January 2026

Special Commission on Micromobility Report

This page is intentionally blank

Table of Contents

Summary of Recommendations

The Commission recommends 16 actions that the legislature, MassDOT, and several other entities should take to respond to the increasing prevalence of micromobility in the Commonwealth, grouped into four thematic categories. These recommendations will be explored in more depth later in this report in Chapter 4.

January 31, 2026

To the Commonwealth of Massachusetts Legislature -

In November 2024, as part of the economic development bond bill, you created the Special Commission on Micromobility to focus on three key areas: classification, regulation, and expansion. First convening in April of this year, the Commission met five times through the end of December to discuss the current status of micromobility use and rules across the Commonwealth. The Commission has 15 members including secretariats, policy makers, public safety officers, advocates, and innovators. We heard from experts on topics related to battery fire safety, discrepancies related to classification and enforcement, and incentive programs to expand the daily use of micromobility. We want to thank the Chairs of the Joint Committee on Transportation and the MassDOT team, specifically the staff of The Lab, for their skillful stewardship of a complex and comprehensive process. After nine months of work and discussion, we are pleased to present the Commission's final report.

The Commission recognizes the importance of our charge to address several of the existential crises facing our Commonwealth, including roadway congestion and motor vehicle pollution: Massachusetts ranks fifth in the nation for roadway congestion, despite being third in capital and bridge spending per mile.[1] Our overall performance ranks 48th among the states, with the average person spending 93 hours in traffic annually, and our transportation sector remains the state's largest source of greenhouse gas emissions, accounting for roughly 37% of the total—putting serious pressure on our ability to meet our mandated 2050 climate goals.[2]

Micromobility presents a solution to many of these challenges: in Massachusetts, 57% of all trips are three miles or fewer—a typical biking and scooting distance for many people—and yet 80% of those trips are currently made in automobiles.[3] Increasing the use of micromobility for short trips can reduce congestion and emissions statewide, while delivering meaningful benefits such as improved physical and mental health, greater affordability and independence, and expanded access to the Commonwealth's natural resources.

The Commission's charge, then, is to provide a framework of regulatory and incentive recommendations for the legislature and administration to act upon to accelerate the adoption of micromobility in a safe, sensible, and comprehensive way. By enabling and encouraging new ways to move around, we can begin to meaningfully address the real mobility challenges we face.

Our recommendations aim to enhance safety on roads and pathways while improving accessibility and affordability for everyone, including those most vulnerable—such as older adults, youth, and people with disabilities. Micromobility should be proactively integrated into the Commonwealth's transportation system, rather than managed through reactive and fragmented regulations, to ensure that all users—regardless of speed or device—can share space safely and harmoniously.

This requires consistent standards so that regulators, law enforcement, policymakers, planners, retailers, and consumers share a clear understanding of how to move Massachusetts forward to a cleaner and less congested future. In the near term, we propose a tiered classification system for micromobility devices based on top speed, along with simple, effective data metrics to track usage and crashes. Looking further ahead, we outline strategies to expand adoption through innovation, design guidance, infrastructure investment, education, and targeted public funding.

This report is an important first step that we hope will inform timely legislative and administrative action to bring clarity, consistency, and direction for micromobility policies in the Commonwealth. We thank you for the opportunity to serve and to offer our recommendations on these important issues.

Sincerely,

The Special Commission on Micromobility

Purpose of the Commission

The Massachusetts Legislature sought to establish the Special Commission on Micromobility to provide legal and regulatory clarity to micromobility users, and all other road users interacting with micromobility users; to support and enhance mobility access for residents of the Commonwealth; and to ensure Massachusetts remains innovative and competitive in this emerging industry.

In the Session Law Acts of 2024, Chapter 238, Section 306, lawmakers established the commission, saying:

> *"There shall be a special commission to study and recommend ways to regulate micro-mobility vehicles. The study shall include, but not be limited to: (i) a review of current state and local laws and regulations for micro-mobility vehicles; (ii) recommendations to regulate micro mobility vehicles, including on bike paths, sidewalks and shared use paths; and (iii) recommendations to support the expansion of micro-mobility vehicle use and innovation including shared micro-mobility options for municipalities."*

By naming a number of relevant state agencies, as well as external partners and subject matter experts, the Legislature gave Massachusetts the opportunity to explore best practices, thoughtfully engage with complex questions of regulation and expansion, and make solid recommendations for the Legislature to consider.

The commission could not solve every issue raised in its short tenure, and has therefore highlighted areas requiring future work, which the Legislature could assign to new working groups going forward.

Commission Members

Phil Eng	Chair, Interim Secretary, *MassDOT*
Leonardi Aray	President, *Consulting Planners of Massachusetts*
Rep. James Arciero	*2nd Middlesex;* Chairperson, *Joint Committee on Transportation*
Gerald Autler	Director of Trails and Greenways, *DCR*
Naroa Coretti Sánchez	Researcher, *MIT Media Lab*
Sen. Brendan Crighton	*Third Essex;* Chairperson, *Joint Committee on Transportation*
Dorothy Fennell	Co-Founder & CEO, *CargoB*
Nick Gove	Deputy Chief of Transportation, *City of Boston*
Chief John G. LeLacheur	Chief, *City of Beverly Police Department*
Nathaniel Malloy	Senior Planner, *Town of Amherst*
Galen Mook	Executive Director, *MassBike*
Scott Mullen	TDM Director, *A Better City*
Kara Oberg	Owner, *The Ride Cafe*
Alicia Rebello-Pradas	Senior Advisor, *Executive Office of Public Safety and Security*
Stefanie Seskin	Board Member, *WalkMassachusetts*

Alternate Commission Members

Alex Chilton	Legislative Director, *Sen. Crighton's Office*
Brendan Kearney	Executive Director, *WalkMassachusetts*
Craig Kelley	Founder, *Urban Core Strategies*
Jonathan Gulliver	Undersecretary, *MassDOT*
Stella Lensing	Trails & Greenways Planner, *DCR*
Susan Terrey	Deputy Secretary, *Executive Office of Public Safety and Security*

Commission Support Cast

Kris Carter	Chief Innovation Officer, *The Lab @ MassDOT*
Caroline DeMarco	Graduate Co-op, *The Lab @ MassDOT*
Jaclyn Youngblood	Deputy Chief Innovation Officer, *The Lab @ MassDOT*

Special thanks to Niren Sirohi, Bonnie Polin, Monica Tibbits-Nutt, Hayes Morrison, Kevin Galligan, Mike Knodler, Angelina Caggiano, Pete Sutton, Faisa Sharif, Matt Warfield, Kunthea Ly, Elijah Sinclair, Miller Nuttle, Tejus Shankar, Laura Kavanagh, Mike Carpentier, Derek Krevat, Meghan Haggerty, Ha Nguyen, Rebecca Yao, Amélie Clark and everyone else who gave comments, lent their expertise, and helped make the Commission's work possible.

Executive Summary

Micromobility, including electric bicycles, electric scooters, mopeds, and other small, powered devices, has become a common sight on streets and paths across Massachusetts and the nation. These devices offer people a convenient, affordable, and low-emission way to travel short distances, which make up a large share of daily trips. Micromobility can help reduce traffic congestion, lower greenhouse gas emissions, and expand access to jobs, schools, and services. However, rapid growth and fast-changing technology have made it difficult for laws and regulations to keep pace. As a result, riders, municipal officials, law enforcement, and the public often lack clear guidance about where different devices belong and how they can be used safely.

The Legislature identified the need to further study these devices and develop possible regulatory and statutory frameworks that could be implemented. The lack of clarity in existing laws and regulations impedes the effective governance of these devices, and the ability of state and local government to support necessary infrastructure to accommodate micromobility device users.

The Special Commission on Micromobility was formally established to provide recommendations for how best to structure regulation and improve transportation options in this growing sector.

In Massachusetts, the need for action is urgent. The Commonwealth struggles with some of the worst traffic congestion in the country, while transportation remains our largest source of climate pollution. Many trips are short enough to be taken on micromobility devices, yet existing laws do not clearly distinguish between slower, bicycle-like devices and faster, heavier vehicles that pose greater safety risks. This has led to confusion, uneven enforcement, and a patchwork of local rules. At the same time, serious crashes and injuries, often involving young riders, delivery workers, and pedestrians, have increased public concern. These challenges highlight the need for clearer statewide rules that improve safety without limiting access to these affordable transportation options.

The Commission's recommendations begin with creating a clear and modern framework for micromobility classification. At the center of this framework is a speed-based tier system that groups devices according to their maximum operating speed. Speed is one of the strongest indicators of risk, affecting stopping distance, crash severity, and the suitability of different devices for shared spaces. By organizing micromobility into clear speed tiers, the framework provides a consistent way to determine where devices can operate and what safety rules apply. This approach replaces unclear or outdated labels with a system that reflects how micromobility users actually behave in real-world conditions.

Under the proposed framework, lower-speed devices would be treated more like traditional bicycles and allowed broader access to paths and bike facilities, while higher-speed devices would face stricter rules, such as roadway use, age limits, or additional safety requirements. This tiered structure allows the state to prioritize safety for vulnerable users without restricting low-risk devices that support everyday travel. The Commission also recommends a simple "Micro ID" system tied to these tiers, which would help identify device type and speed class, support enforcement and data collection, and reduce confusion for riders and retailers. Together, the speed tiers and Micro ID system create a flexible foundation that can adapt as technology evolves.

A second set of recommendations focuses on safety and enforcement, recognizing that clear rules must be paired with education and reliable data. Better crash reporting is needed to capture micromobility incidents more accurately, including crashes that do not involve motor vehicles. The Commission also recommends improved training for police officers so laws can be applied consistently and fairly. To reduce risk on shared use paths, the Commission recommends a default maximum speed, along with public education campaigns on safe riding, battery safety, and respectful behavior around pedestrians and other road users. Model local ordinances and carefully designed automated enforcement tools could further support municipalities while keeping enforcement focused on the most dangerous behaviors.

The final group of recommendations addresses infrastructure and growth, emphasizing that safe micromobility use is supported by well-designed streets and paths. The Commission recommends updated statewide design guidance that reflects mixed-speed travel and newer device types, along with better integration of micromobility into transportation planning and transit systems. Dedicated funding is needed to close gaps in bike and path networks, improve intersections, and create safer spaces for vulnerable users. To expand access, the Commission also recommends growing bikeshare systems and increasing funding for e-bike subsidies.

The Commission recognizes that this report is the beginning of a conversation, not an endpoint. Technology will continue to evolve, and new devices and business models will raise new questions. For this reason, the Commission identifies several areas for future work, including studying commercial micromobility use to better understand safety, labor, and infrastructure impacts; battery safety; data sharing; and liability frameworks. Continued collaboration among state agencies, municipalities, advocates, industry, and residents will be essential. With thoughtful action, Massachusetts can lead by taking bold action to improve safety, support innovation, and enable clean, affordable transportation options for people across the Commonwealth.

Introduction

In recent years, Massachusetts has seen a dramatic surge in the use of electric-assisted bicycles, scooters, mopeds, e-motos (electric dirt bikes), and other micromobility devices. This is a national trend, too. Micromobility has become increasingly visible on our roads and paths: commuters riding to work, students gliding across campus, moped-riding delivery drivers shuttling meals down local streets, and urban or suburban residents opting for e-bikes over cars for daily trips. With this rapid growth that has unlocked mobility for many has come an increase in serious injuries,[4] crashes, and confusion over how to best accommodate these devices. It demands our attention.

This report details the efforts of the Special Commission on Micromobility over the last year. Commission members arrived at a set of recommendations to improve the safety of our public ways, address confusion around these devices, and enable more people to access the mobility they offer. The Commission's mission was to evaluate the existing regulatory and legal framework governing micromobility in Massachusetts and develop a set of concrete recommendations to guide how micromobility devices are safely and equitably integrated into our transportation system.

Although the term "micromobility" can be difficult to define, the Commission spent its time looking at e-bikes, e-scooters, mopeds, and other powered devices that are 'smaller than a golf cart' that are found on streets and paved paths in Massachusetts.

A Surge in Popularity

Micromobility devices unlock mobility for many people in the Commonwealth at a price point that they can afford. E-bikes, e-scooters, and other powered devices can help people access work, school, and social activities that keep our economy thriving and the population connected. There are many positive benefits to micromobility, including significant emission reduction potential.[5] The prevalence of micromobility devices has skyrocketed nationwide over the last ten years. Consider the case of just e-bikes: in 2016, they made up 2 percent of U.S. bicycle sales revenue. A decade later, they account for 28 percent[6] of the market. This equates to over 1.7 million e-bikes[7] sold in 2024. Consider the case of the older adult demographic experiencing this growth in micromobility. Charlie Knight, a Springfield, MA resident and a recent participant in the Pioneer Valley Planning Commission's ACT4All program that provided low-cost e-bikes to structurally disadvantaged residents put it this way "...this e-bike makes it almost as if I was 45 and not 77!"[8] *Cycling Past 50*,[9] a recurring North American survey of older adults who cycle, reported a growth in older adult ownership of e-bikes (from 3 percent in the Year 1 survey to 29 percent in the Year 5 survey). This is not to say that all older adults choose or are able to bike, but rather to show that even as folks age, some people are finding e-bikes a useful tool to unlock more personal mobility, either for transportation or recreation.

But micromobility isn't just a means of recreation or transportation; it unlocks economic opportunity. Luis Montes De Oca of Lawrence, MA uses a low-cost shared e-bike as a tool for his job making grocery deliveries.[10] The potential of these devices to improve the lives of people in the Commonwealth with access to opportunity or improved health is significant. However, as with any new technology, micromobility brings with it the need for improved regulations, new societal norms, changes to infrastructure, more education, and well-constructed laws that foster safe use.

Serious Injuries and Crashes

The number of emergency department visits for both e-bike and e-scooter injuries have also increased. Micromobility-related injuries have trended upward since 2017, increasing an estimated average 23 percent annually according to the Consumer Product Safety Commission.[11] Although it's not an apples-to-apples comparison, it bears noting that the

total number of serious injuries and fatalities from motor vehicle crashes is significantly higher than those from micromobility crashes in Massachusetts.

From low-power pedal-assist bicycles to high-speed e-unicycles and throttle-driven scooters, the pace of innovation has been dizzying. Because of this device diversity, a single term like "e-bike" or "micromobility device" can mask a wide spectrum of performance, risk, and regulatory needs. This has left laws and regulations in Massachusetts and other states across the country racing to catch up with the safety challenges local communities are experiencing.

The growth in the variety and severity of injuries tied to micromobility devices is concerning. Trauma centers[12] are beginning to see a steady uptick in severe injuries tied to high-powered e-devices. The biggest risks come from larger and faster vehicles. Off-road e-dirt bikes and illegally modified scooters can reach speeds well above the current classes of e-bike and mopeds (currently termed *motorized bicycles*) defined in Massachusetts General Laws.

Off-road electric dirt bikes, also referred to as 'e-motos', often have weights closer to mopeds than traditional bicycles, magnifying risks of injury to riders and pedestrians. Unfortunately, they are also often conflated in reporting and broadly grouped together in common parlance with Class 1 and Class 2 e-bikes that operate at much slower speeds and with smaller motors.

This Commission did not include Off-Highway Vehicles (OHV)

These vehicles, commonly used for recreational, off-road activities, include ATVs, dirt bikes, and 'four-wheelers'. They are regulated by MGL Chapter 90B, Section 20 and overseen by the Massachusetts Environmental Police. The Commission also excluded the emerging category of "mini-mobility" or "Local Use Vehicles", which are larger and are often built with three or four wheels. MassDOT has recently joined a multi-state, multi-city research effort looking at this separate topic.

Emerging Hazards

Further complicating the picture are risks beyond crashes. Many e-bikes and e-scooters use lithium-ion batteries. When these types of batteries malfunction or are improperly charged, they can cause dangerous fires in an event called "thermal runaway". The Commission spent time learning from the former Fire Commissioner of New York City on this topic, something of concern for firefighting professionals in New York City, which has had over 30 deaths from battery related fires since 2022.[13]

Beyond the fire risk of batteries, nationally, micromobility-related fatality counts have risen as more devices contend for space on our car-centric infrastructure. But without good data, the picture in Massachusetts is still fuzzy. Regulatory clarity, better data, education, and enforcement can help us assist riders and other roadway users.

It is important to keep in mind that micromobility devices represent a small fraction of the overall fatal vehicle crashes in Massachusetts each year. While we do not have a reliable publicly available dataset for fatal micromobility crashes that don't involve a motor vehicle, we do know that there were 10 fatal crashes involving bicycles with a motor vehicle in 2024. Collisions involving motor vehicles remain the top contributors to fatal crashes. In 2024, 349 people died in all motor vehicle-involved crashes in Massachusetts.

A Growing Concern

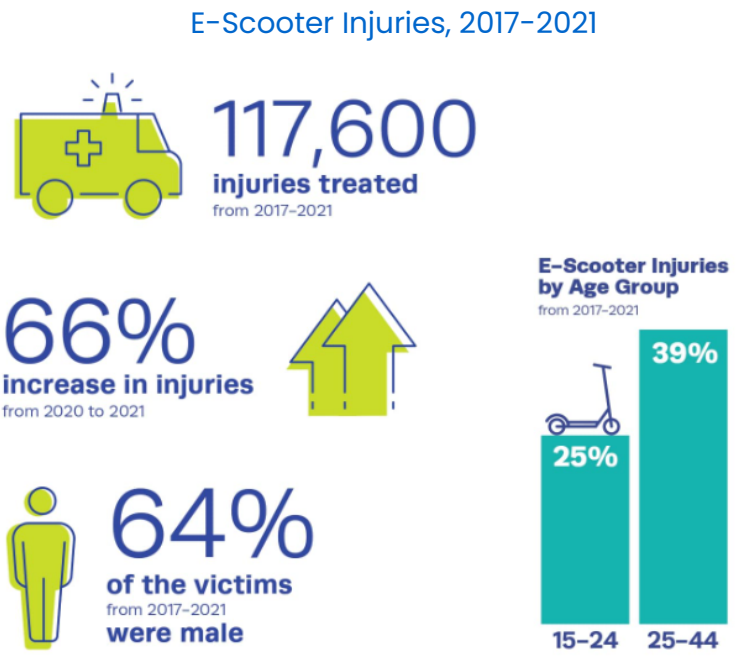
In recognition of these mounting risks and the evolving transportation landscape, the Massachusetts Legislature tapped the leadership of the Massachusetts Department of Transportation (MassDOT) to coordinate the Special Commission on Micromobility.

The Commission was tasked with turning around recommendations in a matter of months to the legislature. The urgency indicated was not hypothetical. Recent events underscore just how real and devastating the consequences of regulatory gaps can be.

- In June 2025, a 13-year-old in Plymouth suffered "catastrophic" injuries after his e-moto collided with a car. The boy had to be flown to a Boston hospital with 24 broken bones and brain and abdominal bleeding. This incident was not the first serious injury crash involving e-motos in Plymouth this year.[14]
- In early August 2025, a 64-year-old man from Braintree was hit by a delivery driver on an e-bike in Copley Square, Boston. He was hospitalized with life-threatening head trauma and died from his injuries a few weeks later.[15]
- In late November 2025, a 13-year-old in Stoneham was killed when the electric dirt bike he was riding crashed into a car. The tragedy shocked the community and triggered calls for stricter oversight of e-dirt bikes, improved classification of micromobility vehicles, and mandatory licensing or age restrictions.[16]

The combination of age and speed is a classic cocktail for risk on America's roads. This trend shows up in motor vehicle crash data where teen drivers have a higher crash rate than any other age group.[17] Perhaps it is not surprising that this trend also exists for this new set of devices, some capable of speeds nearing 100 MPH. For example, a report from the Consumer Product Safety Commission in 2023[18] found that children 14 years and younger accounted for 36 percent of micromobility injuries from 2017 to 2022, double their 18 percent proportion of the U.S. population. Age restrictions on faster devices are starting to emerge in other states.

This Commission was tasked with striking a balance between unlocking affordable mobility for residents and improving safety for vulnerable road users. It is clear that the rapid uptake of powered micromobility devices in Massachusetts has reached a tipping point for action.



Source: US Consumer Product Safety Commission, Micromobility Products-Related Deaths Injuries and Hazard Patterns 2017-2021

Why the Commission's Work Matters

The formation of this Commission represents an inflection point. At its best, micromobility delivers significant benefits: reduced traffic congestion, lower emissions, more equitable access to transit, a flexible alternative to cars, and improved physical and mental health. But without careful analysis and action, those benefits risk being overshadowed by mounting human costs in injuries, deaths, and public distrust. The choices we make on this topic matter.

The Commission's work offers an opportunity: to re-envision mobility in Massachusetts; to integrate micromobility thoughtfully and safely; to expand access to clean, affordable, efficient transportation; to design streets, sidewalks, and trails that accommodate riders alongside pedestrians, drivers, and transit users; and to lay the groundwork for responsible micromobility usage not just for today, but for decades to come.

This moment demands realism, bold policy thinking, and collaboration among state agencies, municipalities, transit planners, public health experts, local law enforcement, schools, local businesses, and community stakeholders. If done well, Massachusetts can lead with a model that balances innovation and safety, sustainability and responsibility.

Call to Action

In this report to the legislature from the Special Commission on Micromobility, a series of recommendations are laid out to address this challenge. Now is the time to commit to a safer, smarter micromobility future. That means:

- Investing in accurate and comprehensive crash and injury data collection, so that policy is grounded in evidence
- Revising laws and regulations to address the realities of modern powered micromobility devices, including appropriate classification that is tiered based on speed, outlines safety requirements, and sets clear rules for shared use paths, bike lanes, and streets
- Expanding and improving infrastructure: protected bike lanes, separated micromobility corridors, shared use paths, and traffic-calming designs that protect vulnerable road users
- Promoting public education around safe riding practices, battery and fire safety, communication on benefits and risks, and respectful coexistence among riders, pedestrians, and drivers
- Engaging communities to understand how micromobility intersects with equity, accessibility, and environmental justice
- Expanding access to shared micromobility systems throughout the Commonwealth and empowering programs that provide disadvantaged residents a new tool for accessing their communities or participating in the economy

This report could be the first leg of a journey for the Commonwealth. It is a roadmap of sorts. If we do this right, we can welcome micromobility not as a dangerous add-on to our streets, but as a safe, equitable, and integral part of our transportation future.

01

Micromobility in the US

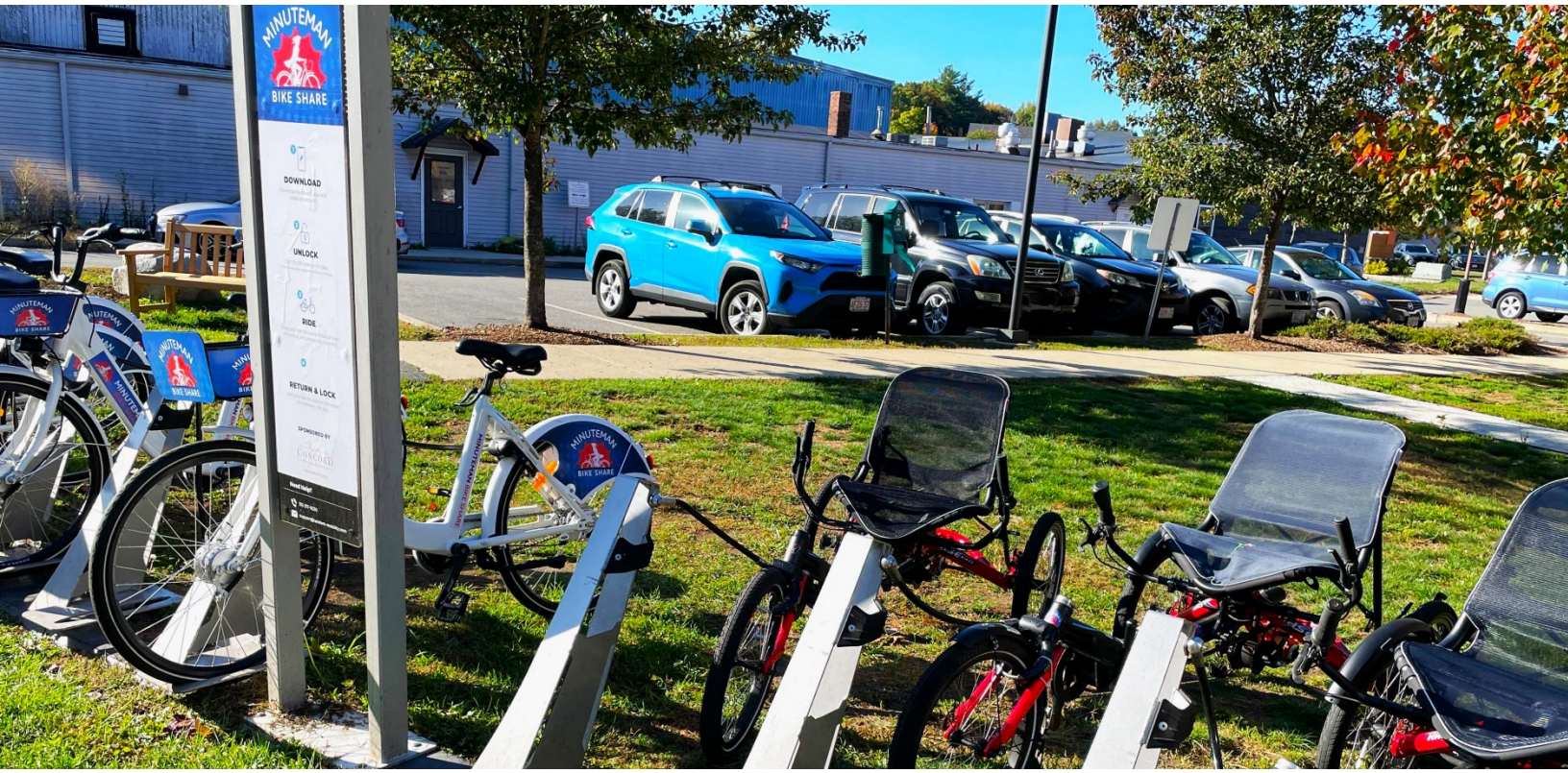
Micromobility Share Systems

Micromobility share systems have cropped up in nearly every major city across the globe in the last 15-20 years to offer short-term rental bicycles, e-bikes, or e-scooters at centralized (docked) or decentralized (dockless) locations. Shared micromobility provides low-cost public transportation without the need for personal ownership. While bikeshare systems emerged slowly over the last two decades with considerable public investment, input, and steady growth of ridership, e-scooters seemed to magically appear overnight in some cities in the late 2010s-early 2020.[19] Contrary to the station-based bikeshare systems that often took years to fund, plan, and deploy, the two biggest players to date, Miami-based Bird Global and San Francisco's Lime, began their services by placing hundreds of scooters at a time on city sidewalks and other publicly shared spaces, most of the time without permits or permission from the city. This strategy initially worked for them, and although they were kicked out of some cities, Bird now operates in 350 cities and Lime operates in over 30 countries.

Learn more about Bluebikes in **Appendix II: Case Studies**

Here in Massachusetts, the most prominent and long running docked bikeshare systems are the metro-Boston system of BlueBikes (initially launched as Hubway) and the Pioneer Valley system of ValleyBike. Various dockless pilots were launched in the Commonwealth as well. Brookline piloted a dockless shared e-scooter program in 2019 with the companies Lime, Bird, and Spin. West Springfield and Pittsfield also tested out dockless scooter share with Bird in 2022-2023. Finally, Lime won an open Request for Proposals (RFP) and operated thousands of dockless bicycles, including pedal-assist e-bikes, in 16 metro Boston communities for 18 months between 2018-2019.

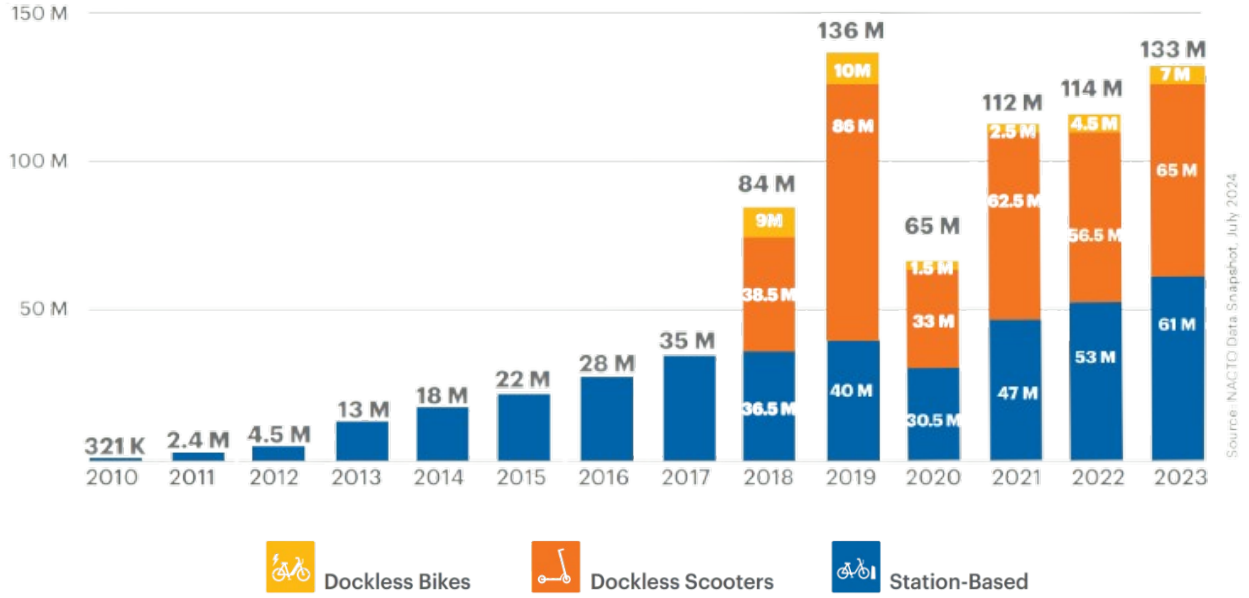
Cities have evolved in their permitting strategies in recent years and the age of rogue deployments of dockless shared bikes and scooters has largely ended. Micromobility share systems are as popular as ever, though. The National



Concord, MA

Association of City Transportation Officials (NACTO) estimates that in the US, 133 million trips were taken in 2023, surpassing pre-pandemic numbers and increasing 20% since the previous year. [20] These micromobility share systems are a part of the fabric of public transit in the city, and there are many ways cities have implemented them. According to the North American Bikeshare and Scootershare Association (NABSA), shared micromobility was responsible for offsetting 101 million pounds of CO_2 in 2024. [21] Of the 171 million shared micromobility trips taken in 2024, 35% replaced a car trip.

