



SOUTH CAROLINA SECTION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS



INFRASTRUCTUREREPORTCARD.ORG/SOUTH-CAROLINA



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Executive Summary

We all use infrastructure every day, but we rarely think about it. Whether you are driving to work on roads and bridges, fishing beside a dam or getting a glass of water on a hot summer's day, infrastructure affects everyone in South Carolina. It also impacts the industries that power our economy bringing goods across our state and taking workers to their jobs.

Although South Carolina has made recent efforts to improve our aging infrastructure, there are some challenges you should be aware of. Infrastructure deteriorates every single day as it ages and many of these critical systems need improvement, repair, or replacement. Furthermore, our rapidly growing population is straining the capacity of our systems.

Fortunately, civil engineers focus on infrastructure every single day. The South Carolina Section of the American Society of Civil Engineers (ASCE) has prepared our first Report Card so every resident and decision maker can understand the current condition of our state infrastructure. If you live, work, or play in South Carolina, this Report Card is for you.

About The Report Card for South Carolina'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 South Carolina, we want to share what its condition is and what can be done to improve it.

Methodology

The purpose of the Report Card for South Carolina'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

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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.



Recommendations to Raise the Grade

- 1. The federal government should fully fund authorized infrastructure programs to invest in South Carolina's aging infrastructure to support the growing population.
- 2. Continue the current momentum and trend that state and local agencies as well as utilities have taken to invest traditional funding and newly implemented revenue channels toward maintaining and improving infrastructure.
- **3.** Design, operate, maintain, and expand infrastructure using consensus-based codes and standards, focusing on resilience and life cycle cost as the best measures of infrastructure performance and best use of taxpayer dollars.
- 4. Develop a comprehensive education campaign on the true costs and savings associated with investment in critical infrastructure and disseminate it statewide through publicly accessible channels.
- 5. Establish funding and grants to assist programs that enhance the quality of public service in the areas such as drinking water, wastewater, regional transit and aviation. These programs would consist of utility consolidation where appropriate, resilience improvements, capacity-related infrastructure upgrades, and technical career training that retains South Carolina's talent.
- 6. Ensure that infrastructure investment is strategically focused on efforts that maximize good-paying jobs, promote South Carolina's economic competitiveness, and enhance usability for the state's residents and visitors.



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EXECUTIVE SUMMARY

Aviation is a key component to South Carolina's economic growth. A 2018 study of the state's aviation sector showed that 7% of the workforce and \$16.3 billion of economic impact were attributed to South Carolina's 57 airports. Within five years, the state's demand for flights is projected to increase by nearly 15% while the air cargo sector is also growing. This growth is contributing to congested airspace, delays, and capacity challenges. Furthermore, only five of the six commercial service airports are reporting a pavement condition index above the expected threshold. To maintain and expand runways and terminals, update technology, and ensure the public has easy access to safe airports, calculations show that South Carolina has an annual investment need of nearly \$154 million through 2023. However, experts predict the state's funding could fall short by as much as 75%. Although there is significant future need, the aviation sector shows areas of progress including the new, annual benchmark set for inspecting airport pavement and prioritizing the recovery of aviation infrastructure in the wake of natural or manmade disasters.

CAPACITY

Aviation's positive impact on South Carolina began in the late 1920's when the state's first commercial airport opened. Today, the state boasts 57 airports: 6 commercial, 14 corporate/executive, 19 business/recreation, and 18 recreation/local. Of the total, more than 50 are general aviation airports and 6 are air carrier airports.

The FAA requires a master plan for each airport to be updated every 10 years. In South Carolina, 100% of airports which are eligible for federal funding have updated plans. Seventy-five % of the state's total airports have updated layout plans which are being implemented. The 2018 South Carolina Statewide Aviation System Plan and Economic Impact Report (SCAC Report) highlights tower data which indicates the state's demand for flights from all airports will increase from nearly 750,000 in 2016 to more than 860,000 by 2026, exceeding the national average. In the following table, enplanement growth can be seen at the state's six commercial airports between 2017 and 2018 with only Florence Regional showing a decrease when compared 2018 to 2016.

Current SC Designation	City	Airport Name	Hub	CY 16 Enplanements	CY 17 Enplanements	16 to 17 % Change	CY 18 Preliminary Enplanements	17 to 18 % Change
Commercial Service (SCI)	Charleston	Charleston AFB/ International	S	1,811,695	1,945,699	7.40%	2,194,130	11.32%
Commercial Service (SCI)	Columbia	Columbia Metropolitan	S	553,658	510,188	-7.85%	566,975	10.02%
Commercial Service (SCI)	Florence	Florence Regional	N	45,300	42,058	-7.16%	44,333	5.13%
Commercial Service (SCI)	Greer	Greenville Spartanburg International	S	991,276	1,051,089	6.03%	1,133,165	7.24%
Commercial Service (SCI)	Hilton Head Island	Hilton Head	N	30,956	26,220		36,732	28.62%
Commercial Service (SCI)	Myrtle Beach	Myrtle Beach International	S	944,849	1,131,959		1,254,433	9.76%

Unless there are expansions to the state's airport systems, increased flight demand and cargo growth will lead to facility capacity issues and impacts to airspace. Other factors also impact facility issues. For example, in Charleston, the U.S. Air Force owns the runways, while two privately owned fixed-based operations are located on the campus alongside corporate cargo carriers whose employees make significant use of airport facilities. A growing air cargo sector also impacts capacity. For example, Charleston International and Greenville-Spartanburg have seen rapid cargo growth due to business expansion by companies such as Boeing, Volvo, FedEx, Delta, BMW, Bosch, and Daimler. Therefore, as airspace becomes more congested, the necessity to expand capacity increases.

Growth across South Carolina's commercial airports is not equal. The SCAC Report warns that smaller regional airports are at risk due to pilot shortage and passengers' preference to drive farther to access direct routes and other carrier options. As airports compensate for one issue, others arise. For example, Hilton Head expanded its runway to provide jet service which resulted in an 28.6% increase in enplanements between 2017 and 2018. This drove the current need to expand the terminal building and terminal apron.

CONDITION, OPERATIONS, AND MAINTENANCE

According the 2018 South Carolina Statewide Aviation System Plan and Economic Impact Report, 25% of all South Carolina's airports have pavement conditions that do not meet the appropriate Pavement Condition Index (PCI) standard. The PCI ranges from a poor score of 0 to the highest score of 100, with a 70 or greater indicating that the runway pavement is in good condition. When that PCI standard is not met, maintenance or rehabilitation is typically required. Currently, only one commercial service airport is not meeting the PCI standard while at least three locations fall beneath the 70 PCI threshold in all the other categories.



Source: South Carolina Statewide Airfield Pavement Management System Update, Horry County Department of Airports, South Carolina Aeronautics Commission

Note: Since it has a turf runway, Edgefield County Airport is not included in this analysis.

The Federal Aviation Administration (FAA) requires that a Pavement Maintenance Plan is in place before airport funding is provided. Also, a PCI Study is required every 3 years. South Carolina's Systematic Pavement Studies were completed in 2017. In 2020, the SCAC put in place a practice requiring that one-third of the State's airport system pavement be inspected annually.

Maintenance projects identified at the state's airports include six mill and overlay projects and sixteen reconstruction or rehabilitation projects. Each unique airport owner is ultimately responsible for the operation and maintenance of the airport(s) within its district. These duties are carried out in different ways, including lease agreements, tenant agreements, and management agreements.

FUNDING

While there is universal agreement on the positive impact of aviation to the economy, funding for airport infrastructure is not so straightforward. A blend of federal grants, private investment, district bonds, passenger facility charges (PFCs), and state and local funding must be secured before general maintenance or expansion can be funded.

The FAA's PFC Program allows commercial airports controlled by public agencies to collect fees up to \$4.50 for every eligible passenger. However, PFCs are capped at \$4.50 per flight and are not allowed to exceed a maximum of \$18 total. These fees are intended to fund projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition. All six of South Carolina's commercial service airports charge the maximum PFC resulting in more than \$416 million for these airports since the mid-1990s.

Of the state's nearly 60 airports, 53 are included in the National Plan of Integrated Airport Systems (NPIAS) and are eligible to receive federal grants under the FAA. In June 2019, the FAA granted 7 airports \$23.3 million on August 1, 2019, the FAA granted \$6.6 million to six airports in South Carolina. These grants were part of the fourth allotment of \$3.18 billion from the U.S. Department of Transportation's national Airport Improvement Program.

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In South Carolina, funding flows to some airports (primarily commercial service airports) through the region's airport district, a designation created by the state's General Assembly in 1977. Each district is overseen by an associated airport authority which is given broad jurisdiction, including the letting of bonds if the district enplanes at least 300,000 passengers per year for three consecutive years.

The visibility and importance placed on South Carolina's airports has grown significantly due to their economic impact which totaled \$16.3 billion in 2018. However, the six commercial airports account for nearly 94% of this total economic impact, leaving the 51 smaller systems to share the 6% (about \$1 billion) remaining. Therefore, the commercial service airports' budgets and access to funding significantly outpace that of the smaller facilities.

When the local economy expands, the demand for

FUTURE NEED

Airport expansion and development are based on population density and destination popularity. Experts project the state will need to invest \$153.7 million annually through 2023 to maintain and expand runways and terminals, update technology, and ensure citizens have close access to safe airports. They also predict, based on historic models, that the state's funding could fall short by as much as 75%.

Charleston International Airport enplaned about 2.2 million passengers in 2018. Eight airlines offer nonstop flights to 30 airports and 25 cities nationwide. Recently, the site completed a Terminal Redevelopment Improvement Plan which added \$1 billion to the region's economy and created 1,400 local jobs. Officially, flights increases. The larger airport, in turn, strengthens regional employment and increases the viability of affiliated businesses. Adam Williams, manager of airport policy for the Aircraft Owners and Pilots Association, a national nonprofit organization that advocates for general aviation, said, "Research shows every dollar invested in an airport has an economic benefit of more than \$2."



plans are in development to add a 3rd concourse and six additional gates to serve up to 7 million passengers annually, a number The *Post and Courier* reported could increase to almost 8 million by 2028.

In March 2019, Upstate Business Journal reported that the Greenville-Spartanburg International Airport's passenger and cargo traffic hit an all-time high, primarily because Southwest Airlines entered the market in 2010. By 2011, the airport's passenger market had grown by 42%. "The biggest challenge we face right now is... providing facilities during a time when we're seeing growth the likes of which we haven't seen to date," said Dave Edwards, President and CEO.

PUBLIC SAFETY & RESILIENCE

The South Carolina Aeronautics Commission inspects general aviation airports; the FAA inspects commercially certificated (CFR Part 139) sites. Any issues are addressed through a mitigation plan. For example, about 80% of South Carolina's airports are entirely fenced, protecting them against wildlife. Plans are in place to fence the remaining sites.

Coastal airlines suffer substantial disruption and financial

INNOVATION

South Carolina's Aeronautics Commission operates an Unmanned Aircraft System (UAS) to inspect airports and obstructions and to assess conditions after natural disasters. The UAS assists airport management and operations staff by providing data for decision making related to airport projects.

The Next Generation Air Transportation System, or NextGen, is the FAA-led modernization of America's air transportation system to make flying even safer, more efficient, and more predictable. According to the FAA, "NextGen is not one technology, product, or goal. The NextGen portfolio encompasses the planning losses because of hurricanes nearly every year. South Carolina airports collaborate with each other, with the FAA, and with the state's emergency management division to coordinate restoring services as quickly and safely as possible after a disruption. The FAA and South Carolina Aeronautics Commission are responsible for collecting, validating, and distributing the operational status of all aspects of the state's air traffic facilities, in addition to the safety of the people in these locations.

and implementation of innovative new technologies and airspace procedures after thorough safety testing."

In South Carolina, NextGen implementation can already be seen in the use of GPS-direct routes instead of traditional VOR's (Very High-Frequency Omnidirectional Range). This change is anticipated to reduce the operation of Ground Based Navigation Aids, resulting in a decrease in aircraft operational fuel costs because GPS approaches provide more direct routes and gradual descents.

Aviation



RECOMMENDATION TO RAISE THE GRADE

- Develop airports resilience plans with nearby communities in mind. Consider severe weather impacts, emerging technologies and shifting social and economic trends to ensure longtime use of new utilities and facilities.
- Remain up to date regarding new materials, technologies and processes which can be streamlined into the state's airports to extend the life of the infrastructure and expedite repairs.
- Use life-cycle cost analysis for all projects receiving more than \$5 million in federal funding.
- Smart investment requires a collaboration of funding from users, government, and labor. Incentivize partnered investments among government and the private sector.
- Ensure asset management tools are implemented sector wide to assess needs and priorities.
- Streamline project permitting across sectors.
- Taxes and user fees approved by the state's legislature for upgrades to airports should not be diverted to other needs.
- Prioritize and commit to fully fund deficient infrastructure.
- Educate the public: "Americans must be willing to pay rates and fees that reflect the true cost of using, maintaining, and improving all infrastructures."

SOURCES

- South Carolina Statewide Aviation System Plan and Economic Impact Report, SC Aeronautics Commission, p. 24
- South Carolina Statewide Aviation System Plan and Economic Impact Report, SC Aeronautics Commission, p. 24
- South Carolina Statewide Aviation System Plan and Economic Impact Report, SC Aeronautics Commission, p. 16
- http://www.greenvillebusinessmag.com/2018/09/05/179799/south-carolina-sairfreight-industry-is-climbing-steadily-and-ready-to-soar
- Gary Siegfried, program manager at South Carolina's Aeronautics Commission
- "Mill & overlay" is a pavement maintenance technique that requires the removal of the top layer (2") by the grinding action of a large milling machine. Then, a new layer of bituminous pavement is put in its place.
- https://www.faa.gov/airports/pfc/monthly_reports/media/airports.pdf
- https://www.postandcourier.com/business/real_estate/charleston-airports-grantedm-for-improvements-others-in-sc-share/article_ef70a730-9754-11e9-a395df536d2cd78b.html
- https://www.wmbfnews.com/2019/08/01/faa-awards-million-seven-airports-scinclude-florence-hartsville/

SOURCES (cont.)

Aviation

- South Carolina Code of Laws, Title 55 Aeronautics, Ch. 17 Regional Airport Districts, Section 55-17-20. https://www.scstatehouse.gov/code/t55c017.php
- South Carolina Statewide Aviation System Plan and Economic Impact Report, SC Aeronautics Commission, p. 14
- "The Impact of Airport Development on Economic Development" by Melanie Green. Urban Economics Literature Survey, April 2014. https://sites.duke.edu/ urbaneconomics/?p=1248
- "Airports Make Economic Development Soar" Uptown, May 2016. https://www.masc. sc/Pages/newsroom/uptown/May-2016/Airports_make_economic_development_soar. aspx
- South Carolina Statewide Aviation System Plan and Economic Impact Report, SC Aeronautics Commission, p. 24
- https://calendar.google.com/calendar/r/agenda/2019/10/5?tab=wc
- https://www.iflychs.com/AviationAuthority/Strategic-Plan
- https://www.iflychs.com/roadwaytorunway/PARC-Timeline.aspx
- https://www.postandcourier.com/business/charleston-airport-predicts-passengergrowth-will-double-to-almost-million/article_4ab1552a-6ddb-11e9-9e0a-1f2a7e992573.html
- https://upstatebusinessjournal.com/flying-high-greenville-spartanburg-internationalairport-plans-future-as-passenger-cargo-traffic-hit-record-highs/
- https://www.faa.gov/nextgen/
- American Society of Civil Engineers 2017 Infrastructure Report Card/Investment. https://www.infrastructurereportcard.org/solutions/preparing-for-the-future/



Bridges





EXECUTIVE SUMMARY

South Carolina is ranked 26th in the nation in bridge inventory with 9,410 bridges. The state is highly dependent on the large number of bridges for connectivity between communities as well as intrastate and interstate commerce. The South Carolina Department of Transportation (SCDOT) manages approximately 90% of all bridges. The average age for bridges is almost 39 years old, close the 50-year service life. Nearly 11% of South Carolina's bridges are rated as structurally deficient, higher than the national average of 7.5%. Additionally, by Federal Highway Administration standards, more of the state's bridges are rated in fair (47%) than in good condition (45%). This trend of more bridges being downgraded from good to fair condition is similar to the nationwide challenge of prioritizing repair and preservation work, particularly of structurally deficient bridges. Fortunately, SCDOT has created a Targeted Asset Management Plan (TAMP) to clearly layout life-cycle management goals, track progress toward those goals, and provide transparent accountability of funding for state highway assets. The SCDOT is now in the 4th year of the ten-year plan and ahead of schedule for bridge replacements.

