



2022

REPORT CARD FOR **ALABAMA'S** INFRASTRUCTURE

**ALABAMA SECTION
OF THE
AMERICAN SOCIETY
OF CIVIL ENGINEERS**





*Aerial view of beautiful early morning with low hanging fog looking over over the interchange of Interstate 65 and US 43 in Satsuma, Alabama.
Front cover: Completed CBD Bridges in Birmingham, Alabama. (Photo provided by Adam Patterson.)*

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2022 Alabama Report Card Executive Summary

It is easy to become complacent about the condition of the infrastructure we depend on every day. When you turn on a faucet, you usually do not think about the necessity of reliable and safe drinking water until you find a boil water notice taped to your front door. You typically are not contemplating the impact that properly functioning port and rail systems have on a resilient economy until your online order experiences continual delivery delays. In driving to work or around your community, you assume travel interruptions will be due to driver error and not because that roadway is performing under capacity or you are being detoured around a structurally-deficient bridge. Infrastructure powers our economy and supports quality of life for the citizens utilizing those systems, and it is crucial that we are knowledgeable about its successes and challenges, gaps and opportunities, safety, and resiliency.

To that end, engineers with the Alabama Section of the American Society of Civil Engineers were personally invested in the research, writing, and production of this *2022 Report Card for Alabama's Infrastructure*. The anticipated outcome of these efforts is to convey to the public the current state of Alabama's infrastructure and its limitations, needs, and avenues for future investment. The team evaluated condition, capacity, operation and maintenance, public safety, funding (opportunities and challenges), future need, resiliency, and innovation for 12 different categories of infrastructure, including a new chapter, stormwater, not previously reviewed in the *2015 Report Card for Alabama's Infrastructure*. Based on findings, each category was assigned a

simple letter grade from A to F. The 2022 grades ranged from B to D, which resulted in an overall grade of C- for Alabama's infrastructure – an identical result from the 2015 Report Card. Of the 12 categories, five categories saw an improvement from the 2015 Report Card, two categories neither increased nor decreased, and four categories are worse off than they were in the previous review. Alabama remains the only state in the United States without a dam safety program; as such, data needed to determine a grade for the Dams category is still insufficient.

In addition to utilizing the results of this report card to educate non-technical audiences, providing this information to our elected leaders about where funding gaps lie or which systems are failing to perform empowers them to focus their attention on those critical areas. For example, the *2015 Report Card for Alabama's Infrastructure* underpinned efforts to pass the Rebuild Alabama Act, which has awarded over \$100 million in state transportation funds since the program's inception in 2019¹. While this funding helped to stabilize Alabama's roads and bridges, worsening congestion and a growing population will require us to continue to invest in and strengthen our transportation networks; this report card can support those efforts. Similarly, the Infrastructure Investment and Jobs Act (IIJA) will provide more than \$170 billion in funding over the next five years to ensure Alabama's infrastructure meets future needs. This includes \$55 billion to upgrade the nation's water infrastructure, such as drinking water systems within Alabama where many have aged well beyond their intended lifespans. This report card can be used to support policy and formulate long term operation, maintenance, rehabilitation, and replacement plans for those systems and others that the IIJA will impact.

Alabama's infrastructure is on the cusp of transition. Recent success with the Rebuild Alabama Act laid the groundwork for how to leverage hard data and public engagement into bipartisan policy for infrastructure improvements. An injection of sorely-needed funding from the IIJA will provide the capital that Alabama lacks to take the next step towards robust infrastructure we can depend on for the next 50 years. In order to raise the grade on future report cards, the general public and our elected leaders should utilize the information and recommendations herein to ensure that we optimize the economic and quality of life benefits our infrastructure systems provide into long-term, positive outcomes for all. To connect with your elected leaders about these issues, please visit the Alabama Secretary of State's Find My Elected Official Map at <https://www.sos.alabama.gov/alabama-votes/elected-official-map>.

¹ <https://yellowhammernews.com/ivey-aldot-announce-40m-worth-of-2022-rebuild-alabama-act-infrastructure-projects/>

About The Report Card for Alabama's Infrastructure

While you may not think about infrastructure every day, civil engineers do because we've pledged to build it, maintain it, and keep the public safe. As an organization of civil engineers who live and work in Alabama, we want to share what its condition is and what can be done to improve it.

Methodology

The purpose of the Report Card for Alabama's Infrastructure is to inform the public and decision makers of the current condition of our state's infrastructure in a concise and easily accessible format of a school report card. Each of the categories of infrastructure covered in the Report Card is assessed using rigorous grading criteria and recent data to provide a comprehensive assessment of the area's infrastructure. ASCE has used the following criteria to discuss and grade the state of the infrastructure:

CAPACITY

Does the infrastructure's capacity meet current and future demands?

CONDITION

What is the infrastructure's existing and near-future physical condition?

FUNDING

What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?

FUTURE NEED

What is the cost to improve the infrastructure? Will future funding prospects address the need?

OPERATION AND MAINTENANCE

What is the owners' ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations?

PUBLIC SAFETY

To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?

RESILIENCE

What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?

INNOVATION

What new and innovative techniques, materials, technologies, and delivery methods are being implemented to improve the infrastructure?

GRADING SCALE



EXCEPTIONAL: FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.



GOOD: ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.



MEDIOCRE: REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.



POOR: AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.



FAILING/CRITICAL: UNFIT FOR PURPOSE

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.



INCOMPLETE

The infrastructure in the system or network does not have sufficient data to provide a grade.

G.P.A.



2022 Alabama's Infrastructure Report Card



AVIATION



PORTS



BRIDGES



RAIL



DAMS



ROADS



DRINKING
WATER



STORMWATER



ENERGY



TRANSIT



INLAND
WATERWAYS



WASTEWATER



Infrastructure Sectors	2015 ASCE-AL Grades	2022 ASCE-AL Grades	TREND
Aviation	B-	C	↓
Bridges	C-	C+	↑
Dams	??	??	↔
Drinking Water	C+	C-	↓
Energy	B	B	↔
Inland Waterways	D+	D	↓
Ports	B-	B	↑
Rail	B-	B	↑
Roads	D+	C-	↑
Stormwater		D+	
Transit	D	C-	↑
Wastewater	C-	D+	↓
OVERALL GPA	C-	C-	↔

Recommendations to Raise the Grade

1. State lawmakers and their Rebuild Alabama program have improved surface transportation sectors. This progress should guide decision makers at every level of government to improve infrastructure funding.
2. Prioritize project planning and management techniques such as asset management, design-build project delivery, and life cycle costing to wisely implement projects and utilize funds throughout all infrastructure sectors.
3. Improve the resilience and sustainability of infrastructure and the safety and security of communities to prepare for the future.
4. Establish a dam safety program to inspect the condition of the state's dams and create a revolving grant or loan program to rehabilitate and repair dams in need.

Key Messages

Alabama's transportation and energy networks have received significant investments necessary to stabilize conditions and prevent worsening conditions, but issues remain. A growing population, widespread congestion issues, and a rise in severe weather events mean Alabama's systems must evolve to meet current and future needs.

- **Roads (C-):** The 2019 Rebuild Alabama Act increased the state's gas tax by 10 cents, creating \$320 million in new funding per year for Alabama's roads and bridges and resulting in an additional 9,000 jobs. While this program has kept road conditions from plummeting, congestion is a growing issue and congestion-related delays and traffic crashes are costing state residents \$5.3 billion per year.
- **Bridges (C+):** Thanks in large part to Rebuild Alabama, the percentage of bridges in poor condition has decreased dramatically, now standing at just 3.8% of the state's total inventory, or half the national average. However, even after the Rebuild Alabama Act, the sector faces a funding shortfall of \$113 million and more than 2,200 of the state's 16,000 bridges have weight restrictions, slowing down the supply chain and local economy.
- **Aviation (C):** The state's 80 public airports exceed current capacity needs and face minimal maintenance needs, but funding levels across the sector are lower than needed to maintain good conditions.
- **Energy (B):** Alabama consumes roughly the same amount of energy as it produces, and the network has grown to be more resilient to withstand increasingly severe weather events; however, national efficiency and renewable energy requirements will force Alabama's energy grid to continue adapting.

The state's water systems, ranging from drinking water, stormwater, and wastewater networks to dams and inland waterways, are severely underfunded and, as a result, their conditions have deteriorated. These systems are aging and are not built to withstand current capacity needs and will require immediate attention to protect residents in the future.

- **Dams (Incomplete):** Alabama is the only state in the U.S. without a dam safety program, disqualifying itself from accessing federal infrastructure funds for inspections, training, and rehabilitation. This lack of funding and knowledge of conditions state-wide leaves communities vulnerable.
- **Drinking Water (C-):** Much of Alabama's drinking water systems have aged well beyond their intended lives, and adequate funding to meet growing needs is critically lacking, putting residents' health at risk.
- **Inland Waterways (D):** Lack of funding has led to deferred maintenance, causing these structures to be unavailable for commercial traffic, slowing down shipment of commodities, and hindering the economy. Two of Alabama's locks have been completely closed to traffic due to poor conditions, and 12 of the 16 locks in the state were built more than 50 years ago.
- **Stormwater (D+):** Dedicated and adequate funding for stormwater infrastructure and management is largely nonexistent in most communities across the state, and the state lacks stormwater system inventory and condition assessment data. This lack of clarity and oversight endangers Alabama's social, environmental, and economic interests.
- **Wastewater (D+):** Due to an increasing population and aging assets, Alabama needs more than \$3 billion over the next 15 years to bring its wastewater systems up to par. One quarter of the state's septic tanks are failing, and utility rates are just two-thirds the national average, proving inadequate for improving and maintaining these systems.

State agencies have done a commendable job prioritizing sectors that play a massive role in the local and regional economy – ports, rail, and transit. Each of these sectors factor into job creation and the movement of goods and services, while also providing more working opportunities for residents across the state. While there are still needs to be met, these sectors have experienced positive growth and are on the pathway to providing a more equitable and economically stable future for Alabama.

- **Ports (B):** The recent Rebuild Alabama Act included \$150 million for ports, while the Alabama State Port authority has spent \$1.4 billion on channel improvements since 2002. These investments have increased capacity and efficiency for one of the state’s major economic drivers.
- **Rail (B):** Federal funding has increased in recent years, supporting an already strong freight and passenger rail network throughout the state. To improve the grade, the state must utilize new resources allocated from the Infrastructure Investment and Jobs Act (IIJA) to expand passenger rail services.
- **Transit (C-):** Alabama’s transit networks do face funding shortfalls, despite an expected injection of resources from the IIJA, but more than 80% of the state’s population is served by a transit system, a very strong percentage. Conditions are also improving, but additional funds are needed to meet growing demands.



The Fairhope, Alabama Municipal Pier on Mobile Bay



Aviation





EXECUTIVE SUMMARY

Alabama's 80 publicly-owned airports have excess capacity for connecting people and goods to other local, national, and global areas. In today's global economy, this connectivity is critical for Alabama's economic future. According to a 2020 condition inspection report, less than half of Alabama's airports require multiple types of minor maintenance while only 17% have other condition-related needs such as lighting, marking, and/or pavement distresses. The 2020 Alabama Statewide Airport System Plan (AL SASP), completed by the Alabama Department of Transportation, showed a system-wide, 10-year development need of \$1.34 billion. However, at current funding levels, an annual funding deficit of \$67.6 million exists. In order to maintain the state's 145 million square feet of pavement, promote economic impact, maintain public safety, and implement the recommendations from the AL SASP, the airport system needs appropriate funding to ensure conditions do not deteriorate.

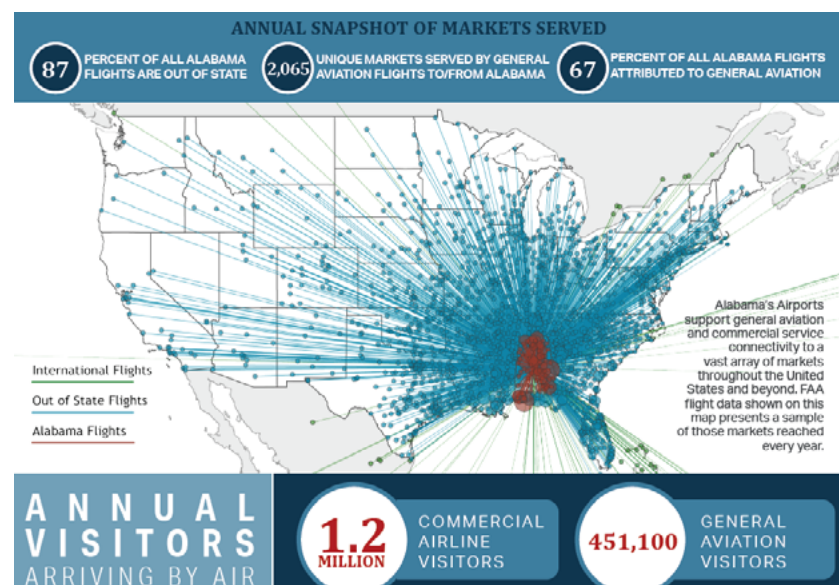
BACKGROUND

Alabama has approximately 280 landing areas, including both publicly- and privately-owned airports and heliports. Alabama's system of publicly-owned airports consists of 80 airports ranging in size from large commercial service facilities to smaller general aviation airstrips. These airports are important assets in supporting

Alabama's economic development by providing safe and efficient access to the state's communities, businesses, recreational areas, and abundant natural resources. A flight from an Alabama airport is a gateway to over 40,000 worldwide airports, including over 19,000 airports in the US alone.

FIGURE 1: AVIATION MARKETS SERVED

source: ALDOT Aeronautics System Plan Study

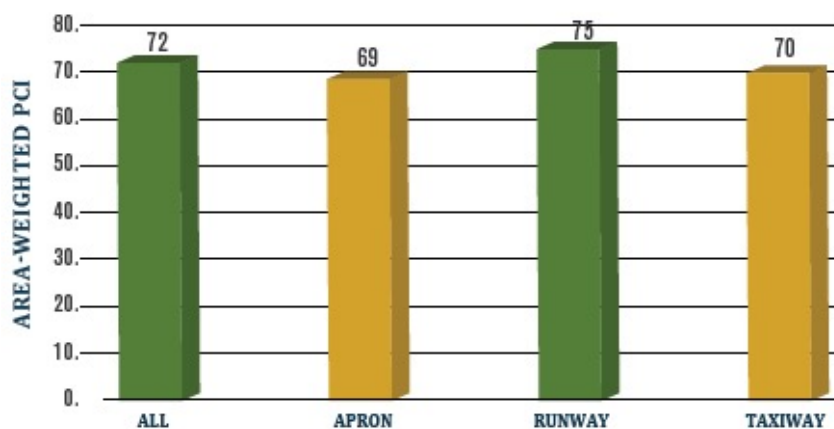


CONDITION

In 2020, Alabama Department of Transportation (ALDOT) Aeronautics Bureau performed a study of general aviation airports to assess their pavements. It was found that across Alabama's 145 million square feet

of pavement, the average Pavement Condition Index (PCI) is 72 out of 100, and none of Alabama's airports have pavements exhibiting a weighted total PCI under 55, which is a poor grade.

FIGURE 2: AREA WEIGHTED PCI
STATEWIDE AREA WEIGHTED PCI BY BRANCH TYPE



2020 Pavement Study from ALDOT

Furthermore, the state inspection report also shows that less than half of Alabama's airports require multiple types of minor maintenance such as sealcoats and crack sealant.

However, approximately 17% need immediate attention to condition-related items including lighting, marking, and/or pavement distresses.

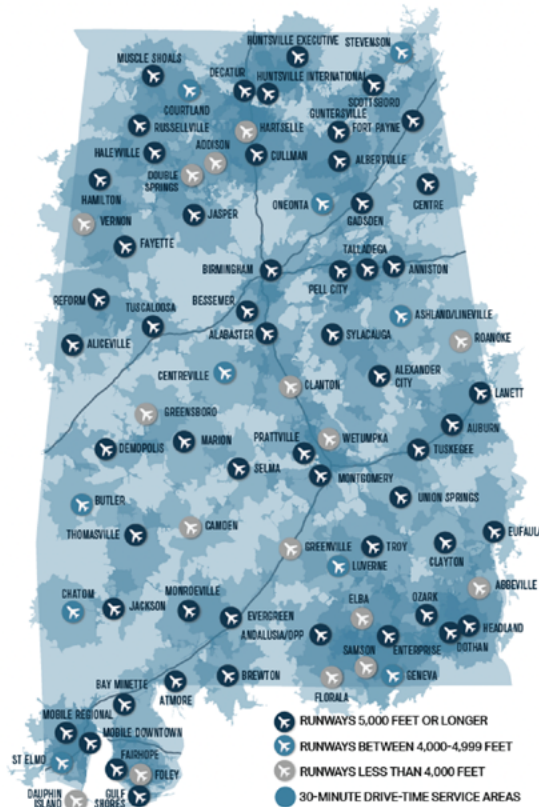


CAPACITY

Airport capacity is measured as the infrastructure's ability to meet current and future demands. Alabama is home to 74 general aviation airports and 6 commercial passenger service airports.

- Alabama's airport system annually boasts 2.9 million commercial airline passenger enplanements and 1.8 million general aviation aircraft operations.
- 94% of Alabama's population lives within 90 minutes of a commercial service airport.
- 44% of Alabama's airports meet the National Business Aviation Association's requirements for light business jets.
- A total of 66% of Alabama airports currently have a primary runway length of at least 5,000 feet.
- There are 2,065 unique markets served by general aviation flights to/from Alabama.

Aviation is an incredibly dynamic industry that is always changing. Alabama airports support a wide array of industries as well as military operations and commercial and general aviation services. From 2000-2019, Alabama's six commercial airports experienced a 14% decline in passenger enplanements. Further exacerbating this decline is the nationwide trend brought on by the COVID-19 pandemic where most airports, including those in Alabama, experienced a decrease in activity and operations. Overall, Alabama airports have



The map above illustrates 30-minute drive-time access to Alabama airports with runways over 5,000' and 4,000' in length, which are widely considered standard for medium/light business aircraft to operate on.

been underutilized and have excess capacity that can be used for commercial flights, general aviation operations, and/or air-cargo shipments.

OPERATION & MAINTENANCE

Aviation is consistently the safest mode of transportation in the U.S. having a 0.6 death rate per billion miles compared to 24 deaths per billion miles in a vehicle. This is broadly due to an industry-wide culture of safety, a multi-layered system of checks and balances, and the prioritization of routine operation and maintenance efforts. In general, compliance with government regulations is strong as sponsors have both formal and informal regulatory oversight by FAA, ALDOT, users, consultants, industry groups, and other stakeholders. ALDOT's airport licensing program performs an annual landing area inspection for compliance and safety. Thereafter, ALDOT reports the

findings to the airport sponsor and the FAA. The FAA also performs annual commercial airport inspections for compliance purposes.

In the past few years, ALDOT has made a concerted effort to bring as many airports as possible into satisfactory standing within state licensing, safety, and pavement condition standards by providing grant monies and by working closely with the airports to resolve any safety issues. Those steps coincided with other measures to ensure Alabama's airports fall within FAA's design requirements and newly implemented mandates.

The FAA's Airport Improvement Program (AIP) provides capital improvement grants and prioritizes safety and compliance projects. This well-funded program requires satisfactory performance on FAA safety and compliance priorities prior to receiving funding for other development projects. A recent update in 2020 to the Statewide Airport System Plan showed that the airport system has 87% overall compliance with the state's aviation facilities and service objectives.

The challenge for airport sponsors arises from the fact that operations and maintenance activities themselves are not eligible for AIP grant funding. Many smaller municipal or county sponsors do not have the staff, equipment, or financial resources to fully address the operations and maintenance needs. The statewide airport system consists of large amounts of property, legacy facilities, and over 145 million square feet of pavement that require consistent maintenance.

Though there is a high level of design, training, compliance, inspection, and validation required for the nation's aviation sector, aging infrastructure and airport

compliance issues can pose a small risk to the public and aviation system users.

In Alabama, steps have been taken at the state level to identify and correct airport deficiencies to address public safety risk throughout the state. Key metrics include:

- Nine airports maintain a FAA Airport Certificate through 14 CFR Part 139 and adhere to rigorous operational, safety, and security standards.
- Approximately 32% of airports display deficiencies, such as runway safety area deficiencies, currently preventing the renewal of state license.
- Approximately 15% of airports display primary surface or access/security deficiencies per state licensing standards, both violations and minor maintenance items.
- Approximately 21% of airports have potential obstructions such as trees, utility poles, or terrain in their varying approach surfaces per state licensing standards, both violations and minor maintenance items.

FUNDING

Alabama's aviation sector has federal, state, and local revenue and funding streams. At the federal level, the AIP provides grants to airports within the National Plan of Integrated Airports System (NPIAS). Administered by the FAA, AIP funds originate from the Airport and Airway Trust Fund and are sourced from aviation-related fees and taxes such as airline ticket taxes, segment and international travel fees, cargo fees, and general aviation and jet fuel taxes. AIP provides funds for planning and development projects geared to improving infrastructure, safety, and security including improvements to runways, taxiways, and aprons; noise control; land purchases; and navigational aids. In Alabama, there are 73 airports included in the NPIAS that are eligible for AIP funding.

In 2018, a five-year FAA reauthorization was signed into law. However, the legislation failed to increase the AIP, which has had the same annual authorization level of \$3.35 billion for over 10 years. Despite an unchanged authorization level, Congress has provided recent supplemental funding for the AIP program, including \$1

billion in FY 2018, \$500 million in FY 2019, and \$400 million in FY 2020. Because the demand for AIP funds exceeds the funding available, AIP funds are distributed by the FAA based on national priorities and objectives. The distribution is accomplished utilizing formulas set by law for entitlement and discretionary grants as determined by the FAA. From 2011 to 2020, Alabama received an average of \$60.1 million annually in FAA AIP funds, ranging from a high of \$78.6 million in 2018 to a low of \$45.5 million in 2016.

The Alabama Aeronautics Bureau operates the Airport Development Fund (ADF) to assist with the administration of the system and disburse state aviation grant funds. Primary sources of funding include fuel tax revenue and supplemental funding from ALDOT. The State of Alabama collects aviation fuel taxes on the sale of AvGas and Jet A fuel. Current rates are \$0.035 per gallon for Jet A and \$0.095 per gallon for AvGas. The Aeronautics Bureau typically receives approximately \$2 million from fuel tax revenue.

After considering money allocated for administration of the Aeronautics Bureau, \$2.5 million to \$2.8 million is typically available to support state-matching funds for annual FAA AIP grants. In the event a project is fully

FUTURE NEED

As part of the Alabama Statewide Airport System Plan (AL SASP), cost estimates for addressing facility and service deficiencies were determined. Implementing these projects will provide guidance to airports on the best ways to fulfill their role in the state airport system.

Within the cost estimates are future projects in each airport's capital improvement program including pavement

funded by the AIP, state grant funds are made available, when possible, for projects such as terminal buildings and fuel facilities that have a low FAA funding priority.

maintenance and rehabilitation projects.

In 2020, ALDOT's AL SASP showed a system wide 10-year development need of \$1.34 billion. This equates to \$134.1 million of annual funding needs. Considering that Alabama's Airport system is currently funded at a level of \$66.5 million per year, the state airport system has a \$67.6 million annual funding deficiency.

RESILIENCY

Resilience is the aviation system's ability to withstand multi-hazard threats or incidents or the ability to efficiently recover and reconstitute critical services with minimum damage to public safety, health, economy, and national security. This area is particularly critical for aviation infrastructure, because airports serve as strategic locations in times of disaster/emergency. Airports routinely operate as bases of operation for medical transport aircraft including Med Flight, Angel Flight, and Veterans Airlift Command providing patients and doctors with quick, efficient transportation. Airports are also utilized by state and local police units as bases

of operation for helicopter units and as staging areas for emergency evacuations among other services.

In March 2019, after an airport was destroyed by a tornado, its reconstruction included a reconfiguration of the airport movement area to improve traffic flow. This improvement facilitates the airport's ability to more quickly "bounce back" with a critical service area after future natural disasters. The FAA has designated all Alabama airports as "Low Risk" due to many facilities' updated security plans that include grid layouts of the airport facilities that assist first responders addressing emergencies.

INNOVATION

Alabama's airports support innovative features including areas that can be used for landing spacecraft, world-class aircraft manufacturing, the integration of Unmanned Aerial Systems (UAS), collegiate aviation education and flight training, disaster response and recovery, continued implementation of FAA NextGen digital resources, such as GPS guided approaches, and Automatic Dependent Surveillance-Broadcast (ADS-B) digital flight tracking of airport traffic.

