

2026 REPORT CARD FOR PENNSYLVANIA'S INFRASTRUCTURE

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

INFRASTRUCTUREREPORTCARD.ORG/PENNSYLVANIA



Cover photo: Parker Dam State Park in Huston Township, Clearfield County, Pennsylvania, Surrounded by Moshannon State Forest; Zack Frank

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2026 REPORT CARD FOR PENNSYLVANIA'S INFRASTRUCTURE

INFRASTRUCTURE REPORT CARD TEAM

REPORT CARD CHAIR
Justin Komp, EIT

GOVERMENT RELATIONS
Mulberry Public Affairs

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ASCE Pennsylvania State Council
ASCE Central Pennsylvania Section
ASCE Lehigh Valley Section
ASCE Philadelphia Section
ASCE Pittsburgh Section
ASCE Reading Branch
ASCE Committee on America's Infrastructure
ASCE Staff

INFRASTRUCTURE CATEGORIES

AVIATION
Daniel Ritter, PE, ENV SP
Leah Coleman, EIT
Maria Juarez
Jordan Schuller
Zachary Smith, EIT

BRIDGES
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Jacob Schlosser, EIT
Nicholas Giglio, PE
Ray Szczucki, PE
Emanuela Esposito

BROADBAND
Tom Musgrove

DAMS
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Lois Bijl
Ryan Rauschenberger

HAZARDOUS WASTE
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Kevin Conway

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Bradley DiCola, PE
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2026 REPORT CARD
FOR PENNSYLVANIA'S INFRASTRUCTURE

Executive Summary

From being a powerhouse energy-producer, to daily transit on roadways and bridges, to crucial commercial shipping channels, infrastructure is a vital backbone for Pennsylvania and its economic prosperity. Over the past year, members of the American Society of Civil Engineers from across the commonwealth volunteered to produce the 2026 Report Card for Pennsylvania's Infrastructure. The purpose of this report is to inform the public on the condition of the commonwealth's infrastructure so that they may advocate to elected officials on how to improve the condition, capacity, operations, maintenance, safety, and resilience of infrastructure. Pennsylvania's infrastructure overall gets a 'C-', the same grade as the 2018 and 2022 reports. While significant progress has been seen in some areas, in others, real challenges still remain. Pennsylvania is unique in that it has some of the oldest infrastructure in the country. The federal Infrastructure Investment and Jobs Act (IIJA) provided a boost in funding for many infrastructure projects across the entire commonwealth. However, with the expiration of the IIJA this year, future funding is uncertain.

Since the previous Report Card, increased federal funding, state legislative support for infrastructure, and public agency planning allowed improvements in several key pieces of infrastructure. Energy improved to a 'B-' as the commonwealth is one of the most energy-productive states in the nation, having exported nearly 87 million megawatt-hours of electricity in 2024. Inland Waterways also increased to a 'C-' due to several major lock and dam improvement projects that received funding due to the IIJA; this increased funding totals nearly $900 million to the state. Rail improved to a 'C' as well; the 2025 Pennsylvania State Rail Plan reports $21.6 billion of investments in capital projects between 2021 and 2045. Wastewater raised to a 'D' as a result of increased federal funding from the IIJA that has allowed major projects to get off the ground. For example, Allegheny County Sanitary Authority (ALCOSAN) in western Pennsylvania has begun an ambitious project to construct three deep wet weather collector sewer tunnels.

Despite increases in funding across the state, some infrastructure areas saw downgrades in their rating. Public Parks has been downgraded to a 'C-' as demand for both the creation of new facilities and the need to maintain existing facilities is not being met. Schools lowered to a 'C-' as funding for schools is extremely limited and a statewide survey shows that 80% of responding school districts have delayed at least one capital project due to a lack of available funding. Transit has been downgraded to a 'D-'. Pennsylvania's transit network faces significant financial and infrastructure challenges, as prior levels of state transit funding have sunset, resulting in the transferring of capital dollars to cover operating costs, a solution that is not sustainable.

While great progress has been made for Pennsylvania's infrastructure over the last 4 years, there is still much to do to maintain and improve the state of the commonwealth's assets for the safety and security of all residents.

Recommendations to Raise the Grade

1

INVEST IN TRANSPORTATION AS A SYSTEM:

Transportation is the backbone of the commonwealth. Roads, bridges, and public transit all work together as one combined system, and this system needs a long-term funding mechanism to adequately function. Act 89 provided funding from 2013 until 2023, however no long-term replacement has been implemented. Stop-gap measures and temporary funding, though valuable, are not sustainable solutions. The development of long-term funding streams for transportation would enable agencies to reliably plan for the future.

2

WATER IS VITAL:

Water is critical to the public's health and wellbeing. Drinking water, stormwater, and wastewater continue to be some of the lowest grades for the third consecutive report. Increased federal funding from the IIJA was not sufficient to address the massive backlog of work to be done. New legislation must close the infrastructure funding gap through sustained capitalization and grants for small-systems and disadvantaged communities.

3

PRIORITIZE ASSET MANAGEMENT:

Regular maintenance of the commonwealth's infrastructure systems is just as important as conducting emergency repairs. Compounding and escalating costs to replace key components, such as bridges or dams, can be mitigated with lower cost maintenance strategies that lengthen their lifespan. Development and implementation of routine maintenance schedules are essential for well-performing infrastructure assets.

4

INVEST IN WORKFORCE AND TRAINING:

Robust funding for infrastructure is limited if there are not enough skilled people for sufficient project delivery. Retirements are continuing to outpace new hires into the industry. Expand training programs, improve wages and working conditions, and educate the public about infrastructure careers.

5

INCORPORATE NEW TECHNOLOGY:

The emergence of new technology, such as Artificial Intelligence (AI), has the capability of greatly affecting the industry. Infrastructure can be accommodated through acceptance, adaptation, and implementation of systems that can improve efficiency without compromising accuracy and integrity.

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.

About the Grades

The 2026 Report Card for Pennsylvania's Infrastructure was written by a committee of more than 50 civil engineers across Arizona who volunteered their time to collect and analyze data, prepare and review their findings and present their conclusions. The committee worked with staff from ASCE National and ASCE's Committee on America's Infrastructure to provide a snapshot of our state's infrastructure, as it relates to us locally and on a national level. The Report Card Sections are graded based on the following eight criteria: capacity, condition, funding, future need, operation and maintenance, public safety, resilience and innovation. ASCE defines these grades as follows:



Exceptional, Fit for the Future



Good, Adequate for Now



Mediocre, Requires Attention



Poor, At Risk



Failing/Critical, Unfit for Purpose

The 2026 Report Card for Pennsylvania's Infrastructure



Aviation
B-



Bridges
D+



Broadband
C-



Dams
C



Drinking Water
D



Energy
B-



Hazardous Waste
B-



Inland Waterways
C-



Levees
C



Ports
C+



Public Parks
C-



Rail
C+



Roads
C-



Schools
D



Stormwater
D



Transit
D-



Wastewater
D



OVERALL GPA



Photo: Jag_cz

GRADE COMPARISON

PA: B-

Nat'l: D+

AVIATION

EXECUTIVE SUMMARY

Following a steady increase in enplanements after the COVID-19 pandemic, with an average increase of 10% year over year for the 15 commercial service airports within Pennsylvania, airports across the Commonwealth generate over $34 billion annually. With significant improvements including the Pittsburgh International Airport (PIT) Terminal Modernization and several airfield rehabilitation projects at airports across Pennsylvania, recent years have seen a general improvement in condition of airport facilities. Several major airports, including Philadelphia International (PHL), are at risk of constrained capacity, and general aviation (GA) airports across Pennsylvania lack sufficient hangar space and cargo infrastructure to meet demand. While recent funding opportunities including the Infrastructure Investment and Jobs Act of 2021 (IIJA) have provided funding for much-needed improvements, a need exists for consistent funding sources to allow for airports to continue the growth and repair required for the additional enplanements and cargo operations anticipated in the coming years.

BACKGROUND

The Commonwealth of Pennsylvania (PA) is home to 119 public use airports, of which 15 provide commercial airline service, with the remaining 104 GA airports providing service for private and corporate aircraft. Pennsylvania ranks 17th in the country in the number of public use airport facilities.

The Federal Aviation Administration (FAA)'s calendar year 2024 reporting ranks four of PA's airports within the top 75 nationally for cargo operations based on volume. This report also ranks two of PA's airports among the top airports for passenger enplanements, with PHL ranked at 21 and PIT ranked at 48. The airports within Pennsylvania generate over $34 billion annually and support over 200,000 jobs within Pennsylvania.

CONDITION AND CAPACITY

Activity at airports is typically tracked through enplanements, or the number of passengers boarding aircraft for commercial service, and cargo operations. Enplanement and cargo operation data assist in determining funding needs; additionally, this data can aid airports in planning for future growth and the needs of their facilities.

Between 2022 and 2024, enplanements increased by 10% across Pennsylvania. Detailed enplanement data for the thirteen most heavily trafficked airports in Pennsylvania is included within Table 1 below. Generally, enplanements have continued to increase in recent years, coming to within 5% of 2019 enplanements measured prior to the COVID-19 pandemic. Further increases are anticipated in the coming years.

Table 1 - Enplanement Data

Airport	City	CY2022	CY2023	CY2024	Avg. Yearly Change
Philadelphia International (PHL)	Philadelphia	12,421,168	13,658,669	15,102,261	+10.3%
Pittsburgh International (PIT)	Pittsburgh	3,918,968	4,493,052	4,862,376	+11.4%
Harrisburg International (MDT)	Harrisburg	625,698	654,791	727,163	+7.9%
Lehigh Valley International (ABE)	Allentown	419,772	419,604	447,899	+3.4%
Wilkes-Barre/Scranton International (AVP)	Avoca	190,406	174,061	219,572	+8.8%
State College Regional (UNV)	State College	112,474	138,860	134,128	+10.0%
Arnold Palmer Regional (LBE)	Latrobe	124,422	76,925	76,437	-19.4%
Erie International/Tom Ridge Field (ERI)	Erie	61,860	47,206	46,810	-12.3%
John Murtha Johnstown / Cambria County (JST)	Johnstown	7,764	14,253	17,690	+53.8%
Lancaster (LNS)	Lititz	6,274	6,264	8,417	+17.1%
Dubois Regional (DUJ)	Brookville	6,200	5,568	5,584	-5.0%
Altoona/Blair County (AOO)	Altoona	4,442	3,231	5,151	+16.1%
Bradford Regional (BFD)	Bradford	4,509	3,897	3,521	-11.6%
TOTALS	—	**17,903,957**	**19,696,381**	**21,657,009**	**+10.0%**

Source: Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports

Aviation demand in general is expected to continue growing at a significant rate in the coming years following the resurgence of air travel post-pandemic. At PHL, passenger activity is projected to grow at 11.8% compound annual growth rate from 2021 to 2030. Despite this anticipated growth, aircraft delays at PHL already exceed typical large-hub airport delay averages (8.9 minutes versus 5 to 6 minutes) and could continue to increase without proper improvements.

Terminals, Facilities, and Landside Infrastructure

Expansion of cargo facilities in order to enhance cargo operations has been widespread throughout airports within Pennsylvania, with numerous airports planning and executing cargo expansion efforts. Harrisburg International Airport (MDT) completed a multi-year series of cargo expansion projects, including the construction of additional apron space to accommodate increases in cargo

operations. In late 2024, Lehigh Valley International (ABE) began implementing efforts to expand cargo operations. Expansion of cargo facilities has been a focus of the two airports within Pennsylvania accounting for the largest share of cargo operations, with PHL planning the construction of a 260,000 SF cold storage facility and PIT leasing a 78,000 SF cargo facility on site.

Terminals at airports across Pennsylvania have seen significant investment and subsequent improvements in recent years. PIT completed a Terminal Modernization Program, opening a new terminal with increased capacity, a new parking garage, rental car facility, parking lots, and associated access roadways. Arnold Palmer Regional Airport (LBE) is expanding their terminal facility to double its passenger capacity, of which Phase 1 concluded in August. ABE completed and opened a terminal expansion in 2023, with a new security checkpoint and terminal connector to bridge the expansion with its existing facility. While PHL has not made significant expansions to its terminal facilities, improvements such as curtain wall replacements, restroom upgrades, and new exit lanes have helped to improve the condition of its terminals. PHL and the Northeast Philadelphia Airport (PNE) also plan to invest a combined $2 billion in airport improvements, including airfield and apron pavement and terminal projects. Similarly, MDT conducted an extensive upgrade of their baggage handling system, replacing the existing system with high-tech, energy efficient equipment.

Despite improvements in facilities at the larger airports across Pennsylvania, hangar space at GA airports remains a critical need. Studies conducted on the available infrastructure at airports within Pennsylvania have found that over half have waiting lists for their hangars and the average age of existing hangars is over 30 years. It is estimated that the number of hangars would need to increase by nearly 40% to meet current demand.

Airside Infrastructure

PHL has undertaken significant improvements to its existing airside infrastructure, conducting rehabilitations of major taxiways and runways in deteriorating condition and reconstructing portions of apron pavement. ABE has conducted rehabilitation of a major runway and several taxiways, as well as constructed a new taxiway for cargo access. PNE has conducted pavement improvement projects on several taxiways and both runways as well as pervious land cover restoration throughout the airfield.

Reporting under the most recent Pennsylvania Airport Pavement Management System analysis conducted in 2023 shows consistency in Pavement Condition Index (PCI) values for general and commercial service airports across Pennsylvania, with 2023 values for runway, taxiway, apron, T-hangar, and helipad pavement types all being rated as “fair” condition. Table 2 summarizes the PCI values for various pavement types in 2016 and 2023.

Table 2 - PCI Values for Various Pavement Types in 2016 and 2023

Pavement Type	2016 PCI Value	2023 PCI Value
Runway	71	68
Taxiway	69	65
T-hangar	63	57
Apron	68	70
Helipad	38	70

Despite improvements to airside infrastructure made at airports throughout Pennsylvania, major airports are forecasted to see increased operations despite limited available infrastructure. Runway congestion is forecasted at PHL due to limited available space within the airfield due to constraints including the adjacent Delaware River and existing properties. As increased operations are anticipated, increasing levels of congestion and reduced levels of efficiency at PHL and other constrained airports within Pennsylvania are to be expected.

OPERATIONS AND MAINTENANCE

Airports across Pennsylvania have varying department sizes for operations and maintenance to handle different degrees of tasks. For safety to be of utmost priority, airports largely have a combination of maintenance completed by in-house maintenance staff or design-bid-build contracts. For a larger airport such as PIT, the in-house maintenance staff of around 70 individuals handles remarking of pavement, light swaps, and small-scale pavement rehabilitation while large-scale taxiway or runway rehabilitations are primarily designed and bid out to contractors to perform the work. Many landside improvements involve coordination with utility companies, the Pennsylvania Department of Transportation (PennDOT), or other external agencies, which necessitate specific skillsets and designs to meet the requirements of all agencies. Other regional airports may also have an "on-call" contract to facilitate small-scale rehabilitations when their maintenance department is unable to fulfill the tasks at hand. These on-call contracts are typically between an airport authority and a small number of contractors to elicit bids for small paving or lighting jobs.

Although the maintenance departments and contractors are largely able to meet the maintenance workload needed, there is potential for shortcomings with a lack of available funding for large scale projects. Currently, airports are separating a single runway or taxiway rehabilitation into up to six distinct projects due to the current funding available when a project is bid. Examples include the rehabilitation of Taxiway J at PHL, the rehabilitation of Runway 15-33 at PNE, and the rehabilitation of Taxiway A at ABE. Not only does the lack of funding slow the construction progress, it may also increase the amount of temporary work between projects and thus increase total contract value and timeline for completion. The additional waiting time in order to rehabilitate pavement also leaves sub-par infrastructure on the airfield for a longer period of time.

Although the maintenance departments and contractors are largely able to meet the maintenance workload needed, there is potential for shortcomings with a lack of available funding for large scale projects.

FUNDING AND FUTURE NEED

Over the past four years, airport funding in Pennsylvania has been supported through a combination of federal and state programs aimed at maintaining and modernizing aviation infrastructure. The FAA's Airport Improvement Program (AIP) continues to serve as the primary federal funding source for runway rehabilitation, taxiway improvements, safety upgrades, and terminal development projects at airports included in the national system. Additional federal funding has been provided through the Bipartisan Infrastructure Law, which established the Airport Infrastructure Grant (AIG) program and the Airport Terminal Program (ATP) to address aging facilities and capacity constraints. Since the enactment of the BIL, Pennsylvania airports have

received significant AIG funding for airfield, safety, and infrastructure improvement, while ATP awards have supported terminal modernization projects, including funding for improvements at PIT and PHL that enhance passenger experience, operational efficiency, accessibility, and sustainability.

In addition to federal grant programs, airports may generate local revenue through Passenger Facility Charges (PFCs), which are fees collected from enplaned passengers and used to fund FAA-approved airport improvement projects. PFC revenues provide airports with a critical source of matching funds for federal grants and help finance terminal, safety, capacity, security, and noise mitigation projects that might otherwise be delayed due to funding limitations.

At the state level, PennDOT administers several aviation grant programs that collectively invest roughly $35 million annually in airport development, including PA's Aviation Development Program and the Federal Block Grant Program. Recent state investments have supported improvements at multiple public-use airports across Pennsylvania, funding infrastructure preservation, safety enhancements, and projects that support regional economic development. Airports across Pennsylvania are investing in modernization and expansion projects to improve efficiency and accommodate growth. The PIT Terminal Modernization Program has successfully increased passenger capacity, streamlined security screening, and improved ground access and parking. Meanwhile, ABE is expanding cargo and logistics facilities and planning additional parking to meet rising passenger demand. Despite these improvements, Pennsylvania's aviation system continues to face challenges such as hangar shortages, the need for expanded cargo infrastructure to support e-commerce, and uncertainty as federal infrastructure funding from the IIJA approaches expiration.

Despite the aforementioned funding sources, many Pennsylvania airports continue to face significant capital improvement backlogs as aging infrastructure, increasing maintenance costs, and evolving aviation demands outpace available funding. The Pennsylvania Aviation System Strategic Investment Plan highlights a significant funding gap in the efforts to maintain and modernize aviation infrastructure throughout Pennsylvania. The plan outlines a current $53.5 million annual funding shortfall, with $164 million invested annually compared to an estimated annual funding requirement of $217.5 million. Strategic financial investment is needed in the coming years to prevent the deterioration of aging aviation infrastructure, and to ensure future modernization and technological advancements.

In response to the findings of the Aviation System Strategic Investment Plan, legislation was proposed in June 2026 which seeks to raise available funding for airports through increases in aircraft fuel taxes, establishment of aircraft registration fees and private aviation facility fees, with future provisions for alternative aviation fuels such as electric and hydrogen. This legislation would help to modernize aviation funding and provide a long-term funding opportunity for airports across Pennsylvania, addressing a long-standing failure to raise aircraft fuel taxes to generate revenues for airports.

While funding sources like the IIJA have provided necessary funds to complete capital improvement projects, the funding provided through consistent sources such as the AIP and PennDOT grants are generally insufficient to address the needs of airports across Pennsylvania. Funding is also more difficult to attain for smaller facilities, or those without scheduled commercial service, making projects more difficult to execute given the lack of available funding. A wider variety of funding sources at both the federal and state levels, providing more consistent funds on a regular basis, would allow for more consistent forecasting for airports as they plan for capital improvements and help ensure that repairs and improvements could be carried out based on identified needs, rather than working to utilize funds made available from one-time awards through infrastructure laws. As some airports across Pennsylvania have dealt with funding challenges, funds that are provided are earmarked for future use on a forecasted project, or dedicated to a multi-year project, leaving little if any funds available to complete additional improvements or conduct more time-sensitive repairs.



Photo: Plane landing at airport terminal in Philadelphia; Latsamee

PUBLIC SAFETY

Airports and their infrastructure have an inherent need to keep up with the ever changing and increasing demand for air travel while also maintaining the safety and wellbeing of the public. Backed by the FAA's push for additional safety per its Part 139 airport certification requirements, the 16 airports under this designation in Pennsylvania have been required to compile a Safety Management System by way of creating an Implementation Plan. Airports with commercial service are required to hold an active Part 139 certification; however, airports without commercial service have begun efforts to move toward this requirement. The goal of the Part 139 certification is to promote safety between stakeholders and the airport. This will occur through four functions - policy, risk management, assurance, and promotion. To further the Part 139 requirements regarding safety, each of the airports are required to uphold strict guidelines around Runway Safety Area mitigation and fencing.

While the FAA has and continues to make strides to increase the safety of passengers and the general public, project delivery methods and permitting oftentimes result in a delay in the execution of projects which increase safety and operational efficiency. Environmental permitting agencies cause a damper on the efficiency of project execution with increasingly long review times and design requirements that are not suitable for the large-scale projects that occur at airports. These can result in major changes in design or even delays in construction. Longer review times and increasing requirements that cause delays in design and construction allow for poor infrastructure that is in need of repair to be used for longer, which is a risk to public safety as well as to the aircraft that utilize these facilities. Similarly, some traditional project delivery methods such as design-bid-build can delay the execution of construction for time-sensitive repairs and upgrades. Airports should consider alternative delivery methods, such as Design Build Best Value to increase the efficiency of project timelines.

Airports have made additional progress in prioritizing safety for their passengers and are spearheading a way into the future. ABE's Terminal Connector and Security Checkpoint, which opened in 2023, has become the first airport in the country to install a LifeAire system, eliminating 99% of airborne pathogens, while PHL has installed an EMAS bed for Runway 8-26 to prevent overruns. Many safety improvements are hindered by lack of funding for improvement projects, delays or major changes in design due to external reviewing agencies and project delivery methods, and construction phasing that prioritizes operations over construction efficiency.

RESILIENCE

Air transportation services throughout Pennsylvania have seen continued growth in recent years; however, larger variation in temperatures and an increased likelihood of severe weather events, such as airfield flooding or increased wind speeds from large storms, entail the need for resilient airport infrastructure to ensure continued operations. Considerations for resilient and sustainable infrastructure have become priorities for airports across Pennsylvania, with major airports including PHL and PIT developing published Environmental, Social, and Governance reports to publicize their goals and initiatives with respect to the environment.

The PHL Department of Aviation (DOA)'s dedicated Sustainability team implemented standardized sustainability and resiliency requirements in 2023, ensuring that each new project undertaken at PHL or PNE considers sustainable design features, designs resilient infrastructure, and considers diversion of waste materials. PHL has also conducted stormwater master planning efforts and hydrologic and hydraulic modeling to develop an airfield-wide plan for ensuring a resilient stormwater conveyance system; this effort is particularly important given the airport's proximity to the Delaware River. Additional efforts at PHL include LED lighting upgrades, installation of bicycle racks and EV chargers, and purchase of electric fleet vehicles. The DOA has also proposed a 1.5-megawatt solar farm at PNE, which would provide sufficient power for the airport's entire operational energy demand.

In their development of their new terminal facility, PIT placed a focus on sustainable design; reducing energy consumption, emissions, water usage and waste were goals set in the design of the project. PIT also implements a recycling system for their deicing activities, with runoff from deicing collected, treated, and recycled on site. This recycled water is stored for alternative uses, such as aircraft lavatory use.

Airport infrastructure projects throughout Pennsylvania have sought recognition for their focus on sustainability. Three projects in the Philadelphia area have received Envision verification from the Institute for Sustainable Infrastructure, with the Taxiway J Rehabilitation and the Taxiways Y/U Rehabilitation at PHL receiving a Verified level and the Taxiway L Rehabilitation at PNE receiving a Silver award level. Additionally, ABE's new TSA Checkpoint and Terminal Connector received a LEED Gold certification through the Green Building Council, and the new terminal facility at PIT has pursued a LEED Gold certification.

INNOVATION

The aviation industry is particularly susceptible to the benefits of innovative and emerging technologies, as new methods can be implemented across design, construction, operations, and maintenance at airports.

The FAA's ongoing Next Generation Air Transportation System (NextGen), intended to modernize the United States National Airspace system, has been implemented at PHL's Air Traffic Control Tower to help increase capacity and reliability, improve safety and security, and minimize the environmental impact of aviation. The implementation of this system has allowed for increased low-visibility landings and reduced cancellations and delays as a result of more efficient operations.

PIT's new terminal facility has implemented artificial intelligence (AI) in a variety of capacities, including autonomous mobility vehicles, wayfinding, forecasted staffing needs, and predictive maintenance. Despite a surge in advancement of AI, other airports throughout Pennsylvania have not capitalized on the utilization of AI. In the coming years, airports across Pennsylvania should work to evaluate how AI can be adopted to their needs.

Innovation in design methods has allowed for first-of-its-kind uses of construction methods at PHL, including the implementation of full-depth pavement reclamation, cement treatment of subgrade materials, and use of lightweight foamed glass aggregate, across a number of recent pavement rehabilitation projects. These innovative methods have allowed for a reduction in construction waste, as well reduced construction durations and subsequent airfield impacts.



RECOMMENDATIONS TO RAISE THE GRADE

- Explore a wider variety of federal and state funding sources, including those from aircraft fuel taxes and other airport fees, used for capital improvement projects and improve the consistency and availability of funding sources to allow for more effective capital planning efforts; execute funding when available rather than earmarking money and planning for future use, particularly with respect to multi-year or phased projects.
- Prioritize timely execution of projects through the utilization of alternative delivery methods and through coordination with state and local environmental agencies to identify opportunities to expedite review of permit submissions for ease of construction projects to correct potential safety and operational issues.
- Evaluate implementation of the use of NextGen, or utilize increased capabilities, for airports throughout Pennsylvania and identify opportunities for implementation of AI for use throughout airport facilities, such as Foreign Object Debris detection, building maintenance, and enhanced facility security.
- Prioritize development at GA airports across Pennsylvania to allow for hangar construction and cargo infrastructure in order to meet the current demands of the market and address shortfalls in available infrastructure.

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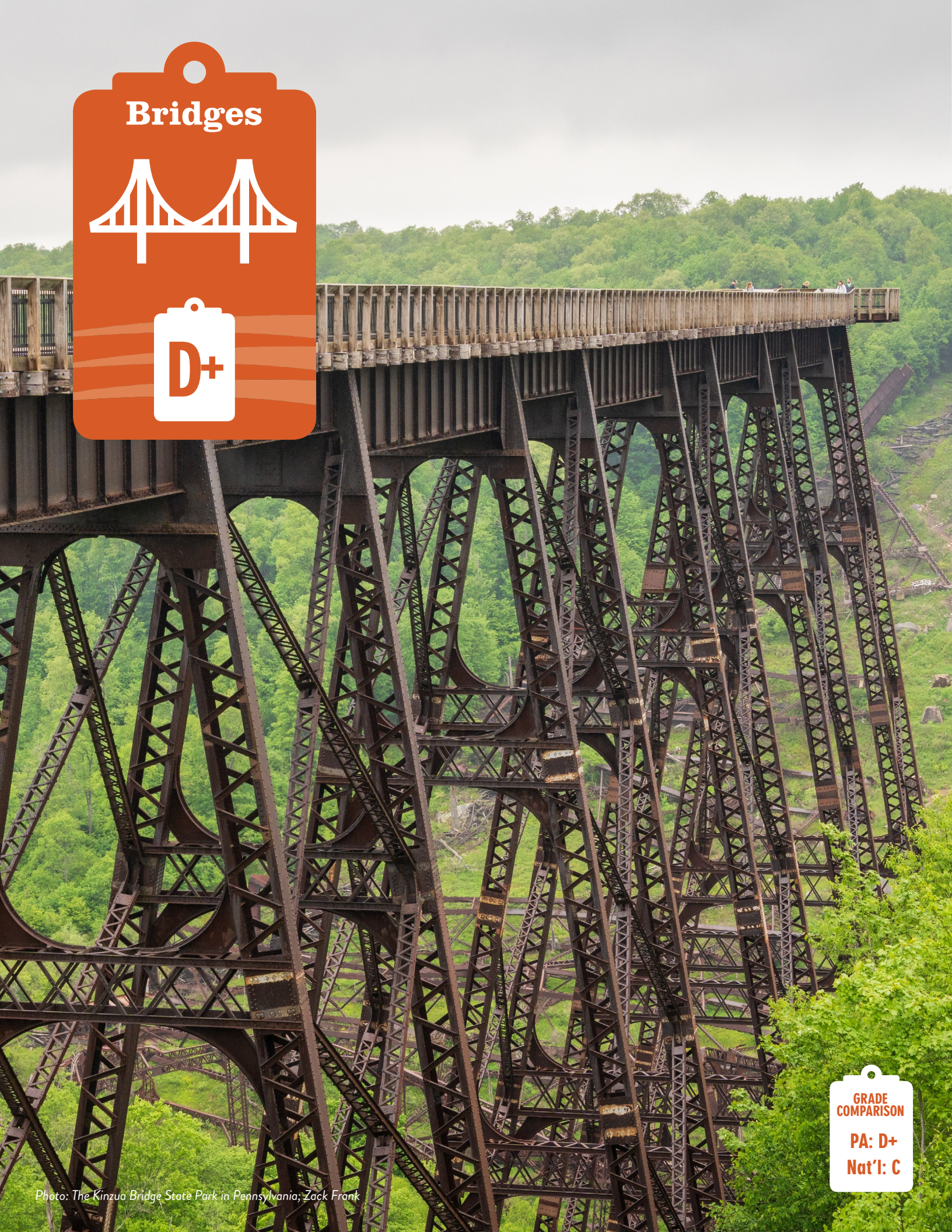
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Bridges

D+



GRADE COMPARISON

PA: D+

Nat'l: C

Photo: The Kinzua Bridge State Park in Pennsylvania; Zack Frank

BRIDGES

EXECUTIVE SUMMARY

Pennsylvania's bridges make up the eighth largest inventory in the United States, average 59 years old, and have the sixth highest rate of bridges in poor condition at 12.1%. The percentage of bridges considered to be in poor condition in the Commonwealth has decreased every year since 2021, reaping the benefits that additional funding from the Infrastructure Investment and Jobs Act (IIJA) has provided. However, with the expiration of the IIJA in 2026, as well as the reliability of funding from the gas tax in flux, the state of funding for bridges remains in a state of uncertainty. Despite this uncertainty, Pennsylvania continues to showcase innovative construction methods, as well as integrate resilient design processes into their standards. Replacements of both the I-95 over Cottman Avenue bridge in Philadelphia and the Commercial Street Bridge in Pittsburgh exemplify what can be done to improve bridge conditions when adequate resources are devoted to the cause.

CONDITION & CAPACITY

Pennsylvania ranks eighth in the United States in terms of the total number of bridges, with 23,314 bridges exceeding 20 feet in length [1]. Of those bridges, 34.4% (8,019) are considered in "good" condition, 53.5% (12,482) are in "fair" condition, and 12.1% (2,813) are in "poor" condition. The percentage of poor bridges (12.1%) ranks as the 6th highest in the country, and is nearly double that of the national average (6.7%). While Pennsylvania still does not have a high percentage of poor condition bridges, the state has made progress in recent years, seeing a decrease from 2022 when the number and percentage of bridges in poor condition was 13.8% (3,198). Bridge condition by count can be seen in total, as well as by owner in Figure 1. Across the Commonwealth, an average of 7,456 vehicles cross state-owned bridges per day, while an average of 1,225 vehicles cross locally-owned bridges per day. In total, an average of 6,154 vehicles per day cross bridges in Pennsylvania, with the maximum reaching as high as 277,960 [2].

In addition to bridge condition by count, bridge condition can be observed by bridge deck area. Per FHWA's 2025 data, of the 144.93 million square feet of deck area that are carried by Pennsylvania bridges, 31.2% are in good condition, 62.2% are in fair condition, and 6.6% are in poor condition. The percentage of bridge deck area that is carried by bridges in poor condition (6.6%) is roughly half that of the percentage of bridges in poor condition by count (12.1%). This indicates that a large majority of bridges in poor condition have small deck areas. Bridge condition by deck area can be seen in total, as well as by owner in Figure 2.

The overall average age of bridges in Pennsylvania is 59 years old [2], compared to the national average of 47 years old [3]. The condition of bridges correlates closely with age, as good bridges average 31 years old, fair bridges average 71 years old, and poor bridges average 87 years old [2].

The Pennsylvania Department of Transportation (PennDOT) maintains their own database that includes all state-owned bridges over eight feet in length, and all locally-owned bridges over 20 feet in length [2]. This provides a more comprehensive look at Pennsylvania's bridge inventory, however for the purposes of this report, in order to be able to make a more direct comparison with data for other states as well as nationally, numbers from the FHWA database are utilized.

Figure 1: State- and Locally-Owned Bridges By Count and Condition Category [1]

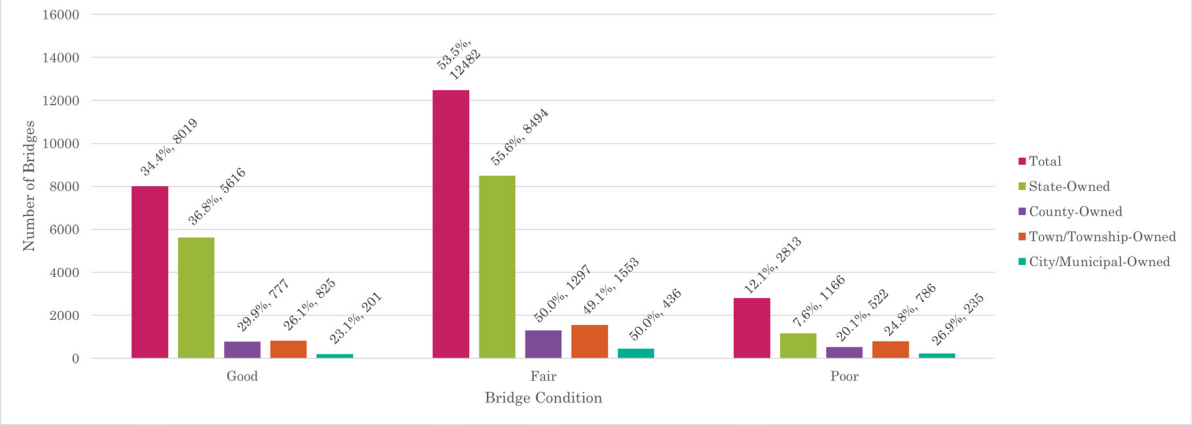
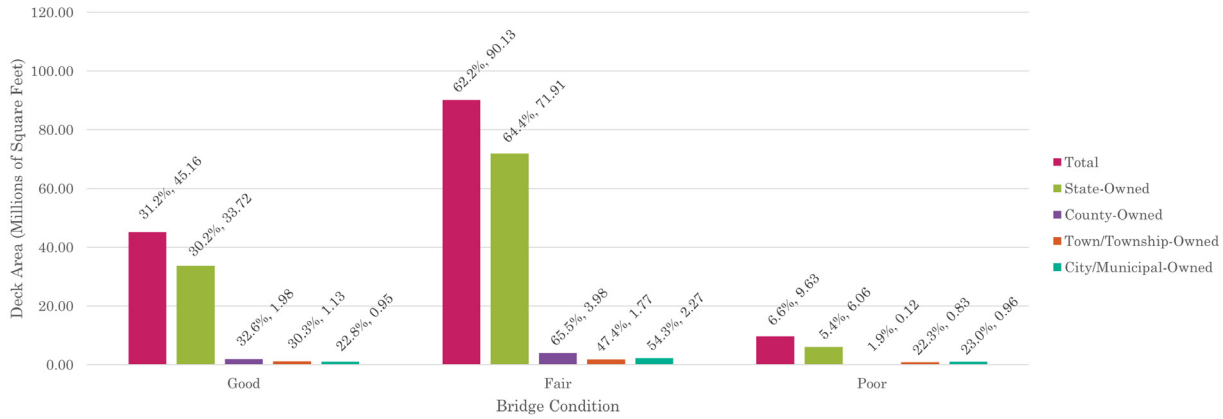


Figure 2: State- and Locally-Owned Bridges By Deck Area and Condition Category [1]



The Pennsylvania Turnpike Commission (PTC) owns and maintains 771 bridges. According to FHWA's 2025 data, 45.8% (353) of these bridges are in good condition, 52.8% (407) are in fair condition, and 1.4% (11) are in poor condition [1]. In terms of deck area carried by bridges, 58.3% is in good condition, 34.6% is in fair condition, and 7.1% is in poor condition.

The preceding data considers a snapshot of bridge conditions in the year 2025, however it is also important to account for the trend of bridge conditions over time. Bridge condition trends from 2021 through 2025 are illustrated in Figures 3 and 4 [1].

Figure 3: Bridge Condition by Number of Bridges 5 Year Trend [1]

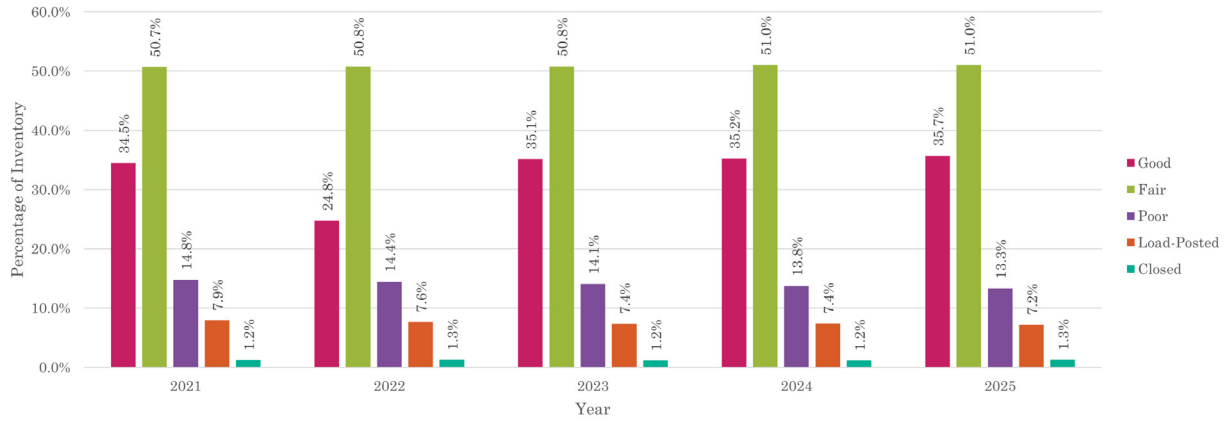
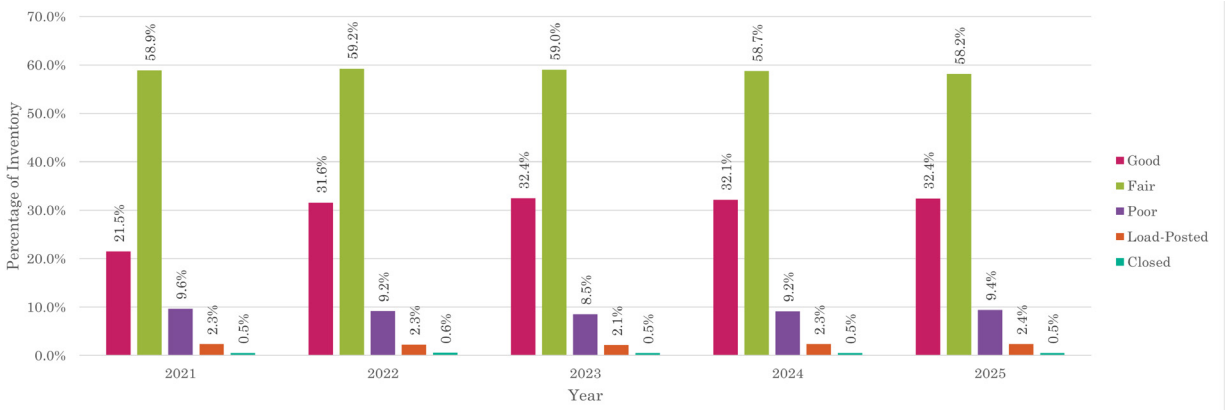


Figure 4: Bridge Condition by Deck Area 5 Year Trend [1]



The percentage of poor bridges has decreased every year over the time period considered, while the deck area of poor bridges, measured by a percentage of the total deck area, has fluctuated slightly. This indicates that a large portion of condition improvements have been on bridges with smaller deck areas.

The same trends can be observed for the number of bridges that are load-posted and closed to traffic over the same time period. The percentage of bridges that are load-posted has followed a general trend of decline from 2021 to 2025. However, the percentage of bridges that are closed to traffic has decreased and then increased during the same time period. When this data is broken down by deck area, both load-posted and bridges closed to traffic decreased and then increased during the same time period.

FUNDING & FUTURE NEED

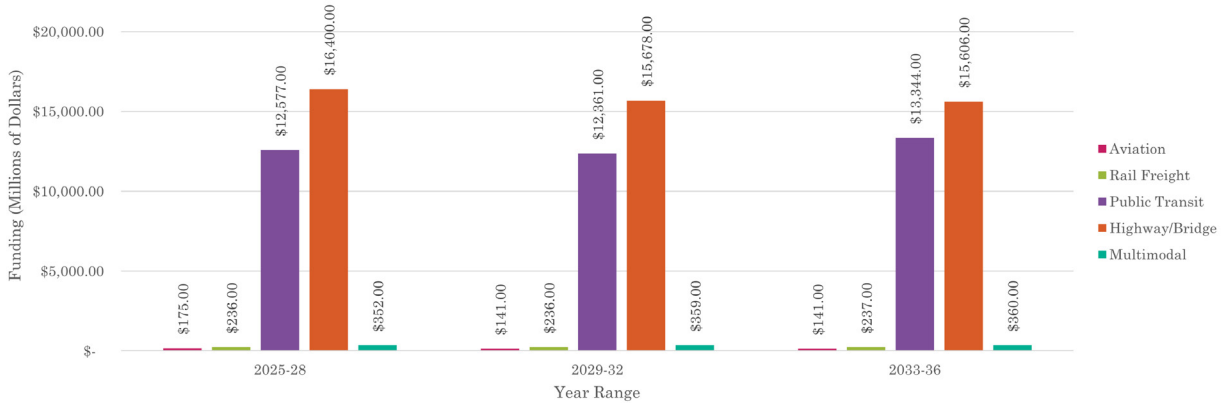
Funding for bridge projects (and transportation projects as a whole) in Pennsylvania comes from a variety of sources. However, the Commonwealth still relies heavily on the gas tax as its primary source of funding. The gas tax in Pennsylvania, in terms of cost per gallon that consumers pay at the pump, was higher in 2025 than all except 5 other states [4]. However, much like many other states around the country, revenue brought in from the gas tax is declining due to a wide array of factors, most notably an increasing number of electric

vehicles being on the road, and a declining reliance on fuel consumption [5]. It should also be noted that the gas tax does not fluctuate with inflation, meaning that as construction prices rise, funding from the gas tax becomes less valuable.

Pennsylvania transportation capital funding is supplemented through federal support. The federally passed Infrastructure Investment and Jobs Act (IIJA) has contributed over $11 billion from late 2021 through early 2025 towards roads, bridges, and major projects in Pennsylvania [6], with over $23 billion going directly toward transportation projects overall [5]. However, funding through the IIJA is set to expire in 2026, leaving the future of transportation funding in Pennsylvania in a state of flux.

In 2025, PennDOT updated its 12-Year Program (TYP), serving as the guiding blueprint for the future of transportation funding throughout the Commonwealth. The 2025 TYP forecasts funding devoted to highway and bridge projects to be $16.4 trillion from 2025-2028, $15.7 trillion from 2029-2032, and $15.6 trillion from 2033-2036, as illustrated in Figure 5 [5].

Figure 5: PennDOT TYP Projected Funding Levels by 4-Year Time Period [5]



Additionally, in 2024 the General Assembly made the decision to end the diversion of $141 million per year from transportation funding to the Pennsylvania State Police [7]. This results in more funding available for infrastructure improvement, including bridges.

Many bridges in poor condition are locally owned. These are bridges that would be repaired using local agency funding, if not for a stark lack of resources for local governments to devote towards transportation projects. IIJA funding allows local agencies to apply for grants. However, a 2023 study shows that many local Pennsylvania agencies had difficulties securing grants due to a wide variety of reasons, including stringent match requirements, complex application processes, and a general lack of budget and resources that would otherwise help more densely populated areas [8].

PennDOT's 2025 TYP highlights multiple grants awarded to local agencies in late 2023 and 2024, after the aforementioned study was published [5]. Additionally, in March of 2026, PennDOT announced a $461 million investment in road and bridge maintenance for municipally-owned assets [9]. Though this investment shows promise, more reliable funding is needed to address the condition of Pennsylvania's locally-owned assets. And with the expiration of IIJA funding coming in 2026, supplemental funding for local bridge projects enters an uncertain state for the foreseeable future.

Through a Planning and Environmental Linkages (PEL) Study in late 2021, PennDOT has investigated other potential funding solutions, such as bridge tolling, mileage-based user fees, managed lanes, congestion pricing, and corridor tolling [10]. Ultimately, none of these alternatives have been put into action, and remain possibilities moving forward.

Elsewhere, beginning in 2022, Act 44 obligations from the PTC to PennDOT were reduced from $450 million

annually to $50 million [11]. These payments were previously made starting in 2007 as part of legislation requiring the PTC to make payments to PennDOT to assist in funding statewide transportation projects. Though the obligations are now reduced, the PTC plans on increasing tolls through at least 2051 to offset the debt accrued through Act 44 payments made from 2007 to 2022. Additionally, this means that there is $400 million less being added to PennDOT funding every year starting in 2022. The PTC continues to investigate alternative funding resources, including transitioning from traditional tolls to Open-Road-Tolling (ORT), as well as utilizing a Commonwealth-wide fiber optic network with surplus capacity that can be rented out to private clients [12].

OPERATION & MAINTENANCE

Pennsylvania bridges undergo routine inspections, at least once every two years, in accordance with the Specification for the National Bridge Inventory (SNBI) [13]. These inspections provide assessments of bridge conditions and identify what bridges need to be rehabilitated or addressed, and to what extent.

During 2024 and 2025, PennDOT transitioned from the BMS2 system to BMS3 system as the primary way of managing bridge inspection findings. While similar to its predecessor, BMS3 is a web-based system, allowing for standardization of inspection reports [14].

In 2024, the Pennsylvania Department of the Auditor General released a report of findings from an audit of PennDOT's bridge inspection processes covering the period from July 2020 to May 2023. The audit found:

- PennDOT has more stringent inspection requirements than mandated by NBIS
- PennDOT assigns positions to staff that do not meet minimum requirements for those positions
- PennDOT was not ensuring inspection documentation was properly prepared/maintained
- PennDOT failed to ensure critical and high priority maintenance item written notifications were provided in a timely manner
- Inspection reports were not approved or accepted in a timely manner
- Noted failures in preparation of a required bridge problem report regarding the closure of one bridge
- Failure to close a bridge while awaiting additional analysis to be performed [15].

When given an opportunity to respond to these findings, PennDOT agreed to some degree with most of the findings, while providing the proper context where necessary, as well as providing plans of action for any items and recommendations that required consideration. Any PennDOT responses that were not marked as complete by the Auditor General were marked as to be completed upon the release of either an updated Publication 238 (PennDOT's Bridge Safety Inspection Manual), or the transition to BMS3. For the findings that PennDOT disagreed with, proper context was provided for the situation, to which the Auditor General agreed [16].

Along with its transition to a Lowest Life Cycle Cost (LLCC) approach to maintenance, PennDOT also implemented BridgeCare, a bridge asset management forecasting software [17]. Using data stored in BMS2 (and now BMS3), BridgeCare can model future deterioration, and estimate the remaining service life of each bridge. PennDOT released an accompanying document, PennDOT BridgeCare Treatment Criteria and Consequences, as a means of determining the proper treatment of bridges based on the findings of BridgeCare. This offers a standard procedure in deciding the best treatment for a bridge repair or rehabilitation, whether it be applying an overlay, painting, joint replacement, deck replacement, or full structure replacement [18]. This allows PennDOT to perform more targeted maintenance that will maximize the service life of a bridge by recommending the timing and scope of the most appropriate treatments.

An issue that has faced the Commonwealth in the past has been creating an inventory of small (less than 20 feet in length) local bridges, and incorporating them into an asset management plan. In 2021, the Pennsylvania Transportation Advisory Committee (TAC) published a report on small local bridges. An associated survey of local

bridge owners (boroughs, townships, cities, and counties), was conducted with the intention of learning if and how local entities maintain inventories of their bridges. This survey revealed that, among responding local entities, only 15% had asset management plans for small local bridges, and that municipal general funds are the primary source of funding for work on these bridges [19].

Since this study, PennDOT has created a large number of local structures within its BMS2 (now BMS3) database. According to PennDOT's Open Data OneMap, there are currently 17,398 local bridges in PennDOT's inventory system [20]. This includes 6,615 bridges over 20 feet in length, requiring routine inspections at regular intervals by federal law. This leaves 10,783 bridges less than or equal to 20 feet in length, which are not required by federal law to be routinely inspected. Breaking it down further, there are 8,065 bridges that classify as L2 (between 8 feet and 20 feet in length), and 2,718 bridges that classify as L3 (under 8 feet in length). Note that state-owned bridges that classify as L2 are required to be routinely inspected. Of these 10,783 small local bridges, 9,549 have only been inventories, and have not been inspected for condition. In 2020, PennDOT launched a Local Bridge Inventory application available to their partners that can be used to provide details on these bridges. The application's integration into BMS3 continues to be developed.

PUBLIC SAFETY

After bridges are inspected, engineers determine if an updated load rating is necessary based on the condition. This may be due to deterioration of structural components on the bridge, a change in design vehicle from when the bridge was originally designed, or other specific concerns. If the updated load rating finds that the bridge does not have adequate capacity to support the current design truck, the bridge is posted for the maximum allowable load that it can safely carry. Per FHWA's 2025 data, there are 1,619 load pasted bridges in Pennsylvania, and 293 bridges that are closed to traffic [1]. Among bridges that are load posted, the average number of cars that cross these bridges every day is 1,222, with the maximum exceeding 40,000 vehicles per day.

RESILIENCE

The most significant threat to bridge resilience in Pennsylvania remains flooding, and more generally, climate change and increased waterway flow.

Recent updates to the PennDOT Design Manual have placed an emphasis on drainage, hydrology, and design procedures to improve bridge resilience against extreme events. With both existing and new bridges, weather factors such as flooding, extreme temperatures, and climate stressors are taken into consideration.

In April of 2025, PennDOT introduced a new section (10.6.7) to its Design Manual Part 2, Contextual Roadway Design (DM-2): Resilient Design Assessment (RDA) [21]. This new design process uses factors such as access, detour length, flooding impacts, overtopping impacts, scour concerns, and pressure flow, to consider increased discharge to eligible projects. This increased discharge is used to identify possible vulnerabilities early in the design process for future culverts, bridges, and roadways. Though there are no hard criteria to be met (as is the case to design for a 50-year design flow to avoid pressure flow, or to design for a 100-year design flow to defend against scour), designers are required to take these results into consideration when deciding on what design works best for the site as a whole. Exhibits 10.6.4 and 10.6.5 from DM-2 are shown in Figure 6, showcasing the factors that go into consideration for increased discharge.

Figure 6: Exhibit 10.6.4 (top) and Exhibit 10.6.5 (bottom) from DM-2 showing factors taken into consideration for a bridge's vulnerability score [21]

Concern	Condition	Number to Add to Score	
		Yes	No
Access (Essential)	The site provides access to essential services, such as hospitals, other emergency services, major utilities, etc., or is an evacuation route for residential or public facilities, such as nursing homes or prisons.	4	0
Detour	The official detour length for alternate access, if the project site is closed due to an emergency, exceeds 10 miles.	3	0
Access (Sole)	The route is an only point of access for homes, schools, businesses, etc., with no available detour.	4	0
Access (Mobility)	Serves members of the community that rely on non-motorized transportation options.	3	0
Flooding	The site is located in a FEMA Zone AE floodplain (detailed study area).	1	0
Overtopping	The site has a proposed overtopping frequency of 0.01 AEP (100-year) or more.	2	0
Buildings	There are buildings in the 0.01 AEP (100-year) floodplain.	1	0
Scour	There are existing scour or stream stability concerns, such as migration or deposition, or the site has potential for future concerns.	3	0
Pressure Flow	The proposed bridge is under pressure flow for the 0.01 AEP (100-year) event or more frequent.	2	0

Vulnerability Score (Based on Exhibit 10.6.4) or Pre-Determined RDL*	Discharge Multiplier
0-3 (Level 1)	1.1 (10% increase)
4-7 (Level 2)	1.2 (20% increase)
8+ (Level 3)*	1.3 (30% increase)

*RDL Level 3 may be assigned by PennDOT during project scoping.

In terms of managing current assets and measuring their performance, PennDOT has maintained its scour-critical monitoring program and website based on NBIS requirements. This includes increased inspection frequency for structures that are more vulnerable to scour, as well as monitoring of structure performance during flood events [22].

INNOVATION

PennDOT has released a Focus on Innovations (FOI) publication for the last 4 years, highlighting various means and methods that the Department has utilized to push design, construction, and maintenance of their assets forward [23]. The primary innovation relating to bridges is the Department's transformation of its project delivery and asset management program into a fully digital process.

In 2020, PennDOT published a final strategic plan to have construction projects be bid using 3D technology, rather than relying on a traditional construction plan format. As of early 2025, PennDOT has used 30-plus pilot projects to test various phases of the digital delivery process [24]. This includes aspects such as Advanced Digital Construction Management Systems, Bridge Authoring, Digital As-Builts, and Model as Legal Deliverable. With each pilot project, PennDOT has provided training to all involved stakeholders, and feedback is provided for the process to be refined and improved upon. Relative to bridges, these pilot projects are being utilized with the end goal in mind of having a complete digital inventory of all of PennDOT's assets. This would allow the condition of each structure to be updated with each inspection, giving PennDOT a comprehensive understanding of the performance of each structure, and the ability to accurately project the performance of each structure throughout its anticipated life span.

When a fuel tanker truck crashed into an abutment of a bridge carrying I-95 over an exit ramp in Philadelphia in June 2023, an emergency replacement was warranted due to a subsequent explosion and fire. PennDOT and its partners utilized an innovative lightweight recycled foamed glass aggregate as a temporary fill material, so as not to damage vital utility lines underneath [25]. Since this implementation, this material has been gaining popularity across varying project types for its beneficial properties.

Figure 7: Photos of the aftermath of a fuel tanker truck crashing into the abutment of a bridge carrying I-95 over Cottman Avenue, as well as the temporary condition during replacement [25]



On the other side of the state, in July of 2026, PennDOT District 11-0 was able to replace the 70-year-old Commercial Street Bridge, which carries I-376 in Pittsburgh, and carries over 100,000 vehicles per day [26]. The replacement utilized staged and slide-in construction, building the new bridge adjacent to the old bridge, and then laterally sliding the new bridge 102 feet into place. Most notably, the old bridge was able to still be open to traffic during the construction of the new bridge. Ultimately, I-376 was fully-closed for 17 days (one full week ahead of schedule) while the old bridge was demolished, and the new bridge was successfully slid into place. This saved the traveling public years of potential temporary traffic conditions, as well as showcased one of the largest bridge slides by weight and distance slid to ever take place in America [27].

