



NATIONAL CAPITAL SECTION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS



INFRASTRUCTUREREPORTCARD.ORG/DISTRICT-OF-COLUMBIA



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INFRASTRUCTURE: basi c structures and faci li ti es (e.g., water, roads, bri dges, transi t, and power) meded for the operation of a soci ety.

Infrastructure impacts you whether you see it or not. We all use infrastructure every day, but we rarely think about it until it breaks.

Look around you, D.C. We've outgrown our grandparents' infrastructure. Most of our infrastructure was put in place by our grandparents (and maybe even great great grandparents), and D.C. is rapidly outgrowing the systems around us and underneath us.

Infrastructure can either make your life more difficult or it can be so seamless you barely notice you used it. But if you live in D.C., you've probably noticed it: When commutes are brutal; neighborhoods flood, or the power is out—you've noticed your infrastructure a lot more lately.

Recommendations exist to raise every grade for D.C.'s infrastructure. Infrastructure problems are not impossible to solve. There are ways to improve each of these grades, and some solutions are already on the way. Major wastewater projects across D.C. are in progress to reduce flooding and clean up the Anacostia, critical bridges have been fixed and others have repairs in the works, levees have made modest improvements, and some of the rail system has seen network expansions.

This Report Card gives you facts and grades on D.C's core infrastructure. The Report Card shows how it all stacks up – from roads to water to levees. If you drive in D.C., if you flush a toilet in D.C., if you want infrastructure that works – this Report Card is for you.

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

Methodology

The purpose of the Report Card for D.C.'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.

2021 Washington, D.C.'s Infrastructure Report Card

BRIDGES	Ê.	RAIL	B
DRINKING WATER	C	ROADS	<u>D</u> .
ENERGY	Ċ	TRANSIT	Ď
	Ď	WASTEWATER	B

G.P.A.

<u>e</u>

C

Recommendations to Raise the Grade

1. KEEP UP THE GOOD WORK AND LOOK AHEAD:

Grades are improving for sectors that procure and generate sufficient funding, perform timely expansion or rehabilitation efforts, and invest in innovative and resilient approaches to provide service to the public. These efforts should continue and look ahead for ways to improve efficiency and affordability.

2. EDUCATE THE PUBLIC ON TRUE COST OF INFRASTRUCTURE:

Many infrastructure owners can determine their own needs and set user fees, but a sustained educational effort should be made to inform users of fee changes. The public's willingness to finance new or upgraded infrastructure through changes to their user fees is critical, especially when significant investment is needed. User fees should reflect the true cost of using, maintaining, and improving infrastructure.

3. MAKE THE INVESTMENT:

Smart infrastructure investments should be made on a consistent and strategic foundation based on long-term planning and prioritization. Leaders need to create consistent, dedicated funding from a variety of sources to allow infrastructure owners to plan for the long-term future of their investments.





Bridges



EXECUTIVE SUMMARY

D.C. has 244 highway bridges, 208 of which are owned by the D.C. Department of Transportation (DDOT) and 36 of which are owned by the National Park Service (NPS). The average age of these bridges is 62 years and approximately 30% of them will need to be rehabilitated in the next 10 years. Though DDOT and NPS have made significant strides in replacing or rehabilitating old bridges, about three percent of bridge conditions are still classified as poor. Even after the rehabilitation of the Arlington Memorial Bridge, more than 200,000 trips will be taken, every day, over bridges in poor condition.

CONDITIONS & CAPACITY

Over the past decade, both DDOT and NPS have made significant progress in rehabilitation and replacement of highway bridge structures that were rated as poor. A bridge rated as poor does not mean it is unsafe, but it could become so without substantial improvements. A poor rating can also cause limitations on vehicle speeds and weights to ensure safety if the structure remains open. Currently, 70 percent of the District's bridges have at least one major component listed in fair condition. Without proper maintenance these bridges will continue to deteriorate thereby resulting in an increase in the cost of future repairs. Importantly, both the Theodore Roosevelt (TR) Bridge and the H Street Bridge over Washington Terminal Yard have continued to deteriorate in recent years and are now considered to be in poor condition. The condition of these two bridges that are critical to the District highlight the importance of preventative maintenance and rehabilitation of bridges to avoid their reduced condition classification. Overall, about 30 percent of D.C.'s bridges were either built or rehabilitated before 1980. With an average life span of bridge structures at 50 years, these bridges will likely need a major rehabilitation or replacement in the next 10 years, unless there is a robust preventive maintenance program implemented.

On the bright side, the District has recently taken some positive steps. In the past several years the Arlington Memorial Bridge received a FASTLANE grant of nearly \$200 million together with funding from the NPS Federal Lands Transportation Program to perform major rehabilitation. As of December 2020, construction was completed to bring this bridge up to a "good" condition and it was reopened to drivers, pedestrians, and bicyclists. Some of the District's oldest bridges in need of repair are two NPS bridges which carry less than 2,000 trips a day and are classified as poor. While the Joyce Road bridge over Luzon Branch is funded for construction before 2022, the Edgewater Stables bridge over Rock Creek, which carries only 50 trips a day, still needs to be funded. Overall, though there has been some progress in repairing structurally deficient bridges in the District, efforts have essentially plateaued. As construction and rehabilitation priorities are set and limited funds are stretched between projects, it is important to highlight the benefit of implementing a preventive maintenance program to avoid major bridge rehabilitation projects by arresting the deterioration before it leads to significant structural damage.

PUBLIC SAFETY

With more than 200,000 trips per day still taken across highway bridges with structural features in poor condition and an inventory of older bridges, it is important that D.C. employ accelerated bridge construction methods as these bridges are rehabilitated or replaced. Aside from improving the condition of the bridges, it will also reduce traffic impacts, contributing to improved air quality of pedestrians.

FUNDING AND FUTURE NEEDS

D.C. bridge projects are funded by a combination of local and federal funds. D.C. has a unique challenge in that there are only two levels of funding available, compared to most major cities which also benefit from state support for repairs. Some of the major bridge rehabilitation projects necessary for D.C. to reduce the number of bridges in poor condition have been funded. Although DDOT has been doing their best with limited resources and there is significant support from residents and elected officials for transportation infrastructure development in the District, D.C.'s aging bridges continue to need funding for preventive maintenance, major rehabilitation or replacement. Looking to the future, the list of D.C. bridges with major components that are in fair condition and that would need major rehabilitation or replacement includes the East Capitol Street over the Anacostia River and the Pennsylvania Avenue Bridge over Rock Creek.

Metropolitan Washington Council of Governments (MWCOG) forecasts that D.C.'s population will grow from 672,200 in 2015 to 987,200 in 2045 and that the number of jobs in D.C. will grow from 798,300 in 2015 to 1,045,400 in 2045. To accommodate the increases in population and jobs, it is important to fund all

INNOVATION

With an average age of 62 years, D.C. bridges are significantly older than the national average of 44 years, as reported in the 2021 ASCE Report Card. In order to stretch DDOT and NPS' limited resources, new practices to extend bridge life rather than to completely replace the structures are being considered. Some engineers, within the industry, are shifting toward the use of cathodic Also, more than 100 D.C. bridges have substandard conditions of their deck geometry, vertical and horizontal clearances, water flow adequacy or approach roadway alignment. Without updates, these structures can lead to unsafe situations for the travelling public, add to mounting congestion problems in the District, and ultimately contribute to increased use of drivers' time and money.



transportation systems, whether roads, bridges or transit lines. As D.C.'s bridges continue to age, it is becoming increasingly important to have a "retirement plan" for maintaining or replacing bridges on a consistent schedule, communicating these plans to the public, and facilitating pedestrian and multi-modal transportation systems to accommodate users' needs during construction.

protection and the elimination of joints on the rehabilitated or replaced structures. The TR Bridge is currently under design for major rehabilitation and the structure is being evaluated for suitable cathodic protection and for either elimination of existing joints or to provide better details under the tooth joints that provide positive drainage away from the structure.

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Bridges



LET'S RAISE THE GRADE

- Increase funding to rehabilitate or replace bridges that are classified in poor condition and prioritize rehabilitation of bridges that are posted for load restrictions.
- Rehabilitate or replace bridges in fair condition before their condition continues to deteriorate to poor.
- Prioritize preventive maintenance of bridges that carry heavy traffic and have at least one of the major components in fair condition, like East Capitol Street over the Anacostia River and the Pennsylvania Avenue Bridge over Rock Creek, in order to bring them up to good condition or replace them before compromising the safety of the travelling public.
- Make smart design decisions on rehabilitation or replacement projects by considering costs across a bridge's entire lifecycle.
- Emphasize the use of prefabricated bridge elements to reduce traffic impacts from rehabilitation or reconstruction of highway bridge structures.
- Continue designing and developing pedestrian and multi-modal transportation systems on bridges to accommodate other modes of transportation, particularly during periods of rehabilitation and repair.

