



Marblehead Bike Facility Plan

June 2025

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Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change. Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein.

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We acknowledge that the land on which we reside, now known as the Town of Marblehead, is the ancestral homeland of the Naumkeag Band of the Massachusetts and Pawtucket tribes. They lived here under the leadership of the Great Sachem Nanepashemet. Since time immemorial, the Naumkeag people maintained this land and surrounding water with the utmost respect, preserving it for future generations and treating it as sacred ground for the burial of their dead. They had an organized and thriving community before the arrival of European settlers. The Naumkeag people suffered great loss of life during King Philip's War and the small pox plagues, and the surviving members were dispossessed of the land. Although we are unaware of any Naumkeag descendants living in Marblehead today, we honor the Naumkeag people of the Massachusetts and Pawtucket tribes, past and present, as the original stewards of this land and pledge to include their history in the history of our Town.¹

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¹ https://www.marblehead.org/sites/g/files/vyhlif4661/f/uploads/land_acknowledgment_-_town_of_mhead.pdf#:~:text=We%20acknowledge%20that%20the%20land,of%20the%20Great%20Sachem%20Nanepashemet



CHAPTER 1

INTRODUCTION

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01 Introduction

Marblehead's rich history, beautiful scenery, and small, compact size provide ample opportunity for bicycling as an effective and joyful mode of transportation. Marblehead's geography as a peninsula keeps vehicle volumes low with minimal "cut-through" traffic. These lower vehicle volumes and short trip distances within the peninsula create an opportunity for people to walk and bike to their destinations. Approximately 40% of trips starting in Marblehead are under two miles, with the peninsula being about one and one quarter miles wide. These short trips provide ample opportunity for a mode shift from motor vehicles to people walking and biking, if safe infrastructure is provided.



Figure 1: A bike parked at Lead Mills Conservation Area, one of Marblehead's natural assets

Many residents of all ages currently use the Marblehead Rail Trail to bike for recreation or to access schools and other destinations. Thus, the Rail Trail currently serves the Town as both a recreational trail and utility corridor. The Rail Trail is maintained by the Marblehead Water and Sewer Commissioners and the Marblehead Municipal Light Department. Expanding bicycling opportunities in Marblehead in addition to the Rail Trail will not only provide greater safety for current riders but will also support public health benefits, economic and tourism growth, and provide greater access to Marblehead's many schools, businesses, and natural assets. The Marblehead Rail Trail Plan (2020) details safety improvements along the trail and at street crossings, facilitating trail connections and expansion of bike infrastructure beyond the trail.

The Marblehead Bike Facility Plan is one piece of Marblehead's efforts to make transportation safer for people travelling by any mode of transportation. In 2018, Marblehead adopted a Complete Streets Policy, and in 2019, Marblehead developed a Complete Streets Prioritization Plan. Complete Streets are streets that prioritize safety, accessibility, convenience, and comfort for people walking, using a mobility device, riding a bicycle or scooter, taking transit, and driving, regardless of their age and ability. Complete Streets are friendly and intuitive: they are places where it feels safe to cross the street, enjoyable to walk to shops, and comfortable to ride a bicycle to school. Designing streets with all these different modes of transportation in mind provides clarity and comfort, reduces conflicts, and increases safety for all. The Marblehead Bike Facility Plan builds upon the goals and priorities of the Complete Streets Plan to create a plan for safe, comfortable infrastructure for people biking.

The Marblehead Bike Facility Plan also directly addresses goals set forth in the Marblehead Net Zero Roadmap² around giving residents more sustainable transportation choices. Some of the Net Zero Roadmap goals include

² https://www.marblehead.org/sites/g/files/vyhlif4661/f/uploads/marblehead_net_zero_roadmap_1.pdf

implementation of the Complete Streets Plan, development of a bicycle plan, and incentivizing transit-oriented development (TOD).

Goals & Objectives

The objective of this Bike Facility Plan is to provide the framework for a network of high-comfort bike facilities (of all types and based on context) that are safe, convenient, attractive, and accessible to residents and visitors of all ages and abilities.

This framework will allow the Town to guide investments in an efficient way and consider other Town priorities in combination with bicycle infrastructure improvements.

Three **goals**, developed through public input and Town guidance, help to work toward this objective:

- 1. Make bicycling a safe, efficient, and practical option for all residents and visitors, with specific focus on the safety of children biking to school.**
- 2. Expand the bike network in Town to increase safety, reduce traffic, improve public health, and raise awareness for people bicycling, walking, and rolling.**
- 3. Incorporate safety and bike planning into Town policies.**

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CHAPTER 2

EXISTING CONDITIONS

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02 Existing Conditions

Marblehead developed as a densely populated fishermen's and seafarer's town, creating the narrow, winding street network present today, especially prominent in the Historic District. This plan builds upon the existing street network to ensure the recommendations work for Marblehead's existing network, to meet future needs, while maintaining the Town's historic character.

This section summarizes current bicycle infrastructure and travel patterns in Marblehead. Current townwide data, bike routes, and plans and policies affecting transportation are summarized below. Public outreach also played a large role in understanding existing conditions in Marblehead, and findings from public outreach are summarized in the following section (**Chapter 03 Public Outreach**).

Existing Bike Network

The Rail Trail (mapped in **Figure 3**), a utility corridor and a recreational trail, is currently the only bike facility in Marblehead, though it is not exclusively for bikes and is heavily used by walkers and joggers. The Rail Trail is a great asset to Marblehead, as it provides a safe and scenic route to neighborhoods, schools, and access to neighboring Swampscott and Salem. This multimodal facility is a low-stress biking route, completely separated from vehicle traffic. However, as noted in the Rail Trail Plan, many street crossings along the Rail Trail are high-stress due to poorly marked crossings and high vehicle speeds. Improving safety at the Rail Trail crossings, as the Town is currently doing, and providing additional on-street bike facilities that connect to the Rail Trail, will be important steps to expand the current bike network.

Marblehead has few existing bike racks, noticeably absent in downtown areas and parks where many current bike trips start and end. Some of the existing bike racks are located at schools, where many students bike to school using the Rail Trail. Bike parking is an important component to building out the bike network, because it provides a safe place to store bikes at key destinations.

There are also on-street bike facilities in the neighboring communities of Swampscott and Salem that connect to Marblehead. Salem has buffered and unprotected bike lanes on Lafayette Street, which connect to the Rail Trail around the Marblehead Town line. Swampscott has conventional bike lanes on Atlantic Avenue, leading up to the Marblehead Town line.

Vulnerable Road User (VRU) Crashes

Vulnerable Road Users refers to people walking and bicycling, in other words people travelling without the protection of a vehicle, and therefore at more risk of fatal or serious injury. Between 2019 and 2024, Marblehead experienced 41 bicycle and pedestrian crashes, 31 of which resulted in an injury (76%), and one of which resulted in a fatality, shown in **Figure 2**.³ Of these 41 crashes, 33 involved people biking, 24 of which resulted in injury (73%). Because Marblehead's existing bike network is limited,

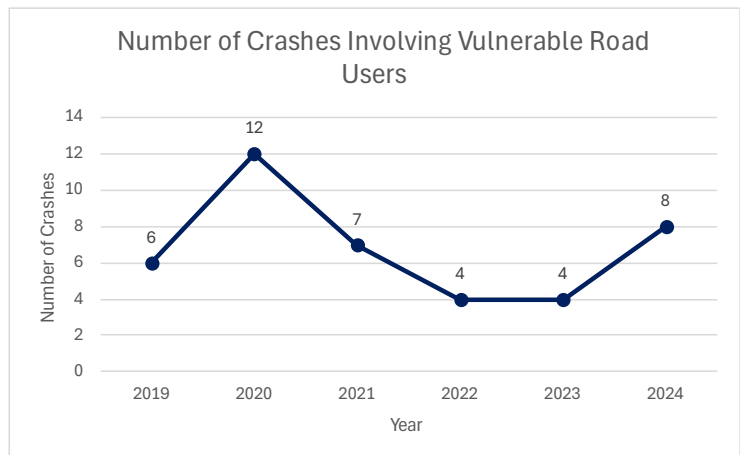


Figure 2: Injury Crashes Involving Vulnerable Road Users, by Year (Source: MassDOT Impact Portal)

³ <https://apps.impact.dot.state.ma.us/cdp/home>

particularly on high speed and high-volume roadways, crashes like these are more likely and can result in injuries or fatalities. Separating bicycle and vehicle traffic with dedicated bicycle facilities and slowing vehicular traffic are important steps to reduce crashes and eliminate fatalities not only for people biking, but also for those walking and driving. As shown in **Figure 3**, reported bicycle and pedestrian crashes were concentrated along high-volume roads like Pleasant Street and Atlantic Avenue, especially at busy intersections. A crash hot spot also exists where the Rail Trail dead-ends near the historic downtown.

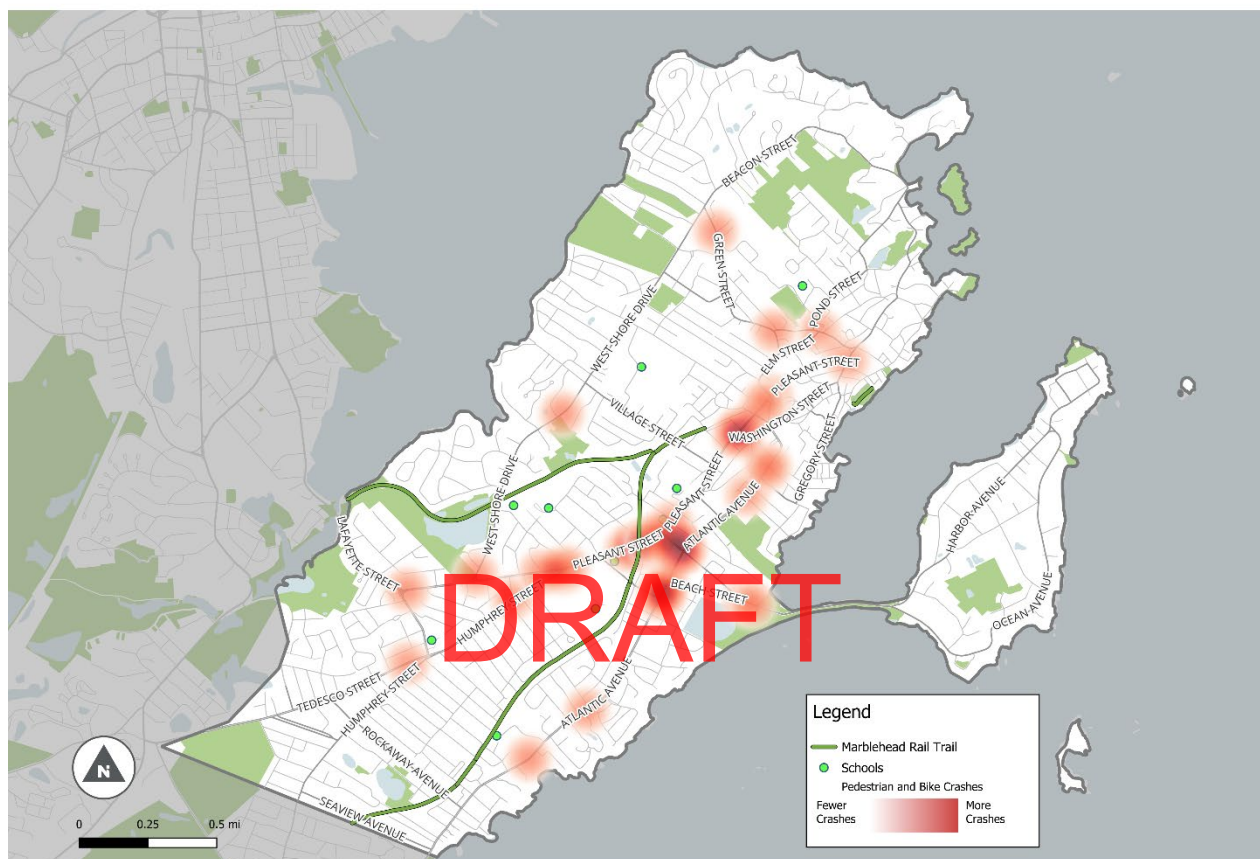


Figure 3: Heat map showing locations of VRU crashes in Marblehead from 2019-2024
[Source: MassDOT Impact Portal]

Handlebar Survey

To better understand existing conditions for people biking throughout Town, the project team conducted a handlebar survey to experience the conditions of riding a bike in Marblehead today. The survey was conducted by bike with visits to several key destinations including the Rail Trail, historic downtown, and five schools. The survey route was determined based on roads and intersections that were highlighted at public outreach events as well as the crash map. Along each roadway and at each intersection, important safety metrics like perceived driver speed, driver behavior, geometric deficiencies, and yielding behavior at crosswalks and trail crossings were observed. The handlebar survey was key to understanding concerns raised by the public.



Figure 4: Project team members at a Rail Trail access trail during the handlebar survey

Multimodal Travel Patterns

Marblehead is 4.33 square miles in size, creating opportunities for short trips around town, to access schools, parks, and other destinations, to be completed on a bicycle. Marblehead also has a high concentration of schools, with five public schools and multiple private schools within the town limits.

Estimates of existing travel patterns are sourced from Replica, a data vendor that models multimodal travel activity, based on a variety of data sources, including demographic and locational data (sources from smart phones and connected vehicles).⁴

According to Replica data and shown in **Figure 5**, most trips, made by all modes of transportation, are short trips – approximately 45% of trips starting in Marblehead are less than 2 miles in distance, and 62% of trips are less than 4 miles. These short trip distances likely represent travel within town limits and commutes for those working close to home. Trips this short in distance are generally considered feasible to be completed by walking or biking if there is safe, convenient infrastructure and supportive policies.

According to Replica data and shown in **Figure 6**, driving is the most common form of transportation for trips starting or ending in Marblehead, making up 80% of trips (65% private auto, in other words people driving, plus 15% auto passenger, in other words people travelling in cars driven by someone else, typically friends or family). Walking is the second most common mode at 15% of trips, speaking to the compact nature of Marblehead. Other trips are made by commercial vehicles, public transit, and biking, each of which makes up 2% or less of total trips. However, it is important to note that this data is based on smart phones and other connected devices, meaning that, despite calibration, it may underrepresent children and other groups.

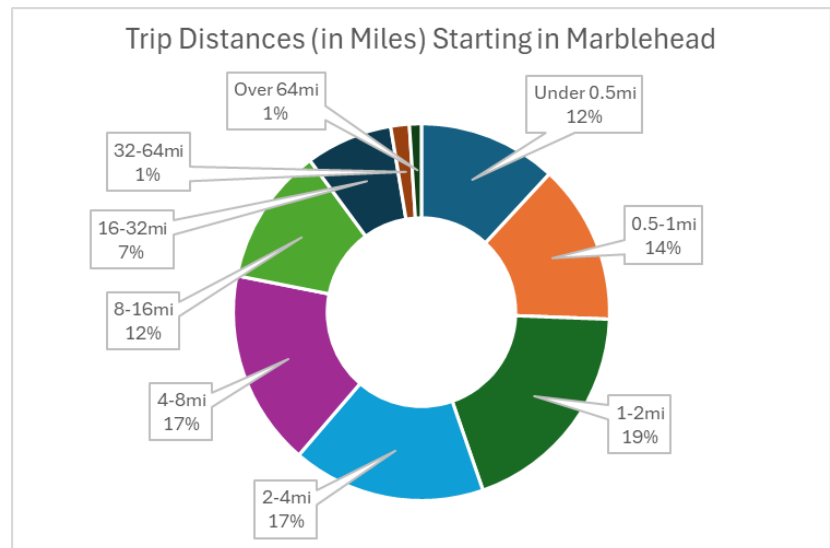


Figure 5: Trip Lengths for Trip Starting in Marblehead (Source: Replica Places Model, Spring 2024, Average Weekday)

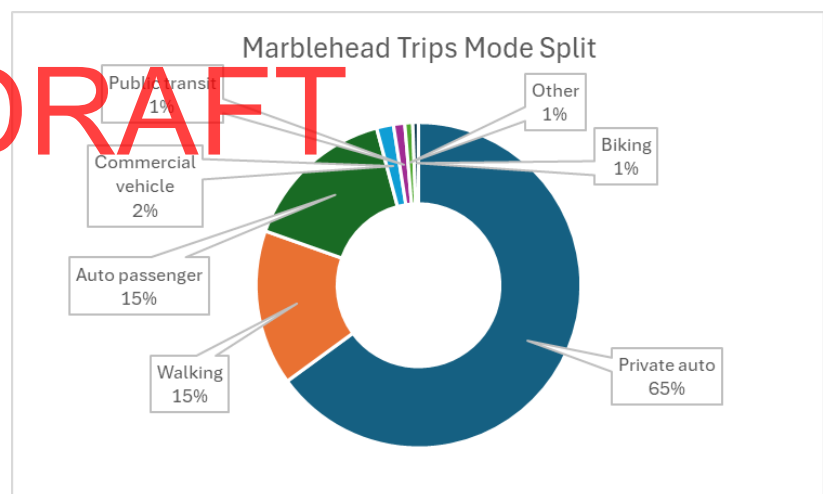


Figure 6: Mode Split in Marblehead (Source: Replica Place Model, Spring 2024, Average Weekday)

⁴ <https://www.replicahq.com/>

There is much room to grow for the share of bike trips. Because there are no bike facilities along routes to key destinations and no bike racks at these destinations today, but there is vehicle infrastructure and parking at destinations, and in many cases sidewalks as well, people choose to take their vehicles or walk to their destinations instead.

Bike infrastructure can also provide access to transit that may not be easily accessible by walking or driving. Though Marblehead does not have a Commuter Rail station, its two neighboring communities, Swampscott and Salem, both have stations. These stations are somewhat accessible via the Marblehead Rail Trail and are roughly 5 miles (a 30-minute bike ride) from downtown Marblehead. Providing better bike infrastructure would allow for easier access to these stations. Additionally, an MBTA bus route serves Marblehead via Humphrey, Pleasant, Elm, and Washington Streets, which are currently high-stress roads for people biking. The bus route ends on Front Street in the Historic District. Coordinating with the MBTA on bus stop placement where bike infrastructure is being implemented and installing bike racks near transit stops should be considered to improve transit access and bicyclist comfort.

Many students in Marblehead bike to school. The MassDOT Safe Routes to School (SRTS) program conducted observations between 2020 – 2023 to provide insight into student travel patterns at six schools in Marblehead: Village School (2020), Marblehead Veterans Middle School (2021), Marblehead Community Charter Public School (2021), Glover Elementary School (2022), Brown Elementary School (2023), and Marblehead High School (2023). The SRTS program also mapped the number of students within different distance thresholds of their school for four of the six schools. **Table 1** displays the distribution of students by distance from each of these four schools. At all four schools, over 50% of students live within a mile of their school. These short trips could easily become walking or biking trips with safe infrastructure in place. The SRTS analysis also revealed that many students travelling to Brown Elementary School live in the northern half of Marblehead, which is not accessible via the Rail Trail, so providing other safe biking and walking routes is important to increase school trips made without a vehicle.

