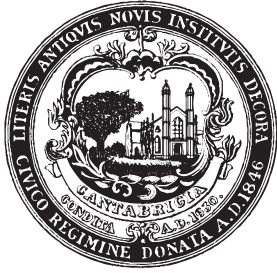


CITY OF CAMBRIDGE BICYCLE PLAN

TOWARD A BIKEABLE FUTURE 2020



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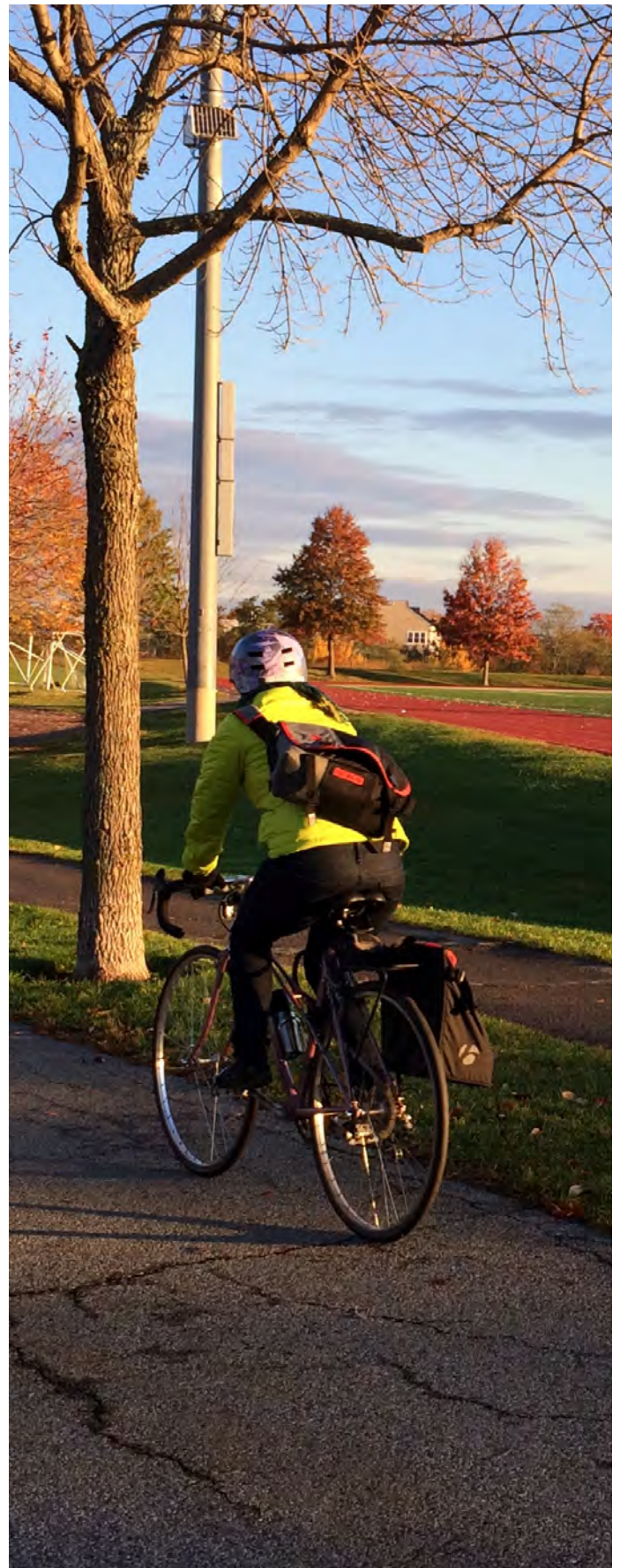
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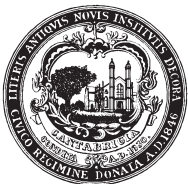
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CONTENTS

PREFACE CAMBRIDGE BICYCLE PLAN 2020 UPDATE

CHAPTER 1 PEOPLE, POLICIES, & GOALS

- + OVERVIEW
- + A PLAN FOR EVERYONE
- + POLICY CONTEXT
- + PLAN VISION, GOALS & TARGETS
- + DEVELOPING THE VISION
- + HOW THE BICYCLE NETWORK VISION IS USED

CHAPTER 2 BICYCLE TRANSPORTATION

- + BICYCLING IN AMERICA
- + THE BENEFITS OF BICYCLING
- + THE POTENTIAL FOR BICYCLING
- + WHAT IS NEEDED TO SUPPORT PEOPLE OF ALL AGES, ABILITIES AND IDENTITIES?

