia Statewide Freight and Logistics Plan, the Port of Savannah is focused on developing four "last-mile" roadway access projects to meet the current needs of the Garden City Terminal, along with the demand of the terminal through 2020. Figure 6.2 (page 6-5) shows the location of these projects and the following text provides an updated description of each project.

Figure 6.2 Last-Mile Projects for Garden City Terminal



1. **SR 307 Overpass –** This last-mile project included the construction of a bridge and approaches to carry SR 307 traffic over both the existing Norfolk Southern rail track and the existing and proposed Intermodal Facility railroad tracks. This project was completed in 2012.

2. **Brampton Road Connector –** Brampton Road serves as an access point to various industrial facilities, including Gate 3 of the GPA's Garden City Terminal. An existing NS railroad track (the Chatham Lead) runs parallel to the east side of SR 25 and intersects Brampton Road at grade. All traffic accessing the terminal at Gate 3, and traffic accessing the other industries located on Brampton Road, is required to cross these tracks when entering and exiting on Brampton Road. Currently, trains utilizing these tracks, especially the spur line which services the port and adjacent warehouses, can cause significant delays to trucks trying to enter and exit the terminal. The Brampton Road Connector project consists of a new 1.2-mile roadway corridor. The corridor starts at the intersection of Burnsed Avenue and SR 25 and will tie into Brampton Road east of its intersection with SR 25 and the at-grade rail crossing. The new roadway is planned to be four lanes wide with two lanes in each direction. The NS line will also be relocated as part of the project. These improvements are necessary to improve the safety of truck traffic into and out of the terminal from SR 25. The project will also provide direct connectivity to I-516.

3. **Jimmy Deloach Connector – T**his project will provide safety enhancements by providing separation of rail, truck, and commuter traffic. GDOT sold bonds

to fund the construction of this roadway. The project consists of the construction of a new roadway alignment that would begin at Bourne Avenue/SR 307 and terminate at the existing eastern end of Jimmy Deloach Parkway. New interchanges would be constructed at both Grange Road and Jimmy Deloach Parkway. The proposed project would be approximately 3.1 miles long. The typical section of the proposed limited access roadway would consist of four 12-foot-wide lanes (two in each direction) separated by a 24-foot-wide raised median and 6.5-foot-wide paved outside shoulders on both sides of the roadway. An exception to this typical section would begin just south of Crossgate Road and continue to the existing Jimmy Deloach Parkway and would include a median barrier with 4-foot-wide inside shoulders. The project is a design-ROW-build project. It is anticipated to be completed by 2015.

4 **Grange Road Upgrades –** Grange Road extends from SR 21 to SR 25 and then to the northern boundary of the Garden City Terminal. Grange Road currently provides access to multiple industrial facilities. The current proposed improvements consist of the widening of approximately one mile of roadway from SR 25 to SR 21 to four lanes with two lanes in each direction. The project currently is in the preliminary conceptual design stage.

A. Outlook for Freight Demand

To examine the future needs of goods movement, we projected what future freight demand might look like. This appendix presents a traffic flow forecast that was developed to examine projected demand for freight transportation in Georgia. A Q2 2012 forecast incorporated into the Federal Highway Administration's (FHWA) Freight Analysis Framework version 3.4, was applied to a 2007 IHS TRANSEARCH dataset, by mode, commodity, and origin-destination. The results from the forecast are presented for truck, rail, and water and air cargo moving to, from, through, and within the State.

The first section of this Appendix describes future freight demand as derived from the forecast. Section A.2 provides a technical description of the process used to create the forecast, and draws a comparison with a forecast that was developed for the 2011 Georgia Statewide Freight and Logistics Plan.

A.1 FUTURE FREIGHT DEMAND

In 2007, 853 million tons of freight moved over Georgia's transportation system valued at $2.1 trillion. By 2040, it is projected that Georgia's transportation system will carry more than 1.5 billion tons of freight annually, valued at $4.8 trillion, an increase of 71 percent by tonnage and 130 percent by value.

A.1.1 Directional Analysis

Tables A.1 (page A-2) and A.2 (page A-3) display the tonnage and value respectively of the freight flows by direction in 2007, 2010, and 2040. Figure A.1 (page A-2) graphically displays the proportion of freight tonnage by direction for 2007 and 2040. Figure A.2 (page A-3) graphically displays the freight value by direction for 2007 and 2040.

