2025 REPORT CARD FOR OHIO'S INFRASTRUCTURE

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

INFRASTRUCTUREREPORTCARD.ORG/OHIO

Cover photo: Stewart Street Bridge, Dayton, OH.

Table of Contents

2025 REPORT CARD FOR OHIO'S INFRASTRUCTURE

Introduction

The American Society of Civil Engineers (ASCE) Ohio Council of Local Sections has released its 2025 report card for Ohio's infrastructure, assessing seventeen infrastructure areas: Aviation, bridges, dams, drinking water, energy, hazardous waste, inland waterways, levees, parks, ports, rail, roads, schools, solid waste, stormwater, transit, and wastewater. Ohio's infrastructure earned an overall grade of C, indicating significant concerns across multiple sectors – particularly in condition and capacity, where systems are at an increased risk of failure.

Ohio's infrastructure is a driver of economic activity and quality of life and is critical for the state's public health and safety. Yet, much of the state's infrastructure is aging, underfunded, and at risk of not meeting future demand. In May 2025, Ohio voters approved a constitutional amendment to provide funding through the State Capital Improvement Program (SCIP) to allow the state government to issue $2.5 billion in general obligation bonds over ten years, with no more than $250 million a year, for use by local governments to pay for public infrastructure projects. SCIP typically goes to funding infrastructure projects like bridges, roads, water systems and waste facilities. This funding commitment demonstrates public recognition of the urgent need to invest in infrastructure.

This report card highlights mixed performance across sectors:

- Some of the state's privately owned infrastructure such as electric utilities and rail have benefited from increased investment.
- Public infrastructure, including roads, ports, inland waterways, airports, and many other types of public infrastructure continue to face substantial funding gaps, despite increased investments through the Infrastructure Investments and Jobs Act (IIJA).
- Many assets, including most of Ohio's bridges, dams, levees, drinking water distribution systems and ports, are approaching or have exceeded their design life. For example:
    - Ohio's high-hazard dams average 69 years in age and need approximately $1.06 billion for rehabilitating all of them at current cost.
    - Levee systems provide flood risk reduction for more than 165,000 people and $37 billion in property but are nearly 50 years old and in need of risk assessments.
    - Funding for operation and maintenance of park land is inadequate. For example, Cuyahoga Valley National Park has deferred maintenance and repairs totaling $162 million.
- Water quality remains a critical concern. Ohio relies heavily on surface water from Lake Erie and creeks and rivers. Protecting Ohio's water resources by managing stormwater runoff and improving water quality through ongoing investment in wastewater infrastructure is a high priority.
- Ohio roadways and bridges carry the third highest freight volume in the U.S. and accommodate the fifth highest volume of vehicular traffic. Surface transportation, rail, ports, and inland waterways are critical for safely and efficiently moving goods, particularly in sectors such as manufacturing, agriculture and mining. While currently meeting the needs within the state, continued investment is needed to meet future demand, expand the local economy and ensure equitable investment across regions and industries.
- Ohio's transit systems require immediate attention. Reliable transit connects people to jobs, schools, and services, and transit is critical for local businesses that rely on tourism and interstate connectivity.

Increased spending on Ohio's infrastructure will have both short-term and long-term benefits. In the short term, infrastructure will stimulate economic activity and create jobs within the state. In the long term, improvements in the state's infrastructure would benefit both businesses and consumers in the state by lowering the cost of materials, manufactured goods, and delivery of goods, reducing dependency on imports, improving the health of the workforce and enabling the movement of people within the state and strengthening the state's overall economy.

Recommendations to Raise the Grade

INVESTMENT

Increased investment is needed across all infrastructure sectors to address maintenance backlogs, modernize aging systems, and meet future demands. This includes expanding grant opportunities for systems such as **aviation** and **inland waterways**, and securing sustainable state and federal funding streams for **roads**, **bridges**, **rail**, and **transit**. Long-term funding commitments are also essential for community-serving assets like **public parks**. The examples provided reflect just a portion of the investments needed across the full range of infrastructure categories.

SAFETY

Ensuring safety is a fundamental priority across all infrastructure systems. This includes, for example, increasing inspection capacity for **dams** and **levees**, conducting statewide assessments to identify and prioritize **school** safety retrofits, and accelerating the replacement of lead service lines in **drinking water** systems. Adopting a Safe System Approach for **roadway** design and strengthening rail safety through at-grade crossing improvements and technology upgrades are additional actions that illustrate the need for a comprehensive, system-wide focus on safety.

RESILIENCE

Ohio must accelerate efforts to improve the resilience of its infrastructure to withstand climate-related threats and other hazards. This includes investing in grid modernization and expanding the use of flood modeling tools to inform the design and operation of systems such as **energy**, **stormwater**, **dams**, and **levees**. Resilience strategies should be integrated into planning and investment decisions across all categories.

TECHNOLOGY

Integrating new and emerging technologies across infrastructure sectors can enhance efficiency, safety, and environmental performance. This includes phasing in improved disposal technologies for **hazardous** and **solid waste**, deploying wayside detection systems for rail, and advancing intermodal logistics and cargo handling systems at **ports**. These examples highlight the broader need to support innovation across Ohio's infrastructure networks.

SYSTEM CAPACITY

Infrastructure systems across the state must be designed and upgraded to meet current and future demand, accommodate changing usage patterns, and support economic growth. This includes ensuring **roads** and bridges can handle evolving transportation needs and freight **movement** and expanding capacity at **wastewater** treatment facilities to maintain reliable service and meet regulatory requirements. These examples reflect the broader need to enhance system capacity across a wide range of infrastructure categories.

About The Report Card for America's Infrastructure

Every four years, America's civil engineers provide a comprehensive assessment of the nation's 18 major infrastructure categories in ASCE's *Report Card for America's Infrastructure.* Using a simple A to F school report card format, the Report Card examines current infrastructure conditions and needs, assigning grades and making recommendations to raise them.

The ASCE Committee on America's Infrastructure is made up of 52 dedicated civil engineers and infrastructure professionals from across the country, with decades of expertise in all categories, who volunteer their time to work with ASCE Infrastructure Initiatives staff to prepare the Report Card. The Committee assesses all relevant data and reports, consults with technical and industry experts, and assigns grades using the following criteria:

Methodology

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 to 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?

In addition to this national Report Card, ASCE's sections and branches prepare state reports on a rolling basis. Visit **InfrastructureReportCard.org** to learn about your state's infrastructure.

The 2025 Report Card for Ohio's Infrastructure

OVERALL GPA

Aviation
C-

Bridges
C+

Dams
C-

Drinking Water
D+

Energy
C-

Hazardous Waste
C-

Inland Waterways
D

Levees
C-

Ports
C+

Public Parks
C+

Rail
B-

Roads
D+

Schools
C

Solid Waste
B-

Stormwater
D+

Transit
C-

Wastewater
C-

Photo: Dayton International Airport

AVIATION

EXECUTIVE SUMMARY

As the birthplace of aviation, Ohio's airports are integral to the economy of the state and nation. The state's commercial-use airports generally provide sufficient airfield capacity and meet or exceed standards. The airfield pavements are generally in fair condition. Terminal and parking facilities have capacity or modernization issues, some of which are already being addressed or are in the planning stages. Pavement conditions are poor, and funding is inadequate to keep up with deferred maintenance. Ohio's numerous general aviation airports need attention and investment, and the availability and reliability of funding to provide this necessary investment is lacking. The grade for aviation in Ohio is a C-. Aviation was not graded in 2021.

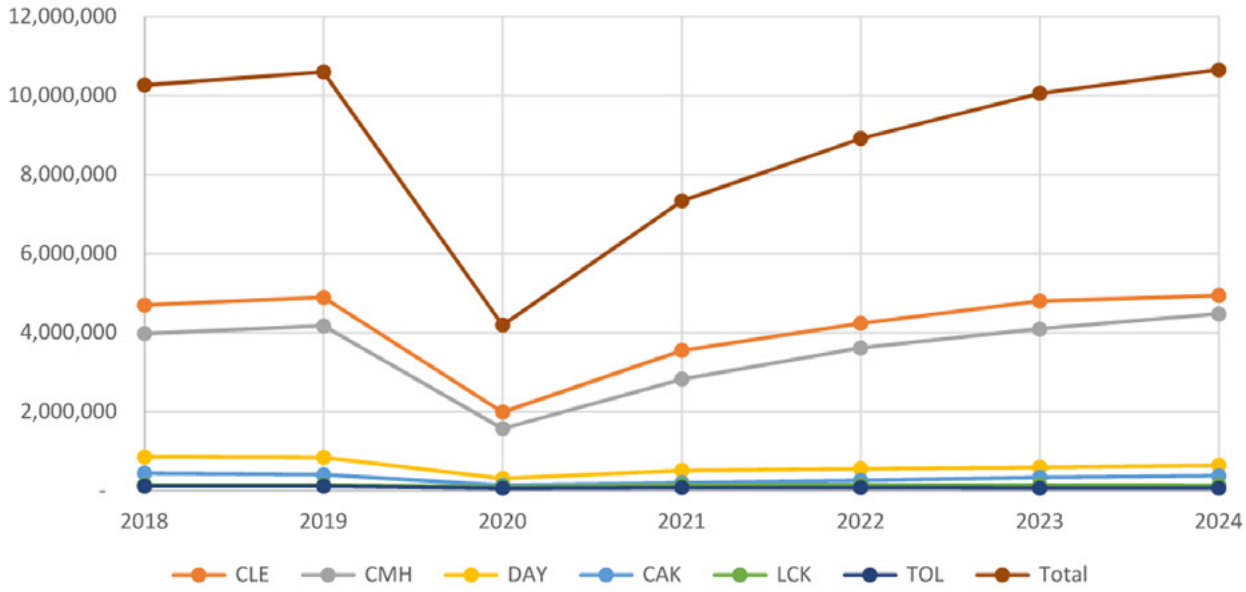
BACKGROUND

Ohio's aviation system is an integral part of our state's transportation network, and every Ohio citizen is impacted by the system's direct and indirect benefits. Ohio is home to 97 public-use airports in the National Plan of Integrated Airport Systems (NPIAS) spread throughout 84 of the 88 counties and an additional 484 private-use airports and heliports. These airports range from larger facilities with paved runways to small grass strips for private pilots, flight schools and corporate aviation. Over 4,000 aircraft are based in Ohio. Of note, this report excludes Cincinnati-Northern Kentucky International Airport (CVG), a medium hub airport serving the Cincinnati tri-state area that is located in Kentucky.

Ohio Airport Enplanements

Airport	2018	2019	2020	2021	2022	2023	2024
CLE	4,701,713	4,894,541	1,990,156	3,552,402	4,237,795	4,803,822	4,939,279
CMH	3,976,620	4,172,067	1,577,596	2,825,259	3,618,555	4,095,189	4,474,715
DAY	858,022	845,776	315,051	517,621	559,347	594,188	645,930
CAK	449,731	407,646	139,509	204,990	265,889	344,002	380,772
LCK	154,475	153,850	104,868	148,397	147,957	149,363	142,744
TOL	123,541	124,211	66,057	85,599	85,451	70,346	59,838
Total	10,264,102	10,598,091	4,193,237	7,334,268	8,914,994	10,056,910	10,643,278
Year to Year Change		+3.3%	-60.4%	+74.9%	+21.6%	+12.8%	+5.8%

Ohio Airport Enplanements



In 2024, the state's six major commercial use airports served over 10.6 million enplanements, a measure of the number of passengers embarking on a flight from an airport, a 5.8% increase from 2023 and surpassing pre-COVID-19 levels. Medium hub airports Cleveland Hopkins International Airport (CLE) and John Glenn Columbus International Airport (CMH), as well as small hub James M. Cox Dayton International Airport (DAY), provide Ohio residents with passenger service to hundreds of national and international destinations. Smaller regional airports include Akron-Canton Airport (CAK), Rickenbacker International Airport (LCK) near Columbus and Eugene F. Kranz Toledo Express Airport (TOL), which contribute to the capacity of Ohio's airports while also being well distributed throughout the state. Nearly 90% of the population is located within a 60-minute drive of a commercial service airport.

OHIO AVIATION FACTS

7,633
registered aircraft

17,866
pilots

130
aircraft repair stations

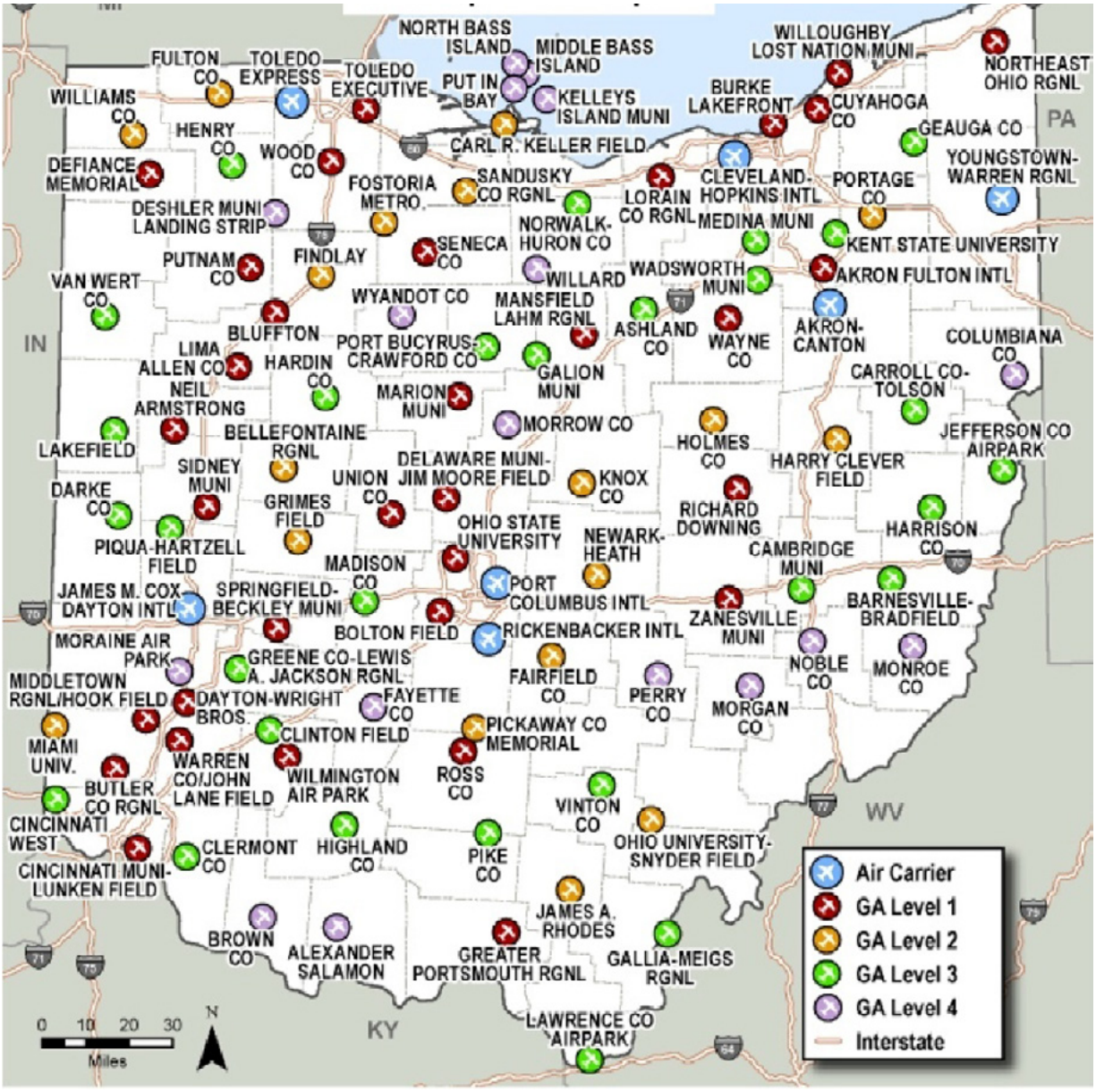
14
FAA Par

141
certified pilot schools

6,282
student pilots

3,124
flight instructors

Ohio Airport and Heliports



CAPACITY

In 2023, the total passenger enplanements (individual passenger boardings) in Ohio were over 10 million, a 13% increase from 2022. According to projections from the Federal Aviation Administration (FAA), this number is expected to grow by nearly 50% to 14.8 million by 2040. While most of Ohio's non-hub airports have adequate terminal and airfield capacity to accommodate this growth, larger airports are making extensive changes. John Glenn Columbus International Airport is in the beginning stages of building a new $2 billion passenger terminal that is expected to increase capacity by 51% (up to 12.7 million passengers) per year when it opens

in 2029. Cleveland Hopkins International Airport is preparing to undertake a significant terminal and parking modernization and expansion program, estimated to cost $2.1 billion, per its most recent master plan update. This extensive program is anticipated to provide 25% more capacity, up to 12.4 million passengers per year, to meet projected passenger levels and modernize the terminal and parking facilities.

Major air cargo users in Ohio include Amazon, UPS, FedEx and DHL, among others. Airports supporting this cargo demand in Ohio include Rickenbacker International Airport (LCK), Wilmington Air Park (ILN), Dayton International Airport (DAY), Toledo Eugene F. Krantz Airport (TOL) and Cleveland Hopkins International Airport (CLE). In general, Ohio's aviation system's existing cargo handling capacity is satisfactory to support current known activity levels. DAY can handle some spot additions in cargo, but any substantial increases will require aprons and buildings on available land. ILN has apron space, but would need buildings/cross-dock buildings to support this additional growth. As part of its master plan update, CLE has confirmed its overall cargo capacity is currently sufficient, except for needing to add apron space throughout their Planning Activity Levels (PAL). The cargo industry is currently in flux due to the market volatility of e-commerce shipments coming out of Asia, so accurately forecasting future capacity needs is difficult.

CONDITION

The condition of airports can generally be broken into two main categories: airside (airside pavement, runways, taxiways, aprons, airfield lighting, navigation aids, airfield operations and maintenance facilities) and landside (terminals, parking, roadways, maintenance facilities and cargo handling).

The Ohio Airport System Plan (OASP) is in the process of being updated by the Ohio Department of Transportation (ODOT). The update will provide a comprehensive analysis of existing conditions and future needs of all eligible public airports in Ohio.

The most recent ODOT Office of Aviation Pavement Condition and System Goals analysis indicated that the Pavement Condition Index (PCI) of Ohio's airports steadily decreased from 1994 through the mid-2000s. The PCI is a numerical rating of pavement condition based on type and severity of distress and is measured from 0 to 100, and is the greatest asset cost for airports in Ohio. The PCI for runways (actual: 74; goal: 85), taxiways (actual 56; goal: 80), and aprons (actual 61; goal: 75) were all well below system goals and targeted satisfactory levels. Pavements with ratings below 70 require some type of maintenance, and those below 55 spur a significant increase in project costs. Even low-cost maintenance investments such as crack sealing can extend pavement life – which is an airport's most expensive asset – by as much as 50%.

OPERATION & MAINTENANCE

Airports vary widely in the types of facilities and services they offer. Therefore, operations and maintenance (O&M) needs are airport-specific. Airport sponsors, the public or private entity that owns and operates a public-use airport, develop O&M plans for their airports and develop budgets according to available resources. These plans are developed to monitor and manage airport performance to optimize planning and resources across airside operations (navigation, landing, traffic and runway management), landside operations (passenger service and facilities), billing and invoicing processes, information management to improve resource management, flight connectivity and the passenger experience. Smaller county general aviation (GA) airports will have a plan tied to their Airport Capital Improvement Program (ACIP), which is submitted to the FAA and ODOT annually. It outlines major expenses, typically for the airfield, terminal and access roadway. Many smaller airports do not have a robust O&M plan due to limited budgets and staff. The majority of day-to-day O&M is funded locally. Many airports are tracking their systems and transitioning into an asset management platform, which helps with budgeting and maintaining the infrastructure.

Aging infrastructure has led to asset management planning as a growing, valuable strategy that allows airports to better understand, forecast and prioritize O&M needs. Asset management plans allow airports to prioritize investment decisions based on the best economic, service level and risk exposure outcomes and improve flexibility when responding to changing regulatory and commercial environments. Currently, CLE and CMH utilize asset management plans. Most commercial airports have initiated asset management plans. Some smaller and general aviation airports may have standalone, airport-specific plans. Others may have abbreviated plans included with a broader agency-wide O&M plan for all organization assets, if they have one at all.

All commercial airports and selected general aviation airports serving medium-sized passenger aircraft must comply with FAA's Part 139 Airport Certification process to ensure the operating conditions of the airfield are safe.

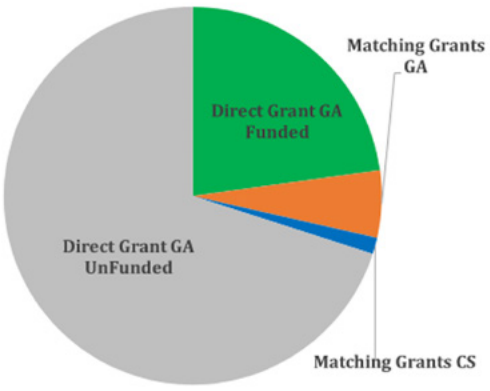
Larger commercial airports utilize their own maintenance teams to complete small, routine maintenance projects. However, smaller airports must rely on grant funding to maintain airfield pavement and utilities. Shortfalls in this funding prevent the efficient deployment of necessary maintenance activities and inhibit airports from utilizing lower-cost preventative maintenance (seal coating, crack sealing, pavement mill/overlay) to extend the useful life of the pavement and reduce the frequency of much more expensive pavement rehabilitation.

FUNDING & FUTURE NEED

ODOT develops the Ohio Airport System Plan (OASP) every 10 years to demonstrate the economic impacts of aviation in the state and to help airports understand the status of their facilities. The facility evaluation criteria are intended to be tracked and updated to help support the airport facility in determining what is needed.

In addition, any airport in the NPIAS seeking federal funding must have a capital improvement plan (CIP) demonstrating the need for FAA funding. Ohio airports are directed by the FAA to submit an annual CIP. These CIPs are used to determine airport needs and outlay of investment capital.

Five Year Ohio Airport Improvement Program History (2020–2024)



Direct Grants for General Aviation Airports (GA)		
Requested		$ 102,037,604
Notice of Project Approval	24%	$ 24,373,773
Un-Funded	73%	$ 74,803,481
Matching Grants for General Aviation Airports		
Funded	AIP	$ 5,958,200
Funded	BIL/AIG	$ 165,074
Matching Grants for Commercial Service Airports (CA)		
Funded	AIP or BIL/AIG	$ 1,500,000
Total Grants Awarded		
Funded		$ 31,997,047

OAA Conference 2024

OHIO DEPARTMENT OF TRANSPORTATION

Photo: Marisa Lindsay

Ohio's general aviation airports face a significant gap in funding. Most capital funds available to Ohio's smaller or general aviation airports are provided via the FAA's Airport Improvement Program (AIP) via direct grants and matching grants. Direct grants provide financial assistance to publicly owned airports that do not receive FAA passenger or air cargo entitlements. The funding provides for up to 95% of eligible costs. Matching grants pay 5% of the non-federal share of AIP-funded projects that don't receive FAA entitlements at GA airports and historically at publicly-owned commercial service airports. However, for the fiscal year 2025-2026, the FAA AIP program increased the AIP share to 95%, so ODOT has paused its contribution.

From 2020-2024, only 32% of the requested grants were funded, predominately to GA airports, leaving a shortfall of over $15 million. Over the last five years, just 24% of requests were funded, resulting in nearly $75 million shortfall. Over 50 of these airports were constructed in the late 1960s as a result of Gov. James Rhodes legislating that each of Ohio's 88 counties have a general aviation airport. Now, nearly 50 years old, many of these airports have maintenance needs that cannot be supported by available local, state and federal funding.

Congress passed the multi-year FAA Reauthorization Act of 2024, which increases AIP funding and will provide some stability for airports to plan better for capital improvements.

ODOT also administers a $7 million annual grant program that must be spread among almost 100 airports, so competition is fierce. The available funding is generally consistent year-to-year and well short of need. In 2024, projects at only 22 airports were funded with an average award of $322,000. Recently, FAA funding has increased slightly. Congress passed the multi-year FAA Reauthorization Act of 2024, which increases AIP funding and will provide some stability for airports to plan better for capital improvements.

Photo: Ohio State University (Don Scott) Airport

The Passenger Facility Charge (PFC) is another funding source available for airport improvements that enhance safety, security or capacity, reduce noise or increase air carrier competition. Every airport in Ohio utilizes the maximum allowable charge of $4.50 per enplaned passenger. Since PFCs are levied on enplaning passengers, there were significant decreases during the COVID-19 pandemic as passenger travel plummeted. Various supplemental federal funding was utilized to supplement funding needs. Several one-time federal funding programs were implemented to support Ohio's airports during the COVID-19 pandemic. The Coronavirus Aid, Relief and Economic Security (CARES) Act allocated $10 billion nationwide, with $108.8 million distributed to 97 airports in Ohio. The Coronavirus Response and Relief Supplemental Appropriations Act (CRRSAA) provided an additional $2 billion, of which $32.9 million supported 95 Ohio airports. Through the American Rescue Plan Act of 2021 (ARPA), Ohio airports received $91.9 million from a national total of $8 billion.

Looking ahead, the Infrastructure Investment and Jobs Act (IIJA) allocates $25 billion from 2022 to 2026 to support capital infrastructure and modernization needs at airports nationwide. Ohio is expected to receive $253 million over five years, which will be used to address critical airside and landside infrastructure needs. These include runway and taxiway improvements, airport-owned tower upgrades, terminal development and noise mitigation projects.

PUBLIC SAFETY & RESILIENCE

Airports and airlines are responsible for public safety and security and have appreciable funding needs, typically from PFC funds, to keep pace with needs and changing mandates.

The airport sponsor's responsibility is to maintain the public's safety, which is the most important aspect of air travel. The FAA regularly completes safety inspections to identify areas that require increased safety. These items, – such as missing lights, deteriorated airfield markings and violations of runway and taxiway safety areas – must be corrected.

Runway Safety Areas (RSAs) serve as the primary safety mitigation for runway excursions – an aircraft veering off the runway – while Taxiway Safety Areas (TSA) are determined and maintained similarly to the RSA for taxiways. Runway excursions occur when an

aircraft veers off or overruns a runway. The RSAs must be maintained to safely accommodate aircraft that may veer off paved surfaces. RSAs are inspected at least annually – and often as frequently as daily – as part of routine safety checks to ensure proper grading, adequate drainage and absence of debris or protruding objects.

The initial dimensions of the RSAs are determined by the size and speed of the airport's critical aircraft. The initial dimensions of the RSA are determined during the planning process which includes identifying the critical aircraft. The critical aircraft of an airport sets all dimensional requirements and is defined as the largest aircraft or grouping of aircraft with at least 500 annual operations.

The airport maintains the RSA through daily inspections by operations staff. During the design process, the RSA is reviewed for any areas that may not comply with the current standard requirements. If any discrepancies are determined, they are corrected within a project.

Runway incursions are defined as the incorrect presence of an aircraft, vehicle or person on the protected area of the airport surface designated for the landing and takeoff of aircraft. There are various types of incursions that are reported – including Pilot Deviation (PD), Operational Incident (OI), Vehicle Pedestrian Deviation (V/PD) and others. In 2023, Eugene F. Kranz Toledo Express Airport initiated a $4.6 million project to shift a taxiway and improve the airport's taxiway safety area to meet FAA design standards.

Ohio's aviation resiliency was highlighted during the COVID-19 pandemic as airlines – many using cargo-converted passenger aircraft – transported medical cargo into and through Ohio.

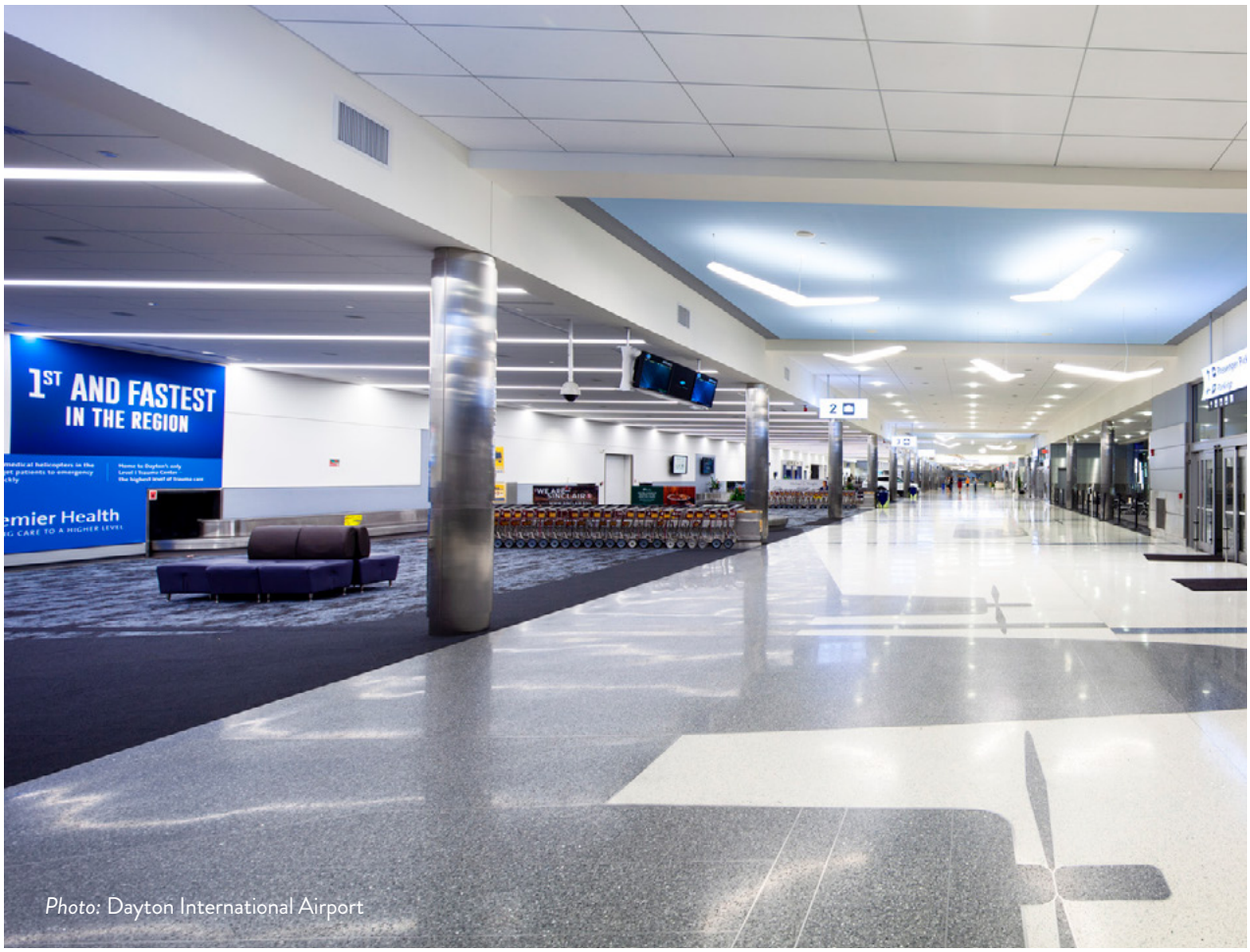


Photo: Dayton International Airport

Recent studies completed by DriveOhio and public university partners show that by investing in AAM infrastructure and technologies, Ohio could expect a $13 billion economic impact over 25 years, generate 15,000 new jobs and $2.5 billion in local, state and federal tax revenues. It could also grow Ohio's GDP by 1.6% through 2045.

INNOVATION

As the birthplace of aviation and home to the Wright Brothers, Ohio has a rich history of innovation and continues to be on the forefront of technology. Ohio is on the leading edge of Unmanned Aircraft Systems (UAS) research, testing and implementation, which is being conducted at Springfield-Beckley Municipal Airport, The Ohio State University, Wright-Patterson Air Force Base and others. DriveOhio is an initiative of ODOT serving as the state's hub for smart mobility and technology on the ground and in the air. DriveOhio's Ohio Uncrewed Aircraft Systems Center is the home to FlyOhio, a coalition of public and private stakeholders working with public, private and academic partners to develop, test and deploy the technology needed for unmanned aerial vehicles (UAV) to fly long distances safely without fear of collision. The widespread use of UAVs has increased but remains limited by line-of-sight restrictions on low-altitude traffic management. FlyOhio seeks to refine the low-altitude air traffic control system and make Ohio airspace among the first in the nation ready to fly beyond line of sight.

Advanced Air Mobility (AAM) is an emerging technology that uses Next Generation Air Transportation System (NextGen) technology to move people and cargo between places not conveniently served by surface infrastructure. Common technologies include electric propulsion, short and vertical takeoff/landing techniques, advanced lightweight materials and the ability to remotely or autonomously pilot aircraft. AAM increases travel mode options, improving transportation resiliency, efficiency and safety.

Recent studies completed by DriveOhio and public university partners show that by investing in AAM infrastructure and technologies, Ohio could expect a $13 billion economic impact over 25 years, generate 15,000 new jobs and $2.5 billion in local, state and federal tax revenues. It could also grow Ohio's GDP by 1.6% through 2045.

RECOMMENDATIONS TO RAISE THE GRADE

- Increase funding at the state and federal level for airports by raising or eliminating the cap on PFC funding and increasing AIP funds. With a maximum limit of $4.50 for each passenger getting on an airplane at a commercial service airport, this is a severely curtailed funding stream that is very important to commercial service airports. The cap has not been raised in about two decades. Annual needs for infrastructure repair at airports throughout the U.S. far exceed the available funding. Establish annual funding for inspecting airside and landside pavements at airports (including PCIs) with dedicated ODOT staff.
- Fund and increase the ODOT share for matching grants to allow airport sponsors to accomplish more with limited resources. Ideally, the Ohio Legislature should expand funding for ODOT Office of Aviation's direct and matching grant programs significantly to be more in line with other neighboring states. By increasing these grant funds, the state would have the ability to fund many more airport projects within Ohio. As with AIP funding, ODOT matching and direct grant programs can meet only a portion of the annual

SOURCES

Airports Council International – North America, "2023 Airport Infrastructure Needs", 2023.

Ohio Department of Transportation, "Office of Aviation Program Updates – OAA Conference Presentation", 2024.

Ohio Department of Transportation, "Ohio Airport System Plan Update (OASP) – ODOT/FAA Workshops Presentation", 2024.

Ohio Department of Transportation, "Pavement Condition Update – ODOT/FAA Workshops Presentation", 2024.

Ohio Department of Transportation, "Ohio Airports Economic Impact Study", 2014.

Ohio Department of Transportation, "Airports & Heliports", 2025.

Ohio Department of Transportation, "Office of Aviation – Airports Program Page", 2025.

Aviation Across America, "Economic Impact in Ohio", 2025.

Ohio Department of Transportation, "Office of Aviation – Airport Grant Program", 2025.

DriveOhio, "Advanced Air Mobility (AAM)", 2025.

DriveOhio, "Uncrewed Aircraft Systems (UAS)", 2025.

Purdue University, "Runway Incursion Incident Reporting Tool", 2025.

The Center Square, "Feds Sending $108 Million to Ohio Airports as Part of CARES Act", 2020.

SOURCES (cont.)

U.S. Department of Transportation, Federal Aviation Administration, "Updated Airport Coronavirus Response Grant Program Allocations", 2021.

U.S. Department of Transportation, Federal Aviation Administration, "Facility Dashboard", 2025.

U.S. Department of Transportation, Federal Aviation Administration, "Report to Congress on the Airport", 2025.

U.S. Department of Transportation, Bureau of Transportation Statistics, "U.S. Airport Data", 2025.

U.S. Department of Transportation, Federal Aviation Administration, "Passenger Boarding and All-Cargo Data", 2025.

U.S. Department of Transportation, Federal Aviation Administration, "Airport Improvement Program (AIP) for FY 2020 and 2021", 2021.

U.S. Department of Transportation, Federal Aviation Administration, "National Plan of Integrated Airport Systems (NPIAS), Appendix A", 2023.

U.S. Department of Transportation, Federal Aviation Administration, "Passenger Facility Charge (PFC) Decisions", 2025.

U.S. Department of Transportation, Federal Aviation Administration, "PFC Monthly Reports and Approved Locations", 2024.

U.S. Department of Transportation, Federal Aviation Administration, "CY 2023 All Enplanements", 2023.

U.S. Department of Transportation, Federal Aviation Administration, "Runway Safety Areas (RSAs)", 2025.

U.S. Department of Transportation, Federal Aviation Administration, "AC 150/5000-17: Critical Aircraft and Regular Use Determination", 2025.

U.S. Department of Transportation, Federal Aviation Administration, "Runway Incursion Totals for FY 2024", 2024.

Bridges

C+

Photo: Brookville, OH

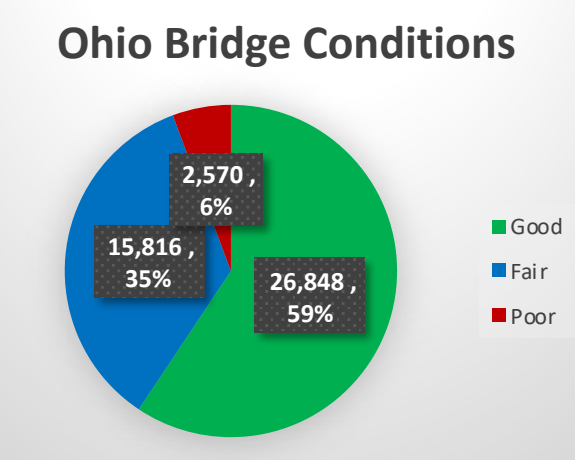
GRADE COMPARISON

Ohio: C+
Nat'l: C

BRIDGES

EXECUTIVE SUMMARY

Ohio is home to 45,234 bridges, of which 59% are rated in good condition, 35% satisfactory or fair and 6% poor, resulting in a C+ grade. Of the state's inventory, 2,252 bridges – or 5% – are posted for reduced load capacity, and 200 are closed altogether. The Ohio Legislature has enabled counties to generate additional revenues for improving their local transportation network, including bridges, by levying a $5 permissive fee on vehicle registration, though increases have not been uniformly adopted across the state. In 2019, state leaders raised the state's gas tax from $0.280 to $0.385. While this resulted in an increase in revenue to local governments of approximately 30% in fiscal year (FY) 2021, annual increases have remained flat over the last three years. In total, Ohio is expected to see a decrease of $877 million annually by 2040. This will lead to funding shortfalls for the Ohio Department of Transportation (ODOT) and local governments. Funding has remained static and is not indexed to inflation, while the system continues to age faster than repairs or replacements can take place. Funding challenges limit the number of replacements or annual repairs. On the other hand, an increased emphasis on system preservation has helped stem the tide of the state's growing needs, although it cannot do so indefinitely. Tangible improvements have been seen over the last five years with increased funding through the Infrastructure Investment and Jobs Act (IIJA), but this investment needs to be sustained to bend the curve in the right direction.



OVERVIEW

Ohio ranks second in the nation for its number of bridges in the National Bridge Inventory (NBI) with 26,960 structures and fifth for its number of interstate lane miles at 8,000. The Federal Highway Administration (FHWA) National Bridge Inventory (NBI) defines a bridge as a structure that is 20 feet or longer and requires an inspection every two years. The state also has the fifth highest volume of vehicular traffic and third highest volume of truck traffic on the interstate system. ODOT has made significant investments in major bridges in the state, including $3.2 billion for the ongoing Brent Spence Bridge Project, with the help of federal investments. Other bridge owners include the Ohio Turnpike and Infrastructure Commission (OTIC), the Ohio Department of Natural Resources (ODNR), counties, municipalities, transit agencies and park agencies.

The Ohio Revised Code (ORC) defines a bridge as any structure of 10 feet or more clear span or 10 feet or more in diameter, situated on, above or below a highway. Also, ORC requires all bridges be inspected annually. Table 1 identifies the bridge distribution by length based on the ORC:

Table 1: Ohio Bridges Total Numbers

2020	2024	Bridges in Ohio
44,736	45,234	Total number of bridges (10 ft. +)
30,805	27,946	Total number of bridges over 20 ft.-span
13,931	17,288	Additional Ohio bridges between 10 ft and 20 ft-span
27,162	26,960	Total number of FHWA/NBI Bridges

CONDITION AND CAPACITY

The federal Moving Ahead for Progress in the 21st Century Act, or MAP-21, defined bridge condition general appraisal ratings as good (9-7), fair (6-5) and poor (4-0). In Ohio, ODOT has established the goal of an average general appraisal rating of 6.8 systemwide. This goal requires the department to judiciously use limited resources across a large infrastructure portfolio, including interstate and freeway pavement, interchanges, traffic signing, safety features and other operations and maintenance commitments.

Nationally, the average bridge age is 42 years, eight years shy of a typical 50-year design life expectancy. The average age of a bridge in Ohio is 43 years, with 48% of ODOT bridges and 40% of all bridges in Ohio greater than 50 years old. Some 16% of Ohio's bridges are older than 75 years.

A bridge's service life is often longer than its design life, with additional repair and rehabilitation investments required as the bridge ages. To achieve a system goal where the inventory consists of bridges below a 75-year design life by 2050, 52% of Ohio's bridges (22,468) will need major rehabilitation or replacement between 2025 and 2050. This equates to 899 bridges per year, a replacement rate 1.65 times higher than the average yearly replacement of 544 bridges per year for the last 20 years.

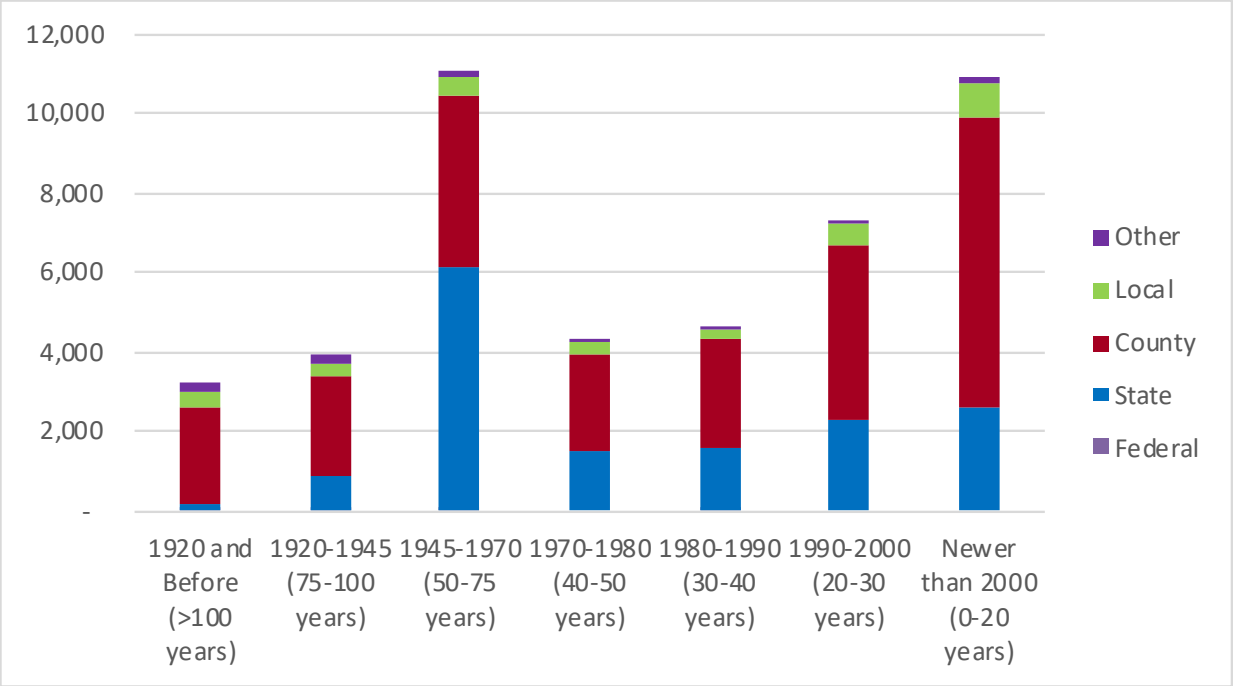
These numbers have improved over the last five years with investments from the IIJA. In the 2020 Ohio Report Card, the needed replacement rate was 1.82 times higher than the average 20-year replacement rate, which was 507 bridges per year. The increased funding has already made a difference in lowering Ohio's backlog. This progress emphasizes the importance of continued funding until a sustainable replacement rate can be achieved. Unfortunately, the present replacement rate is still woefully below the number needed to maintain the state's bridge infrastructure.

Table 2: Bridge Condition Summary based on Statewide, 2024 ODOT Bridge Inventory

Condition (Number of Bridges)								
Owned By	Total				Below 100% Legal Load	Total Deck Area (sf)	Closed to Traffic	Load Posted/ Temp. Closure
	Good	Fair	Poor	Total				
Federal	2	4	-	6	3	163,041	1	-
State	9,435	5,321	301	15,057	354	119,187,400	21	192
County	15,347	8,976	1,753	26,076	1,840	34,421,431	100	1,798
Local	1,793	1,136	260	3,189	424	9,285,075	57	255
Other	271	379	256	906	787	4,926,181	21	7
Total		15,816	2,570		3,408	167,983,128	200	2,252

Photo: Foraker Covered Bridge Monroe County

Figure 2: Ohio Bridge Age Distribution based on Statewide, 2024 ODOT Bridge Inventory



The state owns and maintains 33% of Ohio's bridges, representing 71% of the total bridge deck area, with the majority of inventory in fair to good condition. The bridges that are rated poor are mostly owned by counties (7%), municipalities and local agencies (8%) and other owners (i.e., railroads, parks districts and private entities) (28%). Most of the closed and posted bridges are owned by counties and local agencies.

ORC Sections 5577.042 & 5577.043 recently increased the allowable truck weight by 7.5% for Special Hauling Vehicle (SHV) legal loads. This change applies to all trucks, even those not traveling on interstate routes when carrying materials from its first site of production to its first place of delivery. In addition, vehicles fueled solely by compressed natural gas, liquid natural gas or powered primarily by means of an electric battery are allowed an additional 2,000 pounds for the gross vehicle weight. Elevated weight allowances increase the capacity needs of new and rehabilitated bridges, and higher loads than those were originally designed to reduce the overall life expectancy of existing structures. ODOT negotiated a 2024 FHWA Plan of Corrective Action to address the increased loading, including reviewing all bridge load ratings and performing updated load ratings on structures with a rating factor below 1.08 (8% above standard design and SHV loads). This will result in more bridges being posted for load restrictions given the new, higher requirements.

FUNDING AND FUTURE NEED

Ohio's transportation projects are funded by several revenue streams, including federal and state taxes on gasoline and diesel fuels, permissive license tag fees, income taxes, tolling and other sources. ODOT revenue and receipts for FY 2023 amounted to $3.74 billion, an increase from the FY 2019 amount of $3.23 billion.

According to ODOT's FY 2023 Financial and Statistical Report, motor fuel tax comprises approximately 83% of total state revenue received. The current Ohio tax rates for fuel are 38.5 cents per gallon for gasoline and 47 cents per gallon for diesel. The present federal tax rate is 18.4 cents per gallon for gasoline and 24.4 cents

per gallon for diesel. In 2019, Ohio increased its gas and diesel tax rates. The federal gas and diesel tax rates were last increased in 1993, which results in a reduced buying power of 40% according to an ASCE 2020 issue brief.

In 2021, the IIJA was signed into law. Also, in 2022, the Inflation Reduction Act (IRA) was passed to provide further infrastructure investment. The IIJA is providing over $1.6 billion toward the replacement of the Brent Spence Bridge, which links Cincinnati to Covington, Kentucky. Securing this funding could not have been accomplished without the efforts of elected officials in Ohio and Kentucky. However, more dollars will be needed to fully fund construction.

For local governments such as counties, municipalities, villages and townships, sustained annual revenue varies according to size. Each county, however, receives the same allocation of fuel tax receipts, $3.8 million per county in 2023, up from $2.9 million in 2019. In addition to fuel tax revenue, local agencies have available federal and state funding through the County Engineers Association of Ohio (CEAO) ($61.9 million per year), ODOT's Municipal Bridge Program ($18.5 million per year), ODOT's Local Major Bridge Program ($13 million per year) and permissive license tag fees. Local governments saw increases in these programs because of additional funding provided by the IIJA through ODOT. In addition, in 2022, Ohio expanded the definition of a "local major bridge," which quadrupled the number of bridges qualifying for this program.

Ohio is considered a donor state into the Highway Trust Fund (HTF), meaning it receives less in gas tax receipts than it collects from the HTF. In FY 2023, Ohio received $2.1 billion in funding from the HTF, approximating 3.34% of the total amount available. If Ohio had not been a donor state, it would have received a 3.66% share of the available funding, or approximately $2.3 billion. The $200 million difference was provided to other states or used by FHWA for other purposes. If the IIJA expires in FY 2026 and is not renewed, many programs for locals that received an increase in funding would see a reduction in available funding while construction costs continue to increase.

CEAO projects a decrease in local bridge funds from $74 million in 2026 to $34 million in 2027. The same decrease could be expected for the Municipal Bridge Program as well. In October 2023, ODOT released its Revenue Alternatives Study, which looked at potential revenue sources beyond traditional sources. It projected that, as vehicles become more fuel efficient or utilize different engine types, fuel tax revenue would decrease by $877 million annually. This could be offset by the collection of additional fees, such as hybrid or electric vehicle registration fees.

If the IIJA expires in FY 2026 and is not renewed, many programs for locals that received an increase in funding would see a reduction in available funding while construction costs continue to increase.

OPERATION & MAINTENANCE

Ohio's 10-foot-long bridge definition and greater inspection frequency places a higher level of responsibility on bridge owners in the state – Ohio is the only state with this requirement. Additional staffing and other resources are required to inspect, report and load rate all bridge structures.

State agencies (i.e., ODOT, OTIC and ODNR), counties, municipalities, transit agencies and park agencies share bridge maintenance responsibilities. Each agency has resources consisting of personnel, equipment and facilities to operate and maintain bridges, including safety item repairs, wearing/driving surface patching,

minor rehabilitations, concrete patching and sealing, expansion joint maintenance and drainage system repairs. Extensive bridge repair and rehabilitation work is usually programmed, designed and performed by bridge contractors and managed by the agencies. Challenges faced by bridge owners include:

- Annual bridge inspections, which are costly due to the large inventory of bridges in the state
- The aging bridge system requires additional costs to operate and maintain. 40% of Ohio's bridges are over the age of 50
- Preventative maintenance work is desired but difficult to execute due to limited staff and funding resources
- Lower-priority asset work is deferred until resources are available

ODOT is placing an increased emphasis on bridge system preservation and preventative maintenance programs. Overall, a long-term, life-cycle cost approach to preserving bridge assets will yield cost savings and ultimately improve overall structure conditions.

PUBLIC SAFETY

Bridges in Ohio are load rated, with bridge inspection condition data used to determine the safe load carrying capacity of each structure. Bridges that cannot carry the state legal vehicle loads are posted to a safe load capacity based on condition or original bridge design loading. Currently, 3,408 or 7.5% of state bridges in service cannot carry full Ohio legal loads, 2,252 or 5 % of bridges are posted for low load capacity and 200 or .5% are closed.

Photo: Quaker City

RESILIENCE

Infrastructure resilience refers to the ability of the system to recover from a catastrophic event. Ohio is fortunate to have a generally redundant transportation system, with highly urbanized areas served by an extensive network that consists of interstate, freeway and urban arterial roadways. In the event of a complete bridge closure, a suitable alternate transportation route would be available in nearly all cases to detour traffic, although traffic congestion and travel delay could be significant. Agencies have focused on eliminating or reducing the number of fracture-critical bridges (a structure where there is no redundancy and failure of one member can collapse the structure). This reduction in non-redundant structures increases the overall resiliency of the system.

Both state and local bridge networks have been facing demands from the freight industry recently with higher capacities, increased special hauling permits and heavier loads of electric-powered vehicles. The ODOT Resilience Improvement Plan, published in 2024, identified and prioritized projects and bridge rehabilitations using risk-based metrics to generate a list of the top 20 highest-risk value bridges. The largest risks include flooding, rock falls and landslides, with an annual risk value due to flooding and geohazards totaling more than $113 million per year.

One concern is the increasing number and size of storm and flood events as well as cycles of extreme precipitation and drought. Regional impacts noted in the Fifth National Climate Assessment indicate annual runoffs are projected to increase between 5-15% and seasonal spring runoffs will increase 20% or more from 2036-2050 compared with 1991-2020 levels. Similarly, the U.S. Army Corps of Engineers' (USACE) 2017 report on the Ohio River Basin indicates "sub-basins located northeast, east and south of the Ohio River are expected to experience greater precipitation and thus higher stream flows – up to 50% greater." As flows grow larger, they could damage bridges during floods, increase scour risks and cause premature deterioration in bridges where increased water exposure leads to corrosion.