CHAPTER 3 INFORMATION AND REPORTING

- + SURVEYS ON BICYCLING
- + BICYCLE COUNTS
- + BICYCLE CRASH DATA AND ANALYSIS

CHAPTER 4 BICYCLE FACILITY TOOLBOX

- + GOALS AND PRINCIPLES
- + SEPARATED BIKE LANES
- + SHARED USE PATHS
- + BICYCLE PRIORITY STREETS
- + OTHER BICYCLE LANES
- + CORRIDOR TREATMENTS
- + SPOT TREATMENTS

CHAPTER 5 THE BICYCLE NETWORK VISION

- + OVERVIEW
- + PUBLIC INPUT
- + BICYCLE LEVEL OF COMFORT
- + LEVEL OF ACCOMMODATION
- + BICYCLE NETWORK VISION

CHAPTER 6 BICYCLE PROGRAMS

- + OVERVIEW
- + COMMUNITY OUTREACH PROGRAMS
- + ADVISORY COMMITTEES AND INTERDEPARTMENTAL COORDINATION
- + OTHER PUBLIC AGENCIES
- + WORKING WITH COMMUNITY PARTNERS
- + CITY OF CAMBRIDGE EMPLOYEES
- + REGULATIONS THAT SUPPORT BICYCLING

CHAPTER 7 BICYCLE PARKING AND PUBLIC BICYCLE REPAIR FACILITIES

- + OVERVIEW
- + PUBLIC BICYCLE PARKING
- + PRIVATE BICYCLE PARKING
- + BICYCLE RACK DESIGN STANDARDS
- + PUBLIC BICYCLE REPAIR STANDS

CHAPTER 8 PUBLIC TRANSPORTATION AND PUBLIC BIKE SHARE

- + MULTI-MODAL TRIPS: PUBLIC TRANSPORTATION
- + BIKE SHARE

CHAPTER 9 OPERATION AND MAINTENANCE

- + OPERATION & MAINTENANCE PROGRAM
- + CONSTRUCTION MANAGEMENT

CHAPTER 10 ACTION ITEMS

- + IMPLEMENTATION
- + ONGOING WORK

APPENDICES

- + APPENDIX A: CAMBRIDGE COMMUNITY SURVEY SUMMARY (2014)
- + APPENDIX B: CAMBRIDGE COMMUNITY NEEDS SURVEY SUMMARY (2020)
- + APPENDIX C: CAMBRIDGE BICYCLE CONVERSATIONS SUMMARY
- + APPENDIX D: EXISTING AND PLANNED BICYCLE FACILITIES MAP
- + APPENDIX E: BICYCLE LEVEL OF COMFORT CRITERIA
- + APPENDIX F: BICYCLE NETWORK VISION MAP
- + APPENDIX G: BICYCLE NETWORK VISION RESPONSE
- + APPENDIX H: QUICK-BUILD BIKEWAY PROJECT SELECTION, CONCEPT DEVELOPMENT, AND PRIORITIZATION PROCESS
- + APPENDIX I: BICYCLE PARKING GUIDE

PREFACE

CAMBRIDGE BICYCLE PLAN 2020 UPDATE

A MESSAGE

When the City embarked on this update of the 2015 Bike Plan in 2019, it could not have foreseen the events of 2020 and the impact of the COVID-19 pandemic, which caused the City to direct a large part of its resources towards addressing the public's immediate needs. This led to an extension in the time it took to complete the update.

From the experiences of 2020, it became even more apparent that among peoples' critical needs is access to safe, affordable transportation, including the use of bicycles. In fact, bicycle use throughout the US increased markedly during the year, as people discovered or rediscovered its benefits for health,

affordability, and convenience. The significant value of bicycle transportation highlighted the importance of completing the Bike Plan Update work underway. We were fortunate to have engaged with many stakeholders and received feedback for the Plan before March of 2020. However, COVID-19 required that we shift engagement from primarily in-person to primarily virtual. During this pivot, efforts were made to ensure feedback was representative of the diverse Cambridge community. It is important to note that this plan is intended as a framework and roadmap, and the work we are doing will be ongoing. As the work was substantially completed during 2019-2020, the Plan will be referred to as the '2020 Update'.



Despite the pandemic, bicycling activity remained high in Cambridge and riding increased, including on Memorial Drive when it is closed to motor vehicle traffic.

