



REPORT CARD FOR **MASSACHUSETTS** ✓ INFRASTRUCTURE



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2026 REPORT CARD

FOR MASSACHUSETTS' INFRASTRUCTURE

Executive Summary

The Boston Society of Civil Engineers Section (BSCES) of the American Society of Civil Engineers (ASCE) released its inaugural Infrastructure Report Card in 2026, delivering data-driven evaluation of statewide physical systems. Civil engineers, academia and industry experts volunteered countless hours to analyze publicly available data against the nationally standardized ASCE grading rubric in seven core categories. Massachusetts' infrastructure is approaching a critical turning point as aging assets, decades of underfunding, and increasingly extreme weather are straining systems, notwithstanding the exceptional expertise, maintenance efforts, and recent funding achievements of public agencies.

The Commonwealth benefits from a robust tax base and a highly-educated populace, yet it's one of the oldest built and most challenging maintenance environments in the United States. The findings across this report reflect a structural funding deficit and assets performing well past the engineered lifespan. Massachusetts possesses the oldest bridge inventory in the nation and an estimated \$1 billion annual funding gap over the next decade. Similarly, nearly half of the Commonwealth's monitored dams have exceeded their 75-year design life, while municipal roads, stormwater systems, drinking water networks, and wastewater systems face chronic capital shortfalls and workforce shortages.

Furthermore, climate change is an active operational disruptor and compounds maintenance challenges. Intense precipitation events, rising sea levels, and severe winter weather are actively overwhelming undersized municipal culverts, legacy combined sewer systems, and vulnerable coastal transit lines. Stormwater runoff now stands as the leading cause of surface-water impairment statewide, while the Massachusetts Bay Transportation Authority (MBTA) navigates a staggering \$24.5 billion State of Good Repair backlog for transit related projects alongside federal safety oversight.

The Report Card for Massachusetts Infrastructure aims to raise public awareness of the importance of modern and well-maintained infrastructure. To improve the infrastructure grade and safeguard public health, equity and economic vitality, Massachusetts must move past temporary funding supplements to establish predictable and sustainable funding structures. Maintaining our shared infrastructure is an inherent civic responsibility of our Commonwealth.

Recommendations to Raise the Grade



Establish Sustainable, Long-Term Funding Mechanisms

- **Stabilize Transportation Funds:** Transition Chapter 90 program increases to predictable, long-term investment and index funds to construction cost inflation. Permanently dedicate a consistent share of Fair Share Amendment revenues to address municipal, MassDOT and MBTA asset backlog.
- **Expand Local User-Fee Structures:** Mandate public drinking water and wastewater systems to implement full-cost pricing structures where local user rates directly cover operations, maintenance, and future capital needs. Concurrently, expand municipal stormwater utilities beyond the current 28 communities to tie revenue to runoff generation.
- **Maximize Federal Funding:** Advocate for sustained State Revolving Fund (SRF) allocations and state grants to maintain 0% interest loans for PFAS mitigation, lead line replacements, and cybersecurity preparedness. Leverage federal discretionary awards to secure maximum matching funds, restore cut FEMA Dam Safety grants, and expand rebates for nitrogen-reducing septic upgrades.



Modernize Regulatory Standards, Project Development, and Performance Metrics

- **Streamline Environmental Permitting:** Establish uniform criteria across the federal, state and local authorities to accelerate the regulatory approval process for municipality-owned culverts, small bridges, and dam projects. Concurrently, update the Massachusetts Stormwater Handbook and related municipal design criteria to reflect current NOAA Atlas rainfall data, replacing legacy 2008 standards.
- **Adopt Standardized Performance Metrics:** Mandate a statewide framework to track municipal stormwater asset inventories, document annual nutrient loading reductions, and establish an updated, online state-managed dam safety database. Adopt innovative, risk-based dam safety evaluations as a regulatory requirement to predict failures.
- **Prioritize Climate Resilience and Safety Improvements:** Mandate climate resilience design criteria across highway and transit programs. Prioritize asset electrification, depot modernization, and foundation armor for low-lying coastal spans or scour-critical bridges. Concurrently, lower capital costs by integrating stormwater, utility, complete streets, and safety retrofits directly into routine preservation projects.



Proactively Invest in Workforce Recruitment and Retention

- **Launch Specialized Training Programs:** Prioritize establishing a dedicated Water and Wastewater Sector Workforce Development Fund to reverse the critical shortage of licensed treatment plant and system operators across the Commonwealth.
- **Restore Agency Staffing Baselines:** Provide competitive, cost-of-living-adjusted wages for municipal and state departments to fill high-vacancy roles. Concurrently, restore technical assistance staffing levels at MassDEP and increase the number of Dam Safety Program personnel.
- **Mitigate Cost-of-Living and Housing Pressures:** Address public sector recruitment and retention bottlenecks by exploring commuter benefits, municipal housing partnerships, and localized workforce incentives to allow essential personnel to live and work within the high-cost communities they serve.

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](https://www.infrastructurereportcard.org) to learn about your state's infrastructure.

About the Grades

The 2026 Report Card for Massachusetts's Infrastructure was written by a committee of more than 50 civil engineers across Massachusetts 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 on Massachusetts' Infrastructure



Bridges

D+



Dams

D+



Drinking Water

D



Roads

D+



Stormwater

D+



Transit

C-



Wastewater

D



**OVERALL
GPA**

Bridges



SAGAMORE
BRIDGE
1933-1935

GRADE
COMPARISON

MA: D+
Nat'l: C



BRIDGES

EXECUTIVE SUMMARY

Massachusetts' bridges are critical for mobility and freight movement in the Commonwealth. However, these vital links are aging and now average 65 years in age. While most bridges remain serviceable, the Commonwealth faces growing maintenance and safety challenges: 24.3% of bridges are in good condition, 66.3% are in fair condition, and 9.4% are in poor condition. Another 459 bridges have posted load restrictions, and 44 are closed. As of 2024, Massachusetts had the oldest bridge inventory nationally and ranked third-worst for poor bridge area on the National Highway System. Over the past decade, bridge closures increased by 27%, while weight postings rose by 4%, underscoring the urgency of sustained investment. Recent federal funding through the Infrastructure Investment and Jobs Act (IIJA) and state support through Chapter 90 have provided important resources. However, MassDOT estimates that \$1 billion in annual bridge funding will be needed for the next 7 to 10 years to address the growing backlog.

CONDITION AND CAPACITY

Bridges play a critical role in Massachusetts' transportation network, supporting the movement of people, goods, and services across a densely developed and historically complex landscape. Given the state's geography, bridges are essential for maintaining connectivity between cities and linking suburban and rural communities. They support major economic activities, including commuting, freight transport, and tourism, particularly along coastal and historic routes.

Massachusetts agencies own and maintain approximately 9,406 roadway and railroad bridges, including culverts, that vary in age and condition. All bridges in Massachusetts are inspected on a routine schedule, a maximum of every two years. This report covers the

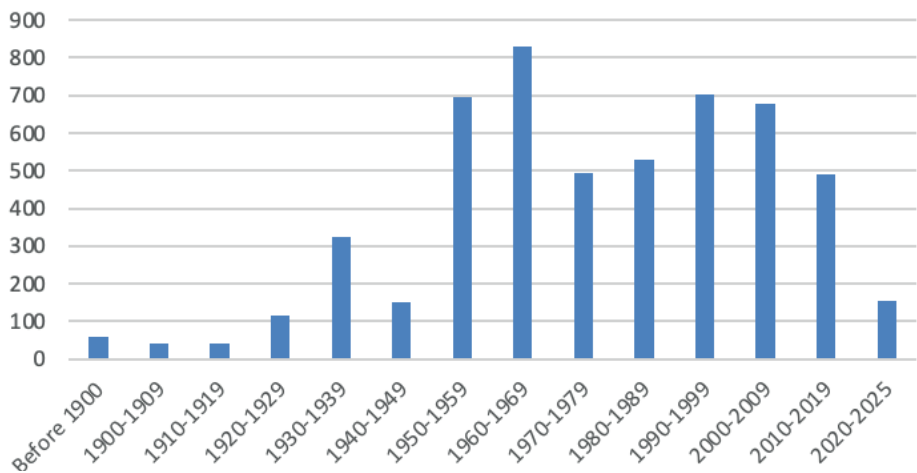
5,311 roadway bridges which are over twenty feet in length, meeting the national definition of a bridge and are recorded in the Federal Highway Administration (FHWA) National Bridge Inventory (NBI). The NBI defines a bridge as a structure with a passageway for carrying traffic with which spans greater than 20 feet.

Ownership of the 5,311 NBI bridges in Massachusetts is split primarily between state and municipal control, with 3,611 state-owned bridges and 1,700 municipally owned bridges. These bridges are routinely inspected every two years. Most of these bridges were built in the mid-20th century, with an average age of 65 years. This is based on the average age of current bridges based on year built or the most recent year of reconstruction with many others

still requiring maintenance, rehabilitation, or replacement. This is significant when compared to the present design life of many bridges, which is often 75 years or less, due to the growing number of bridges reaching this threshold.

This indicates that a large portion of the bridge inventory is approaching or has reached its intended service life, reinforcing the urgent need for ongoing maintenance, rehabilitation, and replacement efforts.

Figure 1. Number of Bridges Built by Year 1900-2025



Source: MassDOT 2025 NBIS Master List

Based on inspection scores, as of June 2025, the average condition rating of bridges within the state is 5.70, which

is a fair rating. The bridge condition values are determined from national scale of 0 to 9 per the table below.

Table 1. NBI Coding Guide

CODE	CONDITION	DEFECTS
9	EXCELLENT	Excellent condition.
8	VERY GOOD	No problem noted.
7	GOOD	Some minor problems.
6	SATISFACTORY	Structural elements show some minor deterioration.
5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
4	POOR	Advanced section loss, deterioration, spalling or scour.
3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
1	“IMMINENT” FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic, but corrective action may put it back in light service.
0	FAILED	Out of service - beyond corrective action.

Source: MassDOT Bridge Inspection Form

Bridges are comprised of three major elements - the bridge deck, superstructure (beam system supporting the deck), and the substructure (the abutments and piers that support the superstructure and deck). Every component of each bridge element is inspected with a condition value assigned to it to provide one condition value for each major bridge element. The lowest condition value for each major bridge element is used to report the overall condition for a specific bridge.

By bridge count, 24.3% (1,291 bridges) are in good condition, 66.3% (3,519 bridges) are in fair condition, and 9.4% (501 bridges) are in poor condition. Additionally, 459 bridges (8.6%) have posted load restrictions (maximum vehicle legal weights) and 44 (0.8%) are

closed. All bridges are designed to carry a maximum truck vehicle load permitted by the FHWA. When evaluated by deck area, the distribution shifts: 20.6% of total deck area is in good condition, 68.0% is in fair condition, and 11.4% is in poor condition. This is higher than the percentage by bridge count (9.4%), indicating that larger bridges are disproportionately represented among those in poor condition. This indicates that poor-condition bridges tend to represent a slightly larger share of total bridge area than their share by count, meaning that larger bridges are in slightly worse condition on average than smaller bridges. 5.5% of total deck area is associated with load-restricted bridges and 0.4% are closed.

Table 2. Total Bridge Count and Condition

Metric	Good	Fair	Poor	Total
Number of Bridges	1,291 (24.3%)	3,519 (66.3%)	501 (9.4%)	5,311
Deck area	20.6%	68%	11.4%	100%

Source: National Bridge Inventory

Bridges classified as “poor” (having any condition rating less than or equal to 4, do not necessarily pose an immediate safety risk to the public. Many of these bridges are still open for travel but may have components such as deck, superstructure, or substructure in deteriorated condition. Usually, they require more frequent inspections, maintenance, rehabilitation, or eventual replacement. In many cases, load restrictions

are applied if engineers determine, through a process called load rating, that a bridge’s safe operating capacity has been reduced.

As of 2022, roughly one in nine bridge crossings in the Commonwealth occurred on a bridge in poor condition. Of the nearly 127 million average daily bridge crossings statewide, about 14.3 million were on bridges rated poor.

FUNDING AND FUTURE NEED

Bridges in Massachusetts are funded by various federal, state, and local sources.

Federal bridge funding comes from the U.S. Department of Transportation’s Federal Highway Administration (FHWA) through a combination of competitive and formula programs. This funding saw a significant increase following the enactment of the Infrastructure Investment and Jobs Act (IIJA) in November 2021. The federal Bridge Formula Program allocated over \$1.2 billion between Fiscal Year (FY) 2021 and 2026 in Massachusetts. Fifteen percent of this funding is

dedicated to “off-system” bridges, or bridges that are not a part of the federal-aid highway system. Other highway formula dollars can also be used to support bridges in the Commonwealth, including the National Highway Performance Program, the Surface Transportation Block Grant Program, the Highway Safety Improvement Program, and the PROTECT Program.

Massachusetts has also benefited from competitive bridge funding. Most notably, MassDOT and the U.S. Army Corps of Engineers were awarded nearly \$1 billion for the Sagamore Bridge Replacement Project

through the federal Bridge Investment Program. This award builds upon a prior \$372 million federal Mega grant, \$350 million in federal appropriations, and \$700 million in state matching funds. The funding is for the first phase of the estimated \$4.5 billion Cape Cod Bridges Program, which will ultimately replace both the Sagamore and Bourne bridges. While the Sagamore Bridge replacement is fully funded, significant funding gaps remain to deliver the subsequent Bourne Bridge replacement phase. The Cape Cod bridges facilitate 38 million vehicle crossings per year, including seasonal tourism traffic, and year-round local, freight and commuter trips.

Additional megaprojects highlight the maintenance needs along major commuter corridors. A prominent example is the legacy Tobin Bridge, the largest wetland- and river-spanning structure in New England, which carries over 80,000 daily vehicles between Chelsea and Boston. Decades of harsh coastal exposure have necessitated continuous, multi-million-dollar contracts for structural steel repairs, deck resurfacing, and extensive corrosion mitigation on its non-redundant elements. The compounding costs of complex traffic management and overnight work schedules on this critical urban span illustrate how a significant portion of Massachusetts' capital funding must be continuously diverted to defensive holding actions on existing assets.

Tobin Bridge



Source: Linda Hager

Bourne Bridge



Source: Wikimedia Commons

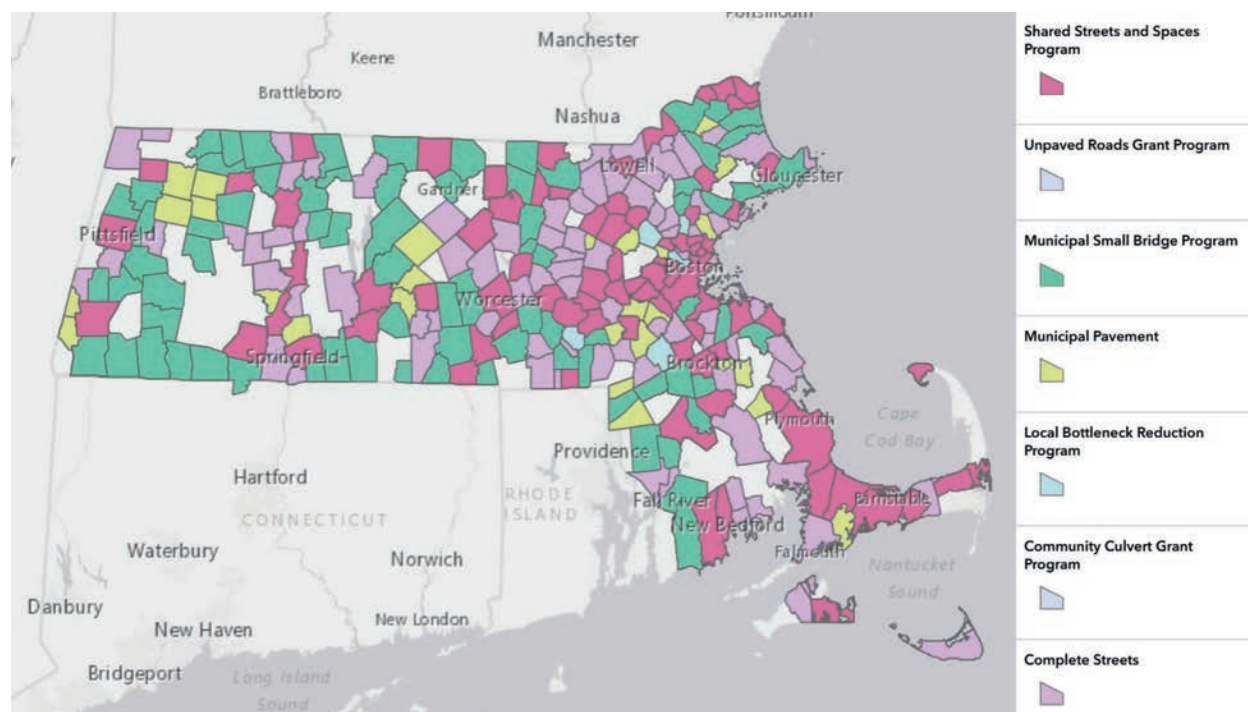
Massachusetts is committed to improving the condition of its bridges and reducing the number of structures that are in fair and poor condition. The State is investing \$5.5 billion in the Bridge Program from all funding sources over FYs 2025 through 2029. This funding is in addition

to funding for the Cape Cod Canal Bridges. State funding is also essential for bridges in the Commonwealth, particularly to provide matching funds for federal funds (typically a 20% match is required) and for bridges off of the federal-aid highway system. Significant state

sources in addition to the \$5.5 billion include the Chapter 90 Program for municipalities (funded by state transportation bonds and the “Fair Share Amendment”, which leverages higher taxes on households with very high incomes) and MassDOT Grant and Special Purpose Programs (such as the Municipal Small Bridge Program).

The Municipal Small Bridge Program provides funding to municipalities for replacement, preservation and rehabilitation of municipally owned small bridges with a record span between 10 and 20 feet, non-NBI bridges known as BRI bridges.

Figure 2. MassDOT Grant and Special Program Award History



Source: MassDOT

In August 2025, the Massachusetts Legislature approved \$1.2 billion in funding for transportation across the state. This included a \$300 million one-year authorization of the Chapter 90 Program (a 50% increase over prior years), which provides all municipalities in the Commonwealth with funding annually for municipally-owned transportation infrastructure, including bridges. It also provided \$500 million for the Lifecycle Asset Management Program (LAMP) which funds road and bridge projects that are not on the federal aid highway system and \$200 million for a culvert and small bridge replacement program – specifically for bridges under 20 feet in need of rehabilitation or replacement. This program will fund bridges that are not included in the National Bridge Inventory and thereby ineligible for federal funding.

However, the Transportation Funding Task Force Report published in January 2025 highlights that purchasing power of expanded funding programs has been diluted by historic construction material inflation. Over the past decade, increased costs for structural steel, concrete, asphalt, and specialized labor mean that the purchasing value from funding boosts are eroded, which limits the number of bridge rehabilitation projects that can be executed.

In 2026, the Massachusetts House of Representatives passed authorizing \$4.58 billion in bonding to expand the Chapter 90 program and other transportation programs, including \$500 million for LAMP and \$800 million for non-federally aided roadways and bridges.

According to the MassDOT Highway Division, between 2014 and 2024, MassDOT accrued over \$1 billion in bridge backlog per year on average. As of 2024, MassDOT estimated that \$1 billion in bridge funding would be needed annually for 7-10 years.

Funding alone cannot accelerate project delivery without structural regulatory changes. Accelerating the approval process through closer coordination among state environmental oversight agencies (such as MassDEP and MEPA) is critical to reducing administrative delays that leave small bridges and culverts deteriorating while awaiting permits.

MassDOT is required by federal law to inspect all National Bridge Inventory (NBI) bridges over 20 feet in span length, however, Massachusetts state law expands this mandate to include “small bridges” with spans between 10 and 20 feet for both state and municipal owned structures.

OPERATION & MAINTENANCE AND RESILIENCE

The MassDOT Highway Division is responsible for the operation and maintenance of the state's interstate highway and interstate bridges, and assists municipalities with their bridge needs. However, cities and towns are responsible for maintenance and replacement of municipality-owned bridges, including bridges on state-numbered routes through local jurisdictions.

MassDOT classifies highway bridges using two definitions based on span length: the federal National Bridge Inspection Standards (NBIS), which define bridges as structures with spans over 20 feet, and Massachusetts state law, which defines bridges as structures with spans of 10 feet or more, identified as BRI. MassDOT maintains inventories for both bridge categories, covering MassDOT-owned, municipal, and other state agency roadway bridges (such as the Massachusetts Bay Transportation Authority), as well as pedestrian, bikeway, and utility bridges. MassDOT is required by federal law to inspect all National Bridge Inventory (NBI) bridges over 20 feet in span length, however, Massachusetts state law expands this mandate to include “small bridges” with spans between 10 and 20 feet for both state and municipal owned structures.

MassDOT conducts five main types of inspections: 1) initial inventory inspections for new or rehabilitated bridges; 2) routine inspections every two years per federal requirements; 3) special member inspections a minimum of every year or six months, focused on

aspects of a bridge that are causing it to be classified as “poor”; 4) inspections for steel bridges that have non-redundant steel members that would result in the failure of the entire bridge should they fail; and 5) underwater dive inspections to access piers, abutments, and foundations below the water. Engineers will then assign condition ratings to three parts of the bridge: the deck, the superstructure, and the substructure, which are ultimately used to establish the condition rating. In the case of culverts that meet the definition of an NBI bridge, a single condition rating for “culvert” is provided.

MassDOT engineers use these inspections to identify bridge rehabilitation and replacement needs, identifying immediate critical work, maintenance needs, or the addition of the bridge on the Statewide Transportation Improvement Program (STIP) for a replacement or significant rehabilitation. MassDOT uses a risk-based prioritization system that ranks federally defined bridges based on current condition and a 15-year forecast of condition. These deterioration measures are combined with current condition loss and key highway factors (such as traffic volume, detour length, roadway classification, geometric deficiencies, and load rating) to produce a statewide bridge ranking.

MassDOT is working to strengthen its asset management program, including updates to its public online bridge database and Bridge Management System. While the

bridge program is well established, the data system continues to evolve, and not all bridge and culvert assets are currently captured, including some BRI bridges and culverts. Maintaining an accurate inventory requires regular updates when inspection findings, bridge designs, or ownership information changes. It also requires coordination with municipalities, as new structures associated with development — including some bridges 20 feet or longer — may not be added to the system if MassDOT is not notified. Continued improvements to data collection and reporting will support more effective operations and maintenance planning. Resilience is also an increasing consideration, particularly for bridge hydraulics. Updated design criteria related to scour, stream channel size, and 25-, 50-, 75-, and 100-year flood elevations can help ensure bridges are better prepared for changing water levels and future flood risks. Proactive monitoring and targeted capital funding are essential, as many older statewide bridges are currently classified as scour-critical. Many of these low-lying coastal spans and riverine foundations are inherently undersized, directly undermining structural stability and negatively impacting local environmental and ecological conditions.

The Commonwealth acknowledges the need to build resilient bridges and to proactively focus on bridge rehabilitation. However, as of 2024, about half of the state's maintenance expenditures were on reactive bridge repairs. In addition to building bridges to modern design standards, bridges in the Commonwealth must meet modern resilience standards per the 2023 Resilient Mass Plan.

Massachusetts is facing increased average temperatures and precipitation. By the mid-21st century, average annual temperatures are expected to be 2.8-6.2°F warmer. In addition, total annual precipitation is expected to increase by 2-13% with winter precipitation increasing up to 21% and sea level is expected to rise 1.1-1.2 feet in the Boston area. MassDOT is planning to adapt to these changes. In 2024, MassDOT's Highway Division released its Resilience Improvement Plan, which addresses resilience priorities. Specifically, it focuses on addressing flooding from precipitation, coastal flooding and sea level rise, average and extreme temperatures, coastal erosion, changes in groundwater, earthquakes, landslides and mudflows, hurricanes and tropical cyclones, and severe winter storms.

MassDOT integrates resilience throughout the full project lifecycle, from planning and design through operations and maintenance. The Highway Division's Project Intake Tool (MaPIT) automatically screens proposed project locations using environmental, system condition, equity, and safety data layers. In addition, MassDOT incorporated a "Climate Change Indicator" subsection into the Bridge Design Manual and updated the Hydrology and Hydraulics section to incorporate climate change considerations into hydrologic analyses, including increased flood frequencies. MassDOT has also updated standards to align with resiliency best practices for pavement mixtures, preservation projects, and both existing and new bridges. source dedicated to maintaining and preserving its bridges.



Photo: Bass River Bridge; Patrick Tierney

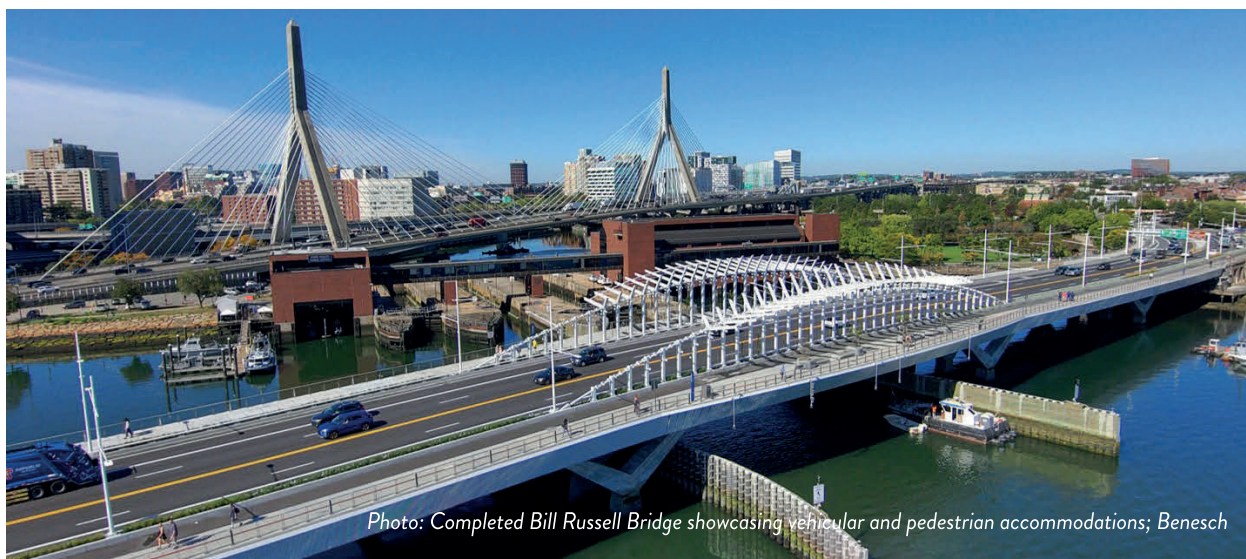


Photo: Completed Bill Russell Bridge showcasing vehicular and pedestrian accommodations; Benesch

PUBLIC SAFETY

As discussed previously, 459 bridges, or approximately 8.6% of the Commonwealth's bridge inventory, are subject to posted load restrictions. Of these, 362 are restricted for certain 2 axle vehicles. These limitations not only disrupt freight movement along key corridors, but also constrain the routes available to emergency vehicles, including fire apparatus and ambulances. Load restrictions can force lengthy detours, increase response times, and create significant operational challenges during routine emergencies. More broadly, these deficiencies can undermine the overall performance and resilience of the transportation system during emergencies or disaster response.