BACKGROUND

South Carolina's bridge infrastructure consists of 9,410 bridges. Of these, the South Carolina Department of Transportation (SCDOT) owns and operates 8,380 bridges. Local governments and other entities own the remaining bridges. More than 20% of bridges located

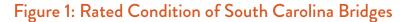
CONDITION AND CAPACITY

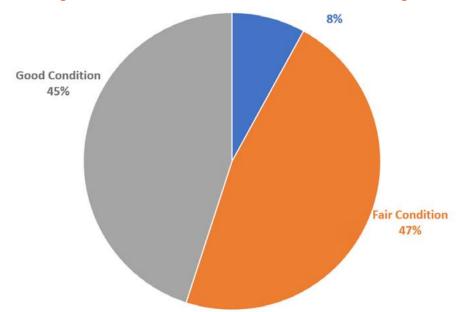
SCDOT inspects its bridge infrastructure every two years, maximum, in accordance with federal requirements. Currently, the Federal Highway Administration (FHWA) collects data on the condition of bridges and classifies them on a scale of 0 to 9. A bridge's score is determined based on the lowest condition assigned to its various structural components. Structural components vary depending on the type of structure being inspected but basically consist of the deck, superstructure, and substructure as major components of the bridge. The assigned condition ranges on interstates, expressways, or other principal arterials. Nearly 75% of the state-maintained bridges are in rural areas. The average bridge age is 38.6 years, with 6.8% of those bridges classified as load posted, 10.6% rated as structurally deficient, and 0.33% reported closed.

from good to fair to poor. Overall, nearly 45% of all bridges in South Carolina are rated in good condition, about 47% are rated in fair condition, and approximately 8% are rated in poor condition. The condition of bridges owned and operated by SCDOT are generally proportional to all bridges of the state with about 44% rated good condition, nearly 48% rated fair condition, and approximately 8% rated poor condition. The average age of South Carolina's bridges is 38.6 years. The following table provides summary information on the bridges:

Table	1: South	Carolina	Bridge	Data

SOUTH CAROLINA BRIDGES				
Total Number of Bridges (U.S. Rank)	9,410 (26th)			
Structurally Deficient Bridges	996			
% Structurally Deficient Bridges	10.6%			
Closed Bridges	31			
% Closed Bridges	0.33%			
Average Age	38.6 years			
State Bridge Budget (FY 2019)	\$170 M			
State Gas Tax (2019)	\$0.22 / gallon			
State Gas Tax increase per year through 2022	\$0.02 / gallon			





Structural capacity is another critical feature of bridge infrastructure. Some bridges with inadequate structural capacity are posted to restrict the load supported by these bridges. Load restricted bridges can have significant impacts on communities. School buses and emergency vehicles may be forced to use alternate routes increasing the time it takes to access vital community resources. The associated delays can be significant, especially in rural areas where alternate routes are limited. Furthermore, the presence of structurally inadequate bridges can severely hinder economic growth by limiting commercial vehicle access. Figure 2 shows that since 2009, SCDOT has reduced the number of load restricted bridges from approximately five % to four % of all bridges on the state system.

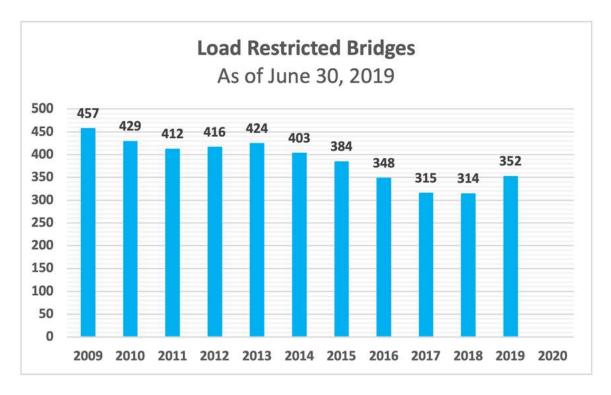


Figure 2: Load Restricted Bridges (SCDOT)

OPERATIONS AND MANAGEMENT

Following a federal directive to ensure accountability and transparency regarding the use of taxpayer funds related to the State Highway System, SCDOT has created the Transportation Asset Management Plan (TAMP). This 10-year plan includes operating, maintaining, and improving bridge infrastructure within the system through maintenance, preservation, repair, and rehabilitation of bridges throughout their lifecycle.

Bridgework priorities identified during inspections are entered and tracked in the Highway Maintenance Management System (HMMS) Bridge Deficiency Module. Since these bridge safety inspections capture all the various maintenance needs that a bridge may have, the recorded deficiencies drive the preservation and rehabilitation work needed to sustain a desired state of good repair over the lifecycle of the bridge at minimum practical cost.

Over the next 10 years, SCDOT will be focused on eliminating structurally deficient bridges on its National Highway System and reducing the number of load restricted bridges on the state's secondary system. Details regarding programmed bridge replacement and improvement projects can be accessed online by the public. An interactive user interface is provided by SCDOT, as illustrated in Figure 3.

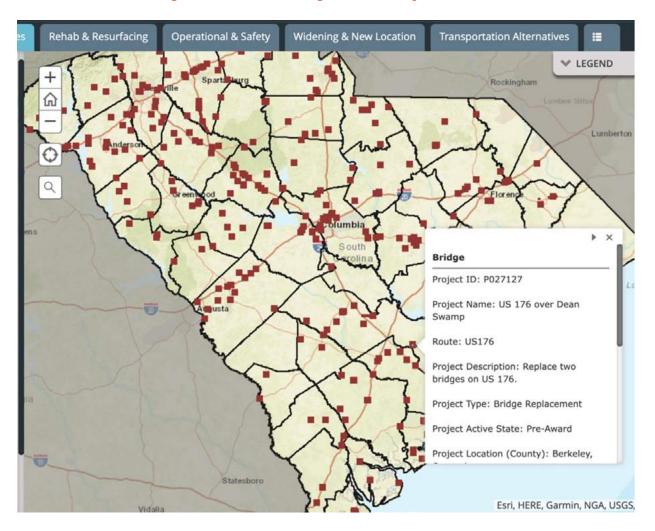


Figure 3: SCDOT Programmed Project Viewer

FUNDING & FUTURE NEED

Financial planning for bridge infrastructure is incorporated in three future-facing SCDOT documents: The Multimodal Transportation Plan (MTP), Targeted Asset Management Plan (TAMP), and The Statewide Transportation Improvement Plan (STIP), described in Figure 4.

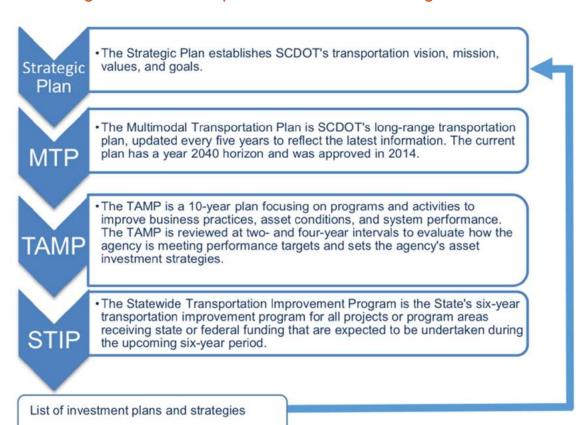


Figure 4: Relationship Between SCDOT Planning Documents

By 2040, the MTP estimates that bridge-related financial needs will reach \$5.4 billion, annualized at \$186 million. Specific areas of future need include bridge replacement, maintenance, modernization, and culverts:

- \$4.0 billion for replacements.
- \$1.3 billion for maintenance, including routine and as needed maintenance.
- \$32 million for modernization, including major work to improve structural integrity, safety, and functionality; and
- \$90 million for culverts.

However, the same MTP study also estimates that if approximately \$1 billion in bridge needs were invested

to bring existing bridges to good condition, the sector's needs through 2040 would fall from \$186 million to a consistent \$170 million annually.

TAMP estimates future funding projections based on historical revenue trends for state and federal appropriations, inflation numbers, and forecasts revenue from the newly instituted, Act 40 in May 2017. Act 40 provides a 2 cents per gallon annual increase in gas tax over a 10-year period, and a raising of the ceiling on fees collected from new vehicle purchases. Act 40 is projected to increase total annual revenue by \$600 million when fully phased in by FY 2023. SCDOT establishes a 10-year financial plan, described in TAMP, identifying program investments, illustrated in Figure 5.

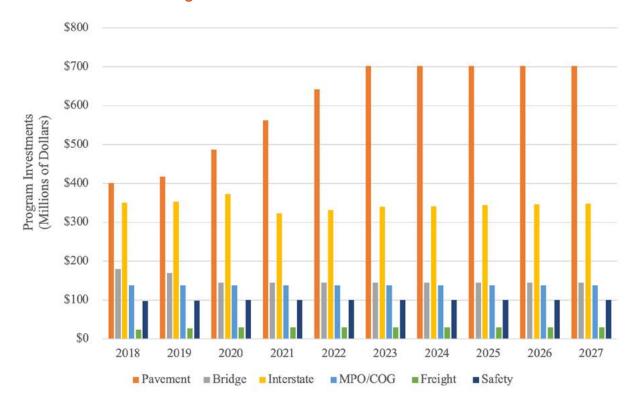


Figure 5: TAMP Ten Year Investment Plan

STIP provides a 6-year constrained budget, which cannot exceed available funds, and utilizes a performancebased investment approach designed to link department goals, objectives, and risks, as defined in TAMP. Figure 6 depicts the Fiscal Year 2018 Program Revenue.

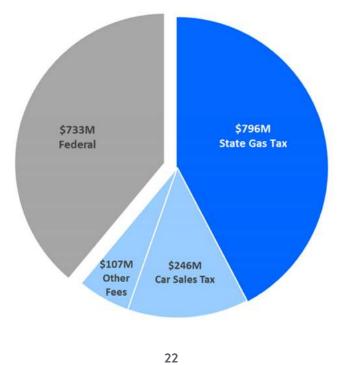


Figure 6: FY 2021 Estimated Values for SCDOT Revenue

2021 REPORT CARD FOR SOUTH CAROLINA'S INFRASTRUCTURE www.infrastructurereportcard.org/south-carolina.

PUBLIC SAFETY, RESILIENCE, AND INNOVATION

Resilience is defined as the infrastructure system's capability to prevent or protect against multi-hazard threats and incidents and how quickly it can recover and reconstitute critical services with minimum consequences for public health and safety, the economy, and security. Not only must an individual bridge exhibit resilience, but so should the entire infrastructure system.

SCDOT has various methods for achieving resilience related to bridge infrastructure. For example, heavily populated barrier islands such as Sullivan's Island and Isle of Palms in Charleston County each have multiple routes accessing the island, providing redundancy. To provide resilience with respect to extreme seismic events, new bridges are designed with resonant frequencies that differ from other bridges for which they provide redundant service. The intent is to avoid significant damage to redundant bridges from a single seismic event. For extreme high-water events, SCDOT has acquired rapidly deployable resources, such as water-filled and portable bridges, to allow traffic on critical roadways, which would otherwise be impassable.

SCDOT is currently evaluating innovative bridge replacement techniques, focusing on shortening closure times required for interstate highways. Bridge designers and instructors have been offered incentives for novel solutions that would significantly improve construction schedules.





Bridges



RECOMMENDATION TO RAISE THE GRADE

- Continue to focus on reducing the number of structurally deficient bridges to achieve the 10-year goals currently set by SCDOT.
- Expand research and implementation of innovative materials and techniques to increase sustainability, enhance durability, and decrease construction impacts due to construction.
- Develop and implement an accelerated bridge construction program.
- Continue to develop resiliency plans for specific critical assets located on interstate systems and coastal regions. Resiliency plans should address possible man-made or natural disasters.
- Expand asset management implementation. Encourage local governments to use the system to manage their local bridge infrastructure.

SOURCES

- https://fhwaapps.fhwa.dot.gov/ltbpp/Bridges/RunSimpleQuery
- LBTP-Bridge Portal (Federal Highway Administration) https://fhwaapps.fhwa.dot. gov/ltbpp/
- South Carolina Multimodal Transportation Plan, Executive Summary, 2014. https://www.scdot.org/Multimodal/pdf/SC_MTP_Executive_Summary_FINAL.pdf
- SCDOT Programmed Project Viewer, 2019. https://www.arcgis.com/apps/ MapSeries/index.html?appid=ca1cd69fc88945f4bb465e16765d761c
- https://www.scdot.org/StrategicPlanning/Dashboards/SMPlan2018/2018-goal-2.aspx
- SCDOT, Transportation Asset Management Plan (2016-2026). https://www.scdot.org/performance/pdf/reports/TAMP.pdf
- SCDOT Annual Report, 2019, reporting Fiscal Year 2018. https://www.scdot.org/inside/pdf/FINAL_Combined_Notebook_for_ January_18_2019.pdf
- South Carolina Comptroller General, New Taxes and Fees for Road Maintenance. https://cg.sc.gov/fiscal-transparency/new-taxes-and-fees-road-maintenance
- State of SCDOT Annual Progress Report https://www.scdot.org/performance/pdf/SCDOT-EndofYearThree-ProgressReport-Presentation.pdf





EXECUTIVE SUMMARY

Since 2015, a series of historic weather events caused dozens of state-regulated dam failures which drove lawmakers' renewed awareness of dams and their risks to public health, safety, and welfare. There are more than 2,200 dams across the state with more than 80% being privately owned. Over the last several years, more than \$12 million in one-time and recurring funds have been invested in the South Carolina's Dams Safety and Reservoir Program housed within the Department of Health and Environmental Control (DHEC). DHEC's personnel has increased, and capacity has expanded such that they now offer services including engineering technical support, dam inspections, and inundation mapping to plan for the future. However, there remain limited resources to support dam owners' maintenance and repair activities resulting in an unaddressed backlog of dam safety needs. Though funding has increased, South Carolina's dam safety budget remains well below the national average particularly for spending on high hazard potential dams (HHPDs). About 24% of the state's inventory is HHPDs which, in the event of failure, could cause catastrophic damage to infrastructure and property while also carrying the risk of injury and death to people. Spending on HHPDs increased from \$1,500 to \$1,900 per dam, but the value falls under the national average of \$4,875 per HHPD. Increased funding and expanded technical capacity are applauded, but ongoing efforts need to continue to determine sustainable sources of funding for dam rehabilitation, maintenance, and other safety projects.

BACKGROUND

Since 2015, a series of historic weather events – extreme rainfall and hurricanes – have caused more than 80 state-regulated dams to fail. These failures and the ongoing threat of more frequent and intense weather events have driven the residents of South Carolina to a renewed awareness of the state's dams and their risks to public health, safety, and welfare.