Shared Micromobility Ridership in the US



Shared Micromobility in the US, NACTO 2024

Shared E-scooters

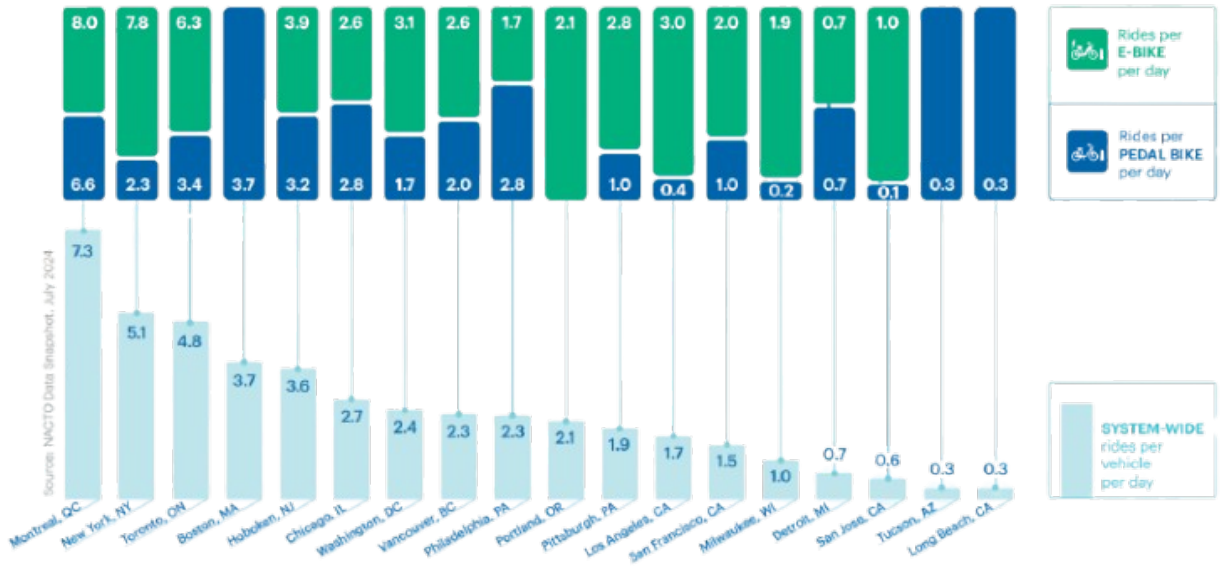
Nearly every shared e-scooter program is designed as a dockless system. The key characteristic of a dockless system is that users can park an e-scooter anywhere when they are finished using it. In a docked system, by contrast, the rider is required to leave the device at a specific docking location, usually a streetside kiosk.

Effective management of dockless scooters has evolved from the early days of 'scooter drops'. In some cities, 'lock-to' requirements and parking corrals have helped address sidewalk clutter, but docked e-scooter systems are rare in the US. At the time of this report, only Chicago has a docked e-scooter system. Lyft Urban Solutions, which operates the local bikeshare program Divvy Bike, has been experimenting with introducing e-scooters that are compatible with the existing bikeshare infrastructure.[22] The pilot is still underway, and while e-scooters are popular in many cities, it remains to be seen what impact this docking application will have on people's travel preferences.

The innate decentralization of scooter parking in dockless systems can be unpopular with some local residents, and non-compliance with federal manufacturing guidelines at the time of the initial boom of dockless scooters led Massachusetts to halt their introduction. Brookline experimented with a limited pilot of a dockless scooter program in 2019, as mentioned above. Brookline's dockless e-scooter pilot geofenced the scooters to the town of Brookline, and a rider couldn't start a ride if they were outside that geofence. The scooters were placed at designated locations within Brookline at 5 AM and removed every evening at 10 PM. New riders were required to watch some educational content before their first ride and had to submit ID proving they were over the age of 18. Despite survey data that showed over 68% of people wanting scooter share to continue, the Town did not continue the program after the pilot ended.[23]

In most places where Lyft operates a service, it has begun removing all dockless bikes and scooters from its fleet, citing reduced labor costs, better fleet management, and better overall relationships with cities with docked systems.[24] Lyft Urban Solutions currently holds the operating contract for Bluebikes, which is the publicly owned bikeshare service in the Boston metro area.

Trips Per Station-Based Bike Per Day, September 2023



Trips Per Station-Based Bike Per Day, September 2023, NACTO 2024

Bikeshare

Bikeshare refers to programs that include both e-bikes and traditional pedal bikes, and like e-scooters has seen a notable increase in use in recent years. The same dichotomy between docked and undocked systems discussed above for scooter-share appears in bike-share, as well. E-bikes, however, need a place to charge. Unlike traditional pedal bikeshare that can operate stations on a small solar charger, e-bikes need to be plugged in. Combined with proprietary charging hardware, docked e-bikes are harder to steal, too. On average, e-bikes get more rides per day than traditional pedal bikes, in some cities by a factor of two or three.

Dockless bikeshare systems are less prevalent than docked bikeshare systems, but not non-existent. Both Bird and Lime have e-bike offerings. According to NACTO, about 7 million rides were taken in the US and Canada on dockless e-bikes in 2023 [25]. They make up about 10% of all devices and 4% of all rides and seem to be most popular in fair-weather cities.

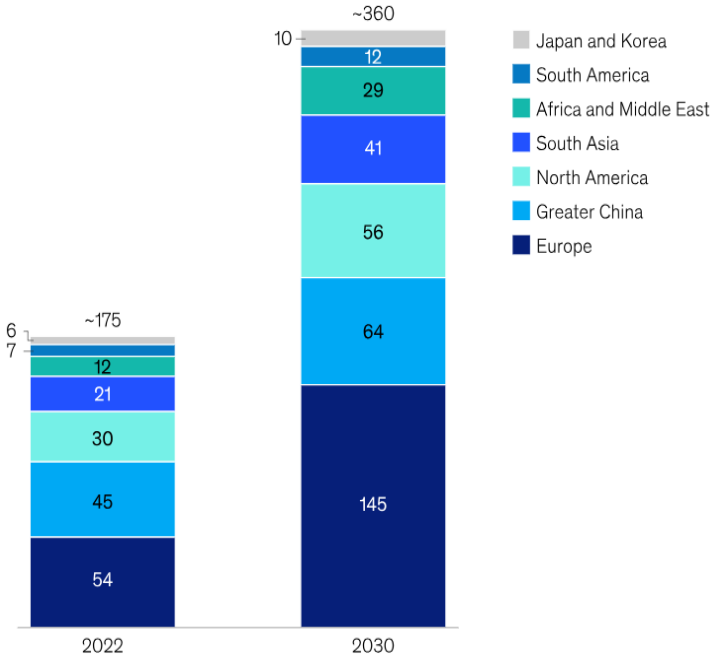
In 2019, the Metropolitan Area Planning Council (MAPC) reviewed 18 months of operation data from Lime, who introduced a dockless bikeshare program in 16 municipalities. They found that, unlike docked bikes, which see significant use as connectors to public transit, dockless bikes provided connections to moderate- and low-density neighborhoods that do not see enough volume to support a dedicated bikeshare dock.[26] Market forces led to Lime ceasing operations in Massachusetts in early 2020. The company never reentered the market, but many of the pilot municipalities ultimately joined the Bluebikes system. ValleyBike is the e-bikeshare system in the Pioneer Valley and Metro Mobility recently rolled out e-bikeshare in Worcester, Lawrence, and Lowell.

Consumer Growth

Private ownership of micromobility devices has increased in the last 10 years and is expected to continue to rise steadily in the next decade. With an increasingly environmentally and budget conscious consumer base, innovations in battery technology, and the accelerating cost of owning a car, the US micromobility market is ripe for expansion.[27]

Market Outlook

The US micromobility market saw impressive growth from 2022 to 2023, when it grew from $20 billion to $35 billion.[28] In markets like China and Europe that are further ahead than the US in adoption, growth more than doubled in that period. The global market value is projected to grow from $175 billion in 2022 to $360 billion in 2030, with the North American market potentially being worth $56 billion.[29]



Source: McKinsey, Value of the Micromobility Market by Region, $ billion, 2024

E-bikes are quickly outpacing traditional pedal bikes in terms of imports.[30] In 2022, there were 1.1 million e-bikes sold in the United States, almost four times as many as were sold in 2019.[31] E-bikes are expected to see sustained demand, and there is growing demand for add-on services like theft protection.[32]. E-bikes are increasingly representing larger percentages of bike imports every year.[33]

This growth is not without its challenges. Most manufacturers are international, the largest being companies in China and Taiwan. With little domestic manufacturing capacity, prices could stay high even as demand increases. Complex supply chains and manufacturing logistics have historically been the drivers of startup failures even as top line revenue grows.[34] Infrastructure like publicly available charging capacity, safe travel lanes, secure parking, and multimodal integration will be key to meeting the needs this growth will bring.[35]

Demographics

Micromobility users represent a diverse set of backgrounds, use cases, abilities, and incentives. Potential users are influenced by a number of factors, including trip efficiency, perceived safety, and weather.[36] One study looking at e-scooter adoption in Washington DC and Portland, OR found that female riders tended to be young, affluent, and likely have other vehicles or modes of transportation available to them.[37] These riders used e-scooters for tourism, leisure, and time-saving. Male riders, meanwhile, spanned a wider range of ages and income groups. They tended to not have very many transit options and used their e-scooters for commuting and errands. An environmentally conscious individual is more likely to try micromobility, but concerns around privacy, safety, and difficulty of use hold back adoption. [38]

Mode Shift

According to the Bureau of Transportation Statistics, it costs the average owner more than $1000 a month to own and maintain a car.[39] Further, more than half of all car trips are less than three miles,[40] a distance that is reachable by micromobility for many people. At the time of writing, a monthly unsubsidized Bluebikes membership is $30.50, and an annual pass is $13/month. On average, a new e-bike will cost around $1,500 to $2,000, and a new e-scooter can cost less than $500. These prices are expected to drop as the market expands. One study found that e-bikes led to a 19 percent reduction in car mode-share in households that own two types of modes, as compared to car-owner-only households.[41] A range of other studies found that new owners of e-bikes replaced short car trips with their e-bikes 20% to 86% of the time.[42]

The value proposition for the average consumer is clear given these numbers, especially for people who live in dense urban areas where the cost of storing a car can be burdensome. Micromobility can also act as a connector to public transit nodes, giving more mobility options to people who live farther away from transit stations or in single-car households. For people who are reliant on a car to get to work but are kept in a cycle of poverty because of the cost of that vehicle, micromobility can act as a force to break that cycle. E-bike subsidy programs have been successful and in high demand. The program run by the Massachusetts Clean Energy Center (MassCEC) this past year, which was designed to give out 2500-3000 vouchers, received interest from over 10,000 voucher applicants.

Learn more about the MassCEC e-bike voucher program in **Appendix II: Case Studies**

Food and Package Delivery

According to estimates by the Metropolitan Area Planning Council (MAPC), in 2023 there were about 445 million package deliveries in Massachusetts and more than 120 million "rapid food deliveries".[43] Massachusetts has a higher share of e-commerce for retail sales compared to the U.S. average (25% and 16%, respectively). Those e-commerce sales are typically delivered directly to buyers at home, work, or a community parcel locker.

These numbers are increasing. National data indicates upward trends for both percentage of retail sales that are e-commerce, as well as net revenues from e-commerce (including both package and rapid food delivery).[44] According to MAPC's report, "In 2023, the United States' online food delivery market generated around $287.5 billion in revenue, with projections suggesting a 74% increase to over $500 billion by 2028."[45]

There is clear demand from consumers due to the convenience and speed of e-commerce deliveries. Therefore, as e-commerce purchases increase, for both parcel and rapid food delivery, we can reasonably expect the traffic from delivery vehicles to increase, too.

In New York City, for example, one study estimated that 536,000 packages were delivered daily in Manhattan. These were made via an estimated 853 delivery trucks. Sensor data was used to identify double-parked trucks and vans in four different locations. Double parking was identified in all four locations — most commonly on weekdays — and ranged from five to over 70 minutes of double-parking, with an average duration of 10.5 minutes.[46] Double-parking by delivery companies contributes to congestion on streets by forcing vehicles to queue behind the double-parked vehicle, or maneuver into the adjacent lane, thereby impacting traffic in both directions. It also has significant emissions implications. Shifting to smaller delivery vehicles, including e-bikes, could reduce or eliminate congestion-causing double parking in dense urban areas.

Some food and parcel service delivery companies have seen an increase in contracted deliverers making deliveries on micromobility devices, such as mopeds or electric bicycles.[47] While this is likely an improvement in terms of emissions and congestion, it still creates potential safety issues, particularly when these vehicles operate in traditional bike lanes at speeds that are perhaps unexpected for the width of the lane and by others users of the lane; sometimes going against the flow of traffic; or riding on sidewalks to reach destinations as quickly as possible often due to financial incentive structures imposed by the platforms.

Source: MAPC, Boston Delivers

Here in Massachusetts, Boston has experimented with shifting some of these parcel deliveries to zero emissions vehicle modes, such as electric cargo bikes. The City of Boston's Boston Delivers project ran from September 2023 through January 2025. The grant-funded program delivered approximately 20,000 items via cargo e-bike, logging nearly 6,000 miles traveled. One of the goals of the program was to right-size delivery vehicles for Boston's narrow, congested streets. Another was to improve safety by reducing the size, speed, and environmental impacts of commercial delivery vehicles.[48] According to the University of Washington's Urban Freight Lab, the program's evaluator, "Boston Delivers shows both the promise of the shift [to cargo e-bike delivery] and the challenges in connecting success with other planning and policy efforts."[49]

Boston has also been working to address challenges largely associated with food delivery platforms. In the downtown area, deliveries have increasingly moved from four-wheel motor vehicles to various micromobility devices. While there are many positives associated with this shift to smaller vehicles, public concern over the poor operating behaviors of those delivery drivers responding to the time-incentives of the food delivery platforms led to the City of Boston issuing an ordinance requiring app-based food delivery platforms to 1) have a permit to operate in the city, 2) agree to certain data-sharing requirements and 3) carry umbrella insurance for all of their contracted deliverers.[50]

Seattle recently launched its Commercial E-Cargo Bike program. The program is one response to the city's expected 42% increase in goods traveling the freight network by 2050. In September 2025, Seattle City Council passed legislation classifying e-cargo bikes as a legal vehicle type, allowing the Seattle Department of Transportation to permit their ability to park at the curb. Through its program, Seattle hopes businesses will realize cost-savings (e-cargo bikes being cheaper to purchase than vans or trucks); and to decrease delivery times (one study showed cargo bikes can make deliveries up to 60% faster than vans or trucks in urban areas).[51]

The growth in e-commerce, and those deliveries being made on micromobility devices, is not just a trend in the United States. In London, cargo bikes reportedly traveled 6% faster than cars throughout the city's congested streets, representing a time-savings for delivery service providers.[52] Further, according to a study by Columbia University's School of Professional Studies, London is "projecting that by 2030, 17 percent of all delivery trucks in London will be replaced by bicycles, removing 30,000 tons of carbon-dioxide from the air."[53]

While e-commerce and its associated deliveries will increase, cities and towns will have the same finite sidewalk, street, and curb space. Navigating that balance and associated tradeoffs will be an important task for the 351 municipalities across the Commonwealth.

Policies Across the US

At the time of the writing of this report, there is no one unifying federal policy that regulates the classification or use of micromobility devices. Rules vary widely from state to state. With no federal guidance on the horizon, state and local policies are evolving rapidly. New approaches are being tested all over the country. Nearly all states have an e-bike policy, and 28 states have passed some form of e-scooter law. This section looks at policies that have passed and been implemented as of June 1, 2025.

Federal Guidance

E-bicycles were officially recognized by the federal government in 2002 with the passage of Public Law 107-319. This law set the precedent that e-bikes whose top speed is 20 MPH are consumer products that must comply with 16 C.F.R. Part 1512 and are not considered motor vehicles. E-bike classes are not covered in that law. Therefore, electric bicycle-like devices that travel over 20 miles per hour are not considered 'bicycles' in that federal regulation. In reference to e-bikes as a kind of off-road vehicle in 43 CFR 420.5, e-bikes are defined as:

> ***Electric bicycle*** *(also known as an E-bike) means a two- or three-wheeled cycle with fully operable pedals and an electric motor of not more than 750 watts (1 horsepower) that meets the requirements of one of the following three classes:*
>
> *(1)* ***Class 1 electric bicycle*** *means an electric bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 20 miles per hour.*
>
> *(2)* ***Class 2 electric bicycle*** *means an electric bicycle equipped with a motor that may be used exclusively to propel the bicycle, and that is not capable of providing assistance when the bicycle reaches the speed of 20 miles per hour.*
>
> *(3)* ***Class 3 electric bicycle*** *means an electric bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 28 miles per hour.*

Other micromobility devices are not formally defined by the federal government and do not have to comply with any consumer protection regulations. Some other micromobility devices, such as e-scooters, are recognized by the Department of Transportation as "low-speed electric vehicles" but have not been included in legislation by Congress.

State-by-State Policy Approaches

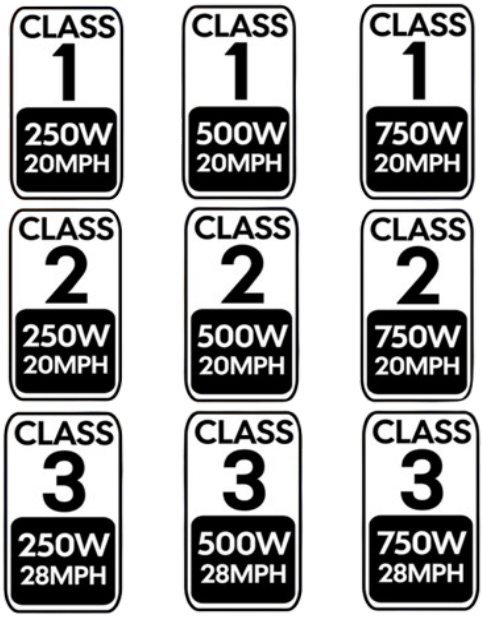
Policies toward micromobility vary substantially across states and are rapidly evolving. Several policy themes are addressed in this review as they relate to the recommendations developed by the Commission. This is not a comprehensive review of all approaches taken by all states, and no doubt new ones will come about as micromobility continues to evolve in the coming years.

This report discusses the currently existing relevant Massachusetts laws and regulations found in Massachusetts General Law (MGL) and the Code of Massachusetts Regulations (CMR) in **Chapter 2: Micromobility in Massachusetts**.

3 Classes of E-bikes

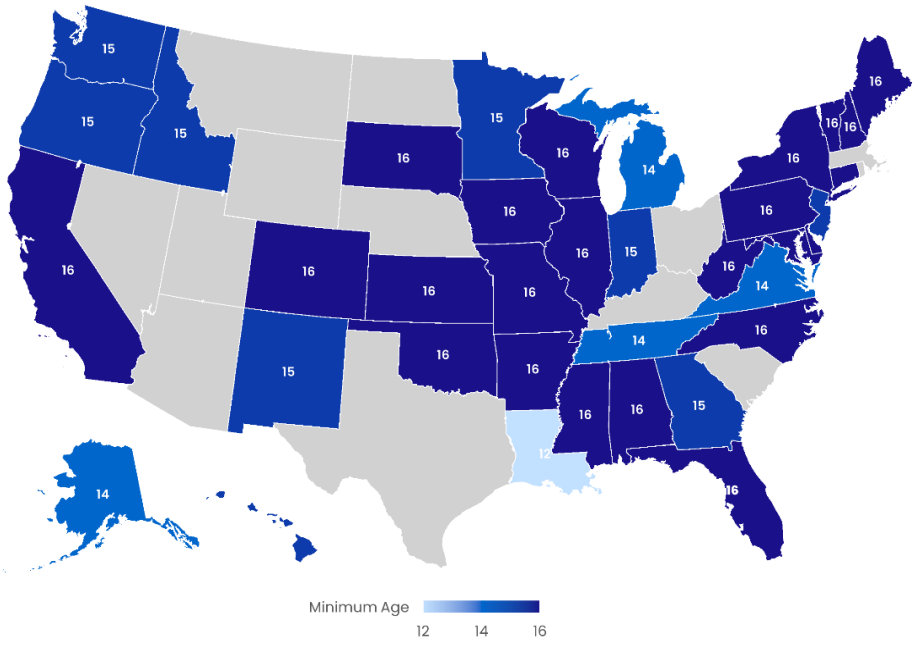
Thirty-six (36) states and Washington, D.C. classify e-bikes using a three-class system.[54] Class 1 e-bikes have pedal assist motors, but no throttle, and have a top speed of 20 MPH. Class 2 e-bikes have pedal assist motors, a throttle, and similarly have a top speed of 20 MPH. Class 3 e-bikes are pedal assist-only and have a top speed of 28 MPH. In Massachusetts, Class 1 and Class 2 e-bikes are defined in law, but Class 3 e-bikes are not. These classes aid states in creating boundaries for use. For example, several states have age restrictions on Class 3 e-bikes, but not on Class 1 or Class 2 e-bikes.

Some places have taken a different approach. New Jersey only recognizes two classes of e-bikes. Class 1 are e-bikes that can go up to 20 MPH and Class 2 are e-bikes that can go up to 28 MPH. Class 1 e-bikes are largely treated the same as solely human-powered pedal bikes, whereas Class 2 e-bikes are required to have licensing and registration. Alaska treats e-bikes almost the same as motorcycles; New Mexico treats e-bikes as mopeds; and Arkansas treats e-bikes like traditional pedal bicycles.[55]



Examples of California's new mandated stickers

Class 3 Age Restrictions



Source: National Council of State Legislatures, State Electric Bike Laws

E-bike Age Limits

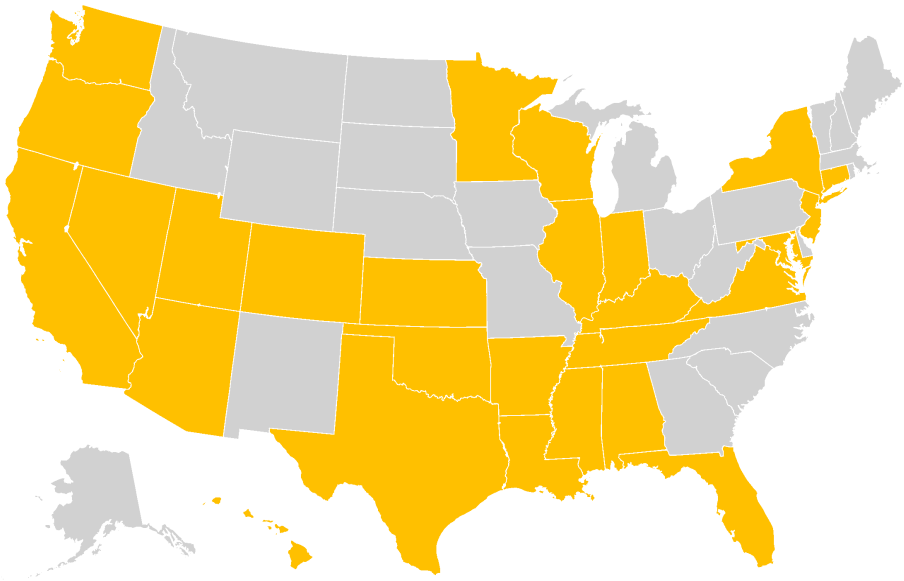
For Class 3 e-bikes, or e-bikes that can go faster than 20 MPH for states that don't use the three-class system, some states require the operator to be a certain age, though most let underage users ride as a passenger.

The most common minimum age is 16. Alaska considers all bikes with a motor attached to be a "motor-driven cycle," which requires a class M license. This is available at age 14. Maine extends the age requirement to Class 2 e-bikes as well. Hawaii requires e-bike registration, which the owner needs to be at least 18 years old to do, however people 15 years old or older can ride an e-bike registered to a member of their household. Utah's law does not allow individuals under the age of 14 to operate an electric-assisted bicycle without the direct supervision of their parent or guardian and prohibits any individual under 8 from using an e-bike.

Stand Up E-scooters

Twenty-eight (28) states have introduced some kind of e-scooter legislation setting guardrails for operator age, maximum speed, weight, use, and a variety of other factors. Of the 15 states that set an age minimum for operating an e-scooter, the minimum age for operating an e-scooter is generally 16, though there are exceptions. For example, in Illinois the minimum is 18. Max speed also varies. Seventeen states have made the maximum manufactured speed 20 MPH, and of those, seven set the operational speed maximum at 15 MPH. Illinois caps speeds at 10 MPH, whereas in Oklahoma, it is legal to go up to 25 MPH.

States with E-Scooter Safety Laws



Source: National Conference of State Legislatures, State e-Scooter Laws

Hawaii, Illinois, Louisiana, Minnesota, and New York forbid operators from holding anything that could potentially impact steering or braking. Illinois, New York, and Utah have made it illegal to operate an e-scooter under the influence or while carrying alcoholic beverages.

Delaware and Pennsylvania have the most restrictions on e-scooters. Delaware prohibits e-scooters and e-skateboards from being operated on any highway, street, sidewalk, or right-of-way, and anyone under the age of 12 can only operate an e-scooter on land owned by their parent or guardian.[56] Pennsylvania, meanwhile, considers e-scooters to be motor vehicles and thus subject to titling, registration, licensing, and inspection requirements. This means that e-scooters must have equipment like turn signals and mirrors which most lack, making them *de facto* illegal to operate on any roadway in the state.[57]

License and Registration

Alaska, Hawaii, New Jersey, New Mexico, North Dakota, and South Dakota are the only states that may require a license for e-bikes, depending on the max speed of the device.[58] In California, Florida, and Alabama, neither the e-bike needs to be registered nor the operator licensed, but the manufacturer or distributor must apply a sticker identifying the class of the bike prominently on the frame.[59] California is also considering adding an age requirement.[60]

Alaska, New Jersey, and Hawaii are the only states that require e-bike registration, and Hawaii is the only state that explicitly requires e-scooter registration.[61] Hawaii's registration for e-bikes and e-scooters consists of a one-time $30 fee that goes towards infrastructure improvements. In some states, seated e-scooters get lumped in with gas-powered mopeds and inherit those licensing and registration requirements, but these devices tend to lack Vehicle Identification Numbers (VINs), which makes registration more difficult.

False Advertising

The Commission did not thoroughly examine the issue of false and deceptive advertising in the micromobility market, though individual members and support staff reported seeing many troubling examples, especially online. Devices are often marketed as e-bikes but do not meet the current e-bike definitions in Massachusetts law. Some Off-Highway Vehicles are being marketed as bicycles and dubiously advertised with "street-legal" versions. Confusion among parents and guardians from these marketing practices have likely led to devices that are more akin to motorcycles being purchased for youth, whose family members may believe they are buying e-bikes.[62] Other states have begun to respond to this misinformation. California and Minnesota have passed laws prohibiting the false advertisement of any device as an e-bicycle which does not fit the legal definition of an e-bike.[63] Connecticut introduced a similar bill that died in committee in the 2025 legislative session. [64] California and Utah also require e-moto sellers to explicitly communicate state regulations and restrictions at point of sale.[65][66]

Emerging Tech

Micromobility came to US cities rapidly, and the innovation behind this technology continues to evolve at a blistering pace. Micromobility, and particularly electric-powered micromobility, is an emergent and ever-changing space. The advent of lightweight and battery-powered devices has shifted how people get around cities, campuses, and towns around the world. Reports estimate that the overall micromobility market could be worth $56 billion in North America by 2030. Long dominated by stand-up e-scooters and e-bikes, there is a new wave of innovation. Since 2024, we've seen product announcements from electric car companies ready to produce a 100-mile range e-bike; stand-up scooters that close in on a top speed of 100 MPH; new electric uniwheels and one-wheel-skateboards designed for high-speed dirt singletrack trail use; the first US deployment of bucket-style (or "bakfiets") cargo e-bike share to the streets of Boston; and the addition of cargo quadricycles to the streets of New York City. Some manufacturers are selling devices that allow users to select e-bike Class modes through variable power output in an app. For example, the same device could be set to operate in Class 1 mode where the rider has pedal-assist, no throttle action, and it tops out at 20mph; Class 2 where the throttle becomes functional; or Class 3 mode which would top out at 28 MPH. These innovations blur the legal lines drawn in many states. It can be hard to keep up both with the pace of innovation and the speeds of the vehicles themselves.

Quadricycles (e-Quads)

One emerging tech development Commission members didn't have enough time to wade into is quadricycles. However, it's important to note the potential growth of quadricycles. These are small, four-wheeled micromobility vehicles built for commercial delivery use cases. For logistics companies, they offer a compelling last-mile solution in dense urban environments without relying on traditional vans and accruing parking fines or causing emissions associated with current delivery models. As the micromobility fleet grows, quadricycles may become a key piece in the puzzle of sustainable urban logistics. For example, New York City and Seattle have adopted rules for commercial e-bikes and have launched commercial e-bike delivery programs. In Massachusetts, cities may want to consider looking at rules for parking, infrastructure use, and the operation of commercial pedal vehicles that have a larger form factor (e.g., wider than 36").

AI and GeoFencing

Beyond the new devices themselves, micromobility technology is also pushing into smarter, more efficient systems. Like many industries, the impact of artificial intelligence is being felt in advanced fleet management of shared systems. There is a promise that this technology will allow operators of bike- and scooter-share systems to better predict demand, proactively rebalance vehicles, and detect maintenance needs before breakdowns occur. All of that should ultimately result in more reliable public micromobility transportation in cities across the US.

On the infrastructure side, geofencing is becoming increasingly common to minimize safety impacts among shared devices. Geofencing — marking virtual zones on a digital map — is based on Global Positioning System (GPS) data, which is a constantly improving technology, whose accuracy can be impacted by various factors, such as tall buildings, weak signals, and complex infrastructure.

Source: Darren Cole

Both Bluebikes and ValleyBike restrict the speeds of their e-bikes universally, without using geofencing. Micromobility devices are being programmed to slow down automatically in restricted areas like school zones or pedestrian-heavy streets. In Hartford, Connecticut, local regulators require scooters to slow to 8 MPH in certain parks via geofencing. In Santa Monica, California, geofencing has been used to create deactivation zones around the beach, where scooters automatically decelerate and stop to protect pedestrians. However, with personally owned devices, geofencing technology is not currently a solution and thus infrastructure design, enforcement, and education will continue to play significant roles.

E-Motos and Modifications

Electric motorcycles, or "e-motos", are gaining popularity for their efficiency, performance, and lower environmental impact compared with traditional gas-powered motorcycles. There is also considerable social media hype among younger riders for these devices and for modifying them beyond their factory settings. Many of these are designed to be legally ridden off-road but are marketed for on-street use by their manufacturers. However, they present unique regulatory and safety challenges, particularly when riders attempt to modify them. Modifications such as aftermarket app upgrades, magnet-based speed limiter circumvention, or hardware tweaks can significantly increase speed and power beyond legal or safe limits. These alterations not only put riders at risk but also complicate enforcement for regulators, as speed-limiting technology is increasingly easy to bypass.

A growing concern arises when high-powered e-motos are classified *or perceived as* e-bikes, either intentionally or through loopholes in federal, state, and/or local regulations. If they were actually motorcycles, they would need to follow Federal Motor Vehicle Safety Standards (FMVSS) for motorcycles. Some may *look* like fat-tire bicycles but have motors up to 5000 watts, more than six times the maximum wattage for an e-bike as defined in Massachusetts and federal law. These vehicles often share infrastructure, such as bike lanes and shared use paths, with other micromobility users, but their weight, acceleration, and speed far exceed the design assumptions of these spaces. This creates safety hazards for riders and the public alike. The combination of easy-to-bypass software limits, rapid technological upgrades, and blurred regulatory classifications makes it difficult for authorities to ensure consistent safety standards, leaving both riders and communities vulnerable to crashes and legal uncertainty.

This is a topic being looked at in states across the country. It was brought up on the Commission from first responders and local law enforcement. Increasingly, it has been a topic of reporting in the press and in discussion among parent groups looking for guidance on safe devices that enable freedom of car-free movement for young people. Addressing these challenges requires a combination of updated regulations at the federal and state level, technological enforcement tools, and better public education. Some states have moved to action on this issue, including California Senate Bill 586 that sought to better define off-highway electric motorcycles and their requirements, which passed in October. Manufacturers and software developers could be encouraged or required to design tamper-resistant systems to prevent users from bypassing limits. Manufacturers and retailers should be required to clearly indicate if a particular device's motor exceeds legal e-bike limits for motor power, thereby rendering it illegal for on-street use. Clear rules, combined with awareness campaigns on the risks of modifications, would likely help reduce crashes.