Compounding these challenges, the average age of bridges in the Commonwealth is 65 years, well beyond the typical 50 year late 20th century design life. Many older bridges no longer meet modern design standards and may have insufficient roadway widths, reduced load carrying capacity, or inadequate waterway openings. These shortcomings can lead to severe traffic disruptions and further limit the reliability and safety of the transportation network.

In addition, MassDOT recently installed barriers on the French King Bridge, where dozens of people have died by suicide. Such barriers are proven to deter and prevent attempts. Before installation, the local fire department received 10–15 crisis calls per month from the bridge; in 2024, the year after completion, it reported zero such calls.



Photo: Monson-Palmer Bridge; Linda Hager

INNOVATION

Massachusetts is deploying several innovative strategies to modernize bridge funding, inspection, and maintenance. MassDOT's Fully Integrated Application (FIA) allows municipalities to apply for multiple grant programs through a single portal, reducing administrative burden for local governments that often operate with limited staff and resources. To support data driven asset management, MassDOT also utilizes AASHTOWare Bridge Management software to forecast changes in a bridge's Health Index over a 15 year horizon, helping prioritize maintenance and investment decisions.

MassDOT further enhances inspection and monitoring through its Aeronautics Drone Operations Program, which uses drones to assess critical state infrastructure, including bridges, and to monitor construction projects, thus improving both safety and efficiency. MassDOT is also conducting research, funded by the U.S. DOT, to explore how LiDAR and other 3D scanning technologies can improve bridge inspection protocols, particularly for deteriorated steel beam ends.

MassDOT's Accelerated Bridge Program introduced innovative construction techniques to speed the

construction process, and the agency is continuing to review new solutions to shorten construction time. MassDOT has also implemented a robust design-build program, which brings the design and construction team on board to work together in saving construction costs and accelerating the process from design through construction. Presently MassDOT has \$7.8 billion design-build bridge rehabilitation/replacement projects in various phases over the next five years, with 17 presently under construction and 16 more scheduled for release for procurement within the next two years.

Additional innovations are on the horizon. The American Institute of Steel Construction awarded a 2026 IDEAS Award to a team at UMass Amherst's College of Engineering for applying a 3D printing technique known as cold spray to restore corroded steel bridge members. This technique was first demonstrated on the Red Bridge (formerly the Brown Bridge) in Great Barrington through a collaboration among UMass Amherst, MIT, MassDOT, and the Massachusetts Technology Collaborative. Cold spray use for bridge repairs would reduce costs while minimizing disruptions to motorists.



Photo: William Felton "Bill" Russell Bridge in Boston; Benesch



RECOMMENDATIONS TO RAISE THE GRADE

- Increase and stabilize the Chapter 90 program by transitioning from legislative extensions to multi-year capital plans indexed to construction cost inflation to provide predictable revenue streams that allow municipal public works departments to plan and deliver complex bridge rehabilitations.
- Prioritize targeted investments in bridge maintenance and rehabilitation to reduce the number of bridges classified as being in poor condition and to eliminate load posted bridges that constrain safety, freight movement, and local economies.
- Secure full federal and state funding for the Bourne Bridge Replacement to ensure timely delivery of the project and complete the Cape Cod Bridges Program, improving resiliency, safety, and regional mobility.
- Prioritize capital funding for the structural stabilization and foundation of scour-critical bridges and low-lying coastal spans vulnerable to sea-level rise and wave action, of which may be undersized and affecting environmental and ecological conditions.
- Work across state agencies (MassDEP, MEPA) to accelerate the regulatory approval process for municipality-owned small bridges and culverts, reducing project delays that exacerbate structural deterioration.



SOURCES

- American Society of Civil Engineers, “Policy statement 208 – Bridge safety,” 2024.
- Cape Cod Commission, “Cape Cod Bridges Program,” n.d.
- Commonwealth Beacon, “Barriers going up on bridge to prevent suicide jumps,” 2023.
- Commonwealth of Massachusetts, “About the MassDOT Aeronautics Drone Operations Program,” n.d.
- Commonwealth of Massachusetts, “Chapter 90 Program,” n.d.
- Commonwealth of Massachusetts, “House Passes Bill Authorizing Chapter 90 Funding,” 2026.
- Commonwealth of Massachusetts, “Massachusetts Climate Projections,” n.d.
- Commonwealth of Massachusetts, “PDDG Chapter 10 – Bridges,” n.d.
- Commonwealth of Massachusetts, “ResilientMass Plan Action Tracker,” 2026.
- Commonwealth of Massachusetts, “Transportation Grant Central,” n.d.
- Federal Highway Administration, “Bridge Formula Program,” n.d.
- General Court of the Commonwealth of Massachusetts, “MassDOT Highway Division 2024 Capital Needs Snapshot,” 2024.
- Federal Highway Administration, “Bridge Condition by Posting Status 2025,” 2025.
- Greenfield Recorder, “French King Bridge barriers ‘working’ after 2023 installation,” 2024.
- Jamie Eldridge, “Massachusetts Legislature Approves Road and Bridge Funding for Cities and Towns,” 2025.
- Massachusetts Budget and Policy Center, “A Bridge Too Far: Sagging Investment Leaves 644 Massachusetts Bridges Structurally Deficient,” 2022.
- Massachusetts Department of Transportation, “Development of Improved Inspection Techniques Using LiDAR for Deteriorated Steel Beam Ends,” 2024.
- Massachusetts Department of Transportation, “Massachusetts geoDOT Bridges,” 2024.
- Massachusetts Department of Transportation Highway Division 2024 Capital Needs Snapshot, “Bridges,” 2024.
- Massachusetts Department of Transportation Highway Division, “Resilience Improvement Plan,” 2024.
- University of Massachusetts, Amherst, “Innovative Bridge Repair Method Developed by UMass Amherst-led Team Awarded as ‘Idea that could Change the Future’,” 2026.
- U.S. Department of Transportation, “INVESTING IN AMERICA: Biden-Harris Administration Announces \$5 Billion to Restore, Reconstruct, and Repair Nationally Significant Large Bridges Across the Country,” 2024.
- Wikimedia Commons, “File:Cape Cod Canal - Bourne Bridge.jp

Dams



Photo: Harbor Pond mill dam on Squannacook River in Townsend, MA; Jerry G

GRADE
COMPARISON

MA: D+
Nat'l: D+



DAMS

EXECUTIVE SUMMARY

Massachusetts dams provide water supply, enable flood control, produce hydropower, and support fire safety and recreation. There are 2,829 dams along 8,000 miles of river; 45% publicly owned and 55% privately owned. About 50% are regulated by Massachusetts. About 47% dams are non-jurisdictional. These dams are generally under six feet tall, have outlived their original purposes, and face increasing risk of failure as they age.

Among the state regulated dams, 297 dams classified as high-hazard potential, 12% are in poor condition and 3% are in unsatisfactory condition. Of dams listed in the National Inventory of Dams (NID), 49% (658) dams have exceeded their 75-year design life. Despite these risks, Massachusetts has a strong oversight program for compliance including emergency action planning for 98% of high-hazard dams and 84% of significant-hazard dams.

As flooding and extreme precipitation events become more frequent and severe, aging and obsolete dams pose increasing safety risks, underscoring the need for greater investment in dam safety, rehabilitation, removal, and resilience programs.

BACKGROUND

In Massachusetts, dam oversight is primarily led by the Department of Conservation and Recreation's (DCR) Office of Dam Safety (ODS), which coordinates compliance through inspections, maintenance plans, and emergency action plans. Massachusetts Emergency Management Agency (MEMA) collaborates with ODS for emergency preparedness requirements and response improvements.

Data for this Infrastructure Report Card comes from the 2,829 dams' inventory by ODS in 2025. This report card also relies on the 1,340 National Inventory of Dams (NID) in the database for Massachusetts

which is maintained by US Army Corps of Engineers (USACE). The difference in the number of dams in the ODS inventory and the NID database is that the NID database includes only the regulated dams, whereas the ODS inventory includes both the regulated and non-jurisdictional dams.

Of the 1,340 dams in the NID, 49% of dams in Massachusetts are older than 75 years, and 21% are older than 100 years. These dams provide many benefits like reliable water supply (17%), flood control (7%), hydropower (6.5%), fire safety (6%), and recreation (54%).

The MA Department of Conservation Recreation (DCR) and Office of Dam Safety (ODS) inventoried 2,829 dams in 2025; ~50% under ODS jurisdiction, ~47% non-jurisdictional by the ODS, 2% overseen by Federal Energy Regulatory Commission (FERC), 1% by United States Army Corps of Engineers (USACE), and <1% by US Fish & Wildlife (Figure 1).

Less than half the dams in MA are publicly owned (45%, 1,284). These public dams are either owned by Municipalities (31%), State (13%), Political Sub-Division (1%), and Federal (<1%), (Figure 2).

ODS non-jurisdictional dams are as defined in the dam safety regulations, and the ODS inventory includes non-jurisdictional dams (Figure 3).

Figure 1: Dam Jurisdiction in MA

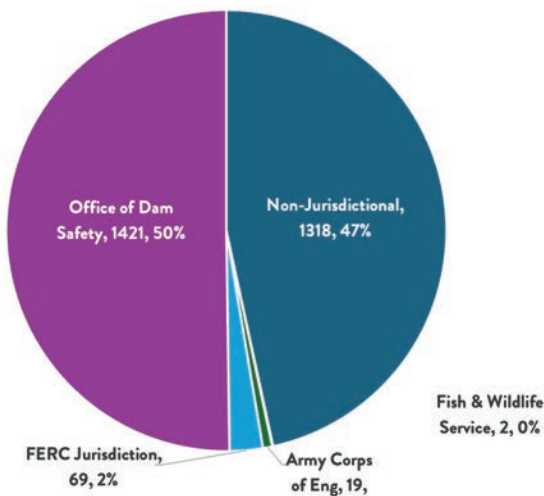
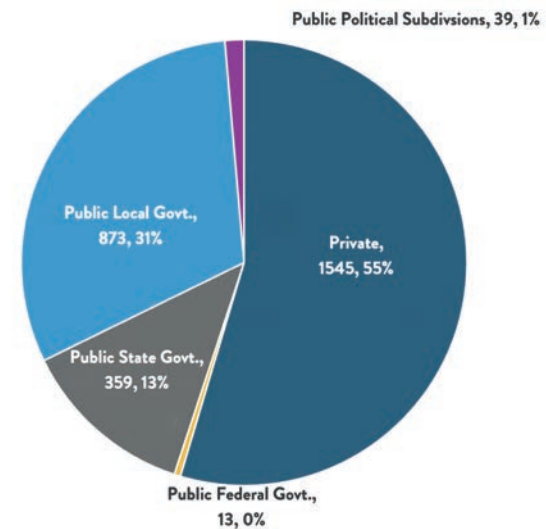


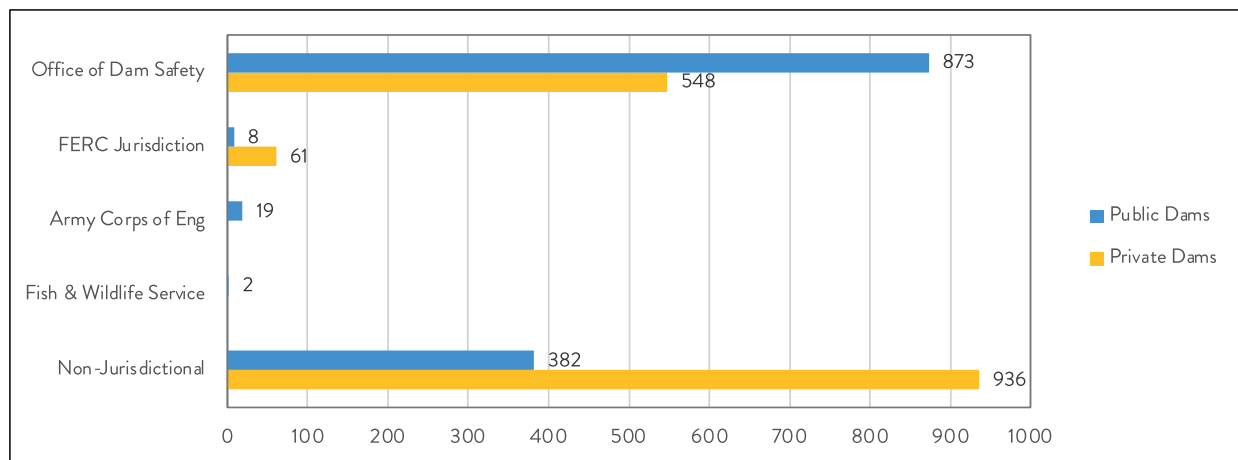
Figure 2: Dam Ownership in MA



MA has 1,421 regulated dams by ODS, and 1,318 non-jurisdictional dams. Refer to Figure 3 for jurisdiction

and ownership inventory.

Figure 3: Jurisdiction and Ownership breakdown of Dams in MA

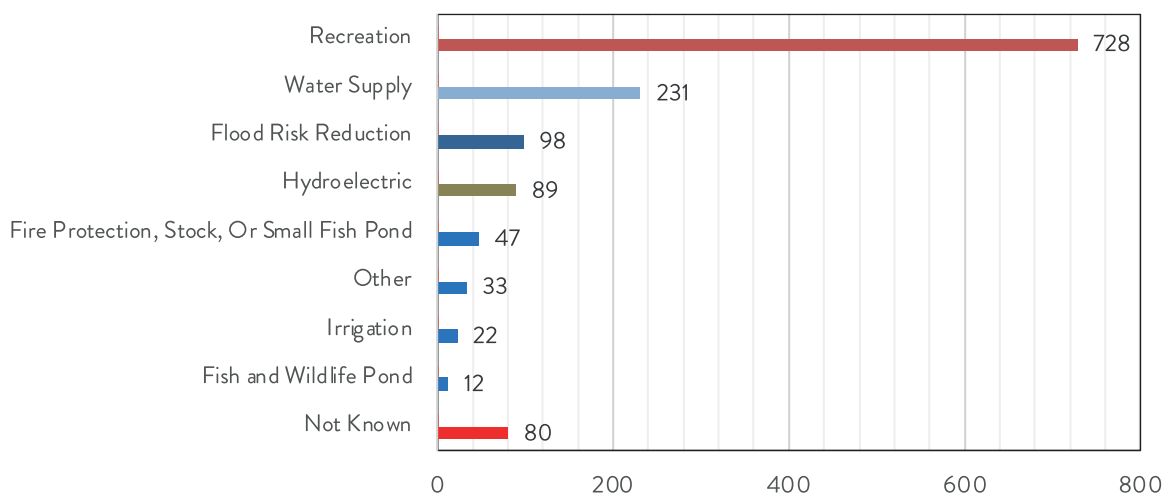


CAPACITY

Massachusetts dams serve a variety of critical and functional purposes (Figure 4). Over half (54%, 728)

no longer serve their original purpose, instead of being used for recreation. 113 dams serve no purpose.

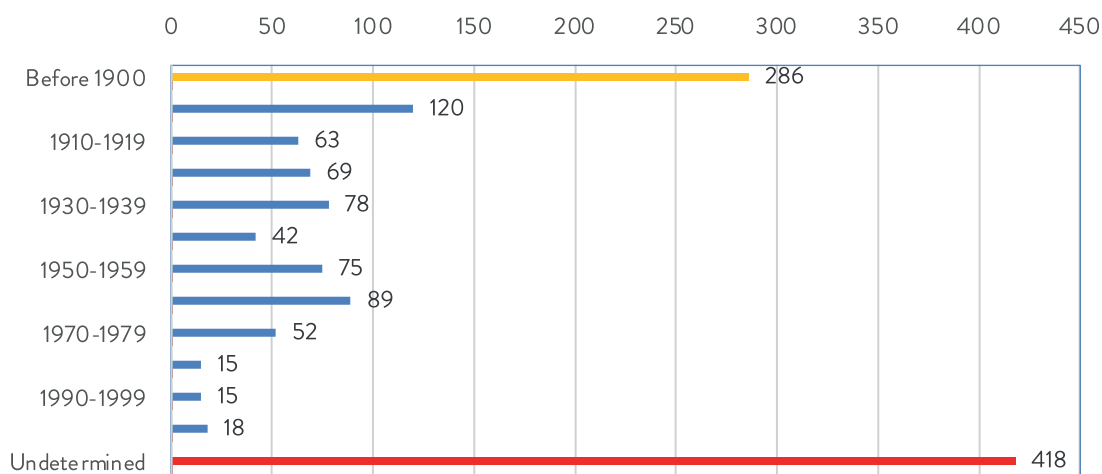
Figure 4: Primary Purpose of Massachusetts Dams



The average age of regulated dams is 111 years; 49% (658) are older than the typical maximum lifespan of 75 years and 31% (418) have an unknown age (Figure 5). 208 earth dams, a type of embankment dam, were built in the 17th, 18th, and 19th centuries.

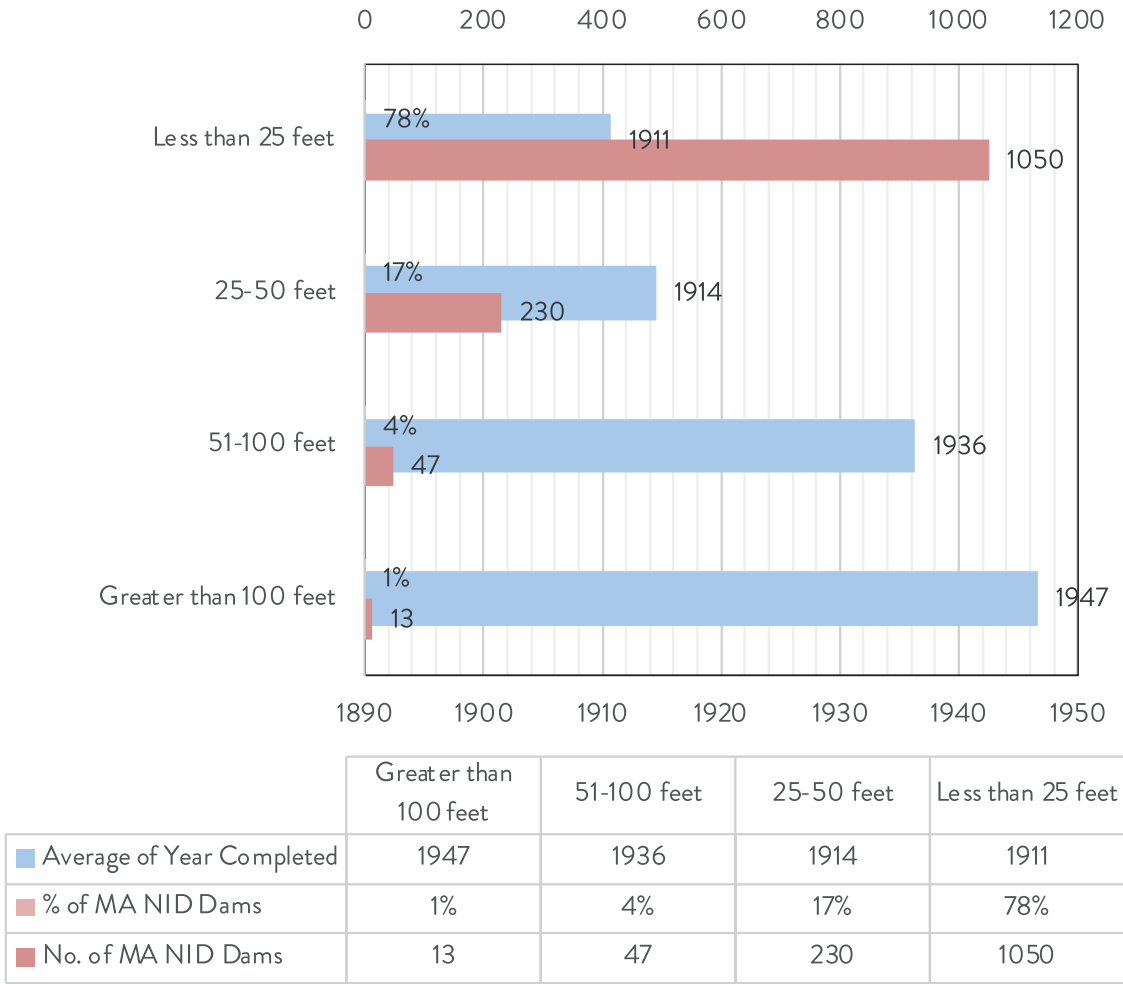
Dams are designed with a specific design life, often 50-100 years. Embankment dams are considered especially resilient (providing service for 100+ years with proper maintenance and operation). However, the critical components necessary for maintaining the safety of aging dams would require significant and costly periodic upgrades.

Figure 5: Massachusetts Dams and Year Completed



The distribution of Massachusetts's dam height and average year of completion is provided in Figure 6.

Figure 6: Massachusetts Dam Height and Average Year Dam Completed



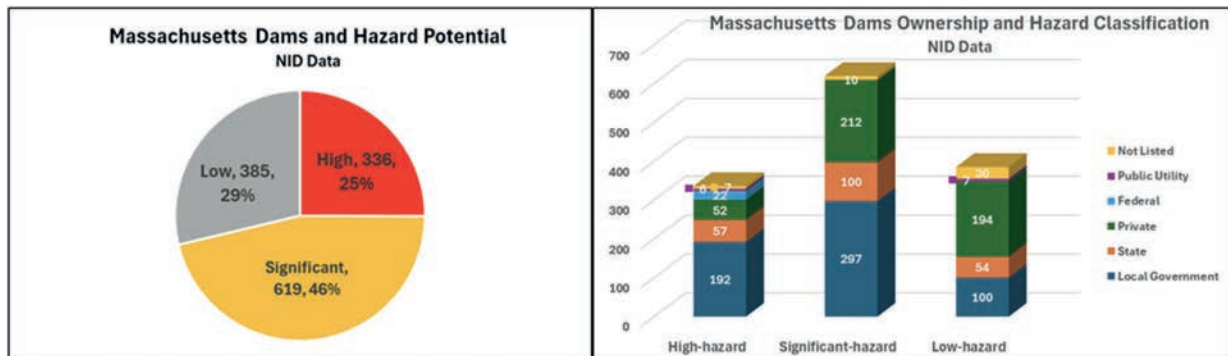
*MA NID database under less than 25 feet dam height category includes total of eight dams less than six-feet height with significant and high hazard potential. Low-hazard potential dams of less than six feet height are excluded from NID catalog.

Dams are assigned hazard codes and physical condition ratings. Hazard codes describe the risk of impact if the dam were to fail while the condition ratings describe the physical condition of the dam. Hazard potential codes include: high-hazard, significant-hazard, or low-

hazard. These hazard classifications do not consider the condition of a dam or its appurtenances.

In the NID catalog, 25% (336) of dams, which also include 41 federally owned and regulated dams, are high-hazard potential (Figure 7).

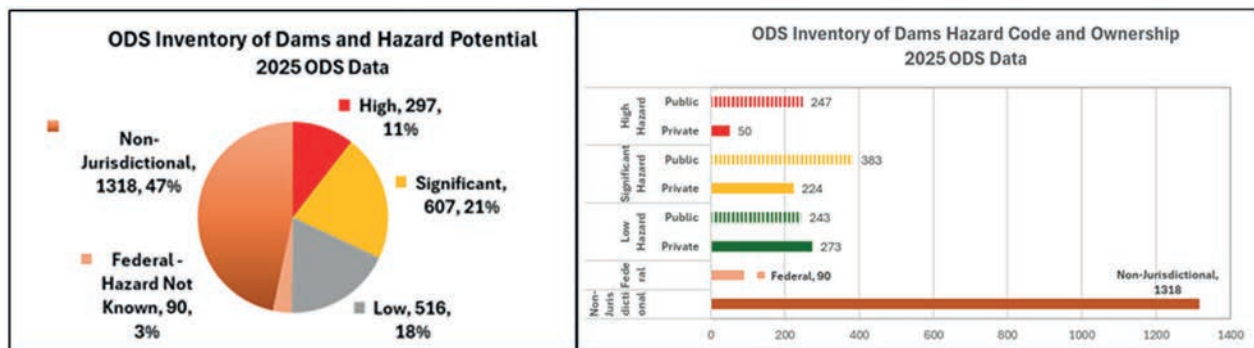
Figure 7: Massachusetts NID Dams Ownership and Hazard Classification



Based on 2025 ODS data, 297 state regulated dams are classified as high-hazard potential (Figure 8). Figures 7 and 8 illustrate the difference between NID database and ODS inventory. The notable difference between the number of high-hazard potential dams in NID catalog and ODS inventory is that ODS

inventory lists the hazard potential of federally owned and regulated dams as not known. The other notable difference between the low-hazard potential dams in NID catalog and ODS inventory is that NID catalog lists only the low-hazard potential dams meeting the certain height and volume requirements.

Figure 8: ODS Inventory of Dams Hazard Classification and Ownership



As severe weather becomes more frequent, Massachusetts dam design standards (last updated in 2017) should account for increased rainfall and storm intensity associated with climate change. As Massachusetts' dam inventory ages, capacity improvements should be evaluated case by case based on each dam's specific risks, needs, and benefits.