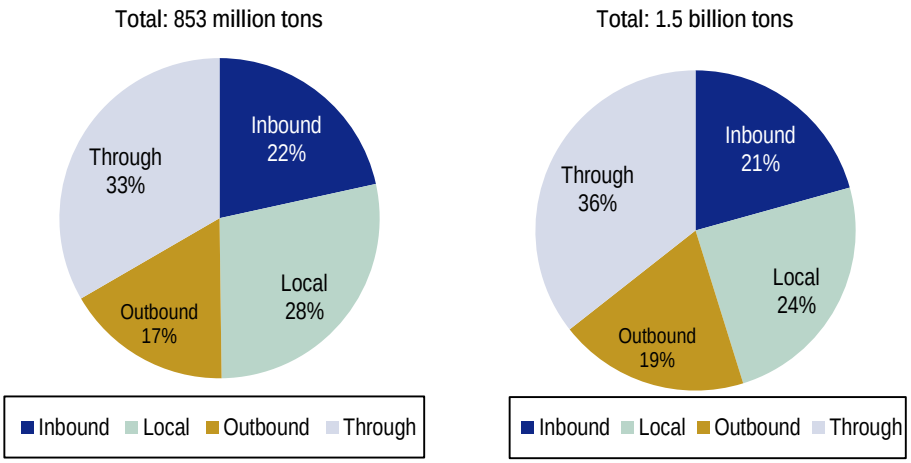
The largest component of total statewide freight tonnage, through traffic, is expected to continue to account for the largest share over the next 33 years, from 33 percent of the total tonnage in 2007 to 36 percent by 2040. Intrastate or local freight is the second largest component, 28 percent of the 2007 total, and by 2040 this share will likely decrease to 24 percent of the 2040 total. Inbound freight is the third largest component and it is expected to slightly decrease its share over the next 30 years (22 percent of the 2007 total and 21 percent of the 2040 total) which indicates that Georgia will continue to be a net importer of goods. Outbound freight accounted for 17 percent of the total freight movements in 2007, and is projected to increase to 19 percent over the next 33 years.

Table A.1 Total Tonnage by Direction
2007 to 2040, Tons in Thousands

Direction	2007	2010	2040	Percent Change (2007 to 2040)
Inbound	183,904	165,416	301,354	64%
Intrastate	240,724	198,941	357,042	48%
Outbound	143,638	133,353	279,928	95%
Through	284,496	279,102	518,731	82%
Total	852,761	776,812	1,457,046	71%

Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Figure A.1 Direction of Total Freight Flows by Weight
2007 (left) and 2040 (right)



Source: IHS, Inc., 2007 TRANSEARCH data; and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

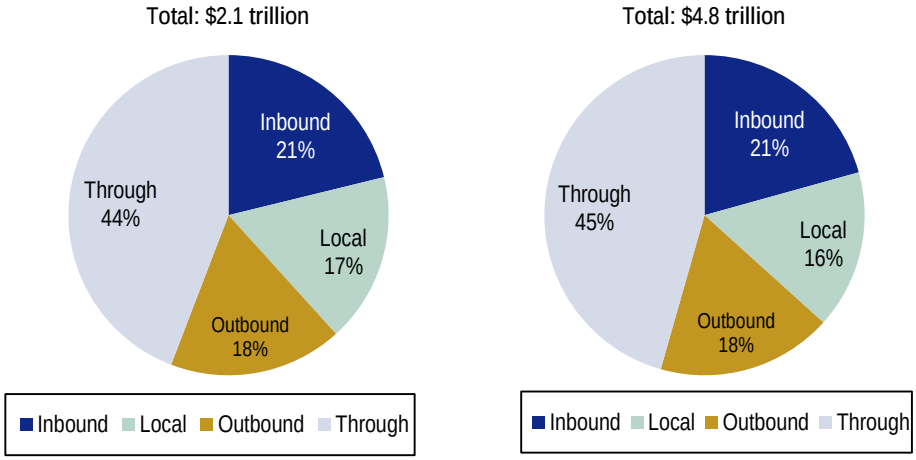
When measured by value (see Table A.2, page A-3, and Figure A.2, page A-3), through traffic represents the largest share of the total statewide freight flows – 44 percent in 2007 and expected to increase to 45 percent by 2040. The inbound freight is the second largest component when measured by value, and its share is expected to remain constant over the next 33 years (21 percent in 2007 and 2040). Outbound freight is the third largest component, representing 18 percent in 2007 and expected to remain constant over the next 33 years. Local freight accounted for 17 percent of the freight value in 2007 and is expected to decrease to 16 percent by 2040. This is because local freight is expected to grow more slowly than through, inbound, and outbound flows.

Table A.2 Total Value by Direction
2007 to 2040, Value in Millions

Direction	2007	2010	2040	Percent Change (2007 to 2040)
Inbound	440,554	420,437	990,215	125%
Intrastate	355,830	327,389	766,099	115%
Outbound	365,197	351,635	848,436	132%
Through	918,670	906,465	2,182,132	138%
Total	2,080,251	2,005,926	4,786,792	130%

Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Figure A.2 Direction of Total Freight Flows by Value
2007 (left) and 2040 (right)



Source: IHS, Inc., 2007 TRANSEARCH data; and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Terminating Counties for Total Inbound Freight

Figure A.3 (page A-4) graphically presents the top 10 terminating counties in Georgia for total inbound tonnage for 2007, 2010, and 2040. Over the next 33 years Fulton County (Atlanta) is expected to remain the top county in the region receiving freight shipments, accounting for 22 percent of all inbound tonnage to the State, or 67 million tons, in 2040. These inbound shipments, which are typical of freight received by large urban areas, consist of food and kindred products; lumber and wood products; secondary moves (warehoused goods); clay, concrete, glass, and stone products; and chemical products among others.