ALDOT Aeronautics is currently in the process of implementing a GIS web-based and "living" Pavement

Management Plan (PMP) that will provide a complete picture of condition and need. It will assist FAA, ALDOT, and airport sponsors with an understanding of how best to implement maintenance and capital projects to manage airport pavement infrastructure. ALDOT is also currently in the process of working with federal and state stakeholders to support airport-related emergency and disaster management activity. This unique and innovative initiative has the potential to provide an immeasurable benefit to the people of Alabama in times of need.



Aviation



RECOMMENDATIONS TO RAISE THE GRADE

The recommendations listed below can help Raise the Grade on future reports cards.

1. Fund aviation initiatives that will help the state grow.

- o Raise state funding for aviation in line with its economic benefit to the state.
- o Increase the Airport Trust Fund and Passenger Facility Charges at commercial service airports.

2. Consolidate resources where practical.

- o The trend towards a regional aviation footprint that encompasses a larger, combined entity rather than multiple small communities should be embraced. This allows for greater combined economic gain and reduces the maintenance burden on financially- strained communities.

3. Save funds by preserving and maintaining before major repair is needed.

- o Place emphasize and incentives on remediation to prevent total failures to maximize existing infrastructure life and maximize budgets.

4. Promote economic development.

- o The system must enhance economic development opportunities for industrial sectors that are likely to utilize general aviation aircraft for business travel.

5. Implement projects aligned with the system plan, Airport Capital Improvement Plan, and Pavement Management Plan.

- o Projects from these three sources should be supported when they align with future system needs. Properly sequenced projects will deliver system improvements.



Aviation



SOURCES

Federal Aviation Administration
www.faa.gov

National Plan of Integrated Airport Systems
www.faa.gov/airports/planning_capacity/npias/

Operational Data
www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/

Aviation Forecasts
www.faa.gov/data_research/aviation/

Part 139 Airport Certification
www.faa.gov/airports/airport_safety/part139_cert/

Alabama Department of Transportation Website
www.dot.state.al.us/

Aeronautics Bureau Website
<https://www.dot.state.al.us/programs/Aeronautics.html>

Inspection Reports
<https://www.dot.state.al.us/publications/Aero/InspectionReports.html>

Unmanned Aerial Systems
www.dot.state.al.us/programs/UAS.html

Pavement Maintenance
<https://www.dot.state.al.us/programs/AirportPavementMaintenance.html>

Airport State System Plan
<https://www.dot.state.al.us/programs/Aeronautics.html>

Airports Council International
www.aci-na.org

Airport Cooperative Research Program
www.trb.org/ACRP



Bridges



Central Business District (CBD) bridges under construction in Birmingham, Alabama.



EXECUTIVE SUMMARY

Alabama is home to nearly 16,000 bridges. Of these, 41.5% are rated in good condition, 54.7% are in fair condition, and 3.8% are in poor condition. The portion of poor rated bridges has seen significant state-level improvement, decreasing from more than 8.6% in 2015 and currently much better than the national average of 7.5%. However, more than 2,200 of Alabama's bridges are restricted to carry loads less than their legal weight limit. That means that 14% of Alabama's bridges cannot allow fully loaded semi-tractor trailers, dump trucks, or concrete trucks to pass over them. This affects the state's freight movement, restricting industry supply chain operations. Making a meaningful impact to these challenges, the Alabama Legislature passed the Rebuild Alabama Act in 2019, which provides an additional 10 cents-per-gallon to the state fuel tax to help close the funding gap for Alabama's roads and bridges. Alabama, however, still faces a 10-year annual funding shortfall of \$113 million for addressing the state's future needs and bridge program funding.

CONDITION & CAPACITY

The State of Alabama is heavily reliant upon bridges to move goods and services throughout rural and urban areas across the state. From the Ports of Mobile to the Rocket City of Huntsville, Alabama's bridges have a combined span length of over 485 miles on state, county, and municipal routes. The Alabama Department of Transportation (ALDOT) is responsible for maintaining over 36% of these bridges. Alabama local governments, made up of counties and municipalities, maintain 10,127 structures, which account for nearly two-thirds of the bridge inventory.

Alabama ensures that all bridges are inspected in accordance with the Federal Highway Administration (FHWA) National Bridge Inspection Standards (NBIS). Based on the NBIS, major bridge components consisting of the bridge deck, superstructure, and substructure can be classified on a scale of 0 to 9. These ratings are used to determine an overall bridge condition of Good, Fair, and Poor. If the lowest rating is greater than or equal to 7, the bridge is classified as Good; if it is less than or equal to 4, the classification is Poor. Bridges rated 5 or 6 are classified as Fair.



TABLE 1: ALABAMA BRIDGE CONDITIONS

BRIDGE CONDITION SUMMARY Based on Statewide 2020 ALDOT Bridge Inventory				
	Good	Fair	Poor	Total
State	1,858	3,829	78	5,765
County	4,137	4,002	432	8,571
City	598	869	89	1,556
Total	6,593	8,700	599	15,892
%	41.49	54.74	3.77	100%

Information provided by ALDOT.

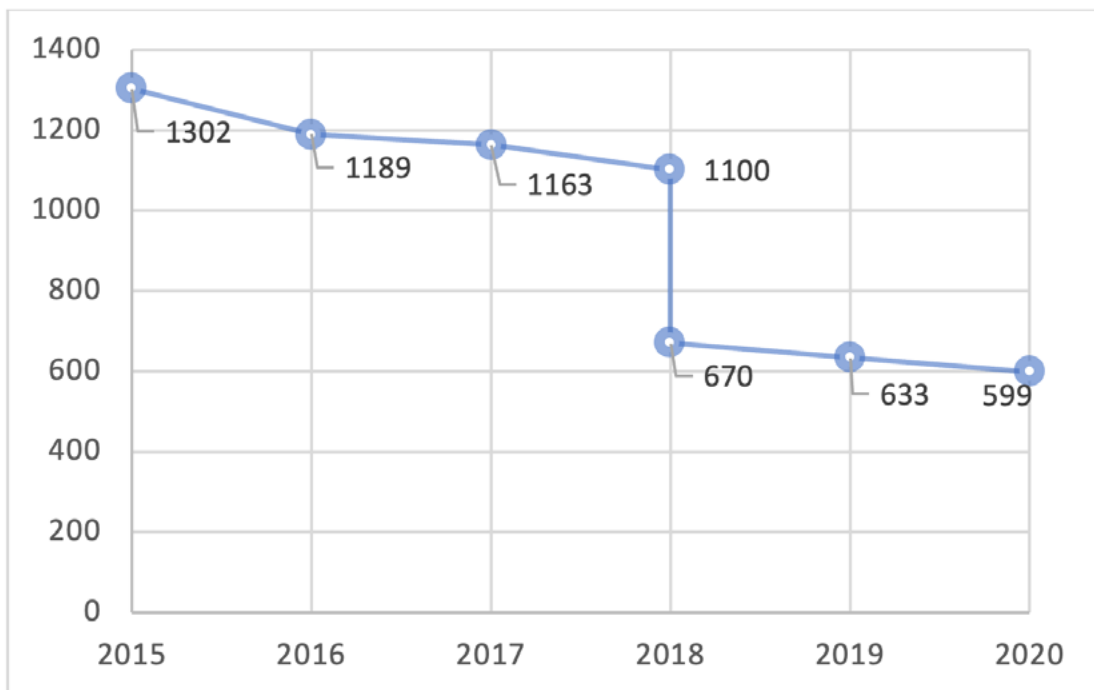
Bridge Rating Definitions

- Good (G) – Greater than or equal to 7
- Fair (F) – Equal to 5 or 6
- Poor (P) – Less than or equal to 4

If any component is rated 4 or less, the bridge will receive

an overall condition rating of Poor. Even though a bridge has a condition rating of Poor, it doesn't necessarily mean there is a threat to public safety. These bridges will require more frequent inspections, maintenance activities, and/or a limit on certain types of vehicles that are able to utilize the structure.

FIGURE 1: POOR CONDITION BRIDGES IN ALABAMA



Reduction in poor condition bridges in 2018 based on FHWA definition change for structurally-deficient bridges. Information provided by ALDOT.

Alabama currently has 599 (3.8%) bridges with a condition of Poor. This number has decreased each year since the 2015 *Report Card for Alabama's Infrastructure* reported 1,388 (8.63%) of bridges were structurally deficient (Poor in today's ratings). This downward trend can be attributed to the financial investment by the State of Alabama through the Rebuild Alabama Act and other infrastructure funding programs. Additionally, Alabama is well ahead of the national average of 7.5% of bridges being classified as Poor.

The age of Alabama's bridges averages 47 years old. This number is slightly higher than the national average of 44 years old but is still six years shy of the typical 50-year design life expectancy for bridges built prior to 2013. However, FHWA requires bridges built after 2013 to provide 75 years of service life. Alabama is home to more than 8,255 bridges that are 50 years or older, accounting for over 51% of the combined bridge inventory for state, county, and municipal bridges.

TABLE 2: AGE OF ALABAMA BRIDGES

AGE OF ALABAMA BRIDGES									
Age	< 5 Years	5 – 14 Years	15 -24 Years	25-34 Years	35-44 Years	45-54 Years	55-64 Years	65-74 Years	75+ Years
Number	364	934	1,938	2,191	1,699	2,107	2,918	1,623	2,118

Information provided by ALDOT.

PUBLIC SAFETY

Safe bridges are vital to Alabama's infrastructure system and citizens. The current Alabama code allows for a maximum gross weight of 84,000 pounds on a six-axle, truck-semitrailer combination. Bridges that cannot carry the state maximum vehicle loads are posted to a safe load capacity based on condition or the original bridge design loading. Currently, the State of Alabama

has over 2,200 bridges in service that cannot carry full legal loads. In addition to the posted bridges, Alabama has over 170 bridges that are closed to traffic. These bridge closures and postings can create long delays, detours, and impact day-to-day needs of the public such as school bus routes or access to emergency vehicles like ambulances and firetrucks.



Posted bridge in Chilton County, Alabama.

OPERATION & MAINTENANCE, FUNDING, & FUTURE NEED

Funding for bridge construction and maintenance projects in Alabama comes from multiple sources. Most revenue comes in the form of both federal and state gasoline and diesel fuel taxes. However, another fairly significant funding stream is motor vehicle licenses, with a minor amount coming from various miscellaneous fees and permits.

The federal fuel tax rate for Alabama, as well as every other state in the U.S., is 18.4 cents for gasoline and 24.4 cents for diesel, per gallon. This tax rate has not changed since 1993. Although this tax rate has not increased in some time, Alabama has seen its federal share from the past several highway transportation bills increase from an average of \$283 million a year during the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1992 to an average of \$791 million a year during the Fixing America's Surface Transportation (FAST) Act in 2015. The recent signing into law of the Infrastructure Investment and Jobs Act (IIJA) has seen the average federal funding grow to \$1.046 billion a year until September 30, 2026. In addition to the STRA, the Infrastructure Investment and Jobs Act (IIJA) was also signed into law. This IIJA will benefit Alabama with an average of \$212.5 million a year for roads, bridges, and major projects until September 30, 2026.



Project sign on a Rebuild Alabama Act-funded project in Autauga County, Alabama.

Alabama's tax on gasoline and diesel fuel remained stagnant at 18 cents and 19 cents per gallon, respectively, from 1992-2019. In 2019, Governor Kay Ivey signed into law the Rebuild Alabama Act. That bill raised the state gas tax by 10 cents over the course of three years, with the full

increase in effect on October 1, 2021. It is expected that this full 10-cent tax will result in \$320 million annually for infrastructure needs in the state. A portion of the Rebuild Alabama Act is earmarked for financing the widening and deepening of the shipping channel in Mobile Bay. The remaining funds will help to fund state government and local agency roadway and bridge construction projects. The distribution of the funding will provide 66.67% of new revenue to the state, 25% to counties, and 8.33% to municipalities. Effective October 1, 2023, and on July 1 of every other year thereafter, the gasoline and undyed diesel excise tax rate will be adjusted by the percentage change in the yearly average of the National Highway Construction Cost Index and rounded to the nearest whole cent, with the increase or decrease of the excise tax rate not exceeding one cent per gallon.

The state gas tax increase and the federal IIJA funding will go a long way toward rehabilitating Alabama's surface transportation infrastructure. However, progress toward fixing our state's bridges also dates back to February 2012, when the State of Alabama took the lack of infrastructure funds into its own hands by starting the Alabama Transportation Rehabilitation and Improvement Program (ATRIP). The ATRIP Program is a \$1 Billion Grant Anticipation Revenue Vehicles (GARVEE) Bond meant to rehabilitate and improve transportation infrastructure through the accelerated delivery of project funding. The program's goal was to address critical need projects across the state in an effort to rehabilitate and improve in-place facilities and, in some cases, provide new facilities at locations throughout the state. The program's focus was on essential needs relating to roads and bridges. Of the 885 projects let to contract, there are 282 bridge replacements or bridge rehabilitation projects on county or city routes. ALDOT also bonded \$653 million in 2015 for a major project along I-59/I-20 in downtown Birmingham to replace the interstate bridges and approaches, as well as redesign a heavily congested route interchange. This project was completed and opened to traffic in early 2020. Between these two bond programs, the State of Alabama pays approximately \$113 million in principal and interest each year for 20 years.

Despite the recent increases in infrastructure revenue, the future need for Alabama is still great. Even though

Alabama has invested millions of dollars into making its infrastructure better, there is still a long way to go to replace or rehabilitate aging bridges throughout the state. To maintain the current bridge condition levels, without regard for resources, and to maintain 98% of the state's bridges in Good or Fair condition over the next ten years, ALDOT would need to spend more than triple the current funding level annually. To achieve its goals, ALDOT must select an investment approach that addresses the annual shortfall of \$113 million for bridges over the next ten years.

RESILIENCY

Infrastructure resilience is defined as the ability of the system to recover following a catastrophic event. The most common cause of bridge failures is from floods scouring bed material from around bridge foundations. Scour is the engineering term for the erosion of the soil surrounding a bridge foundation (piers and abutments) caused by water. In Alabama, many of the new bridges being built on state and interstate routes are longer and higher than the existing bridges being replaced. These design choices are meant to improve resiliency. In ALDOT's Bridge Design Policy, new bridges built over waterways (i.e. streams, rivers, lakes, etc.) are required to be designed based on a 50-year flood frequency.

Furthermore, new bridges built over waterways on state and interstate routes are designed to resist the effects of scour by evaluating the 100-year flood frequency. The additional cost of designing bridges to be less susceptible to damage caused by floods is small when comparing it to the potential for loss of life following a bridge failure. Ensuring the safety of the traveling public is of monumental importance. Currently, ALDOT combines the five work types (Maintenance, Preservation, Rehabilitation,

Life-cycle planning and preservation are critical when considering how to address this challenge. This should be done through a mix of preservation optimization and an increase in funding. The Interstate 10 (I-10) Corridor in Mobile and Baldwin County is in dire need of expansion in order to handle current traffic counts. The I-10 Mobile River Bridge and Bayway Project was impacted by lack of revenue to build the six-lane bridge across the Mobile River and widen the existing I-10 bridges from four to eight lanes.



*Scoured bridge piers in Barbour County, Alabama.
(Photo provided by ALDOT.)*

Reconstruction, and New Construction) into the bridge replacement program. ALDOT intends to incorporate life-cycle planning to shift the focus from “worst-first” methodology to strategic preservation to avoid or delay major rehabilitation and replacement costs. This will help ALDOT become more proactive with improvements rather than reacting to needs.

INNOVATION

Alabama is implementing various innovative technologies throughout its bridge design, construction, and maintenance programs to minimize traffic disruptions and/or road closures in order to reduce user-delay-related costs. Accelerated Bridge Construction (ABC) is one method that is being used to update infrastructure while minimizing costs and impacts to the public. ABC can include methods such as replacing a bridge by

building it adjacent to the old one and then shifting the roadway after completion. As a recent example, ALDOT successfully completed an ABC project in Dothan on Ross Clark Circle to replace a culvert with a Slide-in Bridge. ALDOT is continuing to use ABC techniques for future bridge projects across the state to include using pre-manufactured Northeast Extreme Tee (NEXT) beams. This technology combines concrete beams and

decks that are installed side-by-side and completed with a closure pour of Ultra High-Performance Concrete (UHPC) to reduce construction time and traffic impacts. Additionally, ALDOT utilized segmental bridge design and construction to replace over 2.46 miles of bridge length in the Central Business District (CBD) of Birmingham on Interstate 20/59. The contractor was able to cast concrete segments offsite and then transport them to the new bridge location for erection. By employing this technique, the construction schedule was greatly accelerated, which allowed less closure time to the public.

ALDOT continues to use the innovative bridge management technology AASHTOWare Bridge Management (BrM) software. This asset management software stores Alabama's comprehensive bridge inspection and inventory data as well as assists ALDOT and local agencies in determining maintenance needs. With aging bridges, funding shortages, and soaring construction costs, AASHTOWare BrM helps engineers make recommendations for bridge rehabilitation or bridge replacement projects based on cost benefit analyses.



Concrete segment erection on CBD mainline bridge on I-20/59.



Completed CBD Bridges in Birmingham, Alabama. (Photo provided by Adam Patterson.)



Bridges



RECOMMENDATIONS TO RAISE THE GRADE

The recommendations listed below can help Raise the Grade on future reports cards.

- Continue to make transportation funding a priority in the state.
- Bridges in Poor condition should continue to be upgraded and rehabilitated.
- Bridges in Fair condition should continue to be preserved and rehabilitated for continued usage.
- Employ innovative solutions and resilient building technologies to replace, repair, and maintain existing infrastructure.
- Use alternate project delivery methods such as Design-Build, when appropriate.

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Bridges



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Dams





EXECUTIVE SUMMARY

Unfortunately, most dams in Alabama are out of sight and out of mind to the public. As the only state in the U.S. without a Dam Safety Program, Alabama lacks the institutional office that educates the public, leads dam inspections, and houses condition data. Consequently, the potential vulnerability of the public is unknown, and the state disqualifies itself from accessing federal infrastructure funds for inspections, training, improvements, and rehabilitation.

Alabama urgently needs a data-driven, decision-making process for its aging dams. Fortunately, the Alabama Safe Dam Coalition Technical Committee has proposed an advisory pilot study to provide information and guidance to the legislature. However, the pilot study has not yet been approved. The implementation and rollout of an Alabama Dam Safety Program will take a considerable amount of time since it requires a complete understanding of the overall integrity of the state's dam infrastructure and risk to downstream property and human life. Therefore, with years still ahead until completion, the time for legislative action is now to protect Alabama citizens from risk caused by the state's dams.

INTRODUCTION

Alabama has abundant water resources, some of which are controlled by dams to provide freshwater for hydroelectric generation, cooling for power plants and industrial activities, public water supplies, navigation along inland waterways, and recreation. Dams are traditionally classified based upon size (dam height and reservoir storage) and hazard potential or the anticipated consequences to the public and property should a dam failure occur.

The National Inventory of Dams (NID) is managed by the U.S. Army Corps of Engineers (USACE). The NID consists of dams meeting at least one of the following features:

- High hazard potential classification – loss of human life is likely if the dam fails;
- Significant hazard potential classification – no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns;
- Equal or exceed 25 feet in height and exceed 15 acre-feet in storage; or
- Equal or exceed 50 acre-feet storage and exceed 6 feet in height.

A high-potential hazard-potential rating does not imply that a dam has an increased risk for failure; it simply means that if failure were to occur, the resulting consequences would likely be a direct loss of human life and extensive property damage.

CAPACITY

The USACE NID is updated annually, but because Alabama has no dam safety program, the state's information provided to the USACE is limited. Typically, state dam safety programs guide the development of an accurate dam inventory with classification, monitoring, inspections, corrective action, and other appropriate strategies and technical expertise for protecting citizens and property located downstream.

Based on best estimates by Alabama Department of Economic and Community Affairs (ADECA), the USACE, and other sources, the NID shows that Alabama has 2,273 dams, primarily constructed of earthen materials. Of these dams, 226 are high hazard potential dams (HHPD), 449 are significant hazard potential dams (SHPD), and the remaining 1,598 dams are low hazard potential dams (LHPD). Currently, the average age of known Alabama dams is 52 years, slightly lower than the national average of 57 years.

CONDITION

According to the NID, approximately 3% of Alabama's known dams are federally owned or regulated, which means their condition is inspected and corrective actions are taken to maintain a state of good repair. Most of the remaining dams are owned by public utilities, local governments, the state, or other private entities, which means the responsibility for funding condition assessments and rehabilitation falls on them. The typical municipal utility does not budget for dam safety, inspections, and maintenance, which leaves the condition of dams and the corresponding downstream vulnerabilities largely unknown. However, some municipalities, particularly those with drinking water utilities that depend on dams, make modest condition improvements due to resources generated from small annual rate adjustments that raise limited funds.

About 1% of Alabama's dams serve private utility hydroelectric generation purposes. The existing

Through a grant from Federal Emergency Management Agency (FEMA), ADECA has made progress on preparing an inventory of dams in Alabama. ADECA used aerial photography, computer mapping tools, satellite imagery, and input from private and public entities to build this inventory. As a result of its work, ADECA has identified multiple dams of each hazard potential category. However, the total amount of the FEMA grant was not sufficient for ADECA to perform onsite surveys, inspections, or assessments. For that reason, the age and condition of the dams could not be determined, and it was not possible to differentiate between all of the high and significant hazard potential dams. This means Alabama's data represents a serious gap for the NID since there is no vetted, comprehensive listing of high and significant hazard potential dams in the state.



Recently completed water supply clay core/rockfill embankment dam with a concrete spillway.

hydroelectric capacity should be better maintained through routine inspection, maintenance, and upgrades. As a part of the state's overall energy generation mix, Alabama's future electric capacity will depend on alternative generation sources like hydroelectric dams to meet utilities' long range capacity plans.

OPERATION & MAINTENANCE

Periodic dam inspections are needed to identify dam condition concerns that could impact downstream property and the safety of human lives. A typical dam safety program provides consensus standards for dam design, rehabilitation and inspection, and implementation of corrective actions to reduce the chances of a catastrophic dam break. Common causes for dam failures include the following:

- **Embankment Overtopping** – This is caused by water spilling over the top of an earthen embankment due to the lack of an emergency spillway or deficient spillway flow capacity for the design event such as a Probable Maximum Flood. Approximately 96% of the known dams in Alabama consist of earthen embankments. The flowing water over an earthen embankment leads to erosion of the structure, which, once it down cuts back to the reservoir, can result in a full breach and uncontrolled release of the retained pool. Overtopping is the most frequent mode of failure of embankment dams.
- **Soil Piping or Tunneling** – When excessive water seepage through the core of an earthen embankment is not detected, soil particles can be removed (erosion), and sinkholes can form in the dam. This failure mode accounts for approximately 20% of dam failures in the U.S. and is the second most common failure mode for embankment dams. To reiterate, approximately 96% of the known dams in Alabama consist of earthen embankments.



Dam failures can cause significant flooding conditions resulting in unanticipated property damage and/or loss of life.

- **Foundation Defects** – Generally, this is a result in deficient engineering design and/or insufficient or nonexistent geotechnical and geological investigations. This can affect all types of dams.
- **Cracking** – This can be caused by differential movement like the long-term settling of a concrete gravity dam.
- **Inadequate maintenance and upkeep** – This negligence results in unanticipated dam failures, which could have likely been avoided. Most dams in Alabama come under this category.

Based on anecdotal information, it is understood that a very small percentage of Alabama dams are being inspected and monitored under facility-specific operations & maintenance (O&M) plans. Typically, in all other states with a dam safety program, high and significant hazard potential dams would be periodically inspected using specific, formalized inspection processes.

Other than the dams licensed by FERC and those owned by the USACE and TVA, dams in Alabama are not regulated, and neither the public nor non-utility private dam owners are required to practice proper dam operations, maintenance, and inspections. To protect the safety of the public, all dam owners should operate their facilities under a comprehensive O&M program, which would include pool operations, spillway gates, inspection protocols, reporting requirements, and corrective action strategies. One example of a typical problem with earthen embankment dams is dam owners allowing trees to grow in the face of the dam embankment. This lack of maintenance is one of multiple examples of conditions that can negatively impact embankment integrity and potentially result in a catastrophic failure.