Figure 8: Photos of the new Commercial Street Bridge being constructed next to the old bridge, as well as the new bridge in place after a 102 foot slide has taken place [27]



Outside of PennDOT, the PTC has continued its efforts in implementing Open-Road Tolling (ORT) throughout its asset network [28]. As a part of this project, hundreds of miles of fiber optic lines have been implemented across the Commonwealth. While not directly tied to bridges, this allows the PTC to use the fiber optic network as an additional revenue stream, possibly contributing to more funding for capital improvement among its asset inventory, including bridges [12].



RECOMMENDATIONS TO RAISE THE GRADE

- Maintain investments in bridge infrastructure through a combination of federal, state, and local funding.
- Explore alternative revenue streams for funding to reduce the reliance on revenue from the gas tax
- Strengthen technical assistance for local agencies to assist them in securing grants when those funding opportunities arise
- Consider legislation to include small (< 20 feet in length) locally-owned bridges in a formal asset management plan
- Continue the use of BMS3 and BridgeCare to address priority bridges that need to be rehabilitated or replaced
- Encourage and enforce the use of Resilient Design Assessment and monitor how it is helping new structures withstand increasingly volatile scour conditions
- Continue to develop and foster the digital delivery program such that it becomes the norm as it is included on more projects
- Improve bridge inspection program in accordance with auditor's recommendations

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Broadband
C-
GRADE COMPARISON
PA: C-
Nat'l: C+
Photo: manfredxy

BROADBAND

EXECUTIVE SUMMARY

Broadband infrastructure is necessary for Pennsylvania residents and businesses to access information with high-speed data. The Pennsylvania Broadband Development Authority (PBDA) was signed into law in December 2021 as an arm of the Department of Community and Economic Development (DCED) to create a statewide broadband plan to distribute federal and state monies to unserved areas of PA. The two key programs administered by the PBDA are the Capital Projects Fund (CPF) and the Broadband Equity, Access and Deployment (BEAD) Program which will deliver over $1.3 billion dollars in broadband, last-mile connectivity to unserved areas.

As of September 2026, there are approximately 130,000 unserved and underserved locations remaining. Current funding from the CPF program has serviced approximately 44,000 locations in PA. Pennsylvania's rural areas require more government incentives and facilitation for the investments of internet service providers. Additionally, Pennsylvania's challenging topography through the Appalachian Mountains makes construction and deployment more complicated and adds to the overall cost of expanding broadband service.

BACKGROUND

The Federal Communications Commission (FCC) defines broadband capability as a download speed of 100 megabits (MB) per second or higher, and upload speeds of 20 MB or higher (100/20). Unserved areas are defined as having download/upload speeds of less than 25/3 Mbps while underserved areas are at less than 100/20 Mbps. Internet access can be provided by satellite, digital subscriber line (DSL), coaxial cable, microwave, wireless (i.e. fixed wireless) or fiber. Broadband infrastructure includes towers and tower-supported antennae/repeaters (wireless), as well as fiber optic or copper aerial and underground wire lines to deliver fiber to the home (FTTH).

Over the past couple of decades, consumer demand for increased broadband speeds and reduced latency has grown dramatically, as households steadily consume greater amounts of data, such as for streaming video. This demand for faster and better connectivity is expected to continue to grow as technologies incorporating artificial intelligence proliferate. However, in rural unserved areas

with low population density, extending fiber or cable may be economically impractical, satellite or fixed wireless is often more cost effective.

There are four major types of broadband service delivery.

A further breakdown of serviceable locations can be evaluated by the type of broadband service. These types are defined below from the most resilient, fastest and scalable to the least:

Table 1: Broadband Types – Pros & Cons

Broadband Type	Pros	Cons
Fiber	Fastest, greatest scalability, lowest latency, requires one-time construction event with ongoing O&M	Expensive, long-term O&M of infrastructure (poles), available workforce for large scale deployment
Fixed Wireless	Lower cost of deployment to cover a greater area, available existing infrastructure (towers & utility poles), meets current demand for speed and latency given the appropriate proximity to infrastructure	Long-term scalability will be an issue given increasing data demand and speed which may reduce bandwidth to consumers, will be reliant on fiber to the base infrastructure for scalability
Satellite	Ability to deliver service to the most remote, unserved locations above all others	Congestion on the network, weather and maintenance of terrestrial-based equipment, cost of upgrades to network for LEO's are greater than existing fiber plant or foxed wireless
Cable	Existing footprint across the national reduces overall need for greenfield builds/project costs	Will eventually become obsolete technology due to ability to meet increasing demand for broadband

FUNDING

As of September of 2026, approximately 130,000 unserved/underserved locations were identified in Pennsylvania, which is 3-4% of the population. This number may now be less as awardees of the Rural Opportunity Digital Fund (RDOF), CPF or counties that utilized American Rescue Plan Act (ARPA) funds have begun to serve unserved areas.

Since 2020, the federal government has created three major subsidy programs to reduce the digital divide.

1. Rural Digital Opportunity Fund Phase I (RDOF)
2. ARPA Capital Projects Fund (CPF)
3. Broadband, Equity, Access and Deployment (BEAD)

In addition to the federal funding programs, certain counties in Pennsylvania have budgeted funding for broadband, examples include but are not limited to Washington, Westmoreland, York and Crawford. Washington County, in particular, set aside over $27 million to expand broadband in three primarily unserved areas.

Below is a breakdown of each of the federal funding programs as related to Pennsylvania.

RDOF

- $368.7 million dollars awarded in 2020.
- Awarded for FTTH, DSL to Fiber upgrades, Fixed Wireless, and Satellite.
- Key winners of RDOF:

Table 2: PA RDOF Awardees

Provider	RDOF Awarded	Technology	Additional Notes
SpaceX/Starlink	$70.6M	Satellite	Defaulted on RDOF
Windstream (Kinetic)	$46.7M	DSL to FTTH	
Frontier	$38.1M	FTTH	
Armstrong	$31.0M	FTTH	
Conexon Connect/Rural Co-Ops	$28.0M	FTTH	Defaulted on RDOF
Comcast	$20.4M	FTTH	
Verizon	$17.0M	FTTH	
Brightspeed	$14.2M	DSL to FTTH	
Other	$103M	Mix	Includes small local fiber providers, wireless ISP's, etc.

Main Takeaways:

- Multiple awardees defaulted (failed or chose not to fulfill regulatory commitments per FCC regulations).
- Lack of clarity on which providers have fulfilled their obligations.
- Approximately 15-25% of funded areas have been reported as completed since 2020.

ARPA Capital Projects Fund "CPF"

- $204 million in grants were awarded in 2023.
- 53 applications awarded across 41 counties to 12 providers
- Winners of CPF:

CPF was awarded by the PBDA in April 2023 to the providers above. The awardees were a hybrid of FTTH and fixed wireless providers. Through a review of the awards, the PBDA has prioritized selecting existing infrastructure providers to "edge out" or extend existing networks over "greenfield" or new builds. PBDA's intent was to expand upon existing infrastructure in unserved areas. As of today, the PBDA has not published its scoring metric on how applications for the CPF funding were awarded, nor is it clear on how providers are progressing on completing their obligations to expand networks where awarded. The last CPF Performance Report was published in July 2025, and the next Performance Report is expected in mid-2026 which should provide better clarity on individual provider progression and performance.

Table 3: CPF Awardees from PBDA

Provider	CPF Awarded	Technology
Adams CATV	$387,969	Fiber
Alleghenies Broadband	$1,809,524	Fixed Wireless
Armstrong	$12,470,081	Fiber
Blue Ridge	$524,857	Fiber
Brightspeed	$782,163	Fiber
Claverack	$4,771,248	Fiber
Comcast	$61,662,538	Fiber
Frontier	$3,528,901	Fiber
Upward	$1,476,288	Fixed Wireless
Verizon	$78,369,788	Fiber
Windstream	$11,979,595	Fiber
Zito	$26,388,039	Fiber

Broadband Equity, Access and Deployment (BEAD) Program

The Commonwealth was granted $1.16 billion in broadband funding in June 2023 from the National Telecommunications and Information Administration (NTIA). This was part of the BEAD Program, a $42.45 billion federal program intended to expand broadband access to as many unserved residents as possible in every state and territory in the U.S. BEAD is a product of the COVID-19 pandemic era's Infrastructure Investment and Jobs Act (IIJA), which supplied $65 billion for broadband expansion. In 2025, BEAD undertook some modifications on how grants will be awarded.

A part of these changes has included the reduction in the importance of FTTH. This has a positive and a negative impact on Pennsylvania residents. While FTTH provides the best scalability of speed and capacity for broadband into the foreseeable future, the cost of building FTTH for every unserved home and Community Anchor Institutions (CAI) can be tremendously expensive in Pennsylvania. Due to lack of density in rural areas, topography and ongoing operation and maintenance costs in parts of the Commonwealth that present severe climate concerns. The federal government shifted from a fiber first to a technology neutral posture, directing more BEAD funding to projects deploying other technologies such as fixed wireless and satellite to provide broadband to unserved locations where FTTH is not a cost-effective solution. This shift will give Pennsylvania more flexibility to use federal dollars to provide broadband to as many residents and CAI's as possible with the given funds.

One significant flaw in the Commonwealth's broadband program as it relates to both BEAD and CPF is the cost of labor associated with both programs. Pennsylvania requires both programs to utilize the prevailing wage rates for electrical lineman to perform broadband construction. Nearby states such as New York and Maryland have adopted labor wage rates for teledata lineman that work in the communication space on a pole as compared to the electrified space on a pole which requires more training and certifications. This lack of classification for teledata lineman in Pennsylvania can increase labor costs 30-40% which can increase overall project budgets by 10-20%. Verizon challenged the labor classification, however in March 2026, a Commonwealth Court of Pennsylvania rejected Verizon's attempt to change the wage classification stating that the Bureau of Labor Law Compliance had proper authority to issue the prevailing wage determinations. The International Brotherhood of Electrical Workers (IBEW) supported the higher wage

classification whereas the Communication Workers of America (CWA) supported Verizon's challenge. The result is that any/all telecommunication infrastructure awarded by BEAD and awarded by CPF will be significantly more costly to awardees that are attaching their infrastructure to electrified poles. This creates a significant advantage to non-fiber providers or ISP's that utilize their own, unenergized poles or other infrastructure like towers or satellite to provide broadband.

The PA BEAD program was approved on June 28, 2024. There are 7 key categories in Pennsylvania's BEAD guidelines on how they will be scored. The first is the BEAD outlay which covers cost-efficiency per location, scalability of technology, and the amount of a provider to match what the Commonwealth is providing. The second is affordability, simply demonstrating that a provider can provide low-cost options for the minimum requirements for the program. The third is fair labor practices which cover prevailing wage and workforce protection and investment. The fourth is speed of deployment, stating that the broadband network will be built in the most efficient timeframe. The fifth is equitable workforce development that ensures local laborers will be utilized and develop a diverse workforce. The sixth is local government coordination that requires the provider to work with local and regional governments to provide timelines and productivity on a regular basis. The final category is an open-access network that will make the broadband network available to other providers to utilize the infrastructure.

FUTURE NEED

Given the amount of funding through CPF and what will eventually be awarded through BEAD, the Commonwealth is on a path to provide broadband to as many Pennsylvanians as possible. The five-year action plan developed by the Governor and the PBDA was published in August 2023. The following priorities are identified:

- Expand infrastructure across the Commonwealth in areas of most need to accurately and equitably build out.
- Collaborate with CAI's to provide digital literacy training and community access to high-speed broadband.
- Educate and support implementation of affordability programs and access to available funding by government and community organizations.

As previously highlighted, there are challenges to ensuring that every unserved area in Pennsylvania is served through CPF and BEAD. This has been identified in its labor wage issues and challenging topography through mountains and valleys in PA where cost of construction per mile becomes cost-prohibitive.

In addition to cost of construction, affordability is a key issue in both rural and urban areas of the Commonwealth. Providers must be able to provide a low-cost solution for low-income homes to have access to broadband. The federal Affordable Connectivity Program (ACP) expired in June 2024. There are no current federal programs that are on board to replace ACP. This leaves states to subsidize low-income families or requires ISP's to provide affordability programs. Pennsylvania's BEAD guidelines prioritize affordability. However, given the rising costs of goods and services, there is no definition to what constitutes is a "low-cost" option. More competition and expansion of broadband will provide more options to consumers, which typically creates more competitive pricing in the marketplace. PA does not currently have a program to help subsidize the cost of broadband for low-income families.

OPERATION AND MAINTENANCE

Providing proper operational support and maintenance of broadband systems is critical to ensure that broadband access improves in Pennsylvania. A challenge in building broadband infrastructure in rural areas is ensuring that there is adequate maintenance of the system. This challenge has been an impediment to building rural broadband infrastructure due to geographical and topographic limitations. In addition, smaller subscriber bases make it more difficult to have sufficient funding for ongoing and future maintenance and discourages the building of rural broadband infrastructure as a result.

With these challenges in mind, it is important to maintain adequate funding for long-term operations and maintenance, particularly in rural areas, to ensure the development of increased broadband capacity in Pennsylvania. The major challenge will depend on the ability for broadband network providers to adequately have an available, local workforce and pay for overhead lineman at the prevailing wage rate to service network outages.

PUBLIC SAFETY

Broadband access is certainly a critical component of economic development. However, the lack of broadband access can also prove to be a serious detriment to public safety. Emergency response may be limited or delayed if broadband communications are hampered. Per the Commonwealth, over 80% of E911 calls are made from mobile devices which accounts for over 11 million calls per year.

Given these numbers, emergency response is also negatively affected if broadband communications are unable to handle the high volume of communications that will inevitably be part of such events such as heavy snowfall, significant storms that may damage utility poles like lightning strikes or simple accidents on the roadway that could impact the broadband network.

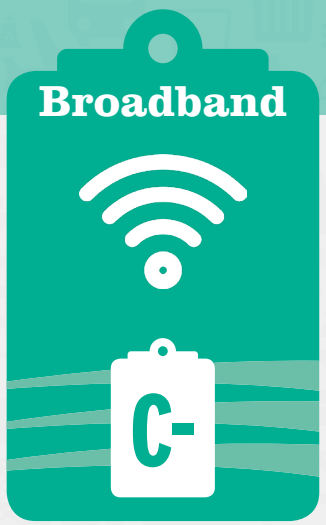
Pennsylvania should continue to evaluate and fund operations for mobile E911 services. Many systems are inadequate or simply obsolete. In most cases, towers can provide adequate coverage via cellular or radio signals to first responders to those most in need. However, as technology advances, the equipment on the towers or the handsets provided to first responders must be able to provide the greatest access to the newest technology.

RESILIENCE

With respect to broadband access, resilience is defined by the reliability of service. Even in areas where service is present, reliability can be inconsistent. This is often true in areas of central Pennsylvania within the Appalachian Mountains. Broadband, if delivered via overhead utility lines, runs the same risk as the electrical grid in extreme weather conditions or in events where a utility pole is compromised. The PA PUC published an article in 2025 covered issues with the power grid associated with electrical outage events in 2024, which was the highest number in 30 years and given that the telecommunications infrastructure resides on the same poles, the network is impacted as well. Ideally, all telecommunication infrastructure should be buried underground. However, underground construction is significantly more expensive than overhead construction. The Commonwealth and PA Utility Commission should review standards such as burying fiber at a more shallow depth such as 12” to 16” for building future telecommunication facilities and not apply similar standards that are applied to more volatile utilities such as gas, sewer and electric.

INNOVATION

As broadband infrastructure evolves, the need for data consumption, network speed, low latency and capacity will grow. Providers continue to develop technology to deliver the most efficient networks, however most technologies come with their challenges. Fiber has the highest speed, capacity and low latency, but is the most expensive to install. Satellite is currently cost-effective, but latency, scalability, capacity and ongoing operation and maintenance of the network are significant limitations. Fixed wireless is also cost-effective topography and potentially limited access to fiber backhaul can constrain performance.



RECOMMENDATIONS TO RAISE THE GRADE

Pennsylvania has started the process of serving the unserved residents of the Commonwealth. Pennsylvania and the PBDA should

- Evaluate the cost of labor associated with BEAD applications to ensure that the Commonwealth is utilizing federal funds in the most economical manner.
- Adopt teledata lineman wage rates to support the most cost-efficient manner to deploy broadband.
- Advance and maintain funding programs that promote fiber, fixed wireless, microwave and satellite technologies in order to get broadband to all Pennsylvanians.
- Implement stronger accountability measures of CPF awardees to fulfill contract obligations.
- Grow state funding sources targeting broadband expansion in the "true" last-mile connection to those unserved.

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Dams

C



GRADE COMPARISON

PA: C

Nat'l: D+

Photo: Dam on the Schuylkill River, seen from Fairmount Park in Philadelphia, Pennsylvania; ESB Professional

DAMS

EXECUTIVE SUMMARY

Pennsylvania's dams provide critical benefits, including flood risk reduction, water supply, recreation, habitat, navigation, and hydroelectric power. Of the 1,492 Pennsylvania dams included in the U.S. Army Corps of Engineers' (USACE) National Inventory of Dams (NID), 788 are classified as high-hazard potential dams, meaning failure could result in loss of life regardless of condition. Pennsylvania's dams are among the oldest in the nation, with an average age of 80 years, well beyond the typical 50-year design life, and more than 30% are over 100 years old. Since the 2022 Report Card, Pennsylvania has improved inspection compliance for high-hazard potential dams, advanced emergency preparedness, and remained a national leader in dam removals. However, aging infrastructure, significant rehabilitation needs, increasing downstream development, extensive private ownership, and funding and regulatory staffing challenges justify retaining a C grade. Achieving a higher grade will require sustained inspection compliance, fewer poor and unsatisfactory condition dams, and dedicated funding for rehabilitation, removal, and right-sizing.

BACKGROUND

Pennsylvania's dams support flood management, water supply and irrigation, recreation, fish and wildlife habitat, mining, waste management, navigation, hydroelectric power generation, and other public benefits across the Commonwealth. These structures vary widely in size, purpose, ownership, age, condition, and hazard potential, but collectively they are an important part of the Commonwealth's water resources and public safety infrastructure.

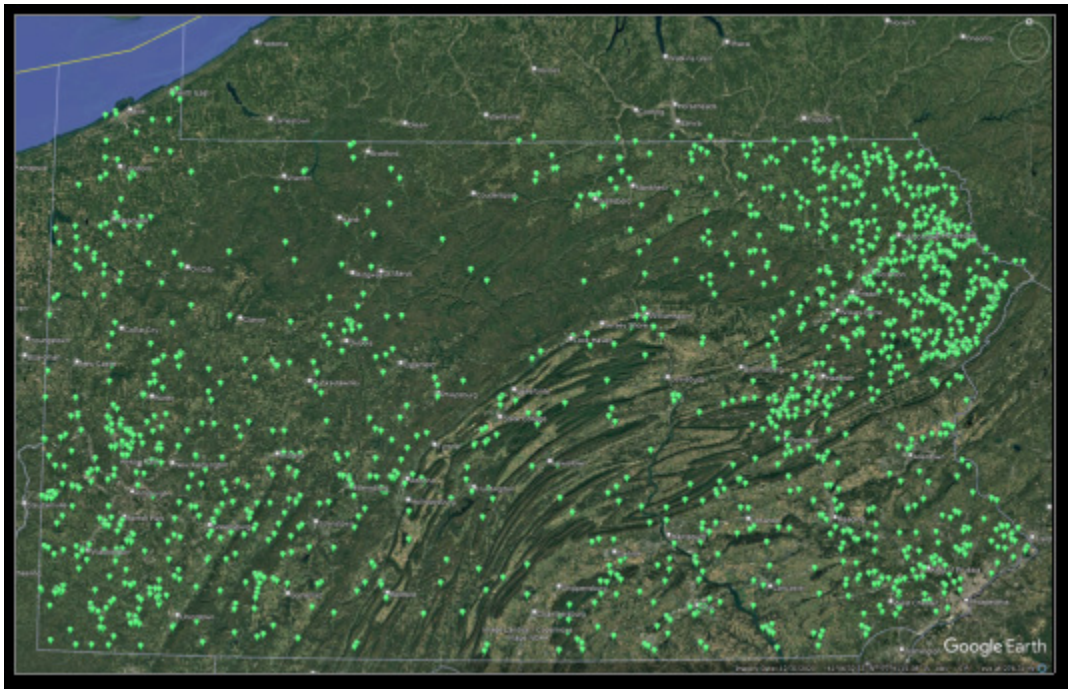
The Pennsylvania Department of Environmental Protection's (PADEP) Division of Dam Safety regulates and oversees dam planning, design, construction, maintenance, monitoring, periodic inspection, and risk reduction efforts of state-regulated dams. Pennsylvania has established one of the strongest state dam safety programs in the U.S., which was initially formed over 110 years ago in response to two catastrophic dam failures that claimed more than 2,300 lives. Pennsylvania's modern dam safety framework was established through the Dam Safety and Encroachments Act of 1978 and Pa. Code Chapter 105. Dam Safety and Waterway Management regulations.

Pennsylvania has 1,492 dams listed in the USACE NID, which includes all high- and significant-hazard potential dams and dams meeting the minimum federal inventory criteria related to height, storage, and hazard potential. PADEP regulates a total of 3,406 dams statewide, including many smaller or lower hazard potential dams that may not meet NID inclusion criteria. Most, but not all, Pennsylvania dams listed in the NID are also state-

regulated; some NID-listed dams may be federally owned, federally regulated, or otherwise included in the national inventory but not classified as PADEP-regulated dams.[1]

Figure 1 depicts the locations of the NID-listed dams in Pennsylvania. Table 1 provides Pennsylvania's hazard potential classification criteria and Table 2 summarizes the number of NID-listed and state-regulated dams assigned to each hazard potential category. Hazard potential classifications reflect the consequences of failure, not the physical condition of a dam.

Figure 1. Location Map Showing Distribution of 1,492 NID-listed Pennsylvania Dams



Source: 2026 NID Data

Table 1. Pennsylvania Dam Hazard Potential Classification

Hazard Potential Category	Population at Risk	Economic Loss
Category 1 (High-Hazard)	**Substantial** *(Numerous homes or small businesses or a large business or school)*	**Excessive** *such as extensive residential, commercial, or agricultural damage, or substantial public inconvenience*
Category 2 (High-Hazard)	**Few** *(A small number of homes or small businesses)*	**Appreciable** *such as limited residential, commercial, or agricultural damage, or moderate public inconvenience*
Category 3 (Significant-Hazard)	**None Expected** *(No permanent structures for human habitation or employment)*	**Significant** *damage to private or public property and short duration public inconvenience such as damage to storage facilities or loss of critical stream crossings*
Category 4 (Low-Hazard)	**None Expected** *(No permanent structures for human habitation or employment)*	**Minimal** *damage to private or public property and no significant public inconvenience*

Source: 25 Pa. Code § 105.91

Table 2. Number of Pennsylvania Dams by Hazard Classification (Both State-Regulated and NID-Listed Dams)

Hazard Potential Classification	Number of NID-listed Dams	Number of State-Regulated Dams
High-Hazard Potential (PADEP Category 1 & 2)	788 (52.8%)	741 (21.8%)
Significant-Hazard Potential (PADEP Category 3)	310 (20.8%)	289 (8.5%)
Low-Hazard Potential (PADEP Category 4)	381 (25.5%)	2,376 (69.7%)
Unspecified Hazard Potential	13 (0.9%)	-
Total	**1,492**	**3,406**

Source: 2026 NID and PADEP Data

Dam owners are responsible for the safe operation, maintenance, and inspection of their dams, including emergency preparedness obligations, where applicable. More than 60% of Pennsylvania's NID-listed dams are privately owned, creating financial and technical challenges for long-term operation, maintenance, inspection, and rehabilitation. Table 3 presents the distribution of owner type for Pennsylvania's NID-listed dams.

Table 3. Pennsylvania Dam Ownership Type

Ownership Type	Number of NID-listed Dams
Federal	63 (4.2%)
State	152 (10.2%)
Local Government	351 (23.5%)
Public Utility	12 (0.8%)
Private	911 (61.1%)
Not Specified	3 (0.2%)
Total	**1,492 (100.0%)**

Source: 2026 NID Data

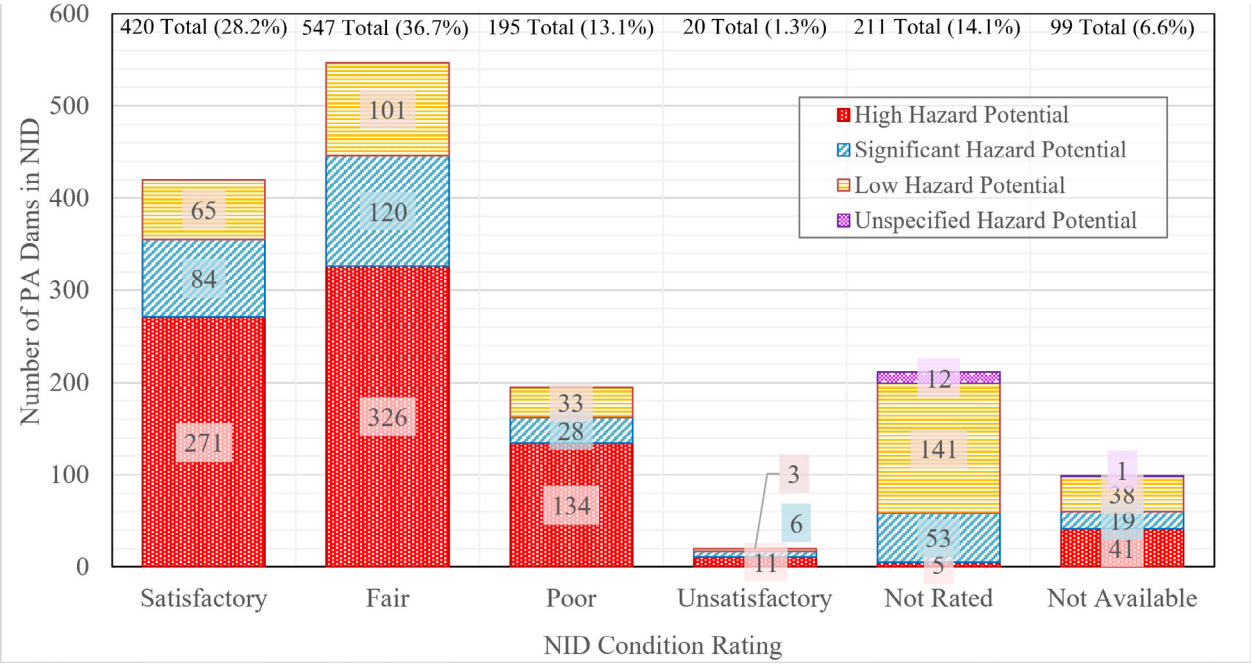
CAPACITY AND CONDITION

Pennsylvania's dam inventory generally meets current operational demands and continues to support a variety of critical purposes. However, aging infrastructure, increased downstream development, and changing hydrologic conditions are placing greater pressure on many facilities. Dam capacity is not limited to reservoir storage volume; it also includes the ability of spillways, outlet works, embankments, and operating procedures to safely perform under current and future loading conditions. Many Pennsylvania dams were designed before current engineering criteria and before significant downstream growth occurred, which means a dam that once posed limited consequences may now require higher levels of evaluation, emergency planning, or rehabilitation.

Although Pennsylvania accounts for only about 1.6% of dams listed in the NID nationwide, it contains approximately 4.6% of the nation's high-hazard potential dams and approximately 2.7% of the nation's significant-hazard potential dams. As homes, roads, utilities, businesses, and other developments expand below existing dams, the consequences of failure can increase even when the dam structure has not changed. This makes continued hazard classification review, inundation mapping, emergency planning, and local coordination essential to managing capacity at the system level.

The overall physical condition of Pennsylvania's dams has not changed significantly since the 2022 Report Card.[2] Based on available NID condition ratings, 179 high- and significant-hazard potential dams remain in poor or unsatisfactory condition and an additional 446 high- and significant-hazard potential dams are rated fair.[3] Figure 2 presents the distribution of NID-listed Pennsylvania dams by hazard potential and condition rating. Many low-hazard potential dams outside the NID do not have publicly available condition ratings, which limits the ability to fully assess the condition of the broader state-regulated inventory.

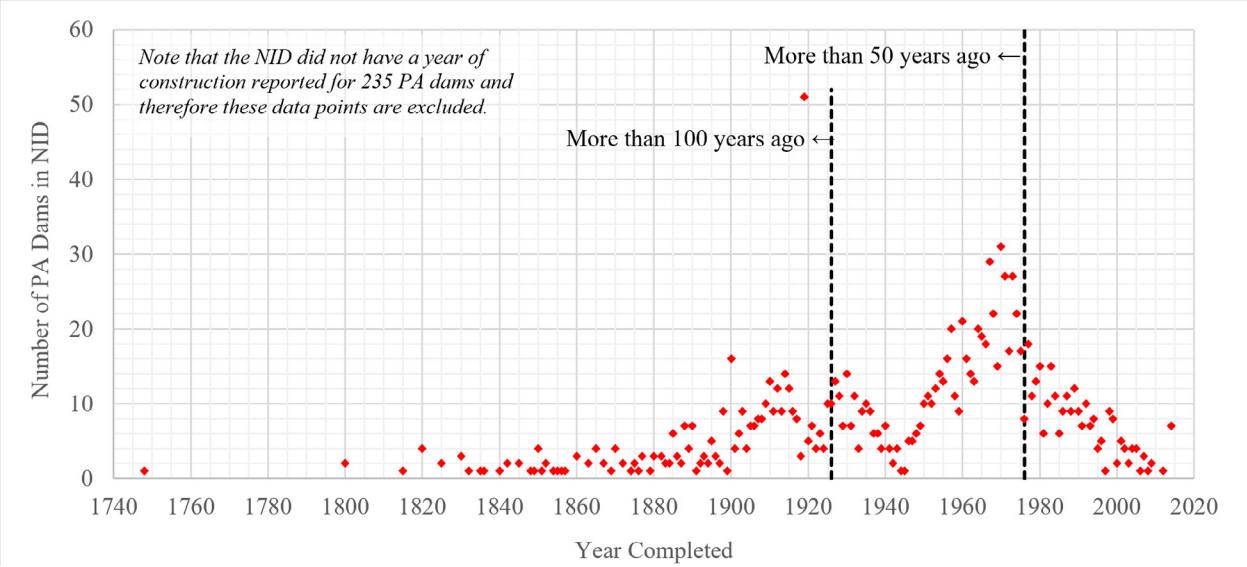
Figure 2. 2026 Condition Assessment Ratings and Hazard Potential Classifications for Pennsylvania NID-Listed Dams



Source: 2026 NID Data

Pennsylvania also has one of the oldest dam inventories in the country. The average NID-listed Pennsylvania dam is approximately 80 years old, nearly 15 years older than the national average and well beyond the typical 50-year design life used for much civil infrastructure. More than 30% of the NID-listed Pennsylvania dams have reported construction dates over 100 years old, and approximately 70% of NID-listed dams were built before the adoption of Pennsylvania's modern Chapter 105 dam safety regulations. Figure 3 shows a timeline of dam construction in Pennsylvania.

Figure 3. Year of Construction of Pennsylvania NID-Listed Dams



Pre-1900	1900-1909	1910-1919	1920-1929	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	Post-2000	Unknown
127	79	140	77	80	42	126	187	191	104	68	36	235

Source: 2026 NID Data

Although Pennsylvania has made progress in program administration and risk management since 2022, physical condition challenges facing Pennsylvania's dams remain substantial and continue to constrain the overall grade.

OPERATION & MAINTENANCE

Under Chapter 105 regulations, individual dam owners are responsible for operating and maintaining their dams in a safe condition. This includes routine surveillance, inspection, maintenance, monitoring, and emergency preparedness activities. Owners of high-hazard potential dams must submit annual inspection reports prepared by a qualified professional engineer to PADEP Division of Dam Safety, and they must maintain and periodically update dam-specific Emergency Action Plans (EAPs).

Owner accountability is central to Pennsylvania's dam safety framework. PADEP oversight can identify deficiencies, require corrective action, and verify compliance, but routine operation and maintenance activities must be performed by owners or their representatives. When these activities are deferred, relatively minor maintenance issues can develop into costly structural, hydraulic, or regulatory deficiencies. Private ownership makes this challenge more difficult. Many private owners do not generate dedicated revenue from their dams, and homeowner associations, individuals, camps, and small organizations may have limited ability to fund engineering evaluations, maintenance, rehabilitation, or removal. Because more than 60% of Pennsylvania's NID-listed dams are privately owned, technical assistance and financing tools remain critical to improving long-term dam safety performance.

Since the 2022 Report Card, Pennsylvania has made measurable progress in dam safety oversight. Following organizational changes[iv] that consolidated PADEP Division of Dam Safety field inspection staff into the Central Office, inspection coordination and coverage improved. PADEP inspected all highhazard potential dams in both 2024 and 2025, a level of compliance not achieved since before the 2022 Report Card. In 2025, PADEP

conducted approximately 1,360 routine inspections statewide, achieving full inspection compliance for all highhazard potential dams, approximately half of scheduled significanthazard potential dams, and about onefifth of scheduled lowhazard potential dams. This marks a meaningful improvement from 2022, when several high-hazard potential dams were overdue for annual inspections and substantial portions of the biennial and five-year inspection inventory were outside target inspection cycles.

Meaningful progress has been reducing inspection backlogs identified during the 2022 Report Card cycle. However, despite these improvements, Pennsylvania's aging dam inventory continues to present long-term operational and maintenance challenges. Many dams throughout the Commonwealth are operating well beyond their original design lives, and dam owners, particularly private owners, often face financial and technical challenges associated with maintenance, rehabilitation, and regulatory compliance. Continued investment in dam maintenance, rehabilitation, and regulatory oversight will be necessary to ensure the long-term safety and resilience of Pennsylvania's dam infrastructure.

PUBLIC SAFETY

Dam failures can have severe consequences for downstream communities, infrastructure, and natural resources. Pennsylvania's large inventory of high-hazard potential dams requires continued emphasis on emergency preparedness and risk reduction.

The Commonwealth's dam safety program performs favorably compared to national benchmarks. According to the Association of State Dam Safety Officials' (ASDSO) 2024 Pennsylvania Dam Safety Performance Report, Pennsylvania achieved 85% alignment with the Model State Dam Safety Program, exceeding the national average of 81%. Strong performance areas include emergency planning/incident response, construction/modification/removal, legislative authorities, and communication/coordination/outreach.

EAPs remain a critical public safety tool. Owners of high and significant hazard potential dams are required to prepare and maintain an EAP to facilitate effective emergency response. Compliance has improved since 2022, with 98% of state-regulated high-hazard potential dams currently having a modern, acknowledged EAP. An ongoing enforcement initiative is addressing the remaining 17 dams without an EAP.

Low-head dams across Pennsylvania continue to pose a significant public safety hazard. Although these structures are typically only a few feet high and often span the full width of a stream, they can create powerful recirculating currents, known as hydraulic rollers, immediately downstream. These currents can trap swimmers, boaters, and paddlers, making escape extremely difficult, earning low-head dams the nickname "drowning machines".

The Dock Street Dam in Harrisburg exemplifies this risk. Although only 6 feet high, it is regarded as one of the most dangerous low-head dams in the U.S. Since documented record keeping began in 1935, at least 30 people have drowned at the dam, with at least 30 additional documented near-fatal incidents. Since 2023, the Dock Street Dam has been the site of one fatal boating accident and multiple high-profile rescue incidents, underscoring the persistent dangers posed by the dam. Public education, warning systems, mapping and inventory management, and targeted removal of obsolete low-head dams remain important safety strategies.

Pennsylvania House Bill 961, introduced by Representative Natalie Mihalek during the 2025-2026 regular session, seeks to improve public safety at dams by strengthening requirements for warning signs and hazard markings as an amendment to the original Act 91 of 1998 for low-head dams to better alert recreational users to dangerous conditions. HB 961 received first consideration from the House in November 2025; however, it was then laid on the table in the House and has not become law. Similarly, passing Water Resources Development Act (WRDA) could support efforts to strengthen dam safety by incentivizing spending associated with maintenance of qualifying hydropower dams, increase funding for the National Dam Safety Program, and fund dam removal projects.

Pennsylvania remains the national leader in cumulative dam removals. According to American Rivers 433[v]

dams removed since 1912, approximately 18% of the total number removed nationally during this time. Between 2022 and 2025 alone, Pennsylvania removed 66 dams, more than 2.5 times the number removed by the next highest state (Massachusetts). While dam removals often provide ecological benefits by restoring aquatic connectivity, they also serve as a proactive public safety strategy by eliminating aging, structurally deficient, or obsolete dams that no longer provide sufficient public benefit to justify the risks they pose to water users and downstream communities.

FUNDING & FUTURE NEED

Funding remains one of the most significant barriers to improving dam safety in Pennsylvania. The cost of dam rehabilitation has increased substantially in recent years due to escalation in labor, materials, specialized construction services, engineering, permitting, and regulatory compliance requirements. These cost pressures are especially challenging for owners of significant- and high-hazard potential dams, where rehabilitation measures often involve major spillway upgrades, embankment stabilization, seepage remediation, outlet works improvements, and construction-phase risk management. As a result, many dam owners face repair costs that far exceed available reserves, annual operating budgets, or the financial capacity of private associations, municipalities, and small utilities.

Several public funding mechanisms may be available to Pennsylvania dam owners, including PENNVEST, Growing Greener II, FEMA's Rehabilitation of High-Hazard Potential Dams (HHPD) Grant Program, and other state or federal initiatives. However, these programs are highly competitive, limited in total funding capacity, and often not specifically dedicated to dam rehabilitation. In practice, dam safety projects must frequently compete against broader drinking water, wastewater, stormwater, watershed restoration, flood mitigation, and environmental improvement priorities. This limits the reliability of these programs as a consistent funding pathway for owners with urgent dam safety deficiencies. A more reliable state funding program would help dam owners address safety deficiencies, meet regulatory requirements, and reduce downstream risk.

The Private Dam Financial Assurance Program (PDFAP) Act, passed in 2018, provides an important framework for assisting owners of regulated private dams by helping satisfy proof-of-financial-responsibility requirements and, when funding is available, offering low-interest loans for eligible dam maintenance, repair, rehabilitation, permanent breach, demolition, excavation, engineering, and related costs. However, the loan component remains constrained by fund availability and is not currently scaled to meet the magnitude of statewide private dam rehabilitation needs. Additional capitalization of this program through state or federal support would improve its effectiveness, expand access to affordable financing, and provide a more practical pathway for private dam owners facing significant safety-related improvements.

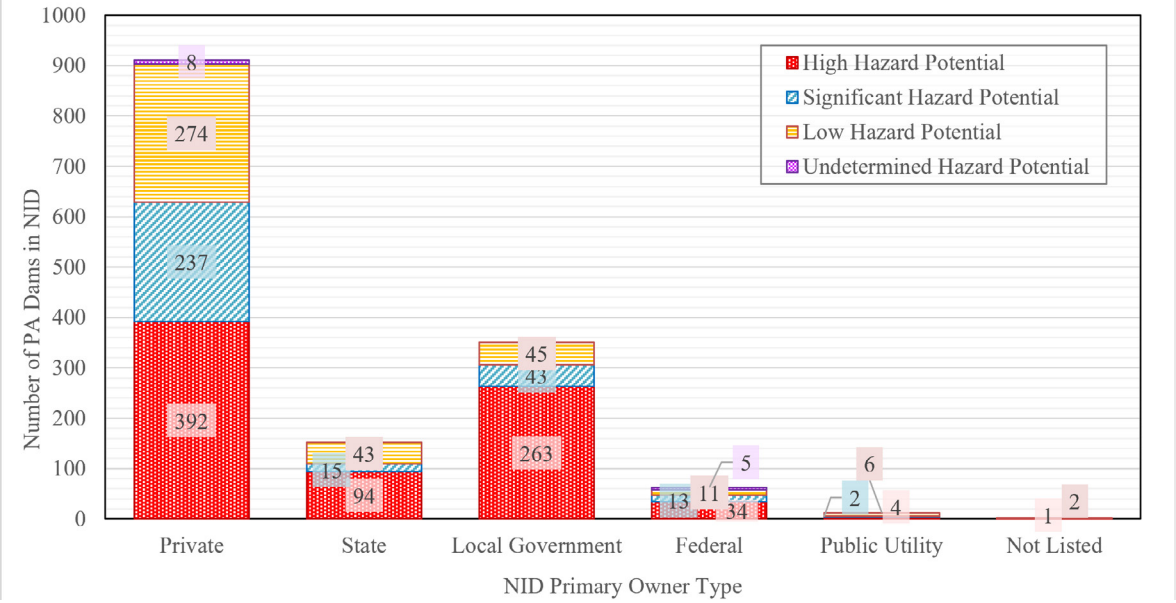
In 2025, ASDSO estimated that the cost to rehabilitate all Pennsylvania non-federal dams rated less than satisfactory to be approximately $2.88 billion, and the rehabilitation cost for only the high-hazard potential dams to be approximately $1.9 billion (50% of which are privately owned; refer to Figure 4 for the distribution of Pennsylvania dams by ownership type).

FEMA's HHPD Grant Program, considered one of the best funding opportunities specifically targeted to high-hazard potential dam repair, rehabilitation, and removal, provides a 65% federal cost share to awarded projects. Funding is distributed through the state to eligible dam owners for planning, design, and construction; however, the program remains highly competitive, limiting its overall reach relative to the Commonwealth's significant needs. Since the last Report Card was issued, FEMA's HHPD Grant Program had two funding opportunities. The Fiscal Year 2022 grant program awarded $1.7 million in federal funds to Pennsylvania to finance seven dams projects (six design and planning phase projects and one construction phase project), while the Fiscal Year 2024 grant program awarded $18.1 million in federal funds to Pennsylvania to help finance 14 dam projects (five design and planning phase projects (~10% of total award) and nine construction phase projects (~90% of total award)). These recent investments will benefit individual dams, but leave many other high- and significant-hazard dams still in need of funding to address deficiencies.

As Pennsylvania's dam inventory continues to age, many structures require substantial upgrades to meet modern safety expectations, hydrologic criteria, and regulatory standards. Future funding mechanisms must support rehabilitation, removal, or right-sizing strategies that appropriately match the long-term public value of individual dams.

Future need also includes non-construction costs that are often underestimated, including engineering studies, hydrologic and hydraulic analyses, geotechnical investigations, environmental permitting, property coordination, construction-phase services, and emergency planning updates. These soft costs can be significant for complex dam projects and may be difficult for private owners to fund before grant or loan reimbursement is available.

Figure 4. Primary Ownership Type for Pennsylvania NID-Listed Dams



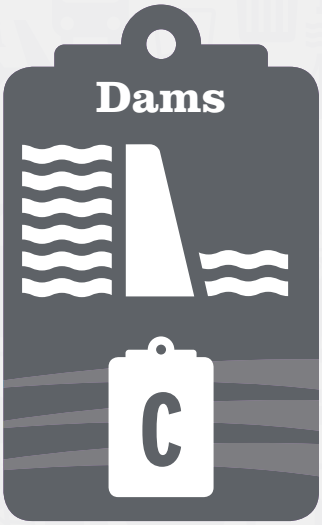
Source: 2026 NID Data

RESILIENCE & INNOVATION

Pennsylvania's dam safety challenges are increasing as more frequent and intense rainfall events place greater demands on aging infrastructure, much of which was designed using older hydrologic data, design criteria, and risk assumptions. The Commonwealth's statewide Probable Maximum Precipitation study provides an important technical basis for updating spillway evaluations, dam safety analyses, and rehabilitation planning. As hydrologic conditions evolve, resilience improvements should continue to prioritize a risk-informed approach[vi] that focuses resources on dams with the greatest potential consequences to public safety. Key priorities include spillway capacity upgrades, embankment and seepage improvements, reliable outlet works, emergency preparedness, and post-event inspection capabilities.

The PADEP 2024 Pennsylvania Climate Action Plan and Pennsylvania Climate Impacts Assessment identify rehabilitation and modernization of aging water infrastructure as key climate adaptation strategies for reducing flood risk and improving community resilience. While these documents do not prescribe specific dam engineering measures, they support targeted investment in vulnerable infrastructure, rehabilitation of high-risk assets, and removal of obsolete dams where appropriate.

Pennsylvania is also advancing innovative risk-reduction strategies through rehabilitation, right-sizing, and dam removal where aging structures no longer provide sufficient public benefit to justify long-term safety liabilities. Documented dam removals between 2022 and 2026 demonstrate the Commonwealth's continued use of removal as a dam safety, ecological restoration, and infrastructure management tool. Together, these efforts reflect a balanced approach to improving public safety, adapting to current hydrologic conditions, and managing Pennsylvania's aging dam inventory.



RECOMMENDATIONS TO RAISE THE GRADE

- Ensure all remaining high-hazard and significant-hazard potential dams complete and maintain current EAPs by 2030.
- Increase state support for the PADEP Division of Dam Safety to maintain adequate staffing, technical expertise, inspection capacity, compliance oversight, and owner assistance.
- Expand reliable funding for dam rehabilitation, removal, and risk reduction by capitalizing the PDFAP Act loan program, continuing support for both publicly and privately-owned dam infrastructure, and pursuing federal opportunities, such as WRDA and FEMA HHPD programs.
- Continue improving dam safety data, interagency coordination, and public awareness by completing updates to the statewide run-of-the-river dam inventory, enhancing data sharing and coordination between PADEP and the Pennsylvania Fish and Boat Commission (PFBC), and making information on known dam locations publicly accessible.[KK1.1]
- Build on existing run-of-the-river dam safety requirements by advancing the strengthened compliance timeframes, owner-notification procedures, warning sign and buoy requirements, and enforcement provisions proposed in House Bill 961..

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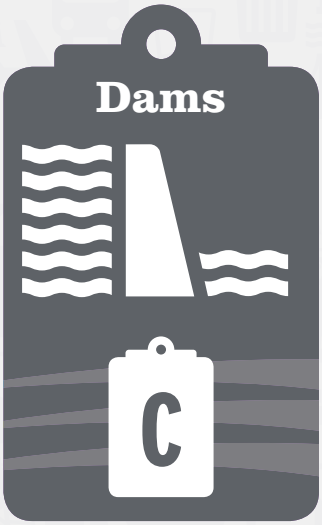
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DEFINITIONS

Hazard classifications developed by the Interagency Committee on Dam Safety (ICODS) as part of the National Dam Safety Program (NDSP):

- **High-Hazard:** Dams where failure or misoperation will probably cause loss of human life and may also cause economic loss, environmental damage, and disruption of lifeline facilities.
- **Significant-Hazard:** Dams where failure or misoperation is not expected to cause loss of human life but will cause economic loss, environmental damage, and disruption of lifeline facilities.
- **Low-Hazard:** Dams where failure or misoperation is not expected to cause loss of human life and economic or environmental damages would be low and generally limited to the owner.
- **Deficient Condition:** Dams are considered deficient when an issue is present that could cause a dam failure; thus, the dam would not meet the applicable minimum regulatory condition.

USACE National Inventory of Dams Condition Ratings:

- **Satisfactory:** No existing or potential dam safety deficiencies are recognized.
- **Fair:** No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency.
- **Poor:** A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. Poor may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.
- **Unsatisfactory:** A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.
- **Not Rated:** The dam has not been inspected or has been inspected but, for unknown reasons, has not been rated.

FOOTNOTES

1. This chapter uses the NID as the primary dataset for hazard classification, condition, age, and ownership so the published statistics are consistent with National Report Card practice. PADEP's larger state-regulated inventory is still important because it captures smaller regulated structures that may not meet NID criteria, including many low-hazard potential dams. Where the two datasets differ, the chapter identifies which source is being used rather than presenting parallel statistics throughout the narrative.
2. The number of high- and significant-hazard potential dams rated in poor or unsatisfactory condition remains unchanged at 179, while the number rated fair increased slightly from 443 to 446.
3. Refer to the Quick Definitions section for definitions of the NID condition ratings.
4. These organizational changes were finalized in August 2026 with the notable addition of a Compliance and Enforcement Section. Previously this function was housed in the Preparedness, Enforcement and Security Section, which was split into the Compliance and Enforcement Section and Monitoring and Emergency Preparedness Section to provide better focus on those areas.
5. PADEP internal tracking shows over 560 dams removed since 1994. This is based on approvals to breach a dam in PADEP correspondence tracking system.
6. Pennsylvania has been using risk-informed decision making since the early 2000s. Risk evaluations are used to rank dams based on potential failure risks and consequences, helping prioritize rehabilitation and enforcement efforts. To date, approximately half of Pennsylvania's state-regulated high-hazard dams have been evaluated using this methodology.



Photo: Arugula Pica

DRINKING WATER

EXECUTIVE SUMMARY

Pennsylvania's 1,886 community water systems (CWS) serve 88% of the population while 3.3 to 3.5 million residents rely on private wells that are largely unregulated. Pennsylvania has the fourth highest number of lead service lines in use in the nation. CWS monitoring data from 2025 show 41 systems exceed state thresholds for per- and polyfluoroalkyl substances (PFAS); additional exceedances may occur should the Environmental Protection Agency's lower limits take effect. Beyond CWS, a recent study found PFAS in 65 percent of sampled wells.

Pennsylvania's 20-year drinking water infrastructure needs are $24.3 billion. Federal Drinking Water State Revolving Fund capitalization covers only 22 cents of every dollar of annual need. The gap is worst for the state's 1,553 small CWS. To improve the grade, PA should close data gaps, establish resilience metrics and fund resilience efforts, accelerate lead service line and PFAS compliance, and establish protections for private well users.

CONDITION AND CAPACITY

As of 2024, Pennsylvania's Drinking Water Information System (PADWIS) database records 7,875 public water systems (PWS) serving approximately 12.7 million people, with 88% receiving water from the 1,886 community water systems (CWSs).

Table 1. System type and population served, from 2024 PADWIS

System Type	# Systems	Population Served
Community (CWS)	1,886	11,470,560
Non-Transient Non-Community (NTNCWS)	1,116	
Transient Non-Community (TNCWS)	4,873	
TOTAL	**7875**	

Pennsylvania's large CWSs (35 systems) serve 58% of the CWS population while the 1,553 small CWS collectively serve 8% of the CWS population. Small systems typically lack the rate base, staffing, and technical expertise of larger utilities, making deferred maintenance, compliance challenges, and financial distress more common.

Pennsylvania draws drinking water from both surface water (rivers, reservoirs) and groundwater. Pennsylvania operates 328 surface water filtration plants. According to the Pennsylvania Department of Environmental Protection (DEP), only three systems still operate unfiltered surface or groundwater under the direct influence of surface water sources down from seven in 2020. Eighty-eight percent of the CWS population is covered by a source water protection program, up from roughly 65 percent in 2013. Meanwhile, twelve percent of CWS customers remain without formal source water protection, most concentrated in those served by smaller drinking water systems. The Delaware River is the single most critical surface water source, providing water to Philadelphia and surrounding municipalities serving millions of residents in Pennsylvania, New Jersey, and New York.

Much of Pennsylvania's distribution infrastructure is approaching or has exceeded its design life. There is no statewide data on pipe age, material composition, and break frequency per 100 miles. The absence of these data, which are useful American Water Works Association benchmarks, makes it difficult to assess the true condition of the distribution system or to quantify the rehabilitation backlog with precision.

According to estimates by Penn State Extension, approximately 3.3 to 3.5 million Pennsylvanians or roughly one in four residents, rely on private domestic wells that fall outside the Safe Drinking Water Act's regulatory framework. Private well owners are solely responsible for testing and maintaining their own water supply. And, while Pennsylvania requires water quality testing for newly constructed wells before first use and mandates that drillers be licensed and file completion reports, there is no statewide requirement for ongoing testing or point-of-sale testing when property changes hands. Some municipalities have adopted local testing requirements, and mortgage lenders often require testing as a loan condition, but protection is uneven and owner-dependent. The Pennsylvania Geological Survey maintains records of drilled wells through required driller completion reports, providing a count of registered wells, but the population currently served by those wells and the quality of the water they provide are not systematically tracked. Pennsylvania's approach is consistent with how other states approach private wells. Most states impose no ongoing monitoring or point-of-sale testing requirement, leaving households reliant on private wells largely responsible for their own water safety.

OPERATION AND MAINTENANCE

Pennsylvania's 1,886 CWSs are operated by a mix of municipal authorities, boroughs, townships, investor-owned utilities, and private entities. Day-to-day operations of regulated CWS are governed by DEP's Bureau of Safe Drinking Water under 25 PA Code Chapter 109. In 2024, DEP conducted 2,418 sanitary surveys and issued 177 consent and administrative orders and 9,819 notices of violation.

The overall compliance picture is better than raw violation counts suggest. In 2024, a large majority of Pennsylvanians received water from systems that reported no health-based violations (e.g., maximum contaminant level (MCL) exceedances), and the ten-year trend shows a consistently high compliance rate for MCL and treatment technique requirements. Most of the 9,819 notices of violation issued in 2024 are for monitoring and reporting (i.e., failure to sample on schedule or submit results on time). Public notice violations (i.e., for failing to issue a public notice) declined from a peak of approximately 10,000–11,000 in the early 2020s to approximately 6,798 in 2024. The large public notice violation count is partly a function of Pennsylvania's large number of regulated systems (8,046 systems of all regulated types). DEP collected $60,135 in civil penalties in 2024, consistent with the range of $50,000–$80,000 annually for the past six years and with the longstanding emphasis on providing technical assistance to encourage and support compliance rather than relying on compliance through financial enforcement. A 2019 study suggests this approach is consistent with a broader national shift towards capacity development and technical assistance.

Looking ahead, compliance monitoring is currently underway for PA's PFAS MCL rule enacted in January 2023. As systems complete their first full monitoring cycles under the rule accumulating the running annual average data on which MCL compliance determinations will be based, a spike in MCL violations are likely to appear in the 2025–2026 compliance data, consistent with the pattern seen after prior major rule implementations. Should stricter federal PFAS MCLs take effect in the future, the number of systems in violation would likely increase.

No statewide dataset tracks main break rates, pipe replacement rates, or non-revenue water across Pennsylvania's full range of water systems, which limits system-wide assessment. A recent Pennsylvania's Public Utility Commission audit of Pennsylvania American Water found that main leaks repaired increased 6.6% from 2018 to 2022. Comparable maintenance data for the state's roughly 1,800 municipal and small systems are not compiled in any public registry.

Pennsylvania's drinking water sector faces mounting workforce pressure. DEP's 2025 operator certification data show approximately 5,100 certified drinking water operators statewide, a decline of roughly 16% since 2005, and most of those operators are 50–59. This reflects larger national trends. The American Water Works Association's 2026 State of the Water Industry report found a 9% sector-wide vacancy rate and that 21% of utility employees are eligible to retire within five years. DEP's operator certification program provides counts of credentialed operators and exam activity, but no publicly compiled data exist on vacancy rates, time-to-fill, or overtime use across Pennsylvania's water systems.