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Table 1: Student Travel Distances to Four Marblehead Schools (schools included in SRTS observations)

Schools	Students' Distance from School			
	Less than 0.5 mi	0.5 – 1 mi	1 - 1.5 mi	Greater than 1.5 mi
Brown Elementary School	25%	40%	25%	10%
Glover Elementary School	60%	35%	2%	3%
Veterans Middle School	21%	38%	29%	12%
Village School	24%	33%	26%	17%

The SRTS observations noted existing arrival and dismissal patterns, including walking and biking behaviors, connections to surrounding bike routes including the Rail Trail, and bike racks available at each school. All schools included in the observations had existing bike racks, but all observation recommendations included adding or moving bike racks to more convenient locations near school entrances. The observations also noted a lack of existing arrival and dismissal protocol that creates dangerous conditions for kids walking and biking, since most parents drop off their kids in vehicles. Furthermore, they noted a lack of existing knowledge of safe biking practices and a lack of driver awareness of people biking and walking.



Figure 7: Well-used bike racks at the Village School

Marblehead High School observations tallied the largest number of students walking and biking to school, likely due to the school's proximity to the Rail Trail and greater independence of older students. To increase the number of young students at elementary and middle schools walking and biking, further safety and infrastructure improvements are necessary, as detailed in the SRTS observations and in this plan. The SRTS program recommendations were considered and incorporated into **Chapter 06 Policy Actions and Performance Measures** in this document.

Existing Policies and Programs

Support for bike infrastructure across Marblehead policies, plans, and leadership is key to improving safety and developing a bike network. Marblehead has incorporated biking into several policies and Town plans, including the Complete Streets Policy, Complete Streets Prioritization Plan, and Rail Trail Plan. These policies provide general guidance and overarching goals for the bike network in Marblehead, centered around the Rail Trail.

Currently, Marblehead has two committees that are focused on the safety of all roadway users, applying a Complete Streets strategy to Marblehead's roadway design process. These include the Complete Streets Committee and the Traffic Safety Advisory Committee. Both committees are focused on implementing Marblehead's Complete Streets Policy and addressing transportation related safety concerns throughout the Town, including Safe Routes to School. Marblehead also published a Net Zero Roadmap in 2023 to work towards reducing Town emissions, with transportation mode shift being part of the plan goals. The Boston Region Metropolitan Planning Organization is also developing a Vision Zero Action Plan to reduce fatal crashes, including those for people walking and biking.

Marblehead Schools participate in several MassDOT Safe Routes to School programs, including Walk, Bike, and Roll Days, Crossing Guard Appreciation Day, and community-led bike buses, where caregivers lead kids in biking

safely to school.⁵ The bike bus initiative provides a safe way for kids to ride together to school, partially along the Rail Trail, and partially on-street. Expanding on-street bike facilities would help existing programs to grow and provide an even safer route for kids to get to school.⁶

Planning Initiatives

This plan is informed by existing and ongoing related plans to ensure a cohesive vision for the Marblehead Bike Facility Plan. These plans include:

- The **Marblehead Complete Streets Policy (2018)** provides a framework for incorporating bike and pedestrian infrastructure into street design throughout the Town. The Complete Streets policy guided this Plan's goals and implementation strategies, to help carry out the Complete Streets vision and best practices.
- The **Marblehead Complete Streets Prioritization Plan (2019)** includes project priorities and project implementation timelines. Projects from the Prioritization Plan that were not yet completed and that involve bike and pedestrian infrastructure, informed the network developed in this Bike Facility Plan.
- The **Marblehead Rail Trail Plan (2020)** highlights the importance of the Rail Trail as a key piece of infrastructure in Marblehead. The plan summarizes existing challenges and recommends safety improvements along the trail and at key road crossings. The Bike Facility Plan connects to and builds upon the Rail Trail Plan to develop a cohesive bike network that makes access to the Rail Trail easier and safer for users.
- The **Pavement Management Plan (2022)** details existing pavement conditions and prioritizes areas for improvement and reconstruction. The bike network implementation (chapter 7) is informed by the paving projects and priority areas from the Pavement Management Plan.
- The **Marblehead Net Zero Roadmap (2023)** laid out several goals to move Marblehead to being net zero by 2040, one of which is to reduce emissions from transportation. As a subset of this transportation goal, the plan recommended the implementation of a Complete Streets Prioritization Plan and the development of bicycle and pedestrian plans. The Bike Facility Plan was developed with this Net Zero Plan in mind, creating a bike network that will allow trips within the Town to shift from vehicle trips to bicycle trips with safe infrastructure.
- The **Marblehead ADA Self-Evaluation and Transition Plan (2023)** provides an overview of the Americans with Disabilities Act (ADA) requirements and a self-evaluation of public buildings and spaces around Marblehead. The plan also summarizes public engagement detailing accessibility experiences of community members. The transition plan aims to remove accessibility barriers with short-, medium-, and long-term objectives, in other words a check list for implementation.
- The **Marblehead Infrastructure Improvement Plan - Sidewalk and Curb Ramps Plan (2024)** details the existing conditions of sidewalks and curb ramps in Marblehead. This includes a self-evaluation which is an appendix under the Town's current ADA Transition Plan. In response to the existing conditions inventory, the plan also prioritizes the repair and replacement of sidewalk infrastructure as well as areas where sidewalks and curb ramps are currently missing and should be constructed. The Bike Facility Plan recommendations align with pedestrian infrastructure priorities and areas that need reconstruction to meet complete streets goals and coordinate roadway reconstruction projects.

⁵ <https://marbleheadcurrent.org/2023/06/11/superintendent-update-safe-routes-to-school-honors-glover/>

⁶ <https://marbleheadcurrent.org/2023/05/23/kids-parents-pedal-to-school-together-on-bike-bus-joining-international-movement/>

Plans from neighboring municipalities and regional plans also informed this plan, to ensure network connectivity. These plans include:

- The **Swampscott Master Plan (2016)** provides a Town vision and guide for future development, including transportation and circulation. The transportation goals and initiatives outlined in the plan informed Marblehead's bike network and goals. One of Swampscott's priorities is to connect to neighboring towns and improve access to MBTA Commuter Rail facilities, which is a goal shared by the Marblehead Bike Facility Plan and members of the Marblehead community.
- The **Salem Bike Plan (2018)** provides a comprehensive guide to installing bike facilities and developing a bike network in Salem. The plan provides clear opportunities for connecting facilities between Salem and Marblehead; these opportunities informed the Marblehead's bike network development.
- The **Border to Boston Trail** is a 70-mile trail that stretches from Boston to the New Hampshire border, including the Marblehead Rail Trail. The Border to Boston trail is a segment of the East Coast Greenway. There are still gaps and on-road segments of the trail, with plans to expand the trail to off-street facilities within coming years.⁷
- The **East Coast Greenway** is a shared use trail stretching from Maine to Florida. The nonprofit, East Coast Greenway Alliance, leads the development of the trail network, which is expanding year by year through their work with partner organizations, volunteers, and local, state, regional, and national officials. The Marblehead Rail Trail is part of the East Coast Greenway network.⁸

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⁷ <https://essexheritage.org/explore/border-to-boston/>

⁸ <https://greenway.org/about/the-east-coast-greenway>



CHAPTER 3

PUBLIC OUTREACH

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03 Public Outreach

The purpose of public engagement for the Marblehead Bike Facility Plan was to capture the safety concerns and lived experiences of Marblehead residents to guide the planning process. Public engagement was conducted with the goals of reaching a broad cross-section of Marblehead residents and visitors with a focus on families, children and youth, older adults, and seasonal visitors – including people who do and do not bike today. In addition to reaching this broad sector of the population, engagement was planned around local destinations to understand current and future biking trips, which a future bike network could support. Finally, identifying dangerous streets and intersections and general priorities, like Safe Routes to School, shaped the bike network and prioritization metrics.

What We Did

After the Town developed the public engagement framework, described above, a steering committee was formed with representatives from the Marblehead Town government, Complete Streets Committee, and Traffic Safety Advisory Committee. Two meetings were conducted to guide decision making and strategy for public outreach as well as plan development and priorities.

Several in-person events and pop-ups were held to reach the key audiences identified, as described below. The event timeline was as follows:

- Pop-up 1: July 5th, 2024 at Arts Festival
- Pop-up 2: July 20th, 2024 at Farmers Market
- Public Workshop: July 30th, 2024
- Pop-up 3: September 30th, 2024 at Village School Open House
- Public Meeting: February 24th, 2025

Locations for pop-up events were geared toward each key audience identified. The arts festival and farmers market targeted older adults, families, and seasonal visitors, and the Village School open house targeted families and youth. At each in-person community event and pop-up, members of the community provided feedback through conversation, leaving comments on maps, and through an online survey.

In addition to in-person community events, stakeholder interviews were conducted between May 2024 and January 2025 and consisted of discussions in smaller groups of three to six people. These conversations were about participants' experiences biking and concerns with expanding the bike network, as well as their knowledge of Town policies and future plans. The groups that participated are as follows:

- **Town Departments:** Police Department, Fire Department, Department of Public Works, Community Development and Planning Department, Municipal Light, Water and Sewer Commission
- **Town Councils and Committees:** Council on Aging, Board of Health, Marblehead Housing, Disabilities Commission, Recreation and Parks, Harbor Master, Complete Streets Committee, Sustainable Marblehead, Traffic Safety Advisory Committee, Finance Committee, Old and Historic Commission
- **School groups:** School Health and Wellness, School Safety Advisory, Bike Bus, Facility Director
- **Business Groups and Neighborhood Associations:** Chamber of Commerce, Marblehead Cycle, Clifton Improvement Association, Neck Association, Shipyard Association

Finally, the Marblehead Bike Plan public survey was live from July 6th to October 14th, 2024. The survey was available on the Town website, shared through various Town group listservs, and promoted at public engagement events throughout the summer of 2024, as well as through flyers around Town. The survey collected a total of 832 responses, and the collected information is summarized below. This data, in conjunction with community feedback from stakeholder meetings and engagement events, informed the routes and locations that were prioritized for the bike network.

What We Heard

Though we heard nuanced and context specific feedback at each outreach event, there are four key takeaways from the engagement process that represent common themes expressed by community members:

- Today, most people bike for exercise, recreation, or enjoyment using the Rail Trail.
- Biking to school and bike infrastructure near schools is a top priority for members of the community and stakeholders.
- Vehicle traffic and the lack of dedicated bike facilities is the most commonly cited barrier to bicycling more.
- While the community is looking for safety improvements, the community also expressed an interest in intentionality and context sensitivity over rapid implementation.

Pop-ups

Kids, families, and older adults provided input at three pop-up events through the summer and fall of 2024. The Arts Festival was an opportunity for feedback from an older segment of the population who may not bike themselves but have children and grandchildren that do. Many community members at the Arts Festival did not see bicycling as a priority, highlighting roadway condition and pedestrian infrastructure like sidewalks as equally or more important than bicycle infrastructure. Requests specifically related to bike infrastructure included properly maintaining the Rail Trail and providing educational programs for cyclists and drivers to understand safety practices.

Marblehead residents at the Farmers Market and Village School Open House provided more bike-specific feedback, highlighting that many kids bike to school via the Rail Trail, but many parents do not feel comfortable letting their kids ride bikes on the streets in Marblehead. At both events, participants noted West Shore Drive as a particularly dangerous street where people drive at high speeds. People mentioned Rail Trail crossings and maintenance as safety issues related to Rail Trail users and kids riding bicycles to school. Community members at these events also mentioned education programs to promote safe bike riding.



Figure 8: Map comments from the Arts Festival pop-up

Public Workshop and Meeting

The public workshop in July 2024 collected feedback on three main sections of the plan: goals, prioritization factors, and wayfinding. Community members filled out worksheets and provided feedback on goals and factors they found most important. Goals that participants highlighted included safety around kids biking to school, expanding bike amenities like bike racks, maps, and signage, and implementing new policies like a Vision Zero policy and



Figure 9: Toole Design staff and community members at the public workshop

rules for e-bikes. Participants also made it clear that the Town should implement facilities along a reasonable timeline without bringing rapid change by trying to achieve goals focused on constructing a certain mileage of bike lanes per year. Community members also highlighted the importance of educational campaigns, so bicycle riders understand safety precautions and drivers know what to expect when sharing the road with cyclists; community members offered similar feedback at the pop-ups.

In February 2025, the team presented their progress at a Traffic Safety Advisory Committee (TSAC) meeting to receive feedback from the committee and members of the public who attended. The presentation included plan context, the plan creation process and findings, and next steps to move towards the final plan. The committee had positive feedback on the plan elements and questions regarding general costs for bike improvements, concern for areas with high crash rates, and implementation methodology including before and after studies where bicycle facilities are installed. Members of the public also attended the committee meeting and provided comments, including one community member who spoke about the lack of safety for pedestrians and bicyclists on West Shore Drive, and two other community members who were concerned about people driving interacting with new bicycle traffic.

Map-based feedback

One feedback method used during the pop-ups and the public workshop was to provide comments on a map of Marblehead, marking unsafe roads and intersections and areas where bike infrastructure is desired (**Figure 8**). This map-based feedback was an initial starting point for developing the bike network based on streets that community members highlighted as key connections or streets that are currently unsafe to bike on. The map-based feedback also helped to develop the prioritization factors based on number of comments per street or intersection, across all events. The most frequently mentioned streets and intersections included:

- West Shore Drive
- Atlantic Avenue
- Village Street
- Lafayette Street
- The intersection of Tedesco Street, Humphrey Street, and Maple Street

- The intersection of Lafayette Street, Humphrey Street, and Pleasant Street (at the entrance to Marblehead High School)
- West Shore Drive Rail Trail crossing
- Village Street Rail Trail access

Stakeholder Interviews

While feedback from the stakeholder interviews varied between groups, many stakeholders stressed that safety for all roadway users should be paramount when considering changes to the road network. Most supported expanding the bike network and concurred with the goals and priorities developed in collaboration with the larger community. They also stressed consideration for vehicle parking to remain in key areas, matching the aesthetics of the bike facilities with the existing Town fabric, and implementing facilities thoughtfully, not necessarily quickly. Stakeholders also mentioned the cost of facilities as an important factor to consider, both in the implementation and maintenance of facilities.

Survey

The online survey collected responses about the community's general opinion of biking in Marblehead, current biking patterns, safety concerns, and anticipated bicycling behavior if a safer network was implemented.

Why are people biking today in Marblehead?

Shown in **Figure 10**, survey respondents noted their primary reasons for riding a bike are for exercise and because it is enjoyable, as well as because it is better for the environment. Roughly 70% of respondents noted they bike for exercise. Only 20% of respondents indicated that they do not bike in Marblehead.

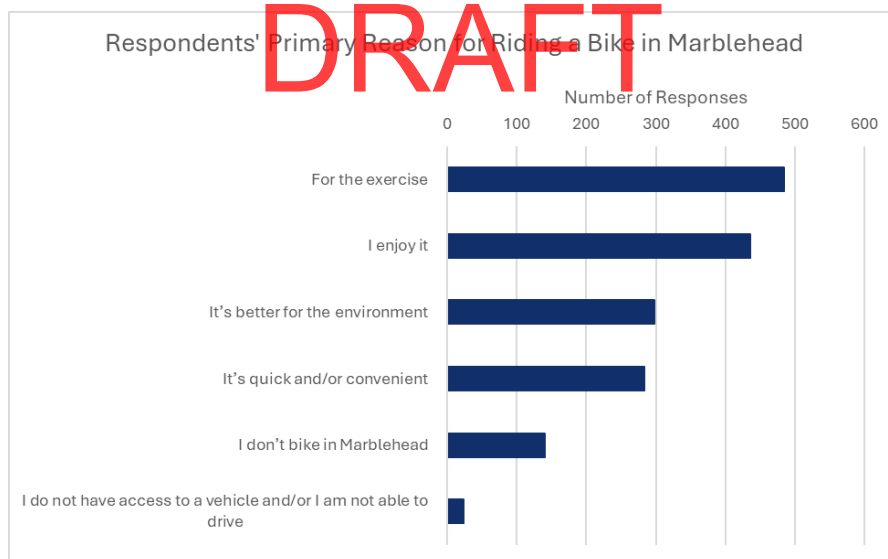


Figure 10: [If you ride a bike in Marblehead today, what are your primary reasons for doing so? Check all that apply.]

What purpose do bike trips in Marblehead serve?

Over 70% of respondents said that their current bicycle trips in Marblehead are for exercise, recreation, or to access recreational destinations like beaches, parks, and trails, as shown in **Figure 11**. Importantly, respondents said they would bicycle more often for all purposes with a low-stress bike network, with a notable increase in bike trips to access the Commuter Rail, go to appointments, and visit neighboring communities. Responses jumped from roughly 20% of respondents saying they would make trips to appointments and the Commuter Rail with current facilities, to 35% with a low-stress bike network. In addition to the survey options, respondents noted in the other – write in option, that they bike to destinations like gyms, religious institutions, the library, and the post office, indicating those destinations are important connections to make within the local bike network.

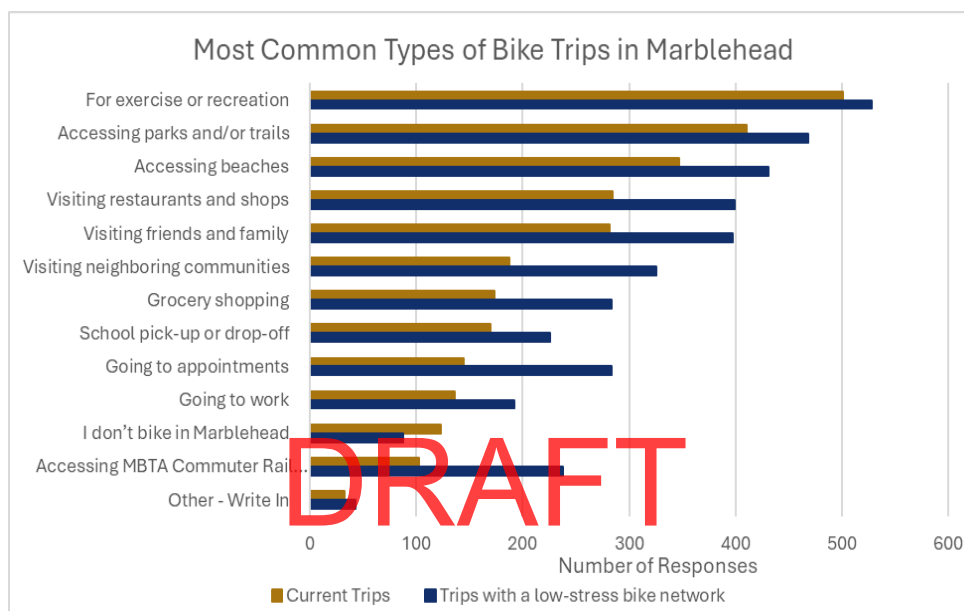


Figure 11: [Do you or your family ever travel by bike for the following kinds of trips? Check all that apply.] and [If Marblehead's bike network provided an enjoyable, low-stress biking experience, what kinds of trips would you or your family be interested in taking by bike? Check all that apply.]