Without a statewide Dam Safety Program in Alabama, the funding needs for dam rehabilitation and addressing other safety issues in the state are unknown but are believed to be significant due to neglect. We do not know what the costs would be to rehabilitate Alabama dams that are categorized as high and significant hazard potential, but we do know that the cost will continue to escalate as dam inspections, maintenance, repair,

and rehabilitation are deferred. At the national level, according to the most recent Association of State Dam Safety Officials' (ASDSO) cost estimate, the combined total cost to rehabilitate the nation's non-federal dams exceeds \$66 billion, and \$20 billion is needed just to rehabilitate those that are designated as high-hazard potential.

At the federal level, funding resources through the High Hazard Potential Dam Rehabilitation (HHPDR)

Program provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. In both FY2019 and FY2020, the program received \$10 million, while FY2021 saw an increase to \$12 million. However, eligibility for these funding resources requires states to have a dam safety program. Without a statewide dam safety program, Alabama dam owners do not qualify for this or any other federal grant program.

FUTURE NEED

Since 2015, steady economic development and growth have occurred in Alabama and will likely continue in the future. This has resulted in the development of areas downstream of some Alabama dams that place additional property and people at risk from a dam failure. As these dams continue to age without any inspections or appropriate rehabilitation, more people and property are at potential risk. Without a dam safety program, the resilience of Alabama's dams, the future increased potential for dam failures and the downstream consequences are unknown. From a dam safety perspective, the public safety needs of Alabama's citizens are not being met.

In 2021, the Alabama Safe Dam Coalition Technical Committee developed an informative road map to facilitate the writing and passage of legislation to create the Alabama Dam Safety Program. The Committee proposed a three-county pilot study aimed at improving the existing dam inventory, performing dam safety

evaluations, and developing a plan for evaluating the remaining dams based on best practices from the study. An engineer that has served in the Alabama State Senate since 2014 who understands the technical challenges within the dams sector has sought information from the Committee to consider of legislative funding during the 2022 Legislative session for the proposed three-county pilot study.

Dam failures not only put the public's safety at risk, but they can also cost local economies millions of dollars in damages. With no Dam Safety Program in Alabama, future economic development can be impacted. Since dam failures can cause severe downstream consequences to public safety and the economy, Emergency Action Plans are needed for all high hazard potential dams. Resilience is the ability to come back from an incident or an event, and, without Emergency Action Plans for high hazard potential dams, Alabama is not prepared for the future.

PUBLIC SAFETY & RESILIENCY

Finally, as the state moves towards the development of a dam safety engineering practice, risk-based decision making should be mainstreamed. This practice enables dam owners to better utilize limited funding to prioritize projects by focusing on repairs and operational changes that reduce risk to acceptable levels, thus improving community safety and resilience. Engineers, dam owners, regulators, and EMA professionals should be

provided with comprehensive information for engaging those communities potentially impacted by a dam failure to provide a fair portrayal of risk. Through broader community collaboration, stakeholders will be better able to support land-use decisions, emergency action planning, and maintenance and rehabilitation funding, which will reduce community risk in the long term and provide for sustainable growth.



Dams



RECOMMENDATIONS TO RAISE THE GRADE

With a high degree of urgency, the following steps need to be completed, so dam infrastructure and infrastructure public safety risks can be enumerated and mitigated:

- **Complete a Pilot Program** to identify and recommend consideration of best practices for the Alabama Dam Safety Program.
- **Establish a dam safety program in Alabama**, the only state without a dam safety program.
- **Establish a dam rehabilitation and repair revolving grant or loan program and/or provide access to federal grants** to ensure dam owners can affordably repair privately- and publicly-owned, non-federal, high hazard dams.
- **Incorporate a risk-based, engineering-informed decision making process** for the design of new dams, rehabilitation of deficient dams, and operation of all dams.
- **Provide educational resources** to dam owners and operators.
- **Implement a public awareness campaign** in Alabama to educate individuals about the need for a Dam Safety Program by ensuring the public has a better understanding of potential risks.

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Dams



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Drinking Water





EXECUTIVE SUMMARY

In Alabama, 576 permitted public water systems provide safe and reliable drinking water. The challenge currently facing Alabama's public water systems is that the infrastructure, including water mains, tanks, plants, and pumps, were built between the 1870s and 1980s. It has aged well beyond its intended life, making near-term repair and replacement of these components crucial to the continued operation of our water systems. Innovative funding sources to address these needs are important and would allow water utilities to invest in asset management systems and smart technologies that facilitate predictive and proactive maintenance rather than reactive maintenance, decrease emergency repairs and unanticipated rate impacts, and limit real water losses.

BACKGROUND

Of the Alabamians that have access to public sources of drinking water, 25% get their water from systems that are classified as "small" systems, meaning that the utility serves a population of less than 10,000. Small water systems are generally operated by public corporations forming an "authority" or "system" and are governed by appointed or elected boards of directors.

Public water systems are regulated by the Alabama Department of Environmental Management (ADEM) in terms of operations and water quality. In order to operate, a public water system is required to have a valid permit issued by ADEM. Originally established under the Safe Drinking Water Act (SDWA) of 1974, water quality requirements in accordance with U.S. Environmental Protection Agency (EPA) standards are included in the permit, are measured on an ongoing basis, and are reported to each customer annually.

Water is treated through a variety of proven engineering methods, transmitted, and distributed through pipe



networks. A significant portion of drinking water infrastructure is aged and generally is not replaced and/or rehabilitated in advance of the end of its useful life. ADEM performs annual inspections to check a number of chemical treatment parameters and to visually inspect the system facilities to confirm proper operation and maintenance. During these inspections, issues such as deteriorating equipment, inadequate water storage tank maintenance, or other deficiencies are noted for correction.

CONDITION

Public water systems have expanded, often with support from various federal and state programs, to bring safe and reliable drinking water to the majority of the state's population; unfortunately, the infrastructure has aged well beyond the material's expected life. Between 1977 and 1994, over 52,000 miles of pipe were added to existing and new systems. Systems currently operate under a mode whereby most resources are expended on fixing leaks and trying to limit non-revenue (unaccounted for) water, rather than on proactive preventive replacement programs. Of the total 831 million gallons withdrawn daily from surface and ground water sources, only 327 million gallons is ultimately billed to system customers.



In some areas, as much as 20% of Alabama's treated water is lost as non-revenue water due to leaking infrastructure and other inefficiencies.

CAPACITY

Many of the state's systems were constructed to provide drinking water to rural customers under programs that perform expansion only when existing needs change. For instance, when schools and other larger demand facilities are placed outside municipal areas, systems must upgrade

and expand to meet demand. This capacity-straining trend is common in Alabama. The situation is further exacerbated by the requirement that public buildings like schools meet stringent fire demand requirements significantly increasing domestic demand.

OPERATION & MAINTENANCE

During 2020, approximately 20% of the public water systems in Alabama were found to be in violation of one or more rules or regulations at some point during the year. This 20% noncompliance rate in Alabama was 11% below the national average, and only 10% of the recorded violations were for health-based violations. Public funding for projects to address non-compliance issues is available through the Drinking Water State Revolving Fund

(DWSRF). The FY 2020 Intended Use Plan for the state DWSRF program indicates a total of \$105,129,000 in funding was available through this program for 33 new projects. Unfortunately, many systems lack the revenue to incur additional debt service payments without unacceptable rate impacts, making new preventative maintenance projects via DWSRF funding challenging or impossible.

PUBLIC SAFETY

Alabama's public water systems are safe and reliable, and the quality of life and economic vitality of the state depend on them. The professionals that operate these systems are well trained and capable. The water quality is reported annually to the customers of the systems of the state. Many rural systems were not initially designed to provide fire demand but in most cases are being upgraded to ensure adequate fire flow supply. Unlike 49 other states, Alabama currently has no Dam Safety Act to ensure public safety around drinking water impoundments; enacting such a measure in Alabama should be a high priority. Beginning in 2020, COVID-19 has caused significant personnel challenges; many operators were forced to quarantine, leaving insufficient personnel to operate and maintain some systems.



FUNDING

Adequate funding to meet the increasing need for infrastructure rehabilitation and replacement is critically lacking. Funding is generated through water rates. Currently, no grant funds are available to all of the water systems of the state. Borrowing is available; however, doing so creates an additional burden on rate structures simultaneous with ever-increasing demands

to keep water rates affordable. Funding sources need to be expanded to meet the 20-year need of \$7.9 billion. Small water systems face additional financial and operational challenges in consistently providing drinking water that meets ever more stringent EPA standards and requirements.

FUTURE NEED

As Alabama's drinking water infrastructure continues to age, the percentage of water lost within each system will continue to increase. This in turn adds to the financial burden and need for new water sources. Underfunding improvements right now merely delays the inevitable and would result in more costly rehabilitation and replacement in the future. The beneficial consolidation of systems by leveraging economies of scale should become a key area of focus. Capacity Development is a process for water systems to acquire and maintain adequate technical, managerial, and financial (TMF) capacity, which enables water systems to have the capability to consistently provide safe drinking water to the public. SDWA requires ADEM to develop a Water System Capacity Development Strategy and Implementation Plan. The basis of ADEM's plan is to limit the development of



non-viable systems. Procedures established by this plan were incorporated into a Capacity Development Strategy, which has been utilized to reduce the number of systems that do not have the TMF ability to operate

in accordance with state and federal requirements. Since FY2018, 10 public drinking water systems in Alabama have been inactivated as a result of this plan.

RESILIENCY

The lack of interconnection and the lack of redundant source water limit the water systems' ability to provide resilient safe drinking water during catastrophic events. The systems rely heavily on electricity provided by local providers with limited backup generation or alternative sources of energy. Most systems draw from only one water source (surface, ground, or wholesale purchase) making them susceptible to extended outages in the event of natural or man-made disasters. This lack of interconnectivity or consolidation of systems fails to provide for short-term emergency use when events occur. In order to protect against the impacts of COVID-19 and future pandemics, "front line" operator staffing levels should be increased.

The lack of interconnection and the lack of redundant source water limit the water systems' ability to provide resilient safe drinking water during catastrophic events.

INNOVATION

In order to meet the growing gap in funding, the state should consider innovative mechanisms such as public-private partnerships, infrastructure banks, and a water system trust fund. The state should consider programs to encourage consolidation, use of technology, and water use accountability. In order to speed construction of

water infrastructure projects, provisions in Alabama law should be made to encourage the use of alternative delivery mechanisms like progressive design-build. The role of the new National Water Center located at the University of Alabama should be expanded to include direct input into the development of EPA drinking water quality standards.



Drinking Water



RECOMMENDATIONS TO RAISE THE GRADE

- Fund infrastructure improvements that provide for the consolidation of water systems to take advantage of economies of scope.
- Provide a greater source of grant funds for infrastructure rehabilitation and replacement.
- Provide resources for infrastructure asset mapping, hydraulic modeling, standard operating procedures, computerized preventative maintenance and asset management planning, and long-range strategic master planning.
- Develop innovative funding sources such as infrastructure banks.
- Encourage alternative delivery mechanisms like progressive design-build.
- Implement a Dam Safety Act in Alabama.

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Energy





EXECUTIVE SUMMARY

Alabama is home to over 4.8 million people and roughly consumes the same amount of energy as it produces. There are over 6,000 miles of high (above 230kv) and low (below 230kv) voltage transmission lines, 14,400 miles of natural gas pipeline, and nearly 7,000 miles of oil pipeline across the state. Alabama ranked 14th in the nation in terms of energy expenditures per capita with customers averaging approximately \$4,330 per year on household energy costs. As a state accustomed to severe weather, Alabama's energy infrastructure has become more robust and resilient in the face of these conditions. While the state's energy infrastructure is sufficient to meet today's needs, changes occurring across the state and within the national economy are requiring Alabama to evolve even further into more renewable and distributed energy resources and next generation smart grid technologies.

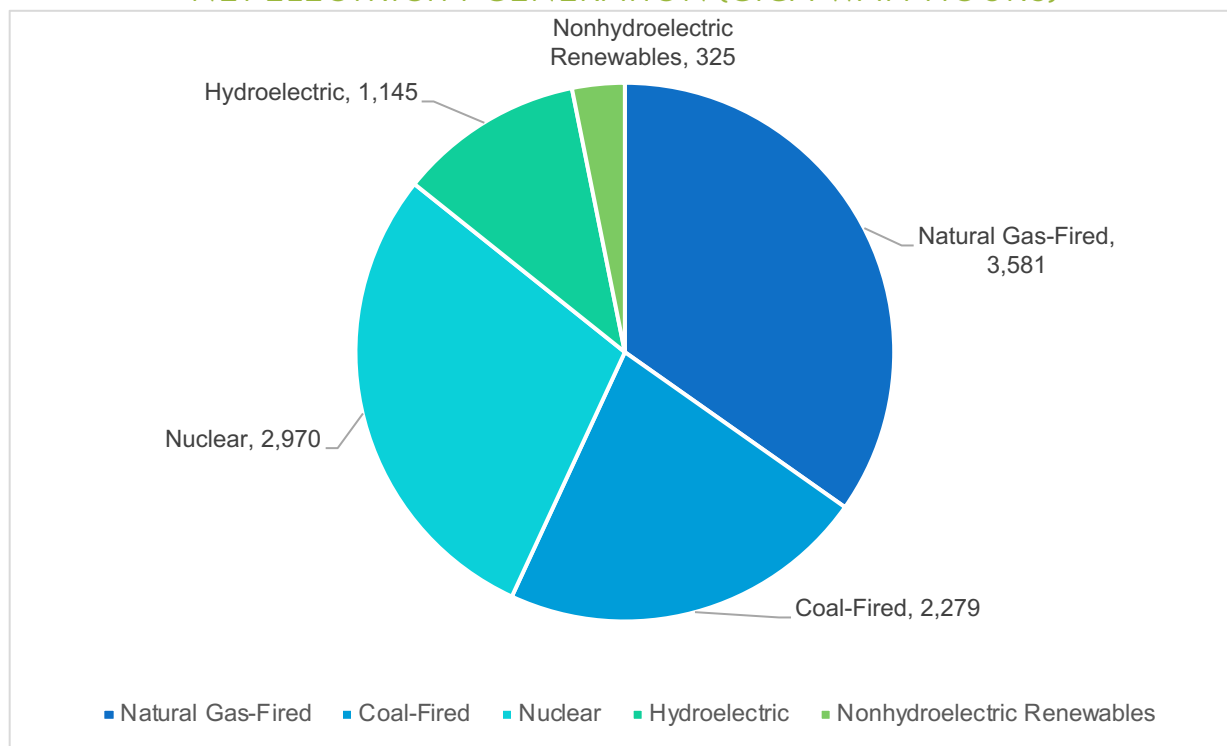
BACKGROUND

Alabama is a state of abundant natural resources, including a diverse energy portfolio. Resources that power the state include: petroleum and oil, natural gas, coal, biomass, water, and renewables. Alabama has long offered low-cost energy that helps support the state and local economies, fostering an affordable standard of living for its residents. Alabama is leading the way by focusing on research and development, innovation, and deployment of new technologies to remain competitive and well positioned for the future.

Like many states, Alabama operates multiple interconnected delivery systems to transfer energy both within and outside the state. Whether it is natural gas, transportation fuels and refined hydrocarbon products, or electricity transmission, these delivery networks are the backbone of the state's economy, facilitating its growth.

According to the U.S. Department of Energy's (DOE) Energy Information Administration (EIA), Alabama consumed almost 1,923 trillion British Thermal Units (Btu) of energy in 2019. As of March 2021, Alabama ranked 6th in the nation for total net electricity generation. For decades, Alabama was supported predominantly with coal-based electricity generation. Although coal still plays a significant role in the state's energy portfolio, other energy sources have increasingly become more prevalent in the electricity generation mix. Power produced in Alabama today looks different than in did just ten years ago, with natural gas and nuclear taking making up the first and second spots for most electrical energy produced. Coal is now in the third spot. Renewable energy deployment, while still a smaller portion of the total, is growing and will become a more significant percentage of Alabama's total energy production in later years.

NET ELECTRICITY GENERATION (GIGA-WATT HOURS)



Energy Information Administration at the US Department of Energy

CONDITION & CAPACITY

Alabama relies upon an electricity and pipeline infrastructure system that was developed years ago but that today continues to grow and evolve to support the people and economies of the state. The state ranks 14th in the nation for total energy production. Electricity, natural gas, and crude oil all rely on pipeline or electrical distribution infrastructure used within the state's geographic boundaries or for exporting resources to other parts of the country.

There are over 6,000 miles of high voltage transmission lines within the state of Alabama. Although much of this

interconnected system was built years ago, it continues to evolve and change to meet the needs of the state's population as well as tie in the evolving electric power generating plants that serve that population.

There are 6,000 natural gas production wells, 16 processing plants, and two storage fields. Natural gas is moved through 14,400 miles of interstate pipeline, which feeds 98 Local Distribution Companies (LDCs). Petroleum is put through three refineries in Alabama, utilizes 345 miles of crude oil pipeline and 6,480 miles of product pipeline, and exported from 42 petroleum or product terminals.

Electricity, natural gas, and crude oil all rely on pipeline or electrical distribution infrastructure used within the state's geographic boundaries or for exporting resources to other parts of the country.

PUBLIC SAFETY, OPERATION & MAINTENANCE, AND RESILIENCY

Dependable and affordable energy is crucial to Alabama's overall wellbeing. Alabama's energy providers must continue to provide high-quality service to the state, so its citizens know they can depend on uninterrupted service for their businesses and operations, homes, communication needs, and most importantly health and safety.

Power companies in Alabama are diligent and prepared to respond to extreme weather events. Service restoration is conducted as quickly and safely as possible. Because Alabama is susceptible to many varieties of inclement weather (hurricanes, tornados, winter storms), utilities have developed and continue to demonstrate the ability to respond to extreme cases. Comprehensive and tested emergency response protocols have been established and proven, and replacement technologies that are used are smarter, faster, and better able to respond to these weather events.

The North American Electric Reliability Corporation's (NERC) 2020 Long-Term Reliability Assessment evaluated the region encompassing Alabama's electric utilities and reported an annual probability close to zero for experiencing an outage event due to generation resource insufficiency. NERC forecasts higher longer-term reliability in the region due to the area's level of generation reserves. Meanwhile, utilities in the state have consistently shown the ability to meet the energy demands in the most extreme peak load cases and have

not suffered from more recent rolling blackouts like those that have occurred in other parts of the country.

Natural gas utilities and pipeline companies work together with the Alabama Public Service Commission's (APSC) Pipeline Safety Division to ensure that safety is the first priority in energy delivery. This is accomplished through APSC's enforcement initiatives which focus on monitoring and inspection activities on a continuous basis.

Alabama's electricity and natural gas industries are continuing to invest in required maintenance, replacement, modernization, and improvements of existing infrastructure over the last decade. The addition of more "real-time" control and data acquisition, remote systems control devices, self-healing network technologies, and technologies that allow for better integration of distributed energy resources and bi-direction power flow are just some examples of how Alabama's energy delivery infrastructure is evolving and advancing.

Streamlining of regulatory approval and permitting processes, at both the state and national levels, will aid in the faster deployment of resources. Current processes can encumber projects and add to deployment lag times resulting in later in-service dates and delayed benefits for consumers. Pre-authorizations, shorter approval windows, and more streamlining overall can help speed up these efforts and allow for faster deployments.



FUNDING & FUTURE NEED

Energy infrastructure funding in the state comes predominately from investment from those companies that own and operate the state's energy systems. Federal and state funding does make their way into energy projects and have contributed materially to aid in the advancement of R&D and development of new technologies.

Alabama ranked 14th in the nation in terms of energy expenditures per capita consumed with customers averaging approximately \$4,330 per year on energy expenditures. Alabama ranking 19th in terms of highest electricity prices at 13.53 cents/kWh and 20th in natural gas prices at \$23.16/thousand cubic feet; both to residential customers.

INNOVATION

Utilities in Alabama continue to invest in research and development to explore energy technologies that improve efficiency, reliability, affordability, and sustainability. Considering future uncertainties – including energy demand, climate change benchmarks for the energy industry and environmental regulations, as well as emerging trends in technology – these innovation efforts will be crucial to providing reliable, low-cost energy and economic growth.

Ongoing research is focused on advancing a diverse portfolio of energy solutions for a lower carbon future, which includes renewables, energy storage and carbon capture, further modernization of the transmission and distribution system, further advancement of vehicle electrification, advanced nuclear solutions, and eliminating cyber security threats.

The National Carbon Capture Center (NCCC), located in Wilsonville, Alabama, serves as the DOE's primary carbon capture research facility. Managed and operated by Southern Company, this world-class test center works with innovators from around the world to accelerate the development of technologies to reduce greenhouse gas emissions from fossil-fueled power plants and to promote carbon utilization and direct air capture solutions.

As with other states, utilities in Alabama continue to invest to build and maintain a smarter, more robust electricity transmission and distribution system. Smart grid technologies allow utilities to remotely monitor the system, gather data regarding grid conditions, and isolate problems, enabling faster restoration of power. This technology also allows utilities to better manage demand, lower operating costs, improve reliability and efficiency, better integrate intermittent renewable energy and energy storage options into the system, and give customers more control over their energy usage and more choices for efficiencies in their own homes and businesses.

At the Energy Storage Research Center (ESRC) in Birmingham, innovators are accelerating the development and deployment of a full spectrum of energy storage systems. This collaboration between Southern Company, Southern Research, DOE, the State of Alabama, and others, presents a unique opportunity to test and develop energy storage technologies needed to better integrate renewable energy into the power grid while also improving reliability, resiliency, and customer value.

The Alabama Power Smart Neighborhood® in suburban Birmingham is a community of 62 single-family, highly-efficient homes powered by the traditional grid, as well as a microgrid made up of solar, battery energy storage, and a natural gas generator. Through this first-of-a-kind research project, Alabama Power is gaining insights for the development of products and services to better meet the evolving needs of its customers. The research is expanding the entire utility industry's understanding of how distributed energy resources, including battery storage, interact with the broader power delivery systems, how emerging home automation technologies can improve customers' lives, and what role microgrids play in supporting customer needs.



Energy



RECOMMENDATIONS TO RAISE THE GRADE

The following recommendations aim to ensure Alabama's energy infrastructure remains safe, reliable, and affordable while continuing to improve and evolve with needs of communities and economies. Focus areas include:

- **Continue to preserve a diverse fuel mix to maintain the lowest energy cost for customers.** Diversity is the key. Our energy systems are evolving and that is a good thing. Adoption and development of new technologies and resource types will maintain Alabama's competitive edge going forward. The speed the state moves needs to be tempered by appropriate due diligence, careful consideration of costs and impacts, and, most importantly, address the needs of the state to maintain safety, reliability, and cost in its energy infrastructure. Policy development focused on constructive regulation is essential. Failure to do so impacts our competitiveness in the U.S. and world economies.
- **Protecting critical infrastructure assets.** Computer viruses, ransomware attacks, and other cyber threats against our energy infrastructure are an unfortunate but ever-present reality today. These threats are forecasted to increase going forward as threats becoming more sophisticated and malicious; Alabama's energy companies need to remain vigilant and take necessary steps to protect core energy infrastructure. Adoption of new technologies and keeping our systems up to date will be key.
- **Continue to improve generation, transmission, and distribution infrastructure to ensure safety and reliability.** Evolving the power delivery system to incorporate new and changing technologies such as solar and batteries as well as the continued focus on characterizing vulnerabilities and identifying mitigation options is imperative.
- **Provide mechanisms for timely approval of new energy projects to minimize the cost and timeframe from planning to operation.** The timely approval should include adequate regulatory review but should streamline the permitting process so that unnecessary barriers to development are removed while still protecting and preserving natural resources.
- **Continue to support and promote the research and development of new energy technologies through funding and incentives for research projects.** Additionally, energy suppliers should seek out and incorporate new resources and technologies such as carbon capture, renewables, battery storage, and smart-grid applications. The successes of public/private sector consortiums and multi-industry project efforts are evident. These models provide effective vehicles for the advancement of new technology R&D as well as deployment.
- **Promote awareness and increase public education on energy conservation and stewardship directly through the Energy Industry and in conjunction with other sectors such as Transportation, where synergies can be gained.** Increased energy conservation can be achieved through energy efficiency incentives for consumers and utilities, incentives to produce, use, and promote alternative fuels and infrastructure for transportation; and development, enhancement, and support of education initiatives for consumers and businesses.



