ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS
GEORGIA SECTION

2014 Georgia Infrastructure Report Card

For more information please visit
www.ascega.org

Contact your legislators to let them know your infrastructure concerns
www.legis.state.ga.us

January 13, 2014

TABLE OF CONTENTS

www.ascega.org • reportcard@asce.org • www.infrastructurereportcard.org/georgia

EXECUTIVE SUMMARY

Georgia's infrastructure encompasses everything from your neighborhood roads to the dam on West Point Lake to the community school to the Port of Savannah. Our state's infrastructure is vital to the economy, safety, environment and quality of life of all Georgians. Once every five years, the Georgia Section of the American Society of Civil Engineers (ASCE) assesses the state's infrastructure. Using a simple A to F school report card format, the 2014 Georgia Infrastructure Report Card provides a comprehensive assessment of current infrastructure conditions and needs, assigns grades and makes recommendations for how to raise the grades. The Report Card is written by ASCE members in Georgia who assign the grades according to the following seven criteria: capacity, condition, funding, future need, operation and maintenance, public safety, and resilience. This is the same criteria used by the national ASCE to develop the Report Card for America's Infrastructure.

With new grades for the first time since 2009, Georgia's infrastructure has shown very little improvement and once again received a cumulative grade of C. The Georgia Section of ASCE assessed the same 12 categories as 2009: aviation, bridges, dams, drinking water, energy, parks and recreation, ports, rail, roads, school facilities, solid waste, stormwater, transit and wastewater. Recognizing the importance of transportation to Georgians, we added two new categories in 2014: ports and rail. As indicated by the grade, much work remains to be done, though there are some bright spots.

Since 2009, significant progress has been made in several areas, including the opening of the $1.2 billion international terminal in Atlanta's Hartsfield-Jackson International Airport and the approval of two new 1,100 megawatt nuclear units at Plant Vogtle near Augusta. Georgians should be proud of these accomplishments, especially the $14 billion expansion at Plant Vogtle, the first nuclear units in the US since 1979. Significant determination was required to make these accomplishments a reality. This same determination will be needed to address the state's many other infrastructure challenges.

In the 2009 Report Card, we noted that dam safety must be addressed as dam failure can cause property damage and potentially loss of life. While the Georgia Safe Dams Program has done their best with very limited resources, the number of dams in Georgia is growing. The number of dams per regulatory staff member is five times the national average and the backlog of permits and dam inspections is unacceptably long. This represents an unacceptable level of risk to public safety.

The growth in Georgia's population to nearly 10 million has led to new infrastructure which brings with it the requirement for maintenance. Georgia has almost 800 structurally deficient bridges and over 2,000 functionally obsolete bridges. Lack of a cohesive transit system makes ridership time-consuming and confusing. The Savannah Harbor Expansion Project needs federal funding to be completed. These challenges must be addressed if the state is to remain competitive in the global economy.

The state's continued economic prosperity is dependent on a strong, sustainable infrastructure. Georgia citizens and policy makers must unite to address the challenges and issues posed by the current and future state of our infrastructure and respond with dedication and results. Failure to address the requirements of our infrastructure will lead to degradation of basic public services, our quality of life and Georgia's ability to remain competitive in attracting new businesses.

The 2014 Georgia Infrastructure Report Card is not intended to be a commentary on, nor an evaluation of, the performance of any particular government department, agency or individuals of these groups. In fact, our research found that most agencies have made remarkable progress in fulfilling their ever-expanding responsibilities despite being understaffed and underfunded.

A challenge in producing the Georgia Infrastructure Report Card was to maintain focus on statewide issues and avoid being overly influenced by local needs, especially in the metro Atlanta area. Although in many categories more data were available for the metro Atlanta area, significant efforts were made to make a statewide analysis.

The Georgia Section of ASCE represents nearly 3,000 civil engineering professionals who live and work in Georgia. On behalf of engineers dedicated to problem solving and creating a better quality of life, the Georgia Section presents this document to the citizens and policy makers of Georgia. As in 2009, we must ask ourselves if the grade is acceptable. We believe Georgia should aspire to be "Hope Scholars" with at least a B average. We have some work to do.

GRADING PROCESS

OVERVIEW

The 2014 Georgia Infrastructure Report Card was modeled after the national ASCE Report Card for America's Infrastructure. A committee of nearly 50 practicing civil engineers was assembled to collect, review and evaluate data, and develop grades and recommendations. The committee volunteers were organized into fourteen major categories of infrastructure. Each committee's assessment is captured in the corresponding section of the Report Card. Twelve of these categories were evaluated in the 2009 Report Card on Georgia's Infrastructure and two new categories, Ports and Rail were added. Data sources used by the respective subcommittees included: federal, state and local agencies; consultants; and industry. In some cases, key information and data were collected from phone conversations with experts in the field.

The 2014 grading criteria is similar to that used in 2009. Each of the 14 sections was rated on the basis of condition, capacity, operation and maintenance, funding, future need, public safety and resilience. Resilience is the ability to prevent or protect against significant multi-hazard threats and incidents and the ability to quickly recover critical services.

For each infrastructure category, each of the grading criteria was assigned a weighting factor. In most categories, more weight was placed on condition, capacity, funding and future needs because these are core criteria and better data were usually available for evaluation in these areas. The data were evaluated against objective grading criteria and a grade was assigned. Grades were assigned as follows:

A = 90-100%

B = 80-89%

C = 70-79%

D = 51-69%

F = 50% or lower

The section for each infrastructure category was peer reviewed by a group of technical experts not involved with their initial preparation. They were also reviewed by ASCE National.

REPORT CARD

Aviation	B+	↔
Bridges	C-	↔
Dams	D-	↓
Drinking Water	C+	↔
Energy	B	↑
Parks and Recreation	D+	↑
Ports	C+	NEW
Rail	B	NEW
Roads	C-	↑
School Facilities	C+	↔
Solid Waste	C+	↑
Stormwater	D+	↔
Transit	D-	↓
Wastewater	C	↔
Georgia's Cumulative GPA	C	↔

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

American Society of Civil Engineers
Georgia Section

www.ascega.org • reportcard@asce.org

AVIATION

B+

RECOMMENDATIONS

- *Plan and Fund for the Future:* While the system continues to enjoy excess capacity and increased accessibility it still needs continued focus on funding projects that remedy non-standard conditions (conditions that do not comply with FAA regulatory guidelines) and updating airport layout plans. Improvements in the runway systems should be planned and executed in the next few years.
- *Keep Airport Layout Plans Up to Date:* While the FAA and GDOT Aviation Programs permit the airports to rely on the most recent Airport Layout Plan beyond the 5 year period if there are no new requirements, there are still improvements to be accomplished from the most recent plan.
- *Use Technology to Improve:* Encourage airports to use innovative technology and processes when expanding and enhancing their infrastructure.

DEFINITION OF THE ISSUE

The Federal Aviation Administration (FAA) reviews the condition of the airports in the state and their ability to serve the public. There are 109 public use airports in the state of Georgia including the busiest airport in the world, Hartsfield-Jackson Atlanta International Airport. Due to its unique nature, Hartsfield-Jackson is considered separately from Georgia's other airports, and this report focuses primarily on the overall aviation system in Georgia. The review of airport system was divided into five performance measures:

1. **Capacity** – The percent usage of available airport operational capacity.
2. **Standards** – The ability to meet design standards for safety and use of airports.
3. **Flexibility** – The ability to meet current and future demands.
4. **Accessibility** – The accessibility of airports to the public.
5. **Facilities and Services** – The ability to provide the minimum facilities and services for the particular level of airport.

Since the 2009 Report Card, the assessment confirms that aviation facilities in Georgia have improved in areas of Capacity, Accessibility and Facilities & Services, but have declined in Standards and Flexibility. Based on traffic projections put together by the FAA, capacity for the system continues to exceed current requirements, implying additional capacity. There were no data available at the time of this publication that could be used to compare Georgia's aviation infrastructure to other states.

GRADE

The Georgia Section of ASCE has assigned Aviation a 2014 grade of B+. This grade was obtained by assessing the five performance areas. The percentage goal for each weighted performance measure was used to arrive at the numerical score. The weighting was established for each measure based on significance to the performance of the system ("1" is least significant and "3" is most significant).

1. **Capacity** – The aviation system still has excess capacity, so a capacity grade of 100 percent was awarded. Capacity is very significant to performance of the system so a relative weight of 3 was used.
2. **Standards** – The aviation system average of the Standards measures is 86 percent, an increase from 84 percent in 2009. Standards address compliance with federal safety requirements and are very significant to performance of the system. Therefore, a relative weight of 3 was assigned.
3. **Flexibility** – This criterion calls for 100 percent compliance with federal regulatory requirements for Level 2 and 3 airports. There are 73 Level 2 and 3 airports (71 percent of the total). The system average (which includes Level 1, 2 and 3 airports) is 45 percent, down from 56 percent in 2009. This was divided by the goal of 71 percent to yield a score of 79 percent. Flexibility is less significant to performance of the system so a relative weight of 1 was used.
4. **Accessibility** – The aviation system average of the Accessibility measures (which require accessibility to airport facilities) is 100 percent based on the targets, which is an increase from 98 percent in 2009. Access is not as critical to performance of the system so a relative weight of 1 was assigned.
5. **Facilities and Services** – The aviation system average score was 75 percent, an increase of 5 points from 2009 largely due to the improvement in Level 1 facilities. Facilities and Services are significant to performance of the system so a relative weight of 2 was used.

The overall score results in an aviation grade of B+, which is unchanged from 2009.

TYPES OF AIRPORTS

There are three levels of airports as evaluated by the Federal Aviation Administration (FAA):

- **Level I** - Minimum standard general airport: Level I airports should accommodate all single-engine and some small twin-engine general aviation aircraft. A minimum runway length of 4000 feet is recommended. It is also recommended that Level I airports be aided by a non-precision instrument approach. Examples of these types of airports are Dahlonega, Jekyll Island, and Madison.
- **Level II** - Business airport of local impact: Level II airports should be capable of accommodating all business and personal use single and twin-engine general aviation aircraft, and a broad range of the corporate/business jet fleet. A minimum runway length of 5000 feet is recommended. It is also recommended that Level II airports be aided by a non-precision instrument approach. Examples of these types of airports are Cartersville, Pine Mountain, and Moultrie.
- **Level III** - Business airport of regional impact: Level III airports should be capable of accommodating commercial aircraft or the majority of business and corporate jet aircraft. A minimum runway length of 5,500 feet is recommended. It is also recommended that Level III airports be aided by a precision instrument approach. Examples of these types of airports are Hartsfield-Jackson, Peachtree-Dekalb, Macon, Newnan, and Savannah.

CAPACITY

The goal is to provide a statewide aviation system with airside and landside facilities to meet current and future demand. The FAA has determined that as an airport's annual demand reaches 60 percent or more of the airport's calculated airfield operating capacity, delays to aircraft on the ground and in the air begin to increase and capacity-enhancing

Table 1: Georgia Aviation System General Information

Criteria	2012	2008	Difference
Total Number of Airports (95 General Aviation and 9 Commercial Service)	104	104	0
General Aviation Airport Arrivals and Departures	1,617,000	1,970,000	-353,000
Air Carrier Airport Arrivals and Departures (not including Hartsfield-Jackson)	272,438	363,703	-91,265
Aircraft Based at Georgia Airports	4,996	6,098	-1102
Square Yards of Pavement at Georgia Airports	16,170,000	15,490,000	680,000
Average Number of Daily Arrivals and Departures at Hartsfield-Jackson	2,549	2,716	-167
Airports with Runway Length of 4000 feet or greater (Level I airports)	87%	83%	5%
Airports with Runway Length of 5000 feet or greater (Level II airports)	76%	64%	12%
Airports with Runway Length of 5,500 feet or greater (Level III airports)	43%	40%	3%
Airports in the National Plan of Integrated Airport Systems (NPIAS)	94%	94%	0%
Airports that Meet or Exceed a PCI Rating of 70 for their Primary Runway	84%	85%	-1%

SOURCE: GDOT

capital projects should be planned. As annual demand exceeds or equals 80 percent of an airport's operation capacity, delays can increase dramatically and capacity projects should be implemented. Current data suggest that Georgia has significant excess capacity; however this may be reduced as air travel increases with the improvement in the economy. Updated projections for 2021 show that the state will have usage rates well below the 60 percent level.

Table 2: Statewide Annual Demand/Capacity ratios
(Percentage of available capacity in use)

Year	Level I	Level II	Level III	Total System
2001	9%	10%	20%	15%
2012	7%	10%	15%	11%
2021	10%	12%	25%	19%

SOURCE: GDOT

At Hartsfield-Jackson airport, efficiency is measured by the FAA using performance indicators, including average gate arrival delay, average gate to gate time and taxi times, among others. Besides being the world's busiest airport in terms of passenger traffic and numbers of take-offs and landings, Hartsfield-Jackson has seen steady improvement in all efficiency metrics over the past 5 years. The airport has been recognized for many years by the Air Transport Research Society as the world leader in airport efficiency. Hartsfield-Jackson is often referred to as the busiest airport in the world and to meet that demand a $1.2 billion international terminal was opened in 2012.

STANDARDS

The goal is to support a statewide aviation system that complies with applicable State and Federal design, safety, and development standards. It should be noted that many of the airports in the state were constructed when design standards were significantly different than today. Because some of the new design standards are more stringent, some of these airports will require significant modification to meet current standards. Therefore, although the goal is to have 100 percent compliance, this will be unlikely until major capital projects can be funded. Below is a summary of significant aspects of this performance measure:

- The Runway/Taxiway Separation Standard measures the ability to meet the separation standard between the primary runway centerline and any full or partial parallel taxiway centerline. Each airport's standard is determined by its current FAA Runway Reference Code (RRC). Currently, 82 percent of Georgia airports meet the standard. This is a decrease from 89 percent in 2008.
- The Runway Safety Area (RSA) Standard for Primary Runways measures the ability to meet the dimensions of runway safety areas on each end of the primary runway. Each airport's standard is determined by its current FAA Runway Reference Code (RRC). Currently, 91 percent of Georgia airports meet the standard. This 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. Currently, 84 percent of Georgia airports meet the standard. This is a decrease from 85 percent in 2008. Between 2003 and 2008, nearly 30 runways were extended as part of the statewide AirGeorgia program. A combination of reduced state funding levels and aging pavements at AirGeorgia airports contributed to this slight decrease in the last 5 years. A number of runway and other airport pavement maintenance projects are funded for 2013 and are planned for the next several years to maintain these pavements in accordance with the PCI criteria.

FLEXIBILITY

The goal is to provide a system of airports that remains flexible and capable of responding to future change while maintaining compatibility with surrounding communities.

- Of Level I, II, and III airports that have current master plans or Airport Layout Plans (ALPs), 40 percent have completed the plan within the past 5 years. This is down from 64 percent in 2008. Because of the requirement of planned construction projects to be shown on an approved ALP to indicate all safety and design standards are met or planned to be met, many AirGeorgia airports updated their ALPs between 2003 and 2008 in anticipation of pending runway extensions and other capital airside improvements. Although many of the ALPs were completed longer than five years ago, the plans remain valid until all projects are completed or a new layout of facilities is required.
- Of Level I, II, and III airports with surrounding municipalities that have adopted controls and/or zoning to assure land use in the airport environs is compatible with airport operations and development, 50 percent have adopted land use or zoning controls. This is an increase from 48 percent in 2008.

ACCESSIBILITY

When evaluating accessibility, the goal is to provide an airport system that is easily accessible from both the ground and the air. These criteria are evaluated based on the airport Level designation. To summarize significant changes since 2008:

- The goal of Level I Airports is to be within a 30-minute drive time of the statewide population. The target population coverage per GDOT is 96.1 percent. The existing population coverage of Level I Airports in Georgia is 99 percent. This is an increase from 93 percent in 2008.
- The goal of Level II Airports is to be within a 30-minute drive time of the statewide population. The target population coverage per GDOT is 89.5 percent. The existing population coverage of Level II Airports in Georgia is 90 percent. This is an increase from 86 percent in 2008.
- The goal of Level III Airports is to be within a 45-minutes drive time of the statewide population and a 60-minutes drive time for commercial service airports. The target population coverage for Georgia per GDOT is 98.1 percent. The existing population coverage for Level III Airports in Georgia is 98.1 percent. This is unchanged from 2008.

FACILITIES AND SERVICES

The goal is to provide facilities and services, such as adequate airfield infrastructure, parking, terminal space, navigation aids, etc., that should ideally be in place at Level I, Level II, and Level III airports as identified by the Georgia Aviation System Plan. This should guide future development at Georgia airports. Table 3 (on page 10) shows the compliance percentages for a number of facilities and services.

Giving each category equal weight we were able to compute an overall score for each level of airport.

- The percentage of Level I Airports meeting the combined standard is 61 percent (up from 49 percent in 2008).
- The percentage of Level II Airports meeting the combined standard is 78 percent (up from 70 percent in 2008).
- The percentage of Level III Airports meeting the combined standard is 90 percent (up from 89 percent in 2008).

Table 3: Facilities and Services by Level of Airport

	Level I	Level II	Level III
Runway Length	60	88	95
Runway & Taxiway Lighting	87	100	100
Terminal Building	23	50	78
Aircraft Maintenance Availability	47	81	88
Fuel Availability	50	97	98
Hangar Space	87	84	88
Tie Downs	73	78	88
Vehicle Parking	57	47	61

SOURCES

Georgia Department of Transportation (GDOT) Intermodal Division Director.

Georgia Department of Transportation (GDOT) Aviation Programs Aviation Planner.

National Plan of Integrated Airport Systems (NPIAS).

BRIDGES

C-

RECOMMENDATIONS

- *Repair or Replace Structurally Deficient Bridges:* State and local governments should try to reduce the number of structurally deficient bridges throughout the state. Additional focus should be placed on replacing and repairing locally maintained structurally deficient bridges that make up the majority of the state's structurally deficient inventory.
- *Implement Asset Management:* Continue to shift away from a "worst first" bridge repair and replacement prioritization methodology to one that focuses on replacing the bridges that pose the greatest risk if they were to go offline. Develop tools that assist a risk based model and reduce the dependence on the sufficiency ratings to determine priority.
- *Focus on Preventive Maintenance:* The state has to make what they have last, so there should be a focus on preventive maintenance measures to relatively healthy structures early in their life cycle. Funds spent on preventive maintenance will reduce or delay future major repairs.
- *Consider Alternative Funding Sources:* The state should continue to look to alternative sources of funding through new legislation such as the Regional Sales Taxes or similar legislation. Some consideration should be given to increasing the motor fuel tax to levels that would help to keep up with the current levels of inflation.

DEFINITION OF THE ISSUE

As of 2012 there were 14,769 bridge structures in Georgia, according to the bridge inventory listing maintained by the Georgia Department of Transportation (GDOT) Office of Bridge Maintenance. The Federal Highway Administration (FHWA) defines a bridge as any structure with a length greater than 20 feet that passes over an obstruction, such as a river or railroad. Of the 14,769 structures inspected by the GDOT Office of Bridge Maintenance, 5,627 are culvert-type structures and the remaining 9,142 are span bridges.

In Georgia, the sufficiency rating is one of the indicators of the health of bridges in the state along with other metrics such as number of structurally deficient bridges, meaning they require maintenance or replacement, and functionally obsolete bridges which means they were not built to today's standards. This information is determined based on the bi-annual inspection of the state's bridges undertaken by GDOT. The State Bridge Maintenance Engineer uses this information in establishing the priority for repairs and replacement of bridges throughout the state. Georgia has 784 structurally deficient bridges and 2,308 functionally obsolete bridges.

GRADE

The Georgia Section of ASCE assigned Bridges a 2014 grade of C-. This is the same grade assigned in 2009. As in 2009, the 2014 grade for bridges is based primarily on condition and capacity. This report is based on the current condition and capacity of the bridges in Georgia, as defined by their sufficiency rating. This analysis was based on the ASCE Georgia Section's review of the data available from the FHWA National Bridge Inventory Database and information from the GDOT Bridge Maintenance Unit.

As with the 2009 Report Card, the basis for the grade focuses more on bridges than culverts. A bridge is a structure built to span a river, road, railroad track or any other physical obstacle for the purpose of providing passage over the obstacle. Generally, culverts are concrete boxes designed to convey water under a road where it crosses a creek or low area. Culverts generally require less maintenance and have a high average sufficiency rating of 90.1 overall in the state. This report focuses on bridges and not culverts for several reasons. The general public typically views bridges as span structures, not culverts. In addition, the installation and maintenance costs for bridges are substantially higher than those for culverts. Therefore, the 2014 grade of C- is based on bridge structures alone.

The amount of funding for bridge replacement and bridge maintenance in Georgia has remained at relatively constant levels over the past four years. This level of funding has allowed the state to address the critical needs for bridge replacements and repair but is still not at the levels needed to completely meet the maintenance needs of the state. GDOT's bridge maintenance program requires that the focus be on repairing and replacing critical bridges first. This could result in more routine or minor maintenance on the bridge inventory being deferred until funding becomes available from other sources.

CONDITION/CAPACITY

Sufficiency Rating

The sufficiency rating is determined by evaluating factors which indicate a bridge's sufficiency to remain in service. The rating is a percentage in which 100 represents an entirely sufficient bridge and zero represents an entirely insufficient (or deficient) bridge. The calculation takes into account the structural adequacy (55 percent), serviceability and functional adequacy (35 percent), and how essential the bridge is for public use (15 percent). Over half of the rating is based on structural condition (or adequacy) because failure of a bridge structure could be catastrophic. Serviceability and functional adequacy takes into account the factors that affect the capacity and use of the bridge such as roadway width, amount of traffic, condition of the bridge surface, and likelihood of flooding. If the bridge is on the National Highway System, has a lot of traffic or is difficult to detour around, that is taken into account in the essentiality part of the rating.

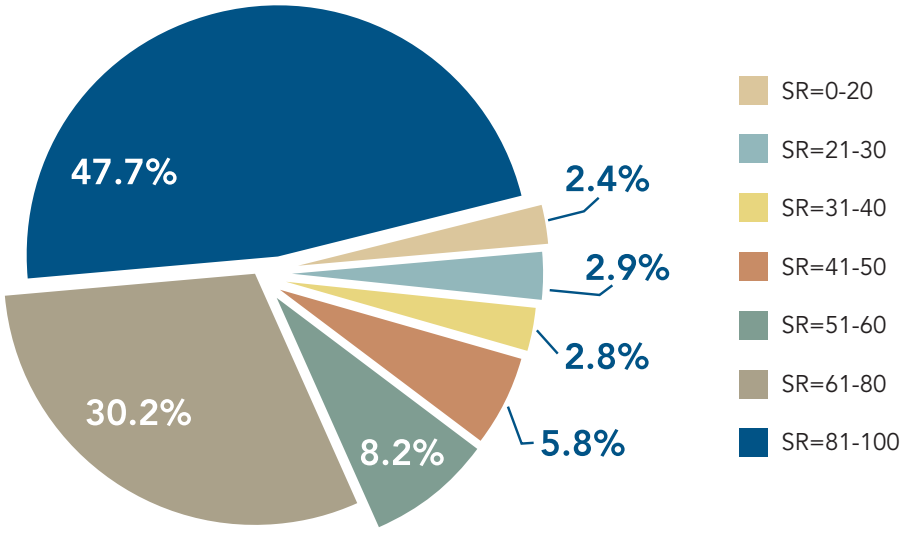


Figure 1 - Sufficiency Rating of Bridges in Georgia

Each bridge structure in Georgia is inspected every other year by GDOT and evaluated to determine the overall condition as well as the sufficiency rating. In the past, a sufficiency rating below 50 was considered by GDOT to be in need of replacement, but recent changes to the inspection procedures and methodology are moving away from sufficiency alone as the determinate for replacement. Each bridge is now evaluated on a case by case basis. For this report, sufficiency ratings, as well as structural deficiency and functional obsolescence, will be used as indicators of overall bridge health.

The bridge structures shown in Figure 1 are grouped based on their sufficiency ratings. Approximately 2 percent of bridges have a sufficiency rating of zero to 20, 6 percent of bridges have a rating of 20 to 40, 13.9 percent of bridges have a rating of 40 to 60, 30.1 percent of bridges have a rating of 60 to 80 and 47.7 percent of bridges have a rating of 80 to 100. The average rating for bridges is 74.6.

In 2012, the U.S. Congress passed the Moving Ahead for Progress in the 21st Century (MAP-21) legislation. MAP-21 will change the way that bridges will be evaluated in the future. This will be a departure from the sufficiency based model that has been used since the establishment of the National Bridge Inventory System since the sufficiency model is a "worst first" replacement methodology. MAP-21 now requires state DOTs to develop asset management based plans and this change requires the prioritization of bridge replacement based on risk rather than condition alone.

Structurally Deficient and Functionally Obsolete Bridges

A bridge is considered structurally deficient if the bridge requires significant maintenance, rehabilitation or replacement. These bridges must be inspected at least every year since critical load-carrying elements were found to be in poor condition due to deterioration or damage. The fact that a bridge is classified under the federal definition as "structurally deficient" does not imply that it is unsafe. A structurally deficient bridge, when left open to traffic, typically requires significant maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies. To remain in service, structurally deficient bridges are often posted with weight limits to restrict the gross weight of vehicles using the bridges to less than the maximum weight typically allowed by statute. Georgia has 784 structurally deficient bridges, which is 8.6 percent of the 9,142 span bridges. This is just below the national average of 11 percent.

A functionally obsolete bridge is one that was built to standards that are not used today. These bridges are not necessarily rated as structurally deficient, nor are they inherently unsafe. Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or those that may be occasionally flooded. These are bridges that require major repair work to bring the bridge up to current code requirements. Georgia has 2,308 bridges that meet the criteria to be called functionally obsolete. This is 25.2 percent of the 9,142 span bridges and well above the national average of 14 percent.