Micromobility Outliers

What will the future hold? The only constant is change. More than just e-bikes and e-scooters exist in the consumer micromobility market, and new devices are being introduced every year. It's unlikely that any of these devices will be taking the majority of the micromobility market-share anytime soon, but they are important to consider. Whatever framework the legislature decides to adopt, these edge cases need to fit somewhere. The advent of autonomous micromobility is not just science fiction but is being prototyped and tested by the MIT Media Lab among others. This will bring with it the need for scalable urban simulations to determine impacts of this new technology and responsive public policy to minimize the negative externalities and maximize public benefit.

02

Micromobility in Massachusetts

Massachusetts General Law (MGL) Review

Massachusetts General Law (MGL) includes definitions and laws on micromobility devices across multiple sections of Part 1 Title XIV.[67] The following chapters are relevant to this Commission.

M.G.L. c. 85 § 11B-E outlines restrictions for use, manufacturing, safety, and traffic violations for electric bicycles.

- **§ 11B**: Bicycles; operation and equipment; regulations; federal product safety standards, effect; races; violations; penalties
- **§ 11B 1/2**: Mandatory helmet use for persons 16 years of age or younger
- **§ 11B 3/4**: Electric bicycles; rights, privileges, duties; regulations
- **§ 11D**: Bicycle helmets; display of sign requiring use
- **§ 11E**: Traffic law violations by bicyclist

N.B. This review includes current laws as written. It does not account for language changes that would be made if the recommendations of the Commission were to be adopted.

MGL c. 90 § 1, § 1B-E outlines the rules for legally operating motorized bicycles, motorized scooters, and electric bicycles. **§ 1H and § 1I** handle registering vehicles that can go faster than 30 MPH but not faster than 40 MPH.

- **§ 1**: Definitions
- **§ 1B**: Motorized bicycles; operation regulations
- **§ 1C**: Motorized bicycles and scooters; compliance with federal standards
- **§ 1D**: Motorized bicycles; sales; number sticker or plate
- **§ 1E**: Motorized scooters; operation regulations
- **§ 1H**: Registration of motor vehicles designed for operation on public ways but not capable of exceeding 40 miles per hour
- **§ 1I**: 3-wheeled motor vehicle registered as a motorcycle

MGL c. 90B §20-22, §25, §26 handles rules and registration for recreational vehicles, all-terrain vehicles, off-highway vehicles, etc.

- **§20**: Definitions
- **§21**: Recreation vehicle safety and responsibility course
- **§22**: Registration; application; period; certificate; name and address; transferability; fees
- **§25**: Operation on public ways; emergencies; regulations
- **§26**: Prohibited or limited operation by underage persons; restrictions

MGL c. 90E §1-3 defines the rules for bicycles and e-bicycles and the various paths, ways, and lanes designated for bicycles to use.

- **§ 1**: Definitions
- **§ 2**: Rules, regulations and plans; bikeways program; participation
- **§ 2A**: Accommodation of bicycle and pedestrian traffic in construction projects
- **§ 3**: Funding; expenditures; federal funds

Definitions

C. 90 § 1 contains definitions for class 1 e-bike, class 2 e-bike, electric bicycle, motorcycle, motorized bicycle, motorized scooter, and vulnerable user. Note that while class 1 and 2 electric bikes are defined, there is not a definition for class 3 electric bikes at present.

C. 90E § 1 contains the definitions for bicycle, bike path, bike lane, bike route, bikeway, and bicycle facility.

Current Requirements

This chart summarizes the current laws around use of these devices that are directly relevant to the recommendations in this report. The full text of these laws can be found in Appendix III: MGL and CMR Text.

	Registration	Licensing	Mandatory helmet use	Speed limit
Bicycle	☐	☐	☑ Under 16 years old	☐
Electric Bicycle	☐	☐	☑ Under 16 years old	☐
Motorized Bicycle	☑	☑ license or permit *any class	☑	☑ 25mph
Motorized Scooter	☐	☑ license or permit *any class	☑	☑ 20mph

The full text of these laws is included in **Appendix III: MGL and CMR Text.**

Code of Massachusetts Regulations (CMR) Review

Regulations around micromobility are currently found in three sections of the Code of Massachusetts Regulations (CMR). Below is a summary of the relevant text.

302 CMR, Department of Conservation and Recreations (DCR) contains regulations around micromobility use on DCR land.[68]

- A class 3 e-bike is defined as "an electric bicycle, other than a Class 1 electric bicycle, equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches or exceeds 28 miles per hour."
- Electric bicycles are prohibited from operating on the Appalachian Trail.
- Motorized devices are largely not allowed on trails maintained by DCR.
- Class 1 e-bikes are allowed on paths that are wider than 8 feet.
- Class 1, 2, and 3 e-bikes are allowed in bike lanes.

540 CMR, Registry of Motor Vehicles contains several definitions for micromobility devices and regulations around registration and conversion.[69]

- Motorized bicycles cannot be converted and registered as a motorcycle. If a motorized bicycle can go faster than 30 MPH, the registrar can refuse to register it.
- An off-road vehicle cannot be registered for on-road use unless it installs the requisite parts and passes examination.
- Motorized scooters are not allowed to register.
- A Class D license or permit may be used to operate a motorized bicycle or scooter.
- If a vehicle fits the definition of a motorcycle and its top speed is between 30 and 40, it should be registered as a "limited use motorcycle" and can be restricted from certain ways.

700 CMR, Massachusetts Department of Transportation contains few mentions of micromobility and only insofar as to define traffic control devices and violations of legal road use for bicycles.[70]

- Bicyclists are beholden to separate bicycle traffic lights, where installed.
- Bicyclists are not allowed on limited access highways.

The full text of these regulations is included in **Appendix III: MGL and CMR Text.**

Review of Select Local Ordinances

In Massachusetts' 351 cities and towns, municipalities have passed dozens of local ordinances about micromobility devices to fill in where state law does not provide clear guidance, or where additional municipal regulation is needed to address residents' needs. Through the Commission's process we have heard a continued desire from city and town officials and residents for additional clarity from the state.

This report includes several distinct ordinances found around the Commonwealth that illustrate how local authorities have been tackling micromobility in their communities. This is not an exhaustive list of ordinances, nor is it an exhaustive list of cities and towns that use the same or similar ordinances. The curated section below is intended to give readers a sense of the types of efforts being undertaken by municipalities across the Commonwealth.

Definitions

Several municipalities have additional micromobility-related definitions. Below are a few of those definitions culled from ordinances across the Commonwealth.

- "*Class 3 – Speed Pedelec*", The electric drive system on the e-bike is activated by pedaling which ceases to provide assistance once the e-bike reaches 28 mph.[71]
- "*e-cargo bikes*", motorized bikes, which can come in any class listed above, that are designed to carry heavy loads, including additional people, or goods.[72]
- "*Moped*" shall have the same definition as a "motorized bicycle" under Massachusetts General Law Chapter 90, Section 1.[73]
- "*Motorized Uniwheel*", any motorized device with a single wheel.[74]
- "*class 3 e-bike*" A Class 3 e-bike has an electric motor that assists only when the rider is pedaling and can go up to 28 mph.[75]
- "*Electric Assist Scooter*", a primarily human-powered or low speed electric stand-on vehicle used by an individual for transportation.[76]
- "*Shared Mobility Device (SMD)*", a human-powered or low speed electric vehicle for public shared use to individuals on a short-term basis and may include bicycles, scooters, Segways or similar devices.[77]

Boston, MA

- "*Electric personal assistive mobility device (EPAMD)*", a self-balancing device with two wheels not in tandem, designed to transport only one person by an electric propulsion system having a maximum speed on a paved level surface of less than 20 mph. For purposes of this Section, EPAMDs shall include, but shall not be limited to, the Segway® PT. […] electric or motorized wheelchairs and powerchairs shall not be considered EPAMDs.[78]

- "*Multi-Use Trail*" shall mean a paved trail or pathway eight-feet wide or greater specifically created or designed for bicycle and pedestrian travel to the exclusion of autos and motorcycles including the entire length and width of any such trail or pathway as well as landscaped or areas within or adjacent to such trails or pathways.[79]

- "*Electric Bicycle*" shall mean Class 1 and Class 2 electric bicycles as defined by M.G.L. c. 90 § 1 with tire widths of five inches or less.[80]

- "*Electric Scooter*" shall mean a device that carries a passenger that: has two to four wheels with diameters of 12 inches or less, is no wider than two feet nor longer than six feet, weighs less than 35 pounds, has a maximum speed of 15 miles per hour and an electric motor with 300 watts or less of power.[81]

Bicycle Registration

In **Nantucket**, all bicycles must be registered with the town to assist in recovering stolen or abandoned bikes.[82] The owner of the bicycle receives a decal upon registration which must be displayed at all times.[83] The registration fee is $2.50.

Nantucket's 3-Class E-bike Decals

In addition to a registration sticker, **Nantucket** provides free e-bike classification stickers to spread awareness of the e-bike classification system.[84] These locally designed stickers are available at public schools, police stations, and the Planning and Land Use Services (PLUS) offices.

Foxborough requires bicycle owners to register the device with the local police department, and the police department will issue them a plate that needs to be displayed somewhere on the bicycle. If the owner ever decides to sell the bicycle, the registration plate has to be removed and surrendered to the police department or transfer the registration to the new owner.[85]

Travel Restrictions

Nantucket has prohibited class 3 e-bikes from paths; operators of class 3 e-bikes must ride in the street and have a speedometer. While paths have no set speed limit and ostensibly have been designed for a maximum of 20 MPH, the town urges bike riders of all kinds to ride slowly.

E-bikes have also been banned from use on school grounds in **Nantucket**. If a student is found to be riding an e-bike where they're not supposed to, the school will confiscate the bike's battery. The battery can be reclaimed by the student's parent or guardian.[86]

Motorized bikes and motorized scooters have a blanket speed limit of 20 MPH on all ways in **Marlborough**. Motorized devices are banned from off-street paths, limited access highways, state highways, but are allowed to operate in bike lanes.

Malden gives default right-of-way to human-propelled micromobility over motorized micromobility on paths.[87]

Agawam passed an ordinance in November 2025 that e-scooters will be banned from roads with speed limits over 30 MPH. This pairs with a similar restriction to e-bikes that the town passed in the summer. Neither type of device is allowed to operate after dark.[88]

On shared-use paths in **Northampton**, only e-bikes that weigh less than 170 lbs and have a maximum speed of 20 MPH are allowed, and the path speed limit is 12 MPH.[89]

Source: MassDOT

In their regulation of multi-use trails passed in 2023, **Malden** uses the current M.G.L. definition of e-bikes, but adds the stipulation that the tires are less than 5 inches in width to exclude "fat tire" bikes from this category.[9] Malden also limits operational speed to 15 MPH on multi-use trails and 20 MPH elsewhere.[90]

Fall River prohibits e-scooters from using sidewalks and operating on public property.[91]

Rentals

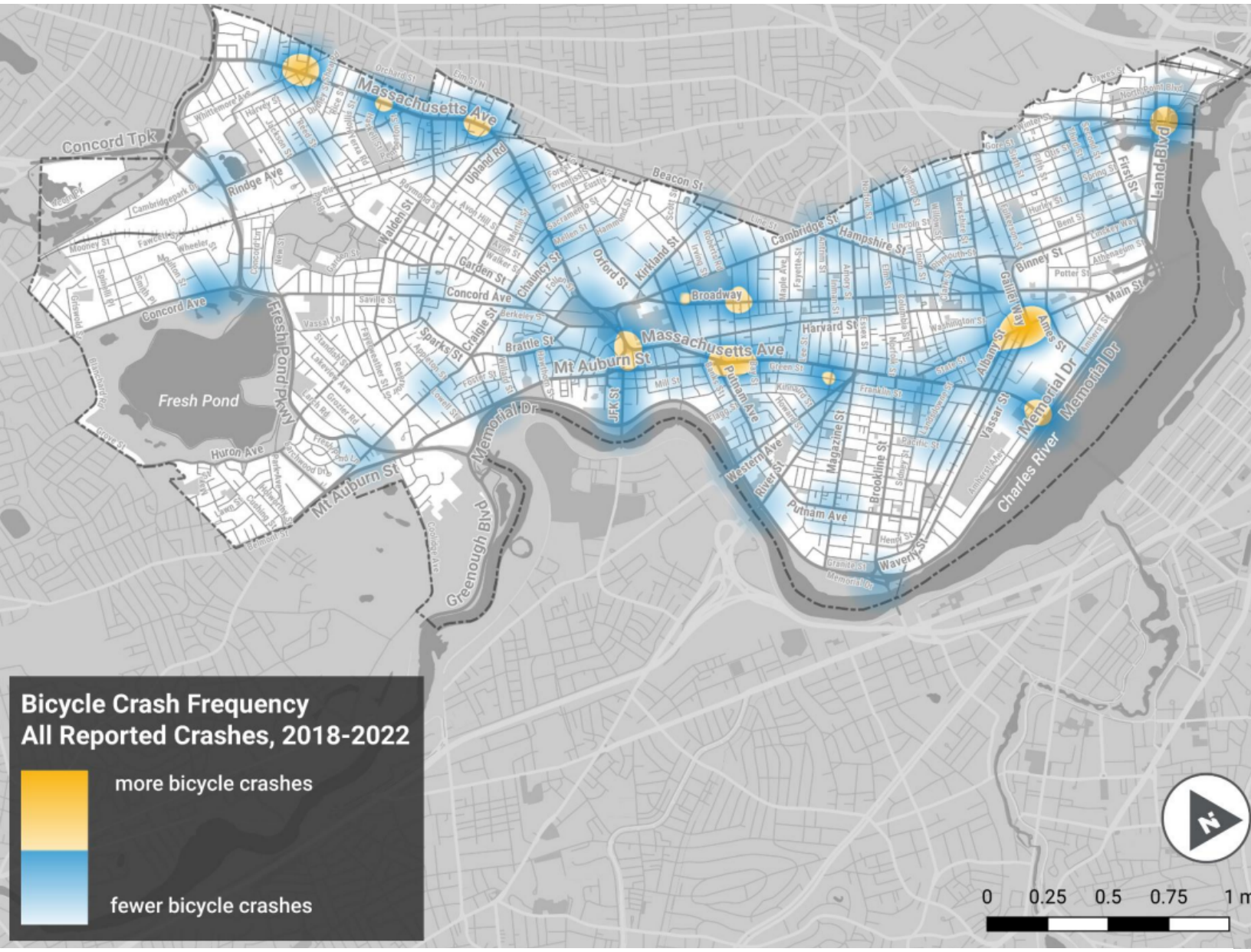
Nantucket requires businesses who rent out motorized bicycles on a short- or long-term basis to provide helmets equal to the passenger carrying capacity of each e-bike.[92] They maintain a registry of rental e-bikes which includes all crash records, and they expressly forbid operating an e-bike with more than the intended number of riders.

Reckless Use

While **Hanover** has not passed any local ordinances around micromobility devices, the police chief has said that anyone under the age of 18 cited for violating MGL Ch. 85/11B, which prohibits operating a bicycle recklessly, will have their e-bike impounded.[93]

Operational Requirements

Like many other towns, **Marlborough** prohibits anyone under the age of 16 from operating a motorized bicycle or a motorized scooter. The town also prohibits motorized devices from operating at night or being used without a helmet.[94]



Cambridge, MA, Bicycle Crash Frequency Map 2018-2022

Crash Data Collection

Cambridge tracks collisions between vulnerable road users (e.g. bicyclists, motorized scooters, pedestrians) in crashes that do not involve a motor vehicle in their crash database.[95] Typically, the crash report form requires an operated motor vehicle to be involved in a crash in order to be entered into the Massachusetts crash data system, but in Cambridge's system, a collision can be recorded in the event that it is with another vulnerable road user.[96] There were 42 such reported incidents between March 2024 and November 2025.

03

Challenges in Massachusetts

Challenges in Massachusetts

Given the context in Massachusetts, and in the United States overall, it is clear that there are a number of micromobility-related challenges we must tackle. Commission members heard and discussed three main challenges: **overall confusion, insufficient infrastructure, hampered growth**.

Overall Confusion

The commission heard repeatedly, from a variety of stakeholders, that the current state of micromobility is confusing. It is confusing for micromobility users themselves, who may not know exactly which device they have, what it is capable of, or where it is allowed to go. It is confusing for law enforcement officers, who are trying to fill out crash reports accurately, apply laws consistently, and maintain safety on our streets and paths. It is confusing for buyers, such as for parents considering a micromobility device for their teenager who just got a job and can't get to it on transit or can't afford a car. And it is confusing for local leaders and state officials, who are trying to explain the complicated (and sometimes contradictory) rules to their communities and stakeholders.

Recommendations 1, 2, 3, 4, 7, and 9 aim to address this concern.

Insufficient Infrastructure

Commission members heard, and have experienced themselves, that infrastructure for micromobility users across the Commonwealth is incomplete. We are introducing new devices into and onto infrastructure that has been largely unchanged from its original car-centric designs for almost a century. Even the growing network of bicycle facilities added over the last decade is insufficient to meet the demand of current micromobility vehicles available today.

Whether a lack of sidewalks or shared use paths in more rural areas, or an unconnected network of paths in denser parts of the state — a micromobility user (or potential user) does not experience a seamless, separated network of facilities. While grants like MassTrails, Shared Streets and Spaces, and Complete Streets aim to address these issues, the reality is that gaps exist today and likely will for some time.

Additionally, even where infrastructure exists, a common complaint is that it is not enforced (e.g., a bike lane is blocked by a parked vehicle). This is a problem because it means micromobility users are sometimes forced into the road, where they have to mix with heavier, faster traffic (e.g., cars and trucks). Micromobility users are more vulnerable than motor vehicle operators in the event of a crash, due to their lower speed and device weights. It is a problem because it deters would-be or potential riders from accessing the mobility unlocked by these devices.

Recommendations 5, 6, 8, and 10 attempt to mitigate this concern.

Hampered Growth

Commission members noticed that their discussions often started at the statutory mandate to clarify vehicle types and where they're allowed to travel and didn't always transition into the commission's second statutory mandate to encourage growth. There was an inherent tension in the commission's work: acknowledge the current status quo (e.g., confusion, safety concerns) while also acknowledging that we want more micromobility devices to be used by more people.

The growth goals for micromobility in Massachusetts may be hampered by public perception of the riskiness of these devices. As discussed in the introduction, serious injury and fatal crashes rightly increase the urgency of the discussion,

but have — in some other places — led to crackdowns and outright bans on certain devices. While commission members affirmed safety as paramount, they also agreed that micromobility devices can offer new or increased mobility for various users.

The desire for the growth of micromobility use also highlights the need for additional resources, both for supporting infrastructure and for increasing access to devices. The Commission heard consistent feedback about the need for increased funding for this mode of transportation, whether in shared or personally owned scenarios, to provide mobility for all residents of the Commonwealth, and to ensure it is done in an equitable fashion.

Recommendations 11, 12, 13, 14, 15 and 16 seek to remedy these situations.

04

Recommendations

Recommendations

The Commission recommends 16 actions be taken by the legislature, MassDOT, and various other parties. These recommendations were developed by commission members and contain expertise from state and local experts.

Methodology

The first three recommendations were initially developed by the Registry of Motor Vehicles (RMV), informed by research on vulnerable users from the University of Massachusetts Transportation Center in collaboration with MassDOT's Highway Safety team, and were refined by the Commission over several sessions.

For the remaining recommendations, the Commission heard presentations on various topics concerning micromobility, after which commissioners submitted potential recommendations. These recommendations were presented to the Commission in the October 14th, 2025 meeting, and commissioners were given the opportunity to indicate their preferences, priorities, and any opposition they may have had. See Appendix IV for more information on this process.

Of the 54 recommendations that were presented, five received immediate majority consensus. Eight additional recommendations were refined based on discussions held within the Commission. Finally, in consultation with the RMV and additional subject matter experts, a 'core schema' was developed and broken out into three additional recommendations. Final recommendations were selected in the November 3rd, 2025 meeting.

Core Framework

Recommendations

1 Legislative and Regulatory Changes

The legislature should add the necessary legal definitions to Massachusetts General Law and update all existing relevant definitions or remove those that are no longer relevant to accommodate these new definitions. Additionally, the legislature or the relevant regulatory body should enact appropriate statutory and/or regulatory changes that would provide the legal framework for the classification schema.

The Commission agreed that there are currently gaps and inconsistencies in Massachusetts General Law (MGL) and the Code of Massachusetts Regulations (CMR) that the legislature and/or the appropriate regulating body should remedy. This recommendation is divided into four sections containing the changes that the Commission has identified. All the existing relevant law can be found in MGL Part 1 Title XIV Chapters 85, 90, and 90E.

New Definitions

To bring our state law up to date with the emergence of micromobility, the Commission recommends adding the following definitions and where to put them in statute:

Chapter 90 § 1

> "**Maximum design speed-based tiers**", creating speed tiers for all micromobility devices. Tier 0: <=20 MPH, Tier 1: 21-30 MPH, Tier 2: 31-40 MPH and Tier 3: 41+ MPH).

This definition unlocks the ability to have better education, safer operation, and when needed, enforcement.

> "***Cycle***", a powered or unpowered device with functional pedals OR if it lacks functional pedals, rider must be seated during typical operation (cannot stand and operate)

This definition will serve as the overarching category for these kinds of devices.

> "***Scooter***", a powered or unpowered device without pedals where the rider can sit and/or stand on a footboard for typical operation.

This definition will serve as the overarching category for these kinds of devices.

> "***Class 3 electric bicycle***", an electric bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 28 miles per hour.

This definition is the same as the federal definition of class 3 e-bike as written in 23 USC § 217(j)(2).

"***Solely Human Powered micromobility device***", A micromobility device (non-electric bicycles, push scooters, skateboards, longboards, unicycles, roller skates, inline skates etc.) that is propelled exclusively by human muscular effort and has no onboard motor capable of delivering tractive power to the device. Excludes Mobility aid devices.

This definition is to be used to differentiate motor-assisted devices from traditional non-motorized devices that are propelled by human power.

"***Powered micromobility device***", A micromobility device (scooters, skateboards, hoverboards, unicycles etc.) that has an onboard motor capable of delivering tractive power to the device either as power assist or as sole propulsion (aka throttle). Excludes mobility aid devices.

This definition is to be used to refer to devices like e-scooters, e-skateboards, hoverboards, etc. that are motor-assisted. Eliminating the current definition of "Motorized Scooter" is also important so as to not conflict with this definition.

"***Mobility aid device***", A device, other than one used for general transportation, used by a pedestrian with a mobility disability to assist with indoor and outdoor locomotion. Will encompass existing EPAMD mentioned in vulnerable user definition, and group wheelchairs, mobility carts, etc.

This definition refers to mobility disability assistive devices that are treated as distinct from all other motorized micromobility.

"***Maximum designed speed tier classification system",*** the system by which micromobility devices are categorized by the fastest speed the manufacturer designed the device to attain on a flat surface in normal conditions by an average rider.

This definition and the following four set up the legal framework for the speed tier system laid out in Recommendation 2.

"***Speed Tier 0***", The category that contains all motorized devices whose top designed speed is 20 MPH and all non-motorized devices.

"***Speed Tier 1***", The category that contains all motorized devices whose top designed speed is 30 MPH.

"***Speed Tier 2***", The category that contains all motorized devices whose top designed speed is 40 MPH.

"***Speed Tier 3***", The category that contains all motorized devices whose top designed speed is faster than 40 MPH.

Chapter 90E § 1

"Separated micromobility lane," a micromobility travel lane within or adjacent to a roadway that is physically separated from motor vehicle traffic by a vertical element such as a curb, median, flexible post, parked vehicles, or other barrier, and designated by signs or pavement markings for exclusive use by bicycles.

This definition splits out micromobility lanes with a physical barrier from lanes separated from traffic only by paint. Further, the legislature should consider reviewing all definitions in c. 90E § 1 that reference "bicycle" or "bike" lane/route/way (etc.) only and change to "micromobility".

"***Shared use path***", a path intended for transportation or recreational use that is designed for people of all ages and abilities on foot or using motorized or non-motorized micromobility devices and is physically separated from motorized vehicle traffic within a highway right-of-way or an independent right-of-way with few crossflows with motor vehicles.

This definition combines the definitions used in other state laws with ones currently used by MassDOT and the American Association of State Highway and Transportation Officials (AASHTO) in design and planning guides, and other important documentation. These types of paths are sometimes also called trails, multi-use paths, or bike paths. Types of shared use paths include rail trails, which are built on abandoned rail beds; rails with trails, which run adjacent to active rail lines; side paths, which run adjacent to roadways; and other types including linear parks, canal towpaths, waterfront trails, and paths along utility corridors. Shared use paths must meet pedestrian accessibility surface requirements. This addition is also discussed in Recommendation 6.

Additionally, addressing the current requirements for ***Motorized Scooters*** in this section is important. The Commission recommends striking the current requirements while enabling new requirements under the micromobility speed tiers. Currently, Section 1E requires that a "Scooter shall be equipped with operational stop and turn signals"; that a user must have a valid driver's license; and that devices are operated only during daylight hours. The current requirements increase confusion among all parties and should be replaced with the speed tier device and operational requirements.

Updated Definitions

- In MGL c. 90, § 1, update the definition of "Electric bicycle" to include "Class 3 electric bicycle", so that it reads: "…a bicycle or tricycle equipped with fully operable pedals and an electric motor of 750 watts or less that meets the requirements of a class 1 electric bicycle, a class 2 electric bicycle, or a class 3 electric bicycle."

- The legislature needs to identify and amend any existing definitions and/or sections that conflict or are inconsistent with new definitions with the appropriate new definition(s). For example, in the definition for "Vulnerable User" the phrase "electric personal mobility assistive device (EPAMD)" needs to be replaced with "Mobility Aid Device".

- The legislature should rename "motorized bicycle" as "**moped**" to align with colloquial use. This should also update the definition to remove the requirement of an automatic transmission and include devices with electric motors.

- In MGL c. 90, § 1B, explicitly disallow mopeds from bike lanes: "…Motorized bicycles [renamed as mopeds, per above] **shall not be operated in bicycle lanes adjacent to the various ways**, and shall be excluded from off-street recreational bicycle paths…."

New Laws and Regulations

The Commission recommends adding the following laws and regulations:

- **Micromobility device lightweight registration**, which will provide the Registry of Motor Vehicles (RMV) with the rulemaking authority to design an identification and registration program for devices in tier 1 and above, where one does not exist today in 540 CMR.

- **Tier 3.A powered micromobility device**, which will be regulated as a motorcycle.

- **Micromobility device operating rules and requirements**, which provides the RMV with the rulemaking authority to design operational and device requirements by speed tiers and device sub-tiers in 540 CMR.
- **Enforcement and penalties for micromobility devices**, which will provide penalty guardrails (ranges, caps, aggravators allowed, civil vs criminal disposition, impound authority, due process etc.) for micromobility infractions by speed tier and grant power to specific officials to enforce said penalties.
- **Anti-tampering law**, which makes it illegal for an e-bike user to modify their bike to go faster than its original designed speed unless 1) the e-bike continues to meet the definition of a class 1, 2, or 3 e-bike and 2) the e-bike's labeling is updated to reflect its new class, when appropriate.

Updated Laws and Regulations

- The definition of "***reportable crash***" needs to be updated to include micromobility-only crashes. Without this change, data on micromobility crashes that do not involve an operated motor vehicle will continue to be difficult to obtain.
- Updating MGL c.6, § 116 to include other micromobility devices as it relates to the development and establishment of courses in bicycle safety enforcement for police training.

Why This Matters:

The definitions used to describe micromobility devices in our state laws have been defined over multiple decades through a patchwork of laws. This has been confusing for many people in the Commonwealth, but especially for users of these devices. To best address modern micromobility challenges, the legislature must realign the language around these devices.

Where To Start:

- The legislature should **hold a hearing** to discuss these potential changes.

This report discusses the currently existing relevant Massachusetts laws and regulations found in Massachusetts General Law (MGL) and the Code of Massachusetts Regulations (CMR) in **Chapter 2: Micromobility in Massachusetts**.

2 Speed-Based Classification Schema

The Commission recommends that the legislature adopt a methodology to classify micromobility devices; define requirements for operating a device based on its classification; place restrictions on where a given device can be operated; define what standards a device should be manufactured to; and devise a way to identify an individual device.

This classification schema was developed by MassDOT from research conducted by the UMass Transportation Center and refined by the Commission.[97] This schema, once enacted, can be used as a **uniform foundation for regulating micromobility devices**.

Categorization is the first step to properly setting regulations in place for safety purposes. A flexible, future-oriented framework allows for new devices to be slotted into the appropriate tiers based on the maximum speed **without needing to insert a new definition in MGL for each new device**. Within each speed tier, **devices are grouped into categories**. This two-step structure makes it easy to understand, apply, and extend to new devices.

The classification framework is anchored in maximum speed because speed is findable on every device, enables field identification and enforcement, and supports tier-based regulation. Higher speeds directly correlate to crash risk and injury severity. Higher speed devices are uncomfortable to travel alongside in a bike lane and can lead to dangerous maneuvering by riders who want to go faster than riders on slower devices. On the other hand, devices that cannot go more than 50 MPH **cannot contend with typical highway speeds**.

Importantly, a class 2 e-bike that can be switched to a class 3 e-bike should be a Tier 1 device. Modifications to any micromobility device that increase the maximum operational speed, such that it also changes that device's tier, are permitted so long as the new tier's rules are followed. Maximum speed modifications are controversial, and both California[98] and Florida[99] attempt to address this potential for modification, which should be reviewed further.

Defining Speed

Speed is not a one-size-fits-all term. Given that two of our goals for the framework are that it is future-proof and has clear definitions, the Commission recommends thinking about speed in a nuanced way. Therefore, apply the definition that is most appropriate for the situation:

Maximum Assisted Speed applies to e-bikes and any device with electric/motor pedal assist:

The highest speed at which the motor provides propulsion on level ground with factory settings

Maximum Designed Speed applies to fully motorized devices (no pedals):

The highest speed the device is designed to reach on level ground under its own power in factory settings.

Typical Operational Speed applies to human-powered only devices:

The expected speed on level ground in ordinary use, not including downhill coasting.

Classification Schema

How should devices be grouped?

The goal of developing a classification schema is to make the laws and regulations that would be based on it simple, intuitive, risk-based, futureproof, field-ready, action-oriented, legally grounded, and clear. The Commission and representatives from the RMV developed this speed-based schema, which it recommends the legislature adopt.

Tier 0 0-20 MPH	**A.**	Human-powered Micromobility Device
	B.	Powered Micromobility Device
	C.	Mobility Aid Device
Tier 1 21-30 MPH	**A.**	Class 3 E-bike
	B.	Powered Micromobility Device
	C.	Moped^ with 2 or 3 wheels
Tier 2 31-40 MPH	**A.**	Limited Use Motorcycle
	B.	Powered Micromobility Device
Tier 3 41+ MPH	**A.**	Motorcycle
	B.	Powered Micromobility Device

Limited use motorcycle and motorcycle already have definitions in MGL. They are required to have FMVSS-standard motorcycle equipment. Any cycle device that goes faster than 30 MPH and does not meet FMVSS is considered a powered micromobility device.

^Currently called Motorized Bicycle in MGL

"Powered" and "motor" in this case can refer to electric, gas, hybrid, or other non-human-powered propulsion systems.

Tier 0 (0-20 MPH)

These devices include the majority of current commercially available micromobility devices. This tier includes non-powered devices, mobility aid devices used by people who require assistance because of a mobility disability, or powered devices that have a maximum designed speed of 20 MPH. This includes, but is not limited to:

- All non-powered bicycles and tricycles, including road bikes, mountain bikes, BMX bikes, etc.
- All non-powered kick scooters
- Class 1 and 2 e-bikes and e-trikes, where the maximum assisted (Class 1) or throttled (Class 2) speed is capped at 20 MPH by design
- Powered scooters with maximum operational speed of 20 MPH
- Other powered micromobility devices such as hoverboards, electric skateboards, uniwheels, etc. that can go no faster than 20 MPH
- Cargo e-bikes and cargo e-trikes capped at 20 MPH
- Powered wheelchairs and other mobility aid devices for people with disabilities

This tier is capped at 20 MPH to align with 36 other states[100] and the federal government,[101] which have adopted Class 1 and 2 e-bike definitions with maximum speeds of 20 MPH. This provides some certainty for the industry and consumers across the US.