The navigable waterways in Ohio mainly include the Ohio River and Lake Erie. Sea level rise has a minimal impact on these systems and the Ohio River is managed by USACE through a series of dams.

The seismic retrofit of bridges in Ohio is ongoing, mainly focused on column confinement and ductility and the seat width under bearings to make bridges more resilient to earthquakes. Most of Ohio is in Seismic Zone 1, which indicates low risk (where 1 is the lowest and 4 is the highest).

INNOVATION

ODOT has been a leader in the development of improved materials and research. It provides counties and municipalities funding through Ohio's Research Initiative for Locals (ORIL) program. This program takes ideas from owners, engineers and stakeholders to fund applied research. The program has funded 32 projects since 2014, including six projects specifically related to bridges. Other efforts through ODOT's Statewide Planning and Research office and cooperation with FHWA's Every Day Counts (EDC) program have resulted in test projects for innovative materials and specifications.

Integral and semi-integral designs are widely used and adopted in Ohio to eliminate joints. Link-slab retrofits which eliminate existing joints are beginning to be used by some bridge owners. These joint replacements prevent water infiltration and reduce corrosion on structures.

The use of alternative materials has been adopted in Ohio, including the widespread use of fiber-reinforced polymers (FRP) reinforcement in ODOT standard drawings. Other alternative materials are also being explored in Ohio, such as stainless steel or galvanized reinforcing bars, FRP bars or other materials, steel or FRP macro-fibers in concrete and additives to improve concrete mix performance and durability. This results in longer-lasting structures with less maintenance and future operating costs.

RECOMMENDATIONS TO RAISE THE GRADE

- More counties should take advantage of the opportunity to increase vehicle registration revenues by imposing an additional $5 permissive fee until the state maximum amount is achieved.
- The state legislature should index the state gas tax rate to inflation, which would extend the legislation beyond short-term fixes. Similarly, the federal government should raise the motor fuels tax and index it to inflation.
- Current funding levels are making an impact but need to be sustained long-term to improve the overall state and local bridge network.
- The use of public-private partnerships should be encouraged to replace bridges when appropriate.
- Bridges in poor condition should continue to be upgraded and rehabilitated.
- Preservation and rehabilitation projects on bridges in "fair" condition should be increased.
- Legislators should provide more financial tools that offer certainty in funding. The lack of indexing, capped fees and an unknown employment environment contribute to uncertainty in future funding capacity and a reduction in the available construction workforce and buying power.

SOURCES

State of Ohio, "Ohio Revised Code section 5501.47 (B.1.c) – Bridge Inspections", 2025.

American Society of Civil Engineers, "Policy Statement 208 – Bridge Safety", 2025.

American Society of Civil Engineers, "Policy Statement 500 – Resilient Infrastructure", 2025.

State of Ohio, "Ohio 2018–2019 Transportation Budget Bill (HB 26)", 2017.

Federal Highway Administration, "2025."

U.S. Global Change Research Program, "The Fifth National Climate Assessment", 2023.

Ohio Department of Transportation, "Bridge Inventory and Appraisal Reports – Structure Management System", 2025.

Ohio Department of Transportation, "Fiscal Year 2023 Annual Report", 2023.

Ohio Department of Transportation, "Fiscal Year 2023 Division of Finance Financial and Statistical Report", 2023.

County Engineers Association of Ohio, "Welcome to CEAO", 2025.

Ohio Department of Transportation, "Revenue Alternatives Study", 2023.

American Society of Civil Engineers, "Bridging the Gap Report", 2025.

Ohio Department of Transportation, "ODOT Resilience Improvement Plan", 2024.

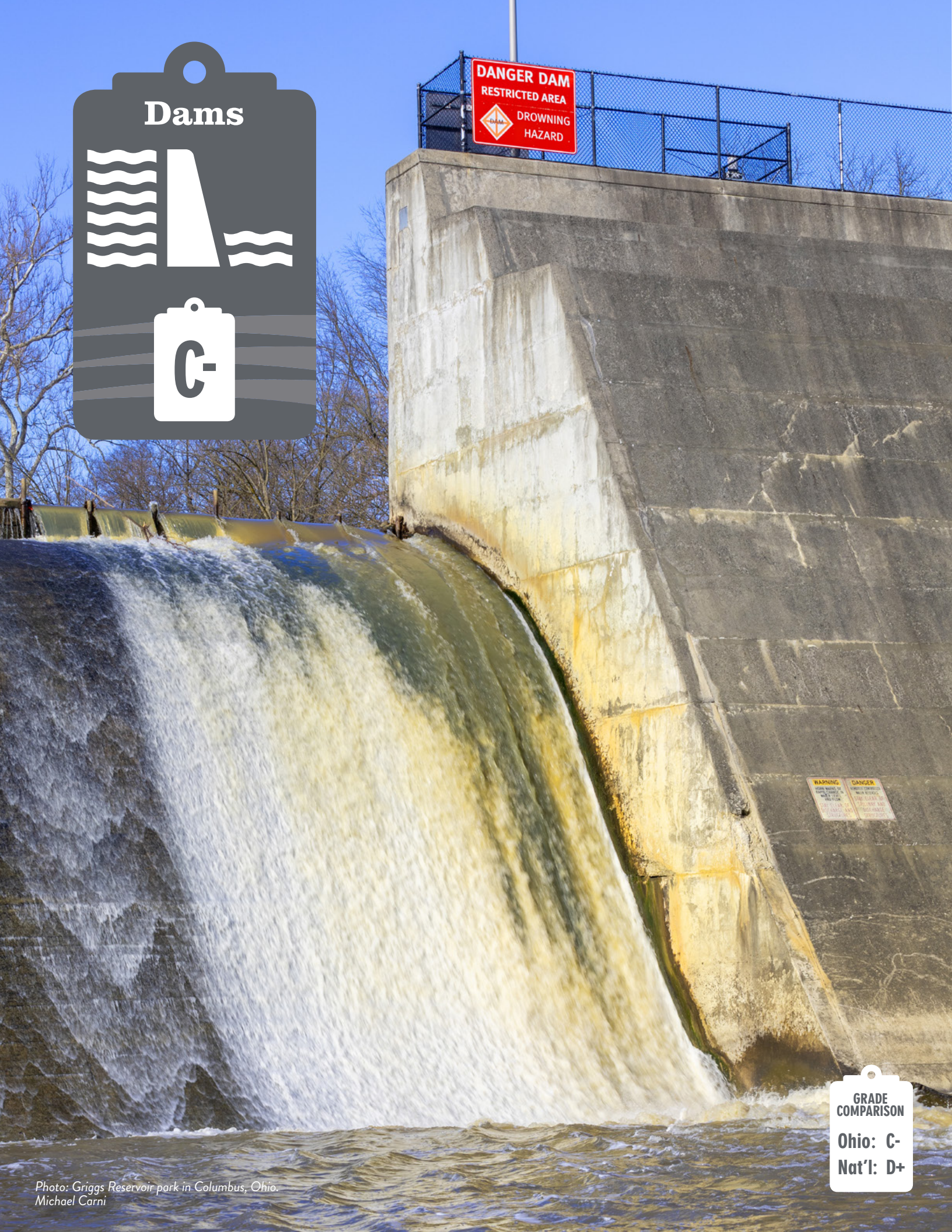


Photo: Griggs Reservoir park in Columbus, Ohio.
Michael Carni

DAMS

EXECUTIVE SUMMARY

There are approximately 1,442 state-regulated dams in Ohio, including 417 high-hazard dams that can cause human life loss or significant property damage if they fail. The Ohio Department of Natural Resources (ODNR), Division of Water, Dam Safety Program is primarily responsible for regulating dams in Ohio.

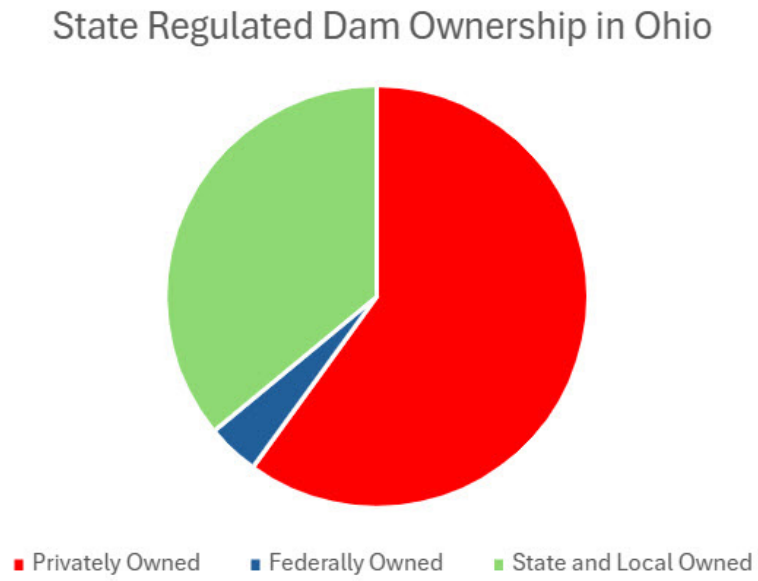
Recent increases in federal grant opportunities with a focus on high-hazard dams have allowed the Ohio Dam Safety Program to assist dam owners with funding for engineering studies and construction to rehabilitate, modify or remove high-hazard dams with deficiencies. A prerequisite for eligibility for federal grant funding is an approved Emergency Action Plan (EAP). High-hazard dam owners have recently been creating or updating their existing EAPs to become eligible, therefore reducing risk and improving safety. However, there are still many high-hazard dams in need of EAPs. In fact, 24% of high-hazard dams do not have an EAP, according to the National Inventory of Dams (NID). The average high-hazard dam is 69 years old, so many must be upgraded to comply with current structural requirements. Also, an Association of State Dam Safety Officials (ASDSO) 2023 report estimated the cost to rehabilitate all regulated dams in Ohio at $3.47 billion with approximately $1.06 billion required for the high-hazard dams.

At least two additional engineering staff are necessary for the Ohio Dam Safety Program to perform its work. Continued funding from the Federal Emergency Management Agency (FEMA) National Dam Safety Program (NDSP) Assistance Grant will allow the Dam Safety Program to hire additional employees and continue providing the resources necessary to perform its duties.

Therefore, continued and additional funding is required to maintain and upgrade the Dam Safety Program and ensure the necessary upgrades and adequacy of dams in Ohio.

BACKGROUND

There are 1,442 state-regulated dams located throughout all of Ohio's 88 counties. They provide social and economic benefits including flood control, drinking water, irrigation, fish and wildlife habitat, hydroelectric power, recreation and navigation. Private entities own approximately 55% of Ohio's dams, the federal government owns 4% and the remainder is publicly-owned by entities like state and local governments, conservancy districts and utilities.



Regulated dams are categorized into four classes (I, II, III and IV) based on the height of the dam, storage capacity measured at the crest of the dam and potential downstream hazard as shown in the table below:

Category	No.	Potential failure impact	Comment
Class I – High-Hazard Potential	417	Failure impacts include probable loss of human life or structural collapse of at least one residence or commercial/industrial business	380 regulated by ODNR 37 regulated by federal agencies
Class II – Significant-Hazard Potential	574	Failure impacts include health hazards, release of hazardous waste, disruption of public water supply, flooding of high-value property, damage or disruption of highways, railroads, and public utilities, or damage to Class I, II or III dams	569 regulated by ODNR 5 regulated by federal agencies
Class III - Low Hazard Potential	451	Failure impacts include property damage to rural buildings, local roads, or Class IV dams	444 regulated by ODNR 7 regulated by federal agencies
Class IV dams	1,046	Failure impact would only result in property damage to rural lands and the dam itself	

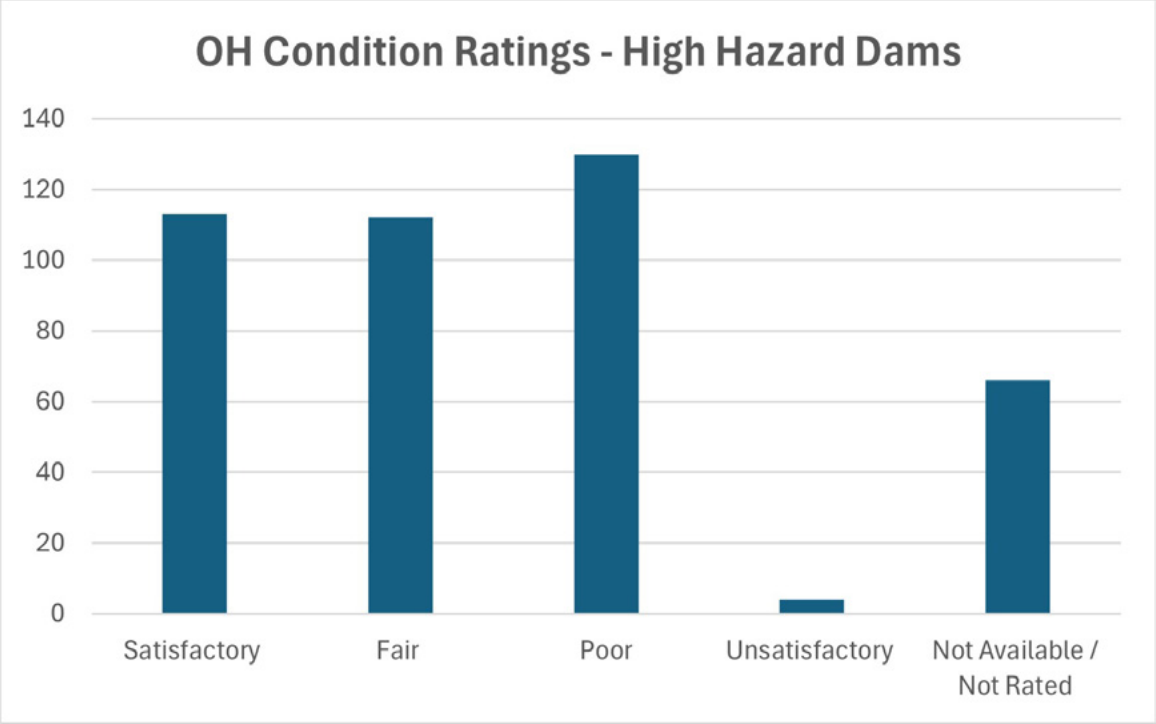
CONDITION AND CAPACITY

Dams must be periodically inspected according to the Ohio Revised Code and properly maintained to comply with operational and safety requirements contained in the Ohio Administrative Code and the state of the practice in dam safety engineering. Periodic inspections result in a written report provided to dam owners by the Ohio Dam Safety Program. The report includes a summary of the dam condition and a list of concerns and deficiencies organized by monitoring items and tasks that the owner can perform as well as a list of deficiencies that require the services of a registered professional engineer to resolve. Items that require an engineer can include detailed assessments to evaluate spillway capacity, hydrological changes (i.e., storm frequency, intensity), developing conditions (i.e. stability, seepage issues) and downstream development.

Regulated dams in Ohio are also listed in the NID database, organized by the U.S. Army Corps of Engineers. Dams included in the NID database include a condition rating from the following categories:

- Satisfactory: No existing or potentially unsafe conditions are recognized and acceptable performance is expected under all loading conditions
- Fair: No existing dam safety deficiencies are recognized for normal loading conditions, but rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency
- Poor: A dam safety deficiency is recognized for normal operating conditions which may realistically occur, and remedial action is necessary. Additional investigations and studies are necessary.
- Unsatisfactory: A dam safety deficiency is recognized that requires immediate or emergency remedial action.

NID condition ratings for high-hazard dams in Ohio are summarized in the chart below:



Approximately 135 dams were rated in poor or unsatisfactory condition. These ratings are largely the result of age; the average age of the high-hazard dams is 69 years, and the average regulated dam in Ohio is 63 years. Approximately two-thirds of Ohio's dams are older than the typical design life of 50 years. Additionally, at least 95 of Ohio's dams are over 100 years old. As dams age, earth embankments and foundations may experience increased seepage and erosion, while concrete becomes more vulnerable to cracking, spalling and chemical reactions that weaken its structural integrity. Steel can corrode and mechanical equipment – such as gates and valves – may deteriorate and fail to function properly. Therefore, dams generally deteriorate over time. In addition, existing dams frequently need to be modified to comply with updated hydrological and safety requirements.

Indian Lake Labyrinth Spillway,
Courtesy of the Ohio Department of Natural Resources

OPERATION & MAINTENANCE

Proper operation, maintenance and inspections are important to ensure dams are safe, meet their intended purposes and reduce the risk of failure. Federally-owned dams are regulated and inspected by federal agencies at a level that is considered sufficient to meet national dam safety guidelines. Federally-owned dams are exempt from Ohio dam safety laws.

Ohio dam owners are responsible for maintaining the safe condition of their dam and ensuring it is maintained and operated so that it does not constitute a hazard to life, health or property. The Ohio Dam Safety Program has the responsibility to verify that those obligations are met and has the authority to require the owner of a dam to perform repairs, maintenance or other measures necessary to safeguard, life, health or property.

Ohio law requires all regulated dams to have an approved EAP. An EAP can provide early identification of a hazardous situation and includes a detailed plan of action for dam owners and emergency management officials who are responsible for warning and evacuating downstream residents. As of 2024, approximately 76% of high-hazard dams had approved EAPs.

ODNR has also recently funded and implemented work to address deficiencies and upgrade state owned dams. Construction was completed in 2022 to remediate hydraulic and structural deficiencies at seven state-owned high-hazard dams.

FUNDING AND FUTURE NEED

Dam failures threaten public safety and could cost the Ohio economy billions of dollars in damages. Impacts from dam failures are not limited to the dam itself. They can include loss of life and damage to private property, roads, bridges, water systems, and other critical infrastructure.

Sufficient funding is necessary to implement and administer the Ohio Dam Safety Program and to address deficiencies in high-hazard dams. As shown on the table below, federal funding through FEMA has recently increased to Ohio through the NDSP State Assistance Grant Program and the High Hazard Potential Dams (HHPD) Grant Awards.

FEMA Dam Safety Funding for Ohio

Fiscal Year	National Dam Safety Program (NDSP) State Assistance Grant Program	High-hazard Potential Dams (HHPD) Grant Awards
2024	$692,137	$10,925,323
2023	$128,218	N/A
2022	$219,493	$3,133,869
2021	$118,034	$1,114,751
2020	$126,080	$558,002
2019	$139,470	$1,250,000

The primary purpose of the NDSP is to provide financial assistance to the states for strengthening their dam safety programs. The Ohio Dam Safety Program is using these funds to hire additional staff, train state personnel, purchase upgraded equipment including drones, create dam safety awareness outreach materials and other related tasks. The HHPD Grant Awards provide technical, planning, design and construction assistance in the form of grants for rehabilitation of eligible high-hazard potential dams. The Dam Safety Program is passing the grant award on to supplement up to 65% of the dam owner's costs to rehabilitate or remove high-hazard dams. This increased funding is allowing ODNR to implement a better dam safety program and to continue to rehab known deficiencies in high-hazard dams. These funding levels need to continue to maintain performance and address the deficiency repair backlogs.

The estimated cost to rehabilitate Ohio dams is significant. As previously stated, the estimated cost to rehabilitate non-federal regulated dams in Ohio is $3.47 billion; rehabilitation of the high-hazard dams alone is estimated at $1.06 billion. This study was based on data from more than 500 dam rehabilitation projects nationwide, with total construction costs ranging from $10,000 to more than $500 million. New funding initiatives are needed for dam safety assessments and expensive rehabilitation, including assistance to private dam owners who are not eligible for the HHPD grant or other federal grant programs.

Lake Loramie Labyrinth Spillway
Courtesy of the Ohio Department of Natural Resources

PUBLIC SAFETY AND RESILIENCE

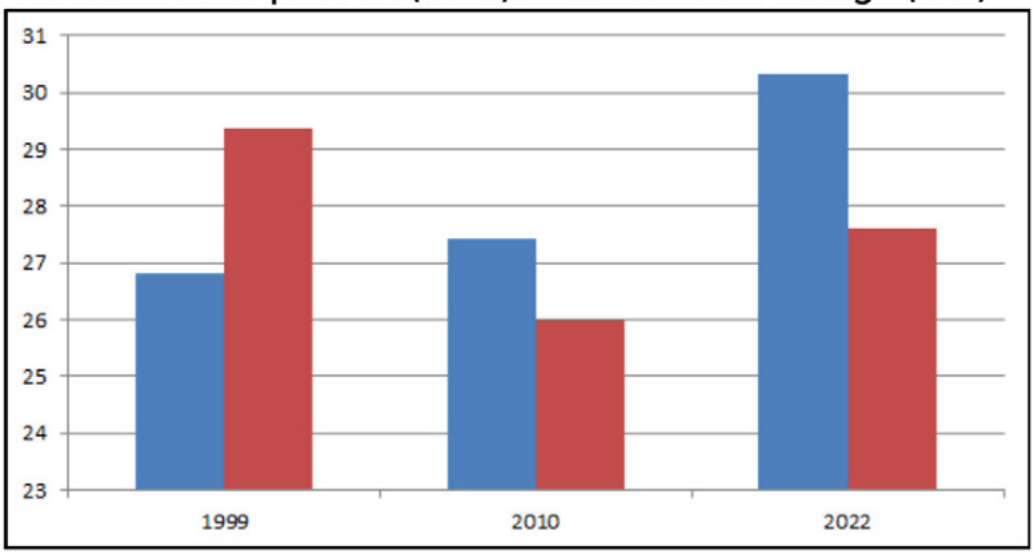
Worldwide, more than 200 dam failures have occurred in the past century resulting in over 8,000 deaths and costing billions of dollars.

Public safety includes protecting lives and minimizing property and infrastructure damage; resiliency includes the operation and maintenance of a dam structure so that the dam performs safely under all loading conditions. Considering the age and condition of dams throughout Ohio, achieving these objectives requires understanding risk and implementing risk reduction measures until a full rehabilitation can be completed. This includes documenting completed actions into EAPs and operation, maintenance and inspection manuals (OMIs). It also includes promoting public awareness of the hazards and risks associated with living downstream of dams.

The Probable Maximum Precipitation (PMP) Study for the State of Ohio (April 2013, Applied Weather Associates, LLC) provides updated hydrological data to determine design floods for dams in Ohio. The data provides a basis to assess and potentially upgrade the hydraulic capacity of Ohio dams. Dam owners can hire an engineer to evaluate alternatives to rehabilitate dams that are found to be deficient using the PMP study. Appropriate risk reduction measures or full rehabilitation and updated EAPs must be implemented as soon as practicable following the identification of hydrologic deficiencies. An up-to-date EAP is a critical tool for minimizing loss of life and property damage in the event of a dam failure.

The Ohio Dam Safety Program performs critical tasks, including periodic dam inspections, reviewing EAPs and OMIs for dams, issuing dam permits, reviewing drawings and specifications for dam rehabilitation projects and providing dam education and training. Currently, the Ohio Dam Safety Program has 12 full-time equivalent (FTE) engineering staff. It has more high-hazard potential dams per FTE than the national average, as shown in the table below. At least two additional state dam safety engineering staff are necessary to staff the program properly.

State Staffing for Dam Safety: State Regulated High-Hazard Potential Dams per FTE (blue) and National Average (red)

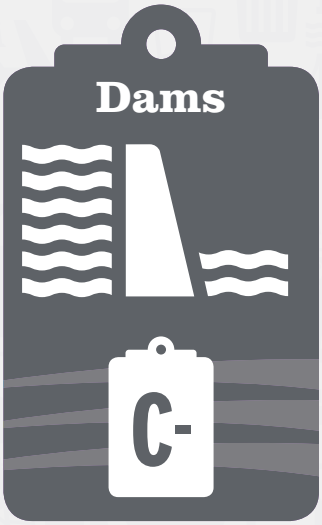


INNOVATION

While dam safety innovation is sometimes difficult, expensive and relatively slow to be implemented, Ohio dams are being upgraded using innovative techniques that improve performance. These techniques include:

1. Installing labyrinth weirs to significantly increase hydraulic capacity with a smaller footprint and the ability to maintain 100-year flood levels downstream
2. Armoring embankments with roller compacted concrete (RCC) to increase erosion resilience
3. Installing technology to improve remote monitoring

Roller Compacted Concrete Armor at Lake White, Waverly, Ohio, *Courtesy of the Ohio Department of Natural Resources*



RECOMMENDATIONS TO RAISE THE GRADE

- Continue FEMA NDSP Assistance Grant funding and increase Ohio Dam Safety Program staff. At least two additional engineering staff are necessary for the Ohio Dam Safety Program to match the FTE national average for high-hazard dams.
- Continue FEMA HHPD grant funding to continue rehabilitating high-hazard dams with noted deficiencies.
- Continue to fund and support the statewide awareness campaign to educate individuals on the location and condition of dams in their area to become more "dam aware".
- Increase outreach to dam owners, local officials and the public, including convening stakeholder dam safety workshops.
- Continue to increase the number of high-hazard potential dams with EAPs and perform exercises to identify opportunities for improvement.
- Emphasize the critical importance of public safety in dam maintenance and operation with social media and other high-visibility outlets.

SOURCES

Applied Weather Associates, "LLC", Probable Maximum Precipitation Study for the State of Ohio, 2013.

Association of State Dam Safety Officials (ASDSO), "Ohio Dam Safety Performance Report", 2023.

ASDSO, "The Cost of Rehabilitating Dams in the U.S.", A Methodology and Estimate, 2023.

FEMA, "National Dam Safety Program", 2024.

FEMA, "Rehabilitation of High-hazard Potential Dams (HHPD) Grant Program", 2021.

Ohio Department of Natural Resources, "Ohio Dam Safety", 2024.

US Army Corp of Engineers (USACE), "National Inventory of Dams", 2024.

Department of Civil & Environmental Engineering, "Stanford University", National Performance of Dams Program, 2018.

Photo: Arugula Pica

DRINKING WATER

EXECUTIVE SUMMARY

Ohio's drinking water infrastructure is a significant asset, providing the necessary facilities for sourcing, treating and distributing water to meet both current and anticipated residential and commercial demands. Its grade remained at a D+ in 2025, the same as the D+ it received in 2021. House Bill 364 requires public water systems to demonstrate the technical, managerial and financial capability of the system to comply with this chapter and rules adopted under it by implementing an asset management program. Over the past decade, many large water utilities have made strides in improving treatment systems to comply with water quality regulations and enhance infrastructure resilience. However, Ohio's drinking water sector is grappling with critical challenges. A notable concern is the disproportionate focus on treatment improvements at the expense of essential distribution system assets – particularly buried water mains – which are often over a century old and in dire need of renewal, rehabilitation and replacement. This neglect contributes to costly repairs and operational disruptions due to main breaks. Funds are not available even to replace failing fire hydrants in some areas. This poses danger to human life. Additionally, Ohio water utilities face operational hurdles that will necessitate further investment in the coming years. These include managing new water quality issues – such as emerging contaminants and lead corrosion – while ensuring effective workforce succession in operations and maintenance. While state funding is available for communities that meet certain standards, much comes from loans that translate into user debt service. Small systems face additional funding challenges but can access specific grants and loans. Over the past two decades, user fees for drinking water in Ohio have risen at double the rate of the Consumer Price Index. Also, Ohio needs a significant funding increase to both replace old infrastructure and meet current standards to improve public safety, reduce flood risks and become more resilient to extreme weather.

Recent assessments reveal that Ohio's water distribution systems have seen minimal progress since 2021. Despite investments from state and federal sources aimed at rectifying infrastructure shortcomings, the deterioration of these systems continues to outpace improvements. The persistent gaps in upgrading and maintaining water infrastructure are reflected in a stagnated overall score, and overall score remained the same compared to the last evaluation. This situation highlights the ongoing difficulties in implementing necessary upgrades to guarantee residents a reliable and safe water supply. Effective management of water systems in Ohio requires collaboration among local governments, utilities and authorities, emphasizing asset management, proactive maintenance and workforce challenges. Investments in training, technology and infrastructure enhancements are vital to overcoming these obstacles and ensuring sustainable, reliable water services for communities statewide.

CAPACITY

According to the latest data, Ohio is home to approximately 4,800 active public drinking water systems, which fall into the following main categories:

- Community Water Systems (CWS): Approximately 1,200 systems
- Non-Transient Non-Community Water Systems (NTNCWS): About 700 systems
- Transient Non-Community Water Systems (TNCWS): Approximately 2,900 systems
- Other rural and smaller systems

According to the Ohio Environmental Protection Agency (Ohio EPA), some of those rural and smaller systems are struggling to meet demand during peak periods or droughts. Additionally, a Ohio water systems need an estimated $16 billion in investment to maintain capacity and meet growing demand. With a population of around 11.7 million, most Ohioans depend on municipal drinking water systems for their supply, consisting of about 33,000 miles of mains. It's estimated that about 90% of the population, or roughly 10.5 million people, rely on public water systems for their drinking water.

Water consumption in Ohio ranges from 936 million to 1.17 billion gallons per day. In cities like Columbus, water demand is projected to increase by 10% to 15% by 2040, requiring expanded treatment capacity and infrastructure upgrades. The state's otherwise minimum to moderate population growth will influence water infrastructure and consumption patterns, highlighting the need for strategic investments and modern management practices to ensure a reliable and safe water supply and to retain and attract business. Proactive planning, sustainable practices and technological advancements will be essential in effectively addressing these challenges. By 2050, Ohio is expected to experience a 30% increase in extreme rainfall events, which could further strain water treatment systems and reduce clean water availability during flooding.

Extreme weather events are projected to become more frequent and severe in the Midwest, including Ohio. Consequently, areas with aging water infrastructure will face an increased risk of flooding compared to current conditions, as outdated systems may struggle to handle the intensified impacts of these events.

CONDITION

Many segments of Ohio's drinking water infrastructure have exceeded their intended lifespan. Much of the infrastructure – including pipes and treatment facilities – was constructed decades ago and now requires replacement or substantial upgrades. Typically, the design life for components like water pipes is around 50 to 100 years, and numerous systems in Ohio are nearing or have surpassed this limit. Specific statewide data on older water mains in Ohio, which are beyond their intended design life, isn't readily available from a single source. According to the Ohio EPA and the Ohio Department of Health's utilities database, aging water infrastructure is a significant concern throughout the state. Many urban areas contain pipes that were installed from the late 19th to mid-20th centuries, with cities like Cleveland and Cincinnati having pipeline assets that are over 100 years old. In newer developments and suburban regions, pipes are typically 30 to 50 years old. Nationally, the recommended replacement rate for water infrastructure is 1% to 2% per year to maintain sustainability; Ohio needs about $16 billion in drinking water infrastructure improvements over the next two decades. Specific data on water main break rates for Ohio's public drinking water systems is limited. However, available information from utility websites within the state provides some insight. For instance, Montgomery County reports approximately 300 water main breaks annually across its 1,400-mile system, averaging about 21.4 breaks per 100 miles each year. Similarly, the city of Dayton experiences around 120 breaks annually in its 792-mile system, equating to approximately 15.2 breaks per 100 miles each year. In Cleveland, during winter months, the water system averages five to seven main breaks daily, which can increase during extreme cold spells. This uptick is attributed to factors like aging infrastructure and temperature fluctuations, causing ground shifts. Ohio's statewide water main break rates are scarce – regional reports indicate that break rates can vary, often influenced by factors like infrastructure age, maintenance practices and environmental conditions.

A critical challenge is the replacement of lead service lines in several water distribution networks. Although Ohio is actively tackling the problem, the lack of cost-effective technologies to determine the locations of these service lines is a major issue. In Ohio, tracking lead and copper service line issues is a multifaceted process involving various methods. Water utilities conduct inventory assessments to pinpoint the presence of lead and copper lines in their systems. Continuous water quality testing is essential to monitor and detect any fluctuations in lead and copper levels. Ensuring regulatory compliance, educating the public on risks and implementing targeted replacement programs are crucial steps taken to effectively mitigate lead and copper service line issues in the state.

Extreme weather events are projected to become more frequent and severe in the Midwest, including Ohio. Consequently, areas with aging water infrastructure will face an increased risk of flooding compared to current conditions, as outdated systems may struggle to handle the intensified impacts of these events.

OPERATION AND MAINTENANCE

Managing and operating water systems in Ohio requires collaboration among local governments, utilities and authorities, emphasizing the need for effective asset management, proactive maintenance and addressing workforce challenges. Investing in training, technology and infrastructure upgrades is crucial for tackling these issues and ensuring sustainable, reliable water services for communities throughout the state. Additionally, promoting transparency, monitoring water quality rigorously and engaging with stakeholders are vital components in managing operations and maintenance effectively to uphold water quality standards and public health in Ohio.

Ohio Administrative Code (OAC) Chapter 3745 provides specific rules for public water systems, including operation, maintenance and infrastructure requirements. Many utilities, especially smaller systems in rural areas, struggle to secure adequate funding for necessary upgrades, maintenance and compliance with regulatory standards. Large utilities – such as Greater Cincinnati Water Works and Cleveland Water – have strategic asset management plans that refer to operation and maintenance guidelines in place to meet expected levels of service. Programs like the Drinking Water State Revolving Fund (DWSRF) and funding from the Infrastructure Investment and Jobs Act (IIJA) have helped, but the demand for infrastructure improvements often exceeds available resources.

PUBLIC SAFETY

Ohio remains committed to meeting Safe Drinking Water Act (SDWA) standards and tackling challenges associated with drinking water quality through regulatory oversight, monitoring initiatives and infrastructure enhancements. Although incidents and violations may arise occasionally, there are continuous efforts to improve water quality management, address emerging contaminants and safeguard public health. Tracking trends, adhering to new regulatory requirements and investing in infrastructure upgrades are essential for maintaining and enhancing Ohio's drinking water standards and overall public health outcomes.

Several regions have raised concerns about per- and polyfluoroalkyl substances (PFAS), a group of synthetic chemicals used in numerous industries and consumer products. These substances have been linked to potential health risks and have received considerable attention in recent years. PFAS contamination poses a significant environmental and public health challenge in various parts of the state. State and local authorities – along with community stakeholders – are working to identify sources, evaluate risks and implement advanced treatment to reduce exposure and safeguard public health. Ongoing monitoring, regulatory updates and community involvement will be crucial in effectively tackling PFAS-related issues throughout Ohio.

In Ohio, major water systems are fortified through robust monitoring initiatives like continuous water quality testing, remote sensing and data analytics, coupled with infrastructure enhancements such as distribution system improvements and water treatment plant upgrades. One significant public safety incident in Ohio was the Toledo water crisis in 2014, arising from toxic algae blooms contaminating Lake Erie and prompting a tap water ban affecting hundreds of thousands of residents.

To safeguard water systems against terrorism, Ohio employs a multifaceted approach encompassing physical security measures like fencing and surveillance, cybersecurity protocols and well-defined emergency response plans. These collective efforts aim to protect Ohio's water infrastructure from potential threats, ensuring safe and reliable drinking water to residents across the state. Violations of SDWA regulations are categorized as health-based (e.g., contaminants exceeding limits) or monitoring/reporting violations. While individual system violations can be accessed through the EPA's ECHO database or Ohio EPA reports, aggregated statewide data on violations is not readily available. Smaller systems often face higher violation rates due to limited resources. Improving public safety includes increasing transparency, supporting small systems, accelerating lead service line replacement and enhancing public access to water quality data. According to the U.S. EPA's 2021 National Compliance Report, Ohio reported 98 health-based violations across its public water systems. These violations typically involve contaminants exceeding allowable limits, such as lead or microbial pathogens.

Photo: Water pipes for drinking water; Another77

FUNDING

In Ohio, drinking water infrastructure is mainly financed through user fees, where residents and businesses pay for their water consumption via established rates. These rates generally cover operations, maintenance and certain capital improvements. Additionally, Ohio benefits from state funding sources – including grants and loans – as well as federal programs such as the DWSRF and the Water Infrastructure Finance and Innovation Act (WIFIA). Since 2021, the Ohio BUILDS Water and Wastewater Infrastructure Grant Program has provided nearly $620 million to support hundreds of local water projects in all of Ohio's 88 counties. For instance, if the funding has been allocated over five years, the approximate yearly amount would be $124 million. Recently, the U.S. EPA announced more than $210 million from the prior presidential administration's Investing in America agenda for Ohio drinking water and clean water infrastructure upgrades. In Ohio, drinking water utilities can access various grants and loans to enhance their water systems, such as the Ohio EPA Water Pollution Control Loan Fund and the Great Lakes Restoration Initiative (GLRI) grants. The current funding available in Ohio fluctuates based on program budgets and state priorities. However, a substantial increase in funding is often recommended to adequately support the improvement of Ohio's drinking water systems annually. Estimates cited earlier indicate that annual funding in the range of hundreds of millions to billions of dollars are needed to address infrastructure needs, promote water quality enhancements and ensure the long-term sustainability of water systems throughout the state. This increased funding would empower Ohio's drinking water utilities to meet evolving challenges, upgrade aging infrastructure and deliver safe, reliable water services to residents and communities.

FUTURE NEED

The future needs can be divided into O&M needs and capital project needs. The estimated O&M costs for Ohio's water systems vary based on factors like system size, infrastructure age, regulatory compliance and the service area's demographics. Typically, O&M costs encompass routine operations, facility maintenance, labor and administrative expenses. On average, these costs can range from hundreds of thousands to millions of dollars yearly, depending on the system's size, age and regulatory compliance requirements. These costs typically include routine operations totaling between $100,000 and $500,000, facility maintenance ranging from $200,000 to $1,000,000, labor costs varying from $300,000 to $1,500,000 and administrative expenses ranging from $50,000 to $200,000. However, these are estimates and subject to variability based on the specific characteristics and needs of each water system in Ohio. Accurately estimating and budgeting for these expenses is essential for the sustainable operation and maintenance of Ohio's water infrastructure to ensure the continued delivery of safe and reliable drinking water to residents and businesses across the state.

Capital needs involve investments in infrastructure upgrades, expansions to support growth, the replacement of aging pipes and treatment facilities and compliance with regulatory standards. These costs can differ widely depending on the scale and nature of projects undertaken by various utilities and municipalities.

Ohio faces significant challenges in managing its water infrastructure due to population growth, shifting consumption patterns and aging systems. Tackling these issues demands strategic planning, investments in modernization and sustainable water management practices. Collaboration among utilities and authorities is essential to secure adequate funding, enhance operational efficiency and ensure reliable water services for current and future generations. Ongoing trend monitoring and proactive planning will be critical to effectively addressing Ohio's evolving water infrastructure needs. In addition, the replacement of lead service lines is expected to cost approximately $10,000 per service line, according to a recent AWWA statement.

Ohio's strategy for funding and managing drinking water infrastructure incorporates a combination of user fees, state funding and federal assistance programs. Balancing the need for infrastructure improvements with affordable rates, optimized system design and the maintenance and effective leveraging of federal resources are ongoing challenges that remain a priority in providing safe and reliable drinking water to residents throughout the state. Continued investment in modernizing infrastructure and adopting sustainable water management practices will be crucial for effectively meeting future demands and regulatory standards.

RESILIENCE AND INNOVATION

Ohio's strategy for drinking water infrastructure encompasses emergency preparedness, the exploration of alternative water sources, the adoption of efficient technologies, conservation initiatives and innovative financing methods. Ongoing enhancements in infrastructure management and regulatory compliance are vital for ensuring a sustainable water supply and resilience to challenges such as natural disasters and other extreme events. Collaborative efforts among utilities, municipalities and stakeholders are crucial for achieving long-term water security and environmental stewardship in the state. Ohio water municipalities are proactively enhancing resiliency against natural disasters and extreme events. Strategies include investing in green infrastructure like rain gardens and permeable pavements, upgrading aging infrastructure to withstand extreme weather, diversifying water sources with rainwater harvesting and recycled water and improving emergency response plans for swift action during crises. These initiatives showcase a commitment to designing for resiliency, ensuring the continued provision of safe and reliable water services despite evolving environmental challenges in Ohio. In addition, each large utility will submit a resiliency report to the U.S. EPA in 2025.

RECOMMENDATIONS TO RAISE THE GRADE

- Implement asset management plans – especially with respect to distribution systems – to track assets for planned replacement.
- Expand public information programs to enhance support for increasing user rates.
- Explore alternative funding sources for grants and low-interest loans, including adjusting user fee structure.
- Increase regionalizing/consolidation of water utilities to better control costs for smaller water systems and communities that can't afford enhanced treatment or distribution system asset rehabilitation on their own.

SOURCES

U.S. Environmental Protection Agency, "Overview of the Safe Drinking Water Act", 2025.

Ohio Environmental Protection Agency, "Drinking & Ground Waters", 2025.

U.S. Environmental Protection Agency, Lead and Copper Rule Overview Fact Sheet, 2020.

Agilent, "Per- and Polyfluoroalkyl Substance (PFAS) Standards", 2025.

State of Ohio, "Water Sector Cybersecurity Brief for States", 2025.

Ohio Environmental Council and Alliance for Great Lakes, "Water Affordability Case Studies", 2023.

U.S. Environmental Protection Agency, "EPA Announces $210 Million for Ohio Drinking Water", Wastewater and Stormwater Infrastructure Upgrades, 2023.

State of Ohio, "Water and Wastewater Quality Grant", 2025.

Ohio Department of Development, "Water and Wastewater Infrastructure Grant Program", 2025.

Cleveland.com, "Cleveland Water to Replace Lead Service Lines with $19M from Bipartisan Infrastructure Law", 2023.

Cleveland Water Alliance, "CWA Continues to Accelerate Solutions to the Lead Service Line Crisis", 2025.

American Water Works Association, "Benchmarking Performance Indicators for Water and Wastewater Utilities: Survey Data and Analyses", 2023.

Ohio Environmental Protection Agency, "Drinking Water Infrastructure Challenges in Ohio", 2022.

U.S. Environmental Protection Agency, "Drinking Water Infrastructure Needs Survey and Assessment – 7th Report to Congress", 2023.

Photo: peterschreiber.media

ENERGY

EXECUTIVE SUMMARY

Ohio's energy infrastructure is diverse, with a significant portion of its electricity generated from coal and natural gas. Ohio is home to several key oil refineries – including PBF Energy's Toledo Refinery, Marathon Petroleum's refining complex in Canton and Findlay and Sunoco Logistics' former BP-Husky refinery in Toledo – which collectively play a vital role in the state's energy landscape. These refineries process crude oil into essential products like gasoline, diesel, jet fuel and heating oil, which are crucial for transportation, industrial use and regional energy security.

In 2023, Ohio's energy landscape saw significant changes, with shale gas production driving a 13-fold increase in natural gas output since 2013, accounting for 97% of the state's gross natural gas withdrawals. Ohio also ranked as the seventh-largest ethanol producer in the U.S. in 2022, with seven ethanol plants having a combined production capacity of 765 million gallons per year. Despite declining coal use, Ohio remained the tenth-largest coal-consuming state in 2022, relying on coal from other states, while natural gas became the dominant fuel for in-state electricity generation. As the eighth-largest in electricity production and fourth-largest in electricity sales in 2023, Ohio's energy mix continued to shift toward cleaner sources. However, there has been a gradual shift towards renewable energy sources like wind and solar power. Ohio's energy landscape is influenced by its large population, industrial economy and seasonal temperature variations, making it one of the top ten states in total energy consumption. Despite this, the state's per capita energy consumption is only slightly above the national average.

By the end of 2022, the industrial sector accounted for about one-third of Ohio's total energy use, with manufacturing – particularly in chemicals, motor vehicles, fabricated metal products, food and beverages and machinery – remaining a significant contributor to the state's economy. Ohio's transportation sector is the second-largest energy consumer, representing approximately one-fourth of the state's energy consumption, supported by its extensive interstate highway system. Ohio's transportation sector is the state's second-largest energy consumer, driven by its strategic location as a major logistics hub in the Midwest, with key highways, railroads and airports connecting the

state to national and international markets. The state's large population and high vehicle ownership rate contribute to significant gasoline consumption, particularly in urban areas like Cleveland, Columbus and Cincinnati. Additionally, Ohio's role as a central hub for freight trucking – with its extensive interstate network – fuels high demand for diesel. At the same time, the state's airports and rail industry require substantial energy for air travel and freight transport. The growth of suburban areas and the state's reliance on personal vehicles due to limited public transportation options further increases energy consumption. With its thriving manufacturing sector and pivotal role in regional and national trade, Ohio's transportation infrastructure remains a key driver of energy use, making it a critical component of the state's overall energy consumption.

The residential sector uses nearly as much energy as transportation, accounting for about one-fourth of the total. In contrast, the commercial sector consumed less than one-fifth of Ohio's energy. Data centers are becoming a significant source of energy consumption in Ohio due to several factors like the rapid expansion of cloud computing, big data and digital service providers in the state. Dayton, Akron and the central region of the state have become notable hubs for data center facilities, but they have the potential to put serious strain on the electric grid and other natural resources. According to a recent study, data centers could possibly account for 6% of all power use in the United States by 2026.

CONDITION

As of 2024, Ohio's energy infrastructure is a mix of traditional and emerging elements, reflecting both challenges and advancements. Electric Ohio's electric grid is generally reliable, with improvements made over the years in terms of technology and grid management. However, like many states, it occasionally faces challenges related to outages, particularly during severe weather events. Ohio has 429 megawatts (MW) of battery storage case status as of mid-January 2025, but only 50 MW is operational. Like many parts of the U.S., Ohio's energy infrastructure includes aging components that require upgrades and maintenance. This includes everything from power plants to transmission and distribution lines. There is an ongoing need for investment to modernize the grid, enhance resilience and integrate new technologies. The state's energy policies and regulations have significantly impacted infrastructure development. Ohio has seen debates over renewable energy standards, energy efficiency programs and other regulatory issues that affect the energy landscape.

CAPACITY

Ohio's total electricity generation capacity is in the range of 30,000 to 35,000 MW. This capacity includes various sources and reflects both installed and operational facilities. Natural gas has become a dominant source of electricity generation in Ohio. Between 2019 and 2022, natural gas accounted for a significant portion of the state's capacity, approximately 50%. The relatively lower cost of natural gas and its reduced environmental impact compared to coal have driven this shift.

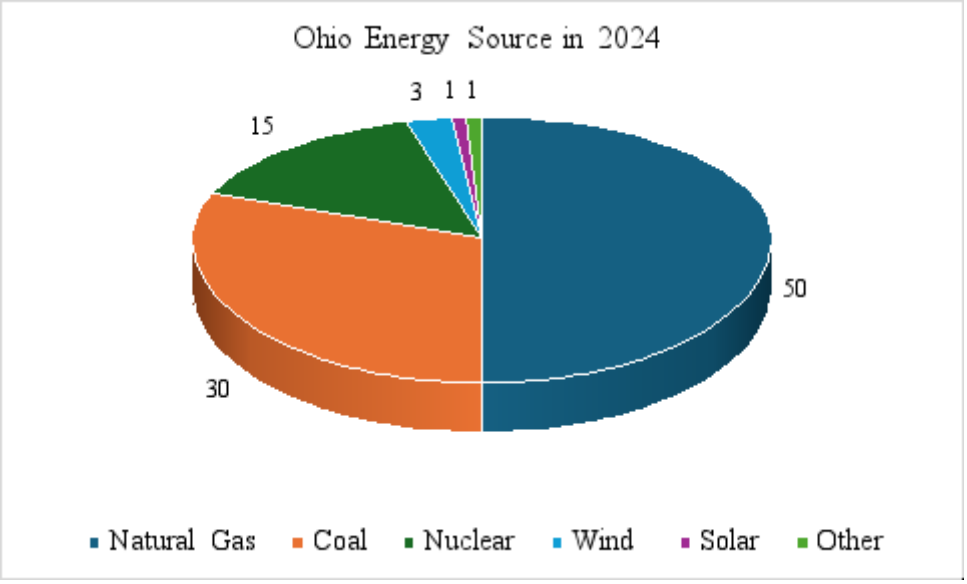
Historically, coal was a major source of electricity in Ohio, but its share has declined due to economic factors and environmental regulations. As of 2024, coal still contributes a notable but reduced percentage to the state's capacity, approximately 20% to 30%.

Nuclear power remains a key component of Ohio's energy mix, contributing a substantial portion of the state's capacity. Ohio has several operational nuclear power plants and nuclear power often accounts for about 15% to 20% of the state's capacity.

In October 2023, Centrus Energy started operating a cascade of centrifuges to enrich uranium on a parcel of land at the former Portsmouth Gaseous Diffusion Plant. Centrus Energy's new plant in Piketon produces high-assay, low-enriched uranium (HALEU). The fuel will contain between 5% and 20% fissile uranium (U-235), which is the range needed for various types of small modular reactors (SMRs). The current fleet of large nuclear reactors uses fuel with up to 5% U-235. Oklo plans to build two sodium-cooled fast reactors in Piketon near the Centrus's HALEU production plant. Each of the SMRs could supply up to 15 MW of electricity and more than 25 MW of clean heating, according to Oklo's spokesperson.

Wind energy capacity has been growing in Ohio, though it still represents a smaller portion of the overall capacity compared to fossil fuels and nuclear power. Wind supplies of 25% of total capacity. Solar power capacity is also increasing, though it currently makes up a smaller percentage of the total energy mix, typically from 1% to 3%.

Ohio has some hydropower capacity, but it is relatively modest compared to other sources. It generally contributes a small fraction of the state's total energy capacity.



As stated previously, there has been a noticeable shift towards natural gas and renewables over recent years. The state has been investing in new natural gas facilities and increasing its renewable energy capacity, partly driven by state policies and market conditions. Ohio's renewable energy policies have been shaped by a mix of supportive and restrictive measures. The Renewable Portfolio Standard (RPS) was set in 2008 and initially promoted renewable energy growth, but House Bill 6 in 2019 froze the RPS and reduced energy efficiency standards, limiting further development. Solar incentives and net metering have encouraged some growth, though challenges persist, particularly with the wind setback law limiting new wind projects. Despite state-level setbacks, federal incentives and private-sector investments have helped maintain some momentum for renewable energy. Ohio's future renewable energy expansion depends on evolving state policies and continued investments in clean energy technologies.

Ongoing developments and investments in renewable energy technologies – as well as potential retirements of older coal plants – may continue to reshape the state's energy capacity landscape. Efforts to modernize the grid and enhance energy efficiency are also expected to influence future capacity trends.

OPERATION AND MAINTENANCE, FUNDING, AND FUTURE NEED

Energy infrastructure in Ohio is funded through a combination of public and private sources. The funding mechanisms involve various approaches depending on the type of infrastructure and its purpose. Private utility companies invest in the development, maintenance and upgrade of energy infrastructure, including power plants, transmission lines and distribution networks. These investments are often funded through a combination of company capital, loans and revenue generated from customer bills. So far, total funding for energy infrastructure in Ohio from all the various public and private sources can be estimated at approximately $1 billion.

The state of Ohio offers grants, loans and incentives for energy infrastructure projects. Programs administered by state agencies – such as the Ohio Development Services Agency – may provide financial support for projects that align with state energy goals and policies. Various federal programs and grants provide funding for energy infrastructure projects. This includes funding from the U.S. Department of Energy (DOE) and other federal agencies that support research, development and deployment of advanced energy technologies.

DOE has made available more than $212 million in the past year to Ohio's state and local governments to invest in energy efficiency and grid resilience. This includes administrative funding to build a robust rebate program to help low-income households access more efficient appliances and over $7 million to help strengthen grid resilience. Additionally, DOE allocated nearly $13.3 million in Infrastructure Investment and Jobs Act (IIJA) State Energy Program funds to Ohio in April 2023 for energy-related programs, with $8 million earmarked for the Energy Efficiency Program for Ohio Communities (EEPOC) initiatives.

Electricity costs are a considerable concern for many Ohio residents, and the state's transition to renewable energy can play a critical role in mitigating them. As of August 2024, the average monthly electric bill in Ohio is around 15 cents per kilowatt hour (kWh), according to EnergySage. On average, Ohio residents spend about $185 per month on electricity and with a population of over 11.7 million people, the total monthly revenue generated is approximately $2.18 billion. AES Ohio's proposal to invest $682.7 million in improving its electric grid infrastructure – coupled with a $2.99 per month increase in the average customer's bill – is a significant step in modernizing the state's energy grid. This proposal focuses on infrastructure upgrades designed to enhance grid reliability and resilience. It also accommodates the increasing integration of renewable energy sources. AES Ohio's proposed upgrade focuses primarily on enhancing the distribution lines to improve grid reliability and resilience. It also accommodates the integration of renewable energy sources. The $2.99 per month increase is based on a customer using 1,000 kilowatt hours of electricity per month. The average customer uses 750 to 1,000 kilowatt hours. To take effect, the plan would have to be approved the Public Utilities Commission of Ohio (PUCO). If approved, the investment in grid upgrades is expected to reduce the frequency and duration of outages, increase the grid's ability to incorporate renewable energy sources and improve overall grid efficiency and reliability. While the monthly bill increase is relatively modest, it is an important step in ensuring Ohio's energy infrastructure can meet future challenges, especially in terms of resiliency against extreme weather and the integration of green energy sources.