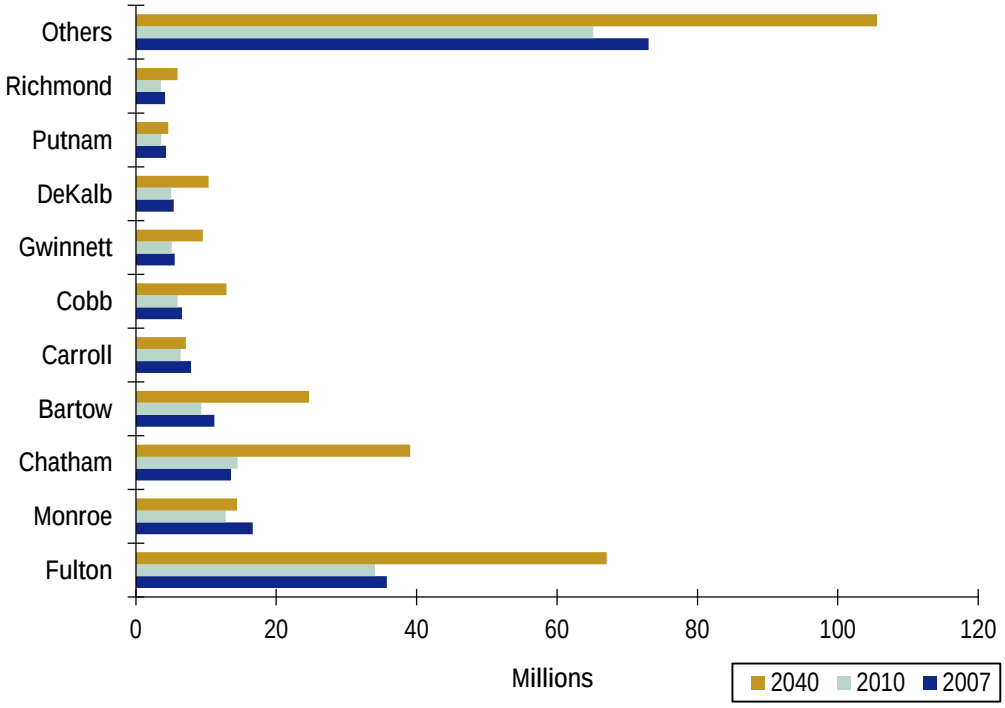
Monroe County (where Georgia Power's coal fired Scherer Plant is located) received approximately 17 million tons of inbound traffic in 2007 – a nine percent share of the inbound tonnage. This share is expected to decrease to 14 million tons

by 2040 – a five percent share of the 2040 inbound tonnage. This decline is due to an expected drop in coal shipments, which comprises most of the tonnage shipped to Monroe County.

Chatham County (Savannah) received 14 million tons of freight in 2007 and is expected to increase to 39 million tons by 2040. This growth is driven by high growth in petroleum products, farm products, pulp, paper, and allied products, among others.

The remaining counties combined are projected to account for 60 percent or 181 million tons of inbound tonnage in 2040.

Figure A.3 Top 10 Terminating Counties for Inbound Freight by Weight
2007 to 2040



Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

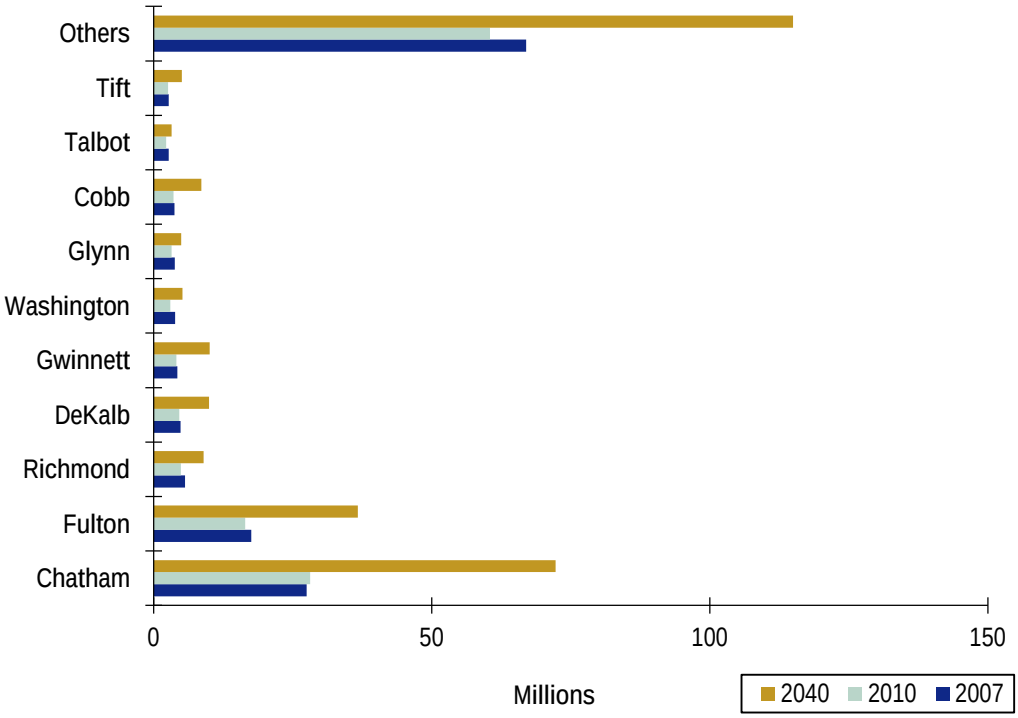
Originating Counties for Total Outbound Freight

Figure A.4 presents the top 10 originating counties in Georgia for total outbound tonnage for 2007, 2010, and 2040. Chatham County accounted for 19 percent (27 million tons) of outbound freight tonnage originating from Georgia in 2007 and over the next 33 years this share is expected to increase to 26 percent (72 million tons). This growth is driven by growth in shipments of chemicals and allied products, and food and kindred products.