Under MAP-21, the state DOT is required to report the area of structurally deficient bridge deck to FHWA annually. The area reported is only on bridges that are classified as National Highway System structures. This number is required to be below 10 percent to avoid penalties from FHWA. The total area reported to FHWA in Georgia in 2013 was 2.7 percent which is well below the 10 percent threshold. The majority of deficient bridges in Georgia are not included in this total because they are off the state system and are not owned by the state. These off-system bridges are owned by local governments such as cities and counties.

FUNDING

The primary source of funding for transportation in Georgia is the motor fuel tax, commonly known as the gas tax. At just 7.5 cents per gallon, Georgia has the lowest motor fuel tax in the United States. This revenue is used to pay for state funded projects, or as part of the state's matching percentage on projects funded primarily with federal funds. One issue with the gas tax is that it is not indexed to inflation and continues to see an erosion of buying power as inflation rises. Also, with the rise of more fuel efficient vehicles and people driving fewer miles, gas tax collections have suffered. As a result, funding levels have remained at a constant level that only allows the state to address critical bridge repairs and replacements. This funding is not at the level necessary to meet all replacement and repair needs throughout the state, particularly for off-system (locally owned) bridges. MAP 21 legislation does provide a 15 percent set aside for off-system bridges and will help to address repairs to bridges not owned by the state, but it is still not adequate to address the needs in this area.

Without alternative funding sources or increases to the motor fuel tax there appears to be limited opportunity to meet state needs for fully funding bridge replacement and repair. Recently the Georgia legislature attempted to address the need for additional infrastructure funding through a regional 1 percent sales tax referendum to fund transportation projects in 12 regions across the state. The referendum passed in 3 regions and will generate up to $1.8 billion over the next 10 years in those areas. 85 percent of the collections will go to funding preselected projects which will address critical infrastructure upgrades including bridge repairs of locally owned roads. Approximately 15 percent of the money collected will be used at the discretion of the local municipalities and counties to fund projects that they develop. Some of these projects will likely include bridge repair and replacement. There may be an opportunity for a similar referendum to fund infrastructure in the coming years.

SOURCES

AASHTO subcommittee on Transportation Asset Management, Strategic Direction of Georgia Department of Transportation, 2011.

Federal Highway Administration, FHWA NBI ASCII Files.

Federal Highway Administration, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges. www.fhwa.dot.gov/bridge/nbi.cfm

Iowa Department of Transportation, Subcommittee on Transportation Communications. www.iowadot.gov/subcommittee/bridgetermspz.aspx

NBIS database and inspection coding for Georgia. www.fhwa.dot.gov/bridge/nbi/ascii.cfm

DAMS

D-

RECOMMENDATIONS

- *Increase the Dam Safety Program Staffing Level:* Increase Georgia Safe Dams Program staffing to address the backlog of enforcement actions yet to be completed and to decrease the number of high-hazard dams which need to be assessed for compliance with the Rules for Dam Safety. This should be a priority since it impacts public safety. In 2013 the number of dams per staff member in Georgia was five times the national average.

- *Increase Dam Safety Funding:* In order to provide additional staff, increased funding for the Georgia Safe Dams Program is needed to address the increasing number of dams. The additional staff and funding will need to focus on accelerating the repairs of existing deficiencies, assessing dams for compliance, and classifying dams. Additionally, Georgia could consider establishing a grant program for dam owners who need financial assistance. There are 20 or more states that have some form of grants or loans for property owners.

CONTINUED PAGE 16

DEFINITION OF THE ISSUE

Although Georgia has no naturally occurring ponds and lakes, these features have been created all over the state by placing dams on streams and rivers to impound the water. Dams create reservoirs, ponds and lakes that are used for water storage, recreation and flood management. In 2013, Georgia had 4,053 dams, 484 of which were considered to be high-hazard. The Georgia Rules for Dam Safety define high hazard dams as those that in the case of failure would result in the probable loss of human life and are termed Category I dams. Category II dams are those that are not likely to pose a threat to human life in the event of failure. Some structures are exempt from state regulation because they do not meet the criteria to be considered a dam or because they are regulated by the United States Government. A total of 130 high-hazard dams in Georgia are considered deficient by the Georgia Department of Natural Resources (DNR). The majority of these deficiencies are due to inadequate hydraulic capacity, which could cause the water to go over the top of the dam during extreme rain events.

WHAT IS A DAM?

Any artificial barrier which impounds water with:
1) Height of 25 feet or greater, or
2) Storage volume of 100 acre-feet or greater at the maximum water storage elevation.

SOURCE: O.C.G.A. § 12-5-372

Many of these dams are remnants of Georgia's agricultural past and were constructed more than 50 years ago using materials which have outlived their design life. Design methodologies and construction practices have also significantly improved since these dams were originally constructed. The U.S. Census Bureau estimates that Georgia's population increased about 18 percent from 8.2 million in 2000 to 9.7 million in 2010. By 2030, the state's population is estimated to reach 13.5 million. Lakes and ponds are magnets for residential development and eventually become focal points of communities. Therefore, as the population density increases throughout Georgia, many rural dams which once were not considered to be high-hazard will be re-classified to Category I dams because more people will live near them.

The Georgia Safe Dams Act was enacted in 1978 after the failure of the Kelly-Barnes Dam in Toccoa, Georgia. The dam failure killed 39 people at Toccoa Falls College in the fall of 1977. The Safe Dams Program is the regulatory arm of Georgia DNR Environmental Protection Division (EPD) and enforces the Georgia Rules for Dam Safety which were developed to implement the provisions of the Georgia Safe Dams Act. Its role is to inspect and permit certain dams for the purpose of reducing the risk of failure for the protection of health, safety and welfare of all the citizens of the state. This role includes review of construction and rehabilitation plans and maintaining an inventory of all dams in the state with inventory updates every five years. The Safe Dams Program regulates dams which, based on definition, are not otherwise regulated by the federal government. Under this protocol dams in Georgia that are regulated by the Federal Energy Regulatory Commission (FERC), the U.S. Army Corps of Engineers, and the Tennessee Valley Authority (TVA) are exempt from the Georgia Rules for Dam Safety.

RECOMMENDATIONS

- *Ensure Emergency Action Plans for High-Hazard Dams:* Ensure that all high-hazard (Category I) dams have emergency action plans that can be used in the event of a dam failure to identify and notify people residing below the dam, and to coordinate their evacuation.
- *Provide Education to Businesses and Homeowners Responsible for Dams:* Educational materials should be developed and provided to homeowners and businesses responsible for dam repair and maintenance. These materials should be made available to realty companies, chambers of commerce, libraries and online through Georgia Safe Dams Program and local governments. Professional organizations such as ASCE can assist in developing these materials.

GRADE

The Georgia Section of ASCE has assigned Dams in Georgia a 2014 grade of D-. This is a decrease from the 2009 grade of D. The Georgia Safe Dams Program identifies 130, or 27 percent, of the state's 484 high-hazard dams as deficient. Additionally, there has been a fifty percent decrease in Georgia Safe Dams staff and almost 10 percent increase in the number of regulated dams since 2008. The Georgia Section of ASCE has recommended increased the staff and funding for the Georgia Safe Dams Program since the 2003 Report Card on Georgia's Infrastructure, yet in the last 10 years the Program's staff decreased in number from 10 to 4 and the number of regulated dams increased from 3,412 to 4,053. As the population in Georgia continues to increase, the state will continue to rely heavily on dam structures for water storage, recreation and flood management. The inspection and maintenance of dams is a public safety issue and the state's failure to address these pressing issues by providing proper funding and adequate staff levels results in a D- grade.

CONDITION, OPERATION AND MAINTENANCE

Since 2009, four dam failures have been reported in the state. Each of these structures were either Category II or exempt dams. In September 2009, the Atlanta metro area experienced extreme flooding, and as a result, 96 Category I dams were impacted. Four of these dams overtopped but did not fail, and 46 had their emergency spillway engaged. The emergency spillway of a dam engages only in extreme rain events and provides a path for excess water to cross the dam safely without overtopping the dam which could cause the dam to fail.

The number of high-hazard dams in Georgia has increased from 450 in 2008 to 484 in 2013, an increase of 7.5 percent. The greater number is due to the construction of new dams and re-classification of existing dams due to new development downstream of existing dams. Of the high-hazard dams identified, over 50 percent do not have a permit to operate. The lack of an operations permit indicates that they have not been assessed for compliance with the Georgia Rules for Dam Safety or there are known deficiencies which need to be corrected to be eligible for a permit.

In Georgia, there are 357 watershed dams which were constructed by the Soil Conservation Service since the 1940's. Over 100 of these dams are high-hazard dams and are maintained and operated by the Soil and Water Conservation Districts which has no revenue source for maintenance or rehabilitation. Approximately 44 percent of the high hazard dams in Georgia are privately owned. Many are owned by individuals or homeowners associations. These dam owners are often unaware that they own a dam, and thus unaware of the maintenance and repair requirements. There are no funding sources to assist private owners with dam maintenance or repair.

Any dam must be inspected and maintained to prolong the structure's life and prevent catastrophic failure. Since the inception of the Safe Dams Program, staff has inspected all high-hazard dams on an annual basis; however, due to staffing shortages, the inspection schedule has changed to a bi-annual basis. As part of shifting to bi-annual inspections, dam owners were notified of their

lawful responsibility to inspect their own dams quarterly. The Safe Dams Program reports that the participation rate for self-inspections has been very low, around 20 percent.

Low-hazard (Category II) dams are required to be re-inventoried at least once every five years. There are counties in the state that have not been re-inventoried within the 5-year window stated in the law. As of 2013, the number of lagging counties was 54 and increasing. Category II and unregulated dams account for almost 90 percent of the dams in Georgia. In 2013, both an exempt dam and Category II dam failed in Georgia. Failure of these dams did not result in loss of human life, but necessitated evacuating nearly 100 people from downstream of the exempt dam and caused millions of dollars of environmental damages downstream of the Category II dam.

CAPACITY, FUNDING AND FUTURE NEED

Based on 2011 data from the National Inventory of Dams, the total number of dams in the inventory nationwide increased 8.7 percent between 2008 and 2011, while the total number of dams in Georgia subject to state regulation increased 9.5 percent between 2008 and 2013. The number of deficient dams in Georgia decreased 16.1 percent versus a 17.6 percent increase nationally. The majority of these deficiencies are due to inadequate hydraulic capacity, such as not enough spillway capacity, which could cause a dam to overtop during a flood event.

Despite the 9.5 percent increase in state regulated dams, the Georgia dam safety budget decreased 17.5 percent during the same time period. In Georgia, the dam safety budget is used to fund the Georgia Safe Dams Program staff. In 2013 Georgia employed 4 full time staff within the Safe Dams Program. Due to staff shortage, the Safe Dams Program had a backlog of 34 design reviews to be performed, 113 compliance reports to be written, 278 dams to be permitted and nearly 500 dams to be assessed to determine if they need to be upgraded to Category I status.

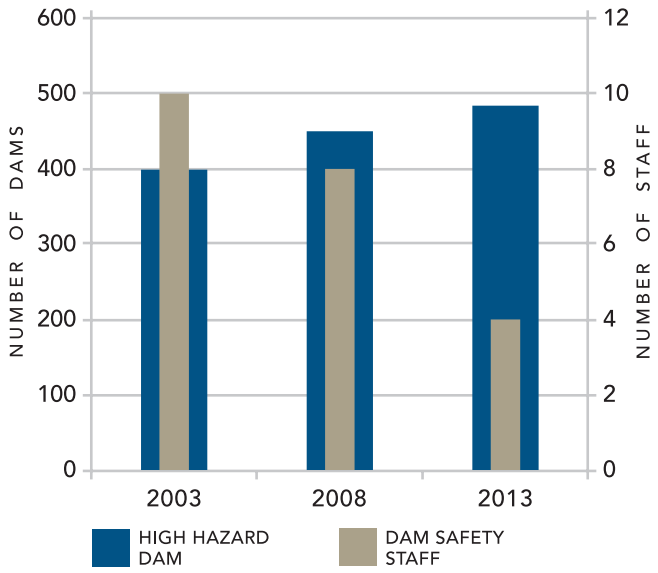


Figure 1 - Number of High Hazard Dams versus Dam Safety Staff

In 2013 the state of Georgia was recovering from a historic drought period. New raw water reservoir projects were being constructed and proposed to increase water supply capacity. The Georgia Safe Dams Program reviews and approves the design of all Category I dams and has the option to review any design for a water supply reservoir project. The anticipated timeframe to have a dam design reviewed and approved was more than six months. On June 9, 2013, The Atlanta Journal-Constitution newspaper reported, "The agency has a backlog of 115 dams recently upgraded to high hazard that have yet to be fully assessed so their owners know how to address them. There are also just under 500 low-hazard dams waiting for further study because they were flagged for potential upgrade to high-hazard status."

PUBLIC SAFETY

The failure of a dam, especially a high hazard dam, can have catastrophic downstream effects, including damage to property and potential loss of life. In Georgia, only 5% of high-hazard dams have emergency action plans (EAPs) which can be used in the event of a dam failure to identify and notify people residing below the dam, and to coordinate their evacuation. The national average of EAPs for high-hazard dams is 69%; thus, Georgia's dams significantly lack the planning to protect citizens in an emergency. In comparison to the number of dams regulated per staff (as presented in Table 1 on page 18) the Georgia Safe Dams Program staff has a work load five times greater than the national average. As of 2013, the Georgia policy to address dam deficiencies is with a letter requiring the dam owner to hire an engineer within four to eight weeks, and subsequently submit an engineering report within three to four months. Serious deficiencies may result in the owner being required to comply with safety standards within reduced timeframes. Failure to comply could lead to enforcement action against the dam owner. The lack of Safe Dams staff makes it difficult to find time to write enforcement orders against these owners. There are several cases that will ultimately go to the State Attorney General's office for enforcement assistance, which also takes extensive staff time.

Table 1: Dam Safety Statistics

	Total Dams in National Inventory	Total Dams under State Regulation[1]	High Hazard Dams[2]	High Hazard Deficient Dams[3]	State Dam Safety Budget ($ thousands)	No. State Staff on Dam Safety	No. State Regulated Dams Per FTE Staff
% GA Change (2008-2013)	-17.0%	+9.5%	+7.5%	-16.1%	-17.5%	**-50%**	**+119%**
GA Change	-830	+350	+34	-25	-$127	**-4**	**+550**
Georgia (2013)*	4,053 (2011)	4,053	484	130	$600 (2013)	4	1,013
Georgia (2008)*	4,883	3,703	450	155	$727 (2005)	8	463
Georgia (2003)*	4,977	3,412	399	105	$682	10	341
% Nat. Change	+8.7%	-	+38.1%	+17.6%	-21.3%	-8.8%	+5.0%
Nat. Change	+6,971	-	+3,861	+600	$11,923	-39	+10
National (2013)*	87,354	-	13,991	4,000	$44,000	405	207
National (2005-2006)*	80,383 (2005)	87,310	10,130	3,402	$55,923	444	197
National (2003)*	175,592	87,310	25,454	7,766.839	$112,527.787	827.412	252

SOURCE: ASSOCIATION OF STATE DAM SAFETY OFFICIALS AND THE ENVIRONMENTAL PROTECTION DIVISION OF GEORGIA DNR

* Indicates figure taken from National Inventory of Dams (NID) and based on NID definitions.

1 - Estimated number of all dams under state regulatory control. Data for 2013 could not be verified and thus is not reported for some national categories.

2 - Includes dams, not regulated by the US government that are 25 feet high or greater or impound a volume of 100 acre-feet or greater at the maximum dam height.

3 - High-hazard dams with identified deficiencies by state definition.

SOURCES

Association of Dam Safety Officials.

Fox, Pat, Atlanta Journal and Constitution, "Agency Awash in Untended Dam Inventory", June 8, 2013. www.ajc.com

Environmental Protection Division, Georgia Department of Natural Resources.

U.S. Census Bureau. www.census.gov/2010census/popmap/ipmtext.php?fl=13

Georgia Office of Planning and Budget. opb.georgia.gov

DRINKING WATER

C+

RECOMMENDATIONS

- *Investigate Alternative Water Supply Sources and New Technologies:* As demand increases and impacts to water supplies are better understood, Georgia needs to investigate alternative water supplies and related technologies. These may include the use of deeper aquifers, desalination water treatment facilities, and aquifer storage and recovery.
- *Utilize Water Supply Reservoirs:* Reservoir capacity in north Georgia needs to be expanded to ensure future needs are met. This can be accomplished through construction of new reservoirs and expansion of existing reservoirs. Local governments, with resources provided by GEFA and other state agencies, can accomplish this goal.
- *Employ Asset Management to Improve Capital Efficiency:* Asset management programs can vastly improve the efficiency with which Georgia utilities stay ahead of aging infrastructure. Fewer unpredicted failures will reduce liabilities and will save revenues for planned rehabilitation and replacement projects.

CONTINUED PAGE 20

DEFINITION OF THE ISSUE

Public water systems serve over 8 million of Georgia's 10.2 million residents, with the remainder served by private systems, delivering water from over 2,000 individual systems. There are 17 public water systems, in Georgia that serve over 100,000 people each. There are 220 systems that can serve 3,300 to 10,000 people, and there are 2,185 small systems that can serve less than 3,300 people. Other residents receive water through private well systems.

These systems are managed to deliver water to homes and water for fire hydrants every day of the year at any hour. Expectations remain high: Interruptions in water service are unacceptable and the quality of water delivered to homes and businesses is expected to meet U.S. Environmental Protection Agency (EPA) public health standards while meeting individual customers' standards of aesthetics and taste.

Since the 2003, the Georgia Environmental Protection Division (EPD) has prohibited new permits for water intake in coastal counties and in the lower Flint River basin. These actions, designed to protect water quality and groundwater resources, represent a challenge for water supply infrastructure as demands are increasing and impacts to the source are becoming better understood. This will necessitate consideration of other sources of water such as surface water, desalination of sea water and other aquifers.

Funding demands on public water systems include development of additional water supply projects and improvements to the water treatment plants and distribution systems for capacity increases, operation and maintenance needs, and water plant process improvements to meet new water quality regulations. Much of the water infrastructure in Georgia is well into or beyond its predicted service life. Responsible management of these assets is crucial to maintaining an acceptable level of service to all of the state's water consumers.

RECOMMENDATIONS

- *Use Rate Studies as a Funding Tool:* Water utilities need to analyze rate structures to ensure they fully fund all utility needs. There is evidence of many Georgia utilities having rate structures that are not sustainable. This will inevitably result in urgent funding needs in the future and will ultimately increase costs to ratepayers.
- *Strategic Management and Water Supply Source Protection Improve Quality:* Watershed protection plans are needed to lessen potential impacts to source waters and reduce costs of drinking water treatment.
- *Use Automation and Technology to Stretch Resources:* As more advanced methods and materials become available, utilities need to remain flexible and open. Capital projects can benefit from value engineering that includes a review of the latest methods, materials and equipment.
- *People are Important - Use Workforce Development:* Training courses on advanced technology and tools will be necessary to keep pace with stricter regulatory requirements, replace a much reduced workforce, and attract a limited recruitment pool. Position descriptions and qualifications should reflect the increasing technical complexities of the field.

GRADE

The Georgia Section of ASCE has assigned Drinking Water a 2014 grade of C+. This is the same grade as 2009. Water quality continues to improve as new processes are implemented in response to stricter regulations and public expectations. Capacity of water infrastructure has had a chance to "catch up" as development slowed during the economic downturn. However, the corresponding reduction in water revenues has limited re-investment in existing infrastructure, and formal asset management programs need to be adopted at all water utilities.

The best estimates of population in Georgia indicate that there will be over 13 million residents of the state by 2030. This is about a 27 percent increase in population and corresponding potable water use. Since the vast majority of new residents will depend on public water sources, this growth presents growing challenges for the state's water systems.

CONDITION

Public water utility owners have begun emphasizing tracking and assessing the condition of pipes, water plants, and other components of their water systems. Asset management has become essential to responsible utility stewardship. Only by understanding the risks associated with various assets can owners intelligently decide how to re-invest and bring the most value to the utility, given limited funding resources.

At present, there is no state-wide database of water infrastructure condition. It is difficult to assess how many water systems in Georgia are at or beyond their predicted service life. Even so, catastrophic failures are rare. The age and resulting condition of water infrastructure typically manifests itself in many smaller failures consisting of breakdowns of plant equipment and water main leaks and breaks.

The current rate of failures in water infrastructure indicates that the condition of systems is relatively good. However, this is likely to change rapidly as systems reach the end of their service lives. More data and visibility are needed to better understand the condition of water systems.

WATER CAPACITY AND FUTURE NEED

Water shortages experienced in Georgia during 2007-2008 have eased with increased rainfall in recent years. This has replenished surface water reservoirs in northern parts of the state and has recharged groundwater sources in south Georgia. Of course, it is unknown how long these gains will keep Georgia from having to worry about water supply, especially with the increase in climate variability. Droughts are cyclical in nature, and the next one may be just around the corner. Regional Water Plans generally predict adequate supplies through the planning period, but contingency plans are integral to any water utility's overall management.

The Georgia Water Stewardship Act of 2010 incentivizes water conservation, encourages water loss abatement, improves public outreach, and examines rate structures of public water utilities. This Act is an important step toward increased water conservation and represents an improvement since the 2009 Report Card.

As of 2010, municipal and industrial water uses in Georgia averaged just over 2

billion gallons per day (BGD) with projections for 2050 at about 3.2 BGD. Agricultural withdrawals of ground and surface water together averaged about 1.4 BGD in 2010, and are expected to increase about 14 percent by 2050. Thermoelectric (primarily cooling) uses account for about 2.8 BGD, but over 90 percent of this water is returned to the environment at or near its source. Withdrawal rates will escalate with increased population and conversely will be partially mitigated by improved water conservation measures.

In 2011, Georgia Governor Nathan Deal issued an executive order directing the Georgia Environmental Finance Authority (GEFA) to develop and implement the Governor's Water Supply Program (GWSP). A Water Supply Task Force (WSTF) was formed, and was charged with guiding development of the GWSP. A commitment of over $300 million from various sources over four years for reservoir and water supply development was announced in 2011.

At this time, water supply appears to be stable in the Metro Region and throughout Georgia. On June 26, 2012, Governor Deal announced the legal opinion by the US Army Corps of Engineers that they have the authority to grant Georgia's water supply request of May 16, 2000 for the Metro Atlanta Region, thus advancing the Corps final reallocation process and helping to set parameters for resolution of water issues with neighboring states. The decision of whether or not to actually grant the request has not been made by the Corps to date. This water supply issue is by far the most critical in the state, and has been contentious and uncertain for many years.

The public is very sensitive to water level-of-service issues, and the ability of water systems in Georgia to meet current demands is generally very good. Because of economic uncertainties, future demands are not well understood. Thanks to formal water planning at the regional level, local utilities have good base information to work with in developing their own future supply and system capacity plans. The current status of these plans is aligned with the potential for elevated demand due to population increases.

Water loss is another area where progress has been made in Georgia in recent years. The Water Stewardship Act of 2010 requires annual water loss audit reporting as one important part of a comprehensive water supply and water conservation program allowing Georgia to efficiently meet water demands while reducing water waste reflecting a culture of conservation throughout the state. Every gallon of water lost or wasted due to system inefficiencies comes at increasing cost to communities and natural environments, especially in areas where demands may exceed supplies. Water system audits and water loss control are valuable water management strategies that can improve the efficiency of water production and delivery. The Infrastructure Leakage Index (ILI) is the best performance indicator for benchmarking leakage within an individual water system. An ILI close to "1" indicates the utility's real losses are close to the unavoidable losses and therefore further reductions in real water losses might be unattainable or uneconomical. The validity score is a rating of the utility's confidence and accuracy of data used to calculate the ILI. A lower score means the data is less reliable and the utility should focus on improving its data inputs for a more accurate assessment of system water losses. Leak detection, meter calibration, pipe condition assessment, and surveys of interconnections are just a few of the tools available to reduce water loss, and their use is becoming more common.

OPERATION AND MAINTENANCE

Reactive maintenance of public water systems occurs too frequently, and could be forestalled with better asset management programs that rehabilitate and replace infrastructure before damaging failures occur. Utilities in Georgia are beginning to develop formal asset management tools. Inventories of existing infrastructure including condition assessment are the first component necessary for an effective asset management program. These inventories ideally are stored in geospatial information systems (GIS) that act as powerful databases capable of sorting and retrieving data in ways that are useful to asset managers.

Another important component of asset management systems is a computerized maintenance management system, or CMMS. Having such a system allows maintenance managers to track all maintenance activity, asset by asset. Work orders for preventative maintenance are generated automatically and can be increased or decreased in frequency, based on results. The relative expense of planned versus reactive maintenance can be examined and maintenance habits adjusted accordingly. Using these tools, water utilities in Georgia are beginning to better manage operation and maintenance of their very large investments in infrastructure.

PUBLIC HEALTH AND SAFETY

Georgia residents deservedly expect their water to be free of harmful contaminants and objectionable tastes and odors. By stringently following standards set by the US EPA, the Georgia Department of Natural Resources regulates all public water in the state. Compliance with water regulations in Georgia is very high, with over 99 percent of public water systems operating without health-based water quality violations.

Although compliance rates are very high in Georgia, the ability to meet regulations is always dependent on responsible operation and maintenance of public water systems. Funding is needed for development of industry best practices by water utilities that do not yet employ formal asset management in their operations and maintenance strategies.