HIGHLIGHTS OF THE 2020 UPDATE

You will see in this 2020 Update:

- + **Spotlights on members of our community:** this plan is for the people who live, work, and visit here and we want to keep them front and center.
- + **The principle of achieving a bikeable city for people of “all ages and abilities” has been expanded to include the term “identities.”** This expanded definition recognizes that many factors beyond age and physical ability influence how people experience bicycling.
- + **A heightened focus on equity and inclusiveness.** While these are values that were present in the development of the 2015 Plan, the 2020 Plan more explicitly highlights how those principles inform our work and what we can do to enhance those efforts.
- + **Descriptions of City policies and ordinances adopted since 2015, including: Vision Zero; Complete Streets; and the Cycling Safety Ordinance.**
- + **Updated information throughout, including highlights of our expanded Safe Routes to Schools program and new programming for older adults.**
- + **An updated map of the Network Vision, along with information on new tools and procedures for implementation, particularly as they related to the Cycling Safety Ordinance.**
- + **Information on “Quick-Build” tools, which have become very important in expanding the pace of facility implementation.**
- + **Updates on our Action Items, including the successful completion of over 80% of the action items identified in the 2015 Plan.**
- + **Updates on the ever-expanding and successful Bluebikes bike share program.**



Bicyclist riding with two children.

NB: COVID-19 safety protocols were followed in all work undertaken as part of this Plan Update after the beginning of the pandemic. Note that the Plan Update includes photographs of engagement and outreach activities that were taken prior to the beginning of the COVID-19 pandemic.

ADAPTING AND RESPONDING TO PANDEMIC CIRCUMSTANCES

This Plan is intended to be long-lasting, and we are optimistic that in the future we will not be living under the constrained conditions of a pandemic, which reduced our ability to engage with the community in-person. The events of 2020 required some creative thinking, and innovative efforts were implemented to support the community’s ability to be outside safely. This included more room for outdoor restaurant dining to support small businesses and piloting “shared streets” to promote physical activity. We expanded outdoor “tabling” events to be able to reach people where they were and provide opportunities for input with appropriate safety protocols in place.

The following images highlight some of the ways the City and the members of the community adapted to the unprecedented challenges of 2020 to build a better and more resilient plan, environment, and culture for bicycling.

REPURPOSING STREET SPACE FOR OUTDOOR DINING



Inman Square, Summer 2020

SHARED STREETS FOR PHYSICAL DISTANCING



Bicyclist riding on shared street.

IN-PERSON ENGAGEMENT FOLLOWING HEALTH AND SAFETY PROTOCOLS



Members of the outreach team spoke with people at Starlight in Central Square to get feedback on their thoughts about bicycling in Cambridge.

OUTDOOR "ADVERTISING" TO REACH THE COMMUNITY



Sign about the Cambridge Bike Plan Update.

About 70 signs were placed throughout the city to let people know about opportunities to engage in the Bicycle Plan Update efforts.

BLUEBIKES

The Bluebikes bike share system was not only in continuous service throughout 2020 but also provided enhanced support to ensure that people had access to safe, reliable transportation. In addition to the ongoing income eligible program, supplemental resources provided key sectors with support.

During the summer of 2020, free memberships were offered to those on the front lines of the fight against the pandemic through our Hospital Workers program, which helped 1130 riders to take over 20,000 trips, with 15 hospitals participating. Free memberships were also offered to essential workers in grocery, pharmacy, retail and restaurant sectors. The Essential Workers program helped 305 members take over 6000 trips through the end of 2020. See Chapter 8 for more details about Bluebikes.



Person riding a Bluebike.



Nurse biking with child.

I'm a nurse practitioner who lives in Cambridge and works at MGH. Before COVID, I was very reliant on public transportation. But since March 2020, I've dusted off my bike and gotten back onto the road. It's been a beautiful and invigorating way to start and end my day- especially after some rough days at the hospital during the peak of COVID. My young children have also gotten in on the excitement- they love riding on the back of mom's bike even if it's just a loop around the block or a trip down the bike path.

- Tiffany Clapp, North Cambridge

GRASS ROOTS ENERGY

Cambridge Bike Give Back is a grass roots organization started during the COVID-19 pandemic in response to needs the founders saw in the community for affordable and safe transportation. They collect old bikes, fix them up and donate them to those in need.