Additionally, according to a widely regarded study by the AAA Foundation for Traffic Safety, [102] the risk of a pedestrian suffering major injury or death when struck by a motor vehicle increases from 18% if the vehicle is going 20 MPH to 50% if the vehicle is going 30 MPH. Although micromobility devices have considerably less mass – and therefore less kinetic energy – than motor vehicles, this study is still the best guidance for where to delineate the end of the first speed tier. For reasons we will address in Recommendation #5, data on micromobility-related crashes is sparse and unreliable at present.

Tier 1 (21-30 MPH)

These devices are meant to include devices that are safe to operate at typical neighborhood speeds (e.g., 25 MPH for municipalities that have adopted MGL c. 90, § 17c) but can go faster than any solely human powered micromobility device operated by an average person on a flat surface. The Commission considered folding Tier 1.A into Tier 1.B, to combine all powered micromobility devices in that speed range. This tier includes:

- Class 3 e-bikes, with maximum assisted speed of 28 MPH
- Mopeds, currently defined in MGL as motorized bicycles
- Scooters, hoverboards, electric skateboards, etc. that have a maximum designed speed of between 21 and 30 MPH

Tier 2 (31-40 MPH)

Cycle devices that fall into this category should be thought of as "limited use motorcycles", which must follow relevant federal requirements. The Commission recommends **explicitly banning devices in this tier from bike lanes**, shared use paths, and other ways that non-motorized bicycles operate on.

Tier 3 (41+ MPH)

This tier includes any device capable of reaching speeds over 40 MPH. The Commission recommends **explicitly banning devices in this tier from bike lanes**, shared use paths, and other ways that non-motorized bicycles operate on. Devices in Tier 3.A are allowed on the road and limited-access highways, if the operator follows posted speed limits. Tier 3.B are non-cycle micromobility devices capable of these speeds, however, should still be banned from limited-access highways.

Device Requirements

What is the device required to have to be street legal?

The Commission recommends several device standards be put in place to protect consumers and enable safe operation. These requirements fit the speed-tier classification schema as follows:

		UL Electrical Standard	UL Battery Standard	Lights, Brakes, Horn	Motorcycle Equipment	Speedometer	Stop and Turn Signals
Tier 0 0–20 MPH	**0.A**: Human-Powered	n/a	n/a	■			
	0.B: Powered Micromobility	UL 2849 or UL 2272	UL 2271	■			
	0.C: Mobility Aid Device						
Tier 1 21–30 MPH	**1.A**: Class 3 E-bike	UL 2849	UL 2271	■ *		■	
	1.B: Powered Micromobility	UL 2272	UL 2271	■		■	
	1.C: Moped^	UL 2849	UL 2271	■ **		■	■
Tier 2 31–40 MPH	**2.A**: Limited Use Motorcycle	UL 2849	UL 2271	■ **	■	■	■
	2.B: Powered Micromobility	UL 2272	UL 2271	■		■	■
Tier 3 41+ MPH	**3.A**: Motorcycle	UL 2849	UL 2271	■ **	■	■	■
	3.B: Powered Micromobility#	UL 2272	UL 2271	■		■	■

^ Currently called Motorized Bicycle in MGL

* Follow the federal motor vehicle guidelines for bicycles (see 16 CFR Part 1512)

** Follow FMVSS standards (see 49 CFR part 571)

Need to follow the motorcycle pathway i.e. FMVSS, VIN etc. else illegal on public roadways

UL Electrical and Battery Standards

Lithium-ion battery fires burn hotter, faster, and are more difficult to extinguish than normal fires. Between 2022 and 2025 in New York City, there have been more than 800 fires caused by lithium-ion batteries, 70% of which were caused by e-bikes and e-scooters.[103] These fires are the leading cause of fire death in the city, directly causing 17 deaths in 2024.[104] Because of the construction and chemistry of lithium-ion batteries, when a battery is damaged and fails, it triggers a chain reaction called thermal runaway. Combustion events like these quickly produce thick, toxic smoke and the resulting fire is resistant to water and fire suppressing foam, making them very difficult to put out.

Since the most common place for users to charge their micromobility devices is in their home, **subpar or damaged batteries can be a hazard**. Specific risks are tied to dangerous charging and storing practices and the use of aftermarket or third-party batteries. While many devices in our homes may have lithium-ion batteries (e.g., laptops, cell phones, toys), micromobility device batteries are unique in the amount of moisture and physical damage they are exposed to through regular use, making them perhaps more susceptible to failure.

The best tool we have to fight these fires is to keep them from happening in the first place. UL-certified batteries are less prone to failure, having to meet certain standards

for materials and construction.[105] By requiring micromobility devices to use certified batteries, the state can potentially reduce incidents of fires caused by faulty batteries.

Faulty batteries are also known to cause fires at waste centers across the state, and the Massachusetts Extended Producer Responsibility (EPR) Commission recommends that an EPR law for batteries would provide greater access to recovery of removable lithium-ion batteries (such as those found in e-micromobility devices), the cost of which would be funded by industry, significantly increasing the likelihood of participation by residents.[106]

Additional Device Requirements

Beyond battery requirements, any additional device requirements are for the purpose of safe operation at night; to conform to federal safety standards set out in the Code of Federal Regulation (CFR); and/or to provide the means of safe and legal operation.

Nearly all these requirements are already in place. For standard non-motorized pedal bicycles, MGL c. 85 § 11B requires brakes, lights, and reflectors that perform to a certain standard to be installed and functional. Bicycles of this kind and Class 1 and Class 2 e-bikes are also required to follow the CFR standards set out in Chapter II Subchapter C Part 1512,[107] which includes specifications for various additional parts of the bicycle. The Commission's addition here is to **extend these requirements to Class 3 e-bikes**.

Mopeds, limited use motorcycles, and motorcycles are considered motor vehicles and are thus also subject to the Federal Motor Vehicle Safety Standards (FMVSS), which is a subsection of the CFR handled by the National Highway Traffic Safety Administration (NHTSA). The requirement set out above for motorcycle equipment is to conform to this federal standard for the purposes of decreasing the likelihood of collision and increasing survivability in case of a crash.

UL Standards

UL 2849 (e-bike "system" safety): A system-level standard that evaluates an e-bike's entire electrical system working together — battery, motor/controller, wiring and the specific charger — for fire/electrical hazards. It's certified by an OSHA-recognized NRTL (e.g., UL, Intertek, SGS) and includes construction + test requirements and required markings.

UL 2271 (battery pack safety for LEVs): A pack-level standard for lithium-ion battery assemblies used in light electric vehicles (including e-bikes/scooters). It focuses on the battery pack's design, BMS, abuse/thermal tests, production checks, and labeling. It's distinct from automotive EV batteries (UL 2580).

UL 2272 applies to personal e-mobility devices (e-scooters/hoverboards, etc.) at the device electrical system level.

Many jurisdictions pair UL 2272 for scooters with UL 2271 for their batteries, and UL 2849 for e-bikes.

Operational Requirements

What is required of a user?

This table describes what requirements the Commission recommends for a micromobility user to operate a micromobility device based on the tier system.

		Helmet	Age 16+	License/ Education	Insurance	RMV Registration	State Micro ID/Decal
Tier 0 0-20 MPH	**0.A**: Human Powered	■‡					
	0.B: Powered Micromobility	■‡					
	0.C: Mobility Aid Device						
Tier 1 21–30 MPH	**1.A**: Class 3 E-bike	■	■	Education			■
	1.B: Powered Micromobility	■	■	Education			■
	1.C: Moped^	■	■	■ Class D	■	■	
Tier 2 31–40 MPH	**2.A**: Limited Use Motorcycle	■	■	■ Class M	■	■	
	2.B: Powered Micromobility	■	■	■ Type TBD	■		■
Tier 3 41+ MPH	**3.A**: Motorcycle	■	■	■ Class M	■	■	
	3.B: Powered Micromobility	■	■	■ Type TBD	■		■

‡Bicycle Helmet Law applies to riders ages 16 and younger

^ Currently called Motorized Bicycle in MGL

Helmets

The Bicycle Helmet Law in Massachusetts stipulates that bicycle riders, both operators and passengers, ages 16 and under must wear a bicycle helmet while riding a bike.[108] The Commission recommends that **this law be extended to powered bicycles and micromobility devices**. In the event of a crash, a helmet offers the best protection against concussions and traumatic brain injuries. According to the Cleveland Clinic, bicycle helmets reduce serious head injuries by 60%, reduce traumatic brain injury by 53%, and reduce the number of cyclists killed or seriously injured by 34%.[109] The Commission therefore recommends extending the 16 and under bicycle helmet requirement to Class 1 and 2 e-bikes and similar powered Tier 0 devices.

Additionally, the Commission recommends a helmet requirement for all users of Tier 1 (20-30 MPH) devices, including Class 3 e-bikes (Tier 1.A), and strongly encourages Class 3 e-bike riders to use Class 3 e-bike helmets or motorcycle helmets but recognizes this requirement would be very difficult to enforce. An operator of a Tier 1.A or Tier 1.B device should not be stopped by police solely for not wearing a helmet, and it should not be considered contributory negligence in a crash.

Already, MGL has a "Universal Helmet Law" that requires moped and motorcycle operators and passengers to wear a motorcycle helmet, regardless of age, in accordance with federal safety standards.[110] The Commission recommends **extending this requirement to other micromobility devices that can achieve speeds between 21-30 MPH or more**.

Age Minimums

The Commission recommends imposing minimum operating age requirements (e.g. 16 years old) on devices that can travel over 20 MPH. Children are more likely to be involved in incidents involving micromobility devices; according to the Consumer Product Safety Commission, "Children 14 years and younger accounted for about 36% of micromobility injuries from 2017 to 2022, double their 18% proportion of the U.S. population."[111] The Commission recommends setting a minimum operating age on micromobility devices that can go faster than a child could reasonably be expected to achieve by their own power. This requirement aims to protect both children and the people travelling around them. If the legislature adopts age limits, it should additionally investigate advertising practices aimed at children.

Licensing & Education Requirements

While broad education programs are needed to address safe operation practices for all micromobility devices, which is discussed further in Recommendation #7, the Commission felt that **additional requirements should exist for Tier 2 (31-40 MPH) and Tier 3 (41+ MPH) devices**. Class M licenses are already required by the RMV for motorcycles and limited use motorcycles, while Class D licenses are required to operate a moped. The Commission recommends a potentially new license category for powered micromobility devices that travel above 30 MPH (e.g., Tier 2 and Tier 3), which would be developed by the RMV. Additionally, the RMV should develop material for a light-weight education requirement, potentially issued at the point of sale, for Tier 1.A and Tier 1.B devices. This is to help riders better understand the basic rules of the road and where the device can travel. These educational materials should also be incorporated into the driver's manual.

Insurance Requirements

For faster devices, insurance coverage is crucial because of the potential for physical harm caused by the device in the event of a crash involving a vulnerable user. Just as with car insurance, the Commission recommends that **some higher-speed micromobility users have liability insurance to ease the financial burden of treating serious or potentially life-threatening injuries** in the event of a crash. The most notable change to current requirements here in Massachusetts is for an insurance requirement to be added for mopeds (Tier 1.C). This is because they weigh more than other Tier 1 (21-30 MPH) devices. Examples of liability insurance requirements for these types of devices exist in several states, including California, Florida, and New York.[112] The Commission is recommending this be part of the discussion in any future legislation.

RMV Vehicle Registration

The RMV already requires gas-powered mopeds and motorcycles to register with the RMV.[113] The Commission recommends extending this requirement to similar electric mopeds (Tier 1.C) and electric motorcycles (Tier 2.A and Tier 3.A).

Micro ID will be covered in-depth in **Recommendation #3**

Travel Allowances

Where can these devices be used?

Travel allowances were discussed at length by the Commission. To maintain consistency across the Commonwealth, the legislature should adopt the following requirements.

		Sidewalks	Bike Lanes	Shared Use Paths	Roadways	Limited Access Highways (>40 MPH)
Tier 0 0–20 MPH	**0.A**: Human Powered	■ ¶	■ ¶	■ ¶	■ ¶	
	0.B: Powered Micromobility		■ ¶	■ ¶	■ ¶	
	0.C: Mobility Aid Device	■	■	■	■	
Tier 1 21–30 MPH	**1.A**: Class 3 E-bike		■ ¶		■	
	1.B: Powered Micromobility		■ ¶		■	
	1.C: Moped^				■	
Tier 2 31–40 MPH	**2.A**: Limited Use Motorcycle				■	
	2.B: Powered Micromobility				■	
Tier 3 41+ MPH	**3.A**: Motorcycle				■	■
	3.B: Powered Micromobility				■	

¶ Follow local bicycling rules

^ Currently called Motorized Bicycle in MGL

Allowances

These travel allowances should stand as a default guide. **Municipalities will retain the discretion to set their own rules** about sidewalks and shared use paths in their communities. Already in MGL, bicyclists are given these standards for operation.[114] Once a universal and adaptable categorization framework is established, MassDOT, in consultation with EOPSS and local law enforcement agencies, should promulgate these regulations on micromobility road use and road safety requirements.

The Commission agreed that sidewalks are predominantly the domain of pedestrians, and **powered devices should largely stick to the road and dedicated bikeways**. Understanding, though, that Massachusetts does not have a complete network of bikeways, there are instances when, in the interest of safety (unless otherwise directed by local ordinance), a micromobility operator needs to ride on the sidewalk. A person operating a micromobility device on the sidewalk shall yield the right of way to pedestrians and give an audible signal before overtaking and passing any pedestrian.[115] Current law does not allow for Class 1 and Class 2 e-bikes on sidewalks.[116] Individual municipalities have additional rules for sidewalk use restrictions. The Commission also noted that some e-bikes can toggle between e-bike classes using manufacturer supplied apps and this should be considered in travel allowances. The Commission, in Recommendation 12, recommends funding for bicycle facility infrastructure and upgrades, which could be used by municipalities to remediate these kinds of gaps in the infrastructure. Until then, no punitive action

should be taken on operators to slowly operate Tier 0 (0-20 MPH) devices when connecting between existing infrastructure, provided that they yield the right of way to pedestrians and give an audible signal before overtaking and passing any pedestrian. The Commission also recognizes that vehicles of all Tiers may need to access sidewalks for parking or unloading.

In Massachusetts law, shared use paths are not defined, but these kinds of paths require different travel restrictions than currently defined bikeways because of the nature of mixed pedestrian and micromobility traffic these paths carry. Representatives from MassDOT and DCR agreed that Tier 0 (0-20 MPH) devices should be allowed on these kinds of paths with the opportunity for path-operating entities and municipalities to **set additional speed restrictions**. All Tier 0 (0-20 MPH) micromobility devices should follow the same rules for maximum speed; and giving space for pedestrians, people using Mobility Aid Devices, equestrians, etc. This is discussed more in Recommendation 10.

Currently, mopeds are allowed in bike lanes as defined in Massachusetts law. The Commission decided that this was a misallocation and recommends **restricting mopeds (Tier 1.C) to roadways**. Given their usual operating speed and heavier weight, mopeds raise overall speeds and kinetic energy, and thus the potential for more serious injuries in a crash. Bicyclists and other micromobility users can feel unsafe sharing those facilities. It can also feel unsafe to moped operators themselves, based on the engineering design factors (e.g., sight distance, signal clearance) of those narrower lanes that were originally designed for lower-speed devices. Traffic from mopeds operating unpredictably in bike lanes is also heavily perceived as dangerous among community members who do not bike but walk, drive, or take transit.

Street Legal Devices

Some off-road devices are marketed with "street legal" packages. It is important to remember that registration is needed for many higher speed vehicles, which requires a Manufacturer Certificate of Origin (MCO) or Vehicle Identification Number (VIN). Marketing practices can be obfuscatory around these requirements and many vehicles do not qualify for on-street use.

Wide Micromobility Devices

Special travel restrictions should be placed on any micromobility device, regardless of classification, **that is wider than 36"**, such as an e-quadricycle. Wider devices can block bicycle paths, clog bike lanes, and be a general nuisance to the flow of micromobility traffic. For this group of devices, the Commission recommends **constraining their operations to just roadways**, while allowing for short stops off the road. The impact of these devices, specifically as they are used commercially in delivering meals and packages, are still poorly understood and should be studied further, as this report discusses in Recommendation 15.

Why This Matters:

A speed-based tiered system works because any future device that may need to be evaluated necessarily has some maximum speed it is designed to go, so applying safety restrictions and regulations to any future device is as straightforward as possible. It is well-documented that **faster speeds lead to worse outcomes in a crash**, so higher (faster) tiers can have stricter safety standards whereas lower (slower) tiers have more protections as vulnerable road users. Every Commission member has heard how confusing the current system is and how unsafe people feel right now, and every decision made behind this recommendation was made with safety and comfort in mind.

Where To Start:

- The legislature should **begin drafting a bill** that establishes this tier-based speed classification framework to facilitate a public hearing and review process.

3 Micro ID

The legislature should establish a time-limited working group with funding to design a statewide Micro ID Decal pilot. This should enable MassDOT, acting through the RMV, to convene a multi-agency working group to develop a light-touch micromobility identification framework using a tamper-evident decal with QR/NFC that links to a record confirming device tier, basic safety compliance, and limited, opt-in personally identifiable information for authorized parties.

Law enforcement needs to be able to identify devices that go faster than 20 MPH for the purposes of safety and crash reporting. The Commission recommends the legislature convene a working group to develop a unique identifier that is **tamper-evident, durable, easy to apply, and can provide law enforcement with pertinent information about the device**.

The Commission proposes the legislature establish a working group to develop a Micro ID for this purpose. A Micro ID is a light-touch identifier, not a license plate or VIN, and comes in the form of a sticker. Designed correctly, it is an **easy way to verify the characteristics of the device and confirm if the device complies** with rules associated with its tier and category, as laid out in Recommendation 2. They can be used for quick roadside verification by law enforcement for crash reporting, product defect identification, and returning a stolen device to its original owner. The stickers should be tamper-evident to reduce the possibility for counterfeits and mismatched tiers. The Micro ID can be issued at point-of-sale (POS), in a self-service e-registration process, or in bulk to a fleet.

To further develop this concept, the Commission recommends convening a working group that should deliver within 12 months:

1. draft legislation,
2. a regulatory outline,
3. a pilot plan, and
4. a fiscal note.

Concept art for the Micro ID

The working group should address the following outstanding tasks:

- Design e-registration and process
- Define renewal & compliance cycle
- Develop privacy and data security policies
- Clarify the roles of dealers, manufacturers, and the RMV
- Evaluate tech standards such as QR/NFC, UL docs, and tamper features
- Design roadside enforcement process
- Determine enforceable penalties

The Legislature should also provide an appropriation to MassDOT for staffing, facilitation, stakeholder engagement, accessibility/translation, technical research, and drafting.

Why This Matters:

The Micro ID system makes **enforcement of safety standards** possible. In the field, law enforcement officers will not easily be able to tell what a device is capable of and if it is compliant with the corresponding safety standards according to its speed tier without such a decal. This also allows for **better crash data collection** so MassDOT can get a better understanding of the impact micromobility devices have on public health. Finally, a Micro ID system helps residents know which device type they have and what regulations apply.

Where To Start:

- The legislature should **identify the appropriate members** for the working group.
- The legislature should task the working group to **begin developing** this concept further.

Enforcement & Safety

Recommendations

4 Police Training

The Massachusetts State Police Academy and the Massachusetts Police Training Committee should develop and deliver training for law enforcement officers, consistent with new and current micromobility laws, regulations and guidelines.

Current training largely focuses on motor vehicles or bicycles, but not the wide variety of e-devices officers are encountering in their communities. It is important to update older trainings and create new ones to ensure uniform understanding and enforcement across the Commonwealth. The Commission was very clear **that there is confusion among the public on what laws exist**. Local law enforcement has shared how difficult it is to enforce current laws that have large gray areas due to the pace of innovation in the micromobility industry. Future training for law enforcement should include clear instruction on the legal classifications and operating rules for all micromobility devices; consistent enforcement practices that reflect these distinctions; and standardized procedures for documenting micromobility-involved crashes to improve data quality.

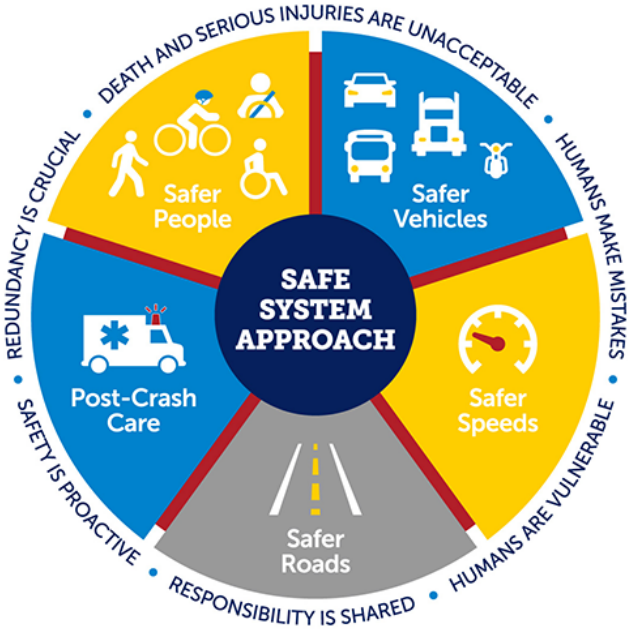
Training should also integrate Safe System[117] principles, emphasizing speed management and road design considerations that influence rider safety and behaviors. Additionally, law enforcement officers should receive guidance on equitable enforcement and effective community engagement, particularly in areas where micromobility supports affordable transportation for residents and workers. As a best practice, scenario-based and hands-on components, such as on-electric-bike or on-electric-scooter exercises and mock traffic interactions, should be incorporated to improve officers' understanding of the behavior, risks, and vulnerabilities of micromobility users. This training should be developed and implemented with the involvement of community transportation advocacy organizations. The Executive Office of Public Safety and Security (EOPSS) indicated in a Commission meeting that should the laws change, this work to update the trainings would already have dedicated funding. Funding for local law enforcement to deliver updated trainings is likely needed.

This recommendation may require updating MGL c. 6 § 116E to include e-bike and other micromobility device education in its mandated establishment of a bicycle safety enforcement course.

Why This Matters:

Training law enforcement officers on bicycles and micromobility laws and regulation is essential not only for officer readiness but for **the safety and trust of everyone who shares the road**. When officers better understand how bicycles, e-bikes, scooters, electric unicycles, and other devices operate, they can apply laws fairly and model safe behavior in traffic, especially if they are operating micromobility devices themselves. It's important for law enforcement officers to learn about new laws and new technologies, modalities, or devices that they are tasked with enforcing. This improves consistency in enforcement across jurisdictions, ensures riders are treated appropriately under current or new regulations, and helps prevent crashes through informed education and engagement rather than just penalties. Officers who are trained to interact safely and respectfully with riders also build stronger community relationships, making roads safer and more predictable for all users.

For drivers, pedestrians, and riders alike, law enforcement training supports a more balanced and coordinated transportation system. When police apply the Safe System Approach, emphasizing shared responsibility and harm reduction, everyone benefits from roads designed and policed with vulnerability in mind. Accurate crash reporting and data collection from well-trained officers lead to better infrastructure and policy decisions that protect all road users. In short, micromobility training for law enforcement strengthens the connection between enforcement, education, and design that creates safer, fairer streets across the Commonwealth.



Source: US Department of Transportation

Where To Start

- The Massachusetts Police Training Committee, EOPSS, and relevant local law enforcement leadership should convene with active transportation advocacy organizations to **outline an effective training curriculum**.
- MassDOT should coordinate with an academic partner to **conduct a best practice scan** from other states and countries for training related to micromobility use.

5 Crash Report & Vulnerable User Data

The legislature should amend state law to enable the inclusion within MassDOT's crash data system of micromobility-involved crashes that don't also involve an operated motor vehicle.

Following this statutory update and with specific funds appropriated by the legislature, MassDOT should implement the expanded data collection system within 15 months of enactment, with functionality to distinguish between crash types and updates to the Vulnerable User section of the Massachusetts Crash Report to improve reporting accuracy. All law enforcement agencies should adopt the updated crash reporting forms within three years of system implementation.

MassDOT should continue to study methods to improve the accuracy and reliability of micromobility crash data once incorporated into the state crash system.

The Federal Highway Administration (FHWA) defines a Vulnerable Road User (VRU) as an individual who uses streets, roads, and highways without the protection of a motor vehicle.[118] In Massachusetts, we refer to these individuals as "Vulnerable Users". This term is defined in state law and includes 22 different categories of vulnerable users, such as pedestrians, bicyclists, and skateboarders. When the Act to Reduce Traffic Fatalities was signed into law in January 2023, it required updates to the Massachusetts Crash Report form to include information about Vulnerable Users.[119]

The Massachusetts crash report form is used by law enforcement agencies (LEAs) to provide information about a crash. A Motor Vehicle Crash Police Report must be completed when a motor vehicle is involved in a crash in which a person was killed or injured, or in which there was more than $1,000 damage to any one vehicle or other property. The crash report form includes fields about the crash, the vehicle, the driver, and any vulnerable users involved. There is also a crash narrative section where the crash is described in a more open-ended way. This information is then shared with the Registry of Motor Vehicles (RMV) and shows up in IMPACT, MassDOT's crash data portal.

Currently, crash reports are not required to be completed for crashes that don't involve an operated motor vehicle. This means that if an e-scooter operator hit a bicyclist, that crash would not be captured via a crash report and therefore would not show up in the Registry's crash system, nor in IMPACT. (It may, however, show up in local EMS data or in hospital emergency department report-outs like those via the National Electronic Injury Surveillance database from the Consumer Product Safety Commission.) As a result, **MassDOT can't know the volume of crashes that occur between micromobility device users or between micromobility device users and pedestrians.** This recommendation is intended to correct that data gap, while acknowledging sensitivity with

Boston, MA

respect to personally identifiable information in small datasets.

Changes to the Crash Report Form must be shared with all of the Record Management System (RMS) vendors that are used by law enforcement agencies in Massachusetts. There are over a dozen different RMS platforms used by Law Enforcement Agencies across the Commonwealth, which significantly complicates the implementation of this effort. Sometimes, that update requires each car with the software to return to a specific location and physically receive the update. Because of the fractured RMS vendor marketplace, these changes take time and significant resources to implement.

Details need to be worked out as to where this information fits best on the Crash Report Form, but it would be additional to what is already there. These data would be held at the Commonwealth level, as they are not technically "FARS" (Fatality Analysis Reporting System) crashes from the National Highway Traffic Safety Administration's perspective.

Why This Matters:

Collecting crash data helps inform crash prevention programming in the future. Without robust information about micromobility-only crashes, we have an incomplete fact base from which to make decisions to increase safety. We can't identify hotspots of micromobility-only crashes because the data don't exist. These data could also enable various analyses, such as correlating crashes with infrastructure types; studying vehicle types that cause the most (or most severe) injuries; and environmental factors.

Where To Start:

- MassDOT should **launch a working group** to figure out process questions like whether to include injury and fatal micromobility crashes only; whether to include micromobility crashes not on public ways; and what the minimum fields to be included should be. Learning can be gleaned from places already collecting their own micromobility only-involved crashes, such as the City of Cambridge.

- Using insights from the working group, MassDOT should **prototype an update to the Crash Form** for micromobility-only crashes and do usability testing with LEAs.

- MassDOT should work with an academic partner to **research best practices** in other states and countries for collecting data and reporting on micromobility-only crashes.

6 Default Maximum Speeds on Paths

The legislature should establish a default maximum speed of 20 MPH on shared use paths, applicable statewide, unless otherwise posted. Path-operating entities retain the authority to lower the limit based on context-specific factors such as user volume, path width, crossings, geometry, and adjacent land uses.

Municipalities already have the authority to set speed limits for shared use paths, but there is no default maximum speed for them to fall back on. For example, Malden and Northampton have set speed limits under 20 MPH for their paths, but that is not necessarily the rule in the surrounding communities. The Commission recommends the legislature

a. Define "shared use path" in MGL
b. Set the default shared use path maximum speed statewide to 20 MPH

"Shared use path" is a common phrase found in federal and state documentation to refer to a path that sees traffic from pedestrians, bicyclists, and micromobility devices but is not accessible to motor vehicle traffic. As MGL is written now, this kind of "way" has no definition and does not fall under the umbrella term "bikeway". **Defining this term allows the legislature to better delineate where certain devices should and should not go** and enables entities like MassDOT and DCR to create rules of use and signage.

For "Shared use path", the Commission recommends using the following definition, which was developed as a combination of the existing MassDOT definition from the Project Development and Design Guide (PDDG), model language from other states, and the definition used by AASHTO.

Source: MassDOT

"***Shared use path***", a path intended for transportation or recreation use that is designed for people of all ages and abilities on foot or using motorized or non-motorized micromobility devices and is physically separated from motorized vehicle traffic within a highway right-of-way or an independent right-of-way with few crossflows with motor vehicles.

For more discussion on the definition of shared use path, see Recommendation 1.

Once "shared use path" is defined in MGL, the legislature should set a statewide default maximum speed on these paths at 20 MPH. This default would not change any of the powers or responsibilities municipalities have over setting their own speed limits on their paths, nor any currently existing speed limits under 20 MPH. Rather, it would be a general expectation for path users to abide by unless otherwise instructed. In locations with significant pedestrian activity, sight line challenges, and other environmental factors, the speeds should be lowered.

Why This Matters:

Adding the shared use path definition as it is already used by planners and path designers makes laws and regulations easier to apply. It also makes existing design documentation clearer in its application.

Setting the maximum speed of paths at the state level sets a clear, uniform expectation for riders, especially those unfamiliar with a given path, and gives law enforcement a clearer standard to apply. Aligning the maximum with the proposed speed tiers enables legibility by the public.

Where To Start:

- As part of legislation based on this report, the draft bill should include the term and definition for shared use path.
- The Commission recommends including in that legislation an authorization to MassDOT, in conjunction with DCR, to allow further use of "shared use paths" to be regulated to enable streamlined updates that match evolving micromobility usage in the future.
- The Legislature should hold a hearing as part of the legislative process to **discuss the 20 MPH maximum speed on shared use paths** recommendation.

7 Education Campaign

Law enforcement and state and local stakeholders, such as Safe Routes to School, should collaborate with relevant community partners, such as local bike shops, to develop and deliver an educational campaign to inform micromobility users about state laws, regulations, local ordinances, and safety practices.

The Commission heard multiple groups express frustration at the lack of knowledge and etiquette among bicyclists and micromobility users, especially in communities seeing a growth in e-device use. With the rise of micromobility usage, more people are using these shared spaces on new devices, often at higher speeds. This has led to increased concerns and general unease for pedestrians, exasperation for seasoned micromobility users, fear from drivers not wanting to cause harm, and hesitation for potential new micromobility users.

Boston, MA

Three populations especially stood out as key audiences for targeted education campaigns: people without an RMV-issued license (including those too young to receive one), older adults, and people who speak or read languages other than English.

The Commission heard from Safe Routes to School (SRTS), the MassDOT program that puts on bike education programming, that there is a high demand from parents, kids, school administrators, and law enforcement for micromobility education content. At the beginning of the 2025-26 school year, there was a surge of new micromobility users at schools, among both students and parents alike. Class 1, 2, and 3 e-bikes are an increasingly common sight in bike racks outside schools. **The importance of wearing the right helmet and following the rules of the road were specifically called out as under-communicated.**

People without a license, particularly those under the age of 16, likely have not had formal instruction on the rules of the road. Interactions with vehicle traffic and mixed pedestrian traffic can become dangerous quickly, a fact which has been the impetus behind traditional bicycle safety education for decades. The danger only grows as the device goes faster, and kids specifically are ill-equipped to navigate these complex interactions. Content on social media showing e-bike modifications and risky tricks encourages dangerous behavior to proliferate in a proactive education void.