FIND OUT MORE

- MWCOG Round 9.1 Cooperative Forecasting Summary Tables Adopted October 10, 2018, https://www.mwcog.org/community/planning-areas/cooperative-forecast/
- 2. www.hstreetbridgeproject.com
- www.fhwa.dot.gov/bridge/nbi/disclaim.cfm?nbiYear=2018/delimited&nbi-State=DC18
- 4. https://www.nps.gov/gwmp/planyourvisit/memorialave.htm
- 5. https://artbabridgereport.org/state/profile/DC



EXECUTIVE SUMMARY

D.C.'s drinking water comes from the Potomac River, is conveyed by the U.S. Army Corps of Engineers (USACE)-owned Washington Aqueduct, and is purchased and delivered to users by the D.C. Water and Sewer Authority (D.C. Water). The system supplies approximately 94 million gallons per day (MGD) through a distribution network that contains 1,350 miles of pipes. The District's drinking water infrastructure also includes four pumping stations, five reservoirs, three elevated water storage tanks, and 9,300 fire hydrants. Current projections show capacity is sufficient to meet demands through 2030. However, the network of drinking water pipes has a median age of 77 years and leaks at more than twice the rate of the industry's average. While D.C.'s current and projected fiscal resources for drinking water are adequate to meet needs until FY 2026, ratepayers' bills have been on the rise as the combined drinking water and wastewater monthly cost was approximately \$67 in 2019 and rose to about \$75 in 2020.. Though the increase is consistent with nationwide trends, to combat the rising costs, a Customer Assistance Program for low-income families has been provided to help offset the financial burden. Overall, streamlined asset management, cybersecurity improvements to system vulnerabilities, and more federal support are needed to augment sound water policy and planning in Washington, D.C.

CAPACITY & CONDITION

The pipes' median age, by itself indicates that they are well towards the end of their suggested life cycle which ranges from 50-125 years per the American Water Works Association (AWWA), with two percent of pipes having been installed prior to the Civil War. D.C. Water replaces one percent of all pipes each year, a program initiated in 2018, which can address approximately 13 miles of aging pipes per year. In an average year, there are typically 400 to 550 water main breaks in D.C. primarily due to age and deteriorating conditions. However, during a short 11-day period in January 2018, 118 breaks occurred, according to D.C. Water's 2018 Annual Report. This resulted in an Infrastructure Leakage Index (ILI) of 7.64, a rate much higher than the AWWA benchmark average of 3.3. An ILI is a water distribution system performance indicator of water loss from the supply network.

The impact of underground water main breaks can be severe resulting in road closures for construction, lack of water service to both businesses and residences and high repair costs. In addition to physical breaks, malfunctions can also affect service. A system malfunction in July 2018 at a pumping station caused a loss of water pressure leading to a precautionary boil water advisory being issued for 34,000 District customers and an additional boil water notice was issued in November 2019 following a water main break in Arlington, VA. Boil water advisories are a standard precautionary practice when unusual conditions are detected during monitoring operations. Typically, D.C. Water issues the advisory as a safety measure until the water is tested. The current capacity of drinking water infrastructure is sufficient to meet demands through 2030. The Washington Aqueduct withdraws approximately 140 MGD from the Potomac River at two locations – Great Falls and Little Falls - serving customers in D.C. and parts of Northern Virginia. From these locations the water is sent to the Dalecarlia or McMillan Water Treatment Plants for treatment and distribution to customers. The Dalecarlia Reservoir serves as pretreatment for the Dalecarlia Water Treatment Plant through the settlement of solids in an earthen basin with a capacity of 238 million gallons located between the Spring Valley and Palisades neighborhoods of D.C. The Georgetown Reservoir, an earthen basin located in the Palisades neighborhood, with a capacity of 140 million gallons, supplies water to the McMillan Water Treatment Plant. The two treatment plants have a combined design capacity of 284 MGD, with a maximum capacity of 444 MGD. Through these treatment facilities, D.C. Water provided approximately 94 MGD of potable water to its more than 700,000 residential, commercial and governmental customers during Fiscal Years 2018 and 2019. Consumption rates in the District have been decreasing over the past few years down from 114.6 MGD in 2008. These decreases are likely due to the effectiveness of replacement and repair of water mains and pipes, replacement of water meters, and an increase in water efficiency practices.

OPERATIONS AND MAINTENANCE

In January 2018, the region experienced severe cold weather and over the course of 11 days, D.C. Water repaired 150 broken water mains and service lines. Later in 2018, a project began to replace 90,000 small-diameter water meters on residential properties to improve billing accuracy. Small-diameter water meters are standard instruments placed on residential units to determine unit water usage. Since the program began, 82,000 water meters have been replaced, reducing leaks in a system that was experiencing as much as 10 percent treated water loss that did not count towards the utility's revenue. Further addressing this issue is a fire hydrant replacement program that replaces 500 fire hydrants per year and, in 2017, reduced the number of out-of-service hydrants to 0.25-0.38 percent.

The impact of underground water mainbreaks can be severe resulting inroad closures for construction, lackof water service to both businesses and residences and high repair costs.

PUBLIC SAFETY

D.C. Water has not experienced any Safe Drinking Water Act permit violations since 2006. Although lead in homeowner's water service lines continues to be a public health and safety risk, water is essentially lead-free when it leaves the Washington Aqueduct's treatment facility and travels through D.C. Water's distribution system. To mitigate any lead risk, D.C. Water continues to monitor the distribution system, incorporates corrosion control, offers free lead testing for customers, has an \$18.5 million program to replace lead water service pipes, and continues extensive outreach. Notably, D.C. Water implemented a successful program to systematically map its lead service lines while providing its customers with an interactive means of identifying sources of lead in their drinking water. When lead pipes have worn down and need to be replaced, crews employ trenchless lead pipe replacement efforts allowing service to be restored in an average of one day. A mechanism has also been devised between D.C. Water and the D.C. Council allowing for some of the cost of replacement to be covered by the City ensuring that this public health issue will not be overly expensive to tackle.

FUNDING AND FUTURE NEEDS

D.C. Water's combined budget of \$800 million is adequate to cover drinking water operations and planned capital investments between FY 2017 and FY 2026. In addition, D.C. Water maintains at least \$125.5 million in operating cash reserves, equivalent to a 120-day operations and maintenance budget, to ensure that any necessary work can be completed without delay.

2017 saw a 1.9 percent increase in D.C. residents and an increase of 3.6 percent visitors over 2016 with more than 22.8 million annual visitors to D.C. The District's high AAA credit rating affords favorable bond rates and in 2014 D.C. Water issued \$450 million worth of bonds, including a first of its kind \$350 million Green Bond, allowing it to fund capital projects. These Green Bonds were some of the first of their kind helping to fund projects including valve replacements, large and small diameter water main inspection, repair, and replacement projects, pressure zone improvements, water meter rehabilitation, and water quality studies. While D.C.'s current and projected fiscal

resources for drinking water are adequate to meet needs until FY 2026, ratepayers' bills have been on the rise as the average monthly combined drinking water, wastewater, and stormwater bill was approximately \$108 in 2019 and rose to about \$115 in 2020. These rising costs can be seen nationwide and are largely attributed to aging water infrastructure across the country. To combat these rising costs D.C. Water provides a Customer Assistance Program for low income families to offset the financial burden they present.

In 2014 as the dangers presented by certain chemicals began to emerge nationwide, D.C. Water began testing its drinking water source, the Potomac River. Through this testing they were able to determine that these compounds were not present in quantities considered hazardous to human health. D.C. Water continues to monitor for these chemicals using new and more accurate tests as they become available.

RESILIENCE AND INNOVATION

Resilience in infrastructure systems is critical in D.C. as the Nation's Capital relies on a singular major water source, the Potomac River, which is easily accessible. While system redundancies are in place, a more diversified network of water sources or greater storage capacity would boost resilience. The USACE has made improvements in barring unauthorized physical access to the Washington Aqueduct and other water facilities. In addition to physical security, cybersecurity has become a looming threat as much of the current infrastructure is controlled by systems that remain vulnerable.

Innovation has been, and continues to be, a focus of the D.C. Water drinking water system. The new technologies that have been adopted include the implementation of a just-in-time equipment management system. This computerized system ensures that replacement parts for machinery within D.C. Water operations are ordered according to a pre-determined replacement

schedule, minimizing loss of service and guaranteeing that inventories are up to date. In addition to this system D.C. Water adopted a three-pronged approach to strategic asset management in 2017 using: ISO 55000 asset management attributes, operational level work and specific staff-identified high priority needs. This plan ensures that D.C. Water obtains the optimal value from its assets and helps to reduce loss of service to its customers by combining regular inspections with lifecycle tracking programs. In a further effort to improve meter accuracy and reduce leaks, D.C. Water provides their customers with an automated meter reading system (AMR). The implementation of this AMR system was completed at the end of FY18 and provides customers twice-a-day meter reading access and improves the accuracy of billing in addition to providing highly accurate leak detection.

Drinking Water



LET'S RAISE THE GRADE

- Continue to replace a minimum of one percent of the drinking water pipes every year to improve system reliability and reduce the impact of water main breaks.
- Streamline the ongoing asset management program to better determine the average life expectancy of D.C. Water infrastructure. This will allow for a more consistent and efficient replacement rate to be determined.
- Further examine cybersecurity vulnerabilities and develop a cybersecurity risk management program.
- Consider additional opportunities for improved risk reduction and resiliency through a secondary water source and additional drinking water storage capacity.