Massachusetts' strategy for addressing increased dam risks has focused more on removing unsafe dams than building new capacity. Massachusetts removed 15 dams in 2025, and more than 100 dams have been removed since 1902.

CONDITION

ODS provides regulatory oversight for dams, which includes inspecting existing dams, managing remediation of deficient dams, and working with local officials and dam owners on emergency preparedness. High-hazard dams are inspected every two years, significant-hazard dams every five years, low hazard dams every ten years, and unregulated dams have no inspection requirement. ODS also assigns condition ratings, including: Satisfactory, Fair, Poor, Unsatisfactory, and Not rated.

According to 2025 Resilient Mass Finance Strategy report, about 30% of Massachusetts' state-regulated dams (434 of 1,421) are classified as unsafe or in poor condition. Among 297 high-hazard dams, 12% are in poor condition and 3% are unsatisfactory, while 28% of 607 significant-hazard dams are in poor or unsatisfactory condition.

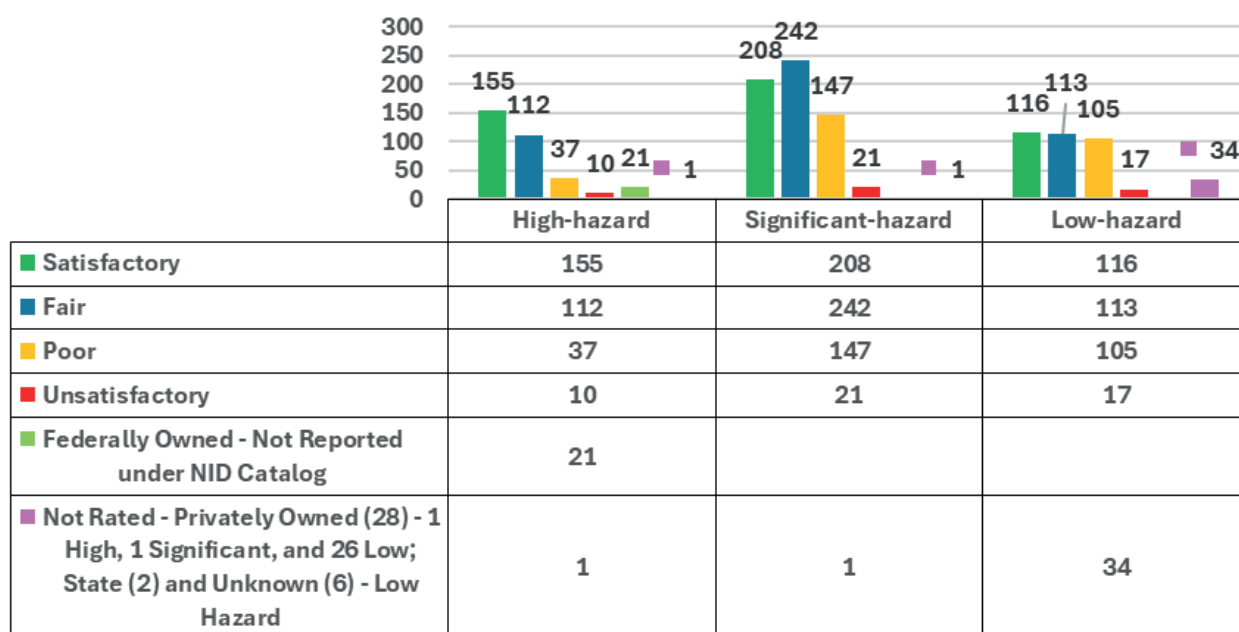
The hazard potential and condition assessment of 1,340 dams in NID data is provided in Figure 9. The condition assessment of federally owned dams is reported as not known in NID data. Excluding federally owned dams, inspections for 22 high-hazard-potential dams (approximately 7%) and 45 significant-hazard-

potential dams (7%) were overdue relative to the required inspection frequencies of every two and five years, respectively.

Of the ten high-hazard-potential dams rated in unsatisfactory condition, three are owned by local governments and seven are privately owned. The 38 significant- and low-hazard-potential dams in unsatisfactory condition are owned by a mix of state and local governments as well as private entities.

Dams in Massachusetts face increasing risk from extreme weather events. For example, historic flooding in Taunton in 2005 placed the Whittenton Mill Pond Dam (built in 1832) at risk of failure, prompting obsolete dam removals and Mill-river restoration initiatives between 2012 and 2022. More recently, catastrophic flash flooding in Leominster in September 2023—driven by 9 to 11 inches of rain in six hours, exceeding the estimated 500-year, 24-hour rainfall event—compromised the significant-hazard Barrett Park Pond Dam, where the emergency action plan was successfully implemented. Two additional low-hazard or non-jurisdictional dams were also compromised during the event.

Figure 9: Massachusetts Dams Hazard Potential and Condition Assessment



As extreme weather becomes more frequent, aging dams pose growing maintenance, rehabilitation, and removal challenges. Massachusetts should ensure dam condition and capacity meet updated current standards accommodating climate change and reassess repair and removal needs, especially since the last State Auditor's report on dam safety's financial impact was completed in 2011.

ODS received a FEMA High-Hazard Potential Dams (HHPD) Grant in FY20. ODS developed a screening-

level, risk-based, decision-making methodology to prioritize high-hazard potential dams that are reported to be in poor or unsafe condition and to assess which dams should be repaired or removed. ODS identified 35 high-hazard dams that would qualify for FEMA High-Hazard Potential Dams (HHPD) Grant Program in FY24. Massachusetts continues to further explore the future funding need of high vulnerability dams.

FUNDING

The primary categories associated with funding for dam projects are 1) funding for regulatory oversight programs 2) rehabilitation, repair, or removal of obsolete dams, and 3) climate resilience improvements.

Regulatory Oversight Programs:

In FY 2025, the ODS program operating budget expended \$702,173 and FY 2026 projected spending is \$744,853. FY 2027 proposed operating budget is \$780,818. Additionally, funding is also available via the Infrastructure Investment and Jobs Act (IIJA) and the Federal Emergency Management Agency's (FEMA) National Dam Safety Program (NDSP). Massachusetts Dam Safety program relies on FEMA funding. In 2024, MA received \$502,700 from these sources. FEMA funding has been cut for FY 25 and FY 26, and future appropriations are unknown at this time.

The Massachusetts ODS program meets the national average by relying on both state budget and FEMA grants. Massachusetts budgeted only \$100 more per state regulated dam compared to the national average of \$900 per dam. This gap is especially notable for high-hazard potential dams, where MA invests \$1,500 less per dam compared to the national average. Lastly, over the last thirteen years, the state dam safety budget has only increased by \$150K.

Rehabilitation and removal of obsolete dams:

In 2013, Massachusetts established the specific Dam and Seawall Program for the rehabilitation, repair, and removal of obsolete dams to support local governments and nonprofits.

In FY 2025, \$13.9 million was allocated for the Dams and Seawalls Grants and ResilientMass initiative, a nearly twofold increase from the \$5.6 million allocated in FY 2024. These grants helped fund 23 projects to repair critical water supply dams, remove obsolete dams, reconstruct seawalls, repair levees, construct seawalls, and repair levees.

Massachusetts has also established a state level funding program for dam regulatory compliance. The Executive Office of Energy and Environmental Affairs (EEA) launched the Dam Owners Technical Assistance (TA) Program in FY25 to assist dam owners in complying with dam safety regulations. Priority is given to High and Significant Hazard Potential dams that are privately owned to help address potential lapses in regulatory compliance. In FY25 & FY26, \$1 million was allocated, and for FY 27, same amount is proposed.

Funding is also provided via FEMA's NDSP. In FY 24, FEMA provided \$6.98 million to the Department of Conservation and Recreation. However, funding was cut in FY 2025 and FY 2026, and future appropriations are unknown at the time of writing.

Funding for climate resilience improvements

In 2023, the DCR provided \$28 million in funding to improve climate resiliency, provide significant flood protection, and maintain environmental justice for communities surrounding the Amelia Earhart Dam (AED) on the Mystic River. The project was funded through the American Rescue Plan Act (ARPA), and portioned \$13 million to redesign the dam's elevation and \$15 million to renovate the Draw Seven Park and build a flood control berm.

FUTURE NEED

Massachusetts has not recently undertaken a comprehensive effort to estimate the repair cost of high-hazard and significant-hazard municipally owned dams that are in poor and unsatisfactory condition. A 2011 report from the state auditor’s office estimated that \$60 million would be needed just to repair high-hazard and significant-hazard municipally owned dams in unsafe or poor condition. The report identified 100 municipally owned dams of high-hazard and significant-hazard potential in 62 communities that were rated in unsafe or poor condition.

Even after fifteen years, the total number of high-hazard and significant-hazard dams in unsafe or poor conditions remain the same. According to NID data, 98 municipally owned dams are in unsafe or poor condition (25 high-hazard and 73 significant-hazard). Also, ~20% (59 dams) of 297 municipally owned and 10% (10 dams) of 100 state owned significant-hazard

dams do not have emergency action plan and total of 33 dams of these are in poor condition.

Although the last cost estimate report by Massachusetts was in 2011, ASDSO 2025 report determined that the current cost for repairing Massachusetts’s 1,298 non-federally owned dams is \$2 billion, and \$460 million of which needed for 306 non-federally owned high-hazard potential dams.

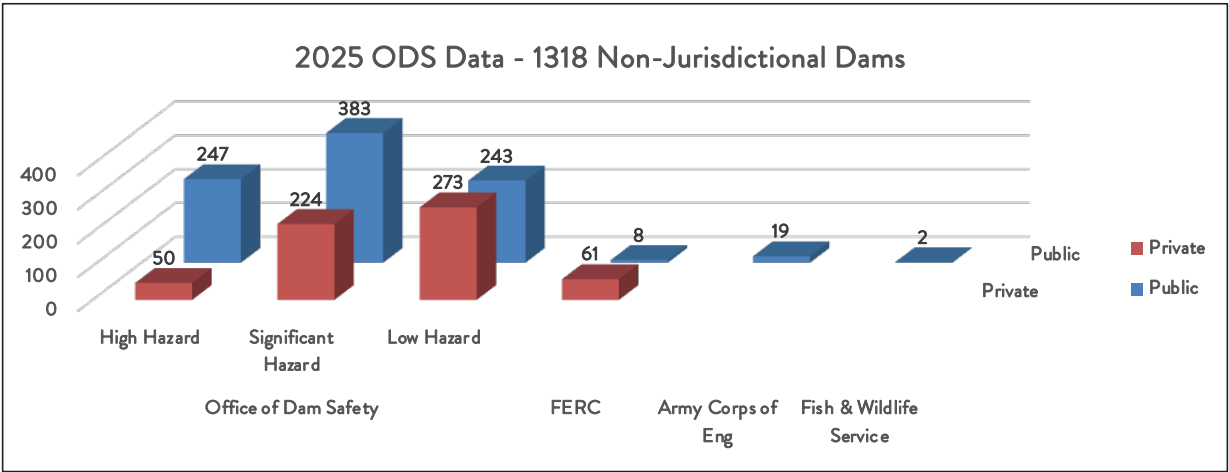
During FY25, ODS identified the 43 highest priority dams for removal or repair based on hazard potential and condition. Massachusetts must further explore to see whether to remove, upgrade, or repair high vulnerability dams to respond to future climate conditions. Future investment needed for the 1,318 non-jurisdictional aging dams in the ODS inventory must also be explored by Massachusetts.

OPERATION AND MAINTENANCE

The Commonwealth of Massachusetts Dam Safety Law and Regulations require owners of state-regulated dams to have a professional engineer inspect dams at a frequency established by the dam’s hazard potential classification.

Refer to Figure 10 for the breakdown of ODS inventoried dams by the hazard potential, regulating authority, and public or private ownership.

Figure 10: ODS Inventory of Dams Regulating Authority, Hazard Classification and Ownership



Massachusetts achieved 100% compliance in 2024 based on the dam safety program performance report provided by ASDSO for dam construction, modification, removal, emergency planning and incident response. However, Massachusetts achieved only 60% compliance under the performance report provided by ASDSO for the dam safety program component for dam inspection, risk assessment, and enforcement, below the national average of 65%.

Massachusetts' lower-than-average compliance partly reflects gaps in timely inspections of state-regulated high-hazard dams. While performance

report by ASDSO reported 140% compliance in 2015, indicating inspections were completed ahead of schedule, inspection coverage fell to 60% in 2023 and 80% in 2024. Although capacity has improved since then, Massachusetts has not yet returned to historical levels of coverage, largely due to staffing and capacity constraints. In 2024, the state averaged 41 high-hazard dams and 200 total state-regulated dams per full-time equivalent (FTE) regulator, exceeding national averages of 28 and 180, respectively. Additional staffing and training are needed to keep pace with inspections, assessments, and enforcement.

PUBLIC SAFETY

Public safety measures are critical for Massachusetts' dam infrastructure, especially given that the average age of state's dam is 111 years (Figure 5, NID data). Public safety measures span across dam maintenance, inspection, emergency action planning, and hazard mitigation planning.

One of the most important public safety measures for dams is an Emergency Action Plan (EAP). In 2017, ODS provided a regulatory update that required EAPs for also for all significant-hazard potential dams. These EAPs must provide public safety officials and dam owners with the appropriate procedures and communications network needed to minimize loss of life in the event of a dam emergency. Currently, MA has 98% compliance with EAPs for high-hazard potential dams, and 84% compliance with significant-hazard potential dams.

While having an EAP is the necessary first step, effective emergency response depends on routinely testing the plan through exercises that simulate emergency management response to a potential dam failure. Based on 2023 & 2024 ASDSO performance reporting for MA, no data is available for whether EAPs for high-hazard-potential dams were exercised in the past five years. Additional data is needed to fully evaluate the effectiveness of the EAP listed in the NID. However, during September 2023 catastrophic flash flooding in Leominster, the EAPs of the dams were reported to be implemented effectively by the Massachusetts.

EAP requirements by the ODS for the state regulated high-hazard dams are based on FEMA 64 guidelines on inundation mapping. Relatedly, based on NID data, inundation maps are only made available to NID database for 18 out of 336 high-hazard potential dams. According to ODS, these inundation maps for the state regulated dams are available in the PDF or paper EAP documents and are available to emergency managers and MEMA.

As identified in the 2023 Resilient Mass Plan, MEMA will have to work with ODS to strengthen emergency response planning, establish annual update cycle for Emergency Action Plans, and provide more readily available inundation maps. As such, the ODS is in the process of digitizing EAP inundation maps into digital spatial data sets.

Another emerging concern is the growing focus on low-head dams (roller dams). Following the definition established in the Water Resources and Development Act of 2024, USACE is incorporating low-head dam data into the NID. In Massachusetts, 514 dams are under USACE review for potential low-head dam classification. Of these, 88 are regulated by the ODS, six are not regulated by ODS, and 420 have no available ODS status.

ODS defines low-head dams under 302 CMR 10.03. Because ODS data were unavailable for the report card evaluation, it could not be determined whether the

420 dams with unavailable status are among the 1,318 non-jurisdictional dams identified by ODS (Figure 1).

Massachusetts continues to address the risks associated with low-head dams through public safety

warnings issued by the Department of Conservation and Recreation and ongoing dam removal projects led by the Department of Ecological Restoration as part of broader ecosystem restoration efforts.

RESILIENCE AND INNOVATION

Massachusetts has several initiatives to ensure that its dams remain resilient and up to standards. For instance, the Massachusetts Dam and Seawall Program provide financial resources to assist local government bodies and nonprofit organizations with the repair or removal of aging and outdated infrastructure. The program supports critical repairs to protective infrastructure, as well as the removal of obsolete dams for ecological restoration. Massachusetts has also established ResilientMass initiative and Biodiversity Goals in 2025, and on-going climate resilience improvements as discussed under the Funding section.

Another program that supports Massachusetts's dam resiliency efforts is the Department of Ecological Restoration (DER). DER was established in 2009, and its main objective is to advance ecological restoration efforts in the Commonwealth via dam removal, culvert replacement, restoration of wetlands and retired cranberry bogs, and building capacity of restoration partners throughout the state. DER has played a leading role in supporting this strategy of dam removals. In 2007 Massachusetts published the first dam removal guide in the nation. Other Watershed Associations and organizations like the Mass Rivers Alliance also promote safe dam removal efforts.

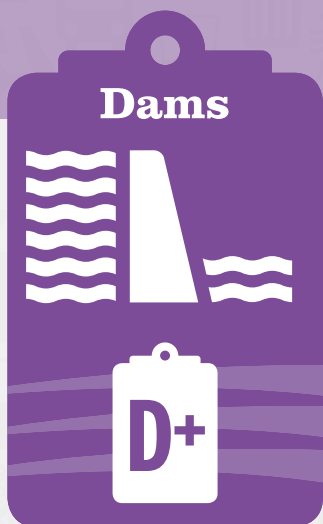
Massachusetts is considered among the national leaders in the dam removal efforts. In 2025, Massachusetts led the nation in dam removal and river restoration, with 15 dams, including Becker Pond Dam in Mount Washington and Larkin Dam in Newbury, removed by state agencies and partners. Larkin Dam removal from Parker River restores natural processes of nearly 8 river miles, improves water quality, and reduces local

flood risks by eliminating an obsolete structure that had long constrained the river.

DER annual reporting states that dam removal in 2024 was also very successful. Three dams were removed, one of which was the oldest Lyman Pond Dam No. 2 (built in 1731), Quinnapoxet River Dam (high-hazard potential), and Dudleyville Pond Dam (significant-hazard Potential). Quinnapoxet River Dam removal in 2024 included thoughtful planning and collaboration to overcome unique challenges. Dudleyville Pond Dam reported to be completed efficiently and with cost savings despite being done so via an emergency order.

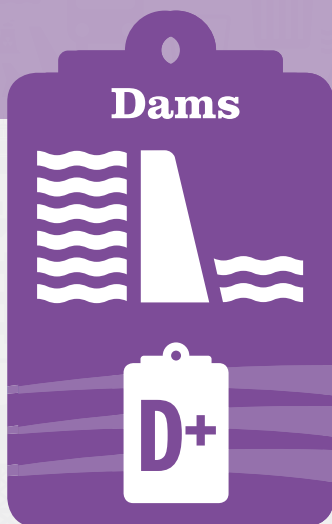
Massachusetts has also taken several other initiatives for sustainable fish passage and in 2023, the removal of an obsolete 100-year-old High Street Dam in the Taunton River Watershed in Bridgewater was as part of a \$1.55 million investment through the IJA and National Fish Passage Program.

Today, many aging and vulnerable dams are being prioritized for removal to improve the ecological conditions of rivers and streams, which will also help cities and towns to meet water quality requirements. While these efforts being supported by state agencies and municipal associations, more funding is still needed. Given the potential risk that more than one dam and other critical infrastructure could be compromised in a single catastrophic event, MA must continue to adopt and fund innovative technologies (e.g., survey and drone capabilities for close inspection and to increase monitoring frequency, real-time monitoring to improve day-to-day operations and emergency response) to continue to raise the bar for dam resilience efforts.



RECOMMENDATIONS TO RAISE THE GRADE

- Continue FEMA's NDSP Assistance Grant funding. Address current staffing gaps to meet the national average (increase the number of Massachusetts Dam Safety Program staff to match the FTE national average for high-hazard dams) and continue to invest in proper training.
- Support key legislation initiatives for the MA Dam Safety program to at least to meet the national average. Secure additional annual funding by at least \$500K (\$1,500 increase per each 297 high-hazard dams).
- Continue to invest more in funding and grant support for dam safety, maintenance, and compliance (e.g. support ODS and MEMA coordination including for high vulnerability dams, and ResilientMass initiatives, develop Hazard Mitigation Plan requirements to maximize FEMA supported HHPD funding).
- Adopt the risk-based assessment as a requirement in the dam safety regulations. Apply a risk-based dam safety evaluations and assessments and predict the annual probability of failure for a given dam. Adopt the FEMA guidelines for risk-based dam safety evaluations and increase the opportunities from obtaining federal funds.
- Support funding for engineering studies updating the risk-prioritized listing of high vulnerability dams. Update previous 2011 cost estimate for the state and municipally owned high vulnerability dams to respond to future climate conditions.
- Support funding to continue removing dams that no longer serve a useful purpose. Address the future investment need to explore the 1,318 non-jurisdictional aging dams in the ODS inventory.
- Update the state-managed dam safety database (update hazard classification, coordinate with USACE for both NID database and low-head dams' inventory, expand online EAP and Inundation Mapping for tracking, storing, reviewing and updating).
- Continue to plan and adapt to future technologies that support aging dams (e.g. survey and drone capabilities, remote monitoring).



SOURCES

- American Rivers, “2025 State of Dam Removals in the US,” 2026.
- Association of State Dam Safety Officials (ASDSO), “Massachusetts Dam Safety Performance Reports,” 2024, 2023, & 2015.
- Association of State Dam Safety Officials (ASDSO), “Development of a Consistent Framework: Risk Prioritization for 35 Unsafe, High Hazard Dams in Massachusetts,” 2023.
- Association of State Dam Safety Officials. “The cost of rehabilitating dams in the U.S.: A methodology and estimate,” 2025.
- Congressional Research Service Report R45981 “Dam Safety Overview and the Federal Rule,” 2023.
- Environmental Business Council, “Annual Briefing by the New England Dam Safety Presentations,” 2024 – 2026.
- FEMA, “High Hazard Potential Dams: Grant Program, Dam & Project Eligibility, Grant Awards,” FY 2019-2024.
- FEMA and ASDSO, “Model Dam Safety Program Manual,” 2022.
- Massachusetts Governor’s Budget FY2026 Appropriations, FY2027 Recommendations, “Department of Conservation and Recreation Office of Dam Safety Historical Budget and Historical Spending,” 2026.
- Massachusetts Capital Investment Plan, “Department of Conservation and Recreation – Dam Safety, Inspection, and Maintenance Program,” FY2026 – 2030.
- Massachusetts Dam Safety Regulations 302 CMR 10.00, February 2017, “Massachusetts Dam Safety Act M.G.L.c. 253 §§44-48 and c. 21, § 65,” 2017.
- Massachusetts, Department of Conservation Recreation, Office of Dam Safety, “Emergency Action Plans,” n.d.
- Massachusetts, “Division of Ecological Restorations Annual Reports,” 2024 & 2025.
- Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), Department of Fish and Game, Division of Ecological Restoration, Division of Marine Fisheries, “Larkin Dam Removed, Restoring a Free-Flowing Parker River in Newbury,” 2026.
- Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), “2024 & 2025 End of Year Reports,” 2024, 2025.
- Massachusetts, “Office of Dam Safety data set email coordination,” 2026.
- Massachusetts Infrastructure Investment Coalition, “Infrastructure Status Report: Massachusetts Dams,” 2010.
- Massachusetts, “ResilientMass Maps and Data Center,” 2026.
- Massachusetts, “ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,” 2023.
- Massachusetts, “ResilientMass Finance Strategy Full Report: Appendix B: Investment Assessment Technical Appendix” – Investment Need and Resilience Value of Key Resilience Measures for Significant and High Hazard dams,” 2025.
- U.S Army Corp of Engineers (USACE), “National Inventory of Dams (NID),” and “Low-Head Dam Inventory,” accessed May & June 2026.

Drinking Water



Photo: Ashley Reservoir, Holyoke, Massachusetts; Tighe & Bond

GRADE
COMPARISON

MA: D
Nat'l: C-



DRINKING WATER

EXECUTIVE SUMMARY

Drinking water system capacity and aging water mains are primary concerns for Massachusetts communities plus supply limitations due to contamination or other impacts. Massachusetts water supplies are also vulnerable to climate change, which can impact supply capacity and quality. Limited funding prevents most water suppliers from keeping up with water main replacement needs, which can cause pipe failures, leakage, and reduced capacity for fire flow. Also, lead service lines exist in older, urban communities, but also in some suburban communities. Sustained funding for drinking water in Massachusetts is needed to ensure reliable and safe drinking water for residents and businesses into the future. The state legislature should also prioritize establishing the Water Sector Workforce Development Fund to address the shortage of licensed water system operators in the state.

CAPACITY

Massachusetts has over 1,700 public water systems that serve over 90% of the state's population. These public water systems are supplied by over 3,700 public drinking water wells and 250 surface water supplies. Approximately 33% are community water systems that serve residents full-time, while the others are for other uses, transient population, or seasonal. Public water systems in Massachusetts can vary in size. Approximately 76% are considered very small and 10% are large. The Boston Water and Sewer Commission system has more than 90,000 service connections and serves over 1 million people. The Massachusetts Water Resources Authority (MWRA) regional water system provides wholesale water supply to 2.5 million people in 53 communities, which is 35% of the state's population, and 5,500 industrial users. Over 500,000 people, or 7% of the population, rely on

private wells for drinking water because access to a public water system is not available.

Massachusetts water suppliers regularly upgrade distribution systems and treatment plants to meet average and peak demand. Capacity challenges are more common in systems facing growing demand or contamination issues. While the state's population has increased over time, water use has recently declined: about 60% of systems have reduced total use over the past decade, averaging a 1.8% annual decrease.

Communities across Massachusetts face challenges meeting current and future water demand due to declining supply capacity and contamination risks. In eastern Massachusetts, limited options for new water sources have led many communities to consider

connecting to the MWRA or neighboring systems. Droughts are expected to become more frequent with climate change, further straining supplies, as seen during

the significant 2016–2017 drought that impacted agriculture, water systems, and ecosystems.

Cleveland Brook Reservoir, Hinsdale, Massachusetts



Source: Kleinfelder

Massachusetts established Water Conservation Standards in 1992 to promote efficient water use and protect supply capacity. Updated periodically, these standards guide state and local efforts to manage demand and encourage conservation among residents and businesses. Key goals for public water suppliers include maintaining a drought management plan, limiting non-revenue water to 10% or less, conducting leak detection every three years, fully metering customers, promoting residential use of 65 gallons per capita per day or less,

performing water audits, and enforcing outdoor use restrictions during droughts.

Water withdrawals are regulated under the Water Management Act (effective March 1986), which authorizes the Massachusetts Department of Environmental Protection (MassDEP) to oversee surface and groundwater use through registration and permitting programs, requiring users to manage withdrawals, particularly during drought conditions.