FUNDING

Pennsylvania drinking water infrastructure is funded through a combination of user rates, the Drinking Water State Revolving Fund (DWSRF), and municipal bonds, with DWSRF and bonds paid back from income generated by water users. Federal DWSRF capitalization grants increased between 2022 and 2025 due to Infrastructure Investment and Jobs Act (IIJA) funding, as shown in Table 2. IIJA requires that a substantial portion of each grant be provided as principal forgiveness to disadvantaged communities (DAC).

Table 2. Federal DWSRF and DAC.

Fiscal Year	Federal DWSRF Capitalization	Additional Subsidy (DAC)
FFY2022	~$187.5 million	~$97.4 million
FFY2023	~$266.2 million	~$137.9 million
FFY2024	~$280.2 million	~$145.9 million
FFY2025	~$296.5 million	~$149.2 million

Additional IIJA appropriations targeted specific priorities: $265.9 million in FY2023 and over $200 million combined drinking and clean water in FY2024 for Pennsylvania infrastructure upgrades.

According to the 2023 EPA Drinking Water Infrastructure Needs Survey and Assessment, despite increased federal investment, Pennsylvania's 20-year drinking water infrastructure need is estimated at $24.3 billion. Annual federal DWSRF capitalization of roughly $266–280 million covers approximately 22 cents of every dollar of annual need. Roughly half of those funds are subsided loans that utilities must repay through rates, rather than grants (that do not require repayment). Rate revenue helps cover the remainder. Both Aqua Pennsylvania and Pennsylvania American Water have already cited PFAS treatment costs as a driver in recent rate cases, and evidence from states

ahead of Pennsylvania on PFAS compliance suggests rate increases of 18 to 50 percent are not uncommon where treatment must be added. Large investor-owned utilities serving suburban Pennsylvania are better positioned to finance these investments through the rate case process; the steepest challenge falls on small systems with limited rate bases serving lower-income communities, where rate increases sufficient to close the gap may be unaffordable for customers. There is no comprehensive statewide data on average residential water rates or rate affordability.

FUTURE NEED

Pennsylvania's drinking water infrastructure needs are driven primarily by transmission and distribution system rehabilitation and replacement. Treatment plant upgrades, new source development, and emerging lead service line replacement and contaminant compliance needs add costs that existing needs estimates do not fully capture. Compliance with PA's PFAS MCL in 2025-2026 and potential future EPA PFAS MCL in 2031 are already raising rates. Both Aqua Pennsylvania (PA PUC 2025a) and Pennsylvania American Water (PA PUC 2025b) cited PFAS treatment costs as a driver in recent rate cases, and early evidence from states ahead of Pennsylvania on PFAS compliance suggests rate increases of 18 to 50% are not uncommon where treatment must be added (Goode 2023).

Pennsylvania's population growth is modest and geographically uneven. According to the Center for Rural Pennsylvania and drawing on U.S. Census data, suburban Philadelphia and south-central counties are growing, while most of western Pennsylvania, rural counties and post-industrial communities continue to lose population. Growing systems in high-demand suburban areas may require capacity expansion, while shrinking systems in declining communities face the well-documented challenge of spreading fixed infrastructure costs over a shrinking rate base, compounding affordability pressures that already strain household budgets.

Pennsylvania's 20-year drinking water infrastructure needs are $24.3 billion. Federal Drinking Water State Revolving Fund capitalization covers only 22 cents of every dollar of annual need.

PUBLIC SAFETY

Pennsylvania's public drinking water systems face two significant challenges: PFAS and lead service line replacement. A review of 2025 PFAS monitoring data covering CWS, non-transient noncommunity water systems (NTNCWS), and bottled, vended, retail, and bulk systems (BVRBs) shows that of 2,205 systems with monitoring results, 25 systems exceed Pennsylvania's maximum contaminant level (MCL) for perfluorooctanesulfonic acid (PFOS) (≥18 ppt PFOS), and 30 systems exceed the MCL for perfluorooctanoic acid (PFOA) (≥14 ppt PFOA). These data are for annual averages that meet or exceed the threshold for entry point only samples. Collectively, approximately 172,000 Pennsylvanian's get water from systems that exceed Pennsylvania's PFAS limits (Table 3).

Table 3. Review of 2025 PFAS monitoring data annual averages exceeding PA MCLs.

System Type	Total Systems Monitored	Exceed PA PFOS MCL	Exceed PA PFOA MCL	Population Affected
CWS	1315	11	18	167,540
NTNCWS	890	14	12	4,543
Total	**2205**	**25**	**30**	**172,083**

The EPA has proposed more stringent PFAS MCLs (≥ 4 ppt PFOA, ≥ 4 ppt PFOS). If these more stringent levels go into effect, the number of systems exceeding limits may drastically increase alongside the affected population (Table 4). Systems that exceed PFAS MCL limits cluster in two geographic hotspots: the southeast (Bucks, Montgomery, Chester) and south-central Pennsylvania (York, Adams, Lancaster, Cumberland).

Table 4. Review of 2025 PFAS monitoring data annual averages exceeding EPA's proposed MCLs.

System Type	Total Systems Monitored	Exceed Proposed EPA PFOS MCL	Exceed Proposed EPA PFOA MCL	Population Affected
CWS	1315	223	204	4,147,074
NTNCWS	890	125	138	63,059
Total	**2205**	**348**	**342**	**4,210,133**

On PFAS, DEP's PFAS MCL rule (effective January 2023) set compliance timelines that utilities are now working through; DEP has paired the rule with technical assistance resources for smaller systems through its capacity development program. DWSRF targeting of funds for PFAS treatment is ongoing, though no statewide tracking of PFAS treatment projects funded through the DWSRF is yet publicly compiled.

Pennsylvania has the fourth highest lead service line (LSL) concentrations nationally with 668,697 projected LSLs, roughly 7.5 percent of the national inventory. The Lead and Copper Rule Revisions (LCRR) required CWSs and NTNCWSs to complete LSL inventories by October 16, 2024. A statewide aggregated LSL count is not yet publicly available. Pittsburgh's PWSA removed its 11,000th LSL in April 2024. Aqua Pennsylvania received PA PUC approval in April 2025 for a plan to replace all LSLs across its 450,000-customer, 32-county service area by December 31, 2034.

In 2024 there were five *Legionella* outbreaks, 16 cases, and two deaths. *Legionella* outbreaks occur when the bacteria thrive in warm, stagnant water within building plumbing well beyond the reach of treatment plants and disinfectant residuals meant to keep people safe. None of the outbreaks occurred at CWS. Instead, these outbreaks occurred at NTNCWS or TNCWS facilities including a hospital, a nursing home, a correctional facility, a hotel, and an inn.

Private wells are not subject to Safe Drinking Water Act monitoring or enforcement, and no state agency routinely tests them. According to a US Geological Survey report using data collected from Pennsylvania Groundwater Monitoring Network wells, on groundwater quality, 3 percent of samples exceeded the MCL for nitrate. A 2025 Penn State University citizen science study found PFAS in 65 percent of 167 sampled private wells, concentrated especially in southeastern Pennsylvania.

RESILIENCE AND INNOVATION

Pennsylvania's 2025 Climate Change Impacts Assessment, required under Act 70 of 2008, identifies flooding, drought, and water quality degradation as growing risks to the state's water supply, and lists water system climate risk analysis as a state adaptation priority. The fall 2024 drought pushed the Delaware River's salt front, the boundary where ocean saltwater meets freshwater, to within 18 to 23 miles of Philadelphia's Baxter Water Treatment Plant intake, which serves more than half of the Philadelphia Water Department's two million customers. Sea level rise plus channel deepening for navigation mean future droughts start from a worse baseline than equivalent past events. The Delaware River Basin Commission managed the 2024 event through upstream reservoir releases, but those same reservoirs were at historic lows during the peak of the drought, creating direct tension between salt front management and upstream supply security.

Separately, a 2024 Center for Progressive Reform analysis identified southeastern Pennsylvania's Delaware River Upper Estuary region, home to thousands of manufacturing and chemical storage facilities, as facing extreme risk of toxic floodwater contamination during the more intense storms that climate change is producing. Communities closest to industrial sites, which are disproportionately low-wealth and communities of color, face the greatest exposure.

The America's Water Infrastructure Act (AWIA, 2018) required CWSs serving more than 3,300 people to complete risk and resilience assessments and emergency response plan updates. These plans are not publicly available. The Philadelphia Water Department (PWD) has gone further than most, adopting a Department-wide policy in 2022 requiring climate-resilient planning and design guidance for all PWD capital projects. Since 2014, Pennsylvania American Water, which owns and operates 68 water systems in the state, has used risk assessments including from ice storms, flooding, and drought to guide capital investments to improve resilience. Beyond these examples, there is no systematic accounting of climate adaptation planning or of resilience efforts for drinking water infrastructure in Pennsylvania.

The rapid buildout of AI data centers in Pennsylvania introduces a new category of large, concentrated water demand with direct implications for supply resilience. According to Penn State Extension, over 20 hyperscale data centers were in the planning stages in Pennsylvania as of late 2025. A single data center can consume 300,000 gallons per day or more; the largest can approach 5 million gallons per day during peak cooling periods. Recently, the Susquehanna River Basin Commission promulgated Resolution 2025-03 to encourage data centers and other emerging facilities to consider the use of dry, hybrid, or other water-saving technologies for cooling. Pennsylvania American Water has stated publicly that data centers should pay the full costs of infrastructure upgrades required to serve them, so existing ratepayers are not burdened. Currently, there is no regulatory framework to manage either water supply or water infrastructure cost impacts from data centers.



RECOMMENDATIONS TO RAISE THE GRADE

- Close the infrastructure funding gap through sustained capitalization and grants for small-systems and for disadvantaged communities.
- Establish a state-required water supply impact review for large water withdrawals including data centers that evaluates adequacy at the basin and utility service area scale, specifies dry cooling or water recycling requirements where appropriate, and considers requiring infrastructure upgrade costs to be borne by large water withdrawal users.
- Publish a statewide inventory of lead service lines and replacement needs, establish replacement milestones, and prioritize DWSRF funding to accelerate replacement in communities that exceed household's ability to pay.
- Facilitate collaboration between experts, practitioners, and other knowledge holders to establish resilience metrics for drinking water systems and fund a statewide drinking water system vulnerability and resilience assessment.
- Coordinate additional data on the water workforce, water rates, lead service line inventories, pipe age and material composition, frequency and duration of water main breaks and other disruptions in drinking water service, private well water quality and population served, and climate resilience.
- Develop a PFAS compliance assistance program for small and medium systems, prioritizing DWSRF funding and targeting hotspots.

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Energy
B-
GRADE COMPARISON
PA: B+
Nat'l: D+
Photo: Bilanol

ENERGY

EXECUTIVE SUMMARY

Pennsylvania is one of the most energy-productive states in the nation. It is the second-largest natural gas producer, a top-three coal producer, and the second-largest nuclear-power producer. Pennsylvania also participates in the Pennsylvania-New Jersey-Maryland Interconnection (PJM), supporting regional grid operations for 13 states and the District of Columbia. Pennsylvania's energy system, however, is at a structural inflection point. As demand rapidly rises and energy systems age, the transmission and distribution (T&D) network needs sustained investment amidst changing regulations and state climate policy. The Commonwealth repealed its participation in the Regional Greenhouse Gas Initiative (RGGI) in 2025 and has not updated its renewable-energy standard (RES) in more than a decade. Decisions made over the next five years will determine whether Pennsylvania's energy infrastructure can overcome aging while keeping pace with a rapidly changing economy, increasing energy demands from data centers and vehicle electrification, and economic growth.

CAPACITY & CONDITION

Pennsylvania has a substantial surplus of energy generation and natural-resource production, supported by a well-developed electricity transmission and logistics network. In 2024, Pennsylvania exported about 87 million megawatt-hours of electricity—nearly twice the volume of the next-highest exporting state, and up about 24 percent since 2019.

The state is also the second-largest producer of natural gas in the United States. The Marcellus Shale formation, whose epicenter lies in Pennsylvania, is estimated to hold roughly 500 trillion cubic feet of recoverable gas. Pennsylvania generates over 7 trillion cubic feet of gas annually, close to 20 percent of total U.S. natural gas production. Production had steadily increased before reaching a plateau in 2022, but growth has resumed as of 2026. Pennsylvania is also a top-three coal-producing state (after Wyoming and West Virginia) and the nation's only significant source of high-heat anthracite coal, used in steelmaking, metallurgical, and filtration applications. It is also the second-largest nuclear-generating state, behind only Illinois, with existing reactors having gone through life extension programs and the 835-megawatt Three-Mile Island Unit1 being considered for a 20-year restart in 2027, specifically to meet data center demand.

While Pennsylvania's generation market is deregulated, most of the 6 million customers in the regulated retail market are served by First Energy, Exelon, and PPL utility companies. Much of Pennsylvania's T&D infrastructure was built in the 1950s and 1960s, with some components dating to the 1920s. Upgrades are

needed both to maintain reliable operations and to connect new generation, particularly solar and wind, which are sited remotely from legacy coal and nuclear plants. Solar now represents 49 percent of new interconnection requests in PJM's queue, and utilities are investing upwards of $1.6 billion in improvement and maintenance projects statewide.

Common upgrades to the electric power transmission grid include replacing older oil-insulated equipment with modern gas-insulated equipment; installing digital controls and automation for real-time management; adding communications infrastructure for continuous monitoring; and increasing sectionalization so a single fault affects fewer customers. Reclosers, automated switches that isolate and restore faulted line segments, have been widely deployed in southeastern Pennsylvania, producing measurable reductions in outage frequency. These investments are financially rational for utilities: they cut operating costs, improve the reliability metrics that the Pennsylvania Public Utility Commission (PUC) tracks, and reduce customer outages. Increasing distributed energy resources (DERs) also offer local benefits to distribution reliability and generation supply.

As utilities work to improve the grid, they face a dramatic load-growth forecast. PJM's 2025 long-term electricity demand forecast projects the regional summer peak climbing about 70,000 megawatts, to roughly 220,000 MW, over the next 15 years, even as older power plants retire faster than new ones come online. The capacity cushion that the 2022 Report Card described as comfortable has tightened sharply. Clearing capacity has fallen to an 18.5% reserve margin as prices jumped roughly tenfold in the most recent capacity auction. PJM has warned of a possible capacity shortfall as early as the 2026/2027 delivery year. As demand grows rapidly, existing customers have seen rate increases from 30 to 50 percent since 2022 due to general inflation, fuel market conditions, and the need to invest to maintain and improve the grid. Utilities and regulators are working to respond to these competing demands.

Natural gas pipeline logistics are also central to the state's energy infrastructure, including export to neighboring states and markets. The Mariner East system transports natural gas liquids from the Marcellus and Utica regions to the Marcus Hook terminal in southeastern Pennsylvania, where products are packaged for Mid-Atlantic markets and exported to Europe for industrial use. Pennsylvania retains three small petroleum refineries, in Bradford, Marcus Hook, and Warren, while former major refinery sites in the southeast now function primarily as logistics terminals for regional distribution and export.

OPERATIONS & MAINTENANCE

The PUC publishes annual Electric Service Reliability Reports that track Pennsylvania's Electric Distribution Companies (EDCs) using standard industry metrics. The 2024 report, released in August 2025, shows a significant deterioration in recent performance, with the majority of utilities missing the standard targets for the number and duration of customer outages. Performance was not uniform across the state, meaning some customers experienced nearly three and a half times as many outage-minutes as the standard permits, while others experienced improved performance compared to prior years. Most significant outages were driven by an increase in both the number and severity of weather events. The PUC should consider strengthening performance incentives and consequences for utilities that persistently miss targets, as well as examining alternative sources such as DERs, multi-purpose hydrogen, and virtual power plants (VPPs).

As the technologies and regulation of the state's energy industry become more complex, the industry requires a highly skilled workforce to sustain both day-to-day and emergency operations. Meanwhile, the industry is in a generational change, with half of current personnel expected to retire in the next decade and intense competition for new workers from other technology sectors. With a large installed base of complex equipment subject to an increased rate of failure from environmental conditions, recruiting a stable and capable workforce is key to the state's energy future. The state needs to scale project delivery, streamline permitting, build workforce pipelines, and improve coordination across state agencies, resource extraction companies, logistics companies, and utilities. The Pennsylvania energy industry, state universities, the state Department of Labor and Industry, and the state Department of Environmental Protection all maintain programs to help recruit and train this critical workforce.

FUNDING & FUTURE NEED

The 2021 Infrastructure Investment and Jobs Act (IIJA) and the 2022 Inflation Reduction Act (IRA) represent the largest federal investments in U.S. energy infrastructure in a generation. Pennsylvania has been highly successful in securing and obligating this funding, positioning itself as a major national recipient. More recently, the 2025 One Big Beautiful Bill Act (OBBBA) accelerated the phase-out of many IRA clean-energy tax credits. Wind and solar incentives now sunset on a compressed schedule, and consumer credits for electric vehicles and residential efficiency ended at the close of 2025, while credits for nuclear carbon-capture were preserved. The practical effect has been to shift more of Pennsylvania's clean-energy momentum from IRA tax incentives toward IIJA infrastructure grants and private deals such as the nuclear-data-center agreements. The central finding of this Report Card is that funding availability is no longer controlling—the primary constraint is the capacity to responsibly implement the work required to meet the current demand in a safe and effective manner.

Energy demand in Pennsylvania is expected to continue to grow, and the state is working to accommodate that growth. For example, Pennsylvania is receiving about $170 million to deploy fast-charging stations along designated highway corridors through the National Electric Vehicle Infrastructure (NEVI) program. Deployment of these stations has moved into active construction and operation, and Pennsylvania led successful NEVI-station deployment by the end of 2025. Pennsylvania has earned FHWA build-out certification, enabling NEVI investments beyond interstate corridors, and the state recently launched a $100 million Community Charging program to fund local projects.

Pennsylvania utilities have also competed successfully for federal discretionary funding. Pennsylvania has been allocated $40 million through the Department of Energy (DOE)'s Grid Resilience Formula Grant Program for substation hardening, vegetation management, grid automation, and resilience measures for extreme weather. PPL secured nearly $50 million through the DOE's Grid Innovation Program for a Grid of the Future project that deploys smart devices, automation, and AI to improve reliability and integrate distributed energy resources. Duquesne Light Company received a $20 million federal grant for dynamic line-rating sensors projected to boost transmission capacity by roughly 25 percent and improve resilience against extreme weather. While strategically significant, these investments are modest relative to the size and age of Pennsylvania's T&D network, and most projects remain in early implementation. The reliability improvements they are intended to produce have not yet shown up in the PUC's performance data.

The state is also leveraging nearly $4 billion in federal funds to remediate past projects in energy resource extraction, including Abandoned Mine Land (AML) reclamation, the largest allocation of any state. Since 2023, more than 140 AML projects have been launched or completed, addressing mine subsidence, coal-refuse piles, acid mine drainage, and abandoned openings. The remediation work will help to protect 5,500 miles of Pennsylvania waterways, but significant work remains in areas including plugging more than 27,0000 orphaned wells in the state.

Additionally, Pennsylvania is the only state included in two federally funded hydrogen hubs, a distinction reflecting its gas-production capacity and industrial history. The Mid-Atlantic Clean Hydrogen Hub (MACH2), centered on the Philadelphia region, was awarded up to $750 million for green hydrogen from renewables and nuclear power (roughly 20,000 jobs projected). The Appalachian Hydrogen Hub (ARCH2) was awarded up to $925 million for blue hydrogen (natural gas with carbon capture) in West Virginia and southwestern Pennsylvania (about 21,000 jobs projected), together with roughly $1.7 billion in federal investment. However, both hubs' futures are uncertain, as the federal DOE seeks to rescind funding and industry partners have withdrawn or paused participation. Pennsylvania is also seeking submissions for storage projects to support the integration of renewables, grid resiliency, and energy independence. While the trend toward increased reliance on gas generation has continued, these efforts demonstrate that the Commonwealth is open to alternative energy and diversification of resources.

Pennsylvania was also allocated more than $500 million for energy efficiency and rebate programs under the IRA, but programs had not fully launched

as of early 2026, pending final DOE approvals. This is a meaningful timing gap as federal funding may expire and be lost if not used. The consistent pattern across IIJA and IRA programs in Pennsylvania is strong grant competitiveness and adequate funding, constrained by implementation capacity. Securing federal funding is not enough when federal policy guidance may change with each administration and funds previously allocated rescinded if not spent.

PUBLIC SAFETY & RESILIENCE

Pennsylvania's history includes several major coal-mining accidents and the nation's most significant nuclear radiation release. That history informs the industry's current practices, which place the safety of workers and customers as the most important concern. In parallel, the resiliency of our energy systems in the face of increasingly severe environmental conditions mandates continued investment.

Pennsylvania's generation mix has continued its dramatic shift toward natural gas, which now accounts for about 60 percent of net generation, compared to 15 percent ten years ago. While utility-scale solar generation rose roughly 48 percent in 2024, the increase comes from a relatively small installed capacity, and the state's heavy dependence on natural gas continues to create a material interdependency risk. Natural gas fuels the generation that powers the compressor stations that move gas through pipelines, so a major disruption to gas supply during severe weather could simultaneously impair both gas delivery and electricity generation. Pennsylvania's coal-to-gas transition, while economically rational, has concentrated a single-point-of-failure risk at the system level. In other words, Pennsylvania power generation has become significantly more dependent on an uninterrupted supply of natural gas that could be disrupted by a major climate event. Continued investment in nuclear generation has helped to offset that risk.

Pennsylvania's energy infrastructure faces a growing set of climate-related risks. The Commonwealth is less exposed to hurricanes and coastal flooding than some neighbors, but it is vulnerable to inland flooding from intense precipitation, which has become more frequent and severe. In 2024 Pennsylvania recorded 71 Reportable Outage Events (ROEs), the highest number in 32 years of commission reporting, exceeding the previous high of 63 and far above the 49 recorded in 2023. Nearly 3 million customers were affected. The trend is unmistakable and corroborated—extreme precipitation in Pennsylvania and the broader Mid-Atlantic has increased measurably since the 1950s. The rate of ROEs is more than double the baseline noted in the 2022 Pennsylvania Report Card, and the increase is driven by more severe weather and aging, under-hardened infrastructure. Utilities are responding with proactive hardening: higher-rated distribution poles, expanded vegetation management, reclosers, smart switches, and selective undergrounding of outage-prone circuits.

Further significant investment is required for cybersecurity resilience. Pennsylvania utilities invest in cyber defense and join grid-security exercises, as required by the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation (NERC). Critical Infrastructure Protection (CIP) standards have continued to evolve from Version 5 to Version 6 and the CIP-003-9 framework in 2026. As electric utilities work to deliver power to AI data centers, they must also work to harden against new AI-powered cyber threats.

Overall, Pennsylvania's resilience posture is improving as threats rapidly evolve. The state benefits from PJM's multi-state backup capacity, but committed reserve margin has fallen as capacity prices have risen sharply. PJM warns of near-term capacity shortfalls, and the increased outage trend indicates that resilience is not improving as quickly as necessary. Most customers will judge resilience based on their experience, and the increased rate of outages is a sign that investment is not keeping pace with the increased environmental and cyber threats.

INNOVATION

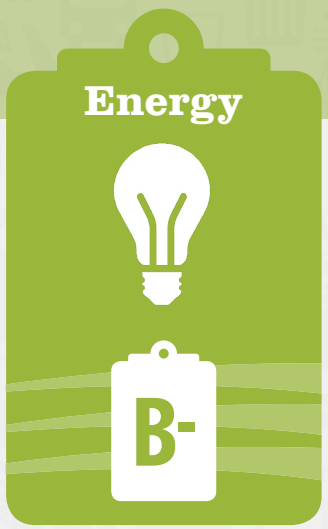
Innovation in Pennsylvania's energy infrastructure is best understood not as the adoption of any single technology, but as the system's capacity to adapt to changing demand, emerging generation, and escalating climate risk. Since the 2022 Report Card, the most consequential innovation is occurring within the T&D system itself.

Utilities are deploying advanced switching automation, enhanced grid sensors, dynamic line-rating systems, and upgraded substations that improve fault detection, isolate outages faster, and restore service more quickly after severe weather. These investments are critical for a grid that must handle higher, more variable loads without the luxury of immediately replacing all aging infrastructure.

The most notable trend since the 2022 Report Card is the rise of AI data centers, which marks the most significant structural shift in electricity demand in Pennsylvania since the industrial era. Data centers need significant quantities of reliable power. Pennsylvania's position as a major electricity exporter, its relatively cool climate, its access to cooling water, and land near existing generation make it attractive for this load. Challenges include interconnection backlogs, which can delay permanent service by years, and price increases as demand comes on-line faster than new generation. PJM, utilities, and regulators are working to streamline processes, but good solutions will require time, investment, and collaboration by government and industry.

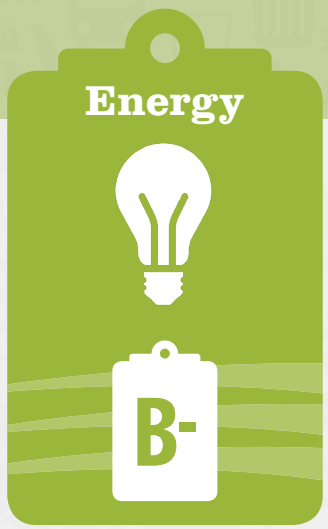
Pennsylvania is in the early stages of a transition toward a more distributed, flexible grid, but this transition is challenged by the incumbency of the state's existing energy industry and policies. Pennsylvania's withdrawal from RGGI participation forfeited significant potential funding and reduced incentives for investment in alternative energy in the state. Pennsylvania's Alternative Energy Portfolio Standard (AEPS) has not been updated in over a decade, and alternative energy proposals have generally stalled in state legislature.

There are bright spots, such as Pittsburgh International Airport's first-of-its-kind microgrid, which combines natural gas and solar generation for the ability to operate independently from the grid. On balance, Pennsylvania is permissive toward energy development and welcomes innovation, but it has not aligned its state policy tools with firm goals to develop a broader mix of energy assets. The result has been a state that is increasingly invested in natural gas as coal generation has declined. Load growth is now driving demand for all types of generation, including renewables, faster than any incentives created by an overarching state policy, which has been lacking.



RECOMMENDATIONS TO RAISE THE GRADE

- Industry and regulatory entities should collaborate to accelerate T&D grid hardening and modernization. Set clear, time-bound targets for utilities to harden distribution infrastructure against storms, prioritizing the worst-performing areas. The PUC should strengthen performance incentives and consequences for utilities that persistently miss current targets as well as converting to leading-edge indicators to avoid outages.
- Strengthen implementation capacity for federal programs so that federal grid-resilience funding moves faster from obligation to construction. Invest in the administrative and workforce infrastructure needed to deploy federal funding at scale by expanding DEP, PUC, and related agency staffing; expanding certified contractor pipelines for grid, well-plugging, and AML work; and streamlining permitting. Support these initiatives with dedicated state funding, supplemented by federal grants, and/or rate-based funding, with rate increases communicated to customers as a necessary investment for resilience.
- Develop a long-term energy demand and capacity plan. AI data centers and electrification represent a structural shift in demand. The PUC should work with PJM, utilities, NERC, and FERC on a comprehensive long-term load forecast and transmission-expansion plan that anticipates concentrated new loads without compromising reliability or increasing rates for existing customers.
- Update and strengthen the Alternative Energy Portfolio Standard. Advance legislation to establish a credible, long-term renewable-energy target consistent with regional peers. Without a stronger state signal, the Commonwealth will remain dependent on federal incentives, leaving its energy portfolio more exposed to federal policy shifts.
- Remove DER barriers and pass community-solar-enabling legislation, which has bipartisan support but has repeatedly stalled. Expanded access to distributed solar and storage improves resilience, lowers costs for those who cannot install rooftop systems, and accelerates DER integration. The PUC should also finalize DER-aggregation rules aligned with FERC Orders 2222/2223 and establish minimum usage similar to RES.
- Invest in climate-resilience planning for energy infrastructure. Require utilities to assess critical assets, including substations, transmission structures, transformers, and gas compressor stations, against updated flood and landslide hazard maps, and to develop capital plans for elevating or relocating the most exposed assets. Strengthen state emergency-management, utility coordination, and public communications for extreme weather, in concert with NERC guidance.



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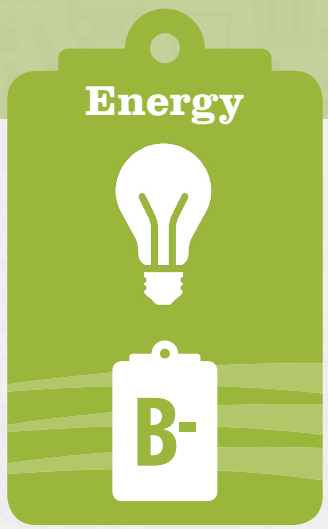
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LIST OF ABBREVIATIONS

Abandoned Mine Land (AML)

Alternative Energy Portfolio Standard (AEPS)

Appalachian Hydrogen Hub (ARCH2)

Critical Infrastructure Protection (CIP)

Department of Energy (DOE)

Distributed Energy Resources (DERs)

Electric Distribution Company (EDC)

Federal Energy Regulatory Commission (FERC)

Federal Highway Administration (FHWA)

Infrastructure Investment and Jobs Act (IIJA)

Inflation Reduction Act (IRA)

Mid-Atlantic Clean Hydrogen Hub (MACH2)

One Big Beautiful Bill Act (OBBBA)

National Electric Vehicle Infrastructure (NEVI)

North American Electric Reliability Corporation (NERC)

Pennsylvania-New Jersey-Maryland Interconnection (PJM)

Public Utility Commission (PUC)

Regional Greenhouse Gas Initiative (RGGI)

Renewable Energy Standard (RES)

Reportable Outage Event (ROE)

Transmission and Distribution (T&D)

Virtual Power Plants (VPPs)



Photo: Old chemical barrels stack. Fahroni

HAZARDOUS WASTE

EXECUTIVE SUMMARY

Pennsylvania's hazardous waste system is broad, mature, and supported by multiple state and federal cleanup programs. The Pennsylvania Department of Environmental Protection (PADEP) manages hazardous waste and cleanup obligations through the Federal Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund); and Pennsylvania's Hazardous Sites Cleanup Act (HSCA) and Act 2. These programs continue to show measurable progress through deleted Superfund sites, Act 2 cleanup approvals, state-funded response actions, and RCRA corrective action milestones. However, the Commonwealth continues to carry a large long-term workload, including complex legacy sites, operation and maintenance obligations, emerging contaminants, staffing demands, and continued pressure on the Hazardous Sites Cleanup Fund (HSCF), where expenditures continue to exceed annual revenue. Pennsylvania currently has 91 final National Priorities List (NPL) sites, with 35 additional sites deleted from the NPL and one proposed site. The Commonwealth has also recorded approximately 8,571 approved Act 2 cleanup activities. Despite this progress, the Hazardous Sites Cleanup Fund reported $25.7 million in revenue compared with $48.9 million in expenditures and commitments in FY2024–25, highlighting the need for sustainable long-term funding.

BACKGROUND

Pennsylvania's hazardous waste management and cleanup programs operate through complementary federal and state regulatory frameworks. At the federal level, the Resource Conservation and Recovery Act (RCRA) governs hazardous waste management and corrective action, while the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA/Superfund) addresses releases at contaminated sites. PADEP administers authorized hazardous waste regulatory programs and coordinates with EPA on federal cleanup activities. At the state level, Pennsylvania's Hazardous Sites Cleanup Act (HSCA) provides authority and funding for response actions, while the Land Recycling and Environmental Remediation Standards Act (Act 2) establishes a risk-based cleanup and redevelopment process.

A deleted Superfund site means required federal response actions have been completed, although monitoring, institutional controls, periodic reviews, or operation and maintenance may continue. RCRA "cleanup achieved" is a separate corrective action milestone and is not the same as Superfund deletion. These distinctions are important because Pennsylvania's hazardous waste capacity depends not only on moving sites toward cleanup, but also on sustaining long-term stewardship after remedies are selected, constructed, or closed.

CONDITION AND CAPACITY

Pennsylvania has a mature hazardous waste management system, with substantial activity across Superfund, Act 2, HSCA, and RCRA corrective action programs. However, the Commonwealth continues to face a significant legacy workload requiring sustained funding, technical oversight, and long-term operation and maintenance.

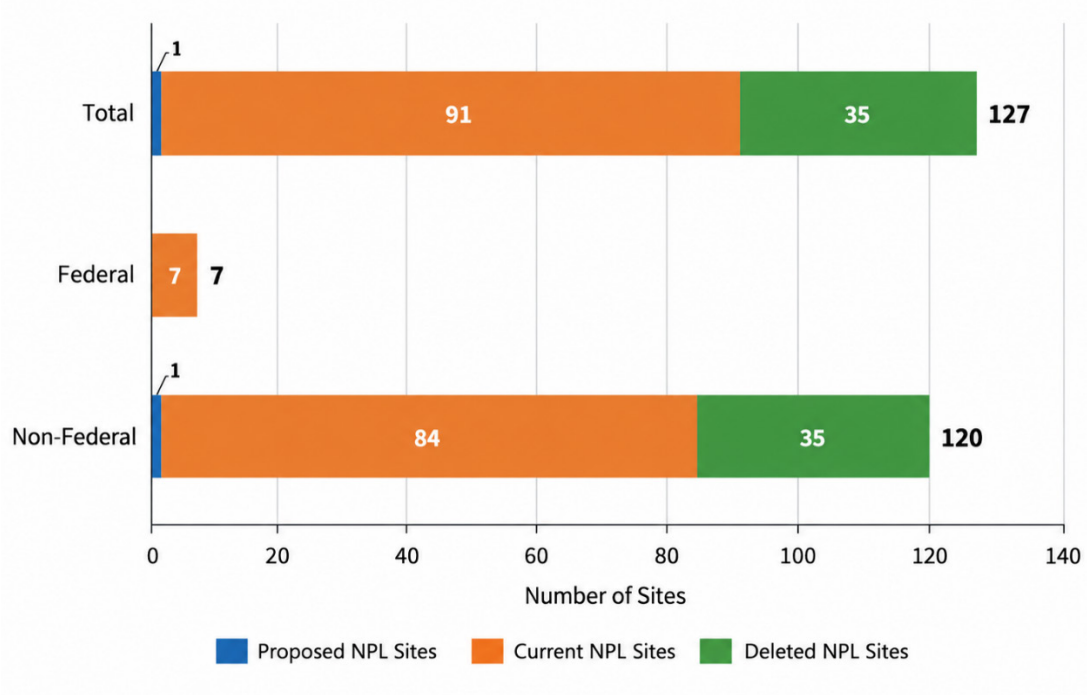
Table 1. Selected Pennsylvania hazardous waste cleanup and corrective action indicators.

Program Area	Current Indicator	What It Suggests
Superfund	92 NPL sites: 91 Final and one proposed (35 former NPL sites have been deleted)	Large legacy burden, but measurable cleanup progress
Act 2	About 8,571 distinct approved cleanup activities through Fiscal Year 2024 to FY25	Strong voluntary cleanup and redevelopment pipeline
HSCA funded cleanups	About $10.4 million in FY23 to FY24 project expenditures	Active state role in sites needing direct response
RCRA corrective action	356 sites, including 344 with human exposures controlled and 267 with cleanup achieved	Broad regulatory reach and steady corrective action progress

Source: EPA, PADEP

Superfund – Superfund remains one of the clearest indicators of Pennsylvania's long-term hazardous waste burden because it includes many of the Commonwealth's most complex contaminated sites. Pennsylvania currently has 92 NPL sites: 91 Final and one proposed (35 former NPL sites have been deleted). Most are nonfederal sites, showing that much of the state's cleanup burden is tied to older industrial and commercial contamination rather than federal property alone.

Figure 1. Pennsylvania National Priorities List Sites



Source: EPA

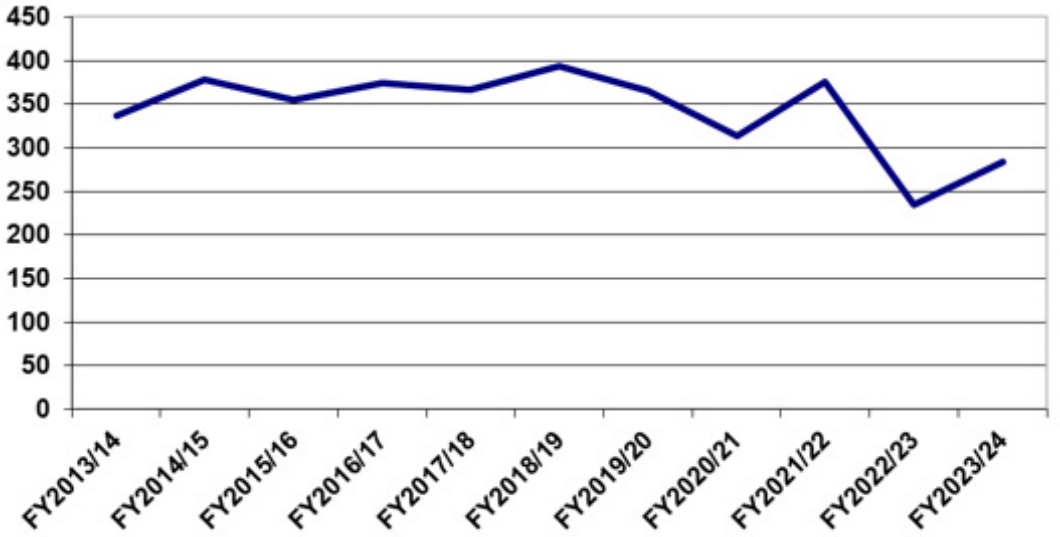
These figures place Pennsylvania among the more heavily burdened states in the nation. EPA reports 1,343 current NPL sites nationwide and 442 deleted sites. Pennsylvania's 91 final sites account for about 6.8% of active NPL sites nationally, while its 35 deleted sites account for about 7.9% of deleted sites nationwide. These figures indicate both scale and progress: Pennsylvania continues to manage a larger than average Superfund workload, while also showing movement of sites through the cleanup process.

Many Superfund sites require years of groundwater treatment, engineering controls, monitoring, and periodic review before their final cleanup goals are reached. As a result, Pennsylvania's Superfund capacity is not defined only by the number of listed or deleted sites. It is also shaped by the Commonwealth's ability to sustain long term oversight after remedies are selected and constructed.

Act 2 - Pennsylvania's Land Recycling Program, known as Act 2, remains one of the Commonwealth's principal hazardous waste and brownfield reuse tools because it connects cleanup with redevelopment. Established in 1995, the program provides a risk-based pathway for the cleanup and reuse of contaminated industrial and commercial properties. PADEP's program materials describe Act 2 as a central part of Pennsylvania's brownfield and site reuse framework.

Recent approval activity indicates that Act 2 continues to operate at a steady pace. Based on PADEP Land Recycling records, the program has logged roughly 8,571 distinct approved cleanup activities through FY24 to FY25. These figures indicate that the program continues to support a steady level of cleanup and redevelopment activity, even as projects become more technically complex.

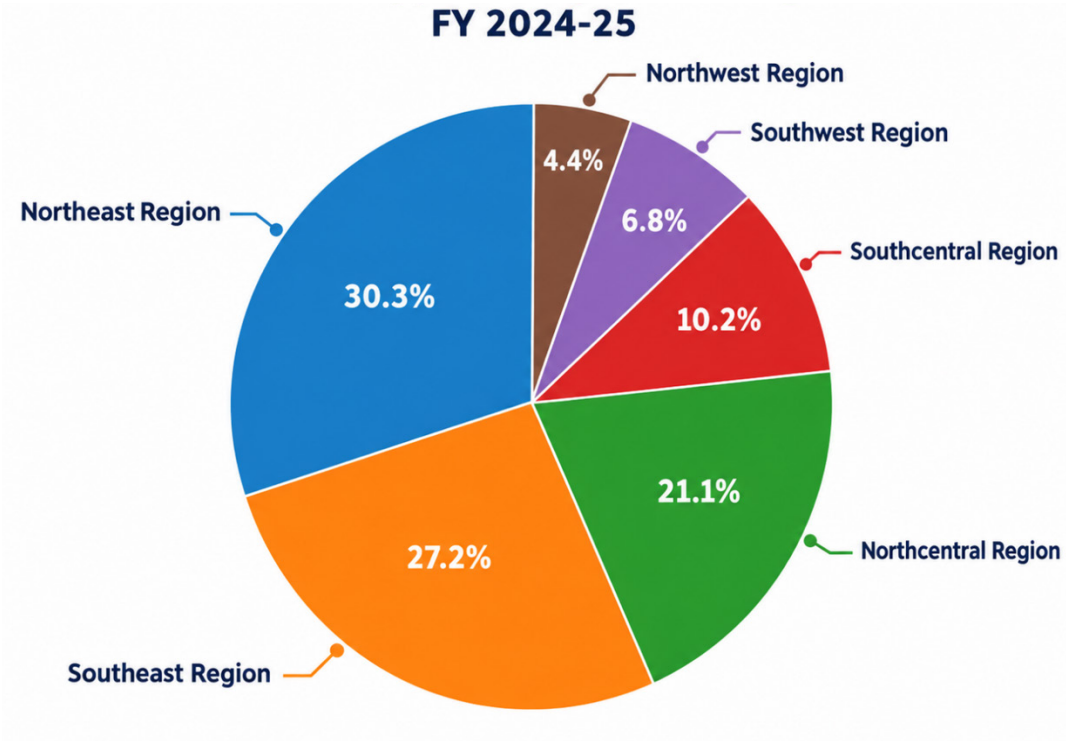
Figure 2. PADEP Act 2 Successful Cleanups



Source: PADEP

Regional activity also illustrates where this capacity is being used in FY24 to FY25. The distribution shows that Act 2 activity is statewide, but strongest in areas with greater redevelopment pressure and larger inventories of legacy industrial land. In capacity terms, Act 2 extends Pennsylvania's cleanup reach by allowing private owners, developers, local governments, public agencies, and redevelopment entities to move sites through remediation and reuse without relying solely on direct state-funded response.

Figure 3. Act 2 Approvals by PADEP Region



Source: PADEP

HSCA Funded Cleanups - HSCA-funded cleanups remain the part of the system where direct public intervention is most visible. Recent PADEP reporting shows about $10.4 million in FY23 to FY24 project expenditures and about $450,000 in temporary water supply maintenance costs. These figures show that Pennsylvania's hazardous waste infrastructure includes more than disposal or final closure. It also includes water supply replacement, response actions, remedy maintenance, and continuing protection of nearby communities while longer-term solutions remain in place.

RCRA - RCRA corrective action is less visible to the public than Superfund or Act 2, but it remains an important part of Pennsylvania's overall hazardous waste capacity. RCRA governs hazardous waste from generation through disposal and requires corrective action when releases occur at regulated treatment, storage, and disposal facilities. In Pennsylvania, this program addresses contamination within an active regulatory framework before sites become larger public liabilities.

PADEP reports the following current RCRA corrective action indicators:

Table 2. RCRA Corrective Actions in PA

RCRA Corrective Action Measure	Pennsylvania Total
Sites subject to corrective action	356
Human exposures controlled	344
Groundwater migration controlled	336
Final remedies selected	277
Construction complete	274
Cleanup achieved	267

Source: EPA

These milestones suggest that many known risk pathways are under control and that a substantial share of facilities have moved through remedy selection, construction, and cleanup completion. The data do not indicate that all work is finished, but they show continued progress.

FUNDING AND FUTURE NEED

Pennsylvania funds hazardous waste management through state appropriations, federal support, dedicated cleanup funds, and redevelopment incentives. These sources support different program responsibilities and are not interchangeable. Several obligations continue long after cleanup construction is complete, including monitoring, institutional controls, temporary water supplies, remedy maintenance, and long-term operation and maintenance.

Table 3. PADEP Funding Mix

Funding Source	FY26 to FY27	Share of PADEP Total	Key Takeaway
State funds	$294.1 million	7.2%	Core support for PADEP operations and state led work
Federal funds	$3.355 billion	82.6%	Federal funding drives most of PADEP's total budget
Augmentations	$20.7 million	0.5%	Supplemental funding source
Restricted revenue	$154.1 million	3.8%	Supports specific program needs
Other funds	$238.5 million	5.9%	Additional operating support
PADEP total	about $4.06 billion	100%	Funding base is much larger than in 2022

Source: PADEP

PADEP's FY26 to FY27 legislative budget shows that federal funds continue to make up the largest share of the department's total funding, while state funds remain critical for program stability and direct Commonwealth obligations.

The Infrastructure Investment and Jobs Act (IIJA) has provided additional federal resources for Superfund remediation, brownfield redevelopment, and other legacy pollution cleanup programs. These investments supplement Pennsylvania's existing cleanup programs but do not eliminate the need for reliable state funding to support long-term remediation and stewardship.

The Hazardous Sites Cleanup Fund (HSCF) remains a key funding source for hazardous waste related activities in Pennsylvania. It supports site investigation, cleanup, monitoring, Land Recycling implementation, and Pennsylvania's participation in the federal Superfund and RCRA programs. Recent HSCF Financials are as follows:

Table 4. HSCF Revenue and Expenditures

HSCF Measure	Fy23 to FY24	FY24 to FY25
Beginning balance	$50.7 million	$38.8 million
Revenue total	$28.7 million	$25.7 million
Expenditures and commitments (combined)	$52.4 million	$48.9 million

Source: PADEP

Note: Reported expenditures and commitments include financial obligations that may not have resulted in cash disbursements during the fiscal year. Accordingly, the reported beginning balances cannot be directly reconciled using the combined expenditures and commitments amount. Actual cash expenditures and any other applicable financial adjustments must be considered when reconciling year-end balances.

These figures demonstrate continued financial pressure on the HSCF, as annual expenditures and commitments have exceeded annual revenue. However, the combined expenditures and commitments should not be interpreted as actual cash outflows. PADEP's FY26 to FY27 budget materials also indicate that the HSCF's long-term outlook remains a concern. The HSCF was originally supported by part of the Capital Stock and Franchise Tax, hazardous waste fees, and General Fund appropriations. PADEP states that the phase out of that tax, the lack of a General Fund appropriation, and a 70% drop in fee revenue have significantly affected the program, and that an additional long term revenue source is needed to avoid an operating deficit. This is a long-standing structural issue rather than a new one-year shortfall.

Pennsylvania also supports cleanup through redevelopment-focused funding. The Industrial Sites Reuse Program (ISRP) provides grants and low-interest loans for environmental assessments and remediation. These tools extend cleanup capacity by supporting assessment and remediation tied to reuse projects, but they do not replace the need for stable state cleanup funding where responsible parties are unavailable, unwilling, or unable to act.

The Superfund program remains a state-federal partnership. Pennsylvania provides 10% of a federally funded remedial action, while the federal government provides the remaining 90%. After remedial action is complete, the Commonwealth is responsible for 100% of operation and maintenance costs. This means Pennsylvania's financial role does not end when cleanup construction is complete; long-term treatment, monitoring, and maintenance can continue for years.

Pennsylvania's funding structure is broad, but long-term obligations continue to outpace the dedicated revenue available for state-led cleanup and stewardship. Federal funding and redevelopment incentives provide important support, but they do not replace the need for a durable state funding source for HSCF, especially where responsible parties are unavailable or remedies require years of monitoring, maintenance, or water supply protection.

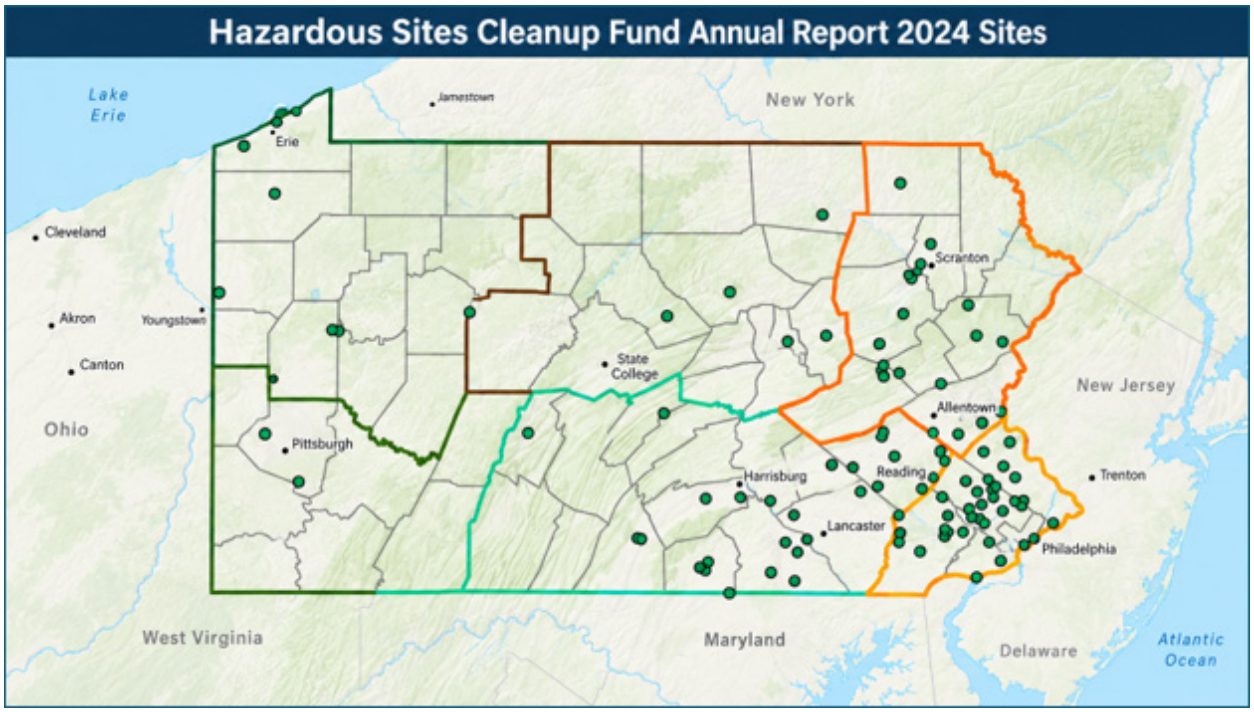
OPERATION AND MAINTENANCE

Pennsylvania's hazardous waste system depends on long-term oversight as much as initial cleanup. Operation and maintenance include compliance inspections, monitoring, water supply replacement, engineering control upkeep, institutional controls, transportation oversight, and long-term remedy management. Pennsylvania also requires a state hazardous waste transporter license for waste picked up or delivered in the Commonwealth, adding another layer of operational oversight.

Staffing is also an operation and maintenance capacity issue. PADEP's FY26 to FY27 requested budget identifies filled and vacant positions supported by different funding categories. Vacancies can affect inspection frequency, corrective action oversight, grant administration, emergency response, and long-term remedy management. Recruitment, retention, and succession planning should therefore be treated as operating capacity needs, not only funding issues.

The 2024 Hazardous Sites Cleanup Fund Annual Report highlights the scale of that responsibility. PADEP identified 110 former and current Pennsylvania NPL sites with ongoing remediation activities, including proposed and listed sites as well as certain deleted sites that still carry operation and maintenance obligations. This indicates that deleted status does not necessarily mean active work has ended. Many sites continue to require groundwater treatment, cap maintenance, inspections, institutional controls, and periodic review to remain protective.

Figure 4. PADEP HSCF Annual Report sites with ongoing remediation or operation and maintenance obligations. Green dots indicate site locations shown in the 2024 HSCF Annual Report



Source: PADEP

Recent PADEP reporting also shows that operation and maintenance remains a recurring cost:

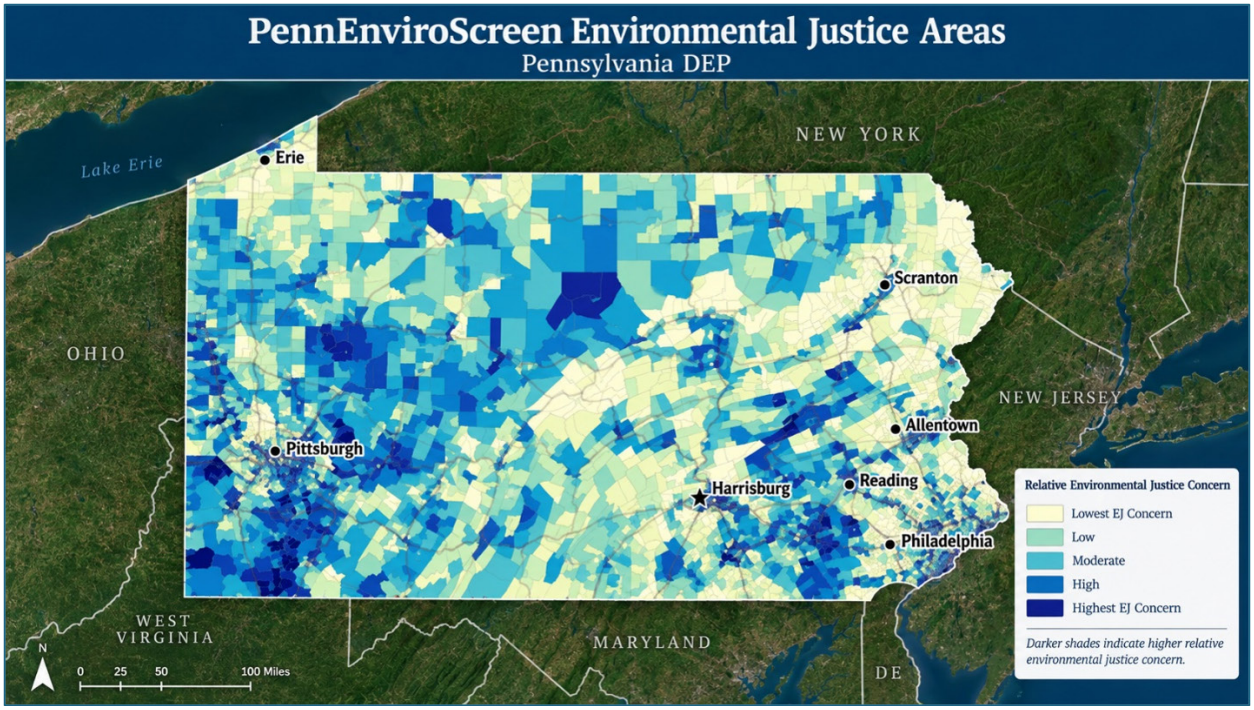
- PADEP estimated about $450,000 in temporary water supply maintenance costs in FY23 to FY24.
- PADEP has reported about $2.9 million per year in contractor costs at 25 Superfund sites to meet federal operation and maintenance obligations, not including staff time.

In practice, Pennsylvania's operation and maintenance workload is shaped by the age and complexity of its cleanup portfolio rather than by new site construction alone. The system remains established, but it continues to depend on staffing, contractor support, and stable funding to keep long-term remedies effective and protective over time.