FIND OUT MORE

- "Keeping Security in Focus at the Water Treatment Facilities." Washington Aqueduct Water Security. Web. 23 June. 2019. https://www.nab.usace.army.mil/ Missions/Washington-Aqueduct/Water-Security/
- 2. "DC Water at a Glance." DC Water. Web. 23 June. 2019 https://www.dcwater. com/dc-water-glance
- "Consumer Safety is Our First Priority." DC Water. Web. 23 June. 2019. https:// www.dcwater.com/lead
- 4. "2018 Annual Report." DC Water. Web. 20 June. 2019. https://www.dcwater.com/ sites/default/files/annual_report_web.pdf
- 5. "2018 Drinking Water Quality Report." DC Water. Web. 20 June. 2019. https:// www.dcwater.com/sites/default/files/2018_dcwater_water_quality_report.pdf
- 6. "2019 Drinking Water Quality Report." DC Water. Web. 20 June. 2019. https:// www.dcwater.com/sites/default/files/2019_dcwater_water_quality_report.pdf
- "2018 Independent Engineering Inspection of the DC Water Wastewater and Water Systems." DC Water. Web. 20 June. 2019. https://www.dcwater.com/sites/ default/files/finance/2017%20Engineering%20Feasibility%20Report.pdf

2021 REPORT CARD FOR WASHINGTON, D.C.'S INFRASTRUCTURE www.infrastructurereportcard.org/district-of-columbia.







EXECUTIVE SUMMARY

D.C. has some of the most advanced renewable and resilient energy infrastructure policies in the country but continues to have a robust reliance on imported electricity and natural gas. D.C. imports upwards of 90 percent of its electricity, while most of what is generated in the District is from rooftop solar resources implemented through successful investment incentives. To ensure energy resources meet the public's needs without compromising safety the D.C. energy sector is transitioning overhead distribution lines underground and routinely repairing natural gas pipelines. Furthermore, D.C. is leveraging utility partnerships to explore energy solutions in a holistic manner. The District has passed ambitious legislation, published plans, and funded a regulator-led working group to conduct in-depth research on technologies including microgrids. Overall, D.C. is meeting its current demands, improving resilience and trying to move towards a more renewable energy portfolio, while also sufficiently prioritizing the social and economic needs of its citizens.

CONDITION, CAPACITY

D.C.'s energy is sourced primarily from two regional investor-owned utilities: Pepco and Washington Gas. Fortunately, the District does not face any short-term concerns over energy shortages.

The District is heavily reliant on energy from outside the city limits, so D.C. has little control of its fuel mixture. The graphic below shows that in 2018, Pepco-supplied electricity was predominately nuclear-sourced (35%) with an additional third of the mix (30%) contributed by coal and a mix of natural gas and renewables. This data, however, does not account for the notable increase in distributed sources of solar power that D.C. has seen in the past four years. Since 2012, the District has reported a nearly 1,000 percent increase in distributed solar capacity totaling 68.85MW in 2019.



PEPCO Electrical Grid Mix by Source



Since Washington, D.C. does not generate any energy within its boundaries from coal, oil, or gas, the District does not have any transmission pipelines or storage facilities. Washington Gas is the sole distributor of natural gas, utilizing approximately 1,392 miles of pipeline in the District. The condition of the infrastructure is generally good, and both Pepco and Washington Gas are making efforts to quickly repair known problems.

Specific improvements include Pepco's partnership with the District for a long-term Power Line Undergrounding (PLUG) project. Initiated in 2012, the program faced legal challenges regarding the financing of these efforts and was able to proceed only after amended legislation (Electric Company Infrastructure Improvement Financing Emergency Amendment Act) was passed in 2017. An official groundbreaking was held in June 2019, and the project is currently expected to cost \$500 million split evenly between Pepco (via small ratepayer surcharges) and the District. The need for D.C. PLUG arose from a citizen call - to - action following repeated severe storms that drove major outages, highlighting a need to enhance reliability by moving overhead feeders underground. The effort anticipates a 95 percent resilience improvement to the most high-risk parts of the distribution system.

While outages in the District are sometimes a problem for residents, D.C. has strong system reliability compared to the rest of the nation. In 2017, the District's System Average

Interruption Duration Index (SAIDI) measured an average of only 58 minutes of system interruption for customers per year, the lowest in the country. The District's System Average Interruption Frequency Index (SAIFI) showed less than one interruption per customer. In 2018, D.C. reported 179 power outages with an average length of 49 minutes, impacting an average of 4,868 people per outage.

Pepco has not yet invested in new smart grid or microgrid technologies, though the D.C. Public Service Commission (DCPSC) has said they are "exploring other avenues for grid modernization." These opportunities may include a Pepco-proposed 'networked underground transmission system initiative'.

Table 1 summarizes some of the most prominent legislation passed in D.C. These policies show the District's good faith effort toward reducing the impacts of climate change by transitioning to renewable energy generation. In 2017, D.C. was named the first LEED Platinum city in the world. This was due to its high walkability and use of public transit, as well as the fact that "the D.C. Government is 100 percent powered by renewable energy, and D.C. is on track to derive at least one-half of the entire city's electricity from renewable resources by 2032." In addition, D.C. created the *Solar For All* initiative, a central grid initiative which will install community- based solar and microgrid systems for low- and moderate-income communities.

Table 1: Summary of Recent Legislation

POLICY	GOAL AREA(S)			
2016 Renewable Portfolio Standard Expansion Amendment Act	Added the Solar for All program that aims to bring solar energy to 100,000 low-to-moderate income homes by 2032.			
2017 The Electric Company Infrastructure Improvement Financing Emergency Amendment Act	Amended language in the <i>D.C. PLUG</i> initiative to fund infrastructure hardening through both ratepayer and tax funds.			
2019	1. Goal of 100% renewable energy by 2032			
 The Clean Energy D.C. Act Renewable Energy Target Sustainable Energy Trust Fund (SETF) Building Energy Performance Standard Transportation Emissions Reduction 	 SETF funds energy efficient electricity and natural gas consumption programs using resident fees 			
	 D.C. will assess private buildings to ensure optimum performance D.C. will move to have all electric public transportation options Funded both privately and publicly, the Green Bank will supply renewable energy to D.C. 			
5. The Green Bank				

OPERATIONS AND MAINTENANCE

Washington Gas'40-year program called *PROJECTpipes* is currently repairing infrastructure. Phase 1 ended in 2019, and Phase 2 is underway. From 2019 to 2024, approximately \$300 million is expected to be invested to replace approximately 22 miles of pipe and 8,274 service lines. Unlike *D.C. PLUG*, this project is being funded entirely by the utility through a ratepayer surcharge and not additional *D.C.* citizen's tax funding.

PUBLIC SAFETY

Public safety concerns related to energy infrastructure in D.C. are limited. *PROJECTpipes* is prioritizing replacement efforts based on several factors including their relative

risk. Undergrounding efforts by D.C. PLUG will not only increase reliability, but also reduce the risks associated with fallen overhead powerlines during severe weather.

FUNDING AND FUTURE NEEDS

D.C. has begun to heavily invest in energy sustainability and resilience. The *D.C. PLUG* initiative formed a publicprivate partnership between the D.C. Government and Pepco which will bring \$500 million in new funding to bury overhead feeder lines entering the District. The investment source will be split between D.C. tax dollars and Pepco rate surcharges on their customers. As of April 2020, D.C.'s residential electrical rate was 12.41 cents/kWh which is approximately 6% below the national average.

To meet their ambitious goal of 100 percent renewable energy by 2032, D.C. passed the *Clean Energy Act* which created multiple programs to spur growth in the renewable energy sector. Included in the legislation is the creation of the Sustainable Energy Trust Fund (SETF) and the Green Bank. The SETF will collect fees assessed from consumers of traditional energy resources and divert them into a fund that will invest in energy efficiency programs across the District. The Green Bank will leverage public and private funds to invest in efficiency and in community-scale renewable energy projects, primarily solar. These projects will feed power into D.C. homes and businesses, with the intent of contributing to no less than 5.5 per cent of D.C.'s energy by 2032. The Clean Energy Act also amends D.C.'s Renewable Portfolio Standard (RPS) to require 100 percent of electricity to be sourced from or offset by credits from Tier One renewable energy sources in the region.



RESILIENCE AND INNOVATION

D.C. is looking to the future in planning its energy infrastructure. Severe weather is a potentially increasing threat, one that D.C. began investing in substantially with D.C. PLUG. Additionally, hotter summers will continue to impact the District, which can lead to strains on the grid during periods of peak load. In 2016, after extensive research and consultation with climate scientists, the District released *Climate Ready D.C.* This is an action plan that lays out climate resilience objectives with 77 suggested actions to reduce risks associated with climate change. Specific steps include techniques to maintain grid stability with increased distributed loads and investments in infrastructure hardening to prevent blackouts from flooding, extreme heat events, and snow-related events. The District is investigating the implementation of efficient building standards as a resilience effort to reduce the load impact that large buildings have on the grid. In January 2021, the Department of Energy and the Environment (DOEE) established energy performance standards for all D.C.- owned buildings greater than 10,000 sq. ft. and commercially - owned buildings greater than 50,000 sq. ft. Buildings not in compliance will be granted a period of five years to become compliant, and can be penalized at the end of that period if they fail to show compliance.

LET'S RAISE THE GRADE

- Develop a "storm hardening" plan that would strengthen systems to withstand reasonable storms and enable rapid restoration of energy supplies after storm events, considering ASCE Manual of Practice (MOP) 74 (Guidelines for Electrical Transmission Line Structural Loading) and ASCE MOP 140 (Climate-Resilient Infrastructure: Adaptive Design and Risk Management);
- Continue research to improve and enhance the transmission, generation, and distribution infrastructure, as well as the deployment of technologies such as smart grid, real-time forecasting for transmission capacity, and sustainable energy generation which provides a reasonable return-on-investment; and
- Continue research to appropriately value and remove market barriers to new energy storage projects, which could improve the reliability of the electric grid and defer the need for some transmission investments.

FIND OUT MORE

Energy

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Levees



EXECUTIVE SUMMARY

The National Levee Database shows that the District of Columbia has two levee systems: The District of Columbia Levee System (DCLS) and the District of Columbia Anacostia Levee (DCAN), totaling 3.41 miles in length. The DCLS was last rated as "Minimally Acceptable" during a 2016 routine inspection by U.S. Army Corps of Engineers (USACE) and became accredited by the Federal Emergency Management Agency (FEMA) to withstand a 100-year riverine flood. The DCAN continues to be rated as "Unacceptable," per a 2012 periodic USACE inspection. To address concerns and resilience, some construction efforts providing additional protection are now complete while discussions are ongoing around raising the DCLS levee crest to provide additional freeboard¹. D.C. depends heavily on both the structural integrity of the levees, and the emergency response planning to prevent flooding within the Nation's Capital.