While there are untold thousands of dams in South Carolina, only a certain set that meet either State or Federal requirements are subject to regulation. Under State law, a dam that is either a) 25-feet in height from the invert of the natural stream bed, or from the lowest point along the outside perimeter of the dam, to the maximum water storage elevation, b) has an impounding capacity at the maximum water storage elevation of 50 acre-feet, or c) regardless of height or impounding capacity, may cause loss of life in the event of its failure, is subject to regulation by the State. Dams meeting the third criteria for regulation are termed "Very Small, High Hazard Potential Dams" under state regulations and are subject to all state regulatory requirements. The Federal definition of "dam," however, does not include dams less than 25-feet in height and less than 50-acrefeet in impounding capacity. Federal ownership and/

CAPACITY & CONDITION

In South Carolina, the Department of Health and Environmental Control (DHEC) is responsible for the inventory, permitting, and inspection of more than 2,200 state-regulated dams. The DHEC state dam safety office collects information and provides updates to the U.S. Army Corps of Engineers (USACE) for their National Inventory of Dams (NID). However, there are variations in the state and national dam inventories due to the periodic nature of the NID reporting, the state's discretion in reclassifying some dams, the aforementioned "Very Small, High Hazard Potential" classification that is excluded from the NID, and the exclusion of federally regulated dams from the state's inventory. Therefore, to provide an accurate picture, this report will use the 2021 pre-published version of South Carolina's submission to the NID, including the "Very Small, High Hazard Potential" dams, as the primary data source. As the 2021 NID has yet to be published, the NID data for South Carolina is to be considered "provisional" at this time.

According to DHEC's 2021 NID submission, South Carolina currently has 2,294 state-regulated dams. Nearly 90% of dams are privately owned and operated. Other entities responsible for South Carolina's dams include local, state, and federal government agencies, public utilities, and mechanisms for joint ownership. All dams are classified under three main hazard ratings: high hazard, significant hazard, or low hazard potential.

Dams in South Carolina, as well as nationally, are classified based on the potential impacts downstream that could result based on failure or improper operation. The condition of the dam has no bearing on the hazard potential classification assigned to the dam. Regulated dams are classified as one of three hazard ratings: high hazard, significant hazard, or low hazard potential. or regulation applies to approximately 76 dams in the State, and these dams are exempt from state regulation by state law.

Dam Hazard Potential	SC DHEC Submission to National Inventory of Dams 2021 (Provisional Data)
High	564
% High	24.6%
Significant	263
% Significant	11.5%
Low	1,401
% Low	61.1%
TOTAL	2,294

High hazard potential dams (HHPDs) have the greatest possibility of causing both serious damage to infrastructure and property, but also carry the likely risk of loss of human life in the case of a dam failure. High hazard potential dams are the second most common classification of dams regulated by the state, of which a total 564, or approximately 25%, are under this designation. According to DHEC, the largest portion of HHPDs (more than 70%) are in satisfactory or fair condition (Figure 1). However, more than 25% are characterized as poor or unsatisfactory, while less than 4% of the state's HHPD inventory remain unrated.

Significant hazard potential dams are those for which failure could cause significant damage to infrastructure and property, and cause loss of life, yet the risk for the loss of human life is low. These incidents could cause interruptions to public and private utilities, cause damage to nearby infrastructure such as roads, bridges, or railways, and could damage isolated residences. DHEC's inventory of significant hazard dams numbers 263 or less than 12% of its total inventory. Lastly, DHEC's inventory includes 1,401 dams, more than 61%, categorized as low hazard potential. A low hazard potential dam is one which, in the case of its failure, could potentially cause minimal property damage and where loss of life is not expected.

According to the NID, South Carolina has 45 federal dams of which 12 are characterized as high hazard potential.

From the published NID data, two of the high hazard potential federal dams are in satisfactory condition, 4 are fair, 1 is poor, 2 are in unsatisfactory condition, and 3 are not yet rated. There is 1 significant hazard potential federal dam, but it is not rated. The condition of the 32 low hazard potential federal dams is that 1 is satisfactory, 6 are fair, 9 are poor, 3 are unsatisfactory, and 13 remain unrated.

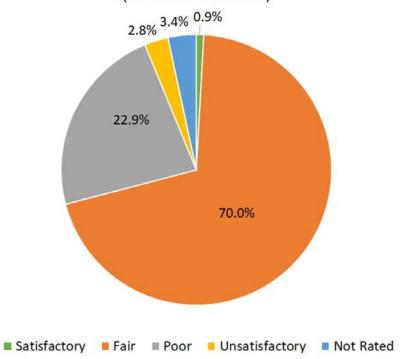


Figure 1: Condition Rating of State-Regulated High Hazard Potential Dams (2021 NID Provisional)

OPERATIONS AND MAINTENANCE

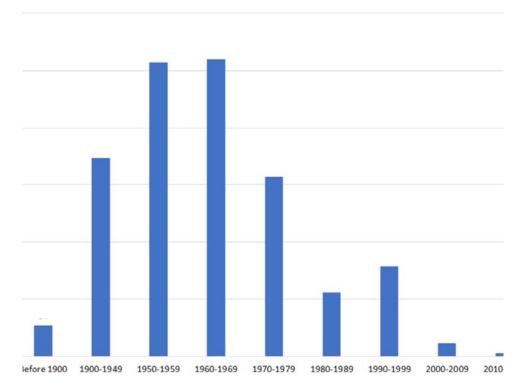
The DHEC Dam Safety and Stormwater Permitting Division of the Bureau of Water is responsible for administering the Dams and Reservoirs Safety Program. This Program was established after the passage of the South Carolina Dams and Reservoirs Safety Act in 1977 to ensure that dams receive adequate safety inspection and remain safe from failure.

The inspections, classification checks, permitting, and educational outreach events are conducted by the DHEC team. The frequency of inspection is related to the hazard classification of a dam, with higher rated dams receiving more frequent inspections. Low hazard potential dams are subject to regular classification checks to ensure that the low hazard potential classification remains accurate.

Additionally, dam ownership and construction details are important for informing the type and frequency of operations and maintenance (O&M) practices. In South Carolina, these areas pose challenges for ensuring routine O&M efforts. For instance, as parcels of land containing dams change ownership, the individual or entity responsible for initiating O&M becomes unclear. Furthermore, as dams age, not only do they become more susceptible to failure, but maintenance needs such as repair and rehabilitation increase and become more complex and costly. Therefore, if a dam owner's documentation is incomplete, inaccurate, scarce, or outdated, critical O&M can go unaddressed.

Of the dams that have accurate construction records, the average age of South Carolina's dams is just over 60 years old, higher than the national average of 57 years old. While the age is not a direct reflection of hazard potential, the high average age typically means that the dams were not built to current standards and may not incorporate newer materials that could be used to improve their resilience and reduce the risk to downstream areas. Nearly 80% of the existing inventory was constructed before South Carolina lawmakers established a statewide dam safety framework. Therefore, many of these dams were constructed with little regulatory oversight or proper documentation of construction details.

Figure 2: South Carolina Dams by Year of Construction



Year of Construction

FUNDING AND FUTURE NEEDS

The 2018 Association of State Dam Safety Officials (ASDSO) Dam Safety Performance Report for South Carolina depicts a drastic increase in the dam safety budget over the last two decades. In 1999, South Carolina's dam safety budget was slightly over \$250,000, translating into approximately \$100 per regulated dam, while the budget per regulated HHPD was around \$1,500. After historic October 2015 rainfall and subsequent dam failures, DHEC reallocated resources and appropriated new funds to rebuild and expand the state's dam safety program. Since that time, more than \$12 million in one-time and recurring funds have been made available for engineering technical support, dam inspections, inundation mapping, and more. Now, the dam safety budget is more than \$1 million with \$453 being spent per regulated dam and more than \$1,900 per HHPD. Though these values have significantly increased, they remain well below the national averages of \$738 per regulated dam and \$4,875 per HHPD.

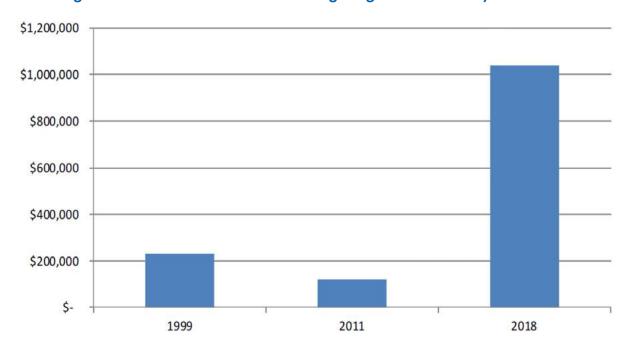


Figure 3: South Carolina Annual Budgeting for Dam Safety Over Time

In South Carolina, more than 80% of the state's dams are privately owned with access to limited resources to support maintenance activities to improve the safety of their dams. Therefore, these dams, 95% of which are earthen structures that, when O&M efforts are required result in the need of expensive equipment, so many dams go unkept and poorly maintained. Furthermore, at present there is currently no dedicated recurring appropriation of state funds for construction and engineering contractors that work alongside the state's dam safety program to take emergency action when dam owners are unwilling or unable to ensure the safety of their dams. DHEC is only authorized to recover expenses from dam owners after an action has been taken; however, this has proven to be a slow, unreliable, and generally ineffective means of recovering costs incurred while performing emergency actions on dams. As a result, a recurring source of funds is needed to support dams that require emergency action by the state. And lawmakers could expand the protection of the public's safety by raising funds for dam safety to the national average due to the threat of high hazard potential dams, particularly in a state with more frequent and severe extreme weather events.

PUBLIC SAFETY

In 2016, due to the increase to the state's dam budget, the total staff increased from less than 2 fulltime equivalents (FTE) to approximately 18 FTE. Accordingly, there was a significant improvement to the number of state-regulated dam safety inspections conducted per staff member. From 2011 to 2018, because the portion of state-regulated dams was distributed across a growing staff, it drove the number of inspections from more than 1,400 per FTE down to approximately 125 per FTE, now better than the national average of 189 per FTE. For HHPD, the value also fell from more than 100 per FTE to nearly 30 per FTE, very close to the national average of 29.

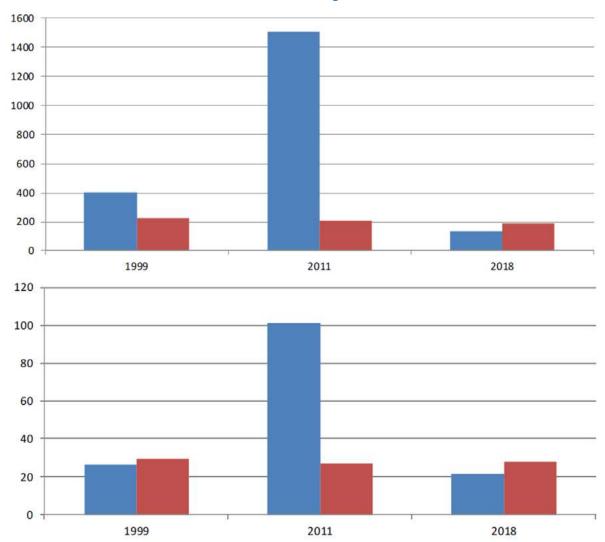


Figure 4: State-Regulated Dams per FTE (blue) and National Average (top); State-Regulated High Hazard Potential Dams per FTE (blue) and National Average (bottom)

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Because all HHPDs have a risk of injury or death to people due to the possibility of dam failure, state dam safety officials develop Emergency Action Plans (EAP). An EAP is a protocol to help plan and coordinate evacuations in the event of a dam failure. Those HHPDs without an EAP have no evacuation or basic plans in place, posing a greater risk to public safety. Ideally, all South Carolina's HHPDs would have EAPs, but

RESILIENCE AND INNOVATION

To withstand or quickly recover from localized storms or non-weather-related events that strain South Carolina's dams, the DHEC program staff rotates 24-hour-a-day on-call shifts for the Dam Safety Technical Assistance phone line. According to DHEC's 2020 report, the state is committed to providing engineering expertise to assist dam owners if trouble arises and to help identify the severity of a situation. This assistance is intended to determine whether local emergency response officials should be notified. To this point, the phone line assistance has enabled DHEC staff to respond to multiple occasions of after-hours dam failure emergencies.

In addition to providing technical assistance to ensure the state's dam sector is becoming more resilient, DHEC has also invested in innovative modeling to improve safety planning efforts. currently only 72.5% are covered, ten % below the national average of 82%.

In the mid-2010s, the state experienced fatal floods and responded by significantly bolstering the dam safety budget. More recently, however, there have been efforts by South Carolina legislators to remove a significant number of dams from government oversight.

The Decision Support System for Water Infrastructural Security (DSS-WISETM) Lite is a tool that has been employed by the state especially developed for dam safety agencies. The tool simulates inundation failures enabling dam safety programs to develop better predictions of the impacts such as depth of flooding, water velocity, and flood wave arrival time on downstream areas. This modeling software has been made available for free by the Federal Emergency Management Agency and can be updated as South Carolina's data becomes more granular.



Dams

RECOMMENDATION TO RAISE THE GRADE

- Restore DHEC's authority to reclassify low hazard dams as significant hazard dams should the structure be determined to cause damage homes, industrial and commercial facilities, highways or railroads, or interrupt public utility service in the instance of failure. Develop emergency action plans for every high-hazard-potential dam by 2025.
- Determine sustainable sources of funding for dam rehabilitation, maintenance, and other safety projects
- Increase state funding to the dam safety program, including adequate staffing and resources per state-regulated and high hazard potential dam that are in line with national averages.
- Educate dam owners about the importance of keeping accurate, easily accessible ownership and operation and maintenance records.

SOURCES

- U.S. Army Corps of Engineers National Inventory of Dams (2018) https://nid.sec.usace.army.mil/ords/f?p=105:113:5862911138679::NO:::
- South Carolina Department of Health and Environmental Control Dams and Reservoir Safety Program Overview https://scdhec.gov/dams-reservoirs-safety-program-overview
- South Carolina Department of Health and Environmental Control, correspondence with DHEC staff (John McCain, PE

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Water

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EXECUTIVE SUMMARY

Drinking water in South Carolina is typically managed and provided by local public water systems. At the state-level, the South Carolina Department of Health and Environmental Control (DHEC) administers and enforces drinking water quality standards and regulations at these public systems. Overall, the state's water utilities have a very high compliance for drinking water standards and federal lead action levels. However, sustaining this performance will require South Carolina's rate structures to be re-examined and potentially updated to ensure adequate, local funding for the drinking water system. The U.S. Environmental Protection Agency projects that over the next 20 years, it will cost nearly \$6 billion to meet all of South Carolina's drinking water system needs. The greatest portion of this need, over \$4.5 billion, come from replacing and refurbishing the aging or deteriorating distribution and transmission pipelines. Utilities in urban areas have taken significant actions to improve drinking water infrastructure, but due to the lack of publicly available data, those positive efforts do not reflect a comprehensive picture of the condition of South Carolina's entire public drinking water system.

CAPACITY & CONDITION

According to the Environmental Protection Agency's (EPA) evaluation of the Public Water System Supervision (PWSS) Program, the South Carolina Department of Health and Environmental Control (DHEC) regulates and adequately serves more than 4 million residents with public water systems (PWS). South Carolina's DHEC defines PWS as infrastructure providing water through piping or other constructed conveyances for human consumption (≥ 15 service connections or serving

≥ 25 people on average) for at least 60 days each year. The three types of PWS are community water systems (CWS, such as towns), non-transient non-community systems (such as schools or factories), or transient non-community systems (such as rest stops or parks). In 2019, EPA's annual review determined that DHEC continued its track record of implementing an effective PWS supervision program.