What are the current barriers to biking in Marblehead?

Survey responses highlighted several current barriers to biking in Marblehead, with the number one barrier being that vehicle traffic makes bicycling feel unsafe as shown in **Figure 12**. About 50% of respondents chose vehicle traffic as the number one barrier, which matches feedback from the pop-ups, regarding driver behavior and safety of biking on-street instead of on the Rail Trail. Respondents also cited the safety of intersections and lack of current bike infrastructure as top barriers. In addition to the survey options for this question, in the other – write in option respondents noted the poor condition of roads and sidewalks, driver behavior, and Rail Trail maintenance as barriers to biking, which aligns with feedback from pop-ups.

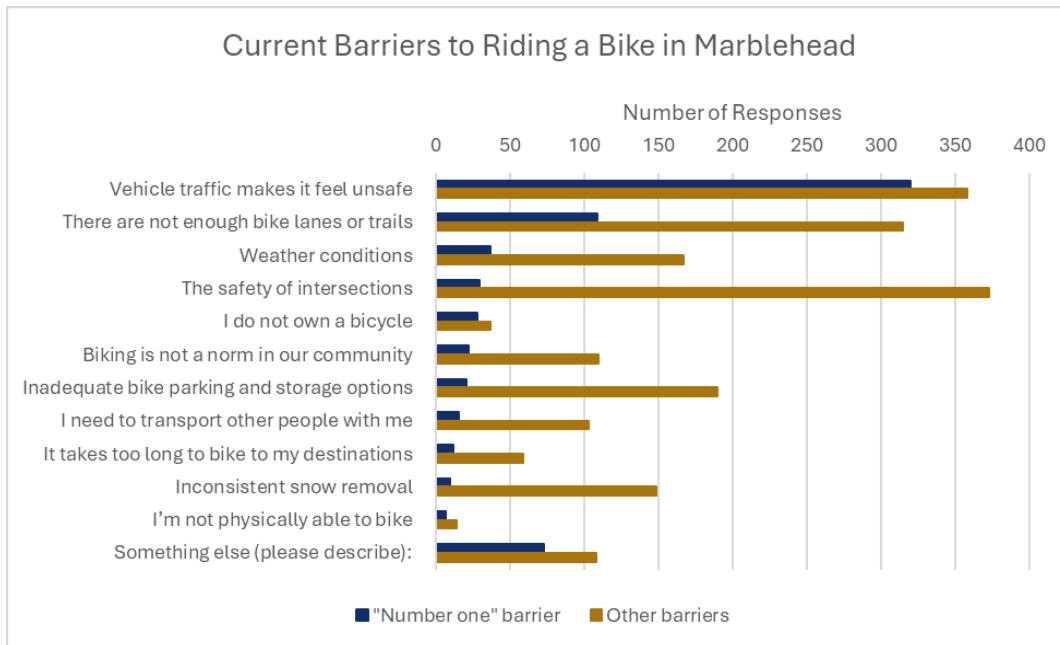


Figure 12: [Which of these is the number one reason you are less likely to ride a bike around Marblehead today? Choose one.] and [Which of these are also reasons you are less likely to ride a bike around Marblehead today? Choose up to 5.]

What can the Town do to help people bike more?

Shown in **Figure 13**, survey respondents prioritized bicycle routes to schools as the greatest opportunity to encourage more bicycle trips in Marblehead, with roughly 50% of respondents selecting this response. Better connection to Salem and the MBTA Commuter Rail station there was also noted as a good opportunity for bike trips, with 41% of respondents selecting this response.

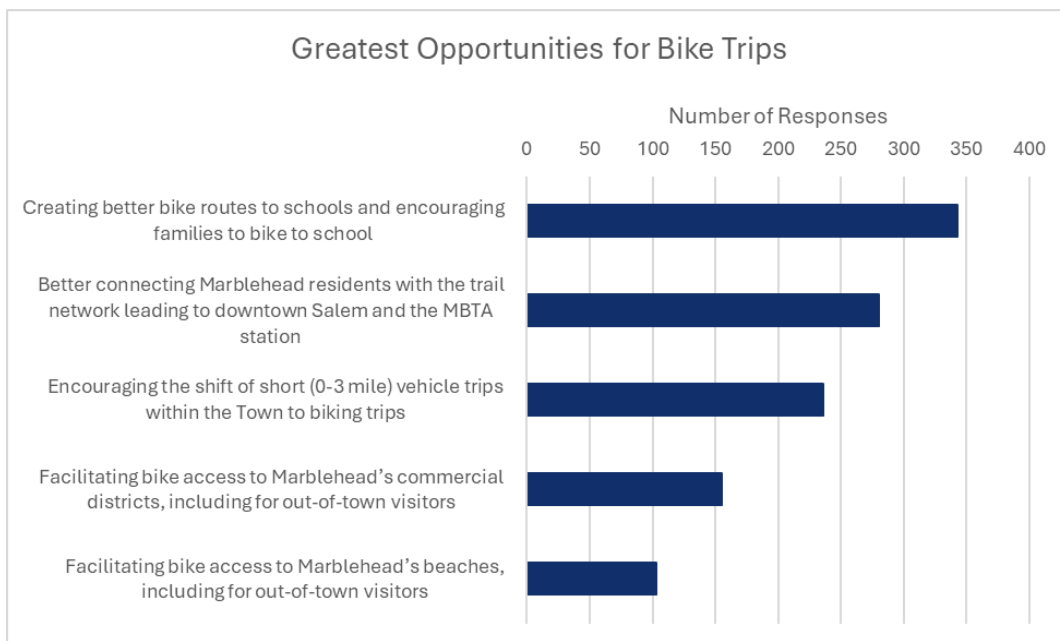


Figure 13: [Which of these do you see as the greatest opportunities to shift vehicle trips to biking trips in Marblehead? Choose up to 2.]

Where do community members want to prioritize bike infrastructure projects?

Community feedback via survey responses, public workshop, and stakeholder meetings played a significant role in choosing prioritization criteria for the bike network. As shown in **Figure 14**, 65% of respondents noted schools and libraries as priority destinations to access with the bike network. Then 59% of respondents noted areas near parks and trails as a priority, and 55% noted areas with high crash rates as priority locations for bike infrastructure.

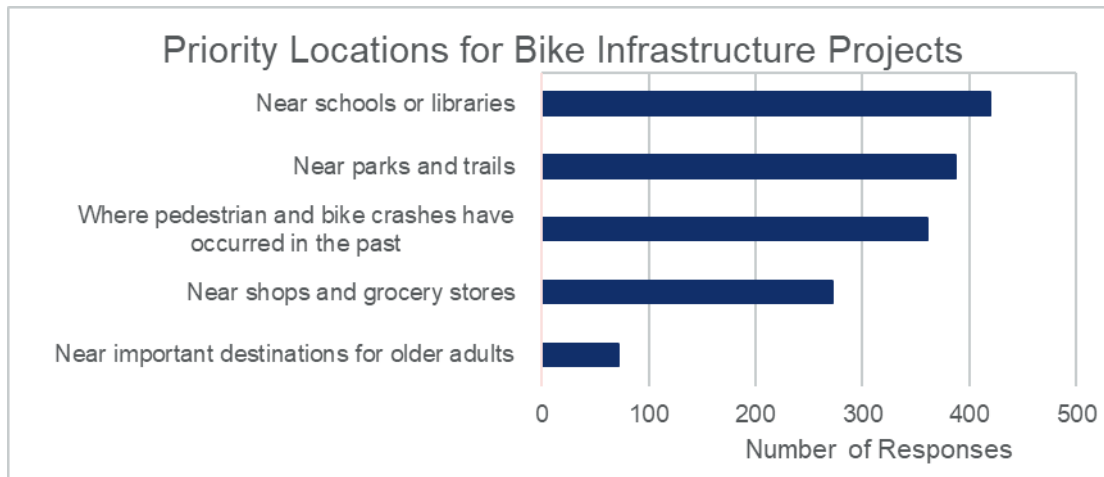


Figure 14: [What kinds of places do you think should be prioritized for future bike infrastructure projects? Choose up to 3.]

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Where do survey respondents live in Marblehead?

Survey respondents were well distributed across all six precincts in Marblehead, with slightly higher responses in Precinct 1 and lower responses in Precinct 4 (**Figure 15**).

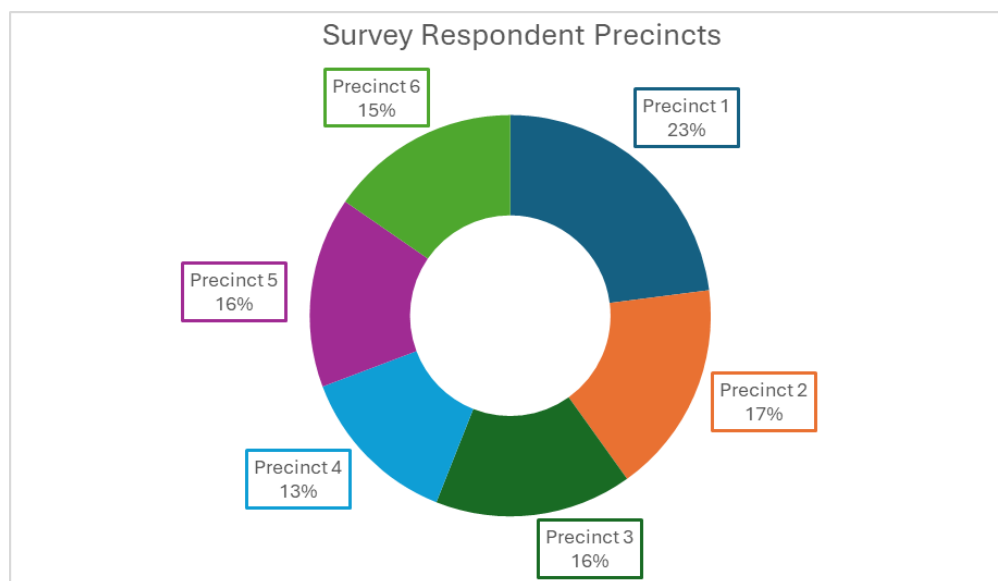


Figure 15: [If you live in Marblehead, what precinct do you live in?]



CHAPTER 4

BICYCLE FACILITIES TOOLKIT

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04 Bicycle Facilities Toolkit

Bicycle facilities improve safety for all road users by providing bicyclists and other road users with guidance on how to interact, whether that be sharing street space at slow speeds on a neighborway or travelling in separated bike facilities. By providing this guidance and clarity on the role and importance of each user, relative to the street's purpose, bicycle facilities reduce conflicts with pedestrians on the sidewalk and with vehicles on the roadway.

Appropriate bicycle facilities vary based on the volumes and speeds of vehicles on a roadway (Figure 16). Ideally, bicycle facilities should be designed for riders with low stress tolerance, including children, so the facilities are accessible, safe, and comfortable for the majority of users (Figure 17). Thus, roads with higher vehicle volumes and speeds are generally higher stress, and these roads require more separation from vehicles.

The facilities considered in this plan for Marblehead include shared-use paths, separated bike lanes, and traffic-calmed neighborways. The design elements and considerations for each are detailed below. Intersections represent key conflict points in a bicycle network, so additional intersection design guidelines, that can be applied regardless of facility type, are detailed in the final section of this chapter. Many of the treatments described herein benefit both people bicycling and people walking, defined in Massachusetts as Vulnerable Road Users.⁹

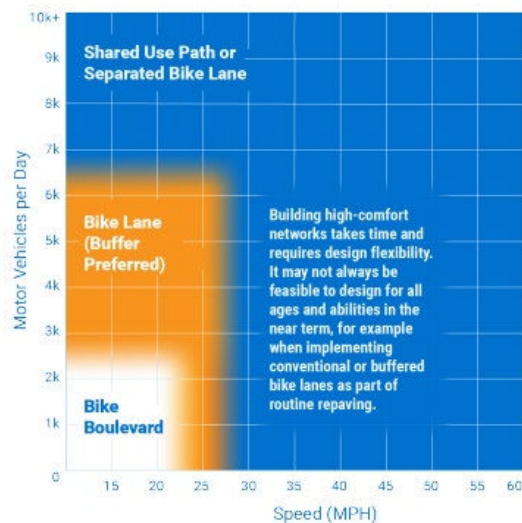


Figure 16: Recommended Facility Type by Roadway Speed and Volume

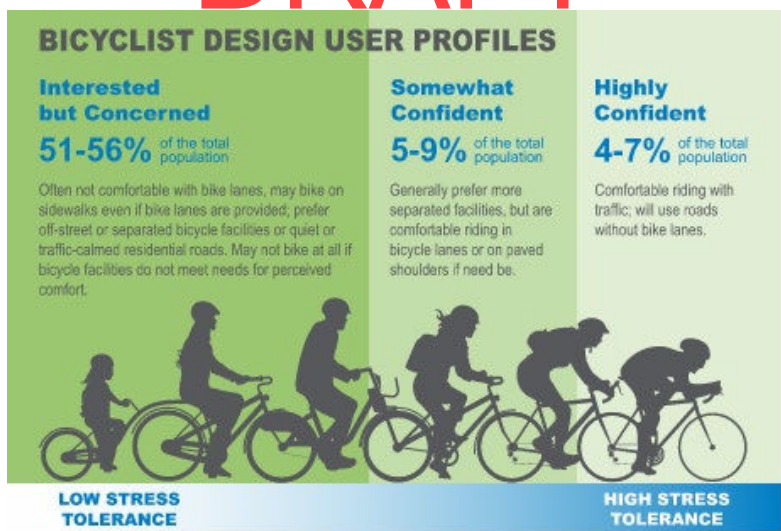


Figure 17: Bicyclist Type and Stress Tolerance

⁹ <https://www.mass.gov/doc/new-vulnerable-road-users-laws-handout/download>

Shared Use Paths

A shared use path is a two-way, off-street facility that is physically separated from vehicle traffic. This facility can be used by people of all ages and abilities, including kids riding to school and older adults using it for recreation, in other words shared. Shared use paths may be located along a street, like a sidewalk, or along an independent right-of-way, like the Marblehead Rail Trail.

Wayfinding and lighting should be considered to provide a safer and more comfortable experience for people. Path material is also an important consideration from an accessibility, maintenance, and cost perspective. Paved pathways function best in areas with high use and those that will be cleared for snow in the winter. “Stone dust” and other non-asphalt materials may be suitable where aesthetic or contextual factors suggest that an unpaved treatment is appropriate.¹⁰ Non-asphalt materials require greater maintenance to maintain accessibility requirements. For more detailed design guidance, consider the MassDOT Shared Use Path Planning and Design Guide.¹¹



Figure 18: Marblehead Rail Trail (top) and a shared use path along a roadway in Salem, MA (bottom)

Recommended use:¹²

- Through parks, along waterways, along railroads, or other areas of interest to the public
- Along corridors with few or no turning conflicts

Typical dimensions:¹³

- 8-20', depending on volume and types (consider large percentages of walkers, runners, and/ or bicyclists)
- > 10' for bi-directional shared use path

¹⁰ <https://www.mass.gov/doc/massdot-design-guide-chapter-11-shared-use-paths-and-greenways/download>

¹¹ https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

¹² https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

¹³ AASHTO

- > 12' where bicycle traffic is high

Benefits and trade-offs:

- Lowest stress facility, likely to be preferred by all user types
- Can provide a more scenic route through a park, along a waterway, etc.
- Higher construction costs compared to other facility types
- May require acquiring right-of-way

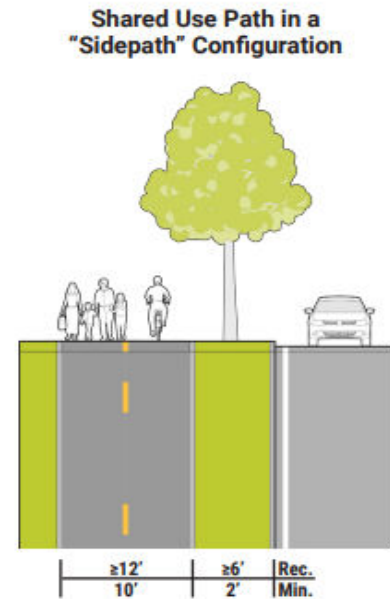


Figure 19: Shared Use Path Dimensions from the MassDOT Municipal Resource Guide

Separated Bike Lanes

Separated bike lanes are exclusive spaces for cyclists on or along a street. They are physically separated from motor vehicles and pedestrians with vertical and/or horizontal elements. The facilities may be one- or two-way and may be constructed at street level, sidewalk level, or an intermediate level. Facilities may be buffered from the street with flexible delineators, planters, concrete elements, or a parking lane. For more information, reference the MassDOT Separated Bike Lane Planning & Design Guide.¹⁴

Recommended use:¹⁵

- Streets with volumes greater than 6000 vehicles per day (vpd) and speeds higher than 25 miles per hour (mph)



Figure 20: Quick-build separated bike lane with planters Burlington, VT (top), and two-way separated bike lane with concrete parking stops in Cambridge, MA (bottom)

¹⁴ https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

¹⁵ https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

- High stress streets including those with more than one lane per direction, a high concentration of large vehicles
- Streets with a high number of children and seniors using the bike facilities

Typical dimensions:

- > 5' for one-way bike lanes
- > 8' for two-way bike lanes
- > 3' for buffers between the bike lane and parking or buffers containing elements like planters and concrete barriers

Benefits and trade-offs:

- Lower cost as compared to shared use paths or off-street facilities; however, costs may vary depending on aesthetic choices. For example, planters require long-term maintenance and are more expensive than flex posts or concrete barriers.
- Special equipment is likely needed to clear bike lanes of snow during the winter.
- May require space reallocation and changes to parking and loading zones.