Figure 1: Washington D.C. Levees with Approximate Leveed Areas

1 Freeboard is defined by USACE as a factor of safety usually expressed in feet above a flood level for purposes of designing flood protection facilities and for floodplain management. Freeboard tends to compensate for the many uncertain factors that could contribute to flood height calculated for a selected size flood.

CONDITION & CAPACITY

D.C. is susceptible to three types of flooding: riverine flooding from the Potomac and Anacostia Rivers, interior flooding, and coastal storm surge. In addition, the watershed that contributes to Anacostia River flooding originates in Bladensburg, MD, is highly urbanized, and quickly generates large volumes of stormwater during rain events. These characteristics put pressure on the levee system to prevent damage due to flooding. D.C. area levees are listed in the table below.

USACE performed a *routine* inspection on the DCLS in September 2016 and rated the DCLS as "Minimally Acceptable." A 2018 USACE Levee System Summary report noted that the DCLS is in "good condition" and is designed to hold back major Potomac River floods. The last periodic inspection for both levee systems was in 2012, with a rating of "Unacceptable." A more recent period inspection report for both systems has not yet been issued to upgrade the safety (inspection) rating.

Although the DCLS is authorized to provide flood risk management from a coincidental tidal flood and river discharge of 700,000 cubic feet per second (cfs) with 1 foot

of freeboard, or a coincidental tidal flood and river discharge of 575,000 cfs with 3.5 feet of freeboard, the levee system would most likely be overtopped during a storm similar to the authorized level unless extraordinary flood flighting efforts are undertaken. According to the NLD, the DCLS has not experienced full loading and the NLD does not have a performance history for this system. There is the potential of high consequence and interruption to the operation of our national government could be extensive if the levee system has an overtopping with breach event.

Furthermore, the NLD explains that the DCAN levee system provides flood risk management against a maximum flood discharge of 600,000 cfs from the Potomac and Anacostia Rivers, or the equivalent flood stage to 5.3 feet higher than the water surface elevation reached during the flood of record in October 1942. The levee system would most likely be overtopped or incur a floodwall failure during a storm similar to the designed level unless extraordinary flood fighting efforts are undertaken. According to the NLD, there are concerns with the DCAN related to incomplete tie-ins to high ground, embankment seepage and erosion

SYSTEM NAME	SEGMENT(S)	SPONSOR(S)	LENGTH (MI)	INSPECTION TYPE	INSPECTION DATE	INSPECTION RATING	ESTIMATED IMPACT
Anacostia (DCAN)	2	Department of the Navy, National Park Service	2.65	Periodic	2012	Unaccept- able	People at risk = 3,697 Structures = 27 valued at \$800M (assessed 12/18/17)
District of Columbia Levee System (DCLS)	1	National Park Service	0.76	Routine	2016	Minimally Acceptable	People at risk = 38,971 Structures = 1,875 valued at \$14B (assessed 08/25/17)

Table 1 - Washington D.C. Levees per the National Levee

and bank caving under full load conditions. These concerns are driven by unknown foundation materials, the presence of large trees and dead roots in the levee, narrowed crest widths, burrowing animal activity, multiple culverts that are 75 years old and in unknown condition, aging and distressed closure structure, aging and deteriorated seawall, an absence of sod cover in areas, and lack of an adequate routine program of inspections and maintenance.

The DCLS system was accredited to reduce the risk of riverine flooding for the 100-year flood event by the Federal Emergency Management Agency (FEMA) in 2016, while

the DCAN system is still lacking FEMA accreditation. The current system does not provide adequate capacity to reduce the risk of flooding to D.C., so our Nation's Capital will continue to have high residual risk to critically important government operations and infrastructure. The threat of increased (intensity, duration, frequency) storms and sea level rise from climate change, coupled with increased runoff and flooding due to new impervious surfaces and development will place significant stresses on these already challenged systems.

OPERATIONS AND MAINTENANCE

The National Park Service (NPS) operates and maintains the DCLS levee and is considered "well maintained," per USACE standards. USACE performs routine and comprehensive periodic inspections on the DCLS. In addition, the Department of the Navy and the NPS jointly operate and maintain the DCAN levee. According to USACE, the NPS routinely maintains and tests plans for placing sandbags at various locations to annually test closure protocols.

FUNDING AND FUTURE NEEDS

USACE is currently conducting a study to evaluate raising the height of the DCLS to provide at least 3.5 feet of freeboard, as well as providing permanent floodwalls at the 2nd and P St. SW closures, which once constructed, would increase the capacity and resilience of the levee system. These modifications require Congressional authorization of the increase in the project cost. A Limited Re-evaluation Report (LRR) with the revised project cost estimate is being developed. There is ongoing coordination for the 2nd and P St. closures regarding the logistics for placing sandbags between NPS, USACE Homeland Security and Emergency Management Agency (HSEMA) and D.C. Department of Public Works (DPW).

Currently, there is no identified funding source to address interior flooding comprehensively as recommended by the 2011 Federal Triangle Stormwater Drainage Study. However, the NPS FY 2019 budget does include funding appropriated to the Dam and Levee Safety and Security The National Nark Service (NNS) operates and maintains the FCNS levee and is considered "well maintained," per USACE standards.

Program in the amount of \$1.24 million. Projects likely to receive these funds include the flood fighting efforts for the Potomac Park Levee at the National Mall.

Coordination between stakeholders in the D.C. metro area is paramount in reducing the flood risk throughout our Nation's Capital. The D.C. Silver Jackets, formerly the Potomac River Flood Coordination Group, formed through an interagency Memorandum of Understanding in 2014, are a key coordinator and advocacy group to increase the safety and resilience of the area. Currently signed by 13 Federal and District agencies, this MOU, established an interagency team comprised of members from Federal, D.C. and regional agencies, as well as, academia who leverage resources to identify and implement comprehensive, resilient, and sustainable solutions to reduce flood risk around D.C. The Department of Energy and Environment (DOEE) is D.C.'s lead agency with USACE, Baltimore District and the NPS, jointly leading the federal agencies. The D.C. Silver Jackets has established five task groups: Development of Flood Inundation Mapping/Stream Gauges; Flood Emergency Planning; Interior Drainage Flooding; Levee Certification and Accreditation; and Flood Risk Communication. Each task group has respective responsibilities that will aid in fulfilling the organization's mission and goals. These efforts should be enhanced with resources that are needed.

PUBLIC SAFETY, RESILIENCE AND INNOVATION

Public safety is highly jeopardized by flooding of the Potomac and Anacostia Rivers because of the dense, urban environment in D.C., including the Federal Triangle, home to federal office buildings, the National Mall, and the southwest D.C. neighborhoods. When considering the over 23 million visitors coming to D.C. in 2018 and spending upwards of \$7.5 billion, the number of people and breadth of impact by flooding greatly increases.

The D.C. Silver Jackets prioritized ensuring the coordination and completion of the 17th St. closure and are evaluating similar permanent closures at 23rd, 2nd and P Streets, and raising the DCLS 3.5 feet to increase the level of protection to the authorized flow rate. Furthermore, the NPS is currently evaluating the potential for adding redundancy and increasing the level of flood risk management of the DCLS through temporary flood barriers, such as sand baskets.

According to the NLD, the risk drivers for the DCLS are the closure systems and effective evacuation during flood events. There is also a concern with the unknown impacts of the performance of the interior drainage system within the leveed area. Evacuation effectiveness is poor for a few reasons. First, there are many local and federal entities with inadequate inter-agency communication, there is a general lack of public knowledge about living, visiting, or working in a leveed area, or there is little public awareness about the location of evacuation routes. If the overtopping or breach of a levee occurs, loss of property or life is likely. Public outreach events and communications among federal agencies and commercial businesses in the area is paramount. For instance, as part of an interagency project, USACE and NPS hosted a public meeting in October 2018, in Southwest D.C., to share information with attendees on the results of a safety risk assessment completed for the DCLS. The D.C. Homeland Security and Emergency Management Agency also presented flood preparedness measures for property and business owners/ renters and evacuation procedures. The purpose of this

meeting was to improve the public's understanding of flood risk in the area as well as to educate residents and businesses on steps they can take to prepare for and reduce damages from flooding.

Because USACE does not have the authority to update the existing D.C. Flood Emergency Manual, the D.C. Silver Jackets has established a Flood Emergency Planning Task Group. In 2018, the Task Group supported NPS in developing a scope of work for making the necessary updates to the manual, which will now be called "Washington DC Potomac River Flood Interagency Coordination Plan." The project team coordinated with members of the D.C. Silver Jackets to solicit feedback on a draft template of the plan. Activities in 2019 included development of a 60 percent draft plan, conducting agency meetings to gain a better understanding of agency flood response, and updating the draft plan to 80 percent and 90 percent based on input from agency interviews.

The D.C. Silver Jackets introduced the Flood Inundation Mapping Tool to view the extent and depth of expected riverine or tidal flooding of the Potomac and Anacostia Rivers in November 2016, resulting in enhanced flood risk management. The tool is housed on the National Weather Service website. The data will be further leveraged by D.C. as part of a comprehensive risk analysis initiative to inform preparedness, flood mitigation strategy and emergency management plans and operations. Flood depths will be used to estimate physical, economic and social impacts, including future risk attributed to sea-level rise. Furthermore, the D.C. Silver Jackets and the National Capital Planning Commission published the Flood Risk Management Planning Resources for Washington, D.C. in January 2018 to provide a summary of key flood risks in the National Capital Region, an overview of recent studies and tools that address current and future flood risks in the region, and brief descriptions of how these studies can be used for flood risk management.