Table 1: South Carolina Capacity and Population Served by Public Water Systems based on the SCDHEC Annual Report – Calendar Year 2019

Type of Public Water System	Number of Systems	Population Served	Percentage of Population Served by PWS
Community Water System (CWS)	575	4,078,027	98%
Non-Transient Non-Community System	96	28,714	1%
Transient Non-Community System	735	48,418	1%
Total	1,406	4,155,159	

There are two types of source water in South Carolina – groundwater and surface water. According to South Carolina DHEC 2019 Annual Report, the state's surface water sources provide drinking water to more than 3.5 million residents or 86% of the state's total population, while groundwater systems provide water to almost 592,000 residents or the remaining 14% of the population.

Though no publicly available report provides an average age of the state's PWSs, many of those in South Carolina's larger cities like Columbia were installed in the 1940s and '50s. With average lifespans ranging from 75 to more than 100 years, some networks within the state are nearing the end of their useful life and require maintenance, rehabilitation, or replacement.

During calendar year 2019, approximately 97% of PWSs were in full compliance with all regulatory requirements (health based, monitoring and reporting). However, when monitoring and reporting violations are excluded, the compliance with only health-based regulation increases to 99% of PWSs. These performance standards were also broadly met (87%) by small CWS serving populations of \leq 10,000. Overall, the condition of South Carolina's drinking water infrastructure produces effective treatment for residents and protection of the state's drinking water sources.

OPERATIONS AND MAINTENANCE

South Carolina DHEC issues permits to municipalities, counties, utilities, and special purpose districts to operate and maintain the treatment processes and sources of drinking water. South Carolina DHEC drinking water enforcement section carries out enforcement actions on PWS compliance to ensure safe drinking water, thereby protecting the public's health.

An additional source of drinking water are private wells. These systems are considered private property and are not regulated by federal standards. It is difficult for the state to accurately estimate the number of private wells because permits were not required until August of 2000. There have been more than 160,000 wells permitted between August 2000 and November 2020. However, not every permitted well is constructed or is in operation. Overall, well owners are responsible for the appropriate operation and maintenance, testing, and treatment of drinking water produced by these systems.

Although no statewide data is available on pipe replacement rates and other asset management practices, South Carolina's largest cities share some planning information at the city level. Columbia, for example, approved an inspection plan to prepare for annual pipe rehabilitation. This was approved in September 2019, though no timeline is yet available. While DHEC does not mandate asset management by linking it to funding or regulations, there are training resources available on their website as well as state staff capacity to assist municipalities that may want to streamline this approach.

FUNDING AND FUTURE NEEDS

The EPA's Drinking Water Infrastructure Needs Survey and Assessment reflects the national and state-level needs for infrastructure maintenance and improvements. Though a dated report, the 2016 nationwide drinking water sector needed more than \$470 billion dollars. However, when this number is disaggregated by state and dissected by the different components of drinking water systems - distribution and transmission, treatment, storage, and source - the emphasis on areas of critical need become clearer. In South Carolina, the area of greatest need is in distribution and transmission where replacing and refurbishing aging or deteriorating pipelines is estimated to cost more than \$4.5 billion.



Table 2: Economic Values of South Carolina and Nation-Wide Needs from EPA's Drinking Water Infrastructure Needs Survey and Assessment (represented in 2016 USD)

Components of Drinking Water Systems	South Carolina's Need (\$USD Million)	Nation-Wide Need (\$USD Million)
Distribution and Transmission	~\$4,560	\$312, 600
Treatment	~ 850	\$83,000
Storage	~420	\$47,600
Source	~180	\$21,800

The need for infrastructure expansion or rehabilitation to reduce contamination at the state-level will cost \$855.9 million. Addressing needs for storage include projects that construct, rehabilitate, and/or cover water storage reservoirs. South Carolina's storage investment need is \$418.4 million. Lastly, to construct or rehabilitate intake structures, wells and spring collectors, the state needs \$181.6 million. Altogether, South Carolina's total drinking water need exceeds \$6 billion over 20 years.

In South Carolina, the State Revolving Loan Fund Program (SRF) is collaboratively operated by DHEC, the South Carolina Rural Infrastructure Authority (RIA) and the Office of Local Government (OLG). Through this program, municipalities, counties, and special purpose districts can apply for low interest rate loans. During Fiscal Year 2017 (FY 2017), the EPA placed more than \$2.2 million in South Carolina's Drinking Water SRF Set-Aside funding. In the following year (FY 2018), the state received more than \$1 million from EPA for their participation in the PWSS Program's Performance Partnership Grant (PPG). In addition, RIA also offers competitive grants to rural applicants that link their infrastructure projects to the expansion of economic growth opportunities.

Finally, water rates and fees play a role in meeting the ongoing Operations and Management (O&M) and capacity expansion needs of the state' drinking water systems. For instance, Charleston Water System has a minimum monthly rate, and a tiered rate structure for nearby, suburban, and industrial connections that also factor in the volume of water demand. The use of greater volumes of water is associated with a higher rate scale. Additionally, in some parts of the state regionalization or consolidation of drinking water systems is taking place through partnerships between local municipalities and utilities to capitalize on better efficiencies and economies of scale.

PUBLIC SAFETY AND RESILIENCE

The 2019 DHEC Annual Compliance Report indicates high compliance with drinking water standards. At a more localized level, PWSs are required to test, treat, and notify customers of their local drinking water quality. This transparency ensures awareness of public resources and action to protect public health. The mandatory public safety notices have been proactively expanded in recent years as areas throughout South Carolina have implemented watershed-based planning by taking a "bird's eye view" of the users, inputs for contamination, urbanization, changes in land development activities, and other impacts to water sources to better inform users and influence protection and future planning of the state's drinking water resources. Charleston has added a position to their staff who works to develop "tools to leverage collaborative partnerships with other stakeholders in a watershed... [and performs] public outreach and education on watershed issues."

At the statewide level, in early 2021, Governor McMaster named the director of South Carolina's Disaster Recovery Office as the state's first Chief Resilience Officer. Under the purview of this office is the development, implementation, and maintenance of the Statewide Resilience Plan with a goal of coordinating statewide resilience and disaster recovery efforts with the federal, state, local and non-governmental entities. Furthermore, there is an expectation that this office will establish the South Carolina Disaster Relief and Resilience Reserve Fund to maintain the Statewide Resilience Plan and for disaster relief assistance, hazard mitigation, and infrastructure improvements.

INNOVATION

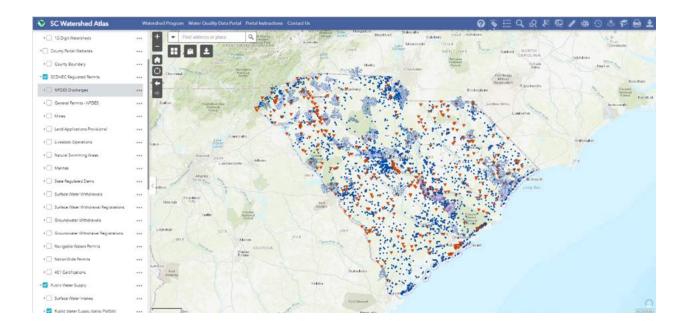
There are many initiatives being implemented across the state to provide drinking water to the public, and some of the innovative process being performed by PWS are listed below.

- Treatment process for taste and odor control
- Treatment process for algae management and algae treatment
- "Smart Technology" such as Advance Metering Infrastructure (AMI) technology in the distribu-

tion systems to help determine how water demand should be met

- Source water protection and watershed-based planning
- Aquifer storage and recovery

Furthermore, DHEC has an innovative, public engagement tool called the Watershed Atlas that enables users to toggle features that characterize the water quality at monitoring locations across the state.



Drinking Water



RECOMMENDATION TO RAISE THE GRADE

- Reinvigorate the State Revolving Loan Fund (SRF) program under the Safe Drinking Water Act through permanent reauthorization.
- Preserve tax exempt municipal bond financing.
- Establish a federal Water Infrastructure financing mechanism to finance the national shortfall in funding of infrastructure systems under the Clean Water Act.
- Encourage utilities to undertake asset management programs.
- Increase federal and local support for vocational training in the drinking water sector as engineers
- Encourage utilities to conduct revenue forecasting models to determine the necessary rate revenues over a period and then institute affordable rates that reflect the true cost of supplying clean water.
- Encourage utilities to take regional approaches for water delivery to take advantage of economies of scale.
- Improve collection efforts for components of systems for which data is not publicly available.

SOURCES

- South Carolina's Water Associations: Water Environment Association of South Carolina (WEASC) and the South Carolina Section of the American Water Works Association (SCAWWA)
- SCDHEC Drinking Water Quality https://www.scdhec.gov/environment/yourhome/drinking-water-concerns/drinking-water-quality
- https://www.scdhec.gov/sites/default/files/media/document/SC2018ACR_final.pdf
- https://scdhec.gov/sites/default/files/media/document/2019%20Annual%20
 Compliance%20Report.pdf
- https://www.scdhec.gov/sites/default/files/media/document/9-11-19_SC%20 Priority%20Review-2019.pdf
- https://www.charlestonwater.com/149/Water-Treatment
- U.S. Environmental Protection Agency Drinking Water Infrastructure Needs Survey and Assessment, Sixth Report to Congress.
- 2018 State Asset Management Initiatives Document https://www.epa.gov/ dwcapacity/asset-management-resources-states
- Phone Interview with Greg Withycombe of SCDHEC Drinking Water Wells Department by South Carolina ASCE Section; November 2020.
- DHEC Watershed Atlas https://gis.dhec.sc.gov/watersheds/
- https://scdhec.gov/environment/your-water-coast/how-dhec-measures-surfacewater-quality

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EXECUTIVE SUMMARY

South Carolina's ports generate \$63.4 billion in annual economic impact and \$1.1 billion in annual tax revenue for the state. Port operations create 1 in 10 South Carolina jobs, and port-supported jobs pay 32% higher than the state's average annual wage. The South Carolina Ports Authority, the state of South Carolina, federal government and industry partners are continuously investing in the port facilities with \$2.6 billion invested through fiscal year 2022. The investment is focused on increasing capacity to accommodate greater volumes to meet global shipping demands. The South Carolina Port Authority will double container capacity upon final buildout of the new Hugh K. Leatherman Sr. Terminal which received its first container vessel on April 9, 2021. The investment also includes harbor deepening to 52 feet to accommodate the largest ships calling on the U.S. East Coast as well as upgrading terminal infrastructure, building a port access road, developing a new marine terminal, and developing two inland rail-served terminals.

BACKGROUND

Established by the South Carolina General Assembly in 1942 [5], South Carolina Ports Authority (SCPA) promotes, develops and facilitates waterborne commerce to meet the current and future needs of its customers, and for the economic benefit of the citizens and businesses of South Carolina. SCPA fulfills this mission by delivering cost competitive facilities and services, collaborating with customers and stakeholders, and sustaining its financial self-sufficiency. S.C. Ports is a top 10 U.S. container port, providing logistics services and supporting a multifaceted supply chain that moves cargo by truck, ship, and rail.

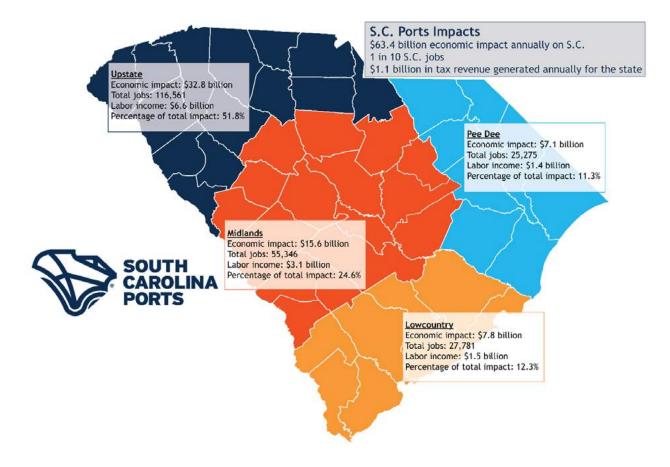
S.C. Ports is an efficient, reliable port system that is constantly advancing, but the agency also faces challenges. The port needs increased capacity to accommodate the fast-growing demand spurred by automotive manufacturing, consumer goods distribution, refrigerated and frozen exports, transloading resin and grain, and tire manufacturing and distribution. The need for more capacity is reinforced as ocean carriers continue to deploy larger vessels, requiring deeper harbors and increased port capacity. In addition, the increased threat of hurricanes, which is exacerbated by sea-level rise, requires more forward-looking planning to ensure the resiliency of port facilities.

South Carolina Ports were hit by the global COVID 19 pandemic which resulted in handling 2.8% less twentyfoot equivalent container units (TEUs) in fiscal year 2020 compared to the previous year. Nonetheless, the SC Ports had a strong rebound in FY21 with 7.7% increase in container volume as compared to the previous year.

South Carolina Ports Authority is amid an ambitious growth plan fueled by the Southeast's booming economy and continued cargo growth, which is due in part to a growing shift from West Coast to East Coast ports. SCPA has several projects underway to increase the capacity of both coastal ports and inland ports throughout the state. Activity at S.C. Ports has increased substantially – with cargo volumes doubling in the past 10 years [2]. SCPA, the state of South Carolina, the Federal Government and other related partners are investing a total of \$2.6 billion through fiscal FY 2022 to enhance port and portrelated infrastructure, including deepening the harbor to 52 feet, upgrading terminal infrastructure, building a port access road, developing a new marine terminal, and developing two inland rail-served terminals.

Port operations drive economic growth in South Carolina, serving as a key competitive advantage for the state. Port

operations support the state's thriving business community and spur economic development by connecting South Carolina to global markets. S.C. Ports generates \$63.4 billion in annual economic impact and \$1.1 billion in annual tax revenue for the state. Port operations creates 1 in 10 S.C. jobs, and port-supported jobs pay 32% higher than the state's average annual wage.



CONDITION & CAPACITY

The port system in South Carolina includes seaport facilities in Charleston and Georgetown, as well as newly built inland ports in Greer and Dillon. From super post-Panamax shipto-shore cranes to heavy-lift equipment, South Carolina's ports are well-equipped to handle cargo with varying sizes.

South Carolina Ports Authority owns and operates five public marine terminals at the Port of Charleston. These facilities handle both containerized and non-containerized cargo, as well as cruise passengers. A sixth facility, the Hugh K. Leatherman Sr. Terminal, on the former Navy Base in North Charleston is planned with Phase 1 completed in 2021 with this first phase adding 700,000 twenty-foot equivalent container units (TEUs) of capacity. From the Port of Charleston, SCPA efficiently serves the entire Southeast and key markets throughout the country, including Chicago and Dallas. Notably, the Port of Charleston has a beneficial location for commerce since around 23% of the U.S. population lives within a one-day truck trip. SCPA's two inland ports in Greer and Dillon help the state with the business growth by enabling more cargo to be brought to oceanside terminals. The Inland Port in Greer, which opened in 2013, extends the reach of the port more than 200 miles into the state's interior. The inland port, which is connected to the Port of Charleston via overnight rail by Norfolk Southern, moves cargo to and from the Interstate 85 corridor, one of the fastest-growing areas of the Southeast. Inland Port Greer reported its busiest fiscal year yet with more than 143,000 rail moves in fiscal year (FY) 2019, up nearly 22% from the year prior. Inland Port Dillon, which opened in 2018, is located near the North Carolina border along Interstate 95, a critical transportation artery in the Southeast. The area is central to a significant base of existing Port users that represent base cargo opportunities for the facility. The inland port offers overnight access to and from the Port of Charleston via CSX rail. In its first full year of business, Inland Port Dillon handled nearly 30,000 rail moves in FY 2019. Now the ports have easy access to large scale cities, saving both shippers and customers time and money by moving cargo via rail.