Green Hill Park Water Tanks, Worcester, MA



Source: Kleinfelder

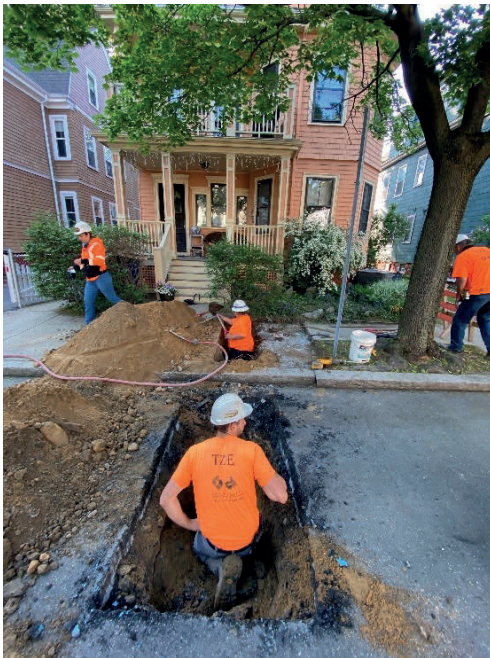
CONDITION

Unlined Cast Iron Water Main Exhibiting Tuberculation from Massachusetts Public Water System



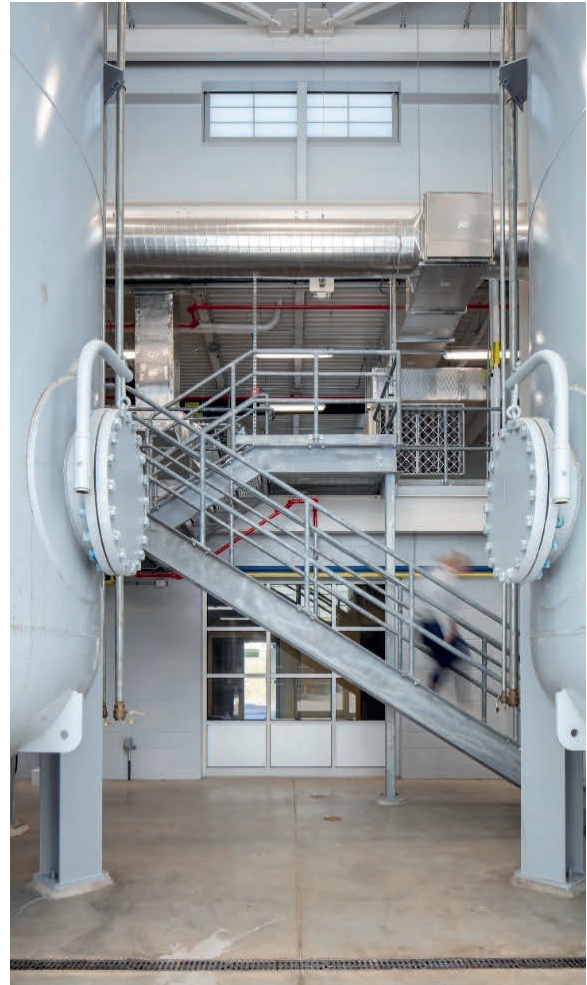
Source: Tighe & Bond

Lead Service Line Replacement Program, Somerville, Massachusetts



Source: Kleinfelder

PFAS Treatment Plant Carbon Vessels, Westfield, MA



Source: Matthew Arielly

System condition is a challenge for most water suppliers in the state because of the age of system components. System age impacts all aspects of drinking water system operation such as funding needs, water quality, operation and maintenance requirements, and reliability. Most of the 21,000 miles of water mains in Massachusetts were installed during the late 1800s-1960s. Many pipes installed 100 years ago are still in use and reaching the end of their intended service life. In addition, newer pipes installed after the 1960s will reach the end of their intended service life during the next 20 years.

Water suppliers struggle to replace distribution system components as they reach the end of their service life due to competing demands such as emergency maintenance, regulatory mandates, and emerging contaminants, which leaves a lack of funding and resources. Common distribution system needs are lining or replacing older water mains and water services. Within the communities served by the MWRA water system, about 29% of the cast iron water mains are unlined (1,962 miles), which can lead to water mains getting clogged with sediments and iron oxides that can degrade water quality and dramatically reduce hydraulic capacity.

Many of the older water suppliers in Massachusetts have lead service lines that require identification and removal following a schedule established by federal regulations. The MWRA provides its member communities with funding programs to address both unlined cast iron mains and lead service lines but water suppliers outside of the MWRA water system do not have a dedicated funding source for distribution system renewal. Also, water treatment plants reach the end of their useful life sooner

than pipes and storage tanks, typically 20-30 years, and are expensive to upgrade. Modern treatment technology construction costs have increased significantly as the technology evolves to keep up with advancing water quality standards.

Surface and groundwater contamination pose a serious threat to the condition of water supplies in the state. MassDEP has assisted suppliers with maintaining a strong water supply protection program since 1980. Federal requirements helped MassDEP focus its resources on improving protection statewide. As a result, local water suppliers and municipal officials received hydrogeological and planning assistance from MassDEP for improved protection of local drinking water sources. However, historical contamination from industrial activities is still emerging and requiring water suppliers to abandon water supplies or invest in costly treatment. Per- and polyfluoroalkyl substances (PFAS) is the most prevalent example of emerging contaminants, and it is widespread in the state.

FUNDING

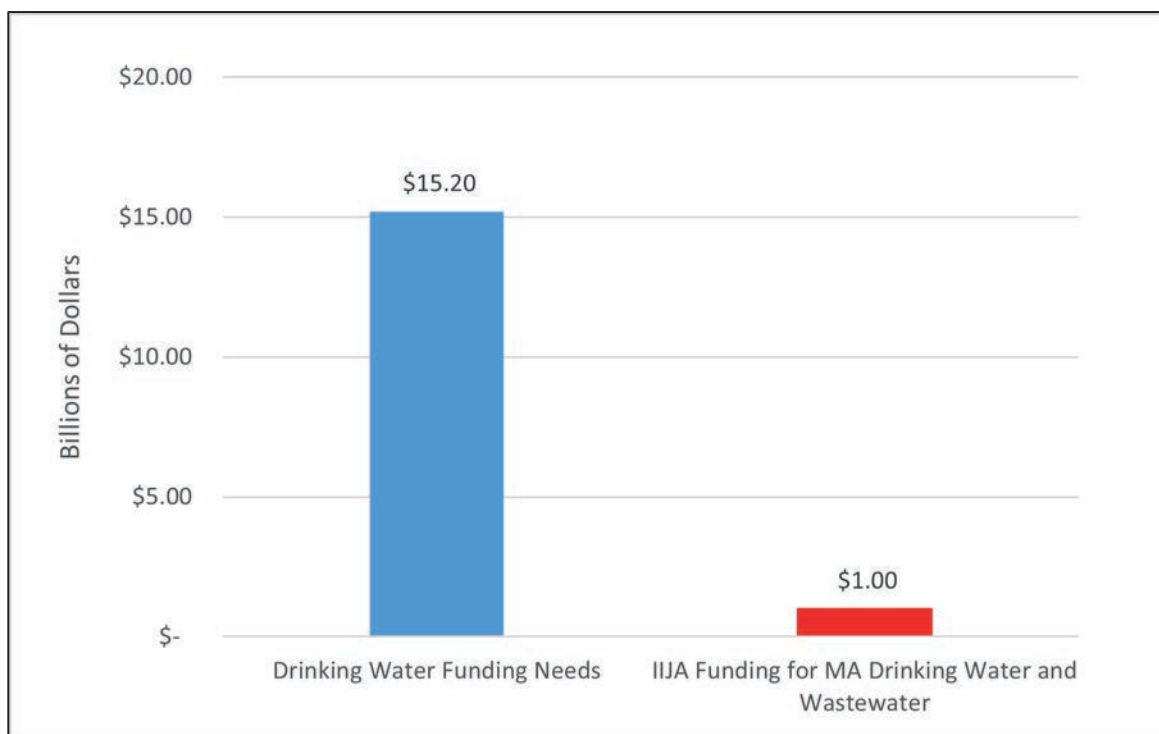
Drinking water infrastructure upkeep in Massachusetts is mainly funded through user fees and rates, and federal- and state-run grant and low-interest loan programs.

At the local level, water system revenue depends largely on customer usage, requiring regular rate increases to offset declining demand and rising operations and maintenance costs. Many Massachusetts systems face challenges securing approval for these increases, which are needed to fund infrastructure repairs and meet regulatory requirements. Because ratepayers bear most costs, municipalities must balance affordability with compliance. As of July 1, 2024, the median monthly bill for 5,000

gallons in Boston was \$42.69 (about 0.67% of median household income). However, affordability remains a concern in many communities, especially as water costs have risen by roughly 5% annually since 2000.

At the federal level, the 2021 Infrastructure Investment and Jobs Act provided critical funding for upgrades, but Massachusetts received only about \$1.1 billion for drinking water and wastewater infrastructure combined, far short of needs. This covers just over 7% of the state's identified drinking water infrastructure funding gap, as seen in Figure 1.

Figure 1: IIJA Funding Compared to Drinking Water Infrastructure Financial Need in Massachusetts



Source: WIAC

The primary mechanism through which IIJA funding is distributed to states is the Drinking Water State Revolving Fund (DWSRF), a financial assistance partnership between federal and state governments. Funding for drinking water infrastructure projects is appropriated by Congress and then apportioned to states by the U.S. Environmental Protection Agency (EPA) based on their most recent Drinking Water Needs Survey and Assessment. This program uses a competitive loan process, leaving many critical projects unfunded. In 2024, over \$468 million in new projects were proposed under the Drinking Water State Revolving Fund (DWSRF) Intended Use Plan, but only about \$341 million was funded—leaving roughly 27% unfunded. In 2025, just 13 of 43 submitted projects received funding due to capacity limits. Unfunded projects must seek alternative financing or wait to reapply. Compounding this gap, federal SRF contributions declined by \$3.73 billion annually between 2022 and 2025, reducing Massachusetts’ ability to address infrastructure needs and ensure equitable access.

At the federal level, the 2021 Infrastructure Investment and Jobs Act provided critical funding for upgrades, but Massachusetts received only about \$1.1 billion for drinking water and wastewater infrastructure combined, far short of needs. This covers just over 7% of the state’s identified drinking water infrastructure funding gap, as seen in Figure 1.

Massachusetts is struggling with a lack of adequate funding sources and rising infrastructure costs, threatening communities' compliance with drinking

water standards and their ability to provide reliable, critical services for the residents, businesses, and institutions.

FUTURE NEED

According to the EPA, drinking water systems in Massachusetts need approximately \$15.2 billion in investments over the next 20 years to maintain compliance with SDWA Regulations. This does not

include the substantial costs related to addressing PFAS. Table 1 breaks down the EPA's 2023 estimate for 20-year water infrastructure need by type of project, and Table 2 breaks down the 20-year need by water system size.

Table 1: MA 20-Year Financial Need by Project Category

Project Category	20-Year Financial Need (Million \$, January 2021)
Distribution/Transmission	10,205.1
Treatment	2,880.1
Storage	1,143.9
Source	440
Other	523.7
Total	15,192.8

Source: EPA

Table 2: MA 20-Year Financial Need by System Size

System Size	20-Year Financial Need (Million \$, January 2021)
Large	3572.2
Medium	10,803.6
Small	654
Not-for-profit noncommunity water systems	163
Total	15,192.8

Source: EPA

The 2021 Lead and Copper Rule (LCR) created additional drinking water funding challenges. In 2023, EPA estimated that 117,900 lead service lines (about 1.27% of all service lines in the state) must be replaced. Before replacements can begin, communities must first complete service line inventories, conduct public outreach, and meet expanded reporting requirements, further increasing costs and administrative burden.

Some funding avenues have emerged to help communities with their compliance with LCR requirements. For example, between 2016 and 2023, MWRA provided \$41 million to 17 different communities throughout the state to replace lead service lines. Additionally, the MWRA Board of Directors approved an updated Water System Assistance Program to provide up to \$100 million in 10-year zero-interest loans to communities to replace lead service lines. In 2024, they approved an additional \$100 million in funding for LSL replacements and a 25% grant component for communities that fully fund LSL replacement on private properties. Though programs like these make a big difference for some communities,

they are not adequate for meeting needs across the Commonwealth.

In 2012, the Water Infrastructure Finance Commission recommended creating a state trust fund of at least \$200 million annually, supported by the General Fund, to address water infrastructure needs. Given rising costs, significantly more funding would now be required. This proposed fund would be separate from existing federal and state contributions to the State Revolving Fund. The state legislature should approve a bill to upgrade and expand Massachusetts' water infrastructure. This bill could include a dedicated water trust fund, maximizing capitalization of the SRF, and assisting municipalities in retiring debt.

Stricter treatment requirements, aging infrastructure, and limited funding have put Massachusetts in a challenging position. As the funding gap grows, threatening public health, economic growth, and quality of life, greater investment in water infrastructure is urgently needed at all levels of government.

OPERATION AND MAINTENANCE

Regular operation and maintenance (O&M) of drinking water treatment facilities, distribution networks, and all other system components is critical for ensuring clean water when Bay Staters turn on their faucets. Examples

of O&M tasks that operators perform regularly include water quality sampling, operation of treatment facilities, fire hydrant flushing as shown in photo below, responding to emergencies throughout the system, and more.

Hydrant Flushing, Ayer, MA



Source: Kleinfelder

MassDEP conducts regular surveys of drinking water systems to ensure proper operation and maintenance, while operators follow best management practices and industry standards. Under the federal Safe Drinking Water Act (SDWA), public systems must undergo sanitary surveys every five years, or every three years for community surface water systems. These inspections review facilities, operations, and records to identify and address potential public health risks.

Private well installation is regulated by the Massachusetts General Laws (Ch. 21G, Section 20) and local Boards of Health, but maintenance and monitoring fall under local Board of Health jurisdiction. MassDEP recommends that monitoring be performed on all private wells periodically, but the state does not have any statutes that specifically regulate

the quality of private water supply systems and requirements vary across communities as dictated by the Boards of Health.

Water infrastructure fields, including construction, engineering, and utilities, face significant workforce challenges. Over half of Massachusetts' licensed drinking water operators are over 50 and nearing retirement, with too few new workers entering the field due to low awareness of its importance. Addressing this gap will require greater investment in recruitment, training, and support. Becoming a licensed operator in Massachusetts requires training, passing a state exam, and ongoing education.

These shortages are already affecting systems: in 2023, 36 public water systems lacked a certified operator, a notable increase from pandemic-era levels (see Table 3).

Table 3: MassDEP Summary of PWS Lacking Certified Operators 2019-2023

Year	PWS Lacking a Certified Operator			Total Number of PWS
	COM	NTNC	TNC	
2023	10	1	25	36
2022	6	7	13	26
2021	22	10	12	44
2020	7	5	16	28
2019	2	1	1	4

Source: MassDEP

PWS = Public Water System

NTNC = Non-Transient Non-Community Water System

COM = Community Water System

TNC = Transient Non-Community Water System

Inadequate funding puts operator salaries, system energy needs, critical repair or replacement of existing

infrastructure, system upgrades required to meet emerging water quality standards, and much more in jeopardy.

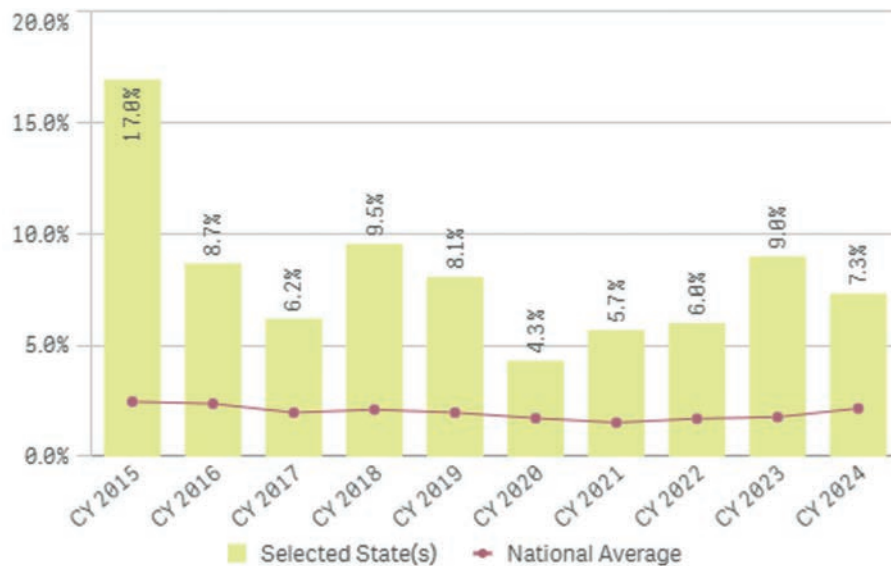
PUBLIC SAFETY

MassDEP provides funding assistance to public water systems and municipalities to support protection of local drinking water sources, helping reduce risks from surface and groundwater contamination.

Massachusetts water suppliers follow national health-based standards for contaminants in drinking water set by the SDWA. Over the last decade around 20%

to 30% of PWS in Massachusetts reported SDWA violations, in line with the national average. Around 7% to 14% of Massachusetts PWS faced compliance issues per year, with around 5% to 10% facing enforcement actions as a result. Figure 2 compares the percentage of Massachusetts PWS facing formal enforcement actions to the national average.

Figure 2: Formal SWDA Enforcement Actions



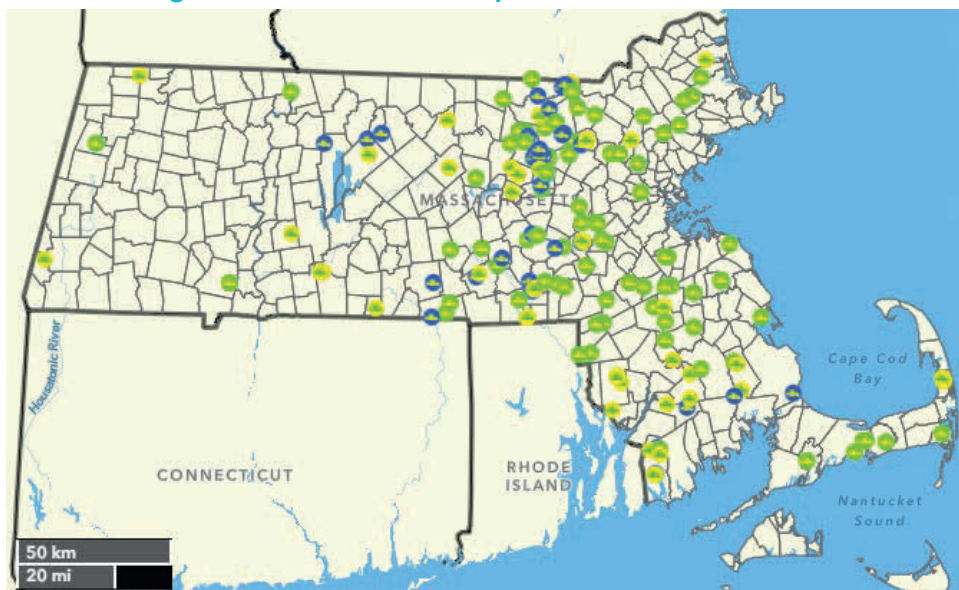
Source: EPA

Contamination from historical industrial activities is still emerging across the state and requiring water suppliers to abandon water supplies or invest in costly treatment. PFAS is the most prevalent example of emerging contaminants and is widespread in the state.

In 2024 just over 22% of large PWS and 13% of small PWS exceeded the Maximum Contaminant Level (MCL) for PFAS compared to 12% and 8% nationally.

To address contamination issues, MassDEP provides testing of water supplies for PFAS, grants for the design of PFAS remediation in PWS, and construction loans to communities. So far, MassDEP has awarded grants to 81 towns to address PFAS contamination totaling \$51.3 million. The state has also provided 0% interest loans for 67 PFAS remediation projects across the state. The locations of Massachusetts PWS that detected PFAS over the state's MCL in their finished water are shown in Figure 3.

Figure 3: Public Water System PFAS Detection



Source: MassDEP

Prioritizing PFAS projects in major state funding programs has made it harder for public water systems to secure support for addressing other contaminants, such as iron, manganese, and road salt–related chlorides.

Lead in drinking water is a major public health concern in Massachusetts. It typically enters water through corrosion of lead-containing pipes and plumbing, especially in homes built before 1986 and in older cities. Due to the age of many systems, lead service lines are relatively common and pose ongoing risks to water quality. New regulations require all public water systems to inventory service line materials, develop lead service line replacement plans, improve sampling protocols, and

expand public communication. While MassDEP has provided grants and loans to support these efforts, fully identifying and replacing lead service lines will require substantial funding over the next decade.

As treatment and distribution interfaces become increasingly digital, the threat of cyber-attacks on PWS also grows. EPA mandates cybersecurity assessments by water systems with updates on a recurring schedule. MassDEP's Cybersecurity Improvements Grant Program offers PWSs up to \$50,000 per system to improve their cybersecurity defense, mitigate the risks of cyber-attacks, and enhance overall resiliency and compliance.

RESILIENCE AND INNOVATION

Massachusetts is a historic state with aging infrastructure that faces modern problems. Climate change threatens drinking water infrastructure through sea level rise, increased frequency and severity of storms, and droughts. Massachusetts has over 1,500 miles of coastline, where Boston and the densely populated communities that surround it are located.

In response to these growing threats, new drinking water infrastructure is designed above designated flood elevations. MassDEP requires all PWS to prepare a written Drinking Water Emergency Response Plan for their systems. Massachusetts WARN (Water/Wastewater Agency Response Network) was formed so that PWS can receive rapid mutual aid and assistance from neighboring public systems to restore service due to damage by natural or man-made incidents. There are currently 119 members of WARN. Water conservation is promoted through water audit funding, leak detection

programs, and increased public education. State level drinking water programs also prioritize grant and loan funding for projects that include green elements and innovative technologies, such as those that reduce energy consumption, conserve resources, produce renewable energy, and enhance climate resiliency.

The use of innovative technology has many potential benefits. Adaptive models for risk analysis allow PWS to better plan system improvements. Improvements in leak detection and flow monitoring technologies support water conservation efforts. Nondisruptive water main rehabilitation technologies are becoming more common and provide PWS with more options for system maintenance. Massachusetts was a leader in piloting large scale PFAS treatment using activated carbon, ion exchange and high-pressure membrane technologies at WTPs across the nation.



RECOMMENDATIONS TO RAISE THE GRADE

- Prioritize increased funding at the state level and advocate for increased federal funding, including state bonding bills and maintaining SRF funding levels.
- The state legislature should prioritize establishing the Water Sector Workforce Development Fund to address the shortage of licensed water system operators in the state.
- Continue to fund grants and 0% interest loans for PFAS, lead service line replacement projects and other resilience-based initiatives such as climate change preparedness and cybersecurity.
- Restore staffing levels at MassDEP to fully support the state's programs and initiatives to support water suppliers and protect natural resources.
- Public water systems should ensure that rates include the full cost of service including operations, maintenance, and capital improvements.
- Establish minimum requirements at the state level for water quality testing in private wells.

SOURCES

Environmental Protection Agency, "State Drinking Water Dashboard," n.d.

Environmental Protection Agency, "UCMR 5 Data Finder," n.d.

Executive Office of Energy and Environmental Affairs and Massachusetts Emergency Management Agency, "Massachusetts Drought Management Plan," 2023.

Massachusetts Association of Health Boards, "Massachusetts Board of Health Guidebook," 2014.

Massachusetts Clean Water Trust, "PFAS Mitigation Loans," n.d.

Massachusetts Clean Water Trust, "Public Water Suppliers Cybersecurity Improvements Grant Program," n.d.

Massachusetts Department of Energy Resources, "Energy Efficiency at Water Utilities," n.d.

Massachusetts Department of Environmental Protection, "310 CMR 22: The Massachusetts Drinking Water Regulations," 2020.

Massachusetts Department of Environmental Protection, "Addressing PFAS Contamination," n.d.

Massachusetts Department of Environmental Protection, "Certified Operator 2023 Annual Report," 2023.

Massachusetts Department of Environmental Protection, "Guidelines and Policies for Public Water Systems, Appendix O-Handbook for Water Supply Emergencies," 2025.

Massachusetts Department of Environmental Protection, "Lead in Drinking Water," n.d.

Massachusetts Department of Environmental Protection, "Massachusetts GAP Energy Grant Program," n.d.

Massachusetts Department of Environmental Protection, "Preparing for a Sanitary Survey," 2006.

Massachusetts Department of Environmental Protection, "Private Well Guidelines," n.d.



SOURCES (cont.)

Massachusetts Department of Environmental Protection, “Source Water Assessment & Protection (SWAP) Program,” n.d.

Massachusetts Department of Environmental Protection, “Water Management Act Program,” n.d.

Massachusetts Division of Occupational Licensure, “How to Apply for a DW Supply Facility Operators License,” n.d.

Massachusetts Executive Office of Energy & Environmental Affairs,” 2024.

Massachusetts Infrastructure Investment Coalition, May 2007, “Infrastructure Status Report: Massachusetts Drinking Water,” 2007.

Massachusetts Office of Coastal Zone Management, “Introduction to the Massachusetts Coast, Coastal Tour for the NOAA 312 Review,” 2021.

Massachusetts WARN (Water/Wastewater Agency Response Network), n.d.

Massachusetts Water Resources Authority, “Lead Service Line Replacement Program,” n.d.

Massachusetts Water Resources Authority, “MWRA Water Quality Report,” 2025.

Massachusetts Water Resources Authority, “Your Water System,” n.d.

Massachusetts Water Resources Commission, “Collecting, Managing, and Analyzing Water Usage Data,” 2020.

Massachusetts Water Resources Commission, Drought Management Task Force, “Drought Management in Massachusetts,” n.d.

Massachusetts Water Resources Commission, “Water Conservation for Municipalities,” n.d.

Massachusetts Water Works Association, “Pathway to Becoming Drinking Water Operator in Massachusetts,” n.d.

Tighe and Bond & UNC Massachusetts, “Water And Wastewater Rates Dashboard,” 2024.