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LET'S RAISE THE GRADE

- Increase ongoing collaboration efforts between D.C. and surrounding areas to mitigate the impacts of upstream and downstream construction projects and improvements to reduce the probability of flooding within the District. Coordination and interagency collaboration should include regional, Federal, and the D.C. agencies.
- Currently, the system requires workers to manually build protective barriers in the event of a flood and the manual process puts the leveed area at risk. The protective barriers at Constitution Avenue and 23rd St., and at P and 2nd Streets near Fort McNair and the post-and-panel barrier that connects to earthen berms at 17th St. should be automated to ensure proper execution and protection of lives.
- Continued use of storm/flood prediction technologies and collaboration among agencies such as those participating in the D.C. Silver Jackets should be leveraged to determine construction requirements and increase public awareness of floodprone areas and evacuation routes.
- Encourage congressional leadership to champion funding legislation to meet the repair and operations and maintenance needs of the system. In addition, impacted agencies and advocacy groups such as the D.C. Silver Jackets should present flood inundation scenario impacts to congressional leadership to increase awareness.

FIND OUT MORE

- 1. USACE National Levee Database
- 2. DC Silver Jackets
- 3. DCLS FEMA Accreditation
- 4. USACE Washington, DC and Vicinity Local Flood Protection Fact Sheet
- 5. USACE Levee System Summary
- 6. D.C. Silver Jackets Flood Risk Management Planning Resources
- 7. DOEE Climate Projections & Scenario Development Report and Technical Appendices
- 8. USACE Washington DC Flood Risk Management
- 9. NOAA Potomac River at Georgetown
- 10. FHWA Washington, DC Flood Levee System Improvements
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- 12. NCPC Report on Flooding and Stormwater in Washington, DC (2008)
- 13. Potomac Park Levee Project Environmental Assessment
- 14. Federal Triangle Stormwater Drainage Study (2011)

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EXECUTIVE SUMMARY

Within the District of Columba, rail includes 75 track miles, four rail yards, and two passenger stations. Freight rail is owned and operated by CSX, a Class I railroad that operates throughout the Midwest and east coast. Passenger rail service is provided by Amtrak, the Virginia Railway Express (VRE), and the Maryland Area Regional Commuter (MARC). Thanks to major investments, including the completion of two double-stack-capable tracks through the Virginia Avenue Tunnel, the condition of rail infrastructure in the District is improving. However, challenges remain. Passenger rail capacity in D.C. is constrained by the current two-track bridge owned by CSX and Washington Union Station facilities, even as plans are being made to more than double the number of freight and passenger trains crossing the Potomac by 2040. Passenger rail continues to be underfunded, despite providing a host of economic, public health, and environmental benefits to the region.

CONDITION & CAPACITY

D.C.'s rail infrastructure includes 26.7 route miles (or 75 track miles) of track and bridges, four rail yards, and two passenger stations. CSX (Class I Freight Railroad) and Amtrak (National Railroad Passenger Corporation) own and are responsible for investing in and maintaining all the rails within Washington, D.C.. The Virginia Railway Express (VRE) and Maryland Area Regional Commuter (MARC) both operate commuter rail services over Amtrak and CSX lines within D.C. Norfolk Southern Railway (NS) also has rights over the CSX line that include operation over the Long Bridge and through the Virginia Avenue Tunnel (VAT).

As a major node on Amtrak's busiest line, ticket sales to and from D.C. rank second in the nation at 5.2 million passengers as of FY2017. Between 223 and 233 trains pass through, depart, or arrive in D.C. on a typical weekday. Of these, 213 are passenger trains with MARC having the largest share (95 trains), followed by Amtrak (86 trains) and VRE (32 trains).

An average of 18 CSX freight trains per day operate through

D.C. typically consisting of two coal trains, six intermodal trains, and ten general merchandise trains. Recent carload data is not publicly available, but in 2014, CSX moved more than 416,000 carloads of freight through D.C. and invested \$250 million (with a contribution of \$24 million from the Commonwealth of Virginia) over the past four years to complete the VAT. Although commuter rail operations are funded by Virginia and Maryland, major infrastructure improvements at D.C. stations would require investment from Amtrak, CSX, federal and local governments.

The overall condition of the freight rail system in D.C. has improved since 2016 due to the major investment in and completion of the two-track double-stack-capable Virginia Avenue Tunnel in the fall of 2018. Elsewhere in the system, key structures such as Long Bridge (built 1872, rebuilt 1943), First Street Tunnel (built 1904-1906), and infrastructure in and around Washington Union Station (WUS), while aging, are being monitored to maintain safe conditions. As funds become available for overhaul or

replacement, plans are being advanced through planning phases prior to construction.

Overall freight and passenger rail capacity have remained steady as major planned improvements progress. The Long Bridge Replacement Project over the Potomac River and the Washington Union Station Expansion Project are both in the middle of the NEPA process. The Long Bridge Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) documents were issued in September 2020, while the WUS Expansion DEIS was issued in January 2020. The Long Bridge Replacement project will add a two-track bridge for passenger rail systems to the north and parallel to the existing two-track bridge, thereby maintaining the existing bridge for freight service. The separation of passenger and freight train movements will be an advantage for the two types of train movement and allow for expansion of both passenger and freight services. VRE has a L'Enfant Station Expansion project in its long-range plan which is funded for advancement into the planning and preliminary engineering phase over the course of the next few years. The new Long Bridge Replacement improvements will begin south of VRE's L'Enfant Station. The additional bridge will require a portion of mainline track to the south of Long Bridge in Virginia to be shifted to the west which will be addressed by the Transforming Rail in Virginia project. VRE has planned station improvements, in Virginia from Crystal City to Fredericksburg, in conjunction with the mainline track shifts which will be undertaken by DRPT.

WUS was last overhauled in 2014-2016 following a 5.8-magnitude earthquake which caused damage to the main hall. Reinforcement of the 96-foot-tall plaster ceiling and regilding of 255 octagonal-shaped coffers in

the ceiling required 120,000 sheets of 23-karat gold. A near-term expansion of the existing WUS railroad passenger concourse to increase the size of the passenger waiting area is nearing the construction phase. VRE and MARC will need to partner with CSX to enable runthrough service by MARC, and throughout the D.C. network. Without implementation of these key projects, passenger rail capacity in D.C. will remain constrained by the current two-track bridge owned by CSX and today's WUS facilities, even as plans are being made to more than double the number of freight and passenger trains crossing the Potomac by 2040.



In 2.19, Am trak's network carried 32.5 million riders tomore than 5.. destinations across 46 states and the F istrict of Columbia. This translates to a daily average of nearly 89,1.. trips on more than 3.. Am trak trains.

OPERATIONS AND MAINTENANCE, FUNDING AND FUTURE NEEDS

CSX has significant financial resources available for operations, maintenance and improvement of its own property, while Amtrak, VRE and MARC face perennial shortfalls in funding to maintain and expand service. Continued lack of robust funding for passenger service makes it difficult for passenger rail operators to get beyond maintenance to focus on growing ridership.

With multiple owners and users of D.C.'s rail facilities, there is disparate financial capacity, responsibility and priority for major capital projects, often resulting in funding gaps. CSX does not own the tracks going into WUS nor does it operate on them, so has little influence on the Union Station improvements and must limit its improvements to tracks it owns. Amtrak has been receiving more funding annually under the FAST Act from 2015-2020, however, this funding is spread across its entire network and is not enough to fully construct the major programs envisioned for the infrastructure to support the public and private projects adjacent to the proposed \$5 billion to \$7 billion WUS 2nd Century Plan. This Plan is a multi-use project, which includes new entrances, concourses, platforms, parking and bus facilities, and a major overbuild development known as Burnham Place utilizing air rights above the rail yard north of the station. The three-million square foot mixed use development will add a new community in Northeast Washington, DC. The 20-year project will expand rail ridership by expanding train capacity with additional platforms and update the station facilities to absorb more passengers.

All three passenger railroads (Amtrak, VRE, and MARC) need to work closely together on train storage and operations in and around Union Station, and with CSX to enhance the utility and operational flexibility of the current D.C. rail system to collectively make the necessary investments in bridges, tunnels, stations and State-of-Good - Repair of all aspects. CSX has addressed some of their future needs and the passenger railroads will need to do the same to enable ridership growth. VRE's service requires midday storage in the District, currently in Ivy City. Since Amtrak will use VRE's current midday vehicle parking area for its new Acela vehicles, VRE has a study underway for its shift away from Ivy City. The New York Avenue Yard, between the Northeast Corridor Tracks and New York Avenue, NE Washington, D.C., will absorb the tracks and storage operation for VRE midday storage. Only with greater capacity from projects like Long Bridge and WUS Expansion can the railroads make major progress in mode-share.

PUBLIC SAFETY, RESILIENCE AND INNOVATION

NTSB reports only one fatality occurring on Amtrak or CSX property within the bounds of D.C. in the past 45 years, and that was a trespasser-caused incident. According to FRA's safety database, in the past five years, there have been 24 train derailments within D.C., seven other types of accidents, and one collision, resulting in two injuries but no fatalities. This is a major decrease in both incidents and injuries from 2016. Other public safety concerns include hazmat trains passing through D.C.