Cambridge Bicycle Safety, a local advocacy organization, organized Volunteer Emergency Delivery Service during the COVID-19 pandemic. They offered seniors, parents of small children who could not get out to stores, and other vulnerable residents help picking up store orders by bike from local businesses that support “curbside pick-up” and “contactless” ordering.



Co-founder of Cambridge Bike Give Back, Lonnell Wells, familiarizing a recipient with his new bicycle.

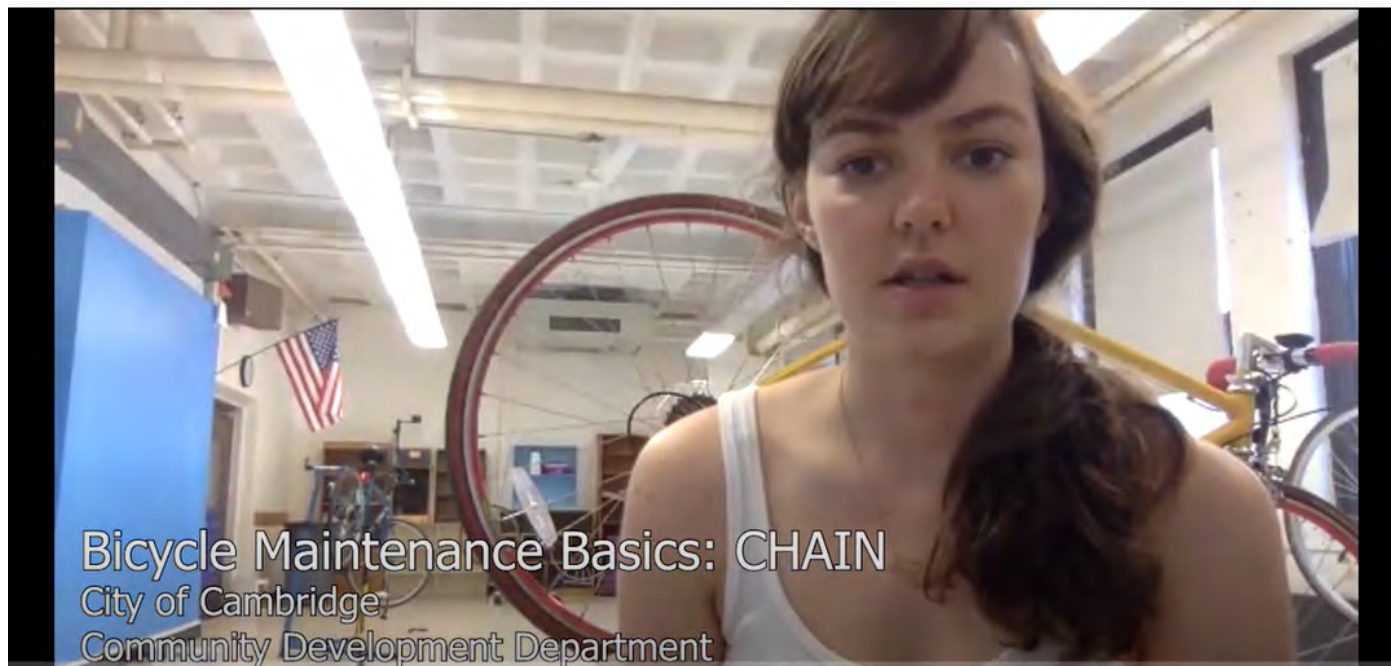


Bicyclist from Cambridge Bicycle Safety making a delivery during COVID-19 pandemic.

VIRTUAL PROGRAMMING

The Safe Routes to School trainings normally held in-person – in classrooms and outside– were done online this year. A special series of virtual workshops focused on urban cycling for older adults was held

in the fall of 2020. See Chapter 6 on Programs for further details on these and more; virtual programming is available on line.



Adi Philson (Community Development Department) provides bicycle maintenance tips in this free online series.

CHAPTER 1

PEOPLE, POLICIES, & GOALS



OVERVIEW

Cambridge is a great place for people to bicycle, whether for a trip to the grocery store, a ride along the river, or a pleasant way to get to work. This can be seen in the large numbers of people who are out and about on a bike. Many days see multitudes of people using the bike facilities going to work or school on a weekday morning, or enjoying a family trip on a weekend. It is a primary goal of this Plan that the city be a place where anyone who would like to bicycle is able to do so.