Most water utilities have completed formal Vulnerability Assessments in response to EPA guidance. These Assessments examine risks associated with everything from malevolent attackers to severe weather. Vulnerability of water utilities is trending toward better public safety, although significant risks remain. Public health and safety can be threatened by the possibility of catastrophic failure of large water infrastructure. Through better management and long-term planning, these risks can be diminished.

FUNDING

Water utility rates are expected to provide nearly all of the funds for operation, maintenance and expansion of water systems in Georgia. In order for any utility to be sustainable, rates must consider full life-cycle costs of services, rehabilitation of existing assets and construction of new assets, plus debt service and other indirect costs. An up-to-date rate study by a qualified financial consultant is essential to responsible operation of a water utility. Costs to a utility change often, with unpredicted failures of assets and implementation of new technology and new regulations having large impacts. In addition, rates must be structured (typically tiered) to encourage water conservation and should include minimum charges to cover costs that are not affected by demand.

The University of North Carolina's Environmental Finance Center (EFC) developed an Internet "dashboard" useful for evaluating rates and comparing to neighboring utilities or to the state of Georgia as a whole. According to this work, a large percentage of utilities in Georgia have rates that only cover a portion of their expenditure needs and therefore, cannot rehabilitate or replace aging infrastructure. Nor do they consider the cost of expansion or upgrades, making the conclusion even more urgent for those utilities below the break-even point.

Short-term solutions to funding deficits are available in Georgia, which eases the concern somewhat, as long as investments are followed by rate restructuring. The Georgia Environmental Finance Authority (GEFA) offers low-interest loan programs for drinking water treatment, interconnections, pipelines, reservoirs, water conservation, meter replacement, and other water infrastructure. Funding is available from the Georgia Fund, the Governor's Water Supply Program, the Clean Water State Revolving Fund, the Drinking Water State Revolving Fund, and the Reservoir and Water Supply Fund. Other funding may be available through the Community Development Block Grant Program and USDA Rural Development Programs

RESILIENCE

Water systems face many challenges in meeting the 24/7 demands for water supply, distribution, and treatment. One challenge in the workplace is insufficient numbers of workers entering the water resources discipline.

It will no longer be enough to advertise available positions. As competition becomes fierce for technicians and engineers, utilities will need to "grow their own" or market their utility to attract qualified candidates. The state supports water distribution operator training. This should be continued and enhanced as the need for operators, maintenance staff, electronics specialists, engineers, geologists, laboratory analysts, and other technical staff will only increase to meet the future water needs. The water resources discipline is becoming increasingly complex and technical qualifications should be reflected in recruitment and training programs. The body of knowledge is essential to keep pace with the needs of the system and the public it serves.

Recognizing the fragmented management of state water resources, in 2001 the Georgia General Assembly established the Metropolitan North Georgia Water Planning District, intended to consolidate water management in the metro Atlanta region. In 2004 the Georgia General Assembly passed the Comprehensive Statewide Water Planning Act resulting in the

2008 Georgia Comprehensive Statewide Water Management Plan. The 2008 Plan identified policies and actions for water quantity and water quality. Subsequently, EPD completed water resource assessments on surface water quantity, groundwater, and water quality throughout the state. This information, along with water demand projections, was used by the 10 newly formed Regional Water Councils. The 300 appointed members of these Councils contributed over 10,000 volunteer hours to develop Regional Water Plans which were adopted by EPD in 2011. These plans describe management practices to meet needs through 2050. Updates occur every five years, with the next one due in 2016. The 2011 Plan recommends higher levels of water storage, and evaluation of additional and alternative sources of water supply.

The Metropolitan North Georgia Water Planning District (MNGWPD) was the first and by far the most populated region to complete a Regional Water Plan. This Plan identified a $4.7 billion water infrastructure need for Georgia by the year 2035. The US EPA 2011 Drinking Water Infrastructure Needs Survey identifies a $9.3 billion need in Georgia for its 20-year planning horizon. The Georgia legislature enacted the Water System Interconnection, Redundancy and Reliability Act in 2010. This legislation examines the ability of large public water systems to share water between adjacent utilities and/or to provide internal redundancy. As a result of the Act, an Emergency Supply Plan was developed to identify projects needed to improve drinking water resilience. This Plan lists 24 water utilities in the study area that would benefit from water interconnection, redundancy or reliability projects. Where interconnection projects would increase resilience and reliability, they should be scheduled in a capital program and implemented.

SOURCES

Georgia Environmental Finance Authority, Water System Interconnection, Redundancy and Reliability Act, 2010. www.gefa.org

Georgia Environmental Finance Authority, Governor's Water Supply Program, 2011. www.gefa.org

Georgia Environmental Protection Division, Watershed Protection Branch. www.gaepd.org

Georgia Environmental Protection Division, Georgia's Water Future in Focus 2009-2011. www.georgiawaterplanning.org

Georgia Environmental Protection Division, "Water Audit Results for Large Georgia Public Drinking Water Systems for 2011", January 2013. http://www.georgiaepd.org/Files_PDF/whats_news/2011_GeorgiaPWS_WaterAuditResults.pdf

Georgia Environmental Protection Division, Water Management Practice Cost Comparison. www.georgiawaterplanning.org

Georgia Environmental Protection Division, "Georgia EPD to Prohibit New Groundwater Permits in Portion of Coastal Region", May 20, 2013. www.georgiaepd.org/Files_PDF/news/Newsrelease_Floridanmoratorium_052013.pdf

Georgia Governor's Office Water Supply Task Force. www.gov.georgia.gov

University of North Carolina Environmental Finance Center, Georgia Water and Wastewater Rates Dashboard. www.efc.unc.edu

U.S. Census Bureau. www.census.gov/2010census

U.S. Environmental Protection Agency, 2011 Drinking Water Needs Survey.

ENERGY

B

RECOMMENDATIONS

- *Continue Research to Improve and Enhance Georgia's Transmission and Generation Infrastructure:* Georgia utilities should actively investigate new technologies such as smart grid, real-time forecasting for transmission capacity and sustainable energy generation, which provides a reasonable return on investment.
- *Be Neutral on Fuel Mix For the Best Price:* Georgia utilities should continually evaluate the current fuel mix and ensure there are diverse options including highly efficient coal, natural gas, nuclear, and renewable (solar, wind, hydro, biomass, and geothermal) generation. This strategy allows for companies to switch between fuels in a volatile market and provide customers with the lowest rates, while minimizing impacts to the environment. New generation investments should employ technologies that reduce the need for fresh water and avoid air emissions. Increasing sustainable use of renewable technologies across all sources of energy consumption (electricity, transportation, others) will also reduce demand on fossil fuels.

CONTINUED PAGE 26

DEFINITION OF THE ISSUE

Georgia has experienced strong population and economic growth as one of the fastest growing states during the last decade. In fact, between 2000 and 2010, Georgia was the seventh fastest-growing state in the U.S., and experienced population growth over 18 percent. The Georgia Office of Planning and Budget (OPB) predicts the growth trend to continue through 2020, with Georgia's population expected to reach 11.3 million people by that time.

While growth and progress have provided tremendous benefits to the region, they also bring challenges for Georgia's electricity providers and regulators. Electric providers must be ready to meet the electricity demands of their customers. Unlike other energy sources, electricity is generated to meet an instantaneous variable and demand cannot be sufficiently stored for future use. Proper planning and execution of an energy plan to meet future demands is paramount for the state to remain economically competitive as other southeastern states continue to grow and compete for business in the global economy.

Some of Georgia's future energy needs can be met through energy efficiency and conservation, demand-side management and renewable sources. However, these measures alone will not be enough to meet demand, and traditional generation sources such as coal, natural gas, biomass, hydroelectric and nuclear will be necessary. This resource mix is constantly evolving as promising new technologies, such as "clean coal", small modular reactors (SMRs) and combined-cycle natural gas plants are developed. Many of these technologies are intended to operate at higher efficiency levels while reducing emissions and demands for water. In recent years, there has been a significant increase in electricity generation from natural gas in Georgia due to operational flexibility, lower emissions and decreased fuel costs. Nuclear fission using advanced light water technology will also play an increasingly important role due to low-operating costs, abundant fuel supply, improved safety features and operational flexibility without the emissions concerns of other fuel types. It is anticipated that generators in the State of Georgia will use a mix of all available resources to ensure future energy demands are met at a reasonable cost.

GRADE

The Georgia Section of ASCE has assigned Energy a 2014 grade of B focused on the generation and transmission of energy in the State. This is slightly higher than the 2009 grade of B-. The cost of electric power for Georgia residents and industrial customers continues to be below the national average, with the average residential user paying less than 12 cents per kilowatt-hour. Electric providers in Georgia have also done an excellent job of maintaining their infrastructure. Current power reserves are adequate based on the 2013 Summer Reliability Assessment issued by North American Electric Reliability Corporation (NERC) and Georgia's reserve margin exceeds many areas of the country.

Reserve margin is an important measure of a utility's ability to meet future demand. The reserve margin is the amount of electric power generation capacity that exceeds the maximum demand. Power generators must provide reserve margin to ensure power supplies are reliable and not interrupted by abnormal weather, plant outages and other adverse events. An industry standard of 15 percent has been set by NERC for the reserve margin to ensure reliability. Georgia exceeds this standard.

Since energy efficiency and conservation are integral parts of Georgia's overall energy plan, several demand-side management programs (DSM) have been implemented as a cost-effective way to meet future demand. These programs include residential lighting and appliances, residential existing homes, residential high-efficiency new homes, residential refrigerator recycling, residential water heating, commercial audits, commercial incentives, commercial prescriptive incentives and industrial audits. The American Recovery and Reinvestment Act of 2009 (ARRA) provided over $341 million dollars of funding for new and existing opportunities for energy projects and clean energy technology in Georgia. These programs promote conservation to help meet future energy needs. This preserves resources by reducing the need to provide additional electrical generation. A benefit of the DSM programs is enhanced power reserves, which serve to improve reserve margin, especially during Georgia's summer months when demand is highest.

CONDITION / OPERATION AND MAINTENANCE

Operation and maintenance of existing infrastructure is vastly important to the reliability of electrical service to Georgia consumers. The transmission (high voltage/power line) owners in Georgia are committed to a combination of ground line, climbing, and aerial inspection of the lines to ensure the infrastructure is safe for the public and functioning properly. Minor interruptions to service are generally repaired quickly and in major events like tornados, hurricanes and ice storms, Georgia's electric utilities work around the clock to restore service to their customers as quickly as possible. Because Georgia's power infrastructure is newer and more reliable, Georgia has not been affected by blackouts like have occurred in the northeast.

The ARRA is making a significant down payment on the nation's infrastructure and energy future. The aforementioned $341 million in grants are supporting a variety of clean energy projects from alternative fuels and vehicles, smart grid technologies and environmental clean-up.

One way many of Georgia's utilities are using the ARRA grants is to invest in smart grid technology. A specific example is smart meter technology. A smart meter can tell residents their hourly energy usage to help them better understand how they use energy. In addition, the meter can tell the power company when the meter is not receiving power, so that companies can quickly identify the extent of power outages and faster restore power. Also, the utility can remotely read a customer's meter without having to send out meter readers each month. Replacement of customers' meters allows for quicker restoration times, increased customer access to their energy usage information, more pricing options and environmental benefits. Other uses of the ARRA grants include replacing older electromechanical relays with microprocessor relays, installing transformer equipment monitors, automating transmission line switches and installing digital fault recorders. All of these devices are designed to reduce response time to power outages and provide a safer environment for customers and utility workers.

Public utilities and transmission cooperatives in the state are investing over $3 billion in the next several years in transmission and distribution system upgrades. This level of investment exceeds that being made in other states and is in part addressing concerns raised by ASCE in its 2011 report entitled Failure to Act: The Economic Impact of Current Investment Trends in Electricity Infrastructure.

RECOMMENDATIONS

- *Increase Public Education to Promote Energy Conservation:* Georgia utilities should educate the public by effectively using the media and technology to allow the customer to make the most informed choices concerning their energy usage. This could include the installation of smart meters; development of web applications and smart phone apps; and staying current with trends and technological advances.

CAPACITY

According to the Energy Information Administration, from May 2012 to May 2013, the average residential user in Georgia paid 11.53 cents per kilowatt-hour (kWh), while the national average was 12.40 cents per kWh. While the cost of electricity to consumers in Georgia remains below the national average, growing pressure to reduce carbon and other emissions and rising commodity and labor costs, threaten to increase electricity costs for consumers. In 2011, the capacity mix for electricity generation in Georgia was 53 percent coal, 24 percent nuclear, 17 percent natural gas, 3 percent hydroelectric and 2 percent renewable and other sources.

Georgia's anticipated capacity thru 2018 is expected to remain above 115 percent based on current growth rates and the addition of two new 1100 megawatt (MW) nuclear units at Plant Vogtle near Augusta. These nuclear units are under construction and planned to be operational in 2016 to 2018. In addition, the Georgia Public Service Commission has approved the addition of 500 MW of solar generation capacity. Combined with increased energy efficiency efforts and the retirement of less efficient units (mostly coal-fired), these initiatives significantly increase the mix of energy sources within the state. Electric energy in Georgia is provided by:

- Georgia Power Company
- The Municipal Electric Authority of Georgia, which supplies 49 communities
- Oglethorpe Power Corporation, which supplies 38 electric membership cooperatives
- Tennessee Valley Authority, which supplies 3 cooperatives

The 2012 Transmission Congestion Study issued by the U.S. Department of Energy noted that the Southeast region of the SERC Reliability Corporation (SERC-SE) territory including Georgia are reasonably free of significant transmission congestion as a result of prudent investments in generation and transmission upgrades.

FUNDING AND FUTURE NEEDS

Rising material and labor costs have caused new generation capital costs to increase by approximately 65 percent since 2008. The median estimated capital cost for a modern gas-fired power plant starting service in 2012 is nearly $900 per kilowatt, which compares to $545 per kilowatt for a similar plant starting service in 2008. Today, capital costs are approaching $1,000 per kilowatt which places increasing importance on reducing demand via efficiency improvements and conservation.

Georgians used 16 percent more energy per person in 2004 than they did in 1984. During this 20-year period, population increased by 51 percent, while energy demand increased by 76 percent. One of the best ways to approach increasing demand and costs is to promote a statewide energy conservation plan.

Georgia is recognized as a leader in nuclear development. Georgia Power is overseeing construction of two nuclear units at the existing Alvin W. Vogtle Nuclear Plant. These two Westinghouse AP1000 units will be the first units built in the United States in 30 years. The Nuclear Regulatory Commission issued Construction and Operation Licenses for Vogtle Units 3 and 4 in February 2012. The units will be operated by Southern Nuclear and are co-owned by Georgia Power Company, Oglethorpe Power Corporation, the Municipal Electric Authority of Georgia and Dalton Utilities.

To support the new generation at Plant Vogtle, many new miles of transmission lines are being constructed. Instead of the typical 500kV tower design, the new Delta Cat tower has a smaller footprint that requires less material, including steel. This new design was developed specifically for transmission projects in Georgia and addressed many issues common to typical 500kV towers by reducing bird contamination, reducing contact with trees, increasing the distance between towers and improving maintainability.

PUBLIC SAFETY AND RESILIENCE

Blackouts and forced outages are an unacceptable outcome for customers. If the reserve margin falls below 15 percent, the possibility of unscheduled outages increases. With reserve margins less than 10 percent, blackouts due to shortfalls in generation become even more likely. Major blackouts and large-scale forced outages have significant economic consequences, severely affect daily life and impact important safety devices such as medical equipment and traffic signals. The Georgia and southeastern grid are more reliable than most states. A 2013 long-term North American Electric Reliability Corporation (NERC) study cites that there are no concerns with current projects meeting in-service dates or affecting reliability and that the forced outage rate in SERC-SE compared to other NERC-based reliability assessment areas is well below the median. New investments to the infrastructure will only strengthen the system's performance and resilience to future storm events, which is the leading cause for power outages.

The state has also been working on a number of initiatives in coordination with energy companies to improve Georgia's ability to prepare for, and respond to, a variety of energy emergencies and supply disruptions. Energy assurance planning helps to provide Georgia with a resilient, robust and secure energy supply.

SOURCES

Georgia Environmental Finance Authority (GEFA), 2012 Georgia Energy Report. www.gefa.org

Georgia Power Company.

Georgia Public Service Commission, Final Order with Dissent (Docket #148995), July 2013. www.psc.state.ga.us

Georgia Public Service Commission, IRP Main Doc and Decert App (Docket #36498), January 2013. www.psc.state.ga.us

Municipal Electric Authority of Georgia. www.meagpower.org

North American Electric Reliability Corporation, 2012 Long-Term Reliability Assessment, November 2012.

Oglethorpe Power. www.opc.com

Starks, Gregory , Payne, Herb and Fan, Quan He, GTC Rethinks 500-kV Line Design Possibilities, T&D World Magazine, January 1, 2010. www.tdworld.com/overhead-transmission/gtc-rethinks-500-kv-line-design-possibilities

U.S. Department of Energy, Recovery Act State Memos Georgia, June 1, 2010. www.energy.gov/downloads/georgia-recovery-act-state-memo

U.S. Department of Energy, Smart Grid. www.smartgrid.gov

U.S. Energy Information Administration, Georgia State Energy Profile. www.eia.gov

PARKS & RECREATION D+

RECOMMENDATIONS

- *Create a Fund for Green Space Efforts:* Use funds to conserve and protect green space. Alternatively, the state could create a Heritage Fund for conservation, recreation and preservation efforts to protect Georgia's natural green space. Furthering the creation of land conservation programs in counties throughout the state will foster protection of our state's green space. Successful programs already exist in several counties, including Cobb, DeKalb, Gwinnett and Paulding and could be used as models for a statewide program.
- *Broadly Apply the Principle of "The Beneficiary Pays":* Charge appropriate user fees and allow those sites to keep collected funds to support on-site maintenance and operations. Enact legislation to support this effect where necessary.

CONTINUED PAGE 30

DEFINITION OF THE ISSUE

Georgia's parks, like many nationwide, are facing significant shortfalls in meeting maintenance needs and demands for access and services. The State Parks and Historic Sites Division of the Georgia Department of Natural Resources (DNR), oversees the operation of 63 state parks and historic sites as well as 90 wildlife management areas (WMA) for hunting and other outdoor recreational activities throughout the state. The DNR's budget has been reduced by over 50 percent over the last five years. As a result, parks increasingly rely on fee-generated revenue and outside support groups for funding. Parks overseen by cities and counties in Georgia face pressures similar to state parks, however, funding cuts have not been as drastic. Fortunately, both financial and volunteer support for those parks that serve middle- income to high- income urban areas has increased. Also, cities and counties have demonstrated their motivation to continue funding parks in vital tourist areas where access to parks affects revenue to surrounding businesses.

In 2008, the recession caused many local governments to drastically cut spending on "non-essential" programs. While many active recreation programs were preserved, many organizations also reduced maintenance staff and budgets to "weather the storm," with the result that facilities have not received consistent maintenance and have deteriorated accordingly. In doing "more with less," facilities were kept open for public use, but maintenance and operations staff declined. However, since the last Georgia Report Card in 2009, most local departments are better able to manage and maintain their facilities than at the beginning of the recession. This is due in part to the following:

- Other sources of revenue have been identified (e.g., grants, private donations, user fees, etc.) so there is less dependence on scarce general funding sources
- Agencies have adjusted to the new reality and organized differently to provide the services and facilities most in demand from citizens
- In some cases, environmental programs have identified the benefits of green space for stormwater management and general urban life, so park projects have been combined with other environmental projects for multiple objectives

GRADE

The Georgia Section of ASCE has assigned Parks and Recreation a 2014 grade of D+. This is slightly higher than the 2009 grade of D and is based on the condition of the federal parks, state parks and municipal parks in Georgia as demonstrated by the deferred maintenance backlog at these facilities. Due to the lack of a dedicated funding source and adequate appropriations from the General Assembly, some parks are in jeopardy of being closed and the state is unable to protect and conserve additional land. These park systems are evaluated based on the following criteria:

- Sources of Funding
- Condition of facilities
- Attendance
- Conservation practices
- Comparison to other states

The evaluation is based on data through 2010. The data for state parks is current as of the recent budget cycle, June 30, 2013.

FACILITIES CONDITION

Many park facilities, both state and locally-operated, are showing signs of deferred maintenance and lack of repair. Table 1 shows that maintenance costs at state parks have increased by nearly $2 million over the past 5 years, which indicates an increased emphasis on this vital need. However, the expenditure on infrastructure repairs has been reduced by 75 percent (over $6 million) over the same period. The Parks and Historic Preservation Division of DNR estimates that they have accrued deferred maintenance in the range of $100 million for parks and related facilities throughout the state. At some of the privatized "resort" properties in state parks, anecdotal evidence of wear and discoloration suggests the deteriorating condition of these amenities, which may not yet impact operations but will inevitably require much greater expenditures to maintain acceptable standards.

FUNDING

The Governor of Georgia, Nathan Deal, wants all state parks to become self-sufficient. By the end of 2013 the parks reached their goal of self-funding 75 percent of their operational costs. Many of the parks that have significant lodging operations have been privatized, including Amicalola Falls, Unicoi, George T. Bagby, Little Ocmulgee, and Georgia Veterans. Most parks have scaled back hours of operation and activities in order to keep core operations funded. Urbanized areas such as metro Atlanta communities generally have a greater density of parks, both active and passive, than other areas of the State. While budgets have also been strained in these areas, most facilities have been able to stay open or continue functioning, albeit on limited hours or staff.

There are also significant federal lands in Georgia like the Chattahoochee National Forest and the Okefenokee Wildlife Refuge. As pointed out in the 2013 Report Card for America's Infrastructure (March 2013), cuts proposed by the administration and Congress will likely mean closures, limited access, and limited services to National Park Service (NPS) park units in 2013. At the United States Forest Service (USFS), which manages national forests, grasslands, and other natural areas, budgets remain flat. The impact of funding at the NPS and USFS is unknown for federal lands in Georgia.

In addition, the Nongame Conservation Section of the Wildlife Resources Division relies on federal grants to provide funding for initiatives of national importance, such as sea turtle habitat restoration, and other non-game initiatives. It also raises funds through a $10 fee for each special wildlife license plate sold, by the Weekend for Wildlife event, and the Give Wildlife a Chance annual income tax donation.

As a result of cuts, operating hours for most state parks have been reduced, and many programs for engaging citizens in state history and resource conservation have been cut in order to maintain funding for core services. Park support groups have increasingly helped fill the gap in funding and personnel shortages at state parks and have even funded expanded hours and new programs in some cases. Further reductions in services are expected as the Governor's stated goal is to eliminate operational funding of state parks from the annual budget. The State funding goal does not consider the economic impact on the businesses that surround, or provide services to, state parks.

Table 1: Georgia State Parks & Historic Sites

	FY2008	FY2009	FY2010	FY2011	FY2012
Attendance	10,352,491	10,270,601	9,481,142	8,858,751	9,013,624
Revenue Generated	$35,941,540	$33,607,551	$32,552,140	$32,222,008	$32,907,887
State Funding	$23,554,721	$22,971,195	$14,676,612	$13,388,086	$13,189,970
Private (Other) Funding	$7,636,002	$2,505,948	$8,071,322	$5,860,852	$5,113,065
Maintenance Costs	$2,848,854	$3,151,324	$4,241,007	$4,183,644	$4,579,630
Infrastructure Repairs & Upgrade Costs	$8,482,568	$6,449,016	$6,622,724	$1,666,660	$2,253,375

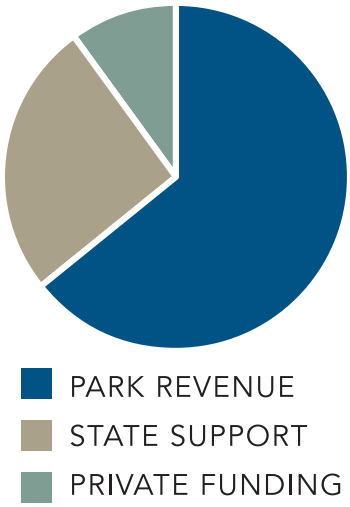
SOURCE: FRIENDS OF GEORGIA STATE PARKS & HISTORIC SITES, INC.

RECOMMENDATIONS

- *Actively Support Volunteer Organizations:* Encourage use of volunteers to offset reductions in operations and maintenance funding. The lack of funding for park upkeep has been partially filled by various "friends of" groups that provide labor on weekends and special events to maintain and repair park infrastructure. Outside groups have demonstrated their effectiveness in supporting local parks; however, most groups have demonstrated their support for capital improvements. Encouraging these efforts as a way to mitigate reductions in maintenance and operations should be encouraged.

CONTINUED PAGE 32

Recent data indicates that attendance has held relatively steady while state funding has been reduced by approximately 44 percent between FY2008 and FY2012. In the same time period, private funding saw a decrease of nearly 33 percent.



In 2012, state parks recorded almost $33 million in raised revenue, and taxpayers provided an additional $13.2 million from the state's general fund for operations and maintenance. Private funding provided another $5.1 million, primarily for upgrades and improvements to park sites. Many cities and counties are using Special Purpose Local Option Sales Taxes (SPLOST), bonds, and impact fees to fund infrastructure improvements. However, by law, these funds cannot be used for maintenance and operations.

Georgia owns 1.2 percent of land area in the state which places it 12th of the 16 southern states in percentage of protected land area. From a funding standpoint, while all park facilities across the country have endured severe budget cuts, Georgia's park system still ranks significantly behind other states of comparable size. Georgia ranked third in the nation for acres of farmland and woodland being converted to subdivisions, malls and other developments.

USAGE

Table 2 (page 31) summarizes recent usage and occupancy for state parks.