Fulton County is next accounting for 12 percent (18 million tons) of the outbound freight tonnage in 2007. By 2040 Fulton's share is projected to increase to 13 percent (37 million tons). Secondary moves (warehoused goods), foods and kindred products, chemicals and allied products, lumber and wood products, freight all kinds (miscellaneous mixed shipments), among others, constitute these shipments.

The remaining counties combined are projected to account for 61 percent or 171 million tons of outbound tonnage in 2040.

Figure A.4 Top 10 Originating Counties for Outbound Freight by Weight
2007 to 2040



Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

A.1.2 Mode Share Analysis

Freight utilizes different modes of transportation. This section will analyze the future trends of the regional movement of freight via the roadways, railways, water, and air.

Tables A.3 and A.4 (page A-7) and Figures A.5 (page A-7) and A.6 (page A-8) display the current and future mode breakdown of total freight tonnage and value. Trucks are the dominant mode of freight transportation throughout the State. About 75 percent of all freight tonnage and 90 percent of all freight value was moved by truck in 2007. Trucks are expected to continue to move most of the State's tonnage and value over the next 33 years (76 percent of the 2040 total tonnage and 90 percent of the 2040 total freight value). Like most states, Georgia is dependent on trucks for movement of most of its freight, particularly those shipments that both originate and terminate within the region. Trucks normally provide the last link in the transportation chain, transporting all types of commodities from their intermediate destinations, such as seaports or rail terminals, to their final destinations.

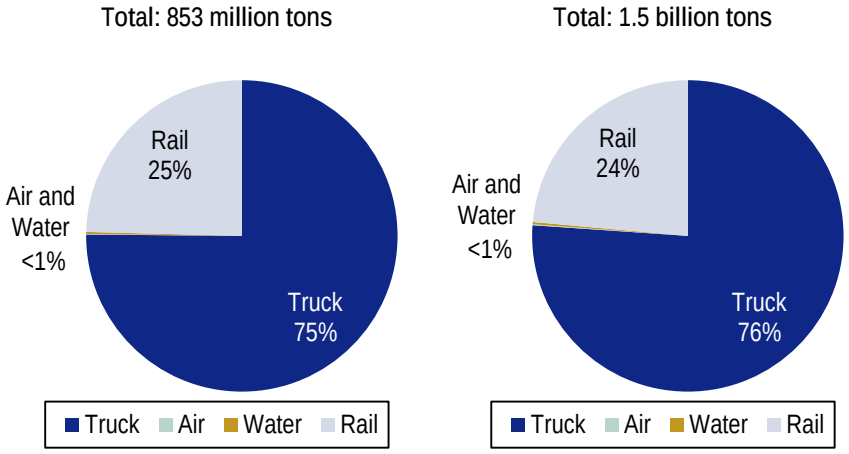
Rail is the second most common mode transporting one-quarter of the freight tonnage in 2007. When measured in value, however, rail only accounted for 10 percent in 2007. These shares are expected to remain constant through 2040. Waterborne and air freight each accounted for less than one percent of the tonnage and value in 2007, and those shares are expected to remain constant through 2040.

Table A.3 Total Tonnage by Mode
2007 to 2040, Tons in Thousands

Mode	2007	2010	2040	Percent Change (2007 to 2040)
Truck	640,799	580,796	1,108,734	73%
Water	537	513	1,444	169%
Air	1,725	1,702	3,385	96%
Rail	209,700	193,800	343,484	64%
Total	852,761	776,812	1,457,046	71%

Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Figure A.5 Mode Share by Weight
2007 (left) and 2040 (right)



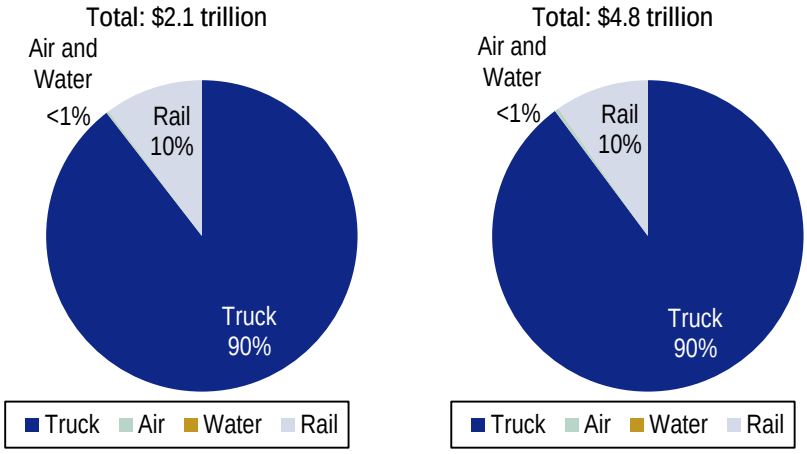
Source: IHS, Inc., 2007 TRANSEARCH data; and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Table A.4 Total Value by Mode
2007 to 2040, Tons in Millions