USA Facts, “Our Changing Population: Massachusetts,” n.d.

Water Infrastructure Advisory Committee (WIAC), “Recommendation letter to the Massachusetts Executive Office of Energy & Environmental Affairs,” 2024.

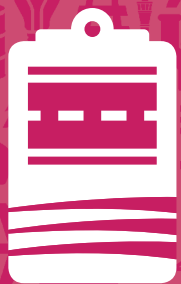
Roads



GRADE
COMPARISON

MA: D+

Nat'l: D+



ROADS

EXECUTIVE SUMMARY

Massachusetts has one of the oldest roadway systems in the United States. Of the Commonwealth's 76,829 lane-miles, the Massachusetts Department of Transportation (MassDOT) owns and maintains 9,526 lane miles, about 12.4%, of the total public lane miles. The remaining lane-miles in Massachusetts are owned and maintained by the municipalities, by government agencies such as the Massachusetts Department of Conservation & Recreation (DCR), the National Park Service, or are privately owned and maintained. State agencies take a data-based approach to managing its roadway systems and MassDOT facilitates a series of policy-targeted funding programs to invest in capital and maintenance projects. However, the Commonwealth faces historic levels of aging assets, funding shortages, and harsh winter weather conditions. Decades of inadequate funding, increased vehicle miles traveled (VMT), accelerated storm damage from climate change, workforce shortages, increases in construction costs, and maintenance backlogs have led to the degradation of road conditions and slowed delivery of planned transportation improvement projects.

CONDITION & CAPACITY

The Massachusetts interstate system, primarily constructed during the 1950s and 1960s, connects various cities and towns to the Atlantic coastline and bordering states.

From the late 1980s through 2007, the Commonwealth delivered the Central Artery/Tunnel Project (Boston's "Big Dig"), a major roadway megaproject that moved portions of I-93 and I-90 underground, improved regional connectivity and access to Logan Airport, and created space for the Rose Kennedy Greenway above the tunnel right-of-way. More recently, the Commonwealth completed several major projects, including signature bridge replacements under the Accelerated Bridge Program—the Fore River, Burns, Whittier, and Braga/

Route 79 bridges—as well as the \$160 million Sumner Tunnel Restoration.

According to MassDOT's 2024 Transportation Asset Management Plan (TAMP), roadway conditions have generally deteriorated, with the percentage of lane miles of roads in good condition decreasing and the percentage of roads in poor condition increasing between 2021 and 2024 (see Table 1). The goal is for 95% of interstates to be in good condition, with fewer than 1% of interstates in poor condition, and for 75% of non-interstate lane miles to be in good condition and fewer than 5% of non-interstate roadway lane miles being in poor condition.

Table 1: Deterioration of Road Conditions 2021 to 2024

Comparisons Statistics for Road Conditions 2021 to 2024			
Category	Condition	2021	2024
Interstate and State-Owned Highways	Good	90.70%	82.20%
	Fair/Other	7.75%	15.30%
	Poor	1.50%	2.50%
Local Roads	Good	70.2%	65.20%
	Fair/Other	19.90%	21.70%
	Poor	9.90%	13.10%

Roads left in poor condition have a significant economic impact on Massachusetts motorists due to additional vehicle operations costs. Driving on deteriorated roads costs drivers in the Commonwealth \$3.8 billion a year (about \$776 per driver) in the form of additional repairs, accelerated vehicle depreciation, and increased fuel consumption and tire wear.

Congestion also greatly impacts Massachusetts drivers, especially around urban centers. According to a 2021 report from TRIP, 68% of urban interstate highways in Massachusetts are considered congested during peak hours, the sixth-highest share in the U.S. Although

congestion dropped sharply during the COVID-19 pandemic, by 2024, vehicle travel rebounded to 92% of pre-pandemic levels.

Long-term trends in Vehicle Miles Traveled (VMT) add to the pressure on the Commonwealth's roadway system. From 2000 to 2019, VMT on Massachusetts' interstate highways increased by 16%, while population only increased by 12%. VMT increases cause increased congestion and wear on roadways, especially in urban areas. Climate trends, including increased precipitation and flooding are further deteriorating roadway conditions.

OPERATION AND MAINTENANCE

Operation and Maintenance (O&M) is distributed according to the legal ownership among MassDOT, municipalities, other government agencies and private owners.

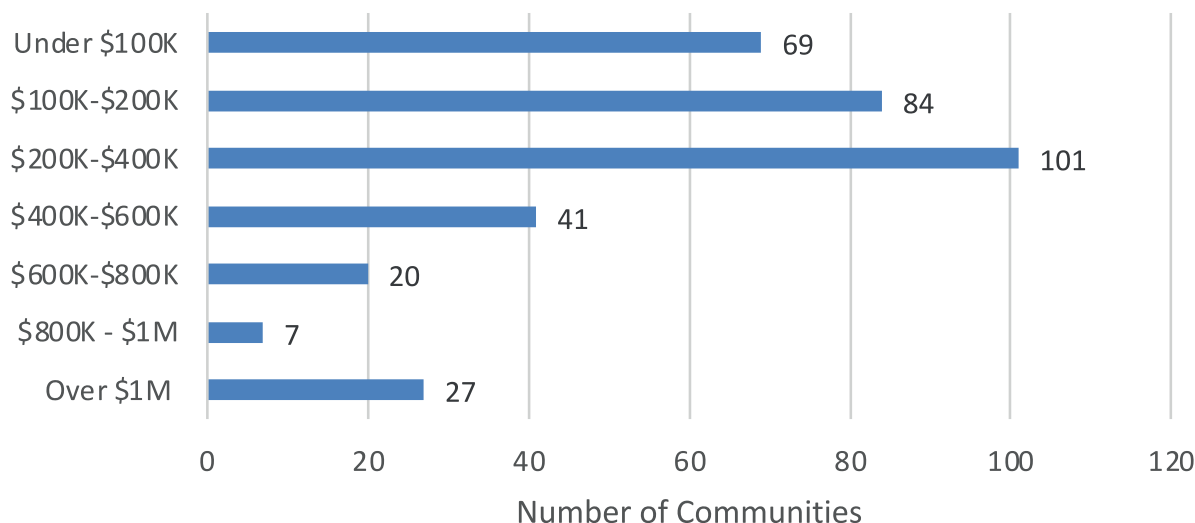
O&M funding is considered generally adequate to sustain core roadway functions; however, it remains constrained relative to system preservation needs and modernization goals. O&M activities include non-discretionary and variable elements. Winter operations, pavement repair, and bridge preservation can limit available funding for new capital projects. In years with higher-than-average winter costs, funds are often diverted to cover snow and

ice removal budget deficits, reducing flexibility to initiate new design and construction projects.

On state-owned roadways, MassDOT conducts proactive pre-treatment and de-icing using liquid brine and enhanced weather forecasting to improve efficiency and minimize chemical use. MassDOT's snow and ice budget historically fluctuates between \$60–\$100 million annually.

Municipal snow and ice removal expenditures totaled over \$147 million in FY24 and 197 of 351 municipalities supplemented their snow and ice removal budgets in FY2024. The figure below shows the distribution of spending for snow and ice removal at the municipal level.

Figure 1: Community Spending for Snow and Ice Removal FY24



Staffing and equipment capacity are persistent challenges for both MassDOT and municipal agencies. MassDOT Districts have stated a need for additional highway maintenance personnel to sustain current performance levels. Smaller municipalities in particular face shortages in available snow and ice contractors and municipal staffing, especially for lower-priority roads and in rural communities.

Equipment modernization (plow trucks, spreaders, loaders) is progressing unevenly across districts and municipalities. Workforce and equipment deficiencies directly impact the ability to sustain adequate pavement

conditions and level of service, particularly in back-to-back winter events or simultaneous emergency responses.

MassDOT administers pavement preservation through its Highway Operations Division in coordination with District Maintenance Offices. Recurring work, such as crack sealing, line striping, guardrail repair, and drainage maintenance, is typically handled through two-year contracts. MassDOT also uses asset management tools to better align O&M spending with long-term preservation goals.

FUNDING & FUTURE NEED

Massachusetts receives federal roadway funds through various programs administered by the Federal Highway Administration (FHWA). To access federal funding, the Commonwealth must provide a non-federal match, which is typically drawn from state-generated revenues.

Currently, MassDOT facilitates roadway funding programs which prioritize investments in safety, active transportation, and state of good repair projects compared with relatively fewer highway capacity expansion projects. Localized, policy-focused funding opportunities include initiatives such as Complete Streets, Bottleneck Reduction, and other funds, which

are allocated via Massachusetts General Law (M.G.L.).

Municipalities receive funding for roadway maintenance and capital projects through state programs such as the Chapter 90 Program, MassDOT Community Grants Program, Executive Office of Economic Development MassWorks Program, and the Municipal Pavement Program. The state also offers supplemental and emergency aid programs, such as the Winter Recovery Assistance Program (WRAP). Nevertheless, municipalities still rely on local taxes for partial funding. As a result, local conditions can vary depending on municipal revenue streams.

State-level transportation funding in Massachusetts comes from several key sources, including the Gasoline Tax, Motor Vehicle Sales Tax, Registry Fees, tolls, portions of the Sales tax, as well as revenues from the Fair Share Amendment, enacted in November 2022 (popularly known as the “Millionaire’s Tax” which imposes a 4% surtax on personal income above \$1 million). Fair Share revenue is dedicated to education and transportation uses and was first collected in 2023. In FY2024, the first full fiscal year of Fair Share collections, the state collected \$2.46 billion.

The revenues from these sources flow into two primary funds, the Commonwealth Transportation Fund (CTF), which supports the operating budget of the MassDOT, and the Massachusetts Transportation Trust Fund (MTTF), which funds capital projects and debt service.

The Massachusetts gas tax last increased in 2013, when it was one-time adjusted for inflation. However, legislation and ballot initiatives to automatically index further adjustments to inflation have failed. The Commonwealth’s gas tax is currently 27.4 cents per gallon, which is below the national average of 30 cents per gallon. The Massachusetts gas tax is in addition to the federal gas tax of 18.4 cents per gallon. Over time, the gas tax is expected to become a less reliable source of revenue due to improvements in vehicle fuel efficiency and the ongoing shift toward electric vehicles.

Recognizing the limitations of the gas tax, the Metropolitan Area Planning Council (MAPC) communities in the greater Boston area have begun exploring alternatives to diversify and stabilize transportation, such as Transportation Network Company (TNC) fees to charge rideshare services; retail delivery fees to charge e-commerce deliveries; and commercial parking taxes.

Sustained and robust funding is necessary to help Massachusetts address current needs and pursue anticipated efforts for improvements of roads in the future. In January 2025, MassDOT released a Chapter

90 Program Advisory Group Report that identified the history and specific needs of the Chapter 90 program. Chapter 90 had been funded at a flat level of \$200 million since 2012 with modest and occasional, one-time supplemental funds and has left rural communities underfunded because the formula historically relied on population, employment and road miles. In the FY26 state budget, Chapter 90 funds were increased to the \$300 million mark for one year, and in FY25/26 an additional \$80 million was allocated through the Fair Share Amendment. The Chapter 90 funding formula was changed such the additional \$100 million was allocated solely based on road miles to direct more funds to rural communities. Despite increases, changes to Chapter 90 will need to be reauthorized in future years.

Additionally, in January 2025, the Massachusetts Transportation Funding Task Force, established by Executive Order No. 626, released recommendations to stabilize, enhance, and transform transportation funding. In support of this vision, the Governor’s office proposed an \$8 billion transportation investment plan. Road-related recommendations include increasing pavement and Chapter 90 funding, providing longer-term Chapter 90 authorizations to support municipal capital planning, and dedicating Fair Share surtax revenues to roads, bridges, culverts, and local infrastructure. The recommendations also emphasize using Fair Share revenues to expand bonding capacity, stabilize MassDOT operations, support municipal roadway programs, and prioritize lifecycle asset management. Targeted investments would address safety hotspots, improve traffic operations and freight efficiency, reduce congestion and emissions, and intervene earlier on pavement and bridge assets before they fall into poor condition.

Current major roadway projects considered in the FY 2026–2030 Capital Investment Plan are presented in Table 2 below. Major projects rely on federal funds and in several cases the Commonwealth has not yet fully received previously allocated federal funds, adding uncertainty to project timelines.

Table 2: Summary of Major Roadway Projects Advanced or Significantly Advancing through Planning, Design and/or Construction

Proposed Major Project	Description and Scope	Estimated Design & Construction Value
I-90 Allston Multimodal Project	Replacing part of the Massachusetts Turnpike with an at-grade highway, a new commuter rail station on the Worcester/Framingham commuter rail line, new open space next to the Charles River, and bicycle and pedestrian connections.	\$1.90 billion
I-90/I-495 Interchange Improvements	Enhancement and addition of capacity to this highway interchange, which needs increased capacity due to the additional utilization and added traffic on the ex-urban Rt. 495.	\$466 million

Note: The above does not include major roadway bridges, which projects are discussed in the ASCE Report Card chapter on Bridges.

In 2024, MassDOT's Highway Division identified a \$7.5 billion backlog of unfunded or underfunded major projects, including both road and bridge projects. For example, this backlog includes the Tobin Bridge replacement, I-91 Springfield Viaduct, I-93/I-95 interchanges, Storrow Drive Tunnel, and Concord Rotary. While the Massachusetts Transportation Funding Task Force recommends aggressively pursuing federal grants, it also warns about the

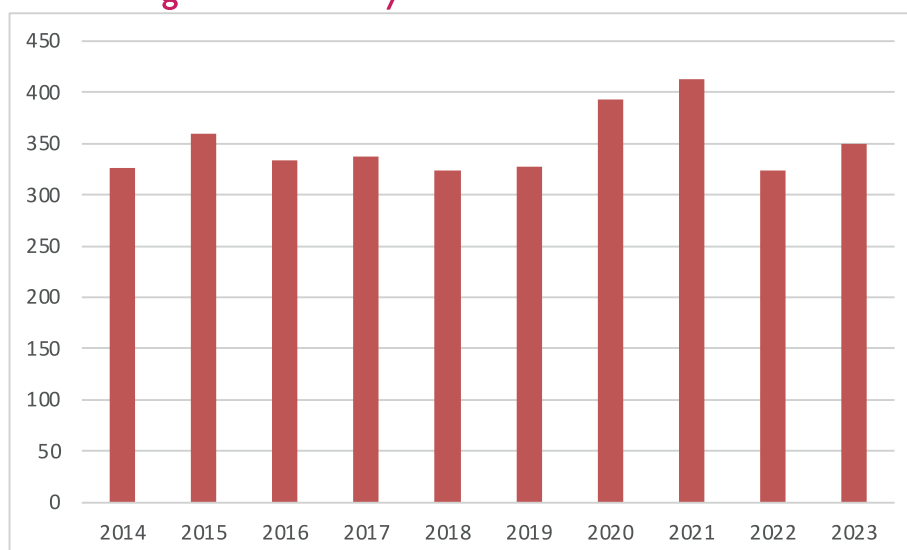
uncertainty of federal discretionary funding and risk for causing deferred maintenance. With these considerations in mind, the Task Force emphasized predictable state funding, early state-of-good-repair investments, expanded Commonwealth Transportation Fund (CTF) bonding, and dedicated Fair Share revenues to reduce long-term costs and prevent future mega-project escalation.

PUBLIC SAFETY

As of 2023, Massachusetts had the lowest traffic fatality rate in the nation, with only 0.56 fatalities per 100 million VMT. Preliminary estimates for fatalities in 2024 suggest a slightly higher fatality rate of 0.62 fatalities

per 100 million VMT, still the lowest rate in the nation. Despite the low rate, the state averaged 374 traffic related deaths annually between 2019 and 2023.

Figure 2: Roadway Fatalities in Massachusetts



Source: MassDOT

MassDOT's 2023 Strategic Highway Safety Plan (SHSP) outlines ways the agency plans to address safety concerns and strategies, including:

- Identifying and initiating projects at fatal and serious crash injury locations and high-risk locations.
- Using proven safety countermeasures, including speed management, intersection safety, protection of vulnerable road users, and roadway treatments.
- Continuously measuring outcomes, including fatal and injury crashes and adjust strategies.

It should be noted that the Massachusetts Legislature is currently (as of June 2026) considering an expanded "Move Over Law" that requires drivers approaching stationary emergency and highway maintenance vehicles, to be expanded to include other vehicles on the shoulders of highways to safely move to the next adjacent lane or slow down to a reasonable speed.

The number of serious injuries and fatalities among pedestrians and cyclists has not shown a significant decline in recent years. From 2018-2022, 15% of roadway fatalities and serious injuries in Massachusetts were made up of pedestrians and other vulnerable road users. To address this issue, MassDOT released the Massachusetts Vulnerable Road User Safety Assessment in 2023, to evaluate crashes involving pedestrians, bicyclists, and

other non-motorized users to inform statewide safety investments. The assessment analyzed fatal and serious injury trends, identified high-risk locations and corridors, and highlighted systemic risk factors such as vehicle speed, intersection design, and roadway context. It recommended prioritizing evidence-based countermeasures including safer crossings, traffic calming, and separated facilities at high-risk areas. Notably the assessment estimated that 41% of fatal and serious injury crashes occur within 300 feet of bus stops statewide.

Speed management is central to the Commonwealth's safety strategy, as higher speeds increase crash severity. MassDOT is advancing speed-reducing roadway designs, prioritizing high-crash and high-risk locations, and supporting municipalities through its Safe Speeds website and Target Speed initiative.

In 2023, traffic crashes in Massachusetts imposed a total of \$9.2 billion in economic costs. The National Transportation Research Nonprofit (TRIP) suggests a lack of adequate roadway safety features, while not the primary factor in these crashes, likely contributed to approximately one third of all fatal traffic crashes, resulting in \$3.1 billion in economic costs in the state. These costs include work and household productivity losses, property damage, medical costs, rehabilitation costs, legal and court costs, congestion costs, and emergency services.



Photo: Route 93 Zipper Lanes in Milton/Quincy; Patrick Tierney

INNOVATION

MassDOT's annual Innovation Conference brings together federal, state, local, academic, and private-sector transportation practitioners to share emerging technologies and best practices. Topics include asset management, AI and data tools, innovative inspection methods, safety, project delivery, resilience, sustainability, and multimodal mobility.

MassDOT is in the process of updating its Project Development and Design Guidebook (PDDG) to modernize its approach towards design and project delivery. The state has also created guidebooks for newer practices, including the Separated Bike Lane Design Guide and Roundabouts Design Guide, which help elevate the state's transportation standards.

MassDOT regularly uses geographic information systems (GIS) through the Geospatial Technology Department (GeoDOT) and IMPACT crash portal to inform policy decisions. GeoDOT hosts an annual GIS day conference. The services offered through GeoDOT include the MassDOT project intake tools (MaPIT) and a wide variety of asset management dash boards. The IMPACT crash portal is a crash database designed to monitor and analyze traffic incidents statewide, which helps to address road safety across the state. Data housed on this platform includes both crash-based and risk-based screening tools to identify priority locations for safety improvements.

RESILIENCE

The coastal areas of Massachusetts are exposed to Nor'easter storms and tidal flooding, while inland areas are exposed to extreme rainfall and other weather events. Most culverts in Massachusetts were constructed more than 50 years ago and are in poor condition.

To strengthen the resiliency of its infrastructure, Massachusetts has developed resources, such as the Office of Coastal Zone Management (CZM) Massachusetts Sea Level Rise and Coastal Flooding Viewer, an interactive map that helps users assess vulnerability to coastal flooding. To support local implementation, the state also funds modernization and upgrades through the Community Culvert Grant Program and the Municipal Small Bridge Program.

The Massachusetts River and Roads Training Program is an interagency partnership that promotes resilient

A practical example of how GIS tools inform decision making includes the effort to target wrong-way driving incidents. Data analysis identified wrong-way driving incidents as one of the most dangerous driving behaviors. To address wrong-way driving incidents, the state deployed their Wrong-Way Vehicle Detection Pilot Project to implement systems designed to prompt drivers to self-correct their wrong-way course before a potential crash.

Massachusetts has embraced tactical urbanism and pilot projects that use low-cost materials, such as flexible signpost delineators, paint, planters, and temporary signage. These pilot projects allow street design changes to be tested before making capital investments and installing permanent infrastructure. To support the low-cost projects, the MassDOT Shared Streets and Spaces Grant Program was initiated to provide funding for quick-building projects that support outdoor dining, temporary bus and bike lanes, bus stops, curbs, pedestrian/bicycle facilities, and pedestrian plazas.

In Boston, the Better Bike Lanes initiative is expanding the city's network of separated bike lanes through quick-build elements such as painted bike boxes, flexible signposts, and lane markings. These improvements are designed for eventual conversion into permanent infrastructure using full-build concrete curbs.

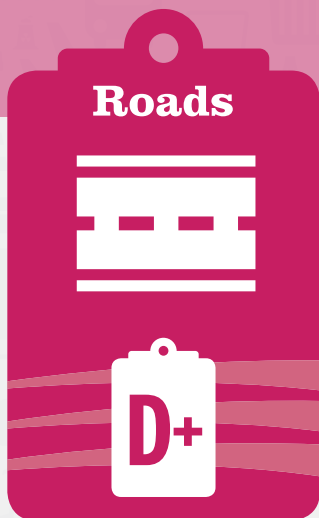
infrastructure and river protection by helping communities replace inadequate culverts with more sustainable designs.

Developed under Executive Order 569, the ResilientMass Plan is Massachusetts' 2023 State Hazard Mitigation and Climate Adaptation Plan. Led by the Massachusetts Emergency Management Agency (MEMA) and updated every five years, it builds on the 2022 Massachusetts Climate Change Assessment to coordinate state agency strategies, reduce vulnerability, improve emergency response and recovery, and prioritize projects that address major climate risks. For MassDOT, these efforts include assessing climate risks, updating design standards, improving resilience screening, enhancing flood mitigation, and updating emergency response plans. This work is supported by the Highway Resilience Improvement Plan and Resiliency Improvement Capital Program, which strengthen transportation infrastructure statewide.



RECOMMENDATIONS TO RAISE THE GRADE

- **Ensure adequate funding for roadways:** Increase state pavement investment by at least \$50 million annually and prioritize preventive maintenance to avoid far higher reconstruction costs. Extend Chapter 90 beyond one-year authorizations, grow the Chapter 90 increase, and maintain the mileage-based equity adjustment so municipalities can plan, bid, and deliver projects efficiently. Continue to dedicate a consistent share of Fair Share revenues to transportation, with a long-term goal of 50% to provide stable funding for roads, bridges, and culverts. Use Fair Share to expand Commonwealth Transportation Fund bonding capacity. Address the \$7.5 billion mega-project backlog by expanding state bonding capacity and strategically leveraging federal funds while reducing overreliance on uncertain federal discretionary grants.
- **Enhance safety:** Continue to prioritize roadway safety as a core investment by funding proven countermeasures, such as speed management, intersection safety, and pedestrian and bicycle protections at high-crash and high-risk locations.
- **Improve efficiency:** Reduce congestion through targeted operational improvements, including bottleneck reduction, signal optimization, and interchange upgrades.
- **Improve resilience:** Align roadway investment with climate resilience by prioritizing projects that reduce greenhouse gas emissions and support the transition to electric vehicles and clean electricity generation. Continue to invest in the resilience of culverts, roadway drainage systems, low-lying roads, and small bridges to protect communities from flooding, storm damage, and climate-driven system failures.
- **Workforce:** Strengthen workforce and equipment capacity by addressing staffing shortages driven by high cost-of-living pressures, investing in competitive wages, growing training programs, and purchasing modern equipment to ensure timely maintenance, winter response, and reliable project delivery.



SOURCES

Commonwealth of Massachusetts, “Beyond Mobility,” 2024.

Commonwealth of Massachusetts, “Capital Investment Plan,” 2025.

Commonwealth of Massachusetts, “Chapter 90 Advisory Group Recommendations Included in Healey-Driscoll Administration Chapter 90 Bond Bill,” 2025.

Commonwealth of Massachusetts, “Chapter 90 Advisory Report,” 2025.

Commonwealth of Massachusetts, “Chapter 90 Program Municipal Guidance Document,” 2026.

Commonwealth of Massachusetts, “Crash Data App (GeoDOT),” 2026.

Commonwealth of Massachusetts, “Federal Funds Infrastructure Office,” 2026.

Commonwealth of Massachusetts, “FY25 Operating Budget Presented at the MassDOT Board Meeting on June 18, 2024,” 2024.

Commonwealth of Massachusetts, “Guidelines for the Planning and Design of Roundabouts,” 2022.

Commonwealth of Massachusetts, “MassDOT Asset Management,” 2026.

Commonwealth of Massachusetts, “MassDOT Highway Division Asset Management Performance Update,” 2024.

Commonwealth of Massachusetts, “MassDOT Rotary Retrofits White Paper,” 2023.

Commonwealth of Massachusetts, “Massachusetts Strategic Highway Safety Plan,” 2023.

Commonwealth of Massachusetts, “Massachusetts Vulnerable Road User Assessment,” 2023.

Commonwealth of Massachusetts, “Road Inventory 2024,” 2024.

Commonwealth of Massachusetts, “Separated Bike Lane Planning & Design Guide,” 2015.

Commonwealth of Massachusetts, “Snow and Ice FY2024 Expenditures,” 2024.

Commonwealth of Massachusetts, “State Transportation Improvement Program (STIP), Federal Fiscal Years 2026–2030,” 2025.