The focus for the Bicycle Plan 2020 Update is on the people who are part of the city, including those who already enjoy riding and those who would like to but are not yet. The latter may be young children just learning to ride a bike or adults who are hesitant for a variety of reasons. We have been working since the previous plan to extend access for all through our enhanced programs such as Safe Routes to School, expansion of the Bluebikes bike share system (both the available network and the range of affordable options), and continued expansion of a high comfort bicycling network. During the 2020 Update process we heard from members of the community about what is working well and where they would like to see additional efforts.

The Cambridge Bicycle Plan lays out a vision for where we as a city want to be. The fundamental guiding principle for this plan is to enable people of all ages, abilities and identities to bicycle safely and comfortably throughout the city. This Plan provides the framework that will help meet this goal.

A PLAN FOR EVERYONE

This is a plan for people. This plan strives to center the experiences people have when moving about the city, recognizing that needs and perspectives are diverse. The goal of establishing a more equitable society and a more equitable city is at the forefront of public policy considerations in Cambridge. The terms “equitable” and “equity” can be used in many ways, and it is not the role of this specific plan to claim to represent all of its meanings for all people.

For the purposes of this work, we are concerned with achieving a future in which one’s age, gender, race/ethnicity, physical ability, or any other identification does not predict (or limit) their quality of life, health outcomes, involvement in crashes, or mode of transportation.

While we recognize that bicycling is a part of a larger solution for supporting people’s mobility needs, it stands out as an especially affordable, healthy mode of transportation that can create opportunities for people. We recognize that barriers currently exist that might prevent or discourage people from bicycling, so our focus is on reducing barriers and providing opportunities.

*As a plan for everyone, the 2020 Cambridge Bicycle Plan Update process included collecting **Bicycle Stories** from people that bike in Cambridge. Stories were collected online and at public outreach events. A related effort, called **Cambridge Bicycle Conversations**,¹ focused on engaging with and collecting experiences from people of color, seniors, people with disabilities and people participating in the city’s affordable housing programs. These stories and experiences not only helped make this a plan for everyone, but are also shared throughout this document to illustrate the diversity of people that bike and their experiences.*

DIVERSITY OF USERS

Throughout this plan, we use the term “all ages, abilities and identities” to refer to the diversity of users. The word “identities” is included to recognize that many factors beyond age and physical ability influence how people experience bicycling.

People are often put in separate boxes based on their mode of travel—drivers, pedestrians, transit users, and bicyclists. People within each box are incorrectly assumed to behave the same way and share the same perspectives. However, the reality is that Cambridge residents potentially use many of these forms of transportation. Furthermore, people who bicycle, or are interested in bicycling, come from every walk of life and are representative of the full range of the population.



As we consider how to address the needs of different users, we take into consideration their diversity* with respect to:

AGE

People have different needs and abilities throughout the course of their lives. Young children not only need to learn how to ride as well as the fundamentals of rules of the road; their cognitive and perceptual abilities are not fully able to manage the complexities of navigating a traffic environment until they are about 10-12 years old. At the other end of the life scale are older people who may need to travel more slowly, or may need to consider using bicycles that support potential balance issues (e.g., an adult tricycle).

PHYSICAL ABILITY

Bicycling is generally accessible for the vast majority of people, regardless of physical fitness, but not everyone can or wants to ride at the same pace or on the same type of bicycle. Recumbent bicycles, adult tricycles, hand-crank cycles and tandem bikes are examples of the kinds of bicycles that may help to support riders for whom a more standard bicycle is not an option. There are some people whose constraints make walking not viable but bicycling accessible.

GENDER

Women are under-represented in their use of bicycling for transportation in the U.S.—an imbalance not present in all places. Research studies have revealed that women are more concerned about traffic safety than men, but other factors are at play as well, including cultural expectations (e.g., perceptions of what norms are for women or expectations for clothing) and the generally greater burden placed upon women for family and household obligations. In other Western

*We recognize that this may not cover every possible permutation or representation.



"I can't walk or run but I use this to go everywhere. I cycled 10,500km on this in the last seven years. Without this tricycle I would have to use a wheelchair."

- Donald Drebaum

countries where bicycling is the norm (e.g., Denmark or the Netherlands), many household obligations such as food shopping or transporting children to school is done by bicycle, and more than half of bicycle trips are made by women. In the U.S., those trips are more likely to be made by car.