PUCO oversees the regulation of utilities in Ohio and can influence funding through decisions on rate cases. Utilities can request approval to recover the costs of infrastructure investments through customer rates, which may include upgrades to transmission and distribution systems. The Electric Power Research Institute (EPRI) has suggested that modernizing the transmission system to incorporate higher renewable energy capacity could cost Ohio between $5 billion to $7 billion in the next decade, with additional funds required for improving the distribution network. The state's RPS mandates that by 2026, 8.5% of electricity sold by Ohio's electric distribution utilities and electric services companies should be generated from renewable energy sources. The RPS also includes a solar carve-out, which requires that 0.5% of the electricity be produced from solar energy. To encourage the adoption of renewable energy, Ohio offers a range of incentives. The state's RPS not only sets goals for renewable energy production but

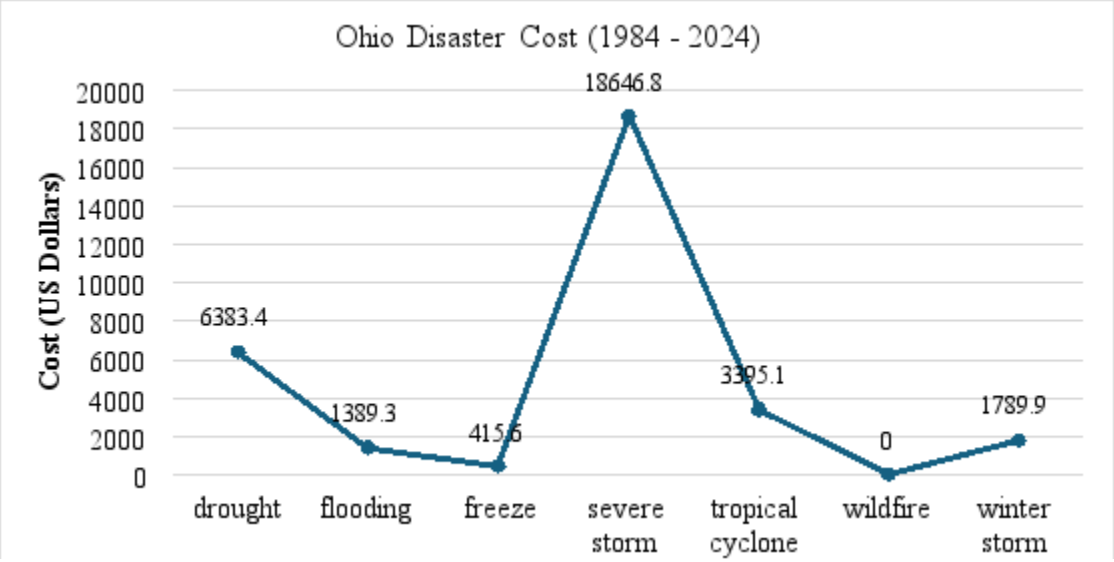
also provides Solar Renewable Energy Credits (SRECs) that incentivize solar installations. Under this system, for every megawatt hour (MWh) of solar energy produced, the system owner earns one SREC that can be sold or traded, providing an additional income stream for solar energy producers. Ohio also offers a statewide property tax exemption for renewable energy systems. This policy means that homeowners and businesses who install renewable energy systems aren't required to pay additional property taxes on the value added by these systems. Currently, Ohio has 1.6 GW of solar, wind and storage capacity. There is over 3.6 GW of additional planned clean energy capacity in the state, which will more than double the amount of clean energy available on Ohio's grid and could power more than 402,000 additional homes.

American Electric Power (AEP) has filed a proposal with PUCO that would create a new rate category for data center customers and cryptocurrency mining/mobile data center operations. The proposed rate structure would require new data centers with loads greater than 25 MW and crypto mining/mobile data center operations with loads greater than 1 MW to agree to meet certain requirements before infrastructure is constructed to serve them. According to AEP testimony to state regulators, data center load is expected to reach a total of 5,000 MW in central Ohio by 2030, based on signed agreements with the company. As of April 2024, the actual data center load was approximately 600 MW in central Ohio.

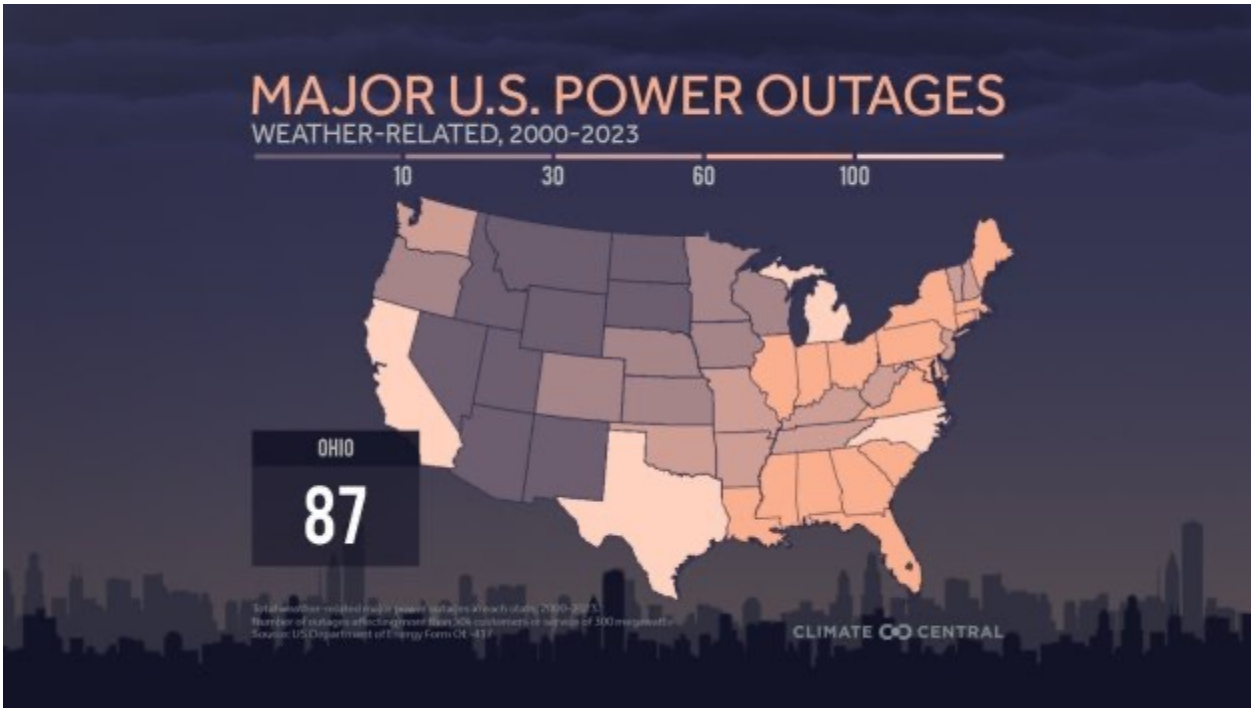
PUBLIC SAFETY, RESILIENCE, AND INNOVATION

Major weather events accounted for more than a third of the time Ohio customers of regulated electric utilities went without power last year. Utility reports filed at the end of March listed 16 calendar days in 2021 with major outage events linked to wind or thunderstorms. More than 900,000 Ohio utility customers lost power during major weather-related outages in 2021.

The major outages in Ohio during 2021 were caused by a combination of transmission and distribution system failures, triggered by severe windstorms and thunderstorms. High winds and falling debris damaged both transmission lines, which carry power over long distances and distribution lines, which deliver electricity to homes and businesses.



The number of weather-related outages varies among U.S. regions – reflecting the weather each region experiences, as well as relative population density and grid vulnerability. The Southeast (360), South (352), Northeast (350) and Ohio Valley (301) experienced the most weather-related outages from 2000 to 2023. The states with the most reported weather-related power outages from 2000 to 2023 were: Texas (210), Michigan (157), California (145), North Carolina (111) and Ohio (88).



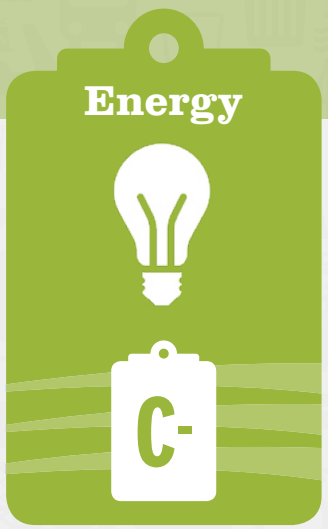
Ohio needs several billion dollars to modernize its grid, improve resiliency and transition to renewable energy sources. Depending on the scope of the projects and the timeline, the state could require anywhere from $5 billion to $10 billion over the next decade to address current and future needs as infrastructure continues to age and energy demands evolve. Federal and state funding programs as well as private investments will play a key role in addressing these needs. In 2023, Ohio Gov. Mike DeWine announced that the state of Ohio will receive a $14.2 million Grid Resilience Formula Grant from the U.S. DOE to modernize the electric grid and reduce the impacts of extreme weather and natural disasters for Ohioans. These grants aim to ensure the reliability of power sector infrastructure so that all communities have access to affordable, reliable, and safe electricity. The funds will help ease or eliminate the cost associated with electrical grid modernization on local communities. Projects eligible to receive funds include placing electrical equipment underground, making technologies fire resistant, replacing old overhead conductors and underground cables and strengthening utility poles.

Gov. DeWine's adminstration is seeking $189 million in federal Inflation Reduction Act funding to help implement the state's first Priority Resilience Plan. The proposal – submitted to the U.S. Environmental Protection Agency in March 2024 – would establish a statewide fund to help electrify government fleets, retrofit public buildings, and install solar generation on city, county and state properties. This plan starts with cutting emissions, generating renewable electricity and building energy efficiency. The grant program would send 60% of its funding to low-income and disadvantaged communities. It will focus on funding resilience and smart city planning. The plan aims to support resilience efforts across the state — including efforts to electrify government fleets, retrofit public buildings, and install solar generation. The final approval and allocation of funds will depend on federal and state agencies' review and decision-making processes. As such, the proposal remains contingent upon government approval before any projects or investments can move forward.

PUCO has sanctioned an electric security plan (ESP) for FirstEnergy's three Ohio electric distribution utilities – Cleveland Electric Illuminating Company, Ohio Edison and Toledo Edison – effective for five years beginning June 1, 2024. The plan is to strike an important balance to improve the service quality and reliability of the grid across FirstEnergy's Ohio service territory and will reduce costs for the utilities. Important components of his plan are competitively priced power, enhancements to reliability and economic development programs.

FirstEnergy's Ohio electric companies – Ohio Edison, The Illuminating Company and Toledo Edison – have reached a settlement on their four-year, $421 million Grid Modernization (Grid Mod) II plan to install smart meters for an additional 1.4 million customers in Ohio. On receiving approval from PUCO, the plan will build on system upgrades completed as part of the companies' Grid Mod I plan approved in 2019, including the installation of approximately 706,000 smart meters across Ohio along with the necessary supporting communications infrastructure and data management system.

Photo: Wind turbine in downtown Cleveland, Ohio. Henryk Sadura



RECOMMENDATIONS TO RAISE THE GRADE

Concerted efforts are underway by PUCO and its affiliated agencies to improve the energy infrastructure with technological advancements, increased investment in renewables and enhanced grid management practices. The state is also exploring ways to balance energy needs with environmental considerations. However, the following measures are recommended for desired improvements in the energy sector:

Enhance Coordination Between Public and Private Sectors

- Develop clearer guidelines and streamlined processes for collaboration between private utility companies and state agencies to ensure efficient allocation and use of funds for energy infrastructure projects.
- Encourage and facilitate more public-private partnerships to leverage additional investment and expertise in the development and upgrading of energy infrastructure.

Strengthen Grid Resilience and Efficiency

- Focus on targeted investments to address vulnerabilities in the energy grid, particularly in areas prone to severe weather. Allocate specific funds for upgrading infrastructure to improve resilience against storms, floods and other hazards.
- Invest in advanced grid technologies, such as smart grids and energy storage solutions, to enhance the flexibility and reliability of the energy system.

Expand and Optimize Renewable Energy Initiatives

- Consider raising the RPS targets to accelerate the transition to renewable energy sources and further reduce dependence on fossil fuels.
- Expand incentives not just for solar, but also for other renewable sources like wind and geothermal to create a more balanced and resilient renewable energy portfolio.

Address Energy Cost Concerns

- Increase support programs for low-income households to mitigate the impact of rising energy costs. This could include expanded rebate programs, energy efficiency upgrades, and targeted financial assistance.
- Review and adjust rate structures to ensure they are fair and reflect the actual costs of providing energy while also providing incentives for energy conservation and efficiency.

Improve Energy Efficiency Measures

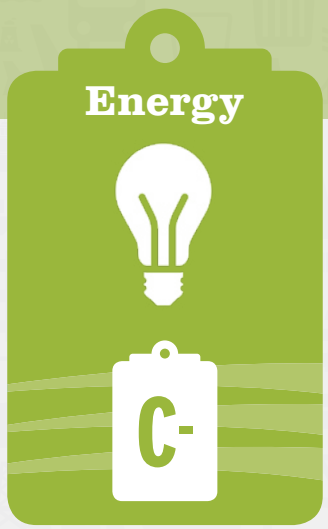
- Build on the success of existing efficiency programs by expanding their scope and reach, particularly in underserved areas. Include more robust measures for residential and commercial buildings.
- Increase public awareness and education on energy efficiency practices and available incentives to encourage more widespread adoption.

Manage Growth in Energy Demand

- Refine and enforce regulations for data centers and cryptocurrency mining operations to ensure they meet infrastructure requirements and contribute to grid stability.
- Improve demand forecasting to better plan for future energy needs, especially in rapidly-growing sectors like data centers.

Leverage Federal and State Funding

- Continuously seek and apply for federal grants and funding opportunities to support energy infrastructure projects. Ensure that Ohio capitalizes on all available federal resources.
- Regularly review and optimize state grant and incentive programs to ensure they effectively support the most impactful and innovative energy projects.



SOURCES

CleanChoice Energy, “Renewable Energy in Ohio”, 2025.

State of Ohio, “Ohio Revised Code Section 4928.64”, 2025.

Public Utilities Commission of Ohio, “Ohio Renewable Energy Portfolio Standard”, 2025.

State of Ohio, “Ohio Administrative Code Rule 4901:1-40-02”, 2025.

Ohio Department of Development, “Development.Ohio.gov”, 2025.

U.S. Department of Energy, “Energy Facts: Impact of Investing in America Agenda – Ohio”, 2025.

EnergySage, “Electricity Cost in Ohio”, 2025.

Power Engineering, “AEP Files Proposal to Handle Surging Data Center Development in Ohio”, 2025.

Energy News Network, “Storms Strain Ohio’s Electric Grid and Climate Change Could Make It Worse”, 2022.

Climate Central, “Weather-Related Power Outages Rising – Ohio”, 2025.

Energy News Network, “Ohio Seeks $189 Million in EPA Funds to Electrify State Fleets”, Retrofit Public Buildings, 2024.

Morning Journal News, “Ohio’s First Climate Action Plan Should Just Be a Start”, 2024.

U.S. Environmental Protection Agency, “State of Ohio PRP”, 2024.

T&D World, “FirstEnergy’s Ohio Utilities Reach Settlement on Four-Year $421 Million Grid Modernization II Plan”, 2025.

U.S. Census Bureau, “QuickFacts: Ohio”, 2025.

U.S. Department of Energy, “What Does It Take to Modernize the U.S. Electric Grid”, 2025.

Electric Power Research Institute (EPRI), “EPRI.com”, 2025.

Energy Central, “AES Ohio Proposes $682M More in Electric Grid Advances; Customer Bills Would Rise”, 2025.

Ohio Power Siting Board, “Battery Map and Stats”, 2025.

Hazardous Waste

C-

GRADE COMPARISON

Ohio: C-

Nat'l: C

Photo: Old chemical barrels stack. Fahroni

HAZARDOUS WASTE

EXECUTIVE SUMMARY

The Ohio Environmental Protection Agency (Ohio EPA) is responsible for the environmental programs in the state. In particular, the Division of Environmental Response and Revitalization (DERR) oversees the investigation and cleanup of contaminated sites; permitting, inspection, compliance and reporting of hazardous waste sites. It also provides assistance and guidance for the voluntary cleanup and reuse of brownfields. Three programs under the U.S. EPA are shaping the nation's hazardous waste infrastructure: Superfund, Resource Conservation and Recovery Act (RCRA) and brownfields. In addition, Ohio also has an underground storage tank program administered by the Department of Commerce (State Fire Marshall). Ohio has 53 sites listed on the U.S. EPA's Superfund, National Priority List (NPL). Ohio is ranked fourth in total number of hazardous waste generators under the RCRA program, not unexpectedly, as it is the nation's seventh most populous state. The legal immunity bill passed in Ohio in 2020 for brownfields has helped the program significantly over the last four years. To date, $636 million has gone to support 626 projects in 86 out of 88 counties in Ohio. This program aims to unlock Ohio's more than 9,000 former industrial and commercial sites that can bring in millions of dollars in additional tax revenue, create jobs and steward the environment for redevelopment through brownfields remediation. Despite efforts to address hazardous waste issues, Ohio's infrastructure remains underfunded and faces significant challenges in managing contamination, which has resulted in delays in remediation and rising long-term costs. The lack of sufficient funding and resources – combined with the state's ongoing struggle to clean up and repurpose contaminated sites – has hindered progress.

CAPACITY

Ohio has 53 sites listed on the "Superfund Exposure Dashboard." Of those 53, Ohio has 37 sites listed on the National Priorities List (NPL). Of the 37, 34 are non-federal. There are three federal sites. The total acreage occupied by Superfund sites is estimated to be 11,000 acres. The three federal sites account for approximately 75 percent of Superfund sites in Ohio.

There is adequate capacity in Ohio for the treatment and disposal of hazardous waste. As of 2023, there were 688 generators of hazardous waste under the RCRA program in Ohio. Ohio has 3.7% of the total number of generators in the U.S., generates 4.6% of total tonnage of hazardous waste in the U.S. and accounts for 4.4% of the number of facilities that manage hazardous waste in the U.S. Table 1 shows pertinent data regarding hazardous waste management in Ohio as of 2023.

Table 1: Pertinent Data for Ohio Regarding Hazardous Waste Management

Number of Generators	688
Generated Tons	1,708,563
Number of Managers	38
Managed Tons	1,493,617
Number of Shippers	679
Shipped Tons	833,557
Number of Receivers	22
Received Tons	665,549

Table 2 shows the total number of generators and total tonnage generated from 2011 to 2023 in Ohio. While the total number of sites generating hazardous waste has decreased, the total amount generated in the state has increased.

Table 2: Generators and Total Tonnage in Ohio, 2011 – 2023

	2011	2013	2015	2017	2019	2021	2023
Ohio-# of Sites	941	1221	1330	1255	1015	711	688
Tot. Generation (Tons)	1,627,192	1,531,251	1,711,5217	1,594,454	1,576,264	1,486,412	1,708,563

CONDITION

The Hazard Ranking System (HRS) – with a range from 0 to 100 – is used to determine eligibility of a site placement on the NPL A site scoring 28.5 or greater is eligible. Ohio has fifteen sites scoring 30 to 39, seven scoring 4 to 49, fourteen scoring 50 to 59 and one scoring 60 to 69.

Since the start of the Superfund program, nine sites in Ohio have been cleaned up and removed from the National Priorities List. All are now in active use. Usually, if the EPA can identify a Potentially Responsible Party (PRP) and the PRP is willing to negotiate and sign an agreement with the EPA to perform the investigation or do the cleanup, that site will be listed as a Superfund Alternative Approach (SAA). There are currently five sites listed as SAA, of which three are classified as Non-NPL SAA. There are four proposed SAA. An SAA uses the same investigation and clean-up process and standards that are used for sites listed on the NPL, but the difference is that federal funds are not used for the cleanup.

There are 13 sites in Ohio that are listed or were once listed as Superfund sites, which are being reused to benefit the communities and are now ready for business. Eight of these have published economic data. Sites with published data account for approximately 72 individual businesses, 3,634 employees and $1.3 billion in annual sales revenue generated.

Table 3 shows the management methods, number of managed sites, and the managed tons at hazardous waste managed facilities.

Table 3: Management Methods, Number of Managed Facilities, and Tons Managed at Hazardous Waste Facilities

Management Method	# of Mngrs	Managed (Tons)
*** Total ***	**51**	**1,628,103**
DEEPWELL / UNDERGROUND INJECTION	3	1,086,032
ENERGY RECOVERY	3	92,215
FUEL BLENDING	8	122,326
INCINERATION	4	155,203
LANDFILL	1	39,052
METALS RECOVERY	5	7,560
OTHER TREATMENT	2	47
SLUDGE TRTMNT / STAB / ENCAP	2	49,539
SOLVENTS RECOVERY	16	21,550
WASTEWATER TREATMENT	21	54,580

Deep well/underground injection accounts for 67% of hazardous waste managed. Recovery methods – such as energy, metals and solvent recovery – account for only 7.5% of management methods. Underground injection can pose a serious threat to groundwater contamination.

In addition to the Superfund program, Ohio EPA has a Voluntary Action Program (VAP) for brownfields cleanup. The number of completed cleanups under this program in the last two years has declined drastically. In 2018, there were eighteen completed VAP cleanups. In 2019, there were nine completed VAPs with several pending. At the height of the Clean Ohio program, Ohio averaged 35 completions per year. However, there is some positive news. Governor Mike DeWine, in 2020, passed the legal immunity bill. This bill was passed to

create opportunities for increasing the number of buyers of contaminated properties, resulting in investment in the cleanup of brownfields. Since its passing, the Brownfield Remediation Program has been awarding funding through the Ohio Department of Development. To date, $636 million has supported 626 projects in 86 out of the 88 counties in Ohio. After remediation, the properties are redeveloped to revitalize the neighborhoods, create new housing options, provide additional tax revenues, provide jobs and attract economic development.

Deep well/underground injection accounts for 67% of hazardous waste managed. Recovery methods – such as energy, metals and solvent recovery – account for only 7.5% of management methods. Underground injection can pose a serious threat to groundwater contamination.

OPERATION AND MAINTENANCE

Listing a non-federal site on the NPL triggers the EPA to determine PRPs to bear some or all the costs for the Remedial Investigation/Feasibility Studies (RI/FS) remedial design and construction, operations and maintenance costs to follow. Ohio EPA bears the initial cost to identify PRPs. The site response cost is determined on a site-by-site basis. Success depends on identifying PRPs and on the actions the EPA and the state choose to take, given the limited funding available

Groundwater treatment system operating costs represent a significant – and growing – portion of the total cost to remediate Superfund sites in Ohio. These rising costs are increasing pressure on Ohio EPA and PRP-led sites, as long-term operation and maintenance (O&M) expenses are often underestimated during initial budgeting. Many sites expected to be completed by now remain active under the Superfund program.

PUBLIC SAFETY

To ensure public safety, hazardous waste must be accurately identified and classified, safely segregated and stored, securely transported and properly treated and disposed. Additionally, robust plans must be in place for emergency preparedness and regulatory compliance. Ohio EPA's Division of Emergency Response, Investigations and Enforcement is responsible for responding to environmental emergencies and investigating potential criminal violations of state and federal environmental laws. However, with an annual budget of approximately $4 million, the Division is significantly underfunded to monitor and investigate environmental activities across the state effectively.

An example of an emergency incident that clearly showed the lack of investment in public safety was the Norfolk Southern freight train derailment in East Palestine on February 3, 2023. The train was carrying hazardous materials when 38 cars derailed. This resulted in Norfolk Southern removing more than 167,000 tons of contaminated soil and 39 million gallons of contaminated water from the derailment site as part of the remediation process. On February 3, 2025, a lawsuit alleged that at least seven people, including a one-week-old infant, died as a result of the toxic chemicals leaked from the train.

FUNDING AND FUTURE NEED

According to Ohio EPA's *Greenbook* publication, agency funding generally falls into four categories: General Revenue, Dedicated Purpose, Internal Service Activity and Federal. The largest is Dedicated Purpose (DP) funding, which typically accounts for 65% to 70% of the agency's total budget. This category is primarily supported through fees collected for permits, inspections and licenses. It's the primary source of funding for remediation and restoration projects. Federal funding is the second-largest revenue stream, contributing approximately 15% to 20% of Ohio EPA's total funding. A summary of the agency's federal budget is provided in Table 4 below.

Table 4: A summary of Ohio EPA Federal Budget 2022-2025

Funding Group	FY 2022 Actual ($)	FY 2023 Actual ($)	FY 2024 Appropriation ($)	FY 2025 Appropriation ($)
General Revenue (GRF)	9,983,506	9,138,454	13,865,000	13,908,000
Dedicated Purpose (DPF)	141,608,062	179,117,863	181,497,675	183,861,282
Internal Revenue Activity (ISA)	7,738,449	10,359,131	11,835,764	11,835,764
Federal (FED)	42,925,234	43,743,924	61,503,730	62,132,822
Total	202,255,234	242,359,372	286,702,169	271,737,868

The parts of the budget dedicated to hazardous waste are shown Table 5 below:

Table 5: Ohio EPA Hazardous Waste Budget

Funding Group	FY 2023 Actual ($)	FY 2024 Appropriation ($)	FY 2025 Appropriation ($)
Hazardous Facility Management	3,551,008	4,887,120	4,877,120
Hazardous Waste Cleanup	8,847,841	10,769,788	10,769,788
Voluntary Action Program	1,019,069	1,143,598	1,143,598
Corrective Action	1,176,000	1,211,000	1,211,000
Federally Supported Cleanup & Response	7,889,893	9,859,094	10,056,289
Site Specific Cleanup	13,453,817	1,271,193	1,271,193
National Priority List Remedial Support Fund	----------	500,000	900,000
Total	35,937,628	29,641,793	30,228,987

These categories of funding support the DERR, which oversees investigation and cleanup of contaminated sites, regulates hazardous waste sites (permitting, inspection, compliance and reporting) and provides assistance and guidance for the voluntary cleanup and reuse of brownfield sites.

DERR received approximately 12.2% of Ohio EPA's total funding in 2020 and 2021, equating to $26 million and $27 million, respectively. In 2023, the allocation increased to 14.8%, totaling $35,937,628. However, funding levels for DERR declined to approximately 11.1% in both 2024 and 2025. This stagnation and reduction in funding for DERR and limited overall growth in Ohio EPA's budget are hindering the state's ability to prioritize and prepare contaminated sites for inclusion on the National Priorities List (NPL) for federal remediation.

RESILIENCE

Ohio is far enough from the coasts and active faults to avoid most risk of hurricane damage or earthquakes, but it is still within the active tornado zone. Landfills are required to have runoff controls to protect against erosion during extreme events. Ohio EPA requires that hazardous waste facilities constructed in floodplains be protected against washouts. Ohio also requires that facilities be designed to withstand credible seismic risks. While Ohio has no seacoast, the agency has required that some facilities on Lake Erie take measures to protect shoreline erosion.

The Ohio River has been experiencing extreme flooding conditions. For example, during the 49-year period of 1970 to 2018, the confluence of the Mississippi and Ohio Rivers exceeded major flood stage at least 16 times, as opposed to 13 times during the 72-year period of 1898 to 1969.

The U.S. EPA should take additional actions to encourage Treatment, Storage and Disposal Facilities (TSDFs) to manage climate risks. Planning for intense weather events can be challenging. Guidance from the U.S. EPA is currently inadequate, especially in assessing the risks and what data to use. There is currently no formal direction on how to address climate risks to TSDFs, but the U.S. EPA has recently taken steps, such as issuing a memorandum to regional offices, to identify authorities and requirements for managing climate risks to TSDFs, as part of RCRA permitting. The U.S. EPA is also planning to provide additional training and technical assistance to states to help them implement the guidance in the memo.

TSDFs also face resource constraints, such as high costs to implement climate adaptation measures. The Office of Land and Emergency Management (OLEM) and some regions, including Region 5, plan to use funding from the Inflation Reduction Act (IRA) to fund projects that will increase their capacity to manage climate risks to TSDFs.

INNOVATION

Remedial cleanup methodologies currently used in many Superfund, RCRA and brownfield sites are causing economic burdens to Ohio EPA, PRPs and the public. Hazardous wastes consist of a variety of substances. For many of these, appropriate remedial and disposal technologies have not been developed or applied sufficiently. Innovative technologies such as supercritical water oxidation, microwave technology, zero liquid discharge, geo-polymerization, and phytoremediation are still far from being scaled up. Technologies for hazardous waste reduction – and for recovering and reusing waste as valuable resources – are actively being researched and developed. It's simply unacceptable that 65% to 70% of hazardous waste in Ohio is managed through deep well injection.

Funding for research provided to Ohio EPA is inadequate. Resources provided to this sector could ignite the development of new, state and/or site-specific technologies that may address recovery and reuse of hazardous wastes, among other novel outcomes.

RECOMMENDATIONS TO RAISE THE GRADE

- Reduce the number of vacant/contaminated brownfield properties in Ohio by about 25% in the next five years by taking advantage of the passed legislative bill for remediating contaminated properties.
- The U.S. EPA should provide adequate funding and direction to Ohio EPA for integrating information on the potential impacts of climate change effects into risk assessments and response decisions.
- Innovation should be encouraged by implementing legislation enabling and encouraging research and development programs aimed at developing technologies for generating them by providing economic incentives for waste reduction and reuse of recovery and reuse of hazardous waste. Development of these technologies should be promoted within the industries.
- Reduce the use of deep well/underground injection (currently accounting for about 67% of management methods) by at least 3% each year, replacing it with future innovative technologies for reducing, recovering and reuse of hazardous waste materials.

SOURCES

American Society of Civil Engineers, “America’s Infrastructure Report Card 2021”, 2021.

U.S. Environmental Protection Agency, “RCRAInfo National Hazardous Waste Biennial Report”, 2025.

Ohio Environmental Protection Agency, “Ohio EPA”, 2025.

County Engineers Group, “Ohio Issues Cleanup Grants”, 2025.

State of Ohio, “Brownfield Redevelopment in Ohio”, 2025.

State of Ohio, “Hazardous Waste Management in Ohio”, 2025.

MyWasteSolution, “5 Innovative Methodologies for Hazardous Waste Treatment”, 2025.

State of Ohio, “Innovation in Hazardous Waste”, 2025.

U.S. Government Accountability Office, “GAO-25-106253 Report”, 2025.

U.S. Government Accountability Office, “Hazardous Waste: EPA Should Take Additional Actions to Encourage Treatment”, Storage, and Disposal Facilities to Manage Climate Risks, 2025.

U.S. Environmental Protection Agency, “National Priorities List (NPL) Sites by State”, 2025.

Legislative Service Commission, “Ohio HB33 – EPA Greenbook (135th General Assembly)”, 2025.

Inland Waterways

D

GRADE COMPARISON

Ohio: D

Nat'l: C-

Photo: John Cheek

INLAND WATERWAYS

EXECUTIVE SUMMARY

Ohio's inland waterway system is composed of 541 miles of the Ohio River and nine navigation locks and dams. More than 61 million tons of cargo passed through Ohio's commercial locks and dams in 2022, valued at $15.7 billion. Many of these structures are well beyond their design life and will require prioritized rehabilitation funding for continued operational reliability.

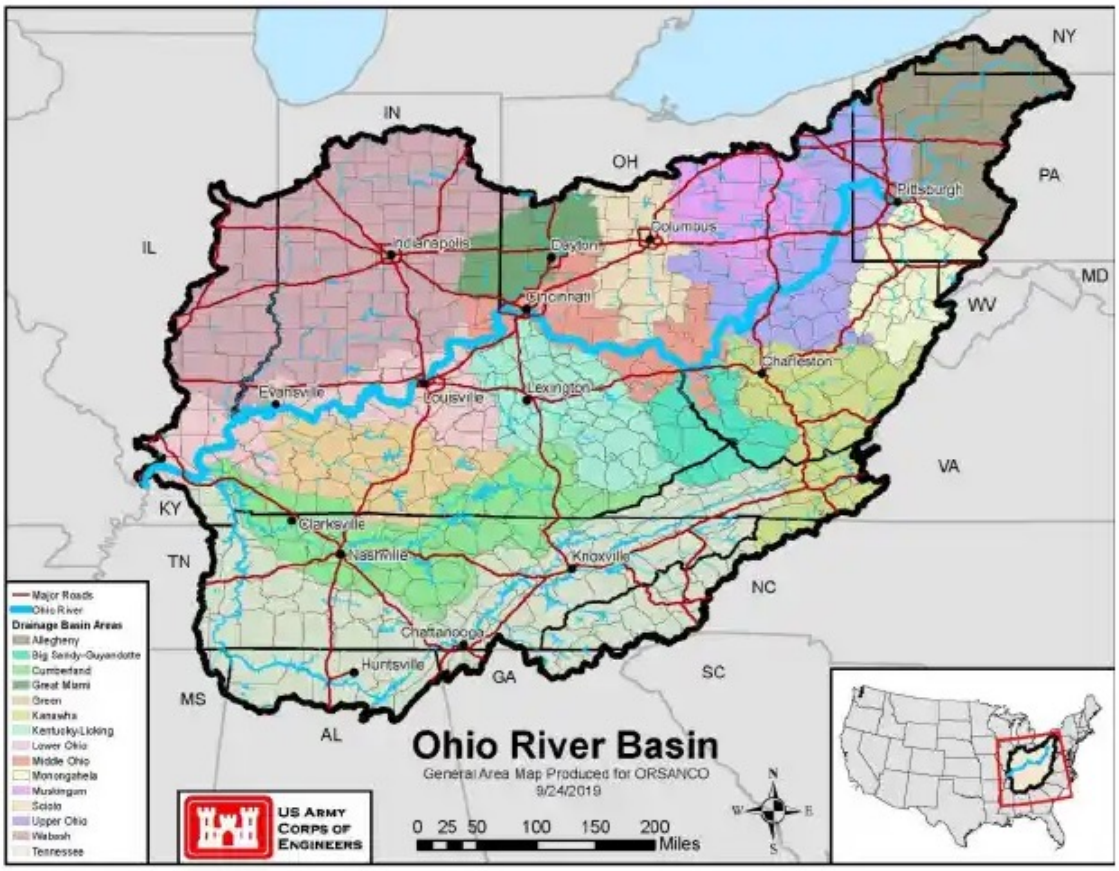
The Ohio River spans 981 miles, originating at the confluence of the Allegheny and Monongahela Rivers in Pittsburgh, Pennsylvania and flowing into the Mississippi River at Cairo, Illinois. Waterborne transportation improvements on the river began in 1824 with channel clearing, followed by the completion of 51 locks and dams in 1929, which enabled year-round navigation. This progress continued through 2018 when the original system of locks and dams was replaced with the current 19-lock and dam system.

The U.S. Army Corps of Engineers (USACE) provides safe, reliable, efficient and environmentally sustainable waterborne transportation systems that support commerce, national security and recreation. Waterborne transportation is USACE's earliest Civil Works (CW) mission, dating back to 1824, when federal laws authorized and funded USACE to improve safety on the Ohio and Mississippi Rivers and at several ports.

CONDITION AND CAPACITY

The Ohio River basin (Figure 1) covers a large geographic area of roughly 204,000 square miles of the U.S. east of the Mississippi River. It reaches northeast into New York, west to Illinois, and south through the drainage area of the Tennessee River in Georgia, Alabama and Mississippi. Through the heart of this vast area, the 981-mile-long Ohio River carries the largest volume of water of any of the Mississippi River tributaries. The Ohio River is formed by the juncture of the Allegheny and Monongahela rivers at Pittsburgh and empties into the Mississippi River at Cairo, IL.

FIGURE 1. OHIO RIVER BASIN



Dams create an "aquatic staircase" (Figure 2) in the river and prevent the river from draining in dry weather, so navigation can go on year-round. Each step on the slope of the riverbed is a pool of water extending miles upstream, maintaining sufficient depth for boats and barges. The normal flow of the river runs through these pools and the excess flows over the dam into the next pool and down the river. Locks serve as an "aquatic elevator," raising and lowering boats and barges between pools.

The entire width of the river is not used for navigation; rather, there is a channel in which the water depth is maintained. In 1910, Congress passed the Rivers and Harbors Act, authorizing the construction of a river-length system of locks and dams that would provide a nine-foot navigation depth.

One of the most remarkable aspects of the Ohio River is that it provides operational service 365 days per year and is never closed for seasonal outages. Locks and dams are operated and maintained by the USACE.

Ohio's commercial inland waterway system includes 451 miles of the Ohio River, which forms the state's southern border, along with nine locks and dams: Captain Anthony Meldahl, Greenup, Robert C. Byrd, Racine, Belleville, Willow Island, Hannibal, Pike Island and New Cumberland.

FIGURE 2. OHIO RIVER MAINSTEM NAVIGATION SYSTEM

Commercial inland waterways are part of Ohio's multimodal freight system (Figure 3) that also includes truck, rail and air. Transportation via inland waterways is best suited for the long-distance movement of bulky cargo such as aggregates, grains, ore, chemicals, steel, coal and petroleum.

Photo: Cincinnati

FIGURE 3. OHIO'S MULTIMODAL FREIGHT SYSTEM

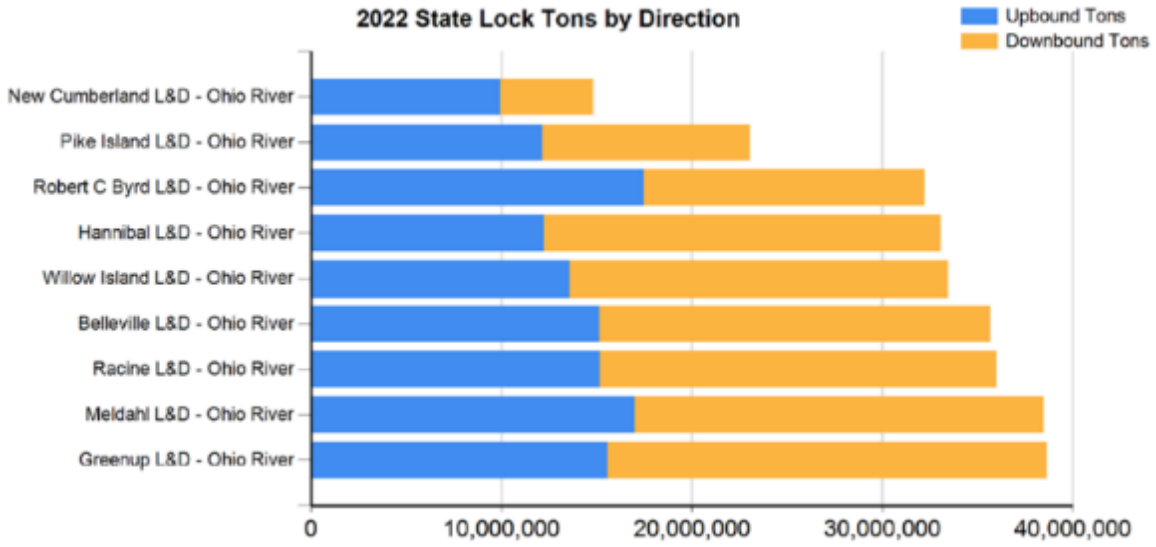
Ohio's commercial inland waterways play an important role in connecting Ohio's industries to raw materials, suppliers and customers. Ohio River ports provide connections to southern, eastern and midwestern states along the Ohio and Mississippi River systems and link the state to foreign markets through New Orleans and other Gulf Coast ports. Figure 4 provides a heat map of waterborne freight showing how far-reaching the tonnage is, with the thickest red line representing the highest tonnage volume.

FIGURE 4. TONNAGE HEAT MAP OF WATERBORNE FREIGHT

Source: US Army Corps of Engineers, Planning Center of Expertise for Inland Navigation

More than 61 million tons of cargo passed through Ohio's commercial locks and dams in 2022, valued at $15.7 billion. Figure 5 shows the total tonnage passing through each of Ohio's locks and dams in 2022. Top ports were Ports of Cincinnati-Northern Kentucky, an inland port jurisdiction, at more than 36 million tons and the Mid-Ohio Valley Port Statistical District at more than 34 million tons.

FIGURE 5. CARGO TONS PER DIRECTION



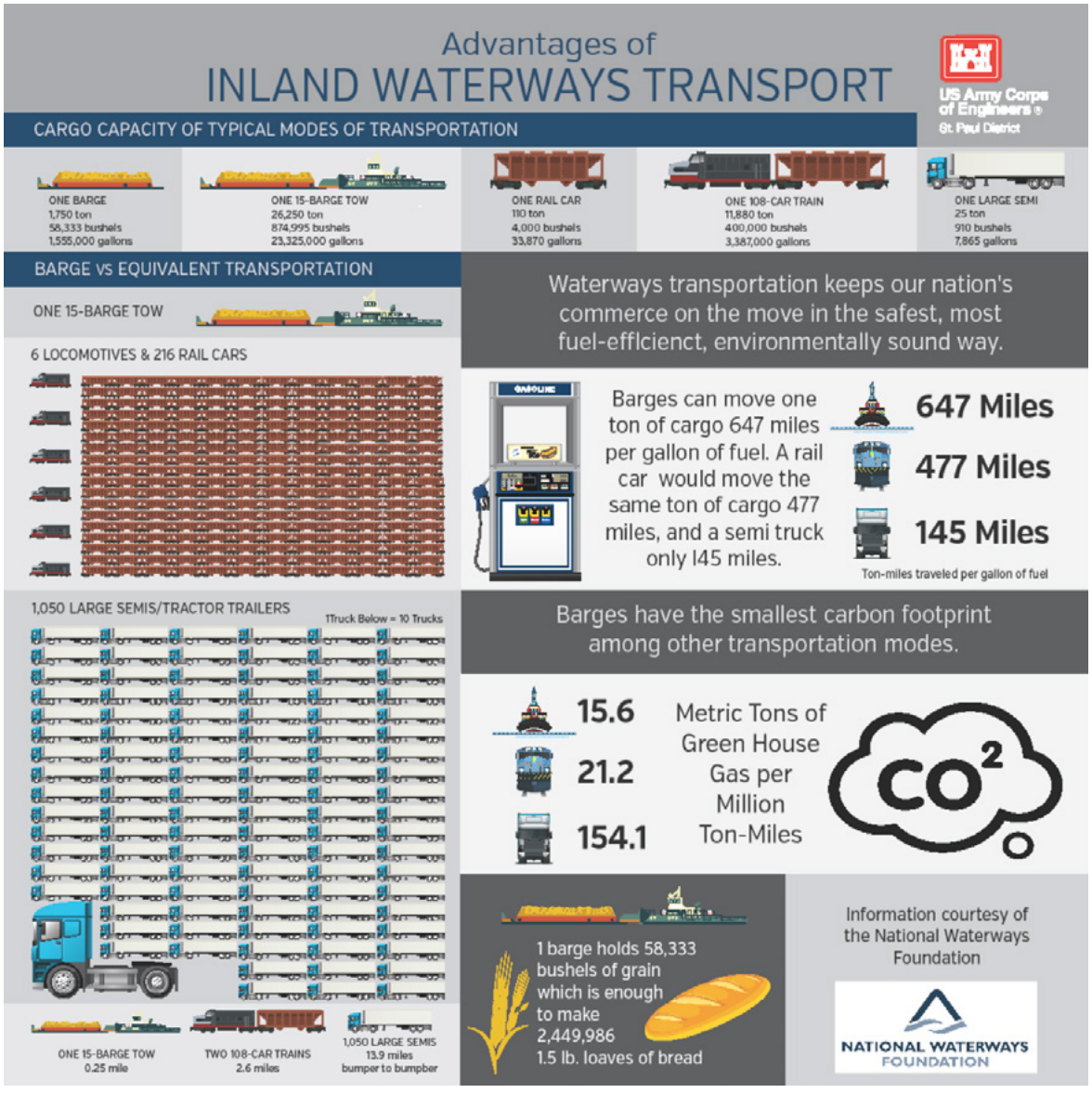
Source: USACE Waterborne Commerce Statistics

Shipping on the inland waterways provides an average transportation savings of $19.25 per ton over the cost of shipping by alternative modes. On average, a gallon of fuel allows one ton of cargo to be shipped 145 miles by truck, 477 miles by rail and 647 miles by barge.

Cargo is transported on inland waterways in barges. The dimensions of a commonly-used barge on the Ohio River – referred to as a jumbo barge – are 195-200 feet long and 35 feet wide. The term tow is used to describe several barges lashed together being pushed from behind by a towboat. The typical Ohio River tow is comprised of 15 barges – three barges wide and five barges long – and pushed by a towboat approximately 125-150 feet in length. In total, this typical tow is approximately 1,125 feet in length and 105 feet wide.

Figure 6 compares the cargo capacity and carbon footprint of locomotives and rail cars, large semi-trailers, towboats and jumbo barges. It takes six locomotives and 216 rail cars – or 1,050 large semi-trailers – to transport the same amount of cargo as one 15-barge tow. Among these transportation modes, barges have the smallest carbon footprint.

FIGURE 6. CARGO AND CARBON FOOTPRINT COMPARISON FOR TRUCK, RAIL, AND BARGE



Ohio's commercial locks and dams consist of two lock chambers – a main 1,200-foot long by 110-foot wide chamber and an auxiliary 600-foot long and 110-foot wide chamber – and a gated dam. Meldahl, Greenup, Racine, Belleville, Willow Island and Hannibal locks and dams include a non-federally operated hydropower plant. These hydropower plants benefit the region by providing a source of renewable, clean electricity through their run-of-the-river design, generating power without emitting greenhouse gases while contributing to grid stability due to their ability to quickly respond to fluctuations in demand. The addition of non-federal hydropower plants is being considered at Robert C. Byrd, Pike Island and New Cumberland locks and dams. The typical Ohio River lock and dam configuration is shown in Figure 7.

FIGURE 7. TYPICAL CONFIGURATION OF OHIO RIVER COMMERCIAL LOCKS AND DAMS

Source: US Army Corps of Engineers, Pittsburgh District

It takes about one hour for a 15-barge tow to transit through a 1,200-foot-long main chamber. When the 1,200-foot-long main chamber is closed for maintenance, all traffic must pass through the 600-foot-long auxiliary chamber. This requires a 15-barge tow to separate into two units, each of which gets locked through separately, more than doubling the transit time through the lock. As a lock chamber approaches its capacity, delays can increase exponentially.

Lock chamber gates are one of the largest and most expensive components to replace. Since repair or replacement of these gates can require extended closures of lock chambers, they can also result in the greatest delay and financial impact on the towing industry. Most lock gates have exceeded their 50-year design life and induced steel fatigue from cyclic loading. Recent replacements of the lock chamber gates have been completed at the New Cumberland Auxiliary Chamber, Greenup Main Chamber, Meldahl Upper Main and Upper Auxiliary Chambers.

All locks and dams except for Robert C. Byrd were initially constructed with one 1200-foot long and 110-foot wide lock chamber to accommodate modern-sized tows in a single lockage. Robert C. Byrd, formerly known as Gallipolis Locks and Dam, began operating

in 1937 with two 600-foot-long and 110-foot-wide lock chambers. Two new lock chambers – a main 1200-foot-long by 110-foot-wide chamber and an auxiliary 600-foot-long and 110-foot-wide chamber – were constructed in 1993 and renamed after West Virginia Senator Robert C. Byrd. The average age of Ohio's navigation locks is 55 years. Greenup is the oldest at 65 years and Robert C. Byrd is the newest at 31 years.

OPERATION AND MAINTENANCE, FUNDING, AND FUTURE NEED

The Ohio River is part of the Inland Waterways Trust Fund (IWTF), a U.S. Treasury fund that receives revenue from a tax on commercial barge fuel used on federally designated waterways. The current fuel tax is $0.29 per gallon and these revenues are subject to appropriation and used to finance construction and major rehabilitation projects. The Thomas R. Carper Water Resources Development Act of 2024 adjusted the cost share formula of the IWTF from 65%-35% General Fund-IWTF to 75%-25%, a step ASCE strongly supported. Operation and maintenance (O&M) costs are fully funded by the federal government. The average total expenditures for O&M of Ohio's locks and dams for fiscal year 2020 through fiscal year 2023 were approximately $55 million per year.

Over the past five years, around 53% of vessels locking through Ohio locks experienced some delay, lower than the national average of 71%.

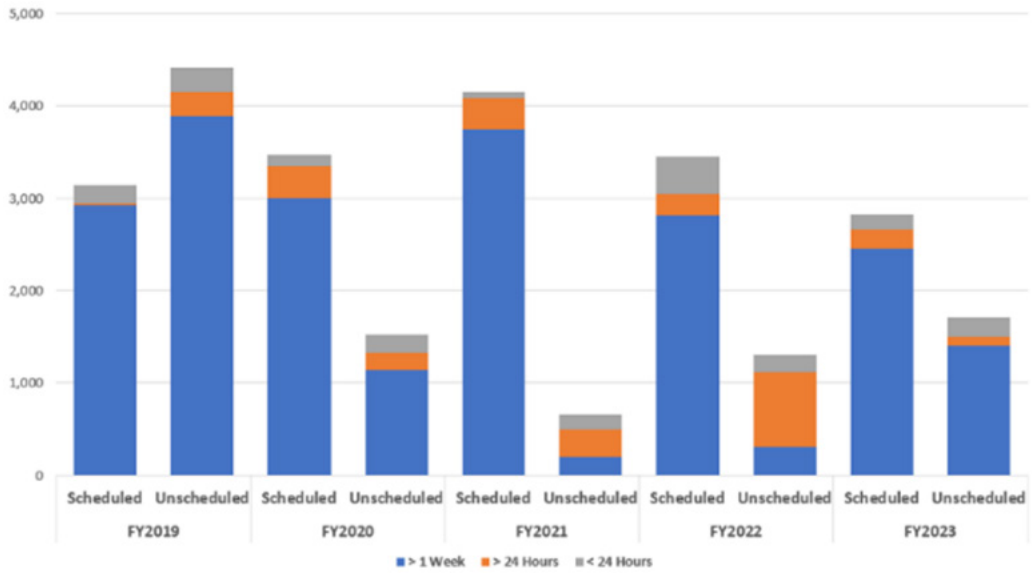
Over time, maintaining this aging infrastructure becomes more difficult. Major systemic infrastructure issues relating to the navigation dams will require significant future investment to ensure the continued reliability of the navigation system. The sheer size of many key components found on locks and dams – lock gates, lock valves and dam gates – makes major repairs or replacement of the parts very labor-intensive and expensive.

In 2014, the USACE Great Lakes and Ohio River Division initiated a Lock Gate Replacement Program. This program analyzed lock gates based on their design characteristics and current operational condition, and then projected the future condition based on expected use. The resulting projected conditions were used to determine suggested future replacement dates.

Over the past five years, around 53% of vessels locking through Ohio locks experienced some delay, lower than the national average of 71%. However, this could vary significantly when looking at each lock individually and considering other factors – maintenance, mechanical issues, traffic volume or weather – that could cause delays to potentially increase or decrease.

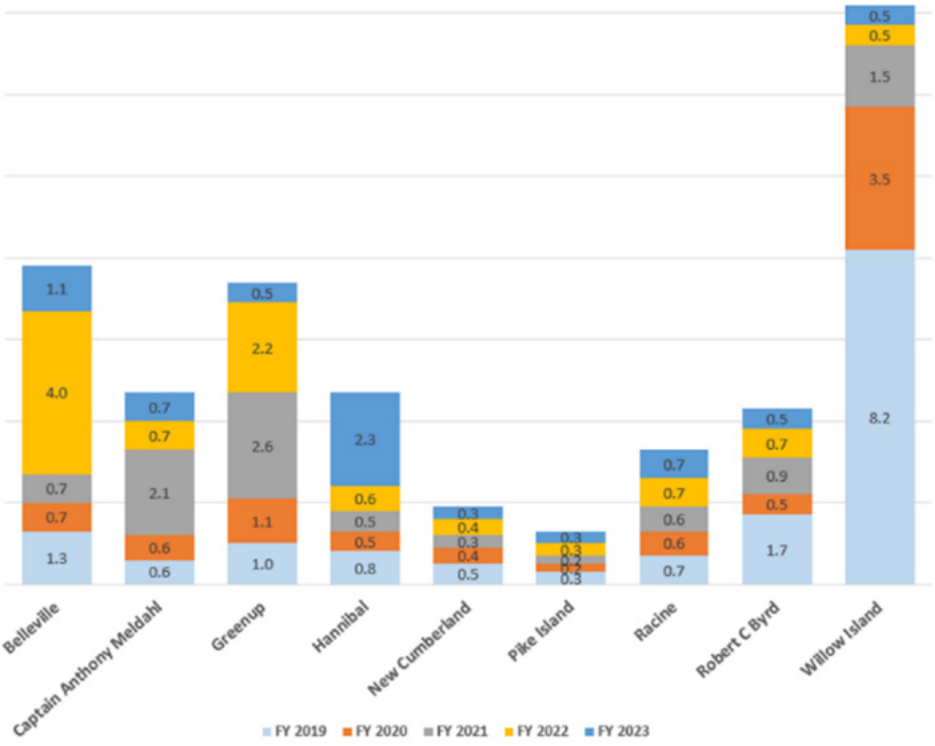
As the infrastructure continues to age, outages in lock service due to scheduled and unscheduled unavailabilities are expected to rise. Lock unavailability refers to a situation where a lock is temporarily unavailable for use, usually due to maintenance, repairs, high water levels or other operational issues, meaning boats cannot pass through the lock. Figure 8 shows the hours of scheduled and unscheduled lock unavailability greater than or less than 24 hours and greater than one week. Figure 9 shows the average delays of tows transiting the locks.