Annual SCPA TEU volume in thousands. SCPA handled a record 2.39 million twenty-foot equivalent units (TEUs) in FY2019, with fiscal year-over-year growth of 8.8 percent.



Source: South Carolina Ports 2018 Annual Report, page 13.

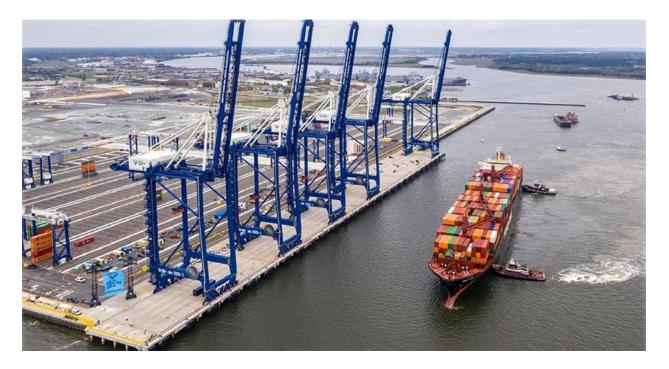
Overall, South Carolina Ports Authority handled nearly 2.4 million TEUs in FY 2019, up 9% year-over-year. SCPA handled nearly 195,000 vehicles, more than half a million pier tons and over 200,000 cruise passengers in FY 2019. In FY 2020, from July to November 2019, SCPA handled 1.04 million TEUs, up 6% year-over-year. SCPA handled more than 310,000 pier tons, up nearly 40%, and over 99,000 vehicles, up nearly 32%, so far in fiscal year 2020.

Infrastructure work is underway to handle consistently increasing cargo volumes. Major projects include a three-year refurbishment effort at Wando Welch Terminal, which will yield 2.4 million TEUs in capacity, and completing the Hugh K. Leatherman Sr. Terminal, which will double Port capacity to 5.2 million TEUs once all three berths are operational.

OPERATIONS & MAINTENANCE

In recent years, SCPA has undertaken major facility renovation efforts and infrastructure projects. Wando Welch Terminal in Mount Pleasant underwent a threeyear terminal upgrade to enhance the state's busiest container terminal to handle larger ships and more cargo. The densification and modernization of Wando Welch Terminal increases that terminal's capacity to 2.4 million TEUs. The three-berth terminal will have 15 ship-to-shore cranes with 155 feet of lift height and 65 rubber-tired gantry cranes by 2021. The terminal also has a modern, electric refrigerated cargo yard; an on-site, privately run distribution center operation for retail goods; and a new chassis yard for the trucking community. The new yard layout and improved facilities improve port efficiency by reducing overall maintenance cost while improving container volume capacity.

Currently, SCPA has 24 Ship-to-Shore Cranes at Wando Welch, Hugh K. Leatherman Sr., and North Charleston terminals with a maximum outreach of 228 feet with a ZPMC Crane at Hugh K. Leatherman Sr. terminal.



FUNDING AND FUTURE NEED

Port operations drive economic growth throughout the Southeast, connecting domestic businesses to global markets and bringing in cargo to U.S. consumers and companies. S.C. Ports is a vital part of the global supply chain and supplies the Southeast with an efficiently run port system.

S.C. Ports has a responsibility to grow volumes and boost the economy as 1 in 10 South Carolina jobs are generated by Port activity. Port operations support existing businesses, attract new industry to the region and generate economic activity throughout the Southeast through the efficient movement of goods.

The ability to run a reliable port operation requires great investment in infrastructure.

SCPA, the state of South Carolina, the Federal Government and other related partners are investing a total of \$2.6 billion through FY 2022 to enhance port and port-related infrastructure, including deepening the harbor to 52 feet, upgrading terminal infrastructure, building a port access road, developing a new marine terminal and developing two inland rail-served terminals.

\$2.6 Billion CAPEX Plan Supporting SC Ports Recent & Planned Investments Through FY2022 (Shown In Millions of Dollars)						
South Carolina Ports Authority-Funded Investments						
Hugh Leatherman Terminal Phase 1	\$	846				
HLT Port Access Road (SCPA Portion)	\$	140				
Wando Welch Terminal Improvements	\$	450				
Inland Port Greer (Initial & Future)	\$	74				
Inland Port Dillon	\$	42				
All Other Terminal Investments (FY19 - FY22)	\$	126				
SC Ports Authority CAPEX Total:	\$	1,678				
Capital Investments Not Funded By SCPA						
Harbor Deepening (State Contribution to Date)	\$	350				
Harbor Deepening (Federal Contribution to Date)	\$	108				
HLT Port Access Road (State Contribution)	\$	220				
Wando Wharf Strengthening (TIGER Grant)	\$	11				
Inland Port Greer (Norfolk Southern)	\$	8				
Inland Port Greer BUILD Grant	\$	15				
Inland Port Dillon (CSX)	\$	10				
New Intermodal Rail Facility (Palmetto Railways)	\$	250				
Other CAPEX Total:	\$	971				
Grand Total SC Port-Related Investment	\$	2,649				

The strengthening and upgrading work to enhance the three-berth Wando Welch Terminal was a vital project to prepare for larger vessels. The terminal will be able to host some of the largest ships in the world due to their large ship-to-shore cranes. By 2022, the total investment will be \$450 million.

In 2021, the state's ports achieved a major milestone with the opening of a new container terminal in North Charleston. The first phase of the Hugh K. Leatherman Sr. Terminal has a 1,400-foot-wharf and five ship-toshore cranes with 169 feet of lift height, which will also be able to handle Neo-Panamax vessels. The terminal will double port capacity at full build-out. The Phase 1 investment in this project totaled \$986 million. There are two additional phases to this project that will be phased in based on demand.

These major infrastructure investments will enable South Carolina's ports to handle four 14,000-TEU ships at one time, ensuring the seamless movement of cargo in the era of big ships and growing e-commerce demands.

The opening of the Hugh K. Leatherman Sr. terminal will be followed with Charleston Harbor achieving a 52-foot depth in 2022, granting mega container ships access to terminals any time, regardless of the tides. The \$558 million project is funded through state and federal dollars. The project is now funded to completion through early support by the South Carolina Legislature setting aside \$350 million, additional federal funds, and the recent \$138 million allocation from Congress and the Trump Administration.

Construction of the Charleston Harbor Deepening Project is underway. The entrance of the channel is being deepened to 54 feet, and the lower harbor and part of the Wando River is being deepened to 52 feet. The Wando turning basin is also being widened to enable two 14,000-TEU-and-above ships to pass one another and access the Wando Welch Terminal at any tide. Future contracts will involve deepening part of the Cooper River up to the Leatherman Terminal to 52 feet and deepening up to the North Charleston Terminal to 48 feet. The importance of the Charleston Harbor Deepening Project coming to fruition and achieving a 52-foot depth cannot be overstated.

If SCPA continues to grow above market by increasing volumes and diversifying its cargo base, it will ensure a sustainable source of funds flow through the system to pay for the vital infrastructure projects. SCPA also relies on partnerships with the state and federal government, regulatory agencies and government agencies to support infrastructure projects through funding and grants to ensure a top 10 U.S. container port remains successful and ultimately benefits the citizens of South Carolina.

PUBLIC SAFETY, RESILIENCE & INNOVATION

Aside from SCPA's facilities improvements, there have also been significant areas of progress representing the sector's commitment to innovation and environmental stewardship in the region. These efforts include:

- Preservation of a 325-acre parcel of land in Ridgeville, South Carolina in partnership with The Open Space Institute.
- Partnership with Palmetto Green and other industry and environmental advocacy representatives, as well as federal and state agencies and conservation groups, to develop the first iteration of the Watershed Resources Registry, an innovative tool that aids industry and environmental groups in future development and conservation efforts.
- Introduction of three hybrid rubber-tired gantry (RTG) cranes into service at the Wando Welch Terminal.
- Initiation of an air quality monitoring station in North Charleston in partnership with SC Department of Health and Environmental Control.
- Continued pre-permitting studies to support a large saltwater wetlands mitigation bank on Daniel Island
- Completed first year of monitoring at the Drum Island marsh restoration site. Constructed as part of the environmental commitments for the construction of the Hugh K. Leatherman Sr. Terminal, this 22-acre created marsh is establishing vegetation at a better-than-expected rate. The

American Council of Engineering Companies of South Carolina recognized the Drum Island Marsh Restoration Project for engineering excellence in the environmental category.

South Carolina Ports Authority and its management team regard the people behind the operations as their most important asset and as such, accept responsibility for protecting, as far as reasonably practicable, the safety and health of our employees and others who may be affected by their day-to-day operations and processes. Accordingly, the SCPA has published general traffic and pedestrian safety guidelines and strives to keep their safety practice strict and up to date. SCPA was recently recognized as one of the Best Places to Work in South Carolina in 2019. The SCPA knows it is the dedication and expertise of the SCPA team, and the broader maritime community, that make port operations successful.



Ports



RECOMMENDATION TO RAISE THE GRADE

- Complete the currently planned projects including the additional phases of the Hugh K. Leatherman Sr. Terminal and dredging operations.
- Ensure continued funding for future improvements, particularly beyond FY 2022.
- Ensure that ports are part of comprehensive disaster planning.
- Continue to improve freight and landside multimodal connections.

Sources

- SCPA's Economic Impact Study, 2019, University of South Carolina http://scspa.com/economic-impact/
- Cargo volumes increasing over the past decade http://scspa.com/wp-content/uploads/gl078-pc-teu-history.pdf
- South Carolina Ports Comprehensive Annual Financial Report for Fiscal Year 2019 http://scspa.com/news/sc-ports-handles-record-cargo-volumes-in-fy19/
- South Carolina Ports Comprehensive Annual Financial Report for Fiscal Year 2020 http://scspa.com/wp-content/uploads/cafr-fy20-final.pdf
- South Carolina Code of Laws Title 54 https://www.scstatehouse.gov/code/t54c003.php
- 2017 South Carolina Port Guide http://scspa.com/about/publications/port-guide/
- SCPA 2020 volumes http://scspa.com/news/sc-ports-in-strong-position-heading-into-2020/
- S.C. Ports 2019 Annual Report http://scspa.com/wp-content/uploads/fy19-annual-report.pdf
- S.C. Ports 2020 Annual Report http://scspa.com/wp-content/uploads/sc-ports-2020-annual-report.pdf
- Harbor Deepening funding http://scspa.com/cargo/planned-improvements/harbor-deepening/
- S.C. Ports General Traffic and Pedestrian Safety http://scspa.com/wp-content/uploads/terminal-traffic-safety.pdf
- SC Ports achieves highest fiscal year on record for containers handled http://scspa.com/news/sc-ports-achieves-highest-fiscal-year-on-record-forcontainers-handled/





EXECUTIVE SUMMARY

Most roads in South Carolina are maintained by the South Carolina Department of Transportation (SCDOT). As the population and tourism industry increase, so do Vehicle Miles Traveled (VMT) which contributes to more traffic congestion and pavement wear. South Carolina has undertaken several initiatives to address the major concerns of the transportation infrastructure, but with more than half the roads in poor condition, the highest fatality rate in the U.S., and almost 20% increase in VMT, there is a significant need for additional funding, especially towards addressing capacity and safety. A critical step in addressing this need was taken in 2017 when the South Carolina General Assembly passed Act 40, which increased fees on vehicles and increased the state's gasoline tax by 12 cents per gallon over six years generating \$625 million in new annual revenue. Though an important step in the right direction, the funding gap is estimated to be nearly \$43 billion over the next two decades.

BACKGROUND

South Carolina has 162,694 lane-miles of roadway. Most of those, about 63% are maintained by the South Carolina Department of Transportation (SCDOT). Based on the South Carolina Transportation by the Numbers report published in 2018, Vehicle Miles Traveled (VMT) in South Carolina increased from 45.5 billion to 54 billion from 2000 to 2016, a growth of 19%. VMT are expected to grow another 20% by 2030. This increase will contribute to more traffic congestion and pavement wear. According to 2019 SCDOT annual report, currently, more than 50% of the South Carolina pavements need to be completely rebuilt, which is a \$11 billion investment. Furthermore, in 2019, the number of fatalities per 100 million VMT in South Carolina was 1.73, the highest in the U.S., with 68% of the fatalities occurring in rural areas. South Carolina has undertaken several initiatives to address the major concerns of the transportation infrastructure, but with more than half the roads in poor condition, the highest fatality rate in the U.S., and almost 20% increase in VMT, there is significant need for additional funding, especially towards addressing capacity and safety. It is estimated that roadway needs will reach \$70.45 billion by 2040 while the estimated revenue for the same period is projected to be \$27.63 billion, leaving a funding deficit of \$42.82 billion. In 2017, the South Carolina General Assembly passed Act 40, which will increase fees on vehicles and the state's gasoline tax by 12 cents per gallon over six years for an estimate of \$625 million of new annual revenue when fully implemented in 2023.

CONDITION & CAPACITY

SCDOT has the 4th largest state-owned roadway system in the U.S, maintaining 63% of the public miles. It is responsible for about 41,444 centerline miles, which are more than 90,000 lane-miles of roadway. From those, 2% are interstates, 23% are primary roads, 25% are secondary federal aid roads, and 50% are secondary non-federal aid roads. Thirty percent of the vehicle miles traveled (VMT) occur on interstates, 46% on primary roads, and the remaining 24% on secondary roads. Based on data from 2018, 74% of the interstate pavements are in good condition, 14% are fair, and 12% are in poor condition. Unfortunately, the same does not appear to be true for the primary and secondary roads, where the good condition pavements are less than 30%, the fair condition pavements about 20% and poor condition pavements are approximately 50%.

VMT in South Carolina increased from 45.5 billion to 54 billion from 2000 to 2016, an increase of 19% following closely the 24% population increase during those years. VMT are expected to increase another 20% by 2030. Fourteen percent of the interstate experiences recurring congestion but there are other areas that experience some level of congestion too. Figure 1 illustrates the top 100 congested segment locations in South Carolina. In Charleston, motorists waste 41 hours annually as a result of congestion while in Columbia, Myrtle Beach, Greenville-Spartanburg-Anderson, and Florence, 38, 30, 20, and 11 hours are wasted in congestion, respectively. Approximately \$5.4 billion in annual cost is a direct result of congestion travel delays from vehicle accidents, increased vehicle operating costs, and from poorly maintained roads.

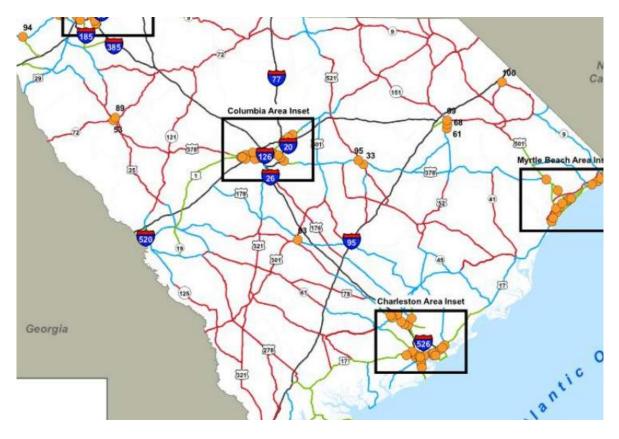


Figure 1: Top 100 Congested Strategic Corridor Segment Locations in South Carolina.