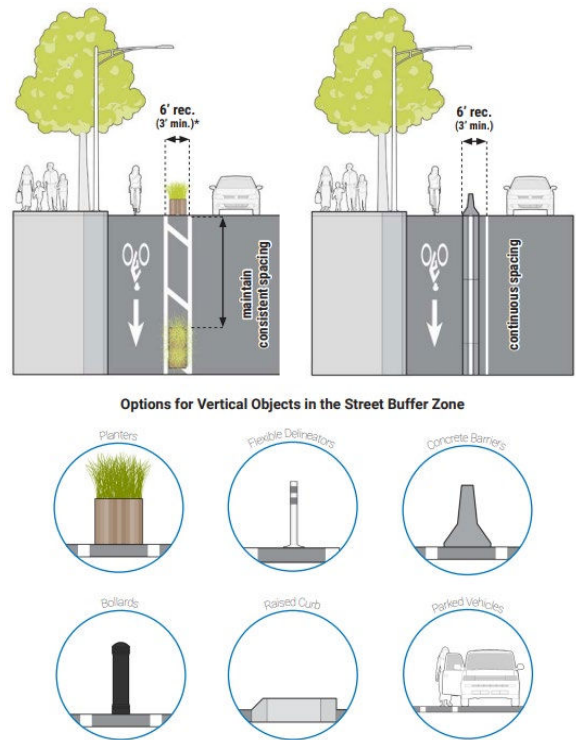


Figure 21: Separated Bike Lane Guidelines from the MassDOT Separated Bike Lane Guide

As part of the public outreach survey, community members were asked which low-cost separated bike lane materials they would prefer to be used for separated bike lanes. Planter boxes were the most preferred, followed by parking stops and flexposts. Community members also used the write-in category to suggest curb-separated and parking-protected bike lanes and share concerns about snow removal and maintaining the historic charm of Marblehead, all of which can be considered by the Town when constructing separated bike lanes.

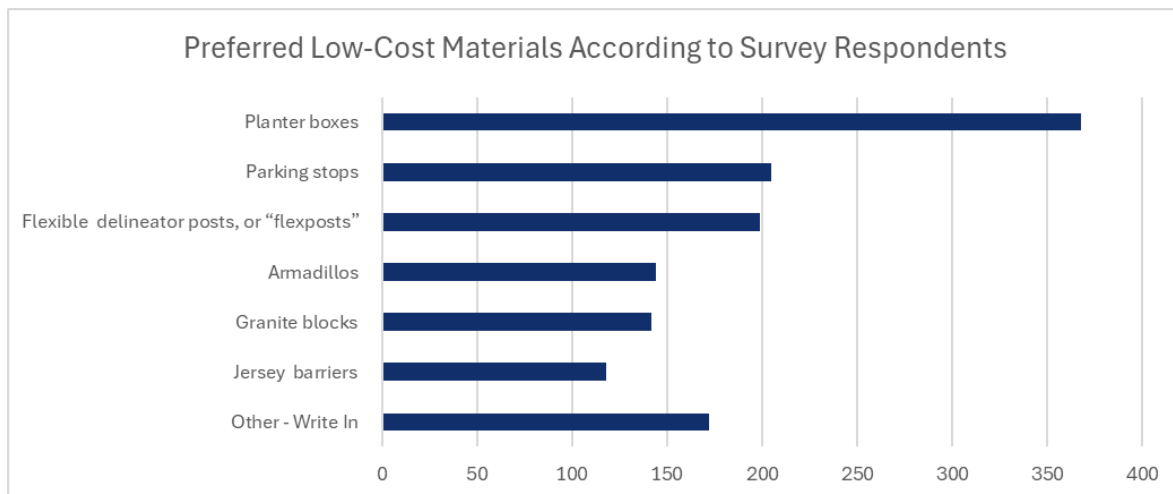


Figure 22: [If the Town were to implement separated bike lanes buffered from vehicle traffic with 'quick build' materials, what materials would you prefer the Town use? Check all that apply.]

Table 2: Quick-Build Materials Summary

Material	Cost (relative to other materials listed)	Benefits and Trade-offs	Example
Planter boxes	\$\$\$	- Aesthetically appealing - Not feasible for long stretches of roadway - Requires frequent maintenance once installed	
Parking stops	\$\$	- Good protection for bikes with minimal visual impact. - Street sweeping and snow blowing operations must be cautious where installed.	
Flexible delineator posts, or "flexposts"	\$	- Low-cost - Easy to install - May not match the aesthetic of the roadway or neighborhood - Large vehicles can easily drive over flexposts - May need to be re-installed annually if knocked down by vehicles	

Material	Cost (relative to other materials listed)	Benefits and Trade-offs	Example
Armadillos	\$	- Low-cost - Easy to install - Less visual impact as compared to flexposts - May need to be replaced seasonally with street sweeping and plowing	
Granite blocks	\$\$\$	- Expensive up-front costs - Low maintenance costs - Size and look can be chosen to match historic character or aesthetics of a roadway/neighborhood	
Jersey barriers	\$\$	- Expensive up-front costs - Low maintenance costs - Large visual impact that may not match aesthetics or character of the roadway	

Traffic-Calmed Neighborways

A neighborway, also known as a bike boulevard or a neighborhood greenway, is a low-volume street that is designed to prioritize slow speeds and bicycle travel. Without providing a dedicated space, a neighborway is made comfortable for people biking with signs, pavement markings, traffic calming measures, and wayfinding. To make the facilities comfortable for users of all ages and abilities, strategies to divert through traffic and lower vehicle speeds may be necessary.

Where roadway space allows, bike lanes can be striped to further notify users of the presence of people biking on the street, as well as visually narrow the travel lanes to encourage slower speeds. Striped bike lanes may also be beneficial when a neighborway connects to separated bike facilities or at intersections to clarify recommended movements or positioning of people biking.

A contra-flow bike lane is another type of bike facility to consider implementing on neighborways. Contra-flow bike lanes allow people on bikes to travel in the opposite direction of motor vehicle traffic on one-way streets, and they may also separate bikes from vehicles with pavement markings and/or vertical elements.¹⁶

Marblehead should consider designating neighborways as Safety Zones with a 20-mph speed limit. For more information, see MassDOT's Procedures for Speed Zoning on State Highways and Municipal Roads.¹⁷

Recommended use:

- Local streets with less than 2000 vpd, but can be applicable on streets as high as 6000 vpd, if bike lanes are viable
- Streets with speeds less than 20 mph, and traffic calming measures should be implemented to reduce speeds if necessary (see details on traffic calming measures in the following section)

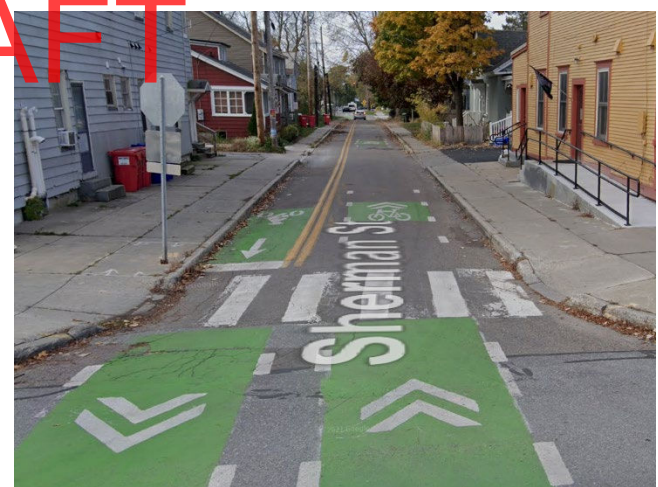


Figure 23: Bike boulevards in Minneapolis, MN (top) and Burlington, VT (middle and bottom)

¹⁶ https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

¹⁷ https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

Typical dimensions:

- Neighborways do not have specific dimensions, but narrower streets are conducive to slower vehicle speeds
- 5' minimum, 6.5' recommended for bike lane width

Benefits and trade-offs:

- May be lower cost than other facilities along existing streets but requires more investment for traffic calming measures and at intersections to maintain comfortable facilities
- Increases safety for people travelling by all modes and residents along the neighborway route by reducing vehicle speeds
- Major street crossings should be evaluated and redesigned if they are unsafe
- Wayfinding along bike boulevards can double as highlighting historic routes through the city
- Considerations for bike lanes:
 - Lowest cost of designated bike facilities
 - Good way to reallocate roadway space on lower volume streets with less curb-to-curb space
 - Requires less maintenance than separated facilities
 - Most susceptible to motorist encroachment and high stress environment for people biking
 - If the buffer is not wide enough or there is no buffer, bicyclists are susceptible to dooring adjacent to parking

Figure 9-3: Shared Lane Marking Lateral Placement in Travel Lanes < 14 Feet Without Parking

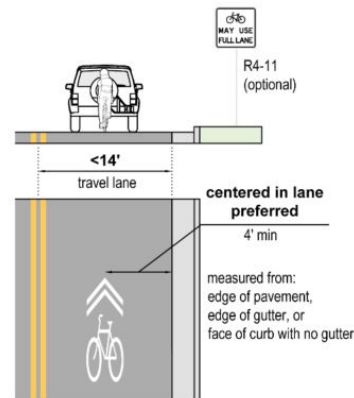


Figure 24: Shared Lane marking guidelines from the AASHTO Bike Guide

Traffic Calming Measures

Neighborways should be supported by traffic calming measures intended to slow vehicle speeds. This section details the most common and effective traffic calming measures.

Daylighting

Daylighting is the removal of street parking around intersections and crossings to increase visibility of pedestrians and cyclists, making people driving more likely to yield to vulnerable road users. This measure may be implemented simply with “No Parking Here to Corner” signs, with striping, or with striping and vertical elements. Daylighting can also improve sight lines for drivers making turns at intersections.



Figure 25: Daylighting at a trail crossing in Winchester, MA

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Curb Extensions

Curb extensions, often referred to as “bump-outs” are extensions of the sidewalk into the parking lane to shorten the crossing distance for people walking and to improve pedestrian visibility at intersections and crossings. Curb extensions also slow vehicles by narrowing the roadway and tightening curb radii for turning vehicles at intersections. Curb extensions also act as daylighting by removing parking and improving visibility at intersections.



Figure 26: Flexpost and planter curb extensions in Burlington, VT (top) and permanent curb extensions in Swampscott, MA (bottom)

Speed Humps / Speed Cushions

Speed humps and speed cushions are traffic calming measures spaced along a street to slow vehicle traffic. Speed humps can be placed along a neighborway in conjunction with other treatments such as raised crosswalks and raised intersections to slow vehicle speeds. For effective speed reduction, traffic calming measures should be placed every 200 to 400 feet.



Figure 27: Temporary and Permanent Speed Humps in Salem, MA

Diverter

Diverter are physical barriers placed in an intersection to prevent vehicle traffic from completing a through movement while still allowing through movements for bicycles and pedestrians. Diverter slow vehicle speeds by forcing vehicles to navigate a turn, and they also prevent cut-through traffic through a neighborhood by changing traffic patterns.¹⁸



Figure 28: Quick-build and full-build diverter in Burlington, VT

¹⁸ <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer/module-3-part-3#:~:text=A%20strategically%20placed%20diagonal%20diverter,and%20a%20diagonal%20road%20closure.%5D>

Chicanes

A chicane is a horizontal diversion of traffic meant to slow vehicle speeds. A chicane can be achieved by alternating parking on either side of the roadway or by adding curb extensions or landscaped islands. Chicanes provide the opportunity to increase greenery on the street, expand pedestrian space, and calm traffic.



Figure 29: Quick-build and full-build chicanes in Burlington, VT

Raised Crosswalks

Raised crosswalks elevate crossings to sidewalk level which provides a continuous path of travel for people walking. Raised crosswalks reinforce the priority of pedestrians in crosswalks while making them more visible to vehicles and slowing drivers as they approach the crosswalk.



Figure 30: Raised Crossings in Boston, MA (top) and Newport, RI (bottom)

Shared Street

Shared streets remove formalized distinctions between space dedicated to pedestrians, bicyclists, and vehicles and provide pedestrians with right-of-way throughout. Shared streets should be considered where pedestrian traffic is high and vehicle volumes are low or not prioritized. Shared streets can be created in commercial areas by expanding pedestrian space and creating places for people to gather with outdoor dining areas, artwork, and landscaping. In residential areas, shared streets can be an extension of front yards where neighbors can meet each other, and children can play. On shared streets, people bicycling, just like people driving, will need to travel slowly and with an awareness of people walking, thus creating safe speeds for a multimodal experience.¹⁹



Figure 31: Street prioritizing pedestrians with outdoor dining and expanded sidewalk space in Rockport, MA

¹⁹ <https://globaldesigningcities.org/publication/global-street-design-guide/streets/shared-streets/>

Gateway Treatments

Gateway treatments signal a change in roadway function or feel. They are often used in downtown areas to slow vehicles speeds and signal that pedestrians and bicyclists are the priority. Gateway treatments may be used in areas with frequent pedestrians or bikes, like near a school or trail, or on streets where pedestrians and bikes currently feel unsafe and should be be prioritized for greater safety. Raised crossings, raised intersections, curb extensions, and changes in materials can be used to give people the idea of a transition. Gateway treatments are also an opportunity to use varied materials and plantings to beautify a street.



Figure 32: Gateway treatments entering a residential street in New York, NY

Sharrows

Sharrows signal to drivers that bikes are present on a roadway and that roadway space should be shared. Sharrows can be effective for bike wayfinding, signaling a clear bike route with pavement markings. Sharrows can also be used in combination with traffic calming measures on neighborways to make the street more comfortable for cyclists.



Figure 33: Sharrows on a neighborhood street in Silver Spring, Maryland

Facility Summary

Table 3: Bike Facility Criteria Summary²⁰

Facility Type	Volume (vpd)	Posted Speed (mph)	Travel Lane (ft)	Bike Lane (ft)	Buffer (ft)	Example Location for Implementation
Traffic-Calmed Neighborway	< 2000	< 20	-	-	-	Glendale Road
Conventional Bike Lane	2000-6000	<25	10	5-7	-	Rockaway Avenue
Separated Bike Lane	>6000	>25	10	5-7	3-5	West Shore Drive
Shared Use Path	>6000	>25	-	10-20	-	Ocean Avenue

Strategies for Constrained Roadway Width

Where streets may not be wide enough to accommodate the proper bike facilities for their speeds and volumes, consider downgrading the facility (e.g. from a separated bike lane to a conventional bike lane) or providing a parallel alternate route to maintain network connectivity.

On streets where the width is constrained so that there is no space for bike facilities, traffic calming measures should be used to slow vehicle traffic and make the street safer and more comfortable without a designated bike facility. Sharrows can also be used for wayfinding but should not be used as a singular bike facility treatment without other traffic calming measures.

Roadway width may also be constrained by parking lanes and curbside uses like loading zones and bus stops. On residential streets where driveways are frequent, removing street parking in favor of bike and/or pedestrian facilities may be favorable. On busier streets with mixed curbside uses and businesses, parking studies and community engagement are recommended to understand which treatments would be best suited for each street segment.

Intersection Design Guidelines

Continuing safe bicycle and pedestrian facilities through intersections is critical in connecting Marblehead's bike network. Even if a comfortable bike facility is constructed along a roadway, concerned cyclists will often avoid a route if an intersection feels high stress or dangerous. The following design elements can be implemented to improve intersection design and safety for people bicycling and walking.

²⁰ https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

Leading Pedestrian Interval (LPI) Signal Phasing

LPI signal phasing gives people using the crosswalk a 3-7 second head start to begin crossing before the corresponding vehicle signal turns green, whether this is a pedestrian or person on a bike. LPI phasing reinforces pedestrian priority over turning vehicles and makes pedestrians more visible to people driving at the intersection.

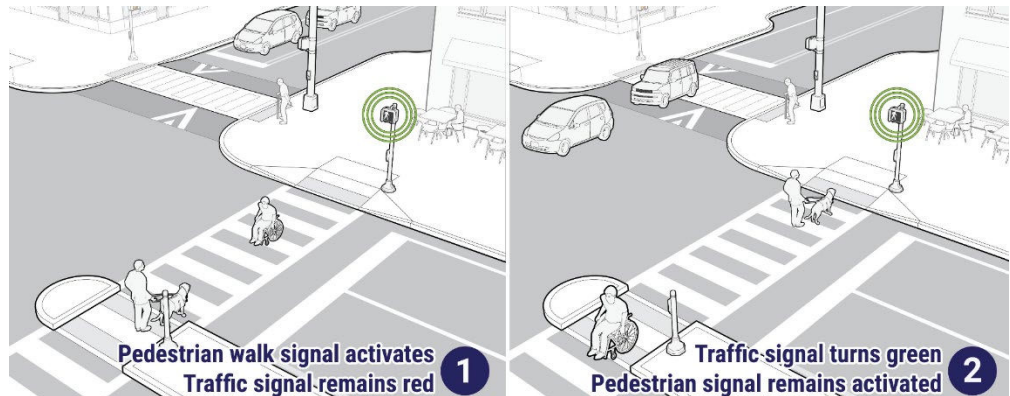


Figure 34: Leading Pedestrian Interval Phasing Explanation

LPI phasing is applicable where pedestrian phases run at the same time as vehicle movements but are not applicable at intersections with exclusive pedestrian phases where the walk signal for all approaches runs at once. For more detail on phasing and equipment compatibility, refer to the Marblehead Traffic Signal Inventory.

Bike Boxes

Bike boxes are marked space for bikes in front of motor vehicles at the approach to an intersection. Bike boxes allow people bicycling to wait in front of vehicles during a red light, increasing their visibility and making cars more aware of their movements through the intersection.



Figure 35: Bike Box in Portland, OR

Geometric Intersection Changes

Due to Marblehead's irregular street grid, streets may meet at unusual angles at intersections, leading to poor sight lines, confusion, and unsafe conditions for people walking and biking. Geometric changes that reduce excess space for vehicles in the intersection can alleviate some of these safety issues, such as vehicle speeds, while also reallocating space to bicyclists and pedestrians. The reallocated space can be used for public amenities like benches, parklets, and outdoor dining as well as bike facilities, like bike lanes and bike boxes.



Figure 36: Irregular Intersection Geometry at Winchester, MA

Protected Intersections

Protected intersections allocate intersection space to people bicycling and walking by providing them separated queueing spaces, marked paths through the intersection, and tightening curb radii to slow vehicle movements. Protected intersections make vulnerable road users more visible to drivers by shortening crossing distances and improving sight lines. Elements of protected intersections include curb extensions, pedestrian waiting areas or islands, and protected bike lanes.