FIGURE 8. SCHEDULED AND UNSCHEDULED LOCK UNAVAILABILITIES (HOURS), FY 2019-2023



Source: US Army Corps of Engineers, Operations and Maintenance Business Information Link

FIGURE 9. AVERAGE DELAYS OF TOWS (HOURS), FY 2019-2023



Source: US Army Corps of Engineers, Operations and Maintenance Business Information Link

Continuing the reliable operation of the navigation system must be managed in a pre-emptive manner since stakeholders expect 100% availability. Operation, repair and rehabilitation must be accomplished through well-managed programs; otherwise, there could be major disruptions in commercial navigation.

The USACE Navigation O&M Program is extremely complex with many different facets. The USACE has worked diligently to optimize its asset management program, which has enabled accurate prioritization of a large list of potential projects. This optimization and feedback from stakeholders regarding asset management, condition assessments, budget development and addressing high-priority maintenance work have led to a highly-developed and defensible system of requirements in the near and long term.

Because of these vulnerabilities, transportation firms and government agencies have become interested in providing a system that is resilient to disruptive impacts, including the ability to prepare for, resist, recover from and adapt to disruptions. A resilient inland waterways system possesses robustness because of its design and can withstand severe blows, respond appropriately to threats and mitigate the consequences of threats through response and recovery operations.

PUBLIC SAFETY

At Ohio River locks and dams, restricted areas have been established to keep boats away from the most dangerous areas near these structures, which can be deadly. Most fatalities at dams result from fishing boats coming too close to the downstream side of the dam gates. Powerful reverse currents in these areas can pull boats into the dam structure, at which point they capsize and smash against the structure.

Above the dams, the water may look calm, but the current of the water flowing underneath the dam gates can create a strong undertow capable of pulling a boat down, and through the dam. Another dangerous area below the dam is the lock chamber discharges, along the river wall. When the chambers are emptied, sudden turbulent discharges can capsize a boat.

RESILIENCE

Many parts of the nation's transportation system, including Ohio's waterways and ports, are vulnerable to both natural and man-made disruptions. Specific threats include natural disruptions like flooding (high water events) and droughts (low water events). Man-made disruptions include accidents, such as uncontrolled barges alliding with the dam. These incidents cause physical damage to the dam gates or structure, interfere with dam gate operations and can cost human lives. The inability to control the pool that leads to the loss of pool would severely disrupt inland navigation. Loss of pool would have secondary effects on municipal and industrial water supply sources, recreation, aquatic habitat, hydropower generation, coal power generation and industrial plant operations.

Because of these vulnerabilities, transportation firms and government agencies have become interested in providing a system that is resilient to disruptive impacts, including the ability to prepare for, resist, recover from and adapt to disruptions. A resilient inland waterways

system possesses robustness because of its design and can withstand severe blows, respond appropriately to threats and mitigate the consequences of threats through response and recovery operations.

High water events are more common and can cause locks to close because the water level interferes with the lock's operating machinery or, if high enough, submerges the lock chamber. To proactively plan for both events, the maritime industry, U.S. Coast Guard, USACE, state and local governments have jointly developed plans – called Waterways Action Plans – to facilitate safe and orderly movement of traffic during evolving conditions. Ohio's inland waterways are included in the Mississippi River & Ohio River & Tributaries Waterways Action Plan.

Efforts have been made to replace centralized hydraulic systems at locks with separate, dedicated systems to reduce the risk of a complete chamber shutdown due to failures in the centralized system's extensive piping. Converting to dedicated hydraulic systems at four locations near the lock gates allows maintenance staff to isolate and resolve equipment failures quicker and reduce environmental risks from hydraulic fluid spills. The centralized hydraulic systems at Pike Island and New Cumberland locks and dams have been upgraded to dedicated systems.

Over the past five years, around 53% of vessels locking through Ohio locks experienced some delay, lower than the national average of 71%.

INNOVATION

The USACE has long served as a risk management organization, addressing uncertainty and managing risk using various methodologies at all levels of the organization. In 2016, the USACE Engineer Research and Development Center (ERDC) released Technologies to Extend the Life of Existing Infrastructure, a first-of-its-kind best practices compilation on life-cycle maintenance management, innovative technologies and emerging capabilities that are happening at USACE locks and dams. In 2021, USACE published Research & Development Strategy, a first for USACE laying out a new programmatic approach to research and development (R&D). The strategy identifies the top ten USACE R&D priorities to address the nation's toughest challenges with multi-disciplinary solutions. Locks and dams are included under the priority of "modernize our nation's infrastructure" to reduce scheduled downtime by 25% and extend the service life of existing and future infrastructure by 50%.

The USACE has recently begun evaluating the use of Fiber-Reinforced Polymer (FRP) composite materials to replace components initially fabricated from metal. Major lock and dam components being considered include lock gates, lock valves, dam gates and bulkheads. FRP composite materials are lighter in weight, have higher strength, are resistant to corrosion and cost less to maintain.

RECOMMENDATIONS TO RAISE THE GRADE

- Consistently fund waterways projects at the authorized levels and continue to pass a Water Resources Development Act on a two-year cycle.
- Increase the amount spent on operation and maintenance of inland waterways each year.
- Prioritize federal funding on rehabilitation of structures that are well beyond their design life and present a high risk of failure rather than new construction. Regular federal appropriations are not adequate to sustain major rehabilitation.
- Continue to advance goals identified in the USACE CW Strategic Asset Management Plan.
- Increase awareness of the value of inland waterways throughout Ohio.

SOURCES

U.S. Army Corps of Engineers, "Great Lakes and Ohio River Division", 2025.

U.S. Army Corps of Engineers, "Institute for Water Resources", 2025.

U.S. Army Corps of Engineers, "Louisville District – ORSANCO Draft Report", 2020.

U.S. Army Corps of Engineers, "Saint Paul District", 2025.

U.S. Army Corps of Engineers, "Pittsburgh District", 2025.

U.S. Army Corps of Engineers, "Planning Center of Expertise for Inland Navigation – 2022 Ohio State Profile", 2022.

U.S. Army Corps of Engineers, "Planning Center of Expertise for Inland Navigation – Waterborne Commerce Statistics", Transportation Rate Database, 2025.

U.S. Army Corps of Engineers, "Enterprise Data Warehouse – Operation and Maintenance Business Information Link", 2025.

Waterways Action Plan, "Mississippi River & Ohio River & Tributaries", 2025.

Ohio Department of Transportation, "Transport Ohio – Working Paper 1: Characteristics of Ohio's Freight System", 2021.

Ohio Department of Transportation, "Transport Ohio – Statewide Freight Plan", 2022.

Levees

C-

GRADE COMPARISON

Ohio: C-

Nat'l: D+

Photo: Hydraulic excavator on the riverbank. Toru Kimura

LEVEES

EXECUTIVE SUMMARY

Ohio has over 172 miles of levees, primarily along the Ohio, Scioto, and Great Miami Rivers. Levees are critical in reducing damage to communities from seasonal flooding caused by heavy rainfall, snowmelt and storms. Ohio's network of levees reduces flood damage risk for more than 165,000 people and $37 billion in property. Many of these levees were constructed in the early 1900s using outdated design standards. The components of these older systems are deteriorating, requiring costly maintenance or replacement. Most levee systems in Ohio have not had risk assessments, and inspection standards are inconsistent across the state.

When levees fail, the consequences can be catastrophic, leading to widespread property damage, displacement of residents and economic losses. As extreme weather events become more frequent, the reliability of Ohio's levees will be increasingly tested. Upgrading and maintaining these structures and improving floodplain management are critical to mitigating future flood risks in the state.

CAPACITY AND CONDITION

Geography – including numerous rivers, lakes and streams – primarily drives flood risk in Ohio. The state experiences seasonal flooding due to heavy rainfall, snowmelt and storms. Areas along major rivers – such as the Ohio River, the Scioto River and the Great Miami River – are particularly vulnerable. Urbanization has also increased flood risks in cities like Columbus, Cincinnati and Cleveland. More impermeable surfaces are leading to higher runoff during storms because this water is not absorbed into the ground. Ohio is prone to flash floods and riverine flooding, with some regions also affected by ice jams during the winter. Floodplains and low-lying areas are at greater risk, and climate change is expected to exacerbate these issues by increasing the frequency and intensity of storms. Flooding in Ohio can cause significant damage to property, infrastructure and agriculture, making it a key concern for disaster preparedness and mitigation efforts in the state.

To address this flood risk, 176 levee systems spanning 172 miles were constructed in Ohio. Most levees in Ohio are earthen embankments designed and built to contain, control or divert the flow of water in a way that reduces the likelihood of flooding. Levee systems in urban areas usually include concrete floodwalls, removable road or rail closures, floodgates and flood pump stations. These tools and systems work together to reduce the likelihood of harm from potentially devastating flood waters.

The U.S. Army Corps of Engineers (USACE) estimates that Ohio's levee systems reduce flood risk for more

than 165,000 people, at least 48,000 structures and $37 billion in property.

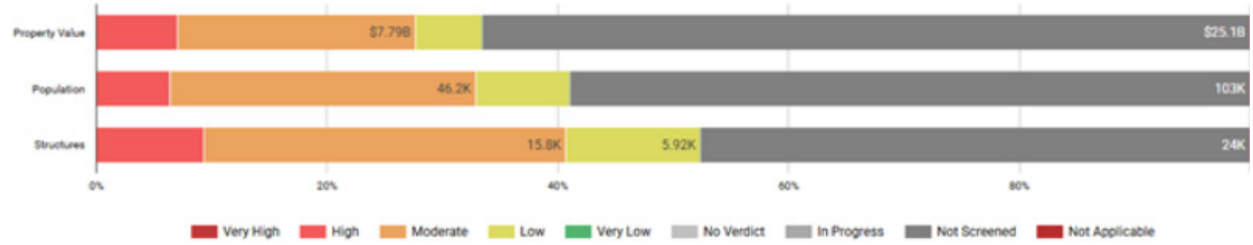
Table 1 and Figure 1 below show data from the USACE National Levee Database (NLD). The database shows that most Ohio levee systems are not under the umbrella of the USACE Levee Safety Program. At least 58% of people living behind a known levee in the state may not realize that their levee hasn't been screened. Screening helps evaluate the benefits of a levee, identify key risk factors (i.e., how it might perform in a flood) and estimate the potential impact on the community. Without this information, it's harder to understand the true level of flood risk and make informed decisions about safety and preparedness.

Of those living behind a federal levee, 7% live behind a levee system determined to have high risk. This means that inundation due to breach and/or system failure would very likely result in loss of life, large economic losses and/or devastating environmental consequences.

Table 1: Levees in the National Levee Database, State of Ohio

	Levee Systems	Levee Miles
USACE Federally Authorized, USACE Operated and Maintained	4	4.7
USACE Federally Authorized, Operated and Maintained by Another Entity	26	51.8
Non-Federally Constructed, local O&M	146	116.0
Total	176	172.5

FIGURE 1: Assets behind levees compared to levee risk level



As part of the National Levee Safety Program, USACE has the authority to conduct a one-time review, known as a Levee Review, of all levees identified in the National Levee Database to provide a clearer picture of levee-related flood risk nationally and a baseline of levee information. Under this initiative, USACE can facilitate a levee site visit and screening-level risk assessment on non-federal levees. In the spring of 2024, the Miami Conservancy District, City of Dayton and the Ohio Department of Natural Resources partnered with USACE to conduct a pilot levee review. The pilot focused on testing and refining processes and Levee Review products to efficiently meet the goal of helping states, tribes and levee owners/operators make informed decisions on managing flood risks associated with those levees.

The average age of levees in the state is 47 years, which is nearing the end of their projected design life of 50 years. Many parts of these systems – such as pumping stations and floodgates – were constructed early in the 20th century. This means repair to the mechanical and/or electrical systems may not be possible since replacement parts are often unavailable or the parts are incredibly costly. When repairs are impossible, the cost of replacement is high.

OPERATION AND MAINTENANCE

While some levees are stationary earthen embankments that do not require operation, some systems require active mechanical operations of pumps and gates, which need to be tested periodically to keep them in good working order. Regardless of type, all levees demand consistent maintenance and periodic repairs, replacements or upgrades to maintain the necessary performance levels to mitigate flood risks.

The USACE designed and constructed 30 of Ohio's levee systems, spanning approximately 56.5 miles. Afterward, they transferred the operations and maintenance responsibilities of 26 systems (51.8 miles) to local sponsors, maintaining ownership of 4 systems (4.7 miles in length). A local sponsor is typically a public entity – such as a city, town, utility or state government – charged with operating and maintaining levees to ensure they function as intended in reducing flood damage.

The Miami Conservancy District is another significant entity responsible for the design, construction and ongoing operations and maintenance of levee systems, particularly along the Great Miami River, where it manages 53 miles of levee. These local sponsors must routinely operate mechanical and electrical systems, conduct regular inspections and maintain detailed records of their operations and maintenance activities. Local sponsors share some of their data with the USACE, which maintains comprehensive records of most U.S. levees in the National Levee Database (NLD). The NLD – created and managed by the USACE – serves as an authoritative source of information on levees, including data on inspections, floodplain management and risk assessments. Additionally, the USACE conducts inspections of levee systems within its portfolio, providing findings that assist federal operators and local sponsors in effectively maintaining and operating their levees.

Levee failures and performance issues have been a concern in Ohio, especially where aging infrastructure and extreme weather events converge. Although Ohio has not faced catastrophic levee failures comparable to those in other states, there have been significant incidents. For instance, levees along the Blanchard River in the Findlay area were overtopped during 2005's severe flooding, causing considerable property damage. This event exposed the limitations of the existing levee system and spurred discussions on necessary improvements and flood mitigation strategies. Similarly, in 2011, heavy rains led to flooding along the Ohio River, stressing levee systems in cities like Cincinnati and Portsmouth. Although these levees held, concerns arose about their long-term performance and the need for upgrades.

The USACE has assessed several Ohio levees as part of its Levee Safety Program, identifying issues such as inadequate height, seepage and insufficient maintenance. These assessments have led to recommendations for repairs and upgrades, though funding and implementation remain ongoing challenges. While Ohio's levees have generally performed adequately, the aging infrastructure and increasingly severe weather events underscore the importance of continued investment in maintenance and improvements to ensure future performance.

FUNDING AND FUTURE NEED

Approximately 98% of Ohio levees are operated and funded by cities, municipalities or other local public entities. Budgets can vary widely, and many entities have limited repairs or maintenance budgets. With the average age of the levee systems approaching 50 years, maintenance costs are expected to increase, further straining communities' ability to maintain the levee systems. The remaining 2% are federally owned levee systems associated with federal dams. Maintenance of these levees is funded through the federal dam safety program.

PUBLIC SAFETY

The public and property protected by levees in Ohio include hospitals, universities, major manufacturing facilities, treatment plants, power plants and densely populated metropolitan areas. During recent significant flooding events along the Ohio River, its tributaries and the Lake Erie shoreline, the state's network of levee systems functioned appropriately without any breaches or failures. Because extreme rain events are occurring with more regularity in recent decades, flooding is a public concern and levees play an important role in keeping Ohio's citizens safe from the devastating effects floods can cause.

Flood awareness and emergency preparedness are key in risk management for individuals and communities living behind levees. The Federal Emergency Management Agency (FEMA) requires every levee within its program have an emergency action plan (EAP). The size of the community within the leveed area will dictate the complexity of the EAP. For example, EAPs for larger, more densely populated urban communities – such as Cincinnati, Columbus or Cleveland – will require more detailed evacuation route mapping and a broader emergency contact flowchart than EAPs for small communities.

Because extreme rain events are occurring with more regularity in recent decades, flooding is a public concern and levees play an important role in keeping Ohio's citizens safe from the devastating effects floods can cause.

RESILIENCE AND INNOVATION

A combination of aging infrastructure, ongoing maintenance efforts and the increasing threat of extreme weather events shapes the resilience of Ohio's levee systems. While the state's levees have generally performed their intended function of protecting communities from flooding, some notable concerns and challenges highlight the need for continued attention and investment. The resilience of Ohio's levee systems is increasingly tested by extreme weather events, such as heavy rainfall and flooding. Events like the 2005 flooding in Findlay and the 2011 flooding along the Ohio River have shown that severe weather can overwhelm even well-maintained levees. These incidents highlight the need to not just maintain existing levees but also re-evaluate their design in the context of changing climate patterns. Enhancing the resilience of levee systems may involve raising levees, improving drainage systems or integrating more advanced monitoring technologies.

While Ohio's levee systems have not experienced the catastrophic failures seen in some other states, the combination of aging infrastructure, funding challenges, and the increasing severity of weather events presents significant risks. The future resilience of Ohio's levee systems will depend on continued investment in maintenance, timely upgrades and the implementation of modern flood management strategies.

In conclusion, while Ohio's levees have shown resilience in the past, their future performance depends on addressing both their physical and financial challenges. Proactive measures – including robust maintenance programs, infrastructure upgrades, and community preparedness – are essential to ensuring these levees continue to protect Ohio's communities from flooding in the years to come.

RECOMMENDATIONS TO RAISE THE GRADE

- Continue involvement in the National Levee Safety Program established by the Water Resources Reform & Development Act of 2014, especially efforts with USACE to inventory and perform inspections & risk assessments on the levee systems in Ohio.
- Establish a statewide levee safety program to encourage the sharing of emergency plans, education, best practices, training and inspection data so Ohio levee owners/operators have a central repository of information.
- Encourage all levee owners to have emergency action plans and stay up to date.
- Explore a program for nonfederal levees to require safety inspections and have EAPs in place.
- Increase public outreach to educate communities about how important levees are to protecting lives.
- Increase citizen awareness of the risks related to levees and effective methods for living safely with them.

SOURCES

U.S. Army Corps of Engineers, “National Levee Database”, 2025.

State of Ohio, “State of Ohio Hazard Mitigation Plan”, 2024.

Ports

C+

GRADE COMPARISON

Ohio: C+

Nat'l: B

Photo: Port of Toledo

PORTS

EXECUTIVE SUMMARY

Ohio's ports serve as key economic drivers for the state, located along the north coast of Lake Erie and the Ohio River. The larger ports are situated on Lake Erie, while smaller, mostly private terminals and commercial docks supporting the intermodal transfer of industrial goods and bulk cargo from barges are found along the Ohio River in designated Port Statistical Areas. These areas aggregate commercial docks and terminals within specific geographic boundaries, which often span county and municipal lines. Port Statistical Areas are common along the Ohio River, while port authorities defined by federally designated harbors, counties, or city boundaries are typically found along the Lake Erie coast. While Ohio's ports are strategically located and possess significant excess capacity, their overall quality is hindered by aging infrastructure, inconsistent asset management and limited funding. Despite recent progress through federal and state grant programs, Ohio's ports continue to fall behind national peers in modernization, efficiency and resilience.

(The Ports section of the Ohio Infrastructure Report Card evaluates the state's port infrastructure, covering upland multimodal connectivity, capital resources, the condition of maritime and local harbor infrastructure and navigation conditions within each harbor/port to support maritime access. For more information on the 541 river miles of the Ohio River, including the nine navigational locks and dams that provide access to Ohio River ports and the locks connecting to the Great Lakes, refer to the Inland Waterways chapter, which highlights the marine highway system serving both sides of the state.)

Ohio's Port Metrics:

- 730 miles of navigable waterways
- Ranked 11th in the nation for annual tonnage, moving 61.7 million tons in 2022
- Two ports in the top 50 by tonnage (Cleveland and Toledo)
- Top three Port Statistical Areas in the United States are along the Ohio River

As Ohio's port infrastructure ages, Ohio struggles to efficiently handle the shifting, more diverse cargo mixes of the 21st century. Ohio ports have excess capacity and lag nationally on decarbonization, resiliency enhancements and preventative asset management programs. This is in large part a result of their market position, resource constraints and the cargo moved, which is different than the nation's large coastal ports. Ports in Ohio are undercapitalized to address future trends and infrastructure needs. While federal and state grant programs have enabled several ports to make capital investments in port infrastructure across the state, a significant backlog remains. The needs of ports within Ohio outpace available funding, coupled with the increased costs of maintaining and reinvesting in aging infrastructure.

Photo: Maritime

BACKGROUND

Ports are a key engine to American competitiveness and prosperity, with over 25% of the U.S. economy linked to ports. Ohio's ports are critical in both the movement of domestic and international goods. Ohio benefits from direct maritime access to regional (Great Lakes, Midwest), national and global markets, thereby providing accessibility, time savings, a lower carbon footprint, safety benefits and lower overall costs. Ohio's ports on Lake Erie and the Ohio River generate over $37.5 billion in economic activity, 130,000 jobs and $970 million in state and local income taxes. Table 1 shows the direct statewide annual economic impact in 2023 dollars.

TABLE 1: ECONOMIC IMPACTS OF THE OHIO MARITIME SYSTEM (2023)

JOBS	PERSONAL INCOME	BUSINESS REVENUE	LOCAL PURCHASES	TOTAL TAXES PAID
130,789	$9.7 billion	$37.5 billion	$2.4 billion	$970 million

The industry-wide saying "If you have seen one port, you have only seen one port" holds true in Ohio. Ports in Ohio consist of public port authority terminals, private industrial terminals and passenger ferry/cruise ship terminals. Many terminals move bulk commodities supporting the manufacturing, agriculture, construction and power generation industries. These ports are decentralized and locally chartered and/or are private, allowing ports to be responsive and adaptable to the needs of local microeconomic drivers. They are also built custom to meet the needs and serve the interests of the private corporations that run them. This has resulted in the absence of a unified funding strategy, preventing strategic investments in ports that could maximize their economic potential by leveraging their capacity and unique attributes.

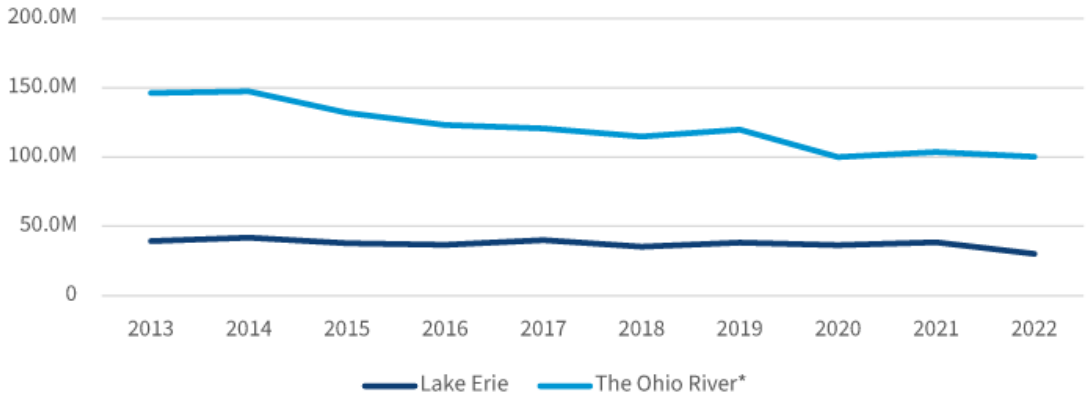
CAPACITY AND CONDITION

Ohio's ports cover 730 miles of navigable waterways and are 11th in the nation for annual tonnage. There are 13 Lake Erie ports and three Port Statistical Areas on the Ohio River with 119 active public and private freight docks combined. Ten of the ports provide passenger services, with the bulk of this activity taking place in the Lake Erie Islands and in the Port of Cleveland where seasonal cruise vessels regularly call the port. Cargo transported through Ohio ports includes cement, coal, grain, break bulk cargo, specialty project cargoes, iron ore/taconite, limestone, liquid bulk, salt, sand petroleum and shipping containers in addition to ferry/cruise ship passengers. Ohio ports have excess capacity, even while moving over 60 million short tons of cargo through their docks annually. While significant, this is only a fraction of their existing capacity.

Seven ports in Ohio carry the designation as a principal port, according to the current list of principal ports designated by the U.S. Army Corp of Engineers (USACE). The principal port designation is a list of the top 150 ports based on tonnage. The Ohio Department of Transportation (ODOT) classifies 12 of the Lake Erie ports as primary freight and passenger ports. The Port of Huron's, located on Lake Erie, primary freight port designation was demoted to a secondary freight port due to limited freight/commercial navigation activity. The authorized project depth of their navigation channel has been reduced from 28 feet to 14 feet and, as a result, its port infrastructure reinvestment opportunities will be limited moving forward. In 2023, the Port of Cleveland's General Cargo Terminal handled approximately 314,000 tons of cargo, which is 13% of the terminal's maximum capacity. In that same year, the Port of Cleveland handled 12,600 containers of its 50,000 annual capacity. While Huron and Cleveland are isolated examples, these utilization trends are not unique to these harbors, and they demonstrate the available capacity and untapped potential of Ohio ports.

Many coastal ports have seen significant growth coupled with public and private investment to expand capacity to handle additional volumes. This is not the case at Ohio's ports. Historically, Ohio ports have served legacy industries and non-dynamic growth markets and are often driven by domestic and international economic conditions. The chart below shows Ohio port cargo trends from 2013 to 2022. While Lake Erie's total tonnage has remained relatively stable throughout the 2010s and early 2020s, the tonnage handled by Ohio River ports has declined by 30% over the last decade. This is largely the result of reductions in specific commodities moved, such as coal. Growth at the coastal ports is largely tied to expanded global trade and the movement of higher-valued consumer goods in shipping containers. This has not been seen at inland and Great Lakes ports, including those in Ohio. Ohio ports have worked hard to diversify their cargo bases to sustain and grow cargo levels. This can be seen at the Port of Cleveland, where they continue to expand the movement of containerized cargo in and out of the Great Lakes via the Cleveland-Europe Express route and support growth in the emerging Great Lakes cruise ship industry.

Figure ES- 5: Total Tonnage Handled at Ohio's Principal Ports (2013-2022)



Source: CPCS analysis of Waterborne Commerce of the United States Annual Reports. US Army Corps of Engineers. 2024. *Note: Besides volume handled by ports in Ohio, the total Ohio River tonnage comprises shipments handled by out-of-state ports located within the PSAs.

Direct access to the Great Lakes, the Atlantic Ocean via the St. Lawrence Seaway and the Gulf of Mexico via the Ohio/Mississippi River system is a tremendous asset; however, this asset is only partially leveraged because of operational and competitive disadvantages and barriers. One constraint is the inability of Ohio ports to efficiently offload cargo with modernized equipment at scale due to outdated and inefficient infrastructure and capital assets. With additional investment to improve and modernize Ohio's ports, the total tonnage can grow dramatically to take advantage of our state's excess capacity and continue to diversify and support the state's

businesses, manufacturers, importers and exporters. The St. Lawrence Seaway closure for nearly three months a year tied to winter navigation conditions and required maintenance on the Seaway's locks is expected to continue to be the most significant constraint on international shipping to Ohio's Great Lakes ports. In recent years, there has been a movement to reduce the duration of this service outage to support the supply chains that rely on this international shipping corridor. In 2023, the Great Lakes St. Lawrence Seaway System had the longest operating season in its history. Binational efforts to limit the duration of the closures within the Great Lakes St. Lawrence Seaway System and at the Soo Locks will continue to benefit Ohio's Lake Erie ports.

Much of the port infrastructure in service today was put into service when major investments were made to the Soo Locks and the Saint Lawrence Seaway from 1940 through the 1960s. The same holds true with major investments and upgrades made in the Ohio/Mississippi River system. Limited local resources are routinely tapped to keep existing infrastructure in service and to support efforts to sustain navigation.

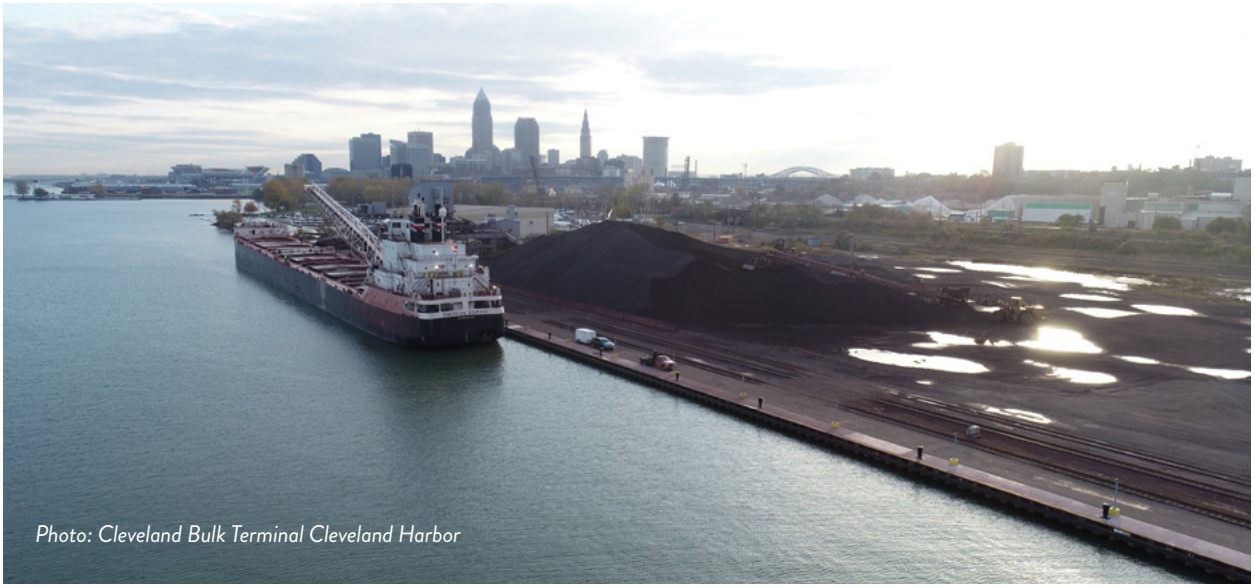


Photo: Cleveland Bulk Terminal Cleveland Harbor

OPERATION AND MAINTENANCE

Limited resources have hindered infrastructure reinvestment in Ohio ports, an issue exacerbated by market and commodity trends, which contribute to the common practice of deferring major reinvestment and modernization, increasing maintenance backlogs and stretching resources to perform an increasingly diverse portfolio of operations. Unforeseen repairs or crises cripple the budgets of ports because they often lack reserves dedicated to such situations.

Each port handles asset management differently, leading to disjointed assessment and planning efforts. The age and condition of the existing infrastructure in Ohio ports present challenges when ports look to formally inventory their capital assets, assess their current conditions, determine their anticipated lifespans and market themselves. As major reinvestment occurs within Ohio ports, asset management programs paired with facility master planning are needed to transition from reactive to proactive maintenance programs. Successful asset management programs require both resources to get off the ground and staff to maintain accurate records. The Port of Cleveland implemented a Computerized Maintenance Management System "CMMS" that is a GIS-based asset management program in 2022 to catalog its assets. This port is actively working to integrate this system into its day-to-day management, aiming to reap the benefits of the system over time. Many of the state's ports lack the financial and internal staff resources to be able to implement these systems.

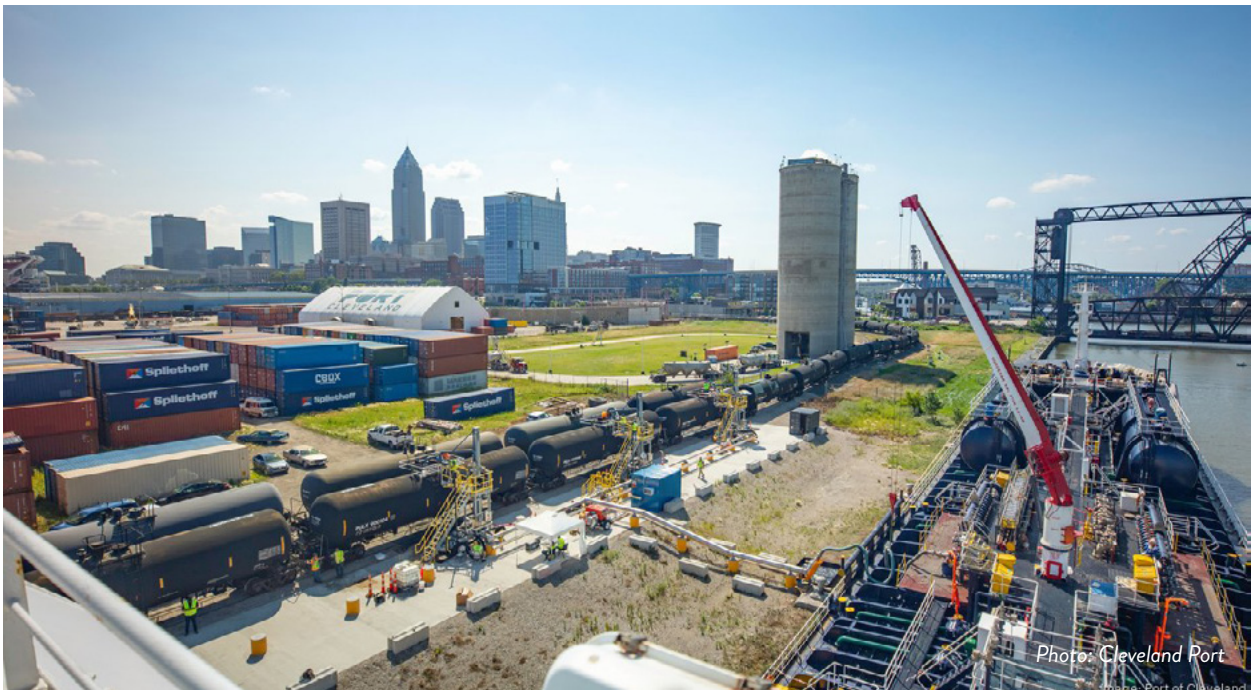


Photo: Cleveland Port

FUNDING AND FUTURE NEED

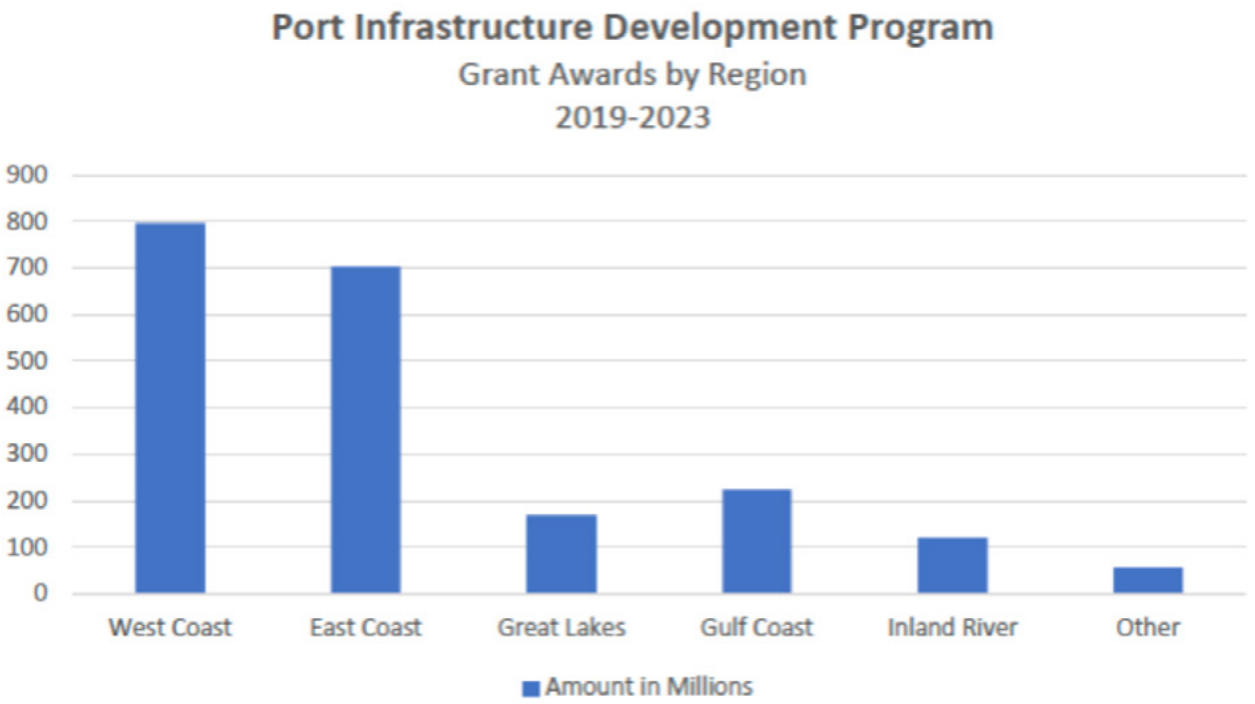
Ohio's public ports have limited means to generate operating revenue and struggle greatly to obtain capital dollars for major reinvestment programs. The state recognized this need and created the Maritime Assistance Program (MAP), administered by ODOT, in 2019. The program was recently renewed in 2023, albeit at a reduced funding level. Funding of this competitive program was reduced from $23 million to $10 million when it was renewed for fiscal year 2024 and fiscal year 2025. The creation of the MAP grant program has positioned Ohio ports to gain the resources needed to compete and modernize their facilities. Several ports – including Cleveland and Toledo on Lake Erie and the Columbiana County Port Authority on the Ohio River – have been awarded grant funds through this program. Projects awarded include equipment upgrades to improve terminal efficiency, dock modernization and reconstruction projects, investments in dredged material management facilities and facility upgrades required to handle modern cargoes. MAP funds are critical in the pursuit of federal funds, as they are leveraged by ports and paired with limited local resources as match dollars. MAP is a discretionary program that must be renewed on a biennial basis as part of the state's operating budget. As a result, the program is at risk of not being renewed and funding levels are uncertain. This makes it difficult for ports to depend on the program to develop their capital programs, which in many cases are multi-year, multifaceted plans.

Several existing federal programs and budgets – including those of the USACE, which provides critical harbor and lock maintenance work – received additional funds from the Infrastructure Investment and Jobs Act (IIJA). Recent legislation included a focus on port programs. The IIJA created the Reduction of Truck Emissions at Port Facilities program, while the Inflation Reduction Act (IRA) established the Clean Ports Program. These new programs – paired with existing ones like the Port Infrastructure Development Program (PIDP) overseen by the U.S. Department of Transportation's Maritime Administration – are great tools for Ohio ports to advance significant investments that were largely out of reach a decade ago. Several ports within the state have been successful in securing federal funds. The ports of Toledo and Cleveland recently completed projects funded through the PIDP. More recently, the Port of Cleveland successfully secured an additional $27.2 million in 2022 PIDP funds to advance a major project that will help the port advance its decarbonization plans, reduce its environmental impact

and improve its energy resilience, while reinvesting in infrastructure beyond its anticipated useful life. In 2024, the Port of Cleveland also received more than $94 million in EPA Clean Ports funding to advance electrification and its net-zero emissions master plan.

In 2023, four Ohio ports applied for more than $46.5 million in federal funds through the PIDP to advance capital reinvestments of over $56 million, but no Ohio port was selected. In 2024, several ports reapplied, and the Put-in-Bay Port Authority was awarded $10.4 million in funds to support improvements in ferry infrastructure improvements in the Lake Erie islands. As a result of the structure of these programs, Ohio ports not only compete within the state against one another to secure infrastructure grant funding, but they also compete nationally with other states and ports that are, in many cases, much larger and more heavily resourced. Additionally, many of these other ports continue to grow, thereby limiting the competitiveness of Ohio's underutilized inland and Great Lakes ports. The data shown below reflects the PIDP funding disparity between Great Lakes and inland ports and coastal ports.

Ohio ports not only compete within the state against one another to secure infrastructure grant funding, but they also compete nationally with other states and ports that are, in many cases, much larger and more heavily resourced.



Data collected and published by the Great Lakes Ports Association

Ohio's ports need predictable, long-term funding for national and global competitiveness. In short, Ohio's ports struggle to play their intended role in what should be a seamless multimodal logistics network that supports our state's manufacturers and businesses. Continuation of funding for both state and federal programs at predictable and consistent levels, with a specific focus on inland and Great Lakes ports, is critical in maximizing and leveraging limited local funds.

PUBLIC SAFETY

Security and cargo clearance systems in Ohio ports are outdated, relying on 20th-century systems and standard business practices. While these antiquated terminal operating systems may limit cybersecurity risks, they reduce terminal efficiency and make it more difficult to harness and act on data. Ports within the state also struggle to provide facilities to meet the specifications required by U.S. Customs and Border Protection. Ports – especially those that handle international cargo – have had to divert significant amounts of operating and capital resources to enhance terminal security over the past 20 years.

RESILIENCE

Weather patterns across the Ohio River Valley and the Great Lakes region show trends of more heavy rainfall events and longer periods of drought. This results in increased navigation channel sediment deposition and water elevation pressures. Lake Erie's water elevations are at or near historic highs, breaking several record-high monthly mean water levels between 2019 and early 2020. Alternatively, the Ohio River is experiencing low water conditions, which are presenting navigation hazards due to the drought conditions in the Ohio River Valley. Water level variability conditions in Lake Erie and on the Ohio River must be considered when upgrading or implementing new infrastructure.

Ohio ports need to conduct resiliency assessments to plan for future climate-related threats. These assessments must be paired with Dredged Material Management Plans (DMMPs) to manage sediment in an environmentally and economically responsible manner. The state restricted the open lake placement of sediment from federal navigation channels into Lake Erie in 2020.

Leading up to this, there has been increased focus on the beneficial reuse of sediment at the local, state and federal levels. DMMPs must be coordinated for each of Ohio's harbors and ports among federal, state and local stakeholders, as none of Ohio's Lake Erie ports currently has an active 20-year DMMP.

While several harbors on Lake Erie have implemented dredged material management solutions through collaborative efforts, work remains to ensure safe, full-depth navigation conditions exist for each of Ohio's ports for the next 20 years or more.

INNOVATION

Maritime shipping – specifically on the Ohio River system and within the Great Lakes – is not recognized as very innovative. The industries that this infrastructure has traditionally supported include manufacturing and the movement of bulk commodities, such as agriculture products, petroleum, coal and iron ore. All are critical to Ohio's economy, but not generally seen as innovative or growth markets. Ohio's ports must continue to push for innovative practices to complement these industries, such as real-time cargo position tracking and development towards autonomous transportation networks.

While the movement of traditional cargoes through Ohio ports is – and will remain – critical, investments must also continue to be made within our ports to service industries that are underserved or emerging, such as the blossoming cruise ship industry. This diversification will result in a more resilient and healthy system for both ports and the state.

Photo: General Cargo International Terminal Port of Cleveland

RECOMMENDATIONS TO RAISE THE GRADE

- Sustain funding of state and federal programs at consistent levels with an equitable distribution of federal funds to inland and Great Lakes ports.
- Modify how maritime ports compete for federal funds to make infrastructure investments to modernize our nation's ports. As it's currently structured, the competitive application process pits some of the nation's largest ports against Ohio ports for limited grant funding.
- Continue national and international efforts to expand the utilization and reduce the barriers of entry to use the nation's marine highway system, which is safer, has environmental benefits, has regional and national supply chain benefits, and would increase utilization of Ohio's ports.
- Continue state-level port freight planning and regional coordination among state port authorities to maximize assets of each port for greatest state benefit.
- Engage stakeholder collaboration to develop 20+-year sustainable Dredged Material Management Plans (DMMPs) where beneficial use is a key component and centerpiece of the plans for each of Ohio's harbors, consistent with Ohio law and containing clearly identified and sustainable funding strategies.
- Provide state-level resources and support to port authorities to develop consistent and comprehensive asset inventories and asset management programs.

SOURCES

Ohio Department of Transportation, "Working Papers & Materials", 2025.

Ohio Department of Transportation, "Maritime Assistance Program", 2025.

U.S. Department of Transportation Maritime Administration, "Port Infrastructure Development Program", 2025.

Navigation and Civil Works Decision Support Center, U.S. Army Corps of Engineers, "The U.S. Coastal and Inland Navigation System: 2022 Transportation Facts & Information", 2022.

Martin Associates, "Infrastructure Investment Survey of the Great Lakes & St. Lawrence Seaway System", 2023.

American Great Lakes Ports Association, "Ohio Relies on Great Lakes Seaway Shipping Fact Sheet", 2024.

Cleveland-Cuyahoga County Port Authority, "Bulkhead Condition Assessment", 2025.

Cleveland-Cuyahoga County Port Authority, "Strategic Plan Update 2023–2027", 2023.

Toledo-Lucas County Port Authority, "2024 Annual Report", 2024.


Public Parks
C+
GRADE COMPARISON
Ohio: C+
Nat'l: C-

PUBLIC PARKS

EXECUTIVE SUMMARY

Ohio's park infrastructure is in fair to good condition. Parks are resilient, safe and innovative, developing new uses of technology to seek funding and connect people. Overall, the needs and funding of Ohio parks are uneven, varying throughout the state and among those managed by federal, state and local entities. The majority of residents of Ohio urban centers live within 10 minutes of a park. However, the total area of parkland and amenities provided is still insufficient for Ohioans, not to mention that usage has increased since the COVID pandemic. Funding shortfalls lead to inadequate maintenance of parks and structures. One-time investments from the American Rescue Plan Act (ARPA) and the Infrastructure Investment and Jobs Act (IIJA) made a significant positive impact, but are due to expire in the coming years.

BACKGROUND

Ohio is home to the Cuyahoga Valley National Park (CVNP), the Wayne National Forest, 10 designated National Park Service historic sites, monuments and memorials, three wildlife refuges managed by the U.S. Fish and Wildlife Service and several U.S. Army Corps of Engineers properties that provide water-based recreational opportunities. Ohio has 75 state parks, 23 state forests, 136 state nature preserves and 152 state wildlife areas under the responsibility of the Ohio Department of Natural Resources (ODNR), totaling 118,153 acres. There are 62 park districts in Ohio, including the metroparks that serve the largest metropolitan areas of the state – Cuyahoga County (Cleveland), Columbus, Hamilton County (Cincinnati) and Toledo. Outdoor recreation activities contribute $17.2 billion, or 2.1%, to Ohio's gross domestic product.

CAPACITY

Publicly accessible outdoor recreation areas total more than one million acres or approximately 0.85 acres per resident (excluding small local parks). Table 1 shows how major Ohio cities rank on the Trust for Public Land's ranking of 100 largest cities in the U.S. for park accessibility.

Table 1: Ranking of Ohio's cities among the 100 largest US cities (Trust for Public Land, 2024)

City	National Rank	% of residents within 10 minutes of a park	Acres of park land per resident
Cincinnati	8	88%	4.2
Toledo	27	83%	5.7
Cleveland	31	81%	3.9
Columbus	46	71%	7.5

The rankings improve on the 2021 data and are supported by a survey conducted in 2024 for this report. This survey showed that 86% of the respondents indicated they could get to a park in 10 minutes or less. The Cleveland score has decreased from 23 in 2022, even though Cleveland Metroparks provides 25,000 acres of parks to the residents.

In the 2024 Ohio Statewide Comprehensive Outdoor Recreation Plan Survey (SCORP), 16% of respondents indicated that they did not participate in outdoor recreational activities because they were either not available or too far from their homes. This is unchanged from the 2018 SCORP survey, which showed 15.9%.

In 2020, the Ohio Trails Partnership (OTP) reported more than 5,000 miles of trails statewide, including 1,367 miles for multi-use and 1,644 miles for horseback riding. These numbers appear to be unchanged since then. The Buckeye Trail, a cross-state hiking trail managed by the nonprofit Buckeye Trail Association, comprises 1,440 miles of the total.

Results from the Ohio Council survey found that 77% and 85% of respondents agreed that there are sufficient trails in state parks and metropark districts (shown in Table 2). However, the 2024 SCORP survey revealed that trails were the facilities most Ohioans would like to increase in number. There is an identified need for trail connectivity to local and regional transportation networks.

Table 2: Miles of trails in Ohio's largest Metroparks (Zimmerman, 2024 and Metropark District websites)

Metropark District	Trails total (miles)
Cleveland	325
Columbus and Franklin County	230
Cincinnati (Great Parks of Hamilton County)	84
Toledo	200

Facilities Ohioans would like more of (a probable indicator of insufficient capacity) are flushed restrooms, shaded areas, campgrounds, wildlife and birding areas and outdoor pools.

In responding to a survey sent to State Park Directors, ODNR reported that parking and campground reservations remain a challenge for Ohio's most popular state parks, such as Hocking Hills.

CONDITION

ODNR has over $2 billion in aged state park infrastructure that needs replacement or rehabilitation. State parks have seen increased usage and need due to an influx of people and large regional investments. ODNR indicated the need to redesign access boat ramps, continue to upgrade restrooms and replace aging water and sewer lines. The agency assessed the conditions of the roads within state parks as an 8 out of 10. The National Bridge Inventory State Level Data for Ohio indicates that 33% of the 203 bridges within state parks are in good condition, 56% in fair and 11% in poor condition. This is an improvement from 2020 values, due to the addition of funds from ARPA and IIJA. For comparison, only 6% of statewide bridges are in poor condition. Of bridges within parks, 28% are over 100 years old, 33% are currently past their design life (over 75 years old) and 49% are reaching or past their design life (over 50 years old).

Respondents to the 2024 SCORP survey indicated that the top outdoor recreational facilities in need of condition improvement were soccer fields, picnic shelters, playgrounds, campgrounds and trails. However, the survey conducted for this report does not indicate dissatisfaction with the condition of those facilities.

Photo: Atwood Park, Mineral City, OH

OPERATION AND MAINTENANCE

The SCORP 2024 report indicates that the maintenance and rehabilitation of aging infrastructure and recreation facilities is a challenge for many public land managers and outdoor recreation providers. Funding for operation and maintenance tends not to generate as much interest and excitement as new projects, but it is an ongoing and increasing need.

The most recent estimate of National Park Service (NPS) Deferred Maintenance and Repairs for CVNP is based on data from September 2022 and totals $162 million. In 2017, CVNP had a maintenance shortfall of $52 million. Changes in how the NPS estimates deferred maintenance account for some of the increase.

In fiscal year 2022, Ohio state parks employed 1,830 people in operations and maintenance including full-time, part-time and seasonal positions. Of these, 620 were full-time, a decrease from the past five and ten years. Over $2 billion in state parks aged infrastructure needs replacement, rehabilitation or rethinking.

Some park systems have experienced increases in operation and maintenance budgets. The Cleveland Metroparks operations budget increased by 28.9% above 2023 levels, while Columbus Metroparks' 2024 budget for park maintenance amounts to $3 million, an increase of 4.85% from the previous year. Columbus has increased the Parks and Recreation Department budget in the past four years, as shown on Table 3, but operations and maintenance needs remain.

Table 3: City of Columbus Parks and Recreation Budget

Fund	2021 Actual	2022 Actual	2023 Budget	2024 Proposed
Department Total	$58,290,157	$61,683,449	$67,590,636	$74,134,777

PUBLIC SAFETY

ODNR reports that its law enforcement staff have seen a substantial increase in resources, including cadet academies, new vehicles and wage adjustments. It has a dedicated full-time staff person evaluating visitor and employee safety programs. ODNR has numerous recreational safety programs in place – including at beaches and boating facilities – resulting in a decrease in boating fatalities from 2020 (26) to 2023 (10).

Despite these positives, concerns about safety included fall concerns on uneven trail surfaces and insufficient lighting and policing in parks. The latter concern was realized with at least one major safety incident of gun violence in the summer of 2024.

FUNDING

There is no entrance fee to CVNP or to any Ohio state park; most municipal and county park districts are also free. While this presents funding challenges, it also makes Ohio parks accessible to all.

CVNP and the Wayne National Forest are funded by the federal budget. Wayne Forest generates some additional revenue from logging, while CVNP is also supported by the Conservancy for Cuyahoga National Park. The Conservancy recently received its largest gift ever ($3.8 million) which will maintain and improve the Ohio & Erie Canal Towpath Trail. CVNP's budget has increased by 20% since 2020, from $10.6 million to $12 million.

Ohio state parks are funded by state general revenue funds, grants, use/registration/permit fees, concessions contract fees and retail sales operations. In fiscal year 2023 to 2024, ODNR received approximately $130 million in ARPA funds to add to its biennial funding program. Funding is expected to revert to previous levels. Allocation of the fiscal year 2025 to 2026 is shown in the table below.