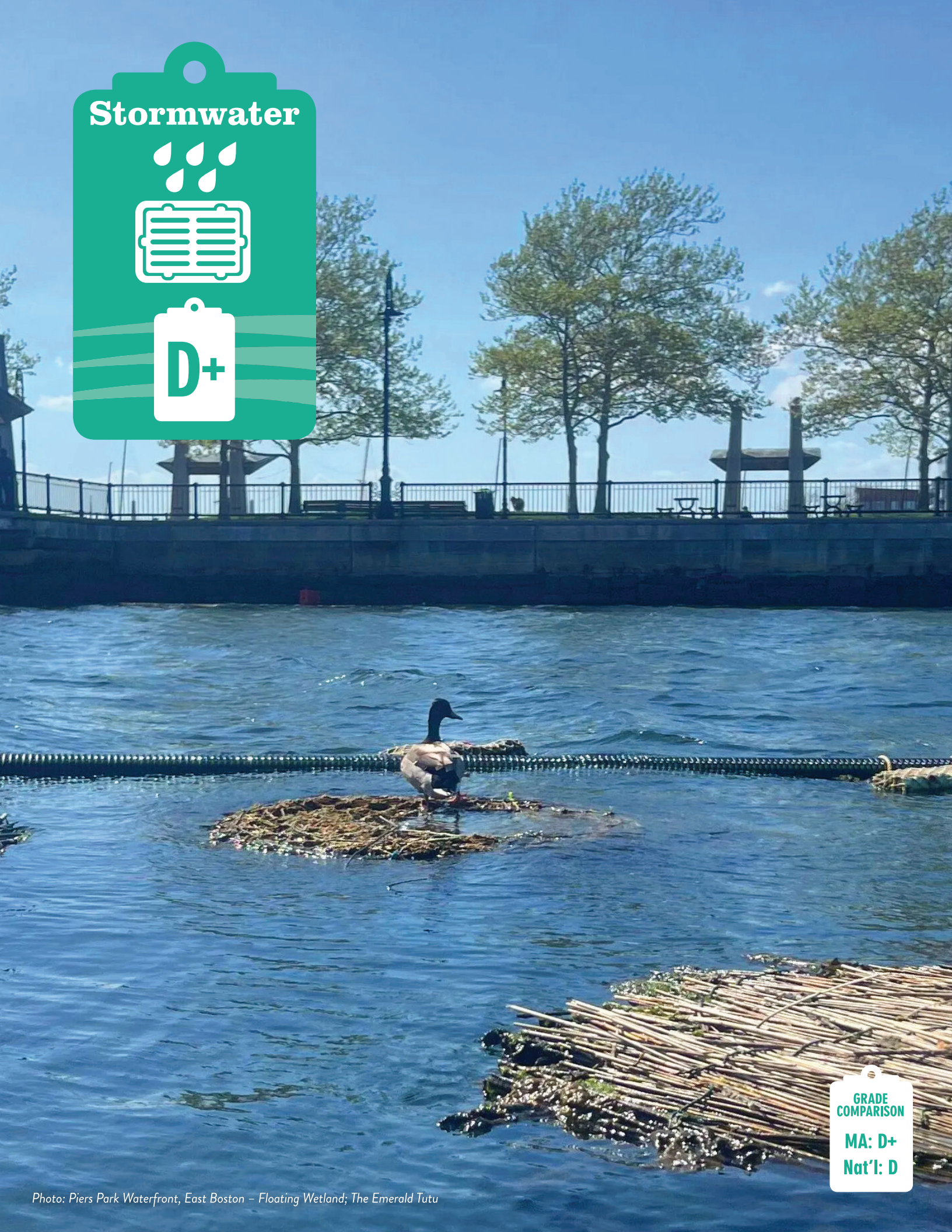
Massachusetts Municipal Association, “Massachusetts Transportation Funding Task Force Final Report,” 2025.

Metropolitan Area Planning Council, “Population and Housing Projections,” 2023.

TRIP, “Massachusetts Transportation by the Numbers,” 2024.

National Highway Traffic Safety Administration, “Early Estimate of Motor Vehicle Traffic Fatalities in 2024,” 2025.

Stormwater



GRADE
COMPARISON

MA: D+

Nat'l: D



STORMWATER

EXECUTIVE SUMMARY

Massachusetts' stormwater systems are generally functional but are becoming increasingly strained due to changing weather patterns and increased development. Much of the infrastructure dates to the early 1900s, when stormwater wasn't widely recognized as a pollution source and treatment was rarely included in system design. Aging assets, undersized culverts, and legacy combined sewer systems contribute to flooding, damage to property and public infrastructure, and increased pollutant discharges. Stormwater runoff is the leading cause of surface-water impairment statewide, degrading rivers, lakes, and coastal waters and contributing to beach closures and public health risks. Many older developed areas lack modern stormwater controls, allowing unmanaged runoff to persist. Operation, maintenance, and funding vary widely across communities, and regulatory demands continue to expand without a dedicated statewide funding source. Massachusetts faces an estimated \$20 billion stormwater investment gap over the next 20 years. Without sustained investment, updated standards, and coordinated action, risks to public safety, water quality, and resilience will continue to grow.

BACKGROUND

Stormwater infrastructure protects public safety, property, and water resources across Massachusetts by managing rainfall and snowmelt to reduce flooding, maintain passable roadways, and limit damage to homes and infrastructure. These systems also improve water quality by treating runoff before it reaches wetlands, rivers, and coastal waters, and can support groundwater recharge to sustain streamflow and aquatic ecosystems. As development increases, impervious surfaces such as

roads, roofs, and parking lots reduce natural infiltration, resulting in greater runoff volumes, more frequent flooding, increased erosion, and pollutant transport, including sediment, nutrients, bacteria, metals, and hydrocarbons, into receiving waters. Together with aging infrastructure and more intense rainfall, these factors place growing strain on stormwater systems, with implications for public safety, environmental quality, and long-term resilience.

CAPACITY AND CONDITION

Evaluating the capacity and condition of Massachusetts' stormwater infrastructure helps identify system limitations and prioritize investments needed to manage storms safely, meet regulatory requirements, and protect water resources. The following outlines the key issues regarding capacity and condition.

Aging Stormwater Assets: Stormwater infrastructure varies widely, but is largely aging, undersized, and beyond its intended service life. Because no statewide asset inventory exists, exact ages are difficult to quantify. In Boston, nearly half of pipes date to the 1930s or earlier, with ~120 miles predating WWI. Similar legacy systems exist in other cities, such as Worcester, Springfield, Lowell, and Fall River. While many of these systems were well built, their age increases maintenance needs, limits capacity for today's storms, and leaves many areas without treatment.

Structural Condition: Aging systems and deferred maintenance increase the risk of clogging, corrosion, and collapse. Many rural culverts are deteriorating. Of the 25,000+ culverts statewide, most are undersized and in poor condition, posing risks of flooding, road failure, and public safety hazards.

Combined Sewer Overflows (CSOs): In some older urban areas, combined sewer systems still carry both stormwater and wastewater. Massachusetts has approximately 194 CSO outfalls are operated by 18 municipalities and the MWRA. During heavy rain, these systems can overflow, discharging stormwater and sewage into rivers and other waters. In 2024, 2,035 CSO events discharged 1.9 billion

gallons of untreated and 853 million gallons of treated discharges. These events pose significant environmental and public health risks.

Flood Control: Outdated Regulatory Requirements & Evolving Storms: Stormwater systems were designed using outdated mid-20th century standards. Extreme rainfall in the Northeast has increased by about 70% and is projected to continue rising with annual precipitation rising 2–13% and winter precipitation increasing up to 21%. Existing state design standards including reliance on TP-40, 10- and 25-year storm assumptions underestimate current and future conditions.

Urbanization: Development increases impervious cover, raising runoff volumes and pollutant transport. Between 2012 and 2017, the Commonwealth lost 24,700 acres of natural land to development, an average of 13.5 acres per day. Parking lots alone account for 1.7% of land area in Massachusetts, the third highest rate in the country.

Legacy Properties: Pre-1996 development lacks stormwater controls, leaving large impervious areas unmanaged. Unmanaged stormwater is the leading cause of water impairment statewide. EPA's draft CII permit may require retrofits for ~3,500 properties in key watersheds.

Data Gaps: Massachusetts lacks a centralized inventory and consistent inspection data. Many municipalities lack complete mapping and maintenance records, limiting understanding of system conditions and hindering effective planning and investment.

OPERATION & MAINTENANCE

Stormwater operation and maintenance (O&M) practices in Massachusetts vary widely due to fragmented ownership, differing municipal budgets, and limited technical capacity. Maintenance responsibilities fall across municipalities, Massachusetts Department of Transportation (MassDOT), conservation commissions, and private property owners. This decentralized approach leads to inconsistent system performance, gaps in funding, and inconsistent regulatory compliance across the Commonwealth.

Approximately 70% of municipalities are covered under the Municipal Separate Storm Sewer System (MS4) program, with 243 municipalities and 31 public entities covered by the Small MS4 General Permit. Boston and Worcester operate under individual MS4 permits, while Lowell and MassDOT have requested similar individual coverage. O&M constitutes one of the six required Minimum Control Measures within the MS4 regulatory framework. This permit also requires Illicit Discharge Detection and Elimination (IDDE) Program, Construction Site Runoff Control, Post Construction

Runoff Control, Public Education and Outreach and Public Participation and Involvement. However, many communities lack sufficient staff or funding to meet these requirements fully.

MassDOT maintains substantial stormwater infrastructure, including approximately 6,000 culverts (with 1,200 considered vulnerable to extreme weather events) and 125,000 catch basins. This extensive infrastructure requires significant annual investment for upkeep and current funding remains inadequate.

Evolving Maintenance Practices and Requirements

Recent research shows that leaf litter and organic debris are major, highly bioavailable sources of phosphorus in urban stormwater runoff, often exceeding inputs from fertilizers or atmospheric deposition, as phosphorus rapidly leaches during rainfall. Studies in Massachusetts and nationwide indicate that timely leaf collection, fall street sweeping, and routine catch basin cleaning can significantly reduce phosphorus loads by intercepting material before it decomposes. However, without regular maintenance, catch basins can become secondary nutrient sources, underscoring the importance of proactive maintenance as a cost-effective water-quality strategy.

FUNDING AND FUTURE NEED

Massachusetts faces a substantial and growing stormwater funding gap. According to the EPA's 2022 Clean Watersheds Needs Survey, the Commonwealth requires approximately \$7.7 billion for stormwater management over 20 years and an additional \$2.5 billion for nonpoint source pollution control. The MWRA estimates \$4.7 billion is needed for CSO correction across the Charles, Mystic, and Alewife watersheds. MassDOT faces a \$20 million annual funding gap to inspect and maintain the 125,000 catch basins along state roadways. Overall, the Commonwealth's stormwater infrastructure gap is estimated at \$20 billion over 20 years, equating to nearly \$1 billion annually. These numbers do not include compliance with evolving regulations.

Massachusetts lacks a dedicated statewide stormwater funding program, leaving municipalities relying on local taxes and DPW budgets, a limited number of

Local Implementation and Reporting

Another evolving trend is the regulation of stormwater O&M on private properties. Massachusetts communities are increasingly implementing formal O&M reporting requirements. Many conservation commissions now require annual O&M reports for projects permitted under the Wetlands Protection Act, which mandates Long-Term operation & maintenance plans under Standard 9 of the Massachusetts Stormwater Standards.

Communities have developed various approaches to ensure compliance. Marlborough requires submission of inspection reports to both the Conservation Commission Officer and City Engineer. Westminster mandates yearly maintenance logs due each June along with certified reports on system performance. Lowell has implemented an innovative web-based self-certification program for private stormwater system operators, complemented by municipal spot checks to verify compliance.

Additionally, to require developed properties to implement maintenance procedures, the draft CII general permit will require O&M programs for about 3,500 private properties within the Charles, Mystic, and Neponset watersheds.

stormwater utilities, competitive SRF loans, and grants from 319, 604(b), MVP, and CZM programs. Only 28 municipalities have established stormwater utilities. As a result, available funding is fragmented, competitive, and often insufficient to meet the scale of infrastructure maintenance, regulatory compliance, and climate resilience needs facing communities statewide. More stormwater utilities are being established and they have the potential to provide a more stable and dedicated revenue source to help close this funding gap.

Local funding disparities create uneven compliance and maintenance across communities; municipalities with a stronger income base can implement green infrastructure and maintain systems proactively, while towns with a smaller income base may struggle to meet even basic MS4 requirements.

Massachusetts's demographic profile amplifies these disparities. The Commonwealth is the third most densely populated state in the U.S., with highly urbanized eastern regions generating large volumes of runoff due to impervious surfaces, while rural western towns have limited property tax bases and constrained municipal funding capacity. These smaller communities often lack technical capacity and rely heavily on state aid and competitive grants. Updated MS4 requirements, including nutrient TMDL compliance, expanded structural BMP implementation, and rigorous asset management, will significantly increase municipal responsibilities.

Massachusetts has established the Environment & Climate One Stop (ECO One Stop) website which provides a streamlined grant application portal open to municipalities seeking funding for climate and environmental resilience projects in Massachusetts. This initiative consolidates multiple EEA grant applications into one application system to help municipalities fund these types of projects.

The Massachusetts Municipal Vulnerability Preparedness (MVP) Program is one of the primary climate resilience funding programs available to municipalities. It provides funding for both planning and implementation to help communities prepare for and respond to significant weather impacts such as flooding, sea level rise, extreme heat, drought, and severe storms.

In addition, MassDOT's municipal grant programs help communities fund transportation-related stormwater and resilience improvements, including roadway drainage upgrades, culvert repair or replacement, small bridge rehabilitation, and flood-prone road improvements.

PUBLIC SAFETY

Massachusetts faces significant public health challenges related to stormwater contamination of recreational waters. In August 2023, the Department of Public Health Interactive Beach Closure Dashboard documented 58 beaches across 36 towns closed due to unsafe water quality conditions. These closures primarily resulted from elevated levels of harmful bacteria and algae, contaminants largely attributed to stormwater runoff and Combined Sewer Overflow (CSO) discharges.

Through programs such as Grant Central, Community Culverts, Municipal Small Bridge, Chapter 90, Complete Streets, and Unpaved Roads, MassDOT supports local projects that improve roadway safety, reduce flooding risks, and strengthen climate resilience.

Without a new statewide funding mechanism, communities will be unable to meet regulatory obligations or adapt systems to climate-driven pressures. Several major legislative proposals underscore the scale of anticipated need: the Mass Ready Act proposes nearly \$3 billion in climate and resilience authorizations and establishes a statewide Resilience Revolving Fund.

Future system renewal includes replacing thousands of aging culverts, retrofitting outfalls, upgrading detention basins, and implementing green infrastructure at scale. Population increases in already urbanized areas, combined with more intense rainfall, will further strain systems already at capacity.

In addition, new state stormwater standards and updated rainfall data will require larger, more resilient systems for new development and redevelopment, increasing capital needs. While home to more than half of Massachusetts residents, coastal communities face additional challenges from sea level rise, groundwater intrusion, salt exposure, and storm surge during "nor'easters" and tropical systems. Projections indicate significant sea level rise, flooding gravity discharge points and requiring pump stations and tide-resistant retrofits. These conditions increase capital needs and maintenance costs, especially for low-lying waterfront neighborhoods, and demand corrosion-resistant materials and elevated BMP designs to withstand saltwater impacts.

The Commonwealth's water quality continues to deteriorate in many areas. According to the 2022 Clean Water Act Section 303(d) List there are 382 new stormwater related impairments in 224 waterbodies across the Commonwealth compared to 274 in the 2018-2020 list.

Flooding and Infrastructure Damage

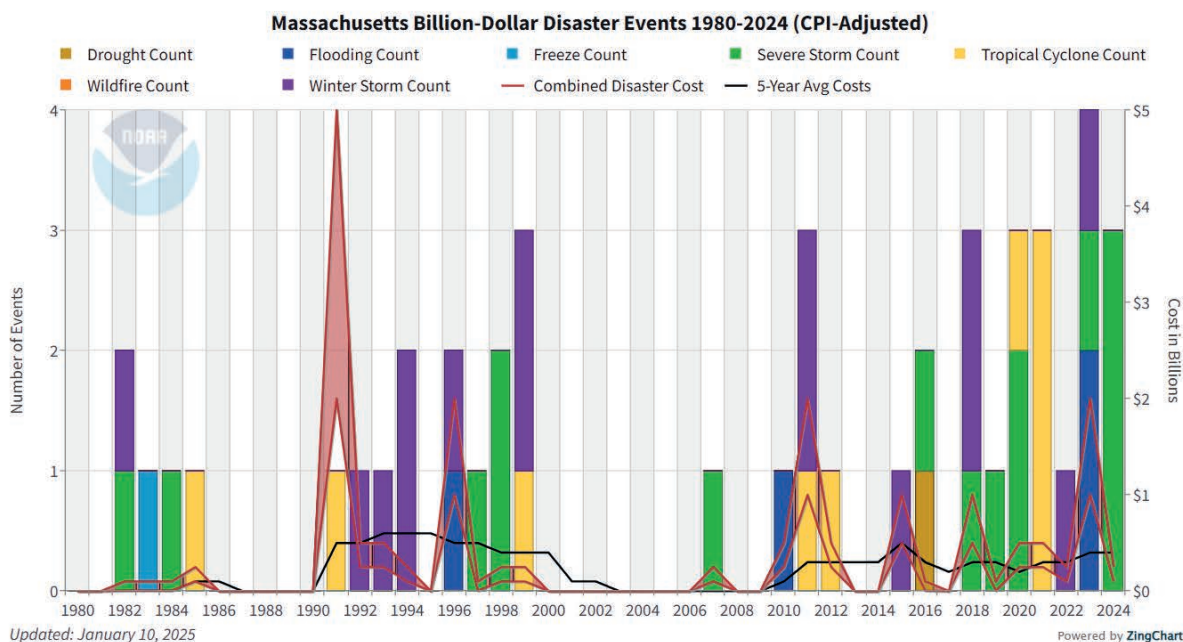
Massachusetts is experiencing an increase in extreme precipitation events that overwhelm stormwater systems and cause significant flooding and property damage. In 2023, Leominster, MA, received nine inches of rainfall within a 24-hour period, resulting in submerged roadways, damaged infrastructure, and flooded homes. The public infrastructure damage from this single event was estimated between \$30-35 million. Similarly, Lawrence, MA, experienced five inches of rainfall within 24 hours that same year. The increasing regularity of these storms places severe strain on aging stormwater infrastructure designed for historical rainfall patterns.

Population Vulnerability and Disaster Declarations

A substantial portion of Massachusetts residents face significant flood risks. Over 400,000 Massachusetts

residents currently live within designated 100-year flood zones, meaning there is greater than a 1-in-4 chance their homes will experience flooding during a standard 30-year mortgage period. This widespread vulnerability translates into tangible disaster impacts.

The frequency of flooding-related federal disaster declarations in Massachusetts demonstrates an increasing trend in severe stormwater-related incidents. Analysis of FEMA and NOAA data indicates the Commonwealth has experienced approximately 1-2 flooding-related federal disaster declarations in the past five years, 2-3 declarations in the past decade, and 4-5 declarations over the last twenty years. This pattern suggests growing challenges in managing stormwater impacts on public safety despite increasing awareness and regulatory attention.



Public Safety Measures to Reduce Risks

Several of the grants noted in the Funding and Future Need section are available to assist municipalities with addressing environmental concerns that affect public safety, including flooding, stormwater management, infrastructure vulnerability, and climate resilience. In addition, these funding opportunities, Massachusetts has existing regulatory programs that promote resilience, flood protection and water quality improvements and proposed amendments to strengthen these projections. For example, one initiative from the Executive Office of Environmental & Energy Affairs involves undertaking design standards addressing resilience within the State including stormwater management measures.

RESILIENCE

Massachusetts faces growing stormwater challenges due to changing precipitation patterns. NOAA data show increasing rainfall in the Northeast, with projections indicating higher annual totals delivered through fewer, more intense storms, particularly in winter, with regional variability in summer. By 2070, annual precipitation may increase by 2–13%, intensifying runoff and system demands. Coastal areas face added risk from sea level rise with Boston ranking fifth among the most vulnerable U.S. cities where reduced drainage capacity and backwater effects further complicate stormwater management during major storm events.

Resilience Initiatives in the Commonwealth

To address these growing challenges, Massachusetts has implemented several key resilience programs. The Municipal Vulnerability Preparedness (MVP) program has become a cornerstone of community-level adaptation planning. Through structured community workshops and planning processes, the MVP program has helped municipalities systematically identify and prioritize climate hazards, with stormwater flooding consistently emerging as a top concern across participating communities.

In 2020–2021, Massachusetts established a Stormwater Advisory Committee to develop “Resilience 1.0,” the

Together, these funding and regulatory efforts support practical public safety measures to reduce stormwater-related risks. Massachusetts and local communities have advanced flood warning systems, culvert and drainage upgrades, roadway flood mitigation projects, emergency preparedness planning, green infrastructure investments, and coastal resilience initiatives. These measures are intended to reduce flooding, protect critical transportation and emergency response routes, prevent infrastructure failures, improve water quality, and strengthen community resilience to increasingly severe storm events.

Commonwealth’s climate-resilient design standard. This initiative modernizes stormwater management by:

- Adjusting design standards to reflect current NOAA-based precipitation data
- Incorporating updated water quality criteria
- Ensuring alignment with the Massachusetts MS4 permit requirements

MassDOT has advanced transportation resilience through its Highway Resilience Improvement Plan (HRIP), launched in May 2024. HRIP integrates the Resilient Mass platform for climate risk visualization and data analysis, aligns with the Beyond Mobility program to embed resilience into long-term transportation planning, and leverages federal support through USDOT’s PROTECT program. Together, these efforts help MassDOT identify and prioritize vulnerable roadway segments, assess climate risks systematically, and implement targeted resilience strategies.

In addition, Massachusetts has developed ECO (Environment & Climate One Stop) website where applicants can find a single point of entry for various climate and environmental resilience grants.



Environment & Climate One Stop (ECO One Stop)

A new, streamlined grant application for climate and environmental resilience projects in Massachusetts.

The ECO One Stop is currently closed to applications.

Source: ResilientMass

Despite progress, Legacy systems still dominate, and many communities lack the resources to implement climate-informed upgrades.

Locally, the Metropolitan Area Planning Council (MAPC) has developed an online interactive tool

that local planners can use to identify and prioritize resilience actions for their communities using MAPC's "Climate Resilience Playbook". In addition, they offer an Accelerating Climate Resilience Grant available to the 101 cities and towns within the MAPC region.



Source: Metropolitan Area Planning Council

INNOVATION

Massachusetts is embracing pragmatic solutions for existing stormwater infrastructure through innovative approaches. Massachusetts municipalities are piloting technologies to automate detention basin operations, optimize storage, and reduce CSO events. These systems use sensors and predictive algorithms to adjust flows dynamically during storms, improving compliance and resilience. The Mystic River watershed offers a notable example of regional collaboration in smart stormwater management. A coalition of 21 municipalities across the watershed has applied watershed-scale modeling and evaluated Active Reservoir Management for coordinated flood and nutrient reduction.

In addition, in 2022 Massachusetts and several other New England States released the New England Stormwater Retrofit Manual that provides technical guidance for practitioners implementing these partial-compliance solutions that nonetheless deliver meaningful water quality and flood control benefits. Stormwater retrofits

can be utilized for redevelopment projects when full compliance with Stormwater Management Standards is not feasible due to existing site constraints. This approach allows municipalities and property owners to make incremental improvements to legacy stormwater systems that might otherwise remain unchanged.

Nature-Based Solutions and Green Infrastructure

Massachusetts is increasingly prioritizing nature-based solutions and low-impact development techniques for stormwater management. The Emerald Tutu project exemplifies this innovative approach, a grant-funded research and environmental justice initiative developing biomass-based coastal protection and restoration infrastructure. One of their projects combines floating vegetated mats designed to attenuate wave energy while enhancing habitat value and capturing stormwater-borne pollutants.

Piers Park Waterfront, East Boston – Floating Wetland



Source: Emerald Tutu

The City of Boston has institutionalized this commitment to nature-based solutions by creating a dedicated Office of Green Infrastructure. This office works collaboratively across all municipal departments to implement green infrastructure throughout the city, ensuring that natural stormwater management approaches are integrated

into capital projects, maintenance operations, and long-term planning efforts. This cross-departmental approach represents an important institutional innovation that helps overcome traditional siloed approaches to stormwater management.

Cambridge Flooding



Source: BSCES

Watershed-Scale Collaboration and Planning

Massachusetts watershed associations have become key innovators in developing regional, watershed-based approaches to stormwater management. Organizations such as the Charles River Watershed Association, Neponset River Watershed Association, and Mystic River Watershed Association partner with municipalities to develop shared resources that optimize stormwater management across jurisdictional boundaries. These collaborative efforts include developing:

- Regional stormwater hydrologic models
- Watershed-wide green infrastructure strategies
- Cross-jurisdictional pollutant tracking tools
- Shared implementation resources

The Mystic River Watershed Association's Green Infrastructure Master Plan exemplifies this approach, integrating data-driven prioritization methods with multi-municipal coordination to efficiently reduce phosphorus loading and flooding risks throughout the watershed. These watershed-scale planning efforts are supported by advanced scientific tools such as the USGS StreamStats platform for Massachusetts, which provides standardized hydrologic analysis capabilities accessible to municipalities and watershed organizations alike.



RECOMMENDATIONS TO RAISE THE GRADE

- **Increase Dedicated State and Federal Appropriations:** Expand the capitalization and eligibility of revolving funds and grant programs. Reduce municipal reliance on competitive grants for baseline compliance to create more predictable long-term capital planning and ensure smaller communities can meet regulatory mandates.
- **Establish Sustainable Dedicated Stormwater Funding:** Prioritize closing the funding gap for aging infrastructure by expanding the use of municipal stormwater utilities beyond the current 28 communities. Transition to stable, user-based revenue tied to runoff generation to reduce reliance on property taxes.
- **Modernize and Align Regulatory Standards:** Update the Massachusetts Stormwater Handbook and state design standards to reflect current NOAA Atlas rainfall data, replacing the outdated 2008 guidelines. Establish uniform criteria across EPA, MassDEP, MassDOT, and local agencies to eliminate regulatory conflicts and ensure infrastructure is resilient to modern precipitation patterns.
- **Develop Statewide Performance Metrics and Accountability:** Implement a core set of standardized performance indicators to track progress in system condition, capacity, and resilience to demonstrate the return on public investment. At a minimum track the following metrics:
 - Percentage of municipalities with documented stormwater asset inventories.
 - Percentage of the population served by stormwater utilities.
 - Annual reductions in phosphorus and bacteria loading.
 - Number of culverts in need of replacement, or recently upgraded or replaced to resilient standards.
- **Adopt Standardized Testing and Verification Protocols:** Participate in the National STEP program and support the adoption of ASTM E64 standards to create a consistent framework for certifying stormwater treatment technologies.
- **Strengthen Statewide Operations and Maintenance (O&M):** Establish minimum statewide O&M expectations to improve the performance of existing assets through cost-effective tools like street sweeping, leaf litter management, and routine catch basin cleaning.
- **Enhance Statewide Coordination:** Create a statewide coordinating entity and/or framework for regional coordination entities to improve compliance capacity in low-resource communities and enable planning at a watershed scale. Regional coordination allows for technical assistance and long-term planning while preserving local authority.
- **Integrate Stormwater Retrofits into Capital Projects:** Scale up retrofit programs by integrating stormwater upgrades directly into roadway reconstruction and culvert replacement projects. Leverage routine infrastructure investments to address historical environmental impacts and mitigate flooding.
- **Incentivize Retrofit of Legacy Development:** Expand incentives and regulatory requirements to address the significant share of stormwater impacts originating from development constructed before modern standards existed.
 - **Integrate Stormwater Upgrades into Capital Improvement Projects:** Leverage routine infrastructure investments by incorporating stormwater retrofit improvements directly into transportation and public works projects, such as roadway reconstruction and culvert replacements to lower construction and design costs.