Energy



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Jordan Dam in Wetumpka , Alabama



Inland Waterways



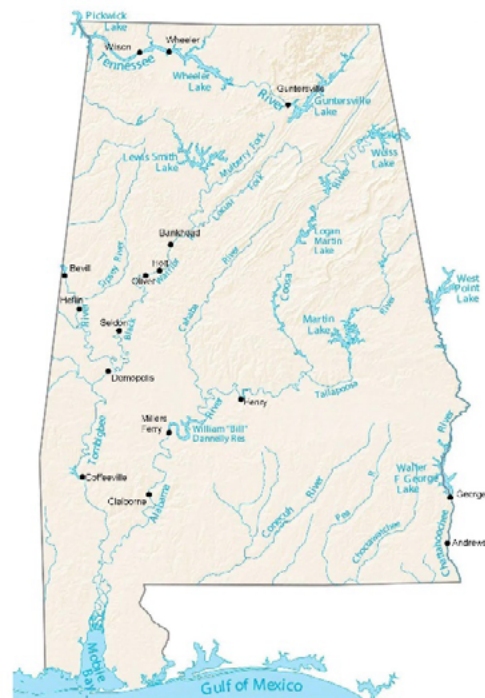


EXECUTIVE SUMMARY

Alabama's inland waterways are made navigable with the use of 32 locks and dams across 5 different waterway systems that span several states. Some 16 locks reside within Alabama's boundaries. These structures were built between 1924 and 1994, with 12 structures completed more than 50 years ago. These lock and dam structures are essential for economical and safe shipment of commodities from numerous inland port facilities to the Port of Mobile, but many are operating well beyond their 50-year design service life. Since 2015, two locks have been completely closed to traffic due to their poor condition. Lack of funding, particularly for low use waterways, has led to deferred maintenance, causing these structures to be unavailable for commercial traffic. If this trend continues, Alabama may see more outages or potential closures delaying transportation even on the high use waterways. Alabama's inland waterways could face a miniature Suez Canal incident if any one of the high usage locks fails, blocking barge traffic for days, weeks, or even months while awaiting repair. Proper funding could substantially reduce the risk of these events occurring.

CONDITION & CAPACITY

Alabama's waterways contain over 1,200 miles of navigable water, ranking it 6th in the nation. The nation's waterway network is comprised of approximately 12,000 miles of inland navigation channels as well as an additional 11,000 miles of intracoastal waterways owned and operated by the U.S. Army Corps of Engineers (USACE). Alabama's waterways lead to the Port of Mobile, which is ranked 11th in the nation for tonnage by the Bureau of Transportation Statistics (BTS). Wilson Dam, located on the Tennessee River, is Alabama's oldest lock and dam, completed in 1924. At 93 feet, it is the highest single-lift lock east of the Rocky Mountains. The next two oldest lock and dams are also located on the Tennessee River: Wheeler (1936) and Guntersville (1939). These are all classified as high use locks. High use locks in Alabama generally see over 600 lockages per year with some ex-



Alabama waterways and locks.

periencing over 2,000 lockages per year. The remaining high use locks listed in order of age are Demopolis (1954), Selden (1957), Coffeeville (1960), Holt (1967), Bankhead (1975), Heflin (1978), Beville (1979), and Oliver (1994). Low use locks have less than 100 lockages per year. Low use waterway locks listed in order of age include Andrews (1962), George (1963), Claiborne (1969), Millers Ferry (1969), and Henry (1972). The locks are spread across five major waterway systems in the state that are made up of the following rivers: Alabama, Apalachicola, Black Warrior, Chattahoochee, Tennessee, Tennessee-Tombigbee, and Tombigbee.

The higher capacity locks in the state have chambers measuring 110 feet by 600 feet, which can simultaneously accommodate eight barges and a push boat. Coffeeville, Demopolis, Wheeler, and Wilson locks average more than 5,000 loaded barges per year, requiring more than 2,000 lock cycles per year. Tennessee, Tombigbee, Black Warrior, and Tennessee-Tombigbee waterways all have the same size locks to accommodate the barge traffic that ultimately travels these connected systems to reach the Port of Mobile. Black Warrior and Tombigbee

waterway locks transport around 3 million ton-miles of coal per year. The BTS defines a ton-mile as one ton of freight shipped one mile. Wheeler and Wilson locks transport about 2.5 million ton-miles each of chemicals, crude inedible nonfuel materials, and food and farm goods. Lock chambers for the other systems are smaller chambers, lowering the capacity of those systems. Even though the higher capacity locks are staffed continuously, delays up to 2 hours are still experienced due to travel intensity versus the chamber capacity.

The high use locks in the state that were built prior to 1960 are in poor condition due to age, lockage cycles, and wear from commercial traffic. Due to their high usage, these locks receive periodic maintenance but not at a sufficient rate needed based on the amount they are used. Low use locks have had all maintenance deferred to provide funding to the high use locks and other high priority national projects along the Ohio River and Mississippi River. This deferred maintenance has led to George W. Andrews and Walter F. George locks, on the Chattahoochee River system, being closed to all traffic in the last six years.

OPERATION & MAINTENANCE, FUNDING, & FUTURE NEED

National operation and maintenance budgets are insufficient and have not increased at an appropriate rate to keep up with the growing maintenance backlog, which simply leads to more deferred maintenance. Low use waterways have suffered the most from the lack of funding, with reduced staffing and no funding for dredging to maintain navigation channels. This has led to periods of closure for commercial traffic. Funding competition also exists between dams' spillway gate maintenance and lock maintenance. Spillway gates and locks are both important for maintaining navigation and other project operations such as hydropower generation and recreation.

Significant funding is necessary for replacing old and aging locks and other structures such as spillway gates. Higher priority projects along the Mississippi and Ohio rivers have absorbed most of the federal funds for re-investments and improvements of waterways. Systems are funded based on a ton-mile average for the system. Higher usage results in higher priority. High tonnage

systems average over 3 million ton-miles. Medium tonnage systems average between 1.5 million to 3 million ton-miles. This categorization includes the Tennessee, Black Warrior, Tombigbee, and Tennessee-Tombigbee waterways. Lower tonnage systems are ranked at the bottom, which include Alabama's other two waterways. Due to flat funding in the last decade and aging structures, even medium tonnage systems across the nation have suffered due to the high tonnage systems' funding demand caused by their criticality importance to the nation's transportation system.

Nationally, inland waterways are slightly better, on average, than Alabama's due, in part, to Congress' passage of a massive legislative package at the end of 2020. The package included the Water Resources Development Act (WRDA), a significant victory that updated the cost share of the Inland Waterways Trust Fund.

Expected growth in the Port of Mobile will require greater shipping on Alabama's inland waterway systems.

A study has also been funded to examine deepening the authorized channel of the Black Warrior, Tombigbee, and Tennessee-Tombigbee waterways from 9 feet to 12 feet. This would allow for more cargo to be transported per

barge, increasing transport efficiency. Major construction is also needed at Coffeeville, Demopolis, and Selden locks to realize a 12-foot navigation system.

National operation and maintenance budgets are insufficient and have not increased at an appropriate rate to keep up with the growing maintenance backlog, which simply leads to more deferred maintenance.

RESILIENCY & INNOVATION

Alabama's inland waterway systems remove about the equivalent 800,000 semi-tractor trailer trucks from the road annually due to the transportation of goods on barges. That leads to less strain on the roadway system and the potential for fewer vehicle accidents involving tractor trailer trucks. Lock failures and spillway failures can, however, lead to immediate risk to life due to downstream flooding. Failure of a lock could mean rerouting critical cargo and delaying shipments.

All of Alabama's locks, except those on the Tennessee River (Wilson, Wheeler, and Guntersville, which have auxiliary locks), are single chamber, and the loss of function of the lock would stop all transportation through it. Since there is no redundancy in the system, a catastrophic failure would stop all navigation until the lock was repaired, with little option for rerouting goods. This means Alabama's locks have critically unaddressed resilience chokepoints. The most critical locks in the state are also the oldest and are underfunded for major upgrades and maintenance. Dams are similar in age to the

locks and have equally inadequate funding to acquire resilience-related upgrades such as spare spillway gates. A failed spillway gate could lead to flooding or loss of pool depths sufficient for navigation. Recent increased incidents of runaway barge strikes have also caused damage to spillways.

Alabama's navigation infrastructure today is similar to that of the 1950s. There has been very little technological advancement in existing lock and dam components. The U.S. Army Corps of Engineers Headquarters is pushing to explore alternative materials like composites for spillway gates, lock valves, and lock gates. Research is also being performed to mitigate issues with lock approaches and increase the automation of lock and dam controls (Guntersville, Wheeler, and Wilson dams are remotely operated by Tennessee Valley Authority). Predictive modeling for hydraulic structures, improved sensor systems, and new coating systems are also being researched.



Inland Waterways



RECOMMENDATIONS TO RAISE THE GRADE

The recommendations listed below can help Raise the Grade on future reports cards.

- Investment into major replacement components such as new lock miter gates for the older high use locks to increase system resilience.
- Investment in spare parts for critical components for the locks (lack of funding has delayed obtaining replacements).
- Increased funding to resume periodic lock dewatering for inspection and repair (10-year interval) on the high use locks.
- Study the construction of additional lock chambers at some of the existing single chamber locks.
- Investment into major maintenance or rehabilitations on the low use system locks.
- Increase in dredge funds to include the periodic haul out or relocation of upland disposal material for beneficial use by the state or other public entities.

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Ports





EXECUTIVE SUMMARY

Alabama's coastline is relatively short, but its single deep-water port at Mobile, on the Gulf of Mexico, is the 11th largest in the United States by volume. The Port of Mobile has a container capacity of 650,000 twenty-foot equivalent units (TEUs) per year. Since 2002, the Alabama State Port Authority has spent \$1.4 billion on landside and federal channel improvements. The seaport at Mobile is served by five Class I railroads, four Short Line railroads, U.S. highways and interstates, and inland and intracoastal waterways. Alabama's Harbor Modernizing project to dredge the ship channel has begun. It will deepen the federal channel to 50 ft. and provide a wider channel to increase vessel transit efficiency. Alabama's public seaport and inland port facilities are funded by the Alabama State Port Authority's revenues with occasional support by the State of Alabama, including the recent \$150 million investment from the Rebuild Alabama Act. The federal channels are funded from the U.S. Army of Corps of Engineers Civil Works Programs as authorized by the Water Resources Development Act (WRDA), as amended, to provide channel maintenance and capital improvement projects. To raise the grade, the Port needs to rehabilitate three existing piers to provide additional cargo capacity.

CONDITION & CAPACITY

The Alabama State Port Authority (Port Authority) was dedicated in 1928. It manages approximately 3,700 acres of real estate, 41 berths, and 5 million square feet of warehouses and open yards. The Port Authority's current total economic value is \$25.4 billion. This infrastructure sector provides more than 150,400 jobs either directly or indirectly. These jobs generate approximately \$560 million dollars to the state's economy through state and local taxes. More broadly, the Port is also a major supporter to the community, economics, and the natural environment.

The Port of Mobile is home to several public terminals including, but not limited to, APM Terminals Mobile and the container intermodal transfer facility, AutoMobile

International Roll on/Roll off (RO/RO) Terminal (150,000 vehicles annual import/export capacity), MTC Logistics Refrigerated Cargo IDC, Seaonus Refrigerated Services, the Alabama Steel Terminal, Agrex Grain, Argos Aggregates, Marine Liquid Bulk Terminal, and McDuffie Coal Terminal. The public terminals service a diversified cargo base that includes general cargo, dry and liquid bulk, over-dimensional and heavy lift cargo, and containerized cargo. The Port Authority also owns and operates the Terminal Railway (TASD) that provides switching, storage, and port terminal access for all eight railroads servicing the public seaport terminals. The Container Terminal handles over 500,000 twenty-foot equivalent units (TEUs) annually, with expansion capacity of up to 2 million TEUs.

It is currently the nation's fastest-growing container terminal. Currently, growth projections show capacity needs in the next several years of up to 1 million TEUs. Therefore, development is currently underway including the Phase IV Container Yard and Dock Expansion. In Mobile, north of the tunnels for Interstate 10 and US 90/98, the federal channel in the river harbor is 40 feet deep. South of the tunnels, the channel depth is currently 45 feet deep by 400 feet wide. The Mobile River Channel is regularly maintained by hydraulic dredging. With the Harbor Modernizing project, the depth south of the tunnels will be extended to 50 feet deep in the Mobile Bay and Mobile River channels, and 52 feet deep at the bar channel for a total distance of 3 miles and an additional 100 feet in width. The project also includes improvements to widen and lengthen the existing Turning Basin. This project is projected to be completed by 2025.

The Port's general cargo Piers A, B, and C were originally

constructed in the late 1920s. Imports through these piers include heavy lift and oversized cargo, aluminum, iron, steel, copper, and forest products. Exports include iron, steel, lumber, plywood, wood pulp, oriented strand board, laminate, flooring, and roll and cut paper. Though the docks and berths were constructed early last century to move these import and export materials, several projects have been completed to repair and sustain Alabama's ports infrastructure. One of the original main piers and laydown yards was repaired and upgraded with additional support to accommodate steel cargo. Additionally, on-going maintenance projects continue to maintain service of the facilities.

There are 10 ship to shore gantry cranes, two mobile harbor cranes, and one barge-mounted heavy lift crane at the Port Authority's public terminals. These cranes are maintained to move cargo between ships, rail, and truck.

OPERATION & MAINTENANCE, FUNDING, & FUTURE NEED

Since 2000, the State of Alabama has on occasion funded port-related investments through a statewide constitutional measure that provided \$100 million in the year 2000 for new port infrastructure, and up to \$150 million through the Rebuild Alabama Act for the Harbor Modernization project. The total cost of the Harbor Modernization project is approximately \$366 million to accommodate Super Post-Panamax and larger bulk carriers, improve vessel safety, and deliver better vessel transit efficiency. The Port also receives funding through the U.S. Army of Corps of Engineers Civil Works Programs, Alabama Gulf Coast Recovery Council, Transportation Infrastructure Generating Economic Recovery (TIGER), and the Diesel Emissions Reduction Act.

The Port also has invested in Automotive Logistics, RO/RO Terminal to support Alabama's auto industry; MTC Logistics International Distribution Center handling cold cargoes to support Alabama poultry exports, regional proteins, and to supply retail grocers; Phase 4 Container Yard and Dock Extension to support Alabama's advanced manufacturing, assembly, retail/distribution, and agribusiness; Container Intermodal Logistics Park

to drive cargo growth and attract distribution and value-added investments; Montgomery Inland Intermodal Container Transfer Facility; McDuffie multi-phased refurbishment and upgrades; and the Mobile Channel Deepening and Widening to expand Alabama's economy.

Critical operation and maintenance practices for Alabama's ports include an asset management plan to maintain existing facilities against depreciation and dredging to facilitate efficient access between critical land and waterside systems. Each year, the U.S. Army Corps of Engineers and the Alabama State Port Authority remove approximately six million cubic yards of sediment from Alabama's Mobile Harbor federal navigation channel and adjacent public berths. Current practice places dredged materials in permitted open-water or upland management areas.

Future needs for the landside infrastructure also include improvements to the McDuffie Coal Terminal. The current export capacity is 10 to 12 million tons. There is a multi-year, phased capital plan to expand export coal capacity to 15 to 20 million tons. The improvements will add new equipment and rebuild existing equipment. The estimated cost to complete these projects is \$45 million.

PUBLIC SAFETY, INNOVATION, AND RESILIENCY

The Port is prepared for natural disasters. Namely, some of the valuable sediments that are annually dredged from Mobile Harbor will be used to create wetlands and habitat. By constructing the Upper Mobile Bay Wetland Creation project, sediments are allowed to remain in the Upper Mobile Bay system to increase important wetland and submerged aquatic vegetation habitat areas, improve water quality, build resilience against storm surge, and reduce costs to maintain public channels and berths.

Tropical Storm Sally in 2020 caused estimated damages of \$12 million to the Port and channel, in addition to delays to a few vessels. Damage affected roofs, warehouse doors, and the several wharf superstructures. Many of the damaged facilities were covered by insurance, and FEMA disaster response provided funding assistance for other repairs.

The Port maintains a policy to integrate environmental sustainability principals and initiatives into the business decisions, operations, and development of the public port assets. It is a Green Marine certified port. The impact of its operations on the natural environment are decreased

by exceeding minimum standards set forth by regulations governing environmental impact mitigation. The environmental impacts addressed include air quality, water quality, soil and sediment quality, wildlife, management and minimization of waste, and consumption of energy. One recent project is converting the sixth of their eight locomotives from aged diesel to tier 4 EPA certified technology engines, which allow the air leaving to be cleaner than what enters the engine.

The Port maintains a policy to integrate environmental sustainability principals and initiatives into the business decisions, operations, and development of the public port assets. It is a Green Marine certified port.



State docks at the port of Mobile, Alabama



Ports



RECOMMENDATIONS TO RAISE THE GRADE

- The Port needs to rehabilitate Piers C South, B North, and B South of the original piers to improve the condition needed for future use for mooring, rail, and cargo. Rehabilitation would include repair of the decks, foundations, and fenders.
- The Port also needs to continually improve on resiliency to protect the state's economic assets from natural disasters.

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Rail





EXECUTIVE SUMMARY

Alabama has both freight and passenger rail. There are currently 31 freight railroads – Class I, Class II, and Class III/Shortline – consisting of 3,720 track miles, all privately owned and maintained. Amtrak operates one passenger rail line through Alabama – the Crescent – which consists of 1,300 track miles, all of which are owned by Norfolk Southern Railway. Freight continues to maintain a strong, well-funded network while the passenger rail network remains dependent upon federal funding. In recent years, however, federal funding has increased, growing from an annual budget of \$2 million in 2020 to a budget of \$4.7 million in 2022. Specific utilization of this funding includes 45 rail/highway safety crossing projects, which were authorized in 2021. Locally supplementing the federal funds, multiple grants and P3 investments have contributed to improvements at the Port of Mobile, which recently saw major rail projects completed and intermodal facilities expanded. Finally, in November 2021, the Infrastructure Investment and Jobs Act (IIJA) was signed into law, which will inject an unprecedented amount of federal funds into freight and passenger rail infrastructure to improve and expand the safety, operations, and maintenance programs throughout the nation. Currently, however, the IIJA budgets for Alabama are undetermined.

CONDITION & CAPACITY

Freight Rail

Rail operations in Alabama are a private sector enterprise, with improvements and investments made by each railroad to address its needs and business goals. Based on 2021 data from Alabama Department of Transportation's (ALDOT's) Rail-Highway Safety Program, there are a total of 31 freight railroads and 3,720 track miles. Alabama freight railroads consist of 5 Class I Railroads, 1 Regional (Class II) Railroad, and 25 Short Line (Class III) Railroads.

The Class I Railroads operating in Alabama are BNSF

Railway Company (BNSF), Canadian National (CN), CSX Transportation (CSXT), Kansas City Southern Railway Co. (KCS), and Norfolk Southern Corp. (NS). Class I railroads make up 70% of total track mileage or slightly over 2,600 track miles. The only Regional Railroad operating in the state is the Alabama and Gulf Coast Railway, which accounts for 10% of total track mileage. The Short Line Railroads operating in Alabama account for the remaining 20% of track mileage. According to the 2020 National Transportation Atlas Database, published by the U.S. Department of Transportation, Alabama's freight rail network is shown below in Figure 1.

FIGURE 1: ALABAMA'S FREIGHT RAIL NETWORK

	Miles Operated In Alabama in 2019
Class I Railroads	
BNSF Railway Company	231
Canadian National	22
CSX Transportation	1,012
Kansas City Southern Railway Co.	44
Norfolk Southern Corp.	1,304
	<u>2,613</u>
Regional Railroads	
Alabama & Gulf Coast Railway	374
	<u>374</u>
Short Line Railroads	
Alabama & Tennessee River Railway	120
Alabama Export Railroad	12
Alabama Railroad	50
Alabama Southern Railroad	68
Alabama Warrior Railway	14
Autauga Northern Railroad	46
Bay Line Railroad	50
Birmingham Terminal Railway	20
Conecuh Valley Railroad	14
Eastern Alabama Railway	28
Georgia Southwestern Railroad	17
Huntsville & Madison County RR Auth.	13
Luxapalila Valley Railroad	23
Meridian and Bigbee Railroad	158
R.J. Corman Railroad - Childersburg Line	13
Sequatchie Valley Switching Co.	3
Tennessee Southern Railroad	18
Terminal Railway Alabama State Docks	8
Three Notch Railway	36
Wiregrass Central Railway	22
	<u>733</u>

Alabama 2019 Totals	Number of Freight Railroads	Miles Operated	
		Excluding Trackage Rights	Including Trackage Rights
Class I	5	2,240	2,613
Regional	1	273	374
Short Line	20	714	733
Total	26	3,227	3,720

—	BNSF
—	CN
—	CP
—	CSX
—	KCS
—	NS
—	UP
—	Short Line/Regional
—	Multiple Owners



Map is based on the 2020 National Transportation Atlas Database published by the U.S. DOT, Bureau of Transportation Statistics. Some mileage figures are AAR estimates.

In 2019, according to the Association of American Railroads (AAR), the total tonnage of commodities transported by rail that either originated and/or terminated in Alabama was over 81 million tons (~912,700 carloads). The top commodities are coal, primary metal products, and chemicals. The remaining breakdown of Alabama's commodity shipments are shown below in Figures 2 and 3. Overhead traffic, which is the tonnage travelling through Alabama without starting or stopping, accounts for a majority of tonnage moved by rail. Much of this traffic is from intermodal containers and trailers travelling along the NS and CSXT corridors.

Amtrak Station, Mobile, Alabama
(Photo provided by Amtrak.)



FIGURE 2: 2019 ORIGINATED RAIL TRAFFIC

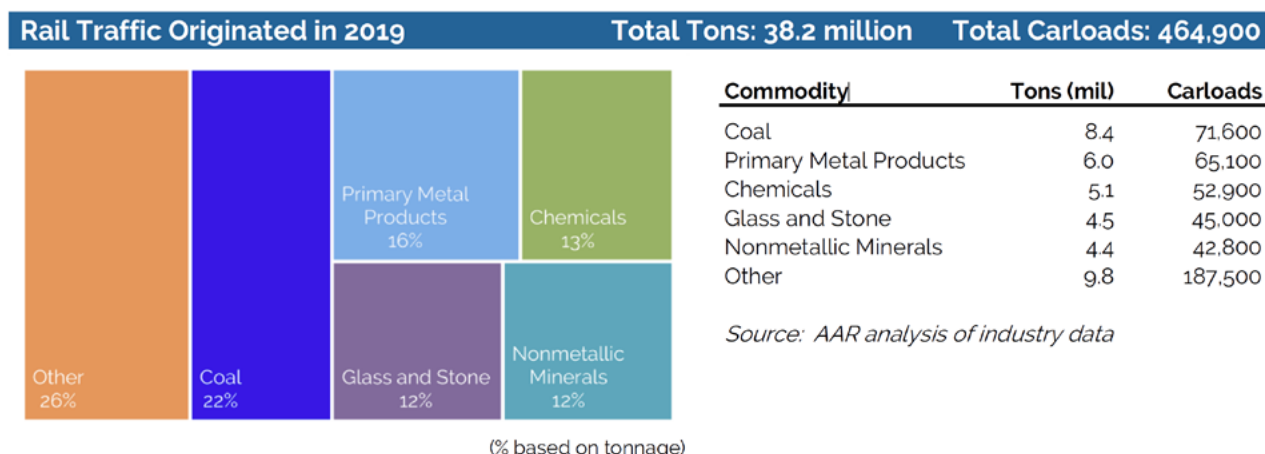
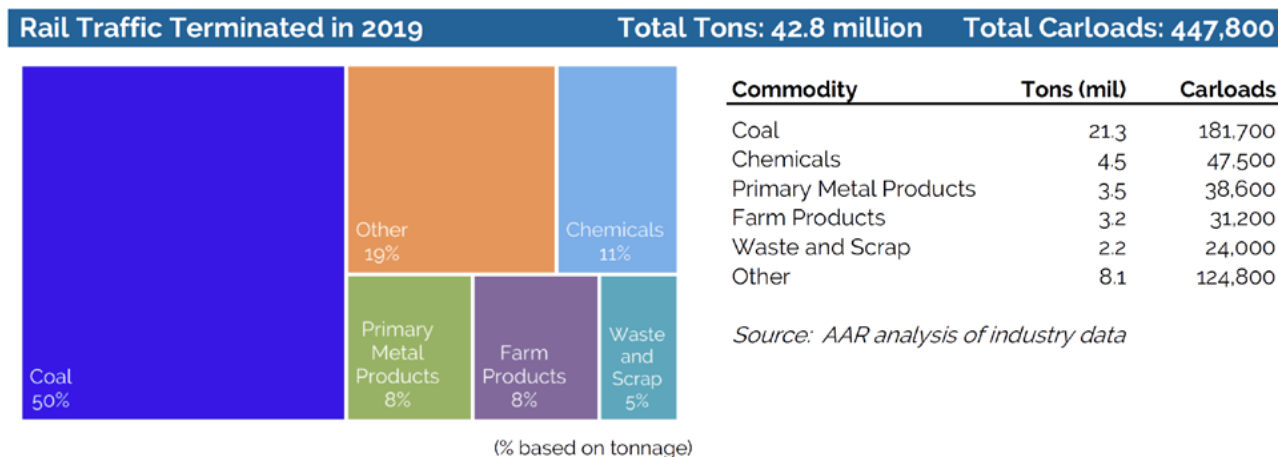


FIGURE 3: 2019 TERMINATED RAIL TRAFFIC



Freight railroads are crucial to efficient product delivery. Rail is four times more fuel efficient than trucks, and a single train can haul as much freight as several hundred trucks. Freight rail provides efficient long-haul and short-haul service and integrates closely with the trucking industry. Because the freight railroads are private entities, they own the infrastructure over which they operate, meaning they also invest heavily in those networks. According to AAR's 2019 State Rankings, Alabama was ranked 12th in the nation in number of freight railroads with 26 lines (U.S. total is 632 lines), 16th in the nation for total rail miles with 3,227 miles (U.S. total is 136,650 miles), 15th in the nation in originated rail tons with 38.2 million tons (U.S. total is 1,607.1 million tons), 15th in the nation in terminated rail tons with 42.8 million tons (U.S. total is 1,630.5 million tons), and 21st in the nation in freight rail employment with nearly 3,000 employees (U.S. total is 159,720 employees).