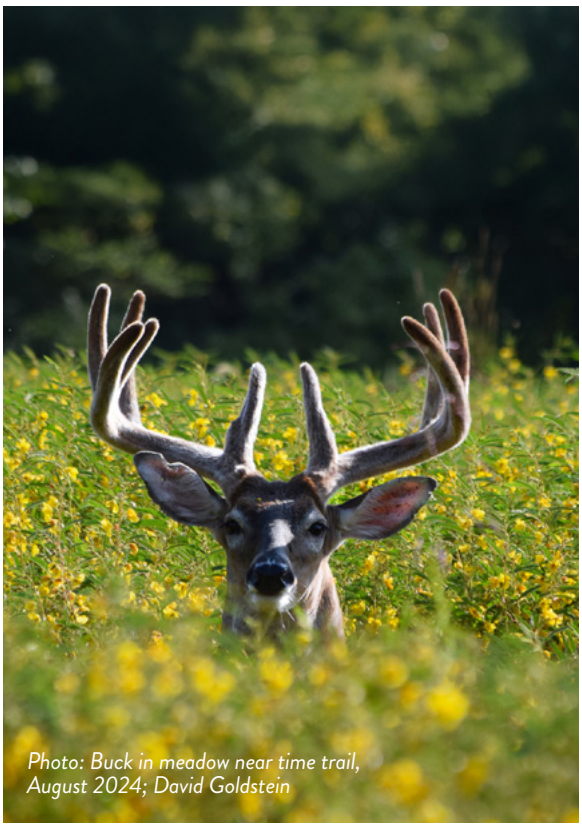


Photo: Buck in meadow near time trail, August 2024; David Goldstein

Table 4: Funding Allocation for Ohio State Parks (ODNR, 2024)

Allocation	Amount in millions
Office and maintenance buildings	$35.7
Cabins, lodges and campgrounds	$42.4
Boating access and marinas	$24.3
Bridges and roadways	$6.7
Day use facilities and small capital improvements	$89.7
Dams, canals and Muskingum River flood control system	$70.6

In April 2023, a law went into effect requiring ODNR to allow hydraulic fracturing (fracking) for natural gas in Ohio's public lands, state parks and wildlife areas. While environmental groups and residents have expressed concern about the associated ecological risks, revenue from the oil and gas leases could significantly increase ODNR's revenue to support parks and public works.

The capital budget signed by Ohio's governor in June 2024 included $298.2 million to support ongoing state park improvements and allow for dam rehabilitation projects. Over the past five years, funds from the state capital budget have been used to build a new lodge at Hocking Hills State Park, make major upgrades to nine other lodges and improve cabins, campgrounds and more.

State of Ohio grants available to local governments and park districts include the Clean Ohio Green Space Conservation Program offered by the Ohio Public Works Commission (OPWC). These grants protect conservation properties in perpetuity and ODNR's Clean Ohio Trail Fund, which supports trail construction, particularly emphasizing underserved communities. Funding levels for the OPWC program total $37.5 million per year. Funding from the Clean Ohio Trail program has remained approximately the same since 2002, averaging slightly over $6 million. The state has recently benefited from a one-time infusion of funds from ARPA, with $151 million for parks and related activities over two years.

Funding for regional park districts (i.e., Metroparks, county parks) comes from federal, state and local grants, not-for-profits, private donors and taxes. Columbus and Franklin County Metroparks expect revenues for fiscal year 2024 to fiscal year 2025 to remain essentially flat. Still, expenditures are expected to grow due to inflation, additional land purchases and increasing operating and capital costs as new parks come online. Cleveland Metroparks, on the other hand, received a $13 million private donation in 2023, followed by a $19.5 million grant from the U.S. Department of Transportation's Rebuilding American Infrastructure with Sustainability and Equity (RAISE) program in June of 2024. The RAISE program's annual investment has more than doubled due to the passage of the IIJA.

Local parks rely on municipal funds, bonds, and taxes, with some revenue from programs/camps, restaurants, concession stands, golf courses and sporting equipment rental in addition to state funds. Local park districts balance keeping fees low while still bringing in revenue. ODNR's NatureWorks program – funded through the sale of state bonds – provides up to 75% reimbursement assistance to eligible townships, villages, joint recreation districts, municipalities, park districts, counties and conservancy districts for the acquisition and/or development of public recreation areas. Municipal parks depend on the tax base of each municipality. 80% of city parks staff perceive the funding for their parks to be insufficient, adding that agencies use their budget in the best possible way. Some Ohio municipalities recently expended more than $30 million on park improvements.

Cleveland, which had relied on bonds for park improvements since 2008, occasionally receiving some additional state funding, received $10 million in the form of an ARPA grant. Unlike Cleveland, Cincinnati relies on a conservancy model for funding, ensuring more funds are available for their parks. Of its $23.6 million 2023 budget, 31.5% came from non-tax-supported sources such as grants, donations, endowments, sponsorships, fees and permits. Admissions, fees, rents, permits and sales generated over $5.3 million in revenue. Private endowments provided over $1.9 million in funding.

The Columbus region recently approved $8 billion for LinkUS, which includes 500 new miles of bike lanes, sidewalks and trails. The project prioritizes connectivity of neighborhoods to trails and parks for first and last mile transit access and coordinates with regional transit connectivity development.

FUTURE NEED

Future needs identified by the 2024 SCORP report include prioritizing advancing trail networks. Future needs are also the focus of master plans being undertaken by the City of Cleveland and completed by Great Parks of Hamilton County. The latter identified priorities as trails, programming for diverse audiences, access to conservation areas, a defined blueway system, partnerships, resiliency, sustainability, access for all users and planning for the future.

When state parks experienced a major increase in usage during COVID, the public rediscovered them. The surge in usage has not abated and parks continue to see large volumes, particularly at sites such as Hocking Hills and trails like Old Man's Cave. Because usage is expected to continue increasing, the need to provide amenities and maintain safe trails and structures will also grow. The billions of dollars in federal COVID aid Ohio received have been allocated, and state tax revenues are lower than initially forecasted. This could indicate the end of a three-year period of solid finances for Ohio and, with it, the end of allocations to park infrastructure.

With future needs in mind, all Metroparks continually acquire land for habitat preservation, nature enjoyment and recreational activities.

RESILIENCE

As the climate continues to change globally, parks can help communities be more resilient by absorbing carbon and offsetting city development. Projects such as the Chagrin River Floodplain Restoration, funded partly by the IIJA, will increase outdoor recreation options and walking trails in the area while ensuring environmental sustainability and increasing resilience to climate change.

The re-opening of Indian Lake State Park shortly after receiving damage from severe storms that struck Logan County in March 2024 is an excellent example of the park resilience.

H2Ohio is a recent partnership between the Ohio Department of Agriculture, Ohio EPA, ODNR and the Ohio Lake Erie Commission that focuses on water quality improvements. It has provided $47 million in funding for waterway sampling, trash and debris collection, low-head dam removal and riverbank and wetland preservation, thus contributing to resilience.

Technological innovations such as digital maps and other wayfinding smartphone applications are also becoming common and are vital both for Emergency Medical Technicians in remote settings and to improve public safety.

INNOVATION

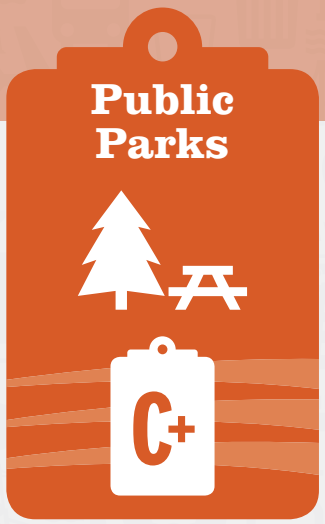
Using technology to connect to the outdoors and parks became more important than ever during the COVID pandemic. Ohio parks are responding to a trend of park visitors using on-line resources for planning information and reservations. Park staff also reported exploring using technology to connect parks to homebound citizens and to provide interpretative services. Technological innovations such as digital maps and other wayfinding smartphone applications are also becoming common and are vital both for Emergency Medical Technicians in remote settings and to improve public safety in general. Cleveland Metroparks has implemented a trail app as well as an e-commerce store.

Ohio park departments use location intelligence tools to evaluate park usage and trends. GIS software can evaluate the demographics, traffic patterns, environments and economics of a specific park or project site. During capital improvement planning, these tools are a valuable resource when used to apply for outside funding that requires traffic data for proper project determination.

Other technological innovations include ODNR's use of Unmanned Aerial Systems (UAS) and magnetometers to help identify orphan oil and gas wells. The Great Parks of Hamilton County transitioned its fleet to all-electric golf and utility carts. Cincinnati Parks developed a biochar production facility that helps grow healthier trees more quickly and combats climate change by turning wood waste into stored carbon.

Cleveland's Master Plan is another example of management innovation. It includes design guidelines based on public input and a parks classification system to shape design and maintenance.

Photo: Hummingbird hawkmoth bill yeck; June 2024; David Goldstein



RECOMMENDATIONS TO RAISE THE GRADE

- Provide residents with a local or regional park within a 10-minute walk in urban areas, along with expanded connectivity and regional transportation networks.
- Continue to add to the network of trails Ohioans enjoy, along with addressing the infrastructure needed to support trails, including additional parking and restrooms, and improved and additional wayfinding.
- Address impacts of increased visitation on park resources, including trail erosion and parking lot development and use. Continue efforts to encourage visitation to lesser-known parks.
- Develop master plans and capital improvements programs for all state parks. Work with Ohio Legislature and Governor's Office to develop longer-term plans that can avoid confusion in priorities during biennial funding allocations. Encourage development of master plans for municipal parks.
- Respond to Ohio's SCORP Survey findings by allocating resources for trail maintenance and rehabilitation and to improvements to athletic fields including adding lighting and facilities upgrades.
- Continue to maximize utilization of multiple funding sources to rehabilitate, update and improve existing outdoor facilities. Continue to acquire more land for habitat preservation, nature enjoyment and recreational activities.
- Develop mobile hiking apps to engage with the large number of park visitors who now use online planning, information and reservation services.
- Provide public Wi-Fi in parks and trails, thus addressing inequities in broadband access across communities and households.
- Provide electric vehicle (EV) charging stations at parks.
- Address requests by the public for increased lighting while being cognizant of energy sources by providing solar-powered lighting.

SOURCES

Armstrong, “Dylan”, ARPA 3 Years Later: Lessons Learned in Ohio, Center for Community Solutions, 2024.

Bilvi, “Brooke”, Brian Zimmerman Grows Cleveland Metroparks into Its Second Century of Stewardship, Smart Business News Online, 2024.

Bureau of Economic Analysis, “2022 Outdoor Recreation Satellite Account”, U.S. Department of Commerce, 2023.

City of Cleveland, “Cleveland Parks and Recreation Plan – Draft Plan Recommendations”, 2024.

City of Cincinnati, “Cincinnati Parks Annual Report 2022–2023”, 2023.

City of Columbus, “2024 Budget – Parks and Recreation”, 2024.

Cleveland Metroparks, “Cleveland Metroparks Budget Book”, 2024.

Cleveland Metroparks, “Cleveland Metroparks Announces $13 Million Gift from the Jack”, Joseph and Morton Mandel Foundation to Expand Park Access on Cleveland’s East Side, 2023.

Comay, “Laura B.”, National Park Service Deferred Maintenance: Overview and Issues, Congressional Research Service, 2024.

Conservancy for CVNP, “Conservancy for Cuyahoga National Park Receives Biggest Gift to Towpath”, Crain’s Cleveland Business, 2024.

Crawford, “Kendall”, Ohio Received Billions in ARPA Funds. Where Is It Going?, The Statehouse News Bureau, 2023.

Daprile, “Lucas”, What Could Cleveland Do with Browns Stadium Funding, Other Than Upgrade a Stadium?, Cleveland.com, 2024.

DeNatale, “Danielle”, Cleveland Metroparks Awarded $19.5M in Federal Funds for 2 East Side Trail Projects, WKYC Studios, 2024.

ESRI, “What Is Location Intelligence? | Location Analysis Delivers Insights”, 2024.

Federal Highway Administration, “National Bridge Inventory – State Level Data”, 2024.

Fisher, “Daniel”, Cleveland Seeks Resident Feedback on Park Plans, The Land, 2024.

Great Parks of Hamilton County, “Annual Report”, 2023.

H2Ohio, “H2Ohio Accomplishments for Fiscal Year 2024”, 2024.

Henry, “Marty”, Who’s Gonna Want to Move Here? How Fracking Around Ohio’s Salt Fork State Park Is Changing Area, Crain’s Cleveland Business, 2024.

LinkUS, “COTA’s Plan to Connect Central Ohio With Sidewalks”, Bikeways and Trails, 2024.

Mitchell, “Olivia”, Officials: 16 People Had Guns During Shootout That Wounded Teen at Edgewater Park in Cleveland, Cleveland.com, 2024.

SOURCES (cont.)

Morrison, "Matt", Efforts for Chagrin River Project Continue in Willoughby, The News-Herald, 2024.

National Association of State Park Directors, "2024 Survey of State Park Directors", 2024.

National Park Service, "Cuyahoga Valley National Park Press Kit", 2024.

National Park Service, "Ohio Deferred Maintenance and Repairs", 2024.

Ohio Council of Sections, "ASCE", Ohio Parks Survey, 2024.

Ohio Department of Natural Resources, "2024 Statewide Comprehensive Outdoor Recreation Plan (SCORP) for Ohio", 2023.

Ohio Department of Natural Resources, "Division of Oil and Gas Resources Management Orphan Well Program – 2021 Annual Report", 2021.

Ohio Department of Natural Resources, "NatureWorks Grant Program", 2024.

Ohio Department of Natural Resources, "Recreational Safety", 2024.

Ohio Department of Natural Resources, "Ohio Boating Fatalities", 2024.

Ohio Department of Natural Resources, "Ohio Trails Partnership", 2020.

Ohio Department of Natural Resources, "Orphan Well Program", 2025.

Ohio Department of Natural Resources, "Orphan Well Program One-Pager", 2025.

Ohio Department of Natural Resources, "The Recreational Trails Program & Clean Ohio Trail Fund Grant Program Information and Application for Ohio Applicants", 2025.

Ohio Department of Transportation, "Walk.Bike.Ohio – Statewide Bike and Pedestrian Plan", 2021.

State of Ohio, "Governor DeWine Announces Indian Lake State Park Set to Reopen on March 29", 2024.

State of Ohio, "Governor DeWine Signs Capital Budget Bill; Creating Historic Investments Throughout Ohio", 2024.

Tobias, "Andrew J.", Great Concept, but Doesn't Work: Ohio to Ditch $930K Trail App Three Years After Its Launch, Cleveland.com, 2024.

The Trust for Public Land, "ParkScore Index", 2024.

U.S. Department of the Interior, "National Park Service Fiscal Year 2020 Budget Justifications", 2020.

Walker, "Steve", ODNR Support Testimony, Ohio Trails Partnership, 2023.

Zuckerman, "Jordan", Drillers Ask Ohio for Permission to Frack Natural Gas Under Keen Wildlife Area, Cleveland.com, 2024.

Photo: A view of derelict, unused tracks on the Scioto River bridge near Portsmouth, Ohio. The American Explorer

RAIL

EXECUTIVE SUMMARY

Ohio has an extensive rail network that is closely integrated with the state's economy. Ohio's 40 freight railroads (four Class I, one Class II and 34 Class III) carry approximately 100 million tons of freight annually across over 5,000 miles of track, serving 86 of Ohio's 88 counties. Ohio has 13 intermodal terminal facilities, more than 100 rail-served transload facilities and numerous maritime facilities along Lake Erie and the Ohio River. Freight railroads pay for all operating expenses and most of their capital expenses through their own revenues. Public funding to support capital projects is available only under specific circumstances. Class II and Class III railroads rely more on public funding than Class I railroads. Amtrak operates long-distance passenger rail service in Ohio along three routes: Capitol Limited (Chicago to Washington), Cardinal (Chicago to New York) and Lake Shore Limited (Chicago to Boston). Due to the scheduling of connecting trains in Chicago, these trains pass through Ohio at night. Based on past success, Ohio should continue to invest in eliminating or improving the safety of highway railroad crossings to reduce accidents. Ohio should also continue to facilitate the upgrade and expansion of the use of wayside detection systems initiated after the East Palestine train derailment. There remains a need to establish sustainable, long-term funding mechanisms at all levels of government to support rail infrastructure investments that generate public benefits and attract private investment.

BACKGROUND

Ohio freight railroads carry approximately 113.7 million tons of freight annually, with 52.8 million tons originating in the state and 60.9 million tons terminating in the state.

Ohio passenger railroad stations serve approximately 134,450 riders annually.

FIGURE 1: FREIGHT TRAFFIC BY COMMODITY IN OHIO (2021)

RAIL TRAFFIC ORIGINATED		
COMMODITY	TONS (M)	CARLOADS
Crushed stone & sand	8.5	79,600
Grain	8.1	75,000
Intermodal	7.8	507,200
Steel products	6.6	73,300
Metallic ores	5.6	56,300
Other	21.9	302,100
TOTAL	58.5M	1,093.4K

RAIL TRAFFIC TERMINATED		
COMMODITY	TONS (M)	CARLOADS
Crushed stone & sand	10.2	93,600
Coal	9.1	81,400
Waste & scrap	9.1	94,500
Chemicals	7.0	72,600
Intermodal	6.4	507,900
Other	23.6	294,500
TOTAL	65.4M	1,144.5K

CONDITION & CAPACITY

The Ohio rail network – comprising active rail lines – spans over 5,000 miles of track, with 89% of the track owned by private freight railroad companies. Some 569 miles of track is owned by government entities (federal, state, county, municipal or port authorities) and 30 miles of track is owned by tourist railroads.

FREIGHT RAIL

Ohio freight railroads are categorized into three classes based on the distance served and earnings: four Class I/national railroads (CSX Transportation, Norfolk Southern, Canadian National Railway Company and Canadian Pacific Railway), one Class II/regional railroad (Wheeling & Lake Erie Railway Company) and 35 Class III/local railroads. CSX Transportation and Norfolk Southern operate 56% of the Ohio rail network.

Most of Ohio's rail lines are composed of only a single track; however, high-density rail lines have two tracks. CSX Transportation and Norfolk Southern each have high-density east-west lines in the northern part of the state. North-south corridors link to other parts of their systems south of Ohio.

CSX Transportation and Norfolk Southern's high-density east-west rail lines can handle double-stack intermodal rail cars. Most other rail lines can accommodate full-height boxcars. Most of Ohio's rail lines can accommodate industry-standard railcars of up to 286,000 pounds gross weight.

CSX Transportation and Norfolk Southern account for 12 of Ohio's 13 intermodal terminal facilities. The 13th, located in Navarre, is currently out of service. With 60% of the U.S. and Canada's population within 600 miles of the Ohio state border, these facilities connect Ohio's commerce to 62% of manufacturing and retail stores.

FIGURE 2: OHIO'S FREIGHT RAIL NETWORK

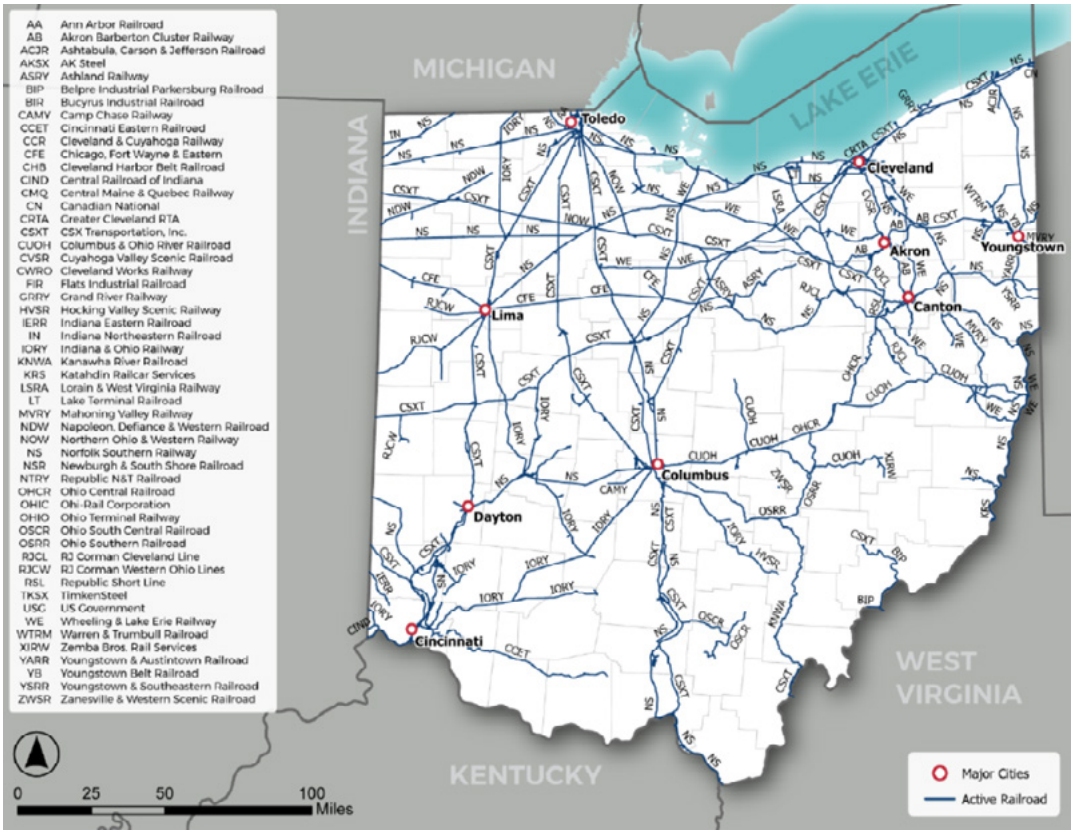
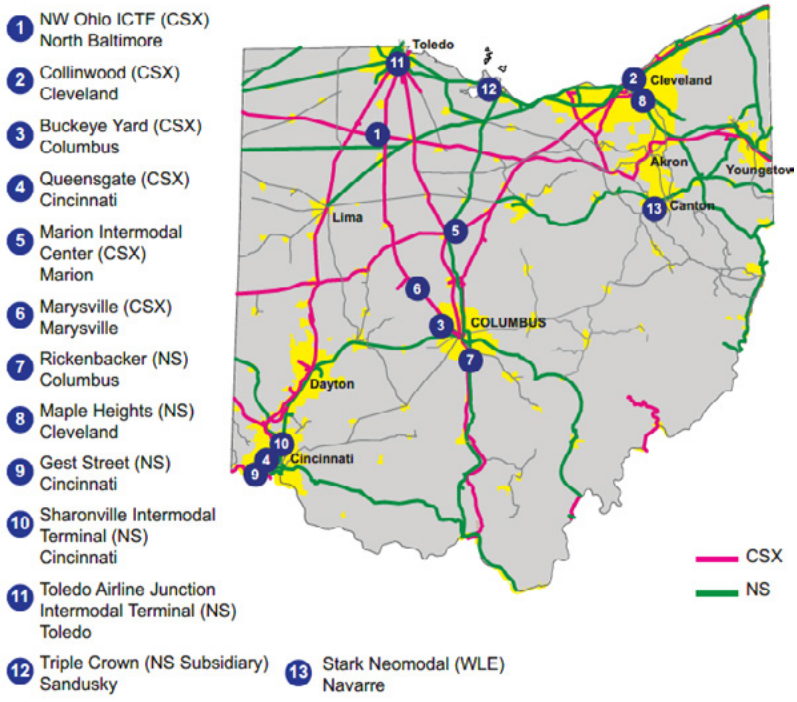


FIGURE 3: OHIO'S INTERMODAL TERMINAL FACILITIES



PASSENGER RAIL

Amtrak operates long-distance passenger rail service in Ohio along three routes: Capitol Limited (Chicago to Washington, DC), Cardinal (Chicago to New York) and Lake Shore Limited (Chicago to Boston). Due to the scheduling of connecting trains in Chicago, these trains pass through Ohio at night. In 2023, 134,450 passengers boarded or disembarked Amtrak trains in Ohio. Of those, 48,784 did so in Cleveland and 53,189 in Toledo.

In Ohio, Amtrak relies on tracks that it does not own or control. Federal law requires freight trains to give passenger trains preference when hosted. However, Amtrak's largest cause of delay on host railroads is freight train interference. On-time performance is a metric used to track service timeliness. The percentage represents the proportion of trips that arrive on time. Amtrak considers 80% on-time performance to be the minimum standard. Using that expectation, Ohio's service is substandard.

FIGURE 4: OHIO'S PASSENGER RAIL NETWORK

Source: National Transportation Atlas Database, 2017; WSP analysis

FIGURE 5: ON-TIME PERFORMANCE BY SERVICE IN OHIO (2022)

Route	In-State Host(s)	C-OTP
Capitol Limited	Norfolk Southern	71.3%
Cardinal	CSX	57.5%
Lake Shore Limited	CSX, Norfolk Southern	76.3%

PUBLIC SAFETY

Ohio has 5,629 at-grade highway-railroad crossings. Of these, 58% have active warning devices with train-activated flashing lights and automatic gates. The remaining 32% have passive warning devices such as crossbucks, and 10% have flashing lights. From 1996 to 2008, the number of highway-rail crashes significantly reduced. From 2008 to 2023, the trend has remained relatively stable.

Rail safety is reported in three categories: train accidents, rail highway accidents and other accidents or incidents. Train accidents are collisions or derailments of trains or other equipment that cause damage to railroad equipment, track or structures. Rail highway accidents involve a train colliding with a highway vehicle, bicycle or pedestrian at an at-grade highway-railroad crossing. Other accidents or incidents include work-related injuries to railroad employees or situations where trespassers, railroad employees or contractors are struck by trains.

FIGURE 6: OHIO HIGHWAY RAIL CRASHES

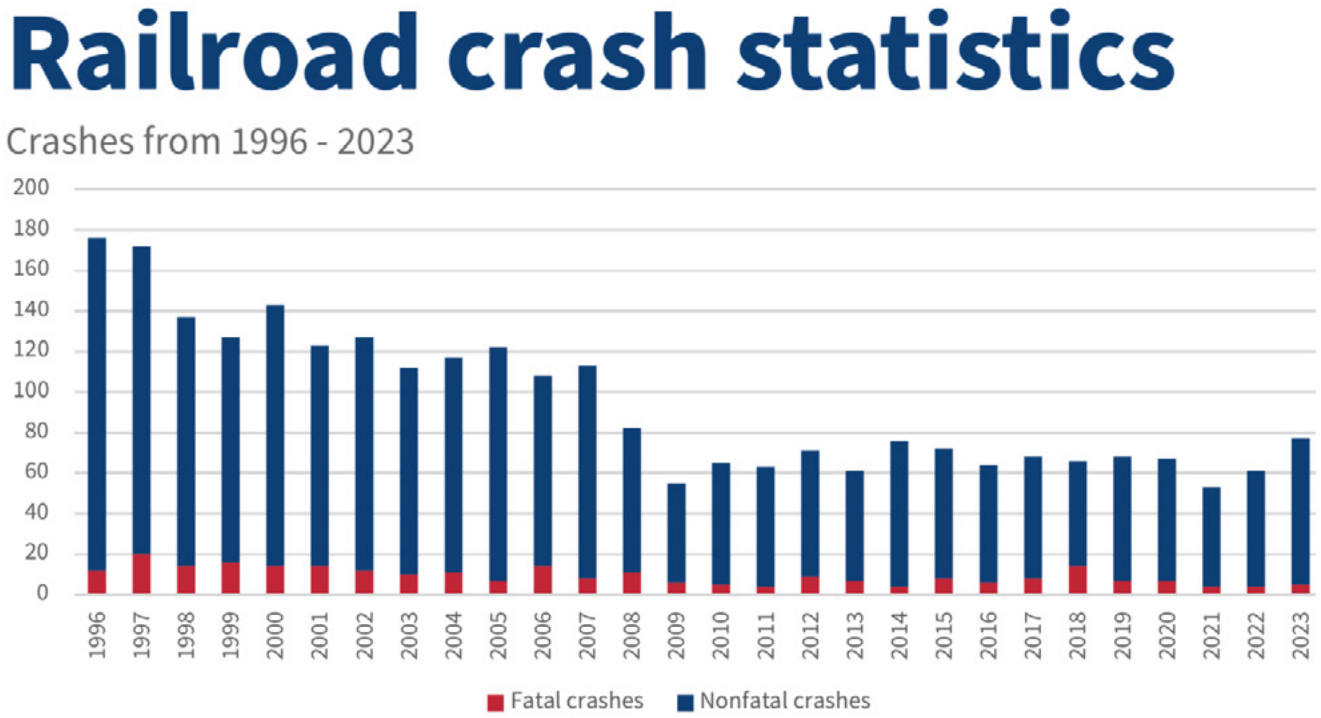
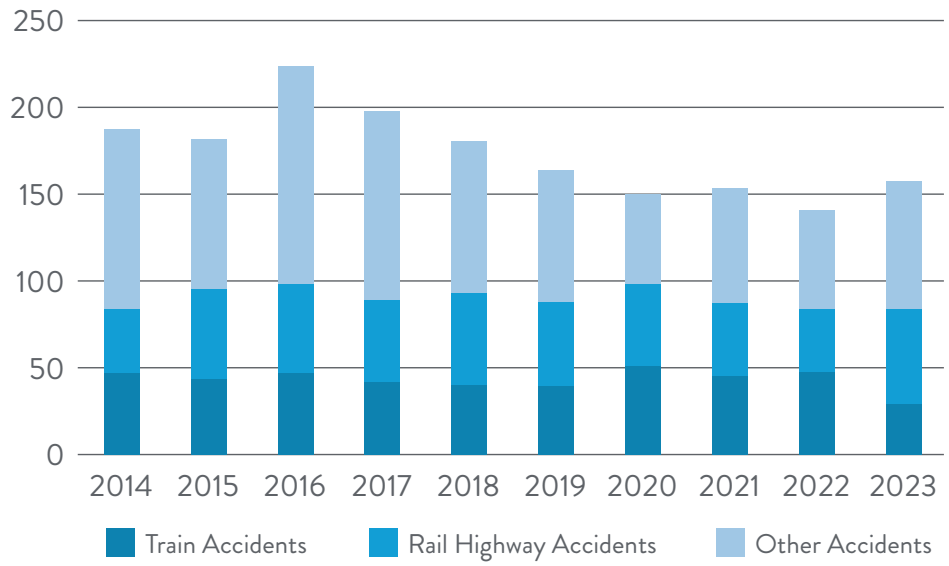


FIGURE 7: OHIO RAIL ACCIDENTS/INCIDENTS



East Palestine Train Derailment

On Feb. 3, 2023, at 8:45 p.m., eastbound Norfolk Southern train 32N derailed 38 mixed freight rail cars at milepost 49.5 on the Fort Wayne Line of the Keystone Division in East Palestine. Three tank cars carrying flammable and combustible hazardous materials were mechanically breached during the derailment. A fire ignited and spread to cargo released from the three breached tank cars, other derailed tank cars carrying hazardous/nonhazardous materials and additional freight cars.

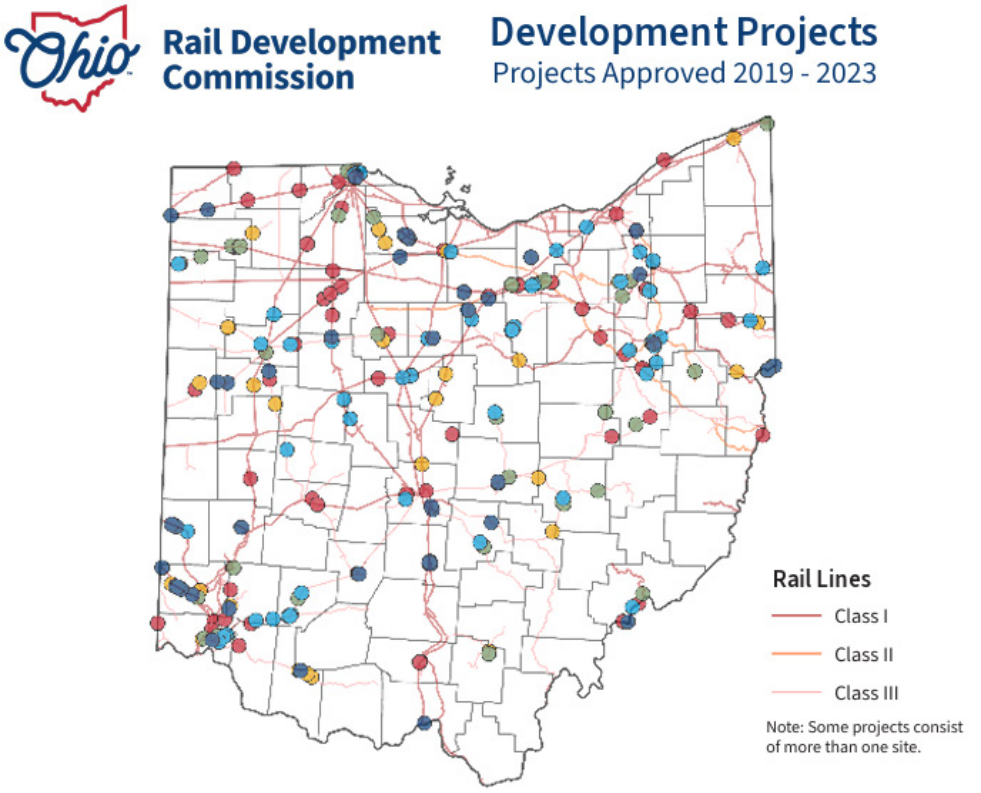
The National Transportation Safety Board (NTSB) determined the probable cause of the derailment was the failure of the L1 bearing on the 23rd railcar in the consist, which overheated and caused the axle to separate. This led to the derailment and a fire that likely began with the release of a flammable liquid from a DOT-111 tank car that was punctured during the incident. The continued use of DOT-111 tank cars in hazardous materials service also contributed to the severity of the fire and the hazardous materials release following the derailment.

A hot bearing detector traversed by train 32N detected an elevated temperature on the overheating bearing, but the low-priority alert it transmitted to the railroad personnel did not reflect the true condition of the failing bearing. Because of design constraints, hot bearing detectors are likely to indicate misleadingly low bearing temperatures. This limit on detector performance, combined with Nortfolk Southern's standard operating procedures and the spacing between detectors, meant the train's crews did not have adequate warning to stop the train before the derailment. *Photo: Matt Kirby*

The DOT-111 tank car design has a lower ability to survive derailments and fires without releasing its contents than current models of tank car. The issue of the DOT-111 tank car survivability is well known and has been recognized for over a decade. On May 8, 2015, the Pipeline and Hazardous Materials Safety Administration (PHMSA) – in coordination with Federal Railroad Administration (FRA) – published a final rule that created a new tank car specification to address the deficiencies in the DOT-111's safety systems. The final rule – commonly known as the high-hazard flammable trains (HHFT) rule – created a phaseout schedule for DOT-111 tank cars in flammable liquid service based on the relative hazards of the flammable liquid materials transported. The HHFT rule phaseout schedule would have prohibited the carriage of flammable liquids in DOT-111 tank cars in a HHFT by May 1, 2025. In December 2015, the Fixing America's Surface Transportation (FAST) Act changed the phaseout schedule for flammable liquid tank cars. The new phaseout schedule applied to flammable liquids transported in all types of train arrangements and allowed the use of DOT-111 tank cars until May 1, 2029.

FUNDING AND FUTURE NEED

FIGURE 8: ORDC DEVELOPMENT PROJECTS 2019-2023



Year	Projects	ORDC Grant	ORDC Loan	Private Investment	Public Investment	Total Investment	Jobs New	Jobs Retained	Carloads New
2019	25	$ 3,883,407	$ 900,000	$ 1,084,696,361	$ 13,184,000	$ 1,102,663,768	461	743	275
2020	17	$ 4,272,461	$ 700,000	$ 120,687,545	$ 16,553,759	$ 142,213,765	267	686	1,500
2021	16	$ 3,980,604	$ 1,070,000	$ 692,718,877	$ 676,400	$ 698,465,880	221	365	90
2022	16	$ 3,669,748	$ 0	$ 877,334,591	$ 8,233,768	$ 889,238,107	553	1,635	3,720
2023	14	$ 4,851,422	$ 500,000	$ 577,011,720	$ 174,044,730	$ 756,407,872	223	716	500
Total	88	$ 20,657,642	$ 3,170,000	$ 3,352,449,094	$ 212,692,657	$ 3,588,989,392	1,725	4,145	6,085

Freight railroads pay for all operating expenses and most of their capital expenses through their own revenues. Public funding to support capital projects is available only under specific circumstances. The state, through the Ohio Rail Development Commission (ORDC), makes grant funding available to promote economic development opportunities and mitigate at-grade highway-railroad crossing safety concerns.

Since 2019, the ORDC has approved grants and loans to 88 development projects. These projects received $23.8 million in funding assistance, creating 1,725 jobs and retaining 4,145 jobs.

Since 2019, the ORDC has entered into agreements for 238 grade crossing safety projects. These improvements include upgrades from passive warning devices (crossbucks) to lights and gates, flashing lights to lights and gates, queue management installations, roadway surface reconstruction and crossing closures. The ORDC administers a $10 million, two-year Wayside System Detection Expansion Program that provides funding to assist Class II and III railroads in installing detectors, as well as a $1 million Orphan Rail Crossing Program.

FIGURE 9: ORDC SAFETY PROJECTS

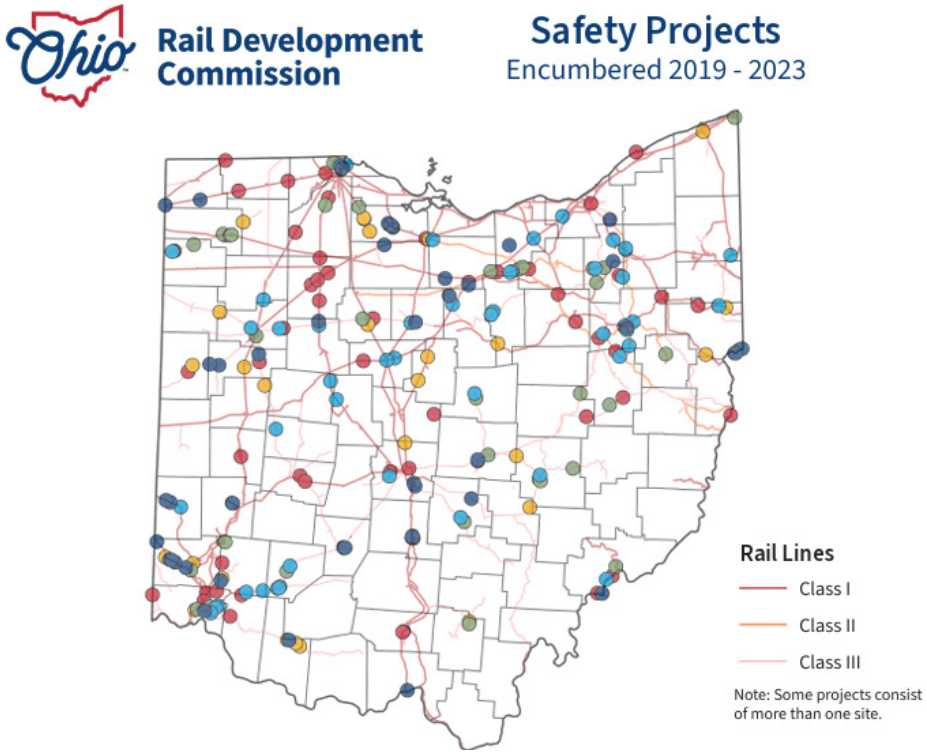
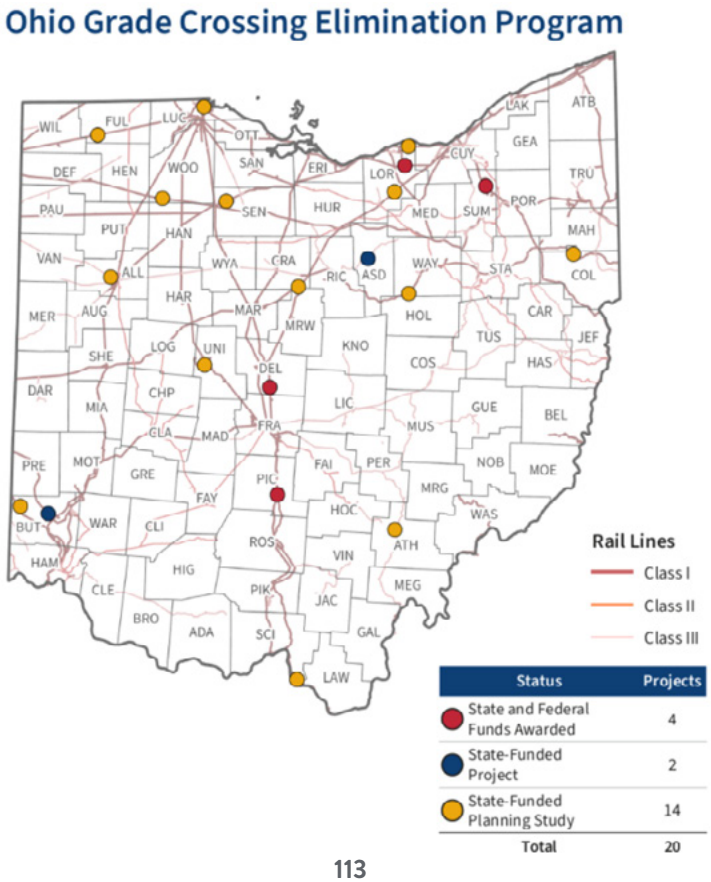


FIGURE 10: ORDC OHIO GRADE CROSSING ELIMINATION PROGRAM



The Ohio Grade Crossing Elimination Program was launched in 2023 to enhance safety by identifying and funding the elimination of existing grade crossings. The program assists communities in leveraging federal funding. To date, four communities have received a total of $81 million in construction funds from the FRA.

The ORDC received funding from the FRA's Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program for the Cincinnati Congestion Mitigation Plan. The plan will focus on the interaction between three sites: Norfolk Southern's Gest Street intermodal facility, CSX's Queensgate Yard and G&W's Central Railroad of Indiana line running south of the yard. This area is one of the most congested rail corridors with numerous blocked crossings.

ORDC has received two Corridor Identification and Development (Corridor ID) Program grants from the FRA for planning new passenger services. The 3C&D corridor would connect Cleveland, Columbus, Dayton and Cincinnati. The CTD corridor would connect Cleveland, Toledo and Detroit. The ORDC has selected and hired a consultant who is currently developing the scope, schedule and budget for the Service Development Plan. Amtrak has also received a grant from the FRA to provide improvements to the existing Amtrak Cardinal service by increasing service frequency from three days per week to daily.

Photo: Lisa M Haase/Shutterstock

INNOVATION

New inspection systems are being implemented nationwide on a limited basis. These systems allow railroads to quickly gather comprehensive information on trains in motion. CSX calls it a Train Inspection Portal (TIP), while Norfolk Southern refers to it as Digital Train Inspection Portals, which it developed in partnership with the Georgia Tech Research Institute. The system consists of an archway that trains can pass through at speeds of up to 60 mph. The portal uses high-resolution, high-speed cameras to collect 360-degree imagery of the train cars. Sensors ahead of the portal trigger the system to capture up to 1,000 images per train car, which are processed through an artificial intelligence (AI) algorithm to flag defects. This critical information is transmitted to network operators, where experts can review the data. Norfolk Southern recently installed one of its first Digital Train Inspection Portals outside East Palestine.

RECOMMENDATIONS TO RAISE THE GRADE

- Invest in eliminating or improving the safety of at-grade highway-railroad crossings to reduce accidents.
- Upgrade and expand the use of wayside detection systems to reduce accidents.
- Accelerate the phaseout of older DOT-111 and CPC-1232 tank cars to improve the overall safety of transporting hazardous materials.
- Create sustainable, long-term funding mechanisms at all levels of government to support rail infrastructure investments that benefit the public and leverage private investment.
- Study new and expanded passenger rail service.

SOURCES

Ohio Department of Transportation, "Ohio Rail Development Commission", State of Ohio Rail Plan, 2019.

Ohio Department of Transportation, "Transport Ohio – Ohio State Freight Plan", 2022.

Ohio Rail Development Commission, "Ohio Highway-Rail Grade Crossing State Action Plan", 2022.

Ohio Rail Development Commission, "Ohio's Intermodal Railroad Terminals", 2025.

Ohio Rail Development Commission, "2023 Rail Statistics Report", 2024.

Public Utilities Commission of Ohio, "Railroad Technology Report", 2023.

Public Utilities Commission of Ohio, "Regulations and Protocols Pertaining to the Transportation of Hazardous Materials and Hazardous Waste", 2023.

National Transportation Safety Board, "Railroad Investigation Report RIR-24-05", 2024.

U.S. Department of Transportation, "Pipeline and Hazardous Materials Safety Administration", Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, 2015.

U.S. Department of Transportation, "Pipeline and Hazardous Materials Safety Administration", Office of Hazardous Materials Safety, Safety Advisory Notice for DOT-111 Tank Cars in Flammable Liquid Service, 2023.

Roads

D+

Photo: Brookville, OH

GRADE COMPARISON

Ohio: D+

Nat'l: D+

ROADS

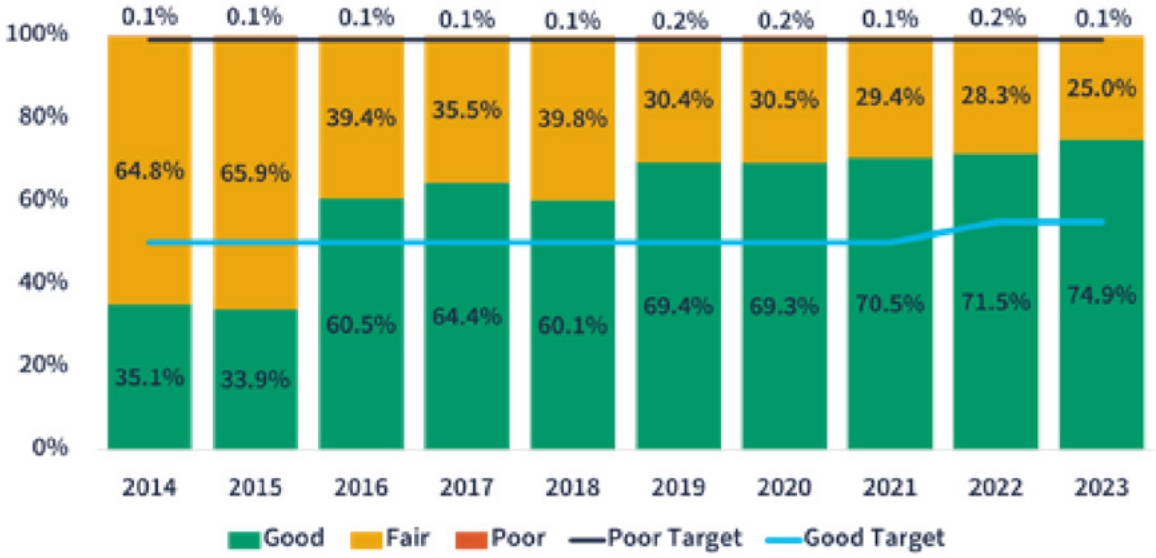
EXECUTIVE SUMMARY

Ohio boasts one of the nation's most extensive and heavily traveled roadway networks: 60% of the U.S. and Canadian populations are within a one-day drive. Recently, increases in state and federal funding – including the 2019 state motor fuel tax and the 2021 federal Infrastructure Investment and Jobs Act (IIJA) – have improved the condition of Ohio's roadways. Some 69% of Ohio's major roads were rated in fair condition or better in 2022, up from 65% in 2018. Despite recent increases in roadway funding, challenges persist in efficiently operating and maintaining the system. Rising costs due to inflation and workforce shortages pose obstacles. Ohioans lose more than $14.4 billion yearly due to deferred maintenance, including vehicle wear and tear, wasted fuel from congestion and crash-related expenses. More than 2,300 people died on Ohio's roads in 2022 and 2023, but the statewide fatality rate was 1.15 per 100 million vehicle miles traveled, lower than the national average of 1.33. However, in rural areas, the fatality rate of 1.61 is near the national average of 1.67. To meet the goals of Ohio's long-range transportation plan (Access Ohio 2045), state and local decision makers should continue to utilize the increased state and federal investment, develop financially sustainable funding sources for transportation improvements, and sustain investments in roadway safety to facilitate the movement of people and freight.

CONDITION AND CAPACITY

Ohio's roadways have seen steady improvement over the past four years. Each year, ODOT assesses federal-aid-eligible roadways (i.e., state and local primary roads) to evaluate the severity and extent of distress types. ODOT assesses pavement quality using the Pavement Condition Rating (PCR) method, which is based on a visual survey of the number and type of distress in a pavement on a scale of 0 to 100, with 100 being the least distressed. As the following graphs demonstrate, the percentage of roadways on the interstate system in good condition has increased over time, indicating a higher investment in roadways that carry the most traffic.

Figure 6: Ohio's Interstate Pavement Conditions
Statewide % of Lane Miles



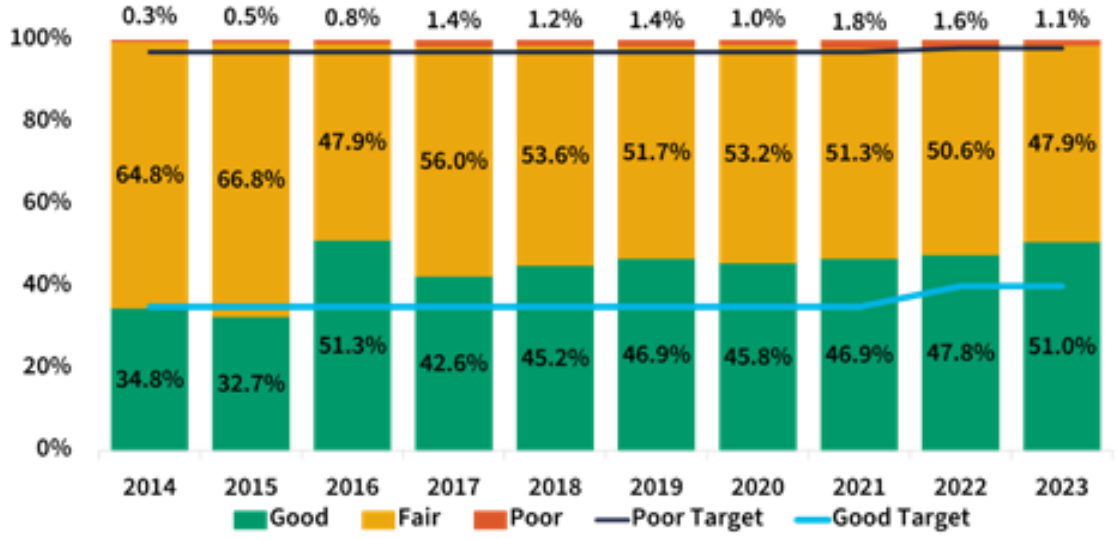
Source: ODOT – 2024 Transportation System Performance Report

Pavement conditions on ODOT's non-interstate highways are also improving, with more miles rated in good condition. The percentage of highways in poor condition has remained steady over the past eight years, while the share of pavement miles rated as good has increased – though not as significantly as the interstate system. This suggests ODOT has prioritized maintaining and improving the interstate highways over non-interstate highways.

The condition of the roads outlined above is largely maintained by ODOT and does not provide a complete picture. Roadways maintained by local jurisdictions have not received the same level of investment as those maintained by ODOT.

A 2024 report by the national transportation research group TRIP found that over 30% of the urban major roads in Ohio were rated poor or mediocre based on their International Roughness Index (IRI) score, approximately the same as in 2018.

Figure 7: Ohio's Non-Interstate NHS Pavement Conditions
Statewide % of Lane Miles



Source: TRIP – Keeping Ohio Mobile Report (2024)

As in 2020, urban roadways – which carry the majority of the traffic – continue to lag rural highways in pavement condition. According to TRIP, 50% of urban major highways have pavements rated in poor or mediocre condition, compared with just 15% of rural major highways. Without significant investment, aging urban roads will deteriorate to the point where routine paving and rehabilitation are no longer sufficient to maintain satisfactory conditions. At that stage, only costly and disruptive reconstruction of the roadways and their underlying support systems will be viable.

TRIP also reports that Ohio's roadway conditions cost motorists over $14.4 billion annually due to vehicle wear and tear, wasted fuel due to congestion and repair costs due to crashes. Traffic congestion in Ohio impacts commuters, businesses, shippers, freight haulers and manufacturers who operate with just-in-time shipments. High congestion can influence whether businesses will relocate or expand. TRIP estimates that lost time and wasted fuel due to congestion in Ohio amount to approximately $5 billion a year, with annual delays and fuel losses in Ohio's major metropolitan areas shown below:

Location	Poor	Mediocre	Fair	Good
Cincinnati	33%	22%	15%	30%
Cleveland-Akron	35%	22%	14%	29%
Columbus	20%	20%	17%	42%
Dayton	28%	27%	13%	33%
Toledo	24%	19%	14%	43%
Ohio Statewide	**16%**	**15%**	**13%**	**55%**

Source: TRIP - Keeping Ohio Mobile Report (2024)

Ohio has 122,884 miles of public highways, with 19,521 miles maintained by ODOT or the Ohio Turnpike and Infrastructure Commission (OTIC). Local jurisdictions maintain the rest. From 2008 to 2019, VMT on state-maintained highways increased by 8.3%, while the state's population grew by just over 4%. VMT dropped nearly 15% in 2020 due to the COVID-19 pandemic but rebounded to pre-pandemic levels by 2023.