Mode	2007	2010	2040	Percent Change (2007 to 2040)
Truck	1,862,114	1,792,505	4,299,547	131%
Water	4,368	4,413	17,167	293%
Air	645	697	1,640	154%
Rail	213,124	208,312	468,438	120%
Total	**2,080,251**	**2,005,926**	**4,786,792**	**130%**

Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Figure A.6 Mode Share by Value
2007 (left) and 2040 (right)



Source: IHS, Inc., 2007 TRANSEARCH data; and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

A.1.3 Analysis by Commodity Type

The top commodities by weight transported into, out of, within, and through the State and their future projections over the next 33 years are shown in Table A.5 (page A-9) and Figure A.7 (page A-10). The top 10 commodities in both 2007 and 2040 are nonmetallic ores and minerals; secondary moves (i.e., freight flows to and from distribution centers or via intermodal facilities and typically representing consumer goods); chemicals and allied products; clay, concrete, glass, and stone products; food and kindred products; coal; lumber and wood products; farm products; pulp, paper, and allied products; and primary metal products. Combined they accounted for more than 80 percent of the freight in 2007 and in 2040. It should be noted that 3 of the top 10 commodities (nonmetallic ores and minerals; clay, concrete, glass, and stone; and coal) are heavy and have relatively low value compared to finished or intermediate manufactured goods (chemical products and secondary moves). Shippers of basic materials, such as coal, tend to be more concerned with minimizing the cost of transportation rather than speed of delivery, while shippers of manufactured goods tend to emphasize travel times and reliability over per-ton mile transport cost.

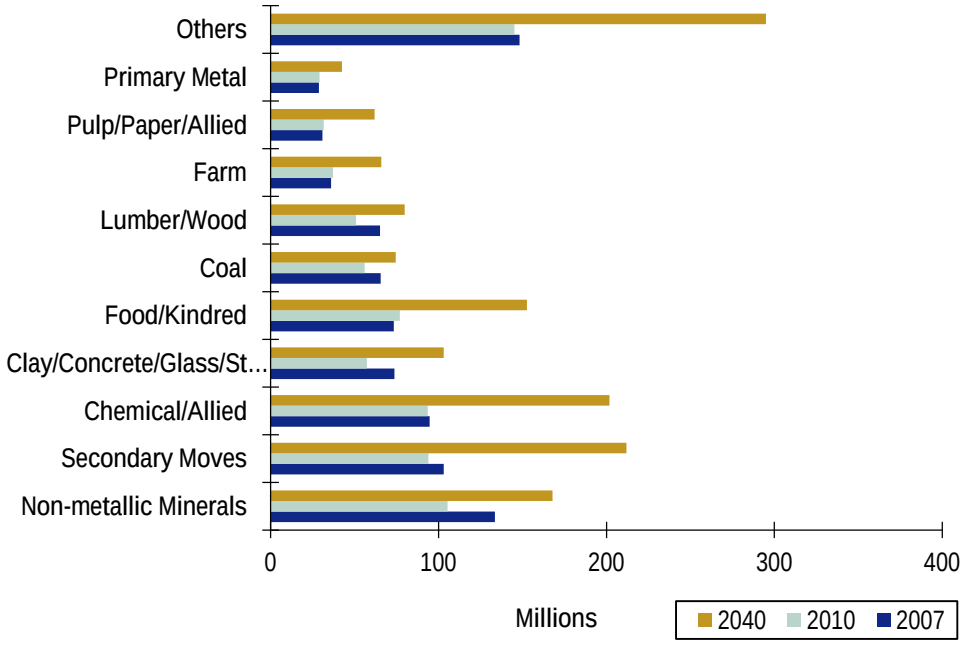
The top commodities by value transported into, out of, within, and through the State via truck, rail, water, and air are shown in Table A.6 (page A-11) and Figure A.8 (page A-12). The top 10 commodities in 2007 constituted more than 80 percent of the total freight value moved in the State in 2007 and in 2040. Secondary moves (warehoused goods) are expected to continue to be the leading commodity group by value over the next 33 years, representing more than one-third of the total freight value moved in the State. The remaining top commodities by value are: chemicals and allied products; transportation equipment; machinery; electrical machinery, equipment, and supplies; apparel; food and kindred products; primary metal products; fabricated metal products; and miscellaneous manufacturing.

Table A.5 Top 10 Commodities by Weight
2007 to 2040, Tons in Thousands

Commodity	STCC 2	2007	2010	2040	Percent Change (2007 to 2040)
Nonmetallic Minerals	14	133,517	105,325	167,870	26%
Secondary Moves	50	103,071	93,954	211,904	106%
Chemical and Allied	28	94,704	93,447	201,812	113%
Clay, Concrete, Glass, Stone	32	73,721	57,296	103,125	40%
Food and Kindred	20	73,246	76,895	152,726	109%
Coal	11	65,540	55,965	74,471	14%
Lumber and Wood	24	65,077	50,836	79,792	23%
Farm	01	36,063	37,138	65,985	83%
Pulp, Paper and Allied	26	30,892	31,548	61,921	100%
Primary Metal	33	28,672	29,157	42,519	48%
Others		148,257	145,252	294,922	99%
Total		852,761	776,812	1,457,046	71%

Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Figure A.7 Top 10 Commodities by Weight
2007 to 2040



Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

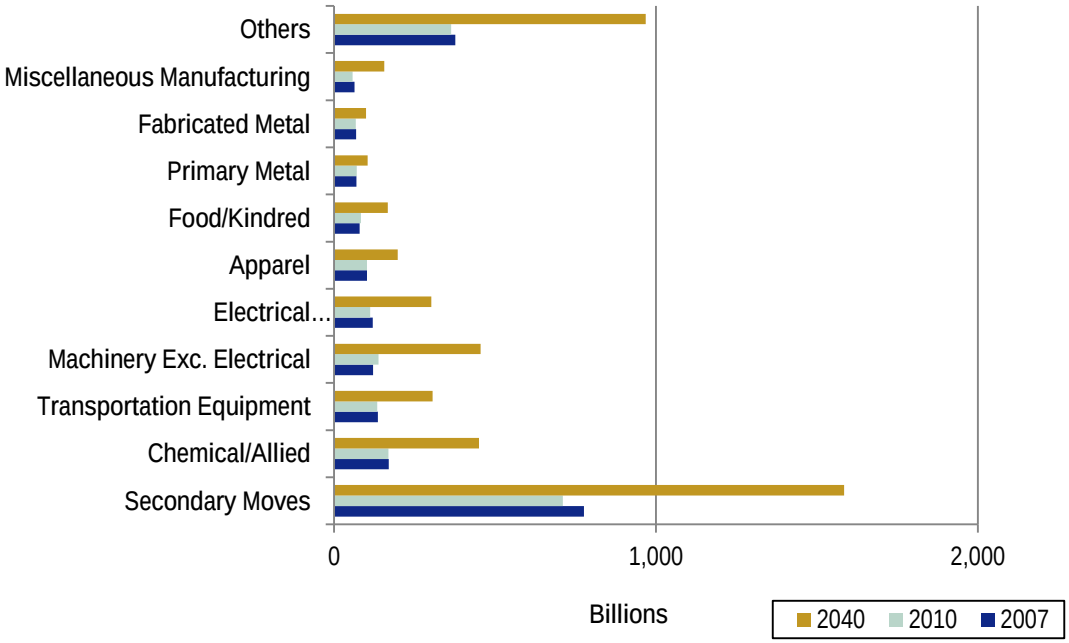
Table A.6 Top 10 Commodities by Value
2007 to 2040, Value in Millions

Commodity	STCC 2	2007	2010	2040	Percent Change (2007 to 2040)
Secondary Moves	50	775,566	709,921	1,584,578	104%
Chemical and Allied	28	169,922	168,650	449,916	165%
Transportation Equipment	37	135,873	133,688	305,442	125%
Machinery Exc. Electrical	35	120,554	137,400	454,675	277%
Electrical Mach., Equip., Supplies	36	119,962	112,004	301,706	152%
Apparel	23	101,966	102,057	197,196	93%
Food and Kindred	20	79,605	83,092	166,795	110%
Primary Metal	33	69,591	70,637	104,381	50%
Fabricated Metal	34	67,873	67,346	98,642	45%
Miscellaneous Manufacturing	39	63,217	57,495	155,710	146%
Others		376,123	363,635	967,750	157%
Total		2,080,251	2,005,926	4,786,792	130%

Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

Figure A.8 Top 10 Commodities by Value

2007 to 2040



Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

A.1.4 Analysis by Trading Partner

In addition to the analysis by mode and commodity summarized in the previous sections, it is also important to identify the region's key trading partners. A better understanding of where the region's shipments are originating and terminating is a critical step to understanding length of haul, market penetration, modal preference, and network utilization. Key trading partners were identified by combining the inbound and outbound freight flows between Georgia and the trading partner region and highlighting the trading partner regions with the largest freight flows.

The "trading partners" (external to Georgia) consist of the states in the rest of the U.S., and the neighboring countries of Canada and Mexico.[36] The top trading partners for freight movements into and out of the State by weight in 2007 and 2040 are shown in Figure A.9 (page A-14). The top three trading partners are Florida, Tennessee, and Alabama. These states account for 37 percent (120 million tons) of total inbound and outbound flows by weight in 2007, and in 2040 these states represent 34 percent (195 million tons) of total inbound and outbound flows. The fact that 9 of the top 10 trading partners are other states within the Southern

[36] Flows originating or terminating in Canada or Mexico only include rail movements.