Kids and young adults aren't the only populations that this messaging should be aimed at. Micromobility is popular with people who don't have or can't get a license for whatever reason. Disability and non-English speaking communities are especially important to reach as micromobility creates opportunities for travelling within their communities that they may not have had access to before.

While older adults are not a monolithic population, the Commission heard that many older adults either don't know what micromobility devices are (nor how and where they can operate), or they are very aware of them because they make older adults nervous as they are

moving about on sidewalks and paths. Micromobility education among older adults is important. Certain micromobility devices can be a viable alternative to driving for those who rarely leave their immediate community. They can be a powerful tool for keeping older adults moving, active, and connected, while giving freedom to those for whom other methods of travel may have become more challenging. One of the biggest hurdles, though, is knowing that these options exist and gaining comfort with their operation.

Both local and online micromobility device retailers can be points of contact for reaching audiences as they are considering buying micromobility devices, and they should be empowered to instruct new micromobility owners about the rules of the road. Advocacy groups should be given the tools to hold educational events for their communities, and law enforcement should offer safe riding courses. Additionally, the Commission recommends **developing and delivering resources to the general public** for drivers who may not be used to navigating around micromobility users and new infrastructure not meant for cars.

Why This Matters:

Education is a key component in the Safe System Approach. We have precedent in Massachusetts for offering education (either via the driver's manual or via SRTS programming) to potential users of various vehicles and devices. Building on that is logical and beneficial. It makes micromobility more accessible to people who might not consider it as an option for themselves, while making clear for those who *already use it* what laws, regulations, and expectations exist for them as users.

Where To Start:

- Safe Routes to School (SRTS) should **further develop education material specific to micromobility** to present to parents and students. If feasible, SRTS should leverage DESE to bring this curriculum to schools that are not currently SRTS partners. These two entities, working with the partners named in the recommendation, should make a plan to visit all school districts within one year to propagate this material.

- MassDOT should **develop micromobility education materials and a Massachusetts family-friendly micromobility guide**, not recommending specific devices, but creating a framework for thinking about what device (type) might fit a family's needs.

- MassDOT (potentially via the RMV and/or SRTS) should consider stepped up education and awareness across the Commonwealth during a **specific week** or month to focus the safety message about micromobility. Education campaigns and signage should also be conducted and installed on paths and trails to meet micromobility users in their immediate environment.

- Local police departments should **offer pop-up micromobility education sessions for adults and kids** as part of their ongoing safety education efforts. Law enforcement should consider using the Community Traffic Safety Grant program to fund this initiative.

- MassDOT should create social media micromobility safety content that can be shared with local stakeholders for distribution.

Boston, MA

8 Automated Enforcement

The legislature should authorize automated enforcement on infractions that impact vulnerable users, such as speeding, the improper use of bus and bike lanes, and red light running.

Automated enforcement, which is sometimes called "camera-based enforcement", is the process by which a technology system captures an infraction and issues a ticket to an individual. This is in lieu of a police officer or other human witnessing the infraction and issuing a ticket to the individual. The Federal Highway Administration (FHWA) has determined that "speed safety cameras" are a proven safety countermeasure that can reduce crashes up to 54% in certain contexts.[120] Additionally, drivers can more easily yield to people in crosswalks when driving slower.

When a driver parks in a bike lane, a cyclist often has to swerve into the adjacent travel lane to avoid the parked car. This can create an unsafe situation if a driver in the adjacent travel lane is not expecting the bicyclist to make that maneuver. It can also throw the rider off-balance as they look back to make this maneuver. While the act of "double parking" in a bike lane for a few minutes may seem like it doesn't harm anyone, the reality is that it can create dangerous conditions for other users of the road.

As of the release of this report, automated enforcement in Massachusetts is only allowed by law in limited use-cases: for enforcing the law to not park in a bus lane or bus stop[121] and for enforcing the law to not pass a stopped school bus that has its stop arm extended. Therefore, Massachusetts does not reap the potentially large safety benefits of automated enforcement for infractions such as speeding and red light running.

Why This Matters:

To encourage increased adoption of micromobility devices, Massachusetts should have access to all available tools for making the roads saver for these vulnerable users, including camera-based enforcement. Encouraging a **culture and behavior shift** toward following posted speeds and respecting marked bicycle lanes can help Massachusetts meet its goal to eliminate roadway fatalities and serious injuries by increasing overall safety on our roads.

Where To Start:

- MassDOT should create a **time-limited, no-fine, no-fee test** of speed safety camera enforcement (as outlined in MassDOT's 2023 Strategic Highway Safety Plan Action 4.2) or automated bike lane enforcement. These tests could help inform future legislation.
- The legislature should pass S.2344 and H.3754 to allow municipalities to opt-in to road safety cameras.
- MassDOT should consult with the MBTA to **understand the effectiveness of the initial MBTA bus lane enforcement testing**.

Automated Enforcement at the MBTA

In October 2025, the MBTA introduced 703 CMR 6.00 which gives the MBTA and the Massachusetts RTAs the authority to use cameras attached to buses to issue fines to vehicles that obstruct bus stops and bus lanes. This Automated Enforcement program received overwhelming support from hearing participants in August that year and will be rolling out beginning with the SL4 and SL5 routes in Spring 2026.

9 Model Municipal Traffic Control Ordinance

MassDOT should include model micromobility traffic control regulations and prohibitions on obstructing bicycle lanes in its Sample Regulation for a Standard Municipal Traffic Code.

The Sample Regulation serves as a template that cities and towns can adopt or adapt to establish local traffic rules consistent with state law. By updating this framework, MassDOT can provide municipalities with clear, consistent language to regulate micromobility devices and explicitly prohibit stopping, standing, or parking in designated bicycle lanes. Asking people to use a bike lane that is regularly blocked by pick-up/drop-off activity, delivery vehicles, and parked vehicles builds frustration among all roadway users and creates unsafe conditions. See more discussion in Recommendation 8.

The Manual on Uniform Traffic Control Devices (MUTCD) establishes national standards for signs, signals, and pavement markings. It ensures that roadway users encounter consistent, recognizable signs and symbols across all communities, improving predictability and safety. While the MUTCD governs how bike lanes and other facilities are marked, the *Sample Regulation* guides how those markings are enforced locally. This regulation defines violations, penalties, and procedures for enforcement. Together, they provide the visual and legal foundation for managing traffic safely and consistently across the Commonwealth.

Including micromobility and bike lane obstruction provisions in the *Sample Regulation* will make it easier for municipalities to adopt and enforce rules that keep vehicles out of bike lanes, reduce conflicts between modes, and support safe, reliable travel for all users. Municipally determined standardized fines and clear enforcement authority will help deter illegal parking and stopping behaviors that force cyclists into mixed traffic or discourage micromobility use altogether.

Why This Matters:

To provide predictable experiences for micromobility users (and other road users) across the state, the Commission recommends updating the Sample Regulation to reflect current realities on our streets. Ensuring that it is updated with new terminology and expected travel behaviors is key. For example, blocked bike lanes force cyclists and scooter riders into traffic, **increasing crash risks and discouraging active travel by some riders**. Clear, enforceable rules and consistent fines help keep lanes clear, making streets safer, more predictable, and more inviting for people using bikes and other micromobility devices.

Where To Start:

- MassDOT should provide **guidance fines tied to these regulations** based upon a survey of cities and towns that have already adopted these into their rules and regulations.
- **Sample Regulation Articles I and V should be adapted** to include explicit micromobility rules and prohibitions on obstructing bike lanes, providing model language municipalities can adopt directly, followed by an educational campaign.

Infrastructure

Recommendations

10 Design Guidance

MassDOT and DCR should develop context-sensitive design guidance for state and municipal trails and shared use paths that establishes recommended design parameters. The guidance should address the separation of pedestrian and wheeled modes, design speed, signage, and emerging micromobility, incorporating variations appropriate to urban, suburban, and rural contexts.

The Commission recommends creating **one unified definitive guide** for designing trails and paths with micromobility accommodations. MassDOT's Project Development and Design Guide (PDDG) is a solid foundation; Commission members wanted to ensure that non-MassDOT projects (e.g., DCR trails) also align with this context-sensitive guidance. Further, the Commission recommends ensuring the PDDG is updated with micromobility-related content.

Many guides exist for building bike lanes in various contexts. The Commonwealth has published the Separated Bike Lane Planning & Design Guide which gives extensive guidance for building bicycle facilities. NACTO publishes an Urban Bikeway Design Guide that similarly has thorough guidance for building this infrastructure, as does the federal Department of Transportation. Several municipalities, including the City of Boston, have their own bike lane guide as well.

The Commission recommends **developing guidance targeting micromobility integration on paths and trails that are separate from roadways**.

Paths and trails have seen an influx of micromobility use. Currently, path users and operators have no guidance on how to build paths to accommodate pedestrians, bicyclists, and micromobility users in a way that makes everyone feel safe. Design signage is not always clear or effective in conveying proper use. **MassDOT should work with DCR to develop a non-binding design guide for path operators and municipalities.**

Source: DCR

Why This Matters:

The Commission heard reports of **pedestrians feeling unsafe on paths** where e-bikes and other forms of powered micromobility are present and that e-bicyclists lack guidance on how to safely use a path. Setting an easy-to-reference standard for administrators can help abate these issues in both design and operation.

Where To Start:

- DCR should **document the design guidance** they use on their trails and paths for micromobility traffic in case it is useful for other path-operating entities. This should take into account the expected and encouraged growth of micromobility on shared use paths, especially as these networks connect and more residents are therefore able to safely access trails for their daily travel.
- MassDOT should **survey suburban and rural municipalities** on their current needs as they relate to micromobility, including elements such as infrastructure, regulations, and user types. MassDOT should publish their findings.

11 Micromobility Integration

The MBTA and other RTAs should adopt and implement a micromobility integration plan that includes:

- Providing secure micromobility parking at park-and-ride lots, subway and commuter rail stations, intermodal hubs, and bus centers;
- Designating micromobility-friendly rail cars, subway cars, and buses where feasible, taking into account space, safety, and accessibility constraints;
- Exploring opportunities for fare integration and/or discounts with micromobility providers (e.g., Bluebikes and ValleyBike), while recognizing the complexity and long timeline of current fare system upgrades;
- Evaluating the potential for charging infrastructure at select locations, in alignment with safety protocols and emerging best practices regarding battery fire risk.

Haverhill, MA

Micromobility needs to fit in with other forms of public transit to **create better rider experiences and increase accessibility to public transit resources**. The Commission heard how micromobility has been a popular solution to the "last-mile problem", where public transit can get you close to your destination, but can't reach the end destination of every traveler it carries.

People are already using private or publicly owned micromobility to close that final gap from transit hub to destination. To support this population of riders that have their own micromobility device, secure micromobility-friendly parking is essential; users need to feel confident that their device will not be stolen or vandalized while they are gone. Larger parking facilities at locations like Park and Ride, subway and commuter rail stops, intermodal hubs, and bus centers can offer more amenities like device charging or separated covered parking to further encourage riders to reach these transit hubs via micromobility rather than driving. For those who want to

take their devices with them on public transit, bike-friendly vehicles will help keep passenger cars decluttered and priority seating open for people using wheelchairs.

Bluebikes has reported that it sees higher than average ridership to and from its docks at public transit stations. Maintaining those facilities and potentially offering fare integration and discounts at transit hubs extends the benefits of using micromobility as a last-mile solution to riders who don't have their own device.

The MBTA has already published a plan for integrating their system with many forms of mobility, including micromobility. The Commission endorses executing on their plan for adding micromobility accommodations and encourages the RTAs to develop similar plans.

Somerville, MA

Why This Matters:

Physical and digital integration makes it easier for people to choose public transit and leave their cars at home. The MBTA and RTAs can make it easier for riders to stitch together multimodal trips by integrating micromobility into their systems.

Where To Start:

- The MBTA should start **executing on their mobility integration plan**, specifically, recommendation 3.1, *update and develop policies that guide partnership with existing and emerging mobility providers to improve seamless access to transit.*
- All RTAs should **evaluate their existing networks** for potential points of micromobility integration and **make a plan** to build the right infrastructure to accommodate higher micromobility use. MassDOT Rail and Transit Division can facilitate a workshop on this topic.

12 Funding for Upgrades and Expansion

The legislature should increase appropriations for existing state programs, particularly the Complete Streets Funding Program and the Shared Streets & Spaces Program, to further assist municipalities in expanding their networks and transitioning from interim infrastructure treatments, such as paint and flex-post delineation, to designs that provide durable, physical separation for vulnerable users and/or overall traffic calming.

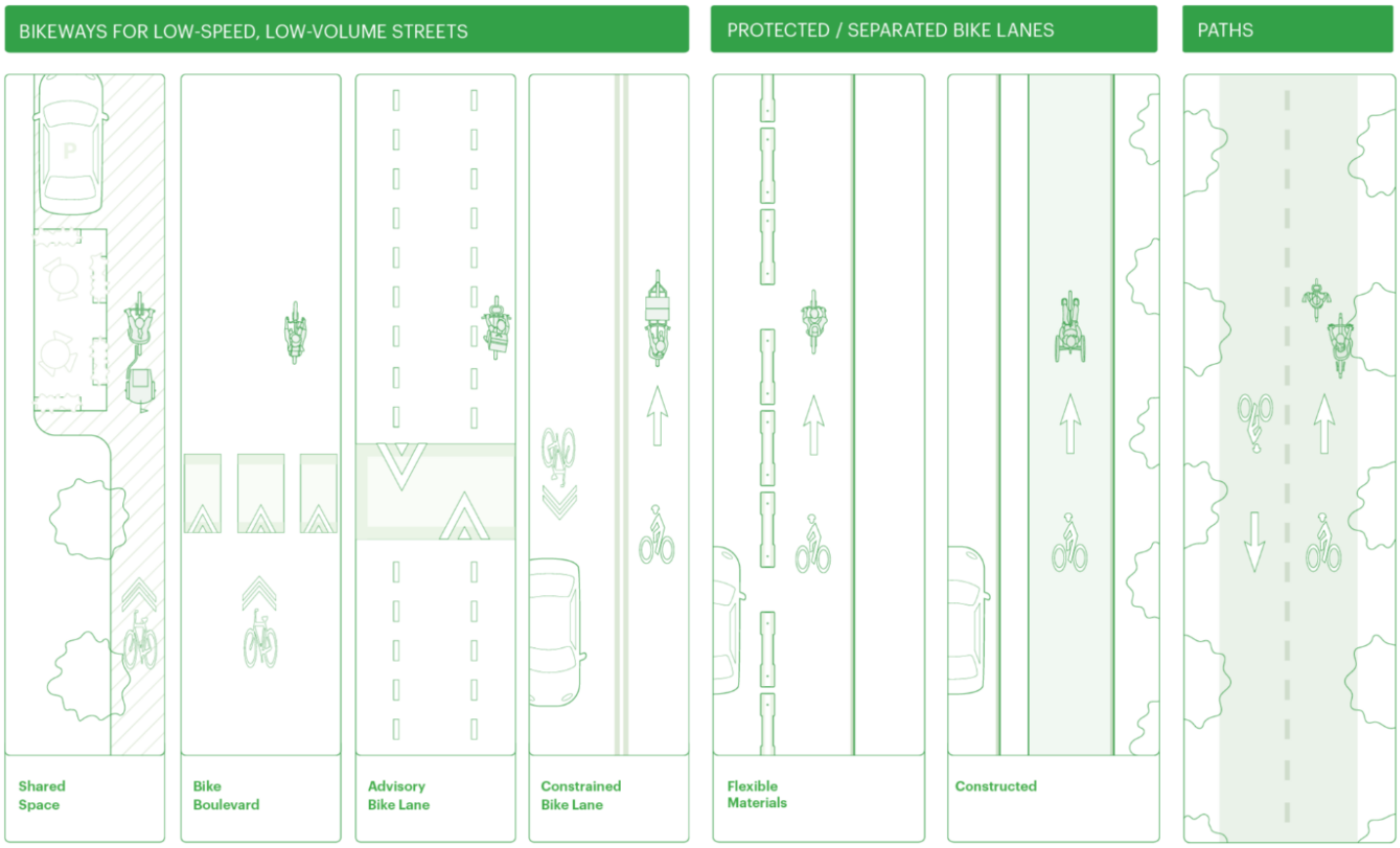
In parallel, MassDOT should enhance its training, technical assistance, and outreach efforts through the Complete Streets Program to support municipalities in planning, designing, delivering, and maintaining this infrastructure.

One of the three mandates of the Commission was to make recommendations to support the expansion of micromobility device use and innovation in the industry. One way to encourage more people to use micromobility for more trips is to make the infrastructure they use on those journeys safer and more comfortable.

The MassDOT Complete Streets Funding Program[122] provides Massachusetts municipalities with tools and financial support to address gaps in their local transportation networks. A Complete Street is one that provides safe and accessible options for all travel modes - walking, biking, transit and vehicles – for people of all ages and abilities. Eligible activities include many things that are relevant for users of micromobility devices, including Street Reconfigurations & Traffic Calming; Pedestrian & Bike Network Connections; Transit Investments; Environment & Streetscape Investments. Technical Assistance funding can be awarded to communities to help them develop a Complete Streets Prioritization plan if they have not done so already.

Another funding source, the Shared Streets & Spaces Grant Program,[123] provides funding to municipalities and public transit authorities to quickly implement improvements to plazas, sidewalks, curbs, streets, bus stops, parking areas, and other public spaces in support of public health, safe mobility, and strengthened commerce. Communities can apply for both design and construction funding. This is a "quick-build" grant program focused on projects that are easily implementable. Eligible activities include many things that are relevant for users of micromobility devices, including bikeshare equipment, bicycle & pedestrian infrastructure, and reimagining public spaces. The Commission recommends that the legislature **increase funding to both Complete Streets and Shared Streets & Spaces grant programs** to support municipalities in providing more micromobility-specific infrastructure.

In the past, these type of "quick-build" projects have led to paint-demarcated or flexpost-separated lanes. While quick-build facilities for bicyclists and other micromobility users are often preferable to no facilities at all, the Commission encourages municipalities to build more permanent, high-comfort infrastructure that provides higher levels of separation and greater safety. For communities that have not yet undertaken a quick-build infrastructure project, the Commission encourages them to **start with something temporary** with the intention to ultimately **move to something more permanent**. For



Source: NACTO, Designing Bikeways for All Ages & Abilities

municipalities that already have quick-build projects on their streets, the Commission encourages them to make plans to turn those into more permanent infrastructure.

Finally, the Commission encourages MassDOT to increase its training, technical assistance, and outreach efforts through the Complete Streets Program to support municipalities in planning, designing, delivering, and maintaining this infrastructure. This recommendation acknowledges that, even with MassDOT's existing efforts, communities can still benefit from additional assistance, education, and supporting evidence.

Why This Matters:

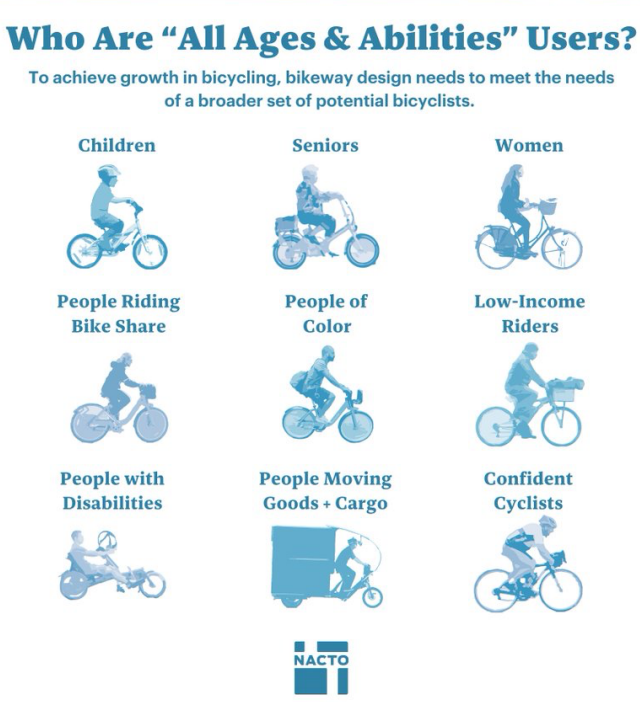
From household travel analysis done for MassDOT's Bicycle and Pedestrian Plan from 2021, 57% of all trips, including all modes of transportation, were less than three miles long.[124] The opportunity for Massachusetts to shift some of those short trips to modes other than a car is significant and can help us meet climate goals and reduce car traffic congestion. Even in less urban environments, there are context-specific types of accommodations for people using micromobility devices that can also support this shift. E-bikes and other e-devices can extend the comfortable range of travel for many users. This requires continual public investment in permanent, separated, high-comfort infrastructure that enables residents to choose to walk, bicycle, roll, or use a micromobility device for their daily needs. The National Association of City Transportation Officials (NACTO) highlights the need for, and benefits of, designing bicycling infrastructure for All Ages & Abilities. Building a more extensive "low-stress" micromobility network encourages use from more cautious users and builds confidence in beginners.[125]

Where To Start:

- MassDOT should **incorporate the findings and recommendations from this report into its upcoming meetings** with MPOs, RPAs, and the Massachusetts Municipal Association. This will help to ensure those organizations can champion the work and support the proposed increase in funding to these grant programs. They can also highlight to their municipalities the importance of shifting from quick-build, or temporary, to more permanent infrastructure over time.

- The legislature should consider the findings from the Transportation Funding Task Force report when discussing increasing funding to the Complete Streets Grant Program and/or the Shared Streets and Spaces Program and the staff that support those programs.

- Grant Central, the centralized online location for MassDOT Highway's grant programs, should **have a call-out that mentions the Commission's recommendation** to encourage municipalities to shift from quick-build to more permanent infrastructure.



Source: NACTO, Designing Bikeways for All Ages & Abilities

Growth

Recommendations

13 Expanding Bikeshare

The legislature should establish a reliable and sustainable funding mechanism to support publicly owned, docked micromobility share systems by expanding the Last Mile Grant program to explicitly include bikeshare, or through a new dedicated program. A combination of formula-based operating support and competitive grants for system expansion should be explored.

Northampton, MA

Municipally owned and managed micromobility share systems are a form of public transportation: they provide shared mobility open to the general public, integrate into broader transit networks, and enable low-emission, short-trip travel that complements bus and rail. **Public ownership ensures that these systems can be planned and operated in the public interest** with transparent governance, equitable access that includes income-based discounted memberships, and strategic station placement in communities underserved by other transit options. These shared forms of micromobility public transit are not niche recreation options, but integral to the present and future of how people move in the Commonwealth.

The Bluebikes system logged more than 4.7 million trips in 2024, more than doubling since 2020. Similarly, the ValleyBike system in the Pioneer Valley rose from just under 80,000 trips in 2019 to over 116,000 trips in 2022 in its regional membership area. In both those systems, e-bikes have been integral to adopting new ridership and sustained growth. The most popular stations in the Bluebikes system are MBTA transit nodes connected to the Red Line. These numbers demonstrate that **bikeshare is not a marginal service but one with sizeable and growing ridership**. It merits public-transportation-level investment rather than ad-hoc sponsorship so that systems outside of the Boston core, where it may be less profitable to operate, can also make this form of public transit available to residents.

The Last Mile Grant Program aligns well with bikeshare because the mode directly serves "last-mile" and "first-mile" objectives: short trips between transit hubs and final destinations, or between homes and transit stops. The program was designed to help municipalities and transit authorities close gaps between transit stops and final destinations and offers a strong foundation for this purpose. It was first funded by the Education and Transportation Fund in FY25. By expanding the program's eligibility to include municipally owned bikeshare systems, or better yet, creating a dedicated companion program for publicly owned shared micromobility, the Commonwealth can build on an existing structure, leverage its statewide reach, and deliver continuity rather than reinvent the wheel.

This could take the shape of a two-part funding structure: first, include formula-based operating support to provide predictable annual funding to existing municipal and regional bikeshare systems. This ensures continuity of service and avoids reliance on short-term sponsorship or uncertain local budgets. Second, include competitive capital grants for system expansion that would allow systems to add stations, increase service areas, and strengthen connections to transit hubs. By layering both predictable operating funding and strategic expansion investment, **the Commonwealth can ensure that publicly owned bikeshare becomes a stable and growing component of the overall transportation network.**

Why This Matters:

Reliable funding for publicly owned bikeshare is essential because these systems advance the Commonwealth's transportation, climate, and equity goals by providing affordable, low-emission mobility options. While large-city systems often rely on tourism and corporate sponsorship, expanding bikeshare to smaller and underserved transit communities will require stable public investment to ensure equitable access. Each trip taken by bike instead of a car reduces congestion and emissions, making bikeshare a key investment in a cleaner, more connected, and more resilient Massachusetts transportation network.

Given the investment Massachusetts has made in expanding the trail and shared use path networks, it's important to ensure residents have access to that infrastructure. Making an investment in the expansion and increased visibility of bikeshare can help more people access these resources. A dedicated funding mechanism gives residents and visitors more confidence in the reliability and sustainability of this mode and increases the return on investment of the infrastructure dollars for trails and paths.

Cambridge, MA

Where To Start:

- **The legislature should explore budget language to expand eligibility within the Last Mile Grant Program** to explicitly include publicly owned bikeshare systems and pilot formula-based operating support for existing municipal systems.
- A coalition of business groups, Metropolitan Planning Organizations, and transit authorities should lead the **development of a statewide bikeshare fund** and coordination to guide equitable expansion, shared standards, and long-term sustainability.

14 Fund More E-bike Subsidies

The legislature should fund, and MassCEC should expand, the statewide e-bike rebate program that was launched in 2025.

In 2025, MassCEC ran an e-bike subsidy program to increase e-bike affordability in low- and moderate-income households, reduce emissions, and increase safety literacy. The program received $5 million in funding: 77% went to bikes and 3% went to holding education events. Program eligibility was based on income, with the average participant making less than $28,000. Every voucher had to be redeemed at a local brick-and-mortar bike shop in Massachusetts, and most vouchers were redeemed at small businesses. Additionally, MassCEC partnered with MassBike to hold events focusing on bike safety education, maintenance, group rides, and commuting.

Halfway through the program, MassCEC issued a survey to 500 participants about their experiences with their new e-bike. People reported feeling more social and independent. The most common use was for recreation, followed by errands, and about a quarter of respondents used their e-bike to attend doctor's visits. Eighty-five percent of respondents reported that they use their e-bike for trips they would have previously made by car, and a majority reported feeling healthier and spending less money on transportation. The group going to the doctor's visits reported no longer needing to rely on rideshare.

If the program is given additional funding, MassCEC wants to prioritize reaching people with disabilities, however there is no scheduled second round of funding. The commission recommends providing sustained funding to MassCEC to administer this program.

Why This Matters:

This program saw 3-4x the expected demand. It received strong interest from the target audiences, low- and moderate-income residents, or those with a disability, who have the greatest need for more transportation options. Feedback from participants was positive, as noted in survey feedback. Eighty-five percent of respondents report that they used their e-bike for trips they would have previously made by car; 78% of respondents believe they are now saving money on transportation; and 73% of respondents reported improved physical health. The funds all went straight into the bottom line of local business owners and the local Massachusetts economy.

Where To Start:

- The legislature should work with MassCEC to **determine budget, needs, timing, and evaluation metrics**.
- MassCEC should take the findings from this 2025 program and **fine-tune the program** for a second round of funding.

Learn more about the MassCEC e-bike voucher program in **Appendix II: Case Studies**

15 Commercial Use Micromobility Study

The legislature should allocate funds for MassDOT to commission a study from an academic partner to understand how micromobility is used in commercial settings, particularly in the package delivery and food delivery industries to learn what, if any, additional regulations are appropriate to apply to commercial use vehicles.

Ever since the explosive growth in demand for home deliveries during the pandemic, it is not uncommon to see delivery drivers on mopeds and other micromobility devices mixed in with regular traffic. What is also not uncommon is seeing delivery drivers on sidewalks, in bike lanes, and on shared use paths.[126] As discussed in Recommendation 2, the Commission recommends that mopeds be prohibited from bike lanes. (They are already not allowed on paths.) In April 2025, the City of Boston recognized this pattern was becoming a problem and passed an ordinance requiring delivery platforms to hold a permit to operate within the city limits.[127] In this ordinance, the city explicitly called out the lack of data around delivery behavior, making policy decisions more difficult to make.

Cities and towns in Massachusetts are also seeing changes in parcel delivery. For example, quadricycles are four-wheeled pedal assist bikes that can haul trailers with cargo behind them. In major cities across the country, parcel delivery by quadricycle has started to appear. The City of Boston ran a pilot program for introducing these devices for parcel delivery in 2023 called "Boston Delivers".[128][129] At the time of this report, there isn't enough volume to warrant immediate legislation, but this is one of several mobility innovations that the Commission recommends investigating.

Boston, MA

The Commission recognizes that using micromobility for a delivery service carries unique externalities, incentives, and risks that differ from recreational or commuter use. However, at present there is not enough data to act meaningfully in this area. On the other hand, the Commission also acknowledges the potential upside of an increase in deliveries by micromobility devices, including that they are often more space-efficient than trucks or vans and they can have lower emissions and thus less negative impact on air quality.

The Commission recommends the legislature commission an academic institution to study who uses micromobility for deliveries, why micromobility is the vehicle of choice, what incentivizes delivery drivers to act the way they do on the roads, and the benefits and tradeoffs of the increase in micromobility deliveries.

Why This Matters:

A thorough, intentional study will provide to the legislature vital data that is not currently available to help inform regulation of delivery drivers and delivery companies. Commercial vehicles operate differently from personal-use devices, with higher trip volumes, longer hours of use, and greater demands on infrastructure. A study led by an academic partner would provide data on how these vehicles are being used, where conflicts or safety concerns arise, education and communication strategies that would work with this industry, and what regulatory or infrastructure changes might be needed. Given the lack of data-sharing currently in both food and parcel delivery, a study could surface potential models of data-sharing between businesses and local government entities.

Where To Start:

- The legislature should **allocate funds for MassDOT to commission an academic partner** to undertake this study in collaboration with delivery companies.

16 Presumed Liability Study

MassDOT should work with an academic partner to study the hierarchy of responsibility in a crash and the potential effects of introducing a "Presumed Liability" law.

The Commission recommends studying strategies to make drivers more aware of the danger they pose to non-motorists using the shared road space. A car entering an area introduces more risk to others in that area than a bicyclist does by virtue of its potential speed and overall mass. In the event of a collision with a moped, an e-scooter is more vulnerable to adverse outcomes; but a moped is more vulnerable if colliding with a pickup truck; and the pickup truck is more vulnerable than a trash truck, all other things being equal. The Commission recommends consideration of this hierarchy of potential harm when considering possible presumed liability changes.

One way several European countries have built this principle into their legal code is through introducing "Presumed Liability" to crashes, where the more dangerous party is presumed at fault for a collision and must prove that the less dangerous party contributed to the incident during the phase of the investigation that determines liability. Therefore, the most potentially dangerous vehicle bears the most responsibility for being a safe road user. If the defendant cannot establish that it is more likely than not that the plaintiff bears some fault in causing the crash, then the defendant bears responsibility as the party that introduced the most potential for harm.

Massachusetts would not be the only state to explore this risk hierarchy concept; Washington State[130] has already introduced a bill to adopt this type of policy. There are a lot of unknowns on how this would work in the Commonwealth.