A Statewide Comprehensive Outdoor Recreation Plan (SCORP) is required so that state parks are eligible for federal funds from the Land and Water Conservation Fund (LWCF). The LWCF grants assist state and local governments in acquiring, redeveloping and rehabilitating outdoor recreational facilities and resources, but require a 50 percent match. The current SCORP was developed from information obtained in 2007, and was used to obtain funding from the LWCF between 2008 and 2013. The SCORP for the period from 2014 through

2019 is currently being updated and was not available at the time of this evaluation. Since the inception of the LWCF, 95 percent of Georgia's counties have received federal grants through the LWCF totaling over $83,000,000. Current federal funding cuts are expected to reduce the number and amount of awards from the LWCF for the coming 2014 federal funding cycle.

Table 2: Parks, Recreation and Historic Sites

YEAR	2009	2010	2011	2012
Average annual occupancy at state park cottages	47%	45%	43%	42%
Number of park, recreation, and historic site visitations	10,270,601	9,722,243	8,858,751	9,013,624

SOURCE: GEORGIA DNR WILDLIFE RESOURCES DIVISION

According to the intensive inventory conducted by the University of Georgia for the SCORP, there are 2,340 sites managed by local service providers totaling 63,103 acres. A total of 1,405 of these sites are high-infrastructure sites such as ball fields, athletic fields and playgrounds, and the remaining 935 are low-infrastructure sites, such as green space and watershed protection-areas. Of these 935 sites, the state green space programs helped protect 310 sites totaling 9,692 acres.

The total land area of the state is roughly 37 million acres. Approximately 0.36 percent is owned or managed by local recreation service providers. Georgia's population of roughly 9.5 million relies on a tiny number of high-infrastructure facilities for day-to-day outdoor activities. Statistically, that places a burden on parks to satisfy an average of 6,500 people per facility.

Relative to other states, Georgia lags when it comes to land preservation. Only 1.2 percent of Georgia's total area is owned by the state, compared with 14.6 percent in Florida. Florida dedicates approximately $300 million per year to conservation, 10 times the amount seen in Georgia. Georgia's land conservation funding comes from the annual appropriations by the General Assembly, which varies yearly. Protected lands make up approximately 3.6 percent of the total land area of Georgia, which is typical of eastern states and southern states in general. Only Florida and Arkansas have a higher percentage of protected lands.

Atlanta is one of the fastest developing regions in the country, but it ranked last among cities of its size in acres of park land per thousand residents, next to last in park space as a percentage of city area, and in the bottom third in public expenditures on parks and open space. In spite of Georgia's ranking as the 20th largest state in size, and 8th in population, only one city, Atlanta, made the top 150 in the Trust for Public Lands 2012 City Parks Survey. Within its category as a city with intermediate to low population density, Atlanta is near the bottom in terms of acres of park space per 1,000 residents (8.8), and when compared to cities of similar size in its category, it is one of the lowest in this group. For cities in the range of 400,000 to 650,000 in population and intermediate to low density, the average acres of park space per 1,000 residents is 16.3, with only Mesa, Arizona, and Fresno, California, having lower scores than Atlanta.

Georgians support parks through volunteer efforts and contributions. Eighty-five percent of Georgia residents support funding parks and recreation and 74 percent support increased funding for these facilities. Surveys have shown that property values increase an average of 20 percent when a park is nearby and that 57 percent of residents want to live near a park. Sixty-eight percent of respondents to the SCORP survey had visited a public outdoor recreation area during the past year and 41 percent did so a couple of times a month.

CONSERVATION PROGRAMS

Local governments are increasingly required to undertake Watershed Improvement Projects to maintain their National Pollutant Discharge Elimination System (NPDES) permits. Since many types of parkland are located in or near wetlands or bodies of water, it is often possible to utilize funding from grant sources or utility funds to undertake programs that benefit both the environment and the park facilities. Also, organizations such as the Trust for Public Lands provide seed and grant monies to acquire and preserve the most environmentally sensitive properties – Smithgall Woods State Park in North Georgia is an example beneficiary of this approach – along with state funds. Absent the availability of such funds, however, there do not appear to be any significant recent initiatives to acquire public properties for the purpose of conservation. Conservation subdivisions are provided for in many local zoning ordinances, to protect sensitive areas while

RECOMMENDATIONS

- *Encourage Land Conservation Through Organizations:* Several conservation organizations have been active in acquiring and protecting green space and private lands that have unique natural resources. The activities of the Trust for Public Land, The Conservation Fund, The Nature Conservancy, and other land trusts have gained prominence in recent years by funding the purchase of conservation easements and assisting state and local communities in their efforts to preserve natural areas and outdoor recreation facilities. These efforts have been further extended by the significant support of Georgia's philanthropic community. The state should also continue to partner with organizations to enhance recreational facilities. By partnering with charitable social organizations such as the YMCA/YWCA, Boys and Girls Clubs, Boy and Girl Scouts and churches, outdoor recreational facilities for public use have been developed. Facilities typically consist of athletic fields for baseball and soccer programs.

allowing the same net density on adjacent property, but the application of such programs has been sporadic due to the common requirement for public hearings. In general, there has been a reduced emphasis on conservation and land protection in recent years unless a clear economic benefit can be seen.

SOURCES

Cordell, H. Ken, Betz, Carter J. and Zarnoch, Stanley J., Recreation and Protected Land Resources in the United States: A Technical Document Supporting the Forest Service 2010 RPA Assessment, January 2013. www.srs.fs.usda.gov/pubs/42756

Friends of Georgia State Parks & Historic Sites, Inc., September 2013. www.friendsofgastateparks.org

Georgia Department of Natural Resources, October 2013. www.gadnr.org

Georgia Department of Natural Resources, Parks, Recreation and Historic Sites Division, Georgia Statewide Comprehensive Outdoor Recreation Plan 2008-2013. www.gastateparks.org/SCORP

Georgia Department of Natural Resources, Wildlife Resources Division, October 2013. www.georgiawildlife.org/hunting/wildlife-management-areas

Georgia Land Conservation Program, October 2013. www.glcp.georgia.gov

The Nature Conservancy, September 2013. www.nature.org

Walls, Margaret, Paying for State Parks: Evaluating Alternative Approaches for the 21st Century, Resources for the Future (RFF) Report, January 2013. www.rff.org/RFF/Documents/RFF-Rpt-Walls-FinancingStateParks.pdf

PORTS

C+

RECOMMENDATIONS

- *Fund the Savannah Harbor Expansion Project:* The U.S. Congress should pass funding for completion of the dredging of the Savannah Harbor Expansion Project to ensure Georgia's deepwater ports continue to attract freight traffic as an essential component to the nation's global economy.
- *Create and Fund a National Freight Infrastructure Strategy:* A national freight infrastructure strategy is needed. In addition, the U.S. Congress should pass a reauthorized multi-year transportation bill, targeting federal dollars for economically strategic freight transportation infrastructure projects of national and regional significance.
- *Improve Intermodal Transportation Links:* While GPA is making major investments in Georgia's port facilities, port landside and waterside intermodal links, such as roads, railroads, bridges and federal navigation channels require adequate and sustained investment by state and federal agencies responsible for their upkeep. For example, Georgia's major interstate highways linking Savannah, I-16 to Atlanta and I-95 along the Atlantic seaboard, are critical to ensure that freight can get to and from the port.

DEFINITION OF THE ISSUE

Without adequate and properly dredged navigational channels, Georgia ports cannot serve the increasing and rapidly changing demands of world trade. A key challenge for marine ports in the United States, particularly on the East Coast, will be their ability to handle the larger Post-Panamax cargo ships that will go into service with the completion of expansions of the Panama Canal in 2015. In many cases, private and public investment by port authorities and non-port entities enables the ports simply to maintain existing conditions and meet customer needs to fulfill waterborne cargo shipment, handling, distribution and storage requirements. The maintenance of existing navigable channels and waterways and the ability to accommodate the increasing size of cargo vessels requires dredging. This dredging is partially funded by the public sector through Congressional appropriations to the U.S. Army Corps of Engineers.

Georgia has two main ports, the Port of Savannah and the Port of Brunswick, and two inland ports, Port Bainbridge and Port Columbus. All of Georgia's ports are managed by the Georgia Port Authority (GPA). The Port of Savannah has two terminals: Garden City and Ocean. The Port of Brunswick has three terminals: Mayor's Point, Colonel's Island and Marine Port. A waterfront terminal is where cargo is transferred between ships and other modes of transportation, such as rail and roads. Ports require adequate waterside and landside intermodal connections for transshipment and cargo handling operations. Therefore, other modes of transportation are vital to the success of ports.

GRADE

The Georgia Section of ASCE has assigned Ports a 2014 grade of C+. This is the first time Ports have been evaluated in the Georgia Report Card. The final grade was obtained by reviewing both land side and port side facilities of GPA including the condition, capacity, operation and maintenance and public safety. Funding for future needs was evaluated based on previous years' spending - not just what was budgeted, but what was actually spent.

GPA's land-side infrastructure is in good condition. However, there is much uncertainty as to the future of federal funding for Georgia Ports. The most pressing issue is federal funding for dredging of the Savannah River, Georgia's highest volume navigational channel. Deeper dredging is needed to allow larger Post-Panamax ships. This is a national concern because Savannah is the second largest port for exports in the United States. Lack of funding could limit future economic growth. In addition, local politics continue to complicate a unified front toward obtaining all permits for the dredging, which is impeding the progress of this effort. In recent years Georgia has taken a proactive stance by securing state funds to contribute toward this effort, however federal assistance is needed to fully fund the Savannah Harbor Expansion Project (SHEP).

GPA is the only major public port authority in the State of Georgia, unlike many states where there are multiple port authority jurisdictions within the same state. Ports rely on a number of public infrastructure investment sources over which the GPA has no control, such as dredging, waterways projects, "First-Mile" transportation and rail connections, etc. This assessment focused on both "inside" and "outside the fence" issues and how the comprehensive port system works. Hence, the ports grade reflects overall infrastructure evaluation, not just what is within the GPA's purview.

CONDITION/OPERATION AND MAINTENANCE

The port industry is very competitive requiring the GPA to be proactive in modernizing their infrastructure, operations and maintenance. The GPA's future success heavily depends on these investments. GPA invests in maintaining their ports' infrastructure, while also making strategic investments in state-of-the art logistic supply chain facilities. The bulk of the GPA's facilities infrastructure and maintenance programs exceeded the evaluation criteria used in determining the port grade for facilities and infrastructure under the control of the GPA – "within the fence".

GPA has undertaken a number of projects in recent years to improve cargo-handling capabilities, operations and maintenance for the eventual servicing of Post-Panamax vessels. One of the most notable projects is the installation of four additional Konecranes Super Post Panamax STS cranes in 2013. These cargo-lifting cranes are larger than previous cranes used by GPA and will allow for the off- and on-loading of cargo to and from Post Panamax ships.

GPA is also making sustainable decisions concerning infrastructure and cargo-handling equipment investments. For example, in 2012, the GPA's electrified ship-to-shore cranes avoided the use of 2 million gallons of diesel to transport freight onto and off of ships by the elimination of diesel motorized cranes.

CAPACITY

In 2012, 22.48 million tons of containerized cargo were handled by Georgia ports, which is the equivalent of almost 3 million twenty-foot containers. This was a record for GPA and represents 8.1 percent of all U.S. containerized cargo volume. The Port of Savannah is the 2nd busiest U.S. port for exports, with 13.27 million containerized tons. This represents 11.6 percent of all U.S. containerized exports. There were 310,010 rail moves in 2012, which was a growth of six percent over the previous year. A rail move is defined as the movement of a twenty-foot shipping container between a train and a ship.

Garden City Terminal at the Port of Savannah is the fourth-largest container port in the United States and the largest single-terminal operation in North America. Garden City terminal has access to two interstates and two rail carriers. There is unrestricted double-stack service via rail and overnight service to Atlanta. There are 17 high-volume retail import distribution centers in the Savannah area. Ocean's terminal also has good access to rail and interstates. GPA uses the interactive Global Carrier Services tool to provide worldwide transit times to and from Savannah, as well as rail and road transit times for major inland U.S. hubs.

Colonel's Island has a RoRo facility which specializes in automobile transportation and is used by automobile manufacturers, and industrial and agricultural equipment manufacturers. Colonel's Island also has an agri-bulk facility which handles agricultural products that can be transported and stored in bulk. The agri-bulk facility includes flat and silo storage facilities with a total capacity of 64,800 tons. The Mayor's Point terminal in the Port of Brunswick specializes in wood products

Table 1: Georgia's Ports

Port	Terminal	Available Rail	Interstate Access
Port of Savannah	Garden City	Norfolk Southern	I 95 - 5.6 miles
		CSX	I 16 - 6.3 miles
	Ocean	Norfolk Southern	I 16 - 1.2 miles
		CSX	I 95 - 10 miles
Port of Brunswick	Colonel's Island	Norfolk Southern	I 95 - 2.5 miles
		CSX	
	Mayor's Point	Norfolk Southern	I 95
		CSX	
	Marine Port	Norfolk Southern	I 95 - 5 miles
		CSX	
Port Bainbridge		CSX	Hwys 84 and 27
Port Columbus		Norfolk Southern	I 85, I 185

such as woodpulp, linerboard, plywood and paper products. Port Columbus is a liquid bulk facility on the Chattahoochee River with access to the Gulf of Mexico through the Appalachacola-Chattahoochee-Flint waterway system. Port Bainbridge is also located on the Chattahoochee River and has a large storage facility.

The Panama Canal expansion is forecasted to be completed in 2015. The expanded Canal will allow much larger ships, about the size of three and half football fields, to pass through its locks. The expanded Canal and shifting international routes is predicted to completely change ocean freight shipping. The major ports of the world must adjust to accommodate larger ships. In order to do so, Georgia's navigable waterways, such as the Savannah River, must undergo a process called dredging. Dredging involves digging existing port berths and navigation channels deeper. GPA has already purchased larger Konecranes required for containerized cargo handling. They will also need to make a number of miscellaneous infrastructure and operations improvements for efficient, cost-effective and safe handling of cargo from ship-to-shore, to rail and truck. However most American ports, including Savannah, have not started dredging or are extremely behind schedule. In fact, the Ports of Virginia and Baltimore are the only ports on the East Coast that are large enough to accommodate the new ships.

FUNDING/FUTURE NEED

Georgia's ports are critical to the economies of Georgia, the southeast and the United States. They support over 352,000 jobs in Georgia, $66.9 billion in sales and $18.5 billion in personal income. In 2011, over $54 billion of containerized cargo was moved through the Port of Savannah. The U.S. Army Corps of Engineers studies have shown that the Savannah Harbor Expansion Project (SHEP) will reduce per-box costs, saving shippers $213 million a year. Lack of parallel state and federal investment in intermodal connections hampers efficiency and job creation. While port authorities and their business partners are making major investments in their port facilities, studies show the intermodal links such as roads, bridges, tunnels and federal navigation channels, which are required for landside and waterside connections, receive inadequate funding from state and federal governments, resulting in inefficient cargo transshipment and traffic congestion, increasing consumer product costs and slowing job growth.

A national freight infrastructure strategy is required to assist in solving the intermodal system deficiencies. In addition, the U.S. Congress should quickly pass a reauthorized multi-year transportation bill that targets federal dollars toward economically strategic freight transportation infrastructure of national and regional significance. This is particularly acute for the southeastern United States which will become one of the major front doors for trade routes once the Panama Canal is completed.

In July 2012, SHEP was placed on a fast track for federal approval. As part of the "We Can't Wait" initiative, seven nationally and regionally significant projects were expedited to help modernize and expand five major U.S. ports, including the Port of Savannah. In addition, the deepening reached a major milestone in 2013, when the U.S. Army Corps of Engineers issued its Record of Decision, granting final federal approval for the project. With the 2015 Panama Canal expansion clearing the way for more Post-Panamax vessels, Congress must soon finalize its financial commitment to this project. Georgia has allocated $181.1 million and proposed another $50 million in fiscal year 2014 toward the state's share of the port deepening costs.

Dredging investment is crucial for the entire economy of Georgia. Such investment will create much-needed, long-term jobs for our region. Georgia's deepwater ports have become the gateway for trade in the southeast and are increasingly important to the nation's global trade. The U.S. Army Corps of Engineers determined that SHEP will provide a 5.5 to 1 cost-benefit ratio, or return on investment (ROI) – one of the highest ROIs for any deepening project in the nation. Such investment will reduce consumer costs and help Georgia keep pace with the evolving world of supply chain logistics.

In October 2013, the U.S. House of Representatives overwhelmingly passed an $8.2 billion bill, mapping out plans for dams, harbor, river navigation and other water projects for the coming decade. The Water Resources Reform and Development Act's sponsors attracted support from members of both parties by including projects from coast to coast and labeling the measure an engine for job creation. The legislation would allow work to proceed on 23 shipping channels, flood management and other water projects that the Corps of Engineers has started studying. Actual money for the work would have to be provided in future legislation. The Senate passed its version of the water bill in May 2013 with a broad, bipartisan vote. This specific bill authorizes numerous port projects, including more than $461 million for SHEP.

SOURCES

American Association of Port Authorities (AAPA), U.S. Seaports, Private-Sector Partners Plan to Invest $46 Billion by 2017 in Port Infrastructure, June 18, 2012. www.aapa-ports.org/Press/PRdetail.cfm?itemnumber=18583

American Association of Port Authorities (AAPA), 2012 AAPA Port Infrastructure Spending Survey, June 2012.

American Society of Civil Engineers, Failure to Act: The Economic Impact of Current Investment Trends in Airports, Inland Waterways and Marine Ports, September 2012.

Center for Transportation Analysis, Oak Ridge National Laboratory, Freight Analysis Framework.

Chapman, Dan, Atlanta Journal-Constitution, Ports to spend big for global bounty, June 14, 2012.

Georgia Port Authority. www.gaports.com

Georgia Port Authority, Annual Report 2013. www.gaports.com/corporate/AboutUs/AnnualReport.aspx

INFORUM, University of Maryland, LIFT model, 2012.

Inland Marine Transportation Systems (IMTS), Capital Projects Business Model Final Report, April 2012.

U.S. Army Corps of Engineers, Civil Works Budgets & Five-Year Plans, www.usace.army.mil/Missions/CivilWorks/Budget.aspx

U.S. Army Corps of Engineers, U.S. Ports and Inland Waterways Modernization: Preparing for Post-Panamax Vessels, June 2012.

U.S. Department of Transportation, 2012 Tiger Grants.

U.S. Department of Transportation, Maritime Administration, U.S. Water Transportation Statistical Snapshot, February 2011.

U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, America's Container Ports: Linking Markets at Home and Abroad, January 2011.

U.S. Government Accountability Office, Maritime Infrastructure: Opportunities Exist to Improve the Effectiveness of Federal Efforts to Support the Marine Transportation System, November 2012.

"U.S. Port and Inland Waterway Modernization Strategy: Options for the Future," presented at Marine Board Spring Meeting, May 15, 2012.

U.S. Waterborne Commerce Statistics Center.

RAIL

B

RECOMMENDATIONS

- *Focus on Non-Class I Rail System Condition:* GDOT should continue to work closely with private and GDOT-owned railroads ensure a continual state of good repair on the non-Class I rail system, which includes track, bridge and C&S infrastructure.
- *Actively Support System Changes:* GDOT should consider funding of improvements when capacity needs or FRA-mandated changes make this necessary. This may include changes at the Port of Savannah.
- *Avoid Creation of Abandoned Rail Corridors:* GDOT should closely monitor rail carriers for signs of insolvency and takes steps to avoid the creation of abandoned rail corridors.

DEFINITION OF THE ISSUE

The Georgia railroad system is utilized for both freight and passenger service. Georgia is one of the top ten states in many categories of freight use based on commodities carried by rail. The two Class I railroads operating in Georgia, CSX Rail (CSX) and Norfolk-Southern (NS) operate four major rail corridors through the state. CSX also hosts two different corridors that provide passenger rail service.

According to the Georgia Department of Transportation (GDOT) 2009 State Rail Plan (SRP), two Class I railroads (defined by the Association of American Railroads, AAR, as having operating revenue in excess of $319.3 million) and 25 Class III carriers (defined by AAR as having annual operating revenue less than $10 million) operate in Georgia. The Class I and Class III rail carriers operate over 5,000 route miles of track. Georgia's rail infrastructure is a mix of main and lighter density infrastructure owned and maintained by the Class I carriers as well as light density rail that is owned and operated by Class III carriers. The two Class I carriers in Georgia comprise approximately 70 percent of the track in the state, which includes main track (2,463 miles) and 40 percent of the light density track (1,071 miles). The 25 Class III carriers form a network tying to the main tracks with a total of 1,505 miles of light density track, bringing the overall total to 5,039 route miles (2,463 main and 2,576 lighter density miles).

GRADE

The Georgia Section of ASCE has assigned Rail a 2014 grade of B. This is the first time Rail has been assessed in the Georgia Report Card. While the Class I carriers are generally able to maintain and modernize their tracks, the Class III carriers struggle to find revenue sources to perform capital improvements. This blend between Class I and Class III rail results in Georgia's overall rail system being in the low "Good" category and receives a letter grade of B. This grade is based on the current condition of the rail system in Georgia, which is periodically assessed by the Georgia Department of Transportation (GDOT) State Rail Plan (SRP) and the AAR databases.

CONDITION & CAPACITY

An assessment of the overall condition of the rail system must take into account the various owners (Class I and Class III rail carriers) and the components that make up the system. The three major infrastructure components include: track, bridges and communication and signaling (C&S). The main tracks typically host train speeds of up to 60 miles per hour (mph) for freight and 79 mph for passenger trains such as Amtrak. Lighter density lines will usually top out at 25 mph with many miles of track only suitable for 10 mph. The lower speeds do not necessarily hurt the operational aspect of the Class III carriers because they typically are the switching parties for local industries and are more closely located to their customer base. Alternately, a fast, well-maintained corridor of rail infrastructure is critical to the Class I carriers. Again, the relationship between higher speed and frequency of inspection and maintenance are directly linked in a highly structured and monitored system by the Federal Railroad Administration (FRA).

The three major components of railroad infrastructure are heavily monitored by the United States federal government, specifically the FRA. While the FRA does not necessarily monitor the maintenance cycles of these three subsets, they do monitor that the railroad has:

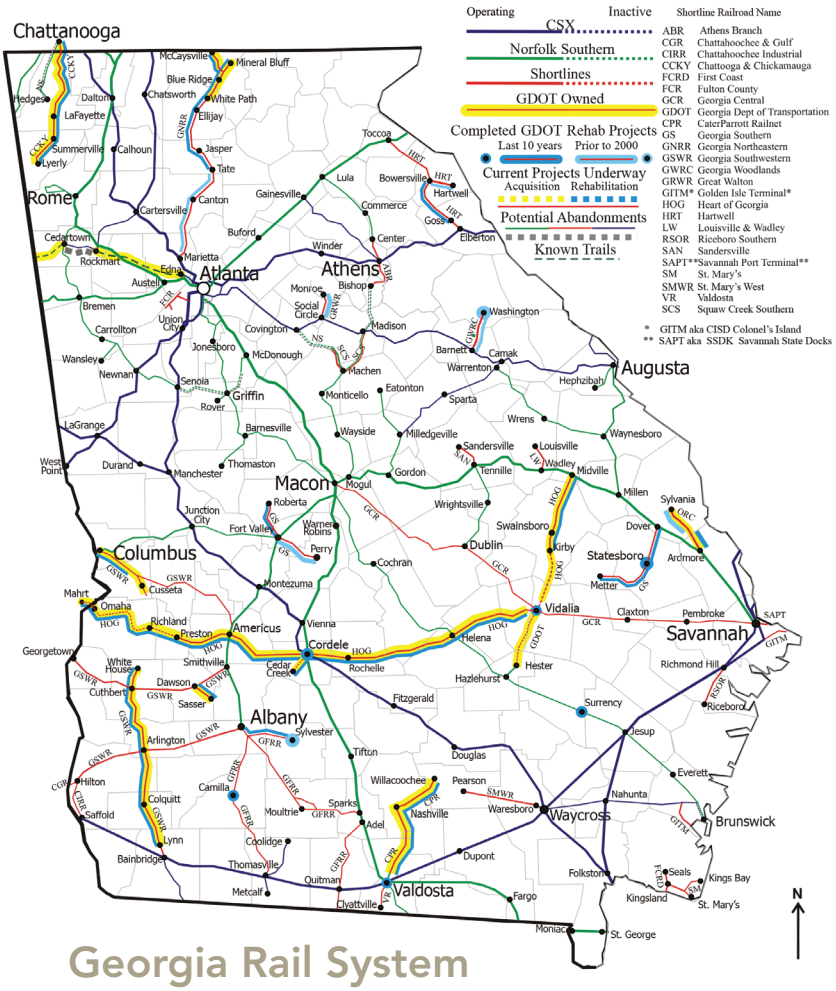
- the necessary inspection schedules (and adherence to that schedule);
- a monitoring system to ensure component fitness for service to the desired utility level;
- methods to adjust the class or rating when warranted by physical condition of the track, bridge or C&S infrastructure and
- a structured process of documenting all of the above including any necessary repairs.

In order for railroads to remain compliant with FRA safety guidelines, railroads routinely inspect at regular intervals and maintain the track, bridge and C&S components of the system to specific standards. FRA guidelines vary by use, class of track and operating speed desired. In order for railroads to properly maintain the track, bridge and C&S infrastructure, frequent and/or constant maintenance activities must occur. It should be noted that GDOT is in the process of updating their 2009 SRP. The overall rail system is evaluated based on railroad Class (I, II or III), main or lighter density track usage, funding and other factors.

The overall condition of Georgia's rail network is quite good and suitable for the intended use and level of utility. Railroad carriers fully understand that the physical condition of their infrastructure allows them to continue freight and passenger movements, which directly affect the bottom line. Lower speed Class III railroads typically have fewer miles and the tracks and are not as well-maintained as their Class I counterparts, but for the desired speeds and use, the track, bridge and C&S components meet FRA criteria.