PUBLIC SAFETY AND RESILIENCE

Pennsylvania's primary hazardous waste public safety challenges include legacy contamination, emerging contaminants such as PFAS, abandoned industrial facilities, and the transportation of hazardous materials. These risks can threaten drinking water supplies, surrounding communities, and the environment. PADEP's Environmental Justice Policy provides a framework for considering impacts on communities already burdened by industrial contamination, while Act 2, HSCA, and RCRA programs support cleanup and long-term protection.

Figure 5. PADEP PennEnviroScreen mapping tool used to identify environmental justice areas and support implementation of Pennsylvania's Environmental Justice Policy



Source: PADEP

Hazardous materials transportation and waste handling also present public safety concerns. The Norfolk Southern derailment in East Palestine, Ohio, highlighted the importance of emergency preparedness, coordination among agencies, and timely communication with affected communities. Similar considerations apply to oil and gas waste, roadway waste handling, and household hazardous waste management.

Climate resilience is an increasing concern for contaminated properties and completed cleanup sites. Flooding and extreme precipitation can damage containment systems, mobilize contaminants, and increase long-term maintenance costs. Incorporating climate risks into remediation planning, stormwater management, and long-term monitoring will help Pennsylvania maintain protective remedies and reduce future public safety risks.

INNOVATION

Pennsylvania's strongest hazardous waste innovation theme is coordination. The One Cleanup Program is designed to align Act 2 with federal RCRA corrective action, CERCLA/ Superfund, and Toxic Substances Control Act (TSCA) requirements where approved, reducing duplicative cleanup pathways and making cleanup decisions more predictable. This is especially important for redevelopment sites where state cleanup requirements, federal obligations, institutional controls, and long-term land use restrictions may overlap.

Pennsylvania has also continued to update how remedies are managed over time. Environmental covenants are required whenever an engineering or institutional control is used to demonstrate attainment of an Act 2 remediation standard. This provides a legal mechanism for managing long-term land use restrictions and remedy obligations where contamination remains in place under controlled conditions.

Pennsylvania's evolving approach to PFAS cleanup illustrates regulatory innovation through the adaptation of existing remediation programs to emerging contaminants. PADEP's January 2026 technical notice addressing PFAS soil standards under Act 2 demonstrates how new scientific information and federal guidance can be integrated into established state cleanup frameworks.

Pennsylvania's emerging data center market creates a new innovation and oversight challenge for hazardous waste management. Major data center investments, proposed Governor's Responsible Infrastructure Development standards, and growing artificial intelligence-related power demand show how quickly digital infrastructure can reshape industrial reuse, backup power needs, and environmental compliance. From a hazardous waste perspective, these facilities require cradle-to-grave management under RCRA for battery systems, backup power equipment, decommissioned information technology equipment, cooling agents, fire suppression agents, spent materials, and wastes associated with onsite power generation.

EPA has also created data center-specific Clean Air Act resources in response to the growth of data centers and AI facilities. As these facilities are developed, Pennsylvania has an opportunity to connect economic development with strong generator compliance, waste minimization, reuse of legacy industrial sites, resilient infrastructure, and sustainable design practices.

Pennsylvania's approach also aligns with broader national remedy trends, including increased use of in situ treatment and monitored natural attenuation where appropriate. Pennsylvania's Act 2 framework, updated guidance structure, coordinated state and federal cleanup model, and emerging focus on responsible data center development provide a basis for applying innovative practices at legacy cleanup, redevelopment, and new infrastructure sites.

The annual Pennsylvania Brownfields Conference, presented by PADEP, further supports innovation by bringing together regulators, environmental professionals, developers, and community stakeholders to share best practices, emerging technologies, and successful approaches to site remediation and redevelopment.

Figure 6. Brownfield Conference Notice



Source: PADEP



RECOMMENDATIONS TO RAISE THE GRADE

- **Establish a durable long-term revenue source for HSCF.** HSCF remains essential for site investigation, cleanup, monitoring, emergency response, and long-term stewardship. A stable revenue source is needed to address the structural funding pressure created by reduced fee revenue, loss of prior tax support, and continued cleanup obligations.
- **Strengthen PADEP staffing and technical capacity.** PADEP should continue recruitment, retention, and succession planning efforts to support inspections, RCRA corrective action, HSCA response actions, Act 2 reviews, grant administration, emergency response, and long-term remedy oversight.
- **Integrate resilience and emerging contaminants into cleanup programs.** PADEP should continue incorporating PFAS, climate exposure, stormwater impacts, institutional controls, emergency access, and long-term O&M into Act 2, HSCA, RCRA, and Superfund decision-making.
- **Improve public-facing cleanup data.** Pennsylvania should continue improving public dashboards and reporting tools so communities can more easily understand cleanup status, funding, O&M obligations, institutional controls, and progress toward closure.
- **Strengthen emergency preparedness for hazardous materials and emerging infrastructure.** Pennsylvania should improve coordination, disclosure, and state/local notification related to rail transport, oil and gas waste, roadway waste handling, and large emerging infrastructure uses such as data centers. Data center growth should be proactively managed through generator compliance, waste minimization, decommissioning planning, and emergency response coordination.



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Inland Waterways

C-



GRADE COMPARISON

PA: C-

Nat'l: D+

Photo: Pittsburgh, Pennsylvania; Joseph Sohm

INLAND WATERWAYS

EXECUTIVE SUMMARY

The Port of Pittsburgh's Inland Waterways Navigation System, the only such network in Pennsylvania, consists of 16 locks and dams on the three major rivers that connect in Pittsburgh. Much of the infrastructure is 85 to 95 years old. Extended age and lack of consistent funding have allowed the condition of this system to deteriorate to the point that watercraft lockages have become severely impeded. Reduced hours of operation are in effect for several Locks and Dams along the Allegheny and Monongahela Rivers. While the recent increase in funding for navigation is helpful, a significant backlog still exists. Meanwhile, inconsistent and piecemeal funding has caused the Lower Monongahela Navigation Project costs to increase from the original 1992 estimate of $750 million to the current estimate of $1.2 billion. Lack of funding for condition-driven projects could lead to major lock and dam failures and loss of navigation for an extended period.

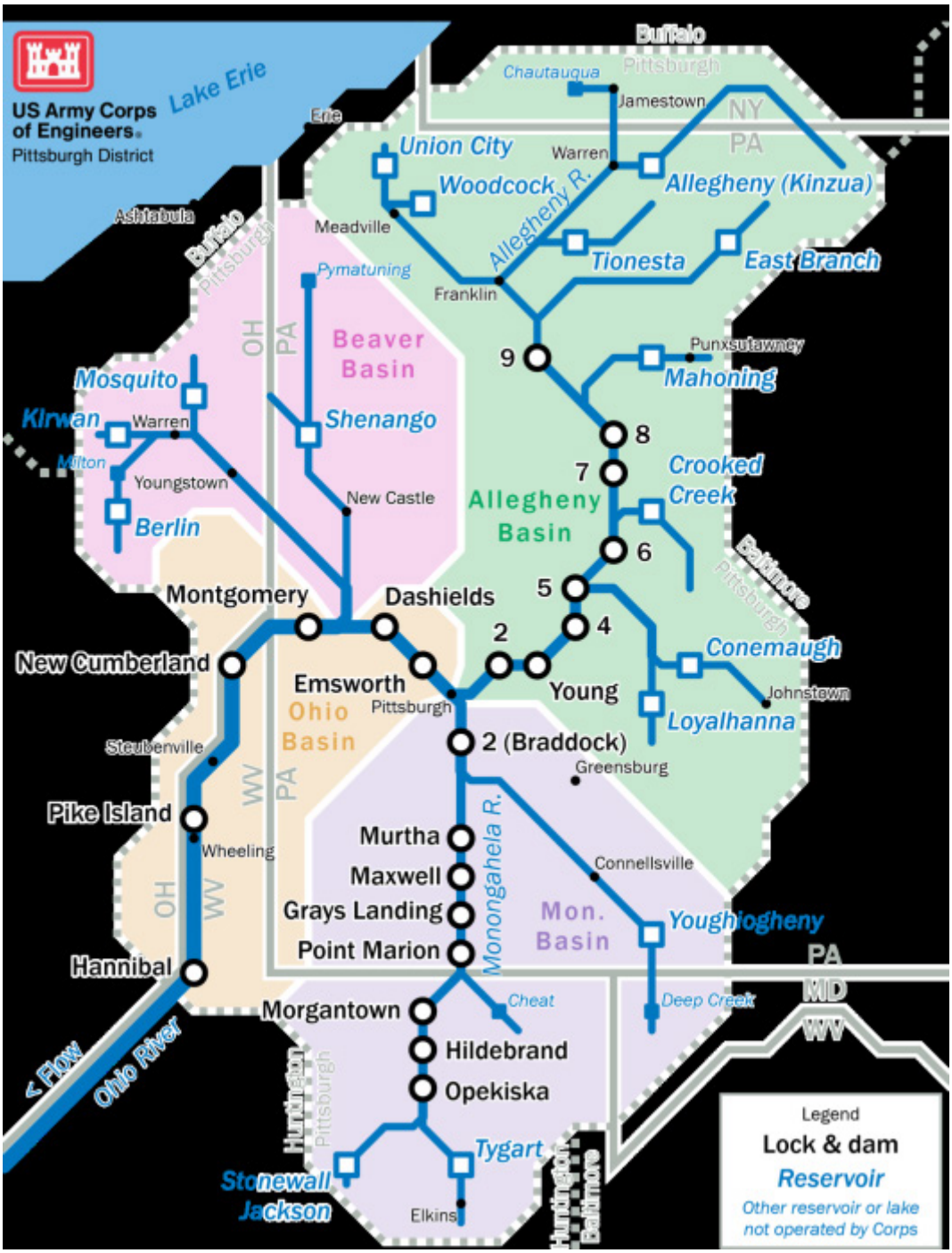
BACKGROUND

Pennsylvania's inland waterways are located primarily in the western area of the state serving twelve counties in Pennsylvania through 200 miles of navigable waterways and 16 locks and dams. Eight of these locks and dams are located on the Allegheny River, five on the Monongahela River, and three on the Ohio River. These are the only rivers considered to be inland waterways in Pennsylvania.

There are 200 river terminals and barge industry suppliers, including privately owned terminals that depend on these inland waterways. Advocacy for the region's waterways is provided by the Port of Pittsburgh Commission, as designated by the Commonwealth of Pennsylvania. Ownership, as well as operation and maintenance of this navigation system, is the responsibility of the US Army Corps of Engineers (USACE), Pittsburgh District. Figure 1 shows the extent of the Locks and Dams in Pennsylvania.

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Figure 1. Pennsylvania's Inland Waterways



Source: "Pittsburgh District Schematic Map"

CAPACITY

The Port of Pittsburgh's Inland Waterways Navigation System consists of 16 locks and dams on the three major rivers that connect in Pittsburgh. Much of the infrastructure is 85 to 95 years old. Pennsylvania's inland waterways are located primarily in the western area of the state serving twelve counties in Pennsylvania through 200 miles of navigable waterways and 16 locks and dams. Eight of these locks and dams are located on the Allegheny River, five on the Monongahela River, and three on the Ohio River. These are the only rivers considered to be inland waterways in Pennsylvania. Since the last report card, John P. Murtha Locks, formerly Charleroi, have been placed into service and Monongahela Locks and Dam #3 have been removed, reducing the facilities on the Monongahela River from six to five.

Lack of funding for condition-driven projects could lead to major lock and dam failures and loss of navigation for an extended period.

From the 2022 Value to the Nation Fast Facts, the benefits of the inland navigation system in Pennsylvania (2024 price level) were $458,383,523. These benefits were measured at the reduction in the cost required to transport commodities compared to the next best alternative. The region transported 17,644,400 tons in 2022.

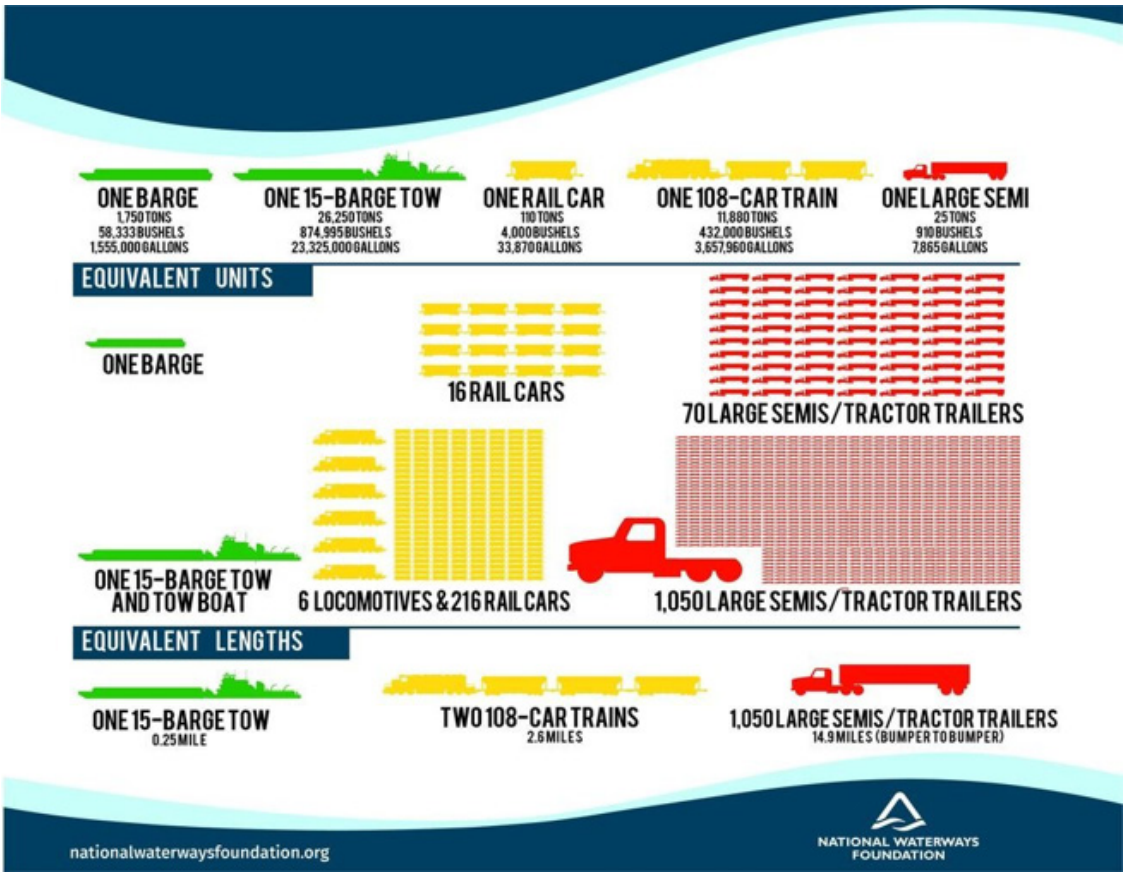
The inland system can carry more cargo efficiently without increasing congestion on the waterways (see Figure 2). However, there has been a steady decrease in commercial river traffic as well as constrained federal funding to support these aging systems. Traffic on the Allegheny River has decreased from 1905 commercial barges in 2021 to 950 in 2025, on the Monongahela from 17,649 commercial barges in 2021 to 10,508 in 2025 and on the Ohio from 21,897 commercial barges in 2021 to 20,977 in 2025. The decline in traffic is primarily due to the reduced coal demand and closure of coal-fired power plants such as the Cheswick Plant on the Allegheny River.

Based on commercial usage the Pittsburgh District USACE has reduced hours of operation for Locks and Dams #5 through #9 on the Allegheny River, and for the Morgantown, Hildebrand and Opekiska Locks and Dams on the Monongahela River. The decline in the Allegheny River commercial traffic is largely tied to the 2022 closure of the Chesick Generating Station, the last coal-fired power plant in Allegheny County.

Section 1220 of Water Resources Development Act of 2024 (WRDA 2024) notes that the Allegheny River is an important waterway that can be utilized more to support recreational, environmental, and navigation needs in Pennsylvania and that ongoing efforts to increase utilization of the Allegheny River will require consistent hours of service at key locks and dams. The section also requires, to the maximum extent practicable, the lockage levels of service at locks and dams along the Allegheny River should be preserved until the completion of the feasibility study for the navigation and ecosystem restoration on the Allegheny River, Pennsylvania, that is authorized by section 1201 of the same Act.

In addition to WRDA 2024's assessment, The Port of Pittsburgh Commission has received $86,200 to prepare a Recreational Impact Study of the Allegheny River from Kinzua Dam in Warren County to the Point in Allegheny County. This study will look at all the beneficiaries of the system in addition to the Commercial Navigation Industry.

Figure 2. Cargo Capacity Comparison



Source: National Waterways Foundation

CONDITION

Pennsylvania's Inland Navigation System is facing critical problems due to the advanced age of its locks and dams. The average age of the facilities on the Allegheny is 95 years, the Monongahela is 40 years, and the Ohio is 97 years. Design life is typically 50 years and is extended through major rehabilitation projects or new construction. While the Pittsburgh District USACE has a very comprehensive asset management system that uses annual inspection, periodic inspection and periodic assessment data at the component level to prioritize maintenance projects, there is a backlog that continues to grow. Unscheduled closures are an indicator of condition as they are caused by a failure in a component that could not be fixed beforehand. A study of the Impact of unscheduled closures was done on four locks and found that trucking to alternative waterway locations would mean an additional 500,000 loaded truck trips per year and an additional 150 million truck miles in the affected states. While these facilities were not in Pennsylvania, the results would be similar. The study noted that the connectivity of the system also creates vulnerability, adding that the impact reaches further than the single lock involved causing billions of dollars in economic harm to shippers, the commerce that depends on those shippers and the communities that rely on this substantial business.

Total closure hours decreased from 2022 to 2024 on the Allegheny, Monongahela and Ohio Rivers. However, in 2024 the unscheduled hours were still close to 70%. While closures will always be necessary to maintain these facilities, it is the significant percentage of unscheduled closures that creates issues for the system and is an indicator of the condition of these facilities.

Information reported in the Lock Performance Monitoring System (LMPS), Table 1, shows the scheduled and unscheduled delays during 2022 - 2024.

Table 1. PA Lock and Dam Delay Statistics

Scheduled and Unscheduled Closures (hours)						
Allegheny River						
	2022		2023		2024	
	Hours	%	Hours	%	Hours	%
Scheduled	180.19	65%	8.05	14%	588	89%
Unscheduled	95.33	35%	48.05	86%	75.57	11%
Monongahela River						
	2022		2023		2024	
	Hours	%	Hours	%	Hours	%
Scheduled	68.95	61%	168.82	41%	81.25	53%
Unscheduled	43.54	39%	245.09	59%	70.88	47%
Ohio River						
	2022		2023		2024	
	Hours	%	Hours	%	Hours	%
Scheduled	1258.61	37%	2529.03	92%	0	0%
Unscheduled	2140.46	63%	226.03	8%	1200.77	100%
TOTAL						
	2022		2023		2024	
	Hours	%	Hours	%	Hours	%
Scheduled	1507.75	40%	2705.9	84%	669.25	33%
Unscheduled	2279.33	60%	519.17	16%	1347.22	67%

Source: Lock Performance Monitoring System

The John P Murtha Locks was placed into service and Monongahela Locks and Dam #3 removed in August 2025 marking significant milestones in the Lower Mon Navigation Project. Removal of Locks and Dam #3 has caused unexpected navigation issues in the form of shallow areas with the lowering of the pool between Locks and Dam #3 and the new John P Murtha Locks. These issues are currently being addressed by both the USACE and the Port of Pittsburgh Commission. The Project also includes a new land chamber at John P Murtha, which, at this time, is planned to be deferred into future years (25-50 years out) unless traffic warrants construction sooner.

Focus has now shifted to the Upper Ohio River Navigation Project, which addresses lock condition and capacity issues at Emsworth, Dashields, and Montgomery Locks and Dams on the Ohio River in Pennsylvania. The Project consists of constructing a new lock chamber (110' wide by 600' long) at each facility riverward of the existing main lock chamber. This new lock chamber would serve as the main lock chamber.

The contract for the new Montgomery Lock was awarded in 2024 and project construction has begun. The total project cost is estimated at about $1.6 billion.

The Project has an estimated eight-year timeline. The Project Delivery Team (PDT) received the 2025 USACE National Project Delivery Team of the Year award. As of early 2026, the project is approximately 10-12% complete, with the batch plant assembled, auxiliary chamber removal underway, and approach walls demolished. Figure 3 shows construction of the batch plant for the new Montgomery Lock.

Figure 3. Montgomery Lock Batch Plant Construction



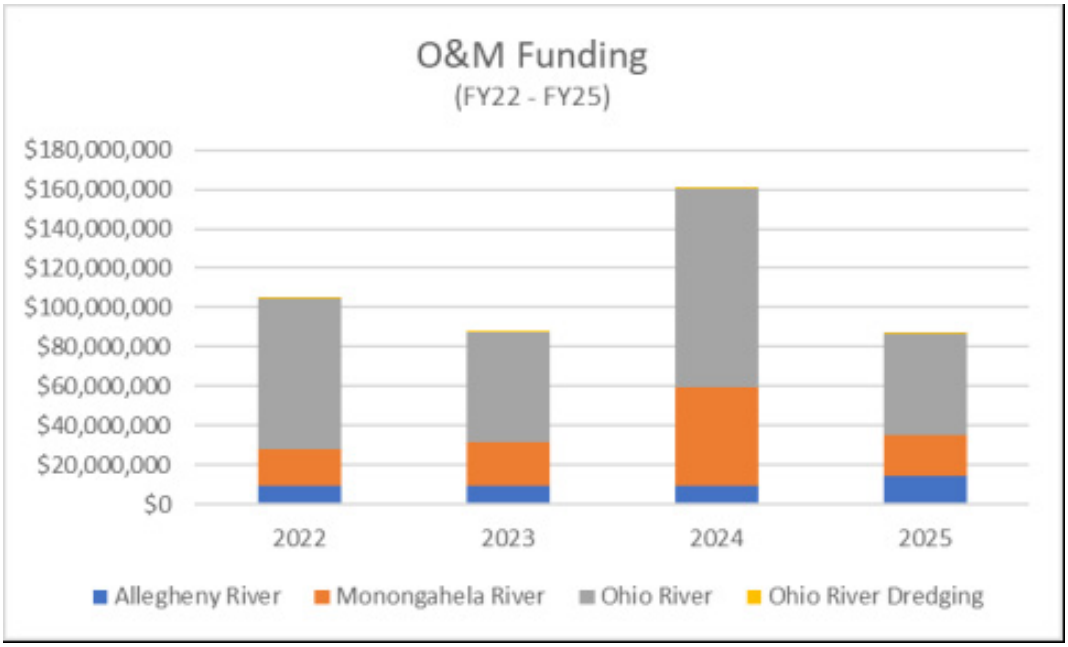
Source: Pittsburgh District Facebook Page

OPERATION AND MAINTENANCE

USACE has a robust inspection program with annual inspections, periodic inspections (5-year interval) and periodic assessments (10-year interval) that provide the maintenance needs for the system. Their asset management program uses this data to develop and prioritize maintenance packages. While they have a good understanding of the maintenance needs, the funding to keep the system operational and avoid unscheduled closures could be more robust.

Operation and Maintenance (O&M) funding shown in Figure 4, for Fiscal Year 2022 through Fiscal Year 2025, showed relatively steady funding for the Allegheny River System from $9.0 million to $9.6 million from FY22 to FY24, with an increase to $14.5 million in FY25. Similarly, The Monongahela River System also remained relatively steady in FY22, FY23 and FY25, $18.8 million to $21.9 million, with an increase to $49.6 million in FY24. The Ohio River System also had an increase to $100.9 million in FY24, with more steady funding in FY22, FY23 and FY25, ranging from $51.5 million to $76.6 million. The additional funds in FY25 for the Allegheny River are for the replacement of miter gates, sector gates and the interlock system at Allegheny 2. Additional work on the Monongahela River in FY24 included work on Braddock Locks and on the Ohio River included work on Emsworth, Dashields, Montgomery, New Cumberland and Pike Island.

Figure 4. Total O&M Funding per Fiscal Year



Source: Civil Works Budget and Performance

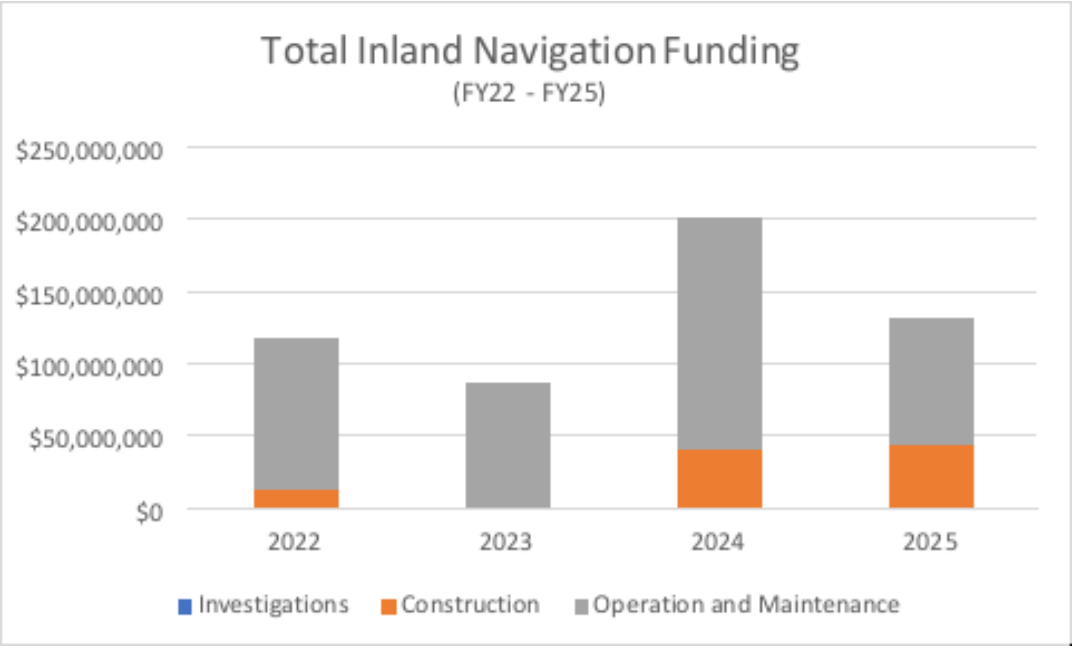
While funding has remained relatively steady, operations and maintenance costs have increased as these structures continue to age. Although the oldest facility in the region, Monongahela Locks and Dam #3, was removed in 2025, the remaining assets continue to need extensive maintenance to function. While funding has been allocated for replacement of the main chamber of Montgomery Locks and Dams, the Ohio River is still at risk until that work is complete, as well as the replacement of the main chambers at Dashields and Emsworth Locks and Dams.

FUNDING

Funding for Inland Waterways typically comes from federal appropriations. Funding is broken out by New Construction (new projects), Investigations (planning studies for new projects), and Operation and Maintenance (maintaining existing projects). In addition to the typical funding process, there is occasionally separate legislation that includes funding for inland waterways such as the Infrastructure Investment and Jobs Act (IIJA).

Funding across all appropriations from 2022 through 2025 is shown in Figure 5. No funding was available for investigations during this time period. Construction funding supported continued design and award of the first Montgomery construction contract for the Upper Ohio project in FY22, closure of land chamber for the Lower Monongahela River Navigation Project in FY24, and for award of option 3 for the Montgomery Lock construction in FY25.

Figure 5. Total Inland Navigation Funding per Fiscal Year



Source: Civil Works Budget and Performance

In addition to the normal USACE funding process, the Infrastructure Investment and Jobs Act (IIJA) provided the funding shown in Table 2 for Pennsylvania Inland Waterways:

Table 2. Infrastructure Investment and Jobs Act Funding for Pennsylvania Inland Navigation

Infrastructure Investment and Jobs Act Funding			
	2022	**2023**	**2024**
Montgomery Locks Construction	$857,708,000		$103,389,485
Emsworth Locks Construction	$77,000,000		-$35,000,000
Lower Monongahela Navigation Construction			$41,000,000
Allegheny River O&M		$400,000	
Ohio River O&M		$20,200,000	$3,000,000
TOTAL	$934,708,000	$20,600,000	$112,389,485

Source: Civil Works Budget and Performance

The funding for Montgomery Locks and Dams was supposed to include full funding for a new main chamber at the facility. At the time the IIJA was enacted, the Montgomery contract for a new main chamber was being finalized and cost estimates were being reviewed considering significant cost increases on several other projects. While the amount provided will accomplish a significant portion of the construction, additional funding will be necessary to complete the project based on the final cost estimates. Funding provided for Emsworth in 2022 was reduced by $35 million in 2024. Those funds were transferred to the Montgomery Locks. Funding from the IIJA is not cost shared with the Inland Waterways Trust Fund (IWTF).

Beginning with the Water Resources Development Act of 2022, the existing cost-share for authorized navigation projects on the inland waterways (65% from the General Fund of the U.S. Treasury and 35% from the IWTF) was made permanent. Set to expire in 2030, the WRDA 2024 further changed the cost share to 75% from the General Fund of the U.S. Treasury and 25% from the IWTF.

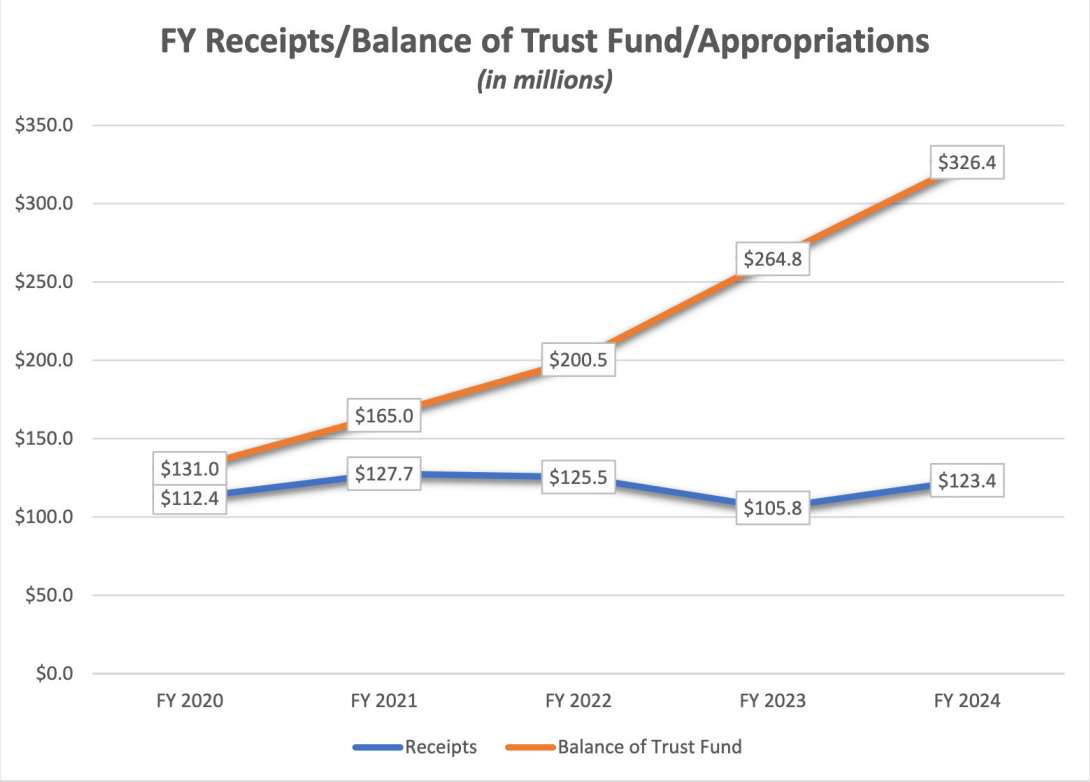
The Pennsylvania Congressional Delegation, the Port of Pittsburgh Commission and the USACE have worked seamlessly to promote, secure and effectively manage legislation and funding to operate and maintain the Inland Navigation System

FUTURE NEED

While recent funding provided to complete the Lower Mon Project, construct the new Montgomery Lock, and begin construction of the new Emsworth Lock are very encouraging, this should be viewed as the beginning. The inland waterways operate as a system, and risk remains until the entire system is upgraded. The work needs to continue with funding for the new chambers at both Emsworth and Dashields Locks and Dam estimated at over $4.5 billion in addition to funding for the second Chamber at John P Murtha Locks and Dam. While the second chamber at John P. Murtha Locks and Dam is part of the original project, a reauthorization would be required to include an updated cost estimate. The Waterways Council Inc. (WCI) Report, “Recommendations for Improving the Delivery of Inland Waterway Capital Projects” emphasizes the need to look at navigation as a system rather than individual projects. The Capital Investment Strategy (CIS) developed by USACE provides the future needs for the system and indicates the current timeframe to complete this work is concerning. In a presentation to the IWUB, USACE notes the 2025 CIS shows with historical funding trends only 8 projects would be completed by 2044. This report has not yet been publicly released. The Inland Waterways Users Board (IWUB) strongly supports the use of the CIS as the best tool to prioritize inland waterways projects that deliver the best value to the Nation.

Of concern to the Waterways Users Board (IWUB) is the current use of the IWTF. The IWUB supports using all funds in the IWTF to move these projects forward and not let the balance in the IWTF grow significantly. While the IIJA has provided significant, much needed funding, the IWTF balance continues to grow with a balance of $326.4 million at the end of 2024. Figure 5 shows the receipts and IWTF balance From FY20 to FY24. Congress should appropriate all estimated IWTF receipts including the excess balance from previous years and apply to the priorities of the CIS.

Figure 6. Inland Waterway Trust Fund Receipts and Balance



Source: Annual Report to Congress for 2024

Current conditions on the Allegheny River need to be addressed. Although there was a recent increase in O&M funding to address some maintenance issues, the Allegheny River facilities still receive minimal maintenance funding. These facilities continue to deteriorate and need to be addressed.

As with many infrastructure categories, recent spikes in inflation will cause both construction and maintenance costs to increase, thus effectively reducing the value of available funding. Additional funding will need to be pursued to account for the higher anticipated costs to permit needed and anticipated upgrades and upkeep of the network's facilities.

PUBLIC SAFETY

It has been estimated that loss of a key lock and dam, such as those on the Ohio River, could result in a major shift in the transportation of coal and coke to the local roadway and rail systems with significant impact. See Figure 2 for a cargo capacity comparison.

To place current tonnage levels onto local roadways would require one truck every 1.5 minutes and a continuous stream of trains carrying coal and coke through the region. The available capacity of the roadway and rail systems to absorb this increase is not sufficient as traffic levels on each are already at maximum levels, thus any such mode shift will only contribute to overtax these facilities and increase congestion, with consequent potential to cause a decrease in safety on the roadway and rail facilities.

Public safety could be severely impacted in the event of lock and dam closures for lengthy periods as more traffic is diverted to local roadways, and additional rail crossing sites will pose increased danger to vehicular traffic.

RESILIENCE

Resilience on the Inland waterways is provided by a second chamber or spare components since there are no alternate routes. Scheduled lock and dam maintenance operations are usually planned to minimize impacts upon river traffic. Often, failure of a component that shuts down a lock for a long period of time would not severely cripple navigation, if there are two chambers available. With the completion of the new lock at John P. Murtha Locks and Dam and the change in river elevations, only one chamber is available at this facility. Since this is a new lock, risk of failure is low, but construction of the new second lock is currently deferred for 25-50 years. The second lock should be completed within the next 25 years when the newer lock may begin to need closures for maintenance. In addition, as the Upper Ohio Project enters the construction phase, each facility will be relying on one chamber while the new chamber is constructed. This lack of resilience is expected to continue over the next 30 years. Prior to construction at these locations, the District is insuring the single operating lock is in good condition through its maintenance program. All locks on the Allegheny River have single locks. Figure 6 is a typical Allegheny River Lock and Dam with one chamber. To provide resilience in this situation, the District has a spare set of miter gates which would require over a year to fabricate. This would result in a shorter closure to repair. Of note, however, is the high percentage of unscheduled closures, 67% in 2024, which cannot be planned to minimize impacts.

Figure 7. CW Bill Young Lock and Dam



Source: US Army Corps of Engineers, Pittsburgh District

Failure of a river navigation dam would have devastating consequences on barge traffic. A dam failure would halt commercial traffic for a considerable amount of time since the navigation depth could not be maintained without the dam. Since the removal of Elizabeth Dam in 2025, the oldest dam on the system, the risk to the navigation system in Pennsylvania is much lower than in past reports.

INNOVATION

Since the Inland Waterways Infrastructure is deteriorating and funding is constrained to keep up with needed upgrades, the use of innovation can help prolong design life and lessen life cycle costs. Recently the National Academy of Sciences, Engineering and Medicine, Committee on Furthering the Development and Beneficial Use of Innovative Materials in Water Resources Infrastructure completed the Report, "Innovative Materials in Water Resources Infrastructure, Opportunities for the Corps of Engineers". The report concluded that the USACE Engineer Research and Development Center (ERDC) maintains state-of-the-art knowledge of innovative materials, and the challenge is to translate this knowledge into routine practice throughout USACE. Since the Pittsburgh District is one location of the Inland Navigation Design Center, the District is heavily involved in this knowledge transfer. Both the Lower Mon Project and the Upper Ohio Project are using some of these materials and are providing lessons learned and knowledge transfer to other Districts.

The Pittsburgh District incorporated several innovative concepts into the Lower Mon Project. Innovations for the John P. Murtha Lock include using high strength concrete, in-the-wet construction methods shown in Figure 8, innovative filling & emptying system, remote lock operation capabilities, and innovative grout bags for scour protection.

Figure 8. In the Wet Construction Methods



Source: Inland Waterways Users Board #90

Innovations for the Upper Ohio project include using high strength concrete, advanced physical modeling, remote lock operation capabilities, construction area GIS Tool, UAS photogrammetry, commonality & standardized designs for interoperability among Emsworth, Dashields and Montgomery, advanced 3D BIM modeling & virtual reality modeling, and potential use of composites for hydraulic structures.



RECOMMENDATIONS TO RAISE THE GRADE

- Continue efforts by the Pennsylvania Congressional Delegation, the Port of Pittsburgh Commission and the USACE to promote, secure and effectively manage legislation and funding to adequately operate and maintain the Inland Navigation System.
- Ensure funding supports all estimated receipts going into the Inland Waterways Trust Fund (IWTF), including any remaining excess balances from previous years.
- Advance federal funding for the Operation and Maintenance (O&M) activities on the inland waterways system, to address the critical backlog of routine work.
- Foster greater coordination, communication and collaboration between the USACE, private sector, and universities for the use of innovative materials in inland navigation projects. Innovative materials can lower costs and increase design life leading to more economical longer lasting structures.

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Levees

C

GRADE COMPARISON

PA: C

Nat'l: D+



Photo: The U.S. Army Corps Of Engineers Union City Dam, Park in Pennsylvania, Zack Frank

LEVEES

EXECUTIVE SUMMARY

180 levee systems span 155 miles and reduce flood risk for approximately 158,000 residents, 47,900 buildings, and $26.2 billion in property. Averaging more than 60 years old, many exceed the design life commonly associated with flood protection infrastructure. Although most screened systems have a low USACE Levee Safety Action Classification, more than 85% are not FEMA-accredited, and many are maintained by local governments with limited financial and technical resources. National Levee Database risk information describes the population, property, and other assets that could be affected by levee failure rather than providing a single numeric score.

Public safety remains a significant concern because levee overtopping or failure can result in rapid flooding and substantial loss of life, economic, or environmental consequences for the communities they protect Continued investment in maintenance, rehabilitation, inspections, emergency preparedness, and Emergency Action Plans is essential as Pennsylvania's levees face aging infrastructure, funding constraints, and preparedness gaps.

BACKGROUND

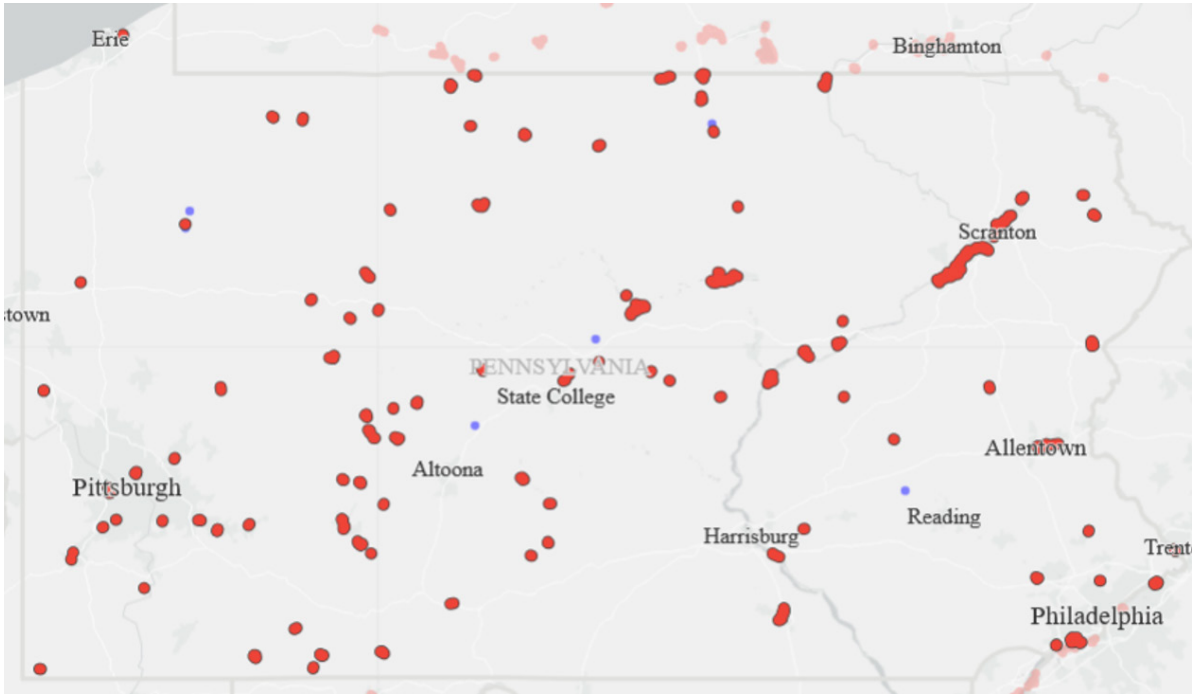
Pennsylvania contains 180 levee systems, comprising 214 levee segments, spanning approximately 155 miles, with approximately 140 miles of earthen embankment and 15 miles of floodwall, as identified in the USACE National Levee Database (see Figure 1). These systems protect communities, businesses, transportation infrastructure, agricultural lands, and other public and private assets from flooding. Ownership and maintenance responsibilities vary among federal, state, county, municipal, and other local entities. Because levees require regular inspections, routine maintenance, and periodic rehabilitation throughout their service lives, long-term funding, technical expertise, and emergency preparedness are critical to maintaining reliable flood protection.

A levee is a constructed barrier, typically made of earth, concrete, or other materials, built along rivers, streams, or other water bodies to reduce the risk of flooding and to convey water safely away from communities, infrastructure, and agricultural areas.

CAPACITY

Levee systems in Pennsylvania protect approximately 158,000 people, 47,900 buildings, and $26.2 billion in property value. These systems collectively provide a significant flood risk management function across the Commonwealth and are an important component of Pennsylvania's overall flood resilience strategy.

Figure 1. Distribution of levee systems across the Commonwealth of Pennsylvania



Source: National Levee Database

Pennsylvania's levee systems vary considerably in size, complexity, and the populations they protect; see Table 1. Some systems provide flood risk reduction for densely developed urban areas while others protect smaller municipalities, agricultural areas, and critical infrastructure.

CONDITION

According to the USACE National Levee Database, Pennsylvania's levee systems have an average age of more than 60 years. Most systems were constructed between 1950 and 1970 (see Figure 2) and now exceed the anticipated design life of approximately 50 years commonly associated with levee infrastructure.

Comprehensive and consistent condition information is not publicly available for all levee systems in Pennsylvania. Inspection frequency, documentation, and oversight vary depending on a system's ownership, authorization, and participation in federal or state programs. In addition, FEMA accreditation is a floodplain-mapping determination and should not be interpreted as a comprehensive condition assessment, safety regulation, or guarantee of levee performance.

The Pennsylvania Department of Environmental Protection tracks 78 levee systems constructed by the Commonwealth. These systems are inspected annually through a cooperative arrangement between PADEP and USACE. PADEP also provides funding opportunities to help sponsors of state-constructed levees address operation and maintenance needs. In 2020, PADEP initiated a grant program supporting video inspection of levee conduits on a recurring five-year cycle. As of July 2026, approximately 80% of eligible state levee sponsors had used the program during the current inspection cycle.

Table 1. A Selection of Pennsylvania Levee Systems and Assets Protected

Levee System	Location	Year	Population Protected	Buildings Protected	Property Value Protected	Risk Classification	FEMA Accreditation
Kingston to Exeter	Forty Fort, Luzerne County	1986	32,002	10,821	$6 Billion	Moderate	Accredited Levee System
Sunbury	Sunbury,	1951	7,471	2,968	$1 Billion	Moderate	Accredited Levee System
Danville - Lower Susquehanna/ Mahoning Creek	Danville, Montour County	1950	1,592	581	$ 200 Million	Moderate	Accredited Levee System
Etna	Etna, Allegheny County	1987	615	308	$90 Million	Low	Provisionally Accredited Levee System
Patton	Patton, Cambria County	1961	28	16	$5 Million	Low	Non Accredited Levee System

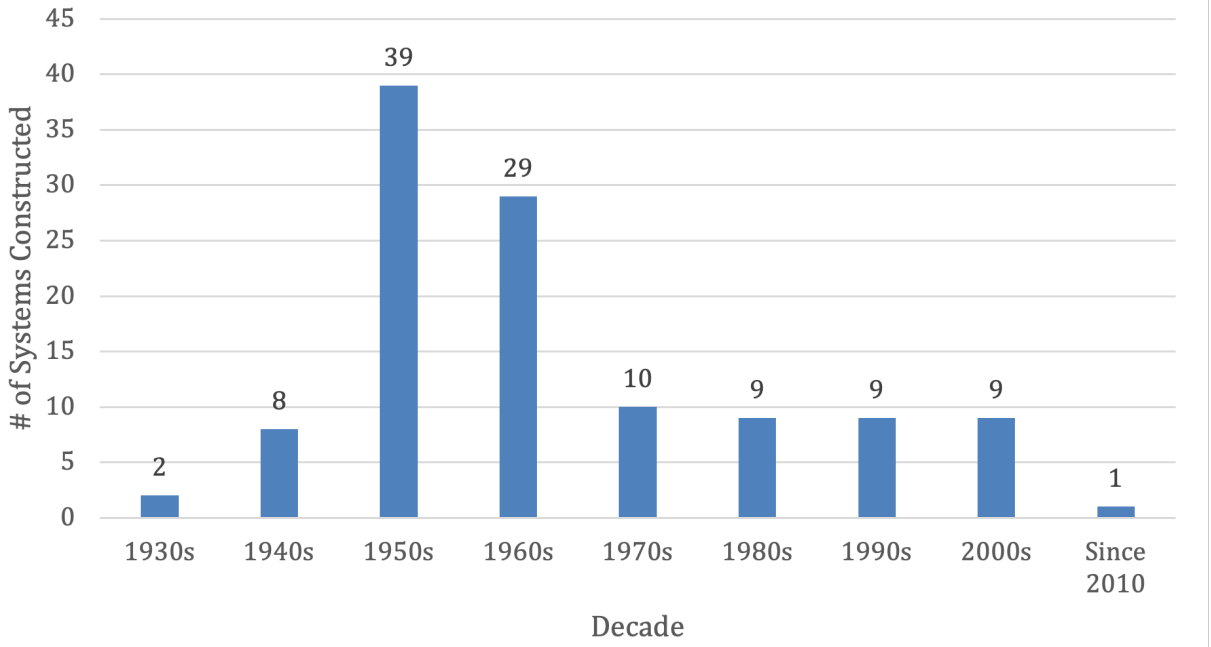
** Date of original construction, modifications have been made to some levees since this time.*

Source: FEMA and U.S. Army Corps of Engineers National Levee Database

For levees outside state and federal inspection programs, statewide condition data are more limited and may depend on information maintained by individual owners. This lack of consistent condition information makes it difficult to characterize the overall physical condition of Pennsylvania's levee portfolio or estimate statewide rehabilitation needs. Expanded technical assistance, standardized inspection and reporting practices, and a centralized inventory of condition findings would provide levee owners and decision-makers with a stronger basis for prioritizing maintenance, rehabilitation, and funding.

More than 85% (156) of Pennsylvania's levee systems are not accredited by FEMA. FEMA-accredited levees are certified by a registered professional engineer, meet National Flood Insurance Program minimum design, operation, and maintenance requirements, and reduce the flood hazard associated with the base (1%-annual-chance, also known as 100-year) flood. While non-accredited levees may still provide meaningful flood risk reduction benefits, accreditation status serves as an indicator of documented compliance with minimum federal requirements.

Figure 2. Number of Pennsylvania Levee Systems by Year Constructed



Source: U.S. Army Corps of Engineers National Levee Database Levee Safety Dashboard

FUNDING

Funding for levee maintenance, rehabilitation, and improvement remains a significant challenge throughout Pennsylvania. Most levee systems are owned and maintained by local governments that often have limited financial resources and competing infrastructure priorities. Capital funding generally comes from federal appropriations administered through the U.S. Army Corps of Engineers (USACE), state appropriations administered by the Pennsylvania Department of Environmental Protection (PADEP) and Department of General Services, Department of Community and & Economic Development (DCED) Pennsylvania Flood Mitigation Program grants, and contributions from municipalities, counties, or authorities. Major rehabilitation projects often exceed the amounts available through individual grant programs and may also require local funding for cost sharing, property acquisition, design, permitting, and long-term operation and maintenance. The existing draft identifies these same funding sources and constraints.

Pennsylvania's Flood Mitigation Program is funded by the Marcellus Legacy Fund - established by Act 13 of 2012 - and uses a portion of oil and gas impact fees to provide grants for eligible flood mitigation projects, including levee-related engineering and improvements. Funds may support land and easement acquisition, engineering studies for levee certification, construction or rehabilitation of flood-control infrastructure, debris removal, security measures, construction inspection, permitting, and other eligible project-administration costs. Grants are limited to $500,000 per project and require a 15% local match.

Although a comprehensive statewide estimate of levee funding needs is not available, individual systems illustrate the types and scale of investments required. The Williamsport flood protection system, which includes approximately 15 miles of earthen levees and concrete floodwalls, has required inspections and engineering evaluations of levees, floodwalls, pump stations, hydrology and hydraulics, interior drainage, geotechnical conditions, structural components, and operation and maintenance procedures. Rehabilitation planning has been undertaken for several components of the system to address federal certification criteria. USACE and local partners have also pursued additional funding for a Williamsport feasibility study and obtained approval for cross-pipe rehabilitation, demonstrating that funding must often be assembled incrementally for studies, design, authorization, and construction.

The Wyoming Valley systems provide another example of continuing maintenance demands. Recent needs identified by the local flood protection authority included rehabilitation of relief wells, cleanout of additional wells, resealing floodwall joints, addressing localized embankment sloughing, and upgrading aging pump stations. The authority serves 12 communities, allowing participating municipalities to pool resources, but increasing costs and limited grant availability continue to constrain maintenance and capital planning.

PADEP has similarly identified multiple state-constructed levee rehabilitation projects moving through the Commonwealth's capital-budget process. Recent needs have included repairs to drainage pipes and interior-drainage features, while some proposed projects have been discontinued because local sponsors could not support required land acquisition, cost sharing, or future maintenance responsibilities. PADEP reported five capital-budget rehabilitation projects ready for bidding, illustrating that the need extends beyond routine maintenance but that projects can take substantial time to advance from identification through funding and construction.

These examples demonstrate that Pennsylvania's levee funding needs are not limited to construction of new embankments or floodwalls. Significant investment is also required for pump stations, relief wells, conduits, closure structures, interior drainage systems, geotechnical and structural evaluations, accreditation analyses, and recurring maintenance. Because project information is maintained by numerous local sponsors and agencies, the examples should not be interpreted as a complete statewide needs estimate. A centralized statewide inventory of identified deficiencies, planned improvements, estimated costs, funding status, and anticipated schedules would provide a stronger basis for prioritizing investment and evaluating the gap between available funding and long-term levee needs.

FUTURE NEED

Pennsylvania's future levee needs are influenced by aging infrastructure, changing development patterns, increasingly severe weather events, evolving flood risk information, and limited local resources. Comprehensive statewide information on rehabilitation needs and associated costs is not readily available because many systems are owned and managed locally. As a result, improvement decisions are made independently by individual municipalities and counties, and there is no single statewide inventory of rehabilitation costs or funding needs.

Many municipalities also lack specialized expertise needed to plan, fund, design, permit, acquire right-of-way, and administer major levee rehabilitation projects. Additional technical assistance could help communities advance needed projects more efficiently and consistently. Pennsylvania contains over 13% of the municipalities in the U.S. This fragmented local government structure can make regional coordination, long-term planning, and development of multi-jurisdictional flood risk reduction projects more challenging.

The levee systems in Pennsylvania that are not currently accredited by FEMA will need to undergo certification to demonstrate that the systems meet minimum design and operation standards. If systems are not certified by a Professional Engineer and subsequently accredited by FEMA, they will not be considered to provide the 1% annual chance flood protection on FEMA's Flood Insurance Rate Maps (FIRMs). This has negative consequences for insurance and floodplain management

for property behind the levees. Levee sponsors are responsible for hiring a Professional Engineer to perform needed analyses, identifying deficiencies and making any physical improvements to the system needed for compliance, and submitting documentation to FEMA to apply for accreditation. These responsibilities are financially challenging for many Pennsylvania levee sponsors.

Although no comprehensive statewide estimate of levee maintenance and construction needs is available, individual projects demonstrate the magnitude of potential costs. Williamsport's current levee rehabilitation program is estimated at approximately $10.75 million, including improvements to pump stations, electrical and backup-power systems, relief wells, cross-pipes, and related infrastructure. The program includes an $8 million federal award, while a separate pump-station electrical upgrade contract was awarded for approximately $1.6 million.

New levee construction can require substantially greater investment. A proposed 1.6-mile levee in West Pittston was estimated at nearly $50 million in a 2019 feasibility study. An October 2026 project update placed the estimated cost at approximately $65 million, with about $2 million in additional state funding still being sought before final design could proceed.

These examples are not a statewide needs estimate, but they illustrate that levee projects can range from million-dollar rehabilitation contracts to tens of millions of dollars for new systems. They also demonstrate the need to combine federal, state, and local funding for engineering, construction, rehabilitation, and long-term maintenance.