Why This Matters:

Studying the tools other government entities have used to encourage a more hazard-conscious culture is the first step the Commonwealth can take to adopting similar approaches. This culture change can help the state meet its Vision Zero goals by incentivizing drivers to behave more cautiously, give people more confidence to shift away from car dependency, and encourage consumers to choose less dangerous vehicles.

Where To Start:

- MassDOT should identify an interested academic partner to review policy reports and conduct interviews with officials or practitioners in countries that have implemented this approach, to understand how it functions in practice and what lessons might apply in Massachusetts.

05

Appendix

Appendix I: Glossary

ADA: The Americans with Disabilities Act is a federal civil rights law that prohibits discrimination against people with disabilities in everyday activities.

Automated enforcement: The use of technology, such as cameras and sensors, to automatically detect and issue citations for traffic violations like speeding or running red lights.

Bike lane: a lane on a street restricted to bicycles and designated by means of painted lines, pavement coloring or other appropriate markings.

Bike path: A designated route for bicycles that is physically separated from motor vehicle traffic.

BTS: The Bureau of Transportation Statistics collects and publishes comprehensive transportation statistics.

Cargo bike: a bicycle with a large integrated container or platform specifically designed for transporting heavy loads, multiple passengers, or both.

CFR: The Code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

CMR: The Code of Massachusetts Regulations is the complete set of regulations enacted by state agencies, under the Administrative Procedures Act.

CPSC: The Consumer Product Safety Commission protects the public from unreasonable risks of serious injury or death from thousands of types of consumer products under its jurisdiction.

Class 1 e-bike: An electric bicycle that provides assistance only when pedaled and stops assisting once the bike reaches 20 mph.

Class 2 e-bike: An electric bicycle with a motor that can propel it with or without pedaling, via a throttle, and has a maximum assisted speed of 20 mph.

Class 3 e-bike: An electric bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 28 miles per hour.

Comparative negligence: When fault for a crash is divided between parties, and a complainant's damages are reduced based on their percentage of fault. It allows an injured party to still recover some damages even if they were partially to blame for the incident.

Complete Streets Funding Program: A grant program that provides financial assistance to municipalities for projects that improve street design to make them safer and more accessible for all users, including pedestrians, cyclists, and motorists of all ages and abilities.

Cycle: A device with functioning pedals, or a device without pedals where the rider must be seated during typical operation.

DCR: The Department of Conservation & Recreation manages state parks and oversees more than 450,000 acres of land throughout Massachusetts.

Docked system: a shared bicycle or other micromobility device that is returned to a specific physical station.

Dockless system: transportation model, like a bike-share or e-scooter program, where users can locate, unlock, and park vehicles via a smartphone app without needing to return them to a specific docking station.

E-bike: A bicycle with an electric motor that assists with pedaling or provides propulsion.

E-scooter: A two-wheeled, electric-motorized scooter with a stand-up deck that is powered by a battery.

ED: Emergency Department

EJ: Environmental Justice is the principle that all people have the right to equal protection from environmental hazards and to live in a healthful environment, regardless of race, color, national origin, or income. REJ+ stands for Regional Environmental Justice Plus and is a tool used in transportation planning, primarily in Massachusetts, to identify communities that may be disproportionately burdened by transportation systems.

Electric skateboard: a self-propelled skateboard that uses an electric motor powered by a rechargeable battery to move the rider.

EPR: The Extended Producer Responsibility Commission is charged with making policy recommendations on specific extended producer responsibility approaches and other strategies for products and packaging categories including paint, mattresses, electronics, lithium-ion batteries, plastics and other packaging.

EUC: Electric Unicycle: A self-balancing, one-wheeled personal transporter that uses a gyroscopic system to stay upright.

FPL: The Federal Poverty Level is a measure of income used to determine eligibility for certain government assistance programs.

EOPSS: The Executive Office of Public Safety and Security is responsible for the policy development and budgetary oversight of its secretariat agencies, independent programs, and several boards which aid in crime prevention, homeland security preparedness, and ensuring the safety of residents and visitors in the Commonwealth.

EPAMD: Electric Personal Assistive Mobility Device, a self-balancing device with two wheels not in tandem, designed to transport only one person by an electric propulsion system having a maximum speed on a paved level surface of less than 20 mph.

FARS: Fatality Analysis Reporting System, a nationwide census providing NHTSA, Congress and the American public yearly data regarding fatal injuries suffered in motor vehicle traffic crashes.

First mile, last mile: (i) The initial and final stages of a journey or delivery, which are often the most challenging to solve. In public transit, they are the segments connecting a person's home or destination to a main transit stop. (ii) Solutions that bridge the gap between a rider's home and transit, or their destination (such as their workplace) and transit.

FHWA: The Federal Highway Administration is a division of the United States Department of Transportation that specializes in highway transportation.

FMVSS: The Federal Motor Vehicle Safety Standards are U.S. federal vehicle regulations specifying design, construction, performance, and durability requirements for motor vehicles and regulated automobile safety-related components, systems, and design features.

Glider: A seated, electric, pedal-free micromobility vehicle, designed to be a cross between a stand-up scooter and an e-bike.

Hoverboard: A motorized personal vehicle consisting of a platform for the feet mounted on two wheels and controlled by the way the rider distributes their weight.

IMPACT: The Interactive Mapping Portal for Analysis and Crash Tracking, a tool for researching crash-related data in Massachusetts compiled by the Registry of Motor Vehicles.

LEAs: Law enforcement agencies are government organizations that enforce criminal laws and have a wide range of responsibilities, such as investigating crimes, preventing illegal activity, enforcing traffic laws, and providing public safety.

MassCEC: The Massachusetts Clean Energy Center is an economic development agency dedicated to accelerating the growth of the Massachusetts clean energy sector.

MBTA: The Massachusetts Bay Transportation Authority is the public agency responsible for operating most public transportation services in Greater Boston, Massachusetts.

MGL: Massachusetts General Laws is the official body of laws for the Commonwealth of Massachusetts. Micromobility: Small, low-speed vehicles intended for personal use, including bicycles, electric scooters (or e-scooters), and similar vehicles, whether powered or unpowered and both personally owned and deployed in shared fleets.

Mobility aid device: A device, other than one used for general transportation, used by a pedestrian with a mobility disability to assist with indoor and outdoor locomotion. Will encompass existing EPAMD mentioned in VU and group wheelchairs, mobility carts etc.

Motor vehicle: A vehicle which is self-propelled and capable of transporting a person or persons.

Moped (Motorized Bicycle): a pedal bicycle which has a helper motor, or a non-pedal bicycle which has a motor, with either a cylinder capacity not exceeding fifty cubic centimeters or the hybrid or electric powered equivalent, an automatic transmission, and which is capable of a maximum speed of no more than 30 mph.

Motorized scooters: A stand-up scooter powered by either a small internal combustion engine or electric hub motor in its front and/or rear wheel.
Motorized: To describe a vehicle powered by either a small internal combustion engine or electric hub motor.

MPO: The Metropolitan Planning Organization is the policy board of an organization created and designated to carry out the metropolitan transportation planning process.

MUTCD: The Manual on Uniform Traffic Control Devices is a document published by the Federal Highway Administration (FHWA) that establishes the national standards for all traffic control devices, including signs, signals, and road markings.

NACTO: The National Association of City Transportation Officials is a coalition of the Departments of Transportation in North American cities.

NHTSA: The National Highway Traffic Safety Administration is responsible for keeping people safe on America's roadways.

Powered micromobility device: A micromobility device (scooters, skateboards, hoverboards, unicycles, etc.) designed to transport a single person that has an onboard motor capable of delivering tractive power to device either as power assist or as sole propulsion. Excludes class 1-3 e-bikes.

Protected bike lane: a dedicated bicycle lane with temporary or permanent physical barriers separating it from motor vehicle traffic.

Presumed liability: The less vulnerable road user is 'presumed liable' following a traffic crash. For instance, a truck driver would be presumed liable for a crash involving a cyclist because the truck driver is less vulnerable than the cyclist.

E-Quadricycle: A four-wheeled electric-assist land vehicle with pedals that is mostly utilized to deliver cargo and parcels.

RPAs: Regional Planning Agencies serves the local governments and citizens in the region by dealing with issues and needs that cross city, town, county and even state boundaries through communication, planning, policymaking, coordination, advocacy and technical assistance.

RTAs: Regional Transit Authorities are public transportation agencies. In Massachusetts there are fifteen RTAs that operate in areas outside of the primary MBTA service zone.

Safe System Approach: a system to address and mitigate the risks inherent in our transportation system. It works by building and reinforcing multiple layers of protection to both prevent crashes from happening and minimize the harm caused to those involved when crashes do occur.

Scooter: A device without pedals where the rider can sit and/or stand on a footboard for typical operation.

Shared Fleet: A system where multiple users share a common pool of vehicles, rather than each user having their own.

Shared Streets and Spaces Grant Program: A grant program that provides money to local Massachusetts governments, to implement quick-build projects that improve public spaces such as streets, sidewalks, and plazas.

Shared Use Path: A pathway physically separated from motorized traffic that accommodates both pedestrians and micromobility users.

Solely Human-Powered micromobility device: A micromobility device (non-electric bicycles, push scooters, skateboards, longboards, unicycles, roller skates, inline skates etc.) designed to transport a single person that is propelled exclusively by human muscular effort and has no onboard motor capable of delivering tractive power to the device.

SRTS: The Safe Routes to School program work to increase safe walking, biking, and rolling among elementary, middle, and high school students by using a collaborative, community-focused approach that bridges the gap between health and transportation.

Thermal runaway: When a battery cell short-circuits and starts to heat up uncontrollably.

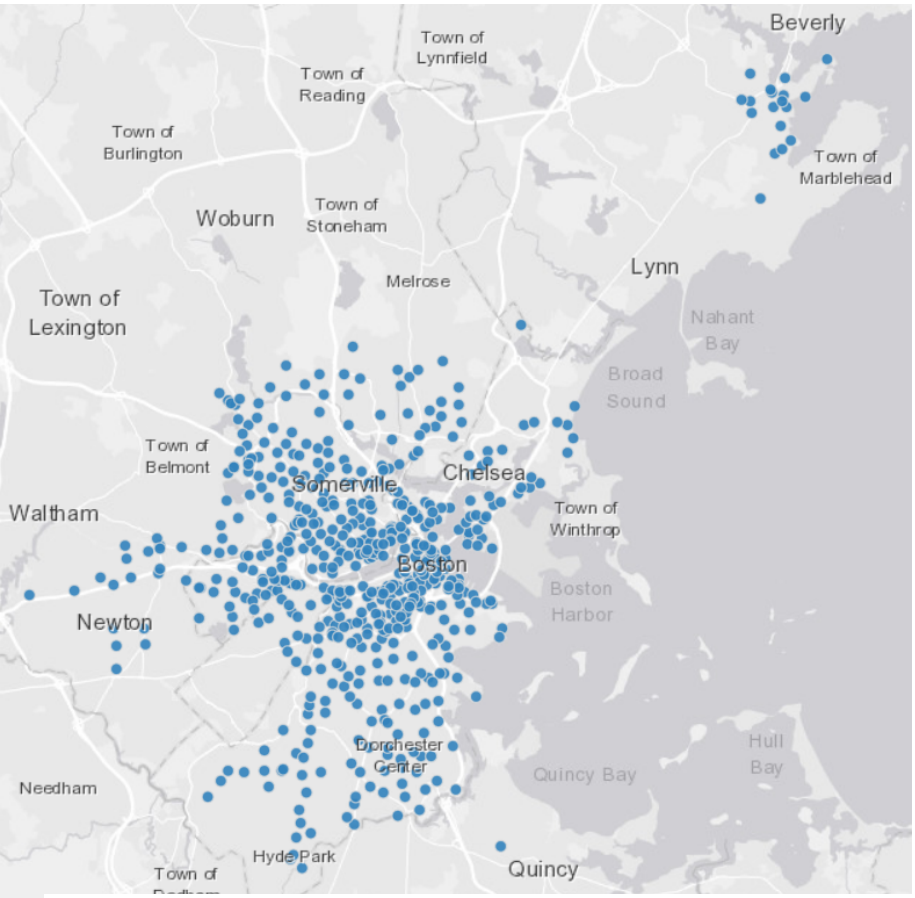
Unicycle: A one-wheeled vehicle, propelled by pedals and balanced by the rider.

VU/VRU: Vulnerable User/Vulnerable Road User are individuals who are less able to protect themselves from harm due to a lack of physical protection, a physical or mental impairment, or other factors like age or circumstance.

Vision Zero: A strategy to eliminate all traffic fatalities and severe injuries by designing safer roadways and transportation systems.

Appendix II: Case Studies

Bluebikes



Bluebike locations, ArcGIS

Bluebikes is a publicly owned station-based bikeshare system that has grown into one of the most significant micromobility systems in the United States. In the Metro Boston-area, Bluebikes is public transit. What began as a four-municipality collaboration called Hubway, first launching in Boston in 2011 and then Cambridge, Somerville, and Brookline in 2012, has expanded to 13 municipalities as of 2024, reflecting both the region's commitment to shared transportation and the increasing demand for high-quality, reliable micromobility options.[131] To help understand the impact of bikeshare in the Commonwealth a story of statistics was shared with the Commission through a presentation by the Bluebikes operator, Lyft.

The system's physical footprint and usage have grown steadily since launch: the number of active stations rose from 61 to 520, and the bicycle fleet expanded from 610 to roughly 5,500 bicycles. Annual ridership grew even more dramatically, increasing from under a million trips in 2011 to more than 4.7 million trips in 2024. Membership has also continued to expand, with peak active memberships reaching nearly 32,000 members.

In more recent years, the introduction of electric bicycles has been a major contributor to this growth. Although e-bikes represent only about 13 percent of the fleet, they already account for a quarter of all system trips. The integration of new e-bike models has increased how frequently members use the system overall; average annual rides per active member increased from 87 to 110 after their deployment, representing a 26 percent jump. In October 2025, there were over 510,000 trips on the Bluebikes system.[132] The system is funded by a mix of municipal budgets, state grants, sponsorship, and farebox revenue, but other funding models were shared with the Commission for systems in Washington, D.C. and New York City that have pros and cons for system design.

Because it is owned by the municipalities, Bluebikes continues to demonstrate progress in equity-focused programming as well. The income-eligible membership program experienced a 300 percent increase in participation in 2024, driven by targeted community outreach efforts and the introduction of lower-cost pass options. These gains

indicate a growing role for bikeshare in meeting the mobility needs of residents who have historically had fewer transportation choices.

The system's operational model supports this expansion through the consistent use of station-based technology, not free-floating devices. Increasingly, this will include in-dock charging for e-bikes, which reduces the labor and vehicle miles associated with battery swapping. As more stations adopt charging capabilities, the system benefits from higher e-bike availability and lower operational burdens, enabling municipalities to support a larger and more reliable fleet.

By 2024, Bluebikes had sold more than one million casual passes and facilitated approximately 12,000 rides per day on average. Its growth pattern shows how sustained public ownership, regional coordination, supportive infrastructure, and strategic integration of e-bikes can expand a bikeshare system's reach and effectiveness. The system now represents a mature and scalable model for shared micromobility in Massachusetts, illustrating both the potential and the operational requirements needed to support continued statewide expansion.

MassCEC E-bike Subsidy Program

The Massachusetts Clean Energy Center (MassCEC) ran a statewide e-bike voucher program in 2025. The program received $5M from the Governor's 2024 budget. Its goals were to increase affordability and access to clean transportation among low- and moderate-income residents; reduce vehicle miles traveled (VMT) for aging vehicles; and reduce emissions for predominantly environmental justice (EJ) communities. The program was designed to provide 2,500-3,000 point-of-sale e-bike vouchers to low- and moderate-income residents. MassCEC received 10,248 applications for the 2,500-3,000 vouchers, indicating a 3-4x greater interest than the program was able to support.

In addition to the vouchers, funding was provided to educate riders on safe riding practices and to increase ridership. This educational element was included based on learnings from a MassCEC ACT4All pilot by MassBike.

The program design included two different e-bike vouchers:

- A "Standard" voucher of $800 for an applicant at or below 400% of the federal poverty line (FPL) (or for an applicant that is participating in an eligible income-certified program)
- An "Enhanced" voucher of $1,200 for an applicant at or below 225% of the federal poverty line (or for an applicant that is participating in an eligible income-certified program; **or** if an applicant submits a signed doctor's note that specifies a need for an adaptive e-bike).

Additionally, all participants could access a $150 equipment voucher to assist with the purchase of a helmet, lock, floor pump, bell, mirrors, phone mount, and/or lights.

Notable program design elements included:

- Vouchers had to be redeemed at brick-and-mortar shops in Massachusetts, meaning the dollars invested in the program benefitted local economies
- 80 bike shops participated at program launch, all of which provided maintenance and battery recycling
- Vouchers were distributed in proportion to the population in each region of the Commonwealth (organized by Executive Office of Health and Human Safety geographic regions)
- Vouchers could only be used to purchase a Class 1 or Class 2 e-bike, both of which are speed-capped at 20MPH
- Vouchers could only be used to purchase devices that meet UL2849 and/or EN15194 certifications, for consumer safety purposes

The program effectively addressed its affordability and access to clean transportation goals:

- 47% of selected applicants had an annual income less than $28,000
- 78% of selected applicants had an annual income less than $55,000

In the middle of the program, a survey was sent to 500 participants. Two hundred eighty-five (285) responses were received. Recreation was reported as the most common use for the e-bike, though errands, work/school commuting, and healthcare appointments were also commonly reported.

Respondents also reported:

- They use their e-bike for trips they previously would have made by car (85%)
- They believe they are saving money on transportation costs (78%)
- They have improved their physical health (73%)

Bike shops shared feedback that the voucher amount of the Enhanced voucher should be increased if there are future funding rounds, as subsidized purchase costs were still high even with the Enhanced voucher. Additional stakeholder feedback included an emphasis on further prioritizing applicants with disabilities if there are future funding rounds. Other secondary considerations that would impact the effectiveness of a future funding round include the need for more bike infrastructure; additional efforts to expand e-bike culture, education, and safe riding practices; continuing the shift of deliveries to bikes and e-bikes; and increasing accessibility of e-bike maintenance.

Bike Shop Interviews

In the summer of 2025, 14 people from varying backgrounds across the Commonwealth were interviewed by Commission representatives and gave their feedback on workforce needs and maintenance for micromobility devices. Bike and scooter shop mechanics, rental shop owners, non-profit organization leaders, and program managers were interviewed. Interviews were conducted over the phone and in person, and interviewees were asked a series of questions including those about fleets, servicing requests, and their hopes for the future of micromobility.

E-bike Repair Challenges

Only two interviewees stated that they offered repairs on all e-bikes, or at least that they would consider servicing them. Some only serviced e-bikes that they sold to the customer, while others only serviced UL-certified e-bikes. One Commission member likened repairing an unfamiliar e-bike to servicing an unfamiliar car, given their complicated electricals.

Generally, the more advanced and/or market-established an e-bike is, the easier the repair becomes. Many of these e-bike repairs are "rip-and-replace," or in other words, the mechanic has to remove some broken, outdated, or underperforming component and replace it with a new one.

A critical component of an e-bike repair business is sourcing the replacement parts. For bike shops that have relationships with manufacturers, this process is straightforward. The process becomes complicated when residents request servicing for less established e-bikes, especially cheaper bikes bought online, because these shops then need to track down the manufacturers for specific parts and/or manuals. Most shops will turn away these requests because it would ultimately be unprofitable for the time and money spent on these repairs.

Workforce

When prompted about the demand for mechanics, most interviewees stated that their current number of employees was meeting the demand for repairs and supporting customers in purchasing bicycles. As for the specificities of e-bike repairs, the bike shops that took all types of e-bikes expressed the need for more electrical knowledge for their mechanics. The battery and electrical wires pose more dangers, which requires more expertise in battery technology. However, this expertise is less necessary for servicing advanced/established e-bikes. Most of the mechanics learned on the job from training by other mechanics.

The two workforce/career program interviewees expressed a lack of a career "pathway" for e-bike mechanics. A fully fledged electric micromobility mechanic internship or career readiness program does not have enough demand from bike shops, and because the bike shop industry has on/off seasons, this makes job security tougher.

Suggested Actions

Interviewees had several suggestions for lawmakers and regulators. These suggestions are not necessarily those of the Commission.

- Require companies to UL-certify their devices and batteries and ban the usage of non-UL (or CE certified) batteries.
- Require that repair manuals include specs and wiring diagrams or mandate a place online to find said information.
- Subsidize programs that support both those purchasing e-bikes and those servicing e-bikes
- Establish regulations to reduce the amount of e-waste that e-bikes produce

Appendix III: CMR and MGL Text

Text of the Cited MGL Laws

Chapter 85

§ 11B Bicycles; operation and equipment; regulations; federal product safety standards, effect; races; violations; penalties

Every person operating a bicycle upon a way, as defined in section one of chapter ninety, shall have the right to use all public ways in the commonwealth except limited access or express state highways where signs specifically prohibiting bicycles have been posted, and shall be subject to the traffic laws and regulations of the commonwealth and the special regulations contained in this section, except that: (1) the bicycle operator may keep to the right when passing a motor vehicle which is moving in the travel lane of the way, (2) the bicycle operator shall signal by either hand his intention to stop or turn; provided, however, that signals need not be made continuously and shall not be made when the use of both hands is necessary for the safe operation of the bicycle, and (3) bicycles may be ridden on sidewalks outside business districts when necessary in the interest of safety, unless otherwise directed by local ordinance. A person operating a bicycle on the sidewalk shall yield the right of way to pedestrians and give an audible signal before overtaking and passing any pedestrian.

Operators of bicycles shall be subject to the following regulations:

(1) Bicyclists riding together shall not ride more than 2 abreast but, on a roadway with more than 1 lane in the direction of travel, bicyclists shall ride within a single lane. Nothing in this clause shall relieve a bicyclist of the duty to facilitate overtaking as required by section 2 of chapter 89.

(2)(i) The operator shall ride only upon or astride a permanent and regular seat attached to the bicycle; a passenger shall ride only upon or astride a permanent and regular seat attached to the bicycle or to a trailer towed by the bicycle.

(ii) The operator shall not transport another person between the ages of one to four years, or weighing forty pounds or less, on a bicycle, except in a "baby seat", so-called, attached to the bicycle, in which such other person shall be able to sit upright; provided, however, that such seat is equipped with a harness to hold such other person securely in the seat and that protection is provided against the feet or hands of such person hitting the spokes of the wheel of the bicycle; or upon or astride a seat of a tandem bicycle equipped so that the other person can comfortably reach the handlebars and pedals. The operator shall not transport any person under the age of one year on said bicycle.

(iii) Any person 16 years of age or younger operating a bicycle or being carried as a passenger on a bicycle on a public way, bicycle path or on any other public right-of-way shall wear a helmet. Said helmet shall fit the person's head, shall be secured to the person's head by straps while the bicycle is being operated, and shall meet the standards for helmets established by the United States Consumer Product Safety Commission. These requirements shall not apply to a passenger if the passenger is in an enclosed trailer or other device which adequately holds the passenger in place and protects the passenger's head from impact in an accident.

(iv) A violation of clause (ii) or (iii) shall not be used as evidence of contributory negligence in any civil action.

(3) The operator shall give an audible warning whenever necessary to insure safe operation of the bicycle; provided, however, the use of a siren or whistle is prohibited.

(4) The operator shall park his bicycle upon a way or a sidewalk in such a manner as not to obstruct vehicular or pedestrian traffic.

(5) The operator shall not permit the bicycle to be drawn by any other moving vehicle. The operator shall not tow any other vehicle or person, except that bicycle trailers properly attached to the bicycle which allow for firm control and braking may be used.

(6) The operator shall not carry any package, bundle or article except in or on a basket, rack, trailer or other device designed for such purposes. The operator shall keep at least one hand upon the handlebars at all times.

(7) Every bicycle operated upon a way shall be equipped with a braking system to enable the operator to bring the bicycle traveling at a speed of fifteen miles per hour to a smooth, safe stop within thirty feet on a dry, clean, hard, level surface.

(8) During the period from one-half hour after sunset to one-half hour before sunrise, the operator shall display to the front of his bicycle a lamp emitting a white light visible from a distance of at least five hundred feet, and to the rear of said bicycle a lamp emitting a red light and a red reflector visible for not less than six hundred feet when directly in front of lawful lower beams of headlamps on a motor vehicle. A generator powered lamp which emits light only when the bicycle is moving shall meet the requirements of this clause. The provisions of this clause related to front and rear lighting shall be enforced by law enforcement agencies only when an operator of a bicycle has been stopped for some other offense. A violation of this clause related to rear lighting shall not be used as conclusive evidence of contributory negligence in any civil action.

(9) During the period from one-half hour after sunset to one-half hour before sunrise, the operator shall display on each pedal of his bicycle a reflector, or around each of his ankles reflective material visible from the front and rear for a distance of six hundred feet, and reflectors or reflective material, either on said bicycle or on the person of the operator, visible on each side for a distance of six hundred feet, when directly in front of lawful lower beams of headlamps of a motor vehicle. This clause shall not prohibit a bicycle or its operator to be equipped with lights or reflectors in addition to those required by clauses (8) and (9).

(10) No bicycle shall be operated upon a way with handlebars so raised that the operator's hands are above his shoulders while gripping them. Any alteration to extend the fork of a bicycle from the original design and construction of the bicycle manufacturer is prohibited.

(11) The operator of a bicycle shall report any accident involving either personal injury or property damage in excess of one hundred dollars, or both, to the police department in the city or town in which the accident occurred.

Any federal product safety standards relating to bicycles which are more stringent than the requirements of clauses (7) through (10), inclusive, shall supersede said requirements.

Competitive bicycle races may be held on public ways, provided that such races are sponsored by or in cooperation with recognized bicycle organizations and, provided further, that the sponsoring organization shall have obtained the approval of the appropriate police department or departments. Special regulations regarding the movement of bicycles during such races, or in training for races, including, but not limited to, permission to ride abreast, may be established by agreement between the police department and the sponsoring organization.

Violations of any provision of this section except violations of subclause (iii) of clause (2) shall be punished by a fine of not more than twenty dollars. The parent or guardian of any person under age eighteen shall not authorize or knowingly permit any such person to violate any of the provisions of this section. A bicycle operated by a person under the age of eighteen in violation of this section may be impounded by the police department, or in a town which has no police department, by the selectmen, for a period not to exceed fifteen days. A violation of any provision of this section by a minor under the age of eighteen shall not affect any civil right or liability nor shall such violation be considered a criminal offense

§ 11B ½ Mandatory helmet use for persons 16 years of age or younger

Any person 16 years of age or younger operating in line skates, a skate board, a scooter or other manually-propelled wheeled vehicle or riding as a passenger on any such manually-propelled vehicle on a public way, bicycle path or on any other public right-of-way shall wear a helmet. Such helmet shall fit the person's head and be secured by straps at all times while operating in line skates, scooters, skate board or other manually-propelled wheeled vehicle and shall meet the standards for helmets established by the American National Standards Institute (ANSI Z 90.4) or subsequent standards or the Snell Memorial Foundation's 1984 standard for use in bicycling or subsequent standards. A violation of this section shall not be used as evidence of contributory negligence in a civil action.

A city or town shall not adopt any by-laws or ordinances to change the standards required by this section.

§ 11B ¾ Electric bicycles; rights, privileges, duties; regulations

(a) For the purposes of this section, the term "electric bicycle" shall have the same meaning as in section 1 of chapter 90 and the terms "bike path" and "bikeway" shall have the same meanings as in section 1 of chapter 90E.

(b) Except as otherwise provided in this section, an electric bicycle or an operator of an electric bicycle shall be afforded all of the rights and privileges, and shall be subject to all of the duties, of the operator of a bicycle or duties related to a bicycle set forth in sections 11B and 11B1/2, any general or special law, regulation or local ordinance; provided, however, that electric bicycles shall not be ridden or operated on sidewalks.

(c) A municipality, local authority or state agency with jurisdiction over a bike path or bikeway after public notice and a public hearing may adopt ordinances or regulations prohibiting or otherwise regulating the operation of electric bicycles on such paths, including, but not limited to, the imposition of speed limits.

(d) An electric bicycle shall not be operated on a trail designated for nonmotorized traffic, that a municipality, local authority or state agency has jurisdiction over, if such trail has a natural surface tread made by clearing and grading the soil and no surfacing materials have been added; provided, however, that a municipality, local authority or state agency after public notice and a public hearing may adopt ordinances or regulations permitting or otherwise regulating the use of electric bicycles on such a trail within its jurisdiction, including, but not limited to, the imposition of speed limits.

(e) Electric bicycles shall comply with the equipment and manufacturing requirements for bicycles adopted by the United States Consumer Product Safety Commission.

(f) Manufacturers and distributors of electric bicycles shall apply a label that shall be permanently affixed, in a prominent location, to each electric bicycle containing the classification number, top assisted speed and motor wattage of the electric bicycle.

(g) No person shall tamper with or modify an electric bicycle so as to change the motor-powered speed capability or engagement of an electric bicycle, unless the person appropriately replaces the label required by subsection (f).

(h) The secretary of transportation may promulgate regulations for electric bicycles in the commonwealth, including, but not limited, to their safe operation and proper labeling. The secretary shall submit any such proposed regulations to the clerks of the house of representatives and senate and the joint committee on transportation not later than 30 days prior to their effective date.

§ 11D Bicycle helmets; display of sign requiring use

Every person engaged in the retail business of selling or renting bicycles, in line skates, scooters, skate boards or other manually-propelled wheeled vehicles shall display in an area conspicuous to customers of the business a sign containing the following statement: Massachusetts law requires that a bicycle helmet be worn by a person 16 years of age or under who is riding as an operator or passenger on a bicycle, in line skates, a scooter, or a skate board.

By posting such a sign, such retail business shall be deemed to be in full compliance with this act, and no liability shall be incurred in the event that said helmet is not worn. A person, firm or corporation engaged in the business of renting bicycles shall make available a bicycle helmet conforming to the specifications for bicycle helmets of the United States Consumer Product Safety Commission to each person renting a bicycle.

§ 11E Traffic law violations by bicyclist

A police officer who observes a traffic law violation committed by a bicyclist may request the offender to state his true name and address. Whoever, upon such request, refuses to state his name and address or whoever states a false name and address or a name and address which is not his name and address in ordinary use, shall be punished by a fine of not less than $20 nor more than $50. An offender who refuses to state his true name and address may be arrested without a warrant for such refusal but no person shall be arrested without a warrant for any other traffic law violation committed while operating a bicycle. A police officer shall use the ticketing procedure described in chapter 90C to cite a bicyclist for a traffic law violation but the violation shall not affect the status of the bicyclist's license to operate a motor vehicle nor shall it affect the bicyclist's status in the safe driver insurance plan. When a citation is issued to a bicyclist, it shall be clearly indicated on the ticket that the violator is a bicyclist, and failure to do so shall be a defense to the violation.

The parent or guardian of a person under 18 years of age shall not authorize or knowingly permit that person to violate this section. A violation of this section by a person under 18 years of age shall not affect any civil right or liability nor shall the violation be a criminal offense. If the offender is under 16 years of age, the officer may give the notice to the parent or guardian of the offender.

All fines collected by a city or town pursuant to this section shall be used by the city or town for the development and implementation of bicycle safety programs.

Chapter 90

§ 1 Definitions

"Class 1 electric bicycle", an electric bicycle or tricycle equipped with a motor that provides assistance only when the rider is pedaling and that ceases to provide assistance when the bicycle reaches the speed of 20 miles per hour.

"Class 2 electric bicycle", an electric bicycle or tricycle equipped with a motor that may be used exclusively to propel the bicycle and that is not capable of providing assistance when the bicycle reaches the speed of 20 miles per hour.

"Electric bicycle", a bicycle or tricycle equipped with fully operable pedals and an electric motor of 750 watts or less that meets the requirements of a class 1 electric bicycle or a class 2 electric bicycle.