While the private Georgia rail network is capable of handling its current carload levels and most likely increased future loadings, GDOT's Freight Assistance Program helps to maintain economic competitiveness. For this program, GDOT has identified the following focus areas:

- Accommodate existing traffic safely and efficiently



Georgia Rail System

SOURCE: ASSOCIATION OF AMERICAN RAILROADS, 2011AAR.

- Handle increased use of high axle load cars
- Ability to return track structure to a state of good repair
- Maintain load bearing capacity on existing bridges
- Provide mode choice for shippers

Railroads have for decades invested billions of dollars, predominately through private funding sources, into infrastructure to improve capacity throughout the system. These efforts have provided significant benefit in congestion reduction and eliminating bottlenecks.

Certain future events could have significant impacts on the capacity of Georgia railroads. Examples include the completion of the Panama Canal widening and the resulting effect on the Port of Savannah. Another might be the decommissioning of some coal-fired power units by Georgia Power. Railroads, especially Class I carriers, are proactive to ensure that the system capacity is not exceeded.

USAGE

Rail system usage is divided into freight and passenger rail. It should be noted that passenger rail in Georgia utilizes mostly Class I (freight) rail lines. Given the unique needs of freight and passenger rail, each is considered separately.

Freight

Georgia depends heavily on rail infrastructure to support the demand to move goods out of the state, which ultimately serves to bring goods into the state. According to AAR in 2011, Georgia ranked 17th in rail tons originated (originating in Georgia) (29.6 million) and 6th in rail tons terminated (arriving in Georgia) (74.4 million) Additionally, Georgia ranks 9th in rail carloads originated (883,000) and 4th in carloads terminated (1,458,700). Another measure of the importance of Georgia's rail infrastructure is the freight tonnage carried through the state (189.1 million – 16th) as well as the number of carloads carried through the state (3,931,500 – 17th).1 The top twelve rail commodities shipped in 2011 along with Georgia's rank are summarized in the table below.

As shown in the table, Georgia depends heavily on rail infrastructure as both a producer and a consumer. Only in Primary Metal Products (mainly iron and steel products) does Georgia not have a significant impact on the national market.

Table 1: 2011 Top Twelve Rail Commodities

		Originated in Georgia			Terminated in Georgia		
	Commodity	**Rank**	**Tons**	**% US Total**	**Rank**	**Tons**	**% US Total**
1	Coal				8	31,234,000	4.0%
2	Chemicals				8	6,422,000	3.7%
3	Farm Products				5	7,188,000	4.9%
4	Nonmetallic Minerals	6	6,766,000	5.4%	7	4,425,000	3.4%
5	Intermodal	5	5,613,000	4.8%	4	7,602,000	6.3%
6	Food Products				4	5,194,000	5.4%
7	Metallic Ores	9	445,000	0.6%			
8	Primary Metal Products						
9	Stone, Clay, Glass Products	2	3,691,000	9.3%			
10	Petroleum & Coal Products				2	2,850,000	6.5%
11	Waste and Scrap	7	1,669,000	4.3			
12	Pulp and Paper	3	2,769,000	8.8%	5	2,823,000	6.9%

SOURCE: ASSOCIATION OF AMERICAN RAILROADS, 2011AAR.

Passenger

Two Amtrak corridors pass through Georgia, providing FRA-compliant passenger rail service to its residents:

- The most northern route connects Spartanburg, South Carolina, with Birmingham, Alabama, via Atlanta, GA, with service provided by the Crescent. It utilizes mostly NS tracks with stops in Toccoa, Gainesville and Atlanta.
- The second corridor skirts the south GA coast over mostly CSX tracks, with service provided by four Amtrak trains including the Auto Train, Palmetto, Silver Star and the Silver Meteor. The southern route connects Columbia, South Carolina, with Jacksonville, Florida, stopping at stations in Savannah and Jesup.

OPERATION AND MAINTENANCE

Regular, routine maintenance, as well as capital improvements, keep Georgia's rail infrastructure in serviceable condition. Railroads, whether Class I or III, maintain their infrastructure to FRA standards for the class track and desired speed. Day-to-day activities could include:

- track inspection (visual and ultrasonic);
- bridge inspection (cursory, annual, special or underwater);
- signal and communication weekly, monthly and annual checks (where appropriate);
- geometry determination/checks;
- turnout lubrication, maintenance and adjustment;
- maintenance-of-way (MOW) such as drainage, clearing trees or other obstructions, erosion control, etc.;
- gage correction; and
- other minor less mechanized activities.

Other maintenance activities include:

- crosstie, ballast and rail replacement;
- bridge repair and/or replacement;
- signal upgrades such as those associated with the implementation of the FRA-mandated Positive Train Control (PTC) and
- at-grade, highway-rail crossing (crossing) improvements.

The railroads keep their infrastructure in a continual state of repair and make capital improvements to take advantage of specialized machinery and to accommodate increased need for capacity. Class III railroads are more challenged by their maintenance needs. Capital improvements on Class III railroads are frequently driven by improvements on Class I carriers. Typical Class III requirements include track upgrades to handle heavier railcars, safety and speed improvements.

FUNDING

While some federal and state funding sources are available to railroads, they are predominately self-sufficient. Both Class I and many Class III railroads are privately-owned or publicly-traded companies. Most of the funding generated from internal sources is from carload movements, lease agreements by individuals or utilities to make use of their right-of-way and other service generating activities (such as technology services). Currently, GDOT owns about 540 miles of railroad (serviced by their Class III operators) and between 2004 and 2009 authorized over $7.2 million in infrastructure improvements. This illustrates GDOT's desire to ensure safe railroad operations, but they too have limited funding sources. The highest profile government funding needs are those associated with crossing improvements. While crossing and infrastructure improvements occur each year, the urbanization of Georgia has caused additional crossings to be built. While it is true that most newly constructed highways are grade-separated or have active signal protection, this may pull available resources from retrofitting existing crossings. GDOT estimates system-wide infrastructure needs in the 2009 SRP as follows:

- Rail Safety Needs - $13.8 billion
- Class I Infrastructure Repair and Maintenance - $80 to $100 billion
- Class I Infrastructure Improvements - $70 billion
- Class III (Short Line) Improvements - $11.8 billion

FUTURE NEED

Federal mandates could create future need for funding. One large funding need for all track owners is the FRA-mandated PTC implementation, which requires the host railroad to make technology improvements to its wayside signal system as well as to its locomotive power in an effort to enhance safety of railroad operations.

Another example is the implementation of the FRA Part 237 Bridge Management Program, which requires all railroad bridges to be inspected annually, rated within five years of the Program's implementation and repaired if necessary in order to safely carry loads. Additionally, while many crossings have been improved with active warning systems, many more could easily be justified as needing the same improvements.

Alternately from a GDOT-owned railroad perspective, continued investment in the crosstie, rail, bridge and crossing protection systems will be critical in order to maintain the steady state of maintenance that railroads require to be viable.

With an eye to the future, certain events could significantly change the landscape of railroad operations both for the Class I and III carriers in Georgia. Impacts to the Port of Savannah and potential changes by Georgia Power will encourage rail carriers to monitor future demands and ensure that their infrastructure is capable of supporting the increased volumes.

PUBLIC SAFETY

While some trespassing occurs along the right-of-way, the most significant public safety concern remains roadway crossings. Many Georgia crossings have received both crossing structure upgrades as well as active crossing protection improvements; but much more is needed. For example, the SRP identifies $13.8 billion that is needed for rail safety enhancements such as highway-rail grade crossings, grade separations and track relocation. Some crossings are such that even active crossing protection is not sufficient and grade separation must be considered to ensure public safety. When grade separation is determined to be necessary, railroads will expect that municipalities, state and federal government funds are available to make the necessary improvements.

A fine line exists when dealing with safety. Increases in train frequency can impact the dynamics of crossing safety. Another factor is the buildup or change of traffic patterns that cross the railroads. These considerations and others force regular monitoring of crossing safety factors and will likely drive infrastructure needs.

RESILIENCE

When accidents or natural disasters occur, railroads look to alternate sources or routes to avoid the problem area while still providing customers with their material goods or transportation services. The Class I carriers often have routes across the state and the financial resources to recover from disasters. Alternately, the Class III carriers have less alternate route options and material resources to overcome such calamities. Consideration must also be given when accidents occur due to the hazardous materials that railroads sometimes transport. By and large, railroads quickly repair their infrastructure unless they are confronted with storms, flooding, or washouts that may delay repairs until they can be performed safely. In this case, the railroads would likely look to state and federal sources for funding and would work with the shipping customers to make alternate arrangements for their freight movements while infrastructure repairs are made.

SOURCES

Amtrak, November 2013. www.amtrak.com.

Association of American Railroads, 2011 STB Waybill Sample.

Association of American Railroads, Railroad Infrastructure Investment, October 2013. www.aar.org/keyissues/Pages/Infrastructure-Investment.aspx#.Uq8X5_uEptQ

Association of American Railroads, Total Annual Spending, 2011 Data.

Association of American Railroads, U.S. Freight Railroad Industry Snapshot, October 2013. www.aar.org/keyissues/Pages/Railroads-And-States.aspx

Georgia Department of Transportation Intermodal Programs Division, State Rail Plan 2009. www.dot.ga.gov/travelingingeorgia/rail/Pages/default.aspx

ROADS

C-

RECOMMENDATIONS

- *Fix the Funding to Ease Congestion:* Georgia needs to increase funding to make needed improvements and move from its rank as 49th in the nation in per capita transportation funding. All potential funding sources should be considered including increasing the gas tax, user fees based on mileage, SPLOSTs, HOT lanes and public private partnerships.
- *Improve Transit Availability to Commuters:* Improve access to the transit system and expand the transit system to provide a viable alternative which will reduce the percent of single occupancy vehicles and reduce peak traffic.
- *Make Improvements To Allow Efficient Movement of Freight:* The movement of freight is critical to the economy of Georgia. GDOT should add capacity to strategic long-haul freight corridors, improve the most congested interstate interchanges and improve last mile connections for freight distribution areas. In addition, freight carriers should look to the rail network to shift more long hauls off the highway system.

CONTINUED PAGE 44

DEFINITION OF THE ISSUE

Whereas Georgia invested in its highway infrastructure significantly between 1977 and 1985, lack of investment since then has created congestion and freight bottlenecks throughout the state. Georgia needs good roads to maintain its place as a business leader. Georgia is home to the busiest passenger airport in the world, the Atlanta Hartsfield-Jackson International Airport and the second largest export port in the country, the Port of Savannah. Georgia is also the second largest inland freight hub behind Chicago. Georgia is a leader in terms of business growth due to its infrastructure. Georgia's interstate system consists of 1,243 miles, which is the 9th largest in the country. Without a significant increase in state and local funding to supplement decreasing federal assistance, Georgia risks losing its economic edge, putting future economic growth at risk.

GRADE

The Georgia Section of ASCE has assigned Roads a 2014 grade of C-. This is a slight increase from the 2009 grade of D+. Although road surface conditions are better than the national average, they are declining, suggesting a lack of funding for maintenance and resurfacing. Georgia's motor fuel excise tax is one of the lowest in the nation, making funding of roadway maintenance and improvements much lower compared to the national average. Special local option sales taxes (SPLOSTs), toll lanes and public private partnerships (PPPs) are good examples of alternative funding sources that should continue to be explored. Although roadway fatalities in Georgia are still higher than the national average, they have decreased significantly over the last 5 years. Despite reductions in peak commuter delays, congestion continues in metro Atlanta. Freight bottlenecks also continue to cause delays.

CAPACITY

The state of Georgia added 4,700 miles of roadway between 2006 and 2010 which moved it from 11th to 8th nationally in highest total miles of public roads with 122,917 miles (256,952 lane-miles) of public roads. A lane-mile is determined by multiplying the number of lanes on a road by the length of the road. For example, if a road is one mile long and has one lane in each direction, it is two lane-miles.

As shown in Table 2 the Atlanta area has seen only small shifts in workers' commuting habits 2007 and 2011 according to the Center for Transportation and the Environment (CTE). Although the percent of commuters using other modes of transportation such as biking or walking decreased slightly, that may change in the future as the Atlanta metro area has started investing in bike and pedestrian infrastructure.

Most regions in the state of Georgia have adequate road capacity to meet the needs of their citizens and freight traffic. Between 2005 and 2010 the state's population grew from 8.9 million to 9.7 million. Rural populations are anticipated to grow another 25 percent over the next 15 years. Along many major metro Atlanta region corridors, inadequate capacity and substandard interchanges have created congestion and safety issues. Congestion occurs when the number of vehicles on the road reaches or exceeds the capacity of the road, resulting in slowed or stopped traffic. The majority of congestion, or lack of capacity, in the state is in the metro Atlanta area. The Atlanta area improved its ranking on several items used to study mobility from 2005 to 2011 as shown in Table 3.

Despite the improvements shown in Table 3, according to the Georgia Department of Transportation (GDOT), morning peak hour speeds on Atlanta freeways have decreased from 45.3 mph in 2008 to 39.5 mph in 2013. The evening peak hour speeds have decreased from 39.6 mph to 37.5 mph during the same time period, which suggests an increase in congestion.

Congestion's impact on Georgia's freight traffic has increased as major bottlenecks have developed around limited capacity freeways and substandard interchanges. Around 70 percent of all the trucks entering Georgia complete their delivery within the state. Unequivocally, the majority of goods moved in Georgia are carried by truck. The three worst bottlenecks in the metro Atlanta Region for freight according to the American Transportation Research Institute (ATRI) in order are: the I-285 at I-85 interchange northeast of Atlanta along the Atlanta to South Carolina corridor (also ninth worst truck bottleneck in the country), the I-285 at I-75 interchange northwest of Atlanta along the Atlanta to Tennessee corridor and the I-20 at I-285 interchange west of Atlanta along the Atlanta to Alabama corridor. In 2010, there were approximately

Table 1: Atlanta Overall Statistics

	2006	2010
Atlanta Freeways, Lane-Miles	2,525	2,930
Atlanta Arterial Streets, Lane-Miles	7,520	7,586
Metro-Atlanta Population	4.07 M	4.30 M
Atlanta Commuters	1.94 M	2.10 M

Table 2: Percent of Atlanta Commuters Using Various Commute Options

	2007	2011
Driving Alone	84	82
Riding Transit	4	5
Telecommuting	4	7
Carpooling	6	5
Other (biking, walking, etc.)	2	1

Table 3: Atlanta Congestion Statistics Per Peak Commuter

	2005	2011
Congestion Cost	$1,865	$1,120
Annual Hours of Delay	68	51
Excess Fuel Consumption (gallons)	31	23
Percent of Lane - Miles Congested	58	58

RECOMMENDATIONS

- *Make Efficient Use of Available Traffic Technologies:* Municipalities and GDOT should increase regional signal synchronization and link with a regionally coordinated real-time traffic monitoring center in order to reduce wait times.
- *Make Road Improvements to Accommodate the Growing Number of Older Drivers:* Municipalities and GDOT should upgrade intersections and lane transitions to reduce the risk of accidents, improve signage by using larger lettering and improve lighting, especially at intersections.

2,000 to 3,000 trucks per day moving goods between Atlanta and the Port of Savannah. Atlanta ranks 4th worst in annual truck freight delay with an estimated congestion cost of $775 million in 2011.

To reduce congestion on the freeway corridors, the Georgia Department of Transportation (GDOT) has started utilizing alternative designs such as Diverging Diamond Interchanges (DDI) to move a higher volume of vehicles through grade separated highway interchanges faster. To reduce congestion at high volume, signalized, at-grade intersections, GDOT is studying the use of Displaced-Left-Turn-Lanes, also called Continuous Flow Intersections, to improve intersection capacity and flow.

CONDITION/OPERATIONS & MAINTENANCE

Road surface condition scores in Georgia have remained fairly consistent since 2006 with 95 percent of the roads considered to be in Fair Condition or better, compared to 83 percent as a national average. However, the percent of roads in Very Good Condition has decreased from 49 percent in 2006 to 46 percent in 2009 and Good Condition has decreased from 31 percent to 27 percent in the same time period. This suggests a downward trend as funding for maintenance and resurfacing of existing roadways is lacking.

GDOT's Regional Traffic Operations Program (RTOP) increases traffic volume throughput by synchronizing the signals along selected regional commuter corridors. In the past two years, the program has reduced the number of stops by 8.3 percent and increased traffic volume throughput by 9 percent during the morning and evening peak hours in those corridors. This program has eliminated an estimated 1.2 million hours of delay and saved 700,000 gallons of fuel in 2012.

Despite these investments, Georgia still remains behind other states in terms of alternative construction, design and operations methods. The City of Atlanta only has a small percentage of their roughly 1,300 signals synchronized compared to the country's most comprehensive traffic management program in Los Angeles, which has all 4,500 signals synchronized. Implementation in Atlanta is complicated due to irregular intersection spacing and an inconsistent street grid. An upgrade to just the City of Atlanta's signal system would cost an estimated $40 million.

FUNDING

Georgia's state motor fuel excise tax is one of the lowest in the United States at 7.5 cents per gallon. Some Georgia counties have supplemented this tax with a 1 percent Special Purpose Local Option Sales Tax (SPLOST). This is a tax voted on by their citizens for a set period of time, for a selected group of projects to be built. In July of 2012, the state of Georgia held a state-wide vote to establish a similar 1 percent sales tax called the T-SPLOST, or Transportation Investment Act (TIA), for all of the counties in Georgia, organized by regions. It passed in only 3 of the 12 regions. In the regions where it passed, it is projected to generate up to $1.8 billion over the next ten years. There are 46 counties included in the three passing regions: River Valley, Central Savannah and Heart of Georgia. Unfortunately, the state will not be able to bring another statewide SPLOST up for a vote until 2014 at the earliest due to state law. Lack of voter confidence makes passing of similar taxes in the near future unlikely.

Georgia increased its roadway expenditures from $1.9 billion in 2005 to $3.3

billion in 2010. This improved the expenditures per mile of public roads ranking from 41st to 34th and its ranking of expenditures per capita from 50th to 49th. This was influenced by a large one time infusion of funding from the American Recovery and Reinvestment Act (ARRA) in 2009 of $932 million for highway projects. As a more accurate depiction of investment, Georgia spent $335 per capita in 2010 versus the national average of $497 per capita. For Georgia to meet the national average of $497 per capita, it would need to generate additional funding of $1.6 billion per year.

To create another source of funding, Georgia DOT is adding managed toll lanes (HOT) to Atlanta freeways both north and south of the city. The goal of adding these lanes is to create an additional revenue source and provide commuters a mobility choice of paying for more reliable travel times during peak. The lanes can also be helpful to transit bus systems along these corridors. Georgia began using Public Private Partnerships (PPPs) in 2010 in order to tap into additional private funding sources. The state also updated their Local Maintenance and Improvement Grant (LMIG) program to allow cities and counties to leverage their funds to receive more state funding to support local projects.

FUTURE NEED

Georgia does not have enough funding to meet future needs. According to GDOT's Statewide Strategic Plan 2010-2030, "the current available resources will only fund 50 percent of burning platform programs." These are programs GDOT believes are critical for the state. According to GDOT's Statewide Transportation Improvement Program FY 2013-2016, the total estimated highway funds available over that time period for spending is $7.8 billion. Using these figures, it appears that Georgia's highways face a $2 billion annual shortfall during that time period. The most critically needed improvements in the state are:

- Adding capacity to strategic long-haul freight corridors
- Improving the most congested Interstate interchanges
- Improving last mile connections for freight distribution areas
- Implementing safety improvements through updated design
- Implementing full-scale and coordinated traffic monitoring systems
- Increasing traffic signal synchronization in the metro Atlanta region
- Increasing statewide pavement maintenance and resurfacing

PUBLIC SAFETY

The total number of traffic fatalities in Georgia has decreased from 1,693 in 2006 to 1,223 in 2011. Over that time period, Georgia's ranking has improved from 4th highest to 6th highest in the nation. As shown in Table 4, despite these improvement Georgia is still above the national average in fatalities per 100,000 people.

Table 4: Traffic Fatalities Per 100,000 People

	2007	2011
Georgia	17.55	12.46
National Average	13.7	10.39

According to TRIP, a national transportation research group, drivers over 65 years old in Georgia account for 8 percent of all miles driven in Georgia, but 17 percent of all traffic fatalities. As the number of Georgia residents over age 65 is expected to double by 2040, this could become a bigger issue in the future.

GDOT has implemented several projects to make roads safer in Georgia. Median cable barriers have been installed on many of the rural interstates to eliminate head-on collisions caused by high speed vehicles crossing the median. The most severe truck-involved crashes in Georgia are related to head-on collisions mostly in rural locations with high truck volumes and no median barriers. Rumble strips on the center stripe have been installed on many curves of two-lane roadways to warn drivers who weave out of their lane into oncoming traffic. GDOT has installed and is testing a High Friction Surface Treatment (HFST) on an interstate exit ramp to determine its viability. GDOT is also considering utilizing this system on several rural sharp curves in northern Georgia and installing it on several interstate ramps in the Atlanta area to reduce the incidence of vehicles leaving the roadway. Substandard interstate intersection design has also been identified as a significant safety hazard for truck traffic and corresponds with many of the metro Atlanta bottleneck issues.

For arterial roadway use, GDOT is also now promoting the consideration of roundabouts in intersection design. Roundabout intersections are characteristically safer than signalized intersections because they reduce the incidence of the T-bone type accidents. Roundabouts are frequently studied as a safer alternative to signalization where field conditions will allow.

RESILIENCE

GDOT has implemented the Highway Emergency Response Operators (HEROs) to manage incidence occurrences on high volume freeways to relieve congestion and maintain consistent traffic flow. The program is funded by the Atlanta Regional Commission (ARC) and sponsored by State Farm Insurance. Events such as the ice storm of 2011 have pointed out significant failures in system resiliency in recent years.

SOURCES

Center for the Transportation and the Environment (CTE), Metro Atlanta's State of the Commerce, 2010 Metro Atlanta Regional Commuter Survey.

Georgia Department of Transportation, American Recovery and Reinvestment Act of 2009. www.dot.ga.gov/informationcenter/gastimulus/Pages/default.aspx

Georgia Department of Transportation, Every Day Counts 2 Spring Summit Meeting Minutes, April 3, 2013.

Georgia Department of Transportation, Fact Book 2013.

Georgia Department of Transportation, Freight & Logistics Action Plan, 2010. www.dot.ga.gov/Projects/programs/georgiafreight/logisticsplan/Documents/Plan/GAFreightLogisticsPlan%20ExecutiveSummary.pdf

Georgia Department of Transportation, Performance Management Dashboard, June 3, 2013. www.dot.ga.gov/informationcenter/statistics/performance/Pages/default.aspx

Georgia Department of Transportation, Public Private Partnerships (P3) Program. www.dot.ga.gov/doingbusiness/p3/Pages/default.aspx

Georgia Department of Transportation, Regional Traffic Operations Program, August 27, 2013. www.dot.ga.gov/travelingingeorgia/trafficcontrol/Pages/Operations.aspx

Georgia Department of Transportation, Statewide Strategic Transportation Plan 2010-2030, April 2010.

Georgia Department of Transportation, Statewide Strategic Transportation Plan Progress Report, February 2012.

Georgia Department of Transportation, Statewide Transportation Improvement Program FY 2013-2016, November 11, 2012.

Lovett, Ian, New York Times, "To Fight Gridlock, Los Angeles Synchronizes Every Red Light", April 1, 2013. www.nytimes.com/2013/04/02/us/to-fight-gridlock-los-angeles-synchronizes-every-red-light.html?_r=0

Research and Innovation Technology Administration (RITA), U.S. Department of Transportation (US DOT), Bureau of Transportation Statistics (BTS), State Transportation Facts, June 2013. gis.rita.dot.gov/StateFacts/

Research and Innovation Technology Administration (RITA), U.S. Department of Transportation (US DOT), Bureau of Transportation Statistics (BTS), State Transportation Statistics 2007.

Research and Innovation Technology Administration (RITA), U.S. Department of Transportation (US DOT), Bureau of Transportation Statistics (BTS), 2011 State Transportation Statistics.

Sabulis, Tom, Atlanta Journal Constitution, "Synchronize Those Traffic Signals", October 1, 2012. blogs.ajc.com/atlanta-forward/2012/10/01/synchronize-those-traffic-signals/

Texas Transportation Institute (TTI), Texas A&M University, 2012 Urban Mobility Report.

Texas Transportation Institute (TTI), Texas A&M University, Performance Measures Summary – Atlanta GA.

TRIP, Fatality Report, February 22, 2013.

SCHOOL FACILITIES

C+

RECOMMENDATIONS

- *Continue to use SPLOST Funding for Georgia's Schools:* The state should continue to support SPLOST funding for all districts and also move toward developing permanent and reliable funding sources.
- *Strong Economic Growth May Require a Shift in Strategy:* While Georgia's population growth rate has slowed in recent years due to the economic downturn, DOE must remain vigilant to new challenges. These challenges come from two very different directions: (1) maintenance and improvements of existing infrastructure, in particular facilities that were constructed during the population boom of the 1980s and 1990s, or (2) the potential for a renewed requirement for new facilities if another significant increase in population occurs.

CONTINUED PAGE 48

DEFINITION OF THE ISSUE

From kindergarten through high school, students are educated in a variety of public facilities across Georgia. The Georgia Department of Education (DOE) provides oversight of the educational facilities of 197 county and city school districts encompassing 2,273 schools serving 1.6 million students. School facility funding is provided to the school district by the local government, which may be at the city (e.g., Atlanta Public Schools) or county (e.g., Fulton County Public Schools) level. A special purpose local option sales tax (SPLOST) may also be used to supplement local school district funding. The Georgia DOE identifies supplemental funding needed to help ensure that schools meet the requirements established by state and federal laws and regulations.