SOURCES

Bluefield Research Group, “US stormwater infrastructure market (Insight Report),” 2024.

Boston.com, “Nearly 60 beaches closed due to bacteria and algae,” 2025.

City of Boston, “Office of Green Infrastructure,” n.d.

City of Lowell, MA, “Stormwater management,” n.d.

Commonwealth of Massachusetts, “Environment & Climate One Stop (ECO One Stop),” n.d.

Commonwealth of Massachusetts, “Municipal stormwater permit compliance fact sheet: Stormwater,” n.d.

Commonwealth of Massachusetts, “Resilient MA: Climate-resilient design standards and guidelines,” 2021.

Healey Driscoll Administration, “Administration awards Town of Ashburnham \$375K for culvert replacement training initiative,” 2024.

Hopkins, J., Lutsko, N., Cira, G., Wise, L., & Tegeler, J., “The Emerald Tutu: Floating vegetated canopies for coastal wave attenuation,” 2022.

Mass Audubon, “Losing Ground VI: Nature’s value in a changing climate,” 2020.

Massachusetts Climate Change Clearinghouse, “Massachusetts climate projections,” n.d.

Massachusetts Department of Environmental Protection (MassDEP), “Annual sewage notification report 2024,” 2025.

Massachusetts Department of Environmental Protection (MassDEP), “Changes to the Massachusetts stormwater management standards,” 2008.

Massachusetts Department of Public Health, “Inland flooding,” 2023.

Massachusetts Department of Transportation (MassDOT) Highway Division, “2024 Highway asset management update,” 2024.

Massachusetts Executive Office of Energy and Environmental Affairs, “Municipal Vulnerability Preparedness (MVP) Program,” n.d.

Metropolitan Area Planning Council (MAPC), n.d.

Mystic River Watershed Association, “Green Infrastructure Master Plan,” n.d.

National Centers for Environmental Information (NOAA), “U.S. billion-dollar weather and climate disasters: Massachusetts,” 2023.

National Oceanic and Atmospheric Administration (NOAA), “Daily precipitation summary for Lawrence, MA,” 2023.

Southeastern New England Program (SNEP), “New England stormwater retrofit manual,” n.d.

U.S. Environmental Protection Agency (EPA), “Extreme precipitation,” n.d.

Stormwater



SOURCES (cont.)

U.S. Environmental Protection Agency (EPA), “Final Massachusetts Integrated List of Waters for the Clean Water Act 2022 Reporting Cycle,” 2023.

U.S. Environmental Protection Agency (EPA), “Massachusetts small MS4 general permit,” n.d.

U.S. Environmental Protection Agency (EPA), “NPDES State Program Authority,” n.d.

U.S. Environmental Protection Agency (EPA), “Potential reductions of street solids and phosphorus in urban watersheds from street cleaning, Cambridge, Massachusetts (2009–2011),” 2013.

U.S. Environmental Protection Agency (EPA), “Stormwater permit program – New England,” n.d.

U.S. Environmental Protection Agency (EPA), “What climate change means for Massachusetts,” 2016.

U.S. Geological Survey (USGS), “StreamStats: Massachusetts,” n.d.

U.S. Geological Survey (USGS), “Using leaf collection and street cleaning to reduce nutrients in urban stormwater,” 2019.

Wasser, M., “Boston’s stormwater problems are older than the city itself,” 2021.

WCVB News, “1 year after devastating Leominster flood, repair work still ongoing,” 2023.

World Bank, “Coastal cities at highest risk from flooding,” 2013.

Transit



Photo: Renovated MBTA Train Station and
Parking Garage in Braintree; Patrick Tierney

GRADE
COMPARISON

MA: C-
Nat'l: D



TRANSIT

EXECUTIVE SUMMARY

Transit in Massachusetts is defined by statewide coverage provided by the Regional Transit Authorities (RTAs), and Massachusetts Bay Transportation Authority (MBTA) subway, bus and commuter rail system. Transit is a major priority in Massachusetts, with recent progress including the elimination of MBTA subway slow zones, safety culture improvements, Green Line and Commuter Rail expansions, real-time transit tools, and bike-share growth to improve first- and last-mile connections.

However, public transit systems in Massachusetts face significant challenges due to aging infrastructure, historic underfunding, and altered post pandemic ridership patterns.

The MBTA continues to face major maintenance, staffing, and financial challenges, facing a \$24.5 billion State of Good Repair backlog. While state funding has supported fare-free service at several RTAs, capital constraints have forced some agencies to operate paratransit and demand-response vehicles beyond their useful life.

The Commonwealth must transition away from temporary funding measures and establish permanent, sustainable funding mechanisms that accelerate modernization, expand workforce, adapt to our changing climate and provide regional equity.

CAPACITY

Massachusetts transit agencies consist of 15 RTAs and the MBTA, which serves Greater Boston. The agencies serve 283 municipalities and all 14 counties with fixed route and demand response paratransit service. The 15 RTAs are listed in table 1.

The MBTA offers heavy rail and light rail subway service. Monthly ridership averages between 450,000 and 500,000 riders, approximately 50% of the total ridership in Greater Boston. The MBTA Commuter Rail lines serve over 100,000 riders each month, 11% of total ridership.

Massachusetts is also served by transit programs such as the Logan Express for access to the airport, and business transit routes such as the Route 128 Business Council Bus, EZRide Shuttle, MASCO Shuttles, and others.

Total public transit ridership, as noted in the APTA Public Transportation Ridership Report, in calendar year 2024 was 271,082,152 unlinked passenger trips split between various service types and providers, as shown in table 2. This represents a steady recovery from ridership lows during the COVID-19 pandemic.

Table 1: Regional Transit Authority (RTA) Annual Ridership Summary

Regional Transit Authority (RTA)	Annual Unlinked Passenger Trips ¹	Service Area Population ¹
Berkshire Regional Transit Authority (BRTA)	567,065	127,500
Brockton Area Transit Authority (BAT)	2,553,455	255,876
Cape Ann Transportation Authority (CATA)	211,850	60,184
Cape Cod Regional Transit Authority (CCRTA)	811,784	303,269
Franklin Regional Transit Authority (FRTA)	169,841	603,790
Greater Attleboro Taunton Regional Transit Authority (Gatra)	451,428	1,190,956
Lowell Regional Transit Authority (LRTA)	917,580	370,594
Merrimack Valley Regional Transit Authority (MeVa)	2,950,920	398,382
Metrowest Regional Transit Authority (MWRTA)	563,477	355,287
Montachusett Regional Transit Authority (MART)	984,506	231,493
Nantucket Regional Transit Authority (NRTA)	285,720	60,000
Pioneer Valley Transit Regional Authority (PVTA)	8,017,071	582,689
Southeastern Regional Transit Authority (SRTA)	2,926,800	308,614
Woods Hole, Martha's Vineyard, And Nantucket Steamship Authority	3,821,383	329,344
Worcester Regional Transit Authority (WRTA)	4,776,662	578,732

¹Federal Transit Agency (FTA) National Transit Database (NTD) – 2024 Transit Agency Profiles

Table 2: Massachusetts Public Transit Annual Ridership Summary

Transit Agency / Mode	Annual Unlinked Passenger Trips ¹
MBTA Bus	97,675,000
MBTA Heavy Rail (Red, Orange, Blue Lines)	84,251,600
MBTA Light Rail (Green Line / Mattapan)	30,631,700
MBTA Commuter Rail	30,343,900
Regional Transit Authorities (RTA - 15 Authorities Total)	27,006,552
MBTA Demand Response (The Ride)	1,173,200
TOTAL TRACKED STATEWIDE TRIPS	271,082,152

¹ APTA Public Transportation Ridership Report Ridership Data For Calendar Year 2024

The MBTA is expanding service, reversing past trends of service cuts defined by recurring fiscal deficits. Notable cuts include the 2012 reductions to Commuter Rail and low-ridership bus routes and cancelation of 2:00 AM weekend trains in 2016. This was followed by the 2021 Forging Ahead plan, which ended subway and bus service at midnight and eliminated several ferry routes in response to a historic fiscal crisis triggered by pandemic ridership plummeting to just 26% of pre-COVID levels.

In fall 2025, the MBTA extended Friday and Saturday service across all subway lines and select high-ridership bus routes, with select buses running every 15 minutes or better. Over the next five years, the Bus Network Redesign intends to double frequent routes, expand service to underserved neighborhoods, simplify the network, and improve reliability and accessibility.

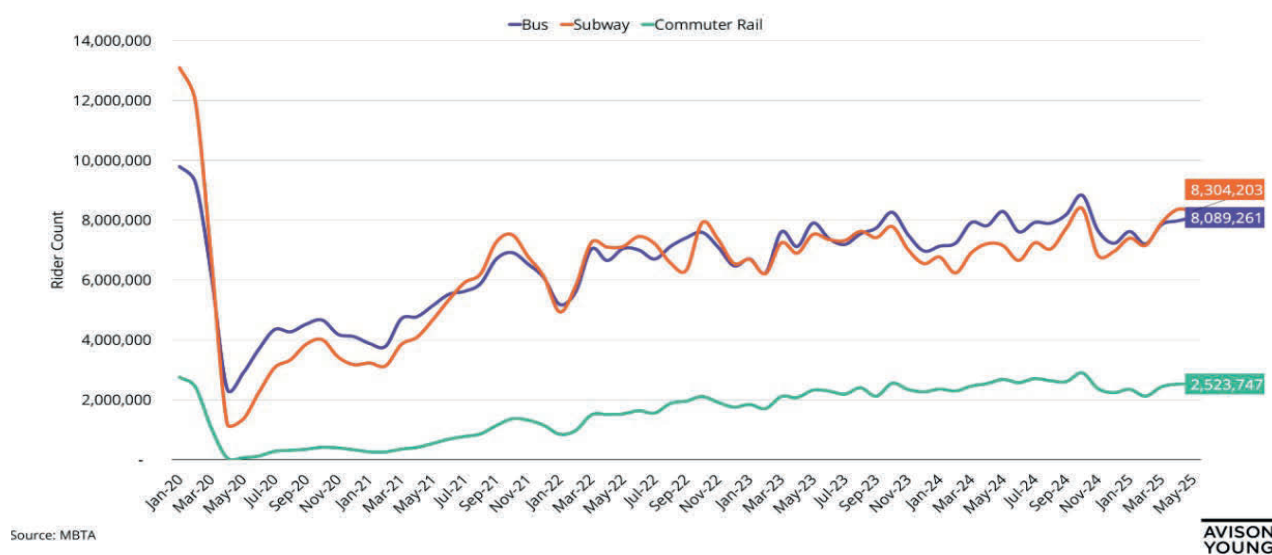
Between 2021 and 2026, the MBTA delivered the Green Line Extension to Medford and Union Square, which added seven accessible stations and 4.3 miles of track. In March 2025, the South Coast Rail Phase 1 launched, restoring commuter rail passenger service to Fall River and New Bedford for the first time in 65 years.

Major planned projects include the Red-Blue Connector to link the system's final two subway lines at Charles/ MGH and the initial conversion of Commuter Rail lines into a frequent, battery-electric Regional Rail network. Additionally, the West-East Rail initiative, also known as MassDOT's Compass Rail program, aims to bridge the transit gap between Boston, Worcester, Springfield, and Pittsfield. Backed by over \$150 million in federal infrastructure awards, this cross-state, intercity corridor has moved from conceptual vision and tracking toward a target initial service launch by 2030.

RTAs are also expanding their service. State contract assistance funding has helped RTAs extend service hours, and fare-free funding initiatives have enabled RTAs to expand financial accessibility.

MBTA transit ridership is slowly approaching pre-pandemic ridership levels (see Figure 1). As of Fall 2025, the fastest networks to recover are the Commuter Rail and the bus network. Heavy and light rail subways are the slowest to recover. Factors contributing to this change are significant funding increases in fare-free funding, state contract assistance (SCA), and focusing on extending service hours.

Figure 1. MBTA Monthly Ridership



Source: Avision Young

CONDITION

After decades of deferred maintenance, the MBTA has overhauled repairs through its Track Improvement Program. As of December 2024, the MBTA replaced over 250,000 feet of rail and removed over 220 speed restrictions. This effort effectively resolved 100% of the targeted system-wide slow zones, returning to a restriction-free state for the first time in decades.

MBTA subway and commuter rail lines continue to experience temporary closures for infrastructure upgrades, including signal system work, track renovation, and station accessibility improvements. According to the MBTA's 2023 Capital Needs Assessment, the agency faces a massive \$24.5 billion State of Good Repair (SOGR) backlog. Key capital liabilities include aging power and traction systems (\$5.1 billion), outdated facilities

and maintenance depots (\$4.8 billion), deteriorating structures and bridges (\$2.0 billion), and signals and train control systems (\$1.3 billion).

RTAs face challenges with underfunding and aging assets. While state capital funds have actively supported vehicle modernizations, fleet age varies drastically across individual authorities and service. According to the MassDOT Regional Transit Authority Performance Management Report, specialized demand-response and paratransit asset classes face the worst replacement backlogs. For example, authorities like the Cape Ann Transportation Authority (CATA) and the MetroWest Regional Transit Authority (MWRTA) navigate disproportionate challenges with 25% to 40% of specialized support vehicles operating past the FTA's default useful life benchmarks.

OPERATION AND MAINTENANCE; FUNDING AND FUTURE NEED

The total Operating and Maintenance (O&M) expense for the MBTA was budgeted at \$2.55 billion for Fiscal Year 2025 (FY2025). This represents a significant 15.5% increase over the previous year, driven by rising employee costs, debt service, and general inflation.

The MBTA's farebox recovery rate (the percentage of operating expenses covered by fares) has suffered a dramatic collapse since the start of the pandemic, from 42.7% prior to the pandemic to a baseline of 15.8% in FY25 revealing a severe structural deficit.

This figure is the second lowest since FY2010. MBTA System-Wide Passenger Survey data suggests shifts to hybrid work based on altered peak hour trip patterns. MassINC Polling Group data suggests continued rider frustration with system reliability have led to fewer monthly pass purchases and lower overall fare revenue.

Transit agencies use a layered framework to identify future needs. At the state level, MassDOT's long-range transportation plan, Beyond Mobility, sets the strategic direction across all modes, including transit, with an emphasis on equity, climate resilience, and safety. For the MBTA, the Focus40 long-range capital vision outlines priorities for system transformation and informs the 5-Year Capital Investment Plan. Long-range transit priorities within the Greater Boston metro area are guided

by the Boston Region MPO's Destination 2050 plan, while RTAs are maintain their service plans.

The primary future service need for the MBTA is achieving a state of good repair and expanding service to accommodate regional growth. The MBTA's FY26-30 CIP (\$9.8 billion) prioritizes safety and reliability, decarbonization, and workforce funding.

The majority of the MBTA's operating funds come from dedicated state sources:

- **Dedicated State Sales Tax Revenue:** Recurring operating revenue budgeted at \$1.465 billion for FY2025.
- **Local Assessments:** Municipal payments from within the MBTA service district.
- **Flexed Federal Funds:** Preventative maintenance funds (FTA 5307/5337) budgeted at \$191 million for FY2025.

Massachusetts provides significant state capital funding to support transit needs. The Commonwealth has historically committed more than \$1 billion to the MBTA's 5-year Capital Investment Plan through General Obligation bonds, to help fund major projects such as the Green Line Extension and new Red and Orange Line vehicles. Recent Fair Share Amendment

revenues, Massachusetts' 4% tax on incomes over \$1 million to provide funding for schools and transportation, have supported safety, reliability, modernization, resilience, bridge repairs, fleet upgrades, and track replacement, in addition to providing funding for RTA service improvements and fare-free service for several RTAs including MeVa, WRTA, and LRTA. In addition, a dedicated portion of state sales tax revenue provides the MBTA with a recurring funding source.

The Commonwealth advanced several major transit funding initiatives in 2024 and 2025. The Governor's proposed FY26 budget would more than double direct operating support for the MBTA to \$687 million, following recommendations from the Transportation Funding Task Force.

Complementing these efforts, the Infrastructure Investment and Jobs Act (IIJA) has provided critical capital for modernization. This includes a \$201.2 million FTA Capital Investment Grant for the Blue Hill Avenue Transit Action Plan to deliver dedicated bus lanes and safety overhauls, alongside a \$67 million FTA All Stations Accessibility Program grant for Green Line Transformation.

Despite these investments, the Commonwealth faces a multi-billion-dollar backlog in maintenance and capital needs across both transit and roadway infrastructure. A projected \$24.5 billion is needed to bring all MBTA assets into a state of good repair through 2040. The backlog functions limits network expansion and results in elevated lifecycle costs. This results in systemic slow zones, deferred accessibility compliance, and constrained operational capacity. This backlog represents the cost of replacing MBTA infrastructure currently operating past its useful life, including power stations, bridge and tunnel structures, rolling stock, tracks and signal systems.

To address the MBTA's looming shortfall, the January 2025 Transportation Funding Task Force report recommended a structural shift and lays out clear recommendations. This plan moves away from short-term, reactive funding measures toward a sustainable model that stabilizes the agency's operating budget for the long term.

The 2025 Task Force identified the need for \$400 million for FTA-required workforce and safety initiatives, prioritized fleet electrification to meet modern performance standards, and proposed \$110 million for RTAs to strengthen regional service and permanently expand fare-free programs.



Photo: Sharon MBTA commuter rail station; Linda Hager

PUBLIC SAFETY

Public transit systems in Massachusetts facilitate millions of safe passenger trips throughout the state annually, however, the network faces scrutinized safety challenges regarding infrastructure conditions and operational incidents. The MBTA is uniquely prone to derailments due to its Type 8 train on the Green Line and aging track infrastructure. The Green Line has the most derailments in the country among light rail networks. There were 3 Green Line derailments in the 12-month period from February 2024 to 2025, all of which involved a Type 8 train.

The MBTA and RTAs use FBI Uniform Crime Reporting data, rider surveys, and polling to assess safety trends and perceptions. While violent offenses remain low relative to ridership, surveys show riders remain concerned about safety, reliability, and visible social challenges such as aggressive panhandling and poor station lighting.

Women, LGBT+ individuals, and racial minorities, report higher levels of harassment on transit. Advocacy groups and recent incidents point to concerns ranging from catcalling and unwanted contact to targeted violence, while MBTA bystander intervention campaigns aim to address hate-motivated incidents that often go underreported.

To improve these perceptions, transit systems are moving beyond traditional policing toward visible presence and physical deterrents. The MBTA has expanded its Transit Ambassador program, placing non-police personnel in bright uniforms to deter aggressive behavior. The MBTA has implemented the See Say App, allowing riders to discreetly report harassment in real-time. On buses, the deployment of AI-powered collision avoidance and live-monitored surveillance screens aims to reduce both physical accidents and interpersonal crime. RTAs across the state are also prioritizing infrastructure like “Stop Request” programs, which allow riders to be dropped off closer to their destinations after dark.

Between 2021 and 2025, the MBTA recorded a total of ten transit-related fatalities. Seven fatalities resulted from right-of-way trespassing or commuter rail at-grade vehicle crossing collisions. Two fatalities stemmed from operational infrastructure failures, and one fatality was categorized as a transit security event involving interpersonal violence. Conversely, across the 15 Regional Transit Authorities (RTAs), only one transit-related fatality occurred over this same timeframe, which was an operational incident caused by an external vehicle collision.

In April of 2022, the FTA began a Safety Management Inspection (SMI) into the MBTA and Department of Public Utilities (DPU), exposing systemic safety failures. As a result, the FTA mandated federal intervention through Special Directives based on understaffing operations personnel, critical training gaps, extensive maintenance backlogs, and failure of the DPU to execute its state safety oversight mandate.

In response, the State legislature launched its own investigation into the MBTA and DPU. The Joint Committee on Transportation (JCOT) Oversight Report (2023) recommended governance changes within the MBTA and DPU, funding improvements, operational reforms, and increased transparency and accountability.

The MBTA and DPU have made progress toward resolving the mandates. Backed by intensified state funding and aggressive track-rehabilitation surges, the FTA has officially accepted and closed multiple Special Directives including major components regarding lapsed personnel certifications, Operations Control Center dispatch staffing, and right-of-way safety procedures. Simultaneously, a restructured DPU has vastly expanded its oversight footprint and increased annual risk-based inspections.

RESILIENCE

Increasing frequency of severe weather events is stressing the urgency of the resilience of the Commonwealth's transit infrastructure. Strong wind gusts fell trees onto exposed catenary wires and commuter rail tracks, summer heatwaves induce track thermal expansion, and rising tides and historic rainfall flood transit stations. Legacy infrastructure historically failed during the extraordinary winter storms of 2015, which caused unprecedented, weeks-long system shutdowns. During severe heatwaves, the MBTA routinely implements proactive, system-wide speed restrictions to slow rapid transit and Commuter Rail trains to prevent heat-induced track kinking. Localized stormwater and torrential precipitation events trigger flash flooding that result in multi-hour closures at underground stations like Aquarium on the Blue Line, and require deployment of emergency surface bus shuttles to bridge flooded track segments.

To systematically protect the network, the MBTA completed a comprehensive suite of climate change vulnerability assessments. These studies analyzed specific risk profiles for rapid transit lines, bus garages, commuter rail rights-of-way, and underlying support infrastructure like pump rooms, signals, and power substations. The assessments actively shape the MBTA's rolling five-year Capital Investment Plan (CIP). The CIP includes completed, active, and planned resiliency projects.

- **Fenway Portal Flood Protection (Completed):** Installed floodgates, specialized doors, and an upgraded pumping station to fortify the Green Line D Branch tunnel.
- **Aquarium Station Flood Proofing (Completed):** Deployed flood barriers and groundwater monitoring wells along the Blue Line's Maverick Portal.

- **Charlestown Seawall Reconstruction (Completed):** Rebuilt and stabilized the historic coastal seawall to protect adjacent transit property from structural erosion.
- **Subway Network System-Wide Infrastructure Overhauls (Under Construction):** Actively modernizing track dewatering pump rooms and elevating low-lying assets to prevent immediate stormwater inundation.
- **North Station Traction Power Substation (Planned):** Funded in the current CIP to replace aging, flood-vulnerable power components and secure energy redundancy.

To support the Commonwealth's net zero mandate for 2050, the MBTA has initiated a transition toward a zero-emissions fleet. Following an initial 2019 procurement of five 60-foot Battery Electric Buses (BEBs), the agency expanded capital procurement to build out an active pipeline of 120 electric buses costing nearly \$185 million, while maintaining a baseline fleet of 480 hybrid buses. The MBTA aims to convert its entire bus fleet to battery-electric propulsion by 2040.

This transition faces operational and capital constraints. Fleet electrification requires overhaul of active bus garages built without the electrical capacity, overhead space, and substations required to support charging. The MBTA is executing capital projects including the retrofit of the North Cambridge facility, construction of the Quincy maintenance facility, and modernization of the Arborway Bus Maintenance Facility in Jamaica Plain. Furthermore, freezing winter temperatures cause battery-range degradation. The MBTA is experimenting with diesel-powered auxiliary heaters to preserve vehicle range during peak winter service blocks.

INNOVATION

Transit innovation across the Commonwealth has targeted infrastructure enhancements designed to optimize cost efficiency, expand system capacity, and improve micro-mobility integration. The steady expansion of regional bike-sharing networks has helped to close first-mile and last-mile transit gaps. The publicly owned Bluebike system includes nearly 600 stations and a fleet of over 5,600 assets across 13 municipalities and has surpassed 4.6 million trips annually.

To mitigate operating costs of traditional paratransit van services, the MBTA integrated Transportation Network Companies (TNCs), partnering with Uber and Lyft as carriers for its paratransit service, The RIDE. This on-demand paratransit structure successfully reduced the MBTA's internal per-trip operating costs by 85 percent, slashing the traditional van service baseline of \$59 per trip down to an average of \$9.10 per trip even while accommodating a 30 percent increase in total paratransit trip volume.

To optimize platform management, the MBTA is deploying solar-powered e-ink digital displays across surface-level Green Line stations. This capital modernization effort enables decentralized stations to display real-time arrival predictions, and plans to outfit most surface rail stations by 2027.

Regional Transit Authorities (RTAs) have deployed modernized tracking platforms. The Worcester Regional Transit Authority (WRTA) integrated the Bus Tracker system and cloud-based Transit application, while Pioneer Valley Transit Authority (PVRTA) launched a mobile tracking app to provide minute-by-minute vehicle location mapping and passenger-load metrics.

To protect bus schedules from general traffic bottlenecks, the MBTA is implementing roadway geometry reconfigurations by piloting center-running bus lanes to prioritize transit and improve safety. A short Columbus Avenue segment is testing bus rapid transit-style features with regular buses. The planned Huntington Avenue/South Huntington busway will implement a shared right-of-way configuration with the Green Line E Branch, eliminating bottleneck delays near Mission Park and Riverway while

providing raised, ADA-compliant platforms for safer, accelerated boarding.