Rising traffic volumes will continue to strain Ohio's roadway infrastructure, impeding travel and economic development. Each year, over $1.1 trillion in goods are shipped to and from Ohio, primarily by truck. TRIP projects that by 2050, freight shipments to and from the state are anticipated to increase by 98% in value and 42% in weight. Additionally, growing congestion in Ohio's urban areas will impact both economic growth and quality of life. According to the Texas A&M University Transportation Institute 2023 Urban Mobility Report, in 2022, three metropolitan areas in Ohio (Cleveland, Columbus and Cincinnati) placed in the top 50 nationwide for congestion. An additional three (Akron, Dayton, and Toledo) placed in the top 100. These rankings are based on four key metrics of congestion: travel delay, excess fuel consumed, truck congestion cost and total congestion cost.

FUNDING AND FUTURE NEED

Ohio has seen a significant increase in roadway investment from state and federal sources in recent years. However, additional sustained funding is needed to improve and maintain the state's transportation network in the years ahead. In fiscal year (FY) 2024 (July 2023 to June 2024), ODOT awarded $2.7 billion in construction funding for interstate maintenance and construction, a 58% increase from $1.7 billion in FY 2020. Funding to local jurisdictions for highway improvement projects also grew, rising to $536 million in FY 2024 from $339 million in FY 2020, also a 58% increase. While local roadways have received a similar funding increase as ODOT, they will require even greater investment to improve conditions at the same level as state roads.

Ohio's transportation funding received a boost in 2021 with the passage of the IIJA. Over the IIJA's five-year span, Ohio is expected to receive an additional $9.2 billion for federal-aid highway programs and $483 million for bridge replacement and repairs compared with pre-IIJA levels. Ohio communities have also successfully secured competitive funding through the IIJA, including over $1.6 billion for the Brent Spence Bridge Corridor project in Cincinnati, over $290 million from Infrastructure for Rebuilding America (INFRA) grants, Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grants and Reconnecting Communities Pilot grants. Ohio communities also secured over $72 million for roadway safety projects through the Safe Streets and Roads for All program.

In 2019, the Ohio General Assembly approved a transportation budget that increased roadway revenue. This included a fuel tax hike of 10.5 cents per gallon for gasoline and 19 cents per gallon for diesel from the previous tax amount of 28 cents per gallon for both gas and diesel. The budget also introduced an annual renewal fee of $100 for hybrid vehicles and $200 for electric plug-in vehicles. These changes generated an additional $719 million in 2023 compared to 2018. The transportation budget also permitted municipalities and townships to raise license plate fees by $5,

complementing the previous $5 increase provided to counties in 2017. Before these adjustments, the last time the Ohio General Assembly passed an increase in transportation revenue was in 2003.

Despite these funding increases, rising inflation has significantly impacted the cost of road and bridge infrastructure improvements. The Federal Highway Administration's (FHWA) National Highway Construction Cost Index (NHCCI) rose 27% in 2022 and another 12% in 2023, outpacing the Consumer Price Index increase of 6.8% and 3.4%, respectively.

Ohio's transportation funding relies heavily on motor fuel taxes and license plate registration fees. However, inflation, rising maintenance and construction costs and the increased adoption of fuel-efficient and alternative fuel vehicles have eroded fuel tax revenues, posing long-term funding challenges. In response, ODOT conducted its Revenue Alternatives Study to explore sustainable transportation revenue mechanisms. Recommendations from the study include indexing the motor fuel tax rate to inflation, increasing registration fees and continuing the additional registration fee for alternative fuel vehicles. ODOT's Access Ohio 2045, Ohio's long-range transportation plan, anticipates that annual transportation funding needs through 2045 will range from $2.6 billion to $2.8 billion for ODOT and $3.7 billion to $4.1 billion for other transportation agencies and partners, totaling $6.2 billion to $6.9 billion per year. While leveraging IIJA funding remains crucial, the plan makes it clear that Ohio will need additional long-term funding sources to meet the future needs of its transportation system.

Photo: Shakertown Rd; Beavercreek, OH

PUBLIC SAFETY

Safe and well-maintained roadways are crucial to economic productivity and enhance the quality of life of Ohio's residents. Serious crashes and fatalities take an emotional and economic toll on Ohio's residents. Economic costs include lost productivity, medical expenses, travel delays, workplace disruptions, insurance premiums and legal fees. In 2023, the Ohio State Highway Patrol reported 252,166 crashes on Ohio roadways. Of those, 1,150 resulted in at least one death and 6,042 in suspected serious injuries. Among the fatalities, 149 were pedestrians (13%) and 22 were cyclists (2%), both of which are lower than the national averages of 18% and 3%, respectively. In addition, of the above vehicle crashes, 9,143 were related to distracted driving, 2,582 were related to pedestrians, and 1,262 were related to bicycles. There were 1,177 fatalities in 2022, a 6% decrease from the 1,244 fatalities in 2021.

The number of fatalities per 100 million VMT has increased in Ohio from 0.99 in 2017 to 1.15 in 2022. However, the number of fatalities per 100 million VMT remains below the national average from 2017 to 2022, ranging from 1.17 to 1.33 fatalities per 100 million VMT. While driver behavior, including distracted and impaired driving and vehicle characteristics contribute to fatal crashes, roadway design also plays a significant role in highway safety. Improvements to the number of lanes, lane widths, lighting, lane markings, pedestrian and bicycle accommodations, shoulders, guardrails, access management and overall infrastructure design can significantly reduce fatalities, injuries and property crashes.

Since 2019, Gov. Mike DeWine has committed significant increases in funding to improve the safety of Ohio's roadways. Funding for the highway safety improvement program has risen from $125 million in fiscal year 2020 to $172 million in fiscal year 2024. In addition, funding for bicycle and pedestrian highway safety programs has increased from $25.7 million in fiscal year 2020 to $35.8 million in fiscal year 2024. ODOT is also participating as a pilot state in the National Cooperative Highway Research Program (NCHRP) Safe System Approach, a comprehensive approach to road safety that considers all elements of the road environment, including people, vehicles, roads, speeds and post-crash care.

INNOVATION AND RESILIENCE

Ohio has been a leader in integrating innovation and resilience into its roadway system. Through the Ohio Research Initiative for Locals (ORIL) program, ODOT supports local jurisdictions by funding research and pilot programs that advance roadway technologies. ORIL-sponsored projects include maintenance practices to reduce corrosion on prestressed concrete box beam bridges, optimized use of recycled asphalt pavement in local roads, use of ground rubber tires in mix design and winter pothole treatments.

ODOT has actively participated in the FHWA's Every Day Counts program, which fosters innovation in state DOT operations. A key initiative was the replacement of all lighting in the ODOT system with LED lamps, improving visibility while reducing energy consumption and maintenance costs. ODOT has built robust partnerships with local jurisdictions to drive innovation and sustainability. For example, ODOT partners with county engineers to upcycle bridge beams from ODOT projects for use in county bridge projects. ODOT also partners with local jurisdictions to install restricted crossing U-turn (RCUT) intersections, simplifying decision-making for drivers and minimizing the potential for severe crashes. Additionally, ODOT partners with local agencies to reduce rural roadway departure crashes by funding roadway curve studies and providing financial support for signing upgrades.

ODOT uses a Transportation Asset Management (TAM) system in the planning, development, preservation and construction of Ohio's transportation system. The TAM is a systematic and strategic investment decision process for operating, upgrading and expanding physical assets effectively over their life cycle that is based on quality data and well-defined objectives which help ODOT make fiscally responsible data-driven resource allocation decisions.

Ohio has also established DriveOhio, an office dedicated to advancing the development of autonomous and connected vehicle technologies. The state has invested in technology to make Ohio's roads "autonomous ready." DriveOhio has coordinated the establishment of Smart Mobility Corridors, including a 35-mile stretch of U.S. Route 33 between Dublin and East Liberty, as well as the I-70 Truck Automation Corridor between Columbus and Indianapolis. These corridors are equipped with technology that enables open-road testing of autonomous and connected vehicles.

In October 2024, ODOT issued a Resilience Improvement Plan (RIP), which identified and prioritized locations for targeted improvements and identified opportunities to embed resilience into long-range transportation planning and decision-making. The metropolitan planning organizations (MPOs) in the three largest metropolitan areas have also developed resiliency improvement plans for their regions.

Photo: Ohio's Cuyahoga Valley near Cleveland; Kenneth Sponsler

RECOMMENDATIONS TO RAISE THE GRADE

An inadequately funded highway transportation system costs Ohio motorists in increased injuries and fatalities from traffic crashes, billions of dollars each year in wasted time and fuel and greater wear and tear on their vehicles. Making necessary improvements to Ohio's roadways is essential for enhancing the quality of life for residents. To raise the grade of Ohio's roads, the following steps can be taken:

- Continue and consider enhancing Gov. DeWine's funding initiatives aimed at improving the safety of Ohio's roadways.
- Establish sustainable, long-term funding mechanisms at all levels of government to repair, improve, and expand the Ohio highway transportation system. These mechanisms should aim to reduce or eliminate the gap between available and required funding, with provisions to account for inflation to prevent the erosion of purchasing power over time.
- Continue and expand the use of data-driven processes to inform asset management decisions for roads and bridges. This effort should be extended across all jurisdictional levels to ensure the most efficient and effective use of transportation investments.
- Create integrated, multimodal transportation systems, especially in urban areas, to reduce congestion and provide more active transportation opportunities.
- Maintain and prioritize strategic decision-making and investments by road designers and owners based on the total life-cycle costs of highway transportation projects.
- Continue to leverage federal funding opportunities, such as those in the IIJA, along with state and local funding sources. Focusing on long-term investments will increase safety and improve the condition of Ohio's roads and transportation systems.

SOURCES

DriveOhio, “Know Our Programs”, 2024.

National Transportation Research Group (TRIP), “Keeping Ohio Mobile: Providing a Modern”, Sustainable Transportation System in the Buckeye State, 2024.

Ohio Department of Transportation, “Revenue Alternatives Study”, 2023.

Ohio Department of Transportation, “2023 Facts Book”, 2023.

Ohio Department of Transportation, “Annual Report – Fiscal Years 2020 Through 2024”, 2024.

Ohio Department of Transportation, “Access Ohio 2045 Transportation Plan”, 2020.

Ohio Department of Transportation, “Financial and Statistical Report – Fiscal Year 2023”, 2023.

Ohio Department of Transportation, “Transportation System Performance Report: Federal Transportation Measures”, 2024.

Ohio Department of Transportation, “Statewide Transportation Improvement Program FY 2024–2027”, 2023.

Ohio Department of Transportation, “Ohio Strategic Highway Safety Plan”, 2020.

Ohio Department of Transportation, “Resilience Improvement Plan”, 2024.

Ohio Department of Transportation, “Ohio’s Research Initiative for Locals”, 2024.

Ohio State Highway Patrol, “Statewide Crash Report by County”, 2018–2023, 2024.

Texas A&M Transportation Institute, “Urban Mobility Report 2023”, 2024.

U.S. Department of Transportation, “Federal Highway Administration”, 2022 State Transportation Statistics – Tables HM-10, HM-48, HM-63, HM-64, VM-2, 2022.

U.S. Department of Transportation, “National Highway Traffic Safety Administration”, Traffic Safety Facts Annual Report – 2018 and 2022, 2022.

U.S. Department of Transportation, “National Highway Traffic Safety Administration”, Traffic Performance Measures for Ohio, 2022.

Federal Highway Administration, “Center for Accelerating Innovation”, Every Day Counts, 2024.

Federal Highway Administration, “National Highway Construction Cost Index”, 2024.

Ohio Department of Taxation, “Annual Report – Motor Vehicle Fuel and Use Tax”, 2018–2023, 2023.

Brookings Institution, “Federal Infrastructure Hub”, 2024.

Photo: Structured Vision

SCHOOLS

EXECUTIVE SUMMARY

Ohio's school infrastructure is facing several challenges, including aging facilities, insufficient funding and a lack of comprehensive emergency preparedness. Many facilities over 50 years old require significant structural upgrades to meet modern safety and educational standards. While the state has invested over $10 billion since 1997, a large funding gap remains, with many schools relying heavily on local property taxes, which perpetuates disparities between affluent and less affluent districts. To address these issues, the Fair School Funding Plan (FSFP) was signed into law in 2021 to provide equitable funding, but full implementation is still needed. In addition, improving the resilience of school facilities through sustainability practices and structural upgrades – such as earthquake-resistant designs and tornado shelters – is essential for enhancing safety. Engaging communities and developing robust asset management plans are also critical to ensuring long-term infrastructure effectiveness.

BACKGROUND

Ohio's school infrastructure includes over 3,500 school buildings, serving approximately 1.6 million students across the state. The Ohio Facilities Construction Commission (OFCC) plays a significant role in overseeing school construction and renovation projects, offering state-level financial support. In addition to state funding, local funding – particularly through property taxes – remains a vital resource for maintaining and improving school infrastructure. Since 1997, more than $11 billion has been disbursed for classroom facilities assistance through the Ohio School Facilities Commission (now part of the OFCC). Despite this investment, many school facilities remain outdated. The most recent comprehensive study of Ohio's school infrastructure needs was conducted in 1997, revealing a $10.2 billion requirement for repairs and reconstruction. Since then, Ohio has maintained spending on school operations, maintenance and construction near the national average. Funding disparities persist, and efforts like the FSFP aim to create a more equitable system. The FSFP – which began development in 2017 and was signed into law in 2021 – represents the first major overhaul of Ohio's school funding system in decades. It addresses issues that the Ohio Supreme Court had previously ruled unconstitutional. Local funding – particularly property taxes – remains vital for maintaining and improving school infrastructure. The FSFP aims to reduce reliance on local property taxes and balance funding across districts based on various factors. Additionally, broader federal programs – such as

the Bipartisan Infrastructure Law – provide some level of support, though they primarily focus on overarching infrastructure improvements rather than school-specific needs. This combination of state, local and federal funding mechanisms remains crucial for addressing the significant challenges facing Ohio's aging school infrastructure.

CAPACITY

Ohio's school infrastructure serves approximately 1.6 million K-12 students across 3,586 school buildings. This large and diverse system presents unique challenges in managing capacity effectively across urban, suburban and rural areas.

Ohio's school infrastructure faces complex capacity challenges, characterized by both overcrowding and underutilization across different regions: Urban areas often experience overcrowding, while rural regions tend to have underutilized facilities. This disparity reflects changing demographics and population shifts, creating inefficiencies in resource allocation. Ohio's student enrollment is projected to decrease by 5% to 12% between 2012 and 2024, suggesting that overall capacity may be sufficient. However, this trend masks localized issues where some schools remain severely overcrowded while others are underutilized.

Many school buildings struggle to accommodate modern educational needs and technologies. This affects the functional capacity of schools to provide adequate learning environments, even if physical space is available.

More than one-third of public schools nationally use portable buildings due to capacity constraints, with 45% of these in poor or fair condition. This trend also likely applies to Ohio, indicating ongoing capacity management issues.

The uneven distribution of students across the state highlights the need for more effective strategic planning and investment. Currently, four in 10 public schools nationwide do not have a long-term facility plan in place to address operations and maintenance. If this trend holds true for Ohio, it indicates a significant gap in planning for future capacity needs.

These capacity challenges underscore the need for strategic planning and targeted investments to optimize Ohio's school infrastructure and ensure it can meet both current and future educational demands effectively.

Photo: Mobile classroom trailers used to temporarily relieve overcrowding in the schools; CLS Digital Arts

CONDITION

The condition of Ohio's school infrastructure presents a complex and challenging picture. There are significant variations across the state.

Many of Ohio's school buildings are over 50 years old. These aging facilities often suffer from outdated systems, structural deficiencies, and issues like lead paint and leaking roofs, which pose risks to student health and learning environments.

Since 1997, over $13 billion has been invested in Ohio's school infrastructure through the OFCC (now part of the Ohio Facilities Construction Commission). However, substantial unmet needs persist, indicating that the scale of the problem outpaces current investment levels.

Economic difficulties have hampered improvement efforts, particularly in securing local matching funds for state support. This has led to delayed or neglected repairs in many districts, as exemplified by Columbus City Schools. The district has struggled with outdated facilities, some of which are more than 50 years old and in urgent need of repair. Despite community support for past levies, rising construction costs and limited budgets have hindered progress. As a result, many students continue to learn in buildings that do not meet current standards for safety, technology or comfort. The problems observed in individual districts like this reflect broader systemic issues across the state. These include difficulties in maintaining aging buildings, addressing modern educational needs and ensuring safe learning environments.

While significant investments have been made, the condition of Ohio's school infrastructure remains a pressing concern. Strategic planning and substantial additional funding are needed to address the backlog of repairs, modernize facilities and ensure all Ohio students have access to safe and effective learning spaces. Significant investments are required to bring these buildings up to modern safety and educational standards.

Photo: Brett Taylor Photography

Many of Ohio's school buildings are over 50 years old. These aging facilities often suffer from outdated systems, structural deficiencies, and issues like lead paint and leaking roofs, which pose risks to student health and learning environments.

OPERATION AND MAINTENANCE

Based on the available information, Ohio's school infrastructure's operation and maintenance (O&M) face several challenges.

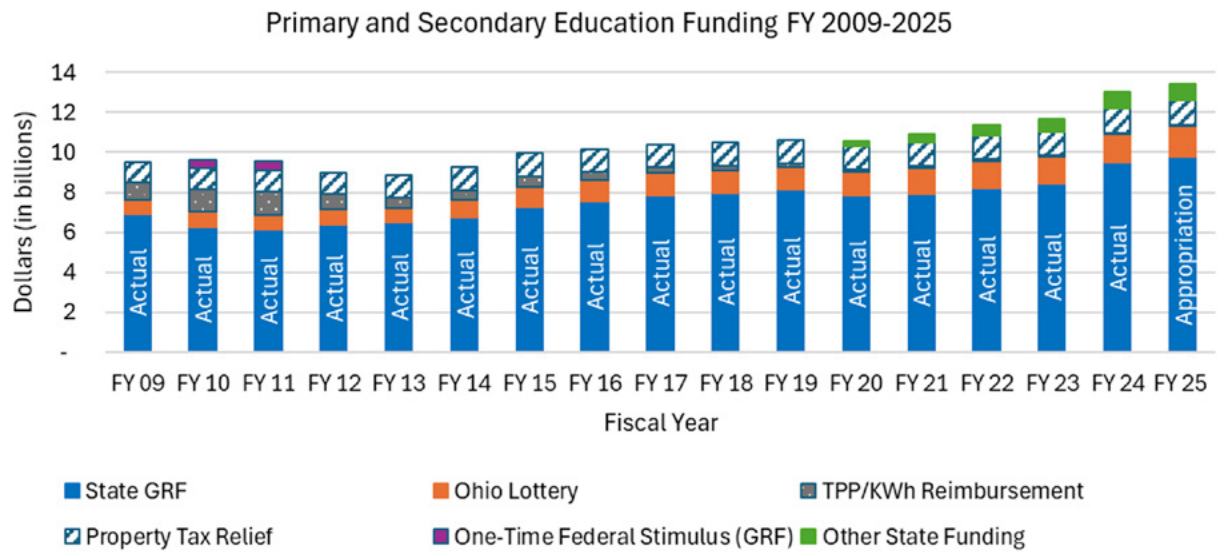
Budget limitations hamper Ohio's ability to operate and maintain its school infrastructure properly. This has led to widespread deferred maintenance, accelerating school facility deterioration. These aging facilities require more intensive and costly maintenance, straining already limited O&M budgets.

Many school districts in Ohio lack comprehensive long-term facility plans. According to the Government Accountability Office (GAO), many public schools nationwide do not have long-term facility plans in place to address operations and maintenance, and 41% of school districts needed to update or replace HVAC systems. This lack of planning extends to Ohio, contributing to inefficient resource allocation and reactive maintenance practices.

The primary source of funding for school facilities varies across districts. An estimated 45% of districts nationwide use local revenues as their primary funding source, while 44% rely on state funds. In Ohio, this reliance on local funding – often through property taxes – can lead to disparities in O&M capabilities between wealthier and poorer districts.

Implementing better planning through life-cycle cost analysis (LCCA) could lead to more effective resource allocation and maintenance practices. However, adopting such practices appears to be limited across Ohio's school districts.

FUNDING



The funding situation for Ohio's school infrastructure is complex and evolving, with recent efforts aimed at addressing long-standing issues. The Fair School Funding Plan (FSFP) – signed into law in 2021 – represents a significant overhaul of Ohio's school funding system. It aims to create a more equitable and adequate funding model based on the actual costs of educating students and the financial capacity of local communities. However, full implementation is still underway, with the plan set to be phased in over six years.

Despite the FSFP's promise, current funding for Ohio's school infrastructure remains insufficient to meet existing needs. Many school buildings are aging – with approximately 24% in fair or poor condition – indicating a substantial backlog of maintenance and renovation requirements.

Ohio's school funding system continues to rely heavily on local property taxes. This dependence contributes to significant disparities between affluent and less affluent districts, as property-rich areas can generate more school funding. The FSFP aims to address this issue, but the impact has not yet been fully realized.

The state has made substantial investments. Over $13 billion has been spent on school upgrades since 1997. However, this has not been sufficient to address all infrastructure needs. Federal contributions to Ohio's school infrastructure are minimal, primarily through specific grants and programs rather than consistent, large-scale funding. Economic difficulties and the struggle to secure local matching funds for state support have hampered improvement efforts in many districts. This has led to delayed or neglected repairs, particularly in economically disadvantaged areas.

FUTURE NEED

The OFCC has invested over $13 billion in state and local funds since 1997, but this only covers about half of the identified needs. The remaining unfunded projects represent a substantial future financial commitment.

Due to age, many of Ohio's school buildings require significant modernization and renovation to meet current educational standards and safety requirements. The backlog of repairs and upgrades continues to grow, increasing the urgency of future investments.

Ohio's student enrollment is projected to decrease by 5% to 12% between 2012 and 2024. This trend necessitates careful planning for future infrastructure needs, as some areas may require expansion while others may need to consolidate or repurpose existing facilities.

As demonstrated during the COVID-19 pandemic, there is an increasing need for technological infrastructure in schools. Future investments will need to address physical building improvements and digital infrastructure to support modern learning environments. Future planning must address the disparities between wealthier and poorer districts in their ability to secure local matching funds for state-supported projects.

Photo: Primary school; sylv1rob1

PUBLIC SAFETY

Ohio law mandates that all schools have comprehensive safety plans. These plans must be updated at least every three years or when major building modifications occur. Schools are required to file these plans and build blueprints with local law enforcement agencies and fire departments, enhancing emergency preparedness. The Ohio School Safety Center – established in 2019 – provides resources and support for schools in preventing, preparing for and responding to threats and acts of violence. This includes offering training, community involvement strategies and interagency coordination.

In 2023, Gov. Mike DeWine announced nearly $42 million in grant funding for 624 K-12 schools across 88 counties. This funding is specifically earmarked for security upgrades, including security cameras, public address systems, automatic door locks and visitor badging systems.

Many Ohio school buildings require upgrades to serve effectively as emergency shelters. Essential improvements include reinforced windows, earthquake-resistant designs and tornado shelters. However, specific data on the number of schools meeting these standards is not readily available. Some Ohio school districts have implemented advanced safety systems. For example, Galion City School District has installed a high-tech safety alarm system that includes strobe lights, alarms and automated announcements during lockdowns.

RESILIENCE

While some Ohio schools have incorporated modern building codes and resilience standards, many facilities still require substantial upgrades to withstand natural disasters and other emergencies. This inconsistency in resilience measures across the state's school infrastructure creates vulnerabilities in the face of potential hazards.

Given that many of Ohio's school buildings were built more than 50 years ago, their ability to withstand modern environmental challenges and emergencies is questionable. Older buildings may lack the structural integrity and design features necessary for resilience against current and future threats.

Ohio suffers from a lack of recent comprehensive data on the quality and resilience of its school infrastructure. The most recent statewide assessment was conducted in 1997, leaving a significant gap in current information about resilience capabilities across Ohio's schools.

Programs like the Renew America's Schools initiative offer potential support for improving resilience in school infrastructure. However, widespread implementation of such programs in Ohio is still needed to significantly enhance the overall resilience of the state's school buildings. While Ohio has invested billions in school infrastructure, the focus has primarily been replacing and repairing existing structures. Dedicated funding for resilience improvements may be limited, potentially hindering progress in this area.

To enhance the resilience of Ohio's school infrastructure, a comprehensive statewide assessment of current resilience capabilities is needed. Targeted investments should follow this in upgrading facilities to meet modern resilience standards, focusing on older buildings. Additionally, incorporating resilience planning into all new school construction and major renovation projects will be crucial for long-term improvement in this area.

INNOVATION

Ohio's school infrastructure is making strides in innovation, particularly in the areas of sustainable building practices and advanced technologies. However, adopting these innovative approaches is not yet widespread across the state. Several Ohio schools have achieved LEED (Leadership in Energy and Environmental Design) certification, demonstrating a commitment to sustainable and energy-efficient design. Notable examples include North College Hill Middle-High School – which achieved LEED Platinum certification, the highest level possible – and Hathaway Brown School – which earned LEED Gold certification for operations and maintenance. Some Ohio schools are implementing innovative energy-saving technologies. For instance, Bethany School features a geothermal energy system and solar photovoltaic systems, with one building designed to be the first net-zero energy school building in the Midwest.

Schools are incorporating green strategies such as strategic building orientation, natural light utilization and environmentally friendly construction materials. These approaches not only reduce energy consumption but also create healthier learning environments. Some schools are integrating green infrastructure and water-smart landscaping to manage stormwater runoff, demonstrating innovative approaches to environmental stewardship. Innovative schools are incorporating sustainability education into their curriculum.

Despite these positive examples, the widespread application of innovative practices in Ohio's school infrastructure remains limited. This suggests that while some schools are at the forefront of innovation, others are still struggling with basic infrastructure needs.

To achieve broader adoption of innovative practices across the state, Ohio needs to increase funding and incentives for sustainable and technologically advanced school designs, provide more resources and training for school districts and develop policies that encourage or require the incorporation of sustainable and innovative features in new school construction and renovation projects.

RECOMMENDATIONS TO RAISE THE GRADE

Based on the information available for schools in Ohio, here are the key recommendations for improving Ohio's school infrastructure:

- Fully implement the Fair School Funding Plan (FSFP): Ensure equitable distribution of funds based on actual education costs, increase state-level investments and leverage federal programs like the Bipartisan Infrastructure Law.
- Develop comprehensive asset management plans: Conduct regular facility assessments, prioritize maintenance and upgrades based on need and implement long-term planning for future infrastructure investments.
- Encourage development of a capacity-specific asset management to address unique challenges in managing capacity effectively across urban, suburban and rural areas.
- Enhance sustainability and energy efficiency: Mandate sustainability requirements for new construction and renovations, utilize frameworks like LEED and encourage use of green building materials and technologies
- Improve emergency preparedness and resilience: Invest in structural upgrades for emergency shelters, adopt modern building codes and resilience standards and install reinforced windows, earthquake-resistant structures and tornado shelters
- Increase community and stakeholder engagement: Involve educators, parents and local businesses in planning processes, communicate transparently about facility upgrades and their impact and garner public support for necessary funding initiatives
- Foster innovation and technology integration: Promote adoption of smart sensors for real-time monitoring, utilize advanced materials and sustainable construction techniques and integrate modern educational technology requirements into infrastructure planning

SOURCES

American Society of Civil Engineers. 2021 Infrastructure Report Card: Schools. 2021.

American Society of Civil Engineers. 2025 Infrastructure Report Card: Schools. 2025.

Brookings. Federal Investments Ignore Crucial Upgrades to School Facilities—and Students Pay the Price. 2022. https://www.brookings.edu/articles/federal-investments-ignore-crucial-upgrades-to-school-facilities-and-students-pay-the-price/.

Galion City Schools. Emergency Procedures & Centegix Crisis Alerts. 2024. https://www.galionschools.org/page/emergency-procedures/.

National Center for Education Statistics. COE - Public School Enrollment. 2024.

National Center for Education Statistics. Public School Revenue Sources. 2023.

Ohio Department of Education and Workforce. Enrollment Data. 2024.

Ohio Department of Education and Workforce. Overview of School Funding. 2024.

Ohio Facilities Construction Commission. Annual Report FY 2024. 2024.

Ohio Facilities Construction Commission. Green Schools. 2023.

Ohio Governor's Office. Governor DeWine Announces Safety Grants for 600+ K-12 Schools. 2023. https://governor.ohio.gov/media/news-and-media/governor-dewine-announces-safety-grants-for-600-plus-k-12-schools-04252023.

Ohio Legislative Service Commission. Fiscal Analysis of OFCC Capital Funding. 2023.

Ohio Legislative Service Commission. K-12 Education Ohio Facts 2020. 2020.

Ohio School Safety Center. About Us. 2025. https://ohioschoolsafetycenter.ohio.gov/about-us.

Policy Matters Ohio. State of Ohio Schools 2023. 2023. https://policymattersohio.org/research/state-of-ohio-schools-2023/

Thomas B. Fordham Institute. Ohio Education by the Numbers: 2025 Statistics, Charts, Tables & Maps. 2025.

U.S. Department of Energy. Renew America's Schools. 2024.

U.S. Government Accountability Office. K-12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement. 2020.


Solid Waste
B-
meiji
GRADE COMPARISON
Ohio: B-
Nat'l: C+

SOLID WASTE

EXECUTIVE SUMMARY

Ohio solid waste management programs provide options for recovery, recycling and/or disposal of solid waste. Most landfills are self-funded through waste collection fees, including collection and disposal fees. Disposal rates range between $9 and $77 per ton, with an average of $44.50 per ton. A large portion of this revenue from fees goes directly to the operations and maintenance of the individual disposal facilities, including landfills. Landfills remain the primary facilities for waste disposal. In 2022, Ohio received solid waste at 37 licensed municipal solid waste landfills, with a combined remaining gross airspace of over 823 million tons, or approximately 32 years of expected landfill life. Residential and commercial solid wastes generated within Ohio totaled more than 15.7 million tons in 2022, equating to 7.27 pounds per person per day, greater than the 2018 national average of 4.9 pounds per person per day. Ohio's solid waste infrastructure earned a B- due to reliable landfill operations, sufficient remaining capacity and strong regulatory oversight. However, opportunities remain to improve waste diversion and reduce per capita waste generation, which exceeds the national average.

CAPACITY AND CONDITION

Based on available data, Ohio's solid waste disposal industry is well-performing, especially with respect to capacity, operations, public safety and resilience. Ohio has a very strong business sector, which means higher waste generation. Ohio's gross domestic product is the 7th highest of the 50 states. One of the consequences of that is generating more waste than states with lower gross domestic product.

Solid waste in Ohio comprises many varied materials, including municipal solid waste (MSW), scrap tires, green waste, industrial/residual waste and infectious waste. Each of these materials can be managed in separate registered facilities, licensed disposal facilities or all can be disposed of at sanitary landfills. In Ohio, construction and demolition debris (C&DD) is not statutorily considered solid waste and is regulated separately. However, C&DD can be disposed of in sanitary landfills.

In 2021, Ohio adopted rules that merged industrial and residual solid waste programs into industrial or manufacturing waste (IMW) programs. IMW is generated by manufacturing or industrial operations. It includes all wastes previously regulated as industrial and residual solid wastes. In Ohio, all IMW landfills are captive landfills, meaning the owning company is the sole entity permitted to use the facility.

Residential and commercial (R/C) solid wastes generated within Ohio totaled more than 15.7 million tons during 2022, equating to 7.27 pounds per person per day. This is greater than the 2018 national average of 4.9 pounds per person per day. As shown in Table 1, total waste disposal quantities are variable in Ohio and range between approximately 20 million and 27.2 million tons of waste disposed of yearly between 2010 and 2022. The variability is largely driven by the variability in IMW disposal. During 2022, Ohio was a net importer of waste, receiving more than 7.4 million tons of out-of-state waste while exporting approximately 1.2 million tons to adjacent states. The amount of imported waste is trending upward. From 2012 to 2022, imported waste increased by almost 79% and exported waste decreased by almost 16%. The amount of solid waste being exported directly to out-of-state transfer stations and landfills is unknown since there is no reporting mechanism to track waste collected and hauled directly to out-of-state transfer stations or landfills.

TABLE 1 – OHIO WASTE VOLUMES

	Disposal			Import	Export	C&DD (disposed in Ohio MSW landfills)
	MSW	ISW	Total			
2010[a]	9,288,946	10,712,265	20,001,211	4,035,755	1,476,297	1,274,977
2011[a]	8,930,047	11,440,080	20,370,127	4,333,873	1,564,307	1,209,915
2012[a]	9,070,492	9,913,387	18,983,879	4,153,796	1,417,246	1,353,212
2013[a]	9,280,842	10,008,892	19,289,734	4,005,492	1,264,883	1,623,353
2014[a]	9,624,972	11,020,194	20,645,166	3,074,319	1,319,415	1,508,774
2015[a]	9,946,514	9,188,524	19,135,038	3,221,729	1,153,701	1,830,649
2016	9,588,076	6,986,686	18,193,381	3,961,305	1,273,922	2,289,931
2017	10,008,296	7,221,886	18,636,558	4,782,343	1,320,868	2,754,362
2018	10,289,301	7,987,468	20,442,937	5,367,955	1,566,087	3,355,777
2019	10,781,471	4,213,089	16,941,743	5,818,708	1,504,714	3,815,140
2020	10,234,272	5,898,653	17,174,075	5,805,002	1,332,983	4,118,913
2021	10,949,269	7,066,280	19,698,764	6,723,464	1,233,748	4,778,680
2022	11,171,403	8,118,662	21,117,170	7,426,851	1,192,636	5,071,460
2023	11,098,254	3,049,788	15,652,678	8,031,172b	1,654,303	5,104,056

Note:
a = Prior to 2016, the total for industrial waste disposed included excluded wastes, like C&DD. Beginning in 2016, Ohio EPA separated industrial from excluded wastes.

b = This is a preliminary calculation and may change.

In 2022, Ohio received solid waste at 37 licensed municipal solid waste disposal facilities. The combined remaining gross airspace of these facilities was over 823 million cubic yards or approximately 32 years of expected life. This represents a robust permitted capacity for future disposal. In addition to the 37 licensed municipal solid waste disposal facilities, there are also 11 industrial or manufacturing landfills.

In 2023, owners/operators of 41 licensed C&DD landfills accepted approximately 3.72 million tons of waste at their disposal facilities. The number of C&DD landfills has reduced since 2010 after Ohio promulgated new laws with upgraded C&DD landfill requirements. The closure of these facilities increased the disposal to municipal solid waste landfills. As shown in Table 2, C&DD waste disposed of at municipal solid waste landfills rose by 298% from 2010 to 2022.

In 2018, approximately 29% – or approximately 4.3 million tons – of R/C solid waste was reduced or recycled, excluding unsuitable materials. This is based on what is recorded through survey efforts and includes material collected from residential curbside and drop-offs, what commercial businesses report having sent to be recycled, material composted, scrap tires recycled and other indicators. It is a measurement of material diverted from disposal in landfills. The top two recovered materials by percent in 2022 were yard waste at 32% and corrugated cardboard at 21%.

TABLE 2 – ANNUAL MSW REDUCTION/RECYCLING RATES

	Reduction/ Recycling Rate (%)	Tons
2010	27.4	3,500,240
2011	28.3	3,628,291
2012	28.1	3,545,301
2013	28.7	3,729,618
2014	27.9	3,724,251
2015	27.3	3,728,582
2016	28.4	3,793,537
2017	29.1	4,098,867
2018	29.6	4,321,496
2019	28.5	4,301,306
2020	30.0	4,386,564
2021	28.0	4,261,337
2022	29.0	4,552,735

Regarding IMW, approximately 50% – or approximately 6.6 million tons – was reduced or recycled. As with the R/C sector, most of the industrial solid waste recycled consisted of a small number of materials. The top two materials by percentage were metals at 57% and flue gas desulfurization products at 8%. For example, refer to Table 3 for information regarding other reduced and/or recycled materials in 2022.

TABLE 3 – 2022 RECYCLING/REDUCTION QUANTITIES

Materials	Amount (tons)
Food	361,228.9
Glass	227,935.3
Ferrous Metals	3,534,838.6
Non-Ferrous Metals	267,491.6
Corrugated Cardboard	450,991.2
All Other Paper	144,168.1
Plastics	227,445.4
Textiles	5,638.8
Wood	473,150.6
Rubber	26,649.6
Commingled Recyclables	41,999.4
Ash (recycled ash only)	132.1
Non-Excluded Foundry Sand	10,4107
Flue Gas Desulfurization Waste	504,914.2
Incineration	1,153.2

FUNDING AND FUTURE NEED

Most landfills are self-funded through waste disposal fees. Disposal rates at Ohio's municipal solid waste landfills ranged between $23 and $105 per ton, with an unweighted average of approximately $50 per ton. A large portion of this revenue goes directly to the development, operations and maintenance of the individual landfills. The rates include governmental fees applied to each ton of solid waste disposed. A state fee is applied to each ton of waste disposed. Each solid waste management district applies certain fees based on the source of the waste, including in-district, out-of-district and out-of-state fees and – in some cases – generation fees. Finally, there are health department and host community fees. These governmental fees can amount to 30% or more of the total disposal charges. The remaining portion of the tipping fee the owner or operator of the facility charges to use the facility.

Some governmental entities also impose fees on private firms that collect waste within the respective governmental boundaries.

All landfills are required to fund financial assurance programs – including funds earmarked for capping, monitoring and maintaining the facility – to ensure proper closure and maintenance of closed landfills. The cost of these assurance programs is included in landfill disposal costs.

Ohio offers a variety of grant programs to encourage citizens to reduce, reuse and recycle solid waste. These include, but are not limited to:

- Academic institutional grants
- Community litter grants
- Green waste collection and composting
- Food waste collection and composting
- Scrap tire grants
- Market development grants
- Water bottle refilling station grants

The amount provided annually depends upon what Ohio EPA is approved to spend by its controlling board. Ohio EPA awarded $6.8 million in grants in 2023 and $7.6 million in 2024. In past years, maximum awards were closer to $4 million.

Even with this funding source in place, there is typically little financial incentive for individuals or small businesses to recycle solid waste materials. Funding is also needed to expand educational programs to communicate what can be reused and recycled and how citizens can lower their consumption and total waste output. This leaves a gap in the market and creates opportunities for companies to begin to increase the number of recycling facilities.

An emerging need for funding and research is likely to be the treatment of per- and polyfluoroalkyl substances, commonly referred to as PFAS. Similar to wastewater treatment plants, landfills are passive receptors (and not generators) of PFAS chemicals. As the government, regulators and industry continue to evaluate how to address these compounds, there is a concern that the leachate generated from landfills will require additional treatment and/or management. Investments in infrastructure are anticipated to be significant and will lead to increased disposal fees to customers.

Finally, in Ohio, the imperative for securing additional funding to implement more effective and additional recycling management is increasingly urgent. Lithium battery management is an example of a need. As the use of lithium-ion batteries proliferates across industries and households, so does the challenge of responsibly managing their end-of-life disposal. Current infrastructure and funding are insufficient to handle the volume and complexity of these batteries, which pose significant environmental and safety risks if not properly managed.

Photo: sigmund-al4RJ--Mw4I-unsplash.jpg

Investing in specialized facilities, technologies and public awareness campaigns can ensure that Ohio meets regulatory standards and leads in sustainable practices. Enhanced funding would support comprehensive collection programs, advanced recycling technologies and educational initiatives to promote responsible consumer behavior, safeguarding Ohio's environment and communities for generations.

Some states have enacted extended producer responsibility (EPR) laws, and others are likely to do so. Although Ohio has not enacted EPR laws, the existence of these laws in other states will impact Ohio's solid waste infrastructure since producers' products are sold in multiple states and many in all states.

OPERATION AND MAINTENANCE

The Ohio Environmental Protection Agency (Ohio EPA) and some local health districts regulate solid waste in Ohio. Some solid waste districts have enacted regulations, but these regulations cannot replace state laws and regulations. The Ohio Administrative Code provides design guidance and regulates key items at these facilities, including siting and location restrictions, leachate management, stormwater management, environmental monitoring (i.e., groundwater, landfill gas), closure and post-closure care. Ohio's requirements are generally equal to the federal requirements, such as with siting criteria.

Disposal planning and recycling support are also provided by solid waste management districts (SWMD). Each county in Ohio is required to be in a SWMD. A SWMD is a local government agency that oversees the management of solid waste, including recycling. Currently, there are 52 SWMDs in Ohio. Of those, there are 37 single-county SWMDs and 15 multi-county SWMDs. The 52 SWMDs range significantly in their funding levels and capabilities. Solid waste planning and service provision are intended to be locally driven, with each SWMD determining how it will operate, be funded and which programs it will provide. Many SWMDs assist with disaster clean-up efforts during natural disaster events. The main purpose of the SWMD is to prepare, ratify and implement a solid waste management plan. This plan is the SWMD's strategy for achieving the recycling goals of the state solid waste management plan and meeting the solid waste management needs of constituents.

PUBLIC SAFETY

The Ohio EPA performs the primary oversight and permitting of solid waste and C&DD facilities with secondary oversight by Ohio EPA-approved local health departments. The onsite operations are monitored internally and externally (i.e., via 3rd party professional consultants) and require routine reporting to Ohio EPA. Facilities that are determined to be non-compliant with the conditions outlined in their permits are subject to penalties, including fines or potentially forced closure. All permits are publicly available, including any violations, correspondence and enforcement actions.

Each owner or operator of a solid waste recycling, transfer or sanitary landfill facility in Ohio reports to Ohio EPA annually. Their annual report summarizes the waste accepted at the facility during the year, including how much, what types were disposed of and where the waste originated. Ohio EPA compiles this data into a facility data report.

RESILIENCE AND INNOVATION

Ohio is generally considered low risk for geological and meteorological natural hazards. The most impactful events are floods and tornadoes. For instance, in 2024, Ohio experienced its worst year of tornadoes, surpassing the previous record of 63. Through coordination and communication among regulatory agencies, solid waste management districts and landfill facilities, the debris and waste generated from these events were managed efficiently and effectively. Solid waste landfills in Ohio are designed to mitigate the impact of significant rain events and earthquakes, including detailed siting studies, subsurface investigations, stormwater management system designs and slope stability analyses.

Solid waste landfills in Ohio are designed to mitigate the impact of significant rain events and earthquakes, including detailed siting studies, subsurface investigations, stormwater management system designs and slope stability analyses.

Innovation in Ohio exists primarily in response to regulatory and market requirements. One prominent example of innovation driven by regulatory and market requirements to minimize waste is the development of Extended Producer Responsibility (EPR) programs for packaging and plastic waste, particularly in the food and beverage industry. However, Ohio has not enacted an EPR program. Landfill space is abundant and relatively low in cost as compared to other areas throughout the U.S. Ohio's landfill capacity and low cost creates economic difficulty for new innovative waste minimization solutions.

Ohio's compost program uses the nomenclature of Class 1 for MSW-derived compost, Class 2 for sewage sludge, food and green waste compost, Class 3 for food and green waste compost and Class 4 for green waste-only compost. Ohio has 28 Class 2 compost facilities, 50 Class 3 compost facilities and 232 Class 4 compost facilities. Ohio formerly had one Class 1 compost facility but it was retired in 2015. Composting and anaerobic digestion of organics have received more support over the past few years and – as a result – new and expanded facilities are being considered. Ohio EPA has funded several organics programs through its recycling grants. Ohio EPA also received a grant through U S. EPA's SWIFR program to conduct a waste characterization study and create a statewide organics management plan. The intent of that plan is to provide a roadmap for developing the infrastructure needed to increase organics recovery.

Many, if not most, Ohio sanitary landfills operate landfill gas extraction systems to maintain compliance with the Federal Clean Air Act. While the purpose of the gas systems is to prevent both migrations of gas off-site and the prevention of fugitive emissions to reduce greenhouse gases, some of the systems also generate electricity or upgrade the gas to pipeline-quality gas to create renewable natural gas.

In recent years, there has been more initiative to evaluate closed landfills or portions of active landfills for developing solar arrays and solar power generation. This potential use for these historically distressed properties and pending legislation in Ohio for community solar projects offer a unique opportunity.

RECOMMENDATIONS TO RAISE THE GRADE

- Improve recycling education for the public, especially regarding excluding unsuitable items from recycling. Additionally, more education can be provided to the public regarding both the use and reuse of materials in a sustainable way throughout the lifecycle of the material and the safe collection and management of lithium-ion batteries.
- Implement local financial incentives, such as reduced monthly household disposal costs for recycling and incentive programs that provide funding based on the actual tons of recyclables collected.
- Create a rapid review and testing program within Ohio EPA to support the development of new and innovative technologies.
- Increase funding for research and development of alternative uses of waste, including waste-to-energy and additional markets for recyclable materials such as glass and plastics.
- The amount of solid waste being exported directly to out-of-state transfer stations and landfills is unknown since there is no reporting mechanism to track waste collected and hauled directly to out-of-state transfer stations or landfills.
- Decrease recycling costs or create better incentives to recycle; moving forward, this could increase the state's diversion rates. Funds are needed to make recyclable materials more marketable, to find innovative ways to manage MSW for a useful purpose and to create new technologies that provide alternative pathways for solid waste rather than entering a landfill. For instance, Ohio is currently performing a waste characterization study that will result in a statewide strategy for diverting organics from disposal. Funding mechanisms are also needed to help transition citizens, local governments and the waste industry into recognizing MSW as a resource to be utilized.
- Invest in infrastructure and funding to address the volume and complexity of lithium-ion battery disposal, including the development of specialized facilities, advanced recycling technologies and public education initiatives to mitigate environmental and safety risks.
- Develop alternative disposal methods for biosolids currently managed through landfilling or land application, and implement programs for recyclable organics that address potential PFAS contamination.

SOURCES

Ohio Environmental Protection Agency, "2022 Ohio Facility Data Report Tables", 2024.

Ohio Environmental Protection Agency, "2022 Disposal", Recycling, and Generation Analytic – Ohio Solid Waste Disposal, 2023.

Ohio Environmental Protection Agency, "Ohio Waste Imports and Exports – 2022", 2023.

Ohio Environmental Protection Agency, "Ohio Waste Imports and Exports – 2012", 2013.

State of Ohio, "Hazard Identification and Risk Analysis", 2011.

Ohio Environmental Protection Agency, "2018 Ohio Facility Data Report Tables", 2019.

American Society of Civil Engineers, "Acknowledgement of Data Assistance from the Ohio Environmental Protection Agency", 2025.

Photo: Underground stormwater vaults with modular tank; Adnan

STORMWATER

EXECUTIVE SUMMARY

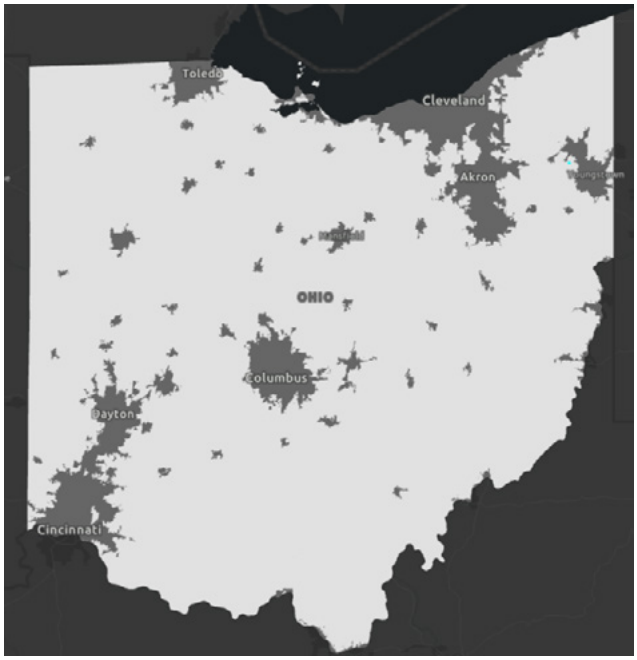
With a population of nearly 12 million, Ohio has an extensive aging stormwater infrastructure to manage and protect. Ohio has approximately 137 stormwater utilities (the 6th most in the US). While Ohio stormwater utility rates increased by 9% from 2020 to 2024, the Engineer News Record (ENR) Cleveland Building Cost Index (BCI) and Construction Cost index (CCI) from March 2020 to March 2024 increased by over 37-percent and 16-percent, respectively. Ohio currently spends between $500M to $900M per year on its stormwater infrastructure but needs up to $900M in additional annual funding to meet future needs.

INTRODUCTION

Ohio spans approximately 44,825 square miles and drains to two major drainage basins: Lake Erie and the Ohio River. Ohio has over 760 square miles of impervious area, 150,000 miles of streams, 60,000 miles of storm sewers, and 792 square miles of delineated wetlands. Ohio's 61 Municipal Separate Storm Sewer System (MS4) regulated areas cover only 7 percent of the land (See Figure 1), but they include nearly 73 percent of the State's population and impervious area.

Embracing a "one-water" approach for managing complex and interconnected challenges in drinking water, wastewater, and stormwater using integrated solutions is critical for ensuring sustainable clean water for Ohioans. Untreated impervious areas are a major cause of flash flooding, erosion, and structural issues. Nearly all rainfall that lands on impervious area turns into surface runoff, and if not properly managed, can threaten non-stormwater related infrastructure: building, transportation, and utilities (BTUs).

FIGURE 1: OHIO'S 61 MS4 AREAS



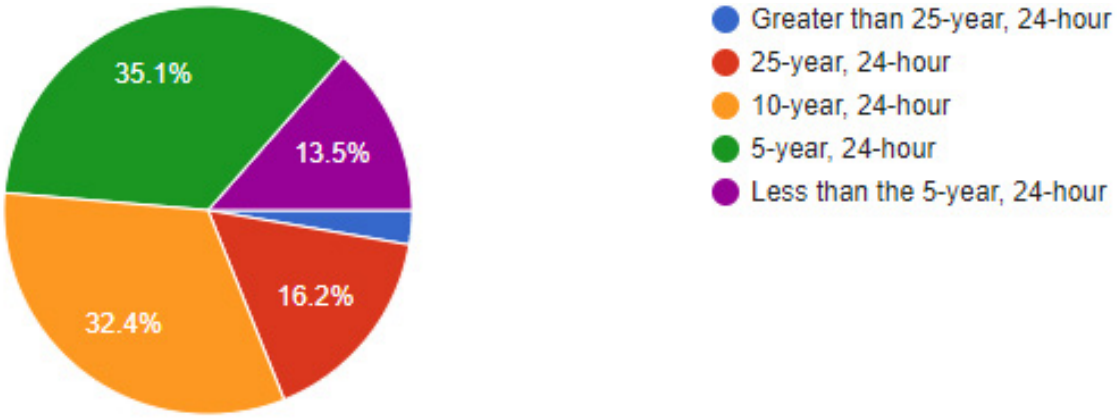
As challenging as it may be to manage the current stormwater infrastructure (SWI), significantly more SWI is still needed to manage untreated impervious areas constructed prior to the current stormwater management regulatory standards. As noted in the 2021 ASCE Ohio Report Card (2021 Ohio Report Card), almost 80-percent of Ohio's impervious area may still not have any Stormwater Control Measures, SCMs (flood control or Water Quality Volume, WQV), leading to more frequent and severe flooding, erosion, and downstream water quality impairment.

To aide in the understanding of current stormwater infrastructure in the state of Ohio, the authors of this chapter created and sent out a 2024 ASCE Ohio Report Card Stormwater Section Survey (2024 Stormwater Survey) to thousands of professionals working in the stormwater field throughout the state. Pertinent survey response summaries are included in the report subsections below.