The recent funding challenges have been partially offset by slowing economic growth. While the focus has largely moved from new facility construction to maintaining existing facilities, funding remains a concern. New construction arising out of a potential economic uptick could also adversely impact existing school facilities.

GRADE

The Georgia Section of ASCE has assigned Schools a 2014 grade of C+. This is the same grade as 2009 and is based on the reported condition of school facilities in terms of capacity, operation and maintenance, the projected funding versus need and future challenges. Although the state legislature has consistently underfunded schools statewide, local SPLOST programs have helped many local school systems bridge the funding gap.

RECOMMENDATIONS

- *Leverage Technology To Reduce Operating Costs:* Schools should identify technology upgrades that lower short-term (two to three years) operating costs. For example, upgrading to electronically controlled fluorescent lights reduces not only power and maintenance costs, but also prevents flicker and humming to improve the learning environment. The state should also consider establishing a revolving loan fund for school systems for improvements with a short-term, dollar-for-dollar payback. In addition, new facilities should be constructed based on lowest life-cycle cost, not just lowest construction cost.

CAPACITY

Based on the state, local and SPLOST funding available for construction and the decrease in the number of schools in Georgia, it appears that Georgia is very close to catching up with the demands for new and upgraded facilities. In the most recent data published by DOE, the number of schools decreased from 2,289 in the 2011/12 school year to 2,273 in the 2012/13 school year. The 2012-2013 school year inventory included the following:

Table 1: Types of Schools

School Type	Number of schools	Percent of Total
Elementary	1,323	58.2%
Middle	488	21.5%
High	450	19.8%
K through 12	12	0.5%

SOURCE: GEORGIA DEPARTMENT OF EDUCATION

There are five types of school systems that comprise the 197 school systems in Georgia:

Table 2: Types of School Systems

Type of System	Number
County	159
City	21
State Chartered Special Schools	15
Department of Juvenile Justice	1
State Schools	1

SOURCE: GEORGIA DEPARTMENT OF EDUCATION

SPLOST programs approved by local voters add a penny sales tax which is dedicated to funding for local schools.

CONDITION/OPERATION AND MAINTENANCE

While specific data on the age of Georgia schools is unavailable, on average, public school buildings in the U.S. are more than 40 years old. However, the maintenance and renovation history of school facilities tends to be more important than the age of the building itself, according to the National Center for Education Statistics (NCES). Deferred maintenance not only compromises the current condition of school facilities, but can also compromise the useful life of the facility. A 1999 NCES survey showed that three-quarters of schools reported needing repairs, renovations and modernizations in order to bring the buildings to "good" condition. Of the schools needing repairs, renovations and modernizations, the average need was $2.2 million per facility.

Many older schools in Georgia are in need of significant renovations. Recently, some school districts have been reevaluating their needs and rationalizing school facilities. In December, 2012, DeKalb County released a five-year plan

that proposes to close 12 schools. The plan also proposes to replace an additional five schools with larger schools that are better able to handle current and future requirements.

FUNDING

Each school district submits its five-year facilities plan based on several factors, including population, future growth and the age of buildings. The DOE performs a series of calculations to determine how much the state should reimburse the district for new construction, modifications and renovations. The DOE presents this estimate to the state Legislature, which then determines the funding amounts. The current maximum annual state entitlement is $300 million per year. Since 2008, the Georgia Legislature has provided funding as shown in Table 3.

Table 3: School Funding

Year	Funding from Georgia Legislature
2008	$454,165,000
2009	$295,621,944
2010	$286,630,000
2011	$121,790,000
2012	$185,905,000
2013	$125,655,000
Total	$1,469,766,944

SOURCE: GEORGIA DEPARTMENT OF EDUCATION

The 2011 figure in Table 1 includes $15 million that was redirected from prior year appropriations, and the 2012 funding does not include a $10,000,000 special appropriation for Science, Mathematics, and Technology (STEM) school construction bonds. In the preceding ASCE report card, projected funding from 2008 to 2013 for DOE state funding for new construction, modifications and renovations was forecast to be approximately $995 million, actual expenditure was approximately $1.47 billion.

Local school districts have primary responsibility for funding operations, maintenance and capital improvements. Prior to 1996, the local school boards had two funding options:

1. By local referendum voters could approve the passage of general obligation bonds, which are paid back through imposition of bond millage rates on the property owners.
2. Ad valorem taxes (millage rates) paid by the property owners could be increased.

Due to imbalances in the economic development of Georgia counties, revenues from property tax millage rates vary widely. As a result, the Legislature imposed a state millage on certain highly developed, high-growth counties and these funds were then directed to less-developed school districts.

In 1996, legislation was passed allowing school districts to put the SPLOST on the ballot in order to create a penny sales tax dedicated to local schools. This penny sales tax, which sunsets after five years but can be renewed by referendum, allows school districts to raise money for debt reduction and capital improvements without putting the burden on the property owners.

Georgia's astronomical rate of population growth in the 1980s and 1990s has slowed, as demonstrated by the only 1.1 percent increase in student enrollment between the school years 2011-2012 and 2012-2013. This shift is mirrored in how funds are being used. The focus has turned from constructing new schools to replacing existing schools, renovations, and deferred maintenance.

From 1997 to 2006, SPLOST referendums provided $16.5 billion for new schools, additions and improvements for existing schools, as well as $2.6 billion for district debt reduction. The local portion of projected costs between 2009 and 2013 above the state eligible amount is approximately $5.23 billion or $1.05 billion per year. Georgia DOE estimates that 193 of the 197 school systems in Georgia are receiving funding from a local SPLOST.

SOURCES

Georgia Department of Education, Quick Facts About Georgia Public Education, October 2013.

US Dept of Education, National Center for Educational Statistics, Condition of America's Public School Facilities: 1999. http://nces.ed.gov/pubs2000/2000032.pdf

SOLID WASTE

C+

RECOMMENDATIONS

- *Reduce Waste:* Waste generation needs to be reduced and more waste needs to be diverted from landfills through recycling programs. The state's commitments to waste reduction in the Georgia Comprehensive Solid Waste Management Act of 1990 caused substantial diversion of waste to recycling programs during the mid-1990s, but the current lack of similar emphasis has allowed goals to go unmet.
- *Expand Recycling Programs:* Education of consumers on the value of recycling and the proper disposal of hazardous waste needs to continue. DCA has promoted several major recycling programs in recent years that are beginning to show tangible results in consumer awareness and waste diversion.
- *Maintain the Solvency of the Solid Waste and Hazardous Waste Trust Funds:* The state legislature needs to ensure that fees citizens pay for solid waste management are devoted to those programs. Hazardous waste management, contaminated site cleanup and waste reduction programs are among the environmentally critical programs that should be funded by these fees.

CONTINUED PAGE 52

DEFINITION OF THE ISSUE

Georgia's collection, processing and disposal of solid waste has evolved in an effort to keep up with the state's steadily increasing population and growing awareness of environmental impacts of waste disposal. Since the 1990s, new regulations at the state and federal levels have resulted in the transition to lined landfills for the disposal of residential, commercial and industrial waste, and a requirement to incorporate life-cycle costs in all operations.

In 2011, Georgia residents, on average, disposed of 3.58 pounds of waste per day, which is 25 percent higher than 2011's national average of 2.87 lbs./person/day. This is after Georgia reduced waste disposal by 15 percent from 2004 to 2011, despite the state's growing population.

The Georgia Solid Waste Trust Fund is intended to provide for the cost of a broad range of state waste management programs, including hazardous waste site cleanup. These funds have been diverted by the state legislature to other funding priorities several times and are set to expire in July 2015. The fate of the ongoing programs and activities funded by this Trust Fund will be in jeopardy if it is not reauthorized to provide a stable source of funding for these vital initiatives. One of the intended uses is to assist local governments in planning, expanding, improving and implementing waste reduction programs such as the Recycling and Waste Reduction Program and the scrap tire recycling program.

GRADE

The Georgia Section of ASCE assigned Solid waste a 2014 grade of C+. This is slight improvement from the grade of C in 2009. This assessment is based on the relationship between waste generation rates and disposal capacity in Georgia and statewide efforts to manage both generation and capacity. The evaluation of Georgia's solid waste disposal facilities is based on per capita waste generation, current status of all facilities, available capacity, and funding. Although residential waste disposal has seen a reduction from 2007 to 2011, many challenges still lie ahead, such as reducing the high rate of out-of-state waste disposed in Georgia, keeping funds intended for waste disposal from being diverted to other uses, developing competitive rates and increasing incentives for recycling.

The inert landfill rules were changed in January 2013 to increase the permitting, monitoring and reporting requirements. Overall, the solid waste infrastructure in Georgia is meeting the state's requirements and there has been an increased focus on education, which is a step in the right direction.

CONDITION

Currently, landfills operate in accordance with EPA's Subtitle D regulations. While older landfills were unlined dumps, landfills constructed since the 1990's have been built so that the waste is isolated by a liner that is placed on the bottom of the landfill to collect and remove any liquid (also known as leachate) that might seep from the waste. A cover system is also installed over the waste to control rain water entering the waste. In addition, gas collection systems are installed to collect gas generated by the decomposition of the waste and groundwater monitoring wells are installed around the landfill to monitor the performance of the liners.

While the statewide picture for waste disposal is generally good, there are several issues of concern:

- Because tipping fees (the fee to dispose of waste in a landfill) in Georgia are much less than in the Northeast and Florida, imported waste needs to be monitored, as 13.6 percent of waste disposed in Georgia municipal solid waste (MSW) landfills daily come from outside of Georgia;
- Soil suitability and high groundwater tables in southeastern Georgia make siting of landfills problematic;
- The reliance on groundwater in the southern portion of the state gives added concern to the problems of contamination from leaking landfills; and
- More than half of permitted disposal capacity in the state is contained in 10 of Georgia's 102 active landfills. Therefore, state-level financial assurance should be carefully monitored.

Georgia is home to some of the strongest recycling markets in the country, yet these industries must purchase and import recycled materials from all over North America to support their operations. Georgia residents annually dispose of waste that contains 40 percent common recyclable materials with an approximate market value of more than $250 million. Although Georgia must purchase recycled materials from outside of the state, the total amount of recycled materials has increased according to annual reports from local governments; for example, the Georgia EPD estimates that approximately 8.5 million of the 9.6 million scrap tires generated were recovered for reuse in 2011.

CAPACITY

Since 2004, the per capita waste disposal rate in Georgia MSW landfills has decreased by approximately one pound per person per day (lb/person/day) from 7.39 lb/person/day to 6.43 lb/person/day in 2011. However, when excluding waste imported from other states, the per capita disposal rate in MSW landfills was 5.43 lb/person/day in 2011. Out of state waste disposal is 13.6 percent of total waste disposed in Georgia.

Of the nearly 13.3 million tons of waste disposed in 2011, the vast majority, approximately 86.5 percent, went into lined MSW landfills while 12.5 percent of the total waste was disposed of in construction and demolition (C&D) landfills. Nearly half of Georgia's MSW waste is disposed at five large landfills in Georgia. From 2004 to 2011, the volume of waste disposed in private MSW landfills slightly decreased from 75 percent to 73 percent of the total amount of waste disposed in Georgia.

Landfill tipping fees across Georgia remain competitive with other southeastern states. Although posted gate rate tipping fees have steadily risen in recent years, the increasing amount of waste sent to Georgia from other states for disposal indicates that the actual contract prices per ton remain attractive to waste hauling companies when compared with

RECOMMENDATIONS

- *Increase Waste-to-Energy Programs:* A focus should be placed on increasing the use of landfills for waste to energy purposes. For example, in 2006, Hickory Ridge Landfill in Conly, Georgia was closed and capped with an Exposed Geomembrane Solar Cover in an effort to create clean, renewable energy. Another example is using the gas generated by a landfill to generate electricity, which is being done at several landfills in the state.

neighboring states. In 2009 the average tipping fee for MSW in Georgia was $35.97 per ton, up slightly from and $35.38 per ton in 2005.

At the end of 2011, the state had 34 years of remaining permitted MSW landfill space and 43 years of permitted construction and demolition landfill space based on current disposal rates. Construction of new Subtitle D landfills increased the total landfill capacity from just over 600 million to approximately 700 million cubic yards between 2004 and 2011.

FUNDING

Disposal costs are almost entirely funded from tipping fees, so expenses for ongoing operations are expected to continue to be covered by available revenues. Full-Cost Accounting Rules established by the Georgia Comprehensive Solid Waste Management Act of 1990 require that local collection entities demonstrate how revenues cover costs and that disposal capacity is available for the next 10 years. Costs associated with long-term environmental monitoring and maintenance of facilities are incorporated into tipping fees for current facilities, while some restoration of "orphan" or abandoned landfills is covered by the Solid Waste Trust Fund.

The Solid Waste Trust Fund is a framework to guide how solid waste is managed in the state of Georgia. Fees collected annually each year are intended to help fund the costs of a broad range of state waste management programs. However, since these funds are not actually pledged for these purposes, they are subject to annual budget approvals by the state legislature, which allows these funds to be diverted to other purposes. For example, a fee of $1 for every new tire sold in Georgia is intended to be used for cleanup of illegal scrap tire disposal sites. However, only $722,139 of the $6.4 million collected from tire fees went to support its intended use in 2011.

PUBLIC SAFETY

The majority of public safety concern related to solid waste revolves around two areas: hazardous waste and "orphan" landfills.

Currently, Georgia does not house a commercial hazardous waste landfill (HWL) and only 21 exist in the entire U.S. There are currently no plans to construct an HWL in Georgia.

Georgia manages a database called the Hazardous Site Inventory (HSI), which is an inventory of sites that are monitored throughout the year. The inventory is updated yearly to either remove sites that have been mitigated or to add sites that need to be monitored. Currently, there are a total of 552 sites in Georgia listed on the HSI. This is a decrease from 574 in 2007.

"Orphan" landfills are abandoned landfills that lack an identified party that would be responsible for cleaning up contamination. Landfill design and

management practice changed dramatically when Subtitle D of the Resource Conservation and Recovery Act set criteria and specified that landfills operating after the regulation's effective date in 1991 would be required to meet extensive post-closure responsibilities. Many of the older landfills that closed have leaked and caused groundwater contamination and several of these have no directly responsible parties to pay for the cleanup.

FUTURE NEED

The increase in out-of-state refuse disposal in Georgia is creating an alarming trend in the growth of per capita disposal rates. In a period when waste generation in the state has increased by approximately 40 percent, out-of-state waste disposal in Georgia has increased tenfold. Such incursions could overwhelm capacity if not accounted for in planning.

With more than 34 years of remaining permitted disposal capacity throughout the state as of 2011, landfill tipping fees remain relatively low, increasing the challenge many local governments face in maintaining or implementing aggressive recycling programs. The availability of disposal capacity at comparatively low rates provides little incentive to citizens and communities to reduce waste generation or increase recycling. The state of Georgia plays an important role in assisting local governments and the recycling industry to strengthen recycling infrastructure and is supporting several initiatives to increase recycling rates throughout the state. These initiatives include the development of a statewide media campaign, investment in special event collections, investment in Regional Recycling Transfer Hubs and environmental education at the K-12 school level. The Department of Community Affairs (DCA) emphasis on recycling programs has apparently helped to increase total recycling, but it is not enough to offset increased waste generation.

SOURCES

Georgia Department of Community Affairs, 2011 Solid Waste Management Annual Report. www.dca.state.ga.us/development/Research/programs/downloads/FY 2011 Solid Waste Annual Report.pdf

Georgia Department of Community Affairs, MSW and C&D Landfill Tipping Fees 2009 Solid Waste Management Update. www.dca.state.ga.us/development/research/programs/downloads/2009TippingFees.pdf

Georgia Environmental Protection Division, "Georgia's Solid Waste Trust Fund, Report for Fiscal Year 2011." www.georgiaepd.org/Files_PDF/techguide/lpb/SWTF_Report_FY11.pdf

Georgia Environmental Protection Division, Hazardous Site Inventory. www.gaepd.org/Documents/hazsiteinv.html

U.S. Environmental Protection Agency, Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2011. www.epa.gov/epawaste/nonhaz/municipal/pubs/MSWcharacterization_508_053113_fs.pdf

STORM WATER

D+

RECOMMENDATIONS

- *Implement Proactive Local Planning and Policies:* Planning should focus on resource protection and reduction of impervious surface as local agencies coordinate with statewide plans and organizations.
- *Complete Stormwater Inventories and Assessments:* Municipalities should inventory their stormwater system to gather specific location, size and structural dimensions and condition information on all stormwater conveyance elements. Available technologies should be used such as Geographical Information Systems (GIS) and computerized asset management programs to allow for efficient use of the data. This will allow for the creation of stormwater management plans, comprehensive master plans, system maps and watershed models.
- *Increase Inspection and Maintenance:* Communities need to regularly inspect and maintain their stormwater infrastructure. Communities with MS4 permits are required to inspect a percentage of their stormwater structures annually. Stable, dedicated funding sources are needed to provide for effective maintenance programs.

CONTINUED PAGE 56

DEFINITION OF THE ISSUE

Stormwater is the runoff generated when precipitation flows over land or impervious surfaces and does not percolate into the ground. Through this "run-off" process, it accumulates debris, chemicals, sediment or other pollutants that can have an adverse impact downstream. In addition, impervious surfaces change the rate and volume of water entering streams and lakes. This change in quantity may increase flooding and decrease baseflow.

In Georgia, stormwater is managed through natural conveyances and manmade infrastructure. Some are owned and managed by local governments, some by private property owners. If certain thresholds are met, stormwater is managed and regulated under National Pollutant Discharge Elimination System (NPDES) Permits in the following categories:

- Urban (152 cities and counties permitted by the Georgia Environmental Protection Division (EPD) through Municipal Separate Storm Sewer System (MS4) permits, others considered non-point sources)
- Industrial (2,600 industries permitted by EPD, others considered non-point sources)
- Construction (land disturbance over 1 acre covered by one of three general permits)
- Agricultural (certain activities permitted, other considered non-point sources)

If a stormwater discharge does not meet the above criteria, it is considered a non-point source of pollution and is not regulated by the State of Georgia. Non-point sources of pollution are those that are difficult or impossible to regulate such as fertilizer and insecticide from residential yards; oils and other pollutants from roadways or parking lots; and sediment from eroding land or stream banks.

GRADE

The Georgia Section of ASCE has assigned Stormwater a 2014 grade of D+. The grade remains unchanged since 2009. The majority of cities and counties in Georgia lack adequate funding to maintain their stormwater infrastructure and few have a dedicated funding source such as a stormwater utility. However, there have been some improvements in stormwater management in the last 5 years, including the addition of approximately 10 stormwater utilities. Stormwater utilities provide a dedicated local funding source for stormwater maintenance activities within a local jurisdiction. Several of these stormwater utilities are located in areas not covered by urban municipal stormwater permits, indicating an awareness of the importance of stormwater beyond meeting regulatory requirements.

CONDITION

Stormwater infrastructure consists of conveyance components such as pipes and streams; storage components such as lakes, ponds and wetlands; and structures such as catch basins, junctions and weirs. Green infrastructure such as buffers, riparian corridors and filter strips are also part of the stormwater system. Stormwater infrastructure can convey not only stormwater runoff but also pollutants (such as sediment) that can reduce the capacity of conveyance systems and storage facilities. Sediment and fecal coliform, an indicator of potential pathogens, are the most commonly identified pollutants in Georgia streams.

Many local governments are struggling to maintain their stormwater pipes and structures. As these structures age, they require inspection and maintenance. If not repaired in a timely manner, roads can collapse, and flooding and sinkholes can occur, significantly impacting public safety. Due to the NPDES and MS4 permitting program, many local governments are creating an inventory of their stormwater infrastructure and some are even assessing condition as part of a proactive maintenance program.

A fully functioning stormwater infrastructure system is essential to operation that is safe for the public. Maintenance of stormwater systems should include regular inspections and, if necessary, removal of accumulated pollutants, especially sediment. Enforcement is limited due to a lack of funds and personnel and is complicated by factors such as transfers of property ownership and ongoing maintenance contracts.

Stormwater best management practices (BMPs) can minimize the water quality and quantity impacts that can be associated with stormwater. The following resources are available for stormwater management:

- Georgia Stormwater Management Manual, published in 2001
- Coastal Supplement to the Georgia Stormwater Management Manual, April 2009
- Manual for Erosion and Sediment Control in Georgia, Fifth Edition, 2000
- Georgia's Best Management Practices for Forestry, May 2009
- Water Quality Best Management Practices for the Aggregate Mining Industry, May 2009

CAPACITY

Georgia stormwater conveyance and treatment facilities have been installed over many years with a variety of design criteria. As stormwater runoff tends to increase with development, the capacity of some systems no longer meets the demand in growing urban areas. Local governments need to assess which systems need increased capacity in addition to evaluating maintenance needs. In addition, the water quality component of stormwater management infrastructure only began to be required in 2001; so much existing infrastructure does not significantly address water quality components.

REGULATORY FRAMEWORK

Urban stormwater includes runoff in developed areas of cities and counties. These systems are regulated by MS4 permits administered by EPD for the U.S. Environmental Protection Agency (EPA). The NPDES program is mandated through the Clean Water Act and focuses on water quality. There are two regulating NPDES permits, depending on the size of the municipality. There are 58 Phase 1 communities and 94 Phase 2 communities. Phase 1 applies to municipalities serving a population over 100,000 and Phase 2 applies to municipalities serving a population less than 100,000. Additionally, the Georgia Department of Transportation was issued a MS4 permit in 2011. Although the format of these permits is different, the basic requirements are the same: communities are required to develop a stormwater management plan that is based on a set of BMPs. EPD requires the adoption of stormwater design standards similar to the Georgia Stormwater Management Manual. EPD's audit process on the NPDES and MS4 programs ensures compliance and progress. Without strong urging through compliance, progress toward water quality improvement will not happen.

These activities are funded by local government tax funds or by local stormwater utilities through user fees. Some of the stormwater infrastructure in these areas is privately owned by individual land owners or homeowner's associations, making management and maintenance challenging.

The most current MS4 permit, adopted December 2012, removes the requirement for Phase 2 permitted municipalities to inspect privately owned stormwater management facilities designed prior to December 2008. The requirement to recommend retrofits for flood control on these older facilities was also removed from the most recent permit. These

RECOMMENDATIONS

- *Increase Public Education:* State and local governments should increase efforts to educate their residents providing increased awareness of stormwater infrastructure and its direct connection to streams, rivers and lakes. Additionally, education programs can inform citizens about the impacts that individual behaviors can have on water quality and stream flow. The Clean Water Campaign, managed by the Atlanta Regional Commission, serves as a model of a collaborative education effort.
- *Improve Watershed Protection Through Better Land Use Practices:* Watershed protection can be obtained through BMPs and improved land use strategies. Land use management that includes greenspace preservation, low impact development patterns, green infrastructure and other innovative land use practices that improve stormwater management should be encouraged.
- *Consider Stormwater Authorities:* Georgia EPD will likely establish more stringent requirements to address specific pollution problems through Total Maximum Daily Load (TMDL) strategies aimed at watershed protection. Enabling statewide legislation for stormwater authorities could lead to stormwater utilities addressing inter-jurisdictional issues because of watersheds that cross county and city boundaries.

relaxations of the inspection requirements will hurt municipalities two-fold. Municipalities with established inspection programs that included older privately owned ponds no longer have the backing of the state to justify funding the inspection program. Additionally, these same municipalities were previously required to retrofit the older ponds to better control flooding and improve water quality. These older ponds generally have neither routine maintenance requirements nor water quality control and channel protection requirements and are usually the ones causing the most damage to the overall system.

Industrial facilities meeting certain criteria are regulated through the Industrial Stormwater General permit, updated in 2013. In Georgia, approximately 2,600 industries are covered by this permit. The General Permit requires these regulated facilities to adopt a Stormwater Pollution Prevention Program which contains BMPs aimed at creating a cleaner facility with respect to the stormwater leaving their facility. The permit also requires an extensive stormwater sampling program be implemented to continuously monitor the quality of stormwater leaving the facility.

CONDITION

Streams and lakes throughout Georgia are used for fishing, recreation and drinking water. The pollutants that stormwater water accumulates can impact these uses. Currently in Georgia, 38 percent of the 13,899 miles of streams and rivers, 59 percent of the 393,348 acres of lakes and reservoirs, 84 percent of the 79 square miles of sounds/ harbors, and 70 percent of the 415 miles of coastal rivers and streams assessed by the Georgia Department of Natural Resources were found to fully support their designated use. Stream segments in Georgia equaling approximately 8,145 miles are listed as impaired by violating at least one water quality criteria and as such, do not meet their designated uses. Stormwater runoff from urban areas and non-point sources account for 99 percent of the violations for rivers and streams and over 55 percent of the violations for lakes and reservoirs.

FUNDING

Funds are needed for stormwater infrastructure construction, operations, inspection, maintenance, educational programs, regulatory coordination and other activities. Funding may come from:

- Local government tax funds
- Stormwater utility revenue
- Private property investment
- State revolving fund loans to local governments
- Clean Water Act 319(h) grants for nonpoint source projects
- Environmental Quality Initiatives Program (EQIP) financing through the USDA

Alternative funding methods for stormwater management programs include general obligation bonds, development impact fees, formation of special assessments or tax districts and the creation of user fees through stormwater utilities.

A stormwater utility, like a sewer or water supply utility, has user fees. These fees are allocated based on impervious surface such as roofs, driveways, park-

ing areas and sidewalks. Currently, Georgia has approximately 44 stormwater utilities. As a comparison, there are more than 100 stormwater utilities in Florida and more than 500 throughout the United States. Stormwater utility fees can be used for activities related to water quality and quantity and their impacts on natural resources, as well as maintenance of failing infrastructure such as pipes and dams.