Figure 37: Protected Intersection in Oakland, CA

Raised Intersections

Raised intersections are where the entire intersection area is raised to sidewalk level. When an intersection is raised, it slows vehicle speeds and encourages yielding to people bicycling or walking. This treatment may be preferred where a bike boulevard intersects another street to access a park, school, or other destinations where pedestrian and bicycle traffic may be high. Raised intersections are also a good option on higher volume streets where speed humps or raised crosswalks may not be appropriate, and where intersections have two approaches that are offset.²¹



Figure 38: Raised intersection in Everett, MA

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²¹ AASHTO

Neighborhood Traffic Circles

Neighborhood traffic circles lower speeds at minor intersections that do not have a stop sign or signal. Neighborhood traffic circles can be installed using markings or a raised island with plantings that also help beautify the neighborhood and reduce ambiguity at intersections with large areas of pavement. Neighborhood traffic circles are not suited for intersections where large vehicles are common.²² Neighborhood traffic circle islands are usually 12-16 feet in diameter but can be smaller depending on the intersection footprint.²³



Figure 39: Traffic circle on a neighborhood greenway in La Crosse, WI

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Trail Crossings

The Marblehead Rail Trail has multiple street crossings across streets of varying character. However, at every crossing, the safety of trail users should be prioritized. The Rail Trail should be accessible to users regardless of age and ability, especially due to the high number of students who use the Rail Trail to get to school. Crossings should not be a prohibitive element where kids and parents are scared to use the trail. On-road facilities should consider trail crossing design for easy transition between facilities and maximum safety. For example, where curb bump outs are provided at a trail crossing, bike ramps can be provided for on-street facilities to easily traverse the bump out without being forced into roadway traffic.

The goal of safety countermeasures at a trail crossing is to increase driver yielding behavior and reduce driver speeds as they approach the trail crossing. The safety measures should also make trail users more visible to drivers on the intersecting street.

Safety countermeasures that can be used to make crossings safer are:

- Trail crossing signage

²² <https://nacto.org/publication/urban-street-design-guide/intersections/minor-intersections/mini-roundabout/>

²³ <https://www.mass.gov/info-details/mini-roundabouts-and-neighborhood-traffic-circles>

- Realigned and repainted high visibility crosswalks
- Pruning and managing vegetation for visibility
- Curb extensions
- Rectangular Rapid Flashing Beacons (RRFBs)
- Raised crossings
- Traffic calming measures on intersecting streets



Figure 40: Salem Bike Path Crossing with a curb extension and RRFB

More guidance on trail design specific to the Marblehead Rail Trail can be found in the Marblehead Rail Trail Plan.²⁴

Street Sweeping and Plowing Considerations

Traffic calming measures such as speed humps, raised crosswalks, raised intersections, curb extensions, and chicanes can affect street sweeping and snow removal due to changes in roadway surface and geometry. These traffic calming measures should be designed with input from the Department of Public Works to develop a shared understanding of how the infrastructure may affect operations. Bike infrastructure should be designed with an understanding of what maintenance equipment will be used for street sweeping and snow clearing, ensuring the bike infrastructure is compatible with the equipment at hand. Making sure maintenance crews are aware of where traffic calming measures are located will also mitigate possible damage.

Vertical traffic calming infrastructure, such as speed humps, raised crosswalks, and raised intersections, can be designed with a shallower slope, or plowing methods can be altered to accommodate the incline, such as raising the plow slightly or using additional salt around the traffic calming infrastructure to melt snow.²⁵ For horizontal traffic calming infrastructure, such as curb extensions and chicanes, reflective signage or posts can be installed to

²⁴ https://www.marblehead.org/sites/g/files/vyhlif4661f/uploads/marblehead_trail_plan_final.pdf

²⁵ <https://highways.dot.gov/safety/speed-management/traffic-calming-eprimer/module-5-effects-traffic-calming-measures-non#5.8>

make the maintenance crew aware of irregular curbs. Horizontal infrastructure can also be designed for snow storage.

A street sweeping and snow clearing plan for bikeways should be created to ensure proper maintenance of the bikeways. To simplify maintenance, on-street bikeways can be incorporated into existing street sweeping and plowing plans.

Equipment Needs: ²⁶

- Narrower plow vehicles with operating widths of 4 to 5 feet may be necessary to clear separated bike facilities and can also be used for sidewalk maintenance.
- Sweeping and debris removal from bikeways is necessary in all seasons and should be incorporated into regular sweeping schedules. Street sweeping vehicles should not be affected by most traffic calming measures, as has been proven in Boston where speed humps are being installed in many neighborhoods.²⁷

Supportive Infrastructure

Bike parking and wayfinding enhance the bike network by guiding riders to comfortable facilities and allowing them to safely park their bike at destinations.

Bike Parking

Bike parking should be placed in downtown areas, high-density residential areas, and adjacent to landmarks or areas of interest like parks, schools, and trails. Bike parking should be visually appealing and varied to accommodate all types of bikes, including children's bikes, e-bikes, and e-scooters. Below are some general resources and best practices to inform bike parking in Marblehead:

- General principles: https://www.apbp.org/assets/docs/EssentialsOfBikeParking_FINAL.pdf
- Example bike parking guidelines from Boston:
https://www.boston.gov/sites/default/files/file/2022/02/Bike%20Parking%20Guidelines_v2.1_0.pdf

Wayfinding

In addition to bike parking, wayfinding should be placed throughout the bike network and in high traffic, downtown areas to direct riders to comfortable facilities as well as destinations of interest. Marblehead has a rich history, and bike wayfinding can double as a guide to historic sites throughout the Town. A comfortable bike network with wayfinding provides residents and visitors with a means to enjoy the area's history and natural beauty. Wayfinding increases access to comfortable bike facilities, increases convenience for users and those unfamiliar with the area, and supports tourism.

Wayfinding can also serve educational purposes, highlighting history and natural surroundings. The land acknowledgement at the beginning of this Bike Facility Plan, stating that Marblehead is the ancestral homeland of the Naumkeag people, can be incorporated into wayfinding, along with other town history, to enrich bike routes

²⁶ https://www.mass.gov/files/documents/2019/06/13/2019_Municipal_Resource_Guide_for_Bikeability.pdf

²⁷ <https://www.boston.gov/departments/transportation/making-neighborhood-streets-safer#:~:text=Speed%20humps%20do%20not%20impede,snow%20plowing%2C%20or%20street%20parking.>

and the Rail Trail. In addition to the guidelines included in the Marblehead Rail Trail Plan (**Figure 41**), below are some general resources and best practices to inform wayfinding in Marblehead:

- General design principles: <https://www.mass.gov/doc/masstrails-bike-wayfinding-design-guide/download>
- Example process from Woburn: <https://www.mass.gov/doc/woburn/download>

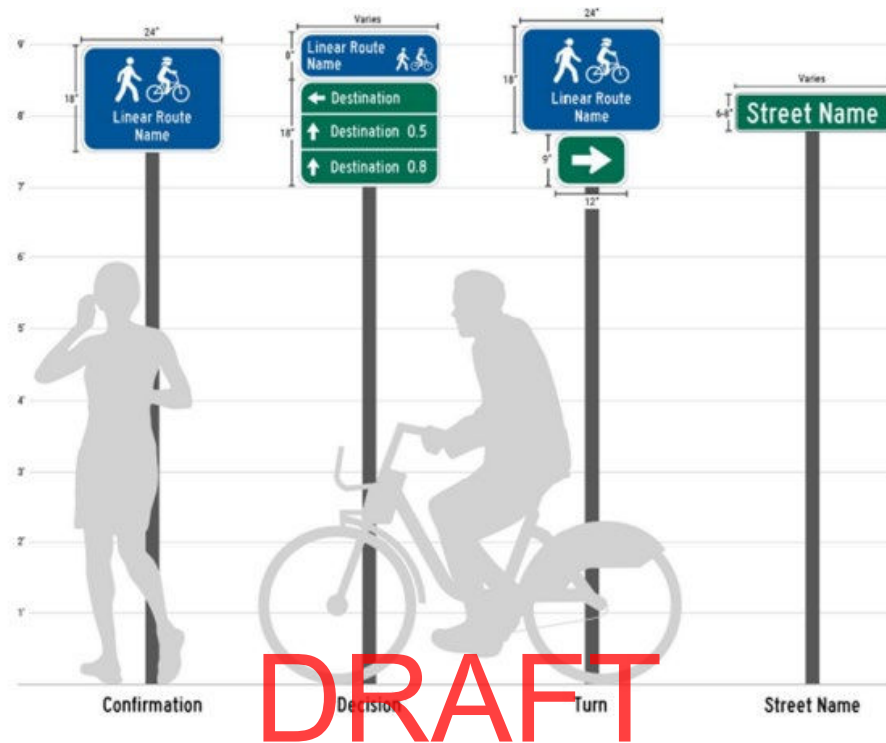


Figure 41: Four fundamental wayfinding sign types from the Marblehead Rail Trail Plan

Cost Estimates by Facility Type

Table 4: Bike Facility Costs

Facility Type	Cost per mile	Trade-offs and Considerations
Neighborhood	\$50k - 100k	Costs can vary greatly based on constructed traffic calming elements (curb extensions, speed humps, etc.). Vehicle speeds and volumes should be considered to determine what type of measures may be necessary.
Separated Bike Lane (quick-build)	\$250k – 700k	Costs can vary greatly based on the separation materials used. Flex posts are the cheapest option, whereas concrete buffers and planters are more expensive. Context and aesthetic priorities should be balanced with cost constraints.
Separated Bike Lane (full construction)	\$500k – 1 million	Can be incorporated as part of a sidewalk or roadway construction project to minimize roadway reconstruction costs, including installing new curb and sidewalk.
Shared Use Path	\$1 million – 2 million	Can be incorporated as part of roadway construction or park/ recreational area improvements to help minimize costs

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Table 5: Neighborway Traffic Calming Measures Costs

	Approx. Cost per Location	Rapid Implementation possible (quick-build)	Trade-offs
Daylighting	Low <\$50k	Yes, can be implemented with paint and flexible materials	-
Curb Extensions	Low (<\$50k) – Medium (\$50k-200k)	Yes, can be implemented with paint and flexible materials	May lose 1-2 parking spaces on either side of crosswalk where installed
Speed Humps	Low <\$50k	Yes	Consider implications for snow clearing and street cleaning
Diverter	Low (<\$50k) – Medium (\$50k-200k)	Yes, can be implemented with paint and flexible materials	Consider traffic impacts if street access changes
Chicane	Low <\$50k	Yes, can be implemented with paint and flexible materials	-
Raised Crosswalk	Medium \$50k-200k	No	Consider implications for snow clearing, street cleaning, and drainage
Shared Street	Medium \$50k-200k	Yes, can be implemented with paint and flexible materials	Consider reduced vehicle access
Gateway Treatment	Low <\$50k	Yes, can be implemented with paint and flexible materials	-
Neighborhood Traffic Circle	Low <\$50k	Yes, can be implemented with paint and flexible materials	Consider any truck traffic that may impact traffic circle construction and radius

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CHAPTER 5

FACILITY SELECTION AND PRIORITIZATION

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05 Facility Selection and Prioritization

Facility Selection

The Marblehead bike network was developed using existing conditions data and community feedback, discussed in previous sections. Public feedback was used to initially identify desire lines and priority areas to expand the existing network. Existing conditions analysis, including crash analysis and observations from the handlebar survey, augmented public feedback and helped the Town identify additional network connections.

Once the general bike network was identified, roadway characteristics including vehicle volumes, speeds, and roadway widths, and curbside uses were considered to select the bicycle facility types, from the toolkit, to provide maximum context-appropriate comfort for bicyclists of all ages and abilities along each route. Considering how roadway characteristics like width and volume change along different segments of each route also guided facility selection. For example, Pleasant Street is a main thoroughfare between Lafayette Street and Spring Street, with vehicle volumes that require separated bike facilities for users of all ages and abilities to be comfortable riding there. However, north of Spring Street, Pleasant Street becomes one-way street with lower vehicle volumes, a narrower width, and a more residential context, where neighborway and traffic calming treatments would make the street comfortable for riders. **Figure 42** is the bike network map, with the proposed facility designation for each corridor.



Figure 42: Marblehead Bike Network by Facility Type

Prioritization Process

Based on public input and survey feedback, Marblehead identified prioritization criteria and weighted them according to their relative importance to other criteria. While Marblehead intends to build out a complete bike network in the years to come, this process reveals the top priority corridors for implementation, rooted in Marblehead's goals and values.

Access to schools was highlighted in the public engagement process and survey, so the prioritization criteria include key routes to schools and weighted this criterion as a top priority. In the survey, respondents also noted that locations with high crash rates should be prioritized, and in interviews stakeholders emphasized safety as a top priority, so safety was included as a prioritization factor and weighted as most important, after key routes to school.

Additionally, the Rail Trail is a high-comfort shared use facility and the only existing bike facility in Marblehead; thus, it was highlighted as a key asset to the Town that is highly used by people biking today. To reflect the importance of this existing spine in Marblehead's Bike Network, the criteria included connectivity to the Rail Trail. Finally, survey respondents noted that accessing recreational destinations such as beaches and parks constituted frequent bike trips in Marblehead today, and these routes should be prioritized for future connectivity. **Table 6** details the four prioritization criteria, their weights relative to each other, and how each corridor within the network was assigned a ranking for each criterion.

Table 6: Bike Facility Prioritization Criteria

Factor	Weight	Ranking	Description
Key Routes to School	4	High	School or library located directly on corridor
		Medium	School or library located within ¼ mile of corridor
		Low	No schools or libraries located within ¼ mile
Safety	3	High	Top 1/3 of fatal and serious injury crash rank
		Medium	Middle 1/3 of fatal and serious injury crash rank
		Low	Bottom 1/3 of fatal and serious injury crash rank
Connectivity	2	High	Connects to existing bike facility (Rail Trail)
		Low	Does not connect to existing bike facility (Rail Trail)
Key Routes to Recreational Destinations	1	High	Destinations* located directly on corridor
		Medium	Destination located within ¼ mile of corridor
		Low	No destination located within ¼ mile

*Destination is defined as recreational fields, beaches, parks, etc.

These prioritization criteria were applied to each roadway segment from the facility selection map to determine which streets are high, medium, and low priorities for implementation, shown in **Figure 43**. The streets ranked as High Priority scored the highest based on the prioritization factors, meaning they are along routes to schools, have high crash rates, connect to the Rail Trail, and connect to beaches and parks. Many arterials (larger roads that connect people across and in and out of town) in Marblehead, including Atlantic Avenue, West Shore Drive, Lafayette Street, and Pleasant Street were designated as High Priority because of their connections to important

destinations around town and high crash rates. Improving safety on these arterials is key to improving the bike network.

It is important to note that this prioritization does not take into account feasibility of constructing the bike facilities, particularly the separated bike facilities, cost and impacts of implementation, or overlap with other Town planned activities, such as repaving, sidewalk repair, or utility work. The prioritization generally shows which streets should receive priority in being built purely based on the above mentioned factors, that reflect Marblehead's goals and values, if constructed without other inputs. The implementation section of this Plan further discusses the next steps and actions for building out bike network with regard to these additional considerations.



Figure 43: Prioritized Bike Network Routes, ranked from High to Low Priority



CHAPTER 6

POLICY ACTIONS AND PERFORMANCE MEASURES

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06 Policy Actions and Performance Measures

The primary way Marblehead will implement this plan will be through infrastructure projects that provide new and improved bike facilities. Additionally, non-infrastructure changes such as policy, program, and strategy actions will support sustained infrastructure investment. Such policy actions will also support use of new bicycle facilities by providing information, education, and encouragement for bicycling. **Table 7** contains these policy actions and performance measures, tied to Marblehead's Bike Facility Plan goals.

Performance measures allow Town staff to track Bike Facility Plan implementation progress. The measures use data that can be easily collected by staff and include process- and outcome-oriented metrics to understand progress towards a successful bike network. The performance measures also incorporate public feedback and provide opportunities for feedback throughout the implementation process, to ensure progress reflects community goals over time. The performance measures are linked directly to the three goals defined at the beginning of this plan.

The Marblehead Town staff should update the Complete Streets Committee and/or TSAC quarterly on progress toward implementation, using the performance measures listed below. This same information should also be available to the public online.

Table 7: Policy Actions and Performance Measures

Goals	Recommended Policy Actions	Recommended Performance Measures
<i>Goal 1: Make bicycling a safe, efficient, and practical option for all residents and visitors, with specific focus on safety of children biking to school.</i>	- Perform a regular safety survey to understand town residents' general perceptions of safety and bicycling (utilized the same survey questions asked through this plan) - Support existing SRTS programs including Walk, Bike, and Roll to school days and the bike bus, and work with the community to expand these initiatives - Continue and expand SRTS Education days to educate kids and drivers about safe biking practices - Consider a town-wide safety campaign such as yard signs to reinforce safe practices	- Future survey responses about perceptions of safety and bicycling, compared to survey responses in this plan - Number of schools with active bike buses
<i>Goal 2: Expand the bike network in Town to increase safety, reduce traffic, improve public health, and raise awareness for alternative roadway users.</i>	- Upkeep a map of current bike network and bike parking locations on town website - Coordinate with paving plan and sidewalk and pedestrian curb ramp plan for opportunities to install bike infrastructure as part of general improvement projects - Expand the bike/e-bikeshare system, currently operating in Salem, into Marblehead with	- Total miles of on-street bicycle routes defined by streets with clearly marked or signed bicycle accommodation (<i>this is also a Complete Streets Policy performance measure</i>) - Number of bikeshare stations - Bike counts from before and after studies

Goal 3: Incorporate safety and bike planning into Town policies

potential locations along the Rail Trail (there are stations along the Rail Trail in Salem), near transit stops, and in commercial areas

- Perform before and after studies for each roadway where a bike facility is implemented, incorporating this into the design fee. The studies may include data collection and targeted surveys, with a focus on safety, bike volumes, and vehicle volumes/delay
- Invest in bike-specific equipment/enhancements like bike parking and wayfinding
- Post temporary signage explaining bike infrastructure to people so they are made aware of roadway changes

- Integrate Net Zero goals into Complete Streets Committee initiatives to achieve them quicker and more efficiently
- Coordinate with Swampscott and Salem planning efforts
- Develop a policy to add covered and secured bike parking for apartment buildings in the development review process
- Adopt a Town Vision Zero Select Board Resolution as part of the Boston Region Vision Zero Action Plan
- Encourage the Complete Streets Committee to aid in bike-focused initiatives, such as Safe Routes to School events, bike light giveaways, educational courses
- Talk with peer municipalities about maintenance to increase staff comfort with and knowledge of bike and traffic calming infrastructure maintenance, particularly related to winter maintenance

- Survey and community input from before and after studies
- Number of public bike parking locations
- Number of bike-oriented wayfinding signs (including bike travel time or directing people to bike routes)

- Injury crash data, per year, by severity, specifically crashes involving people bicycling
- Number of meetings with Swampscott and Salem planning teams
- Number of apartment developments with bicycle parking facilities



CHAPTER 7 IMPLEMENTATION

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07 Implementation

Implementation is the final step in accomplishing the goals established in the Bike Facility Plan. The implementation process is complex and depends heavily on funding sources and Town priorities. This section outlines key considerations and first steps for implementing the network proposed in this plan. This plan does not provide a prescribed schedule for implementation, as the Town may take advantage of opportunities as they arise. Focusing on bike-friendly policies through the Complete Streets Committee and community initiatives is also an important step to take in combination with building pieces of the bike network.