Most of the existing rail infrastructure in D.C. was initially built roughly 120 years ago and in need of upgrades and/ or hardening against prolonged wear and tear – mechanical wear due to length of time in service, train volumes and tonnages - intense weather, including extreme high and low temperatures and flooding. Proper drainage and pump systems are critical for flood mitigation, and track, signal and power infrastructure should be designed with a more extreme temperature range in mind. All passenger and freight railroads operating through D.C. have completed installation of Positive Train Control (PTC) as of December 2019 and are operating the safety systems in revenue service. While PTC will improve the safety of rail operations, it may open it up to new security threats from cyber-attacks if the infrastructure is not properly hardened. Amtrak will be rolling out new Acela Express trainsets and plans to replace its entire Northeast Regional fleet, which will be a major upgrade to the passenger experience. Acela cars offer increased passenger comfort with more space in the seating area and additional options for conveniences such as free WIFI and power outlets by every seat. They travel at higher speeds with fewer stops and provide downtown to downtown service between Boston, New York, Philadelphia, Baltimore, Washington, DC, and other intermediate cities, thereby reducing travel times. VRE and MARC continue to discuss run-through service, but equipment and infrastructure compatibility obstacles remain. Larger industry trends toward automation, unmanned systems, and data-driven decision-making may take time to have real-world impacts on the D.C. rail system.

Rail

LET'S RAISE THE GRADE

- Develop dedicated local funding similar to the WMATA local funding mechanism to build key capacity improvements at D.C.'s two passenger rail stations.
- Incorporate resiliency into design criteria for any new infrastructure and upgrade old infrastructure to be resilient to more extreme temperatures and storms.
- Support a regulatory and financial environment that encourages greater private investment in passenger and freight rail projects in D.C.

FIND OUT MORE

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Rail



GLOSSARY

AAR - Association of American Railroads

Acela Express - Amtrak's premium high-speed train service from D.C. to Boston.

Amtrak – The National Railroad Passenger Corporation is the U.S. national passenger railroad operator and owner of several key assets including the NEC.

CSX - CSX Transportation is a Class I Railroad

DDOT - District Department of Transportation is Washington, D.C.'s DOT.

Double Stack – The stacking of a shipping container on top of another container in a well freight car. To allow of double stack containers on a route, railroads frequently need to raise bridge and tunnel clearances.

FRA – Federal Railroad Administration is the federal rail safety regulator and grant-making organization. FRA administers Amtrak's annual federal grant funding as well as several other competitive grant programs.

Intermodal – The transfer of products involving multiple modes of transportation—truck, railroad, barge, or ship.

MARC – Maryland Area Regional Commuter is Maryland's state-funded commuter rail system serving D.C.

NEC - Northeast Corridor is Amtrak's mainline passenger rail corridor between D.C. and Boston.

NS – Norfolk Southern Railway is a Class I Railroad operating limited freight service through Washington, D.C. via trackage rights with CSX.

NTSB – National Transportation Safety Board is an independent federal agency charged with determining the probable cause of transportation accidents and promoting transportation safety.

Positive Train Control – A signaling system designed to determine a train's location, direction and speed and use that data to prevent: train-to-train collisions; derailments caused by excessive speed; unauthorized incursions by trains onto sections of track where maintenance activities are taking place; and movement of a train through a track switch left in the wrong positions.

Route Miles – Miles of railroad operated, meaning a mile of single track is counted the same as a mile of double track.

Track Miles - Miles of railroad owned, meaning total linear feet of track owned by a railroad.

VAT - Virginia Avenue Tunnel is CSX's new two-track double-stack-capable route through D.C.

VRE - Virginia Railway Express is a northern Virginia commuter rail system serving D.C.

WUS – Washington Union Station is D.C.'s major transportation hub and the terminal for MARC, VRE, and most Amtrak trains.







EXECUTIVE SUMMARY

The District of Columbia is home to more than 1,150 miles of roads, of which less than 10% are rated as "poor" according to the Pavement Condition Index, a noteworthy improvement from five years ago. With a 43-minute average commute (pre COVID-19), the third highest in the country, D.C. workers spent 60% more time commuting than the national average of 27-minutes. This translates to an annual cost of \$2,015 spent sitting in traffic. The COVID-19 pandemic significantly reduced commuter traffic—with 55% employees working full-time remotely—though with projected population and job growth, levels of congestion are projected to return to what they were before the pandemic. D.C. recently raised its gas tax by 10 cents, a step towards generating local funds for preservation and maintenance of the surface transportation network. However, despite a District-wide initiative to reduce pedestrian deaths to zero, known as Vision Zero, pedestrian deaths are on the rise, further indicating that D.C. must find ways to increase its investment in roads for congestion relief, and to improve the safety of drivers and pedestrians alike.

CONDITION AND CAPACITY

The District of Columbia is home to more than 1,150 miles of National Highway System (NHS) and non-NHS roads. Though ownership is split between DDOT, the National Park Service (NPS) and other federal and local agencies, most roadways are within the purview of DDOT.

A 2019 DDOT Transportation Asset Management Plan reported the pavement condition of the District's roadways. Currently, the organization uses three measures (%Good, %Fair, and %Poor) based on the Pavement Condition Index (PCI) to assess pavement performance. The PCI takes into consideration information such as surface defects, surface deformation, and cracking percent. Of the more than 1,000 miles of non-NHS roads, 9.6% were determined to be in poor condition, over 22% in fair condition, and 68.2% in good condition. Additionally, when using the same metrics to assess the NHS interstate pavement condition, 3.8% were assessed to be in poor condition, 17.4% in fair, and more than 78% in good condition.

Prior to the COVID-19 pandemic, 41% of DC commuters

drove alone, carpooled, or took a taxi, motorcycle, or other vehicle. DC has the second highest number of commuters, only behind New York City. Only 28% of workers commute from within District, with the rest commuting from the surrounding states and counties. Likely due to the high volume of commuters, DC workers have unusually long commute times. The average DC commute is 43 minutes long, compared with the national average of 27 minutes. Considering the impacts of congestion on DC commuters, individuals are spending an average of 102 hours sitting in traffic each year, costing them \$2,015 annually. These numbers are the third highest in the country.

Prior to 2020, 6.1% of the DC metro area worked from home, significantly above the national average of 5.3%. After the COVID-19 pandemic began, 96% of worksites either shut down completely or reduced onsite operation, with 55% of employees working fulltime remotely. More than half of employers anticipate continuing to allow telework after the pandemic ends, which may decrease some road congestion.

Pavement Categories		DDOT		NPS		Others*	
		Miles	%	Miles	%	Miles	%
NHS	Interstates	11.8	100%	0.0	0%	0.0	0%
	Non-Interstates	109.3	89%	11.8	10%	1.2	1%
	Subtotal NHS	121	.1	11.8		1.2	
	Total NHS	134.1					
Non-NHS	Federal-Aid Roads	305.2	96%	9.7	3%	4.4	1%
	Local Roads	592.0	85.0%	18.7	2.7%	86.0	12.3%
	Subtotal Non-NHS	897.2		28.4		90.4	
	Total Non-NHS	1016					
System (NHS and Non-NHS) Subtotal		1,018.3		40.2		91.6	
System (NI	IS and Non-NHS) Total	1,150.1					

DDOT Transportation Asset Management Plan

includes other federal and local agencies.

DDOT Transportation Asset Management Plan (Pavement Condition Index – PCI, Interstate Roughness Index – IRI)

Good Fair Poor



OPERATIONS AND MAINTENANCE

In FY 2018, DDOT invested more than \$30 million in preservation and maintenance of the surface transportation network . Mayor Bowser has a goal of eliminating all "poor" quality streets, sidewalks, and alleys by 2024.

Asset management at DDOT focuses on enablers such as policies, procedures, structures, and tools, as well existing strengths like agency culture, business processes, and data and technology. Within all these areas, DDOT identifies areas for improvement and prioritizes projects based on that. A key focus of asset management is the incorporation of risk and resiliency planning into investment decision making.

For instance, DDOT works from spring to fall to resurface roads, prioritizing maintenance efforts based on signs of failure, damage, and deterioration. In recent winters, the District has increased its use of liquid brine as a deicing technique. A brine pretreatment of the roads reduces time needed to remove snow and ice and decreases infrastructure damage from snowplows.

A brine pretreatment of the roads reduces time needed to remove snow and ice and decreases in frastructure damage from snow plows.



FUNDING AND FUTURE NEEDS

DC raised its gas tax in July 2020, increasing it by 10 cents to 23.5 cents per gallon. This is just above Virginia's 21.95 cents per gallon gas tax and significantly below Maryland's 36.7 cent tax. This user fee is in addition to the federal gas tax of 18.4 cents per gallon, which has not been increased since 1993. DC has the 36th highest gas tax in the country. All revenue from DC's gas tax goes toward the Highway Trust Fund. DC's gas tax demonstrates that localities are able to implement gas taxes; they do not need to rely on states. Over the next 25 years, the District is projected to add over 250,000 residents, 90,000 housing units, and almost 200,000 jobs. The current Move DC plan focuses on how the District will address these increases through infrastructure, with a particular emphasis on equity for all. DDOT expects to invest nearly \$286,000 in pavement maintenance, rehabilitation, and improvement over ten years in the NHS roadways alone.

PUBLIC SAFETY

The District fares middlingly in terms of safety. Traffic fatalities are on the rise, with 36 fatalities in 2020, compared to 25 a decade prior. D.C. has recently introduced a safety improvement program called Vision Zero, which seeks to redesign problematic intersections, reduce the number of lanes, and provide greater enforcement of harmful vehicular behavior. In 2018, DDOT developed a plan to improve 36 intersections with dual turn lanes that pose multiple risks, especially to pedestrians.

The city practices its "Fast Forward" emergency evacuation plan on July 4th every year after the conclusion of the National Mall fireworks. The plan clears the downtown area of the city, including the National Mall. The rehearsal for such an evacuation is important, as DC is the hub of our national politics and thus a likely target for terror threats and action.