Georgia EPD delegates Section 319(h) grant funds of approximately $4.5 million annually to local governments for projects that address non-point source water quality. The Georgia Environmental Finance Authority (GEFA) provides grants and low interest and state revolving loans. Since 2010, the federal Clean Water State Revolving Fund administered by GEFA has included a green infrastructure program that includes projects to manage wet weather flows and maintain and restore natural hydrology by infiltrating, evapotranspiring and harvesting. It also includes bioretention, green roofs, urban forestry, permeable pavements, cisterns, establishment or restoration of permanent riparian buffers, floodplains, wetlands and other natural features.

FUTURE NEED

In general, communities lack funding to maintain their stormwater pipe systems. When a community does not have a dedicated funding source, such as a stormwater utility, it must rely on general tax funds. Stormwater programs must compete with police, fire, parks and other community services for funding. Community leaders must decide where to spend very limited public dollars and often times stormwater system upgrades do not make the final list of funded projects. Inspection programs have increased as a result of MS4 permit requirements in turn increasing the amount of already limited funding required to maintain these programs. Communities have made limited use of the loan programs. Georgia should encourage more communities to look holistically at water issues and recognize the connection between stormwater, wastewater and drinking water. Funding stormwater programs can assist with water supply and water quality issues more frequently associated with wastewater and drinking water permits.

PUBLIC SAFETY AND RESILIENCE

Stormwater is closely connected to dam safety discussed elsewhere in the Report Card. Failing dams and undersized stormwater infrastructure may exacerbate flooding problems, impacting public safety. In addition, failing pipes can cause sinkholes in yards and collapsed roadways.

In October 2013, a collapsed storm structure and its subsequent repair closed lanes on I-85 in downtown Atlanta for several days. This serves as a great example of the interconnectedness of infrastructure and the importance of funding the whole system.

Since it is not economically feasible to design for all storm events, most pipes and detention ponds are designed for up to a 25- or 100-year storm event. Rare storm events, such as the extreme rain events in Douglas County and the metro Atlanta area in September 2009, may exceed the capacity of these structures, resulting in flooding and damage. For these cases, local governments should have disaster mitigation plans to quickly respond and restore affected areas.

SOURCES

Atlanta Regional Commission, Georgia Stormwater Management Manual, August 2001. http://www.georgiastormwater.com/

Center for Watershed Protection. http://www.cwp.org

Environmental Protection Agency (EPA). http://www.usepa.gov

Georgia Environmental Protection Division, Georgia Department of Natural Resources, Water Quality in Georgia 2010-2011.

Georgia Soil and Water Conservation Commission, Manual for Erosion and Sediment Control in Georgia, 5th edition, April 2000. http://www.gaswcc.org/

Metropolitan North Georgia Water Planning District, Watershed Management Plan, May 2009. http://www.northgeorgiawater.com/watershed.htm

TRANSIT

D-

RECOMMENDATIONS

- *Increase Dedicated Funding:* Georgia, and especially Metro Atlanta, cannot just rely on roads to fix the state's transportation issues. Additional funding for transit at the state and local level is needed to increase service areas and availability of service. Georgia needs to look towards more alternative funding to address federal cuts by continuing to leverage SPLOSTs, property tax districts, or alternative financing around Transit Oriented Developments (TOD) and Public Private Partnerships (PPP).
- *Improve Transit System Collaboration:* Metro Atlanta's current system of multiple transit providers is inefficient, as well as time-consuming and confusing to the users. The various transit agencies in the Atlanta region need to collaborate more in terms of service and funding. In the short term, the region would benefit from an improved and uniform fare collection system, such as implementing MARTA's Breeze tap card system regionally across all transit agencies, as other major US regions have already done with similar systems.

CONTINUED PAGE 60

DEFINITION OF THE ISSUE

Even though Georgia drivers face congestion on a daily basis, the inability of state and local agencies to provide the necessary funding for meaningful transit has created a backlog of needs that are not likely to be addressed in the near future. Metro Atlanta's current system of multiple transit providers is inefficient, as well as time-consuming and confusing to the users. Without the proper investment in transportation infrastructure, the state stands to lose its competitive advantage in the global economy, which historical investment created. The biggest investments in highways and MARTA were made in the 1970's to 1980's, and the 1990's around the Olympics.

In 2012, Georgia voters were given an opportunity to approve sales tax-based funding for transportation investments, which in the Atlanta region in particular would have provide substantial new funding for transit. Except in three largely rural regions, the referenda were defeated. Transit agencies have relied on federal funding, local funding and sales tax receipts to support services and infrastructure investment. Local transit agencies have shown that they are operating efficiently through high farebox recovery rates, but are lacking the funding support needed to provide more frequent service to attract and retain riders. In the Atlanta region, the long-range plan recommends an ambitious transit investment strategy in the region, but there is very little funding to implement large portions of the plan. Unless some different and innovative sources of funding can be found, Atlanta and Georgia risks falling behind other U.S. cities and states in attracting economic growth. Collaboration between governments is needed to establish a truly regional, accessible transit system in Georgia.

GRADE

The Georgia Section of ASCE has assigned Transit a 2014 grade of D-. This is lower than the D+ assigned in 2009. Georgia's transit systems suffer greatly from lack of coordination and funding. Without state support and additional local investment for transit operations, Georgia will continue to fall behind as federal funding continues to decrease. Additionally, as congestion increases and the population ages, the importance of transit accessibility for mobility will increase.

CONDITION/OPERATION & MAINTENANCE

A transit agency's condition is comprised of the state of its assets, including its vehicles, fixed guideway systems (rail, pavement, track slab), and other supporting systems such as safety, signaling, and communications systems. Maintaining a system's maintenance facilities and yards are also critical to maintaining the working status of other systems. Aside from the heritage streetcar in Savannah, the MARTA heavy rail system in Atlanta is the state's only fixed guideway transit system. Also, MARTA has the state's most comprehensive asset management system.

As part of MARTA's asset management practice, it has developed a Capital Improvement Program and Asset Breakdown Structure, which classifies its assets into 16 categories. MARTA practice involves performing field assessments for selected asset types, rating each asset on a 1-100 scale, and then estimating the condition of other assets based on this sample survey. Using historical data, future replacement needs and budgets can then be developed. MARTA inspects its track twice weekly and stores this data in its Maintenance Management Information System (MMIS). It also has specialized life cycle maintenance programs for its vehicles, and has worked with software developers to store linear asset data in the MMIS as well.

Despite the MARTA's asset management program, many of MARTA's assets are in need of repair or replacement as evidenced by the nearly $600 million that was included in the Transportation Special-Purpose Local-Option Sales Tax (T-SPLOST) project list for the Atlanta region. Many of these dollars were to go to support upgrades and repairs to the train control system, rehabbing the elevator and escalator systems, and other communications and third-rail systems.

MARTA is in the process of replacing its entire existing running rail. This replacement process and resulting single tracking has caused numerous delays – especially on weekends. Some of these delays are unavoidable in the life of a transit system, but others could be avoided with increased funding and transit support. However, despite these shortfalls, MARTA's is still a relatively young transit system, and its asset management programs have helped to limit its deterioration and maintenance backlog.

Georgia's Rural and Human Services Transportation (RHST) program is intended to assist transit-dependent Georgians in rural areas. The RHST is mostly privatized and funded by federal formula programs. Eventually deferred maintenance will put pressure on capital budgets. For example, one of the main supporters of the RHST programs, the Department of Human Services (DHS), stopped purchasing vehicles in 2007. As the DHS fleet begins to age and vehicles are retired, additional capital support will be needed. Currently, non-public transit providers are not eligible to procure vehicles through the state, but those operating state owned vehicles are eligible for state-contracted maintenance, insurance, and fuel purchase programs. Additionally, "surplused" rural transportation vehicles, those that have reached their useful life of 5 years or 100,000 miles of service, are turned over to the Department of Administrative Services (DOAS) for processing and auction. As pressure mounts on capital budgets, rural transit agencies and private operators are trying to change that policy to keep vehicles in use within the RHST system longer.

CAPACITY

Transit capacity can be measured by the area of coverage, frequency of service, and size of vehicle. Figure 1 illustrates the variety of modal types and routes in each of the transit systems in Georgia. Not surprisingly, the Atlanta and Savannah markets offer the greatest modal diversity, with both markets soon to have bus service, demand responsive service, and streetcar. Atlanta also has the heavy-rail system and Savannah offers a ferry boat service. Despite this breadth of service, demand exists in both regions and throughout the state for additional service, as evidenced by the list of projects generated in the Transportation Investment Act (TIA).

In the Atlanta region, the TIA list included rail service to the Center for Disease Control and Emory University, high capacity transit service along I-20 to the Mall at Stonecrest, and rail service into Cobb County from the Arts Center Station. Other more regional transit connections include studying high speed rail from Atlanta to Chattanooga and Charlotte, and the continued planning and feasibility studies associated with the Multi-Modal Passenger Terminal (MMPT) which would be located in downtown Atlanta and would serve as a regional bus and commuter rail hub. These expansion options are being considered in the midst of a decrease in MARTA service frequency and increase in fares.

The total number of non-urbanized transit services in Georgia reporting to the National Transit Database (NTD) is 84. The NTD was established by Congress to be the Nation's primary source for information and statistics on the transit systems of the United States. There is transit service in 122 of the 159 counties in Georgia, which includes 22 new transit provid-

RECOMMENDATIONS

- *Repeal the 50/50 Rule:* Although the state provides no funding support, which makes MARTA the largest transit agency in the country to not receive state funding support for operations, it does impose legislative restrictions. These restrictions continue to create problems in operating the state's largest transit system. The state-imposed 50/50 rule requires MARTA to spend 50 percent of its budget on capital expenditures. This has created a smaller operating budget when local sales tax revenues have fallen. This has resulted in service cuts in the past five years, further limiting MARTA's ability to serve its customers and prepare for the future anticipated growth of the region.

ers in the last few years. The majority of the counties served have less than 5 vehicles in use (see Figure 1 below). Figure 2, below, shows which counties in Georgia have transit systems and how they are governed.

In addition to system coverage, the number and type of vehicles each agency owns also significantly impacts an agency's transit capacity. The 2013 NTD details the number of unlinked trips per each system and mode, as well as the number of vehicles and routes serving that system's boundaries. An unlinked trip is a term used by the Federal DOT and refers to the total number of passenger boardings on bus, rail, or other transit services. This measure does not take into account that some passengers transfer between train and bus service in the same trip.

Even though MARTA has the largest fleet size of any of Georgia's transit systems, it also has some of the highest per-vehicle ridership. MARTA is second only to University of Georgia Transit in per-vehicle usage, which is aided by a dense campus population. Albany's transit system has a high usage per bus and may be close to approaching capacity.

A high level overview of the national data suggests that Georgia's transit agencies have an adequate number of vehicles to serve their existing market areas. However, route coverage maps and anecdotal evidence indicate that these routes may need to be expanded to meet the transit needs of local citizens, especially with an aging population and the desire for more flexible commute options. Depending on the magnitude of these service area expansions, additional vehicles might need to be acquired to accommodate desired headways and ridership demands. This increase in capacity is also highly dependent on federal, state, and local funding, as Georgia currently does not use any state funds for transit operations.

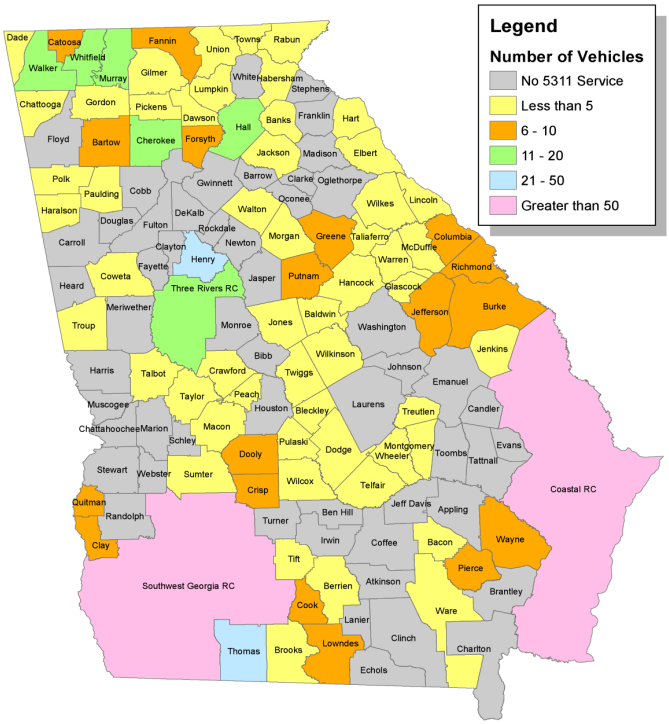


Figure 1: Non-Urbanized (Rural) Transit – Vehicle Data Intermodal SOURCE: GDOT

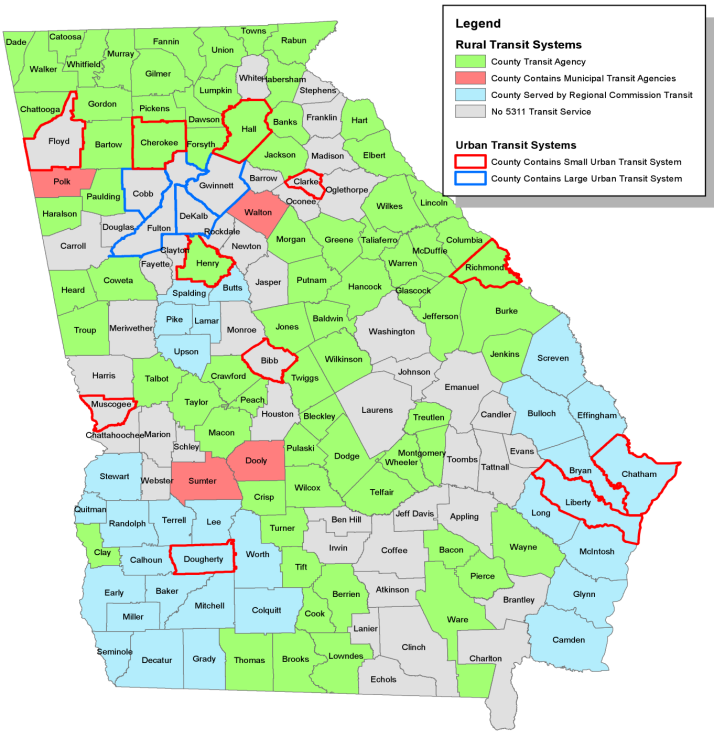


Figure 2 Non-Urban (Rural) Transit – Areas Served SOURCE: GEORGIA DOT

USAGE

The most recent ridership statistics in Georgia were found in the National Transit Database (NTD), hosted by the Federal Transit Administration. This database tracks ridership data in addition to other statistics such as fleet size and revenue. Georgia's transit agencies comprise multiple modes including bus, demand responsive services, and vanpool services that are utilized by multiple transit systems, as well MARTA's heavy rail system in Fulton and DeKalb counties and Savannah's ferry boat service. In addition, Savannah currently operates a heritage streetcar, and the city of Atlanta will begin operating the Atlanta Streetcar in downtown Atlanta in the spring of 2014.

The MARTA system is by far the state's largest system in terms of ridership, fleet size, and revenue. The 2012 APTA Fact Book states that there were over 146 million unlinked passenger trips taken on MARTA in 2010, which generated over 772 million passenger miles of travel, and ranked 9th and 13th respectively among all US transit agencies. Unfortunately, MARTA ridership has declined since 2010 and MARTA only had 135 million unlinked trips in 2012 (a 7.5 percent decrease).

Table 1: 2012 Rural Transit Vehicle Miles Traveled (VMT) by State

Rank	State	Millions of Rural Transit VMT
1	North Carolina	41.4
2	Tennessee	29.4
3	Kentucky	27.2
4	Michigan	23.7
5	Missouri	23.0
6	Texas	21.4
7	California	18.7
8	Oklahoma	18.7
9	Florida	17.2
10	Washington	16.9
11	Georgia	16.3

SOURCE: 2013 RURAL TRANSIT FACT BOOK

Table 2: Georgia 2012 Unlinked Trips by Agency & Mode

Transit System	Mode	Unlinked Trips
Albany	Demand Responsive	10,386
	Bus	1,006,400
MARTA	Demand Responsive	581,476
	Heavy Rail	72,711,487
	Bus	61,596,727
Augusta Richmond Co. Transit Department	Demand Responsive	19,120
	Bus	718,432
Metra Transit (Columbus)	Demand Responsive	32,073
	Bus	1,089,968
Chatham Area Transit Authority	Demand Responsive	78,906
	Ferryboat	642,082
	Bus	3,838,975
Athens Transit	Demand Responsive	9,234
	Bus	1,789,737
City of Rome Transit	Demand Responsive	24,448
	Bus	1,029,272
Cobb Co. Transit	Demand Responsive	60,673
	Bus	3,785,150
Douglasville	Vanpool	191,499
Macon-Bibb Co. Transit Authority	Demand Responsive	19,208
	Bus	926,372
Georgia Regional Transportation Authority	Commuter Bus	1,802,443
	Vanpool	309,032
Gwinnett County Board of Commissioners	Demand Responsive	19,394
	Bus	2,007,139
Hall Area Transit	Demand Responsive	25,066
	Bus	240,190
vRide (Marietta)	Vanpool	757,493
Cherokee Co.	Bus	49,774
Buckhead CID	Bus	137,968
UGA Transit	Demand Responsive	10,009
	Bus	10,876,728

SOURCE: 2013 NATIONAL TRANSIT DATABASE

Although, MARTA represents the majority of the state's transit trips, there are a number of smaller urban agencies as well as rural service. Despite relatively low funding support from the Georgia Department of Transportation (GDOT), which administers the FTA's transit grant programs for the rural services, the National Center for Transit Research's 2013 Rural Transit Fact Book states that Georgia's rural transit systems generated 16.3 million vehicles miles of travel, ranking it 11th among all states, as shown in Table 1. According to Georgia's RHST program, RHST provided 7.8 million trips in FY 2011.

Georgia ranked 8th among all states in the 2010 census in terms of population, meaning that its rural transit usage is less than would be expected given its population. The tables on the following pages illustrate how Georgia's transit systems compare to each other, by both mode and trips per population. Table 2 illustrates the number of unlinked trips by mode by transit agency in the state. The table also indicates which transit services provide which type of service by mode. Demand Responsive service is a non-fixed route system of transporting individuals that requires advanced scheduling by the customer. Typical customers of this type of system include the elderly or disabled.

Table 3: Total Transit Trips by Agency per Person

Transit System	Total System Trips (2012)	Unlinked Trips per person in in Transit Service Area
MARTA	134,889,690	86
University of Georgia Transit System	10,886,737	247
Chatham Area Transit Authority	4,559,963	17
Cobb Co. Transit	3,845,823	6
Georgia Reg. Transportation Authority	2,111,475	2
Gwinnett Co. Board of Commissioners	2,026,533	3
Athens Transit	1,798,971	15
Metra Transit (Columbus)	1,122,041	5
City of Rome Transit	1,053,720	29
Albany	1,016,786	13
Macon-Bibb Co. Transit Authority	945,580	7
vRide (Marietta)	757,493	4
Augusta Richmond Co. Transit Dept.	737,552	4
Hall Area Transit	265,256	8
Douglasville	191,499	1
Buckhead CID	137,968	1
Cherokee Co.	49,774	3

Source: Georgia DOT

Table 3 and Figure 3 further expound the data from Table 2 by illustrating the number of total unlinked trips by agency (regardless of mode) and the number of unlinked trips per person, as well as the percentage of total transit trips in the state by agency.

Table 3 indicates that, as would be expected, MARTA had by far the highest ridership of any transit agency in the state in 2012 at nearly 135 million unlinked trips, down from 146 million in 2010. Perhaps surprisingly, the second highest ridership in the state was generated by the University of Georgia's transit system. This system also had by far the highest number of unlinked trips per person at 247, nearly three times that of MARTA. Figure 3 further illustrates the relative ridership of each system within the state, with MARTA's representing over 75 percent of the state's urban transit agency ridership.

Viewed in isolation, Georgia's transit system usage is average, as its largest flagship system (MARTA) generates ridership roughly on par for its regional population compared to other major metropolitan areas. Unfortunately, its ridership has been declining in recent years due to service cuts and fare increases caused by funding limitations. Likewise, Georgia's rural transit passenger mileage is roughly what would be expected given the state's vast rural geography and population ranking.

FUNDING

Although municipalities and transit agencies in Georgia are working with limited financial resources, studies have shown they are efficiently using those resources and providing a necessary service to the community. Georgia is among the lowest in the country in transit spending per resident. According to APTA's 2010 Survey of State Funding for Public

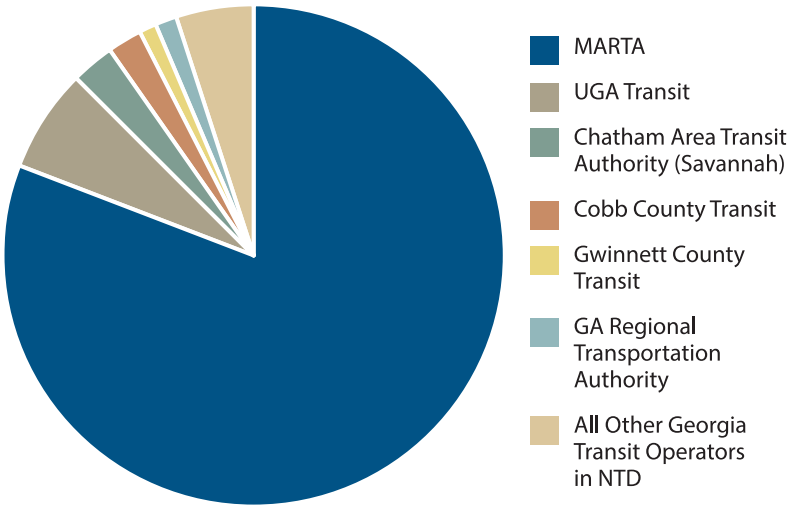


Figure 3 - Trips by Transit Agency in Georgia

Transportation, Georgia spent just $0.63 per person in 2008. In comparison, New Jersey spent $119.52, Illinois spent $40.43, and North Carolina spent $7.94 per person in the same year. Whereas the majority of transit funding in Georgia is provided by the federal government through traditional formula programs, cities and counties have also continued to utilize local property tax districts, general funds, and penny sales tax referendums to operate and expand their transit systems and further leverage federal dollars. Municipalities have also been actively competing in the federal competitive grant process to maximize the state's transit earnings. Atlanta's involvement in the USDOT TIGER grant process resulted in two large awards over the last few years. Atlanta received a TIGER II award in 2010 for their streetcar project in the amount of $47.6 million, and a TIGER V award in 2013 for the Southwest Atlanta BeltLine Corridor Trail in the amount of $18 million. Georgia transit systems also benefitted significantly in the last few years from the onetime cash infusion of $143.6 million in transit funding received through the American Recovery and Reinvestment Act (ARRA) in 2009.

In 2012, Georgia put forward a Transportation Special Purpose Local Option Sales Tax (TSPLOST) referendum TIA to its 159 counties, divided into 12 regions. Only three regions passed the TSPLOST: the Central Savannah River Region, the Heart of Georgia Region, and the River Valley Region. Only two of those regions, Central Savannah River and River Valley, included transit related projects in their funding plan lists, one of which was for a Park-N-Ride Service.

MARTA continues to be solely funded by a one percent sales tax in Fulton and Dekalb Counties, limited federal funding, and fare box revenue. MARTA is the largest transit agency in the country to not receive state funding support for operations. Although the state provides no funding support, it does impose legislative restrictions. These restrictions continue to create problems in operating the state's largest transit system, even though the system surpasses 30 percent in fare box recovery, which is above the 25.3 percent national average. By law, MARTA must spend 50 percent of its budget on capital expenditures. This law has created a smaller operating budget when additional capital funds have not materialized and local sales tax revenues have fallen. This has resulted in service cuts in the past five years, further limiting MARTA's ability to serve its customers and prepare for anticipated growth of the region.

Rural transit funding is distributed through three organizations in Georgia to create the RHST program: the Department of Human Services, Department of Community Health, and GDOT. Georgia's RHST program provides mostly demand responsive services, which in most counties is the only transit service. Georgia's RHST program receives the majority (68 percent) of their funding from federal programs. Almost all state and local dollars provided are used to directly leverage more federal funding resources. Demand Responsive service is a non-fixed route system of transporting individuals that requires advanced scheduling by the customer. These services are the mobility lifeline to a growing population of elderly, disabled, and economically disadvantaged residents in the state. It is anticipated that a 31 percent increase in funding by 2030 will be needed to handle the demand of this growing population.

FUTURE NEEDS

Georgia's greatest transit challenges will be expanding the system to address a growing Atlanta region population and an aging rural population with limited mobility. The biggest hurdles are funding and regional collaboration. In order for Georgia to be able to meet the needs of its population, the state will need to recognize the economic implications of continuing to neglect transit operations within the state. The various transit agencies in the Atlanta region will also need to collaborate more in terms of service and funding. In the short term, the region would benefit from an improved and uniform fare collection system, such as implementing MARTA's Breeze tap card system regionally across all transit agencies, as other major US regions have already done with similar systems. Municipalities in Georgia will also need to look to alternative funding to address federal cuts and lack of state support, whether by continuing to leverage SPLOSTs, prop-

erty tax districts, or alternative financing around Transit Oriented Developments (TOD) and Public Private Partnerships (PPP). Projects like the Atlanta Streetcar, which uses Atlanta Downtown Improvement District funding, and the Beltline, which uses a Tax Allocation District for funding, will continue to be models for alternative financing in the region.