Coordination with Other Planning Documents and Town Projects

Coordinating with Town plans, policies, and projects like the Complete Streets policy, the Sidewalk and Pedestrian Curb Ramp Plan, and paving and roadway reconstruction projects provides opportunities for bike network expansion in combination with other planned projects. Striping separated bicycle lanes or improving a pedestrian crossing or sidewalk near the Rail Trail, on a road that is being repaved, are examples of using funding to address multiple priorities or building in bike infrastructure to an existing improvement. Coordination with plans from surrounding communities, Salem and Swampscott, is also important to understand how infrastructure between municipalities can connect to maximize safety for people.

Some upcoming Marblehead Public Works projects/ Utility Capital Improvement Projects include:

- Marblehead Light Department buried infrastructure
- South Essex Sewerage District (SESD) sewer force main replacement

Project Timelines

In Section 5, the project prioritization map (**Figure 43**) divided the bike network into high, medium, and low priority projects. The prioritization map provides a guideline for bike facilities based on Town priorities but does not represent the order of how bike facilities must be installed. Public engagement and Town representatives stressed that the bike network should be implemented intentionally, not necessarily rapidly, so the prioritization map may serve as a guide with final decisions being made by the Town as implementation opportunities unfold.

In addition to the prioritization map, proposed bike network corridors were analyzed based on feasibility of installation, shown in **Figure 46**. Feasibility in this instance, depends on physical and regulatory constraints that may affect a project. Roadway curves, grades, width, lane assignments, and high-level utilization of on-street parking determine whether a project is feasible in the short-term or if bike facility installation will require a greater effort. Reasons for a facility requiring greater effort to implement include the need to move the curb to construct the desired bike facilities, which may require additional design and construction funds, a longer design period, extended public outreach, and right of way considerations.

Quick-Build/ Short-Term projects

Streets that are considered feasible in the short-term, that do not require moving the curb to construct the bicycle facility, are also feasible for quick-build designs. Quick-build designs are typically constructed using semi-permanent materials, such as paint, signs, bollards, planters, etc. This allows for bike facilities to be installed quickly, at a relatively low-cost, and provides an opportunity to “test out” the design prior to fully constructing the facility. Roadways with large curb-to-curb widths, like Atlantic Avenue closer to Swampscott, are ideal candidates for quick-build projects because they have space between curbs to install street-level protected bike lanes with paint and temporary materials. In comparison, narrow roadways like Tedesco Street may require moving the curb and tougher trade-offs to install separated bicycle facilities that are comfortable and safe for people.



Figure 44: Example of a quick build separated bike lane in Cambridge, MA

Quick-build projects are also good opportunities to test out bike infrastructure to see how community members may use or react to the facility. Because quick-build projects are relatively low-cost and semi-permanent, they can help gauge public opinion and behavior change without a large investment or permanent construction. Early-action quick-build projects can also start the momentum around the bike network, causing people to think differently about sharing the street and understand the need for further buildout of the network.

Explanatory signage can be installed with quick-build projects to help educate community members on roadway changes and how to share the road. Quick-build projects can act as educational opportunities for community members who may not be familiar with bike infrastructure on the roadway.



Figure 45: Example explanatory signage provided for a parking protected bike lane in Boston, MA

The streets listed below and in **Figure 46** are good candidates for quick-build projects. This list does not mean bike facilities on these streets must use quick-build materials, but if an opportunity arises through a repaving project or Complete Streets funding, these streets would be ideal candidates for low-cost, quick-installation bike

facilities. Additionally, parking regulations on some segments of streets are unclear and should be clarified prior to design.

Quick-build facilities are possible on these streets:

- **West Shore Drive** – Lafayette Street to Green Street
- **Atlantic Avenue** – Swampscott Town Line to Ocean Avenue, connect to existing facilities in Swampscott
- **Lafayette Street** – Salem City line to Humphrey/ Pleasant Street, connect to existing facilities in Salem
- **Humphrey Street** – Swampscott Town Line to Pleasant Street
- **Maple Street** – Lafayette Street to Tedesco Street / Humphrey Street
- **Pleasant Street** – Rail Trail crossing to Village Street
- **Ocean Avenue** – Pleasant Street to Beach Street
- **Roundhouse Road** – Bessom Street to School Street
- **Beach Street** – Atlantic Avenue to Ocean Avenue
- **Brookhouse Drive** – Tedesco Street to Humphrey Street
- **Ocean Avenue and Harbor Avenue** – main routes through the Neck
- **Elm Street** – Spring Street to Mugford Street
- **Mugford Street** – Elm Street to Market Square
- **School Street** – Sewell Street to Five Corners



Figure 46: Feasibility of Separated Facilities in the Proposed Bike Network

Many of the arterials (larger roads that connect people across and in and out of town) in Marblehead are narrow and do not have space within their existing curb-to-curb width to construct quick-build facilities. Many of these roadways are part of Marblehead's bike network because they are the key routes across, into, and out of town, and these roadways also generally see high volumes, necessitating separated bicycle facilities to provide safety and comfort for people biking. The Sidewalk and Pedestrian Curb Ramp Plan and the Town's annual repaving

plan provide opportunities through planned or recommended construction projects to incorporate bike infrastructure to these key roadways. A summary of Marblehead's arterials, their construction feasibility, and their presence in the paving plan can be seen in **Table 8**. All the streets listed in **Table 8** have a prioritization score of 80 out of 100 or higher in the Sidewalk and Pedestrian Curb Ramp Plan. **Figure 47** shows the exact locations of priority areas for sidewalk and pedestrian curb ramp placement.

Table 8: Arterial Bike Network Feasibility and Sidewalk and Future Planned Construction Projects

Street	Feasibility/ Construction Type	Future Planned Construction Projects
West Shore Drive	Quick-build	N/A
Atlantic Avenue	Quick-build	Utility work
Humphrey Street	Quick-build	Sidewalk improvements
Lafayette Street	Quick-build	Utility work
Beach Street	Quick-build	Complete streets project
Harbor Avenue	Quick-build	N/A
Ocean Avenue	Quick-build, reconstruction along the Neck	Sidewalk/ shared use path
Pleasant Street	Full construction (except for section between Rail Trail crossing and Village St)	Utility work; design for road diet
Village Street	Full construction	Village Street bridge Sidewalk upgrades

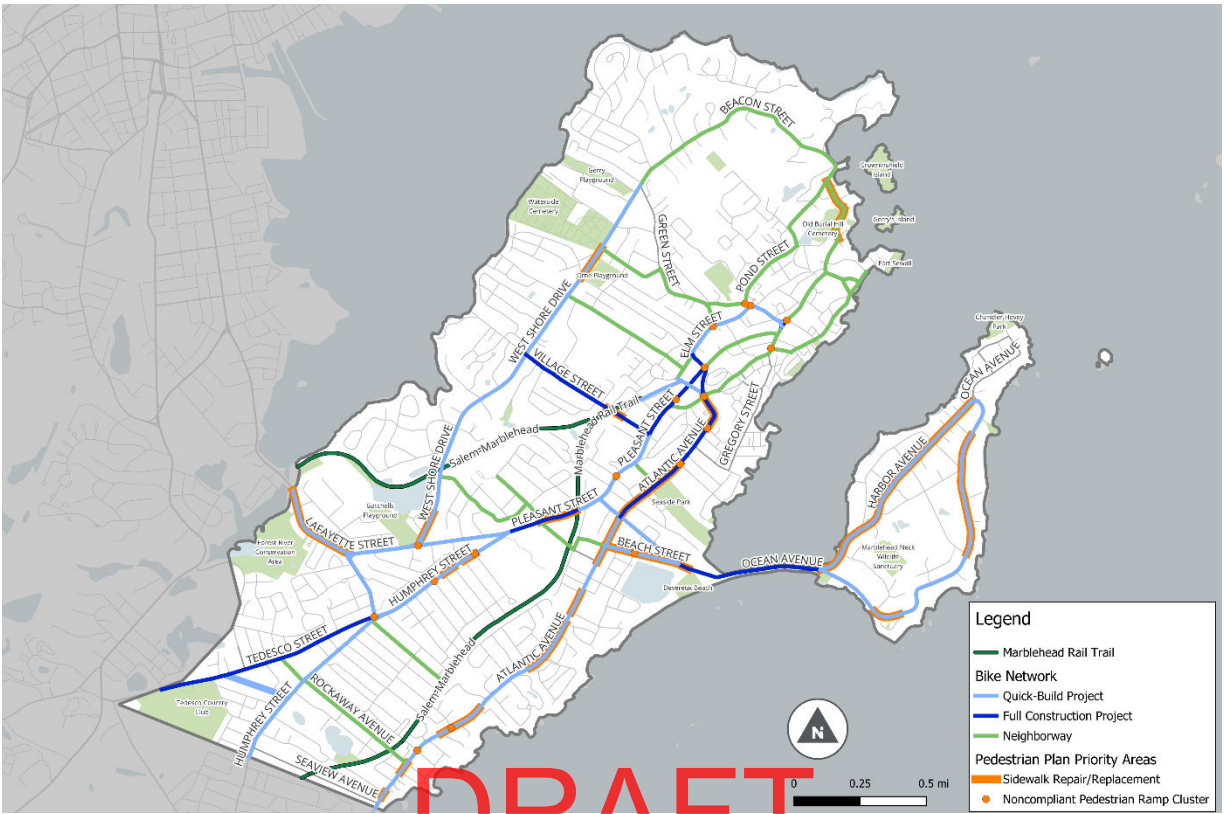


Figure 47: Bike Network Feasibility and Sidewalk and Pedestrian Curb Ramp Plan Priorities

In addition to major arterials, neighborways on more local streets are important to provide greater connectivity within the bike network. Neighborways were not included in the quick-build and long-term feasibility analysis since the traffic calming measures proposed for neighborways are cheaper in cost and less construction-intensive, requiring less resources and funding from the Town to implement. Neighborways will allow safer and more comfortable travel within neighborhoods that connect to arterials.

Project Funding

While Marblehead may not have a large budget for bike improvements or infrastructure, state and federal grants and programs provide funding opportunities for bike-specific or safety projects. Some potential funding sources include:

Funding Source	Description	Additional Resources
MassDOT Chapter 90	Chapter 90 funding often supports repaving projects, which represent an opportunity to integrate quick-build projects into routine Town maintenance projects.	Chapter 90 Program webpage
MassDOT Shared	The Shared Streets and Spaces Grant Program provides funding to municipalities to quickly	Shared Street and Spaces Program webpage

Funding Source	Description	Additional Resources
Streets and Spaces Program	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. This funding must be used within a short time frame, about two years from the time of award. Several of the selection criteria are in line with the prioritization criteria used in this plan, including projects that improve walking and bicycling to schools, for seniors, or within one mile of public transit.	
Transportation Improvement Program (TIP)	The TIP is the five-year capital plan for the cities and towns in the Boston Region Metropolitan Planning Organization (MPO) planning area, which includes Marblehead. The plan documents all transportation projects that will receive federal funding in the region over the next five years. The TIP development and programming process is a collaboration between municipalities and the MPO. Within the TIP there are specific Community Connections programs that municipalities can apply for to fund bicycle lanes, bicycle racks, bikeshare expansion and support, and Wayfinding signage.	Boston Region MPO TIP webpage
MassDOT Complete Streets Funding Program	The MassDOT Complete Streets Funding Program provides grants to support planning and implementation of Complete Streets projects in Massachusetts cities and towns. Marblehead has already completed the initial steps of passing a Complete Streets Policy and creating a Complete Streets Prioritization Plan, thus making the Town eligible for implementation construction funding. Implementation grants are awarded based on a number of factors that align with the process used to develop this plan including projects that improve walking and bicycling to schools, for seniors, projects that fulfill network gaps, are located at high crash locations, and are rooted in public engagement.	Complete Streets Funding Program Portal Complete Streets Funding Program Guidance
MassWorks Infrastructure Program	The MassWorks Infrastructure Program (MassWorks) is a competitive grant program that offers the largest and most flexible source of capital funds for municipalities to make improvements to public infrastructure. This includes design, construction, and repair of streets, public spaces,	MassWorks Infrastructure Program webpage Community One Stop for Growth

Funding Source	Description	Additional Resources
Massachusetts Safe Routes to School	and pedestrian and bicycle facilities. Projects in walkable, mixed-use districts and/or that support new economic development activity are particularly competitive. The Massachusetts Safe Routes to School (SRTS) Program is a federally funded MassDOT initiative that supports school communities in encouraging students to safely walk and bike to and from school. Massachusetts SRTS provides a competitive grant funding program for eligible infrastructure projects in the public right-of-way, within two miles of a school. Massachusetts SRTS infrastructure funding is typically utilized for capital improvements, though Massachusetts SRTS has a guide for implementing temporary pop-up projects to advance safe routes to school.	Massachusetts Safe Routes to School Toolkit Safe Routes to School Engineering webpage Pop-Up Projects for Safe Routes to School
USDOT Safe Streets and Roads for All Grant Program (SS4A)	The Infrastructure Investment and Jobs Act (IIJA) established the Safe Streets and Roads for All (SS4A) discretionary program with \$5 billion in appropriated funds over 5 years, 2022-2026. The SS4A program funds regional, local, and Tribal initiatives through grants to prevent roadway deaths and serious injuries. The program includes planning, demonstration, and implementation grant opportunities. To be eligible for implementation funding, cities and towns must develop a comprehensive safety action plan to identify roadway safety concerns and projects or strategies to address roadway those concerns; the Boston Region MPO is currently developing a plan that will include Marblehead. Once this plan is in place, Marblehead can apply for implementation grants to support the projects in the plan.	Safe Streets and Roads for All (SS4A) Grant Program webpage
MassTrails	MassTrails provides matching grants to communities to plan, design, create, and maintain Massachusetts' network of trails, including the Marblehead Rail Trail. Eligible grant activities include project development, design, engineering, permitting, construction, and maintenance of recreational trails, shared use pathways, and the amenities that support trails.	MassTrails Grant Program webpage

Community Education and Encouragement

Finally, building community support for biking is the final piece of making the Bike Facility Plan successful. Increasing people's comfort with bikes on the road and safe bike practices will foster support for future biking initiatives. To build community and confidence, Marblehead can provide educational programs about bike safety, safe riding skills like wearing a helmet, slowing down at road crossings, and following the rules of the road, especially for kids who ride to school. Additionally, Marblehead can host bike-focused community events including group rides (commonly requested during engagement!), historic bike tours around town, open streets events, and family-oriented bike activities. With education and community activities, biking can become a safer and more frequent activity for community members.

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Appendix – Marblehead Winter Maintenance Resources

Maintenance of bicycle facilities requires special equipment and extra planning into street cleaning and plowing schedules. Toole compiled maintenance feedback and experiences from cities and municipalities across the country to develop the **Toole Winter Maintenance Resource Guide**. This guide is enclosed on the following pages, some key takeaways include:

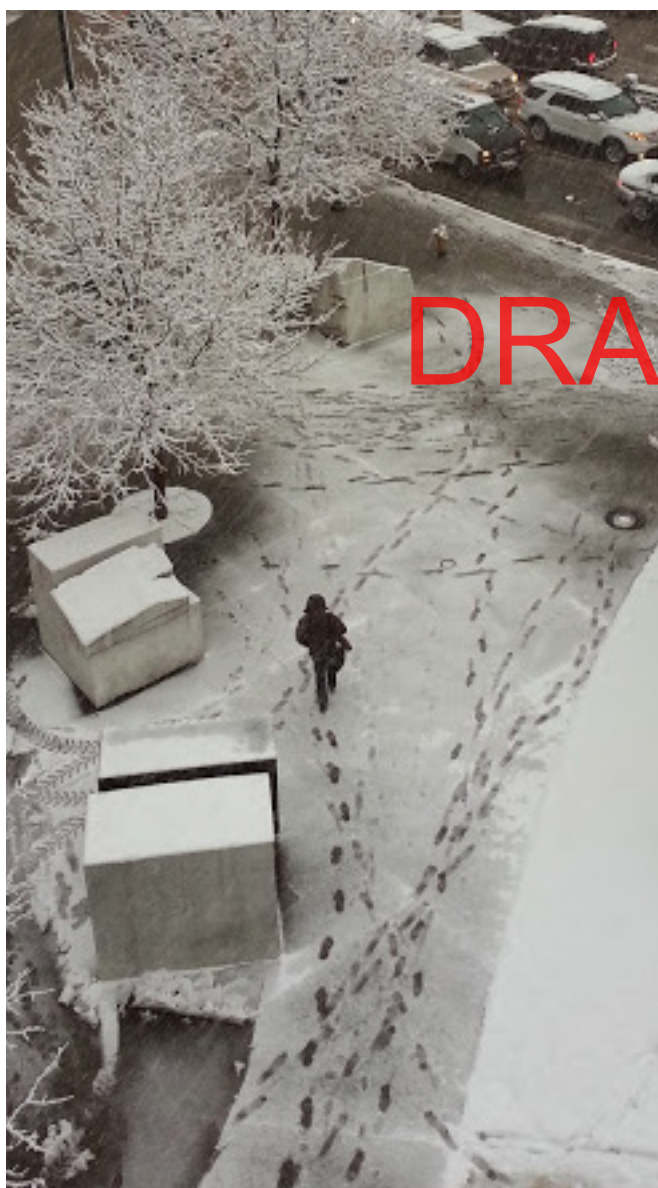
- Most communities push snow to the curb when clearing the roadway and bicycle lanes, and if this snow impedes movement, it will be removed with tractors, dump trucks, etc.
- The width of bicycle lanes and plowing equipment was highlighted as important. Smaller, narrow equipment, like Tool Cats and skid steer loaders may work better for constrained bicycle lanes but have less power and range than a typical plow. Smaller equipment would also likely have to be purchased separately from existing plowing equipment.
- Snow and ice treatment other than salt should be considered. For example, Cambridge, MA uses a brine solution as pre-treatment before a storm, and Milwaukee, WI uses a mix of salt and sand.
- A plan for clearing bicycle facilities and paths can be combined with existing roadway clearing priorities and sidewalk clearing procedures.