To mitigate severe curbside congestion and structural terminal bottlenecks at Logan International Airport, Massport launched a first-in-the-nation Remote Terminal Pilot in June 2026 at the Framingham Logan Express Bus garage. This service allows ticketed passengers to complete TSA screening and check luggage directly at the suburban Framingham facility. Passengers then board a secure-side motorcoach that travels directly to airport terminals. This infrastructure strategy leverages the busiest services in the Logan Express network, which cumulatively carries over 2.7 million passengers annually system-wide.



Photo: Forest Hills MBTA bus; Linda Hager



RECOMMENDATIONS TO RAISE THE GRADE

- **Accelerate State of Good Repair (SOGR) Investments:** Dedicate consistent capital funding to address the \$24.5 billion MBTA asset backlog and modernizing aging infrastructure.
- **Establish a Long-Term, Sustainable Transit Revenue Structure:** Create a permanent funding mechanism to close the MBTA's projected structural operating deficit, transition away from reliance on one-time federal "flex" funds and temporary state supplements.
- **Expand RTA Support:** Increase state operational funding for RTAs to support the successful expansion of fare-free programs and improved service frequency, and provide critical transit alternatives in communities outside the MBTA service area.
- **Prioritize Fleet Electrification and Depot Modernization:** Accelerate the transition to BEB technology by prioritizing the modernization of maintenance facilities and integrating auxiliary heating systems.
- **Invest in Workforce Recruitment and Retention:** Continue to direct funding toward workforce expansion and training initiatives to resolve staffing shortages in safety and operations roles.
- **Integrate Transit into Climate Resiliency Planning:** Mandate climate-adjustment standards in all transit capital projects to protect infrastructure from extreme weather and sea-level rise.
- **Prioritize Transit Security:** Enhance public safety by applying Crime Prevention Through Environmental Design (CPTED) principles and expanding the Transit Ambassador program.



Photo: Blue Line MBTA Aquarium Station in Boston; Patrick Tierney



SOURCES

Annear, Steve, "MBTA Launches New Sexual Harassment Awareness Campaign," 2013.

Avison Young, "Boston MBTA Public Transportation Ridership Continues to Recover," 2025.

City of Boston, "Bike Share Expansion 2024–2026," 2024.

City of Boston, "Huntington Ave / South Huntington Ave E-Branch Accessibility Project," 2025.

Glaeser, Edward, and James M. Poterba, "Economic Analysis and Infrastructure Investment," 2020.

Lagle, Emma, "Public-Private Partnerships and Smart Growth: A Legislative Tool Kit for Public Infrastructure Projects," 2020.

Mass.gov, "Governor's Press Release on Transportation Investment Plan," 2025.

Mass.gov, "Press Releases," 2025.

Massachusetts Office of the State Auditor, "Safety Audit of MBTA Identifies Areas for Improvement Around Inspections and Maintenance," 2025.

Massachusetts Taxpayers Foundation, "MTF Bulletin," n.d.

MassDOT, "FY26–30 Capital Investment Plan Executive Summary," n.d.

MassINC Polling Group, "Poll: Residents Sound the Alarm on MBTA Service Quality, Safety," n.d.

Massport, "September Board Meeting," 2025. (Slide 62)

MBTA, "FY 2025 Operating Budget Oversight Report," 2025.

MBTA, "If You See Something, Say Something," n.d.

MBTA, "Solar-Powered E Ink Signs," n.d.

MBTA Advisory Board, "Advisory Board Reports," 2025.

MBTA Advisory Board, "Capital Investment Plan Oversight Report," 2025.

MBTA Office of Performance Management and Innovation, "System-Wide Passenger Survey Report Executive Summary," 2025.

Patkin, Abby, "Boston Man Accused of Causing Explosion After He Allegedly Snatched a Suitcase and Threw It onto MBTA Tracks," 2026.

UMass Transportation Center, "2024 Moving Together Conference," 2024.

Wastewater



GRADE
COMPARISON

MA: D
Nat'l: D+

Photo: Pittsfield Wastewater Treatment Plant, Pittsfield, Massachusetts; Kleinfelder



WASTEWATER

EXECUTIVE SUMMARY

Like many other states with older cities and towns, wastewater system capacity is a concern in Massachusetts due to aging sewer system infrastructure. Failing pipes and deteriorating structures allow excessive infiltration and inflow (I/I) that can compromise capacity leading to backups and overflows. Massachusetts sewer systems are also vulnerable to climate change, which can exacerbate these conditions and threaten public health and water quality. Investment needs continue to grow as communities struggle to keep up with sewer system maintenance needs. Massachusetts has 19 communities with combined sewer systems that have federal requirements to reduce combined sewer overflows (CSOs). CSO reduction projects can be very costly. Similarly, wastewater treatment plant discharge permit renewals are requiring reductions in pollutant concentrations to improve the quality of receiving waters and the associated projects to improve treatment are just as costly. Sustained funding is needed in Massachusetts to allow system owners maintain reliable wastewater systems that continue to protect public health and the environment.

CAPACITY

There are over 127 public sewer systems in Massachusetts with wastewater treatment facilities that discharge approximately 785 million gallons of treated wastewater into local waterways or underground each day. Over 2 million people in 43 communities (about 30% of the state's population), and over 5,500 businesses and industries send sewage to the Massachusetts Water Resources Authority's (MWRA) regional treatment plants. Most public treatment facilities in Massachusetts are small municipal plants with capacities under 2 million gallons per day. The state has over 20,000 miles of sewer pipes, many more than 100 years old. Since sewer pipes typically last 50–75 years, a significant portion of these systems are operating beyond their intended lifespan. About 30% of Massachusetts's population relies on on-site wastewater treatment systems, or septic systems, for wastewater management which

equates to about 2 million people and nearly 650,000 systems serving residences and businesses.

Sewer systems and wastewater treatment facilities in Massachusetts generally operate within design capacity under dry conditions, but I/I often cause exceedances. Infiltration enters sewer systems through defects like cracked pipes, faulty joints, and damaged manholes, often due to aging, degradation, or poor construction. Inflow occurs when stormwater enters through direct connections such as roof drains, sump pumps, and catch basins. Together, I/I can overwhelm systems during heavy precipitation, causing overflows and treatment plant bypasses that harm water quality and public health. Utilities invest in rehabilitation, maintenance, and inflow removal to address I/I, but it remains a persistent challenge. MassDEP provides

guidance to help communities evaluate and manage these issues while meeting regulatory requirements.

In Massachusetts, wastewater discharges to surface waters are regulated under the National Pollutant Discharge Elimination System (NPDES), administered by EPA and MassDEP, and apply to both public and private treatment plants. The state also has older combined sewer systems that carry both sewage and stormwater; during heavy rain or snowmelt, these systems can overflow, discharging combined sewer overflows (CSOs) directly into rivers, lakes, and coastal waters and increasing pollutant loads.

Combined sewer overflow outfall, Worcester, Massachusetts (City of Worcester and Kleinfelder)

Massachusetts previously had 24 systems with CSOs when long term CSO control programs were initiated in the 1990s, but this has been reduced to 19 due to work by system owners to eliminate CSOs. The 19 CSO communities are primarily older urban areas across the state. Their systems operate under NPDES permits that require limiting CSO discharges, necessitating significant investments in sewer infrastructure and treatment facilities.

Table 1: Combined Sewer Overflow Permittees in Massachusetts, June 2018

CSO Permittee	Permit Number	Active CSO Outfalls	Receiving Waters
Boston Water and Sewer Commission/ MWRA	MA010119	30	Boston Harbor, Charles River, & Muddy River
Cambridge	MA010197	7	Charles River & Alewife Brook
Chelsea	MA010187	3	Mystic River & Chelsea Creek
Chicopee	MA0101508	21	Chicopee River & Connecticut River
Fall River	MA010038	19	Mount Hope Bay, Taunton River, & Quequechan River
Fitchburg	MA010098	11	Nashua River & tributaries
Gloucester	MA010062	5	Gloucester Harbor & Pavilion Beach
Greater Lawrence Sewer District	MA010044	5	Merrimack River & Spicket River
Haverhill	MA010162	15	Merrimack River & Little River
Holyoke	MA0101630	13	Connecticut River
Lowell	MA010063	9	Merrimack River, Beaver Brook, & Concord River
Lynn	MA010055	4	Lynn Harbor, Stacy Brook, & Saugus River
Montague	MA010013	3	Connecticut River
Massachusetts Water Resources Authority (MWRA)	MA010235	10	Boston Harbor, Charles & Mystic Rivers, & Alewife Brook
New Bedford	MA0100781	17	Buzzards Bay, Clark's Cove, & Acushnet River
Somerville	MA010198	1	Mystic River & Alewife Brook
Springfield	MA0103331	24	Connecticut River, Chicopee River, & Mill River
Taunton	MA0100897	1	Taunton River
Worcester	MA0102997	1	Mill Brook

Source: MassDEP

Sewer systems face a major challenge in managing sewage sludge, the solid byproduct of wastewater treatment. Sludge can be landfilled or processed into biosolids used as nutrient-rich soil amendments, but these can also contain contaminants. While there are no federal regulations on biosolids, states including Massachusetts are considering restricting or banning

land application due to PFAS concerns; Maine has already enacted such a ban. In Massachusetts, where landfill and incineration capacity is already strained and about 55% of biosolids were managed out of state in 2023, a ban would further limit disposal options, increase costs, raise greenhouse gas emissions from transport, and eliminate a valuable fertilizer resource.

CONDITION

Wastewater system condition in the Commonwealth is a concern due to the age of the system components. Massachusetts sewer systems were largely built in four periods—the late 1800s, 1920s, 1950s, and 1970s—leaving many pipes beyond their service life in older communities. Between 25% and 50% (or more) of these systems are aging, with many early pipes made of brittle vitrified clay that is prone to cracking from

infrastructure loads, tree roots, and soil movement. Larger pipes from the same era are often brick. As these systems deteriorate, maintenance challenges increase, leading to leaks, I/I, backups, and failures. For example, in Worcester, about half of the sewer network is near or past its intended lifespan, with an estimated \$4-7 million in annual investment needed for replacements.

Deteriorating Clay and Brick Sewer Pipes in Massachusetts Communities



Source: Kleinfelder, Tighe & Bond

Wastewater treatment plants range from small privately-owned facilities for sanitary wastewater from housing developments or a large business to large regional facilities treating millions of gallons a day of sanitary and industrial wastewater. These plants discharge to either surface water or groundwater. In cooperation with local and federal authorities, MassDEP regulates many types of wastewater treatment plants. Regulations recently enacted by the EPA require the treatment of wastewater to remove high levels of nitrogen and

phosphorus, typically treated by advanced processes referred to as tertiary treatment. High levels of these nutrients are known to contribute to algae blooms and fish kills in aquatic ecosystems. Massachusetts has 126 treatment facilities, but only about 18% of the facilities (by population) have a tertiary treatment process. In comparison, about 37% of treatment facilities across the United States provide tertiary treatment. Municipalities often do not have the financial resources to upgrade facilities to meet the new EPA requirements.

Septic systems in Massachusetts are regulated under Title 5 (310 CMR 15.000) and provide effective wastewater treatment where sewers are unavailable when properly designed and sited. However, inadequate maintenance can harm public health and the environment. Local Boards of Health typically oversee these systems, while MassDEP regulates larger systems (10,000+ gallons per day) and those at state or federal facilities.

Title 5 requires septic system inspection for conformance with the regulations when properties are sold, often requiring repairs or replacements costing between \$20,000 and \$50,000. Improperly designed and/or underperforming

systems can contribute to elevated nitrogen concentrations in groundwater. MassDEP made significant changes to the Title 5 regulations in 2023 to address this issue. These changes are being implemented on Cape Cod and in other designated nitrogen-sensitive natural resource areas. The regulations require property owners to upgrade their septic system by 2028 using approved nitrogen reducing technologies. Alternately, a town can obtain a watershed permit provided they meet the nitrogen reduction targets in their permits or request a permit exemption if they can document that their nitrogen contribution to the sensitive area is less than 3% of the total nitrogen load.

FUNDING

Wastewater infrastructure upkeep in Massachusetts is mainly funded through user fees and rates and federal- and state-run grant and low-interest loan programs.

At the local level, individual communities or regions operate their own facilities and collect fees from residents and businesses through user rates to cover operational and maintenance costs, while large infrastructure upgrades and additions are typically funded through state or federal programs. As general infrastructure costs have risen in recent years, sewer rates have also increased. In Massachusetts, the cost of sewer service has risen consistently since 2000 at a rate of approximately 6% per year. In addition to a general

increase in infrastructure costs, wastewater facilities are also seeing additional or more stringent limitations on their NPDES permits.

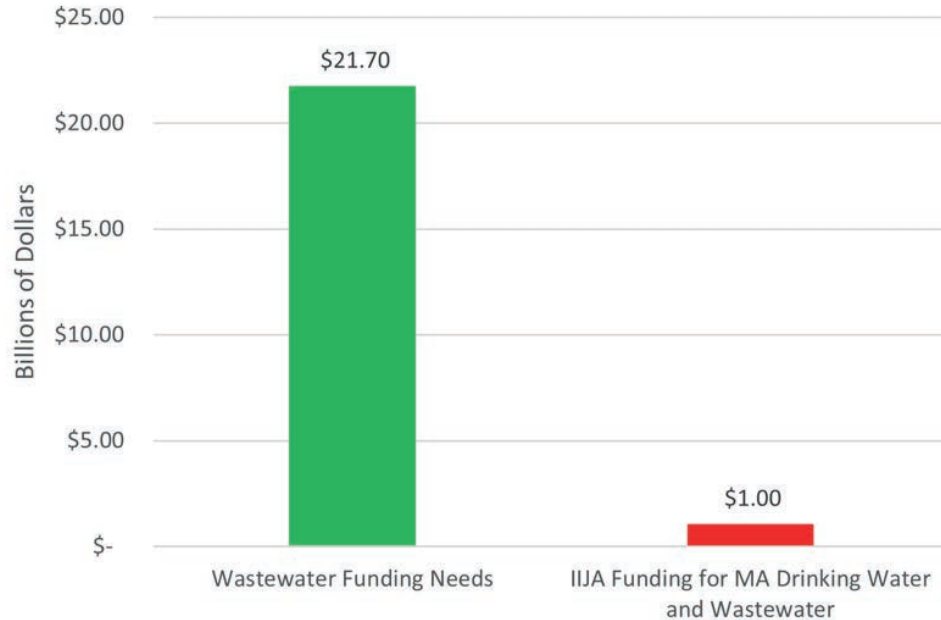
The 2021 federal Infrastructure Investment and Jobs Act (IIJA) provided funding to support infrastructure projects and upgrades, however it has not been sufficient to allow for meaningful progress in closing the funding gap in many states, including Massachusetts. Massachusetts is estimated to receive just \$1 billion over the five-year window of IIJA funding for water and wastewater projects. That \$1 billion represents just over 4.5% of the identified needs for wastewater infrastructure alone, as shown in Figure 1.

Combined sewer overflow outfall, Worcester, Massachusetts



Source: City of Worcester and Kleinfelder

Figure 1: IIJA Funding Compared to Wastewater Infrastructure Financial Need in Massachusetts



Source: WIAC

The Clean Water State Revolving Fund (CWSRF) is the primary mechanism for distributing IIJA wastewater funding. It is a federal-state partnership in which Congress allocates funds that EPA distributes to states based on need through a competitive loan process. As a result, many projects go unfunded each year. In 2024, over \$1.6 billion in new projects were listed on the Intended Use Plan, but less than \$818 million was funded—leaving about 49% unfunded. Some

projects carry over, while others must seek alternative funding or be resubmitted. Due to its competitive and uncertain nature, the CWSRF is not a reliable source for urgent wastewater infrastructure needs, which are increasing as systems age in Massachusetts. However, in November 2025, the Massachusetts Clean Water Trust’s Board of Trustees approved over \$139 million in new low-interest loans and grants for wastewater and stormwater projects.

Repair of a collapsed clay tile sewer pipe, Springfield, Massachusetts



Source: Kleinfelder

Massachusetts is experiencing a funding gap for wastewater and sewer system upkeep, and requires

increased capital funding to upgrade and expand wastewater infrastructure.

FUTURE NEED

EPA's 2022 Clean Watersheds Needs Survey identified \$21.7 billion in needs for Massachusetts to comply with wastewater and stormwater requirements—approximately \$11 billion more than the needs identified in the 2012 report. This trend suggests funding need for clean water standard compliance will continue to increase significantly in future years. Massachusetts is among the states with the highest wastewater funding needs for small communities, with an estimated \$2.1 billion required.

Much of this current and anticipated need comes from more stringent treatment requirements for PFAS and other emerging contaminants. Another area of current and future large funding need is in sewer separation and CSO reduction work. CSO reduction is an area of interest for many communities in Massachusetts to address the public health and environmental harm they cause. For towns with large areas of combined sewer, this is a costly and time-consuming endeavor.

OPERATION AND MAINTENANCE

Regular operation and maintenance (O&M) of wastewater treatment facilities, collection systems, and the components that go into these systems keeps communities and the environment safe and healthy. Wastewater treatment facility operators are responsible for day-to-day operation of the facility. This includes operating equipment such as pumps and generators, maintaining records of operation and testing data, and other various housekeeping tasks. System operators try to inspect and clean sewer systems every 10 years as recommended by MassDEP, however, more frequent inspections and maintenance occur at the treatment plant itself as operators continually work to optimize plant performance. Operators and other facility personnel are also responsible for handling facility emergencies and other reactionary maintenance. It is estimated that 1/3 or more of system maintenance is addressing emergencies.

A major challenge faced by the wastewater industry in Massachusetts is an unprecedented shortage in

the workforce that operates and maintains essential infrastructure. Many wastewater operators in Massachusetts are aging and close to retirement age. In the next 5 to 10 years, wastewater operators will be eligible for retirement without enough young professionals emerging in the field to replace them. The wastewater industry workforce, especially in facility operations, is overwhelmingly male, with only 5.3% of licensed operators identifying as female. This gender imbalance may discourage people from historically underrepresented genders from pursuing careers in the field, worsening workforce shortages.

Many wastewater operators enter the field later in their careers through nontraditional paths, often without prior experience or training. In Massachusetts, becoming a licensed operator requires passing a computer-based exam and paying a fee, followed by ongoing renewal requirements of at least 20 Training Contact Hours every two years and additional fees. These costs can create barriers to entry.

PUBLIC SAFETY

Collection and treatment of wastewater are essential to the public health of all communities; failure of any part of the process puts public health at risk. Most wastewater treatment plants were built in response to the Clean

Water Act in 1972 and are reaching their end of useful life. Aging treatment plants and collection systems pose a risk to public safety since critical failures could lead to discharge of untreated or partially treated wastewater.

Wastewater discharges into surface water bodies through CSOs pose a threat to the health of those who use the water for recreation. The state recently enacted more stringent CSO discharge reporting requirements for public notification including live online maps, physical signage at beaches and boat launches, public education materials, texts, emails, and calls. Beaches undergo water quality testing and close in the event bacteria levels exceed safe levels. CSOs are being eliminated and reduced by communities. MWRA and its service communities alone have made a \$1.52 billion dollar investment (adjusted for inflation) into the reduction of CSOs and have eliminated more than 2.8 billion gallons per year of untreated CSO.

Methods to reduce CSO quantity and frequency, such as reduction of stormwater I/I and replacement of undersized pipes, also decrease the occurrence of wastewater backups into basements, which pose a health threat and cause significant property damage. Other potential causes of basement backups include equipment and power failure at pump stations, collapse of collection pipes, and clogging of undersized pipes, which can be mitigated by proactive replacement and maintenance of wastewater collection system infrastructure. In addition, treatment plant effluent discharges to surface and groundwater containing PFAS

and land application of treatment sludge containing PFAS threaten public health and the environment. Treatment plant owners are not generating the PFAS but finding and controlling the source within the wastewater system is very difficult.

Combined sewer overflow notification sign, Cambridge, Massachusetts



Source: Ekaterina Drizik

RESILIENCE

The challenges facing Massachusetts's sewer infrastructure are being exacerbated by the impact of climate change. Wastewater treatment plants and pump stations are located at the low points of collection systems and therefore are especially susceptible to flooding. Increased frequency and severity of storms will cause more power outages to critical equipment. More stormwater runoff into combined systems will increase the quantity and severity of CSOs and basement backups. Increased temperatures are making water bodies more susceptible to harmful algal blooms caused by nitrogen and phosphorus loading from wastewater and stormwater runoff.

Sea level rise and flooding reduce the treatment effectiveness of and cause damage to septic systems. This is an especially significant issue on Cape Cod and other small coastal communities without public sewer

systems. On Cape Cod, 95% of the population relies on septic systems. Environmental lawsuits in response to increased nitrogen and phosphorus discharge from these systems have led to multiple communities on Cape Cod taking on the costly task of installing new sewer collection and treatment systems where they otherwise would not be financially practical.

Massachusetts is taking multiple approaches to remain resilient against climate threats. Updates to, and new construction of, critical wastewater infrastructure must be designed above specific flood elevations. Coastal communities are building or expanding public wastewater collection systems to prepare for septic system failures. Water infiltration that inundates systems during storm events is being reduced by CSO reduction projects, pipe replacements, and green stormwater projects that reduce urban runoff. Through Massachusetts WARN (Water/

Wastewater Agency Response Network), wastewater systems can receive rapid mutual aid and assistance from neighboring public systems to restore service due to damage by natural or man-made incidents. There are currently 119 members of WARN. Water infiltration that inundates systems during storm events is being reduced by CSO reduction projects, pipe replacements, and green stormwater projects that reduce urban runoff.

INNOVATION

A lack of funding for aging infrastructure forces many wastewater utilities to take a reactive approach to repairs and upgrades, stymieing opportunities for innovative practices and projects. Despite these challenges, Massachusetts communities are adopting innovative wastewater solutions. Facilities are increasingly using AI-enabled predictive tools, digital twins, and 3D systems to improve data management, risk analysis, and operations. Many treatment plants are piloting advanced phosphorus removal technologies to meet regulatory requirements. In 2025, MassDEP launched a pilot program supporting energy recovery projects, including systems that capture heat from wastewater for cost-effective, renewable heating and cooling. Expanded sampling programs are tracking

As treatment and collection interfaces become increasingly digital, the threat of cyber-attacks on facilities also grows. MassDEP offers the Cybersecurity Improvements Grant Program to assist systems in improving their cybersecurity defense, mitigate the risks of cyber-attacks, and enhance overall resiliency and compliance.

PFAS, metals, and pharmaceuticals, informing public education efforts to reduce contamination and discourage harmful disposal practices. Wastewater monitoring has also been used to track COVID-19 spread and community drug use. Meanwhile, collection systems are being upgraded using advanced inspection and rehabilitation techniques such as pipe bursting, lining, and robotic repairs, reducing disruption and saving money for communities. In Barnstable, a neighborhood-scale pilot is testing innovative septic systems designed to reduce nitrogen in effluent and protect sensitive coastal waters.

Wastewater



RECOMMENDATIONS TO RAISE THE GRADE

- Prioritize increased funding at the state level and advocate for increased federal funding.
- The state legislature should prioritize establishing the Water Sector Workforce Development Fund to address the shortage of licensed sewer system operators in the state.
- Continue to fund grants and 0% interest loans for PFAS and lead projects and other resilience-based initiatives such as climate change preparedness and cybersecurity.
- Restore staffing levels at MassDEP to fully support the state's programs and initiatives to support wastewater system owners and protect natural resources.
- Public sewer systems should ensure that rates include the full cost of service including operations, maintenance, and capital improvements.
- Provide rebates, tax relief, and/or funding for areas in the state that require septic system upgrades consisting of nitrogen reducing technologies.

Exposed Underwater Sewer Siphon before Replacement, Massachusetts Public Wastewater System



Source: Tighe & Bond

Wastewater



SOURCES

City of Holyoke, MA, “Veolia Continues Service in Holyoke with new 10-year service agreement, Introducing Northeast’s First AI-Powered Wastewater Treatment System,” 2025.

Environmental Protection Agency, “2022 Clean Watersheds Needs Survey Report to Congress,” April 2024, n.d.

Environmental Protection Agency, “Innovative/Alternative Septic Systems,” n.d.

Massachusetts Clean Water Trust, “Public Water Suppliers Cybersecurity Improvements Grant Program,” n.d.

Massachusetts Department of Environmental Protection, “Guidance for the Inspection of On-site Sewage Disposal Systems,” n.d.

Massachusetts Department of Environmental Protection, “Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Surveys,” 2017.

Massachusetts Department of Environmental Protection, “Massachusetts GAP Energy Grant Program,” n.d.

Massachusetts Department of Environmental Protection, “Residuals & Biosolids,” n.d.

Massachusetts Department of Environmental Protection, “Sanitary Sewer Systems & Combined Sewer Overflows,” n.d.

Massachusetts Department of Environmental Protection, “Sanitary Sewer Systems and Combined Sewer Overflows,” n.d.

Massachusetts Department of Environmental Protection, “Wastewater Energy Recovery,” n.d.

Massachusetts Department of Environmental Protection, “Wastewater Treatment Plant Operations,” n.d.

Massachusetts Department of Public Health, “Wastewater Surveillance Reporting,” n.d.

Massachusetts Executive Office of Economic Development, “Information on the Title 5 Regulation,” n.d.

Massachusetts Infrastructure Investment Coalition, “Infrastructure Status Report: Massachusetts Wastewater Facilities,” 2007.

Massachusetts Real Estate News, “What is The Installation Cost of a Massachusetts Septic System?,” n.d.

Massachusetts WARN (Water/Wastewater Agency Response Network), n.d.

Massachusetts Water Environment Association, “Operator Information,” n.d.

Massachusetts Water Resources Authority, “2024 Annual Water and Sewer Retail Rate Survey,” n.d.

Massachusetts Water Resources Authority, “Pharmaceuticals and Drinking Water,” n.d.

Massachusetts Water Resources Authority, “Your Sewer System,” n.d.

New England Interstate Water Pollution Control Commission, “Interstate Waters,” 2021.

New England Interstate Water Pollution Control Commission, “MA Wastewater Operator Exam,” n.d.

New England Interstate Water Pollution Control Commission, “MA Wastewater Operator Renewals,” n.d.

Tighe and Bond & UNC Massachusetts, “Water and Wastewater Rates Dashboard,” n.d.

WaterOperator.org, “The Impact of Climate Change on Massachusetts Septic Systems,” 2023.