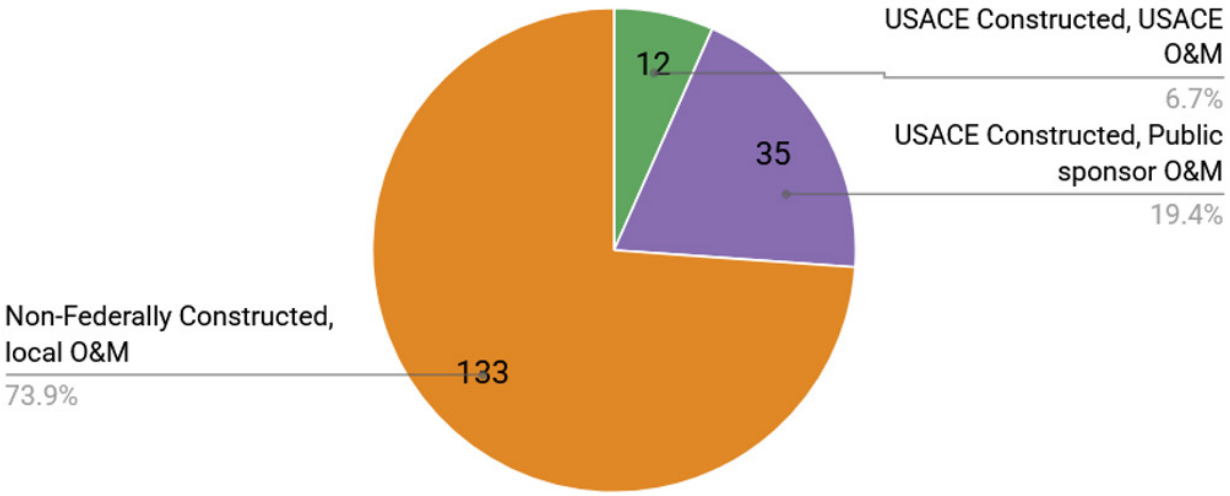
OPERATION AND MAINTENANCE

Levees and associated infrastructure deteriorate over time due to erosion, scour, settlement, corrosion, weathering, and other mechanisms. Regular maintenance and periodic rehabilitation are necessary to ensure systems continue providing their intended level of protection.

Pennsylvania's levee systems fall into three primary authorization categories that dictate construction and operation and maintenance responsibilities (see Figure 3). Twelve levee systems (7%) were constructed by USACE and continue to be operated and maintained by USACE. Thirty-five systems (19%) were constructed by USACE and are currently operated and maintained by local sponsors. The remaining 133 systems (74%) are non-federal levee systems, that were not federally constructed and are operated and maintained by local entities. Authorization category can be indicative of the number of resources available to address operations and maintenance issues. For example, ongoing operation and maintenance costs represent a substantial burden for smaller communities serving as local sponsors, particularly rural municipalities with limited tax bases. Recent projects illustrate the range of these expenses. In Williamsport, a broader levee improvement program includes pump-station, electrical, backup-power, relief-well, and cross-pipe improvements. The Luzerne County Flood Protection Authority has also identified recurring needs involving relief-well rehabilitation and cleanout, floodwall-joint resealing, localized embankment repairs, and upgrades to aging pump stations. As a result, many levee sponsors must focus available resources on maintaining existing infrastructure rather than implementing broader system upgrades or resilience improvements.

The PADEP tracks seventy-eight levee systems that were constructed by the state of Pennsylvania. These systems are inspected annually under a cooperative arrangement between the PADEP and the USACE. Additionally, PADEP provides funding opportunities for sponsors of state-constructed levees to support operations and maintenance. In 2020, the PADEP initiated a grant program to support video inspection of levee conduits. Grants are offered to all state constructed levee sponsors on a revolving 5-year cycle. As of July 2026, approximately 80% of state levee sponsors have utilized this program to have their culverts inspected in this current cycle (PADEP, personal communication, July 20, 2026).

Figure 3. Pennsylvania Levee Systems by Authorization Category



Source: U.S. Army Corps of Engineers National Levee Database Levee Safety Dashboard

PUBLIC SAFETY

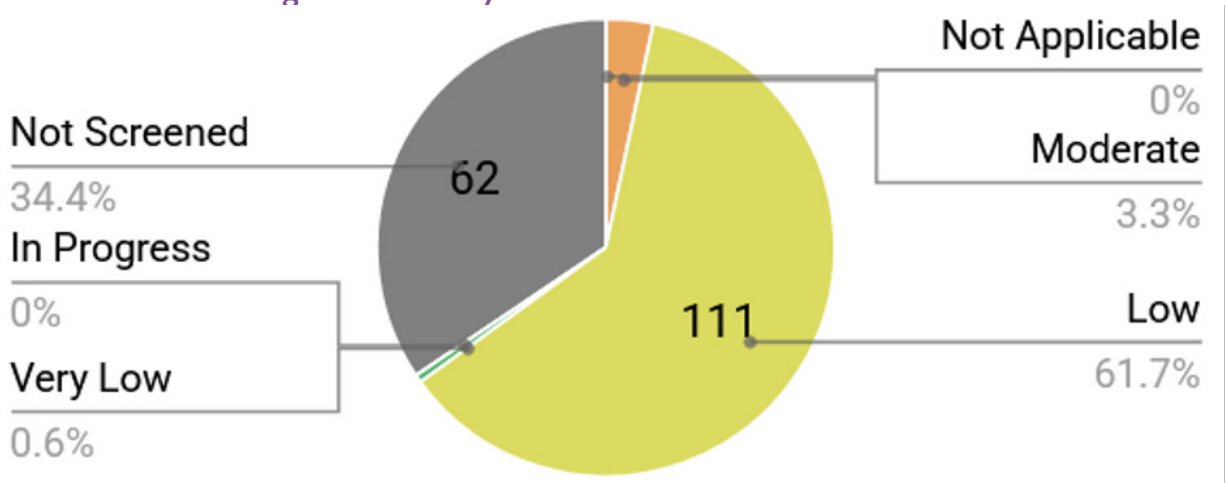
Levees provide a critical public safety function throughout Pennsylvania by reducing flood risk to people, property, businesses, and critical facilities. The consequences of levee overtopping or failure can be severe, particularly in developed areas where populations and infrastructure have been built assuming continued levee performance.

Approximately 158,000 people, 47,900 buildings, and $26.2 billion in property value are located within levee-protected areas across the Commonwealth. This represents increases of approximately 22% in people, 6% in buildings, and 16% in property value being reported as protected by levees since 2022 in the NLD. Much of this increase in reported risk may be due to more comprehensive assessment of risk-prone areas. Even well-maintained levees can be overtopped during extreme events or experience failures resulting from erosion, seepage, or infrastructure deterioration. USACE risk screening evaluates the relative risk of levees in the portfolio based on probability of failure, and potential life and safety consequences if a failure occurs.

In the **National Levee Database (NLD)**, "risk" is not a single numeric score but a **set of consequence data fields** that describe the potential impact if a levee fails. These fields quantify the **population, property, and other assets behind each levee**, which together represent the flood risk to those areas. Through the National Levee Safety Program, USACE is authorized to conduct levee risk assessments to provide a consistent risk characterization and support future risk-reduction actions. For the Pennsylvania levee systems in the National Levee Database (see Figure 4), 63% of Pennsylvania levee systems are classified as very low or low risk by the USACE, 3.3% are classified as moderate risk, and the number of levee systems that have received risk screenings by the USACE has increased by approximately 6% since 2022. However, according to the National Levee Database, 34% of levee systems in the Pennsylvania levee portfolio remain unscreened.

Emergency preparedness remains a vital component of public safety. PADEP publishes guidance for levee-specific Emergency Action Plans; however, there is no statewide requirement that all levee owners develop and routinely update EAPs. As levee systems age and flood risks evolve, maintaining current emergency response procedures and coordination among levee owners, emergency managers, and first responders become increasingly important.

Figure 4. Pennsylvania Levee Risk Classifications



Source: U.S. Army Corps of Engineers National Levee Database

Beyond inspections, levee sponsors have improved public safety through FEMA accreditation efforts, pump station and backup-power upgrades, relief-well rehabilitation, conduit inspections, emergency planning updates, and improved flood-warning and interior-drainage analyses. Recent examples include accreditation-related improvements in the Wyoming Valley system and ongoing pump station and drainage infrastructure upgrades within the Greater Williamsport flood protection system

RESILIENCE AND INNOVATION

Resilience measures seek to reduce flood risk, improve recovery capabilities, and increase the ability of communities to adapt to changing conditions. In addition to levee rehabilitation and maintenance, many communities are evaluating watershed-wide stormwater management, floodplain restoration and protection, property acquisition and relocation programs, bridge opening improvements, ice-jam mitigation measures, and elevation of vulnerable structures.

These complementary approaches can reduce reliance on a single flood protection measure and improve overall community resilience. While some Pennsylvania communities have begun implementing these strategies, broader adoption is often limited by funding, staffing, technical expertise, and the fragmented municipal governance structure of the Commonwealth.

Many flood risk management innovations focus on integrating traditional structural measures with improved planning, forecasting, and data-driven decision making. Continued advances in flood forecasting, risk assessment, and infrastructure monitoring can help levee owners better understand vulnerabilities and prioritize limited resources. A Flood Forecasting System has been used throughout the Wyoming Valley of the Susquehanna River, which encompasses multiple levee systems, for several decades, with continuous improvements as technology has advanced.

Ongoing efforts supporting innovative levee characterization and monitoring, including noninvasive geophysical testing, uncrewed aerial vehicle (UAV) supported photography, LiDAR, multispectral and thermal imaging, and remote bathymetric surveying to support levee resilience in Pennsylvania are active areas of research at The Pennsylvania State University (e.g., see Figure 5). However, these technologies have yet to be adopted into practice.

Figure 5. Researchers preparing for a geophysical survey on a Pennsylvania levee in July 2024



Source: Kaleigh Yost

Early warning systems and flood forecasting capabilities supported by the National Oceanic and Atmospheric Administration, the U.S. Geological Survey, and USACE remain important components of effective levee risk management and emergency preparedness.



RECOMMENDATIONS TO RAISE THE GRADE

- Increase the cap on Pennsylvania Flood Mitigation Program grant funding for levee engineering studies, improvements, upgrades, and non-routine maintenance activities.
- Encourage new and rehabilitated levee projects to consider design standards that go beyond the 100-year level of current design in response to future rainfall trends.
- Require counties and municipalities to address operation and maintenance of levees affecting their community, and any levee safety concerns or levee deficiencies in their Hazard Mitigation Plans. This will trigger revising levee issues at least every 5 years, keep concerns visible, and make needed upgrades eligible for more post-disaster grants.
- Encourage financial incentives for all levee owners to create Emergency Action Plans and update them as climate data and development patterns change risk profiles.
- Provide more statewide or federal expertise to assist local communities in preparing and updating Emergency Action Plans.

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Ports

C+



GRADE COMPARISON

PA: C+

Nat'l: B

Photo: Shipyard industry aerial view of large ship for repairs in large floating dock on the river Delaware Pennsylvania; ungvar/

PORTS

EXECUTIVE SUMMARY

Pennsylvania is home to three main ports located in Philadelphia, Pittsburgh, and Erie. These regions process over 67 million tons of goods annually, valued at nearly $50 billion. Pennsylvania's port infrastructure is aging, with considerable ongoing rehabilitation work and future investment needed for continued operation and realization of future growth potential. In Philadelphia, port operators are initiating regional growth with the development of a new cruise terminal and the Destination 2040 strategic plan to triple container capacity over the next 15 years. State and local funding is critical for maintenance and rehabilitation, as well as future growth, and is anticipated to continue into the foreseeable future.

BACKGROUND

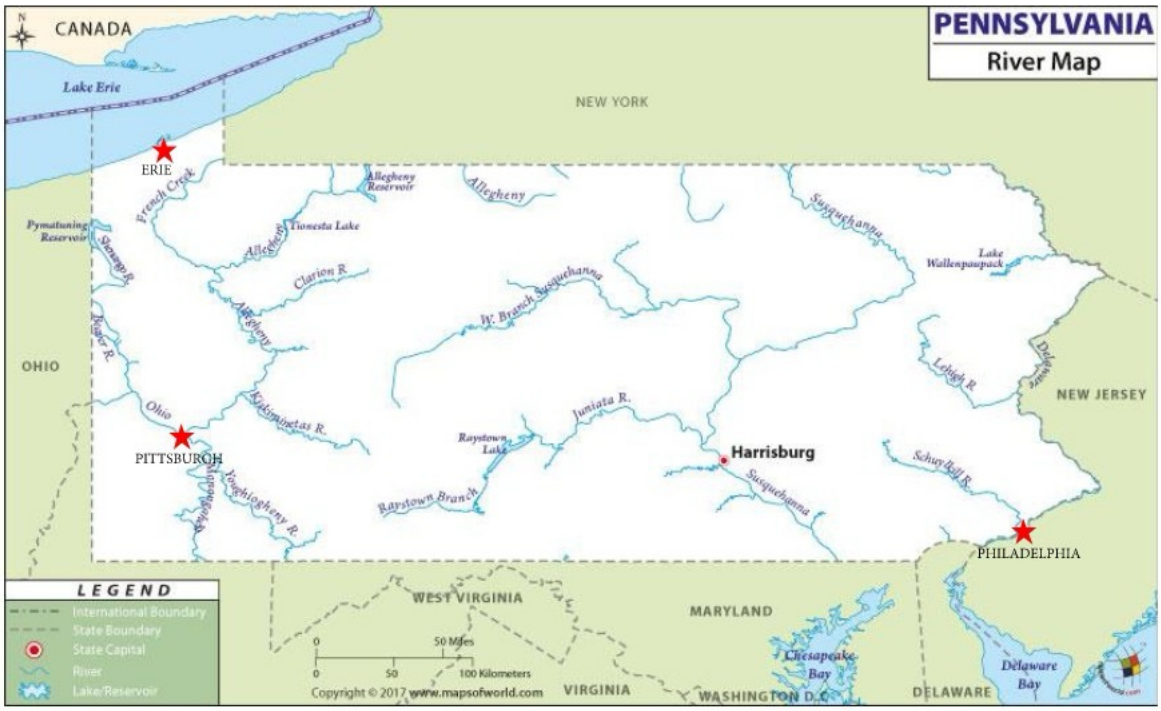
Pennsylvania has several ports, including smaller ports along its inland waterways. The major ports are located in Philadelphia, Erie, and Pittsburgh.

The Port of Philadelphia (PhilaPort) is an independent agency of the Commonwealth, charged with the management, maintenance, marketing, and promotion of port facilities along the Delaware River. It plays a key role in strategic planning throughout Philadelphia's overall port district. As a landlord port, PhilaPort leases its properties to terminal operators who move cargo through each facility and into the region's supply chain. These cargoes and the activities they generate are responsible for tens of thousands of direct and indirect jobs in the Philadelphia area and throughout Pennsylvania.

The Port of Pittsburgh Commission functions as a regional planning, advocacy, and coordination entity rather than a traditional port authority that owns or operates physical infrastructure. It does not maintain terminals, locks, dams, or other navigation assets; instead, it provides system-level leadership to align public agencies, private operators, and federal partners across a 13-county region encompassing approximately 200 miles of navigable inland waterways on the Ohio, Allegheny, and Monongahela Rivers

The Erie-Western Pennsylvania Port Authority (Port of Erie) is Pennsylvania's only Great Lakes port It provides in excess of 750 direct jobs and thousands of indirect jobs to the Erie region, with over $110 million in annual economic stimulus to the Erie area.

Figure 1: Map of Major Pennsylvania Ports



Source: mapsofworld.com

Figure 2: The lighthouse at the Port of Erie



Photo: Maritime

CAPACITY

The major ports in the Commonwealth handle diverse cargoes with varying available drafts, with PhilaPort handling more containers and overall tonnage, while Pittsburgh handles mostly dry bulk cargoes.

Table 1: PA Ports Annual Cargo Tonnage and Navigable Drafts

Port	Cargo (Metric Tons)	Navigable Draft (ft)
PhilaPort	7,400,000	40-45
Port of Erie	600,000	25-27
Port of Pittsburgh	16,000,000	9

While there are existing connections to rail lines, the involved railroads have been reducing their available trackage to cut maintenance costs and market the real estate formerly used for yards and staging areas to reduce land inventory and increase capital. This has often worked at cross-purposes to the ability to bring additional freight rail service for port service and functions and has added to the burden of port operators to locate and identify potential landside storage and laydown areas.

PhilaPort holds assets worth about $900 million and encompasses over 1150 acres of property, including timber piers, cellular wharf structures, dry and cold warehouses, ship to shore and mobile harbor cranes, on-terminal rail tracks, and the world's largest fully enclosed and refrigerated wholesale produce terminal. It handles a variety of cargoes, including containers, breakbulk, roll-on roll-off, and liquid bulk, with containers making up the majority of tonnage.

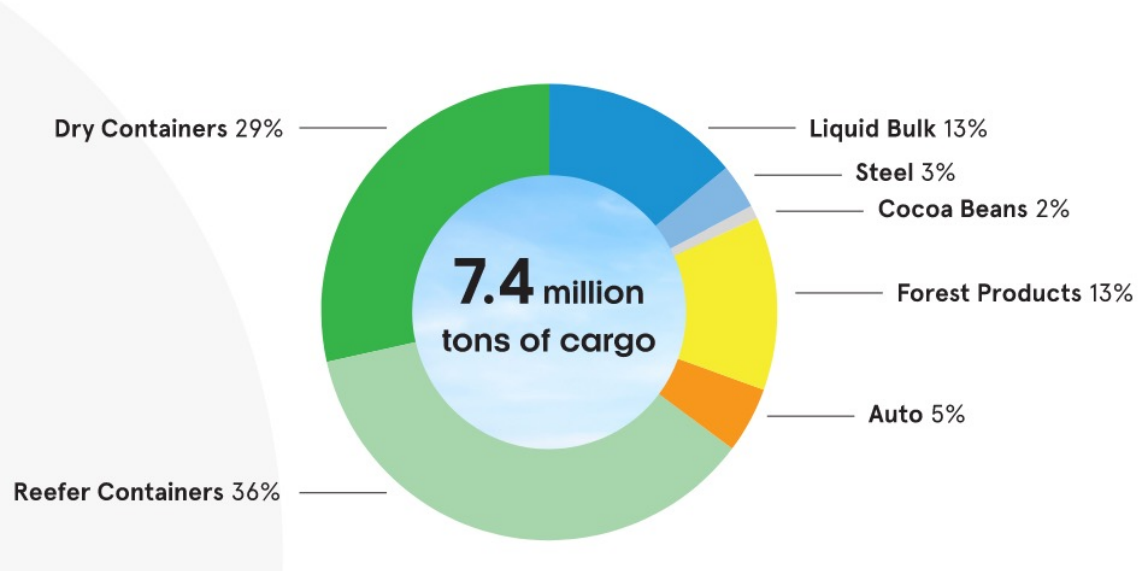
Table 2: PhliaPort Cargo Volumes

Year	Containers (TEUs)	Containers (Metric Tons)	Steel (Metric Tons)	Forest Products (Metric Tons)	Automobiles (Units)
2025	889,268	5,376,248	97,301	648,706	248,753
2040 (Projected)	1,570,000	9,386,200	N/A	1,200,000	540,000

Source: PhilaPort.com

These numbers demonstrate how PhilaPort is able to drive regional growth. Its Destination 2040 strategic plan sets the stage for a 15-year program and outlines procedures for tripling container capacity, upgrading terminal gates, and acquiring new land to relieve supply chain bottlenecks. Philadelphia, however, is not quite ready to accept these volumes in its current state. Its current container capacity is closer to one million TEUs, and it faces a similar constraint for other cargo types. The forecast for increased cargo volumes has necessitated a push for projects that increase on-site storage capacity and includes new warehouses, such as the PhilaPort Distribution center, which offers 175,000 SF dual freezer and refrigerated space and 200,000 SF of dry storage space, container densification on its terminals, as well as several key property acquisitions such as the Mustin Intermodal Yard.

Figure 3: PhilaPort cargo tonnage by commodity



Source: PhilaPort.com

Pittsburgh cargo volumes have remained relatively stable in recent years, though a modest decline has prompted strategic exploration of commodity diversification, including agricultural products that may require long-term market development.

The Port of Erie currently handles about half of its estimated existing throughput capacity of 1.2 million tons, based on a 2022 market analysis. Most of the commodities are sand, salt, limestone, and aggregate. The Port owns 665 acres of Bayfront property. Some of that acreage is submerged lands and more than half of it is non-port related. In 2024, the Port of Erie purchased the Erie Coke site which added 194 acres to their 59 acres of commercial maritime property. The port's storage capacity is adequate given the needs of the region and the adjoining navigation channels; however, the addition of new cargoes such as steel, wood pellets, windfarm components or recycled materials could push it past capacity quickly. The Erie Coke site is still undeveloped and available for future expansion, if needed. The Port of Erie also has one of only two drydocks on the Great Lakes, which is capable of dry-docking 1,000-foot vessels and can be used for ship building, ship repairs, repowering, and more. The Port of Erie recently published a master plan for the site that envisions commercial marina expansion, public greenspace, and mixed-use developments. The Port is actively soliciting maritime dependent partners for the Erie Coke site, but the site has environmental challenges that must be addressed by either the Port or possibly a Public-Private Partnership using private money.

CONDITION

Though specific condition rating data is not typically released publicly by ports for a variety of reasons, aging port infrastructure poses a challenge across the Commonwealth. PhilaPort is no exception to this trend, with most of its piers constructed in the early 1900s and wharves constructed in the mid- to late-1900s. On the river, its 15 deepwater berths must be dredged routinely, vessel bollards and fendering systems require routine repairs, its timber piers in the central port district continue to rot in the tidal zone, and its cellular sheet piles continue to experience section loss, all of which require costly repairs and often innovative modern solutions.

In Pittsburgh, the removal of the Elizabeth Lock and Dam on the Monongahela River in 2024 represents a critical recent policy and operational milestone, a result of system-wide deliberations initiated in the early 2000s. While removal improved operational efficiency and reduced lifecycle maintenance costs, it also resulted

in lower-than-anticipated pool elevations, introducing new challenges related to shallow draft conditions and increased grounding risk in the 24-mile stretch of river between adjacent dams. It has proven difficult to maintain the required 9-foot navigation channel, which has reduced the maximum cargo load for local facilities. Because the U.S. Army Corps of Engineers is constrained in its ability to independently seek supplemental funding, the Port and its partners have assumed a lead role in grant advocacy and mitigation planning, underscoring broader structural challenges in navigation funding governance. (Part of this system and its needs is also covered in the Inland Waterways report).

The Port of Erie has aging infrastructure and is initiating an asset management program which will inspect assets every 3-5 years. A 300-ton stiff leg crane is currently inoperable and must be rehabilitated, as well as other mobile cranes that need replacement. The Port of Erie also has aging dock walls in need of rehabilitation or replacement. Much of its property has undeveloped shorelines that warrant erosion protection measures. The Port's topside infrastructure also has repair needs (structural, utilities, roofs, etc.) and could benefit from additional covered warehouse space.

FUNDING

Just as ports are complex facilities with many interconnected systems and structures, so too are the varied funding sources that the ports draw on for maintenance and capital improvement. All three of the major ports in the Commonwealth rely on state funding and federal grants, and both PhilaPort and Port of Erie can also draw on revenue from tenants. The Commonwealth has invested heavily in its ports over the past decade by providing in excess of $1 billion to help fund upgrades and modernization of facilities at PhilaPort, Port of Erie and Port of Pittsburgh. Recent funding for PhilaPort is listed below.

Table 3: PhilaPort Funding Summary

Description	Year	Amount
Dredging Delaware River to -45 ft	2008	$168M
3-acre Property Acquisition	2022	$6M
PA Funding	2022	$246M
3-acre Property Acquisition	2025	$5M
15-acre Property Acquisition	2025	$34M
152-acre Property Acquisition	2025	$90M
Annual Operations/Maintenance	--	$20M-$25M

Source: PhilaPort.com

PhilaPort receives much of its operating funds from the leases to their terminal operator tenants as well as Commonwealth delegations. To fund capital improvement projects, PhilaPort relies on federal and state grants. Over the last 4 years, they have pursued a variety of federal grants including programs administered by the USDOT, MARAD, EPA, FEMA, and EDA. It has had considerable success winning MARAD INFRA grants in 2021, 2022, 2023, and its largest grant to date remains the MEGA 24 grant for their SouthPort Berth.

PhilaPort is also diversifying its revenue stream through the development of a new cruise terminal located adjacent to the Philadelphia International Airport.

The Port of Pittsburgh Commission has played a central role in pursuing and coordinating a diverse portfolio of state and federal funding sources to support inland waterway infrastructure and vessel sustainability. These sources have included Pennsylvania state agency and nonprofit funding, Maritime Transportation Fund (MTF) grants, Congestion Mitigation and Air Quality (CMAQ/CMAC) grants for repowering diesel-powered vessels, and U.S. Department of Transportation Maritime Administration (MARAD) programs such as the Port Infrastructure Development Program (PIDP). The Port has also expressed concern regarding the fragmentation of federal navigation funding and has advocated for clearer Army Corps project prioritization rather than dispersed allocations across numerous sites.

Erie has continued to utilize its own usage-based funds to make its necessary investments. According to its Master Plan, most financial resources are allocated to operation and maintenance activities, as capital funds are generally limited. Maintenance budget levels are on the order of $15 million annually over the past several years. In 2024, the Port of Erie was awarded an $11.3 million PIDP grant with a $6 million match. This grant will be used to replace the 1,250 linear feet Parade Street wharf and widen the slip to allow two vessels to berth at the same time. This project is to be placed on hold pending sufficient funding to complete it.

Figure 4: The Erie Parade Street Slip from the inshore bulkhead



FUTURE NEED

Most of the piers and other waterfront structures across Pennsylvania's port agencies are old and in constant need of maintenance repairs. Furthermore, they were designed for previous generations of vessels and are therefore in need of upgrades to be able to accommodate current fleet dimensions. Frequently, emergency repairs and reconstruction are necessary due to the age of these facilities and exposure to extreme conditions, like significant storm events. The Port of Erie's needs include rehabilitation of dock structures, upgraded buildings, repairs to the 300-ton stiff leg crane, new mobile harbor cranes, and covered warehousing. It also needs to update utility infrastructure and address deficient seawall and shoreline stabilization infrastructure. Maintenance dredging is an ongoing operational cost that is necessary for vessel navigation. Dedicated funding is needed in the short term to address serious or critical issues for its landside operations, waterfront structures and in-water work. As container volumes increase, Philadelphia will

need to develop land for cargo handling. The authority has plans to construct approximately 2000 linear feet of new berthing space at its SouthPort Auto Complex, leveraging two key Federal grants and Commonwealth funding.

As vessel sizes calling the Port of Philadelphia continue to increase, there may be a need to dredge the Delaware River Channel from its existing 45 ft to a 50 ft depth. The 50 ft depth would ensure that the next class of vessels can access Philadelphia's Port terminals.

Figure 5: PhilaPort's Tioga Marine Terminal



Source: PhilaPort.com

Looking forward, the Port of Pittsburgh faces several persistent challenges, including continued modernization of the Upper Ohio River system, and securing funding for the Emsworth and Dashields Locks and Dams. While maintenance funding for managing sedimentation and dredging needs is always paramount in the budget, the port is also in critical need of funds to assist privately owned facilities that have been affected by the removal of the Elizabeth Dam.

OPERATION AND MAINTENANCE

Current port budgets are primarily geared toward ongoing upkeep and maintenance of existing facilities, which are old and in need of modernization. Consistent heavy vehicle traffic in the terminal yards, often exceeding the loads seen on interstate highways, necessitate annual paving maintenance, and its vast amount of warehouse space demands both structural and mechanical maintenance. Recent major upgrades to facilities are needed to stay competitive in the shipping market and to accommodate newer machinery and methods have helped to reduce maintenance and upkeep burdens to some extent. Most of the piers and other waterfront structures are in constant need of maintenance repairs and oftentimes emergency repairs. Reconstruction is necessary due to the facilities' age and exposure to extreme conditions. For instance, PhilaPort recently completed widescale rail track replacement at its Tioga Marine Terminal.

The ports continue to work to maintain their infrastructure. For instance, in 2025 Port of Erie completed the implementation of an asset management program, promoting better budgeting for infrastructure maintenance and replacement needs, and more effective funding solicitation. Over the next 10 years, it is estimated that $120 million will be needed to address these high-priority items at their sites to maintain current operations. Due to aging of the assets, it can be expected that the needs will increase with each passing year

PUBLIC SAFETY, RESILIENCY, AND INNOVATION

Port facilities have a good safety record and are fairly secure, requiring anyone entering to have a Transportation Workers Identification Credentials (TWIC) card in their possession. PhilaPort completed the installation of central port security cameras in 2025.

From a resilience and climate adaptation perspective, investments supported through federal Congestion Mitigation and Air Quality Program grants have produced immediate environmental benefits, with Port of Pittsburgh receiving $8.2 million in the past 4 years for projects to improve multi-modal access and reduce emissions. Ports are also working in coordination with the National Weather Service to improve preparedness for extreme weather events and predict changing pool elevations. Rising water levels not only threaten waterfront infrastructure and operations through flooding but also complicate maintenance efforts by shortening the available windows to access structural elements located in the low tide zone.

PhilaPort is committed to sustainability, with environmental considerations driving strategic planning and green port initiatives. PhilaPort was awarded $79.7 million from the Environmental Protection Agency's Clean Ports Program to procure 26 electric yard tractors, 10 electric forklifts, and an electric powered rail car mover. In addition to the new equipment, PhilaPort has completed the conversion of its STS cranes at Packer Avenue to sustainable fuel sources, reducing their dependence on fossil fuels. The planned Southport Terminal berth will support the port's resiliency by withstanding significant fluctuations in river water levels while placing the terminal above the floodplain.

As part of its Master Development and Facility Plan, the Port of Erie has recently taken steps to develop a more complete asset management system so that it can more effectively manage its assets and plan for the future. This system provides a single centralized repository to collect, track, and analyze assets, inspection, and project planning data. Additionally, it has created an electronic property database that includes all parcels and associated data from Erie County tax records and web links connected to the Erie County web site and the subject parcel for current data.



RECOMMENDATIONS TO RAISE THE GRADE

- Increase coordination between port agencies and railroads that serve them to enhance and expand abilities for landside distribution and delivery.
- Pursue additional rounds of local, state, and federal grants to continue infrastructure investment.
- Pursue a dedicated funding source which would be used for ongoing dredging at various piers. Dredging is the single most important need of any maritime facility. Without it, vessels cannot get to the wharves.
- Actively implement an asset management program to prioritize its critical needs and proactively secure funding for repairs/replacements.
- PhilaPort - Develop new berths at SouthPort, and improve traffic patterns and exclusive freight connectivity to I-95 in South Philadelphia.
- Port of Pittsburgh – work to sustain sufficient freight volumes to justify future capital investment.
- Port of Erie - Continue to market the Erie Coke site development, either through State or Federal Grant funding to clean up the site to make it more attractive, or through a Public-Private Partnership where the Port of Erie would be obligated for a minimal amount of project funding. In the case of the P3, the Port could be the local sponsor for future grant opportunities to help pay for the infrastructure upgrades.

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Philaport.com

Public Parks

C-



GRADE COMPARISON

PA: C-

Nat'l: C-

Photo: The Perry Square, Park in Erie, Pennsylvania; Zack Frank

PUBLIC PARKS

EXECUTIVE SUMMARY

Public parks, including nature preserves, plazas, trails, and connectors have provided passive and active recreation for centuries. In the modern era public parks are expected to provide natural spaces, transportation for commuters, tourism opportunities, mental health refuges, and community growth assets. Despite increases in funding across the state, demand for both the creation of new facilities and maintenance of existing facilities is not being met. Communities are trying to increase safety and accessibility to parks by providing educational materials, sunscreen dispensers, information signs, and accessible design. Cities and towns are also looking to plant trees to help reduce the heat island effect, improve stormwater management, and reduce crime rate. The Pennsylvania Department of Conservation and Natural Resources (DCNR) has been teaming with trusted mobility data companies, in addition to traditional counting metrics, to conduct its own exploratory studies to understand opportunities, challenges, and trends of public use in their parks, with the goal to inform how to implement strategic improvements to public parks.

BACKGROUND

Public parks are often an overlooked part of our communities, underfunded, and under-maintained. Pennsylvania parks, trails, and connectors provide stormwater and climate resilient infrastructure; transportation networks to work, shopping, and recreation; opportunities for tourist dollars; and incentives to bring in new residents.

Research included publicly available data from DCNR; the cities of Philadelphia, Pittsburgh, Allentown, and Erie; the counties of Bedford, Lackawanna, Lycoming, and Venango; and a questionnaire sent to all 67 counties across the Commonwealth.

CONDITION AND CAPACITY

Pennsylvania has over five million acres of open space for public recreation, three national wildlife refuges, and 6,429 local parks, 19 National Park Service Unites, and 124 State Parks, according to DCNR.

Many communities have found that the COVID-19 pandemic increased the trajectory of community expectations for parks to provide transportation networks for commuters, bicyclists, pedestrians, tourism opportunities, mental health refuges, and access and connection to community growth assets including shops and restaurants. The increased demand for use of trails and parks has led to crowding to be listed as a barrier among 25% of outdoor recreation enthusiasts, according to DCNR. To help combat their disconnected

trail/bike path network, Lackawanna County is looking to develop improvements to bicycle and pedestrian networks in high-priority urban areas. Venango County plans to increase their capacity to attract ecotourism by promoting themselves as "we are the gateway to the forest", and the City of Allentown is focusing on strengthening legislative and ordinance language to protect and promote parks and natural resources.

All eight of the cities and counties that were studied in the preparation of this report have created a comprehensive action plan detailing upgrades to their facilities as well as future visioning. However, visioned projects have either not been constructed or have not been fully documented. It is assumed that, due to lack of funding, the rate of project completion compared to planned time frames is mismatched.

FUNDING AND FUTURE NEED

Funding sources vary across the Commonwealth, including taxes, licenses/ permits, service charges, fines, intergovernmental revenue, trust funds, and other revenue sources. Changing demographics in the state are shifting the needs of communities. According to the PA 2025-2029 Statewide Comprehensive Outdoor Recreation Plan, population decline between 2% and 15% is expected in northern tier and western portions of the Commonwealth, with growth between 0.2% and 12% in the southeastern portion, between 2020 and 2050. These funding sources do not keep up with demand nor shifts in community demographics and increased demands on parks and trials.

Shifts in funding include:

- The City of Philadelphia's Parks & Recreation appropriations budget has increased by approximately 39.6% between 2022 and 2026. (However, in 2025 Philadelphia was ranked below the median of $133, at $122 per capita spent each year on publicly accessible parks and recreation, according to the Trust for Public Lands.)
- The City of Pittsburgh's park budget has increased by over 50.8%, between 2022 and 2026. (With Pittsburgh was ranked above the median of $133, at $176 per capita spent each year on publicly accessible parks and recreation, according to the Trust for Public Lands.)
- The City of Erie's park budget has increased by approximately 32.3%, between 2022 and 2026.
- Bedford Borough's expenses for park infrastructure increased by approximately 124.6%, between 2022 and 2025. (However, the budget only increased by 26.0%, between 2022 and 2024.)
- Pennsylvania's State Budget increased the Conservation and Natural Resources budget by approximately 29.3%, between 2022 and 2025.

It is important to note that these increases do not keep up with the ever-growing demand for the creation of new facilities and maintenance of existing facilities. In the survey of counties conducted for this report, participants noted a need to offset funding gaps by increasing usage fees and implementing new fees to the public for their use of park amenities and services.

OPERATION AND MAINTENANCE

In the survey of counties conducted for this report, regular maintenance, mowing, plowing, repaving, cleaning, and repairing in publicly accessible spaces were reported as the largest maintenance costs. According to DCNR 2025-2029 Pennsylvania Outdoor Recreation Plan, "Surveys show that both the public and recreation providers view maintenance of our current infrastructure as a top priority." The City of Allentown identified that, upgrading infrastructure in downtown Allentown through the rehabilitation of public infrastructure including streets, sidewalks, parks, and other facilities, as a way to attract businesses and residents in their 2024 Draft Action Plan. Despite this, a deficiency in funding continues. The City of Erie's Repair/Maintenance Supplies budget has remained consistent between 2019 and 2026, despite inflation, the Repair/Maintenance Services budget has increased by approximately 33% between 2019 and 2024, and remained constant from 2024 to 2026. Additionally, among the 100 largest parks systems in the U.S., Philadelphia ranks 81st for the amount it spends on park maintenance per resident.

PUBLIC SAFETY

Despite a lack of information regarding park specific safety concerns and incidents in our research, government agencies have identified ways to improve safety in their reports. Across the state, safety improvements include ATV clubs conducting safety training for youth and adult riders, boating safety policies and educational materials, providing sunscreen dispensers in parks, information signage, and accessible design. Lackawanna County has a goal to design streets that accommodate vehicles, pedestrians, bicyclists, and transit users of all mobility levels to increase the number of safe and accessible paths of travel between trails and parks. Bedford Borough has focused on creating an ADA-compliant walking trail in its most prominent public park. Similarly, Oil City's current Three Year Community Development Plan 2025 states, "The City's Section 504 self-evaluation has identified the need for modifications to some City owned facilities to better accommodate our disabled citizens. Projects regularly undertaken in the city include the installation of ADA compliant curbs when reconstructing any road and adding handicapped accessible equipment to the City's playground as appropriate."

RESILIENCE

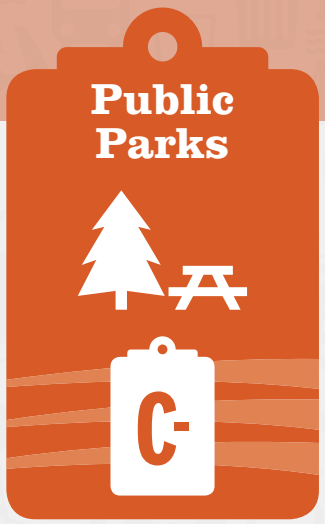
Many communities fold public safety, accessibility, and resilience together. For instance, Philadelphia has a plan to plant trees in lower income communities, where tree cover is currently lacking, to help reduce crime rate, reduce the heat island effect, and improve stormwater management. Lackawanna County municipalities are working to update zoning and land use development codes to promote conservation of riparian corridors and floodplain areas. Similarly, Bedford Borough proposed the implementation of a comprehensive approach to improving stormwater management.

INNOVATION

Over the past decade, DCNR has utilized different mapping and data development methods to learn more about park usage. In the past, data developed by The Trust for Public Land had been used to locate areas lacking recreational access and populations the greatest need for access. More recently, DCNR has had a growing interest in measuring social patterns and behavioral trends using crowdsourced data as a way to better understand how their parks are being used and where to fund strategic projects, improvements, etc. DCNR is accomplishing this by using traditional counting metrics, as well as coordinating with trusted partners, to conduct exploratory studies to understand opportunities, challenges, and trends of mobility data and park users' information. This information has been used to help develop DCNR's strategies.



Photo: Independence National Historical Park in Philadelphia; Roman Babakin



RECOMMENDATIONS TO RAISE THE GRADE

- Increase publicly accessible spaces by partnering with schools, hospitals, and retirement homes, and other community service providers, connecting the community to local amenities and these facilities to the public.
- Create models of self-sustaining parks which focus on balancing income from park activities with maintenance needs. This may be accomplished by increasing revenue generating programming such as athletic tournaments, wedding venue opportunities, or vendor events. Additionally, public private partnerships and "friends of" groups, can be established as trusted partners that can help with stopgaps in funding and park needs.
- Connect parks and trails funding with transportation, tourism, resilience and infrastructure funding. This includes creating trails adjacent to roadways; marketing of amenities and activities to bring in tourism and future prospective residence to bring in tourist and future tax dollars; creating green space inclusive of stormwater management; adding green space to infrastructure projects including damns, bridges, and roadways.
- Direct funding for parks in community redevelopment, as several studies have shown a connection between parks and public spaces and increased growth for local communities and commerce.
- Enhance documentation of before-and-after effects of operation and maintenance projects, to be used as an advocacy tool for more money and to show the voting public its importance.

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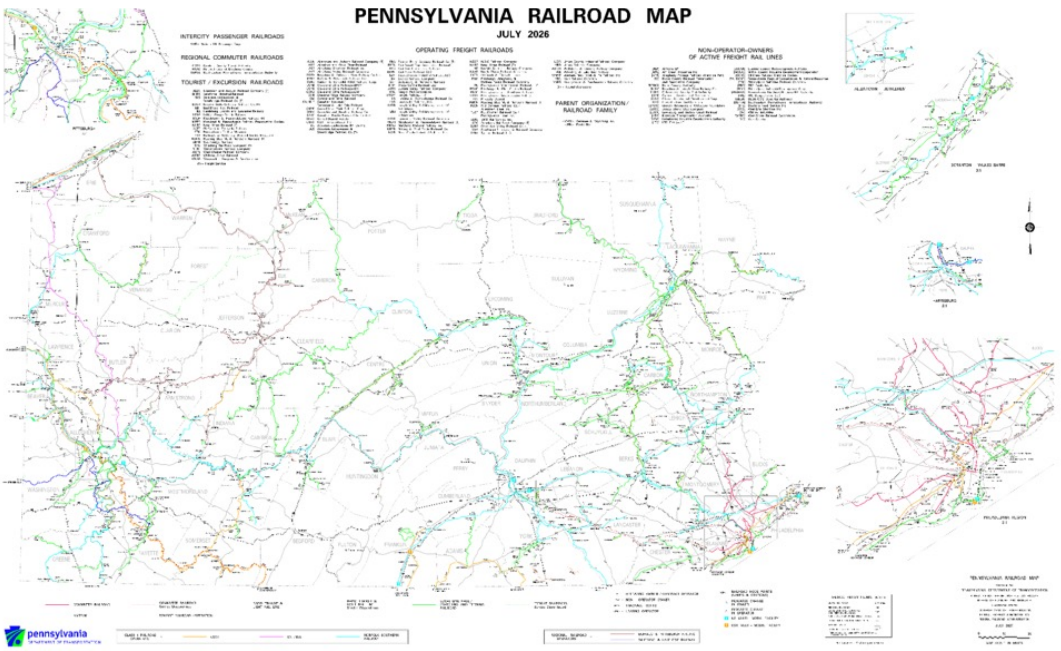
Photo: Allegheny Portage Railroad National Historic Site; Zack Frank

RAIL

EXECUTIVE SUMMARY

Pennsylvania's rail network is as diverse as the Commonwealth itself, ranging from intercity passenger service to transcontinental freight rail systems, to small, short line railroads serving rural areas of the states. The 6,842-mile state network features three Class I operators (CSX, Norfolk Southern, Canadian National), three Class II companies, and 53 Class III operators. In general, Class I infrastructure is in good to excellent condition. Amtrak service will expand with the recently announced agreement to upgrade passenger rail service on Norfolk Southern track in Western Pennsylvania. The 2025 Pennsylvania State Rail Plan (PSRP) reports $21.6 billion of investments in capital projects between 2021 and 2045. This includes $20.2 billion for 218 passenger rail projects and $1.4 billion for 377 freight rail projects, the latter of which are mostly Class III railroad infrastructure needs. The Infrastructure Investment and Jobs Act (IIJA) has expanded and improved passenger rail services in the Keystone state, while keeping the freight network modern and safe.

Figure 1 – Pennsylvania Railroad Map



BACKGROUND

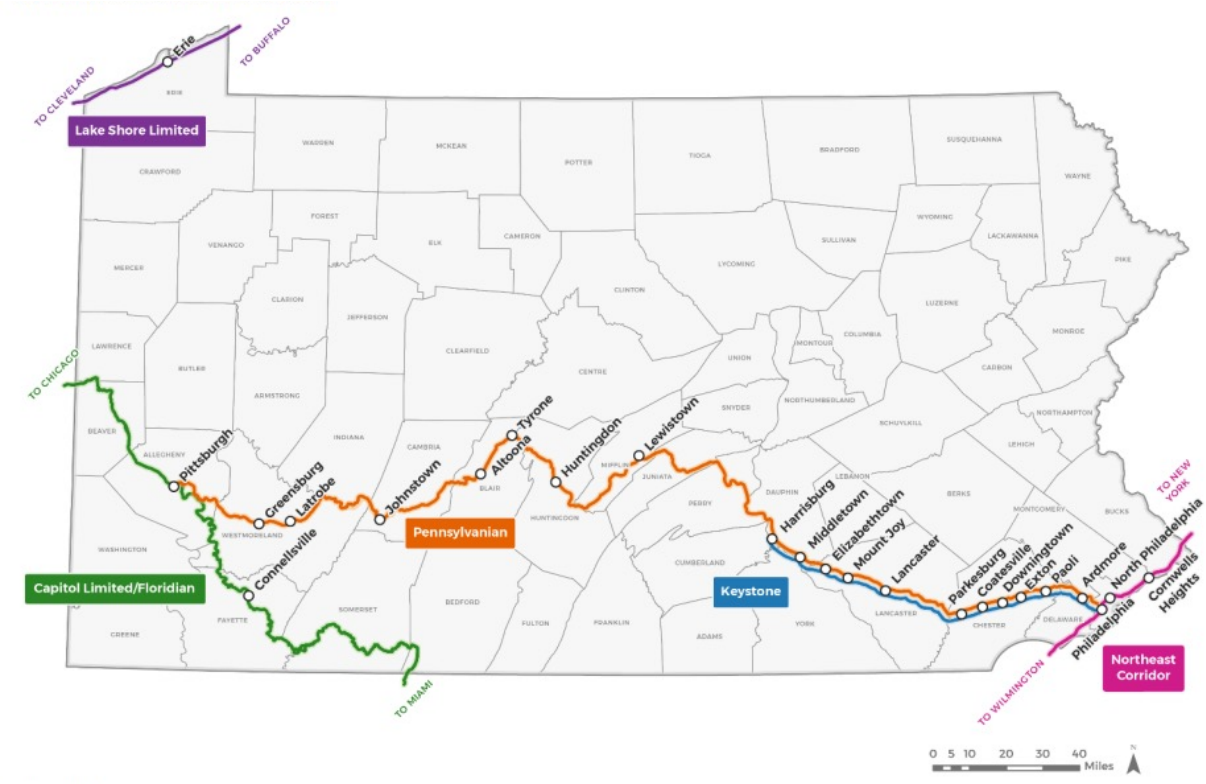
Rail transportation has been a key transportation mode in Pennsylvania for 179 years, supporting industrial production and energy movement. Higher utilization of rail provides congestion mitigation benefits and quicker movement of goods, air quality improvements, and enhancement of transportation safety. The Commonwealth's 59 freight railroads operate on 6,842 miles of track across the state, ranking it the fourth largest rail network by mileage in the U.S.

Passenger

Passenger rail services in Pennsylvania are primarily provided by two operators: Amtrak and the Southeastern Pennsylvania Transportation Authority (SEPTA). Amtrak provides intercity passenger rail services across the commonwealth and throughout the United States, while SEPTA provides commuter rail services throughout the Philadelphia metropolitan region with 280 route miles served by 13 rail lines. Amtrak's Keystone Service, supported by Pennsylvania DOT (PennDOT), runs between New York City and Harrisburg by way of Philadelphia. The Pennsylvanian Service runs between New York City and Pittsburgh by way of Philadelphia.

SEPTA's Regional Rail offers 13 lines with 155 stations serving Philadelphia, Bucks, Chester, Delaware, and Montgomery Counties, as well as service to Newark, DE, and both Trenton and West Trenton, NJ.

Figure 2 – Amtrak Service in Pennsylvania, PSRP, 2025



Source: WSP

Figure 3 – SEPTA Regional Rail System, PSRP, 2025

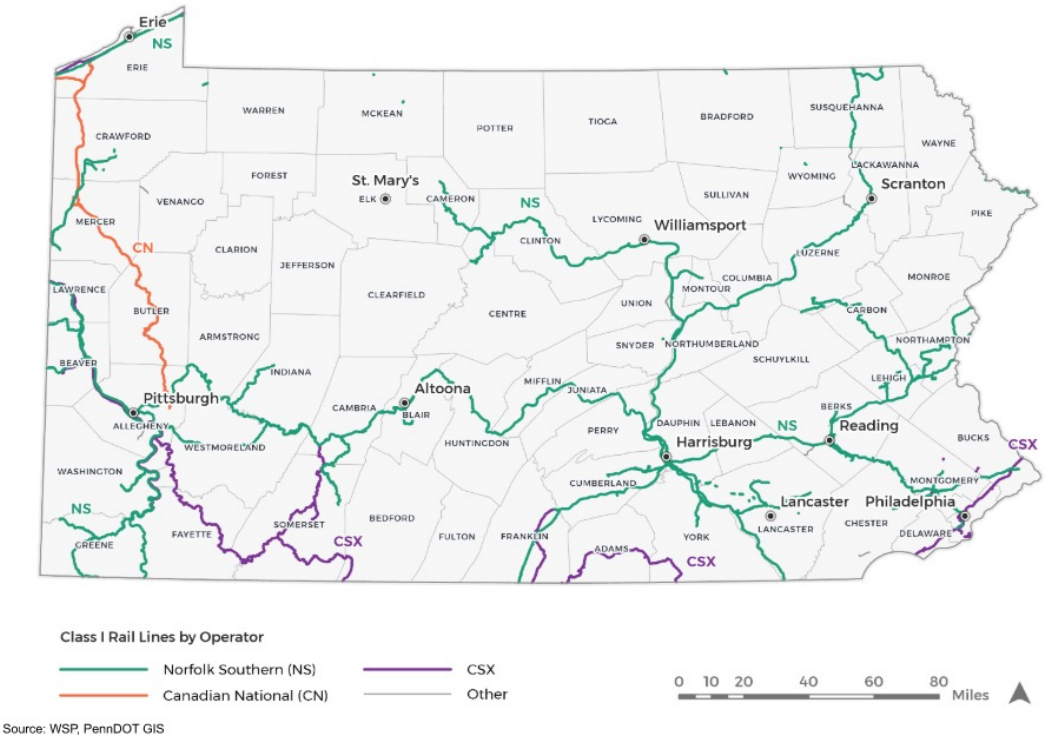


Source: SEPTA

Freight

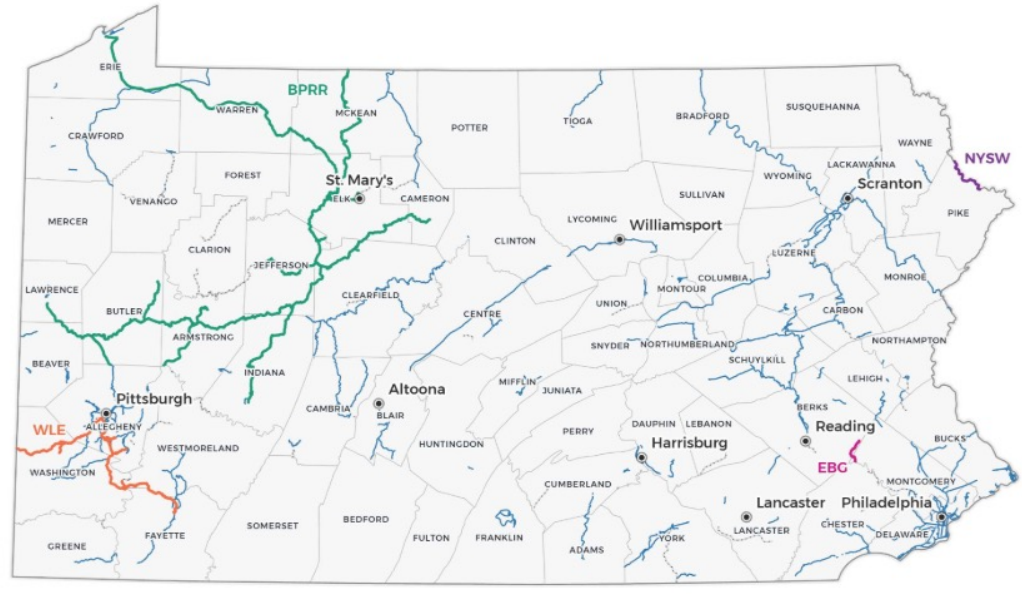
Pennsylvania is one of the nation's leaders in freight assessment, planning, and investment spurring from the Commonwealth's industrial heritage. The 6,842-mile state network features three Class I operators (CSX, Norfolk Southern, and Canadian National), three Class II companies, and 53 Class III operators.

Figure 4 – Pennsylvania Class I Railroads



Source: WSP, PennDOT GIS

Figure 5 – Pennsylvania's Class II and III Railroad Network



Source: PennDOT GIS

CONDITION

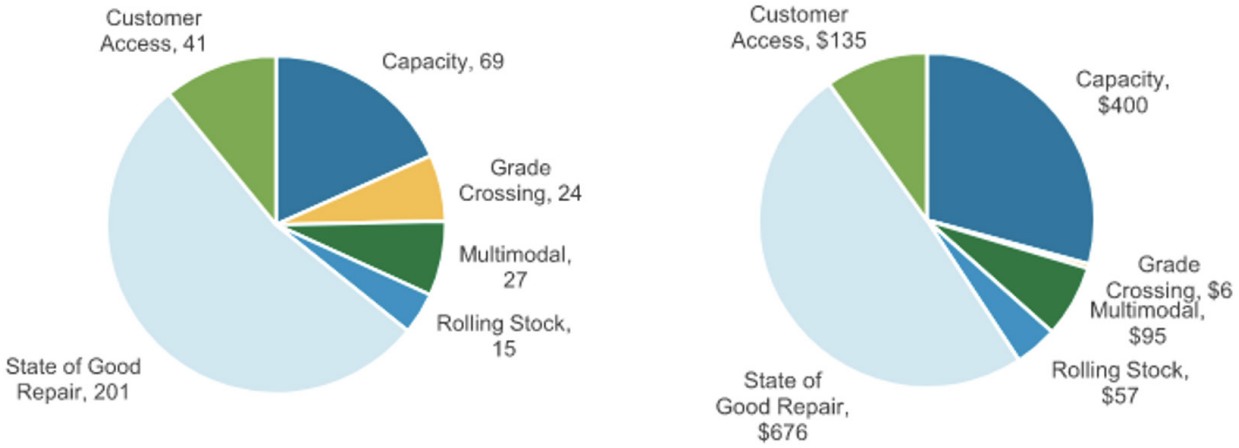
Passenger

Since 2022, Pennsylvania's passenger rail operators have continued investing in infrastructure modernization, accessibility, and system reliability. SEPTA completed the Chestnut Hill East Bridge Rehabilitation Program in 2025 and the reconstruction of Ardmore Station in March 2026, while advancing the renovation of Chestnut Hill East Station and major structural repairs to the Norristown High Speed Line's Bridgeport Viaduct. SEPTA also launched a long-term Station Accessibility Program that will invest more than $1 billion in Metro and Regional Rail stations and is expected to make more than 95% of trips accessible. In addition, planning efforts for transit-oriented development at Ambler and Conshohocken stations are helping coordinate transportation and land-use improvements. Across the Commonwealth, PennDOT, Amtrak, and Norfolk Southern have continued advancing track, signal, siding, and operational improvements along the Keystone West Corridor between Harrisburg and Pittsburgh in support of the second daily Pennsylvanian train and improved network performance. Collectively, these investments reflect Pennsylvania's ongoing commitment to maintaining and modernizing its passenger rail infrastructure while preparing for future service growth.