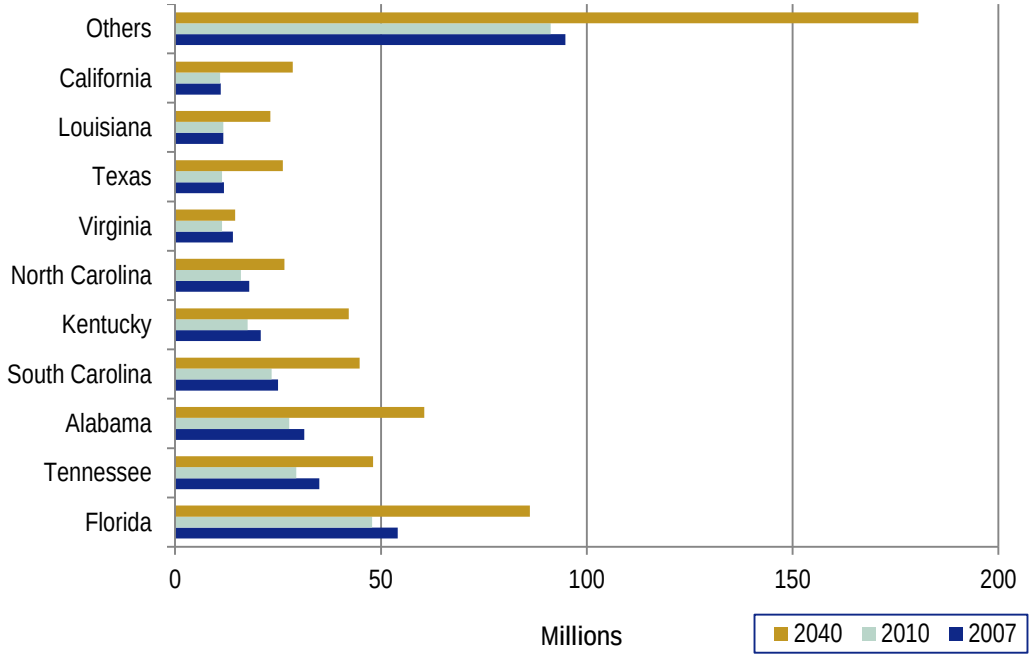
region of the country is evidence that Georgia is particularly important economically to the South Atlantic and South Central regions.

Florida is Georgia's top trading partner by weight. Fifty-five percent of the trade between Georgia and Florida is inbound and the rest outbound. This balance is expected to remain constant over the next 33 years. In 2007, the top commodity groups moving to and from Florida were nonmetallic ores and minerals; lumber and wood products; secondary moves (warehoused goods); food and kindred products; and clay, concrete, glass, and stone products, together accounting for 68 percent of total trade by weight in 2007 and expected to decrease to 59 percent by 2040.

Tennessee is Georgia's second top trading partner by weight. About 71 percent of the trade between Georgia and Tennessee was inbound in 2007 and this share is expected to decrease to 64 percent by 2040. In 2007, the top commodity by weight traded between these two states was coal from Tennessee, accounting for 48 percent of the trade. Over the next 33 years coal's share is expected to decrease to 29 percent of the total tonnage traded between the two states.

Georgia's third largest trading partner by tonnage is Alabama. Sixty-eight percent of the trade between Georgia and Alabama was inbound in 2007 a share that is expected to remain roughly constant through 2040. In 2007, the top commodities by weight traded between the two states were nonmetallic ores and minerals; secondary moves (warehoused goods); lumber and wood products; and clay, concrete, glass, and stone products, together accounting for 62 percent of the trade in 2007 and expected to account for 60 percent by 2040.

Figure A.9 Top 10 Trading Partners by Weight
2007 to 2040



Source: IHS, Inc., 2007 TRANSEARCH data; and 2010 and 2040 TRANSEARCH forecast processed by Cambridge Systematics, Inc.

A.2 FORECAST METHODOLOGY

The 2007 TRANSEARCH data for Georgia contained origin-destination (O-D) freight flows by commodity type (STCC 4) measured in tons and value, for truck, air and water. Rail flows were retrieved from the Surface Transportation Board (STB) 2007 full (confidential) Carload Waybill Sample, a stratified sample of rail traffic moving in the United States. Commodity, volume, type (intermodal and carload), and geographic data were drawn from the Waybill Sample and were incorporated into IHS's TRANSEARCH dataset.

The forecast from the most recent release of the Federal Highway Administration's Freight Analysis Framework (FAF) version 3.4 was used to project 2010 and 2040 volumes using a 2007 TRANSEARCH dataset provided by GDOT. FAF 3.4, which also has a 2007 base year, incorporates a Q2 2012 IHS forecast, with projections reported to 2040 in five-year increments. Growth rates were calculated with the FAF 3.4 forecast by mode, origin-destination (OD), and commodity type and then applied to the TRANSEARCH dataset.

A.2.1 Harmonizing Geographies and Commodities

All commodities in the TRANSEARCH dataset were in four-digit Standard Transportation Commodity Code (STCC 4) and FAF 3 commodity data is provided by two-digit Standard Classification of Transported Goods (SCTG 2) codes. A crosswalk was created that translated the STCC 4 codes in TRANSEARCH into SCTG 2 codes. All commodities but STCC 42 (Containers, Carriers or Devices, Shipping, Returned Empty) were included in the crosswalk.

The TRANSEARCH data was provided by origin and destination at the county-level for Georgia, Florida, Alabama, Tennessee, North Carolina, and South Carolina. The remainder of the U.S. was provided by state share of BEA (not crossing state boundaries). Information on Canada and Mexico was included for rail flows.