While the research and evidence about under-representation of women has been fairly well documented, less is known or understood about how other identities—such as being nonbinary, nongendered or LGBTQ+—may inform a person's relationship to bicycling.

ECONOMIC SITUATION

For some people, owning a bicycle is a cost that is beyond their means, considering the maintenance and items such as helmets and locks, as well as the purchase cost of the bicycle itself. Other costs are more hidden: is there a place to store the bike? What about insurance for a lost or stolen bicycle?

RACE

In the U.S., people of color have experiences and face barriers that differ significantly from those of the white population (or those who may appear white to others and be treated as such). On a national level, people of color are more likely to suffer a fatal crash,^{2,3} and to experience harassment from law enforcement and the general public. While people of other races have such experiences, studies based on national data show that Black people are more likely to be stopped by the police⁴ (and these stops often escalate), and drivers are less likely to yield to people with darker skin tones⁵ when they are walking or biking. These and other facts translate into some people of color expressing concerns about safety when using the transportation system and experiencing disproportionate negative outcomes. These

concerns may play a role in discouraging some people of color from trying biking or biking more.

CULTURAL BACKGROUND/IDENTITY

Riding a bicycle may be perceived differently through the lens of some cultures or communities. It may be looked at as “lower class,” or “only for children,” or “not for women.” There may also be impacts to people whose appearance presents differently to those in a community, and therefore may potentially be treated differently or have concerns about being treated differently.

LANGUAGE

While there is a lot of material and educational information on bicycling, most of it is in English. It is important to consider all communications, including working to present materials in clear language, avoiding jargon, and expanding materials in other languages for the community.



EXPERIENCE

Personal experience influences one's comfort level with bicycling in Cambridge. Has one biked as a child; has one ever biked in an urban setting; has one had negative or positive experiences; has one experienced harassment, either by officials or by other road users?

It is important to acknowledge that we must be considerate of and supportive of all people and their needs. Meeting the needs of the diversity of users requires providing infrastructure that is safe, comfortable, and inviting, as well as shaping programs to prioritize diverse and inclusive participation.

I had a kid three years ago. That changed my cycling...I ride at a quarter of the pace. Now she's like, 'I want to go on the bike' instead of the stroller. People always wave to her on the street.

—Bicyclist who rides daily with her daughter.

PROVIDING ACCESS & ADDRESSING BARRIERS

In order to provide more equitable access to bicycling, we need to consider both providing access and removing barriers to the extent possible. These considerations apply to all aspects of planning for bicycling and are addressed throughout this document. Below is a sampling of how access and barriers apply to various topics and how they can be addressed (see additional information in relevant chapters in the document).

ACCESS TO A BICYCLE

One of the most direct ways of making bicycling available to all is the provision and ongoing support of the public bicycle share system, Bluebikes. Bluebikes is owned by Cambridge and its partner municipalities, with a commitment to maintaining the system. The City of Cambridge has a goal of establishing a station within at least 1/4 mile of every resident and ideally within 1/8 of a mile. The availability and easy access of a public bicycle share system means that one does not need to own a personal bicycle. Moreover, programs such as the Income Eligible Program ensure that it is affordable to all. Educational offerings about how to use bike share help support this access as well.

Some people may of course prefer to own their own bikes, and Bluebikes may not be convenient for all destinations or function adequately for all abilities. Bluebikes are also only available for those 16 and over, so bicycles for children should also be considered. Cambridge has an "Earn-A-Bike" program specifically aimed towards children (see Chapter 6). Similar programs may be created for adults, and one grass roots organization (Cambridge Bike Give Back) works to refurbish abandoned bikes to give to those in need.

Other economic support that the City provides includes an extensive series of free classes, equipment such as helmets and lights, and free tune-ups at various times and events for the public (see below and in Chapter 6).

ACCESS TO KNOWLEDGE

It is the City's intent that all children in the Cambridge Public School system learn to ride, learn rules of the road, and receive on-bike training in riding on the roads. This is done through the Safe Routes to School program and physical education classes. In addition, free bike classes are available to any Cambridge resident (including how to ride in traffic, how to maintain a bike, how to use Bluebikes, etc.), and specialized classes for older adults are offered as well. Supportive programs include

community rides and educational and outreach materials in multiple languages. All who take a City-provided class are eligible to receive a free helmet.

Educational programming is structured so that it is geared towards age and ability groups. Classes and programming have also been created specifically for women and older adults to create a comfortable environment.