Freight

According to PennDOT's 2025 PSRP, there are approximately 377 freight projects totaling $1.4 billion from Class I, Class II, and Class III operators across the Commonwealth. These projects are scheduled from 2026-2045. This is an increase from the 323 projects that the 2020 PSRP had projected. The state plans to spend much less on freight than passenger rail because the private operators finance a large portion of improvements to their networks. The public benefits from these private railways, so public money is needed. Many of the proposed projects increase rail capacity either through new track segments, upgraded weight limits, reconstructed bridges, and overpasses to accommodate double-stacking, or other facility and system improvements that improve integration and operations, further supporting the commonwealth's economy. These projects are broken down into several categories as described in Figure 6 below.

Figure 6 - Freight Rail Projects by Improvements Type, 2026-2045



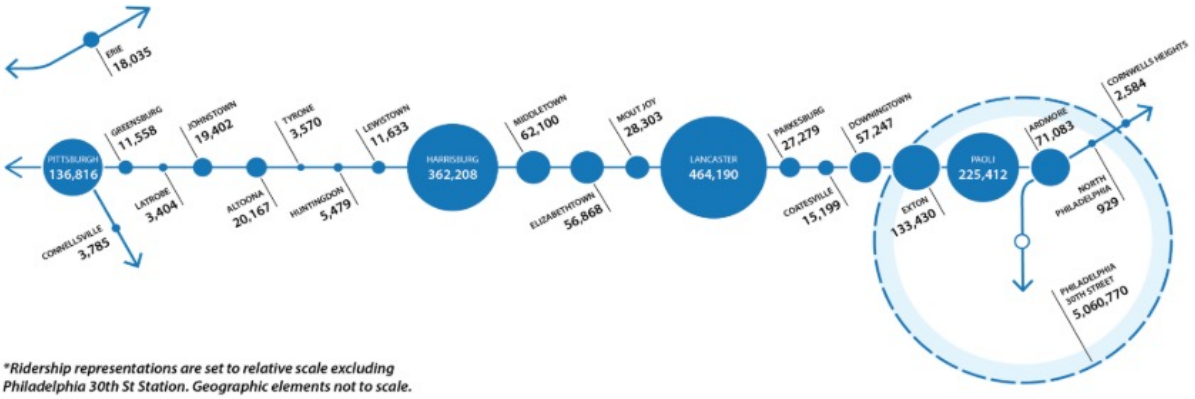
Source: WSP

CAPACITY

Passenger

In Fiscal Year 2025, Amtrak intercity service served approximately 7.4 million riders in the Commonwealth via approximately 110 daily trains with 24 different stations on the 13 permanent service lines. All stations are projected to have an increase in ridership between FY 2029 and FY 2031. The increase in ridership is linked to the addition of a second daily roundtrip on the Pennsylvanian anticipated to begin in fall 2026, with projects upgrading Norfolk Southern's line past Harrisburg nearing completion, in addition to the development of Corridor ID programs across the state. Total growth for all Pennsylvania Amtrak stations is projected at 21% from FY 2025 to FY 2029.

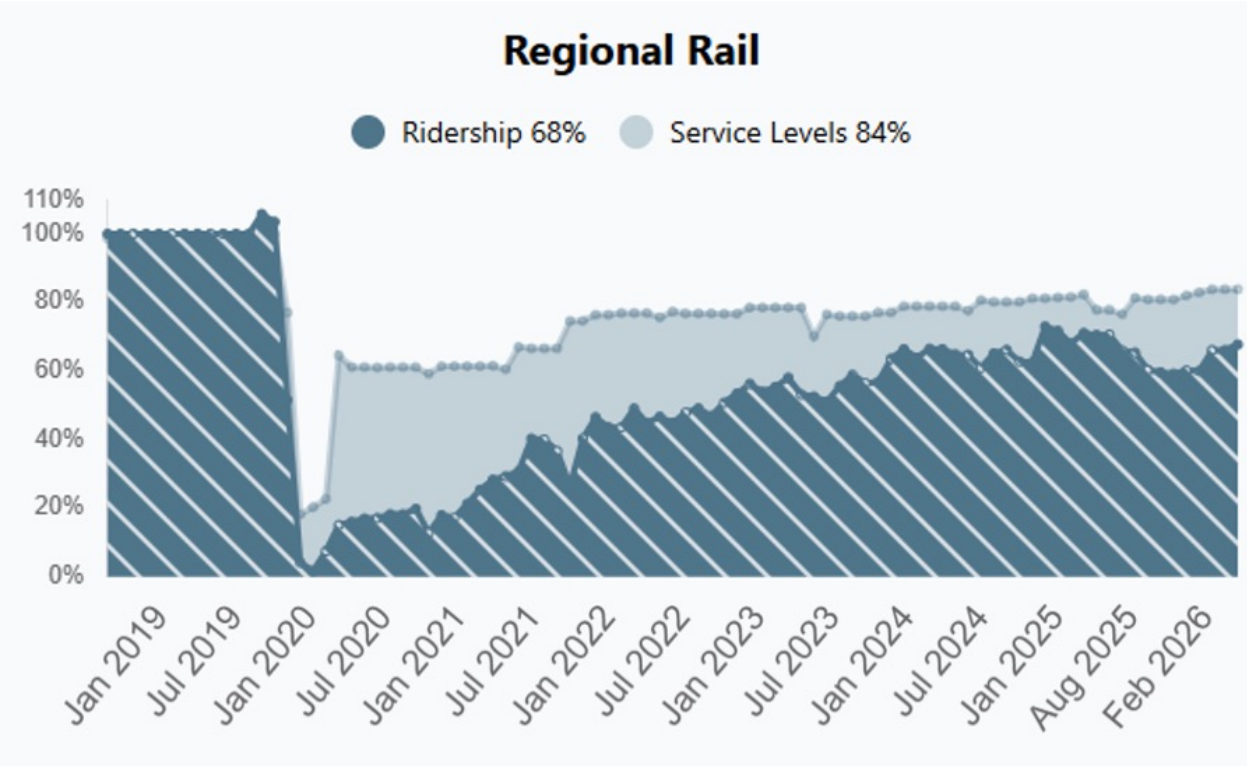
Figure 7 – Pennsylvania FY2024 Ridership by Station



Source: Amtrak Fact Sheet Fiscal Year 2024 Commonwealth of Pennsylvania

On June 27, 2022, PennDOT and Norfolk Southern Corporation (NS) reached an agreement to expand passenger rail access in western Pennsylvania. The milestone follows a February 2022 announcement that the parties would jointly examine opportunities to eliminate chokepoints and improve Pennsylvania's rail system to better permit freight and passenger trains to operate together. To support these expanded passenger operations, the Commonwealth will invest more than $200 million in infrastructure and safety improvements that will be constructed and maintained by NS. The future improvements and construction include upgraded rail lines, passenger platforms, sidings, and necessary communications signals infrastructure. In 2019, SEPTA operated a fleet of 396 vehicles on 13 lines over 223 route miles with 155 stations across the Philadelphia metropolitan area, which includes Bucks, Chester, Delaware, Montgomery, and Philadelphia. In 2019, SEPTA commuter rail service served more than 34 million passengers via 155 stations, a decrease of 0.5% from FY 2018. For FY 2021, SEPTA annual ridership was 106 million or 53% below FY 2020 and 64% below 2019. The COVID-19 global pandemic impacted service, work schedules, and travel patterns. SEPTA lost 59% of its riders from 2019 to 2021 as the pandemic hit. For the first three months of 2022, ridership was at approximately 48% of what it was in the year leading up to the COVID-19 outbreak. This significant decrease in ridership has put tremendous fiscal strain on SEPTA which is set to run out of COVID-19 relief funding by 2024. On the revenue side, SEPTA saw $22.7 million in passenger revenue, 24% below budget, but a 65% increase over what it was in March 2021. SEPTA hopes to have back 80% of its pre-pandemic ridership. The Delaware Valley Regional Planning Commission projected average weekday ridership from 2020 to 2045 for SEPTA Regional Rail network is projected to grow 7.3% from 2020 to 2045 in person trips and 5.2% in passenger miles.

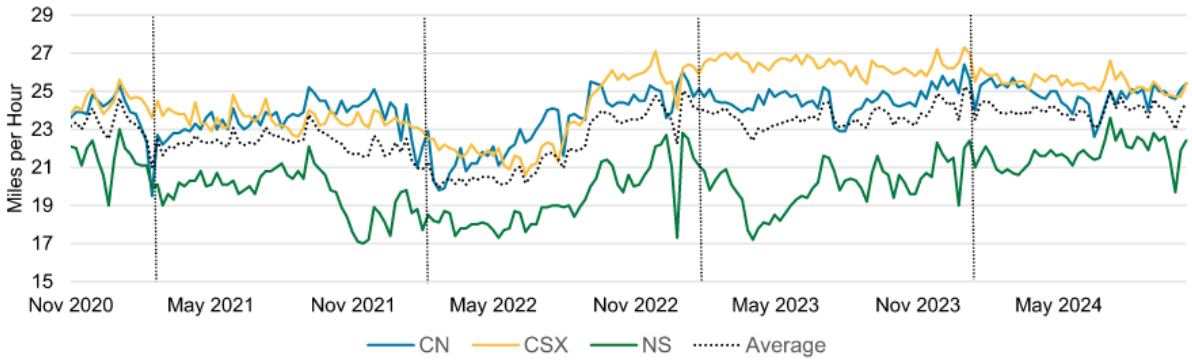
Figure 8 – May 2026 Recovery vs. Pre-pandemic Data



Freight

According to the 2025 PSRP, "The commonwealth ranks high in rail freight carloads and tonnage moved, at sixth and eighth in terminated and originated carloads, respectively, and ninth and twelfth in originated and terminated rail tons". The Pennsylvania freight rail network carried an estimated 170 million tons of freight in 2022. Inbound and outbound traffic accounted for 25% and 28%, respectively, of the Commonwealth's freight rail tonnage (2025 PSRP, 119). This is a decrease from the 193 million tons of freight in 2017 as indicated in the 2020 PSRP. In addition, train average speeds have stayed relatively stable since November 2020. See Figure 9 below.

Figure 9 – Average Train Speeds



Source: STB, 2024

With this decreased level of tonnage from 2017 to 2022 and the relatively stable train speeds, Capacity has been identified as the second largest project need according to the PSRP 2025 with the majority of projects being yard improvements.

FUNDING & FUTURE NEED

The 2025 Pennsylvania State Rail Plan reports $6.9 billion of projected funding in capital projects between 2021 and 2045. This includes $570 million for 132 passenger rail projects and $1.2 billion for 323 freight rail projects.

Passenger

In June of this year SEPTA approved a total budget of $2.7 billion for FY27. SEPTA's proposed budget projects over $1.84 billion in Operating Budget and $920.7 million Capital Budget. The operating budget reflects the second and final year of the $394 million capital funds transfer approved by PennDOT to support operations. As with transit rail and bus systems, SEPTA's regional rail future rests on some combination of attracting riders back to its system, greater recurring subsidies for operations, and service adjustments to manage its budget. Amtrak and PennDOT are also investing in passenger rail infrastructure, in part thanks to support from the Infrastructure Investment and Jobs Act (IIJA), which had not been passed when the 2020 Pennsylvania State Rail Plan was developed. Funding from the law will help actualize some of the needs identified in the state plan. Some of these projects include the Roosevelt Blouevard Multimodal Project, Keystone Corridor Project, and the Scranton to New York Penn Station: Amtrak Passenger Service Corridor Project. Pennsylvania is in a critical planning phase of a large passenger rail expansion. One such step is the recently-announced deal to run passenger train service in Western Pennsylvania on Norfolk Southern-owned track. Strategies such as this can increase passenger usage on active freight rail lines and are less expensive in the near and medium term.

Freight

Class I railroads invest in their own infrastructure projects, while Class II and Class III railroads sometimes need public sources of funding or financing. In order to meet the demand for funds on freight projects, PennDOT has identified several sources of funding through State and Federal funding methods. Penn DOT's Rail Freight Assistance Program (RFAP) grants have ranged in size from $250,000 to nearly $4 million. These grants have been used for new construction of private facilities to spur economic development to improve capacity. Recent RTAP and RFAP examples include Philadelphia Regional Port Authority dba PhilaPort: $974,473 to rehabilitate 2,600 feet of rail storage track and replace a turnout at Tioga Marine Terminal, and Pennsylvania & Southern Railway: $912,000 to rehabilitate over 6,000 feet on the outbound and inbound tracks serving the Cumberland Valley Business Park in Chambersburg.

PennDOT is also beginning to utilize other funding programs to complement their RFAP and capital budget programs, including Federal Highway Administration's Congestion Mitigation Air Quality (CMAQ), and various grants through the Federal Railroad Administration (FRA). The table below shows the number of jobs that have been created as a result of PennDOT grants over the past four years that have been applied towards freight rail projects, typically for Class II and III rail lines.

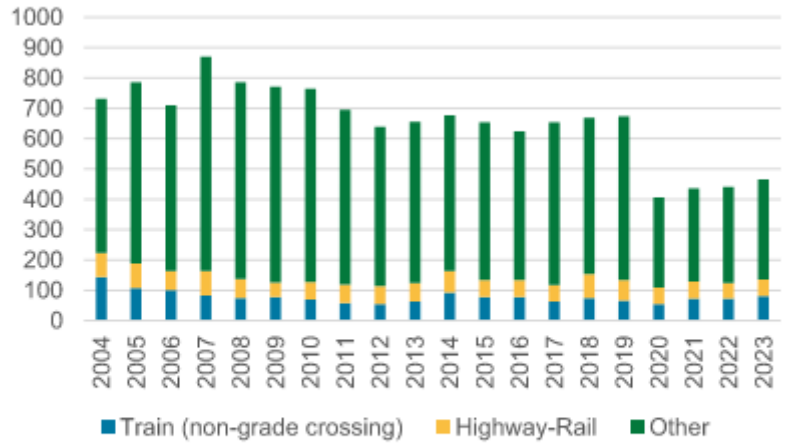
Table 1 - Estimated State Funding Dedicated to Freight Rail Capital Projects, 2025-2028 (in millions of YOE dollars)

Fiscal Year	Grant Type	State Investment	Total Project Cost	Number of Projects Funded	Number of Jobs Created
2022	RFAP	$ 5,940,263.00	$ 7,835,399.00	11	236
2022	CB	$ 20,406,184.00	$ 49,463,226.00	13	104
Total		$ 26,346,447.00	$ 57,298,625.00	24	340
2023	RFAP	$ 19,550,564.00	$ 99,225,959.00	10	132
2023	CB	$ 22,295,189.00	$ 34,393,080.00	16	158
Total		$ 41,845,753.00	$ 133,619,039.00	26	290
2024	RFAP	$ 25,050,126.00	$ 25,559,078.00	20	122
2024	CB	$ 29,158,872.00	$ 54,448,782.00	14	222
Total		$ 54,208,998.00	$ 80,007,860.00	34	344
2025	RFAP	$ 22,056,913.00	$ 30,739,293.00	18	89
2025	CB	$ 28,000,550.00	$ 63,893,227.00	17	360
Total		$ 50,057,463.00	$ 94,632,520.00	35	449

PUBLIC SAFETY

According to the PSRP 2025, Pennsylvania ranks third in the nation in the number of rail miles and fifth in the number of accidents over a 20-year period, with an average of 90 accidents per year. However, when normalizing average annual accidents by number of rail miles, the commonwealth ranks 23rd in the nation. Figure 11 displays rail-related incidents in Pennsylvania between 2004 and 2023, which shows a decrease in incidents over time.

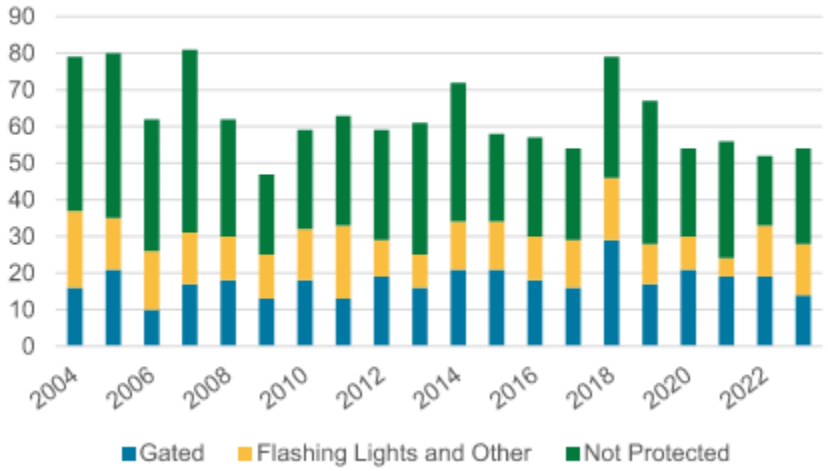
Figure 11 – Accidents/Incidents by Type (2004-2023)



Source: Federal Railroad Administration, Office of Safety Analysis 1.12 – Ten Year Accident/Incident Overview

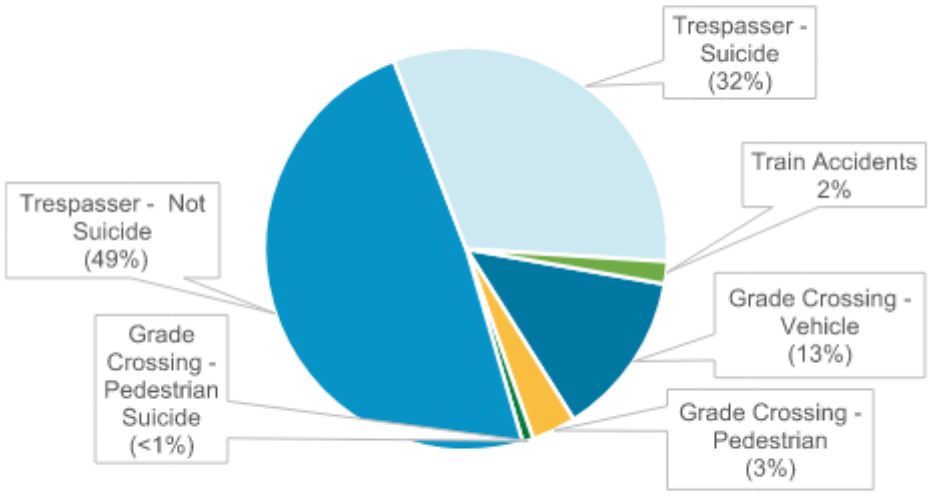
One major cause of incidents are highway-rail grade crossings, and as shown in Figure 12 the number of accidents at highway-rail grade crossings since 2004 declined 32% between 2003 and 2023. However, there has been no consistent trend since 2009.

Figure 12 – Highway-Rail Grade Crossing Accidents in Pennsylvania



Unfortunately, the largest share of rail-related fatalities in Pennsylvania is trespassers, of which 35% are categorized as suicides. Figure 13 shows the five-year fatalities by location and type from 2019 to 2023, of which 59% are freight, 18% Amtrak, 24% SEPTA.

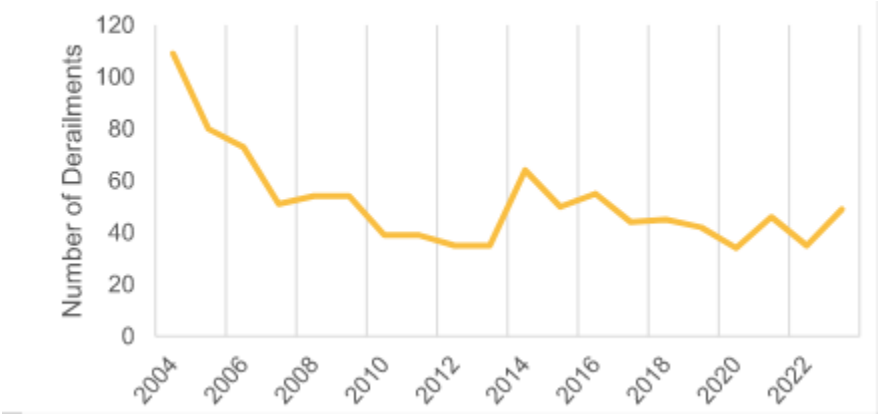
Figure 13 – 5-Year Fatalities by Location and Type



Source: WSP Analysis of FRA Section 4.08 and 4.13 reports, and FRA Form 57 data

Derailments and collisions risk significant public harm and can be caused by deferred maintenance of track or equipment, human error, or environmental factors. Since 2004, derailments have been trending generally downward, as shown in Figure 14.

Figure 14 – Train Derailments in Pennsylvania

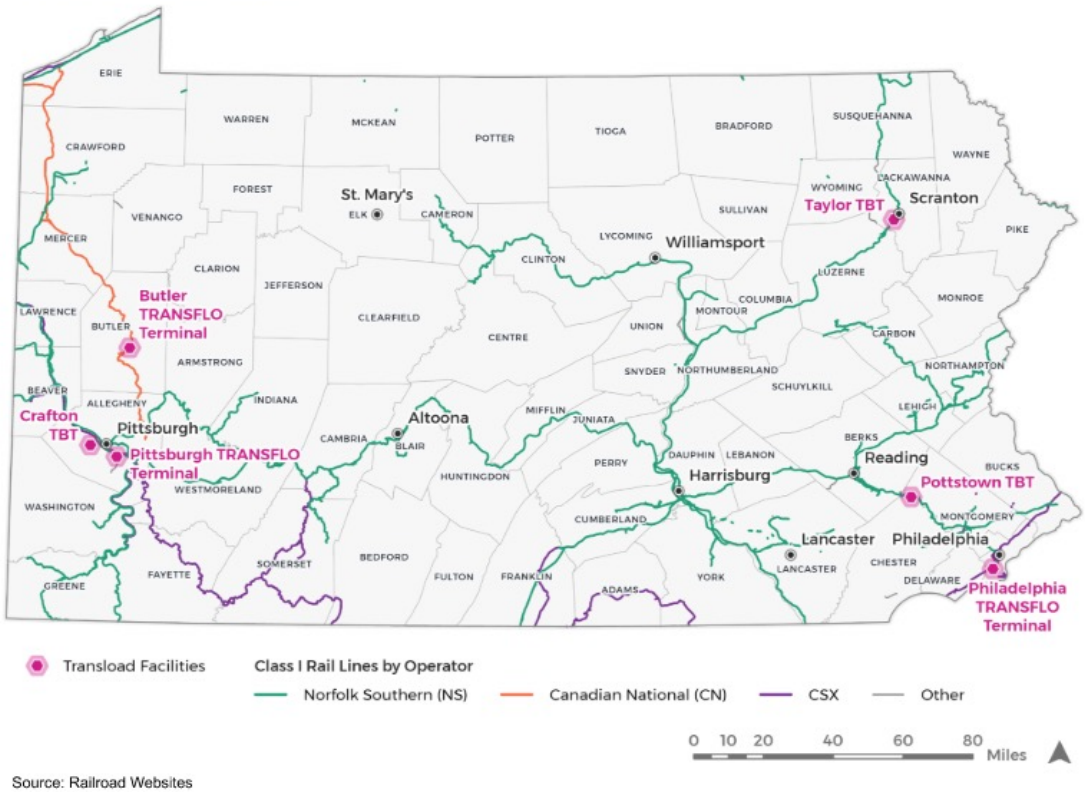


However, there was a train derailment as recently as June 30, 2026, in Bensalem PA where a CSX freight train derailed involving 16 cars, including two carrying hazardous materials, with no injuries or leaks reported.

RESILIENCY

Railroads must ensure that key personnel follow all state and local protocols to limit the possibility of hurting the supply chain. Freight train capacity is limited by the same issues that the trucking industry faces – the limited availability of container chassis trailers, limited terminal working hours, and limited trucker shift working hours. Expanding and upgrading transload facilities are examples of projects that can increase revenue for the railroads. Figure 15 shows the transload facilities by Class I Rail Operator. PennDOT is recommending six new transload projects in the 2025 State Rail Plan to help with supply chain resilience.

Figure 15 – Class I Transload Terminals



Source: Railroad Websites

While having a resilient supply chain is important, it is also important to have resiliency from extreme weather events. With the effects of global warming becoming increasingly apparent with longer hurricane seasons and more frequently occurring extreme weather events it is important that PennDOT remains committed to resiliency in their rail infrastructure as well, which was highlighted as a key goal in PennDOT's 2025 State Rail Plan as shown below:

Support energy efficiency, environmental sustainability, and resiliency.

- Promote energy efficiency and lower greenhouse gas emissions by further investing in rail transportation.
- Explore and promote technological improvements that can enhance energy efficiency, environmental sustainability, or resilience.
- Investigate the risks and impacts of extreme weather events on rail lines and identify potential mitigation actions and resilience improvements.

INNOVATION

According to the PSRP 2025, The adoption of new technologies used in Track Inspection combined with the use of digital twin models aims to integrate the latest technology for improved track inspections. Digital twin models are three dimensional modeling that represent the physical track.

Class I railroads are also using railcar mounted inspection technology to inventory and assess the state of repair for fixed network assets. In the case of Norfolk Southern, as trains transport goods across the network, car-mounted imaging systems and AI models are inventorying every rail — including the manufacturer, year, size, and condition. Norfolk Southern is using this information to create a digital twin of the entire 22,000-mile network. The digital model enables remote analysis of rail condition and facilitates proactive safety programs of the track network.



RECOMMENDATIONS TO RAISE THE GRADE

- Establish a clear long-term passenger rail vision that weighs near-term, lower-cost investments using existing track against higher-cost investments in new corridors capable of delivering high-speed rail with travel times and convenience competitive with driving.
- Create state-level and local incentives for residential and commercial development to cluster in denser, transit-oriented communities near passenger rail stations. This includes reforming zoning and building codes to support the redevelopment of high potential land that is currently underutilized.
- Implement recommended changes that result from the suggested passenger rail study when it relates to shared common tracks. Include municipalities, metropolitan planning organizations, and resident groups to more equitably increase the throughput of both freight and passenger rail in their communities.
- Work with railroad owners, operators, and labor organizations to ensure that the correct number of human operators are staffed at all times to provide continuous network safety. This includes monitoring and addressing security concerns from physical and cyberattacks.

DEFINITIONS

CLASS I RAILROAD - A carrier earning annual revenue greater than $1.05 billion.

CLASS II RAILROAD - A carrier earning annual revenue between $47.3 million and $1.05 billion.

CLASS III RAILROAD - A carrier earning revenue less than $47.3 million.

CONSISTS - A makeup or arrangement of cars contents.

PTC - Positive Traction Control

FRI - Freight Rail Innovation Institute - This program focuses on innovation, lead by Carnegie Mellon University, the Genesee and Wyoming (largest short line and owner of other short lines within Pennsylvania), and Wabtec - a technology company focused on developing large scale batteries for locomotives to drastically reduce the carbon footprint. This partnership is a strong source of pride, as most, if not all, partners are from within the Commonwealth and highlight the Western PA/ Greater Pittsburgh Region.

PENNDOT - Pennsylvania Department of Transportation

SOURCES

Pennsylvania DOT, “Pennsylvania State Rail Plan,” 2025.

Amtrak, “On Track For Transformation Amtrak’s Five Year Plan (FY24-29),” 2024.

Amtrak, “5-Year Plan FY26-31 Delivering Transformation,” 2026.

Amtrak, “Amtrak in Pennsylvania, Fiscal Year 2025,” 2025.

Amtrak, “Amtrak to add second Pittsburgh-NYC train,” 2026.

Pennsylvania DOT, “Pennsylvania Railroad Map,” 2026.

Amtrak, “FY25 Ridership,” 2025.

Roads

C-



GRADE COMPARISON

PA: C-

Nat'l: D+

Photo: Aerial view of Dwight D. Eisenhower highway 70 road near Bentleyville; ungvar

ROADS

EXECUTIVE SUMMARY

Pennsylvania's road network is extensive and covers approximately 122,000 miles. Over the past decade, the Commonwealth has undertaken efforts to improve these roadways, first passing Act 89 in 2013, which increased the fuel tax in Pennsylvania, generating additional revenue of $2.4 billion annually for the transportation system. While it was controversial at the time, that decision has allowed for the programming, design and implementation of nearly 3800 roadway projects, with over 3000 of those projects currently in an active phase according to the Pennsylvania Department of Transportation (PennDOT). These projects have contributed to improved roadway conditions and reduced congestion, but unfortunately Pennsylvanians still spend nearly 50 hours each year stuck in traffic. Additionally, even with Act 89 funding and the state poised to receive nearly $14 billion for roadway projects from the federal Infrastructure Investment and Jobs Act (IIJA), Pennsylvania's roads still face a shortfall of over $17 billion in unmet needs over the next decade.

CONDITION

Of Pennsylvania's approximately 122,000 miles of public roads, a third of these are controlled and maintained by PennDOT, with a mix of 60% rural roads and the remaining 40% considered urban. Approximately 30% of the total roadway system is eligible for federal funding participation for capital improvements.

Using the industry-standard International Roughness Index (IRI), PennDOT has tracked pavement conditions on its system for years and has been categorized by Business Plan Networks (BPN), as shown in Table 1. In 2025 the IRI was assessed as poor for 27% of the roadways included in the BPN, with a rating of poor for 26% of the local road system.

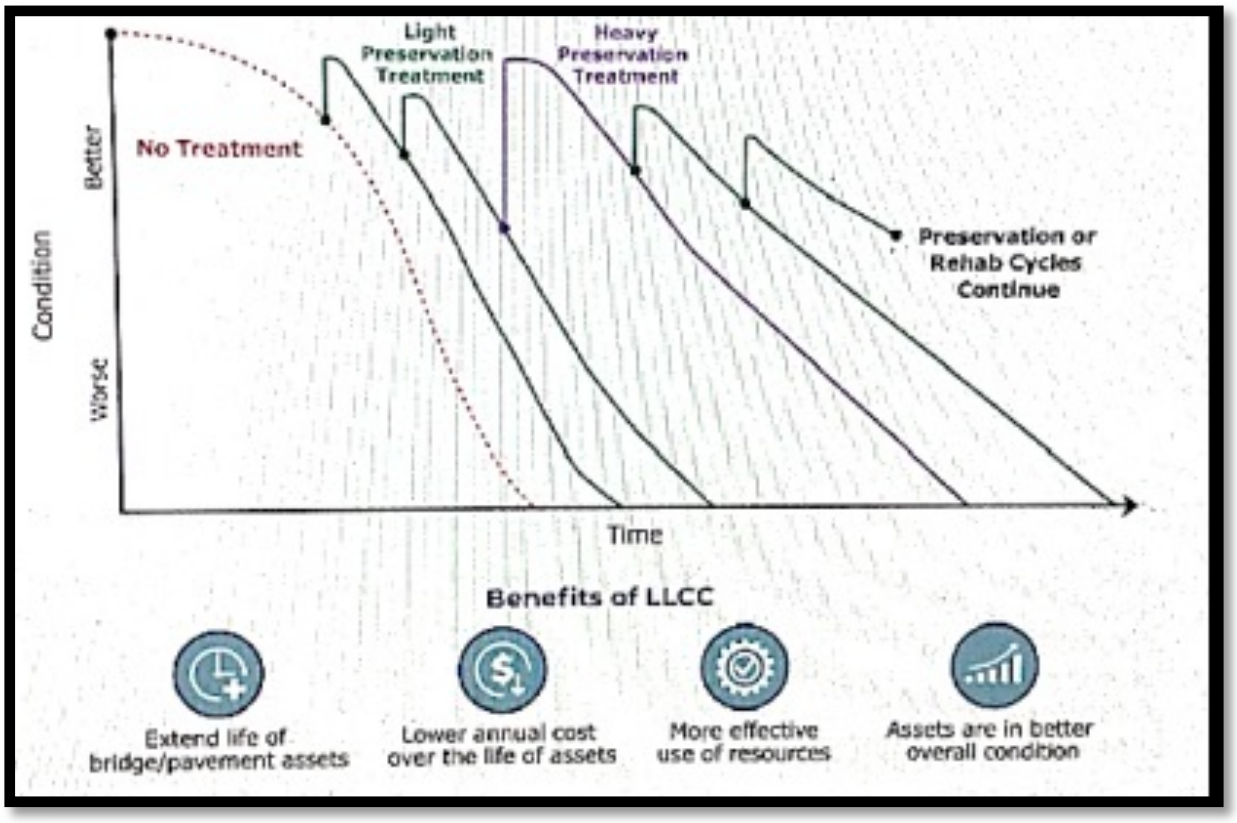
Table 1 : PennDOT Business Plan Network (BPN) Categories

BPN	Facilities
1	Interstate highways
2	Non-Interstate National Highway System (NHS) routes
3	Non-NHS routes, average daily traffic (ADT) > 2000
4	Non-NHS routes, ADT < 2000

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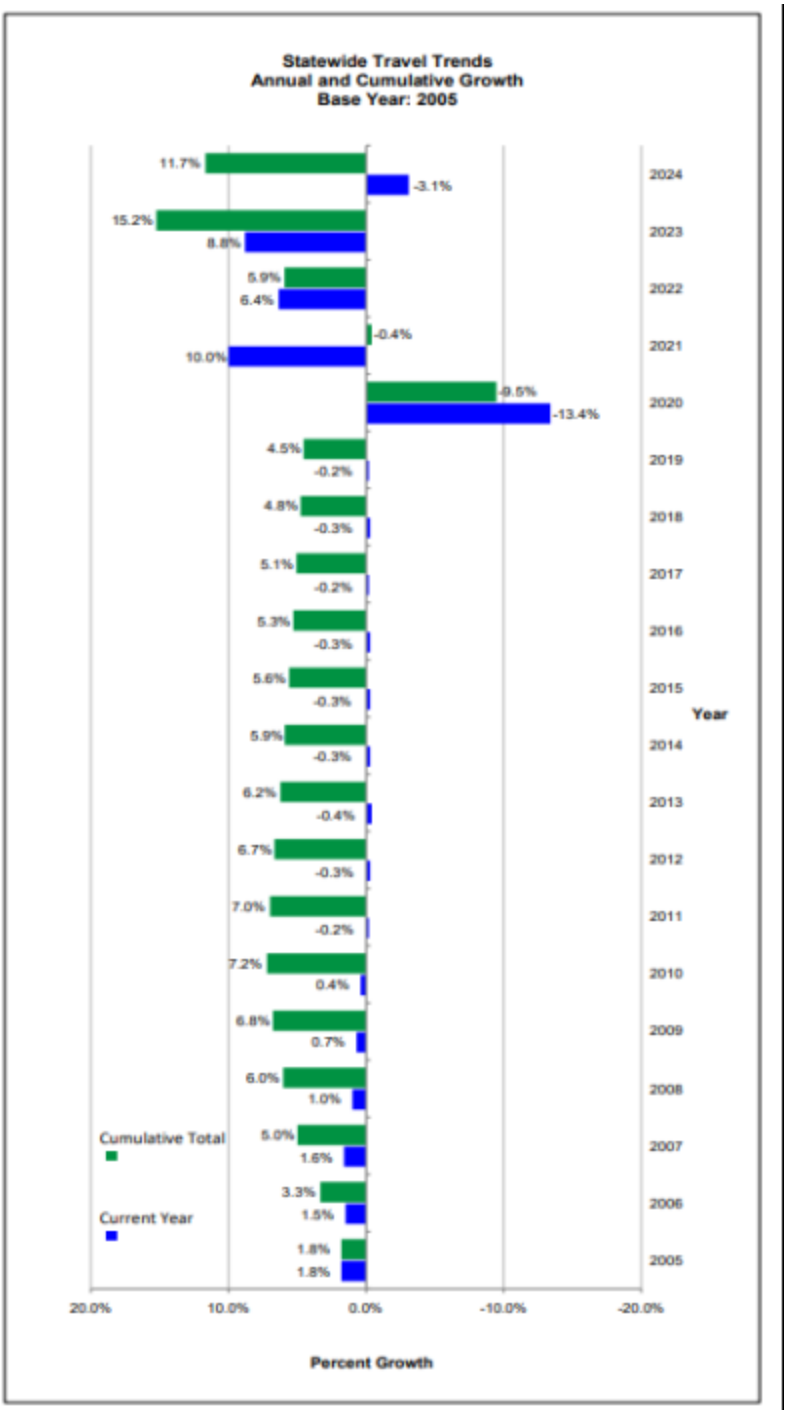
Poor road quality has unfortunately remained steady over the past two decades and has consistently impacted just under 10% of the total roadway mileage in the state (roughly 11,000 miles) at one time or another. This accounts for highways that need more intensive treatments such as complete reconstruction, remediation of chronic subsurface and drainage problems, and similar larger-scale work that may require funding that is not immediately available to address the existing conditions. These roadways must await funding in future years of programs for planned improvements given the funding constraints and limitations of these programs.



Accordingly, PennDOT has taken the life cycle planning approach on pavement preservation for the enhancement of pavement surface quality. This recognizes that applying the right treatment at the right stage will be critical to maintain an asset in a state of good repair. Figure 1 illustrates the benefit of this approach.

CAPACITY

Pennsylvania ranks among the most congested states in the nation, recently placing at #42 in a 2025 report developed by the Reason Foundation (#50 being the most congested rank). Drivers typically lose 47 hours a year in traffic. Much of this is driven by high traffic levels and aging infrastructure.



Truck traffic has noticeably begun to rebound after sharp declines in volumes in 2020 and 2021. This is partly related to changes in consumer behavior with on-line purchasing that requires movement of goods between suppliers and warehouses as well as secondary distribution activity to deliver these products to consumers.

Figure 2 shows overall traffic and travel trends experienced over the 20-year period ending in 2024,

which has been heavily influenced by the noted growth of truck and commercial traffic on the roadway system. Pennsylvania continues to have several top "choke points" where congestion, particularly impacting truck traffic, is regularly experienced.

PennDOT is increasingly investigating alternative modes of transportation to alleviate congestion. Further investments in transit, as well as improved infrastructure for micro-mobile solutions (bicycles and scooters) in dense urban areas, are also being explored. Several localities and counties have developed a bicycle route master plan and PennDOT has a system of designated bike routes throughout the state.

Given funding constraints, the intent of projects tends to be localized capacity improvements such as intersections and congested corridors rather than full-scale capacity addition. System preservation is a priority and addition of more pavement to the system will only further tax maintenance capabilities and budgets. Further, the Federal Highway Administration (FHWA) has found that the traditional peak periods (AM and PM) have expanded with increased travel experienced throughout daylight hours in many communities, and the addition of capacity is often neither practical nor feasible.

State funding legislation (Act 89) has facilitated the identification of 3800 projects in the PennDOT 12-Year Program and local Transportation Improvement Programs (TIP). However, a downside of this is the creation of $14 billion in debt for the Pennsylvania Turnpike Commission (PTC) due to funds previously diverted to PennDOT, which resulted in toll increases. PTC has embarked on a program for annual toll hikes to cover its program and these will continue for the foreseeable future.

FUNDING

State Resources

Act 89 funding has improved investment in the Commonwealth's infrastructure and has generated approximately $2.4 billion per year in funding for all modes of transportation. While this funding continues to provide support for Pennsylvania highways, bridges and public transit, gas tax revenues are decreasing with the rise of hybrid and electric vehicles. In 2025, an annual road-user charge of $250 was enacted to assess alternative fuel vehicles in compensation of these vehicles not paying the traditional fuel tax, yet imposing and exacting wear and tear on the roadway and transportation network. This is collected annually along with the standard vehicle registration fee.

There remain underfunding impediments as demonstrated needs remain unmet. The PennDOT Pathways Study indicates that total needed transportation improvements have grown to result in a funding gap between needs and resources of $8.1 billion in 2021 to a projected $12.6 billion by 2030. Figure 3 shows the unfunded needs projected by PennDOT's Transportation Revenue Options Commission (TROC) in 2022.

There are similar unmet needs at the local level which are estimated to grow to nearly $5.1 billion by 2030. This continued growth in unachievable funding needs is an on-going challenge for agencies to maintain and operate the Commonwealth's transportation infrastructure as it continues to age and increasingly difficult to sustain and maintain.

To date, 25 Pennsylvania counties (of the total, 67) have passed measures, authorized with Act 89, to charge a $5 vehicle registration fee to fund local transportation projects. The average funding generated by this program has ranged between $45-$55 million annually.

Funding for the operations and maintenance of roadways comes primarily from the Motor License Fund, which consists of Liquid Fuels Tax and License/Fees. Local roadways utilize resources from local taxation and fees and the Liquid Fuels Fund. Liquid Fuels allocations from the Motor License Fund are distributed to local municipalities in proportion to the eligible roadway mileage. The total revenue from this Fund is slightly more than $5 billion annually. An allocation of $250 million annually, a level set in 2022 after reductions, is provided to the Pennsylvania State Police (PSP) from the Motor License Fund to cover its costs related to patrol and emergency response on the state highway system and PTC.

Recent high levels of inflation have taken their toll on the ability of existing funding to provide the full expectations of project needs and available funding has not been able to fully keep pace. Alternate funding methods have been explored, particularly those proposed by various agencies, including vehicle miles tax (VMT), which, similar to fuel taxes, is a fair assessment as this is based directly on the frequency of system usage.

Federal Resources

At the federal level, the IIJA was authorized in 2021 and will expire in September 2026. This provided over $16 billion in combined highway/bridge funding for Pennsylvania. It also includes unprecedented levels of federal assistance and competitive grants programs which represent a smaller portion of federal funding available for infrastructure projects.

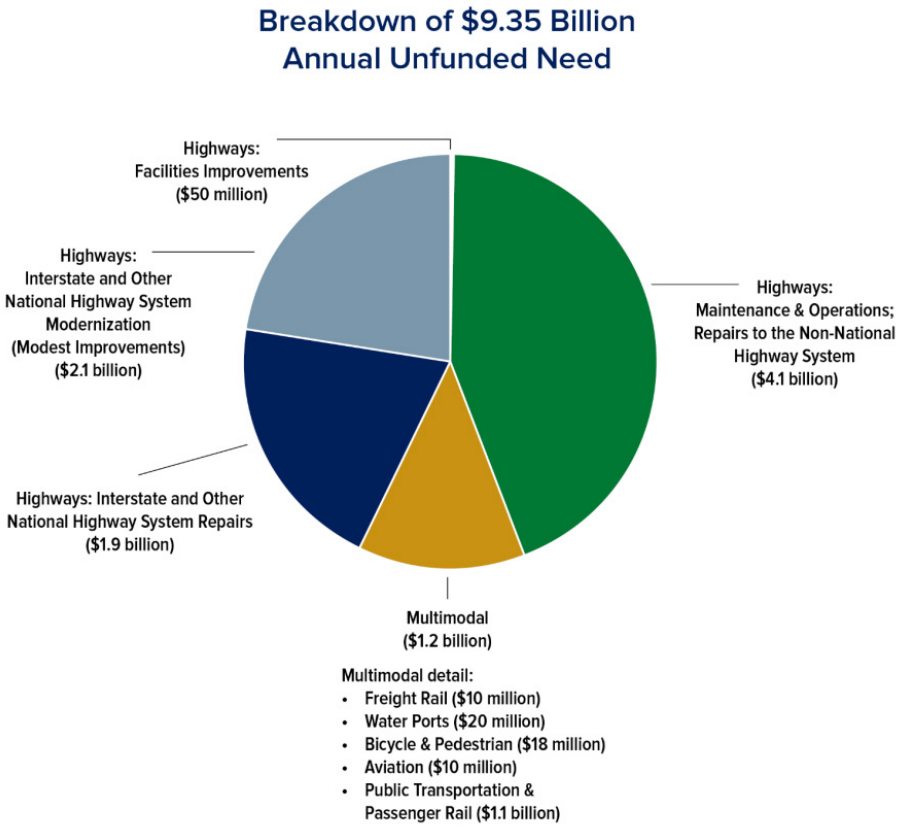
Of this total $13.6 billion is designated for highway projects and grant programs and has been included in the Commonwealth's Twelve-Year Program. For the 2022-24 reporting periods, funding authorizations received by various eligible agencies and grant recipients totaled $6.9 billion with an additional $6 billion programmed in local and regional TIPs

Federal funding through the Highway Trust Fund (HTF) continues to be in a somewhat unstable, as the federal gas tax remains unchanged at the $0.18 per gallon rate ($0.24 per gallon for diesel fuel) since 1993. Adjustments have been suggested to keep HTF viable and able to fund ongoing infrastructure improvements, but no action has been taken to avert this. This could impact the ability to advance future projects.

Continuing weather-event responses as described in the Conditions section reduce funding that is slated for routine maintenance and preservation operations and will likely result in delay and/or deferral of improvements.

Pennsylvania will need to look to implement alternative funding strategies to secure funding to meet the needs of its transportation system in the future.

FUTURE NEED



Pennsylvania's roadways continue to age and conditions will deteriorate unless preservation programs can be put into place and maintained. PennDOT's lowest life-cycle cost approach points to early, repeatable treatments as the lowest long-run cost strategy, compared with waiting for "worst-first" failures. PennDOT's TROC summarizes roughly $8.8 billion annually in current transportation funding against about $18.2 billion yearly need to keep the system in good repair (inflation-adjusted). That implies an annual gap of $9.4 billion, not counting local network needs, as illustrated in Figure 3.

Fuel-tax yield weakens as fleet efficiency rises and alternative-fuel vehicles increase. Revenue will need to track roadway use more directly to stabilize preservation timing. The asset forecasts do not show an easy path under constrained scenarios, with PennDOT TAMP forecasts a showing this continued decline in state-owned pavement condition.

Freight performance is a roadway need in its own right. The PA 2045 Freight Movement Plan identifies two pressing issues, freight/land-use coordination and truck parking shortage. Key freight corridors and adjacent communities face continued bottlenecks, land use conflicts and truck parking constraints.

Although PennDOT owns roughly 33% of Pennsylvania total roadway mileage, network performance depends on local delivery capacity as much as state programming. Local communities and agencies will similarly contend with uneven and unpredictable staffing levels and inadequate or unavailable funding.

OPERATION AND MAINTENANCE (O&M)

Various agencies are responsible for ownership, operation, and maintenance of the roadway system in the Commonwealth. These agencies include PennDOT, PTC, and local municipalities. PennDOT employs several remedial/basic maintenance activities on its roadways, designed to enhance and preserve infrastructure. PTC and local municipalities also perform many of these same activities on their roads and utilize both in-house staff and contract forces to perform these maintenance tasks. In ratings of cost effectiveness and spending for system and facility improvements, upgrades, and maintenance, Pennsylvania agencies collectively rank 7th in capital improvements and 20th in maintenance disbursements compared to other states according to an assessment by the Reason Foundation.

PennDOT publishes a yearly Transportation Systems Management and Operations Performance Report that quantifies and evaluates the effectiveness of these maintenance programs. Continuous prioritization is needed to maintain infrastructure assets efficiently with the available monies. New projects should consider both resiliency and life cycle costs while planning and designing for roadway improvements, and this is being implemented where feasible.

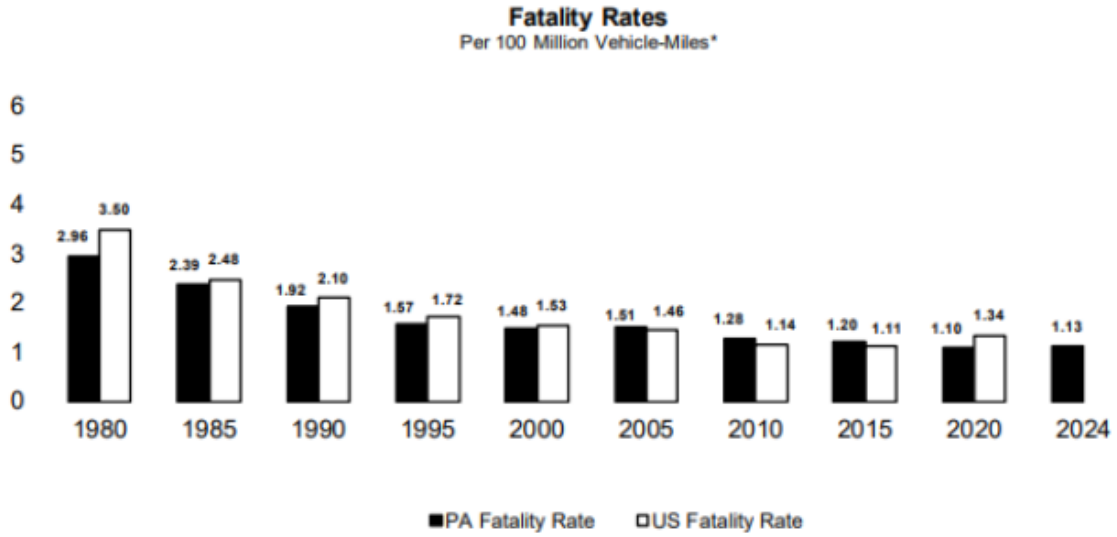
Funding limitations often result in a maintenance backlog, and recent extreme weather events require immediate action, thus reducing the amount of maintenance funding for the remedial measures. Emergency repairs and response needs have continued to impact the roadway system, related primarily to severe weather events that resulted in unusual and unprecedented flooding. While major snow events have been less common in recent years, allocated budgets for anticipated weather-event responses have been greatly exceeded. The winter of 2025-26 was more severe than recent winter seasons both in terms of extreme low temperatures and snowfall, thus its impact was somewhat greater than recent past winters. Philadelphia expended over $59 million for snow response and removal efforts for one particularly difficult storm in January 2026 alone.

Government agencies at all levels have also experienced reduced staffing availability and loss of critical institutional knowledge between attrition related to retirement and inability to attract new hires, thus the alternative is often to look to contracting services. This is not always effective given the staff limitations of contractors.

PUBLIC SAFETY

Pennsylvania's public safety picture is mixed. From 2020 to 2024, total reported crashes increased from 104,472 to 110,764 (6%). Fatalities were essentially flat, moving from 1,129 to 1,127. Suspected serious injuries increased nearly 7%, while over the same period, vehicle miles traveled increased much faster, from about 85.3 billion to 100.2 billion (18%).

While the Commonwealth's statistics beyond 2024 are not publicly available for this report, the National Highway Traffic Safety Administration (NHTSA) has released data that shows traffic fatalities overall have decreased by less than 1% in 2025 compared to 2024. A comparison of national and Pennsylvania fatality rates over the past 40-plus years is shown in Figure 4 below.



The clearest deterioration is in who is being harmed. From 2020 to 2024, pedestrian fatalities and suspected serious injuries increased by nearly 39%. Bicyclist fatalities and suspected serious injuries increased by over 100% and total similar events for non-motorists were up by over 44%. These are not

small changes. Pennsylvania's most exposed users are accounting for a growing share of severe outcomes and this has raised concerns as well as responsiveness from numerous agencies.

Older drivers are also a more important part of the safety picture. While total crashes increased only about 1%, suspected serious injuries and combined fatalities were slightly lower.

- Crashes involving drivers age 65 or older increased by 37%, with fatalities and suspected serious injuries in this group up 50%
- A steeper rise for the oldest drivers, for ages 65 to 74, fatalities and suspected serious injuries increased about 45%, for ages 75 and older 62%
- Pedestrian crashes, +13%
- Pedestrian fatalities and suspected serious injuries, +19%
- Bicyclist crashes, +36%
- Bicyclist fatalities and suspected serious injuries, +45%
- Non-motorist fatalities and suspected serious injuries, +21%

Crash type trends are also uneven. Intersection crashes increased during this period with intersection fatalities and suspected serious injuries increased faster. Some longstanding rural high-severity patterns appear to be improving, while intersection-related severe harm is moving in the wrong direction.

- Fatal-and-serious-injury share of intersection crashes rose slightly, + less than 1%
- Stop-controlled intersections were especially concerning, with crashes +29% and fatalities and suspected serious injuries +39%
- Lane-departure crashes -5%, lane-departure fatalities and suspected serious injuries -8%

The supporting PennDOT safety reports reinforce a basic point: protection still matters. Properly restrained motorists have far lower fatal and serious injury rates than unrestrained or improperly restrained motorists. They remain strong severity separators in the data.

Pennsylvania's safety problem is basically that overall exposure has rebounded, statewide severe outcomes have remained stubborn, and the burden is shifting toward pedestrians, bicyclists, non-motorists, older drivers, and intersection-related crashes. That is where safety performance is under the most pressure. Various measures have been employed to enhance safety, with both physical installations as well as use of technology.

RESILIENCE AND INNOVATION

Pennsylvania's roadway assets are subjected to numerous risks, including aging infrastructure, increased demand, and extreme weather and climate-change related events. Thus it is critical to develop systems and processes that are safe, efficient, and promote the resiliency of the Commonwealth's roadways. At the planning level, the state is identifying risk and resilience strategies within its TAMP and mitigation actions in its Climate Action Plan. At the operational level, this is handled through the advancement of processes and technologies. Innovations that have been tested and implemented to improve resiliency can be grouped into the three categories below.



Materials and Maintenance

Pennsylvania has strongly encouraged, both internally as well as with local agencies, the use of materials and maintenance processes that improve the longevity of its roadways and reduce the emissions produced throughout the life of a roadway. Specific practices used for this include:

- PennDOT has piloted or fully adopted multiple overlay solutions as a part of FHWA's Targeted Overlay Pavement Solutions. The goal is the development of long-lasting pavement and improved skid resistance compared to traditional methods.
- PennDOT has also leveraged the use of cold central plant recycling (CCPR) for asphalt pavements to help reduce carbon emissions associated with the paving process, which uses 100% recycled asphalt pavement (RAP) and is mixed cold, both of which reduce energy use and emissions.
- PennDOT utilizes environmental product declarations (EPD) to help make better decisions on asphalt procurement, which provide information on the environmental impacts of a product and help reduce carbon footprint.
- Continued implementation of natural drainage areas and green infrastructure, as shown in the photo at right (courtesy PennDOT) to reduce dependence on often-overtaxed and difficult to maintain stormwater conveyance systems and provide additional green space and landscaping that add visual and environmental enhancement.
- Infrastructure "hardening" where possible to provide additional drainage capacity, upgrade pumping capability and efficiency, and utilize currently-available higher-strength materials to withstand the impacts of severe weather.



Traffic Management

Pennsylvania is also focused on creating a roadway system that is safe and helps move traffic efficiently. To improve mobility and safety, the following innovations have been explored:

- PennDOT leverages crowdsourced incident data from other transportation agencies to better share and communicate mobility information and traffic conditions. These innovations help mitigate traffic or expected traffic by providing roadway users with updated information on travel routes. Additionally, state legislation has been passed to permit camera-based speed enforcement to help manage and control traffic speeds in problem areas.
- PennDOT has piloted the use of interstate crossover maps to better coordinate with maintenance, Traffic Management Centers, and State Police for incident management.
- PennDOT has implemented a sequential dynamic lighting curve warning system to help improve safety on curved roadways, which includes flashing lighted chevrons to enhance visibility.