"Motorcycle", any motor vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground, including any bicycle with a motor or driving wheel attached, except a tractor or a motor vehicle designed for the carrying of golf clubs and not more than four persons, an industrial three-wheel truck, a motor vehicle on which the operator and passenger ride within an enclosed cab, or a motorized bicycle.

"Motorized bicycle", a pedal bicycle which has a helper motor, or a non-pedal bicycle which has a motor, with a cylinder capacity not exceeding fifty cubic centimeters, an automatic transmission, and which is capable of a maximum speed of no more than thirty miles per hour; provided, that the definition of "motorized bicycle" shall not include an electric bicycle.

"Motorized scooter", any 2 wheeled tandem or 3 wheeled device, that has handlebars, designed to be stood or sat upon by the operator, powered by an electric or gas powered motor that is capable of propelling the device with or without human propulsion. The definition of "motorized scooter" shall not include a motorcycle, electric bicycle or motorized bicycle or a 3 wheeled motorized wheelchair.

"Vulnerable user", (i) a pedestrian, including a person engaged in work upon a way or upon utility facilities along a way or engaged in the provision of emergency services within the way; (ii) a person operating a bicycle, handcycle, tricycle, skateboard, roller skates, in-line skates, non-motorized scooter, wheelchair, electric personal assistive mobility device, horse, horse-drawn carriage, motorized bicycle, motorized scooter, or other micromobility device, or a farm tractor or similar vehicle designed primarily for farm use; or (iii) other such categories that the registrar may designate by regulation.

§ 1B Motorized bicycles; operation regulations

A motorized bicycle shall not be operated upon any way, as defined in section one within the commonwealth by any person under sixteen years of age, nor at a speed in excess of twenty-five miles per hour. A motorized bicycle shall not be operated on any way by any person not possessing a valid driver's license or learner's permit. Every person operating a motorized bicycle upon a way shall have the right to use all public ways in the commonwealth except limited access or express state highways where signs specifically prohibiting bicycles have been posted, and shall be subject to the traffic laws and regulations of the commonwealth and the regulations contained in this section, except that: (1) the motorized bicycle operator may keep to the right when passing a motor vehicle which is moving in the travel lane of the way, and (2) the motorized bicycle operator shall signal by either hand his intention to stop or turn. Motorized bicycles may be operated on bicycle lanes adjacent to the various ways, but shall be excluded from off-street recreational bicycle paths.

Every person operating a motorized bicycle or riding as a passenger on a motorized bicycle shall wear protective headgear conforming with such minimum standards of construction and performance as the registrar may prescribe, and no person operating a motorized bicycle shall permit any other person to ride a passenger on such motorized bicycle unless such passenger is wearing such protective headgear.

A person convicted of a violation of this section shall be punished by a fine of not more than twenty-five dollars for the first offense, not less than twenty-five nor more than fifty dollars for a second offense, and not less than fifty nor more than one hundred dollars for subsequent offenses committed.

§ 1C Motorized bicycles and scooters; compliance with federal standards

Motorized bicycles and motorized scooters shall comply with all applicable federal motor vehicle safety standards.

§ 1D Motorized bicycles; sales; number sticker or plate

Any person who is engaged in the business of buying or selling bicycles or motorized bicycles shall, upon the sale of such motorized bicycle, affix a sticker or plate which shall bear a distinctive number, as prescribed by the registrar, to said bicycle upon a fee to be determined annually by the commissioner of administration under the provision of section three B of chapter seven. Said fee shall be forwarded to the registry of motor vehicles by such person. Said sticker shall be renewed biannually in the manner prescribed by the registrar.

§ 1E Motorized scooters; operation regulations

A motorized scooter shall not be operated on any way by a person not possessing a valid driver's license or learner's permit, nor at a speed in excess of 20 miles per hour. A person operating a motorized scooter upon a way shall have the right to use all public ways in the commonwealth except limited access or express state highways where signs specifically prohibiting scooters or bicycles have been posted, and shall be subject to all traffic laws and regulations of the commonwealth and the regulations contained in this section, except that: (1) a scooter operator shall keep to the right side of the road at all times, including when passing a motor vehicle which is moving in the travel lane of the way; and (2) the scooter shall be equipped with operational stop and turn signals so that the operator can keep both hands on the handlebars at all times. No person shall operate a motor scooter upon any way at any time after sunset or before sunrise.

A person operating a motorized scooter shall wear protective headgear conforming with such minimum standards of construction and performance as the registrar may prescribe. No person operating a motorized scooter shall permit any other person to ride as a passenger on the scooter.

A person convicted of a violation of this section shall be punished by a fine of not more than $25 for the first violation, not less than $25 nor more than $50 for a second violation and not less than $50 nor more than $100 for a third or subsequent violation.

§ 1H Registration of motor vehicles designed for operation on public ways but not capable of exceeding 40 miles per hour

In addition to the types of vehicles that may be registered under chapter 90, the registrar of motor vehicles may issue a registration for a motor vehicle meeting Federal Motor Vehicle Safety Standards for that particular class of vehicle, other than a low-speed motor vehicle, if the vehicle is designed by its manufacturer to be operated on public ways and its speed on a paved level surface can exceed 30 miles per hour but is not capable of exceeding 40 miles per hour, as may be determined by the registrar. The registrar may adopt reasonable rules and regulations concerning requirements for registration, equipment, inspections and insurance for such vehicles. Every person authorized and registered to operate such a vehicle upon a way shall not operate the vehicle in excess of 40 miles per hour and shall have the right to use all public ways in the commonwealth except limited access or express state highways where signs specifically prohibit bicycles, mopeds or low-speed vehicles have been posted and shall not operate the vehicle on a portion of a way where the speed limit increases beyond 40 miles per hour. This shall not prohibit a vehicle described in this section from crossing a public way at an intersection where the public way to be crossed has a posted speed limit between 40 and 55 miles per hour, provided the public way the vehicle is traveling on and the public way the vehicle is crossing the intersection to, both have a speed limit no higher than 40 miles per hour and the intersection is controlled by traffic signals or stop signs. Such limitations as to the vehicle's limited use of public ways may be conspicuously printed on the registration certificate of the vehicle by the registrar. The registrar may issue a distinctive registration plate for such vehicle indicating its speed restrictions.

§ 1I 3-wheeled motor vehicle registered as a motorcycle

Notwithstanding the definition of "Motorcycle" in section 1, the registrar of motor vehicles may register a 3–wheeled motor vehicle as a motorcycle on which the operator and passenger ride within an enclosed cab, if the vehicle's manufacturer has issued a certificate of origin indicating the vehicle meets Federal Motor Vehicle Safety Standards for a motorcycle and if the vehicle is designed by the manufacturer to be operated on public

ways. If the registrar determines that the vehicle can attain a speed of at least 30 miles per hour but cannot exceed 40 miles per hour, he may restrict its use on public ways. If the vehicle was previously registered, the registrar may register the vehicle as a motorcycle if the owner provides documentation, satisfactory to the registrar, that the vehicle was previously registered in this or another state as a motorcycle. The registrar may adopt reasonable rules and regulations concerning requirements for registration, equipment, inspections and insurance. Every person authorized and registered to operate such a vehicle upon a way shall not operate the vehicle in excess of 40 miles per hour and shall have the right to use all public ways except limited access or express state highways where signs specifically prohibiting bicycles, mopeds or low-speed vehicles have been posted and shall not operate the vehicle on a portion of a way where the speed limit increases beyond 40 miles per hour. This shall not prohibit a vehicle described in this section from crossing a public way at an intersection where the public way to be crossed has a posted speed limit between 40 and 55 miles per hour, provided the public way the low-speed vehicle is traveling on and the public way the low-speed vehicle is crossing the intersection to, both have a speed limit no higher than 40 miles per hour and the intersection is controlled by traffic signals or stop signs. Such limitations as to the use of public ways may be conspicuously printed on the registration certificate of the vehicle by the registrar. The registrar may issue a distinctive registration plate for such vehicle indicating its speed restrictions.

Chapter 90E

§ 1 Definitions

"Bicycle", a two-wheel nonmotor-powered vehicle.

"Bike path", a route for the exclusive use of bicycles separated by grade or other physical barrier from motor traffic.

"Bike lane", a lane on a street restricted to bicycles and so designated by means of painted lines, pavement coloring or other appropriate markings.

"Bike route", a roadway shared by both bicycles and other forms of transportation designated by the means of signs or pavement markings.

"Bikeway", bike paths, bike lanes and bike routes.

"Bicycle parking facility", any facility for the temporary storage of bicycles which allows the frame and both wheels of the bicycle to be locked so as to minimize the risk of theft and vandalism.

§ 2 Rules, regulations and plans; bikeways program; participation

The commissioner shall promulgate such rules, regulations, plans, proposals, and procedures as are necessary and appropriate to the construction and maintenance of bikeways and bicycle parking facilities.

Such rules, regulations, plans, proposals and procedures shall take into consideration potential users in high density employment areas, bicycle accident locations, connections to other modes of transportation, special signs, markings necessary for the benefit of cyclists and motorists, bicycle parking facilities at points of public interest and provisions to insure safe, smooth, direct continuous bikeways.

The commissioner shall designate the bureau of transportation planning and development in the department as the principal source for the planning of bikeways in the commonwealth.

The commissioner shall establish, with the advice and assistance of the bicycle advisory board, established by section eleven A of chapter twenty-one A, a bikeways program which shall include, but not be limited to: surveys, safety measures, demonstration projects, research, education, utilization of existing streets and walkways, provisions of bikeways to and from schools affording a minimum of hazard from automobiles, provision of comfort stations and weather shelters, provision of facilities in connection with commuter railroads to facilitate the use of bicycles by commuters in traveling to and from the railroad stations, the use of abandoned rights of way for bicycle paths; the development of commuter and recreational trails; provision of bicycle transportation facilities roadways, bridges and airports; the development of a coordinated program for bicycles and motor vehicles; the development of bicycle amenities such as assigned parking facilities; bicycle routes, paths and trails; bicycle sensitive traffic light actuation; and bicycle transportation as a commuter activity and promulgation of standards, security measures and regulations for the registration and use of bicycles.

The commissioner shall promulgate such rules, regulations and procedures, including public hearings, as are necessary and appropriate to provide the following parties the timely opportunity to participate in the development of bikeway proposals, plans, programs and projects of the department, as defined by the commissioner, and to review and comment thereon:

(a) state, regional and local agencies and authorities, including without limitation, regional planning agencies, affected by said proposals, plans, programs and projects;

(b) elected officials from cities and towns affected by said proposals, plans, programs and projects;

(c) other public and private organizations, groups and persons who are affected by, and who have provided the commissioner with reasonable notice in writing of their desire to participate in the development of said proposals, plans, programs and projects.

In this section, the words "timely opportunity" shall mean sufficiently early in the planning process to permit comments to be considered prior to the final development of or commitment to any such proposal, plan, program or project, at each stage of development.

§ 2A Rules, regulations and plans; bikeways program; participation

The commissioner shall make all reasonable provisions for the accommodation of bicycle and pedestrian traffic in the planning, design, and construction, reconstruction or maintenance of any project undertaken by the department. Such provisions that are unreasonable shall include, but not be limited to, those which the commissioner, after appropriate review by the bicycle program coordinator, determines would be contrary to acceptable standards of public safety, degrade environmental quality or conflict with existing rights of way.

§ 3 Rules, regulations and plans; bikeways program; participation

The commissioner shall expend for the purpose of assisting counties, cities and towns to construct bikeways for commuter or recreational use, and for the construction of unique regional bikeways and bicycle parking facilities, such funds as are appropriated or authorized by the general court for such purpose, and payment shall be made to the county or city or town upon application to the commissioner on the basis of criteria established by him.

Funds made available for the construction of bikeways shall be expended as follows:

(a) Seventy-five per cent of the costs for bikeways, the balance of the costs to be borne by the city or town in which said bikeways are located.

(b) Fifty per cent for the cost of constructing a bicycle parking facility at or adjacent to a mass transit facility, the balance of the costs to be borne by the city or town where said bicycle parking facility is to be constructed.

(c) One hundred per cent for the cost of unique regional bikeways and bicycle parking facilities, as determined by the commissioner.

The department is hereby authorized and directed to take all steps necessary to obtain federal funds that may be available for the construction of bikeways and said funds shall be credited to the Federal Highway Construction Program Fund.

Text of the Cited CMR Regulations

From **302 CMR, Department of Conservation and Recreations (DCR)**

302 CMR 12.02 Definitions

Electric Bicycle. A two- or three-wheeled vehicle that: (i) is equipped with fully operable pedals, a seat or saddle for the rider and an electric motor of no more than 750 watts; and (ii) is a Class 1, Class 2 or Class 3 electric bicycle:

(1) Class 1 electric bicycle. An electric bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches or exceeds 20 miles per hour.

(2) Class 2 electric bicycle. An electric bicycle equipped with a motor that may be used exclusively to propel the bicycle, and that is not capable of providing assistance when the bicycle reaches or exceeds 20 miles per hour.

(3) Class 3 electric bicycle. An electric bicycle, other than a Class 1 electric bicycle, equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches or exceeds 28 miles per hour.

302 CMR 12.05 Rules of Conduct on DCR Properties – Appalachian Trail

(2) No person shall operate any snow vehicle, recreation vehicle, or other vehicle, or ride a bicycle, electric bicycle, motorized conveyance, horse, or other animal upon any portion of the Appalachian Trail except at designated crossings.

302 CMR 12.12 Rules of Conduct on DCR Properties –Trails

(1) All non-motorized trail uses shall be permitted on any DCR trail, including a forest trail, forest way, trail or rail trail unless posted closed with appropriate signage, or otherwise prohibited by regulation or law.

(2) The use of bicycles, electric bicycles, and other means of transportation, including inline skates, scooters, skateboards and similar equipment, may be prohibited in specific areas and at specific times at particular DCR properties, and may be communicated through postings, signs, or markings.

(3) Motorized conveyances are prohibited on improved or natural surface DCR trails unless such trails are designated for such conveyances by the Department or allowed by a duly authorized DCR permit.

(4) The use of electric bicycles is prohibited on sidewalks and on improved or natural surface trails, regardless of trail width or other conditions, except that Class 1 electric bicycles are permitted as follows: (a) on improved DCR trails of 8 feet in width or greater; (b) in places where vehicular traffic is permitted and bicycles are not otherwise prohibited; and (c) in bicycle lanes on DCR roadways.

(5) The use of Class 2 and Class 3 electric bicycles is permitted as follows: (a) where vehicular traffic is permitted and bicycles are not otherwise prohibited; and (b) in bicycle lanes on DCR roadways.

(6) When passing others on a trail, trail users shall alert others with audible signals such as by voice, bell or horn.

(7) Trail users shall stop at all intersections and obey all regulatory signs and pavement markings on DCR property.

(8) A cyclist lawfully using DCR property after dark must equip his or her bicycle or other wheeled vehicle with a white light on the front of the vehicle and a red light to the rear of the vehicle that project illumination visible from 500 feet or more from the vehicle.

(9) Children younger than 17 years old must wear a helmet when riding or operating a bicycle or other wheeled vehicle on DCR property as prescribed by M.G.L. c.85, § 11B½ .

(10) No person shall operate any bicycle, electric bicycle, in-line skates, scooters, skateboards or similar equipment in a reckless manner, or at a speed which may be considered unreasonable or improper for existing conditions.

302 CMR 12.14 Rules of Conduct on DCR Properties – Recreational Vehicles

No person shall operate any moped, scooter or other motorized conveyance, other than a wheelchair or an electric bicycle, on DCR property unless the operator: holds a valid motor vehicle license; and the vehicle is equipped for legal operation on Massachusetts public ways, or is otherwise permitted.

From **540 CMR, Registry of Motor Vehicles**

540 CMR 2.05 Vehicle Registrations Requirements

(3)

Low-speed Electric Bicycle. A two- or three-wheeled vehicle with fully operable pedals and an electric motor of less than 750 watts (one h.p.), whose maximum speed on a paved level surface, when powered solely by such a motor while ridden by an operator who weighs 170 lbs., is less than 20 mph. These bicycles are not "motor vehicles" and are regulated by the U.S. Consumer Product Safety Commission. They are neither required nor authorized to be registered as "motorized bicycles" in the Commonwealth and the operator is not required to have a license or learner's permit but is subject to the traffic laws of the Commonwealth.

Motorized Bicycle (commonly called a moped). As defined in M.G.L. c. 90, § 1, may have two or three wheels. A motorized bicycle, however powered, cannot be converted and registered as a motorcycle. If the Registrar has information that he or she believes to be reliable that a particular make and model of motorized bicycle or a particular motorized bicycle itself can exceed 30 miles per hour, he or she may refuse to recognize it as a motorized bicycle and may reject registration for the specific vehicle or the make and model produced by the manufacturer.

Motorized Scooter. As defined in M.G.L. c. 90, § 1, is neither required nor authorized to be registered in the Commonwealth.

Motorized Vehicle Designed for Off-road Use. A motorized vehicle originally designed and manufactured for off-road use, for example, a snow mobile or ski mobile, an all-terrain (ATV) vehicle, a utility vehicle, etc., that could be registered under M.G.L. c. 90B cannot be registered for on-road use, either in its original manufactured configuration or as modified for on-road use. Only a "motorcycle" properly converted from off-road use may be registered for on-road use.

Motorcycle. As defined in M.G.L. c. 90, § 1, includes any such vehicle if it can achieve a top speed, as designed and manufactured, in excess of 40 miles per hour (MPH). If such vehicle can achieve a top speed, as designed and manufactured, of between 30 and 40 miles per hour (MPH) it may be registered as a "Limited Use Motorcycle" subject to restrictions as to operation on certain ways or portions of ways. Any two- or three-wheeled vehicle which has been certified by the National Highway Traffic Safety Administration (NHTSA) as a "motorcycle" can only be registered as a "Motorcycle" or "Limited Use Motorcycle". It cannot be registered as a "private passenger motor vehicle".

Motorcycle Conversions. A two- or three-wheeled motorcycle originally designed and manufactured for off-road use cannot be registered for on-road use, unless and until it has been physically converted in accord with the required motorcycle equipment/components list as contained in the Registrar's "Motorcycle Conversion Preliminary Examination Report" and the vehicle passes such preliminary examination prior to registration.

540 CMR 2.06 Requirements for Driver (Operator) Licenses, Learner Permits and Identification Cards

(2)

Driver's (Operator) License. An original, renewal or duplicate license to operate a motor vehicle as issued by the Registrar under M.G.L. c. 90 or c. 90F in Class A, B, C, (Commercial licenses); D (Passenger vehicle license); or M (Motorcycle license). It includes a temporary license in any Class. A Class D license may be used to operate a motorized bicycle or a motorized scooter.

Learner's Permit. A restricted permit, issued under M.G.L. c. 90, § 8B, that allows a learning driver to operate a passenger motor vehicle (Class D) and also allows a person to operate a motorized bicycle or a motorized scooter; a restricted permit, also issued under M.G.L. c. 90, § 8B, that allows a learning rider to operate a motorcycle (Class M).

From **700 CMR, Massachusetts Department of Transportation**

700 CMR 9.01 Definitions

Bicycle. Any wheeled vehicle propelled by pedals and operated by one or more persons. Bicycles shall include electric bicycles and motorized bicycles as defined in M.G.L. c. 90, § 1.

Bicycle Signal. A traffic signal indication at a Traffic Control Signal that is identified by a bicycle symbol in each signal face. Bicycle signals shall control right of way for bicyclists only. Where Bicycle Signals are present on an approach to an intersection, they shall control the right of way for bicyclists regardless of the presence of other traffic signals, unless otherwise signed.

Sidewalk. That portion of a highway set aside for pedestrian travel and, where designated, for bicycle travel.

700 CMR 9.06 Operation of Vehicles

(10)

(m) Steady Green Bicycle. Bicyclists approaching a steady green bicycle may proceed through the intersection but shall yield the right of way to pedestrians and vehicles lawfully within a crosswalk and vehicles within the intersection at the time such a signal was exhibited.

(n) Steady Yellow Bicycle. Bicyclists approaching the intersection or a marked stop line facing a steady yellow bicycle shall stop at such point unless so close to the intersection that a stop cannot be made in safety.

(o) Steady Red Bicycle. Bicyclists facing a steady red bicycle shall not enter the intersection and, if approaching, shall stop outside of the intersection or at such point as may be clearly marked by a sign or line. Except when a sign is in place prohibiting such a turn, stopped bicyclists facing a steady red bicycle may turn right, or turn left from a one-way street onto another one-way street, as subject to M.G.L. c. 89, § 8.

(p) Flashing Yellow Bicycle. Bicyclists approaching a flashing circular yellow may proceed through the intersection with caution per the provisions of M.G.L. c. 89 § 8 and shall yield the right of way to pedestrians.

(q) Flashing Red Bicycle. Bicyclists approaching a flashing circular red shall stop at the stop line or, if not marked, before entering the nearest crosswalk at an intersection, and the right to proceed shall be subject to provisions of M.G.L. c. 89, § 8.

700 CMR 9.08 Limited Access and Express State Highways

(2)

(b) No person shall operate or ride a bicycle within the limits of or on any portion of any highway where official signs have been erected at the approaches of said highway prohibiting such traffic.

Appendix IV: Discussion Topics

During the development of the recommendations, commissioners initially submitted 116 items to potentially include. Support staff combined similar items and removed extraneous ones to come to these 54 topics which were presented back to the commission in the October 14, 2025 meeting for discussion. The commissioners selected topics and ideas to include in the final recommendations and refined some of the ideas presented. The recommendations went through several rounds of refinement before the sixteen recommendations in this report were finalized.

Incentives and Subsidies

- The relevant administering group should add UL certified e-bikes and scooters to every state policy and program that provides incentives for Electric Vehicles, including charging infrastructure, by June 30, 2026.
- The Legislature should introduce manufacturing tax credits and/or incentives to promote local micromobility device manufacturing by January 1, 2027.
- The legislature should fund and MassCEC should expand the statewide e-bike rebate program that was piloted in 2024 by December 31, 2026.
- The Massachusetts federal delegation to Congress should support Bicycle Tariff Legislation by January 1, 2027.
- MassCEC, and/or the Department of Energy Resources (DOER) should incentivize e-bike maintenance training and professional technical certifications for MA residents, and explore introducing vocational / technical pathways for high school students.

Enforcement

- MassDOT, in consultation with EOPSS and local law enforcement agencies, promulgate regulations on micromobility vehicle road use and road safety requirements once a universal and adaptable framework for categorization is established.
- The Massachusetts State Police Academy and the Massachusetts Police Training Committee should develop and deliver training for new and in-service police officers, troopers and sheriffs performing police duties and functions, consistent with current micromobility laws, regulations and guidelines, and any new laws regulations and guidelines adopted as a result of this Report within 18 months for current statutes, regulations and guidelines, and 12 months after for any changes.
- The legislature should authorize automated enforcement on infractions that impact vulnerable users, such as the improper use of bus and bike lanes, red light running, and speeding by December 31, 2026.
- The legislature should pass a bill by December 2026 that assigns fault by default to a motorist who strikes a vulnerable road user as defined in MGL.
- MassDOT should reintroduce a digital version of the “driver complaint form” for people to submit claims of bad driving.

Paths and Trails

- MassDOT and DCR should issue design guidance for trails and shared-use paths that includes recommended advisory speed limits, widths and curvature of paths to accommodate cargo bikes, and separation of pedestrians and other wheeled devices within 6 months of the publication of this report.

- MassDOT, Department of Conservation and Recreation, and municipalities, should deploy technology to remind users of recommended speed limits for specific facilities and provide feedback on their own travel speed by December 31, 2026.

Batteries

- The legislature should fund a battery swap program for all non-UL certified battery bikes, removable batteries, and chargers. Mass DEP should hand out safe charging information by 2026.
- The legislature should apply the Extended Producer Responsibility Commission's recommendation about removable batteries, and work with DEP to implement such a recycling program at points of sale for micromobility devices.

Data

- MassDOT should include all micromobility-involved crashes to its crash data dashboards by July 2026 and study how to improve the reliability of micromobility crash data after 12 months of inclusion in dashboards.
- The Legislature should identify resources for the Department of Public Health to collect, organize, and surface data to MassDOT and municipalities on micromobility crashes that do not involve a motor vehicle by December 31, 2026.
- The legislature should enable MassDOT to revise the Vulnerable User section of the Massachusetts Crash Report form by September 1, 2026, using a multi-layer process for ease of use by law enforcement: Those two layers should be:
    - Layer 1 to classify users as Pedestrian, Bicyclist, Other Cyclist, Scooter Rider, Skater/Skateboarder, Mobility Aid Device User, Roadway Worker, Emergency Responder, Other, or Unknown; and
    - Layer 2 to ask if powered for Bicyclist, Other Cyclist, Scooter Rider, Skater/Skateboarder, and Mobility Aid Device User.

  The MassDOT Manager of Highway Safety Programs should approve the updates to the crash reporting form by January 1, 2027.

Multimodality and infrastructure improvements

- The legislature should add the following definition to MGL Chapter 90E Section 1 by December 31, 2026.
    - Separated bike lane - "an exclusive space along or within a roadway that is physically separated from motor vehicles and pedestrians by vertical and/or horizontal elements". This definition would be in line with MassDOT planning and design guidelines.
- The legislature should allocate additional Chapter 90 funds to support municipalities in shifting from paint/flex-posts to physical separation designs (raised, curb-protected, hard physical barriers, or behind parked cars) and those municipalities should publish retrofit schedules by June 2027.
- MassDOT and the state legislature should support municipalities in redesigning the top 10% of high-injury intersections each year by January 2026.
- MassDOT should support municipalities in building a continuous protected network so all residents are within ¼ mile (urban) or ½ mile (suburban) of a protected route to key destinations by December 2030.
- MassDOT should distribute the bike parking best practices literature developed by the City of Boston to other municipalities statewide.
- MassDOT should implement a system for bulk purchasing and distributing approved bike racks to municipalities.
- The legislature should make funding available for municipalities to invest in safe, abundant bike parking and charging stations for electric bikes and cargo bikes.

- The legislature should require municipalities to adopt Complete Streets policies to increase safety and comfort for people outside of cars.
- The MBTA and other RTAs should adopt a multimodality integration plan to

  1. provide secure micromobility parking and charging at park-and-ride, subway, and commuter rail stations, and bus centers
  2. designate bike-friendly rail and subway cars and buses
  3. explore fare integration and/or discounts

  by June 2027.

- The legislature should identify reliable and sustainable operating funds for the publicly owned docked bikeshare networks, including potentially opening regional transportation innovation grant criteria to bike share as a viable transit option in any potential future funding rounds by December 31, 2026.
- Municipalities should adopt "15-minute community" zoning and replacing select curbside parking with active mobility corrals/parking and mobility-share parking.
- MassDOT, MAPC, and/or the MPO should expand the current bikeshare system in MBTA communities by creating and administering bike share grants by the end of 2026.
- MassDOT, MAPC, and/or the MPO should fund a pilot program to test a lock-to-rack/docked bike share model in MBTA communities outside of the Bluebikes system.
- Municipalities and/or DCR should develop a pilot program to test the feasibility and effectiveness of 'slow zones' that are geo-fenced areas where vehicle speeds are automatically capped.

Standards

- The Massachusetts Legislature should set a statewide 20 mph default speed limit on all local urban streets for all vehicles by July 2026.
- The governor's office should submit supportive comments to any potential future draft rules from NHTSA in support of the adoption of Bicyclist Automated Emergency Braking (AEB).
- Municipalities should amend building codes to require secure, covered, easy to access micromobility parking with e-charging in all new or renovated developments by July 2027.
- The legislature should define what is a personal use micromobility device and what is a commercial use micromobility device and determine if and how regulations should differ for personal use vehicles versus commercial use vehicles.

Outreach, Education, and Community Engagement

- MassBike should develop a program to educate bike shop owners on new state laws and encourage them to be micromobility safety ambassadors for customers.
- Law enforcement and state and local stakeholders should develop an educational campaign to inform micromobility users about state laws, regulations, local ordinances, and safety practices before December 2026. This should include special outreach to teens and those without a driver license.
- MassDOT should support an education campaign for drivers to raise awareness of new bike infrastructure.
- MassDOT should partner with the Massachusetts Office of Travel and Tourism and VisitMA to ensure visitors understand how micromobility is to be used and rules of the road.
- The Safe Routes to School program should include micromobility education by September 2026.

Traffic

- Municipalities should pilot at least five Low-Traffic Neighborhoods per year statewide starting in January 2027 and convert pilots that meet agreed performance thresholds to permanent installations within 12 months of evaluation.
- The RMV should require a permit focused on safety (direct vision ratings, side guards, proximity sensors) for large trucks in metropolitan areas by January 2027.
- The Massachusetts federal delegation should support federal legislation to adopt the Massachusetts state legal mandate requiring side guards and updated underride protection standards for large trucks.
- The legislature should amend the current laws designed to prevent more than two bikes or motorcycles from riding abreast on roadways to include all micromobility devices.
- MassDOT should include micromobility regulations in its Sample Regulation for a Standard Municipal Traffic Code when the recommendations are issued.
- The legislature should introduce a bill or amend the current laws to penalize micromobility users interfering with roadway traffic.
- The legislature should enact specific laws that penalize discharging passengers in a travel lane or intersection, and double parking in a travel lane.

Further Studies

- MassDOT and the MBTA should commission a study to understand how micromobility affects car use by December 2026.
- The Department of Public Health should investigate a partnership with health insurers to offer premium discounts for verified micromobility miles traveled by September 2026.
- A local academic partner should study how micromobility vehicles are being used as first/last mile solution to be published by December 31, 2026.
- A local academic partner should conduct a study to understand barriers to micromobility adoption by December 31, 2026.
- MassDOT should work with autonomous vehicle manufacturers to ensure autonomous vehicles can detect, identify, and respond to people biking, walking, and using mobility devices by December 31, 2026.
- Municipalities should study ways to optimize their off-street parking options and make safe spaces for pedestrian corridors, drop offs and active mobility.
- The legislature should commission a study to examine aspects of the food delivery business like working conditions, vehicular violations, safety impacts, and other externalities. The legislature should then develop a bill to reduce externalities and improve working conditions.

Appendix V: Works Cited

[1] Feigenbaum, Baruch, et al. "Massachusetts Ranks 20th in the Nation in Highway Performance and Cost-Effectiveness - Reason Foundation." *Reason Foundation*, 20 Apr. 2023, reason.org/highway-report/27th-annual-highway-report/massachusetts/. Accessed Dec. 2025.

[2] "2024 Massachusetts Climate Report Card - Transportation Decarbonization." *Mass.gov*, Commonwealth of Massachusetts, 2024, www.mass.gov/info-details/2024-massachusetts-climate-report-card-transportation-decarbonization. Accessed Dec. 2025.

[3] "Bicycle Plan." *Mass.gov*, Commonwealth of Massachusetts, 2021, www.mass.gov/info-details/bicycle-plan. Accessed Dec. 2025.

[4] Cho, Nam Yong, et al. "National Trends and Clinical Outcomes after Scooter Injury in the US: 2016 to 2020." *Journal of the American College of Surgeons*, vol. 238, no. 3, Mar. 2024, p. 254, https://doi.org/10.1097/XCS.0000000000000918.

[5] McQueen, Michael, et al. "The E-Bike Potential: Estimating Regional E-Bike Impacts on Greenhouse Gas Emissions." *Transportation Research Part D: Transport and Environment*, vol. 87, Oct. 2020, p. 102482, https://doi.org/10.1016/j.trd.2020.102482.

[6] Vosper, Rick. "Vosper: E-Bikes Step up in a down Market." *Bicycleretailer.com*, Bicycle Retailer and Industry News, 11 Mar. 2024, www.bicycleretailer.com/opinion-analysis/2024/03/11/vosper-e-bikes-step-down-market. Accessed Nov. 2025.