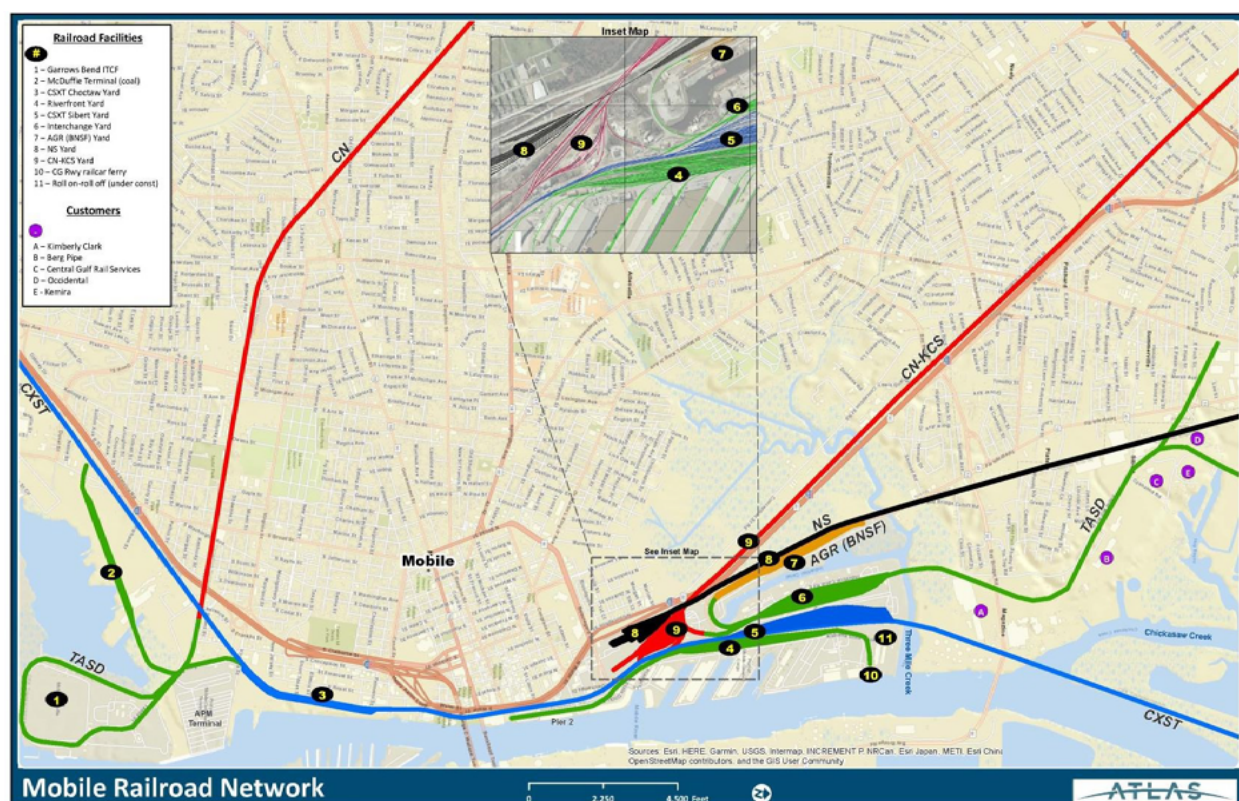
Intermodal connections, meaning those involving two or more different modes of transportation for moving goods throughout Alabama, have many strengths that have led to economically transporting freight on time.

Intermodal facilities include the Port of Mobile, the Port of Huntsville, NS's Birmingham Regional Intermodal Facility, BNSF's Finley Boulevard Yard, CSXT's Boyles Yard, and CSXT's Central Alabama Intermodal Container Transfer Facility (CAICTF).

There have been several successful Port of Mobile projects recently completed, such as construction of the Container Terminal at Choctaw Point, a rail access bridge at the Port of Mobile, to improve connections between the Terminal Railway of Alabama State Docks (TASD) and the five Class I railroads, and the Garrows Bend Intermodal Container Transfer Facility (ICTF). Based on these successful projects, in July 2021, a State Rail Plan Addendum was adopted and includes two projects sponsored by the Alabama State Port Authority (ASPA), a revenue-funded state agency. More information on these projects is provided further down in this report.

In Alabama, goods moved internally on the freight network are projected to grow from 30.0 million tons in 2020 to 34.5 million tons in 2040 (15% increase).

FIGURE 4: MOBILE RAIL NETWORK

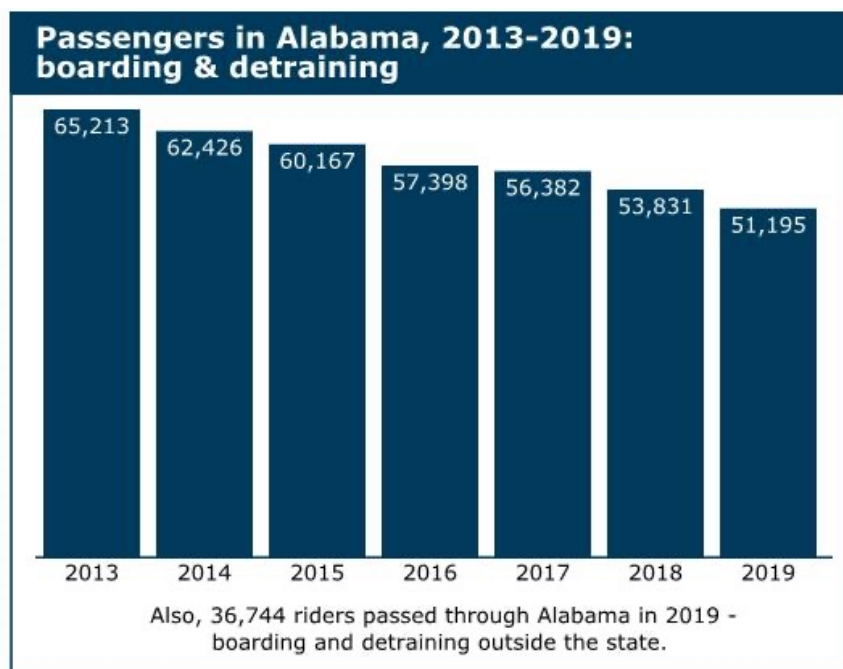


Passenger Rail

Amtrak's only current passenger rail service line, the Crescent Route, travels over 1,300 miles between New Orleans, Louisiana, and New York City, New York, once a day, in both directions. Throughout Alabama, the Crescent line has three stops at stations in Anniston (ATN), Birmingham (BHM), and Tuscaloosa (TCL). Alabama

has two additional Amtrak stations located in Mobile and Atmore. Based on the "Amtrak in Alabama" Fact Sheet, there has been a steady decrease in Amtrak passenger ridership from 2013 to 2019. In 2019, just over 51,000 passengers boarded and departed from the Crescent line from an Alabama Amtrak station.

TABLE 1: AMTRAK PASSENGERS IN ALABAMA



Demand for passenger rail is expected to increase in the long term due to the rising cost of owning automobiles, the state and federal governments' struggle to maintain roads and bridges, and an aging population. As such, Alabama's passenger rail service expansion is being deliberated. A study by the Southern Rail Commission (SRC) promoting the construction of a corridor for a rail passenger service between Birmingham and Montgomery has been considered

by the Alabama Department of Economic and Community Affairs (ADECA). Other potential corridors in Alabama for future passenger rail include Birmingham-Montgomery-Mobile and New Orleans-Mobile-Jacksonville-Orlando-Miami. The SRC has made plans to comply with Federal Rail Administration (FRA) requirements for incremental implementation of service.

OPERATION & MAINTENANCE

Alabama's freight rail system utilizes private sector improvements and investments to address its needs and goals. All railroads in the state have ongoing maintenance and repair schedules. FRA's Track Safety Standards include inspecting rails, cross-ties, special track work (such as turn-outs and bridge lift assemblies), tie plates, track geometry,

gauge alignment, ballast, drainage, and vegetation. Track maintenance involves constant inspection and repair, with frequency based on traffic density, tonnage, and condition of the infrastructure. Some major repair activities involve cross-tie and rail replacement, which improves the track and roadbed maintenance.

While Class I railroads do not provide information on ongoing maintenance, there are other metrics to consider that might provide information. Speed restrictions can be an indication of deteriorating lines and also can reduce the lines' capacity. Some of the infrastructure challenges short lines and regional railroads face include weight restrictions on existing bridges and whether they

can handle 298,000-pound rail cars.

In 2018, Amtrak's Crescent Route, the only passenger rail line traveling through Alabama, recorded a revenue-to-cost ratio of 0.46, and the route operated at a loss of -\$0.31/passenger-mile.

FUNDING, & FUTURE NEED

Federally-funded programs and private capital from the railroad companies are the main sources of funding for rail projects. Freight railroads determine their project priorities under two categories: mission-critical projects and potentially-funded/optional projects. Mission-critical projects include scheduled maintenance and unscheduled repairs. Potentially-funded or optional projects include those that reduce bottlenecks, line extensions, information technology solutions, and related capital investments. In Alabama, private railroads reinvest close to 20% of their operating revenue into infrastructure, and in 2017, \$11.5 billion was budgeted for capital expenditures by Class I railroads. Freight railroads use their revenues to cover both operating costs and capital investments.

The 2021, IIJA Bill impacts to the Section 130 program are the Federal share changed from 90% to 100% funded, incentive payments for At-Grade Crossing Closures changed from \$7,500 to \$100,000, and Alabama will now receive approximately \$4.7 million in Federal funding annually for improvements to rail/highway grade crossings. ALDOT is currently in the process of updating the State Rail Plan (SRP).

In 2021, ALDOT received two Consolidated Rail Infrastructure and Safety Improvements (CRISI) Grant projects. In July 2021, an Addendum was made to the SRP, which consists of the following two projects both sponsored by ASPA.

- **Project 1: Terminal Railway Alabama State Docks (TASD) Railroad Capacity Improvements.** The Port of Mobile qualifies for the Fixing America's Surface Transportation (FAST) Act, which is a funding and authorization bill to govern U.S. federal surface transportation spending. The project involves various types of capacity and safety improvements to prepare the Port for continued rail freight and intermodal container traffic growth.

The estimated total cost of the improvements is up to \$60,000,000. Project funding to be provided by ASPA and the State of Alabama. Federal funding, necessary to complete the project, is being sought.

- **Project 2: Montgomery Inland Intermodal Freight Facility.** ASPA, in partnership with the City of Montgomery and CSXT, proposes to develop an inland port Intermodal Container Transfer Facility (ICTF) located near Montgomery in central Alabama. This new ICTF will primarily support the freight transportation needs of manufacturing, including notably growing motor vehicle production along with agricultural and retail markets in central Alabama and, to a lesser extent, the Southeast, Midwest, and beyond. It will be owned and operated by ASPA.

The estimated total cost of engineering, construction, and initiation of operations, including nominal highway improvements for accessibility is up to \$64,000,000. Public project funding to be provided by the State of Alabama and ASPA. CSXT has also committed substantial funding. Collectively, the non-federal sources would fund in excess of one-half of the total cost. Federal funding, necessary to complete the project, is being sought. This development would lead to similar future facilities in the cities of Birmingham and Huntsville, Alabama.

Regional (Class II) and Short Line (Class III) railroads reinvest an average of 25% to 33% of annual revenues in capital expenditures and maintenance-of-way costs. Despite this investment, funding for capital projects is very challenging. A federal tax credit provides \$0.50 on every dollar spent up to \$3,500 per mile on track and bridge improvements. This has resulted in approximately \$4 billion in investment since it was enacted in 2005.



Amtrak Rail Station, Birmingham, Alabama (Photo provided by Amtrak.)

According to U.S. DOT's Freight Analysis Framework, the volume of goods exported over rail from Alabama is projected to grow in the next 10 years before leveling off, while rail imports are projected to have a slight decline. With future trends most likely to increase, Alabama may face some challenges to meet the demand of maintaining the rail network.

Passenger Rail

In addition to passenger revenues and state funding, Amtrak relies on federal grants to operate, maintain, and invest in capital programs for intercity passenger rail. Under the FAST Act of 2015, Amtrak is authorized from fiscal year (FY) 2016 through FY 2021 a total of \$8.1 billion in federal grants. Congress provided additional funding to support Amtrak over the course of the five-year bill. Additionally, Amtrak received \$1 billion in direct aid through the Coronavirus Aid, Relief, and Economic Security (CARES) Act to support the railroad's activities to prevent, prepare for, and respond to the spread of COVID-19 in the U.S., with \$655 million directed toward the Northeast Corridor (NEC), which runs from Boston, MA to Washington D.C., and \$345 million toward the National network. It is important to note that prior to the pandemic, Amtrak was projected to require no federal funding support to cover operating costs in FY 2020.

The Alabama Capital Assistance Stimulus for Rail Projects Act of 2009 required ADECA and SRC to establish and maintain a program to promote passenger rail travel and service. The current priority for the SRC is to return passenger rail service between Mobile, Alabama, and New Orleans, Louisiana, and this project has gained recent momentum with funding secured and support from Alabama, Mississippi, and Louisiana. A secondary priority is the route between Birmingham, Montgomery, and Mobile. The current SRC federally-funded initiatives in Alabama are as follows:

- Mobile to New Orleans Passenger Rail
 - In May 2019, \$5.45M Restoration and Enhancement (R&E) Grants Program.
 - In August 2019, \$4.36M R&E Grants Program.
 - In June 2019, \$33M Consolidated Rail Infrastructure and Safety Improvements (CRISI) program
- Birmingham to Mobile Passenger Rail
- Gulf Coast Passenger Rail (New Orleans, Louisiana to Orlando, Florida)
- FRA Station Grants (AL Total = \$329,500) – Awarded to City of Anniston, City of Birmingham, and the City of Mobile.

The IIJA was signed in November 2021 is a game-changer. Amtrack will receive \$66 billion to improve and expand service, \$600 million annually will go towards elim-

inating or separating highway-rail grade crossings, and existing grant programs (CRISI, INFRA and RAISE) will receive \$5.5 billion annually.

PUBLIC SAFETY

The Alabama Department of Transportation (ALDOT) Rail-Highway Safety Programs Group manages the Railway-Highway Crossings Program, which uses federal funds to eliminate hazards at rail-highway crossings. In 2020, there were 45 authorized projects, totaling more than \$2.1 million. Currently, there are 2,709 public at-grade crossings, and 50% of those crossings are equipped with active warning devices (signals, bells, and/or gates). There are 689 grade-separated (bridge) crossings, 28

pedestrian at-grade crossings, and 1,728 private crossings at-grade throughout the state. According to FRA statistics, in 2020, Alabama was ranked 7th in the nation for highway-rail grade crossing collisions, with 84 collisions, 3 deaths, and 26 injuries. This is an improvement from 2015 when Alabama was ranked 5th in the nation for accidents at public rail crossings. Nationally, 1,901 highway-rail grade crossing collisions occurred in 2020; therefore Alabama accounted for 4.4% of these collisions.

RESILIENCY & INNOVATION

The Rails to Trails Program in Alabama consists of 26 systems of rails to trails (97 miles) throughout the state that have been planned or developed along abandoned rail corridors. There are 10 projects currently receiving funding from the program, which over the years has allocated over \$15.9 million to Alabama projects. To preserve what was once existing, efforts have been made to convert abandoned rail lines into nature or walking trails. In the future, more rails to trails initiatives will be considered as part of metropolitan and rural planning programs. The Rails-to-Trails Conservancy (RTC) monitors the Transportation Alternatives (TA) Program, which funds the Alabama Rails-Trails projects.

Innovation is a major focus of the IIJA. One aspect of this is the establishment of a new Office of Clean Energy Demonstrations at the Department of Energy (DOE) that will oversee \$21 billion in projects, including those related to emissions reduction in long-distance transportation. Freight railroads continue to be the most sustainable way to move freight over land, having 75% less emissions than trucks; they continually seek alternative fuel options to improve fuel efficiency. This funding recognizes the innovation occurring within the sector and the role railroads will play in moving goods more sustainably.





Rail



RECOMMENDATIONS TO RAISE THE GRADE

The recommendations listed below can help Raise the Grade on future reports cards.

- **Recognizing the importance of the rail industry to support the economic development of Alabama**, including the development of its energy resources, in the transportation planning process is necessary.
- **Use IIJA funding to maintain a viable and efficient rail freight and passenger transportation system.** Ensuring ALDOT and privately-owned rail collaborate in planning all future highway and rail expansion/abandonments is crucial. Promoting the viability of the private rail industry and possible modification of certain rail system components for increased effectiveness is also of great benefit. Strongly considering the expansion of passenger rail service on freight rail lines as a service that the state can operate and maintain can also prove to be beneficial. Implementing passenger rail services from Birmingham to Atlanta would create opportunities to expand Alabama's businesses with densely populated areas.
- **Advocate for support to implement concepts from the NFSP**; improve the multimodal freight network, improve safety, and provide for capacity improvements.
- **Advocate for passenger rail infrastructure studies/investments in high-population areas.** Continue to support light rail investment in added capacity and expanded service in high-density markets to relieve system stress on other modes.
- **Supporting private investment** in the nation's freight railroad system and allowing for more flexible funding in the freight and passenger railroad services (e.g. *All Aboard Florida* - a privately owned, operated, and maintained passenger rail system) is needed.



Rail



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Roads





EXECUTIVE SUMMARY

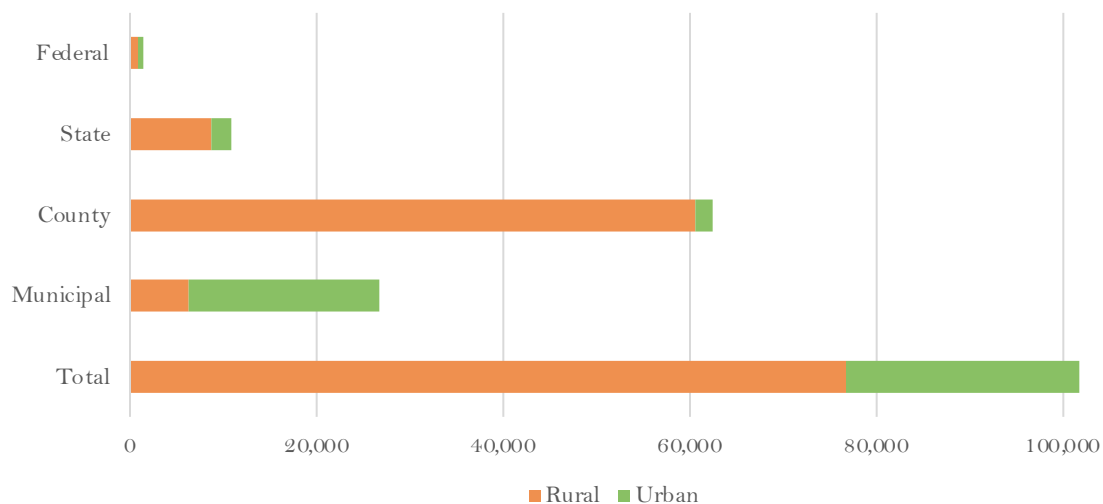
Roadways form the backbone of Alabama's economy by getting people to work, transferring goods and services to market, and connecting residents and visitors to recreational and tourist destinations. Alabama has 102,200 miles of public roads, ranging from multi-lane highways to neighborhood streets. Vehicle travel in the state has increased by 14% from 2009 to 2018, with nearly 60% of this travel occurring on 11,000 miles of federal and state highways, which are maintained by the Alabama Department of Transportation. Of these miles, only about 9% have pavements that are in unacceptable and deficient conditions. However, congestion is a growing issue and is expected to affect 17% of Alabama roads by 2035. To tackle these challenges, initial findings show that two programs – Rebuild Alabama and the Alabama Transportation Rehabilitation Improvement Program – have moved the needle. By topping up locally-sourced funding, these programs have implemented more than 140 roadway improvement projects across the state since 2020.

CONDITION AND CAPACITY

Alabama has 102,200 miles of public roads. About 10,089 miles are federal and state highways and are maintained by the Alabama Department of Transportation (ALDOT). These highways account for 10% of the state's roadways total but carry about 60%

of the total travel. Most Alabama's roads are county roads and streets that are owned and maintained by local jurisdictions. This means counties assess the condition of their roadways differently leading to a lack of consistent metrics statewide.

FIGURE 1: LENGTH OF ALABAMA PUBLIC ROADS

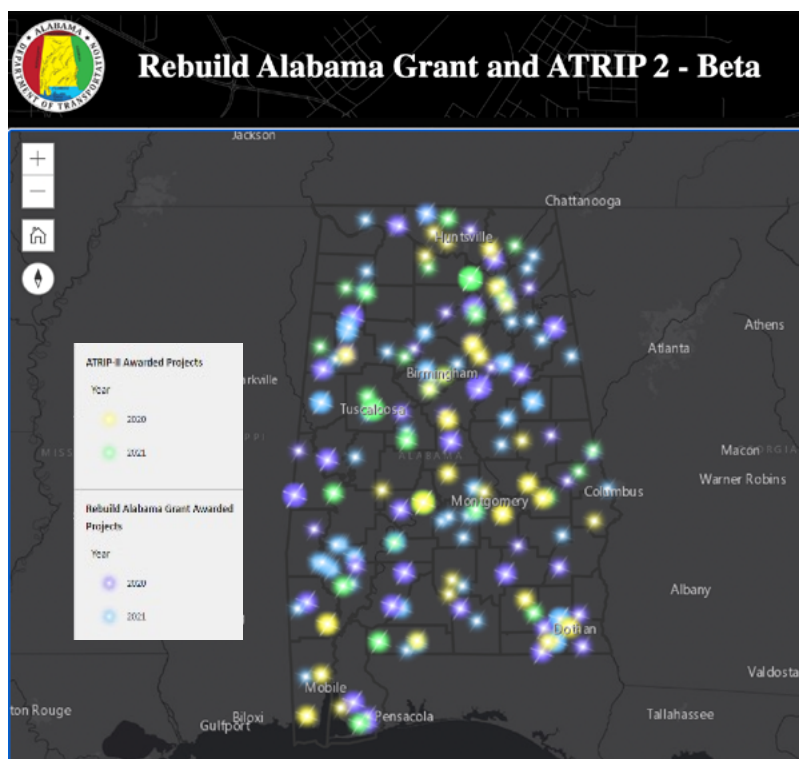


Data provided from TRIP website

However, for roads maintained by ALDOT, a pavement management system is used to determine pavement ratings. Good and fair ratings are considered acceptable, whereas mediocre and poor ratings are considered unacceptable and deficient. Roads that are deficient are those that show signs of deterioration such as ruts, cracks, and potholes. It is critical for such roads to be resurfaced before they need major repair because repairing costs significantly more than resurfacing. In the 2020 Transportation Asset Management Plan (TAMP), interstate and state-owned non-interstate National Highway System roadways were assessed as approximately 70% good, 20% fair, and 10% marginal condition.