Project and Service Delivery

Pennsylvania has focused on improving existing delivery and tracking mechanisms to enable efficient and accessible information and roadway services. These cost-saving solutions include:

- Digital as-builts, which facilitate the collection of roadway data that can be used by multiple stakeholders. This will help streamline the sharing of project data.
- Tracking of material delivery receipts using an e-ticketing system and information on material samples of asphalt and concrete using radio-frequency identification (RFID) tags.
- Reporting on key metrics for roadway project submission tracking to improve efficiency and timeliness of construction project deliverables.
- Implementation of cashless tolling systems to reduce delays associated with toll plazas, which also enhances safety with the removal of the stopping and weaving areas at these locations.

While funding to address roadway issues surrounding resilience and innovation has been made available through state and federal sources, such as IIJA, the well-being of Pennsylvania's roadway infrastructure continues to be challenged. Ongoing investment and research in innovations will help to build a more resilient future.



RECOMMENDATIONS TO RAISE THE GRADE

- Establish predictable, stable and equitable dedicated transportation funding which will enable PennDOT to address the growing backlog of unmet improvement needs and leverage/match federal funding effectively and efficiently.
- Investigate and evaluate programs for alternative funding strategies, such as vehicle-mile assessments and similar measures, to meet the ongoing and anticipated needs of the Commonwealth's transportation system and facilities in the future.
- Encourage continued use of technology to improve traffic flow and safety on the roadway network.
- Expand installation of speed enforcement cameras to control vehicle speeds and enhance corridor safety, particularly in locations with significant vulnerable user volumes.
- Increase funding and introduce new programs focused on roadway safety.
- Develop ongoing and increased strategies and programs for development and updating of asset management plans.
- Utilize innovative and creative project delivery strategies and methods to maximize the benefit of transportation funding.

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Photo: wavebreakmedia

SCHOOLS

EXECUTIVE SUMMARY

Pennsylvania's public school districts are spending $3.2 billion less than the recommended standard for public school facility operation and maintenance, and capital improvements each year. This gap in spending is partnered with aging schools, with the average Pennsylvania school building being over 70 years old. Over 80% of school districts in the Commonwealth that participated in a statewide study report that they have delayed at least one capital project due to the lack of available funding. Simultaneously, the Commonwealth remains a leader in the construction of solar energy for school facilities. The need for more funding remains critical for school infrastructure to be considered fit for the future.

BACKGROUND

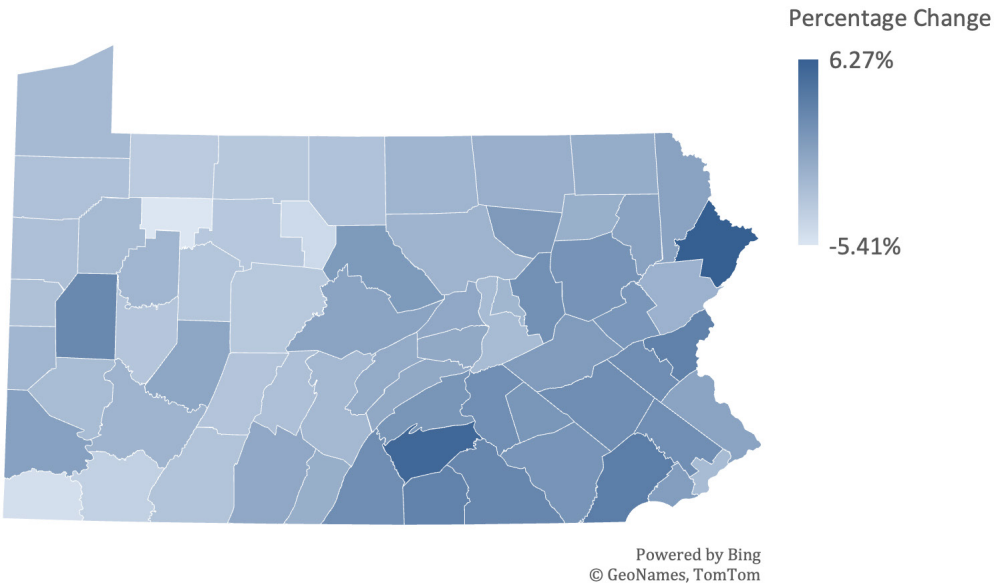
While educational activities have existed in the Commonwealth since its founding in 1682, formal education began to rise following the Common School Act of 1834. In 1837, the Department of Schools was created, which became known as the Department of Education in 1969. The Department of Education implemented the Planning and Construction Workbook (PlanCon) process in 1973 to standardize and reimburse new and existing building designs and refurbishments, respectively, as well as mitigate expenditures on costly design plans. Beginning in 2005, districts were incentivized to design more environmentally conscious buildings through LEED-certification. Over time, priorities and programs have shifted, but the core purpose of providing high quality education remains.

This report specifically addresses the infrastructure related to public, boundary schools covering grades K-12. The scope of this report does not cover the variety of education providers such as non-boundary and/or private K-12 schools and institutions of higher education that also exist in Pennsylvania.

CAPACITY

Pennsylvania's population of K-12 public education students has been on a slow decline over the past 25 or more years, currently sitting at approximately 1.7 million students, with the Pennsylvania Department of Education projecting a continued decline over the next 10 years. The state's current enrollment places Pennsylvania seventh in public school enrollments only behind California, Texas, Florida, New York, Illinois, and Georgia. Figure 1 below shows population percent change data by county in Pennsylvania from 2020 to 2024, based on data from the US Census Bureau.

Figure 1. Population Percent Change by County, 2020 to 2024



Source: data from US Census Bureau: County Population Totals and Components of Change: 2020-2025

From 2013 to 2023, the number of public school buildings declined by 229, leaving a gross square footage of 271.2 million square feet across 2,943 schools. When reviewing this data more granularly, there is a large discrepancy amongst the 500 current school districts. There are school districts where enrollment is rapidly increasing necessitating the construction of additional school facilities, while other districts are experiencing declining enrollment and may be making the decision to consolidate buildings.

With established legal minimum square feet per student, which vary by grade level, there is no collective shortage of potential capacity for the current student population in Pennsylvania's public schools. However, this may vary independently by school districts and school buildings.

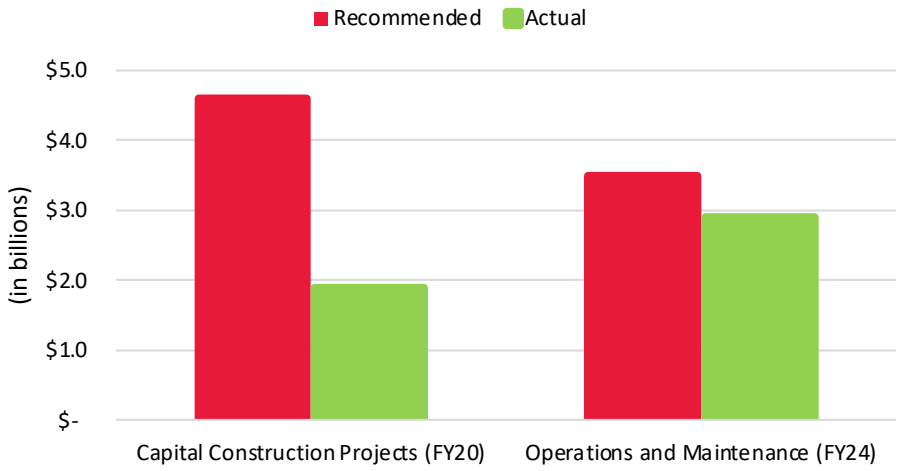
CONDITION

In recent years, there have been a variety of attempts from the Pennsylvania General Assembly to better understand the condition of school facilities across the commonwealth. In 2016, the Pennsylvania Public School Building Construction and Reconstruction Advisory Committee issued a recommendation for the development of an online facility data system to be used for future planning and legislative oversight, but this recommendation has not been implemented. The last such report at a state level containing relevant data was published in 2014, reporting data on building age, enrollment, and rated capacity, and was not designed as a comprehensive assessment of school facility conditions statewide. Act 20 of 2026 amended the Pennsylvania Public School Code to require the development of a school facility inventory to begin in 2027, which will include basic facts of all facilities owned by public school districts. This new inventory requirement currently fails to incorporate information on facility conditions, but makes forward progress in understanding the true condition of Pennsylvania's public schools.

The ever-increasing age of Pennsylvania's school facilities remains an issue yet to be addressed, significantly curtailing innovation of school facilities. Approximately three quarters of school facilities in the commonwealth were built before the 1980s, with the average school facility being 70 years old, compared to a national average age of 49 years. This leaves many schools to worry about contaminants such as lead and asbestos remediation, taking dollars away from other needed expenditures and improvements.

The general industry standard for facility capital investments is to spend 4% of the Current Replacement Value (CRV) on capital construction projects annually, and 3% of the CRV for operations and maintenance annually. For Fiscal Year 2024, the CRV of district facilities was $115.1 billion resulting in recommended spending of $4.6 billion and $3.5 billion, respectively. Data shows that only $1.9 billion has been historically spent on an annual basis for capital construction projects, and only $2.9 billion was spent in 2022 on operations and maintenance. The comparison of the recommended vs. actual spending can be seen in Figure 2 below. These gaps represent a combined $3.2 billion dollars in spending below general industry standards across the commonwealth.

Figure 2. Actual Compared to Recommended Spending for School Facilities Upkeep



The Pennsylvania School Boards Association's (PSBA) 2025 State of Education report identified that of the 256 school districts that responded to their survey (52% of all school districts), 77% reported having at least one school building in need of major repair or replacement. Extrapolated to represent all of Pennsylvania, that is 385 school districts.

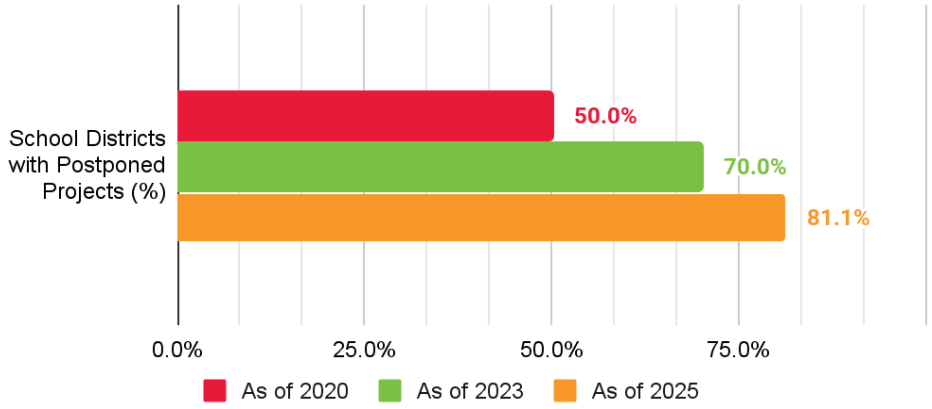
FUNDING

With 500 independent public school districts, there is a wide variety in the actual funding mechanism that each district utilizes. PSBA's 2026 State of Education report shows that suburban districts (concentrated in the areas around Philadelphia and Pittsburgh) are primarily funded through local taxes (as high as 80% of revenues), while rural and urban districts depend more on state funding. Summarizing Pennsylvania as a collective entity, you can see that 52.4% of revenues are locally based with a national average of 42.6%. Only five other states rely more heavily on local revenues for school funding including New Hampshire, Nebraska, Connecticut, Texas, and Ohio.

Pennsylvania's model for funding schools is currently going through a period of transformation following a February 7, 2023 ruling of the Pennsylvania Commonwealth Court where it was found that the state's school funding system was unconstitutional. The case was brought forward by a school district that had historically been underfunded, along with five other school districts that joined the case. As a result of this historic ruling, the 2023 Basic Education Funding Commission (BEFC) was formed with a charge of "reviewing the distribution of state funding for basic education to Pennsylvania's 500 school districts and providing a report of its findings to the General Assembly." This version of the BEFC followed up on the work of the 2015 BEFC which recommended the original basic education funding formula.

Specific to school facilities, funding from the state level has varied over time. One of the most cited funding programs was known as PlanCon, officially called the Planning and Construction Workbook. The PlanCon program included a streamlined process, passed as Act 70 in 2019, for school districts to apply for funding from the state to receive reimbursements for costs associated with construction and reconstruction of school facilities in order to improve Pennsylvania's school building conditions, however the PlanCon program has not been funded since 2016 and no new program (PlanCon 2.0) has been implemented to date. Alternatively, there have been initiatives to provide funds for specific facility improvement initiatives such as a grant program created in 2024 with $75 million for lead, asbestos, and mold remediation in schools. Additionally, schools can currently apply for the Pennsylvania Department of Community and Economic Development's (DCED) Public School Facility Improvement Grant Program with 25% matching funds to cover a variety of school facility improvement projects with costs between $500,000 and $5 million. In 2025, 81.1% of school districts reported that they had postponed a construction or renovation project due to the lack of available state reimbursements according to a PSBA survey which is up from 50.0% in 2020. Figure 3 shows how school districts have progressively been delaying projects over time.

Figure 3. Progression of the Percentage of School Districts with Postponed Projects Due to a Lack of State Funding Options



FUTURE NEED

As noted above, an additional increase of over $3 billion annually is needed to close the gap on O&M and capital spending to meet general industry standards. With the commonwealth's projected declining enrollments, this total spending gap is expected to decline, but at a nominal rate well below 1%.

PUBLIC SAFETY AND RESILIENCE

Pennsylvania law requires each political subdivision (township, borough, town, or city) to maintain a municipal emergency operations plan. The Pennsylvania Emergency Management Agency (PEMA) provides assistance for this effort, however specific public policy for schools as community shelters in the case of a disaster is left to local jurisdictions. While many schools are designated to be shelters in emergency situations, there is no requirement for them to offer such a service to their community, and each individual district has the authority to enter into or refuse such agreements with organizations like the American Red Cross. Information on these agreements can be accessed online through respective school districts.

Beyond the use of school facilities as a community resource in emergency situations, there are also a number of requirements for school facilities to ensure the safety of the students during standard operations. These requirements are focused on structural security, access control, and

emergency preparedness. Examples of these requirements include the need to establish a single point of entry for each school building which must include a secure vestibule with the ability to screen visitors from this location before granting access to the building at large. Schools are also required to regularly perform drills for emergency readiness including monthly fire drills, annual school bus evacuations drills, and lockdown/ enhanced security drills.

Lead in school drinking water is a serious public health concern, especially for young children as it is a neurotoxin that can cause cognitive impairment, behavioral problems, learning difficulties, and other health issues even at low levels. In schools, lead can leach from plumbing materials such as solder, pipes, and fixtures, especially in older buildings with "on/off" water use patterns. Pennsylvania's Act 39 of 2018 created a voluntary testing and remediation program for schools, but it contains loopholes that allow some districts to skip testing or avoid reporting results if they hold public meetings on the issue. The EPA has set a maximum contaminant level goal (MCLG) of 0 parts per billion (ppb) for lead in drinking water but the regulatory action limit is 15 ppb. A 2025 report from Women for a Healthy Environment found that 94.8% of Pennsylvania's districts that test for lead in their drinking water find it, yet fewer than 12% take any action to fix the problem.

Asbestos is a known carcinogen and 90% of American public schools were built before 1985, a time when asbestos was still commonly used in construction, and many of these schools have not been renovated including the removal of asbestos. In 1987, the EPA published the Asbestos-Containing Materials in Schools Rule (40 CFR Part 763), which requires local education agencies to identify asbestos-containing material in schools as part of the Asbestos Hazard Emergency Response Act. From September 2019 to October 2023, more than a dozen Philadelphia schools were closed due to asbestos. In 2024, Pennsylvania approved $75 million of investment to 109 school districts, career and technical education centers, and charter schools to make environmental repairs, including the removal of asbestos.

Additionally, safe and comfortable air temperature control remains an issue in a number of schools. These issues largely stem from inadequate air conditioning or cooling systems during extreme heat events, and can lead to the temporary closure of school. In the Reading School District, this has materialized in full day closures and early dismissals, but has disproportionately impacted students as not all of the district's facilities are without adequate cooling systems. In the Philadelphia School District, Kensington High School is currently undergoing a $17 million HVAC project to prevent these ongoing heat related schedule disruptions, showcasing the extreme costs that these necessary improvements can have on local school districts and their budgets. In the Pittsburgh Public School District, the start of the 2026-2027 school year quickly shifted to synchronous remote learning for a multi-day span as multiple school facilities were facing extreme heat and resulting unsafe conditions for students. While these examples showcase the impacts of extreme heat on a number of school districts in urban settings, this issue impacts districts of all demographics across Pennsylvania, primarily as a result of the large number of older school buildings that are still in use.

INNOVATION

As of mid-2025 Pennsylvania was a top 10 state for solar capacity at K-12 schools, largely driven by an increase from 14 to 45 MW over the last 10 years. This growth trend is expected to continue as the Solar for Schools Grant Program continues to be offered in Pennsylvania through the Department of Community & Economic Development following its legislative enactment in the summer of 2024. Figure 4 shows a rendering of a solar panel design for Oley Valley High School, which has been approved for construction as part of the school district's comprehensive solar project that will result in an approximately 96% offset of the district's energy consumption.

The Separations Act was enacted in 1913 and requires public entities to solicit and award separate contracts for plumbing, heating, electrical, and ventilating work that is part of a public construction project where the cost of construction exceeds $4,000. This Act prevents Pennsylvania school districts from utilizing alternative project delivery methods such as construction management at-risk, design-bid-build with multiple prime contractors, design-bid-build with a single prime contractor, or design-build in instances where these methods could reduce costs and/or accelerate project completion.



RECOMMENDATIONS TO RAISE THE GRADE

- Direct periodic school facilities audits to adequately identify school infrastructure needs.
- Establish predictable and sustained funding for a new PlanCon program.
- Revise current state law allowing for alternative project delivery methods for school constructions and/or renovation projects to permit school districts to select the most efficient means for capital improvements as well as routine operations and maintenance.
- Incentive programs for schools to budget more funds towards O&M and capital expenditures annually.
- Promote further investment in remediation of hazardous materials in schools such as asbestos and lead, partnered with enhanced testing requirements.

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Photo: Old drainage pipes; Alf Ribeiro

STORMWATER

EXECUTIVE SUMMARY

Pennsylvania's stormwater infrastructure manages runoff, helping to reduce flooding and protect water quality across the Commonwealth. While new development is subject to modern permitting requirements that address peak rate, runoff volume, and pollutant reduction, the most pressing challenge lies in the vast inventory of existing infrastructure that predates those standards and has not been retrofitted to meet them. Many of these systems are approaching or exceeding their design lives, and approximately 34% of Pennsylvania's streams are currently classified as impaired, with urban runoff identified as the third-largest source (Pennsylvania Department of Environmental Protection (PADEP) 2024). Responsibility for stormwater management is distributed across more than 2,500 municipalities, contributing to inconsistent maintenance standards, data sharing, and widespread deferred upgrades. Funding is increasing through Pennsylvania Infrastructure Investment Authority (PENNVEST), and state and federal programs, but a significant gap remains relative to the estimated $1.7 billion in identified need (EPA 2022). Building a statewide asset inventory, supported where practical by emerging tools such as AI-assisted condition assessment, is one of the most important steps toward closing that gap.

BACKGROUND

Stormwater infrastructure is a system of inlets, conveyance pipes and channels, and control structures that carry rainwater from impervious and pervious surfaces to streams, ditches, rivers, lakes, and bays, together with stormwater control measures (SCMs) such as detention and infiltration basins and rain gardens that manage the rate, volume, and quality of runoff. Ownership is decentralized across municipalities, government agencies, private businesses, and homeowner associations, and programming at the state, county, and municipal levels has trended toward a reactive rather than proactive approach. Owners often treat these facilities as a nuisance rather than an asset, and capital work tends toward short-term fixes rather than long-term, life-cycle planning.

The regulatory framework governing stormwater is well established. The National Pollutant Discharge Elimination System (NPDES) sets the procedures that apply to stormwater, principally through Earth Disturbance permits for construction and Municipal Separate Storm Sewer System (MS4) permits, both reviewed and issued by County Conservation Districts or the Pennsylvania Department of Environmental Protection (PADEP). More than 1,059 municipalities hold MS4 permit coverage (PADEP 2026), and those discharging to impaired waters

or within the Chesapeake Bay watershed must also prepare pollution-reduction plans. Day-to-day authority rests with individual municipalities, which carry out these permits through Act 167 plans, the watershed-based stormwater management plans that PADEP directs counties to prepare and municipalities to adopt through local ordinances.

CONDITIONS & CAPACITY

Of Pennsylvania's 85,472 stream miles, 28,820 (about 34%) are impaired, up 3.4% from the 27,886 miles reported in 2022, and urban runoff and storm sewers account for 3,828 of those miles, the third-largest identified source behind agriculture and acid mine drainage (PADEP 2024).

Public and private entities in Pennsylvania have been building stormwater assets for more than 160 years, yet there is still no statewide assessment of their condition and capacity, and no easily accessible inventory of the Commonwealth's publicly and privately owned stormwater assets. A few large utilities, such as the Philadelphia Water Department, have begun to map and assess their systems, but most of the network remains uncatalogued. What is known points to an aging inventory under growing strain: much of the system predates the modern design standards introduced by the 2006 PADEP Stormwater BMP Manual, and roughly $2 billion in stormwater assets have already reached the end of their useful life (ASCE 2022).

Responsibility for stormwater falls largely on individual municipalities. A decentralized approach allows local tailoring and innovation, but it also produces inconsistency in stormwater control measures and standards and makes data and inventory sharing difficult. The result of this is a shortage of coordinated information and reinvestment: without a shared picture of what assets exist and what condition they are in, watershed-scale planning and efficient capital allocation remain out of reach.

Stormwater discharges from point sources are managed through the NPDES permitting program, which establishes requirements for discharges to Pennsylvania's waterways. Different permit types apply depending on project characteristics, receiving waters, and discharge conditions. While the requirements of these permits are critical for protecting water resources, the permitting process can also introduce extended review timelines and regulatory creep which may affect the feasibility of projects, and the costs of which may be passed on to end users. To combat this, in 2024, the PADEP instituted the Streamlining Permits for Economic Expansion and Development (SPEED) program, which seeks to expedite PADEP review timelines for qualifying projects (PADEP 2026). Reducing these timelines is significant, and especially important at a time when affordability (housing or otherwise) is of increasing concern across the Commonwealth.

FUNDING & FUTURE NEED

Pennsylvania faces a significant need for investment in stormwater infrastructure across the Commonwealth. The primary funding needs are in upgrading infrastructure to meet the evolving regulations and needs of local municipalities, as well as maintaining and, where necessary, replacing aging infrastructure. Currently, funds are distributed through multiple avenues primarily through revolving funds, clean water act grants, and stormwater utility revenue (where utilities exist). Some of the largest funding sources for stormwater infrastructure are listed below:

- DCNR Community Conservation Partnership Program grants
- Commonwealth Finance Authority
- PADEP's Growing Greener Watershed Grants
- PENNVEST
    - Funded through Clean Water State Revolving Fund (CWSRF)
- US EPA's Green Infrastructure Funding Opportunities
- National Fish and Wildlife Federation's Chesapeake Bay Stewardship Program
- Chesapeake Bay Trust's Green Streets, Green Jobs, Green Towns
- ACT 167 Planning Grants

Additionally, a growing number of municipalities have turned to stormwater utilities. These are dedicated fee systems, similar to sanitary sewer charges, that bill property owners based on the impervious cover on their parcels. A 2025 Western Kentucky University study counted 70 such utilities in the Commonwealth, 14 of them added since 2022, each providing a dedicated revenue stream for stormwater capital and maintenance work that would otherwise compete with everything else in a municipal budget. However, In April 2026, the Pennsylvania Supreme Court held in Borough of *West Chester v. Pennsylvania State System of Higher Education* that municipal stormwater charges of this type constitute a tax rather than a fee, raising unresolved questions about the legality, enforceability, and revenue reliability of these programs across the Commonwealth.

Stormwater utility revenue contributes to local infrastructure funding where programs exist but covers a small fraction of the Commonwealth's identified $1.7 billion need (CWNS 2022). Despite growth in recent years, designated stormwater utilities remain the exception across Pennsylvania's 2,500+ municipalities, and the legal basis for these fees has recently been called into question.

A centralized statewide system for tracking infrastructure conditions and capital needs does not currently exist, contributing to the coordination challenges noted above.

Recent legislation has led to an expansion in funding for Pennsylvania stormwater infrastructure. For example, the PA Act 54 of 2022, dedicated $310 million of American Rescue Plan Act funds to water, sewer and stormwater projects in the Commonwealth. Additionally, the Bipartisan Infrastructure Law includes Over $91 Million directed to PA via Clean Water State Revolving Fund (CWSRF) to improve infrastructure and reduce flooding.

The Pennsylvania population has grown by approximately 56,600 between 2020 and 2025, an increase of 0.4%. Studies show that Pennsylvania's population is moving to more urbanized areas with projections predicting a 2% shift to urban areas by the year 2050. This increase in an urbanized population, and subsequent increase in impervious areas, can lead to an increase in stormwater runoff and need for upgrades to the stormwater infrastructure. Additionally, the PADEP is in the process of updating the regulations for the MS4 program. The upgrades necessary and the engineering involved to meet these new requirements will also increase the future need for funding. The National Oceanic Atmospheric Administration (NOAA) predicts an increase in rainfall totals within Pennsylvania by 8%-14% by 2050 with storms increasing in magnitude, frequency, and intensity of rainfall events raising flood risks statewide. The EPA



Photo: Worker laying an orange PVC drainage pipe in a trench, tanitost

Needs Survey calculates the following funding and future needs for Pennsylvania stormwater infrastructure: $1.9 Billion for gray infrastructure, green infrastructure, and general stormwater management, $4.4 Billion for combined sewer overflow correction, and $1.1 Billion sewer replacement/rehabilitation. This totals to $7.4 billion of funding to meet the future needs of Pennsylvania stormwater infrastructure as reported in the 2022 Clean Watersheds Needs Survey (CWNS) Report to Congress.

Pennsylvania funding for stormwater infrastructure is increasing, primarily through PENNVEST, which awarded approximately $1.1 billion in drinking water, wastewater, stormwater, and non-point source projects together infrastructure investments across its October 2025 and January 2026 board meetings combined. This is a necessary increase in funding; however, a significant funding gap remains.

OPERATIONS AND MAINTENANCE

The benefits of SCMs can only be obtained with proper construction combined with ongoing operation and maintenance (O&M) of the facilities. Pennsylvania's Draft Post-Construction Stormwater Management (PCSM) Manual includes detailed recommendations on the timing and steps for the proper operations and maintenance of SCMs over the lifespan of the system. Many problems with the operation and maintenance of SCMs begin during the construction phase and the Draft PCSM Manual includes additional construction phase inspections and testing to ensure the SCM is constructed as designed. Additionally, the Draft PCSM manual emphasizes the value of vegetation in the function of stormwater management through allowing credit for evapotranspiration and soil health. Since more vegetation is included in the function of the SCM, ongoing operation and maintenance activities are more essential to the survival rate of the vegetation.

The operation and maintenance of stormwater control measures within the Commonwealth are typically assigned to property owners via deed restrictions with enforcement of the operations and maintenance agreement by Municipalities under their MS4 permits and Act 167 plans. Inspection and maintenance records must be maintained documenting the proper care for the SCM. Many private homeowners and homeowners' associations (HOAs) may lack the technical expertise, funding, or organizational capacity necessary to perform specialized stormwater maintenance activities over the full lifespan of SCMs. There has been a rise of SCM specific landscaping and maintenance companies in recent years that can provide services for private and public SCM owners alike.

The continued expansion of green stormwater infrastructure and vegetation-based SCMs may increase demand for specialized maintenance personnel with expertise in landscaping, vegetation management, inspections, sediment removal, and stormwater asset management. As Pennsylvania's inventory of SCMs grows, maintaining adequate workforce capacity may become an increasingly important consideration for both public and private owners. Additional workforce development efforts may be necessary to support the long-term O&M needs associated with Pennsylvania's growing inventory of stormwater management facilities. The Commonwealth's 2026-2027 budget continues investments in workforce development through the Construct PA workforce development initiative administered under the Commonwealth Workforce Transformation Program. According to the Commonwealth, the program allows organizations performing infrastructure work funded through the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) to receive up to $40,000 for each newly trained worker. The program further reserves at least 3% of Pennsylvania's IIJA and IRA funding for workforce development and on-the-job training, representing a potential investment of up to $400 million over five years and supporting as many as 10,000 jobs.

Although these workforce development initiatives are not specifically targeted toward stormwater management, they may provide opportunities for municipalities, authorities, contractors, and other responsible parties to expand the skilled workforce available to inspect, operate, and maintain stormwater infrastructure. Given the increasing number of stormwater management facilities requiring long-term maintenance, stakeholders should evaluate opportunities to leverage available workforce development funding to build organizational capacity and support sustainable O&M programs.

In some areas, there is overlap in the coverage of MS4 permittees and O&M responsibility. For example, Pennsylvania DOT (PennDOT) has its own MS4 permit that overlaps with many local MS4 permits. In this case PennDOT is generally responsible for drainage systems on the surface of state roadways between curb lines and subsurface drainage on state roadways within townships. Municipalities are responsible for underground drainage systems located within their borders. Property owners are responsible for drainage on private property, including driveways. This can lead to confusion and delays in O&M if all stakeholders are not aware of the responsibilities of each party. However, it can also present opportunities for shared funding and larger scale projects.

PUBLIC SAFETY

Pennsylvania's stormwater infrastructure is under increasing strain to keep up with the increased intensity and frequency of rain events, raising public safety concerns. The NWS Middle Atlantic River Forecast Center documented 10 flood events affecting the Mid-Atlantic region in 2025, 6 of which impacted Pennsylvania. Moreover, frequent stormwater infrastructure failures can potentially cause public health challenges. During the summer of 2025, a severe flash flooding event and mudslides in Luzerne, Lycoming, and Columbia counties resulted in damaged roads, culverts, and downed trees. Another event in Lehigh County flooding a community pool which had to shut down for public safety due to the mud carried into the pool. A state road in East Whiteland Township cost PennDOT $22.5 million and 3 years to remediate a sinkhole causing traffic delays and damage to infrastructure. Looking forward, a critical component of the design and construction of resilient stormwater management systems include designing for changing rainfall patterns.

Precipitation estimates are the backbone of all stormwater design and planning efforts in the Commonwealth. The United States has been systematically tracking the weather since around 1850. For about 100 years of the record (1895 to 2000) the rate of change in annual rainfall was less than 1/3 an inch per decade. The 2021 Pennsylvania Climate Impacts Assessment reports that the number of days with greater than three inches of rain will increase 52% by midcentury and 93% by the end of the century, and a 9% increase in annual rainfall.

NOAA's Atlas 14 is the most common rainfall data used for infrastructure design. Pennsylvania's data is based on datasets that in some cases are over a decade old. NOAA Atlas 15 is in development and is anticipated to be released in 2027. The PRECIP Act, signed into law in December 2022, authorizes NOAA to establish a program to update these precipitation frequency estimates no less than once every 10 years. This is critical to the civil engineering community which relies on the most complete, up to date data available for designing and building critical infrastructure which can withstand the increasing frequency and intensity of storms. Governmental budget cuts of up to $2.2 billion to NOAA have recently been proposed. While the head of NOAA, Dr. Niel Jacobs, says these budget cuts would not affect NOAA's services, some others in the government disagree. In addition to the relevancy of the data used, stormwater modeling must be updated regularly to better address short-duration, high-intensity storm events. The PADEP is considering including continuous simulation modeling when it updates its Stormwater BMP Manual.

RESILIENCE

Annual average precipitation is projected to continue to increase, and rainfall events are projected to increase in magnitude, frequency, and intensity as the century progresses. For every $1 spent in mitigation, up to $13 are saved in flood damages. Preparing today is essential to protect our communities and ensure the Commonwealth becomes more resilient in the face of future risks. One way the Commonwealth has been proactive is to not only publish a hazard mitigation plan but be one of 16 states with an enhanced plan. Pennsylvania had to show it had developed a comprehensive mitigation program and is capable of managing increased funding for its mitigation goals. Communities without plans cannot receive FEMA funding.

The Draft PCSM Manual incorporates resiliency into the design and maintenance of SCMs. The manual was developed to adapt to ongoing changes to climate models and precipitation records, such as the release of NOAA Atlas 15. The manual emphasizes the importance of natural landscape processes and provides credit in the permitting process to promote the protection of these areas. SCM design guidance additionally includes more detail on the appropriate selection of soil media to promote groundwater recharge and selection of vegetation to promote evapotranspiration. The new manual also promotes the separation of rate and volume control facilities to reduce the strain on infiltrating surfaces and improve the lifespan of SCMs.

INNOVATION

The most consequential innovations in stormwater are in asset management and monitoring. AI-assisted platforms can now review CCTV pipe-inspection footage to flag defects and forecast pipe condition, letting owners shift from reactive, failure-driven repairs toward proactive, life-cycle planning. Early deployments show the payoff. Fort Worth, Texas used a machine-learning model to predict storm-drain condition from historical data, achieving better than 80% true-positive accuracy, a 30% gain in predictive performance over conventional risk-based methods, and a 50–60% reduction in the cost of CCTV quality-control review (ASCE Library). Artificial intelligence is emerging as a valuable tool for improving the efficiency of stormwater and wastewater infrastructure inspections and asset management. In Pennsylvania, the Delaware County Regional Water Quality Control Authority (DELCORA) has implemented AI-assisted CCTV inspection technology to automatically identify pipe defects, assess infrastructure conditions, and prioritize maintenance and rehabilitation. According to SewerAI, the technology has allowed DELCORA to increase annual pipe inspections by approximately 88%, from 160,000 to 300,000 linear feet, while reducing inspection costs per linear foot by 38%. Although currently applied to wastewater infrastructure, this technology has similar potential for stormwater conveyance systems, allowing municipalities to more efficiently assess aging infrastructure, identify maintenance needs, and prioritize capital improvements (SewerAI). As Pennsylvania works toward statewide asset mapping and condition tracking, platforms like these represent technology that could be adopted to build and monitor the asset inventories that the Commonwealth currently lacks.

Additionally, Pennsylvania is moving to remediate issues with stormwater management by updating the primary technical guidance document for stormwater design: the Stormwater BMP Manual. The new "Post-Construction Stormwater Management (PCSM) Manual" will replace the original manual from 2006 with an updated framework incorporating nearly two decades of advances in stormwater science, engineering, and research. While the manual is guidance rather than regulation, it carries significant practical weight by defining the design standards that engineers and regulators use to evaluate stormwater management plans. While there is no definitive timeline for official implementation, some conservation districts have already begun using it as guidance for their NPDES reviews. However, as with any update to technical guidance, there will likely be a transition period where evolving design requirements may create uncertainty in the project review process.



RECOMMENDATIONS TO RAISE THE GRADE

- Increase local, state, and federal funding to address stormwater infrastructure needs.
- Develop and implement climate adaptation strategies at the Local, and State level to evaluate flood risks, assess resiliency and support mitigation strategies.
- Prioritize using large capital allocations, such as those granted by the Bipartisan Infrastructure Law, for the upgrading and retrofitting of aging systems.
- Release and implement the revised PCSM Manual. This will ensure new systems are designed and built with more recent data and stormwater science.
- Incentivise regional and watershed-based collaboration on stormwater infrastructure projects.
- Create a statewide system that inventories the size, condition, capacity, and capital needs of all stormwater assets that is easily accessible, and incentivise work on this system.
- Take steps to implement artificial intelligence programs to assist in stormwater asset management and expedite plan reviews. These steps can be taken strategically to reduce capital expenditure while also leaving final decision-making with agency/municipal staff.

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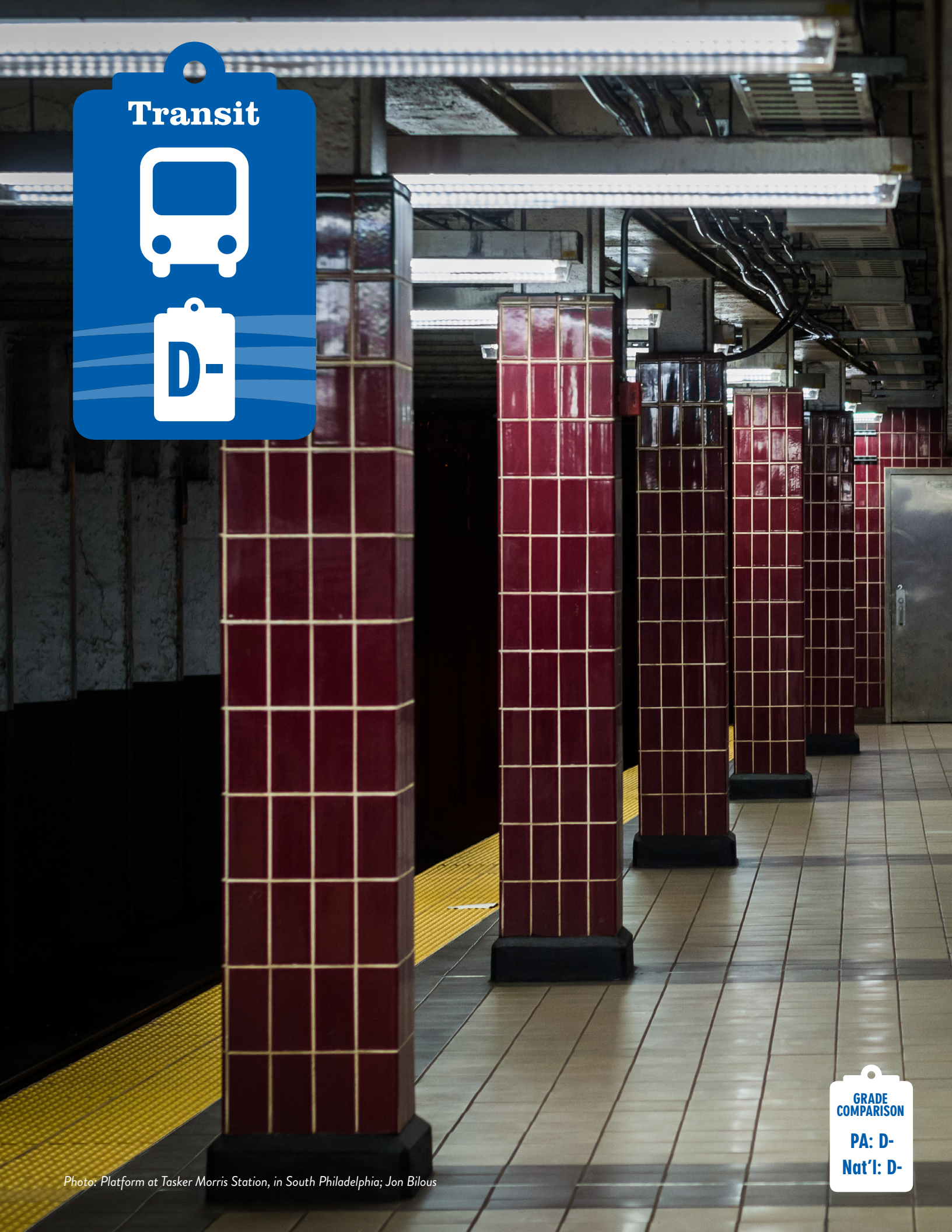


Photo: Platform at Tasker Morris Station, in South Philadelphia; Jon Bilous

TRANSIT

EXECUTIVE SUMMARY

Public transit serves all 67 Pennsylvania counties and continues to support strong ridership in both urban and rural communities. However, Pennsylvania's transit network faces significant financial and infrastructure challenges. While Act 89 helped address critical capital needs, additional long-term investment will be required to maintain and expand service. Temporary COVID relief funding, alongside the federal Infrastructure Investment and Jobs Act (IIJA), has provided substantial funding for transit and infrastructure improvements, but remaining formula funds are set to expire in December 2026 without congressional action. Federal review and grant delays have further limited agencies' ability to obligate available funds.

At the same time, many transit agencies are experiencing operating deficits and have increasingly relied on capital funds to sustain service. In 2025, Pittsburgh Regional Transit (PRT) faced a $100 million budget shortfall and proposed major service reductions and fare increases, while the Southeastern Pennsylvania Transportation Authority (SEPTA) was authorized to use $394 million in capital assistance to support operations. Without dedicated funding streams to make up the loss of other programs, agencies across the state face service cuts and system scale backs. Future improvements, upgrades, safety measures, and expansions remain out of reach, especially if capital funding continues to be used for systems operations.

BACKGROUND

Americans are traveling significantly more than ever before. Following a slight dip from 2008 to 2014, vehicle miles traveled have steadily increased, even surpassing pre-COVID values as of the start of 2025. The Federal Highway Administration has estimated that in the next 20 years, this trend will continue, with vehicle miles traveled increasing by 0.7% each year, outpacing the estimated population growth of 0.2% per year. Despite the constant strain on the road network, only 4.2% of all Pennsylvanians or 5.3% of urban Pennsylvanians use public transportation to commute to work. Rates of transit ridership are higher in the state's largest population centers, with 20% of Philadelphia proper and 13.8% of Pittsburgh proper. More transit options have consistently led to higher transit ridership.

While automobile usage has surpassed pre-COVID levels, the same cannot be said for transit. Prior to

COVID, 5.7% of all Pennsylvanians and 7.1% of urban Pennsylvanians relied on transit to commute to work. Some of this loss can be attributed to new work-from-home trends, evident by the 2019 version of the American Community Survey not having this as a category. However, if transit is to remain a viable alternative to driving, continued focus and investment is necessary to attract new and returning ridership and to prevent the worst impacts.

FIGURE 1. PENNSYLVANIA TRANSPORTATION PERFORMANCE REPORT



Source: PennDOT TPR, 2025

CAPACITY

Pennsylvania's 67 counties have unique transit needs and systems. The state hosts 19 urban and 18 rural fixed route transit systems, 42 shared-ride services, 10 intercity bus routes operated by two companies, and 66 county rural transportation systems for persons with disabilities. In total, over 528 million trips totaling over 2.2 billion miles were facilitated by transit in the Keystone State in FY 2024. The largest cities, Philadelphia and Pittsburgh, and their associated transit agencies, account for 61% of all vehicles and 90% of trips. The full list of ridership metrics is shown in Table 1.

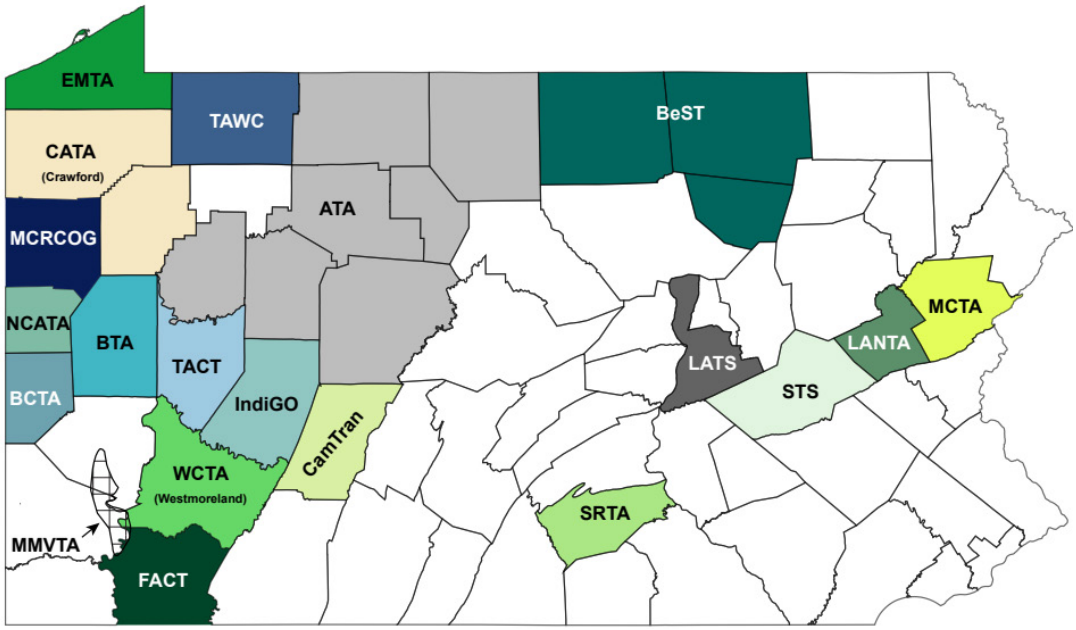
Table 1. Pennsylvania Transit Sytems Key Capacity Metrics

Agency	Service Area Population	Service Area	Annual Passenger Miles Traveled	Annual Unlinked Trips	Total Vehicles
SEPTA	3511062	830	853328085	200711934	1943
SRTA	1544476	5619	20418540	3328330	336
PRT	1238090	775	166448293	37866514	766
SCTA	949401	1800	18548185	3788665	163
LANTA	533100	324	20658629	4209277	140
Other Urban Agencies	2047774	4069	47962718	12386399	610
Rural Agencies	*	*	*	2705246	449

*** Statistic not reported by rural agencies**

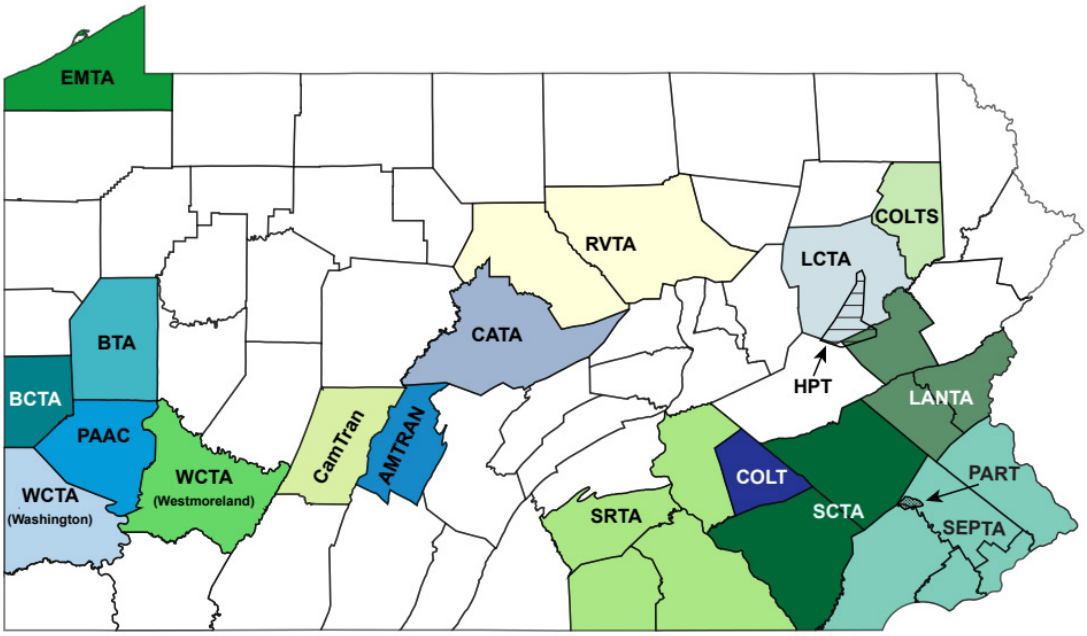
Source: FTA Annual Agency Profiles

Figure 2. Rural Transit Agencies



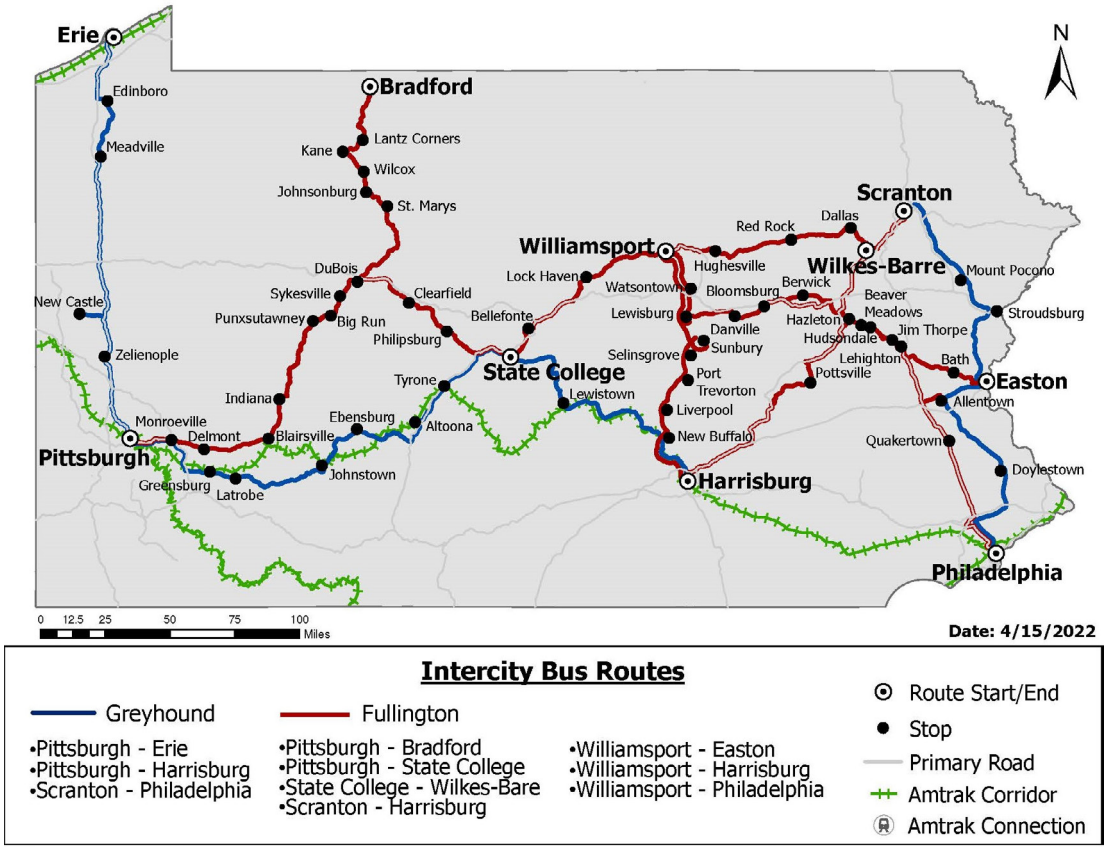
Source: PennDOT Public Transportation Annual Performance Report

Figure 3. Urban Transit Agencies



Source: PennDOT Public Transportation Annual Performance Report

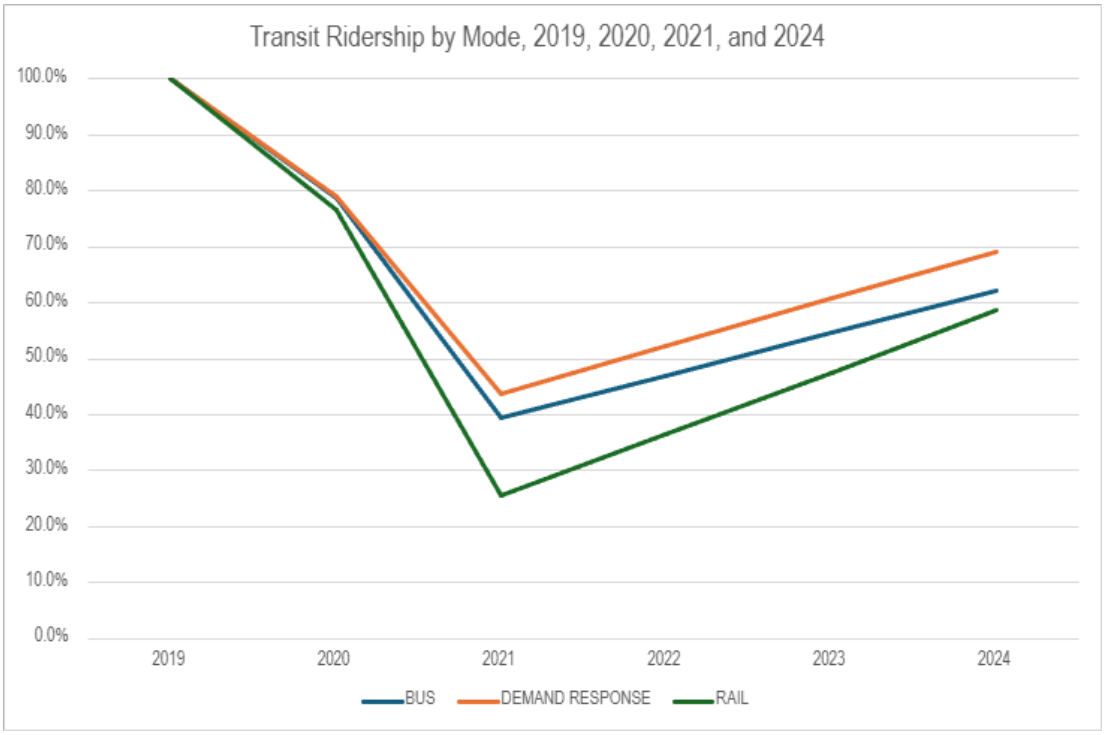
Figure 4. Intercity Bus Routes



Source: PennDOT

The passenger numbers in 2024 show a continued rebound from the effects of COVID-19, but like most other transit networks across the country, passenger counts have yet to return to 2019 levels. From 2019 to 2021, transit ridership fell by 67% across the state, and total trip distances decreased by 65%. From the low in 2021, systems across the state have recovered to approximately 60% of the 2019 totals, as shown in Graph 1.

Graph 1. Transit Ridership 2019-2024



Source: FTA Annual Agency Profiles

Many agencies continue to adapt to changing ridership patterns, as lost ridership typically translates into lower farebox recovery rates. From 2020 to 2024, the total number of service vehicles has decreased by over 900 across the 74 systems analyzed. More recently, several agencies have taken drastic measures to offset losses, sometimes cutting over 20% of all service. In summer 2025, both PRT and SEPTA had proposed large service adjustments. Neither of these proposed changes happened due to PennDOT's approval of using captial funds for operating expenses, but both agencies still emphazise that these proposals are still on the table in the future.

While the most drastic measures have been avoided, many agencies are currently in the process of revising service plans to account for lower ridership. Pittsburgh, for example, is undertaking a complete review of all bus routes operated, resulting in 20 discontinued routes, 14 new lines, and modifications to nearly all existing routes. While PRT claims that 99.2% of residents will still have a bus stop within a quarter mile of their residence, many residents, especially those on the perifory of the urban area, will see reductions in service in the form of reduced frequencies and more transfers required. Meanwhile, areas such as Oakland, which are more affluent and have high transit ridership thanks to several nearby universities, will see service increase. This triage, while it may attrach new riders, also disenfranchises communtiies where transit already served a key role. Additional cuts to late night service or direct services to downtown, mean that some trips may no longer be feasible under new plans.