Source: https://www.scdot.org/Multimodal/pdf/SC_MTP_Strategic_Corridors_Plan_FINAL.pdf, p. 49

OPERATIONS & MAINTENANCE

SCDOT is responsible for maintaining more than 90,000 lane miles. If the state were to perform maintenance on each of its assets once every 10 years, it would need to treat more than 9,000 miles annually. According to the 2019 SCDOT annual report, more than 50% of the pavements need to be completely rebuilt, which is estimated at \$11 billion. The high number of miles needing maintenance and reconstruction is prohibitive with the current funding levels. However, funding for pavements has increased since 2015 and is planned to increase until 2023. Thus, the gap between pavements that need improvements and the ones that do not, is decreasing. Also, SCDOT has a 10-year target of paving up to three % of the network per year, which was exceeded the first year by improving five % of the pavements. SCDOT is also concerned with the interstate widenings because the state is 10 years behind on widening projects. The 10-year target is to improve 140 miles of South Carolina interstates.

SCDOT consists of approximately 4,500 employees and follows a "One DOT" approach in case of emergency situations. This allows all divisions of SCDOT to act as a single unit when necessary. SCDOT exercised this system in January of 2018 when a rare winter storm impacted the Lowcountry.

FUNDING

SCDOT receives funding from federal reimbursements, state motor fuel taxes, the infrastructure maintenance trust fund, as well as various fees, fines, tolls, permits, and other sources. Figure 2 presents the actual and estimated revenues for the state fiscal years 2017 to 2020. Federal reimbursements are based on eligible project expenditures, with average reimbursement rate of 84%.

Figure 2: Actual and estimated revenues for the state fiscal years 2017-2020. (In Millions)

Funding Source	Actual 2017		Actual 2018		Approved 2019		Proposed 2020	
Federal Reimbursements	\$	853	\$	999	\$	1,031	\$	1,211
State Revenues		832		977		1,020		1,111
Partnered Projects		305		115		415		112
Total	\$	1,990	\$	2,091	\$	2,466	\$	<mark>2,43</mark> 4

Source: https://www.scstatehouse.gov/CommitteeInfo/Ways&MeansMeetingHandouts/TransportationandRegulatory /South%20Carolina%20Department%20of%20Transportation%20Budget%20Presentation.pdf, p.66 However, the current funding levels are insufficient to cover all the needs for a safe, efficient, and wellmaintained multimodal transportation system in South Carolina. It is projected that there will be a deficit of \$42.8 billion through year 2040, allocated as following: 62% for maintaining the existing system, 31% for capacity improvements on the interstate system and major routes, and 7% to transit.

In 2017, the South Carolina General Assembly passed Act 40. The law will increase the gasoline and diesel gas tax by 12 cents per gallon over the course of 6 years (2 cents per gallon annually) and impose other fees on vehicles. Currently, the total state gas tax, for both gasoline and diesel, is 24.75 cents per gallon, which is lower than the national average of 36.83 and 37.85 cents per gallon for gasoline and diesel, respectively. Figure 3 shows the South Carolina gas tax, effective 01/01/2021, versus the national average. South Carolina has lower gas tax than 37 other states.

		Gase	oline		Diesel			
State	State Excise Tax	Other State Taxes/Fees	Total State Taxes/Fees	Total State plus Federal Excise Taxes (@ 18.4 cpg)	State Excise Tax	Other State Taxes/Fees	Total State Taxes/Fees	Total State plus Federal Excise Tax (@ 24.4 cpg)
SC	24.00	0.75	24.75	43.15	24.00	0.75	24.75	49.15
US avg	25.68	11.15	36.83	55.23	26.24	11.61	37.85	62.25

Figure 3: South Carolina versus National Average gas tax.

Source: https://www.api.org/-/media/Files/Statistics/State-Motor-Fuel-Notes-Summary-january-2021.pdf

The new gas tax will fund over \$1 billion in road and bridge

work with the distribution demonstrated in Figure 4.

Figure 4: New SC gas trust fund allocation.



Source: https://www.scdot.org/inside/new-gastax-trustfund.aspx

PUBLIC SAFETY

In 2019, the number of fatalities per 100 million VMT in South Carolina was 1.73 which is slightly lower than the 1.80 recorded in 2017, but still the highest in the U.S. The average fatalities per year from 2013 to 2017 is 916. Sixty-eight percent of the fatalities occur in rural areas. The fatalities from 2013 to 2017 increased by 28.9%. However, from 2016 to 2017, they decreased by 3%. In 2017, the economic loss from traffic collisions was \$4.56 billion, 1.9% lower than 2016, but 57.2% higher than 2013.

South Carolina has adopted the Target Zero vision to reduce fatalities on the roads. Some safety campaigns include: Sober or Slammer, Ridesmart, Drive Sober or Get Pulled Over, Buckle Up South Carolina, Pledge and Share. Other initiatives undertaken are Roadway

FUTURE NEED

With more than half the roads in poor condition, the highest fatality rate in the U.S., an almost 20% increase in VMT, South Carolina has a serious need for additional funding towards the transportation infrastructure, and especially towards addressing capacity and safety needs. According to the Executive Summary, Multimodal Needs of South Carolina *Chartering a Course to 2040*, the roadway needs total \$59.8 billion. More specifically, the needs are projected as follows:

RESILIENCE & INNOVATION

In 2014, South Carolina conducted several studies and prepared the South Carolina Multimodal Transportation Plan, *Charting a Course to 2040*, which included the vision, goals, objectives, and measures of a multimodal plan, interstate plan, freight plan, strategic corridor network plan, rail plan, statewide transit plan, and a regional public transit and human health service coordination plan for the state's 10 regions. In 2017, the state prepared the 2017-2022 Statewide Transportation Improvement Program, and in 2019, it published the Departure, Unrestrained Motor Vehicle Occupants, Age Related, Speed Related, Vulnerable Roadway Users, Intersections & Other High-risk Roadway Locations, Impaired Driving, Commercial Motor Vehicles & Heavy Trucks, and Distracted Driving. About \$99.3 million per year is projected to be allocated to improve safety on South Carolina roads until 2027. Based on the South Carolina Strategic Highway Safety Plan, Target Zero published in 2020, SCDOT invests \$70 million annually on roadway departure solutions, and from 2013-2020, over \$50 million in federal funds have been allocated to enforcement and educational countermeasures for impaired driving. Roadway departures account for 43% of fatal and serious injury collisions while impaired driving for 22%.

- \$21.5 billion of roadway expansion
- \$23.1 billion of roadway preservation
- \$10.2 billion of roadway modernization like shoulder widening to accommodate bicycles,
- \$5.0 billion of routine maintenance

Safety improvements are included in the expansion and maintenance needs. In addition, \$5.2 billion is planned for mass transit, premium transit, and passenger rail needs. The estimated revenue for the state for the period until 2040 is \$27.63 billion, which leaves a funding deficit of \$42.82 billion.

2018-2027 Transportation Asset Management Plan. These documents recommend the use of innovative construction methods with targets for environmental, economic, social, and asset sustainability. Further supporting the roll-out of innovation is South Carolina's commitment to transparency based on the procedures utilized for project selection. On the SCDOT website, all the program categories, assigned funding, objective criteria, project prioritization list, and data are available to the public. As of July 31, 2021, South Carolina has more than 600 road projects in various stages of construction across the state. To inform travelers about the projects actively being developed, it has created the SCDOT Programmed Project Viewer, where anyone can zoom to different areas in South Carolina and view all the projects and their respective details such as description, type, active state, exact location and others in that area. In addition, South Carolina has the 511.org website and 511 application that includes ample, up-to-date information about traffic letting user access traffic cameras, construction notices, safety incidents, signs, and navigation tools. Furthermore, road conditions, rest areas, toll roads, scenic byways, and evacuation routes can be found in the SCDOT Traffic & Road Conditions website. South Carolina has been very proactive in managing potential natural disasters like hurricanes with clear evacuation routes, media coverage, and lane reversals.

South Carolina has also participated in Federal Highway Administration's initiative, Every Day Counts: Creating Efficiency Through Technology and Collaboration by preparing specifications and criteria to provide electronic engineering data for automated machine guidance construction, and using e-Construction, which is a paperless approach to project document management.

Roads



RECOMMENDATION TO RAISE THE GRADE

SCDOT is constantly investing in improving the road infrastructure in the state. However, some recommendations to further improve the conditions are:

- Allocate additional funding to highway maintenance and operations to meet the needs of the state infrastructure system.
- Create alternative funding sources to cover current and future transportation needs such as a possible tourism tax.
- Expand the initiatives on traffic safety to reduce crashes and crash severity.
- Examine alternative routes for freight transportation to alleviate congestion and pavement damage.
- Expand on transit and infrastructure for pedestrians and bicyclists to create a real multimodal transportation network and reduce traffic on populated areas.
- Inform the public about the variety of state initiatives related to transportation.

DEFINITIONS

Centerline Miles (CM) – The length of roads and highways in miles throughout an area.

Lane Miles (LM) – Total length in miles and lane count of a given highway or road (Given by multiplying the centerline mileage by the number of lanes it has).

Vehicle miles traveled (VMT) – The amount of travel for all vehicles in a geographic region over a given period of time, typically a one-year.

SOURCES

- United States Department of Transportation (USDOT), Federal Highway Administration (FHWA), Policy and Government Affairs, Office of Highway Policy Information, Functional System Lane-Length – 2017 Lane-Miles. https://www.fhwa.dot.gov/policyinformation/statistics/2017/hm60.cfm
- South Carolina's State Highway System. https://www.sctrucking.org/files/Components_of_SC_Highway_System.pdf
- 3. SCDOT, Transportation Asset Management Plan, 2019. https://www.scdot.org/performance/pdf/reports/TAMP.pdf
- South Carolina Transportation by the Numbers: Meeting the State's Need for Safe, Smooth, and Efficient Mobility, 2017. https://tripnet.org/wp-content/uploads/2018/08/SC_Transportation_by_the_ Numbers_TRIP_Report_March_2017.pdf
- 5. South Carolina Strategic Corridors Plan, Charting a Course to 2040, 2014. https://www.scdot.org/Multimodal/pdf/SC_MTP_Strategic_Corridors_Plan_FINAL.pdf
- 6. SCDOT Annual Report, 2019, reporting Fiscal Year 2018. https://www.scdot.org/ inside/pdf/FINAL_Combined_Notebook_for_January_18_2019.pdf

Roads



- FY 19/20 Budget Submittal, Ways & Means, Jan. 16, 2019. https://www.scstatehouse.gov/CommitteeInfo/Ways&MeansMeetingHandouts/ TransportationandRegulatory/South%20Carolina%20Department%20of%20 Transportation%20Budget%20Presentation.pdf
- 8. Statewide Transportation Improvement Program (STIP) 2017-2022, 2017. https://www.scdot.org/inside/pdf/planning/STIP_DDR_2017.pdf
- 9. South Carolina Comptroller General, New Taxes and Fees for Road Maintenance. https://cg.sc.gov/fiscal-transparency/new-taxes-and-fees-road-maintenance
- American Petroleum Institute, Notes to State Motor Fuel Excise and Other Taxes, Rates Effective 01/01/2021. https://www.api.org/-/media/Files/Statistics/State-Motor-Fuel-Notes-Summary-january-2021.pdf
- 11. SCDOT New Gas Tax Trust Fund. https://www.scdot.org/inside/new-gastax-trustfund.aspx
- 12. Insurance Institute for Highway Safety (IIHS), Fatality Facts 2019, State by State. https://www.iihs.org/topics/fatality-statistics/detail/state-by-state
- 13. South Carolina Traffic Collision Fact Book, 2017. https://scdps.sc.gov/sites/default/ files/Documents/ohsjp/fact%20book/2017%20SC%20Fact%20Book.pdf
- South Carolina Strategic Highway Safety Plan, Target Zero, 2020. https://scdps. sc.gov/sites/default/files/Documents/accountability/BR1_SC_SHSP_Dec20-LoRes. pdf
- 15. South Carolina Multimodal Transportation Plan, Executive Summary, 2014. https://www.scdot.org/Multimodal/pdf/SC_MTP_Executive_Summary_FINAL.pdf
- 16. SCDOT Programmed Project Viewer, 2019. https://www.arcgis.com/apps/ MapSeries/index.html?appid=ca1cd69fc88945f4bb465e16765d761c
- 17. SCDOT 511, https://www.511sc.org/
- 18. SCDOT Traffic & Road Conditions. https://www.scdot.org/travel/travel-road.aspx
- 19. Federal Highway Administration Initiative Every Day Counts: Creating Efficiency Through Technology and Collaboration. https://www.fhwa.dot.gov/innovation/ everydaycounts/reports/edc3_progressreport1.pdf





EXECUTIVE SUMMARY

The South Carolina Department of Transportation (SCDOT) Office of Public Transit (OPT) is responsible for administering and overseeing federal and state funding to support its multimodal transportation network. Twenty-seven transit providers serve 40 of the state's 46 counties. In 2019, for the 8th year in a row, over 12 million annual unlinked passenger trips were made on commuter trains and buses. Between 2014 and 2018, the state's bus fleet saw substantial improvements as the portion past their useful life decreased from 77% to 32%. Nevertheless, intercity buses have struggled to meet residents' transit needs and ridership has declined by more than 60%. However, better outcomes are recognized in rural areas, some of which are seeing expansions to transit, including the Lowcountry Regional Transportation Authority which provided more than 122,000 unlinked passenger trips in 2016, increasing to nearly 193,000 in 2017. To achieve this progress an SCDOT commission approved \$59.5 million in federal and \$5.0 million in state funds in 2020. This funding will not meet all the transit needs as a study recently projected the state's transit shortfall as approximately \$5.2 billion through 2040. Finally, South Carolina is taking steps in the right direction to move its transit sector towards more sustainable and resilient solutions, in part, by replacing older vehicles with alternative fuel vehicles, using LED lights in facilities, conducting preventative maintenance in a timely manner, and studying the feasibility of new commuter rail, light rail, and Bus Rapid Transit systems.

CAPACITY & CONDITION

The SCDOT OPT's overarching goal is to provide mobility options for all residents and visitors including seniors, people with disabilities, and those seeking employment or other opportunities such as access to education and recreation. OPT is actively working in conjunction with local and regional partners as well as the Federal Transit Administration (FTA) to reach this goal. South Carolina is home to 27 regional public transportation providers who are funded in part by SCDOT.

Transit services in South Carolina include commuter fixed-route rural and urban buses, commuter route

deviation buses, Americans with Disabilities Act (ADA) complementary paratransit service, and demand response. South Carolina is also served by intercity bus service and even though there are not commuter or light rail services in the state, there are eight Amtrak daily trains, operating in three different routes passing through Greenville, Columbia, or Charleston, connecting the South with the Northeast U.S. rail services.

Of the 46 counties in South Carolina, most have some level of public transit available. This is illustrated in Figure 1, where the circled numbers indicate a transit provider and its respective operating location. More specifically, 40 counties out of 46 provide bus routes in rural and urban areas. Figure 2 illustrates the counties with urban transit, rural transit, a combination of urban and rural transit, and counties without a public transit system. Most bus routes exist in urbanized areas with larger populations. However, rural transit has improved in recent years as the American Public Transportation Association (APTA) reported that the Lowcountry Regional Transportation Authority expanded from the 10th to the 5th largest rural commuter bus agency in the country based on unlinked passenger trips, providing more than 122,000 unlinked passenger trips in 2016 and increasing to nearly 193,000 in 2017.