Between 2020 and 2021, two programs – Rebuild Alabama and Alabama Transportation Rehabilitation Improvement Program (ATRIP) – implemented a combined 141 widening, resurfacing, repair, remediation, lane additions, lane extensions, traffic striping, intersection improvements, and upgraded median projects throughout the state (Figure 2). While there are not yet any published reports showing effects of these projects on statewide roadway capacity and condition, initial findings indicate that the efforts from these programs have made significant impacts.

FIGURE 2: REBUILD ALABAMA GRANT AND ALABAMA TRANSPORTATION REHABILITATION IMPROVEMENT PROGRAM

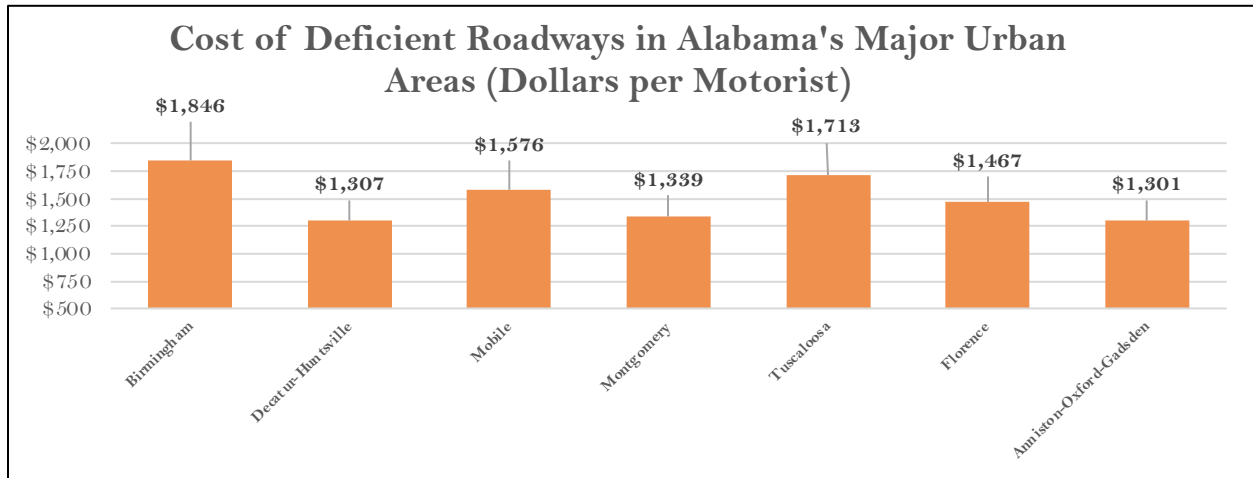


Source: ALDOT

However, roads remaining in poor condition continue to affect Alabama drivers. TRIP, a national transportation research nonprofit, published data about the costs to each motorist in Alabama from driving on roads in need of repair. In 2019, the cost on average was determined to be \$549 a year in the form of additional vehicle

operating costs, totaling \$2 billion for the entire state. The costs to Alabama motorists in the large urban areas of the state are significantly higher, with the highest annual cost per driver ranging from \$1,301 to \$1,846 a year per motorist.

FIGURE 3: COST OF DEFICIENT ROADWAYS IN ALABAMA

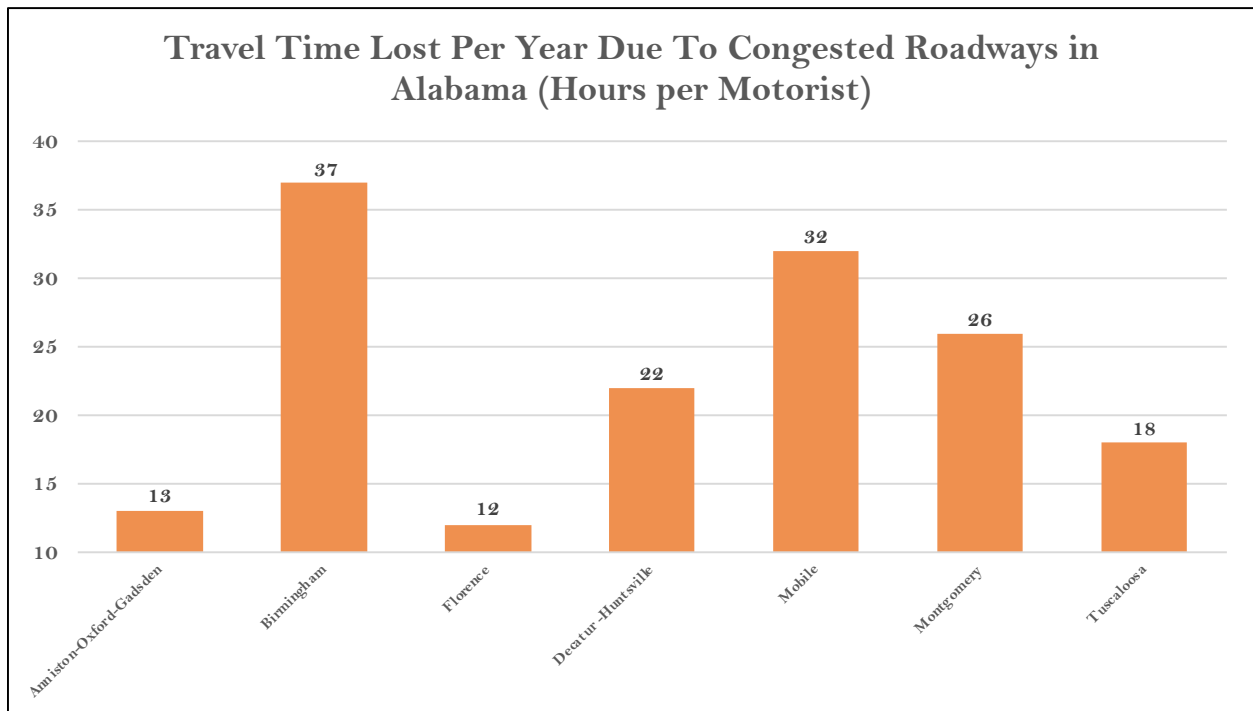


Source: TRIP

Vehicle travel in the state has increased by 14% from 2009 to 2018, with over 70 billion vehicle miles travelled on Alabama roads in 2018. In total, 3.2% of all roadways were congested in 2007 and were predicted to increase to 17% by 2035. Not surprisingly, the most congested

roadways are located in urban areas, with Birmingham experiencing the most delay. Clogged roadways cost time as well as money. Congested roadways, particularly in large urban centers, contribute to hours of lost travel time for motorists

FIGURE 4: TRAVEL TIME LOST BY YEAR



Source: TRIP

OPERATION & MAINTENANCE

ALDOT maintains less than one third of roadways while local jurisdictions maintain the rest. With construction costs outpacing funding, ALDOT recently decided to shift much of its funding towards maintaining acceptable conditions on existing roadways. Without additional funding, ALDOT is under considerable pressure to maintain the existing conditions of major roads and to keep capacity improvement projects to a minimum.

ALDOT has administered a Regional Traffic Operations

Program (RTOP). The RTOP program shifts from signal maintenance to active signal operations to increase travel reliability and safety by minimizing congestion and reducing delays along the regional commuter corridors. The ALDOT West Central Region (WCR) established RTOP in May 2018. Their goals were to reduce delay for all road users, update signal timings in all state and U.S. routes, actively operate signals, monitor and report signal performance, identify and repair malfunctions faster, and respond more quickly to citizens' complaints.

FUNDING

Alabama roadways rely on several funding sources—federal, state, and local. Federal and state gasoline and diesel taxes, or just “gas taxes”, are the most important sources of transportation funding in the nation. The federal tax is a fixed-rate tax that collects the same number of cents on every gallon of fuel purchased. Federal fuel taxes have not been increased since 1993. As a result, fewer dollars are being used to make needed improvements and more spending is being directed to keep existing roads open and in acceptable conditions. However, it is important to note that as of this writing, the federal Infrastructure Investment and Jobs Act passed. While this legislation does not increase the gas tax, it does provide a significant boost in federal funding for roads over the next five years, and Alabama is sure to benefit.



Project sign on a Rebuild Alabama Act-funded project in Autauga County, Alabama. (Photo provided by Brad Williams.)

In 2019, Governor Kay Ivey signed the Rebuild Alabama Act, which increased the state gas tax by 10 cents over three years. Now fully implemented, the total 10 cent per gallon gas tax costs the average driver \$4.58 a month.

In 2021, fuel taxes in Alabama ranked 31st in the nation when compared to other states. Road users in Alabama pay 47.61 cents per gallon of gasoline and 54.55 cents per gallon of diesel pumped, compared to the national averages of 55.23 cents and 62.25 cents per gallon of gasoline and diesel, respectively.

Additionally, the Rebuild Alabama Act indexes Alabama's fuel tax to the National Highway Construction Cost Index (NHCCI), which is issued by the Federal Highway Administration. The index feature will be implemented as follows: Index will begin on June 1, 2023, and only every other year after that (2025, 2027, 2029, etc.). Regardless of growth in NHCCI, the gas tax cannot increase more than 1 cent per gallon at a time.

Furthermore, electric vehicles (EVs) will now pay an annual registration fee, meaning they will now be paying into the state transportation network. Revenue collected for EVs will be distributed through the Rebuild Alabama Fund for use in the construction and maintenance of a modern-day public road and highway system. Alabama's EV fleet has grown to approximately 4,625 vehicles in 2020, based on statistics generated by personnel in the Motor Vehicle Division.



EV Charging Station (Photo provided by Jason T. Kirby, PhD.)

FUTURE NEED

The future roadway needs in Alabama can be split into three categories: capacity improvement needs, pavement maintenance needs, and safety improvement needs. The SWTP addresses Alabama's future transportation needs anticipated through the year 2040. In addition to the SWTP, Alabama has a short-term program aimed at identifying critical safety needs. This program, known as the Statewide Transportation Improvement Program (STIP), identifies crucial safety improvement projects needed.

Future travel in the state is expected to increase by 32% by 2035. Travel on urban roads is expected to be even higher, with an increase of 50% by 2035. Increased travel affects the capacity of existing roads and leads to higher congestion rates. According to the Statewide Transportation Plan (SWTP), congestion is expected to affect 17% of all roads in Alabama by 2035. Interstates are expected to suffer the most, with 73% expected to operate below desired levels. According to these projections, over 1,800 miles of roadways will be congested in Alabama in 2035 and will require capacity improvement projects of \$20.9 billion, inclusive of

Regarding economic impact, the \$320 million of new funding per year invested in Alabama's roads and bridges would have a statewide economic impact of about \$750 million annually and \$15 billion economic impact over the next 20 years. According to projections by the Federal Highway Administration on transportation investment, the Rebuild Alabama Act funding will support an additional 9,000 jobs in Alabama and result in 464 fewer traffic fatalities every 10 years.

\$7.1 billion for urban and \$5 billion for rural roadways. In addition to capacity improvement needs, pavement maintenance needs through 2035 are projected to cost an additional \$8.5 billion. The projected safety improvement needs set forth by the STIP will cost an additional \$7.5 billion.

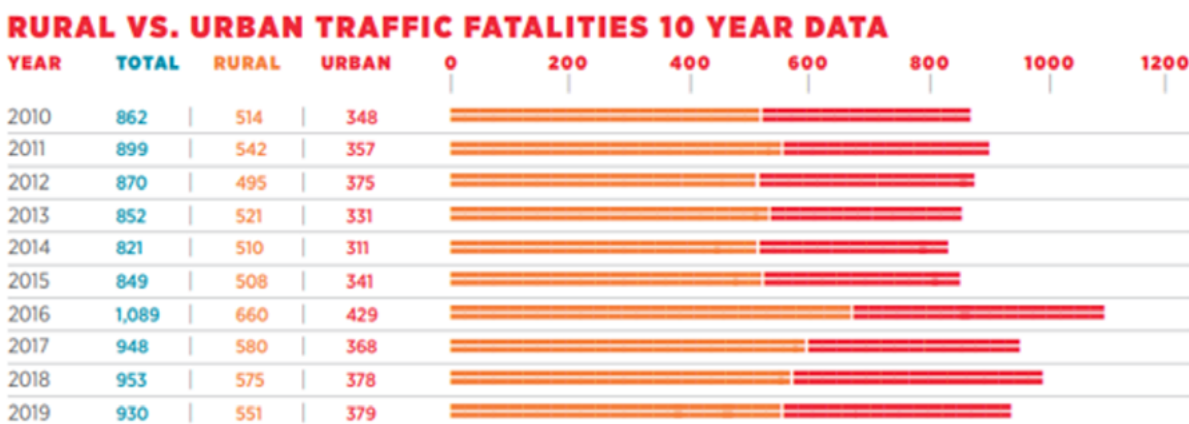
Together, future roadway needs in Alabama are projected to cost almost \$37 billion by 2035. Funding for all highway construction and maintenance through 2035 is projected to be between \$47.4 and \$51 billion. However, these projections include allocations for bridges and pedestrian and bicycle improvements. These additional areas project needs of \$20.5 billion for bridges and \$106 million for pedestrian and bicycle improvements, bringing the total projected needs for highway construction and maintenance in Alabama to \$57.5 billion by 2035. These projections indicate a significant funding shortfall in Alabama of between \$6.5 and \$10 billion by 2035. The IIJA funding would provide \$5.5 billion in additional funding over the next 5 years.

PUBLIC SAFETY

From the 2000s until 2013, there was an average of approximately 871 fatalities per year. Between 2013 and 2016, the average climbed to 920 fatalities per year. In 2018, 953 fatalities were recorded, a rate of 1.36 fatalities per 100

million vehicles miles travelled, which was higher than the national average of 1.14. Notably, in 2018, the fatality rate on Alabama's noninterstate rural roads was 2.88 fatalities per 100 million vehicle miles, or 60 % of total fatalities.

FIGURE 5: TRAFFIC FATALITIES 10-YEAR DATA



As a way to improve safety, ALDOT implemented their Alabama Service and Assistance Patrol (ASAP) in five (5) regions: Mobile, Montgomery, Birmingham, Huntsville, and Tuscaloosa. The ASAP mission is to help facilitate the safe and efficient movement of people

and goods by utilizing effective incident management strategies. This focuses on five distinct services: Traffic Incident Management, Motorist Assistance, Road Maintenance, Emergency Operations, and Work Zone Management.



A.S.A.P. Truck (Photo provided by Ashley Maddox.)

ALDOT and the Alabama Emergency Management Agency (EMA) have identified evacuation routes to deal with large numbers of evacuees from coastal areas. ALDOT has also implemented the Traffic Management Center (TMC) and ASAP programs, as

discussed above. The TMC and ASAP programs utilize various types of surveillance equipment to respond to a variety of incidents ranging from removing debris in the roadway, providing assistance to disabled vehicles, and coordinating incident response with first responders.

RESILIENCY

Alabama's infrastructure must be prepared to meet the challenges in any scenario. In the worst of times, roads provide mobility in and out of areas that are threatened by natural and manmade disasters. The greatest threat to Alabama is hurricanes along the Gulf Coast. However, other threats may include accidents that shut down parts of the roadway, chemical spills that could occur anywhere in the state, and even impacts due to climate change, such as rising sea levels. Roads must be able to recover quickly with minimum disruption to public safety, the economy, and national security.

INNOVATION

Alabama is paving the way with connected vehicle technology. Currently, the University of Alabama's Alabama Transportation Institute (ATI) is working on a \$16.8 million project entitled Advanced Connected Transportation Infrastructure and Operations Network (ACTION). This project will use technology to streamline traffic in normal conditions, bad weather incidents, and special events. The first phase was equipping 85 traffic signals with traffic data logging abilities and radio communications devices to help monitor traffic and adjust the signals as needed. The next phase will be a 32-mile corridor on I-20/59 through Tuscaloosa and to the east. A total of 135 intersections will be upgraded. The key components are a network of sensors, cameras, radar detection devices, traffic signal systems, and



Traffic Management Center - Tuscaloosa (Photo provided by Ashley Maddox.)

communication technology such as the TravelSafely app – a free app that is already widely used in the U.S. that implements the connected vehicle technology.

Alabama has also established the Auburn Transportation Research Institute (AUTRI) this year. In 1986, Auburn and the National Asphalt Pavement Association formed the National Center for Asphalt Technology (NCAT). This center has constructed a 1.7-mile loop test track with 46 sections where highway departments and private industries can test pavement mixtures and different combinations of layer thickness. This track consists of a fleet of loaded trucks totaling 156,000 pounds that run 16 hours a day, 5 days a week driving over this loop to test the pavement performance.



Roads



RECOMMENDATION TO RAISE THE GRADE

The recommendations listed below can help Raise the Grade on future reports cards.

- Coordinate all levels of government to create sustainable, long-term funding mechanisms for funding roadways and consider alternatives to fuel taxes, such as mileage-based user fees.
- Continue research to prioritize pavement preservation and maintenance to extend the lifespan of all roads.
- Increase roadway capacity, identify technologies, and utilize intelligent transportation systems to decrease congestion in urban areas.
- Promote innovative technologies that reduce project costs and speed up project delivery.
- Continue addressing areas where public safety is a concern by identifying unsafe sections of roadways and increasing public awareness of safe driving behaviors



NCAT Test Track Facility
(Photo provided by Christine Hall, NCAT.)



Roads



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Roads



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Stormwater





EXECUTIVE SUMMARY

Alabama's stormwater systems consist of both built and natural infrastructure. Built infrastructure is largely constructed of pipe and ditch systems. Natural infrastructure includes wetlands, streams, vegetation, and other elements that help to manage stormwater quality and quantity using natural materials and processes. The preservation and maintenance of both built and natural systems is essential for ensuring Alabama's social, environmental, and economic interests are addressed. Deficiencies in capacity and condition contribute to increased funding needs and public health and safety risks. Complicating matters is the fact that Alabama communities lack stormwater system inventory and condition assessment data. This absence of data leads to uncertainty in funding needs and prioritization of repair, maintenance, and capital investments. Though the sector is data scarce, it is broadly known that Alabama's stormwater infrastructure has significantly exceeded its design life. Many systems were implemented without uniform community standards, little accounting for upstream development or impacts to infrastructure downstream, and no consideration of the effects of climate change. Finally, dedicated and adequate funding for stormwater infrastructure and management is largely nonexistent in most communities across the state. Therefore, overcoming the current challenges related to stormwater management in Alabama may require a combination of enhancements to state law and regulatory requirements along with development of local technical and revenue-related ordinances.

CONDITION AND CAPACITY

Many communities across the nation and in Alabama lack adequate inventories or data describing location, size, and/or materials information for stormwater infrastructure. This limits communities' ability to perform comprehensive assessments of the condition and capacity of their stormwater infrastructure. Further complicating evaluations of condition and capacity is the fact that many elements of stormwater infrastructure may be owned and managed by various public or private entities such as state or local government agencies, individual or corporate property owners, or homeowners' associations.

The capacity and function of built and natural systems are often compromised by increased runoff due to expanding development in the watershed. Increasing intensity, duration, and frequency of rain events caused by a changing climate also exacerbate local flooding and system degradation. As of 2016, over 3,000 miles of Alabama rivers and streams and over 60% of lakes, reservoirs, bays, and estuaries in the state were too polluted to support designated uses such as fish and wildlife habitat, recreation, fish consumption, and drinking water supply. Stormwater runoff is a leading source for these impairments.

Similar to other elements of Alabama's infrastructure, many stormwater structures and conveyances have outlived or are reaching their design lifespans. Alabama's largest urban expansion occurred in the 1950s, about 70 years ago. This means the stormwater infrastructure needs rehabilitation and/or updates to continue supporting these areas. Furthermore, the cities of Birmingham and Mobile reached their highest populations to date in 1960 indicating that overuse and underperformance has likely been a challenge for decades.

Materials used for closed stormwater systems during Alabama's greatest periods of growth largely consisted of reinforced concrete and corrugated steel. Corrugated High Density Polyethylene (HDPE) was introduced for stormwater applications in the late 1980s and has seen limited use since then. Designers typically expect HDPE plastic to last about 50 years. The anticipated lifespan of reinforced concrete pipe is 70-100 years. The design lifespan for coated corrugated metal pipe is 15-50 years, depending on the corrosive nature of surrounding soils and the type of coatings and linings applied.

Therefore, while satisfying applicable standards of practice of the day, a large percentage of stormwater infrastructure in Alabama was designed and constructed using decades-old design guidance and understanding. Even today, many communities do not have ordinances addressing stormwater design and facility capacity. Where stormwater ordinances do exist, detention requirements, if not applied considering the entire watershed, could actually have adverse impacts. Additionally, many ordinances only provide minimum

capacity requirements for larger anticipated storm events and do not address conveyance of smaller storms that make up the vast majority of storm events in Alabama. Water quality and quantity treatment for smaller storms is typically driven by regulation.

The condition and function of stormwater infrastructure are often impaired by material deterioration, clogging, and capacity exceedances. Design factors of safety for many stormwater systems have been exceeded as system materials have outlived their expected design lives and system capacities have been exceeded by additional runoff from development. Observed indicators of substandard condition and inadequate capacity include localized flooding, erosion and deterioration of enclosed conveyance and open channel linings, and water quality impairments in receiving waters.



Deteriorating and collapsed stormwater infrastructure conveying polluted water. (Photo courtesy of Barry Fagan.)

OPERATION & MAINTENANCE

All stormwater systems require some level of routine maintenance, and the ongoing management of stormwater systems can be complex and expensive. Rather than proactive and preventative maintenance, reactive repair is common in most communities due to limited resources. Levels of operation and maintenance depend on the owner's expertise in managing such assets and funding availability. Entities such as the Alabama Department of Transportation (ALDOT) have processes and asset management systems to help guide operation and maintenance activities. Homeowners' associations are much less equipped to understand and fund the needs of stormwater infrastructure. Alabama cities and counties

vary widely in their ability to adequately fund, operate, and maintain their stormwater systems.

Municipal stormwater regulations include inspection and maintenance requirements for some elements of stormwater infrastructure in urban areas. Elements required to be inspected and adequately maintained are typically those that store or treat runoff and not necessarily those that convey stormwater. Owners and entities outside of urbanized areas and private entities, cooperatives, and individual homeowners are largely not regulated or monitored and are left to manage critical and sometimes expensive components of the community's stormwater system on their own.



Stormwater conveyance and detention basin maintenance. (Photo courtesy of Barry Fagan.)

FUNDING & FUTURE NEED

Alabama Department of Environmental Management (ADEM) Director Lance LeFleur often highlights that Alabama “is dead last in funding.” He is speaking of dedicated funding for state environmental regulation management, but a similar statement could be applied to the lack of dedicated funding for the delivery, operation, maintenance, and repair of stormwater infrastructure. Funding for stormwater management has been a recognized need and challenge for Alabama agencies and communities for many years. In particular, awarded statewide funding loan assistance for green stormwater infrastructure projects decreased from \$1.9 million in 2013 to \$465,000 in 2019. However, through an awareness campaign and a season of catastrophic floods and other storm events, a large disaster-related uptick of \$15.6 million of loan assistance was applied for and granted in 2020. EPA’s Clean Watersheds Needs Survey estimates national stormwater management-related needs at over \$19 billion.

Dedicated funding for maintenance, repair, and expansion of stormwater systems to counter challenges associated with development and a changing climate is insufficient in most communities and nonexistent in others. State

law enables the local collection of stormwater-related user fees. However, the legislation severely limits revenue generation and decision-making at the local level, and few communities have implemented provisions for collecting stormwater user fees. For those that have chosen to establish stormwater user fees, their revenue often does not reach that allowed by law and does not meet their current and future needs.

Of the 69 Municipal Separate Storm Sewer Systems (MS4) communities within Alabama, approximately 25 (36%) have implemented a stormwater user fee. State legislation limits the monthly fee for residential properties to \$0.83, which is 14% of the national median (\$5.87) and 20% of regional median (\$4.22). Further, 18 of the 25 user fees in Alabama charge only half of the fee allowed by law, or \$0.42 per month. In Alabama, the median utility fee equates to roughly \$7 per capita per year, which is in stark contrast to neighboring Georgia at roughly \$46 per capita per year.