[7] "ECycleElectric." *ECycleElectric*, 12 Feb. 2025, www.ecycleelectric.com/blog/2025/2/12/how-big-is-the-usa-e-bike-market-in-2024-25. Accessed Nov. 2025.

[8] Pioneer Valley Planning Commission. "E-bikes for environmental justice: ACT4All in the Pioneer Valley final report." Massachusetts Clean Energy Center. 2025.

[9] Kachadoorian, Carol. *Cycling Past 50: A Closer Look into the World of Older Cyclists, Year 4 Survey*. San Jose State University, Mineta Transportation Institute, Dec. 2023, transweb.sjsu.edu/sites/default/files/2157.1-Kachadoorian-Older-Adults-Cycling-Active-Mobility.pdf. Accessed Nov. 2025.

[10] Umansky-Castro, Rachel. "A New (Very) Affordable Bike Share: Rent a Bike for a Buck - the Boston Globe." *BostonGlobe.com*, 24 Oct. 2024, www.bostonglobe.com/2024/10/24/metro/new-very-affordable-bike-share-rent-bike-buck/. Accessed Dec. 2025.

[11] Consumer Product Safety Commission. "E-Scooter and E-Bike Injuries Soar: 2022 Injuries Increased Nearly 21%." *Cspc.gov*, 17 Oct. 2023, www.cpsc.gov/Newsroom/News-Releases/2024/E-Scooter-and-E-Bike-Injuries-Soar-2022-Injuries-Increased-Nearly-21. Accessed Nov. 2025.

[12] Avanesian, Michael. "Micromobility Accident Report 2025: E-Scooter and E-Bike Injuries, Risks, and Legal Trends." *Avianlawgroup.com*, Avian Law Group, 9 Sept. 2025, www.avianlawgroup.com/reports/micromobility-accident-report-2025. Accessed Nov. 2025.

[13] Roman, Jesse. "Lithium-Ion Battery Fire Learnings from FDNY." *Nfpa.org*, National Fire Protection Association, 7 Aug. 2025, www.nfpa.org/news-blogs-and-articles/nfpa-journal/2025/08/08/lithium-ion-battery-fires-fdny. Accessed Dec. 2025.

[14] Smith, David R. "Teen, Intubated after E-Bike Crash with Car, Has 24 Broken Bones. How You Can Help." *The Patriot Ledger*, 24 June 2025, www.patriotledger.com/story/news/accident/2025/06/24/george-lavoie-plymouth-ma-bike-car-crash-gofundme/84332160007/. Accessed Dec. 2025.

[15] MilNeil, Christian. "E-Bike Rider Inflicts Serious Injuries to Pedestrian in Chaotic Copley Square Intersection - Streetsblog Massachusetts." *Streetsblog.org*, 7 Aug. 2025, mass.streetsblog.org/2025/08/07/e-bike-rider-inflicts-serious-injuries-to-pedestrian-in-chaotic-copley-square-intersection. Accessed Nov. 2025.

[16] "A Tragedy in Stoneham Should Spark a Push to Update Mass. Rules for Micromobility Devices - the Boston Globe." *BostonGlobe.com*, Dec. 2025, bostonglobe.com/2025/12/01/opinion/ebikes-scooters-mopeds-micromobility-regulation. Accessed Dec. 2025.

[17] Centers for Disease Control. "Risk Factors for Teen Drivers." *Cdc.gov*, 2024, www.cdc.gov/teen-drivers/risk-factors/index.html. Accessed Nov. 2025.

[18] Consumer Product Safety Commission. "E-Scooter and E-Bike Injuries Soar: 2022 Injuries Increased Nearly 21%." *Cspc.gov*, 17 Oct. 2023, www.cpsc.gov/Newsroom/News-Releases/2024/E-Scooter-and-E-Bike-Injuries-Soar-2022-Injuries-Increased-Nearly-21. Accessed Nov. 2025.

[19] Irfan, Umair. "Electric Scooters: Why Bird, Lime, Skip, and Spin Are Taking over Cities." *Vox*, Vox, 27 Aug. 2018, www.vox.com/2018/8/27/17676670/electric-scooter-rental-bird-lime-skip-spin-cities. Accessed Nov. 2025.

[20] "Shared Micromobility Report: 2023 - NACTO." *NACTO.org*, National Association of City Transportation Officials , 11 Dec. 2024, nacto.org/publication/shared-micromobility-report-2023/. Accessed Nov. 2025.

[21] "About the Shared Micromobility Industry." *Nabsa.net*, North American Bikeshare & Scootershare Association, 7 Aug. 2025, nabsa.net/about/industry/. Accessed Nov. 2025.

[22] "E-Scooter Share Pilot Program." *Www.chicago.gov*, City of Chicago, IL, www.chicago.gov/city/en/depts/cdot/supp_info/escooter-share-pilot-project.html. Accessed Nov. 2025.

[23] Populus.ai "POPULUS MOBILITY EVALUATION SURVEY Brookline, MA - Scooter Pilot Program April 1st - November 15th 2019." *Brooklinema.gov*, Town of Brookline, MA, 2020, www.brooklinema.gov/DocumentCenter/View/35201/Populus---Brookline-E-Scooter-Pilot-Results. Accessed Dec. 2025.

[24] Risher, Dan. "A Note on the Future of Lyft Bikes and Scooters." *Lyft.com*, Lyft Blog, 4 Sept. 2024, www.lyft.com/blog/posts/future-of-lyft-bikes-and-scooters. Accessed Dec. 2025.

[25] Ibid.

[26] Metropolitan Area Planning Council. "First Miles: Examining 18 Months of Dockless Bikeshare in Metro Boston." *ArcGIS StoryMaps*, Esri, 4 Sept. 2019, storymaps.arcgis.com/stories/f9c8e9cddc444dd7a47a678158fd3580. Accessed Dec. 2025.

[27] Heineke, Kersten, et al. "Spotlight on Micromobility Trends." McKinsey & Company, 12 Mar. 2024, www.mckinsey.com/industries/automotive-and-assembly/our-insights/spotlight-on-mobility-trends. Accessed Nov. 2025.

[28] "What Is Micromobility?" *McKinsey Insights*, McKinsey & Company, 29 Apr. 2025, www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-micromobility. Accessed Nov. 2025.

[29] "Growing Demand for Comprehensive E-Bike Services and Employer Leasing Options." *NIQ*, Nielsen IQ, 26 Feb. 2025, nielseniq.com/global/en/news-center/2025/growing-demand-for-comprehensive-e-bike-services-and-employer-leasing-options/. Accessed Nov. 2025.

[30] Vosper, Rick. "Vosper: E-Bikes Step up in a down Market." *Bicycleretailer.com*, Bicycle Retailer and Industry News, 11 Mar. 2024, www.bicycleretailer.com/opinion-analysis/2024/03/11/vosper-e-bikes-step-down-market. Accessed Nov. 2025.

[31] Vehicle Technologies Office. "FOTW #1321, December 18, 2023: E-Bike Sales in the United States Exceeded One Million in 2022." *Energy.gov*, US Department of Energy, 18 Dec. 2023, www.energy.gov/eere/vehicles/articles/fotw-1321-december-18-2023-e-bike-sales-united-states-exceeded-one-million. Accessed Dec. 2025.

[32] "Growing Demand for Comprehensive E-Bike Services and Employer Leasing Options." *NIQ*, Nielsen IQ, 26 Feb. 2025, nielseniq.com/global/en/news-center/2025/growing-demand-for-comprehensive-e-bike-services-and-employer-leasing-options/. Accessed Nov. 2025.

[33] Vosper, Rick. "Vosper: E-Bikes Step up in a down Market." *Bicycleretailer.com*, Bicycle Retailer and Industry News, 11 Mar. 2024, www.bicycleretailer.com/opinion-analysis/2024/03/11/vosper-e-bikes-step-down-market. Accessed Nov. 2025.

[34] Heineke, Kersten, and Darius Scrutu. "Micromobility's Emerging Road to Profitability." *McKinsey & Company*, McKinsey Center for Future Mobility, 27 Aug. 2025, www.mckinsey.com/features/mckinsey-center-for-future-mobility/mckinsey-on-urban-mobility/micromobilitys-emerging-road-to-profitability. Accessed Nov. 2028.

[35] "What Is Micromobility?" *McKinsey Insights*, McKinsey & Company, 29 Apr. 2025, www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-micromobility. Accessed Nov. 2025.

[36] Mitra, Raktim, and Paul M. Hess. "Who Are the Potential Users of Shared E-Scooters? An Examination of Socio-Demographic, Attitudinal and Environmental Factors." *Travel Behaviour and Society*, vol. 23, Apr. 2021, pp. 100–7, https://doi.org/10.1016/j.tbs.2020.12.004. Accessed Dec. 2025.

[37] Jena, Aurojeet, et al. "Identifying E-Scooter Rider Profiles in the United States: A Latent Class Cluster Analysis." *Journal of Cycling and Micromobility Research*, vol. 6, Elsevier, Sept. 2025, p. 100088, https://doi.org/10.1016/j.jcmr.2025.100088. Accessed Dec. 2025.

[38] Zhang, Yuerong, and Maria Kamargianni. "A Review on the Factors Influencing the Adoption of New Mobility Technologies and Services: Autonomous Vehicle, Drone, Micromobility and Mobility as a Service." *Transport Reviews*, vol. 43, no. 3, Sept. 2022, pp. 1–23, https://doi.org/10.1080/01441647.2022.2119297. Accessed Dec. 2025.

[39] "Average Cost of Owning and Operating an Automobile | Bureau of Transportation Statistics." *Www.bts.gov*, Bureau of Transportation Statistics, 2025, www.bts.gov/content/average-cost-owning-and-operating-automobilea-assuming-15000-vehicle-miles-year. Accessed Dec. 2025.

[40] "FOTW #1230, March 21, 2022: More than Half of All Daily Trips Were Less than Three Miles in 2021." *Energy.gov*, US Department of Energy; Vehicle Technologies Office, 21 Mar. 2022, www.energy.gov/eere/vehicles/articles/fotw-1230-march-21-2022-more-half-all-daily-trips-were-less-three-miles-2021. Accessed Nov. 2025.

[41] Yin, Ailing, et al. "How Electric Bikes Reduce Car Use: A Dual-Mode Ownership Perspective." *Transportation Research Part D Transport and Environment*, vol. 133, Elsevier BV, Aug. 2024, pp. 104304–4, https://doi.org/10.1016/j.trd.2024.104304.

[42] Bourne, Jessica E., et al. "The Impact of E-Cycling on Travel Behaviour: A Scoping Review." *Journal of Transport & Health*, vol. 19, Dec. 2020, p. 100910, https://doi.org/10.1016/j.jth.2020.100910.

[43] Felix, Alison, et al. *Considerations for Retail Delivery Assessments*. Metropolitan Area Planning Council, Aug. 2024, www.mapc.org/wp-content/uploads/2024/07/MAPCPolicyBrief_RetailDeliveryAssessments-final.pdf. Accessed 28 Jan. 2026.

[44] US Census Bureau. "Monthly Retail Trade - Quarterly Retail E-Commerce Sales Report." *Www.census.gov*, US Census Bureau, 8 Dec. 2025, www.census.gov/retail/ecommerce.html. Accessed Dec. 2025.

[45] Felix, Alison, et al. *Considerations for Retail Delivery Assessments*. Metropolitan Area Planning Council, Aug. 2024, www.mapc.org/wp-content/uploads/2024/07/MAPCPolicyBrief_RetailDeliveryAssessments-final.pdf. Accessed 28 Jan. 2026.

[46] Meyer, David. "Study: Microhubs and Last-Mile Cargo Bikes Can Save City $240M a Year - Streetsblog New York City." *Streetsblog.org*, Apr. 2024, nyc.streetsblog.org/2024/04/01/study-microhubs-and-last-mile-cargo-bikes-can-save-city-240m-a-year. Accessed Nov. 2025.

[47] World Economic Forum. *Transforming Urban Logistics: Sustainable and Efficient Last-Mile Delivery in Cities*. World Economic Forum, Dec. 2024, reports.weforum.org/docs/WEF_Transforming_Urban_Logistics_2024.pdf.

[48] Belles, Amanda. "E-Cargo Bikes: Strategies for Municipal Delivery Transition – MAPC." *Metropolitan Area Planning Council* , 30 Sept. 2024, www.mapc.org/resource-library/e-cargo-bikes/. Accessed Dec. 2025.

[49] Rula, K., Rosenblatt, B., Mills, H., Chu, Y, Dalla Chiara, G., Warfield, M., Goodchild, A. (2025). Boston Delivers Cargo Bike Pilot Evaluation. Urban Freight Lab, University of Washington.

[50] "Road Safety and Accountability for Delivery Providers Ordinance." *Boston.gov*, City of Boston, 12 Dec. 2025, www.boston.gov/departments/transportation/road-safety-and-accountability-delivery-providers-ordinance. Accessed Dec. 2025.

[51] Bancroft, Ethan. "Seattle's Commercial E-Cargo Bike Program Has Officially Launched, Supporting Sustainable & Dependable Deliveries throughout the City - SDOT Blog." *SDOT Blog*, Seattle Department of Transportation, 20 Nov. 2025, sdotblog.seattle.gov/2025/11/20/seattle-commercial-e-cargo-bike-program/. Accessed Dec. 2025.

[52] M, Ashutosh. "The New Last Mile: How Micromobility Is Reshaping Urban Delivery." *Micromobility.io*, 2025, micromobility.io/news/the-new-last-mile-how-micromobility-is-reshaping-urban-delivery. Accessed Nov. 2025.

[53] Meyer, David. "Study: Microhubs and Last-Mile Cargo Bikes Can Save City $240M a Year - Streetsblog New York City." *Streetsblog.org*, Apr. 2024, nyc.streetsblog.org/2024/04/01/study-microhubs-and-last-mile-cargo-bikes-can-save-city-240m-a-year. Accessed Nov. 2025.

[54] "State Electric Bicycle Laws | a Legislative Primer." *Www.ncsl.org*, National Conference of State Legislatures, 21 Feb. 2021, www.ncsl.org/transportation/state-electric-bicycle-laws-a-legislative-primer. Accessed Nov. 2025.

[55] "Electric Bike Regulations per State." *Fly Rides USA* , 2024, flyridesusa.com/pages/electric-bike-regulations-per-state?srsltid=AfmBOoqQ9bU2VpDUZWz6Np8V9inGdyytsqbBi92cGc6k-J9QLyoxUVc_. Accessed Dec. 2025.

[56] Delaware, Division of Motor Vehicles. "Vehicle Services Special Vehicles." *Division of Motor Vehicles*, State of Delaware, 2025, dmv.de.gov/VehicleServices/specialvehicles/index.shtml?dc=ve_reg_gopeds. Accessed Dec. 2025.

[57] Upper Allen Police Department. *Electric Scooters*. Upper Allen Township, 23 Apr. 2024, upperallenpolice.com/wp/faqs/electric-scooters-and-pennsylvania-law/. Accessed Dec. 2025.

[58] "A Detailed Guide to U.S. State EBike Laws." *Birch Hunters*, 2025, birchhunters.com/pages/a-detailed-guide-to-u-s-state-ebike-laws?srsltid=AfmBOoqUmh_bM3QfFq8HPrcZN3ZLiA_klxymqU4Jbmja17I4HGstec6v. Accessed Nov. 2025.

[59] "California's New E-Bike Law: Guidance for Manufacturers." *PeopleForBikes.org*, PeopleForBikes, 2016, s3-us-west-2.amazonaws.com/static.peopleforbikes.org/docs/ebikes-manufacturers.pdf. Accessed Nov. 2025.

[60] "Bill Text - AB-2234 Vehicles: Electric Bicycles." *Ca.gov*, State of California, 30 Sept. 2024, leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB2234. Accessed Dec. 2025.

[61] "States Roll out Electric Scooter Laws." *Ncsl.org*, National Conference of State Legislatures, 2024, www.ncsl.org/transportation/states-roll-out-electric-scooter-laws. Accessed Nov. 2025.

[62] Darlington, David. "The Shocking Crash That Led Marin County to Reckon with the Dangers of E-Bikes." *The New York Times*, 30 Nov. 2025, www.nytimes.com/2025/11/30/magazine/e-bikes-accidents-safety-legislation-california.html. Accessed Dec. 2025.

[63] "Sec. 325F.661 SALE OF ELECTRIC-ASSISTED BICYCLES AND OTHER ELECTRIC CYCLES MN Statutes." *Mn.gov*, State of Minnesota, 2025, www.revisor.mn.gov/statutes/cite/325F.661. Accessed Dec. 2025.

[64] "AN ACT CONCERNING ELECTRIC SCOOTERS, ELECTRIC BICYCLES and MOTOR-DRIVEN CYCLES." *Cga.ct.gov*, Connecticut General Assembly, 7 Apr. 2025, www.cga.ct.gov/2025/ba/pdf/2025HB-06862-R000553-BA.pdf. Accessed Dec. 2025.

[65] "Utah Code Section 1115.5 Electric Assisted Bicycles -- Restrictions -- Penalties. (Effective 5/1/2024)." *Utah.gov*, State of Utah, 1 May 2024, le.utah.gov/xcode/Title41/Chapter6A/41-6a-S1115.5.html. Accessed Dec. 2025.

[66] "California Bill Text - SB-1271 Electric Bicycles, Powered Mobility Devices, and Storage Batteries." *Ca.gov*, State of California, 30 Sept. 2024, leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB1271. Accessed Dec. 2025.

[67] Massachusetts, Commonwealth of. "Part I Title XIV." *Malegislature.gov*, Commonwealth of Massachusetts, 2025, malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV. Accessed Nov. 2025.

[68] "302 CMR: DCR Agency Regulations." *Mass.gov*, Commonwealth of Massachusetts, 2020, www.mass.gov/info-details/dcr-agency-regulations. Accessed Nov. 2025.

[69] "540 CMR: Registry of Motor Vehicles." *Mass.gov*, Commonwealth of Massachusetts, 2018, www.mass.gov/law-library/540-cmr. Accessed Nov. 2025.

[70] "700 CMR: Department of Transportation." *Mass.gov*, Commonwealth of Massachusetts, 2018, www.mass.gov/law-library/700-cmr. Accessed Nov. 2025.

[71] "Town of Nantucket, MA: Operation of Bicycles." Town and County of Nantucket, MA, 2024, ecode360.com/11470625#11470626. Accessed Nov. 2025.

[72] Ibid.

[73] "Scooter & Moped Law | Malden, MA." *Cityofmalden.org*, Police Department of Malden, MA, 2025, www.cityofmalden.org/905/Scooter-Moped-Law. Accessed Nov. 2025.

[74] Ibid.

[75] "Information about E-Bikes - CDD - City of Cambridge, Massachusetts." *Cambridgema.gov*, City of Cambridge, MA, 2025, www.cambridgema.gov/CDD/Transportation/gettingaroundcambridge/bikesincambridge/ebikes. Accessed Nov. 2025.

[76] "City of Northampton, MA: Operation of Vehicles." City of Northampton, MA, 2025, ecode360.com/11956644#11956644. Accessed Nov. 2025.

[77] Ibid.

[78] Ibid.

[79] "City of Malden : Municipal Code." *Municipalcodeonline.com*, City of Malden, MA, 2025, malden.municipalcodeonline.com/book?type=ordinances#name=11.12.010_REGULATION_OF_MULTI-USE_TRAILS. Accessed Nov. 2025.

[80] "Information about E-Bikes - CDD - City of Cambridge, Massachusetts." *Cambridgema.gov*, City of Cambridge, MA, 2025, www.cambridgema.gov/CDD/Transportation/gettingaroundcambridge/bikesincambridge/ebikes. Accessed Nov. 2025.

[81] Ibid.

[82] "Forms & Applications | Nantucket, MA - Official Website." *Nantucket-Ma.gov*, Town and County of Nantucket, MA, 2022, www.nantucket-ma.gov/265/Forms-Applications. Accessed Nov. 2025.

[83] "Town of Nantucket, MA: Operation of Bicycles." Town and County of Nantucket, MA, 2024, ecode360.com/11470625#11470626. Accessed Nov. 2025.

[84] "E-Bike Stickers | Nantucket, MA - Official Website." *Nantucket-Ma.gov*, Town and County of Nantucket, MA, 2022, www.nantucket-ma.gov/3127/E-Bike-Stickers. Accessed Nov. 2025.

[85] "Town of Foxborough, MA: Peace and Good Order." Town of Foxborough, MA, 2024, ecode360.com/26808269#26808279. Accessed Nov. 2025.

[86] Creed, David. "As E-Bike Usage Surges on Nantucket, Police Chief Urges Caution." Nantucket Current, 14 July 2024, nantucketcurrent.com/news/police-chief-urges-caution-while-riding-e-bikes. Accessed Nov. 2025.

[87] "City of Malden, MA: Rules & Ordinance Committee Meeting" Cityofmalden.org, City of Malden, MA, 7 March, 2023 cityofmalden.org/AgendaCenter/ViewFile/Minutes/_03072023-2663. Accessed Nov. 2025.

[88] Lisowski, Madison, et al. "City Council Unanimously Passes E-Scooter Regulation Ordinance." *Western Massachusetts News*, 18 Nov. 2025, www.westernmassnews.com/2025/11/19/city-council-unanimously-passes-e-scooter-regulation-ordinance/. Accessed Nov. 2025.

[89] "City of Northampton, MA: Operation of Vehicles." City of Northampton, MA, 2025, ecode360.com/11956644#11956644. Accessed Nov. 2025.

[90] "Scooter & Moped Law | Malden, MA." *Cityofmalden.org*, Police Department of Malden, MA, 2025, www.cityofmalden.org/905/Scooter-Moped-Law. Accessed Nov. 2025.

[91] "City of Fall River, MA: In General." City of Fall River, MA, 2024, ecode360.com/29928914#29928967. Accessed Nov. 2025.

[92] "Town of Nantucket, MA: Moped Rental Agencies." Town and County of Nantucket, MA, 2024, ecode360.com/11470638#11470645. Accessed Nov. 2025.

[93] Kane, Timothy. "Hanover Police Department E-Bike Public Service Announcement." *Hanover-Ma.gov*, 2 July 2025, www.hanover-ma.gov/home/news/hanover-police-department-e-bike-public-service-announcement-7225. Accessed Nov. 2025.

[94] "City of Marlborough, MA: Scooters, Motorized." City of Marlborough, MA, 2025, ecode360.com/9211525#9211530. Accessed Nov. 2025.

[95] "Police Department Crash Data - Updated." *Cambridgema.gov*, City of Cambridge, MA, 25 Oct. 2016, data.cambridgema.gov/Public-Safety/Police-Department-Crash-Data-Updated/gb5w-yva3/about_data. Accessed Nov. 2025.

[96] "Bicycling in Cambridge Data Report 2023." *Cambridgema.gov*, City of Cambridge, MA, Environmental & Transportation Planning Division Community Development Department, Oct. 2023, www.cambridgema.gov/-/media/Files/CDD/Transportation/Bike/bikereports/20231023bicyclingincambridgedatareport_final.pdf.

[97] Publication forthcoming.

[98] "California Code, VEH 24016." *Ca.gov*, State of California, 2024, leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=VEH§ionNum=24016. Accessed Dec. 2025.

[99] "The 2025 Florida Statutes :: Title XXIII, Chapter 316, 316.20655 Electric Bicycle Regulations." *State.fl.us*, State of Florida, 2025, www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0316/Sections/0316.20655.html. Accessed Dec. 2025.

[100] "State by State Electric Bike Laws." *PeopleForBikes*, www.peopleforbikes.org/electric-bikes/state-laws. Accessed Nov. 2025.

[101] "43 CFR 420.5 -- Definitions." *Ecfr.gov*, National Archives, 24 Nov. 2025, www.ecfr.gov/current/title-43/subtitle-B/chapter-I/part-420/section-420.5. Accessed 2025.

[102] Tefft, Brian C. "Impact Speed and a Pedestrian's Risk of Severe Injury or Death." *AAA Foundation*, 22 Sept. 2011, aaafoundation.org/impact-speed-pedestrians-risk-severe-injury-death/.

[103] Roman, Jesse. "Lithium-Ion Battery Fire Learnings from FDNY." *Nfpa.org*, National Fire Protection Association, 7 Aug. 2025, www.nfpa.org/news-blogs-and-articles/nfpa-journal/2025/08/08/lithium-ion-battery-fires-fdny. Accessed Dec. 2025.

[104] Thornton, Claire. "NYC Journalist's Death Is City's Latest Lithium-Ion Battery Fire Fatality, Officials Say." USA TODAY, 26 Feb. 2024, www.usatoday.com/story/news/nation/2024/02/26/lithium-ion-battery-fires-kill-new-yorkers/72743889007/. Accessed Dec. 2025.

[105] "E-Bike & E-Scooter Safety Action Center | UL Standards & Engagement." *ULSE E-Mobility*, UL Standards and Engagement, 13 Aug. 2024, ebikesafety.ulse.org/#take-action. Accessed Nov. 2025.

[106] Extended Producer Responsibility Commission. "Background Document for Policy Recommendations on BATTERIES." *Mass.gov*, MassDEP, 18 Aug. 2025, www.mass.gov/doc/drafteprcommissionbatteriesbackgroundrecommendationdocaug2025/download. Accessed Nov. 2025.

[107] National Archives. "16 CFR Part 1512 -- Requirements for Bicycles." *Ecfr.gov*, 1 Oct. 2025, www.ecfr.gov/current/title-16/chapter-II/subchapter-C/part-1512?toc=1. Accessed Nov. 2025.

[108] "General Law - Part I, Title XIV, Chapter 85, Section 11B." *Malegislature.gov*, The 194th General Court of the Commonwealth of Massachusetts, malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter85/Section11B. Accessed Nov. 2025.

[109] Cleveland Clinic. "The Importance of Wearing a Bicycle Helmet." *Cleveland Clinic*, Cleveland Clinic, 24 Jan. 2023, health.clevelandclinic.org/bicycle-helmet-safety. Accessed Nov. 2025.

[110] "General Law - Part I, Title XIV, Chapter 90, Section 7." *Malegislature.gov*, The 194th General Court of the Commonwealth of Massachusetts, malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter90/Section7. Accessed Nov. 2025.

[111] Consumer Product Safety Commission. "E-Scooter and E-Bike Injuries Soar: 2022 Injuries Increased Nearly 21%." *Cspc.gov*, 17 Oct. 2023, www.cpsc.gov/Newsroom/News-Releases/2024/E-Scooter-and-E-Bike-Injuries-Soar-2022-Injuries-Increased-Nearly-21. Accessed Nov. 2025.

[112] "Scooter Insurance." *Geico.com*, GEICO, 2025, www.geico.com/scooter-insurance/. Accessed 2025.

[113] Massachusetts Registry of Motor Vehicles. "Apply for a Moped Registration." *Mass.gov*, Commonwealth of Massachusetts, 2025, www.mass.gov/how-to/apply-for-a-moped-registration. Accessed 2025.

[114] "General Law - Part I, Title XIV, Chapter 85, Section 11B." *Malegislature.gov*, The 194th General Court of the Commonwealth of Massachusetts, malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter85/Section11B. Accessed Nov. 2025.

[115] Ibid.

[116] "General Law - Part I, Title XIV, Chapter 85, Section 11B 3/4." *Malegislature.gov*, The 194th General Court of the Commonwealth of Massachusetts, malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter85/Section11B%203~4. Accessed Nov. 2025.

[117] "What Is a Safe System Approach?" *Transportation.gov*, US Department of Transportation, 2025, www.transportation.gov/safe-system-approach. Accessed Nov. 2025.

[118] "Data Tools and Resources for the Vulnerable Road User Safety Assessment | FHWA." *Dot.gov*, Federal Highway Administration, 2024, highways.dot.gov/safety/pedestrian-bicyclist/data-tools-and-resources-vulnerable-road-user-safety-assessment. Accessed Dec. 2025.

[119] Slavin, Jes. "An Act to Reduce Traffic Fatalities Is Signed into Law!" *Massachusetts Bicycle Coalition*, 2023, www.massbike.org/aatrtf_signedintolaw. Accessed Dec. 2025.

[120]Federal Highway Administration. MAKING OUR ROADS SAFER 28 Proven Safety Countermeasures That Offer Signiflcant and Measurable Impacts to Improving Safety One Countermeasure at a Time. US Department of Transportation, Oct. 2021, highways.dot.gov/sites/fhwa.dot.gov/files/Proven%20Safety%20Countermeasures%20Booklet.pdf.

[121] "703 CMR 6.00: Issuance and Enforcement of Automated Bus Lane and Bus Stop Violations." Mass.gov, Commonwealth of Massachusetts, 2025, www.mass.gov/regulations/703-CMR-600-issuance-and-enforcement-of-automated-bus-lane-and-bus-stop-violations. Accessed Dec. 2025.

[122] "Massachusetts Complete Streets Funding Program Portal." Masscompletestreets.com, MassDOT, 2016, masscompletestreets.com/. Accessed Nov. 2025.

[123] "Shared Streets and Spaces Grant Program." *Mass.gov*, MassDOT, 2025, www.mass.gov/shared-streets-and-spaces-grant-program. Accessed Dec. 2025.

[124] Massachusetts Department of Transportation. "Bicycle and Pedestrian Update - 2021." *ArcGIS StoryMaps*, Esri, 14 May 2021, storymaps.arcgis.com/stories/446e35bc40614e5aaced4a62ff7343b2. Accessed Dec. 2025.

[125] NACTO. "DESIGNING for ALL AGES & ABILITIES Contextual Guidance for High-Comfort Bicycle Facilities." *Nacto.org*, Dec. 2017, nacto.org/wp-content/uploads/NACTO_Designing-for-All-Ages-Abilities.pdf. Accessed Nov. 2025.

[126] Casey, Michael. "Demand for Food Delivery Has Skyrocketed. So Have Complaints about Some Drivers." *Boston.com*, 8 June 2024, www.boston.com/news/business/2024/06/08/demand-for-food-delivery-has-skyrocketed-so-have-complaints-about-some-drivers/. Accessed Nov. 2025.

[127] "Road Safety and Accountability for Delivery Providers Ordinance." *Boston.gov*, City of Boston, 3 Feb. 2025, www.boston.gov/departments/transportation/road-safety-and-accountability-delivery-providers-ordinance. Accessed Nov. 2025.

[128] "Mayor Wu Announces 'Boston Delivers', an E-Cargo Bike Delivery Pilot Program." *Boston.gov,* City of Boston, 15 Aug. 2023, www.boston.gov/news/mayor-wu-announces-boston-delivers-e-cargo-bike-delivery-pilot-program. Accessed Nov. 2025.

[129] Rula, Kelly, et al. "Boston Delivers: Cargo Bike Pilot Evaluation." *Washington.edu*, University of Washington, 30 May 2025, digital.lib.washington.edu/researchworks/items/d886c051-7d92-44f6-9070-ade8ca82f196. Accessed Dec. 2025.

[130] "HB 1518 Washington State Legislature." *Wa.gov*, State of Washington, 2025, app.leg.wa.gov/billsummary?BillNumber=1518&Year=2025&Initiative=false. Accessed 11 Dec. 2025.

[131] Boston Open Data. "Blue Bike Stations." *Arcgis.com*, Boston Open Data Portal, 2019, bostonopendata-boston.opendata.arcgis.com/datasets/boston::blue-bike-stations/explore?location=42.405850%2C-71.053491%2C11. Accessed Dec. 2025.

[132] "Docked Bikeshare Trips – October 2025 | Bureau of Transportation Statistics." *Bts.gov*, Bureau of Transportation Statistics, 2025, www.bts.gov/newsroom/docked-bikeshare-trips-october-2025. Accessed Dec. 2025.