CAPACITY

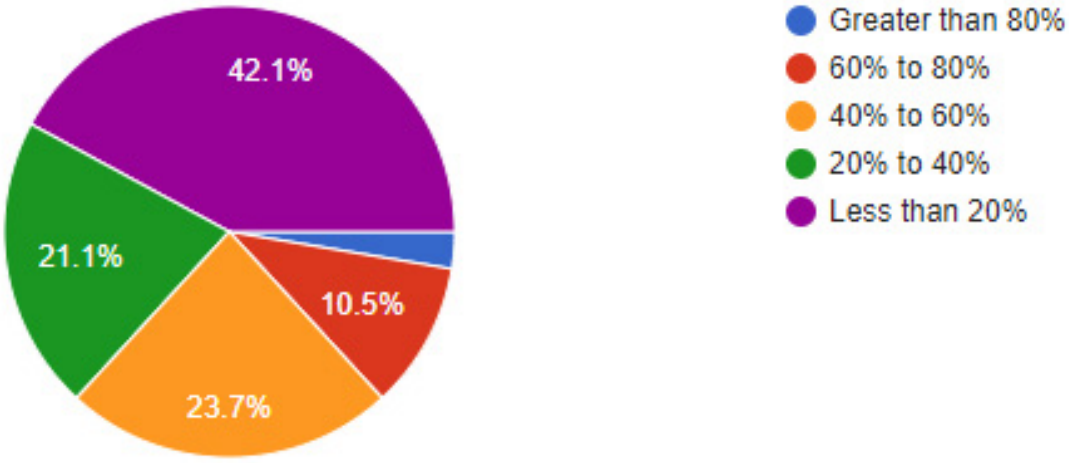
Most of Ohio's existing SWI does not meet today's federal regulatory, state regulatory, and/or local ordinance design standards, because most infrastructure was built well before existing standards. While today's local municipal ordinance design standards typically require storm sewers to handle a 10-year storm without surcharging, over 48% of respondents to the 2024 Stormwater Survey (see Figure 2) indicated that the average design storm that their storm sewer network could handle before surface flooding began was the 5-year storm or smaller.

FIGURE 2: 2024 STORMWATER SURVEY - DESIGN STORM CAPACITY



As noted in the 2021 Ohio Report Card, Ohio may require an additional $20 billion to construct new SCMs to manage untreated impervious area. Untreated impervious area is an issue throughout the state, over 42% of responses from the 2024 Stormwater Survey noted that less than 20% of the impervious area within their service area was treated with an SCM (See Figure 3).

FIGURE 3: 2024 STORMWATER SURVEY - IMPERVIOUS AREA TREATED

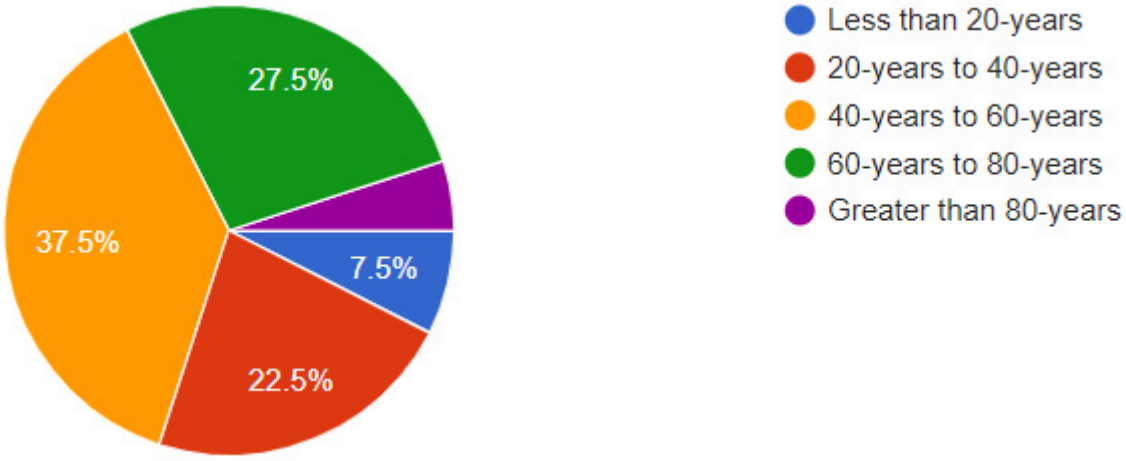


Finding space to add SCMs in many older urban areas is challenging due to space limitations at the surface and the increased costs of implementing subsurface stormwater management. Green Stormwater Infrastructure (GSI) can help manage runoff from an impervious area at its source, and end-of-pipe treatment can help manage runoff before discharging to a stream.

CONDITION

As noted in the 2021 Ohio Report Card, a large portion of the aging SWI across Ohio's 61 MS4s are close to or past their remaining useful life and in need of replacement over the next 20-years. Many surveyed Ohio stormwater professionals agree, since approximately 70% of the 2024 Stormwater Survey respondents said that the average age of the stormwater infrastructure in their service area was 40 years or older, and nearly 33% noted the average ages was 60 years or older, as shown in Figure 4 below.

FIGURE 4: 2024 STORMWATER SURVEY - STORMWATER INFRASTRUCTURE AVERAGE AGE

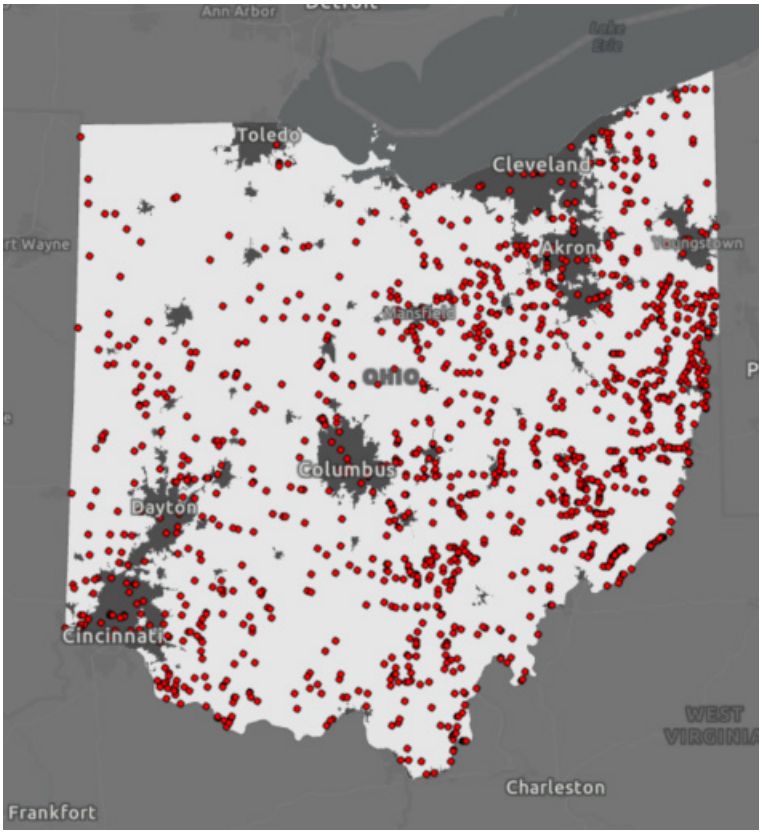


The Ohio EPA, in order to satisfy requirements that are detailed in the Clean Water Act, creates a biennial report that summarizes water quality conditions in the state of Ohio. This report includes a prioritized list of impaired waters within the state. Waters that are considered impaired within the report are those that do not meet the goals for one or more of the four types of "uses". These uses are aquatic life (fish and aquatic insects), recreation (such as boating and swimming), human health (related to fish tissue contamination) and public drinking water supplies. In order to summarize this water quality data on a more granular scale, the report delineates separate waters by their 12-digit hydrological unit code (HUC) and refers to these bodies as Watershed Assessment Units (WAUs). This report is titled the Integrated Water Quality Monitoring and Assessment Report, also known as the Integrated Report.

According to Ohio EPA's 2024 Integrated Report, 27% of WAUs don't support human health use, 80% of WAUs don't support recreational use, 38% of WAUs don't support public water supply use, and 31% of WAUs don't meet aquatic life use attainment. On a positive note, approximately 89% of assessed large rivers (rivers that receive at least 500 square miles of drainage) meet full attainment for aquatic life use.

Within the Ohio Department of Transportation, Transportation Information Mapping System, (ODOT TIMS), almost 98,000 conduits (pipes that have less than a 10-foot diameter) have a general appraisal condition rating, which ranges from 0 (failed condition) to 9 (as-built condition). The average general appraisal rating is 6.9 (good condition), which is generally the same condition rating in 2020. However, nearly 1,500 conduits have a score of 1 to 4 (Poor Condition) (see Figure 5), which generally requires structural rehabilitation or replacement. ODOT's proactive tracking system has been a great tool to budget for and prioritize funding for repair and replacement of conduits in poor condition.

FIGURE 5: ODOT TIMS CONDUITS WITH GENERAL APPRAISAL RATING 1 TO 4



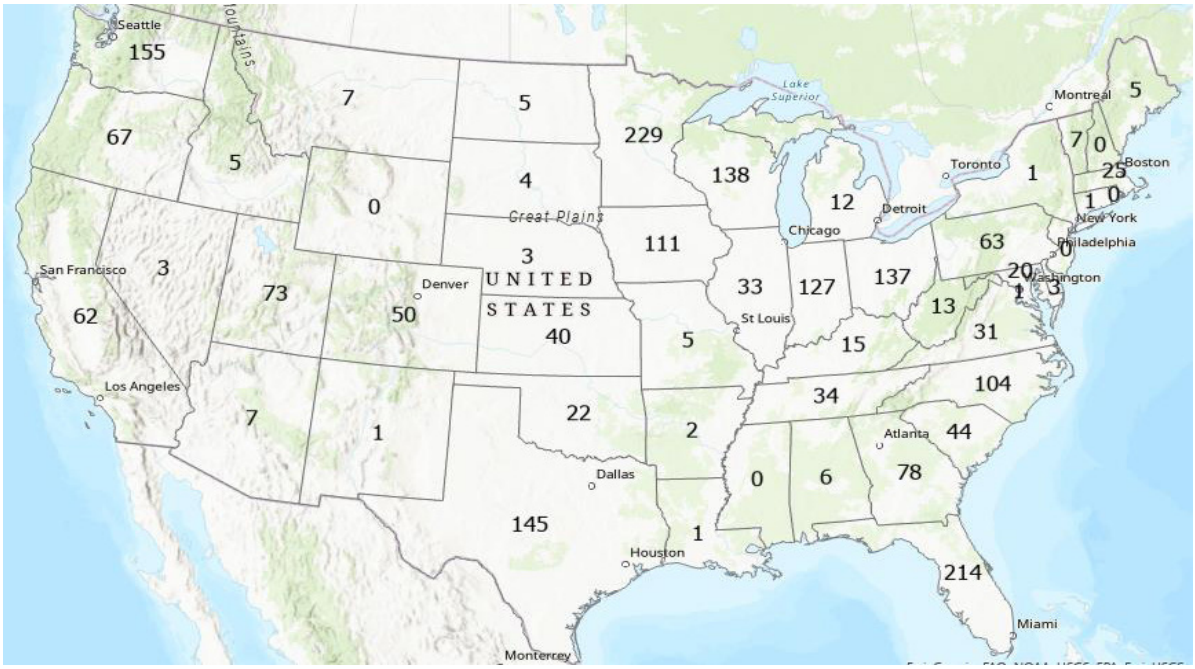
FUNDING

According to the Western Kentucky University Stormwater Utility Survey 2023, stormwater utilities are considered the most reliable method to fund stormwater management programs (SMPs), since they are based upon a customer base, user fees, and a rate tier structure. Figure 6 shows the 137 Ohio stormwater utilities (ranked 6th in the US). Compared to the 2021 Ohio Report card, the average monthly fee increased by 9 percent from approximately $3.50 to $3.83, but it continues to be well below both the national average ($6.06) and median ($5.00), respectively.

Congress passed the Infrastructure Investment and Jobs Act (IIJA) in 2021 and the Inflation Reduction Act (IRA) in 2022. From 2022-2026, $42 billion was anticipated to be spent on new drinking water, wastewater, and stormwater infrastructure across the US, which helps address the funding gaps discussed in this chapter. Approximately 30% of respondents to the 2024 Stormwater Survey indicated that their organization received IIJA funding. However, in 2027, infrastructure spending reverts to 2019 levels in place prior to passage of the IIJA and other major spending bills.

According to a 2019 report by the Center on Budget and Policy Priorities, State and Local governments account for nearly 75-percent of public infrastructure funding. The ENR Cleveland BCI and CCI from March 2020 to March 2024 has increased by over 37-percent and 16-percent, respectively. Because the average 9-percent stormwater utility rate increase over that same timeframe is less than both the BCI, some SMPs may need to explore finding additional funding (e.g., raise stormwater utility rates, apply for state or federal grants) to fill any potential funding gaps for planned projects.

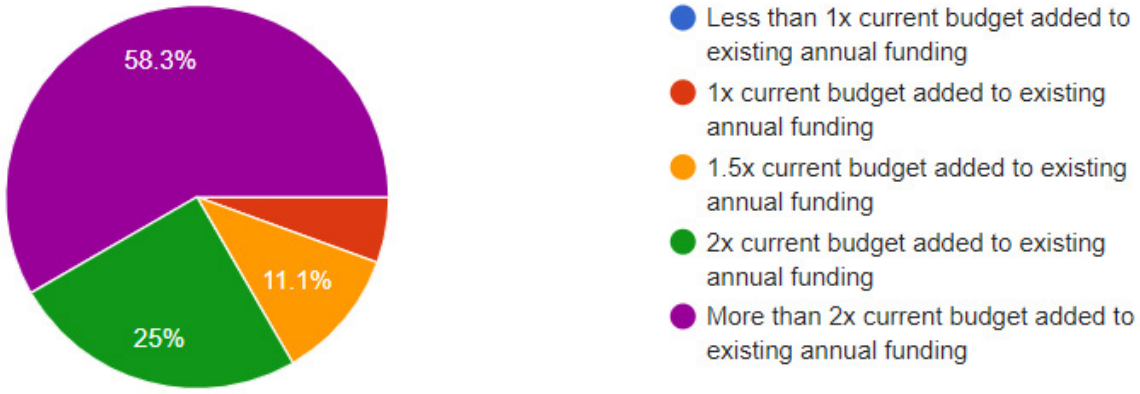
FIGURE 6: NUMBER OF STORMWATER UTILITIES BY STATE (WESTERN KENTUCKY UNIVERSITY STORMWATER UTILITY SURVEY, 2023)



FUTURE NEED

Nearly all the 2024 Stormwater Survey respondents indicated less than 60% of their service areas met their current federal regulatory, state regulatory, or local municipal stormwater management design standards (See Figure 7). Nearly 60% of respondents indicated that their organizations would need more than double their current budget added to their current annual funding, to retroactively meet their standards.

FIGURE 7: 2024 STORMWATER SURVEY - ADDITIONAL ANNUAL FUNDING NEEDED TO RETROACTIVELY MEET CURRENT STANDARDS



According to the 2024 ASCE Bridging the Gap Economic Study, Drinking Water, Wastewater, and Stormwater needs over 2024 to 2033 is approximately $1.653 trillion across the US. However, the anticipated investment is $0.627 billion, indicating there is a funding gap of nearly $1.026 trillion during that time period. Similarly, the USEPA 2022 Clean Watersheds Needs Survey Report to Congress published in April 2024 noted the national capital investment needs (i.e., unfunded project) for stormwater management to address NPDES requirements alone over the next 20-years required an extra $115.3 billion. After wastewater infrastructure, stormwater infrastructure was the highest need in the US. In Ohio, the reported stormwater infrastructure needs exceeded $911 million. The USEPA report acknowledged that many states reported difficulties in obtaining documentation and communicating with local governments to obtain complete information, so the actual national and Ohio stormwater infrastructure needs are likely much greater than noted in the report.

As noted in the 2021 Ohio Report Card, Ohio's SMPs need over $1.2 billion per year to meet current standards. Additional funding could be used to construct new infrastructure, improve O&M programs, conduct additional stormwater master planning, purchase and install additional monitoring equipment, hire additional staff, support urgent storm responses, address any NPDES requirements, etc. Compared to available local, state, and federal funding, between $500 and $900 million in additional annual funding is needed in Ohio alone to meet today's standards. According to the United States Environmental Protection Agency's (USEPA's) Climate Resilience Evaluation and Awareness Tool (CREAT), Ohio storm events are predicted to be more intense than current design standards (5 to 25-percent), so significantly more funding may be needed than estimated in 2021.

OPERATION & MAINTENANCE

Nearly 60% of the respondents to the 2024 Stormwater Survey felt that their operation and maintenance (O&M) program was reactive. A reactive program can be described as:

- Conducting few if any routine inspections to understand the condition of the stormwater infrastructure. Therefore, no comprehensive understanding of the current condition of the existing infrastructure exists.
- Scheduling incidental maintenance occurs along public right-of-way (ROW) asset and is limited to complaint-driven requests and the minimum required by regulations.
- Budgeting little to no preventative maintenance to extend an asset's useful life. Consequently, assets typically fail sooner than if routine inspection and maintenance occurred.
- Not utilizing monitoring equipment or forecasted software to track severe storms and notify various public and private entities of predicted or nowcast flooding.
- Only reacting to customer complaints after a storm event and documenting the minimum amount of information, if any, for record keeping purposes.
- Not utilizing a GIS-based computerized maintenance management system (CMMS) to track the history to track and schedule O&M tasks, running reports to help optimize system performance, and maximize the benefit of overall expenditures.

In contrast, a proactive program includes:

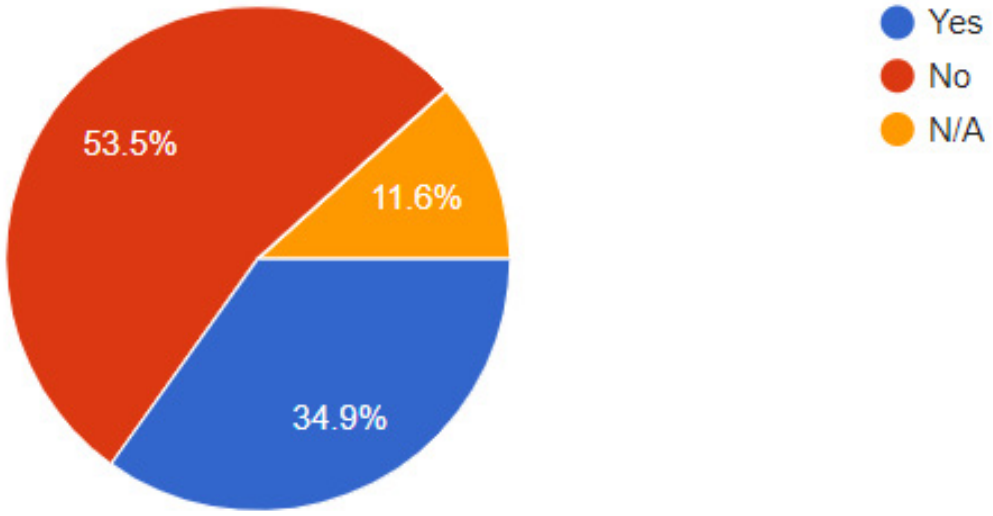
- Conducting routine inspections of all stormwater infrastructure, including assign structural condition ratings to any asset inspected.
- Scheduling routine maintenance and repair, including outside of the ROW, in addition to complaint-driven and regulatory requirements.
- Budgeting preventative maintenance to extend the useful life of assets, thereby reducing the life cycle costs along the overall system.
- Utilizing monitoring equipment and forecasting software to track severe storms, create flood alert rules, and notify various public and private entities of predicted or nowcast flooding.
- Following a pre-established urgent storm standard operating procedure (SOP) that includes conducting pre- and post-inspection and maintenance activities (including customer calls) to improve conveyance and minimize risk during a severe storm event, as well as documenting activities, findings, and recommended next steps.
- Utilizing a GIS-based CMMS to track and schedule O&M tasks, optimize system performance, and maximizing the benefit of overall expenditures.

A proactive O&M program is a valuable part of any SMP, since it can detect and resolve small problems before becoming bigger problems. Knowing where flood prone areas are located and keeping them free of debris can help mitigate flooding during a storm event.

Stormwater systems have public and private owners that implement individual Operation and Maintenance, O&M programs, leading to mixed results. Ohio has 3,399 Private Industrial Stormwater NPDES Permits, which are regularly monitored. However, most private SWI is located on non-industrial property, and is therefore, unregulated, and making it more susceptible to failure. Some private detention basin owners simply focus on aesthetics and overlook structural or storage problems, which can lead to the basin not functioning properly and failing more frequently.

Over 50% of 2024 Stormwater Survey respondents said that they do not have an asset management program for the stormwater infrastructure within their service area (See Figure 8). For programs looking to be more proactive and cost-effective with available resources, a GIS-based CMMS can help maximize the longevity of assets, increase staff efficiency, and support predictive analysis and prevent maintenance. Developing Key Performance Indicators (KPIs) to assess sediment & debris accumulation, structural integrity, and hydraulic performance can help identify problems and support root cause analysis and corrective actions.

FIGURE 8: 2024 STORMWATER SURVEY - O&M ASSET MANAGEMENT SYSTEM



PUBLIC SAFETY

Damaging storms and tornadoes impacted parts of Indiana and Ohio on March 14 and 15, 2024, which resulted in three deaths, over 50 reported injured, 21,000 homes and businesses without power, and many damaged structures. On August 6, 2024, the National Weather Service (NWS) confirmed four tornados and one macroburst touched down in five counties in Northeast Ohio causing widespread structural and tree damage, and 470,000 Ohioans lost power (See Figure 9). On August 8, 2024, moisture from Tropical Storm Debby resulted in rainfall depths in excess of a 1,000-year 3-hour event in some isolated locations that hit four Northeast Ohio counties (See Figures 10 and 11). Thankfully, while hundreds of thousands of Ohioans were without power in Northeast Ohio and cleaning up structural and tree damage after the August 6th tornadoes, the extreme storm event 2 days later from Tropical Storm Debby just missed overlapping the area impacted by tornadoes, else significantly more damage and impacts to public safety (potentially a major catastrophe) would likely have occurred.

FIGURE 9: FOUR TORNADOES AND ONE MACROBURST TOUCHED DOWN IN NORTHEAST OHIO ON AUGUST 6, 2024

FIGURE 10: MOISTURE FROM TROPICAL STORM DEBBY LED TO TORRENTIAL RAIN IN NORTHEAST OHIO ON AUGUST 8, 2024

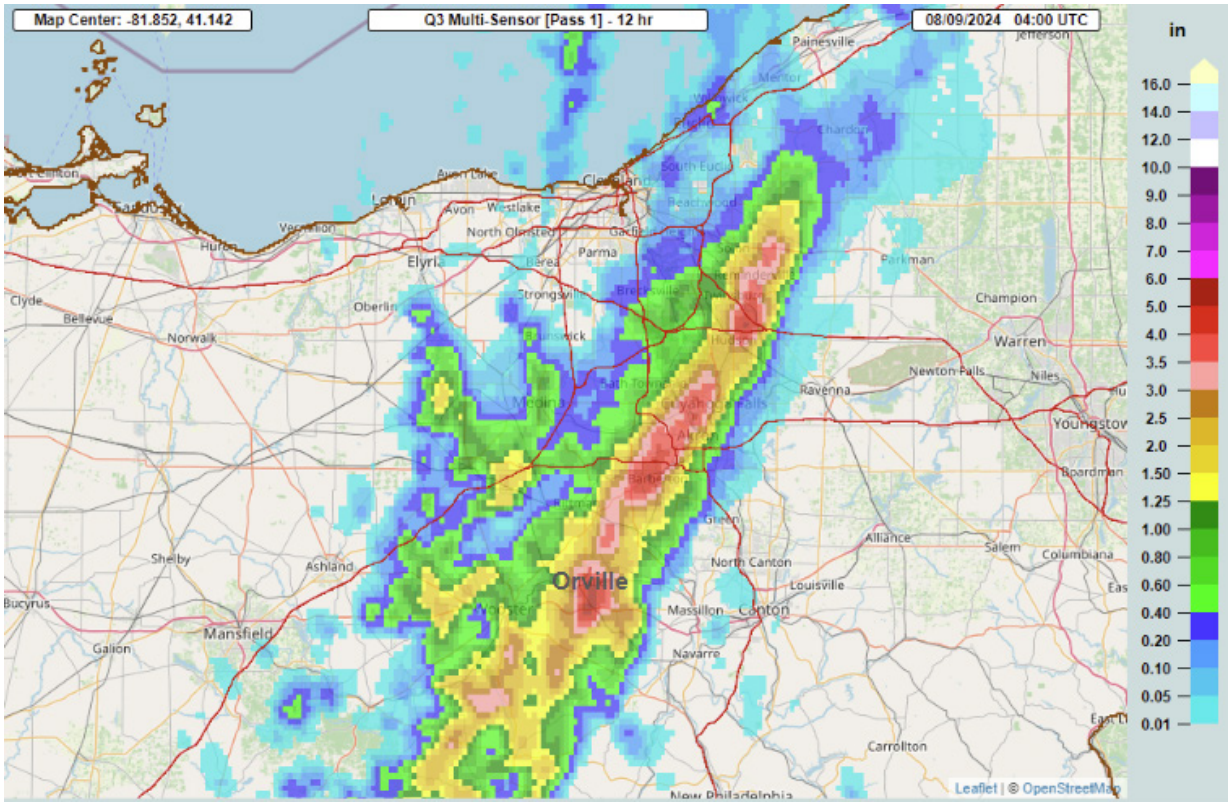


FIGURE 11: I-76 AT SUMMIT ROAD WAS IMPASSABLE DUE TO FLASH FLOODING FROM TROPICAL STORM DEBBY ON AUGUST 8, 2024

According to NOAA, flooding causes more damage in

the United States than any other severe weather-related event, averaging $5 billion a year. Table 1 shows that since 1996, Ohio has recorded nearly $3.2 billion dollars in property and crop damage due to flooding.

TABLE 1: OHIO FLOOD DATA SUMMARY FROM THE NATIONAL CLIMATIC DATA CENTER BETWEEN 1996 AND 2022

Ohio Flood Data Summary from the National Climatic Data Center [1]					
Year	Number of Reported Flood Events [2]	Deaths [3]	Injuries [4]	Recorded Property Damage [5]	Recorded Crop Damage [5]
1996	71	3	None Reported	$43,412,850	$863,850
1997	51	5	5	$125,449,400	$1,862,000
1998	50	9	None Reported	$204,678,980	$134,593,250
1999	30	2	1	$1,644,040	None Reported
2000	45	4	2	$16,113,580	None Reported
2001	35	3	1	$21,850,880	None Reported
2002	38	1	None Reported	$3,848,800	None Reported
2003	64	4	None Reported	$526,955,380	$4,399,000
2004	44	2	None Reported	$205,637,540	$1,450,700
2005	41	3	None Reported	$96,869,800	None Reported
2006	34	4	1	$835,633,376	$57,532,000
2007	23	None Reported	None Reported	$374,280,550	$24,587,980
2008	26	2	None Reported	$7,883,590	$64,350
2009	20	1	None Reported	$6,467,890	$75,790
2010	23	5	4	$18,827,550	$1,390
2011	51	3	None Reported	$61,623,285	$239,750
2012	22	1	2	$1,875,300	None Reported
2013	36	2	None Reported	$55,264,970	$131,000
2014	31	None Reported	None Reported	$90,021,360	$98,040
2015	37	5	3	$34,532,010	$354,750
2016	26	None Reported	None Reported	$5,887,720	None Reported
2017	39	None Reported	None Reported	$23,264,880	$1,860,000
2018	70	2	None Reported	$7,014,390	$1,220
2019	62	3	2	$106,447,020	$182,400
2020	45	4	None Reported	$22,293,765	$2,340
2021	36	None Reported	None Reported	$2,940,550	None Reported
2022	36	None Reported	None Reported	$8,736,604	None Reported
Total:	1086	68	21	$2,909,456,060	$228,299,810

1 - Figures include Flood and Flash Flooding events as recorded on the NOAA Storm Events Database.
2 - Figures of Flood and Flash Flood events were calculated as days with events.
3 - Figures include both direct and indirect deaths.
4 - Figures include both direct and indirect injuries.
5 - Damage figures were converted to 2023 U.S. Dollars from the amount recorded of year.

Ohio EMA noted as of November 2023 that over 2,573 repetitive loss and severe repetitive loss structures exist in Ohio with 7,283 losses and $152.5 million paid. Table 2 below shows the top 15 counties with the greatest losses.

TABLE 2: TOP 15 COUNTIES IN OHIO WITH REPETITIVE AND SEVERE REPETITIVE LOSS STRUCTURES IN OHIO

Repetitive and Severe Repetitive Loss Structures in Ohio as of November 2023 [1]						
County	OEMA Region	Repetitive Loss Structures	Severe Repetitive Loss Structures	Total RL/SRL Structures	Total Losses	Total Paid
HANCOCK COUNTY	1	161	25	186	550	$ 11,832,474.94
OTTAWA COUNTY	1	130	4	134	403	$ 4,023,889.67
ERIE COUNTY	1	76	16	92	322	$ 3,446,452.25
LUCAS COUNTY	1	76	8	84	239	$ 2,975,499.14
REGION 1 TOTAL		**443**	**53**	**496**	**1,514**	**$ 22,278,316.00**
CUYAHOGA COUNTY	2	112	25	137	470	$ 21,647,739.63
HAMILTON COUNTY	2	129	25	154	489	$ 16,721,206.78
SUMMIT COUNTY	2	83	10	93	242	$ 6,019,187.69
LAKE COUNTY	2	76	7	83	245	$ 3,926,915.81
FRANKLIN COUNTY	2	99	5	104	273	$ 3,727,765.50
LORAIN COUNTY	2	54	6	60	166	$ 3,417,320.08
REGION 2 TOTAL		**553**	**78**	**631**	**1,885**	**$ 55,460,135.49**
WASHINGTON COUNTY	3	174	24	198	513	$ 12,069,519.87
BELMONT COUNTY	3	63	2	65	161	$ 2,914,188.51
TRUMBULL COUNTY	3	40	4	44	125	$ 2,181,164.46
ATHENS COUNTY	3	45	5	50	151	$ 2,166,791.99
LAWRENCE COUNTY	3	36	7	43	131	$ 1,664,408.60
REGION 3 TOTAL		**358**	**42**	**400**	**1,081**	**$ 20,996,073.43**
STATEWIDE TOTAL		**1,354**	**173**	**1,527**	**4,480**	**$ 98,734,524.92**

1 – Does not include already mitigated properties.

Almost 30% of the 2024 Survey Respondents indicated that more than 10 storm events in their service area impacted public safety within the last 5 years, and a similar percent of respondents stated that the total estimated economic damage from those storm events was greater than $5 million.

According to FEMA, structures built to the minimum National Flood Insurance Program (NFIP) standards experience 80 percent less damage and avoid $1 billion in losses each year. To encourage and reward local floodplain management, the Community Rating System (CRS) was created and reduces NFIP insurance rates when a local community adopts regulations that meet specific standards. Over 600 municipalities, and 86 counties across Ohio participate in the NFIP. As of October 2023, only eight communities in Ohio participate in the CRS program, which is a decrease from the 2021 Ohio Report Card when 13 communities participated.

RESILIENCE

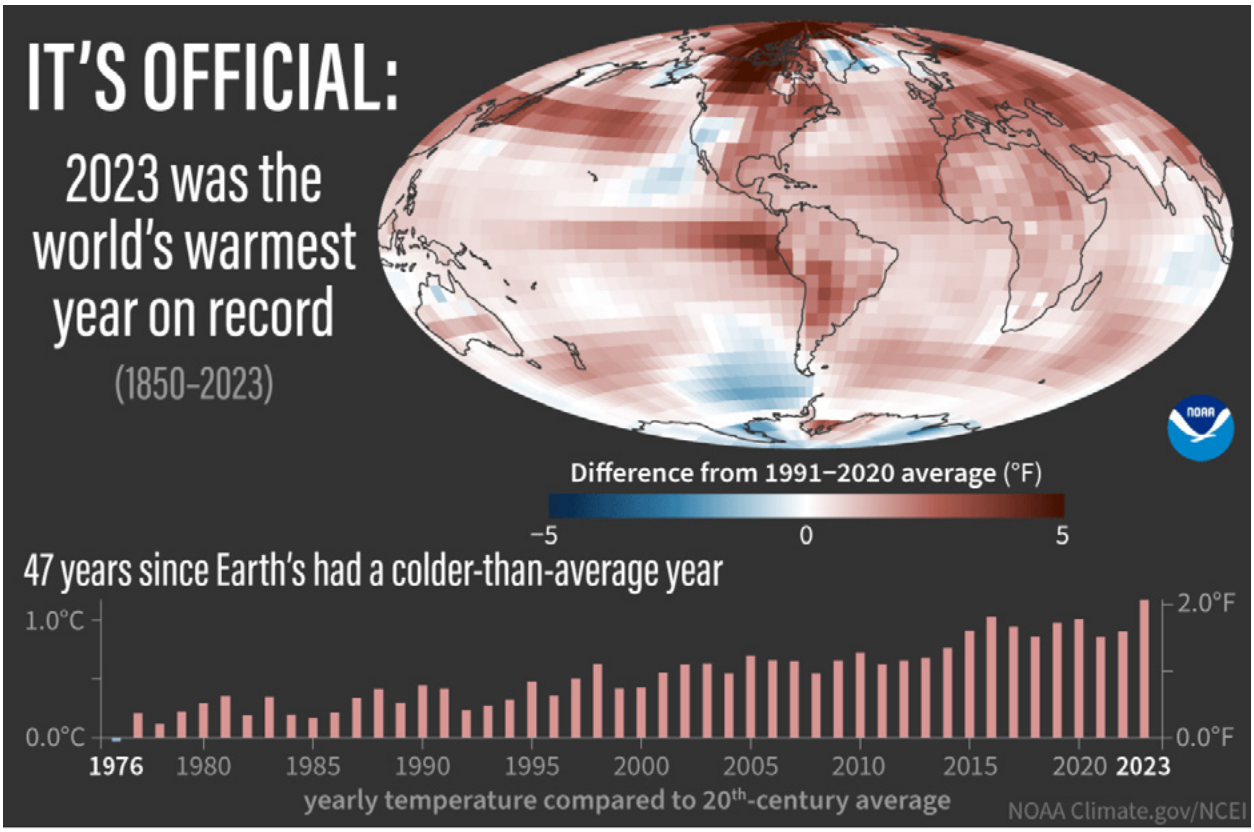
The resilience of stormwater systems to withstand or recover quickly after a storm event is becoming more important, since NOAA and other climate scientists are predicting increased rainfall depths and intensity across the Midwest. As noted previously, current standards typically size storm sewers to convey the 10-year storm, and approximately half of Ohio's storm systems can only withstand the 5-year storm event. If portions of the stormwater system become clogged due to sediment or debris accumulation (e.g., leaves in catch basins or large woody debris in SCMs or crossing inlets), then the stormwater system may have less collection and conveyance capacity than normal, thereby withstand a smaller storm than designed, or it may take a longer time to recover. In addition, any increase in rainfall depths or intensity can further stress an existing stormwater system, exacerbate current problems, extend recovery times, as well as potentially create new problems.

In the face of a extreme weather, several respondents of the survey indicated that stormwater utilities are working to make their infrastructure more resilient, which included:

- Field monitoring of rainfall and streamflow.
- Planning studies incorporating expected future rainfall conditions.
- Design and construction that incorporates the planning study findings.
- Enhanced operation and maintenance practices.
- Updated city/county ordinances that account for extreme weather.

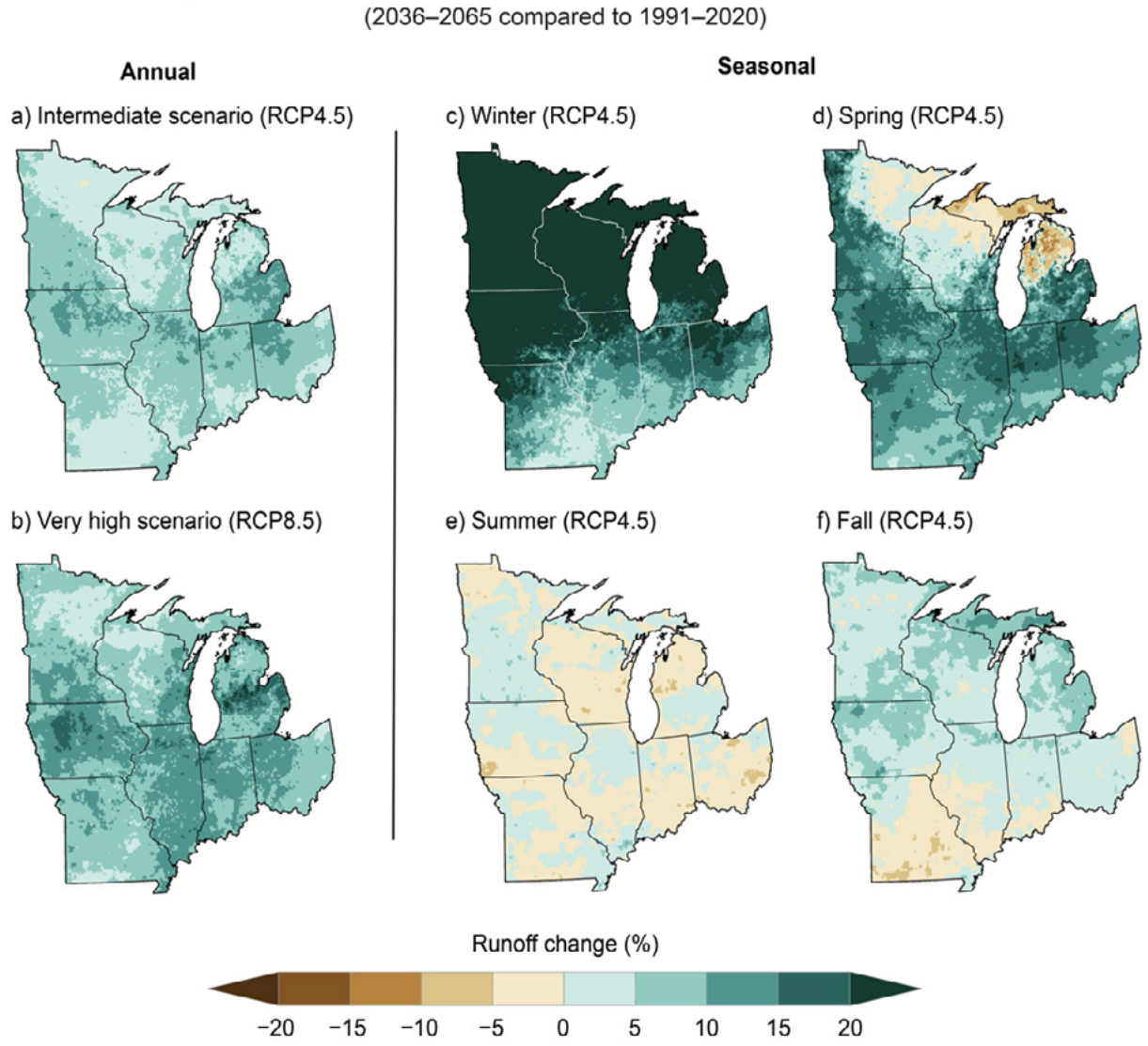
Climate scientists have indicated that for every one degree Celsius (1.8 degrees Fahrenheit) the planet temperature increases results in the atmospheric moisture content capacity increasing by an additional seven percent. Based on data provided by NOAA, 2023 was the warmest year on record (see Figure 12).

FIGURE 12: NOAA TEMPERATURE DATA FROM 1976 THROUGH 2023



According to the Fifth National Climate Assessment, Ohio is expected to have increases in both average annual and heavy precipitation, which can lead to additional flooding (See Figure 13).

FIGURE 13: PROJECTED CHANGES TO SEASONAL AND ANNUAL RUNOFF IN THE MIDWEST



Many Ohio communities and agencies utilize the NOAA Atlas 14 recurrence rainfall values (published in 2004) to size SWI. NOAA Atlas 14 is a project of the National Weather Service's (NWS) Hydrometeorological Design Studies Center (HDSC) that provides precipitation frequency information for the U.S. states and territories. As noted in the 2021 Ohio Report Card, NOAA and NWS suggest the NOAA Atlas 14 values may be underestimating flood recurrence rainfall by up to 20 percent, which can lead to additional public safety impacts, economic impacts, and consequently increased flood insurance rates, because of their reduced effectiveness to withstand and recover from future storm events. In 2025, preliminary NOAA Atlas 15 values will be published for the Continental US (CONUS), which include updated precipitation frequency information using rainfall data through 2023, and it will also include a method for users to explore predicted rainfall values in the future based upon different climate scenarios.

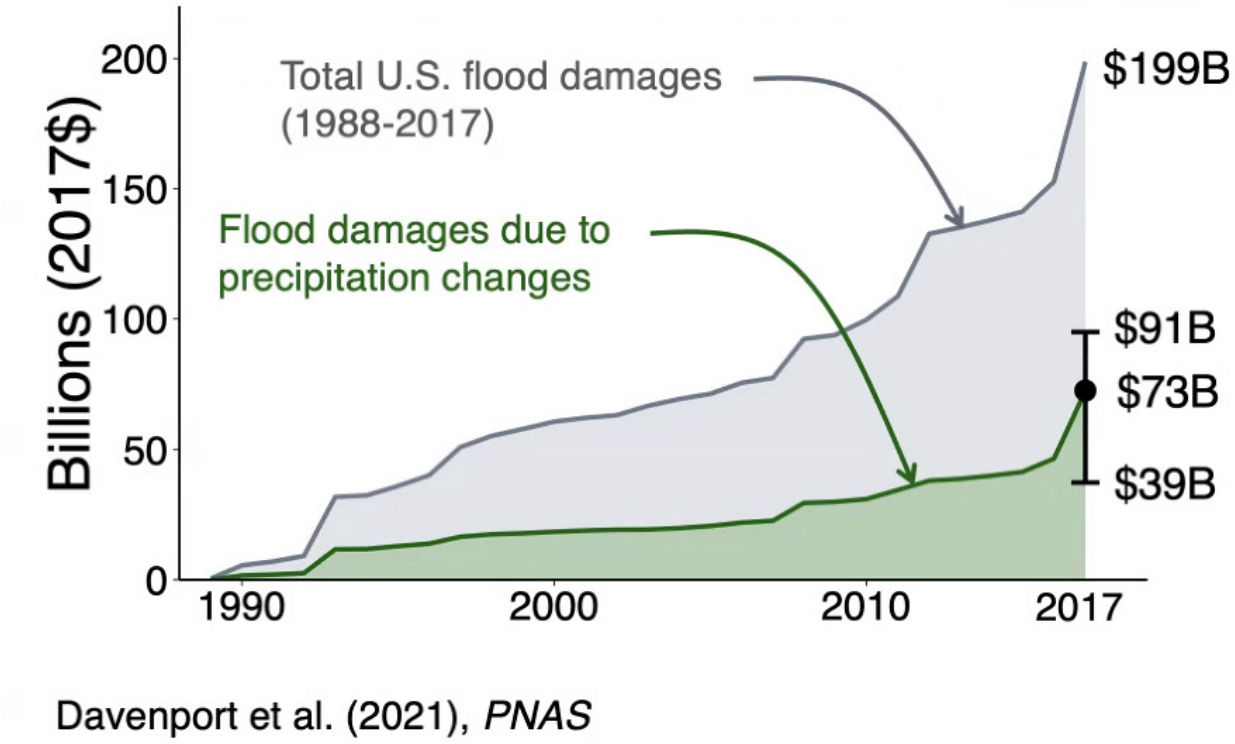
Ohio EMA coordinated with USACE to undertake a HAZUS analysis project that completed a Level 2 flood analysis for 25 Ohio Counties that assessed 25 and 100-year flood event scenarios to estimate building, content, and inventory loss (See Table 3). The results estimated the 25-year flood event scenario would result in nearly $4.8 billion in building, content, and inventory loss, while a 100-year flood event would result in nearly $6.4 billion in losses. Building, content, and inventory loss estimates would increase significantly once applied to all 88 Ohio counties and account for any increase in the 25-year or 100-year flood events due to future flood recurrence intervals.

TABLE 3: ESTIMATED 100-YEAR BUILDING INTERRUPTION FOR 25 OHIO COUNTIES

USACE-OEMA HAZUS-MH Level 2 Scenario Analysis, 100-Year Flood Event											
			Percent Damage						Estimated Building Interuption		
County	2020 Population	Building Exposure Value ($1,000)	1-10% Damage Count	11-20% Damage Count	21-30% Damage Count	31-40% Damage Count	41-50% Damage Count	>50% Damage Count	Building Loss	Content Loss	Inventory Loss
Ashland	52,447	$ 1,786,016	31	68	57	33	29	74	$ 27,462,740	$ 50,388,642	$ 17,852,898
Ashtabula	97,574	$ 3,643,344	31	110	53	37	21	38	$ 19,939,706	$ 34,675,439	$ 7,873,924
Butler	390,357	$ 8,676,740	256	701	763	429	235	270	$ 236,333,798	$ 484,932,872	$ 52,986,063
Cuyahoga	1,264,817	$ 16,268,693	97	296	184	102	74	81	$ 110,148,410	$ 222,970,401	$ 50,484,705
Delaware	214,124	$ 4,605,739	31	63	55	50	96	200	$ 59,947,876	$ 71,221,313	$ 14,222,396
Fairfield	158,921	$ 4,876,227	104	244	241	185	125	180	$ 83,947,013	$ 140,004,516	$ 26,315,536
Franklin	1,323,807	$ 22,711,477	391	1245	849	424	202	140	$ 205,452,090	$ 360,984,631	$ 52,799,748
Geauga	95,397	$ 2,394,681	23	26	15	7	1	3	$ 3,779,520	$ 2,387,798	$ 387,155
Greene	167,966	$ 3,847,505	45	89	69	51	29	23	$ 25,902,724	$ 54,337,409	$ 11,646,306
Hamilton	830,639	$ 14,035,544	229	446	534	471	346	393	$ 260,672,817	$ 522,711,416	$ 125,950,224
Knox	62,721	$ 3,035,442	111	178	153	52	27	28	$ 24,522,874	$ 41,375,025	$ 8,131,340
Lake	232,603	$ 5,311,483	257	184	130	75	35	24	$ 44,122,438	$ 79,301,434	$ 17,613,802
Licking	178,519	$ 7,430,274	160	600	513	268	148	152	$ 139,207,415	$ 203,643,604	$ 77,905,295
Lorain	312,964	$ 9,936,457	78	523	177	66	65	37	$ 69,008,624	$ 82,233,163	$ 11,753,947
Mahoning	228,614	$ 3,234,470	24	27	22	9	10	6	$ 27,791,110	$ 59,808,946	$ 12,493,156
Medina	182,470	$ 3,587,560	33	43	37	12	8	18	$ 9,751,739	$ 12,456,129	$ 4,203,784
Montgomery	537,309	$ 9,433,776	369	847	970	382	190	140	$ 185,681,990	$ 313,380,060	$ 43,916,675
Pickaway	58,539	$ 2,231,664	9	17	12	7	6	15	$ 8,207,035	$ 18,729,370	$ 5,579,817
Portage	161,791	$ 3,436,926	14	39	37	26	23	19	$ 12,034,305	$ 13,531,471	$ 1,517,746
Richland	124,936	$ 2,447,972	54	114	107	70	28	20	$ 48,955,311	$ 122,777,488	$ 24,396,653
Stark	374,853	$ 6,972,526	147	284	255	150	77	77	$ 87,069,885	$ 166,595,976	$ 29,080,510
Summit	540,428	$ 8,604,422	124	243	188	121	82	49	$ 92,633,342	$ 213,287,593	$ 37,610,013
Trumbull	201,977	$ 5,686,303	103	218	213	96	55	47	$ 57,033,857	$ 103,635,138	$ 29,768,583
Warren	242,337	$ 7,232,933	164	313	365	259	192	388	$ 169,573,015	$ 209,941,822	$ 39,354,218
Wayne	116,894	$ 2,506,200	40	39	55	17	19	65	$ 15,989,241	$ 28,071,829	$ 5,359,223

A recent study also noted that changes in precipitation have increased flood damages across the United States by approximately $73 billion dollars between 1988 and 2017 (See Figure 14).

FIGURE 14: ESTIMATED U.S. FLOOD DAMAGES AND PERCENT DUE TO PRECIPITATION CHANGES



A 2024 EPA hosted webinar discussing extreme weather and the financial strength of the water sector noted that credit rating agencies, investors, and insurers are now incorporating extreme weather considerations into their assessment of a water sector utilities' financial health. Consequently, utilities that aren't incorporating any changes to mitigate risks or don't provide climate adaptation strategies may lead to lower credit ratings, fewer investors, and higher insurance premiums compared to water sector utilities that do.

INNOVATION

Several Ohio stormwater programs are implementing NWS equivalent flood stages for any installed stream monitor, so flood-based real-time notifications can be sent to communities and businesses to take corrective actions.

A Northeast Ohio SMP recently filed a provisional patent on a method to estimate the probable annual risk (PAR) associated with structural and flooding problems to support construction and O&M project prioritization, stormwater master planning, and tracking program success.

A Northeast Ohio SMP is utilizing machine learning artificial intelligence to support both urgent storm event responses and near-real time flood inundation mapping.

RECOMMENDATIONS TO RAISE THE GRADE

- Increase Local, State, and Federal Funding to advance SMPs.
- Upgrade SWI by replacing aging, outdated, undersized, and/or missing infrastructure to retroactively meet today's stormwater management standards and address Ohio's missing SCMs.
- Invest in a GIS-based CMMS that tracks the function of streams, SWI, and structurally or hydraulically threatened BTUs.
- Support early flood warning programs by collaborating regionally to share data and research, invest in monitors to measure rainfall, level, and flows in flood prone areas, develop flood risk rules, setup alerts, and notify various public and private entities about forecasted or nowcast flooding.
- Local municipalities and stormwater utilities should develop an Urgent Storm Standard Operating Procedure (SOP)that includes pre-storm planning, storm tracking, post-storm field response, post-storm field recovery phase and communication trees.
- At the local, state, and federal level, begin to evaluate impacts to stormwater infrastructure for a range of extreme weather events under various future climate conditions, then update public safety and public health regulations, structural and non-structural standards, and corresponding codes and ordinances to become more resilient, accordingly.
- At the local, state, and federal level, develop and implement climate adaptation strategies.

SOURCES

American Society of Civil Engineers, "Bridging the Gap: Economic Impacts of National Infrastructure Investments", 2024.

Campbell, "Warren and Davis", Emily G., Western Kentucky University Stormwater Utility Survey 2023, 2023.

NOAA National Weather Service, "Cleveland", OH Weather Forecast Office – August 8, 2024 Flash Flooding, 2024.

Davenport, "Frances V.", Burke, Marshall, and Diffenbaugh, Noah S., Contribution of Historical Precipitation Change to U.S. Flood Damages, Proceedings of the National Academy of Sciences, 2011.

Engineering News-Record, "Cleveland Building Cost Index (BCI)", March 2020 and March 2024.

Engineering News-Record, "Construction Cost Index (CCI)", March 2020 and March 2024.

Ohio Environmental Protection Agency, "General Permit Authorization for Storm Water Discharges Associated with Construction Activity", 2018.

Lindsey, "Rebecca and Dahlman", LuAnn, Climate Change: Global Temperature, NOAA, 2024.

SOURCES (cont.)

McGraw, "Katie and Scofield", Drew, National Weather Service Confirms 4 Tornadoes Touched Down in Several Counties Across Northeast Ohio, ABC News 5 Cleveland, 2024.

McNichol, "Elizabeth C.", It's Time for States to Invest in Infrastructure, Center on Budget and Policy Priorities, 2019.

Federal Emergency Management Agency, "National Flood Insurance Program Description", 2002.

NOAA National Weather Service, "NOAA Atlas 14: Precipitation-Frequency Atlas of the United States – Volume 2", Version 3.0, 2006.

Ohio Environmental Protection Agency, "Ohio NPDES Storm Water Program", 2025.

U.S. Census Bureau, "Ohio Census Data: Households & Families", 2000.

Ohio Environmental Protection Agency, "Division of Surface Water – Ohio Integrated Water Quality Monitoring and Assessment Report", 2024.

Remias, "George", 2021 Report Card for Ohio's Infrastructure – Stormwater Section, American Society of Civil Engineers, 2021.

Ohio Emergency Management Agency, "State of Ohio Enhanced Hazard Mitigation Plan", 2024.

Ohio Department of Transportation, "Transportation Information Mapping System (TIMS)", 2025.

U.S. Environmental Protection Agency, "Climate Resilience Evaluation and Awareness Tool (CREAT)", 2025.

U.S. Environmental Protection Agency, "2022 Clean Watersheds Needs Survey Report to Congress", 2024.

Vogel, "Derek and Remias", George, 2024 ASCE Ohio Report Card – Stormwater Section Survey, Northeast Ohio Regional Sewer District, 2024.

Wilson, "A.B.", et al., Ch. 24. Midwest. In: Fifth National Climate Assessment, U.S. Global Change Research Program, 2023.

Photo: Cinci Streetcar

TRANSIT

EXECUTIVE SUMMARY

Transit is in mediocre to poor condition, with a grade of C-, improving from a D in 2021. Ohio has 26 urban and 40 rural transit systems serving 83 of the state's 88 counties. These systems provided 70.3 million rides in 2023, a 45% decrease over the last 16 years. In 2023, 501 of 3,707 (13.5%) revenue vehicles exceeded their useful lives, a significant improvement since 2018, when 636 of 3,559 (17.9%) revenue vehicles exceeded their useful lives. However, this still lags behind the 12% figure in 2007. This trend coincides with the reversal of a long-term lack of state funding for transit, which decreased from $42.3 million in 2000 to $7.3 million in 2013 and to $6.5 million in 2018 and 2019. State funding then increased to $70 million in 2020 and 2021 and dropped to $37 million in 2022. In 2022, this amounted to just $3.15 per person, ranking Ohio 31st in per capita funding – 25 times less than the average state at $76.67 per capita.