State and federal funding assistance is available to address some stormwater-related needs. However, the low interest and grant funding is limited and has not widely

been utilized by communities in need. The federal Clean Water State Revolving Fund (CWSRF) loan program is typically used in the state for potable water and wastewater projects and traditionally underutilized for stormwater projects. As a part of the CWSRF, the state dedicates \$2 million annually for Low Impact Development (LID) and Green Infrastructure (GI) projects. Only three project applications were received in 2020. Likewise, the CWA 319 grant program that prioritizes the restoration of impaired waters has historically been used for agricultural projects and seldom used for urban stormwater projects. The program is underutilized for LID/GI and stream restoration projects.

Three Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) grant programs are available to communities to fund engineering studies and design along with stormwater infrastructure construction. However, of the 433 communities participating in the NFIP, only 10% have received HMA grants for stormwater infrastructure in the 30-year history of the HMA program. Further, only three communities received grants for stormwater infrastructure in the last 10 years, which combined were less than \$500,000.

Funding for stormwater infrastructure should include support for regulatory compliance and enforcement, inspection, maintenance, operations, investment in new construction and retrofit, and other related activities. Many communities lack dedicated sources for this necessary funding. Stormwater-related grants and low-interest loans along with the adoption of stormwater user fees have the potential to address this gap, but in order to do so, available grants and low-interest loans should be maximized along with legislative changes and targeted education campaigns to increase potential revenue generation and overall popularity of user fees.

RESILIENCY & PUBLIC SAFETY

Future stormwater management needs will also be driven by the impacts of climate change. Sea level rise threatens the function of stormwater infrastructure along the Alabama coast. The frequency of more intense rain events will continue to increase across the state. Overwhelmed stormwater management systems contribute to localized flooding, increased runoff of contaminants (e.g., litter,

State law also limits the extent of local standard-setting and regulation, prohibiting a community from enhancing its stormwater services above the bare minimum required by federal law. As the goals of the federal Clean Water Act continue to be pursued, state and federal stormwater regulations are likely to require continued enhancement of stormwater management practices to improve effectiveness.



Huntsville, Alabama urban median bioswale. (Photo courtesy of Barry Fagan.)

Low-impact development and green infrastructure will continue to be seen as more viable solutions for addressing both the quality and quantity of stormwater runoff as it is conveyed in the future. However, new and innovative solutions for stormwater management will also increase the short-term costs of capital construction and add to the strain on local funding for regulation, enforcement, inspection, and maintenance.

It is anticipated that recently passed Infrastructure Investment and Jobs Act will provide additional opportunities for stormwater funding and will likely include provisions for the use of nontraditional runoff management.

nutrients, sediment, bacteria) into local waterways, and could lead to increased transmission of mosquito-borne, fecal-borne, and other types of diseases.

Extreme precipitation events are among the greatest and increasing threats to Alabama's stormwater infrastructure. According to the U.S. Environmental Protection Agency, annual precipitation in Alabama has increased 5 to 10

percent since 1950. Flooding is Alabama's second-most common natural hazard, occurring on average once every 12 days. Approximately 250,000 Alabamians live within the 100-year floodplain (areas with a 1 in 100 chance of being flooded within any given year). Abnormally high runoff volumes and flow rates can expand these floodplains. Stream bed and stream bank erosion are exacerbated by accelerated stormwater runoff flows and volumes, putting critical infrastructure such as roads, bridges, residential and commercial structures, sanitary sewer appurtenances,

and other utility infrastructure at risk, while also leading to water quality impairments and habitat degradation.

Most stormwater systems are capable of quickly recovering from extreme rainfall events. However, damages to residential property and public infrastructure, societal disruption, and threats to public safety caused by inadequate infrastructure capacity and repeated flooding create a much greater socio-economic impact.

INNOVATION

MS4 permits, which address stormwater discharges from highly populated urban areas, require that innovative design approaches, such as low impact development and green infrastructure, be considered where feasible. This requirement is sometimes used to encourage the implementation of innovative practices, but it is often not enough to drive meaningful change on a broad scale. Several cities have recently adopted ordinances that require smaller, "first flush" stormwater runoff to be addressed using both traditional and innovative approaches.

Innovation in construction stormwater management is also advancing as entities like the Alabama Soil and Water Conservation Committee and ALDOT continue to invest in research, education, evolution, and

implementation of best practices. The Auburn University Erosion and Sediment Control Testing Facility and associated researchers are helping to advance the state of construction stormwater management both in Alabama and at the national level.

Other notable innovations being adopted in Alabama by a few public agencies and private developers include computational watershed modeling; automated, real-time rainfall data monitoring and notification; and intelligent rainfall discharge control. Several nonprofit organizations and other entities such as the Alabama Stormwater Association and the Alabama Cooperative Extension Service also continue to promote the technical advancement and sharing of best practices for managing stormwater in Alabama.



Meeting of the Alabama Stormwater Association. Photo courtesy of Scott Rogers



Stormwater



RECOMMENDATIONS TO RAISE THE GRADE

The recommendations listed below can help Raise the Grade on future reports cards.

- Capture stormwater infrastructure inventory data describing location, size, materials, and condition information for stormwater infrastructure in all communities to better determine funding needs and spending priorities.
- Establish uniform and consistent stormwater design standards considering current and future community needs, anticipated rainfall and associated impacts, and nationally accepted best practices.
- Establish and increase the amount of funding dedicated to stormwater infrastructure, management, regulation, and education through stormwater user fees and utilities.
- Facilitate the public's awareness of stormwater challenges and the ways citizens can participate in solving stormwater problems.
- Use different approaches in the development and enforcement of laws, regulations, and ordinances to utilize traditional and innovative stormwater management practices.
- Promote awareness of challenges and effective practices among stormwater professionals (i.e., planners, designers, developers, consultants, contractors, researchers, regulators, and others).

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Stormwater



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Transit





EXECUTIVE SUMMARY

Alabama's public transit systems serve a vital role in connecting the state's residents to jobs, health care, and other critical services. In 2019, public transit provided approximately 6.8 million trips, of which an estimated 86% were made in urban areas, consistent with the distribution of the state's population. Currently, more than 75% of Alabama's counties are served by a transit system translating into access for more than 4.1 million people, or over 80% of the state's total population. The 2019 ridership numbers illustrate a growing demand for transit services in rural communities. However, systems across the state face funding shortfalls that do not adequately provide for services to meet the demands. While it is estimated that Alabama could receive \$400 million in federal transit funding over five years from the Infrastructure Investment and Jobs Act, state support is also needed to ensure seamless travel by transit across the rural/urban divide. Despite the funding shortfalls, Alabama's transit system operators continue to do a commendable job of managing their assets. The condition of the overall system is improving as indicated by the geographic availability of transit services, traditional transit providers' innovative delivery of services, and the application of technology that improve customer communication, access, and service efficiency.

CAPACITY

Alabama's transit systems are comprised of a mix of urban and rural systems. The state has four large, urban transit systems located in Huntsville, Birmingham, Montgomery, and Mobile. These large metro areas are the primary providers of fixed-route bus services. However, some smaller areas such as Tuscaloosa, Gadsden, Anniston, and Phenix City are expanding to offer fixed-route services to accommodate their expanding urban footprints and provide connections between employment opportunities and prospective employees. Combined, the urban transit systems serve an estimated population of 1.5 million residents, about 29.8% of the state's total population. Rural transit services are available in more than 75% of the state's 67 counties providing access to approximately 2.6

million people, about 51.7% of the state's total population. Smaller urban areas provide a combination of fixed-route and rural on-demand services. In all, approximately 4.1 million people, 81.6% of Alabama's total population, reside within areas served by public transportation.

While more than 80% of the state's population has access to public transit, there remains a need for intercity bus service. Intercity bus service would help to bridge the rural/urban divide and provide much needed transit capacity for the state to address mobility disparities. Intra/interregional transit networks would connect rural residents to healthcare services, employment opportunities, higher education, and other services located in urban areas

across the state. Currently, Alabama has no agreement with any transportation service operator, public or private, to provide intercity transit service. Though there are proposals for both commuter and light-rail systems, there are no agencies that operate such intercity transit modes

such as commuter, heavy, light rail, or streetcar systems in Alabama. **Table 1** presents information about the service types offered by each of the four large urban transit systems, the small urban and rural systems, and shows the capacity of these systems.

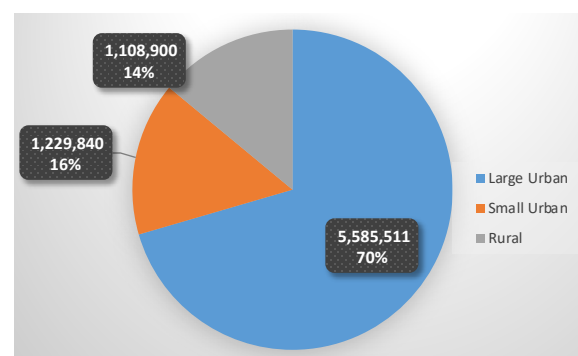
TABLE 1. ALABAMA TRANSIT SYSTEM SERVICE OFFERINGS AND CAPACITY

Providers	Service Types	Fixed-Routes	Vehicles		Minivans / Vans
			Full-Size Buses (28+ pass)	Small Buses	
Huntsville	Fixed-Route Paratransit	10	21	0	24
Birmingham	Fixed-Route Paratransit Central City Circulator Micro transit (Mobility On-Demand)	21	70	40	Not Provided
Montgomery	Fixed-Route Paratransit	14	19	6	Not Provided
Mobile	Fixed-Route Paratransit Central City Circulator	12	20	25	Not Provided
Small Urban and Rural	Fixed-Route Paratransit On-Demand	15	25	182	348

Source: 2019 National Transit Database

The 2019 National Transit Database (NTD) information shows that Alabama's transit systems collectively provided 7.9 million unlinked passenger trips. **Figure 1** illustrates the breakdown of these trips by geographic areas. Approximately 70% trips in 2019 were taken within the large urban areas, 16% within small metro areas, and 14% in Alabama's twenty-eight rural transit systems. **Table 2** outlines the rural transit ridership in 2019.

FIGURE 1. ALABAMA TRANSIT RIDERSHIP IN 2019



Source: 2019 National Transit Database

TABLE 2. RURAL TRANSIT SYSTEM RIDERSHIP IN 2019

Rural Transportation System	Ridership	Rural Transportation System	Ridership
West Alabama Public Transportation	510,522	Pike Area Transit System (PATS)	26,873
Area Wide Community Transportation Service *	253,459	Dekalb County Rural Transportation	21,358
NARCOG Regional Transit Agency *	141,928	Chilton County Transit	20,054
Baldwin Regional Area Transit System	133,765	Transportation for Rural Area of Madison County	17,569
Lee-Russell Council of Governments *	113,766	Guntersville Public Transportation	16,757
Wiregrass Transit Authority *	112,918	Educational Center for Independence	13,852
NACOLG Transit *	108,577	ARISE, Inc.	12,969
Cullman Area Rural Transit System	79,840	Etowah County Rural Area Transportation	12,241
ATRC Rural Transportation	72,199	H.E.L.P., Inc.	11,922
Autauga County Rural Transportation *	43,848	Covington Area Transit System	9,251
St. Clair County Rural Transportation	38,664	ClasTran	8,544
Blount County Public Transportation	30,436	Eufaula/Barbour Transit Authority	7,008
Jackson County Rural Transportation	29,346	Macon County Rural Transportation	5,814
Escambia County Alabama Transit System	27,179	Walker County Rural Transportation Program	2,737

*Ridership for these transit systems is reported to their respective urban area even though they also provide rural transit services.

Source: 2019 National Transit Database

CONDITION, OPERATIONS, AND MAINTENANCE

In 2018, Alabama's transit systems developed Transit Asset Management (TAM) Plans to meet Federal Transit Administration (FTA) requirements. The TAM Plans inventoried all existing assets and set performance measure targets for asset conditions in three areas:

- 1. Rolling Stock.** The percentage of revenue vehicles exceeding their Useful Life Benchmarks (ULBs) for age and/or mileage;
- 2. Equipment.** Percent of equipment exceeding ULBs; and
- 3. Facilities.** Facilities below a 3.0 ratio on a 5.0-point scale for rating condition.

The primary type of vehicle considered in this report are revenue vehicles that carry passengers. Revenue vehicles

include spare and temporarily out of service vehicles, but do not include service vehicles such as tow trucks, repair vehicles, or automobiles used to transport employees.

Since TAM Plans were newly required in 2018, Alabama has a short record of comprehensive data limiting the discussion of condition trends. **Table 3** highlights Alabama's public transit revenue vehicle fleets.

On average, 23.7% of urban and small urban areas' revenue vehicles exceed their ULB for age compared to the 57.1% recorded for rural areas. Additionally, no urban and small urban areas report exceeding the benchmark for mileage while 32.6% of rural area revenue vehicles have surpassed that threshold.

TABLE 3. ALABAMA BASE-YEAR TRANSIT FLEET PERFORMANCE

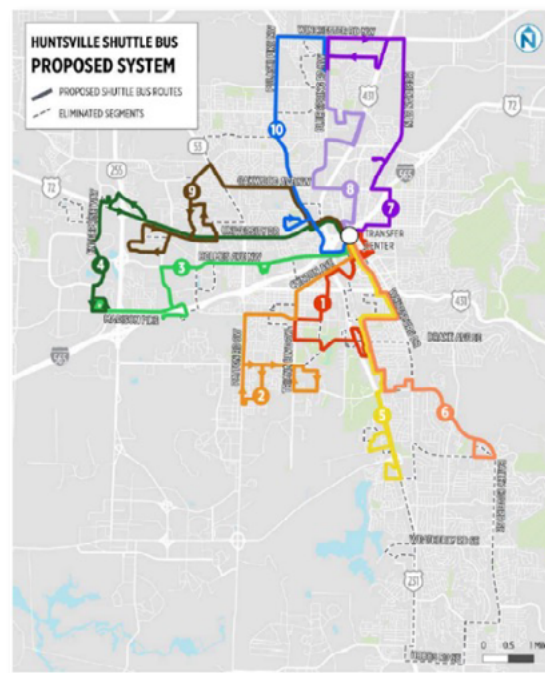
	Revenue Vehicles	Average Age of Fleet (years)	Average Mileage of Fleet	Exceed ULB Age		Exceed ULB Mileage		Exceed ULB Age + Mile	
				No.	%	No.	%	No.	%
Birmingham	110	7.2	281,321	17	15.5%	NA	NA	17	15.5%
Gadsden	18	3.4	84,962	6	33.3%	0	0	0	0
Huntsville	45	5.4	194,783	7	15.6%	NA	NA	7	15.6%
Mobile	63	9.3	429,056	27	42.8%	NA	NA	27	42.8%
Montgomery	39	14.1	430,133	7	17.9%	NA	NA	7	17.9%
Tuscaloosa	12	4.9	143,363	4	33.3%	NA	NA	4	33.3%
Urban/S. Urban	287	7.3	260,603	68	23.7	0	0.0%	62	21.6%
Rural	555	6.4	109,249	317	57.1%	181	32.6%	177	31.8%

Source: 2019 National Transit Database

Preventative maintenance is the regularly scheduled oil changes and bus inspections that typically occur based on a set mileage interval, which is typically every 5,000 miles for smaller body on chassis vans and every 7,000 miles for medium and heavy-duty buses.

Some urban systems also include predictive maintenance. Predictive maintenance is based on historic data of component failures. If an agency can predict the specific mileage that a component may fail, it can repair, rebuild, or replace that component before it fails, resulting in preventing a service interruption – examples include transmission rebuilds, engines, and suspensions.

Non-scheduled maintenance are the component and mechanical failures that occur throughout the life of a bus that are not planned, predicted, or scheduled. These failures typically result in service disruptions. Examples of non-scheduled maintenance include belts slipping off pulleys, clogged DEF filter throwing a check engine light, wheels damaged in potholes, and vehicle accidents, to name a few. The better an agency does with predictive and preventable maintenance, the longer the average miles interval between service interruptions and non-scheduled maintenance.



Huntsville Proposed System

Some areas such as Huntsville and Birmingham have completed route reevaluations of their transit systems. In Birmingham, the reevaluation improved route efficiency, service frequency, and expanded coverage using new

service delivery models. Huntsville Transit is in the process of implementing recommended route changes, expanding temporal coverage by extending weekday evening service and adding Saturday service, expanding coverage by extending service to employment centers, improving route efficiency by eliminating underutilized and circuitous routes, increasing service frequency to

30-minutes, and improving market visibility through a wholesale rebranding of the system.

The Birmingham Intermodal Terminal opened in 2018. In a single facility, services include fixed-route transit, intercity bus (Greyhound and Mega Bus), Amtrak rail service, taxis or ride-sharing services, and micro- and shared-mobility.



MAX Central Station at the Birmingham Intermodal Terminal. (Photo courtesy of Darrell Howard.)

FUNDING & FUTURE NEED

Alabama struggles with providing adequate public funding for its transit systems. Local municipalities and county governments provide most of the funding for public transit service. However, there is currently no state funding for public transit. Financing for urban and rural providers typically comes from a combination of federal and local funds. For example, Jefferson County annually provides \$2 million to the Birmingham-Jefferson County Transit Authority (BJCTA) from a Special Revenue Sales and Use Tax generated from beer (canned and bottled) sales. Additionally, the city provides an annual allocation from its operating budget. In FY2020, Birmingham provided \$10 million. However, in FY 2021 Birmingham amended its allocation to the BJCTA downward, reducing the amount to \$5 million. The reduction was the result of revenue shortfalls resulting from the pandemic. The FY 2022 budget proposes to maintain the allocation at \$5 million. In addition to its allocation to BJCTA, the City of Birmingham also provides an approximate annual average allocation of \$994, 275 for:



Orbit - Huntsville Transit's New Brand Identity
(Photo courtesy of City of Huntsville.)

- Birmingham On-Demand, a city-operated micro-transit service;
- ClasTran, a nonprofit transportation provider that extends elderly and disabled services beyond the ¼ mile fixed-route service area, and;
- Birmingham Bus Rapid Transit (BRT) capital expenditures.

Finally, Jefferson County municipalities outside of Birmingham purchase fixed-route and paratransit transit

service from both BJCTA and ClasTran. Municipalities pay a contract fee based on the number of fixed-route revenue service hours provided within the municipality. ClasTran also charges an hourly rate. At present, 10 cities out of the county's 14 municipalities receive fixed-route transit service.

Most public transit service providers in other urban areas around the state are city/county departments and not independent authorities. This means funding for operational and capital expenses are allocated as line items within the principal city/county's annual budget. Agencies that also operate public surface and structured parking, such as the Tuscaloosa Transit Authority and Huntsville Transit Authority, receive revenue from the fees collected.

In the past decade, there have been no major state or regional funding referendums to support public transit. The State of Alabama's Constitution prohibits money collected from its fuel tax to be allocated to public transit,

a holdover from the Jim Crow era. There have been attempts to persuade the Alabama Legislature to allow a Constitutional Amendment to be placed on the ballot that would lift the restriction. However, these attempts have been unsuccessful. Funding shortcomings aside, many of the state's transit systems have been able to maintain services and even grow, introduce innovations, and implement changes using a combination of local monies, partnerships, innovation, and creativity.

Likewise, the Alabama Department of Transportation (ALDOT), in cooperation with the Office of Public Transportation (OPT) at the University of Alabama in Huntsville (UAH), has helped rural transit service providers to maintain and grow their services, aiding providers to lower administrative costs by providing them with administrative assistance and creatively leveraging state resources to procure capital equipment at preferred pricing.

In the past decade, there have been no major state or regional funding referendums to support public transit. The State of Alabama's Constitution prohibits money collected from its fuel tax to be allocated to public transit, a holdover from the Jim Crow era.

PUBLIC SAFETY

In 2020, ALDOT Public Transportation Division developed a Statewide Public Transit Agency Safety Plan (PTASP) and aided urban and rural transit providers in setting specific targets. During development of the initial PTASP, Alabama's 12 urban (large and small) transit agencies reported a total of 106 safety events and no fatalities.

Each year during the FTA Certifications and Assurances reporting process, Section 5307 agencies transmit updates to its Safety Performance Targets (SPTs) to both their area Metropolitan Planning Organization (MPO's) and ALDOT (unless those agencies specify another time in writing).

Public transit systems, particularly in rural areas, also

serve a vital role in public health. A 2018 survey conducted by the Alabama Department of Public Health (ADPH) shows that Alabamians identified access to medical care as their greatest health concern. While "access" can mean different things, the lack of transportation is a barrier to adequate healthcare, which leads to racial and economic disparities, lower life expectancy, and diminished quality of life. These facts are more evident during the COVID-19 global health pandemic, when public transit providers were the only option to access essential services, such as doctor appointments, COVID-19 testing centers, and vaccination clinic sites. Public transit continues to provide access to essential services through the COVID-19 endemic.

RESILIENCE

Alabama's transit systems have demonstrated resilience by maintaining operations throughout the COVID-19 global health pandemic during which transit has played a vital role in safely moving essential workers. One step towards resilience was taken when Alabama utilized 100% of the available federal Coronavirus Aid, Relief, and Economic Security (CARES) Act allocations to offset urban and rural area pandemic-related losses:

- Operating expenses,
- Administrative expenses,
- Planning activities, and
- An innovative BOGO (buy-one, get-one) capital

equipment program. BOGO on rolling stock was buy-one at 80% federal/20% local price match and get one at 100% federal.

However, a resiliency challenge emerging from the pandemic is the establishment and maintenance of new passenger safety measures amid significant revenue and workforce declines. Similar to most other transit agencies in the U.S., Alabama's transit systems will need to build consumer confidence in the public health and safety of its ridership and beyond to enhance revenues to sustain transit services.

INNOVATION

Fuel and Propulsion

Huntsville Transit is currently assessing the feasibility of converting its fleet to all electric vehicles. Alabama A&M University currently operates 5 battery-electric buses and is building a charging station capable of charging up to 16 vehicles simultaneously. MAX Transit in Birmingham operates 100% of its fixed-route fleet on compressed natural gas (CNG). Tuscaloosa transit is currently operating its entire paratransit fleet on propane. Montgomery and Mobile's transit fleets are comprised of hybrid and CNG vehicles.

Community Outreach

The Birmingham Transit System operates the Birmingham Central Market, a farmer's market, at the MAX Central Station bus terminal. The Birmingham Central Market helps address the City of Birmingham's issues with food deserts by using transit to bring residents in neighborhoods without fresh foods to a central location where they can purchase groceries and then return home. The Birmingham Central Market was funded through a partnership between the FTA and the U.S. Department of Agriculture.



Birmingham Central Market
(Photo courtesy of The Birmingham Times.)

New Modes

The Birmingham Xpress, Alabama's first Bus Rapid Transit (BRT) line, will open for revenue service in 2022. The Birmingham Xpress BRT will operate using battery-electric buses with quick charge stations at the Birmingham Central Station and terminal BRT stations. The Birmingham Xpress also will launch with a touchless fare collection system.



Birmingham Xpress BRT Vehicle (Photo courtesy of the City of Birmingham.)

Technology

All of the large transit systems, many of the small urban systems, and several rural systems have implemented real-time vehicle tracking, making this information available to the public so that travelers can better gauge vehicle arrivals at stops. Huntsville and a number of rural agencies are also planning to launch touchless fare systems. Huntsville and the rural agencies will launch their new mobile fare system through a smartphone application. Other technological and operational innovations utilized by transit agencies across Alabama include:

- Solar Lighting of Bus Stops – Huntsville
- Dynamic bus bay route arrival announcement – Birmingham
- Mobility-on-Demand (MOD) services – Birmingham and Mobile
- Mobile Wi-Fi – Birmingham
- First Mile/Last Mile Shared/Micro-mobility Integration – Huntsville, Birmingham, and Mobile



Transit



RECOMMENDATION TO RAISE THE GRADE

Recommendations to raise Alabama's grade for transit infrastructures include the following.

- **Funding for Public Transit.** Dedicated state funding would help leverage federal funding, offset capital expenses, and supplement or augment provider revenue and local support for system operations. In urban areas, the state's funding could be transformative. It would enable larger systems to leverage federal dollars for new services, modal technologies, capital equipment, and facilities, spurring regional economic growth. State funding could also kick-start economic development in smaller urban areas and rural communities by connecting employees and enabling businesses opportunities.
- **Provide Equitable Coverage and Access to Transit.** Although 51 counties in Alabama offer rural public transportation, there are still 16 rural counties that do not have any form of public transportation services. The lack of transportation negatively impacts residents' access to medical care, affects their quality of life, and reduces life expectancy. Additionally, in some rural areas, transit services are limited to certain days, communities, operating hours, and serve a limited number of locations.
- **Service Integration across Geographies.** There is a need to connect urban and rural transit systems to reduce travel barriers and create a near-seamless transportation network that enables residents to accomplish intraregional travel from rural communities into urban areas and intercity travel, connecting multiple regions. An intercity bus service could expand the travel footprint for communities across the state, greatly improving access to employment, educational opportunities, and health and social services for Alabama residents.
- **Regional Transit Systems.** Alabama's urban transit systems typically serve a limited geographic footprint, confined to a central city and a few suburban communities. However, travel sheds for these urban areas (i.e., the set of all the destinations that can be reached from a location within a specified time) extend to a much larger region. Expansion of the urban systems is limited because of their funding mechanisms and funding availability, and regional approaches to public transit service provision could help increase access to jobs and services in suburban communities. At the same time, regional transit systems might also begin to serve commuters and choice riders and reduce traffic volumes and congestion.