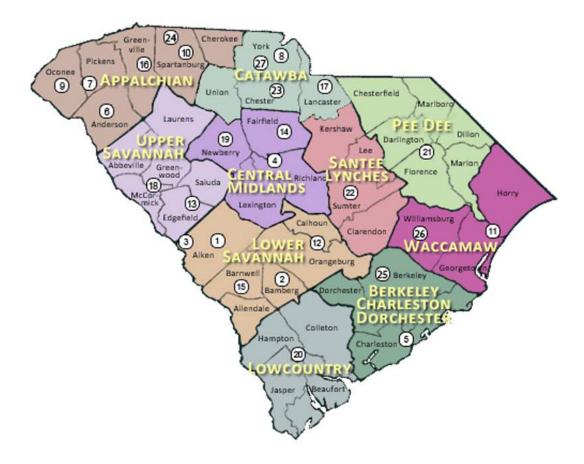


Figure 1: South Carolina Public Transit Provider Location.

Source: https://www.scdot.org/travel/travel-Otransitproviders.aspx

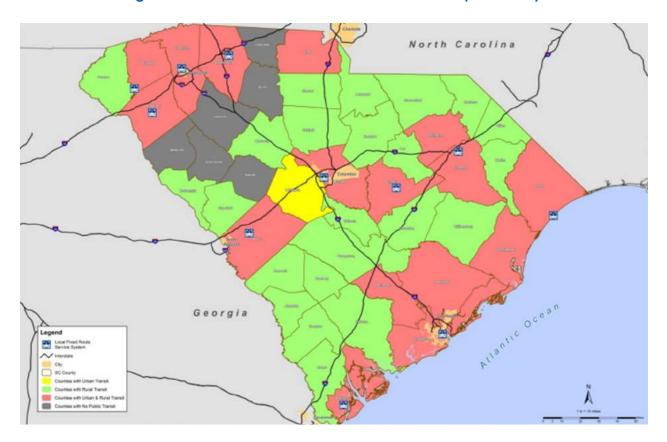


Figure 2: South Carolina Public Transit Service per county.

Source: https://www.scdot.org/Multimodal/pdf/SC_MTP_Transit_Plan_FINAL.pdf, p. 10

SCDOT places emphasis on improving the conditions and capacity of the state's transit system. During the State Fiscal Year (FY) 2019, over 12 million annual unlinked passenger trips were made on commuter trains and buses for the 8th year in a row. However, in 2020, the number of trips dropped to 8.7 million due to the COVID-19 pandemic. Yet, according to the 2010 U.S. Census, less than 1% of all trips to work in South Carolina are made using public transit. The single occupant vehicle remains the primary mode of transportation. In line with national trends, intercity bus service has decreased significantly in the past few years. The decline has affected mainly small communities and rural areas. Greyhound lines and Southeastern stages are the only two Class A intercity bus carriers that serve the state. Figure 3 shows South Carolina's intercity bus routes by company. According to the South Carolina Statewide Inventory and Regional Bus Network Plan, even though

the intercity services have declined by more than 60% over the past couple of years, 87% of residents live within 25 miles of an intercity stop, which is considered "reasonable" access. Nevertheless, the same study identifies a variety of needs when it comes to intercity services for residents.

The condition of existing intercity bus facilities requires improvements and should be prioritized. However, construction of new facilities, upkeep and updates to vehicles and vehicle-related equipment, and operational assistance is also necessary. Almost 74% of stakeholders claim that intercity bus services do not support the needs in their area. For example, intercity bus transportation does not service the state's six commercial airports, the entire north central region, or any of the eleven Amtrak rail stations.

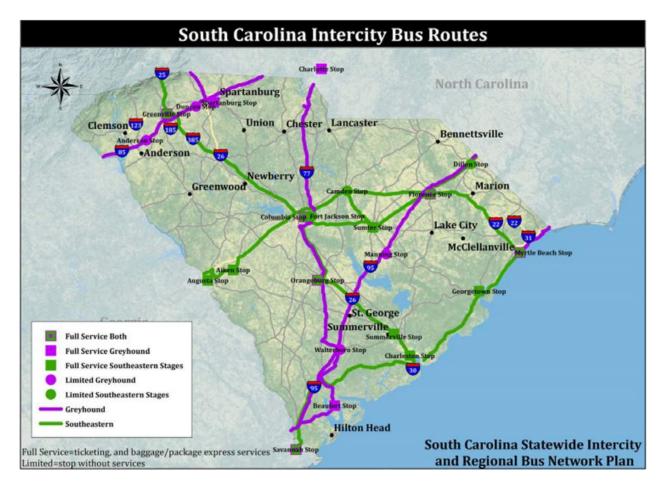
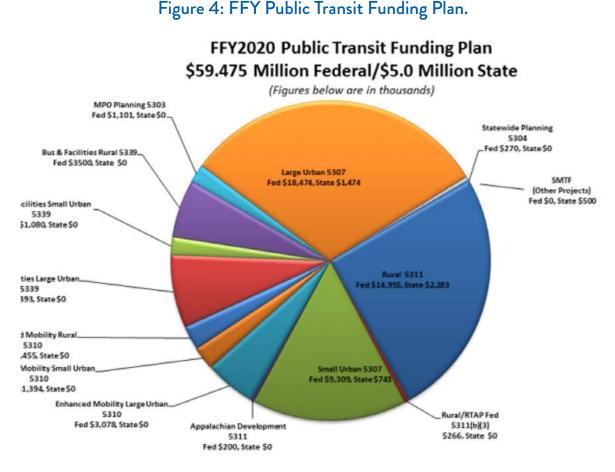


Figure 3: South Carolina Intercity Bus Routes.

Source: https://www.scdot.org/inside/pdf/PublicTransit/SCICB_Final.pdf p. 79

OPERATIONS AND MAINTENANCE, FUNDING & FUTURE NEED

Significant efforts to improve the transit facilities and fleet are underway. In fact, the SCDOT Commission reviews and approves transit funds on an annual basis. Public Transportation in South Carolina receives funds from two main sources: FTA and the State Mass Transit Funds (SMTF). SMTF are sourced from one quarter of a cent of the South Carolina motor fuel user fee. In 2020, \$59.5 million in federal funding and \$5.0 million in state funding were approved in support of transit related improvement plans. Figure 4 provides a visual of the funding distribution of federal and state funds by category for urban, rural, planning needs and more.

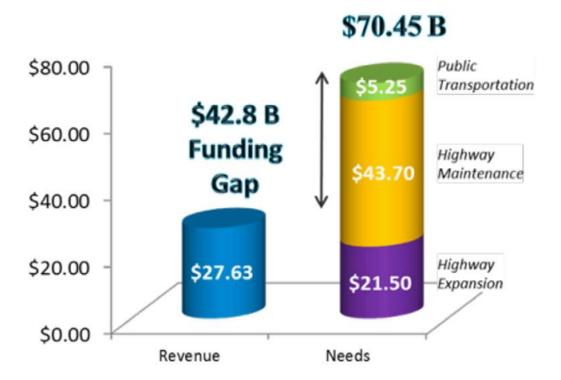


Source: https://www.scdot.org/performance/pdf/reports/SCDOT_Annual_Report_2020.pdf, p. 4

To maintain the existing transit services through the year 2040, the South Carolina Statewide Public Transportation and Coordination Plan estimates the need for a statewide operating and administration annual cost of almost \$62 million statewide. The same study forecasts the associated capital costs, which include the costs of replacing existing vehicle fleet and facility maintenance, new equipment, buildings, bus stops to be over \$21 million. Based on the SCDOT Office of Public Transit 2020 Annual Report annual report, 32% of the buses in South Carolina need to be replaced because they are passed their estimated useful life, resulting in much higher maintenance costs and lower reliability rates. Interestingly, this is a substantial improvement over the 77% of the public transit vehicles that needed replacement in 2014. This change was prompted by the state's emphasis on fleet renewal as outlined in the Statewide Transit Vehicle Replacement Program,

implemented after a Statewide Vehicle Utilization Review and Assessment conducted in 2015.

The South Carolina Statewide Multimodal Transportation Plan (SMTP), conducted in 2014, examined transit needs across the state through 2040. To maintain a safe, efficient, and well-maintained multimodal transportation system, it is estimated that between 2014 and 2040, South Carolina needs \$70.45 billion to invest in the entire multimodal system. Within that total investment need, approximately \$5.25 billion is required specifically for public transportation. However, total revenue estimate is at \$27.63 billion, which results in a \$42.8 billion gap, as seen in Figure 5. The South Carolina SMTP further identifies the need for premium transit and passenger rail, as part of the multimodal system needs, including Bus Rapid Transit (BRT) and commuter rail projects, totaling \$1.65 billion in costs. Figure 5: 2040 Multimodal Transportation Plan Funding Gap.



Source: https://www.scdot.org/inside/pdf/planning/STIP_DDR_2017.pdf, p. 10

In the 2017-2022 Statewide Transportation Improvement Program (STIP) FTA's anticipated funding programs included the Metropolitan & Statewide and Non-Metropolitan Transportation Planning, Urbanized Area Formula Grants, Enhanced Mobility of Seniors and

PUBLIC SAFETY

Safety and security along the state highway system is of the utmost importance to SCDOT. To ensure adherence to safety protocols, all public transportation projects are required to integrate safety improvements and measures. Public Transportation agencies should partner with Human Services Agencies to train passengers and drivers, track accidents, and implement preventive measures.

Overall, public transit is a relatively safe mode of transportation in South Carolina. In 2016, only three

Individuals with Disabilities Program, Formula Grants for Rural Areas Program, Rural Transit Assistance Program, Tribal Transit Program, and the Intercity Bus Facilities Grant Program.

fatalities were reported with one involving rail and two involving commuter buses. While this number did increase to nine fatalities in 2017 with four involving rail and five involving commuter buses, public transit remains one of the safest ways of moving around the state. In 2017, there were 982 fatalities associated with other modes of transportation. For the same year, the number of injuries with commuter bus were 95 and with rail was 60, whereas with other modes it was 460.

RESILIENCE

South Carolina faces several geographic-based climate challenges related to inclement weather, such as flooding and hurricanes. Infrastructure's low elevation along the coastal areas aggravates these challenges. Several divisions, committees, and initiatives exist to actively address factors that impact the climate, including the Coastal Resilience, Resiliency and Sustainability Advisory Committee, South Carolina Emergency Management Division, and Transportation Management Services. Furthermore, several resources exist to support emergency and mandatory evacuations, particularly along the coast. Travelers can utilize the SC 511 application, hurricane guide, interactive evacuation maps, traffic control plans, storm reports, and other resources for planning, particularly during weather-related evacuations. While all public transportation agencies should have evacuation plans in place, coastal cities, such as the City of Charleston, actively utilize evacuation plans. For example, buses are used to transport residents to inland shelters. These services, route information, and availability of buses are communicated via several avenues, online and otherwise.

INNOVATION

South Carolina is seeking innovative ways to increase efficiency and effectiveness of the transit services and to bridge transportation gaps. SCDOT encourages agencies to submit ground-breaking proposals for funding consideration. Major transit agencies throughout the state provide real time information about bus locations via websites, Google maps, and/or mobile applications, which can be downloaded for free. Furthermore, multiple agencies offer rack and ride services, allowing riders to load their bikes onto buses, thereby bolstering their mobility options. The largest communities in the state also have bike-sharing programs such as Charleston's Holy Spokes, Columbia's Blue Bike, Clemson's BikeShare, Greenville's Though several public transportation agencies have plans in place to deal with the negative effects of climate change, agencies are also working on preventative measures. Agencies are actively managing assets to expand the useful life and improve reliability of buses. Additionally, there is a growing focus on alternative fuels and electric vehicles to lessen the environmental impacts of public transit. In particular, Clemson Area Transit maintains 10 electric buses, Anderson's Electric City Transit has natural-gas buses, Charleston's Area Transit bought three electric buses as an effort towards having a zero-emission fleet, and Greenlink transit in Greenville has four electric buses. Moreover, South Carolina decided to spend one third of the Volkswagen \$34 million settlement funds on "clean buses" to reduce emissions and provide green technology. However, most of those funds, \$7.88 million will be allocated to obtain 78 school buses that run on propane. Overall, transit agencies are working towards more sustainable and resilient public transportation solutions, with a focus on replacing older vehicles with alternative fuel and electric vehicles, using LED lights in facilities, and conducting preventative maintenance in a timely manner.

B-Cycle, and Spartanburg's B-Cycle. Bikeshare companies are examining the possibility of adding electric bicycles to their fleet.

Looking to the future, SCDOT is assessing the possibility of implementing premium transit options, to include commuter rail, light rail, and Bus Rapid Transit (BRT). In fact, SCDOT has identified four major projects, which have feasibility studies and estimated budgets are already prepared, to improve transit and connectivity in South Carolina.

•••

Transit



RECOMMENDATION TO RAISE THE GRADE

Even though significant efforts are being made to improve transit in South Carolina, the state still ranks very low in transit performance compared to other states. The ALLTransit Performance score shows South Carolina as the 46th out of 51 states and territories in terms of transit connectivity, access to jobs, and frequency of service. To improve the transit infrastructure's grade, the following recommendations are made:

- Increase funding to improve existing systems and services while also ensuring adequate funding to cover future transit needs.
- Offer intercity buses and increase connectivity between cities, counties, airports, and major transit stops.
- Further develop public transit systems to cover more areas and reduce bus headways.
- Expand initiatives to inform residents about the transportation options available to them.
- Reduce the carbon footprint of transit fleets by investing in alternative fuel and electric vehicles.

SOURCES

- SCDOT Office of Public Transit 2020 Annual Report https://www.scdot.org/ performance/pdf/reports/SCDOT_Annual_Report_2020.pdf
- SCDOT Public Transit Providers https://www.scdot.org/travel/ travel-transitproviders.aspx
- South Carolina Statewide Public Transportation and Coordination Plan, Charting a Course to 2040, 2014. https://www.scdot.org/Multimodal/pdf/SC_MTP_Transit_Plan_FINAL.pdf
- 2019 Public Transportation Fact Book, American Public Transportation Association. https://www.apta.com/wp-content/uploads/APTA_Fact-Book-2019_FINAL.pdf
- South Carolina Multimodal Transportation Plan, Executive Summary, 2014. https://www.scdot.org/Multimodal/pdf/SC_MTP_Executive_Summary_FINAL.pdf
- South Carolina Statewide Rail Plan, Charting a Course to 2040, 2014. https://www.scdot.org/Multimodal/pdf/SC_MTP_Rail_Plan_FINAL.pdf
- Rural Transit Fact Book, 2017. https://www.surtc.org/transitfactbook/downloads/ 2017-rural-transit-fact-book.pdf
- South Carolina Statewide Intercity and Regional Bus Network Plan, Final Report, 2012. 2014.https://www.scdot.org/inside/pdf/PublicTransit/SCICB_Final.pdf
- SCDOT Office of Public Transit, 2018 Annual Report, 2019. https://www.scdot. org/performance/pdf/reports/SCDOT_Annual_Report_2018.pdf

Transit



SOURCES (CONT.)