RESILIENCE AND INNOVATION

During the COVID-19 pandemic, DDOT created three "car-free lanes" reserved for buses and bicycles in order to increase bus efficiency and decrease sidewalk crowding. Additionally, in June 2020, D.C. Mayor Bowser announced the Slow Streets Initiative, which decreased speed limits to 15 mph and restricted traffic on designated streets to "support neighborhood-based safe social distancing." Though this initiative was popular, its implementation left something to be desired. The Traf c fatalities are on the rise, with 36 fatalities in 2.2., compared to 25 a decade prior.



initiative was discontinued in March 2021.

DDOT has a resiliency workgroup which identifies potential risks, guides the development of risk management policies and procedures, participates in risk workshops, provides recommendations to other organizations for risk mitigation strategies, and supports the development and implementation of the risk management plan.

Roads



LET'S RAISE THE GRADE

- Identify funding sources to address the \$27.4 billion funding shortfall required to fully enact the long-range moveDC and Transportation Demand Management initiatives.
- Accelerate plans to improve dangerous intersections to work toward the Vision Zero plan.
- Continue investment in innovative approaches to manage congestion, such as value-pricing for metered curbside parking, the off-hour delivery program to encourage freight vehicles to make deliveries at night, and the livability program that encourages investment and opportunity in communities District-wide.
- Accelerate programs that support alternative forms of multi-modal transportation options to reduce congestion.

FIND OUT MORE

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E



EXECUTIVE SUMMARY

The Washington Metropolitan Area Transit Authority (WMATA or Metro) and the District Department of Transportation (DDOT) provide public transit services in the D.C. metro region over a network comprised of heavy rail transit and bus components supported by circulator bus, paratransit and streetcar elements. WMATA has been challenged by an aging infrastructure with increasing State-of-Good-Repair (SOGR) and safety-related needs during a period of steadily declining ridership. Infrastructure and vehicle investments have been significant in recent years. However, additional funding and new sources are needed to address the \$1.8 billion required to comply with safety and security directives and for upgrades or replacements, all while a \$6.6 billion SOGR backlog persists. In addition, WMATA needs a robust plan to infuse innovation into its system and develop innovative approaches focused on diversifying operations and increasing ridership.

CAPACITY & CONDITION

WMATA and DDOT provide public transit to more than 660,000 D.C. residents as well as tourists and regional commuters.

Metro currently has 118 miles of track and 91 stations on its six heavy rail lines that must be maintained. In 2019, 42 percent of the current active railcar fleet was over 10 years old. The average age of buses in Metrobus' active fleet was 7.25 years, but 28 percent of the bus fleet was over 10 years old. The D.C. Circulator bus fleet is in better shape overall, as only 19 percent of the 72-bus fleet is five years old.

Metro's service area covers approximately 1,500 square miles in the D.C region, serving a population of 4,000,000. Metro's current transit zone consists of the District of Columbia, Prince George's and Montgomery counties in Maryland, and Arlington, Fairfax and Loudoun counties in Northern Virginia. Metro rail and bus currently provide approximately 85 percent of the public transportation in the D.C. region. Metro ranks as the second largest rapid transit heavy rail system in the U. S. and operates the sixth largest bus network. Additionally, Metro has also provided MetroAccess paratransit service since 1994, providing more than two million trips per year.

One of Metro's key challenges is steadily declining ridership since reaching its peak in 2008. Metro projects annual ridership of 286.8 million trips for FY 2020, which is approximately the same as predicted for FY 2019, but down considerably from the FY 2017 actual annual ridership figure of 301.1 million trips. The decline in annual ridership has been attributed to factors such as service interruptions and station closings necessary to address infrastructure safety concerns, the emergence of alternative transportation options such as ridesharing, lower gas prices and longer and more frequent station stops which result in increased commute times.

To increase the system's capacity, the second phase of a Silver Line extension, an additional 11.4 miles with six new stations, will provide service to Dulles International Airport and Loudoun County. Construction on Phase 2 is expected to be complete in CY 2021, with revenue service projected to begin sometime in CY 2021-2022. This extension could serve 50,000 daily riders when fully opened. Metro also operates extensive bus service to 10,687 bus stops on 175 lines and has worked to improve it with new buses and service options.

In addition to Metro, DDOT also provides transit service with its popular six D.C. Circulator bus lines and operates a D.C. Streetcar segment in the H Street NE corridor. To keep up with the increase in demand and meet performance measures, DDOT is expanding their routes and the fleet of Circulator buses and increasing the size of their support facilities. In addition to its fixed rail and bus systems, D.C. also has an extensive bikeshare program and significant bicycle- and pedestrian-friendly infrastructure.

OPERATIONS AND MAINTENANCE

In 2011, Metro began *MetroForward*, a six-year, \$5 billion investment in the transit system to improve safety and reliability of the network. The extensive list of overdue investments aligned with recommendations from the National Transportation Safety Board (NTSB) following a train collision that occurred in 2009. The list includes replacement of switches and track circuitry as well as updating a significant portion of the worst track infrastructure. The program also included facility improvements to 12 stations and three bus garages. The program was generally successful in improving the overall condition of the transit network, resulting in year-overyear improvements to some key metrics, such as ontime performance and escalator availability.

In 2017, Metro approved a FY2018-2023 Capital Investment Program (CIP) totaling \$9.3 billion, which focused on the safety, SOGR, and reliability of Metrorail, Metrobus, and MetroAccess assets. The six-year CIP investment priorities include the acquisition of new 7000 series railcars, establishment of radio and wireless communications infrastructure, replacement of buses and paratransit vehicles, rehabilitation and maintenance of railcars and buses to improve and maintain service reliability and continued investment in rail, rail stations and bus system infrastructure to improve safety and address SOGR backlogs.

Metro is also in the process of executing a long-term FY2013-FY2025 plan to upgrade the traction power delivery system and add traction power substations, which is needed to support the increased power required to increase the train length from six cars to eight cars. To date, however, funding has not been identified to support this need. Metro plans to acquire new 8000-series railcars starting in FY2023 to replace aging 2000- and 3000-series railcars. The base order will be for 250 vehicles and will be increased, if needed. Additionally, new bus and rail maintenance facilities are being planned and constructed to support vehicle maintenance needs and requirements.

PUBLIC SAFETY

In October 2015, the FTA was directed by the U.S. Secretary of Transportation to take over safety oversight of the Metrorail system, replacing the Tri-State Oversight Committee which had been in place to provide that function but lacked the resources, technical capacity and enforcement authority to provide the level of oversight needed. FTA then worked with key regional stakeholders to create an entity that would comply with the federal directive. The Commonwealth of Virginia, the State of Maryland and the District of Columbia joined together to craft an agreement creating the Washington Metrorail Safety Commission (WMSC), which was charged with instituting a new framework to oversee the safety of the WMATA Metrorail system. Because of the unique nature of the multistate agreement, Congress needed to formally approve the compact, which it ratified in August 2017. FTA completed certification of WMSC's oversight program in early 2019 and WMSC began directly overseeing the safety of the Metrorail system on March 18, 2019. WMSC has significant powers to address safety deficiencies and problems it finds on Metrorail, including restricting, suspending or completely shutting down rail service.

FUNDING AND FUTURE NEEDS

Investment to support transit infrastructure is necessary to maintain a safe system as well as support current use and anticipated growth. Metro currently receives capital and operating funding from multiple sources. These include Metrorail, Metrobus and MetroAccess passenger fares and parking fees; state and local capital funding including Passenger Rail Investment and Improvement Act of 2008 (PRIIA) and federal formula funding match; state and local jurisdictional operating funding (funding contributions from the regional partners based on the agreement to fund and operate Metro); Congestion Mitigation and Air Quality (CMAQ) grants; other federal PRIIA and formula funds; and advertising, fiber optic and joint development revenues.

Approximately \$6.3 billion of the \$9.3 billion Capital Improvement Program will come from state and local sources, which represents a significant increase over current funding levels. The CIP also assumes that federal formula funding continues and PRIIA grant funding is reauthorized at current levels.

Complicating the funding picture is that Metro ridership and passenger revenue have declined significantly since 2008 and jurisdictional partners have struggled to find additional state and local funding for transit. Declining ridership numbers have occurred as capital investment and SOGR funding needs have dramatically increased, and ridership losses have occurred to emerging competing modes such as ride-share services. No transit entity in D.C. is without funding challenges—in addition to the funding challenges faced by Metro, DDOT is reliant on local funding sources for the Circulator, and D.C. Streetcar funding was scaled back, resulting in only a portion of the planned route being constructed. Transit modes also face challenges in ridership revenue due to constant pressure to keep fares reasonable and affordable for all. As good as the investment planned under the CIP may sound, the FY2020 capital budget of \$1.4 billion is still less than what is needed to meet SOGR and safety levels. A \$1.8 billion Metro SOGR investment is required to simply comply with FTA, NTSB and other safety and security directives, which is in addition to a current \$6.6 billion project backlog and a projected \$17.36 billion capital investment need over the next 10 years. With respect to the vehicle fleet, rebuilding and reconditioning the bus fleet can save money in the short term, but replacement is the most cost-effective option long-term. In addition, significant investment is needed to address the rapidly decaying Metrorail traction power delivery system, as well as continued investment in the track infrastructure and stations.