In addition, other cities and states have published documents about their maintenance programs. While these communities are different scales from Marblehead, the below may offer inspiration based on what works in other communities:

- **Minneapolis's Pedestrian and Bicycle Winter Maintenance Study** regarding their existing maintenance policies and what could be improved
- **Milwaukee's Bicycle Facilities Maintenance Report**
- **Indiana's Best Practices in Trail Maintenance**

It might also be most beneficial to talk directly to other cities or towns about their process. Visiting a neighboring community that has existing infrastructure and a winter maintenance plan, like Salem, may help Marblehead understand what the process is like within the region.

Winter Maintenance



Ten Questions (and Answers) about Winter Maintenance of Walkways and Bikeways

Communities across North America are dedicating more space and priority to multimodal transportation infrastructure, and those in snowy climates often ask this question:

“How should we maintain sidewalks, bike lanes, and trails in the winter?”

Winter maintenance is an important component of creating a comfortable environment for walking and bicycling year-round. This area of practice is unique, requiring specific legal, technical, and design considerations to operate successfully. With thoughtful planning, clear policies, agency

coordination, and appropriate staffing and equipment, it's possible to perform the winter maintenance needed to keep people walking and biking year-round.

This resource guide was developed specifically to answer important questions about winter maintenance for pedestrian and bicycle facilities and to help communities take a holistic look at their winter maintenance practices. We also recognize that maintenance is one component of a bigger picture approach and that cities such as Edmonton, AB¹ and Winnipeg, MB² are leading the way in embracing a winter city culture that extends beyond snow and ice clearance on walkways and bikeways.

» These are the 10 most frequently asked questions we hear as part of our work with communities across North America. «

1 https://www.edmonton.ca/city_government/documents/PDF/TheLoveofWinter-ImplementationPlan.pdf

2 <https://www.tourismwinnipeg.com/winter-experiences>

1 Do people walk and bike in snowy and icy conditions?

Put simply, yes! There are many places with snowy winters where people continue to walk and bike year-round in significant numbers. For example, Figure 1 below shows that in Cambridge, MA, the bike lanes on Broadway near the Massachusetts Institute of Technology (MIT) are well used throughout the year.

In Madison, WI, counts show that walking often occurs at higher rates than bicycling. On the State Street pedestrian/transit mall between downtown and the University of Wisconsin, winter pedestrian counts are approximately 50% of peak summer counts (see Figure 2). Nearby, on the Capital City Trail, which is five blocks from State Street, winter bicycle counts are 10-20% of peak summer counts (see Figure 3).

Minnesota, which is the 4th-coldest³ and 11th-snowiest⁴ state in the United States, also tracks year-round walking and bicycling. Data collected by the Minnesota Department of Transportation between 2014 and 2017 revealed the following⁵:

- At 10 sites across the state, 18% of total annual pedestrian traffic is generated during the winter months (defined in the report as December through March) (see Figure 4).
- At four sites, the percentage of pedestrian volumes during the winter varied from 9% to 27% of the annual total pedestrian volumes.
- At 10 sites across the state, 7% of total annual bicyclists rode a bike during winter (see Figure 4).
- Across these same 10 sites, winter bicycling varied from 1% of total annual trips on a rural, recreational bike trail in Lanesboro to 18% on an urban street with bike lanes in Saint Paul.

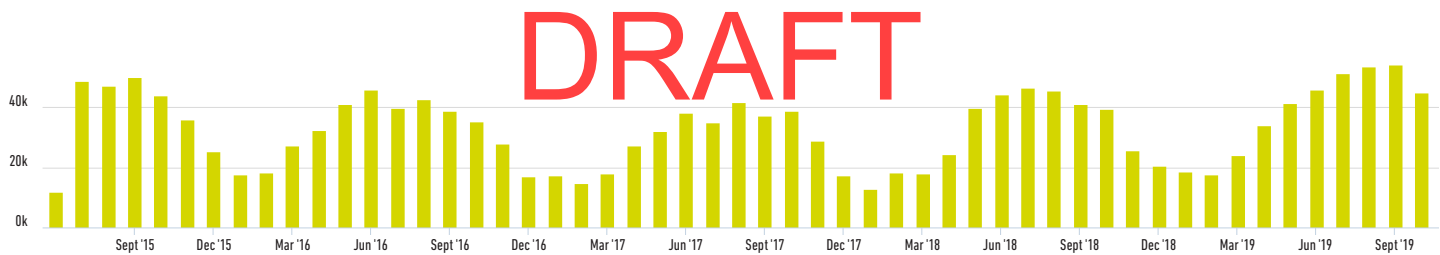


Figure 1. Bicycling on Broadway in Cambridge, MA by month, between the years 2015 and 2019.
Credit: Eco Counter <http://eco-public.com/public2/?id=100023038#>

3 <https://www.currentresults.com/Weather-Extremes/US/coldest-states.php>

4 <http://www.usa.com/rank/us--average-snow--state-rank.htm>

5 <http://www.dot.state.mn.us/bike/documents/planning-research/bike-ped-report.pdf>

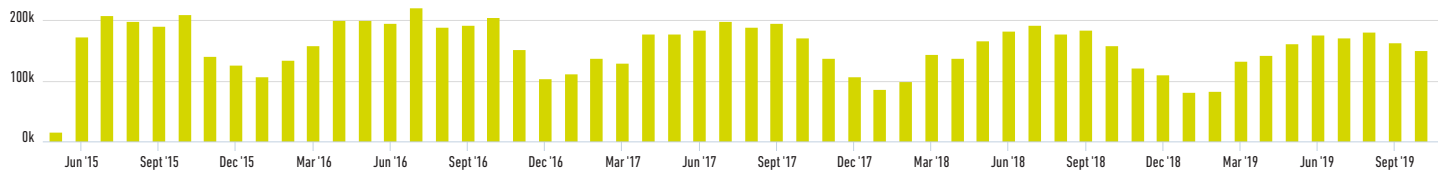


Figure 2. Pedestrian counts on the north side of State Street in Madison, WI by month, between 2015 and 2019.

Credit: Eco Counter <http://www.eco-public.com/public2/?id=100021426#>

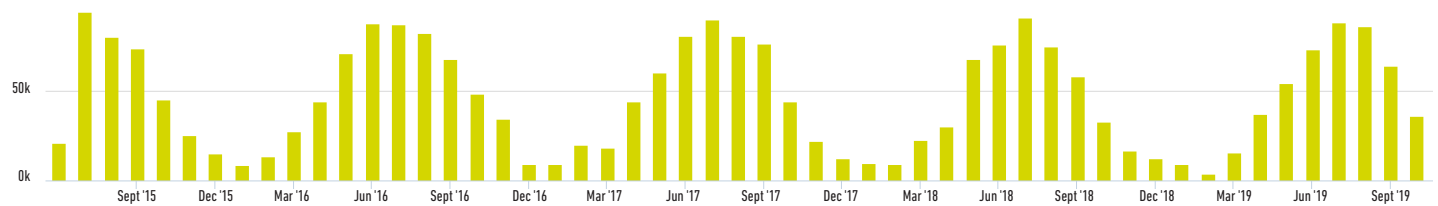


Figure 3. Bicycle counts on the Capital City Trail in Madison, WI by month, between 2015 and 2019.

Credit: Eco Counter <http://www.eco-public.com/public2/?id=100020865#>

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Total Traffic Volumes Across the Ten Reference Sites that Differentiate Between People Walking and Biking, 2014-2017

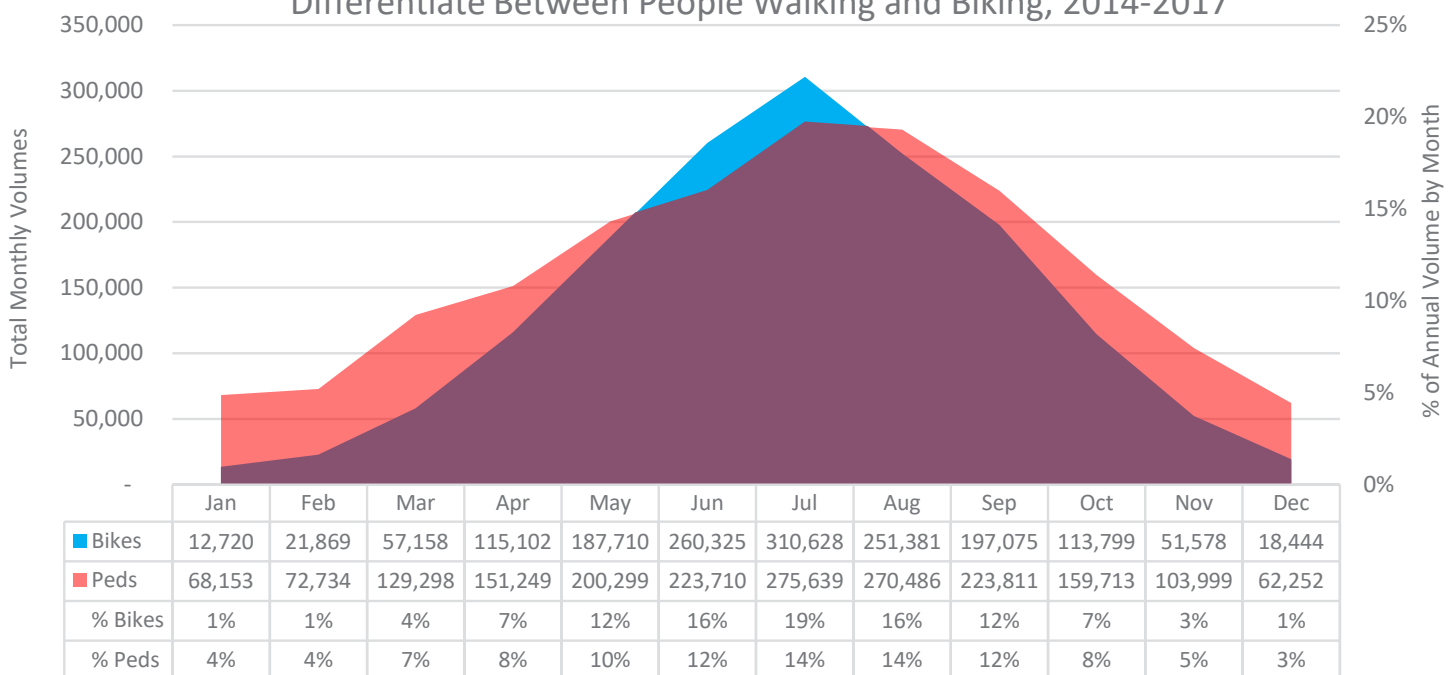


Figure 4. While winter walking and bicycling is less frequent at ten sites across Minnesota as compared to warmer months, data shows that people continue to walk and bike year-round. Credit: Minnesota Department of Transportation

2 Why do people walk and bike in the winter?

Some people walk and bike in the winter because they prefer to, while others do so because it is the most rational or economically viable option. More than 30% of U.S. residents⁶ do not have a driver's license, and close to 10% of U.S. households do not have a motor vehicle. These percentages are typically higher in urban areas, with numbers including 54% in New York City, 34% in Boston, 24% in Cleveland, 19% in Milwaukee, and 17% in Minneapolis.⁷

People walking and biking in winter are making the same kinds of trips as those they make during the rest of the year, and the same kinds of trips as people in cars. They

are getting to work or school, going to shop, visiting friends and relatives, accessing essential medical and social services, attending sporting events or worship services, or participating in a wide variety of other everyday activities. In addition, many people walking in winter are going to and from transit (i.e. bus, light rail, subway) services.

Also of note: many of those who walk and bicycle in winter are people with disabilities, older adults, and children. These people are typically among the most vulnerable road users even without the added challenge of winter conditions.



Figure 5. A bicyclist on the University of Minnesota - Twin Cities campus in Minneapolis.

⁶ <https://www.fhwa.dot.gov/policyinformation/pubs/hf/pl11028/chapter4.cfm>

⁷ <https://www.governing.com/gov-data/car-ownership-numbers-of-vehicles-by-city-map.html>

3 Will more people walk and bike if infrastructure is clear of snow and ice?

Surveys have shown that a lack of winter maintenance contributes to lesser amounts of walking and biking.

- The *Hennepin County 2040 Bicycle Transportation Plan*⁸ (Hennepin County is home to Minneapolis) revealed that snow and ice removal factored heavily into the decision by nearly 50% of survey respondents who would not ride a bicycle during the winter.



Figure 6. Pedestrian travel in winter is often hindered by snow piled at curb ramps, as shown in this image from Madison, WI.

- A survey in Toronto found that the presence of snow and ice kept people from walking in winter, especially older adults, and that icy sidewalks and puddles at street crossings and curb ramps were key elements influencing their reticence⁹ (see Figure 6).
 - Research for the 2013 Ottawa Cycling Plan found that 19% of respondents would use bike paths frequently if they were maintained in winter, and another 17% would use them sometimes.¹⁰ Ottawa subsequently created a winter-maintained cycling network and has seen an increase in winter-time use on these trails as a result.¹¹
 - A study by Winters et al. indicated that icy or snowy conditions, glass or debris, and potholes or uneven paving have a statistically significant negative impact on cycling. Debris, snow, ice, overgrown vegetation, and poor-quality surfaces all pose hazards to people cycling and are potential causes for crashes.¹²
- Another example of this effect comes from Arlington County, VA, which used to have a policy of not maintaining bike paths in the winter. While a considerable number of people continued to ride year-round regardless of temperature, ridership consistently disappeared as soon as snow or ice was present. Due to these trail counts, County policy was subsequently amended to identify a 10-mile/16-kilometer network of winter-maintained bike paths.¹³

8 <https://www.hennepin.us/-/media/hennepinus/residents/transportation/biking/bicycle-transportation-plan.pdf?la=en&hash=26ABAFD2C3476F5AD2CADF6EEB7DCDD509DE6295>

9 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3732686/>

10 https://documents.ottawa.ca/sites/documents/files/documents/ocp2013_report_en.pdf

11 <https://open.ottawa.ca/datasets/bicycle-trip-counters>

12 Winters, M., Davidson, G., Kao, D., Teschke, K., 2011. Motivators and deterrents of bicycling: comparing influences on decisions to ride. *Transportation* (38), 153-168.

13 <https://emergency.arlingtonva.us/weather/snow-ice/clearing-snow-on-trails/>

4

Who is responsible for winter maintenance—property owners or government agencies—and what are the challenges?

Bikeways (e.g. trails, side paths, separated bike lanes, standard bike lanes, shoulders, and bike boulevards¹⁴) are nearly universally maintained by government agencies. Not all agencies maintain bikeways in the winter, and some agencies only maintain priority facilities, such as trails.

When a separated bikeway (e.g. trails, side paths, separated bike lanes) is located along a county or state/provincial road, the road authority frequently develops an agreement with the local municipality to carry out the maintenance work. Sometimes these facilities are cleared before nearby motor vehicle lanes, depending upon priority level.

Snow clearance from non-separated bikeways (e.g. standard bike lanes, shoulders) should be done at the same time as snow clearance from motor vehicle travel lanes. However, due to lower prioritization, plow paths, wheel tracks from motor vehicles, ice and slush, and a lack of adequate physical separation, non-separated bikeways are often not maintained to a standard that provides a safe and comfortable bicycling experience after a winter storm.

Walkways (i.e. sidewalks, street crossings, curb ramps) are maintained by one or more of the following:

- Government agencies
- Individual property owners
- Special districts (a group of individual property or business owners with pooled resources)

In some cases, government agencies clear all walkways. Examples include Burlington, VT¹⁵; Montreal, QC¹⁶ (see Figure 7); and Rochester, NY (only when there is more than 4 inches/10 centimeters snow).¹⁷ Outside urban areas, this approach is usually limited to suburbs where walkway networks are concentrated on arterial roads; for example, Richfield, MN, a suburb of Minneapolis.¹⁸



Figure 7. Municipal crews clearing sidewalks in Montreal.

The more common approach to winter maintenance of walkways in the United States is to assign the responsibility to individual property owners that are adjacent to the walkway. Communities using this approach nearly always have an ordinance requiring snow removal from sidewalks within a designated timeframe, often 24 hours. Typically residents have the option to submit complaints about uncleared sidewalks with municipal staff. Enforcement varies by city, depending largely on specific policies and available staff resources. Madison, WI is an example of a city with an aggressive enforcement process that follows registered complaints, with no warnings given before fines are issued.¹⁹ Madison also has three full-time staff members who inspect sidewalk snow and ice clearance on high-priority corridors such as downtown and around schools.

¹⁴ https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

¹⁵ <https://www.burlingtonvt.gov/DPW/Snowfighting-Program>

¹⁶ <https://beta.montreal.ca/en/topics/snow-removal-sidewalks-and-streets>

¹⁷ <https://www.cityofrochester.gov/sidewalkplowing/>

¹⁸ <https://streets.mn/2019/02/20/municipal-sidewalk-clearing-in-richfield-an-interview/>

¹⁹ <https://www.cityofmadison.com/residents/winter/Snowlce/snowRulesFAQs.cfm>



Figure 8. An educational flyer in Red Wing, MN notifies individual property owners of their responsibility to clear sidewalks.

Some communities create educational materials to notify property owners of their maintenance responsibility (see Figure 8)²⁰, but the individual property owner approach often results in a patchwork effect. Some sidewalks are cleared while others remain uncleared due to a lack of awareness, vacancies, vacationing property owners, and property owners with limited physical abilities; street plows that push snow onto walkways

create additional challenges. Also, many communities do not explicitly require snow removal at curb ramps, further contributing to the patchwork effect. Clearing street crossings and access routes to pedestrian push buttons are additional challenges. While these latter items remain the responsibility of the municipality, staff resources and training are often inadequate and may result in delayed or insufficient snow clearing.

Some communities employ a government agency/property owner hybrid approach, where priority winter walking routes are identified and cleared by municipal crews while the remaining sidewalks are cleared by individual property owners. In this scenario, the municipality uses a set of geographic destinations to identify pedestrian priority routes. These may include proximity to schools, parks, downtown areas, and transit routes. Duluth, MN and Bangor, ME are two American cities that employ this hybrid approach (see Figure 10²¹ and Figure 11).

The final approach is districts, where individual property owners in close geographic proximity are charged annual service charges (a municipal tax) for special services, such as hiring private contractors to clear snow and ice from walkways. These districts are sometimes known as “business improvement districts” or “special service districts,” and are often located in downtown and neighborhood commercial areas. Downtown Fargo, ND is an example of a district that prioritizes winter walkway maintenance (see Figure 9).²² A more informal approach using donations has been developed in a residential neighborhood by a non-profit organization in Ann Arbor, MI.²³

Winter Sidewalk Maintenance Funding by District



Figure 9. Walkways are sometimes cleared by a district authority.