- Statewide Transportation Improvement Program (STIP) 2017-2022, 2017. https://www.scdot.org/inside/pdf/planning/STIP_DDR_2017.pdf
- South Carolina Traffic Collision Fact Book, 2017. https://scdps.sc.gov/sites/default/files/Documents/ohsjp/fact%20book/2017%20SC%20Fact%20Book.pdf
- SCDOT Hurricane Resources website. https://www.scdot.org/travel/stormResources.aspx
- Upstate buses rolling away from diesel, 2017. https://www.independentmail.com/ story/news/local/2017/07/15/upstate-buses-rolling-away-diesel/460998001/
- CARTA purchasing its first electric buses as it plans to replace entire fleet, 2018. https://www.postandcourier.com/news/carta-purchasing-its-first-electric-busesas-it-plans-to/article_05a7a9dc-ad21-11e8-a592-137c6a143f75.html
- South Carolina Celebrates the Deployment of Greenlink Electric Buses with The Proterra Greenville Team. https://www.proterra.com/south-carolina-celebrates-thedeployment-of-greenlink-electric-buses-with-the-proterra-greenville-team/
- Volkswagen paid SC \$34 million after an emissions scandal. It will fund 81 'clean' buses, 2019. https://www.greenvilleonline.com/story/news/2019/07/31/ dieselgate-volkswagen-emissions-scandal-settlement-fine-pays-81-cleanbuses-anderson-sc/1871860001/
- South Carolina Strategic Corridors Plan, Charting a Course to 2040, 2014. https://www.scdot.org/Multimodal/pdf/SC_MTP_Strategic_Corridors_Plan_FINAL.pdf
- AllTransit Rankings. https://alltransit.cnt.org/rankings/



EXECUTIVE SUMMARY

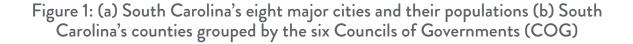
The South Carolina Department of Health and Environmental Control (DHEC) administers the state's wastewater management planning, permitting, compliance, and some expansion initiatives. More locally, wastewater infrastructure decision making is typically overseen by a board of county officials or at the household level by a homeowner using a decentralized system (e.g. septic tank). Overall, wastewater infrastructure in South Carolina is aging, and smaller wastewater agencies struggle to upgrade treatment systems to meet effluent permit requirements and minimize sanitary sewer overflows. As the state's population shifts and with approximately 75% of the population living in one of the state's eight major cities, improvements in infrastructure capacity, condition, and service are necessary. Small and rural utilities have limited resources and personnel to obtain federal grant funding to affordably keep pace with infrastructure needs. Therefore, larger utilities are leading by taking a regional, consolidated approach to wastewater treatment. Consolidation expands access to resources for financing capital improvement programs, performing long term planning or rate restructuring studies, and upgrading the aging infrastructure at smaller utilities.

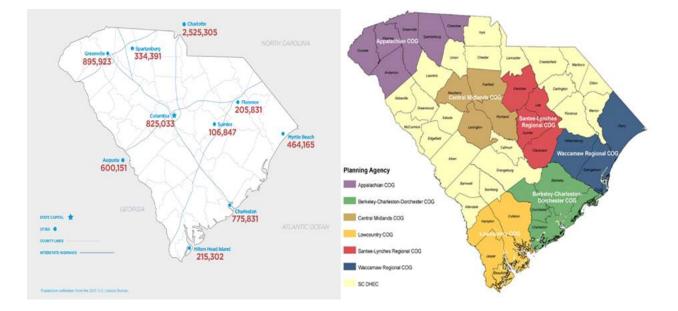
BACKGROUND

In South Carolina, approximately 75% of the population lives in one of the eight major cities depicted in Figure 1a. These dispersed population clusters are consistent with the state's approach to wastewater governance. The state's legislature grouped counties into seven clusters. Six of the groups are overseen by a board of county officials called a Council of Government (COG) whose names and jurisdictions are depicted in Figure 1(b). The COGs mediate between local decision makers and wastewater utilities regarding activities like water quality planning efforts, new projects, and expansions. However, the nearly 1.2 million rural residents whose wastewater decision making is not overseen by a COG depend directly on the South Carolina Department of Health and Environmental Control (DHEC) for assistance in planning, permitting, compliance, and expansion of wastewater infrastructure.

South Carolina's regional wastewater management approach means that details about the infrastructure are localized at COGs, large utilities, and engineering firms throughout the state rather than at a central hub (e.g., DHEC). As such, this limitation of publicly available, state-level data necessitated the review of local data from COGs, engineering reports, and the U.S. Environmental Protection Agency (EPA) to appropriately assess the state's wastewater sector. Additionally, to fill gaps in information, contextualize the data, and incorporate insights for the recommendations, informal interviews and surveys were conducted with utility leaders from geographically diverse areas and representing a range of customers – from 1,200 to upwards of 500,000

customers. This information was collected in collaboration with the South Carolina American Water Works Association Water Utility Council in October of 2020.





CAPACITY AND CONDITION

Table 1 details a portion of South Carolina's wastewater treatment systems and provides a range of the permitted or average operating capacity for centralized systems of about 10 million gallons per day (MGD) or greater. Most utilities serve residential and retail users, while others have treatment processes and collection systems that accommodate wastewater from industrial sources. Consider Renewable Water Resources (ReWa) in the Upstate region as a representative example of centralized wastewater treatment throughout the state. The infrastructure within their portfolio consists of 293 miles of 8 inch to 72-inch diameter pipe, over 7,200 manholes, 60 pump stations for lifting wastewater flow to higher elevations, and 51 miles of pressurized force mains. Table 1: Examples of South Carolina's wastewater treatment plants/utilities by region, form of governance, and range of the permitted or average capacity for systems.

Utility and/or Wastewater Treatment Plant	Governance*	Capacity (Million Gallons Per Day, MGD)				
Upstate						
Greenville	COG	41				
Spartanburg	COG	14				
York	DHEC	20				
Midlands	·					
Metro Wastewater Treatment Plant (Columbia)	COG	60				
Aiken	DHEC	20				
Florence	DHEC	15				
Pocotaligo Wastewater Treatment Plant	COG	9.2**				
Low Country						
Charleston Water System	COG	36				
Grand Strand Water & Sewer Authority	COG	33				
North Charleston Sewer District	COG	34				
Berkeley County Water & Sanitation	COG	22.5				
Dorchester County Water & Sewer Department	COG	12.5				
Center Street Wastewater Treatment Plant	COG	17				
Summerville Commissioners of Public Works	COG	10				

^{*}Governance: COG – Council of Government, DHEC – Department of Health and Environmental Control **Average Daily Discharge

As the state's population shifts, improvements in infrastructure capacity, condition, and service are necessary. Consequently, areas of South Carolina rely on expanded service agreements (consolidation) as one approach for accommodating wastewater systems' changing needs. Oftentimes, a larger utility with remaining capacity expands its footprint to incorporate a smaller system to improve its performance (e.g., reduce chronic challenges of non-compliance with effluent limits). In South Carolina, matters of non-compliance may be due to outdated technologies, wastewater systems operating over their permitted capacity, and/or insufficient full-time and/or skilled personnel.

In some areas, the trend towards consolidation occurs when existing utilities determine that upgrades and/ or comprehensive workforce (re)development is too expensive. Therefore, while local municipalities continue operating the "retail" portion of the wastewater service (e.g., online fee collection and metering), the larger utility takes over ownership, operation, and maintenance (O&M), and responsibilities for upgrading the infrastructure.

Onsite wastewater treatment in South Carolina is administrated and enforced by South Carolina Department

FUNDING

South Carolina's wastewater systems are sustained by a combination of rate payers' fees, state-level and federal grants, and federal funding mechanisms. However, according to the EPA's Clean Watershed Needs Survey which estimates each state's wastewater capital needs, South Carolina did not report information during the data collection phase, so a total funding gap is unavailable.

Most of the state's wastewater utilities depend on consistent revenues from users. In 2020, South Carolina residents pay an average of \$34.09/month for wastewater services, approximately \$8 less per month than the national average of \$42/month according to ASCE's 2021 Report Card for America's Infrastructure. Utility executives who were surveyed explained that each region typically has a base rate, while some may have tiered fee structures that increase with usage volumes or

FUTURE NEEDS

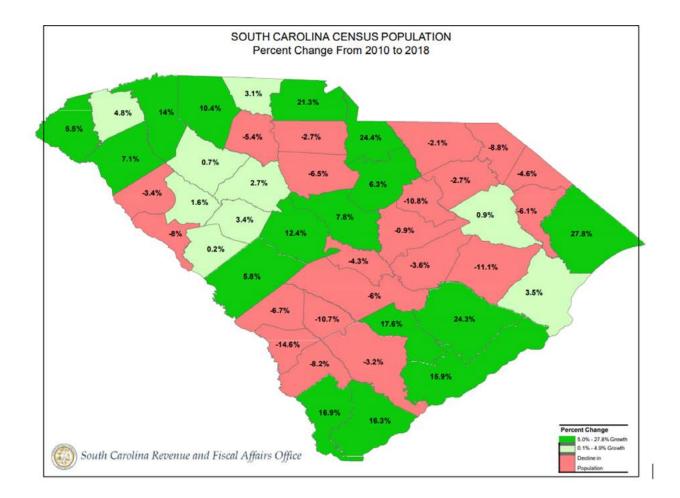
South Carolina's wastewater utilities are typically led by a local board of directors responsible for fiscal management and planning that guide the system in meeting current and future needs. These groups lead the utility in accessing low interest loans or grants to finance upgrades and/or expansions in accordance with future planning documents. However, boards for smaller, rural systems, though experienced in leadership, may lag in identifying future needs and procuring funding because fewer people may be responsible for more infrastructure systems.

Additionally, data scarcity or underutilization, particularly regarding population dynamics may pose challenges for planning for the future. For instance, of Health and Environmental Control (SCDHEC). Onsite wastewater treatment consists of permitted septic systems that are designed and installed by licensed professionals to ensure groundwater is not contaminated.

are tailored to local industrial and/or commercial users.

According to the Rural Infrastructure Authority's Grant Program Summary for FY2020 there is at least \$25 million in available funding for capital projects. Other grant funding and financing options include the federallysupported the State Revolving Loan Fund (SRF), Community Development Block Grants (CDBG), and grant programs through the Department of Housing and Urban Development (HUD). Though these resources are available, utility representatives noted that some facilities, especially those in small communities and rural areas, are at a disadvantage when accessing funds due to the lack of time, personnel, and/or resources (technical, financial) that are needed to compile an application, navigate the process, and follow-up.

South Carolina was in the top 10 states experiencing the most population change between 2010 and 2018. Population dynamics influence the economies of scale in the wastewater sector – larger systems are typically able to charge lower rates for treatment because the system runs more efficiently. However, other systems experiencing growth that may be nearing capacity limits could become overtaxed. Therefore, depending on the circumstances, population dynamics could positively influence system operation, driving down overall costs as parts of the state trend towards consolidation, or it could lead to inefficiencies as older systems needing updates are strained beyond their treatment capacity.



OPERATION, MAINTENANCE, AND INNOVATION

Little state-level data exists for current Operation and Maintenance (O&M) efforts for South Carolina's wastewater sector. However, when surveying utility officials, some mentioned that conducting O&M, performing upgrades, or implementing repairs was best accomplished through intergovernmental cooperation. The utility officials explained how the cooperative approach helped to prevent redundancy in resource use and maximize the mutual benefit of overlapping project timelines. Examples of this type of communication exist among local agencies, COGs, and wastewater utilities as they determine the timing of roadway closures, prioritize maintenance of the wastewater collection network, and/ or re-schedule pipe replacements to reduce the backlog.

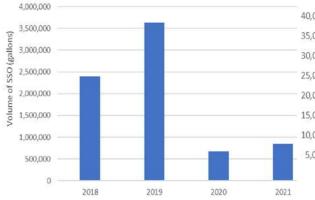
Utility officials in regions throughout the state have

worked with engineering consulting firms to obtain wellcalibrated models to help determine priority schedules for times and locations for O&M and system expansion. As engineers' partner with the technical staff at utilities to interface with the increasingly computerized equipment, data collection technologies, and mapping systems, the need for technically skilled individuals who can enter this evolving workforce and manage innovations grows.

For instance, utilities are employing GIS mapping tools to perform detailed maturity assessments and gap analyses. Asset management software such as CityWorks are being implemented to provide a complete picture of local infrastructure's condition. Asset management data then contributes to capital improvement plans to impact long term improvements and rate structures.

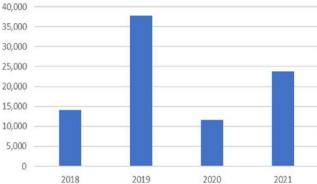
PUBLIC SAFETY

Some wastewater treatment plants in South Carolina experience sanitary sewer overflows (SSOs) which have a variety of causes including inadequate sewer capacity, blockages, line breaks, sewer defects that allow stormwater and groundwater to overload the system, lapses in sewer system operation and maintenance, power failures, and vandalism. During these instances, untreated sewage can contaminate nearby water bodies, causing potentially serious health risks.



Maximum Volume of Sanitary Sewer Overflow Episodes from 2018 to 2021

According to the most up-to-date EPA estimates, South Carolina has reported an average of almost 600 SSOs each year, over the last 10 years, while there are at least 40,000 SSOs annually nationwide. The DHEC website records and reports SSO episodes on their website, and the graphs below were generated from that data. The graphs show the maximum and average volumes of SSO episodes from 2018 to 2021 and reveal fluctuating trends.



Average Volume of Sanitary Sewer Overflow Episodes from 2018 to 2021

RESILIENCE

Some utilities in South Carolina, particularly those in the Low Country region, have been incorporating aspects of resilience into their future planning for decades. For instance, after Hurricane Hugo in 1989, decision makers decided not only to rebuild the wastewater system above the high tide design elevations but also above Hugo's recorded storm surge. More recently, in 2019, to better understand the public health impacts of the state's vulnerable water and wastewater infrastructure, a diverse group of decision makers came together on a federally funded project to produce a tool for assessing the infrastructure's resilience. The researchers, elected officials, and community partners produced the Guidebook for Community Level Assessment which evaluates the impacts of extreme precipitation events, stronger storm surge, riverine flooding, and rising seas on infrastructure while also identifying best management practices, institutional networks, and mitigation activities that should be implemented to proactively improve the community's and infrastructure system's resilience. However, the assessment has not yet been streamlined into future planning among COGs and/or utilities across the state.

Wastewater

RECOMMENDATION TO RAISE THE GRADE

- Establish a federal Water Infrastructure financing mechanism to finance the national shortfall in funding of infrastructure systems under the Clean Water Act.
- Raise awareness of the true cost of wastewater conveyance and treatment.
- Utilities should ensure that their rates cover the full cost of service including operation, maintenance and capital needs.
- Reinvigorate the State Revolving Loan Fund (SRF) under the Clean Water Act by reauthorizing the minimum federal funding of \$20 billion over five years.
- Preserve tax exempt municipal bond financing.
- Preserve the status of tax-exempt bonds.
- Encourage utilities to take regional approaches for wastewater management to take advantage of economies of scale.
- Achieve Clean Water Act compliance in a way that minimizes the impact on lower-income residents and on economic competitiveness through bill payment assistance and affordable rate structuring that covers the true cost of service including operation, maintenance and capital expenditures; revisiting EPA affordability guidelines; renewed or enhanced federal and state aid; and redirecting other aid sources to sewer-mandate compliance

SOURCES

- American Society of Civil Engineers 2021 Report Card for America's Infrastructure https://infrastructurereportcard.org/
- South Carolina's Water Associations: Water Environment Association of South Carolina (WEASC) and the South Carolina Section of the American Water Works Association (SCAWWA)
- United States Census Bureau Quick Facts, South Carolina, https://www.census. gov/quickfacts/fact/dashboard/SC/BZA115216
- South Carolina Watershed Atlas, https://gis.dhec.sc.gov/watersheds/
- Environmental Protection Agency My Environment: South Carolina, https://www3.epa.gov/myem/envmap/myenv.html?minx=-82.89275&miny=31.90486&maxx=-78.89475&maxy=35.90286& ve=6,33.90386,-80.89375&pText=South%20Carolina&pTheme=water
- South Carolina Documents Depository https://dc.statelibrary.sc.gov/handle/10827/1
- SC Population Map https://www.sccommerce.com/research-data
- Mt. Pleasant https://www.mountpleasantwaterworks.com/about-us/what-we-do
- Clear Water 2020: Columbia's Clear Vision for Clean Water
- Charleston Water https://www.charlestonwater.com/139/What-We-Do
- GAO Report to Congressional Requesters: Water Infrastructure https://www.gao. gov/assets/gao-20-24.pdf