CAPACITY AND CONDITION

In 2018, the Federal Transit Administration (FTA) required Ohio's transit agencies to develop Transit Asset Management (TAM) plans. These plans identify assets and establish goals for asset condition in four areas: percentage of revenue vehicles exceeding their useful lives, percentage of equipment exceeding their useful lives, facilities with a rating below 3 on a 5-point scale and percentage of rail track with slow zones. TAM plans also include inspection and condition documentation for each applicable category.

The trend data is only available for the useful life of revenue vehicles. The Ohio Department of Transportation (ODOT) Status of Public Transit reports all revenue vehicle types and their first year of service for all 66 transit agencies. The 2023 National Transit Database includes age distribution per vehicle type, providing trend data for revenue vehicles exceeding their useful lives. Data from 2007, 2013, 2018 (ODOT) and 2023 (NTD) are shown in Table 1 (1,2,3,5).


Photo: Cinci Streetcar

TABLE 1 – OHIO URBAN, RURAL AND OVERALL REVENUE VEHICLE CONDITIONS

Year	System	Revenue Vehicle	Exceed Useful Life	Percentage
2007	Urban	2947	456	15.5%
2013	Urban	2808	407	14.5%
2018	Urban	2971	564	19.0%
2023	Urban	2944	369	12.5%
2007	Rural	505	38	7.5%
2013	Rural	506	42	8.3%
2018	Rural	588	72	12.3%
2023	Rural	763	132	17.3%
2007	Overall	3452	494	12.0%
2013	Overall	3314	449	13.5%
2018	Overall	3559	636	17.9%
2023	Overall	3707	501	13.5%

Over the past 16 years the number of revenue vehicles exceeding their useful lives grew from 494 (12%) in 2007 to 636 (17.9%) in 2018, before decreasing to 501 (13.5%) in 2023. This increase in older vehicles reflected the funding pressures facing transit throughout the state, with overall and urban system improvements coinciding with increased state funding from 2020 to 2022. At the same time, rural systems have grown their fleet and replaced fewer older vehicles.

The number of revenue vehicles in Ohio has grown from 3,452 in 2007 to 3,707 in 2023, but transit ridership has dropped 45%, from 129.9 million in 2007 to 70.3 million in 2023. As shown in Table 2, most ridership is concentrated in Cleveland, Cincinnati and Columbus (the "3Cs)", which account for 59-75% of all rides. The eight largest urban systems (3Cs, Akron, Canton, Dayton, Toledo and Youngstown) account for 90% to 95% of all rides (1,2,3,4,5).

Photo: Cinci Streetcar

TABLE 2 – OHIO AND URBAN TRANSIT RIDERSHIP DATA (MILLIONS)

	2007	2013	2018	2020	2023
Ohio Total	**129.9**	**115.1**	**100.6**	**51.3**	**70.3**
Akron	5.3	5.4	5.1	5.4	4.3
Canton	2.2	2.7	2.5	2.3	1.4
Cincinnati	22.7	17.0	14.0	7.4	13.1
Cleveland	59.5	49.2	39.6	12.2	22.4
Columbus	14.8	18.8	19.2	10.5	11.5
Dayton	10.5	9.7	9.1	6.1	6.6
Toledo	4.6	3.5	2.6	1.1	1.9
Youngstown	1.2	1.5	1.5	1.5	2.0
8 Large Urbans	123.8	107.8	93.6	46.5	63.2
3 C's	97.0	85.0	72.8	30.1	47.0

The ridership losses highlight the impacts of urban sprawl and the de-densifying of Ohio's largest cities. The 2020 ridership decline reflects the COVID-19 impact on urban transit systems, which had not returned to pre-COVID levels by 2023, except in Youngstown. Ohio's population has remained stagnant over this period, with Columbus the only urban area experiencing significant growth. This supported a 23% increase in Columbus's ridership from 2007 to 2018 pre-COVID.

FUNDING

Transit funding in Ohio comes from a combination of federal, state and local funding sources. These funds are used for both operations and capital spending, with many funding sources restricted to either operating or capital expenses. Each of Ohio's 66 transit agencies uses a variety of local funding sources, including county sales and property taxes, local income tax, city/county general funds, farebox revenue, service contracts, advertising and donations. State funding for transit comes in two forms: the State of Ohio General Revenue Fund (GRF) and ODOT Flex Funds, which are federal gas tax funds designated within the ODOT budget for transit. The ODOT Office of Transit manages and allocates a portion of those funds by formula (Urban Transit Program [UTP]) to agencies and another portion through competitive grants (Ohio Transit Preservation Program [OTP2]).

Federal funds are allocated by formula based on population and ridership and are administered through the FTA. These funds provide a base level of support, with additional one-time funds available through competitive grant programs from both FTA and USDOT for capital projects and vehicle replacement programs. For rural transit agencies, the ODOT Office of Transit distributes its federal funds for both operating and capital projects, while urban agencies use federal formula funds for capital projects and to supplement operating budgets for preventative maintenance.

National Transit Database (NTD) time series data for operating, capital and total transit funding sources from 2008, 2013, 2018 and 2023 are shown in Table 3 (6). Local and other funding sources have increased by approximately 3% per year over the last 15 years,

keeping up with inflation. State funding decreased by 30% in 2018 during the same period before rebounding in 2023. Federal funding fluctuated slightly by over 1% per year through 2018, then sharply increased in 2023 due to remaining COVID relief funds and the first year of the Infrastructure Investment and Jobs Act (IIJA).

TABLE 3 – NTD OHIO TRANSIT FUNDING SOURCE DATA FOR EXPENSES (MILLIONS)

Funding Source	2008	2013	2018	2023
Operating				
Local/Other	$460.1	$552.4	$692.7	$785.6
State	$18.5	$8.6	$10.3	$23.2
Federal	$88.8	$102.1	$112.7	$188.6
Total	**$627.4**	**$663.1**	**$815.7**	**$997.4**
Capital				
Local/Other	$63.2	$62.3	$78.3	$104.1
State	$8.7	$0.1	$0.4	$7.1
Federal	$103.5	$119.0	$89.8	$157.3
Total	**$175.4**	**$181.4**	**$168.5**	**$268.5**
All Funding				
Local/Other	$583.3	$614.7	$771.0	$889.7
State	$27.2	$8.7	$10.7	$30.0
Federal	$192.3	$221.1	$202.5	$345.9
Total	**$802.8**	**$844.5**	**$984.2**	**$1,265.9**

A review of the American Association of State Highway and Transportation Officials (AASHTO) Survey of State Funding for Public Transportation shows that Ohio's state funding for transit has decreased from $42.3 million in 2000, $18.3 million in 2005, $15.8 million in 2008, $7.3 million in 2013, $6.5 million in 2018, then increasing to $37 million in 2022 (7,8,9,10,11). This differs slightly from the NTD data due to variations in spending versus funding levels. As shown in Table 4, Ohio's decreased state funding results in a significantly lower state-to-federal funding ratio compared to other states. This contributes to its low ranking in funding per capita, resulting in Ohio lagging other states for many years. In 2019, House Bill 62 increased state GRF funding to $70 million in state fiscal years 2020 and 2021, but that was reduced to $37 million in 2022 and 2023. In 2021, the ODOT Office of Transit began encouraging the use of GRF funds to match and leverage federal formula and discretionary grants.

TABLE 4 – AASHTO FEDERAL AND STATE/D.C. TRANSIT FUNDING DATA

	2000	2008	2013	2018	2022
United States					
State to Federal Funding %	135%	94%	161%	149%	194%
Average State Funding per Capita	$26.57	$42.50	$54.28	$58.69	$76.67
Ohio					
State to Federal Funding %	32.0%	8.6%	4.3%	3.1%	14.3%
State Funding per Capita	$3.75	$1.37	$0.63	$0.56	$3.15
State Ranking	25th (est.)	40th	37th	42nd	31st

FUTURE NEED

In 2015, ODOT's Statewide Transit Needs Study identified future needs for both operating and capital funding to preserve existing services and support system expansion to increase ridership. In 2014, the unmet operating need was $97 million, with annual operating funding needs projected to grow to $1.3 billion by 2025. In 2014, the capital project backlog totaled $274 million, primarily for vehicle replacement, with an additional $1.8 billion needed from 2015 to 2025 to achieve a state of good repair. The report also noted a need for an additional $2.1 billion from 2015-2025 to replace and expand vehicle fleets. As shown in Table 3, available funding still does not meet current operating and capital needs, even with the influx of COVID-19 and the IIJA funding in 2023. In the last four years, ballot issues in Columbus, Cincinnati and Toledo have increased local sales tax revenue to help expand transit services in these communities. However, the remaining public transit systems in Ohio are woefully underfunded.

OPERATION AND MAINTENANCE

Ohio's transit agencies must balance the level of service with the available operating funds. They also face the challenge of maintaining vehicles that have exceeded their useful lives, which require significantly more time and money to keep in service compared to newer vehicles. Those added maintenance costs divert funds from providing service. This has particularly impacted rural agencies, as shown by the increasing number of vehicles exceeding their useful life and the decline in system ridership. Urban agencies, however, have been able to replace more vehicles since 2018, reversing this trend with recent funding increases.

Between 2019 and 2024, the largest systems re-evaluated their route networks to improve efficiency and increase frequency on primary routes. However, the loss of ridership post-COVID has undermined those efficiencies. They also improved their communication networks and real-time vehicle tracking capabilities and used data analytics to improve services.

PUBLIC SAFETY

Ohio's public transit systems provide a much safer travel alternative to the state's freeway and roadway networks. According to the National Transit Database, from 2008 to 2023, there were 7,999 injuries and 59 fatalities on Ohio's 66 transit systems, averaging 500 injuries and 3.7 deaths annually. Injuries have trended down, with a high of 751 in 2008 and a low of 342 in 2022, and seven of the last eight years falling below the 15-year average. Fatalities have fluctuated around the average, with a high of 7 in 2012, a low of 1 in 2010, and 3 in 2021, 2022, and 2023, which is a positive trend and significantly lower than the 1,242 highway fatalities in 2023.

RESILIENCE

Ohio transit agencies are addressing resiliency in two key ways: first, as a modal alternative within the transportation network, and second, by providing reliable and continuous service during extreme weather events (snow, ice, wind, flooding, tornadoes) and human-made disasters.

The large urban agencies have collaborated with ODOT and the media to promote modal alternatives during large-scale highway construction projects, as part of their public outreach to mitigate delays. Similar strategies have been implemented during large-scale civic and sporting events to minimize traffic congestion on highways and roadways. During the COVID pandemic, Ohio's transit systems were enlisted to provide rides to mass vaccination sites and maintain service for essential workers relying on transit.

In response to weather and other disruptions, such as terrorism, the transit agencies have been hardening their passenger and operating facilities. They have added additional emergency communications, backup electricity generators and strengthened their emergency operations plans to ensure continuity of service.

INNOVATION

Ohio's transit agencies have significantly improved technology, fare collection, and communication systems in recent years. In 2020, the ODOT Office of Transit introduced a technology/innovation component to its Ohio Transit Partnership Program (OTP2) grants. This led to the implementation of on-demand and microtransit pilot programs throughout the state and other creative solutions to serve job centers not located on fixed bus routes.

- NeoRide, a multi-agency consortium, has launched a mobile ticketing application and provided mobile ticket readers for both small urban and rural authorities, funded through the ODOT Office of Transit. Contracts are in place for member transit agencies to expand these applications and implement fare-capping solutions.
- Dayton has piloted its RTA Connect program, which links transit to rideshare services in four zones, along with TAPP Pay for fare-capping
- Greater Cleveland has piloted its Baby on Board program to distribute transit passes to expectant mothers and piloted two microtransit programs
- Columbus is piloting three on-demand zones and has introduced fare-capping
- Cincinnati is piloting two on-demand zones and has simplified its fare structure
- Toledo is piloting three on-demand zones

In 2023, the Ohio Legislature created the two-year $30 million Ohio Workforce Mobility Program to improve inter and intra-county transit access to suburban job centers. Funded by additional flex funds, this initiative builds upon pilot programs initially supported by the OTP2 program.

RECOMMENDATIONS TO RAISE THE GRADE

- Complete capital projects and vehicle purchases funded from the IIJA formula and discretionary grant programs that have been awarded to Ohio transit systems.
- Dedicate an increased portion of the state sales tax revenue to public transit or consider expanding the state sales tax to fund public transit.
- Advocate for the re-authorization of federal transit funding at or above the current IIJA amounts.
- Explore partnerships with health and human services organizations to expand upon the innovative pilot programs recently funded by ODOT. Especially as Ohio's population ages and becomes less mobile, ensure that vulnerable populations continue to have access to public transit.
- Continue investing in technology and implementing policies that coordinate mobility as a service (MaaS) and Mobility on Demand (MOD) with public transit, rather than having them compete with transit.
- Use TAM plans and performance metrics to document the condition of transit facility assets throughout the state.
- Update the ODOT Transit Needs Study to reflect changes in transit needs over the last 10 years.

Photo: COTA Olde Towne East; Columbus, OH

SOURCES

Ohio Department of Transportation, "Office of Transit", Status of Public Transit in Ohio, 2008.

Ohio Department of Transportation, "Office of Transit", Status of Public Transit in Ohio, 2014.

Ohio Department of Transportation, "Office of Transit", Status of Public Transit in Ohio, 2020.

Ohio Department of Transportation, "Office of Transit", Status of Public Transit in Ohio, 2023.

National Transit Database, "Vehicle Age Distribution for Ohio", 2023.

National Transit Database, "Time Series Reports for Total", Operating and Capital Funding, 2023.

American Association of State Highway and Transportation Officials, "Survey of Funding for Public Transportation", 2007.

American Association of State Highway and Transportation Officials, "Survey of Funding for Public Transportation", 2010.

American Association of State Highway and Transportation Officials, "Survey of Funding for Public Transportation", 2015.

American Association of State Highway and Transportation Officials, "Survey of Funding for Public Transportation", 2020.

American Association of State Highway and Transportation Officials, "Survey of Funding for Public Transportation", 2024.

Ohio Department of Transportation, "Office of Transit", Ohio Statewide Transit Needs Study, 2015.

Central Ohio Transit Authority, "Greater Cleveland Regional Transit Authority", Greater Dayton Regional Transit Authority, Southwest Ohio Regional Transit Authority, and Toledo Area Regional Transit Authority, 2022 and 2023 Annual and Community Reports, 2023.

National Transit Database, "Time Series Safety and Security Report", 2023.

Ohio Department of Transportation, "Strategic Highway Safety Plan Dashboard", 2023.


Wastewater
C-
GRADE COMPARISON
Ohio: C-
Nat'l: D+
Photo: Lick Run Headwaters

WASTEWATER

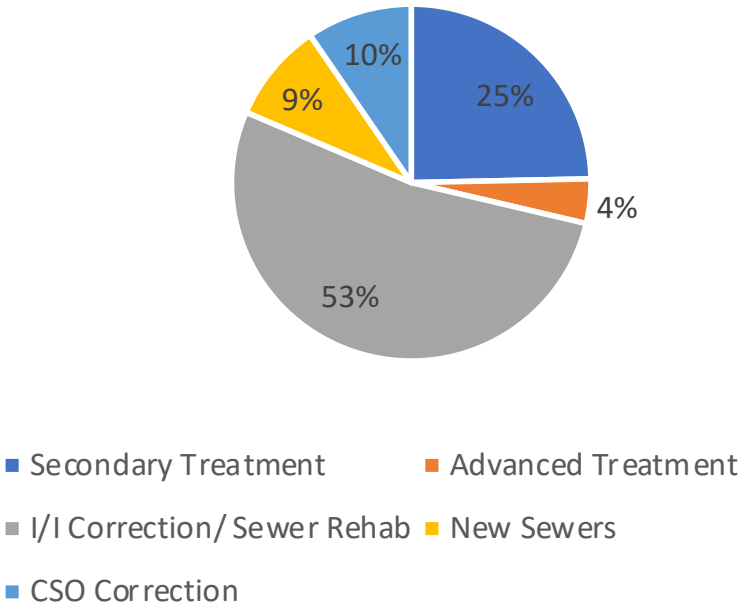
EXECUTIVE SUMMARY

Approximately 81% of Ohio's population of 11.8 million people rely on municipal wastewater collection systems and treatment plants. According to the 2022 Clean Watersheds Needs Survey (CWNS), the state needs almost $16 billion in clean water improvements for wastewater to meet the water quality and human health goals of the Clean Water Act (CWA). Also in 2022, an Ohio survey found that 65% of wastewater utilities have increased rates. This trend is expected to continue as efforts to reduce Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs) remain a priority. Since 2017, infrastructure investments have resulted in a 14% reduction in permitted CSO outfalls and decreased overflow volumes. And while the Infrastructure Investment and Jobs Act (IIJA) provided approximately $675 million in wastewater funding to Ohio, the principal forgiveness loans, similar to a grant, were competitively available to qualifying communities while remaining communities were eligible for traditional loans. As for addressing aging infrastructure in Ohio, most communities only address it when it fails. Utility rate structures typically address operation and maintenance of their systems rather than proactive capital improvement. Ensuring clean water for Ohioans needs a one-water approach for managing wastewater, drinking water and stormwater needs. Integrated solutions are necessary for water management challenges that are complex, interconnected and costly.

BACKGROUND

Collecting and treating residential and non-residential wastewater improves the water quality of Ohio's streams and lakes. It also protects public health. Approximately 9.6 million Ohioans are served by over 1,000 municipal wastewater treatment plants. Many of these collection systems and treatment plants were built more than 50 years ago and they are nearing – or beyond – their useful life. Some of these systems do not meet regulatory standards.

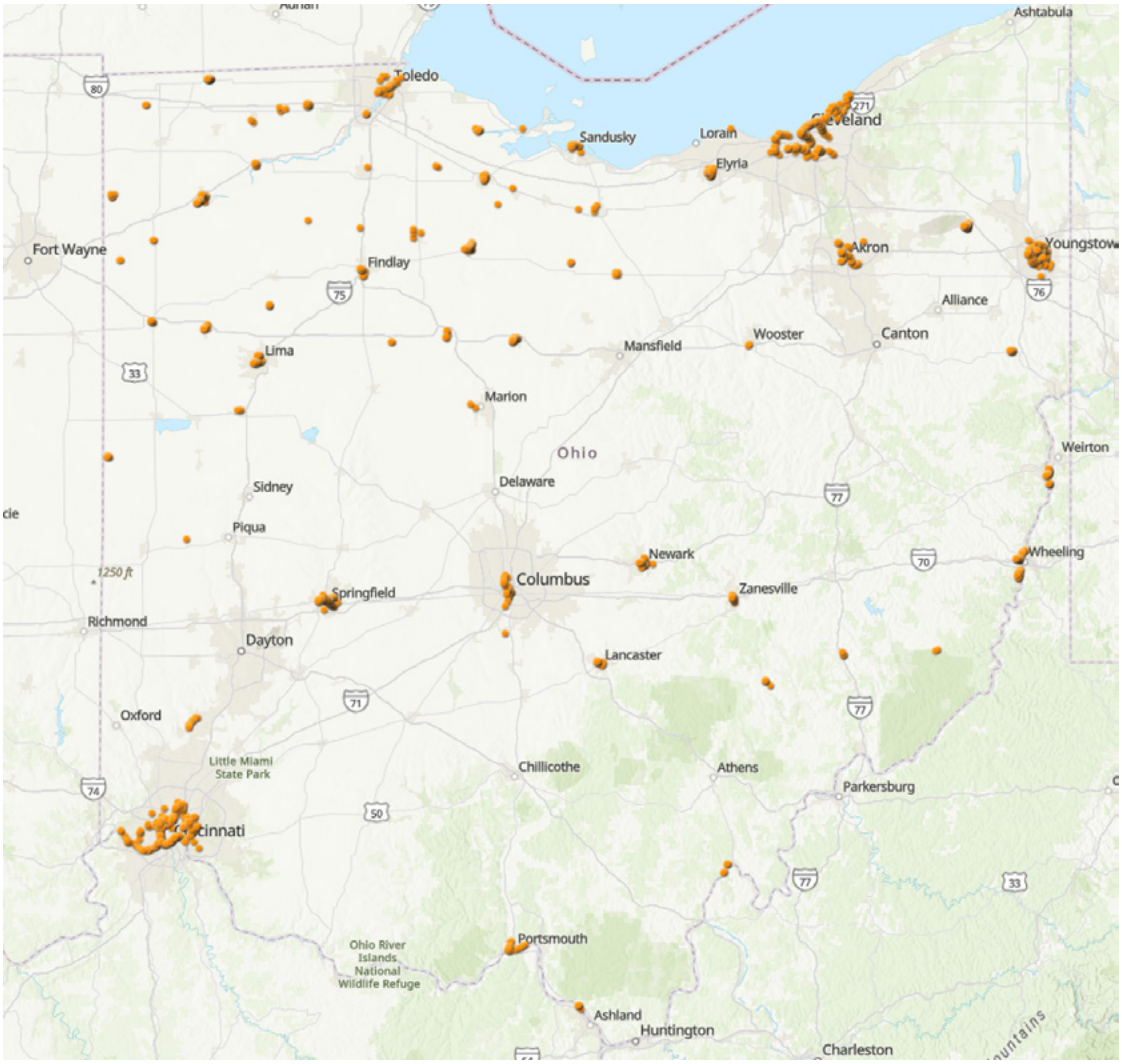
Ohio CWNS Wastewater Needs Total $16B



About 6% of Ohio communities, located in mostly urban areas, have combined sewers which were constructed in the early 20th century and convey both wastewater and stormwater in the same pipe. During heavy rains and/or significant snow melt, the capacity of the combined sewers and treatment plants is overwhelmed. Raw sewage overflows through CSOs to lakes and streams. Over the last 10 to 20 years, wastewater utilities have been implementing CSO correction measures. As of 2024, there were approximately 1,000 permitted CSOs in 66 communities ranging from small rural villages to large metropolitan areas. This is a 14% reduction in the number of permitted CSOs since 2017 because of correction measures. About 45 of the CSO communities discharge to the Lake Erie watershed and the remaining CSO communities discharge to the Ohio River watershed. Since 2006, Cincinnati Metropolitan Sewer District has reduced CSO from 14,000 million gallons to 6,000 million gallons. Since 2012, the Northeast Ohio Regional Sewer District has reduced CSO from 4,500 million gallons to 2,500 million gallons of CSO. Most Ohio communities have separate sanitary and storm sewers, and these systems are challenged by infiltration and inflow (I/I) issues due to aging infrastructure and/or incorrect connections. I/I occurs when rainfall enters the sanitary sewer rather than the storm system. The sanitary sewer is overwhelmed, causing water quality and human health problems, such as basement backups and sanitary sewer overflows (SSOs). The City of Columbus reported 176 wet-weather SSOs and 152 reported basement backups in 2024, with the year experiencing below-average rainfall.

During heavy rains and/or significant snow melt, the capacity of the combined sewers and treatment plants is overwhelmed. Raw sewage overflows through CSOs to lakes and streams.

CSO OUTFALL LOCATIONS IN OHIO



Source: Ohio EPA website

Whether the collection system is combined or separate, approximately 36% of wastewater treatment facilities permitted by the National Pollutant Discharge Elimination System (NPDES) are publicly owned and operated, 29% are semi-public and 34% are industrial. Concentrated Animal Feeding Operations (CAFO) make up 1% of permitted facilities.

CAPACITY AND CONDITION

Most collection systems and treatment plants in Ohio can handle wastewater during dry weather. However, during wet weather, many systems cannot treat all the combined wastewater and stormwater from combined sewers or the excess water that enters separate sanitary sewers through I/I.

During heavy rains and/or significant snow melt, the capacity of the combined sewers and treatment plants is overwhelmed, and raw sewage overflows through CSOs to lakes and streams. These overflows, as a result of wet weather, cause water quality issues and pose a risk to human health. They also make swimming, boating and

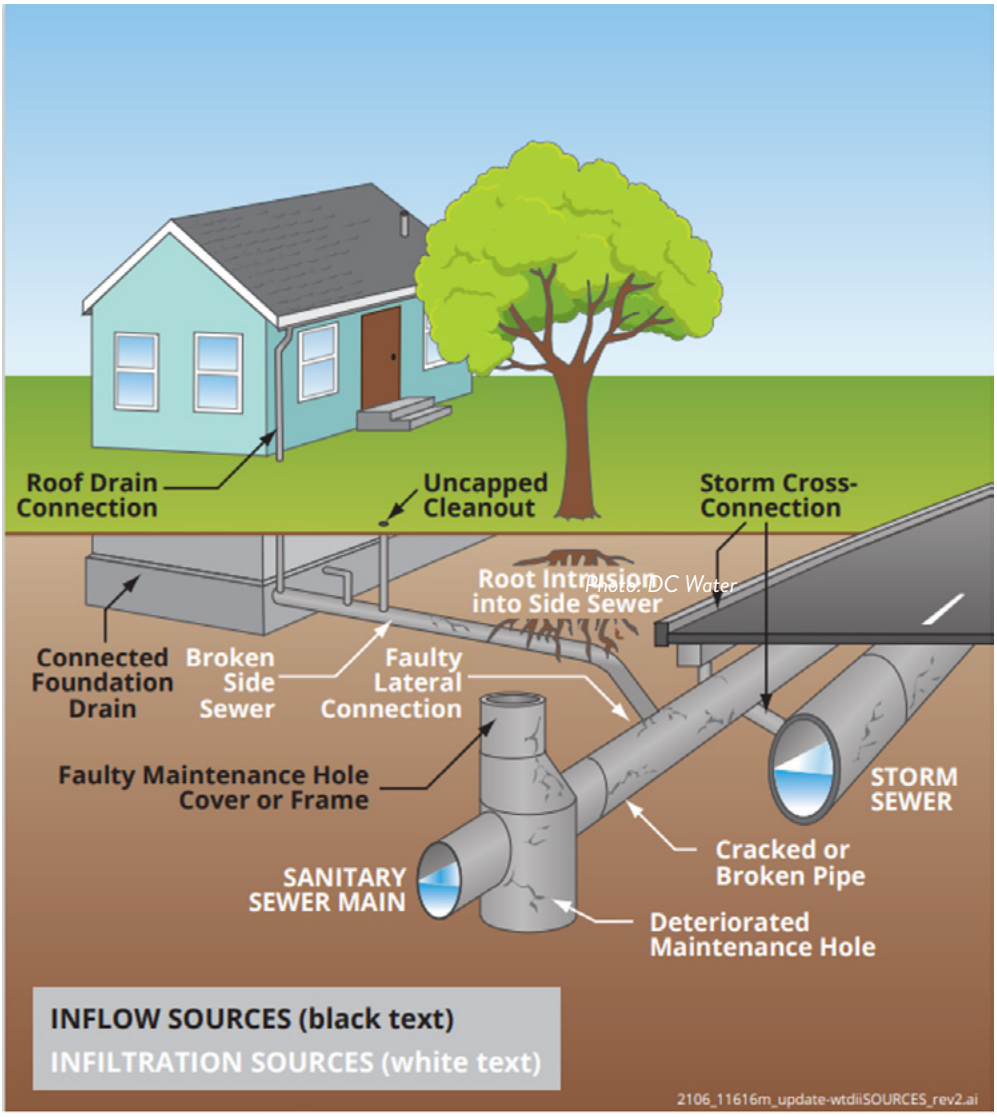
fishing unsafe in Lake Erie and Ohio River tributaries. Many of these water bodies also supply drinking water.

Combined sewers can be mitigated by:

- Installing new relief sewers
- Separating combined sewers into sanitary and storm sewers
- Constructing wet weather or high-rate treatment facilities during high flows
- Constructing storage to contain the overflow until it can be treated later

Separate sanitary sewer systems also face challenges during wet weather. While solutions like relief and storage are similar to those used for controlling CSOs, another key strategy is reducing I/I by repairing or replacing aging sewer infrastructure. Excess I/I can overwhelm the system, leading to basement backups that pose health risks and causing raw sewage to overflow into lakes and streams. Even when overflows don't occur, the increased flow from combined and separate systems during wet weather still strains wastewater treatment plants, which must treat the additional volume.

INFLOW AND INFILTRATION (I/I)

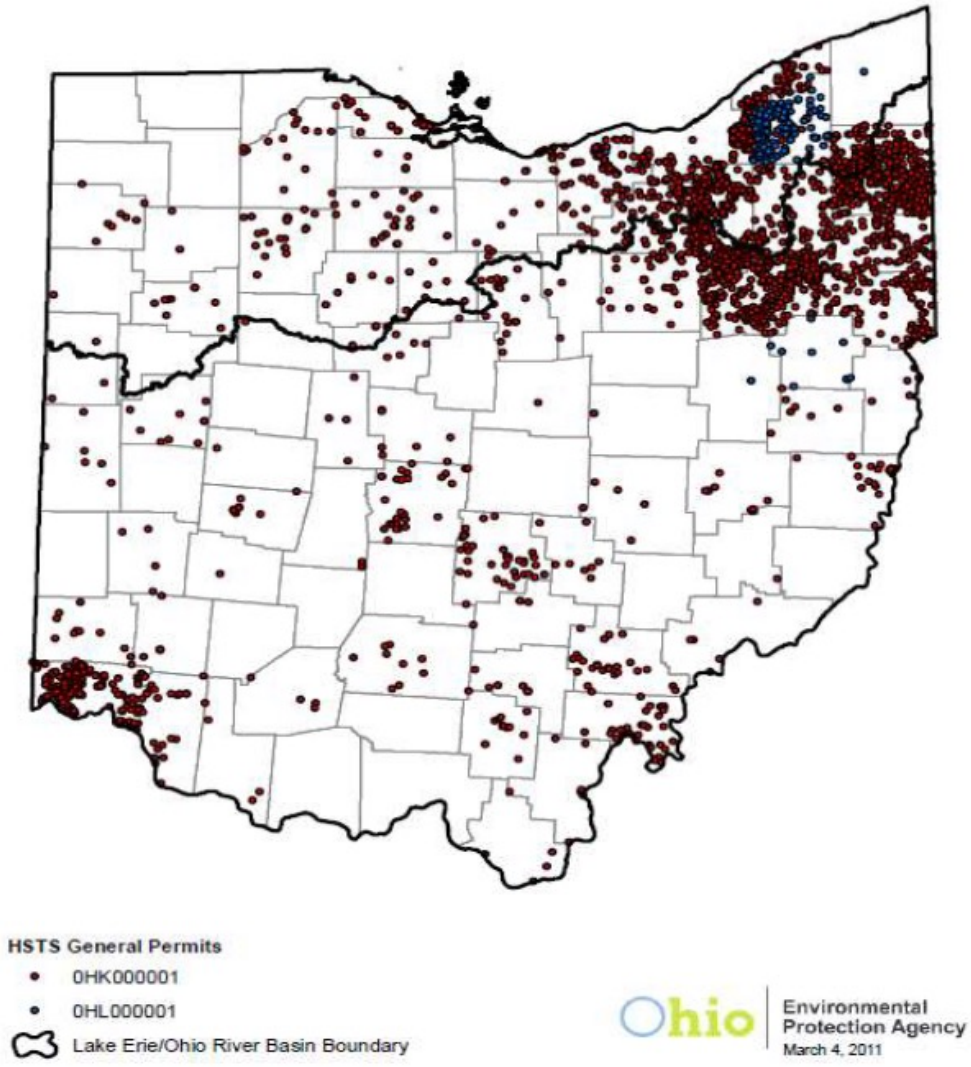


Source: King County, WA)

The condition of treatment plants, pumping stations and pipes is directly influenced by age, maintenance of infrastructure and the financial capability of owners to complete capital improvements. Most utilities do not undertake major improvements within their systems until they are compelled to do so in response to a significant event or series of events, such as rapid growth and economic development, more stringent effluent requirements, system failure or regulatory intervention by the Environmental Protection Agency (EPA). Many utilities recognize the importance of maintaining their systems and prioritize this over making the necessary capital improvements to address aging infrastructure. Some Ohio communities have sewer pipe infrastructure over 100 years old, but most utilities do not have a complete inventory and condition of their pipe assets. According to experts in the field, more than half the wastewater pipes in Ohio are beyond 50 years old and most treatment plants and pump stations are over 30 years old.

Ohio has approximately 1 million home sewage treatment systems (septic systems or HSTS) and the Ohio EPA estimates approximately 30% of these systems are failing and located in rural areas without access to centralized sewers. Most of these systems are located in Northeast Ohio.

HOME SEWAGE TREATMENT SYSTEM PERMITS IN OHIO



There are approximately 150 large CAFOs in Ohio, of which 20% have applied for an NPDES permit. These facilities are located mainly in the western Lake Erie watershed and can significantly impact nutrient loadings in Ohio waterbodies if wastewater and runoff are not properly managed. Ohio EPA and the Ohio Department of Agriculture oversee major CAFOs.

OPERATION AND MAINTENANCE

The wastewater treatment system's operations and maintenance (O&M) are a large undertaking. Typical O&M activities include inspection, cleaning and repair of collection systems and treatment facilities. Computerized maintenance management system (CMMS) is a tool utilized by some utilities in Ohio to monitor and predict when O&M work is needed and would greatly benefit other utilities. A significant number of Ohio wastewater utilities use Geographic Information Systems (GIS) to some extent. However, the level of use varies from power users continuously collecting and updating data to casual use through view-only tools. The benefits of CMMS and GIS as asset management systems include using desktop analysis to proactively identify when O&M activities should occur and track them once completed. A CMMS and/or GIS system would supersede a reactive approach commonly used by many utilities. When a problem manifests and CMMS and GIS tools are not available, utilities typically use paper maps to locate work to be performed and do not having a tracking system to document completed work. A proactive approach is more advantageous in the collection system where assets are typically fixed and don't have moving parts; preventative maintenance can prevent blockages which can lead to dry and wet weather overflows. Because federal funding cannot be used to pay for operations and maintenance, ratepayer revenue funds these services. The funds raised by rates are often used to maintain the aging wastewater systems and limit funding for necessary capital improvement. Continued operation and maintenance of wastewater facilities may face challenges in the future as Ohio has seen a decline in certified treatment plant operators and skilled trades workers.

Continued operation and maintenance of wastewater facilities may face challenges in the future as Ohio has seen a decline in certified treatment plant operators and skilled trades workers.

PUBLIC SAFETY

Direct human exposure to high bacteria levels in lakes and streams represents a significant risk to human health. The inability of combined sewer systems to capture both sewage and stormwater creates CSOs and separate sewers overwhelmed with I/I, resulting in SSOs during wet weather events, directly impacting the water quality of streams and lakes. Most urban areas across Ohio have high percentiles of pollution exposure related to wastewater overflows and stormwater runoff, and this pollution also affects water bodies that are the source of drinking water.

In rural areas, failing HSTS and other commercial on-site systems can also impact water quality if they are not maintained or upgraded.

Wastewater treatment systems are required to collect and treat sewage in accordance with permit requirements. According to Ohio EPA, compliance among permit holders has improved in recent years. In 2017, 21% of treatment plant permit holders were not in compliance; by 2024, that number had decreased to 13%. As Ohio utilities continue to improve compliance with treatment plant permits, public health and environmental safety will benefit.

Photo: Lick Run Pond

FUNDING AND FUTURE NEED

Complying with state and federal wastewater regulations is often among utilities' most expensive capital investments. Statewide, the sources of funds vary; however, they typically come from sewer rates, local taxes and the federal government. Ohio needs an estimated $16 billion in wastewater capital improvements over the next 20 years to meet Clean Water Act goals for water quality and public health, according to the 2022 Clean Water Needs Survey published in 2024. While CSO control was the major need in the 2012 CWNS, the 2022 CWNS identified over half of the need is to address infiltration and inflow (I/I) and rehabilitate existing aging infrastructure. Another 25% is to address secondary wastewater treatment facilities. The needs are significantly underreported since there was only a 40% participation rate in the 2022 CWNS for Ohio. Ohio's future population is projected to decline by almost 6% statewide from 2020 to 2050. Even though the population is declining, there is a significant need for wastewater collection and treatment from data centers populating all around the state but most densely in Cleveland, Columbus, and Cincinnati. In 2011, there were 379 data center locations in Ohio. Today, there are over 1,100. With Ohio having many semi-public and small treatment facilities and septic systems, Ohio EPA has identified regionalization as a priority to optimize wastewater treatment in the State.

A 2022 Ohio EPA survey found that annual sewer rates in Ohio have increased by over 30% since 2018. In 2018, the average residential sewer bill was $0.09 per gallon; by 2022, it had risen to $0.12 per gallon. That year, the average annual residential sewer rate in Ohio was approximately $490, with rates ranging from $24 to $1,125.

A 2023 report from the National Association of Clean Water Agencies reported the national average annual

wastewater service cost of $588. Despite these rising rates, most funds continue to support the operation and maintenance of wastewater systems, leaving limited resources for capital improvements. Continued rate increases pose financial challenges for residents, prompting utilities to seek alternative funding sources and partnerships to invest in critical infrastructure.

The Water Pollution Control Loan Funding (WPCLF) program is Ohio's State Revolving Fund (SRF) Program for clean water projects, providing below-market-rate loans. The IIJA provided around $675 million in additional loan and principal forgiveness (grant) funding to the WPCLF for program years 2023-2027. In 2023, 136 loans were awarded totaling over $1 billion, and 42 of those projects received $60 million in principal forgiveness. However, there was almost $3 billion in projects nominated for funding. Limited grant funding and affordability issues result in Ohio wastewater utilities taking on loans they can repay rather than what is needed, resulting in deferred capital improvement and existing problems worsening. Other sources of clean water infrastructure grant and loan funding include the Ohio Water Development Authority ($1.5 million in 2023), the Ohio Public Works Commission ($75 million across the 2023–2024 fiscal years) and H2Ohio ($5 million in 2023). Continued federal support, such as IIJA, is needed to keep Ohio's infrastructure in working order and water resources clean. However, the resurgence of congressionally-directed spending (earmarks) to fund wastewater projects has impacted the availability of State Revolving Loan Funding. Over the last 2 years, more than $70 million in federal funding has been cut from the Ohio Clean Water SRF to pay for earmarks.

Other important needs for wastewater include aging workforce, cyber security, asset management programs and emerging contaminants. Ohio has seen a steady decline in certified operators, skilled trades and employees with a commercial driver's license. Combined with an aging workforce, there will be a shortage of employees to ensure wastewater facilities are operated and maintained. Ohio EPA is working on proposing changes to increase operator certifications to stabilize the operator market and prevent a shortfall. Cyber security has been another issue of concern with ransomware attacks affecting utility operations. Many utilities have implemented training programs to educate employees to prevent these attacks from happening.

Continued reductions in effluent limits for elements such as phosphorous (P) and mercury (Hg) are anticipated for the future. Most communities currently have effluent limits of 1.0 mg/l or lower for P, with some facilities discharging to higher-quality receiving streams and bodies of water meeting 0.5 mg/l. Removal options for P for are limited and the costs to enhance treatment for such removal can increase rapidly. The use of mercury in commercial and industrial applications has nearly ceased. However, elemental mercury continues to be identified in the wastewater of many communities. Removal of mercury by chemical precipitation generates additional residual solids with enhanced concentrations of mercury to be managed for ultimate disposal.

Emerging contaminants – such as per- and polyfluoroalkyl substances (PFAS), including the commonly used PFOA (Perfluorooctanoic Acid) and PFOS (Perfluorooctane Sulfonate) – are a growing concern and will present significant challenges for wastewater utilities in the future. U.S. EPA recently designated PFOA and PFOS as hazardous substances under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and did not exclude wastewater utilities from complying with this regulatory requirement. Wastewater utilities do not produce or profit from these PFAS substances; they simply passively receive them in their systems. Removing PFOA and PFOS from wastewater is extremely difficult and costly and, in many cases, can result in higher concentrations within sludge that must also be managed. Utilities do not clearly understand these potential financial and legal implications, making future needs unknown.

RESILIENCE

Wastewater infrastructure must be resilient and able to protect Ohio's public health and safety and the environment while serving millions of users during normal operations and times of stress. Many facilities have been designed using out-of-date rainfall and do not have redundancy measures to operate during extreme weather events or power or equipment failures. Wastewater facilities must be designed and built in accordance with regulatory requirements and operational guidance that includes:

- Updated design storm capacity
- Sustainability and energy efficiency checklists during design
- Process and equipment redundancy
- Backup power
- Location of facilities outside the 100-year floodplain
- Other measures that allow operations during times of stress

Action must be taken to revise the planning and design of wastewater facilities to maintain and increase resiliency as annual precipitation and the frequency and intensity of storms continue to increase. More frequent and localized high-intensity storms have overwhelmed sections of wastewater systems and contributed to sewer backups, infrastructure damage and polluted waterways. With increased wet weather as one of the largest issues for Ohio public utilities, resiliency must be considered and incorporated into the planning and design of future and upgraded wastewater systems to better serve the needs of Ohio. For operational readiness, participating in programs such as Ohio Water/Wastewater Response Network (OHWARN) can improve resiliency by participating in a network to provide or receive assistance during emergencies.

Action must be taken to revise the planning and design of wastewater facilities to maintain and increase resiliency as annual precipitation and the frequency and intensity of storms continue to increase.

INNOVATION

COVID-19 paralyzed the world in early 2020. While many were still trying to understand the pandemic, others were looking at ways to get ahead of outbreaks. The Ohio Wastewater Monitoring Network was established in 2020 and brought together a range of utilities – including rural, suburban and urban – in a quick timeframe to monitor wastewater trends and alert local health officials to provide warnings of infection in communities.

Ohio EPA has prioritized water reuse, particularly in areas slated for development or redevelopment with large customers with significant water needs. Reusing wastewater as a non-potable water source provides a sustainable solution for those industries.

Use of artificial intelligence (AI) is still being determined but will likely be a solution for data analysis.

Lastly, implementing affordability programs in conjunction with user rates that meet actual utility needs can ensure that infrastructure improvements are made and that operations and maintenance of those systems are met while providing discounted rates to qualified users.

Continued research, such as Ohio Water Development Authority Research & Development Grants, are needed to develop new solutions for the wastewater industry, including cost-effective removal of PFAS.

RECOMMENDATIONS TO RAISE THE GRADE

- Continue to fund the Clean Water SRF and increase levels, particularly grant funding, to better fit Ohio's needs, and encourage municipalities and wastewater districts to take advantage of available funding. Encourage Ohio communities to leverage improving wastewater infrastructure with economic development using Tax Increment Financing (TIF) Districts and Jobs Ohio Funding, including All Ohio Future Fund.
- Require asset management plans for wastewater utilities similar to Ohio Revised Code 6109.24(B) for water systems and require risk and resilience assessments for Emergency Response Plans defined by the American Water Works Association (AWWA).
- More widely implemented and robust CMMS and asset management programs for municipalities would greatly enhance each community's capacity to direct its limited resources more effectively, reducing operation and maintenance costs and increasing system-wide resiliency long-term.
- Statewide wastewater needs assessment using GIS and asset management principles for current and future needs.
- Utilize tools during infrastructure design, such as hydraulic and hydrologic models and Life Cycle Cost Analysis, of various alternatives. Implement checklists during design that take into consideration resilience measures and alternative project delivery methods.
- Educate the general public and elected officials on the need for continued investment in wastewater infrastructure and implement dedicated funding sources to fix aging infrastructure. Deferred infrastructure improvement will cost more for Ohioans.
- Promote reuse initiatives in water-scarce areas for economic development.
- Encourage regionalization of small wastewater systems and septic system/HSTS abatement improvements.
- Encourage utilities and CAFOs to work with partner agencies, such as Ohio EPA, to learn and implement best practices for compliance, resilience, emergency preparedness and cyber security.
- Begin to plan for more stringent effluent and sludge-handling permit limits at treatment facilities to address nutrient loading and emerging contaminants.
- Implementation of a one-water approach to improve wastewater, stormwater and drinking water needs.

SOURCES

Ohio Environmental Protection Agency, "2022 Ohio Sewer and Water Rate Survey", 2022.

Ohio Environmental Protection Agency, "2018 Ohio Sewer and Water Rate Survey", 2018.

Ohio Environmental Protection Agency, "2024 One Water Government Affairs Workshop – Ohio EPA Updates", 2024.

Ohio Public Works Commission, "FY 2023–FY 2024 Biennial Report", 2024.

Ohio Water Development Authority, "2023 Annual Report", 2023.

H2Ohio, "Accomplishments for Fiscal Year 2023", 2023.

Ohio Environmental Protection Agency, "Ohio EPA Website", 2025.

U.S. Environmental Protection Agency, "2022 Clean Watersheds Needs Survey", 2022.

Metropolitan Sewer District of Greater Cincinnati, "Progress", 2025.

Northeast Ohio Regional Sewer District, "By the Numbers – NEORSD GIS Services", 2025.

Northeast Ohio Regional Sewer District, "Annual SSO and WIB Report", 2025.

National Association of Clean Water Agencies, "2023 NACWA Cost of Clean Water Index", 2023.

ABOUT THE OHIO COUNCIL OF LOCAL SECTIONS OF ASCE

The Ohio Council was organized in 1969 to focus statewide attention on issues of interest and concern to the approximately, 3,300 ASCE members in Ohio. There are six local Sections in Ohio – Akron-Canton, Central Ohio, Cincinnati, Dayton, and Toledo. Each has representation on the Ohio Council in proportion to its membership. Each Local Section has one delegate for each full one hundred assigned members, with a minimum of two delegates regardless of the number of members assigned. The Ohio Council meets twice annually, in spring and fall. The activities of the Ohio Council are financed by the Local Sections.

OHIO REPORT CARD COMMITTEE CHAIRS AND CONTRIBUTORS

Report Card Committee Chair – Dr. Charles Sawyer, P.E., F.ASCE, BCEE, QEP, Lead Hydraulic Modeler, Great Lakes and Ohio River Division, US Army Corps of Engineers, Cincinnati, Ohio.

CATEGORY CHAIR AND CONTRIBUTORS

AVIATION

(Chair) Brooks Vogel, P.E., M.ASCE, Partner & Public Works Group Leader, Korda/Nemeth Engineering, Inc., Columbus, OH.

(Co-Chair) Maria Benovic, Managing Engineer, C&S Companies, Cleveland, OH.

BRIDGES

(Chair) Tom Less, PE, SE, ENV SP, Project Manager/ Bridge Engineer, Woolpert Inc., Columbus OH

Contributors: Jim Pajk, PE, Administrator, Division of Design and Construction, City of Columbus Department of Public Service, Columbus OH.

Edward Adamczyk, PE, Quality Management Lead, Arcadis US, Inc. , Cleveland OH.

Thomas Breininger, EI, Transportation Engineer, Arcadis US Inc., Columbus OH

DAMS

(Chair) Matthew D. Gramza, P.E., F.ASCE, BC.WRE, CFM, CPESC, Vice President – National Water Resources Lead, Civil & Environmental Consultants, Inc., Cincinnati, OH.

(C0-Chair) Anthony (Tony) P. Klimek P.E, F.ASCE, Retired Engineer, Geosyntec Consultants.

Contributor: Ben Silliman, The Nature Conservancy - Ohio Mitigation Program, Dublin, OH

DRINKING WATER

(Chair) Dr. Sudhir Kshirsagar, P.E., M. ASCE, President, Global Quality Corp./HydroTrek.com, Covington, KY.

Co-Chair Dr. Ram Krishna Mazumder, P.E., IAM., A.M. ASCE

Water Engineer 2, Arcadis U.S. Inc., Akron, OH.

ENERGY

(Chair) Daniel Odion, P.E, CCM, PMP,Project Manager, QTS Data Centers,New Albany OH

(Co-Chair) Sheena Hrivnak, MSc., CCM, Senior Project Manager, Ascension Construction Solutions, Columbus OH.

Contributors; Noah Odion, MSc. Project Engineer, Prometrics Construction, Westerville OH.

Daniel Obekpa, MSc., EIT, Resident Construction Engineer, HDR, Atlanta GA.

Pragati Deshmukh, MSc., CMIT, Project Engineer, Ascension Construction Solutions, Columbus OH.

HAZARDOUS WASTE

(Chair) Dr. Charles Sawyer, P.E., F.ASCE, BCEE, QEP, Lead Hydraulic Modeler, Great Lakes and Ohio River Division, US Army Corps of engineers, Cincinnati, OH.

Contributor: Dr. Timothy Christman (Retired), OH Environmental Protection Agency,

INLAND WATERWAYS

(Chair) John Cheek, P.E. Operations and Maintenance SME, Inland Navigation Design Center, US Army Corps of Engineers.

Contributors: Christopher Phillips, PE Deputy Chief, Operations Division Great Lakes and Ohio River Division US Army Corps of Engineers.

Kent Browning Chief, Operations Division Huntington District US Army Corps of Engineers'

Beth Schneller, PE Chief, Technical Support Branch, Operations Division, Pittsburgh District US Army Corps of Engineers

Justin Carlson, Statistician, Planning Center of Expertise for Inland Navigation Great Lakes and Ohio River Division US Army Corps of Engineers

LEVEE

(Chair) Tina Kowitz, P.E., Levee Safety Program Manager/ Geotechnical Engineer, Detroit District, U.S. Army Corps of Engineers, Detroit, MI.

Contributors: Rich Hauck, P.E., Civil Engineer, Levee Safety Center, U.S. Army Corps of Engineers, St. Paul, MN.

David B. Lasoski, P.E., Levee Safety / Geotechnical Engineer, Louisville District, U.S. Army Corps of Engineers, Louisville, KY.

PARKS
(Chair) Gina Beim, P.E., M.ASCE, MCDA Consulting LLC. Cleveland OH

Contributors: Tom Less, PE, SE, ENV SP, Project Manager/Bridge Engineer, Woolpert Inc., Columbus OH

Sonya Burns, P.E., Civil/Environmental Engineer, Haley & Aldrich, Inc., Cleveland, OH.

Nick Meyer, Planning & Project Manager, Centerville-Washington Park District, Centerville, OH.

PORTS
(Chair) Nicholas A. LaPointe, P.E. Littoral Services, LLC, 530 Hidden Beach Road, Lakeside Marblehead, OH.

Contributors: Matthew J. Wenham, P.E., Chief of Engineering & Capital Development

Cleveland-Cuyahoga County Port Authority, Cleveland, OH.

Joe Cappel, Vice President of Business Development, Toledo-Lucas County Port Authority

One Maritime Plaza Toledo, OH.

Brian Perz, Vice President of Construction & Facilities Management, Toledo-Lucas County Port Authority, Toledo, OH

RAIL
(Chair) Craig Hebebrand, P.E., Senior Project Manager, Arcadis US Inc., Cleveland, OH.

Contributors: Michael Boyer, E.I., Transportation Engineer, Arcadis US Inc., Cleveland, OH.

Terrence Mosier, E.I., Transportation Engineer, Arcadis US Inc., Cleveland, OH.

ROAD
(Chair) Michael D. Pniewski, P.E., P.S., F. ASCE – Lucas County Engineer, Lucas County Engineer's Office - Holland, OH

Contributor: Steven Koch, P.E. – Sr. Transportation Engineering Manager - GAI Consultants – Columbus, OH

SCHOOLS
(Chair) Dr. Esmaeel Asadi,P.E., M.ASCE, Structural Engineer at GFT and Adjunct Assistant Professor, Case Western Reserve University, Cleveland, OH.

SOLID WASTE
(Chair) Michael Stepic, PE, Owner/Senior Engineer, Rubber City Engineering and Environmental, LLC

Contributors: Sherry Voros, PE, Senior Engineer, CTI & Associates, Inc.

Bruce O. Schmucker, P.E., Vice President of Engineering & Environmental Affairs, Pioneer Environmental and Engineering, LLC

STORMWATER
(Chair) George Remias, PE, Manager of Stormwater Strategic Support, Northeast Ohio Regional Sewer District, Cleveland, OH

Contributor: Derek Vogel, PE, Project Manager, Northeast Ohio Regional Sewer District, Cleveland, OH

TRANSIT
Michael J. Schipper, P.E., Deputy General Manager – Engineering & Project Management Greater Cleveland Regional Transit Authority Cleveland, Ohio.

WASTEWATER
(Chair) Lita Laven P.E., M. ASCE; Manager of Design - Plants; Northeast Ohio Regional

Sewer District; Cleveland

Contributors: Adam C. Hoff, P.E.; President; Hoff Consulting Services, LLC; Maumee

Keith Aschemeier, P.E., M.ASCE; Senior Design Engineer; Arcadis; Toledo

Elizabeth Buening, P.E.; Engineer; Ottawa County Sanitary Engineering; Port Clinton

DATABASE MANAGER FOR REPORT CARD CONTENT
Peter Narsavage, P.E. E.L. Robinson Engineering, Grandview Heights, OH