CONDITION

Transit systems' capabilities are limited by the condition of the assets they manage. If not routinely maintained and replaced, transit infrastructure can present challenges to agencies and the customers who rely on them. Per guidelines from the FTA, the useful life of a heavy-duty large bus is 12 years and rail car is 30 years. Table 2 outlines the average age of transit vehicles for the five largest agencies in Pennsylvania.

Table 2. Average Age Of Transit Vehicles

Agency	Service Modes	Vehicles, 2024	Vehicles, 2020	Vehicle Ages, 2024	Vehicle Ages, 2020	Vehicle Change	Age Change
PRT	Demand Response	213	267	6.1	5.9	-54	0.2
	Inclined Plane	2	2	154.0	150.0	0	4.0
	Light Rail	47	58	32.4	28.6	-11	3.8
	Bus	504	603	7.5	5.9	-99	1.6
SEPTA	Commuter Rail	311	357	35.4	31.1	-46	4.3
	Demand Response	272	393	4.9	3.4	-121	1.5
	Heavy Rail	215	286	32.7	27.8	-71	4.9
	Bus	1033	1223	7.8	7.3	-190	0.5
	Street Car Rail	85	118	45.3	43.1	-33	2.2
	Trolleybus	27	29	16.0	12.0	-2	4.0
LANTA	Demand Response	20	21	5.9	6.8	-1	-0.9
	Bus	24	27	5.6	4.1	-3	1.5
SCTA	Demand Response	39	36	4.9	11.8	3	-6.9
	Bus	3	3	14.0	8.8	0	5.2
SRTA	Commuter Bus	18	16	3.1	3.3	2	-0.2
	Demand Response	11	18	7.2	3.2	-7	4.0
	Bus	29	34	4.7	3.2	-5	1.4

Source: FTA Annual Agency Profiles

When examining all agencies and modes in Pennsylvania, 39 out of 74 agencies and modes analyzed showed an increase in average fleet age between 2020 and 2024, and 28 showed improvement. Only three agencies, however, currently have vehicles whose average age is greater than FTA recommendations: PRT's inclines, SEPTA's commuter rail rolling stock, and Area Transportation Authority's buses and vanpools. With more than half of the state's transit fleet aging compared to four years ago, problems are bound to arise more frequently in the future. Progress has been made on this in terms of buses, with over 600 vehicles being delivered to agencies across the state in the last four years through the FTA Section 5310 formula funding program. Several agencies, including four out of the five largest agencies, had vehicle ages increase by four years or more. This indicates that no fleet improvements have been made since COVID, or worse, that newer vehicles had to be removed from service.

Recently, SEPTA was subject to an emergency order from the Federal Railroad Administration following a fire onboard a commuter rail car in February 2025 that required immediate inspection of 225 rail cars, representing two-thirds of SEPTA's regional fleet. This in turn required significant adjustments in schedules to facilitate all inspections. The agency also noted that it will face difficulty in replacing these cars given cost constraints, only partially covered with a purchase of 24 rail cars from Montreal. This has further been supported with $219.9 million in funding for SEPTA announced by Governor Shapiro in November 2025.

Outside of Philadelphia, PennDOT has also supported fleet modernizations by assisting in the purchase of 802 buses in 2024. This totals over $182 million from federal, state, and local funding. This funding has helped reduce emissions with the purchasing of alternative fuel and electric buses, improve safety with newer vehicles, and reduce operating costs associated with older fleets.

There have been some improvements to note in facility improvements. Capital construction costs have increased by about 70% since 2020, meaning without an equal increase in funding, projects will continue to be delayed or abandoned. The Pennsylvania Public Transportation Performance Report highlighted 40 projects funded in FY2024. These projects include several multimodal facilities, maintenance garages, park and rides, and storage buildings.

OPERATION & MAINTENANCE

Although total ridership experienced historic low levels during the COVID-19 pandemic, it also emphasized the necessity for public transportation as a life-line service, enabling many people to maintain access to employment and other life-sustaining functions. Some bus operators and other employees even served in additional capacities, engaging in friendly check-ins or delivering meals to elderly or disabled passengers who were riding less frequently.

Today, however, agencies are facing rising operating costs just to maintain similar levels of service. Table 3 shows the increase in operating costs per passenger and per mile.

Table 3. O&M Costs by Agency

Agency	O&M, 2024	$/ passenger, 2024	$/mile, 2024	% O&M, 2020 to 2024	% $/pax, 2020 to 2024	% $/mile, 2020 to 2024
SEPTA	$1,550,987,082.00	$7.73	$1.82	19%	43%	53%
SRTA	$57,262,543.00	$17.20	$2.80	22%	37%	32%
PRT	$504,419,081.00	$13.32	$3.03	16%	59%	53%
SCTA	$40,876,232.00	$10.79	$2.20	31%	47%	47%
LANTA	$56,959,442.00	$13.53	$2.76	51%	45%	64%
Other Urban Agencies	$149,559,975.00	$12.07	$3.12	21%	21%	21%
Rural Agencies	$67,643,965.00	$25.00	*	25%	25%	*
*** Statistic not reported by rural agencies**						

Source: FTA Annual Agency Profiles

Overall, the total operations costs of all systems increased by about $397 million between 2020 and 2024, an increase of 20%. When combined with the loss of ridership, the cost per passenger and cost per mile have increased 46% and 53%, respectively. This loss of ridership also impacts farebox recovery rates, meaning that agencies are even more reliant on federal or state subsidies to keep services running. Overall farebox recovery rates have decreased by $78 million between 2020 and 2024. Table 4 shows this decline for select systems.

Table 4. Farebox Recovery by Agency

Agency	Farebox Recovery, 2024	Farebox Recovery, 2020	2024 Recovery %	2020 Recovery %
SEPTA	$278,836,262.00	$353,276,517.00	18%	27%
SRTA	$20,855,013.00	$17,564,204.00	36%	37%
PRT	$64,282,125.00	$79,071,495.00	13%	18%
SCTA	$6,039,370.00	$6,344,322.00	15%	20%
LANTA	$8,326,635.00	$4,406,167.00	15%	12%
Other Urban Agencies	$23,300,647.00	$22,018,772.00	16%	18%
Rural Agencies	$15,639,304.00	$13,114,231.00	23%	24%

(Source: FTA Annual Agency Profiles)

Because of the increase in operating costs without foreseeable new revenue, PRT and SEPTA were authorized to use up to $106.7 million and $394 million, respectively, out of their capital funds for operating expenses. This is not a long-term sustainable solution and will only worsen capacity and conditions of infrastructure.

Operations and maintenance costs are likely to increase in the future given both inflationary pressures and lack of manpower. SEPTA, the state's largest agency, has a current need of about 200 additional bus drivers to cover existing needs. The lack of drivers has led to loss of revenue hours and dropped transit routes, while also increasing labor costs in order to attract new workers.

FUNDING AND FUTURE NEED

Pennsylvania invests more than $1.6 billion annually in public transportation, ranking fifth in the nation in direct support for public transportation. Transit funding comes through federal, state and local funding, in addition to revenue from fares. Pennsylvania's state funding for transportation is 11% of the 2022-2023 State Budget. It has grown since 2012 as a direct result of Act 89.

When Act 89 was established, the multimodal fund and local use funds were created to provide funding to capital projects supporting the improvement of all transportation modes. Funding for transit projects is available through the State's Liquid Fuels Program. The liquid fuels tax has been the largest revenue contributor to the state transportation fund since it was established in 1984. Act 89 has helped operators address capital needs through 2023.

An additional funding source, Act 44, approved in 2007, expanded the PTC mandate to provide annual funding contributions for broader Pennsylvania transportation needs, including transit. A financial shift in 2022 relieved PTC of these payments but place an additional burden on Pennsylvania's budget. Current law stipulates motor vehicle sales tax revenues will be earmarked to replace that reduced funding with a floor of $450 million from the state's General Fund, without new revenue sources to replace those funds.

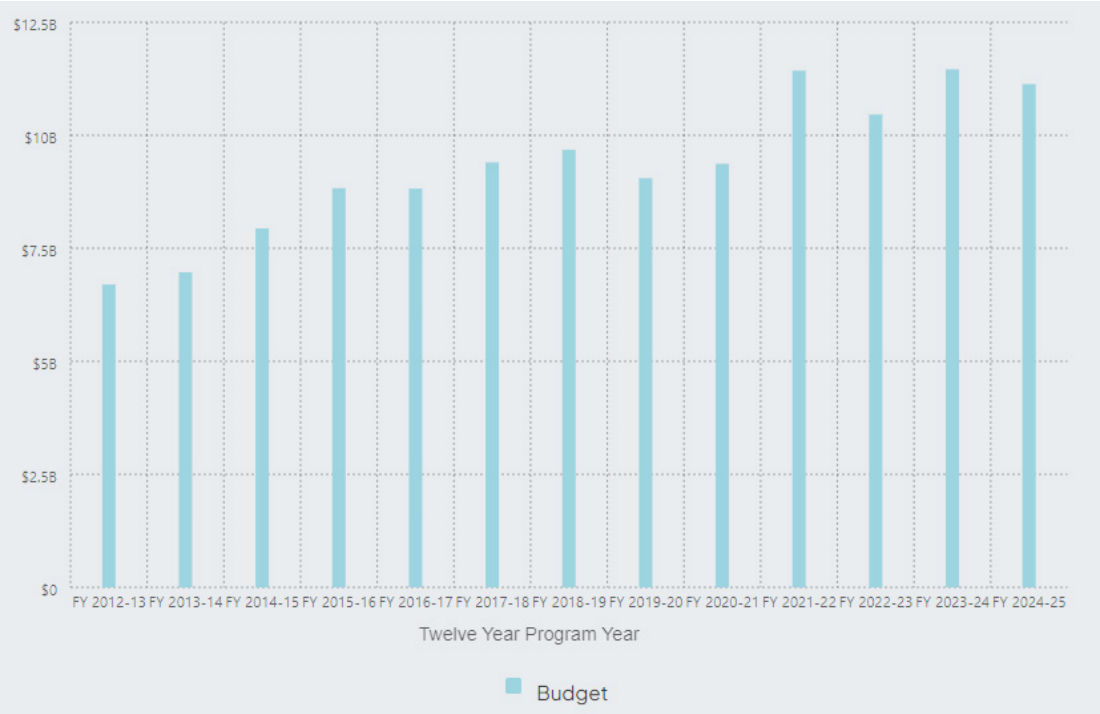
Since Act 89's expiration in 2023, Pennsylvania has relied on mostly stopgap measures to fund transit.

Initially, much of this funding came from COVID-era relief programs, such as the CARES Act, the CRRSA Act, and the American Rescue Act. Pennsylvania alone received $1.13 billion from the CARES Act for transit use, almost matching existing funding from the state. Many of these programs also expired in 2023 or shortly thereafter, helping to at least cover the expenses from the COVID-era loss of ridership.

The federal Infrastructure Investment and Jobs Act (IIJA) has also provided significant investments in transit and infrastructure improvements. Remaining formula funds expire in December 2026 following a three-month extension from September. Federal review and grant delays further compress the obligation window, and lack of state funding means future matching fund requirements may pose an issue.

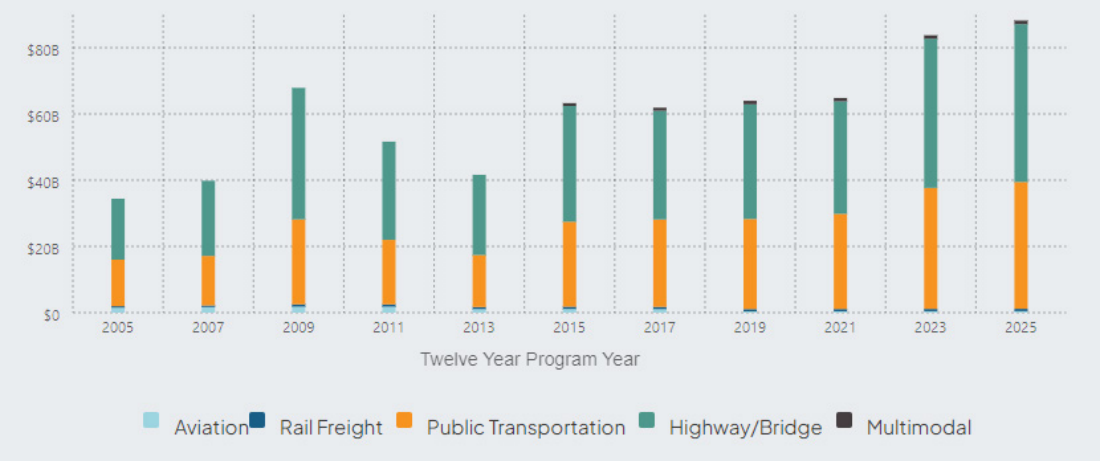
Over the past decade more than $5.2 billion in state capital funds have been granted to transit agencies, averaging more than $500 million per year to provide high-quality transit service and invest in infrastructure. In addition, more than $170 million was invested by local communities to match state capital funding. State and local funding is often used as leverage for federal funding. This had the potential to return more than $2.5 billion in federal funding from 2013 to 2024.

Figure 5. State Transportation Budget



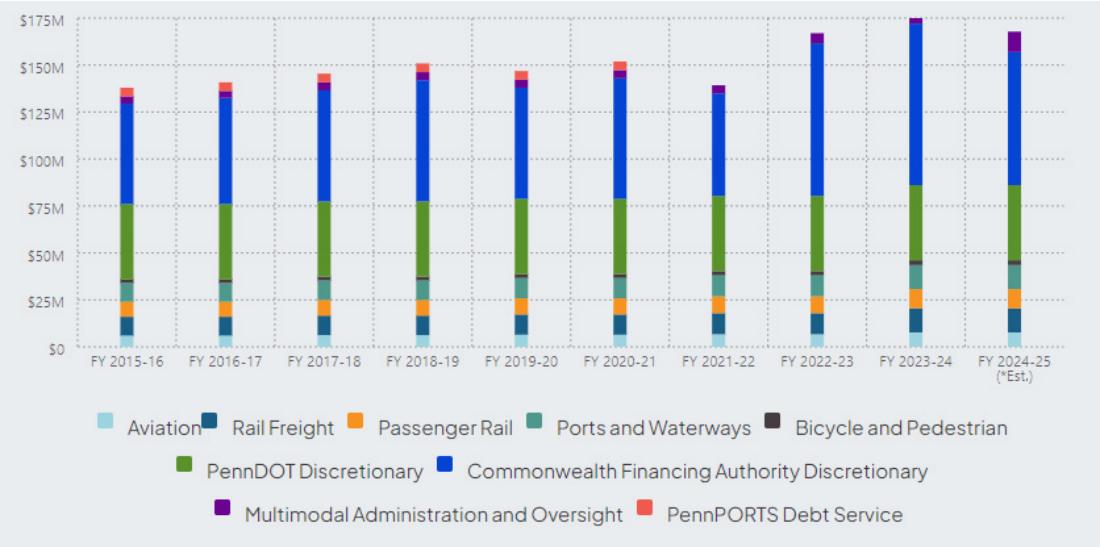
Source: PennDOT Bureau of Fiscal Management

Figure 6. 12-Year Program 2025



Source: PennDOT Center for Program and Management

Figure 7. Multi Modal Fund 2025



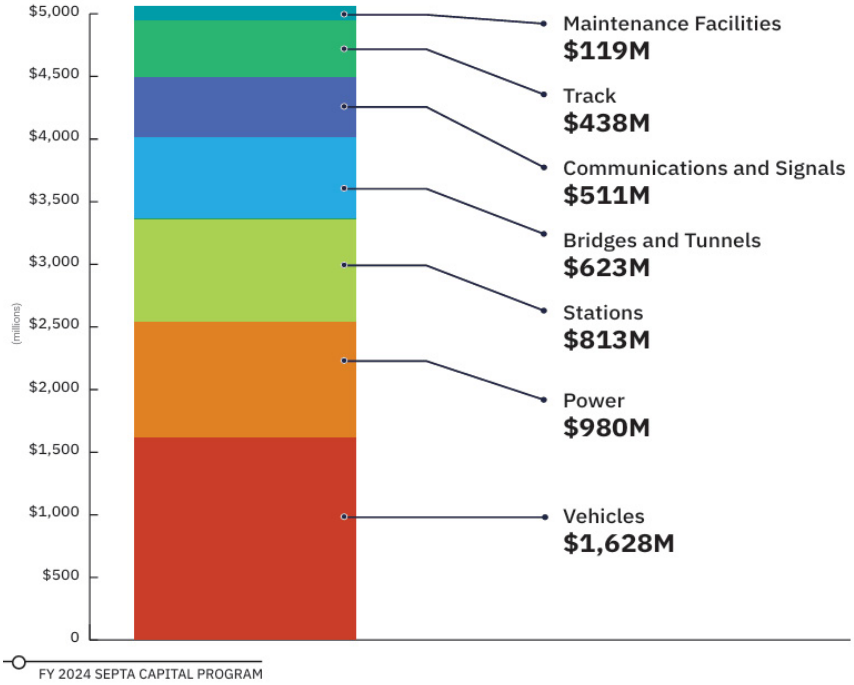
Source: PennDOT Bureau of Fiscal Management

While new investment would expand transit service to more Pennsylvanians, existing systems have great needs for required reinvestment to replace aging infrastructure. Historically unstable funding coupled with rising costs and deferred maintenance represents the greatest threat to agency finances. Additionally, infrastructure inherited from private operators, which often could not sustain the infrastructure to an acceptable condition, caused many of these needs to become critical. SEPTA alone has a state of good repairs backlog of $10.2 billion, which has risen from $4.6 billion a decade ago from $5.1 billion in 2023, representing a doubling in only 3 years. Meanwhile, PRT requires roughly $2.1 billion or backlog for repairs. Smaller transit operators need to invest in vehicle replacement, storage and maintenance facility upgrades, and expanding the number of transit centers.

In an effort to tackle the large state of good repair backlogs, agencies are having to do more with less. Agencies are looking to the state to help "close the gap" on funding shortfalls and tackle some of the challenging

fiscal situations. In 2026, Governor Shapiro proposed a budget increase (House Bill 1364) in the proportion of sales and use tax revenue that goes towards public transportation. This would increase sales tax revenue from 4.4% to 6.2%. It is expected to generate approximately $300 million annually. A stipulation in the bill provides $500 million in bond money to cover road and bridge infrastructure.

Figure 8. Septa State of Good Repair Projects, 2023



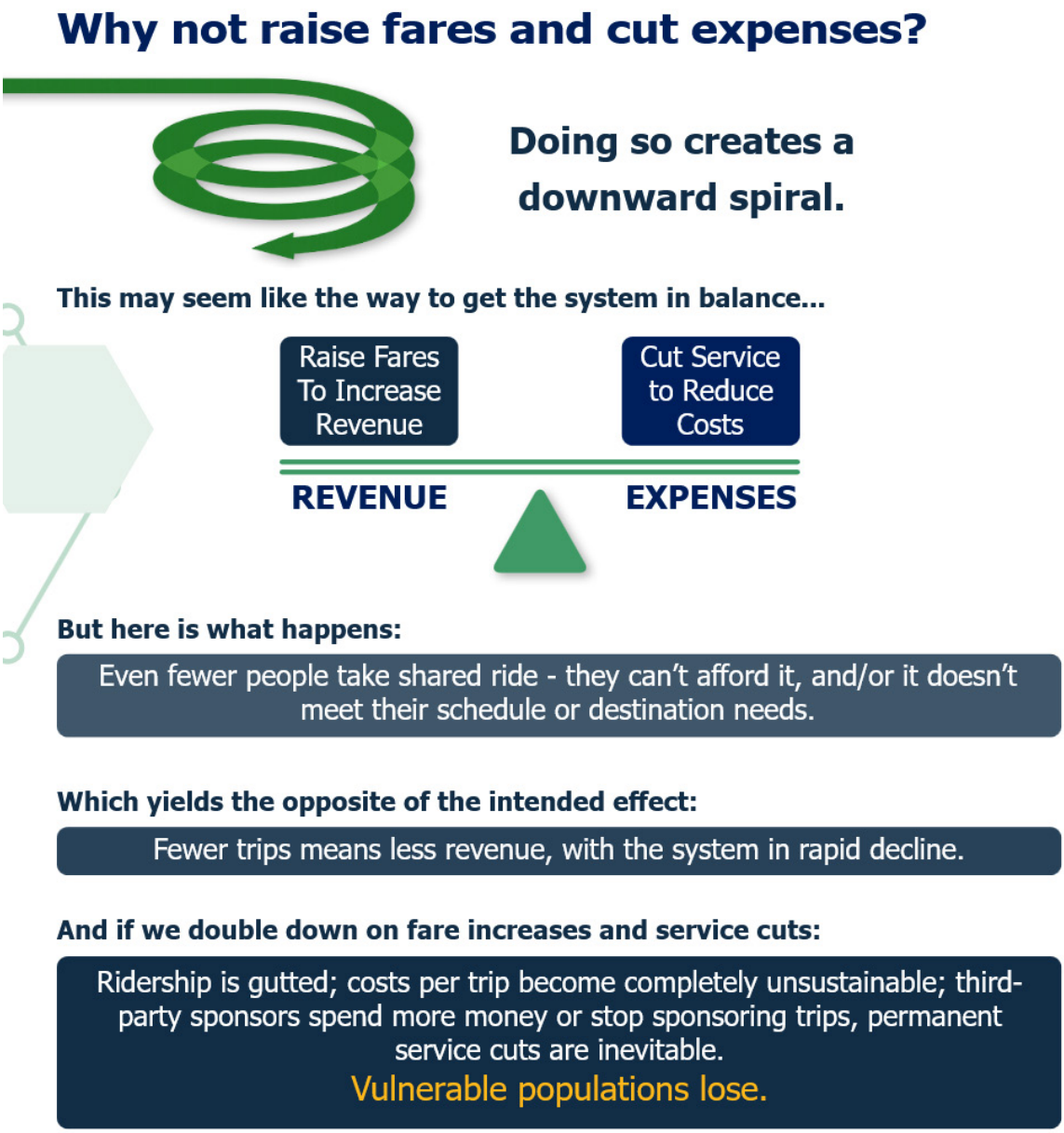
Source: SEPTA FY-2024 Capital Program

Transit agencies are being forced into challenging financial situations. Several agencies have used capital funding to support operating budgets. Starting in July 2025, PRT faced a $100 million budget crisis and had proposed cutting 35% of fixed-route service and increasing fares by 9%. PennDOT approved the use of $106.7 million in capital funding to support its operating budget, which will be used to both address the deficit and to preserve service and avoid fare increases in the 2026-27 fiscal year. PRT needs a $117 million infusion of state funding beginning FY2026 – with compounding annual increases – to support current service levels for the next decade. This would allow PRT to cover expenses of current service and account for rising costs.

In September 2025, PennDOT granted SEPTA similar permission to use $394 million in capital assistance for operations funding. SEPTA had a $213 million funding shortfall and proposed service cuts that fortunately were not implemented, with a 21.5% fare hike to raise roughly $31 million. SEPTA and PRT have called for longer-term solutions. The grants only support funding for the next two years. While the current 12 year program outlines an ambitious $40 billion investment in transit, it is uncertain where this funding will come from without concrete political support. The 2026-2027 budget passed by the state in July of 2026 provides no new long-term transit operating funds or revenue increases, the second budget in a row to not address the issue.

Without long term support, many agencies risk falling into a negative feedback loop, where declining ridership results in fewer revenues and formula grants awarded, leading to further declining transit utilization. The graphic from PennDOT in Figure 9 shows the continued risk of political indecision regarding public transportation.

Figure 9: Transit Negative Feedback Loop



Source: PennDOT Public Transportation Performance Report, FY2024-2025

PUBLIC SAFETY

Transit is a demonstrably safer mode of travel than personal automobile use. Despite this, transit agencies in Pennsylvania and nationwide continue to face challenges in attracting riders, driven in part by public perceptions, changing travel patterns, and concerns that have persisted or intensified since the COVID-19 pandemic. According to the FTA's Safety & Security Major Event Time Series, Pennsylvania transit systems reported two onboard passenger fatalities in 2024 and 2025 and zero onboard passenger fatalities through June of 2026. In terms of passengers waiting at a station, there were 7 fatalities recorded in 2024, 3 in 2025, and one through June of 2026. Across these three years, there were an additional 10 suicides, 1 track encroachment fatality, and 29 deaths from other accidents. The statistics point to the continued need of safe station and facility design in the form of better lighting and visibility, but also hard infrastructure such as platform doors and track fencing. Further improvements can still be made from complete street designs which prioritize transit and its riders.

Several Pennsylvania transit agencies are actively investing in transit infrastructure and safety improvements to address key concerns such as aging assets, pedestrian safety, workforce shortages, and security risks. The Luzerne County Transportation Authority has opened its new 200,000-square-foot facility in July 2024 that has consolidated operations, administration, and maintenance into one facility, significantly expanding the agency's capacity and efficiency while enhancing safety through modern maintenance bays, improved vehicle storage, and inspection capabilities.

Construction is underway on the Monroe County Transportation Authority's transit facility modernization project in Swiftwater, with an anticipated completion date of Spring 2028. The project will expand operations and storage capacity while modernizing the existing facility to improve safety through enhanced vehicle maintenance, safer bus movements around the site, and increased system reliability.

Enhancing public safety, improving accessibility, and addressing long-standing perceptions of public transit remain key priorities for transit agencies and transportation decision makers throughout Pennsylvania.

RESILIENCE

Economic and climate pressures have forced many agencies to adapt to the changing conditions. With this, Pennsylvania transit agencies are considering more resilient fuel options. BeST Transit, which serves Bradford, Sullivan, and Tioga counties, has begun to convert its bus fleet to operate on a propane fuel system, one of the fastest growing fuels in the transit industry. The shift aims to save between $0.25 and $0.45 per mile while also emitting fewer greenhouse gases. Other agencies such as the Center Agency Transportation Authority have implemented similar buses, while the Leigh and Northampton Transportation Authority has utilized compressed natural gas and biofuel as part of its fleet fuel mix.

To reduce carbon footprints and emissions, both SEPTA and PRT are increasing the number of hybrid and electric buses in their fleets. In SEPTA's fleet, 100 diesel buses and 300 hybrid buses are scheduled for replacement between 2021 and 2026. PRT currently operates 8 battery electric buses, with 2 additional vehicles to be ordered. PRT NEXTransit long-range plan envisions a path to being a carbon-neutral agency by 2045, with battery electric buses as a likely part of the solution.

Weather-related events have contributed to extensive delays over recent years. SEPTA has implemented rules for extreme temperatures beginning when forecasts approach 90 degrees Fahrenheit. Additional monitoring is required when temperatures exceed 95 degrees and all trains are slowed by five to ten miles per hour. Much of this delay is due to aging overhead wires which tend to sag in higher temperatures. Philadelphia also has plans in place for winter storms, with adequate salt kept on hand and storage yards adjusted to keep subway cars indoors prior to storms.

In terms of physical infrastructure, investment is being made to alleviate some weather concerns. The current 12-year transportation program outlines upcoming track improvements and power and electrical systems upgrades in the Philadelphia region. The program also highlights efforts in Pittsburgh to improve floodwalls along its riverfront roadways. These improvements aim to prevent the $100,000 cleanup cost for each flooding event and prevent delays to motorists and buses alike.

INNOVATION

The Fixed Route Intelligent Transit System (FRITS) program, launched in 2018, is a statewide technology implementation project that will provide 32 of Pennsylvania's 34 fixed-route transit agencies with cutting-edge technology solutions The program allows all participating transit agencies to collect and report information consistently, standardizing the data elements PennDOT receives and housing the data in a statewide repository. As of 2026, PennDOT has implemented FRITS into all agencies except PRT and SEPTA, which already had their own localized versions prior to the FRITS Program beginning. The system allows for more accurate schedule timings while also allowing passengers to obtain information about their bus.

PennDOT has also identified a need in improving Demand Response and Ride Share programs as a response to inflationary pressures, longer trip distances caused by closures in rural community services, fewer riders per vehicle, and individuals retaining personal vehicles later in life for more dispersed trips. An initial Phase 1 study established four models to address financial sustainability and resiliency of transit rideshares. A Phase 2 study is currently planned, which will expand on these four models and provide funding models, service delivery strategies, and customer experience improvements that all agencies can implement and prevent insolvency of demand response systems.

Bus platooning, a system where several buses arrive and depart at once along a given transit route to provide greater capacity, is being assessed as an alternative to rail-based modes of transit. For example, PennDOT is currently assessing the feasibility of bus platooning between Harrisburg and Pittsburgh as commuter rail has been marginally effective in the Keystone West Corridor. Westmoreland County Transit is currently assessing the use of bus platooning for commuter trips to Pittsburgh using PRT East Busway.

In addition to improving transit systems and technology, significant focus is now being diverted to the last mile. Because every transit trip begins on foot, several agencies, such as the Lehigh Valley Planning Commission, have taken steps to first review gaps in sidewalk and trail infrastructure and developing a future connectivity plan for walking and cycling. Being integrated with the Lehigh Valley Transportation Study, the agency can also better encourage transit-oriented development to boost ridership and increase housing availability.

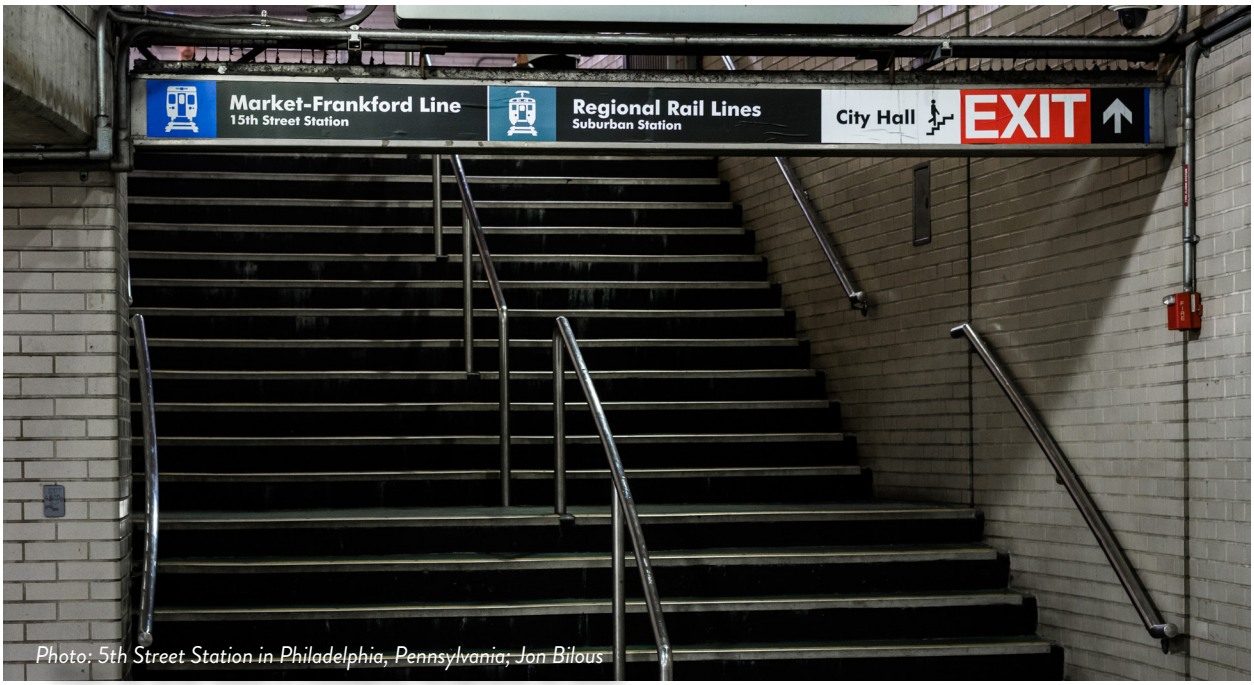


Photo: 5th Street Station in Philadelphia, Pennsylvania; Jon Bilous



RECOMMENDATIONS TO RAISE THE GRADE

- Create a Dedicated and Sustainable Source of Operating Funding – The current philosophy of using capital funds for operating costs is not sustainable and compromises the future of transit to plug present holes. A dedicated state-sourced funding alternative is needed to ensure a state of good repair and guarantee systems are maintained while allowing capital programs to move forward. Without such funding, systems continue to be at risk of loss of ridership, reliability concerns, and lack of forward planning.
- Improve station accessibility, safety, and transit equity for all passengers - Through ADA improvements, first/last mile initiatives, improved wayfinding and signage, proper barriers, and improved lighting, transit stations become safer places that can be utilized by more people for longer hours. Extended safe use improves the optics of transit and further encourages more use. Enhanced safety measures can also reduce the number of incidents that occur on and around transit. Further studies into rideshare programs can also ensure accessibility to seniors, persons with disabilities, and low-income residents and prevent their source of transportation from being cut.
- Continue creating incentives and improvements to user experience to attract ridership – This can be done through optimization of transit frequencies, technology enhancements, partnerships with employers providing employees with transit passes, free parking at stations, reduced fares for off peak hours.
- Modernize the System – This includes infrastructure improvements and fleet replacement for Rail, Trolley, Subway and Buses including options to reduce the carbon footprint and increase use of electric vehicles. The increase in frequency of extreme weather events have pointed to this need, while also highlighting the importance of having contingency plans for such events.

DEFINITIONS

1) FTA – Federal Transit Agency

2) PennDOT – Pennsylvania Department of Transportation

3) PTC – Pennsylvania Turnpike Commission

4) O&M – Operations and Maintenance

5) Community Systems - Community Systems typically coordinate shared-ride services and can be found in all counties.

6) Urban System – Systems servicing areas of 50,000 people or more.

7) Rural System – Systems servicing areas of less than 50,000 people

8) AMTRAN – Altoona Metro Transit (Urban)

9) ATA – Area Transportation Authority of North Central Pennsylvania (Rural)

10) BCTA – Beaver County Transit Authority (Urban)

11) BeST – Endless Mountains Transportation Authority (Bradford, Sullivan, and Tioga County Transportation Authority) (Rural)



DEFINITIONS (cont.)

12) BMC – Borough of Mount Carmel (Rural)

13) BTA – Butler Transit Authority (Urban)

14) CamTran – Cambria County Transit Authority (Urban)

15) CATA (Crawford) – Crawford Area Transportation Authority (Rural)

16) CATA – Centre Area Transportation Authority (Urban)

17) COLT – County of Lebanon Transit (Urban)

18) COLTS – County of Lackawanna Transit System (Urban)

19) EMTA – Erie Metropolitan Transit Authority (Urban)

20) FACT – Fayette Area Coordinated Transportation (Rural)

21) HPT – Hazelton Public Transit (Urban)

22) IndiGo – Indiana County Transit Authority (Rural)

23) LANTA - Lehigh and Northampton Transportation Authority (Urban)

24) LCTA – Luzerne County Transportation Authority (Urban)

25) MCRCOG – Mercer County Regional Council of Governments (Rural)

26) MCTA – Monroe County Transportation Authority (Rural)

27) MMVTA – Mid Mon Valley Transit Authority (Rural)

28) NCATA – New Castle Area Transit Authority (Rural)

29) PART – Pottstown Area Rapid Transit (Urban)

30) PRT – Pittsburgh Regional Transit (Urban). formerly PAAC - Port Authority of Allegheny County

31) RVTA – River Valley Transit Authority (Urban)

32) SCTA – South Central Transit Authority (Urban). Manages and oversees the Red Rose Transit Authority of Lancaster County and the Berks Area Regional Transportation Authority.

33) SEPTA – Southeastern Pennsylvania Transportation Authority (Urban)

34) SRTA – Susquehanna Regional Transportation Authority (Urban). More commonly known by the name rabbittransit, formed as the merger of the Central Pennsylvania Transit Authority, the Adams County Transit Authority, the Union/Snyder Transportation Alliance, and the Cumberland Dauphin-Harrisburg Transit Authority/Capital Area Transit. Mergers took place in 2011, 2016, and 2020.

35) STS – Schuylkill Transportation System (Rural)

36) TACT – Town and Country Transit (Mid-County Transit Authority) (Rural)

37) TAWC – Transit Authority of Warren County (Rural)

38) WCTA (Washington) – Washington County Transportation Authority (Urban). Now operates under the name Freedom Transit

39) WCTA – Westmoreland County Transit Authority (Urban)



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Wastewater
D
GRADE COMPARISON
PA: D
Nat'l: D+

WASTEWATER

EXECUTIVE SUMMARY

The status of Pennsylvania's aging wastewater collection and treatment systems is slowly trending in the right direction but still requires significant investment. Based on current estimates, at least $9.6 billion will be required to address Pennsylvania's funding gap. Over 20% of all Pennsylvania households utilize on-lot disposal systems, with very little data on their failure rate, and almost 75% of Pennsylvania's communities lack up-to-date Act 537 Sewerage Facility Plans. Additionally, Pennsylvania contains over 1,500 combined sewer outfalls that pollute rivers and streams of the Commonwealth during combined sewer overflows (CSOs). CSOs are a major hazard to human health and wildlife, especially as climate change increases the severity and frequency of rain events. While these are all significant challenges for Pennsylvania, many communities are already making steady progress to address these issues.

CONDITION AND CAPACITY

Pennsylvania is home to over 10,000 National Pollution Discharge Elimination System (NPDES)-permitted wastewater facilities. The Pennsylvania Department of Environmental Protection (PA DEP) performs over 4,000 inspections and 500 enforcement actions every year for these facilities.

The Pennsylvania Sewage Facilities Act (Act 537) requires that all municipalities develop and implement 10–20-year plans that provide for the identification and resolution of existing and future sewage disposal, including needs for future development. Only 26% of municipalities have an Act 537 plan on record that is under 20 years old, and 28% of all plans are pre-regulatory (developed before 1966). A contributing factor to these rates falls back to 2014, when PA DEP removed access to grants that covered 50% of the cost to develop or update Act 537 plans. The removal of this funding has been a significant barrier towards municipalities keeping their Act 537 plans up to date, leading to communities at risk of not being able to respond to population changes or adapt to new technologies.

Approximately 22% of all households in Pennsylvania, or 1.3 million households, are serviced by on-lot disposal systems (septic systems). As a part of Act 537, the PA DEP designates local agencies and municipalities to manage the permitting and enforcement actions for on-lot disposal systems. These agencies and municipalities use Sewage Enforcement Officers (SEOs) to carry out enforcement. According to the May 2026 report from the Center for Rural Pennsylvania, approximately 40% of septic systems are between 21 to 40 years old, while 27% are older than 40 years old. The U.S. EPA reported that the average lifespan of septic systems is 15 to 40 years. The PA Integrated Water Quality Report 2026

has established that on-lot disposal systems contribute to 193 miles of impaired streams and 2,901 acres of impaired lake each year. This is a minor reduction in impaired river mileage and impaired lake acreage compared to the PA Integrated Water Quality Report 2021.

There are 120 permitted Combined Sewer Overflow (CSO) communities in Pennsylvania, with approximately 1,548 CSO outfalls in the state. These CSO communities utilize combined sewer systems that convey both storm and sanitary flows. When overloaded with stormwater, they discharge via outfalls to receiving streams and rivers. The untreated human and industrial waste can significantly impair water quality, impact public health, and impact wildlife. CSO discharges vary by location but can be significant. CSO communities have developed EPA required Long Term Control Plans (LTCP), to help plan for and reduce the amount of Combined Sewer Overflow volume. Pennsylvania has identified two main areas of improvement to reduce CSOs: Increased treatment capacity and the separation of sanitary and stormwater flows. While Pennsylvania may never eliminate CSOs, it is making steady progress. The progress and impact of CSOs is best highlighted by examining Pennsylvania's two largest Cities, Philadelphia and Pittsburgh.

- Philadelphia is serviced by the Philadelphia Water Department (PWD), which is responsible for the wastewater collection and treatment in the City of Philadelphia and portions of its surrounding suburbs. The primary method Philadelphia has used to reduce CSO occurrences and volume is via its Green City, Clean Waters program, which was started in 2011 and runs through 2036. This program utilizes Green Stormwater Infrastructure (GSI), proactive maintenance, and upgrades at key treatment bottlenecks to reduce the frequency and volume of CSOs in the City. One major project is the upgrade of the Northeast Water Pollution Control Plant, adding 500 million-gallons-per-day of treatment capacity.
- The City of Pittsburgh is served by the Pittsburgh Water and Sewer Authority (Pittsburgh Water). Approximately 75% of Pittsburgh Water's collector sewers are combined sewers. While Pittsburgh has utilized GSI, it has also begun the process of planning and constructing combined sewer separation projects where feasible. Allegheny County Sanitary Authority (ALCOSAN) receives the sewage from Pittsburgh Water, along with the sewage from 82 communities in Allegheny County. ALCOSAN has begun an ambitious project to construct three deep wet weather collector sewer tunnels. These tunnels are expected to complete construction in 2036, and lead to a total CSO volume reduction of 7 billion gallons, and a reduction of almost 79% CSO volume.

FUNDING AND FUTURE NEED

Pennsylvania's wastewater infrastructure system is primarily supported by customer user fees. However, there is also a complex network of federal, state, and local funding sources to help preserve the overall long-term improvement of aging assets across the Commonwealth. As infrastructure continues to deteriorate and regulatory requirements evolve, the state faces significant challenges in balancing capital investment needs, operational demands, and affordability for ratepayers. Pennsylvania wastewater utilities rely heavily on ratepayer revenue, because federal funding generally cannot be used for operation and maintenance (O&M). Across the state, wastewater systems establish user rates through different mechanisms depending on ownership. Publicly owned systems, including those operated by boroughs, townships, cities, and municipal authorities, establish rates locally to support the costs of service alone or a combination of costs of operating, maintaining, and improving their systems. Privately owned utilities are regulated by the Pennsylvania Public Utility Commission (PUC), which oversees the rates and services of more than 150 water and wastewater utilities.

In 2025, the national average residential wastewater bill was approximately $54 per month. By comparison, Aqua Pennsylvania reported monthly wastewater charges of $49.41 per Equivalent Dwelling Unit (EDU) for metered customers and $101.34 for flat-rate customers within the same rate zone. Based on Aqua's rates between 2024 and 2025, there was a 2.5% increase in EDU rates and a 6.2% increase for flat-rate users. The PUC stated that wastewater rates increased between 2024 to 2025

to meet operating costs/maintain integrity, to earn a reasonable return on its investment, and to complete significant infrastructure projects over the next two years which is on par with the aging and deteriorating infrastructure found across the state.

Federal and state funding are key for most capital improvements to Pennsylvania's aging wastewater infrastructure. At the federal level, the Clean Water State Revolving Fund (CWSRF) and funding from the Infrastructure Investment and Jobs Act (IIJA) have provided substantial capital for system upgrades, replacements, and remediation of aging facilities. In Fiscal Year 2025, the EPA awarded Pennsylvania $98.5 million for Clean Water General Supplemental funds and $8.5 million for Clean Water Emerging Contaminant funds through IIJA. In 2025, the Pennsylvania Infrastructure Investment Authority (PENNVEST) provided $76.8 million in financing and funding programs for PA wastewater improvement projects through the Clean Water State Revolving Fund (CWSRF). Additionally, Pennsylvania uses state funding, whose sources include Act 218 of 2004, Marcellus Shale Legacy Fund, Bond Issues, and Recycled Loan Payments and Interest Earned.

Even with these sources of funding, it is unlikely that Pennsylvania will be able to close the quite large funding gap in their wastewater infrastructure. In this context, the "gap" is defined as the difference between the total amounts of money that wastewater systems can generate for the state versus the amount of resources the state will need. According to the 2022 Clean Watersheds Needs Survey (the most current existing survey), as of 2022, Pennsylvania has over $8.2 billion (approximately $9.4 billion in 2026 dollars) in need for future investment to address water quality objectives. And, according to The Value of Water Campaign, Pennsylvania had an annual Wastewater and Surface Water Infrastructure need of just over $2 billion in 2025 which will continue to compound with the existing needs over time leaving capital needs unmet.

Despite the large funding gap, Pennsylvania is taking meaningful steps to strengthen wastewater system management. PA DEP's Capability Enhancement Program is available to assist sewer systems in developing an Asset Management Program. These programs help utilities plan for the repair and replacement of major components, ultimately saving costs and improving financial planning. The PA DEP also now provides incentives for the adoption of asset management, including bonus priority ranking points and financial support for planning through PENNVEST for projects financed through the federal Clean Water State Revolving Loan Fund.

OPERATION & MAINTENANCE

Operation and Maintenance (O&M) of wastewater systems in Pennsylvania is primarily the responsibility of local agencies, who handle day-to-day oversight. County governments may play a role in planning and coordination; however, they are generally not involved in routine operations. At the state level, PA DEP serves as the regulatory authority; providing guidance, issuing permits, conducting inspections, and enforcing compliance. PA DEP also supports wastewater systems through technical assistance, funding programs, and public health protections.

Effective operation of wastewater systems depends on adequate staffing and resources, which remain ongoing challenges. Many municipalities report shortages of trained personnel, limiting their ability to carry out routine maintenance tasks such as valve operation, hydrant checks, and facility repairs. As of 2024, there are 5,240 water and wastewater treatment plant system operators, however employment is expected to decline to 4,920 operators by 2034. Workforce issues are compounded by factors such as an aging labor pool, limited recruitment of younger workers, and competition from higher paying private sector jobs. Additionally, wastewater operators must obtain and maintain specialized licenses, often requiring ongoing education, while managing demanding on-call responsibilities and emergency response situations.

Addressing workforce and operational challenges has become a priority across the state. Initiatives such as internship programs, accelerated training pathways, and policy reforms aim to attract and retain new workers. Independent organizations such as the Pennsylvania Water Environmental Association and the Pennsylvania

Water Pollution Control Operators Association offer excellent training programs to assist in certification and O&M training. In some cases, the PA DEP has stepped in to provide direct technical assistance to understaffed systems, including deploying experienced operators to support local operations. Nonetheless, many positions remain vacant for months, highlighting the need for continued investment in workforce development alongside infrastructure improvements.

PUBLIC SAFETY

Public safety concerns related to wastewater management in Pennsylvania are closely tied to regulatory compliance, system performance, and environmental protection. Key issues include wastewater treatment plant (WWTP) effluent quality and the occurrence of sanitary sewer overflows (SSOs) and combined sewer overflows (CSOs). In recent years, multiple systems across the state have experienced violations of their NPDES permits, reflecting ongoing challenges. For example, facilities in Corry, PA were cited in 2024 and 2025, and Port Royal, PA reported repeated overflows in 2023 and 2024 that discharged untreated sewage into the Juniata River. Additional examples include the City of Harrisburg/ Capital Region Water, which experienced violations involving its wastewater treatment, sewer, CSO, and MS4 systems; and DELCORA, which faced violations involving its regional sewer system, CSO outfalls, and Western Regional Treatment Plant. These incidents highlight a broader trend: despite continued oversight, inspection, and enforcement by the PA DEP, violations and overflow events remain persistent.

The impacts of inadequate wastewater collection, conveyance, and treatment are significant for both human health and the environment. Untreated or partially treated sewage introduces harmful pathogens, nutrients, and pollutants into waterways, degrading water quality and increasing public health risks. According to the PA DEP's Integrated Water Quality Monitoring & Assessment Report, all sources of contamination contributed to approximately 31,451 miles of stream impairment (37% of PA's stream miles). This is particularly evident in high profile cases across the state, such as the Schuylkill River, which is widely considered unsafe for recreational contact for approximately 48 hours after rainfall due to CSO discharges. Similarly, the Allegheny County Health Department issues wet weather sewage advisories roughly 11 times per year, warning of elevated bacteria levels in waterways caused by storm driven overflows. Comparable challenges exist in Harrisburg and other urban areas with combined sewer systems. At Presque Isle State Park along Lake Erie, beaches are periodically closed due to high bacteria levels, often linked to stormwater runoff and sewage overflows.

Although not all overflow events result in formal closures, they still significantly limit safe water use. Per PennEnvironment, CSO discharges are estimated to occur on approximately 65 days each year, effectively rendering affected waterways unsuitable for recreation during those periods. The frequency of these events underscores the strain placed on existing infrastructure, particularly during increasingly intense storm events. With respect to emerging technical challenges, key contaminants of concern include the Per- and Polyfluoroalkyl Substances (PFAS) occurring in wastewater discharge. Research regarding PFAS chemicals, including their long-term public health impacts is ongoing, and while Pennsylvania is participating in these efforts, no regulatory response has been implemented to date.

In addition to treated wastewater, Pennsylvania wastewater treatment operators produce biosolids (i.e. sludge) as part of the treatment process. Many operators monetize biosolids through permitted biosolids land applications at agricultural, forestry, and reclaimed mining sites. This allows farmers to save money on commercial fertilizers and improve the quality and structure of the soil. However, emerging concerns about the presence of Per- and Polyfluoroalkyl Substances (PFAS) in biosolids may reduce the uptake of beneficial reuse of biosolids due to risks to human health and safety. The US EPA issued draft guidance in 2025 that will inform future and state regulations. The guidance found that PFAS in land-applied biosolids has contributed to PFAS detection in water supplies higher than the EPA thresholds. To date, Pennsylvania has not adopted PFAS regulations for biosolids.

RESILIENCE AND INNOVATION

As an increasing number of utilities are installed below ground in urban areas, it is vital to identify the location of utilities prior to construction. Utility line strikes lead to catastrophic damages up to and including loss of life, as well as schedule delays and increased costs. The discipline of Subsurface Utility Engineering (SUE) has emerged to allow practitioners and technicians to reduce the risk of utility conflicts. Through data processing and site characterization technologies, SUE staff can locate and depict underground utilities in the preliminary stages of a project, aiding design development, construction, and maintenance activities throughout the life of the infrastructure. The American Society of Civil Engineers (ASCE) has developed a National Consensus Standard titled ASCE 38-22, Standard Guideline for Investigating and Documenting Existing Utilities, and the companion standard 75-22, Standard Guideline for Recording and Exchanging Utility Infrastructure Data. These National Consensus Standards (NCS) follow the legal procedures for adoption as ASCE standards as well as American National Standard Institute (ANSI) standards. Adoption of Standards 38 and 75 as part of Pennsylvania's One-Call law will aid in reducing costs to sewer systems by reducing utility conflicts in underground construction work. The One Call law (Act 50 of 1974) has been most recently amended by Pennsylvania Legislature in Act 127 of 2024. This amendment removed the sunset provisions of the One Call law, enhanced safety protocols, and established additional consequences for violations.

Extreme weather poses a significant challenge to wastewater systems throughout Pennsylvania. Per the Pennsylvania Department of Environmental Protection (DEP) Climate Impact Assessment, precipitation on very heavy rainfall events (baseline 95th percentile conditions) is anticipated to increase 9%, with the number of days of very heavy rainfall events expected to rise by 21%. These storms intensify flooding and can overwhelm sewers and treatment plants, resulting in the release of untreated sewage into the environment. Significant steps are needed to increase the resiliency of our wastewater systems from flooding risks especially as annual precipitation and the frequency of heavy downpours are anticipated to continue to rise. Combined Sewer Overflows (CSO) are particularly susceptible to the risk of increased heavy rainfall events. CSO events can be reduced in intensity and duration by reducing infiltration and inflow into the sewer system, increasing capacity of conveyance and treatment infrastructure, regular preventive maintenance and inspection of sewer conditions, and low impact development techniques including green infrastructure.

GSI System in Philadelphia



GSI System in Lancaster



Besides renewing and expanding sewer capacities, communities with CSO systems are also deploying green infrastructure to reduce the impact of stormwater on these systems. In 2011, Philadelphia enacted the Green City, Clean Waters plan, which includes "greening" of public and private properties throughout the City. In fiscal years 2011 through 2025, 370 public retrofits, 597 private development projects, and 133 incentivized retrofits resulted in a cumulative 3,456 greened acres, with the goal of achieving 10,000 greened acres by 2036. In western Pennsylvania, the Allegheny County Sanitary Authority has deployed 11 cycles of grant funding assistance to their upstream municipalities and authorities through the Green Revitalization of our Waterways (GROW) program. The completed projects are estimated to reduce combined sewer overflows by more than 200 million gallons per year. Finally, the EPA has highlighted the City of Lancaster's Green Infrastructure Plan as a national model. The 25-year $140 million plan is expected to save the city $25 million annually and prevent over one billion gallons of CSO discharges from polluting the Conestoga River.

The American Biogas Council ranks Pennsylvania third among US states for methane production potential from biogas sources. There are 172 operational biogas systems in the state (82 of them being wastewater plants) with the potential for more than 716 more (294 being wastewater plants). If the potential were fully realized, enough energy could be generated to meet the needs of 1,642,000 households' electricity.

As water resources become scarce due to droughts, pollution, saltwater intrusion, and other risk factors, the technology of water reclamation has been implemented at sites in the Commonwealth. Reclaimed water from treated municipal wastewater is permitted by Pennsylvania for a variety of uses, including some crops and industrial processes for the lowest class of reclaimed water, municipal and commercial uses for the next class of water, and groundwater recharge for the highest classes of water. Municipal wastewater is not currently permitted to be a direct source for drinking water treatment plants in Pennsylvania. While Pennsylvania does not face the same drought conditions as other locations, the ability to permit and operate additional customers for municipal reclaimed wastewater presents an opportunity for resilience (in the case of a river intake contamination event, for example) and cost savings in the water resources space. An example of a reclaimed wastewater project in Pennsylvania is the Fallingwater architectural and natural resources destination, in which the treated wastewater is kept from the direct discharge to the adjacent Bear Run stream through reuse as irrigation.



RECOMMENDATIONS TO RAISE THE GRADE

- Increase funding for the Pennsylvania Department of Environmental Protection to train Sewage Enforcement Officers and conduct more frequent surveys and studies on the number of On-Lot Disposal Systems in Pennsylvania and their failure rate.
- Expand grants for municipalities to create and update Act 537 plans.
- Prioritize the rehabilitation of aging collection systems through additional funding, upgrading treatment capacity, and implementation of mitigation systems, such as GSI or wet weather collection tunnels, to reduce the quantity and frequency of combined sewer overflows.
- Address workforce shortages through the expansion of operator training pipelines, shared staffing arrangements, and regionalization to help smaller wastewater systems overcome staffing limitations and ensure system sustainability.
- Conduct new studies to improve data transparency and statewide planning. Specifically, Pennsylvania should update the 2015 Pennsylvania Water and Wastewater Gap Study to help inform decision makers on large scale solutions for the sustainability of water and wastewater systems. This study calculated the 10-year gap from 2015, which means the data is no longer reliable after 2025.
- Extend the requirement to prepare Asset Management Programs upon a system receiving State funding through PENNVEST.
- Direct additional state and federal grant funding to subsidize the projected funding gap that cannot be met with reasonable rate increases; particularly for communities with below average income levels, to protect the environment and human health and safety.
- Enhance coordination between PA DEP and US EPA, industry organizations, and research institutions to develop technologies, bodies of knowledge, and public safety education to address 21st-century wastewater industry concerns. The Commonwealth should seek to be at the forefront of development of SCADA cybersecurity, domestic equipment supply, and automated inspection technologies.



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