Transit



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Wastewater





EXECUTIVE SUMMARY

Alabama needs nearly \$3.1 billion over the next 15 years for their wastewater collection systems (60%) and secondary and advanced treatment systems (40%). An increasing population along with industrial and manufacturing growth exacerbate these needs and put pressure on systems' capacities with at least 50% needing expansion to reliably treat and convey wastewater. Additionally, one quarter of the more than 800,000 septic tanks are estimated to be failing, contributing to potential human health challenges. Utility billing rates are only two-thirds of the national average, have remained stagnant, and have proven inadequate to sufficiently operate, maintain, and improve the state's wastewater systems. Further complicating the simple solution of raising wastewater rates are affordability concerns, particularly in a state with 15.5% of households at or below the poverty level. Attempting to fill the gap is the increasingly utilized federal funding that has risen 4-fold over the last three years including the passage of the Infrastructure Investment and Jobs Act. While Alabama has improved the sector's resilience with new approaches to system management, it still needs to strengthen physical infrastructure from potential extreme weather events or cyberattacks. In preparation for the future, the sector is focusing on workforce development, sanitary sewer overflows, and rural wastewater challenges, while noting proactive planning, operation, and maintenance activities leading to downward trends in violations and non-compliance issues.

BACKGROUND

The Alabama Department of Environmental Management (ADEM) regulates wastewater permits authorizing more than 1,300 permit holders to discharge treated effluent into the state's waters. Of these, there are over 500 permits for publicly-owned treatment works (POTWs), and 805 permits for non-POTWs.

There are a significant number of private wastewater dischargers – pulp and paper, chemical manufacturing, metals, energy, and mining industries – that typically own and operate their own facilities, many of which are

permitted for direct surface water discharge rather than through a POTW. Others are subject to monitoring and pretreatment prior to discharging to municipal systems.

Outside the reach of municipal collection, septic systems are the primary wastewater infrastructure. The Alabama Onsite Wastewater Board provides examination, licensure, and regulation for septic system installation, manufacture, and service, while installations are permitted and administered by the Alabama Department of Public Health.

INTRODUCTION

Between 2010 and 2020, Alabama's population rose by 6.3% to just over 5 million residents or nearly 1.9 million households, 66% of which live in incorporated cities or towns. The median household income from 2015 to 2019 is below \$51,000, and more than 15% of Alabama

residents live below the poverty line. These trends indicate that Alabama's wastewater infrastructure must carefully balance affordability and capacity expansion to meet communities' needs.

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CONDITION & CAPACITY

Alabama has over 1,317 National Pollutant Discharge Elimination System (NPDES) permit holders, 515 of which are POTWs, including 121 major permitted dischargers and 394 non-major dischargers. According to a 2019 survey of wastewater service providers, there are 245 wastewater rate-charging utilities in the state. These utilities serve industrial users, commercial facilities, and more than 2.4 million residents, many of whom are in communities of 10,000 or less.

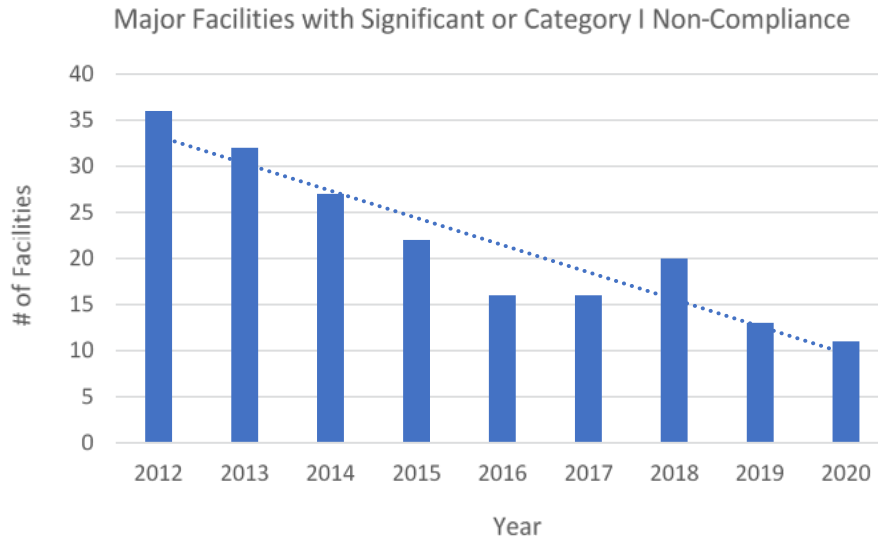
Violations and findings of significant non-compliance have been trending downward for both major and non-major facilities. Figure 1 shows facilities reporting these issues fell from 35 in 2012 to around 10 in 2020. This trend is the product of proactive planning, operation, and maintenance activities that improved performance and addressed capacity challenges, as evidenced by the increasing levels of asset management program implementation taking place in many of the largest utilities across the state, such as that currently being performed by the Jefferson County Environmental Services Department, which serves the greater Birmingham area.

Sanitary Sewer Overflows (SSOs) are a persistent challenge for the state's wastewater sector. SSOs are incidents where untreated sewage is discharged from a sewer system directly into the environment. Many

wastewater service providers are preemptively trying to identify, communicate, and correct the underlying condition and capacity issues that cause SSOs. One capacity challenge contributing to SSOs occurs when wastewater collection systems experience infiltration and inflow from rain events. During periods of wet weather, ADEM receives as many as 30 SSO reports a day from affected wastewater utilities.

At least 50% of the state's wastewater infrastructure – including treatment systems and conveyance networks – is currently experiencing or soon approaching a need for expansion. In the last decade, about half of the state's 20 largest wastewater treatment plants (WWTPs) and collection systems experienced annual average flows that were nearing their design threshold, or more than 75% of the design flow. These systems serve approximately one-third of the population, but over half of them have not upgraded their systems within the last 10 years. Additionally, 60% of the state's largest systems had at least 1 permit violation due for excess flow in the past year. All have preventive maintenance programs and 85% ranked their facilities in good or better condition indicating that maintenance efforts may be shifting towards a more preventative rather than reactionary approach.

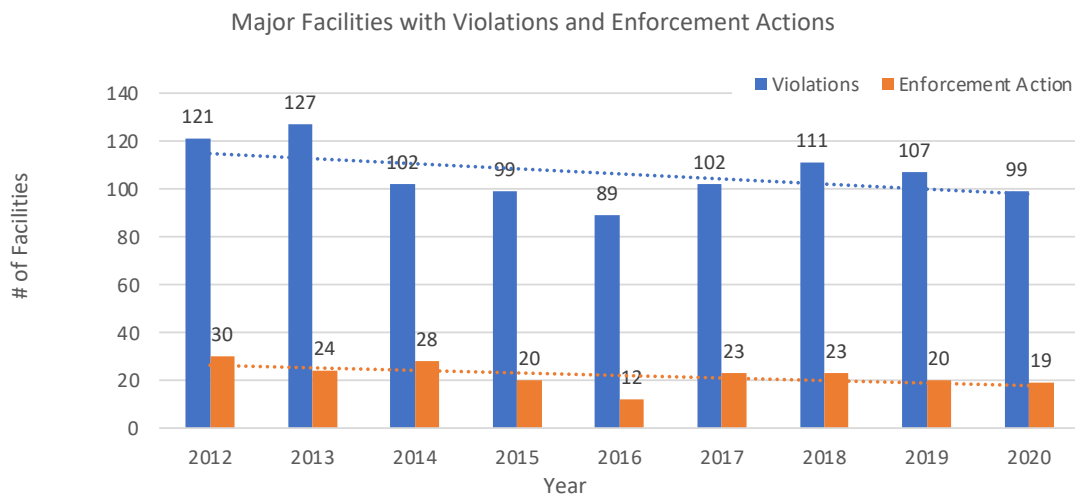
FIGURE 1: NON-COMPLIANT MAJOR FACILITIES



Alabama has more than 800,000 private septic systems utilized by residents not connected to a municipal WWTP. With appropriate operation and maintenance, community septic systems are suitable wastewater treatment options, but typically have a lifespan of 20-30 years, as opposed to wastewater treatment plants that have lifespans of 40-50 years. Currently, about a quarter of them are estimated to be failing, contributing

to the contamination of groundwater and surface water and creating potential human health challenges. Overall, while Alabama's surface water is generally of high quality, collection system failures (such as SSOs or system exfiltration due to leaks or breaks) contribute to approximately 14% of river/stream impairments, while on-site wastewater systems contribute to 2%, and municipal sources contribute to 12%.

FIGURE 2: MAJOR FACILITIES WITH VIOLATIONS AND ENFORCEMENT ACTIONS

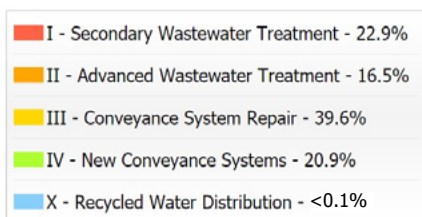
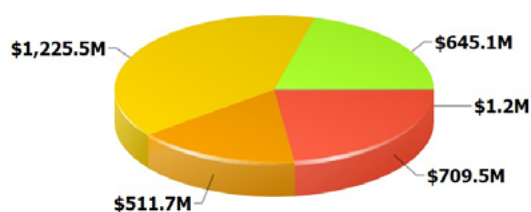


FUTURE NEED

Addressing infrastructure rehabilitation, repair, and replacement is the largest future need in the state. However, in certain areas, there is also significant need to develop new infrastructure to accommodate growth, deal with known water quality challenges, and handle increasingly stringent regulations. Alabama's infrastructure has an almost \$3.1 billion capital improvement need over the next 15 years. Almost 60% of these needs are for collection systems to address aging infrastructure and accommodate new growth while the remaining 40% is needed for secondary and advanced treatment systems. Spending for wastewater infrastructure improvement in Alabama versus the overall capital investment need echoes national investment gap trends.

FIGURE 3:
DOCUMENTED NEEDS BY
CATEGORY

Total Needs: \$ 3,092.9M

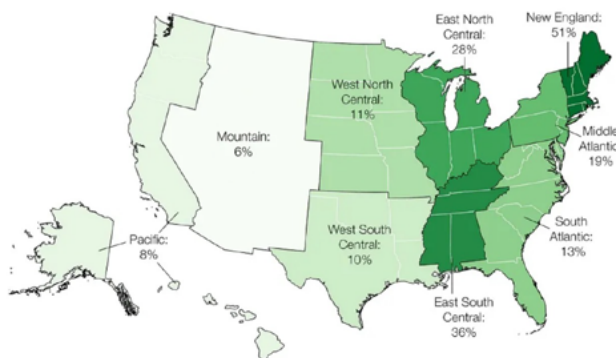


Source: EPA Clean Watershed Needs Survey Database

Alabama's recent residential growth, along with the anticipated increase to the industrial and manufacturing sectors, puts pressures on utilities that are often unable to expand or modify annexation boundaries that enable application of local planning and zoning requirements at a pace that keeps track with development. The result is an increasing reliance on on-site systems such that

approximately 36% of new construction utilizes septic tanks to meet wastewater needs.

FIGURE 4: % of NEW
CONSTRUCTION ON SEPTIC



Source: Circle of Blue

Increasingly stringent water quality regulations, particularly around the discharge of nutrients such as nitrogen and phosphorus compounds that can contribute to surface water quality degradation, will continue to place pressure on Alabama utilities to upgrade treatment systems. Many dischargers are proactively working to address these challenges through collaborative approaches on pollutant management with other point and non-point sources of regulated compounds in their watersheds, to reduce the need for costly advanced treatment plant improvements.

One of the major challenges to municipal wastewater providers in meeting future needs is the market's ability to support the large amounts of construction required. Even if funding is readily available, the required pace of improvement could be limited by the construction industry's workforce and delivery capacity at the state or local levels given other infrastructure needs outside the wastewater sector. Alternative delivery mechanisms such as progressive design-build or construction management at risk have increasingly been used in other states to successfully supplement the industry's needs. To manage risk, expedite the construction schedule, and contain costs, while also diversifying available resources for delivery, Alabama's wastewater sector may benefit from such approaches.

OPERATION & MAINTENANCE

Alabama's wastewater infrastructure is owned, operated, and maintained by a variety of public and private entities. Most of the wastewater service providers responsible for operation and maintenance (O&M) are municipal or county governmental entities. There are also a number of independent utility boards/authorities, private utility owners, and some municipal entities that contract out O&M to private companies. Wastewater service providers are required to meet state regulations for having enough certified O&M staff based on the size of the facility

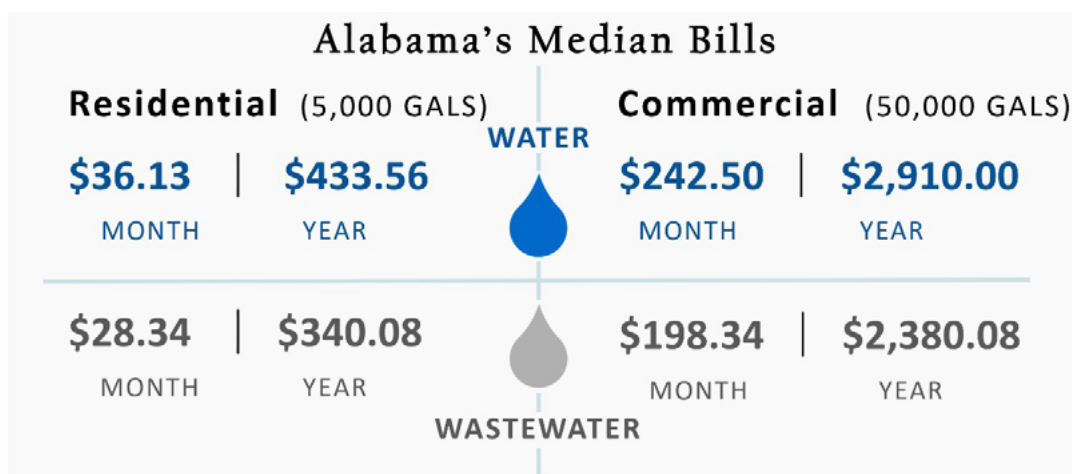
or collection system. Many entities are challenged to maintain enough O&M staff with the appropriate certification due to the increasing age of the workforce and lower numbers of personnel interested in obtaining such certifications. Some entities, such as the Alabama Rural Water Association, provide operator training support and resources to smaller utilities, while many larger utilities have in-house training programs or contract out to third-party service providers to educate new staff or provide continuing education to existing staff.

FUNDING

Wastewater service providers in the state operate, maintain, and construct new wastewater infrastructure improvements using a combination of funding and financing mechanisms. Most utilities fund the costs of operation and ongoing facility maintenance through customer usage rates. Over 70% of utilities' budgets are used on O&M expenditures while 30%, on average, fund capital expenditures.

Alabama's median residential wastewater bill is \$28.34 per month, and the median commercial bill is \$198.34 per month. This is significantly less than the national average wastewater bill of \$504 per year, or an average of \$42 per month. Most utilities do not have separate rate scales for industry or manufacturing sectors. While more than 70% of utilities are charging sufficient rates to keep up with O&M costs, one in five utilities have not recently updated rates and are at risk of having insufficient funds for system needs.

FIGURE 5: MEDIAN WASTEWATER BILLS



Source: 2019 EFC/ADEM Alabama Water and Wastewater Rates Report

The EPA standard for an affordable usage rate is for households to spend no more than 2% on drinking water and 4.5% of median household income on both drinking

water and wastewater services. Currently, the national median range for wastewater spending is between 1% - 1.7% of household income while Alabama's median value

is even less at 0.93%. Most utilities that are not charging sufficient rates are small systems serving a population of less than 10,000. However, simply increasing wastewater rates across the board as a percentage of household income will likely yield affordability challenges, particularly for residents living at or below the poverty level. Therefore, decision makers have the important task ahead of determining acceptable, sustainable, and affordable utility rates that also take into consideration the full life cycle costs of infrastructure maintenance, repair, and replacement.

At the state and federal level, there is continued funding and expansion of low-interest infrastructure loan programs such as the Clean Water State Revolving Loan Fund (CWSRF) and Water Infrastructure Finance and Innovation Act (WIFIA) along with grant programs such as

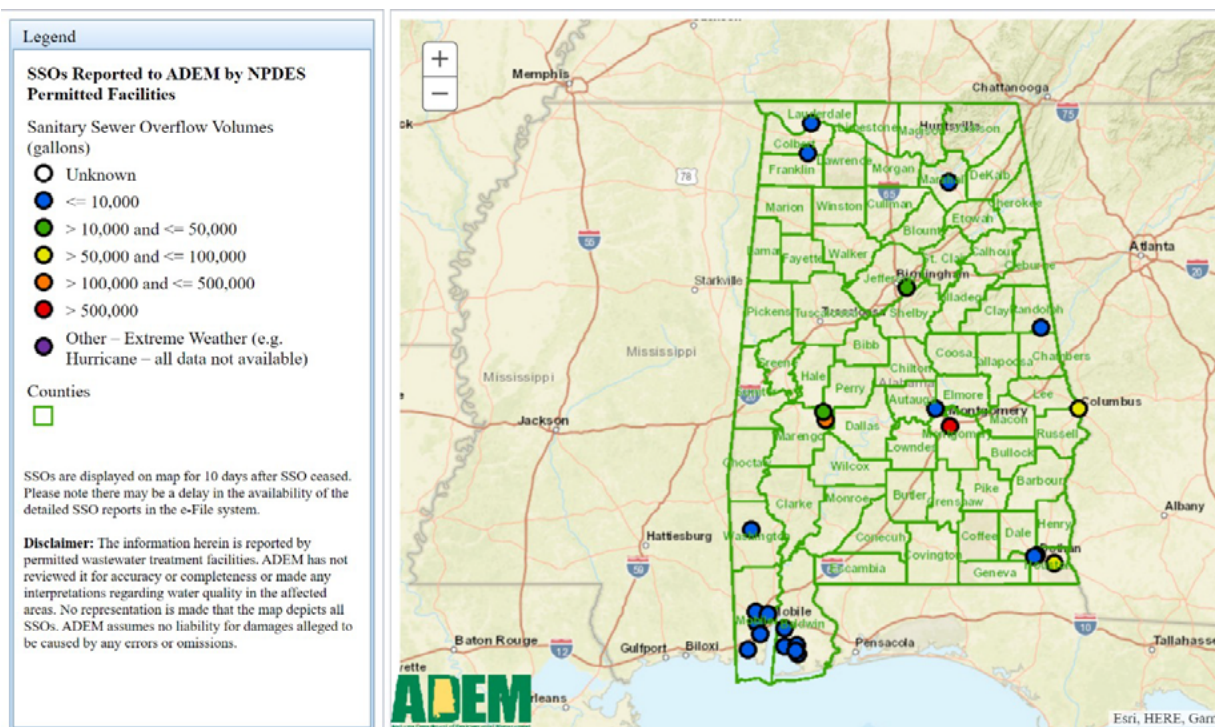
EPA's Sewer Overflow and Stormwater Reuse Municipal Grant Program, Community Development Block Grants and the Federal Emergency Management Agency's Building Resilient Infrastructure and Communities. Many larger utilities take advantage of the CWSRF's low interest loans, typically at 1-1.5% less than municipal bond rates. In FY2020, ADEM distributed low interest loan agreements (2.2% interest rate) to 11 borrowers, totaling \$86,630,000, for a combination of wastewater treatment and collection system improvements. This represents a significant increase from prior years, with loan agreements provided in FY2019 to 8 borrowers, totaling \$58,590,000, and in FY 2018 to 6 borrowers, totaling \$25,315,000. These numbers will only continue to trend upward with the recent passage of the Infrastructure Investment and Jobs Act.

PUBLIC SAFETY & INNOVATION

Alabama's wastewater systems are focused on improving public safety and utilizing innovative approaches to do so. SSOs are one of the primary challenges Alabama deals with in maintaining public safety due to aging

infrastructure and increased intensity of rainfall to the region. Alabama has recently established several systems to proactively manage the risk of wastewater impacts on public health.

FIGURE 6: ADEM'S SSO MAPPING APPLICATION



Source: ADEM's SSO Mapping Application

ADEM's SSO Mapping System allows public users to see the locations of SSOs that have been reported to the department. The public can also register for notifications for when an SSO has been reported/identified. As of 2017, electronic reporting for SSOs is also being incorporated into all new permits and renewals. The Alabama Rural Water Association conducts training classes for utilities and operations staff around SSO reporting and compliance. Utilities are also deploying innovative approaches to better manage SSOs and protect watersheds. Innovations include digital collection system monitoring devices and in-system storage controls based on observed system conditions.

The rural Black Belt area of the state is known to have wastewater challenges due to soil with high clay content that does not readily allow septic system effluent to

drain down through the soil. Many homes in this area are economically-disadvantaged and some have inadequate septic systems or "straight pipe" discharges into nearby ditches or sumps. These systems are known to contribute to diseases such as hookworm and mosquito-borne illnesses such as West Nile Virus. Multiple grants have provided resources to study this issue and determine feasible ways to address the problem. In 2021, \$4.85 million Technical Assistance and Training for Innovative Regional Wastewater Treatment Solutions (TAT/RWTS) grant was awarded to the Consortium for Alabama Rural Water and Wastewater Management – led by the University of South Alabama (USA) in partnership with the University of Alabama, Auburn University, and the Alabama Department of Public Health – to research and develop innovative solutions to address the Black Belt issues.

RESILIENCY

Alabama's wastewater utilities have improved the resilience of the sector's approach to management but need to increase focus on strengthening physical infrastructure.

First, the impending loss of institutional knowledge from many operations staff nearing retirement age and/or leaving for higher wages represents a significant challenge to systemwide resilience. There is an increased focus on improving and expanding access to operator training programs and certification while also exploring new job classifications and developing clearer internal advancement pathways. However, some utilities will absorb a portion of these personnel changes by expanding their digital footprint with more computerized maintenance and asset management systems. As the sector becomes more connected, Alabama's wastewater utilities will need to resiliently evolve by using best practices from the National Institute of Standards and Technology (NIST) Cybersecurity Framework. Currently, many systems remain vulnerable to cybersecurity threats, and additional training and funding are needed to help wastewater utilities withstand and/or recover from potential cyberattacks.



*Example of straight pipe discharge in the Black Belt.
(Montgomery Advertiser, July 2018.)*

Additionally, Alabama's aging wastewater infrastructure network struggles under the increased frequency and severity of weather events. In many areas of the state, though the ages of collection system varying widely, many are operating past their useful lives of 50 years. This means they were likely not designed to accommodate the impacts of climate change. Therefore, planning and design approaches that sufficiently manage the infrastructure challenges compounded by the increased frequency and intensity of weather events are need.



Wastewater



RECOMMENDATION TO RAISE THE GRADE

The recommendations listed below can help Raise the Grade on future reports cards.

1. Implement enhanced public awareness and education campaigns on the importance of well-maintained wastewater infrastructure for the public health and on the stable jobs available in the wastewater industry.
2. Continue repairing infrastructure and increase focus on proactive maintenance of assets.
3. Expand funding and support for implementing enhanced security and resilience enhancement for water utilities, including infrastructure and cybersecurity.
4. Continue workforce training and development programs, support their development at the utility level, and increase knowledge transfer for implementing technology systems.
5. Encourage sewer rate structures that provide affordable utility rates that also take into consideration the full life cycle costs of infrastructure maintenance, repair, and replacement. Extend education of loan programs available for communities to access funds for infrastructure improvements.
6. Develop a comprehensive education campaign on the true costs and savings associated with investment in critical infrastructure and disseminate around the state through publicly accessible channels and platforms.
7. Explore legislative approval of alternative delivery mechanisms such as Construction Management at Risk (CMAR) or design build and for improving the speed, maintaining cost certainty, and attracting additional contracting resources to the state for implementing the needed infrastructure improvements.

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