FAF 3 data provides information on international origin, domestic origin, domestic destination, and international destination. This allows traffic flows to be captured across modes and borders, such as an ocean move from China to Los Angeles, followed by a rail move to an intermodal yard in Atlanta and a truck dray to a final destination. FAF 3 geographies vary in detail, ranging from Metropolitan Statistical Areas (MSA) (and state share of MSA), to Consolidated Statistical Areas (CSA), and state remainders. Data for Georgia is provided for three CSAs: Atlanta GA-AL CSA (GA Part), Savannah GA CSA, and the Remainder of Georgia. Data for some states are provided only at the state level: Alaska, Idaho, Iowa, Delaware, Maine, Mississippi, Montana, Nebraska, New Mexico, North Dakota, Rhode Island, Vermont, and Wyoming. Data for Canada and Mexico are provided at the most aggregate level. The two origin and two destination fields in FAF 3 were

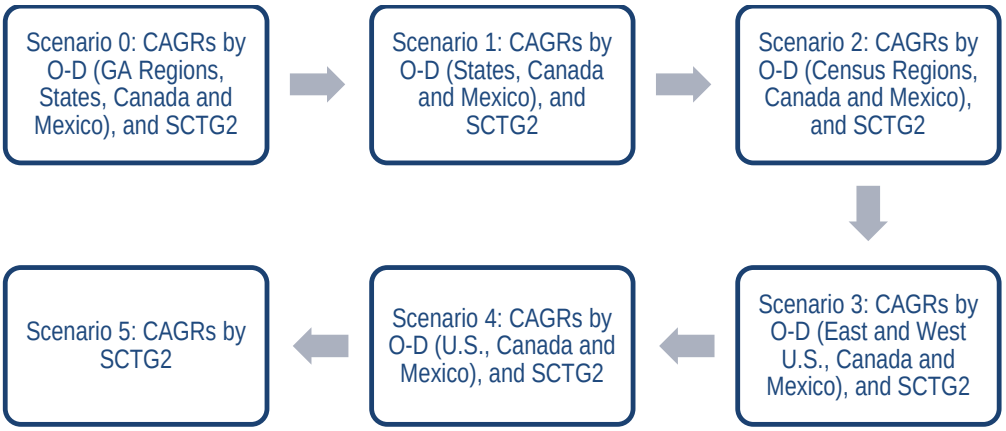
combined into one origin field and one destination field, by discarding the foreign origins and destinations with the exception of Canada and Mexico.

Harmonizing the two data sets for the forecast required the TRANSEARCH Georgia flows to be rolled up to the three corresponding area definitions in FAF 3. For the remainder of the U.S. both data sets were aggregated into states, and Canada and Mexico were included as two separate regions.

A.2.2 Geographic Aggregation Scenarios for Growth Rate Calculations

The Compound Annual Growth Rate (CAGR) was computed using the FAF 3 Forecast by Origin-Destination and Commodity (SCTG 2), on the assumption that mode share would remain unchanged. Because TRANSEARCH contains information on some flows that are not present in FAF 3, CAGRs were calculated using a hierarchical approach to geographic aggregation. Maintaining the detail at the commodity-level (SCTG 2), growth rates were calculated for six scenarios with increasing geographic aggregation. Figure A.10 (page A-16) illustrates the approach with the details of the geographic aggregation for each scenario. In the original scenario (Scenario 0), the Origin-Destination geographies include three Georgia regions, U.S. states, Canada, and Mexico. For Scenario 1, the Georgia regions were aggregated to the state level. For Scenario 2, the states were rolled into census regions. In Scenario 3, the U.S. was divided into two regions, East and West, using the Mississippi River as the boundary. In Scenario 4, the U.S. was aggregated as one region, and in Scenario 5 geography was not taken into account. Georgia through traffic was forecasted using Scenario 5 only.

Figure A.10 Growth Rate Scenarios



A.2.3 Applying the Growth Rates

Growth rates were calculated between 2007 and the future years in the FAF 3 data for each scenario. The FAF 3 growth rates were then applied to the 2007 TRANSEARCH data, resulting in projections for 2010 and 2040. The most disaggregate CAGRs were applied first (Scenario 0) and if there were flows

missing the next level of CAGRs were applied (Scenario 1-5). This process continued until all TRANSEARCH flows were forecasted.

The STCC 42 (Containers, Carriers or Devices, Shipping, Returned Empty) flows in TRANSEARCH, which could not be matched to any SCTG, were forecasted to 2040 using the average growth rates across all of the remaining commodities in the projected TRANSEARCH dataset.

A.2.4 Adjustments

Adjustments were made to the TRANSEARCH forecast to better reflect the expected growth or decline of various industries in the region. For example, the growth rate for nonmetallic ores and minerals from Alabama was reduced from an average Compound Annual Growth Rate (CAGR) of 10 percent to 1.8 percent.

A.2.5 Comparison with Previous Forecasts

The 2011 Georgia Statewide Freight and Logistics Plan (GSFLP) included a freight forecast that was developed using the same methodology as this forecast. The base year data in this study utilized the same source as the Georgia Statewide Freight and Logistics Plan – 2007 TRANSEARCH and the STB Confidential Carload Waybill Sample. In this study, these data were forecasted to 2040 using the FAF version 3.4. The FAF 3.4 forecast was developed in the second quarter of 2012 and was updated to account for the recession. Additionally, 2010 data was produced using the FAF 3.4 forecast to show the effect of the recession.

The overall growth of freight tonnage between 2007 and 2050 reported in the Freight and Logistics Plan amounted to a Compound Annual Growth Rate (CAGR) of 1.5 percent. This compares to a 2007-2040 CAGR of 1.6 percent in the forecast developed for this Statewide Transportation Plan. By value of goods moved, the 2007-2050 CAGR in the Freight and Logistics Plan was 2.5 percent, compared to a 2.6 percent CAGR for 2007-2040 in this study. The more recent forecast projects modestly higher growth rates among the following commodities: chemicals and allied products; food and kindred products; coal, pulp, paper, and allied products; and primary metal products.