PUBLIC SAFETY & RESILIENCE

MARTA has safety programs for rail, bus, mobility, escalator, and elevator safety. The MARTA Police Department consists of over 300 sworn personnel, their own criminal investigations unit, and an emergency call center. They use a progressive crime control model called M*PACT (MARTA Police Proactively Attacking Crime Trends). Using data and computer mapping, the police are able to find trends within the system and address them efficiently. They also police transit stations and try to educate passengers on how to protect their personal items. According to crime data, the occurrence of serious offenses on MARTA over the past decade has dropped 42 percent, but violent crime rose 8 percent because of an increase in aggravated assaults. MARTA also added cameras to all its buses, trains, and para-transit vehicles in 2012 to enhance security.

Of the 85 rural transit programs that reported to NTD, only 4 reported significant safety incidents occurred in 2011. The City of Vienna, Heard County Transit, and Pierce County Transit each reported one major incident and one injury. The Southwest Georgia Regional Commission reported two major incidents and seven injuries.

MARTA holds annual emergency training exercises, and works in collaboration with federal agencies to provide test locations in order to train emergency responders. The training is conducted in order to help the transit authority prepare for potential terrorist attacks, pandemics, and natural disasters.

SOURCES

American Public Transportation Association (APTA), Transit Statistics. http://www.apta.com/research/stats/index.cfm.

American Public Transportation Association (APTA), 2013 Public Transportation Fact Book, http://www.apta.com/resources/statistics/Pages/transitstats.aspx.

Atlanta Beltline, Project Funding. http://beltline.org/about/the-atlanta-beltline-project/funding/

Atlanta Journal Constitution, "MARTA chair says transit system "more and more safe", May 6, 2011. www.politifact.com/georgia/statements/2011/may/06/jim-durrett/marta-chair-says-transit-system-more-and-more-safe/

Bureau of Transportation Statistics, National Transportation Statistics 2002. www.bts.gov

Federal Transit Administration. www.fta.dot.gov/publications.html

Federal Transit Administration, 2010 TIGER Grants. www.dot.gov/policy-initiatives/tiger/fy-2010-tiger-capital-grants

Federal Transit Administration, 2013 TIGER Grants. http://www.dot.gov/tiger#.

Georgia DOT, 2013 Fact Book. www.dot.ga.gov/informationcenter/pressroom/Documents/publications/FactBook/GeorgiaDOT-FactBook.pdf

Georgia DOT, Intermodal Division, Transit Fact Book, September 2013.

Georgia DOT, Transportation Investment Act. www.dot.ga.gov/localgovernment/FundingPrograms/transreferendum/Pages/default.aspx

Georgia Regional Transportation Authority & Governor's Development Council, Rural and Human Services Transportation. www.grta.org/rhst1.php.

Georgia Regional Transportation Authority & Governor's Development Council, Rural and Human Services Transportation 2013 Reporting Year: Coordinating Rural and Human Service Transportation in Georgia, Final Report. www.grta.org/rhst/docs/2013_RHST_Coordination_Rept_FINAL.PDF

Georgia Regional Transportation Authority & Governor's Development Council, 2011 Transportation MAP Report. http://www.grta.org/tran_map.php

MARTA Plans Emergency Training. www.atlanta.cbslocal.com/2013/09/24/marta-plans-emergency-training/

MARTA Rail Car Rehabilitation Program. www.web.archive.org/web/20070929094141/http://www.itsmarta.com/newsroom/railrehab_facts.htm

MARTA, Safety on MARTA. www.itsmarta.com/safety-on-marta.aspx

National Transit Database Glossary. www.ntdprogram.gov/ntdprogram/

Status of the Nation's Highways, Bridges, and Transit: 2002 Conditions and Performance Report. www.fhwa.dot.gov/policy/2002cpr/ch5c.htm

Transportation sales tax: Proceeds could not pay for routine MARTA maintenance, www.saportareport.com/blog/2012/02/transportation-sales-tax-proceeds-could-not-pay-for-routine-marta-maintenance/

United States Department of Transportation (USDOT), Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), "Transportation Planning Update", Summer 2013.

Xpress. www.xpressga.com

WASTEWATER

C

RECOMMENDATIONS

- *Rethink How We Manage Our Wastewater Infrastructure:* Municipalities should consider future WWTP consolidation, return reclaimed water to source basins, upgrade WWTPs to protect water quality and incorporate reuse features, offset direct withdrawals for potable water with alternatives such as non-potable irrigation, and enhance reliability of plants and pump stations.
- *Implement and Improve Asset Management Programs:* Municipalities should ensure availability of adequate collection and conveyance capacity, proper operation of all sewer system components, and reduction or elimination of wastewater overflows and spills. Utilities need to develop a comprehensive inspection and maintenance program including near-term and long-term program goals.
- *Make Use of Automation and Technology:* As more advanced methods and materials become available, utilities need to remain flexible and open. Capital projects can benefit from value engineering that includes a review of the latest methods, technologies, materials and equipment.

CONTINUED PAGE 68

DEFINITION OF THE ISSUE

Wastewater infrastructure is probably the least visible and least thought-about civil engineering discipline of all. In reality, infrastructure involved with the collection and treatment of wastewater is as complex and important as any other. Many laymen are armchair traffic engineers or architects, but few would claim the distinction of knowing what is best in the way of wastewater collection and treatment. Until a major inconvenience arises due to a crisis, the average citizen probably thinks very little about where the water goes after it flows through the drain in their sink or toilet. Even so, there are reminders in the news when cities like Atlanta are compelled by the US Environmental Protection Agency (EPA) to reduce sewage overflows.

Wastewater systems include collection and treatment elements. Without adequate and properly maintained infrastructure, cities cannot serve the existing population, nor accommodate growth. Failure to maintain and upgrade this infrastructure has consequences including sewage overflows into receiving waters or even into homes and businesses. In addition to conveying wastewater to treatment facilities, the system must treat wastewater to very high standards to avoid degradation of streams, rivers, lakes, and oceans.

GRADE

The Georgia Section of ASCE has assigned Wastewater a 2014 grade of C due to aging infrastructure and lack of funding to upgrade wastewater treatment systems to meet changing water quality standards. This is the same grade as 2009 and reflects a review of the condition, capacity, operation & maintenance, protection of public safety, and future funding needs of Georgia's wastewater systems.

Since the 2009 Report Card, progress has been made in some areas. The City of Atlanta is decommissioning the 100-year-old Intrenchment Creek primary treatment facility and will divert flow to an upgraded, more efficient South River plant. Two federal consent decrees have shaped capital investment in Atlanta's infrastructure. A Sanitary Sewer Evaluation Survey (SSES) has been completed for the collection system and identified repairs have been initiated.

Minimum wastewater effluent quality requirements are typically met at Georgia treatment plants, but regulations continue to change according to receiving water impacts. Also, data from the Georgia Environmental Finance Authority and the University of North Carolina indicate that nearly half of Georgia wastewater utilities have rates that are inadequate to sustain funding for capital projects and operating expenses.

CONDITION

Georgia's wastewater utilities are facing challenges brought on by aging infrastructure. It is not difficult to find collection system elements that are approaching the end of their predicted design life. At the same time, capacity needs for future growth must be considered. Georgia has 306 operational wastewater treatment facilities and 337 wastewater collection systems, as reported in the 2008 EPA Clean Watershed Needs Survey (CWNS).

The life span of collection systems is affected by age, type of pipe material, soil conditions and the chemistry of the wastewater. Pipes can break, crack, disintegrate, become disjointed, or clogged. Other elements like pump stations and manholes are also subject to stresses from wastewater flows.

The maintenance of many systems is primarily reactive, and formal asset management programs are only now beginning to proliferate, mostly at larger Georgia utilities. However, capacity certification requirements have been widely implemented and now greatly benefit a utility's ability to manage and plan for growth.

In Georgia, there are 191 wastewater plants with a capacity of more than 1 million gallons per day (MGD). 155 of these are owned by public wastewater utilities and 36 are owned by private industrial facilities. In the 12-month period ending in June, 2008, 30 of the 191 plants failed to comply with their permit conditions in at least one quarter of the year, resulting in an 84 percent annual compliance rate.

EPA consent decrees have required the City of Atlanta to separate certain sanitary and storm systems and reduce Combined Sewer Overflows (CSOs) by building deep tunnel storage systems to capture and treat flows before discharge to receiving waterways. Overflows have been reduced by 80 percent and over 360 miles of sewers have been rehabilitated. The rate of additional sewer upgrades has slowed due to the economic downturn and the resulting decrease in revenues.

CAPACITY

Assessing the capacity of wastewater systems includes collection system hydraulics and complex treatment facility processes, as well as off-line system characteristics. Areas of interest for Georgia include the following:

- Sanitary Sewer Overflows (SSOs) are an indication of collection system failure, and may or may not be due to a lack of capacity. Utilities track the number of overflows per 100 miles of pipe as a metric. This metric is more indicative of system condition than the volume of overflows, because the number of incidences indicates a chronic condition while the volume indicates an acute condition.
- Capacity exceedances can be defined in several ways and can be caused by various mechanisms. Infiltration and inflow (I&I) is a common problem, especially in aging and poorly maintained systems. Capacity certification programs required by the Georgia Environmental Protection Division (EPD) have aided in reducing the "grapevine" effect when new developments are connected to an existing collection system without regard for capacity. Utilities are improving their use of hydraulic modeling to predict capacity issues. Also, Total Maximum Daily Loads (TMDLs) are a measure of the assimilative capacity of receiving waters to take on residual contaminant loadings. An allocation of pollutant loads is established by the EPD and watershed plans are implemented to meet these goals. The allocation for nutrient levels is of special concern to wastewater utilities because nutrients arrive at receiving waters from both point and non-point sources. Should lower concentrations be imposed based on revised nutrient criteria, it is possible that additional wastewater treatment processes would be required, such as membrane filtration, reverse osmosis or other advanced treatment methods. A single large wastewater treatment facility could expect to pay on the order of $100 million to implement such an advanced treatment process.
- Septic systems are typically an environmentally sound method for onsite wastewater treatment when properly designed, constructed and maintained. Otherwise, they can become a source of groundwater and surface water contamination. In 2005, the Metro Planning District estimated that there are more than 525,000 septic systems within the 16-county metro area with more systems being added every year. However, records are incomplete in other areas, and it is estimated that developed counties such as DeKalb and Cobb have less than 10 percent of housing units using septic systems while developing counties have between 25 and 75 percent. Septic systems will remain a viable wastewater management option in Georgia and it is important to ensure that they are designed, constructed and maintained properly. Public education is an essential element of this effort.

RECOMMENDATIONS

- *Improve and Maintain Technical Skills:* Training courses on advanced technology and tools will be necessary to keep pace with stricter regulatory requirements, replace a much reduced workforce, and attract a limited recruitment pool. Position descriptions and qualifications should reflect the increasing technical complexities of the field.
- *Establish a Septic System Inspection and Maintenance Program:* Establish stricter requirements for site selection, design and construction, and maintenance of septic systems; increase enforcement and education.

CONTINUED PAGE 70

OPERATION AND MAINTENANCE

SSO and CSO violations continue to affect the health of Georgia receiving waters. Three Georgia communities (Atlanta, Albany and Columbus) have combined wastewater and stormwater systems that are prone to CSOs during wet weather, although significant improvements have been made since the previous Infrastructure Report Card. SSOs are a threat at many wastewater utilities because of I&I issues and other capacity deficiencies. Many of these violations could be avoided with improved asset management including pipe condition assessment, fat, oil and grease (FOG) programs and pump station maintenance programs.

Many municipalities have implemented Capacity, Management, Operations and Maintenance (CMOM) programs. The CMOM guidelines provide an increased focus on system planning and are complimentary to an asset management program. Under the CMOM approach, a Computerized Maintenance Management System (CMMS) is essential to schedule and track maintenance activities. This allows asset-by-asset tracking of maintenance, and work orders for preventative maintenance can be increased or decreased in frequency based on results. Using these tools, wastewater utilities in Georgia are beginning to better manage operation and maintenance of their very large investments in infrastructure.

Finally, workforce attrition is an important concern as experienced personnel with valuable institutional knowledge leave utilities. The need for operators, maintenance staff, electronics specialists, engineers, geologists, laboratory analysts, and other technical staff will increase to meet future wastewater demands. The wastewater discipline is becoming increasingly complex and advanced technical qualifications should be reflected in recruitment and training programs. A qualified and trained workforce is essential to keep pace with the needs of the system and the public it serves.

PUBLIC HEALTH AND SAFETY

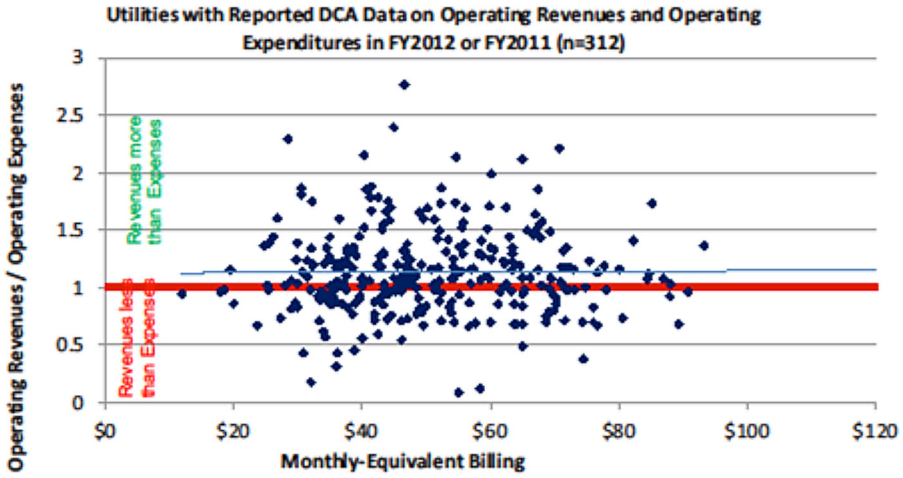
As a stark reminder of the importance of public health and safety, the largest recorded aquatic environmental incident in Georgia history occurred on May 20, 2011, when the Georgia Wildlife Resources Division responded to reports of a fish kill on the Ogeechee River. The total kill was later estimated at 38,000 fish. The apparent source of contaminants was traced to a facility that produces flame resistant fabrics. The EPD directed improvements including limiting discharge of wastewater to 10 percent of stream flow, removing certain constituents from the waste stream, improving treatment and conducting additional monitoring and reporting.

Emergency Response Plans (ERPs) are essential to protect public health against threats to wastewater infrastructure. Georgia municipalities have begun to implement ERPs, but additional training conforming to the National Incident Management System (NIMS) should be mandatory for all essential personnel.

The City of Atlanta received national attention when a regional environmental interest group sued the city for failure to comply with the federal Clean Water Act and was issued a federal and state consent decree due to approximately 1,000 SSOs and 360 CSOs per year. Atlanta spent more than $700 million to separate combined sewer areas and met the mandated deadline of November, 2007. An additional $1 billion has been spent to eliminate SSOs in the separated areas of the wastewater system. Other utilities in Georgia are also facing federal and state consent decrees for failure to comply with the Clean Water Act.

FUNDING AND FUTURE NEEDS

Most of the funding for Georgia's wastewater infrastructure comes from water and sewer rates. These rates frequently fail to keep up with expenses, as shown to the right:



SOURCE: UNC ENVIRONMENTAL FINANCE CENTER

Sewer rates are typically set by a local government that is under political pressure to keep rates low. Consent decrees have forced some utilities to raise rates in order to improve infrastructure. In reality, few Georgia utilities collect the full cost of wastewater services. In order for any utility to be sustainable, rates must consider full life-cycle costs of services, rehabilitation and replacement of existing assets and construction of new assets required by growth or regulatory changes, plus debt service and other indirect costs. An up-to-date study by a qualified financial consultant is essential to responsible operation of a wastewater utility. Costs to a utility change often, with unpredicted failures of assets and implementation of new technology and new regulations having large impacts.

The 2008 CWNS (Figure 1 on page 70) prepared by the US EPA outlined Georgia's reported needs in various categories for a 20-year projection period. The needs represent the capital investment necessary to build wastewater treatment facilities, repair old sewers and build new sewers in order to address a water quality or public health issue. This includes planning, design and construction costs. The EPA has strict documentation required of local governments in order for a need to be included in the survey. Needs that were submitted by local governments but that did not fully meet the documentation criteria were listed as "additional needs".

Only $8 million of these needs were reported for small communities with a population of less than 10,000. According to the CWNS, Georgia's documented needs decreased by 85 percent from 2004 to 2008, from $2.3 billion to $338 million (in 2008 dollars). Since the 2004 CWNS, the City of Atlanta has spent over $2 billion to reduce overflows as a result of Atlanta's consent decree. Clearly the CWNS underestimates the true need. This is likely due to stringent documentation requirements and a lack of reporting by local governments.

A survey conducted by the Georgia Municipal Association (GMA) in June 2008 found that cities in Georgia are projected to need over $3 billion for capital improvements for water, wastewater, stormwater and drainage over just the next 5

RECOMMENDATIONS

- *Connect and Coordinate Planning:* Planning should address short- and long-term issues and consumptive uses. Local management plans need to be coordinated with statewide plans. Asset management programs and emergency preparedness should be implemented at every level.
- *Keep Up with Inspection Needs:* In support of more stringent surface water standards, Georgia EPD is expected to modify existing permits and future permits with more stringent requirements. The state of Georgia should increase staff to provide inspections.
- *Plan for Future Funding:* To improve system performance, municipalities need to improve their planning efforts for obtaining timely funding from traditional sources of financed loans and user revenue. Increased federal funding could also be obtained through a unified appeal, illustrating the capacity for collaboration among local, regional and state interests.

Table 1: 2008 Clean Watershed Needs Survey

	2008		
Infrastructure Type	**Documented Needs ($ Million)**	**Additional Needs ($ Million)**	**Total ($ Million)**
Secondary Wastewater Treatment	27	3	30
Advanced Wastewater Treatment	259	3	262
Infiltration/Inflow Correction	8	2	10
Replacement/Rehabilitation of Sewers	4	2	6
New Collector Sewers	10	6	16
New Interceptor Sewers	10	4	14
Combined Sewer Overflow Correction	0	0	0
Total	318	20	338

SOURCE: USEPA CLEAN WATERSHED NEEDS SURVEY, 2004

years. This does not include capital improvements in the City of Atlanta, but does include other cities in the metro Atlanta area which make up nearly $1 billion of the total.

Replacement of aging wastewater infrastructure represents the largest infrastructure expense facing the state's municipalities. The Metro Planning District Long-Term Wastewater Management Plan states that investment in wastewater collection and treatment systems in the metro Atlanta area alone is expected to be $7 billion through 2035.

Due to increased conservation during the drought that ended in 2009, as of August 2008 many utilities in the metropolitan Atlanta area reported a 20 percent decrease in revenues from the previous year. The recovery from this has been slow and caused many utilities to extend their capital improvement program into the future, doing less in the short term, to compensate for the revenue reduction. This postponement will lead to increased infrastructure needs and costs in the future. Some utilities have also increased their rates due to the reduction in water use.

Private and industrial wastewater facilities also require ongoing operations, maintenance, and replacements. These facilities are not able to access public funding sources such as the State Revolving Loan Program, but must be funded by the facility owner.

SOURCES

1996 Clean Water Needs Survey (CWNS) Report to Congress - Assessment of Needs for Publicly Owned Wastewater Treatment Facilities, Correction of Combined Sewer Overflows, and management of Storm Water and Nonpoint Source Pollution in the United States. http://www.epa.gov/owm/mtb/cwns/index.htm

2007 Intended Use Plan Clean Water State Revolving Fund, Georgia Environmental Facilities Authority, June 22, 2007. http://www.gefa.org

Annual Report of Water and Sewer Rates and Rate Structures in Georgia, GEFA, UNC EFC, August 2013.

Clean Watershed Needs Survey (CWNS) 2004 Report to Congress, January 2008. http://www.epa.gov/cwns/2004rtc/cwns2004rtc.pdf

Clean Watershed Needs Survey (CWNS) 2008 Report to Congress. http://water.epa.gov/scitech/datait/databases/cwns/upload/cwns2008rtc.pdf

Georgia Comprehensive State-Wide Water Management Plan, January 8, 2008. http://www.georgiawatercouncil.org

Georgia Cities Capital Improvement Needs, 2008-2012, Georgia Municipal Association.

Water and Wastewater Funding Sources, UNC EFC September 2008. http://www.efc.unc.edu

Georgia Water and Wastewater Funding Sources, UNC EFC September 2008. http://www.efc.unc.edu

Permit holders in Level IV counties reduced water use in August 2008 by 24 percent when compared to August 2007, Georgia Environmental Protection Division. http://www.gaepd.org/Documents/documents/AugustSummary09-24-08.pdf

Regional Snapshot 2007 Atlanta Region Population, Atlanta Regional Commission. http://www.atlantaregional.com/documents/RS_Aug07_RegPop.pdf

Septic Systems Status and Issues Working Paper, Metropolitan North Georgia Water Planning District, March 2006. http://northgeorgiawater.com

State of Georgia Clean Water State Revolving Fund Program 2008 Annual Report, Georgia Environmental Facilities Authority, September 30, 2008. http://www.gefa.org

Wastewater Management Plan, Metropolitan North Georgia Water Planning District, May 2009. http://www.northgeorgiawater.org

Water and Sewer Rates and Rate Structures in Georgia, May 2008, Environmental Finance Center. http://www.efc.unc.edu

ACKNOWLEDGEMENTS

REPORT CARD COMMITTEE

Co-Chair - Daniel Agramonte, PE, M. ASCE, O'Brien & Gere

Co-Chair - Rebecca Shelton, PE, M. ASCE, Gwinnett County Water Resources

Secretary – Julie Secrist, PE, M. ASCE, TY Lin International

Advisory Board Chair - Adjo Amekudzi, Ph.D., M. ASCE, Georgia Institute of Technology

Amanda Hill, Georgia Department of Transportation

Annie Blissit, EIT, A.M. ASCE, Gresham Smith and Partners

Benjamin Moss, EIT, A.M. ASCE, O'Brien & Gere

Billy J. Cole, Georgia Power Company

Brandon Kennedy, Stantec Consulting

Brian Thompson, Stantec Consulting

Carol Comer, Georgia Department of Transportation

Casey Upperman, Norfolk Southern

Christina Vulova, PE, M. ASCE, Arcadis

Daniel Loudermilk, PE, M. ASCE, Georgia Environmental Protection Division

Danielle Elkins, EIT, A.M. ASCE, CH2M Hill

Denise Funk, PE, M. ASCE, CDM Smith

Douglas Hintz, PE, F. ASCE, Federal Aviation Administration – Retired

Douglas Ford, A.M. ASCE, Skyline Steel

Eric Eaglin, A.M. ASCE, John Group International

Ernie Pollitzer, PE, M. ASCE, Eco Engineers

Gene Davis, PE, Stantec Consulting

George Kelly, PE, F. ASCE, Tennessee Valley Authority

Gregg Hudock, PE, M. ASCE, Golder Associates

James Emery, PE, M. ASCE, Troup County

Janille Smith-Colin, PE, M. ASCE, Georgia Institute of Technology

James Wallace, Sc.D. PE, F. ASCE, AMEC - Retired

Jeffery Chiu, PE, Esq., Kun-young Chiu & Associates

JoAnn Macrina, PE, M. ASCE, City of Atlanta Department of Watershed Management

Joel Price, PE, M. ASCE, Aquaterra

John F. Clarici, PE, M. ASCE, United Consulting

Katherine McLeod Gurd, PE, M. ASCE, AECOM

Kelen Shostak, PE, M. ASCE, City of Woodstock

Kevin Brown, Golder Associates

Lisa Woods, PE, M. ASCE, Jacobs

Matthew Tanner, PE, M. ASCE, Breedlove Land Planning

Melissa Wheeler, A.M. ASCE, Georgia Power Company

Michael S. Miller, Georgia Power Company

Phillip Cherry, EIT, Parsons Brinckerhoff

Raymond J. Wilke, PE, M. ASCE, City of Atlanta Department of Watershed Management

Richard Morales, PE, M. ASCE, L.B. Foster Company

Richard Deason, PE, Atlantic Coast Consulting

Richard L. Boudreau, PE, M. ASCE, Boudreau Engineering, Inc.

Rick Gurney, PE, M. ASCE, Keck & Wood

Santanu Sinharoy, PE, M. ASCE, United Consulting

Steven Seachrist, PE, M. ASCE, Gwinnett County Water Resources

Stuart A. Moring, PE, M. ASCE, City of Roswell Public Works/Environmental

William Moore, PE, City of College Park

ADVISORY BOARD

Chair - Adjo Amekudzi, PhD, Georgia Institute of Technology

Susan Burns, PhD, PE, Georgia Institute of Technology

Lawrence Kahn, PhD, PE, Georgia Institute of Technology

YiChang James Tsai, PhD, PE, Georgia Institute of Technology

Michael Meyer, PhD, PE, Georgia Institute of Technology

Glenn Rix, PhD, PE, Geosyntec Consultants

ASCE NATIONAL

Brittney Kohler

Clark Barrineau

PHOTOS

Atlantic Coast Consulting, Inc.

Danielle Elkins, EIT, CH2M Hill

Georgia Port Authority

Georgia Power Company

Gwinnett County Department of Water Resources

James R. Emery, Jr., PE, Troup County Board of Commissioners

Phillip Cherry, EIT, Parsons Brinckerhoff

Raymond J. Wilke, PE

Rebecca Shelton, PE

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS
GEORGIA SECTION

American Society of Civil Engineers
Georgia Section
www.ascega.org • reportcard@asce.org
www.infrastructurereportcard.org/georgia