When considering the transit system's future needs, the challenge will clearly be centered on finding new and innovative ways to increase ridership in all transit modes, while encouraging additional funding support from state and local partners. There will be overall ridership increases once the Silver Line is completely in service, which hopefully will have a positive impact on overall ridership and revenue. DDOT does not receive any federal funding for Circulator Service; they completely rely on local funding sources. MoveDC continues as D. C.'s long range multimodal transportation plan and serves as the plan that addresses future growth through not only conventional transit ridership options, but also embracing options such as biking, walking and ride sharing. The plan outlines needed investments in infrastructure to support these options, such as onstreet bike lane facilities, bike paths, shared-use paths and Capital Bikeshare, a large bicycle share system that maintains a large fleet of bicycles and provides access to many residents and jobs.



RESILIENCE AND INNOVATION

Resilience is directly impacted by the levels of capital investment in IT, control systems, traction power delivery systems and the overall transit infrastructure. WMATA cannot possibly invest in projects specifically designed to improve overall resilience until all safety and SOGR investment needs have been addressed and the baseline condition of the physical plant has been improved. It is doubtful that there will be near-term funding for this, given the funding challenges discussed above. Most systems will see few upgrades until they fail and force funding to adjusted for replacements.

Finally, there is no evidence in the capital budget for funding innovation or any significant improvements in this area. WMATA states that an innovative approach is required to increase ridership, and that ridership will improve due to enhancements to the passenger experience. While these statements imply a focus on innovation, WMATA has yet to offer clear plans for the future.

Transit



LET'S RAISE THE GRADE

- Develop a robust and comprehensive plan to significantly increase ridership on all modes, employing both technology and innovation in the solution.
- Work collaboratively with the Washington Metrorail Safety Commission (WMSC) to identify potential capital needs in critical areas directly impacting safety and focus budget funds accordingly to address those needs.
- Identify additional funding sources that will allow WMATA to significantly reduce its current State of Good Repair (SOGR) funding shortfall, reduce the project backlog and address the \$1.8 billion investment required to comply with FTA, NTSB and other safety and security directives.
- Develop a comprehensive plan to replace the MetroRail traction power delivery system and replace the portions of the railcar fleet (42%) and bus fleet (28%) that are over 10 years old.

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F

EXECUTIVE SUMMARY

D.C.'s Blue Plains wastewater treatment plant serves more than 2 million people in the District and surrounding areas. The average age of sewer mains has increased from 84 years in 2016 to over 90 years in 2020, moving closer to their service live of 110 to 120 years. The recent Clean Rivers Project has, since 2018, dramatically reduced the discharge of untreated wastewater to local waterbodies during heavy and sustained rain events, with projected 96% reduction in discharge volume per year. However, DC Water is not currently achieving its annual goal of a 1% replacement rate of its aging wastewater collection system. To achieve the improvements that are needed, an adjusted replacement rate of 2.3% per year has been targeted. Blue Plains is world-renowned for its use of innovative technologies to eliminate pollutants while reducing electric consumption by a third.

CONDITION AND CAPACITY

Washington, D.C.'s wastewater system consistently serves more than 700,000 residents in the District and more than 1.6 million people in the surrounding areas. The system consists of nearly 2,000 miles of combined, separate, and stormwater pipes, more than two dozen stormwater and wastewater pump stations, and one advanced wastewater treatment plant. The average age of sewer mains has increased from 84 years in 2016 to over 90 years in 2020, moving closer to the end of a pipe's expected service life of 110 to 120 years. The network collects wastewater from the Potomac Interceptor, a large sewer line stretching to the Dulles Airport, and suburban counties in Maryland and Virginia before arriving at D.C.'s Blue Plains Advanced Wastewater Treatment Plant (Blue Plains).

Blue Plains has an average design capacity to treat more than 380 million gallons of wastewater per day (MGD) and, at peak flows, a four-hour capacity of 555 MGD, with additional wet weather treatment capacity of 225 MGD. Overall, Blue Plains annually records average treatment totals of nearly 292 MGD, signaling adequate remaining design capacity. A potential threat to the wastewater system's capacity and treatment performance is the issue of combined sewer overflows (CSO) that occur during extreme wet weather events. These events occur when the mixture of sewage and stormwater exceeds the capacity of the system and overflows to the nearest water body. Blue Plains documentation shows that prior to the Clean Rivers Project, the CSO volume to the Anacostia and Potomac Rivers and Rock Creek during an average year of rainfall was about three billion gallons.



Facilities managed by, and service areas served by, DC Water.

Fortunately, progress with the Clean Rivers Project, particularly the Blue Plains and Anacostia River Tunnels stretching from Blue Plains to Robert F. Kennedy Stadium, has captured almost 9 billion gallons of combined sewage and over 4,300 tons of trash that would have been discharged into the river during rain events, but, instead, were diverted for treatment.

Qn a daily basis, FC Y ater operates the entire wastewater system to a standard that has earned it a Nlatinum Neak Nerformance Award from NACY A, the National Association of Clean Y ater Agencies.

PUBLIC SAFETY, OPERATION AND MAINTENANCE

On a daily basis, DC Water operates the entire wastewater system to a standard that has earned it a Platinum Peak Performance Award from NACWA, the National Association of Clean Water Agencies. Platinum Awards are earned when facilities have recorded full compliance for five consecutive years, and Blue Plains has had 100 percent compliance for the last 8 consecutive years. However, as DC's wastewater system ages, occurrences of sanitary sewer overflows (SSOs) have increased which means diluted, untreated wastewater spills into local waterbodies, sometimes due to excessive rainfall. Locations and information about the episodes are marked on web mapping interfaces depicted below. Though a dramatic decrease has been seen since 2018, SSO events have increased overall since 2016. The vast majority of SSO events result in spills of less than 14,000 gallons.



Locations and information about sanitary sewer overflows (SSOs) in Washington, D.C.

Recognizing the value of preventative maintenance to reduce breaks and disruptions, DC Water has a goal of 1% replacement rate among parts of the wastewater collection system. However, according to a 2019 DC Water report, that baseline is not currently being achieved for smaller diameter sewer

FUNDING AND FUTURE NEEDS

D.C. Water's Capital Improvement Program projects a \$1.6 billion funding shortfall in meeting the projected needs of the organization's water, wastewater, and stormwater sectors. In the wastewater sector, wastewater treatment is sufficiently funded to meet the U.S. Environmental Protection Agency's National Pollution Discharge Elimination System permit levels of service. However, there are funding gaps for achieving the increased replacement rate for small diameter sewer lines (< 60 inches). These pipes had been substantially underfunded and seeing only a 0.35% replacement rate. Therefore, to address the lagging maintenance, DC Water has determined a new replacement rate of 2.3% per year is required.

lines (from 0.35% to 2.3%) and to bring pump stations to a point that resources are available to meet known and anticipated needs. Though wastewater funding gaps exist, D.C. Water's budget has increased since 2016, but not at a pace enabling it to keep up with the replacement and rehabilitation needs of the extensive and aging wastewater system. Fortunately, the organization is managed in a fiscally sound manner and continues to benefit from high credit ratings which qualifies it for cheaper rates in the bond market to access funding for capital projects. All of this taken together, retail sewer

RESILIENCE AND INNOVATION

In September 2020, the District saw some of its heaviest and most sustained rainfall in decades, with nearly three inches of rain falling in just ninety minutes. DC Water's 124 million gallons of built tunnel storage in the Blue Plains and Anacostia River tunnels went from empty to overwhelmed in 35 minutes, overflowing into the Anacostia River and backing up into homes. After this flooding, DC Water offered to reimburse residents who chose to install backflow preventors and to fund up to an additional \$5,000 in flood remediation costs. DC Water analysis determined that the return frequency of such a storm was between 1 and 5 years. To improve the resilience of DC Water's system, the organization is constructing the Northeast Boundary Tunnel which is intended to bring the Northeast Boundary Sewer and the identified chronic flood areas up to the current design standard of a 15-year storm.

DC's combined sewer system leads to increased risk of CSOs during heavy rain. The DC Clean Rivers Project

rates have been increasing to support the investments needed to maintain and upgrade the system.

works to reduce CSOs, which prior to the project had an annual average volume of about three billion gallons into the Anacostia and Potomac Rivers and Rock Creek. The Clear River Project is projected to reduce CSO volume by 96% in an average year. The project includes green infrastructure like bioretention in planter strips and curb extensions, permeable pavement in streets and alleys, and a downspout disconnection and rain barrels program.

Blue Plains is for its adoption of innovative wastewater treatment and biosolids technologies. Some of these include enhanced nutrient removal and a recent commissioned Filtrate Treatment Facility. Both these practices remove nitrogen from treated water, minimizing chemical use and limiting pollutants discharged to the Potomac. DC Water was also the first utility in North America to use thermal hydrolysis for wastewater treatment, which eliminates pathogens and reduces the size of reactors. This practice also cuts DC Water's net electricity consumption by up to a third.

Wastewater



LET'S RAISE THE GRADE

- Complete the DC Water Clean Rivers Project to address combined sewer overflow (CSO) during high rain events, reduce the impact of flooding in neighborhoods and improve the health of the D.C. Rivers and Creeks.
- Invest in "green infrastructure" throughout D.C. as a cost-effective solution for stormwater management that allows for more water to be absorbed into the ground rather than putting it through the sewer and treatment system, with secondary benefits of additional parks, gardens and green space for D.C. residents and visitors.
- Continue to prioritize and invest in the sanitary sewer system to ensure a reliable and modern system and reduced risk of system failures.
- Increase sewer replacement rate from current rate of from 0.35% to 2.3%.
- Given the location of sewers and pipes beneath roadways, share the cost of infrastructure upgrades by coordinating water and sewer infrastructure upgrades to coincide with District Department of Transportation roadway projects.
- Continue to invest in Blue Plains Advanced Wastewater Treatment Plant to maintain its status as a world-class treatment facility.

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