20 <https://www.red-wing.org/487/Shoveling-Your-Sidewalk>

21 <https://duluthmn.gov/winterwatch/sidewalk-priority-maps/>

22 <https://www.downtownfargobid.com/>

23 <https://snowbuddy.org/>

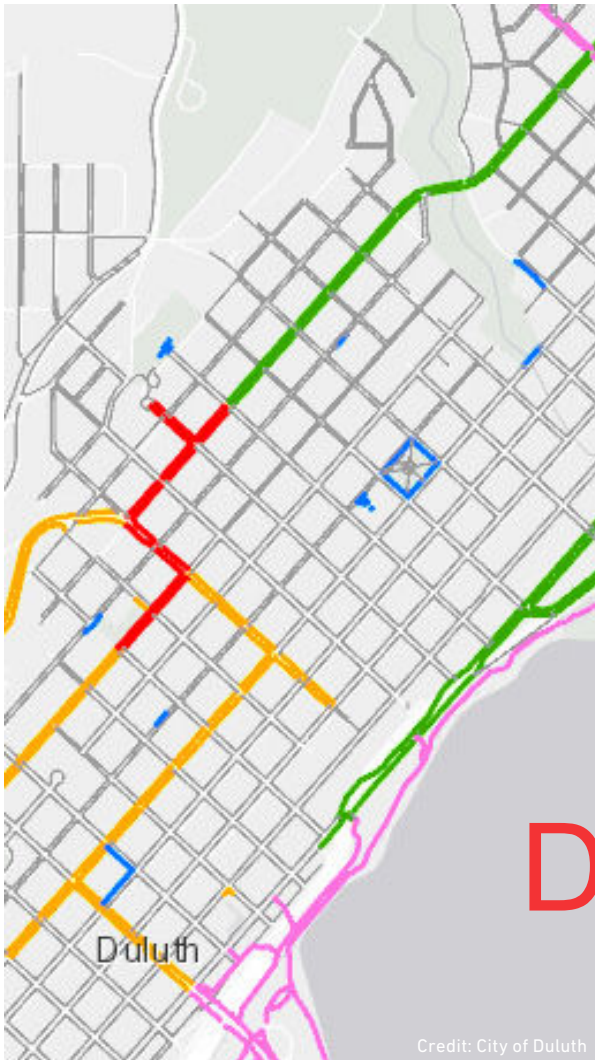


Figure 10. Duluth, MN has a 100-mile/160-kilometer priority walkway network cleared by city and county crews. These routes connect transit routes (shown in green), parks (blue), schools (red), high pedestrian traffic areas (pink), and medium pedestrian traffic areas (yellow).

Partial-Municipality Led Sidewalk Snow Clearing

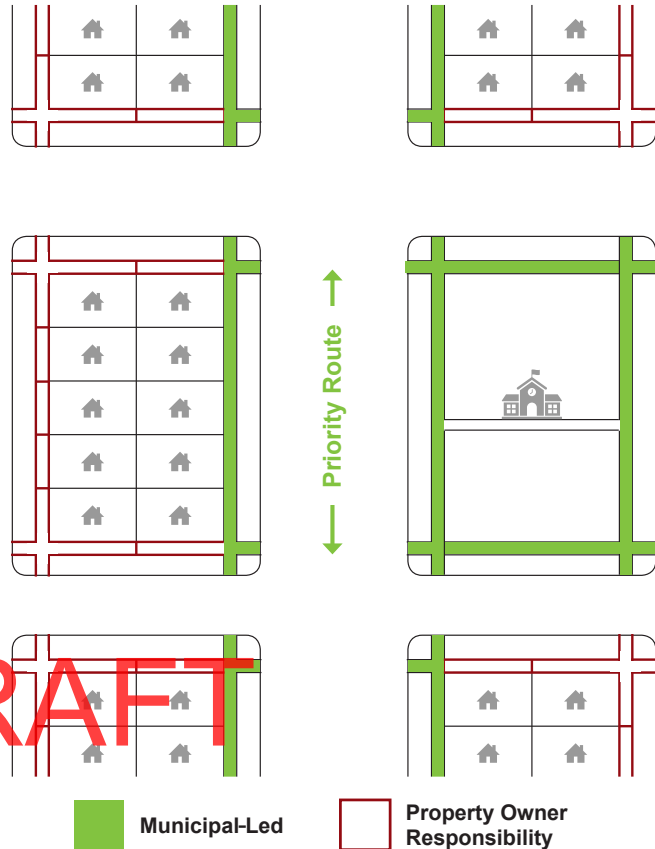


Figure 11. A detailed map illustrating the hybrid approach, where priority routes are cleared by government crews and non-priority routes are maintained by adjacent property owners.

5 What are the best ways to remove snow and ice from walkways and bikeways while also caring for the local ecosystem?

Like for motorists, the safest walking and bicycling surface for pedestrians and bicyclists is bare pavement. Achieving bare pavement may require action before, during, and after winter precipitation.

- **Before:** Pre-treating path, walkway, or street surfaces with salt brine will lower the temperature at which liquid freezes, often keeping pavement wet and reducing the formation of ice (see Figure 12).
- **During:** Clearing accumulated precipitation often prevents footsteps and bicycle tires from packing snow onto surfaces.
- **After:** Clearing snow and ice with equipment and spreading material (e.g., sand, small diameter gravel, salt) speeds melting and improves traction.

More and more, government agencies are using liquid anti-icing mixtures such as salt brine to pre-treat roadways, bikeways, and walkways before a winter storm. Salt brine is commonly applied using “pencil spray nozzles” attached to the back of a truck or utility vehicle, leaving parallel lines of salt brine mixture (see Figure 12).

Pre-treating or anti-icing offers many benefits over de-icing (i.e. applying salt after a snow storm), including faster salt activation and quicker melting, lower melting temperature, better salt penetration, and reduced salt loss due to a lower “bounce and scatter” rate, which saves money and reduces environmental impacts by using less salt.²⁴

Applying too much salt can be very harmful to the local ecosystem as it eventually ends up in our lakes, rivers, streams, and wetlands. High levels of salt in waterways pollutes our water supply and is harmful to fish and other aquatic life. Once salt is in our waterways, it does not break down.²⁵

Timing of snow and ice removal efforts is also an important consideration. Sometimes winter precipitation begins with rain, and with a subsequent drop in temperature, ends with ice and/or snow. Cold air often follows winter precipitation, freezing liquid into ice on a walkway or bikeway. To achieve bare pavement in these scenarios, keep the following in mind:

- If rain falls before ice or snow, spreading salt is ill-advised because rain will wash it away. Furthermore, rain can push salt into storm sewers and bodies of water, causing unnecessary harm to the water supply.
- If rain and snow has turned to slush, remove the combination from walkways and bikeways before the temperature falls very far below freezing. Otherwise this precipitation will stay frozen in place as long as sub-freezing temperatures persist.

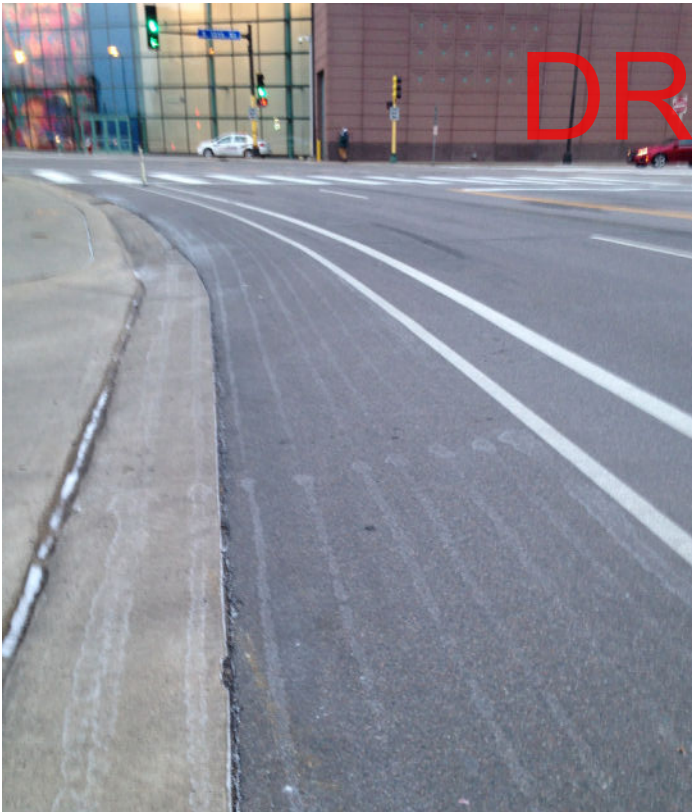


Figure 12. In this case, salt brine has been spread on a bike lane before winter precipitation.

²⁴ http://epdfiles.engr.wisc.edu/pdf_web_files/tic/bulletins/Bltn_022_prewetting_antiicing.pdf

²⁵ <https://www.wisaltwise.com/Overview>

6 What type of equipment is needed?

Equipment for maintaining walkways and bikeways varies widely, from snow shovels to plows attached to pick-up trucks. Operators also vary, from pedestrians and tractor operators to licensed drivers. Unlike roads, walkways and separated bikeways (i.e. trails, side paths, separated bike lanes) are narrow facilities that often require smaller vehicles. The dump trucks and graders that clear streets are usually not practical for walkways and bikeways due to their width and weight.

Maintenance vehicle attachments such as plows, blowers, and brooms are vital pieces of winter equipment. Plows may be attached to many different types of vehicles and are used for pushing aside snowfalls of about 2 inches/5 centimeters or more. Blowers and brooms are attached to smaller pieces of equipment (see Table 1). Blowers move large snowfalls (6 inches/15 centimeters or more) and are also routinely used to move windrows, which are compacted piles of snow left over from road plows. Brooms are used to achieve a bare pavement surface and are typically used for snowfalls of 2 inches/5 centimeters or less. Brooms may also be used to achieve bare pavement after plows or blowers have passed. Salt and sand spreaders may be attached to a vehicle (see Figure 13).



Figure 13. A sand spreader on the back of a pickup truck.

Equipment varies in width, but should not be wider than a walkway or bikeway.



Pickup truck with plow

Approximate Width: 8.5 feet/2.6 meters

Walkway/Bikeway Facility Types: Trails, side paths, 2-way separated bike lanes



Skid loader with snow blower

Approximate Width: 4 feet/1.2 meters

Walkway/Bikeway Facility Types: Walkways, trails, side paths, 2-way separated bike lanes, 1-way separated bike lanes

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Credit: City of Eden Prairie, MN

Miniature tractor with snow blower

Approximate Width: 4 feet/1.2 meters

Walkway/Bikeway Facility Types: Walkways, trails, side paths, 2-way separated bike lanes, 1-way separated bike lanes



Lawn mower tractor (converted to winter maintenance vehicle) with broom

Approximate Width: 4 feet/1.2 meters

Walkway/Bikeway Facility Types: Walkways, trails, side paths, 2-way separated bike lanes, 1-way separated bike lanes

7 Does the Americans with Disabilities Act (ADA) require snow removal on walkways in winter?

The Americans with Disabilities Act (ADA) requires access to walkways during winter, and the Federal Highway Administration has issued guidance that pedestrian routes must be open and usable throughout the year, with only isolated or temporary interruptions.²⁶ The minimum clear width for pedestrian routes is 4 feet, with 5 feet by 5 feet passing areas every 200 feet. Snow removal is also required on pedestrian facilities that have been constructed with federal funds.²⁷

An example of a winter maintenance policy influenced by ADA concerns comes from the State of Delaware. There, the Department of Transportation (DOT) adopted a sidewalk snow removal policy in 2013 that requires the agency to perform winter maintenance on walkways adjacent to its roads, due in large part to ADA requirements.²⁸



Figure 14. Snow piled in front of pedestrian push buttons prevents people with disabilities from activating the signal.

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²⁶ https://www.fhwa.dot.gov/civilrights/programs/ada/ada_sect504qa.cfm#q31

²⁷ <https://www.fhwa.dot.gov/preservation/082708.cfm>

²⁸ <https://deldot.gov/Business/ada/pdfs/SidewalkMaintenancePolicy.pdf>

8 How can walking and bicycling infrastructure be designed for easier winter maintenance?

Several preventative measures can be taken during the design phase of a project to make winter walking and bicycling more feasible. Through careful design, walkways and bikeways can be engineered to avoid issues such as poorly drained walkways and bikeways becoming icy and slippery as a result of the freeze/thaw cycle that often follows a winter precipitation event. Designers should ensure that the areas next to the bikeway or walkway are graded away from the walking or biking surface, and adequate drainage infrastructure should be provided to prevent standing water.

Whenever possible, curb ramps should be located at the high point of an intersection to avoid standing water, and if this isn't possible, ADA-compliant storm drain grates should be added near the base of the curb ramps.

When possible, snow should be stored in the space between a road and a sidewalk or trail. The dimensions will depend upon the given community's climate, but typically these areas range from 4 to 8 feet (1.2 to 2.4 meters) in width.

Where there is no space for snow storage, designers should consult with the jurisdiction's maintenance staff to make plans for the off-site removal of snow.

Several communities have retrofitted separated bike lanes that are located at street-level between existing curbs. When these facilities are located down-slope from the crown of a road, snow often melts and re-freezes into icy patches across bike lanes. To prevent this from occurring, it is possible to remove the snow between the travel lanes and bike lanes instead of using this space for snow storage (see Figure 16). The preferred long-term solution is to redesign the street to drain snowmelt away from separated bike lanes.



Figure 15. This sidewalk is lower than the adjacent yards, resulting in pools of standing water in the pathway of pedestrians.

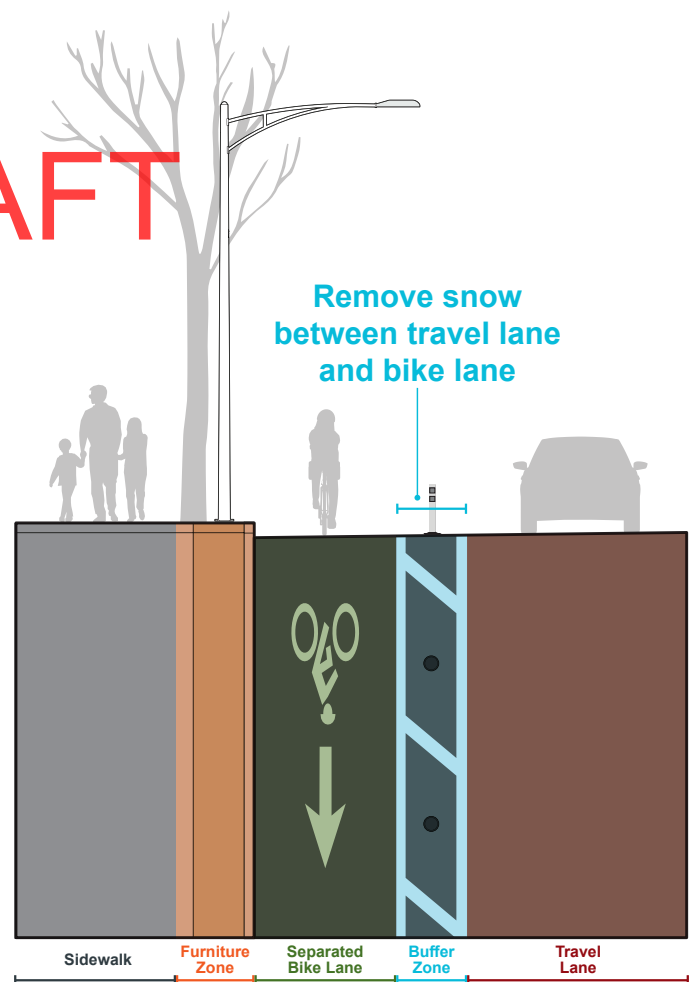


Figure 16. Removing snow from the buffer zone prevents snowmelt from refreezing into icy patches across the bike lane.

9 How should transit stops be maintained in the winter?

Transit (i.e. bus, light rail, subway) stops may see high amounts of foot traffic in winter, making snow and ice removal on nearby walkways critical. Good winter maintenance near transit stops improves safety by keeping pedestrians out of the street and other dangerous areas. The Massachusetts DOT recommends that bus stops have minimum 5-foot by 8-foot boarding and alighting areas cleared of snow and ice, with a minimum 4-foot-wide path connecting with nearby walkways.²⁹

Each community should have a clear idea of who is responsible for maintaining transit stops. The responsible party may be municipal crews, transit agency crews, or adjacent property owners. While some communities, such as Portland, ME, have volunteer programs,³⁰ the most important principle is consistent and reliable maintenance that allows transit users to walk to and from their stops.



Figure 17: A well-maintained bus stop in Minneapolis-Saint Paul. Credit: Metro Transit.



Figure 18: A poorly maintained transit stop will pose significant challenges for transit riders.

29 https://www.mass.gov/files/documents/2018/09/17/MunicipalResourcesGuideForWalkability_2018-08-24.pdf

30 <http://adopt-a-stop.org/>

10 What funding sources are available for winter maintenance?

Properly maintaining walkways and bikeways in the winter requires additional resources including staffing, equipment, and materials. As communities increase their networks of walking and biking infrastructure, it is important to think about the ongoing maintenance and operational costs associated with those facilities before they are built.

Most communities fund winter walkway and bikeway maintenance using general tax funds (sourced through property, sales, and income tax revenues). This is similar to how winter street maintenance is funded. However, if a municipality takes responsibility for winter maintenance of walkways, it is also possible to directly assess property owners for this service. For example, Rochester, NY charges an embellishment fee on property tax bills based on a property's front footage. The charge for sidewalk snow plowing for an average homeowner in Rochester is \$36 per year.³¹

Summary

Multimodal transportation infrastructure helps communities build streets that better serve people of all ages and abilities. As communities expand their walking and biking infrastructure, it is critical that they develop plans for maintaining these facilities throughout the winter to ensure that walking and biking remain viable modes of transportation year-round. Well-maintained walkways and bikeways strengthen confidence in the multimodal network and help provide everyone with equal access to the transportation system.

31 <https://www.cityofrochester.gov/article.aspx?id=8589936477>

More Resources

Several agencies have created resources that examine winter maintenance of walkways and bikeways in more detail. These may be helpful resources for communities interested in modifying their winter maintenance policies or practices.

[Pedestrian and Bicycle Winter Maintenance Study, City of Minneapolis, 2018](#)

[Sidewalk Snow Clearing Guide, Minnesota Department of Health, 2018](#)

[Best Practices for Cycle Path Winter Maintenance Processes, Tampere University, 2014](#)

[A Guide for Maintaining Pedestrian Facilities for Enhanced Safety, Federal Highway Administration, 2013](#)

[Winter Maintenance of Pedestrian Facilities in Delaware: A Guide for Local Governments, Delaware Department of Transportation, 2012](#)

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