Group rides or events that are fun, social, and empowering are effective at encouraging people to get out on their bikes. These events are particularly successful when led by people that are part of the community. The City supports grassroots community groups with resources such as free

Bluebikes passes or providing support materials such as bike lights or helmets.

ACCESS TO SAFE BICYCLE STORAGE

Through its extensive public bicycle parking program and thorough zoning requirements, the City works to ensure that people have safe and convenient places to store bicycles. One challenge is that older buildings may not have useable space; this is a challenge the City will continue to work on.



Soul on Wheels was created by Cambridge resident James Pierre as a means of supporting men of color riding bikes for health and fun while highlighting fashion, style, and local designers.

OVERCOMING PERCEPTUAL BARRIERS

One's culture, gender, race, physical ability and prior experience all contribute to how one relates to and perceives bicycling. One perceptual barrier expressed by many people is that biking requires high levels of physical ability or athleticism. By listening to people and hearing what they need, we can provide the most relevant resources and support.

Cambridge has conducted significant bicycle and public health related outreach to traditionally

underrepresented populations, i.e., groups who are not seen in the bicycling community at levels equal to their presence in the broader community. This includes some racial and ethnic groups, as well as women, older individuals, and some foreign-born communities.

Cambridge also values an "Empowerment Model," meaning that we support organizations within communities in their efforts and programming. For example, Bluebikes access may be provided for free in order to support community rides.



"These are my two kids. The one in front, I can just be right next to him. The one in the back, we can talk about what we see and point out different features of the city. It is great we get to go outside together and see the city. I've lived here for eight years and things have improved a lot. I've seen changes to streets that were a bit hairy before. I am excited that there are even more changes that are going to happen."

— Roy, bicycle commuter during the week and leisure rider with his children during weekends.

ACCESS TO SAFE & COMFORTABLE FACILITIES/CONDITIONS

Network: The network of bicycle-friendly streets and paths needs to connect people in a way that will serve their needs. This means connecting residential areas with places of employment, transit stations, schools, parks, shopping areas, etc.

Facilities: The Bicycle Network Vision is built around the premise that each street will be designed as an “all ages, abilities and identities” facility, with a level of comfort that works for everyone. The tools and facility types in the plan will be used as the Network is built out.

Vision Zero: Principles will be used to identify gaps in safety and priority will be given to addressing locations where high proportions of crashes occur.

Personal safety: In addition to safety from traffic crashes, routes need to feel and be safe for people to travel. Ensuring adequate lighting and visibility is fundamental for all streets and paths in the city. People should also feel that they can travel freely and not be harassed by others. Sometimes harassment can come from other road users (people driving are sometimes aggressive toward people bicycling) but can also come from law enforcement officers (residents have reported being inaccurately told that they were not allowed to bicycle on a sidewalk, or were questioned about the ownership of the bicycle they were riding).

Family friendly: Biking is an increasingly viable option for families. Creating a network of facilities for all ages, abilities, and identities is central to providing family-friendly conditions. Families also benefit from programs and events that encourage biking, bike parking that is close to entrances, and accommodates smaller bikes and cargo bikes, and connections to schools, daycares, and other family-oriented destinations.



POLICY CONTEXT

The Cambridge Bicycle Plan is supported by a set of local policies as well as policies at the regional, state and national level that promote bicycling.

CAMBRIDGE BICYCLE POLICIES

- + **Bicycling will be promoted as a form of transportation for people of all ages, abilities and identities. This includes addressing physical and structural barriers that limit access to bicycling for some people.**
- + **Street design will be based on Complete Streets principles and the Cambridge Cycling Safety Ordinance.**
- + **Traffic safety education and enforcement will support bicycle safety.**
- + **Facilities will be built to encourage more people of all ages, abilities and identities to bicycle, and to better accommodate people currently riding.**
- + **Bicycling conditions must be given careful consideration when improvements are made for other modes, to avoid adverse impacts and ensure safe bicycling conditions.**
- + **Improvements for bicycling will be considered in all roadway projects undertaken in the city.**
- + **New development projects will be designed and built to encourage users and occupants to access buildings by bicycle.**
- + **Priority will be given to enable children to bicycle safely to school and other destinations through Safe Routes to School programs, bicycle education programs, and supportive infrastructure design.**

Note: A companion document, the [Cambridge Pedestrian Plan](#) provides the policies and design guidelines related to walking facilities.

CAMBRIDGE MUNICIPAL POLICIES

VEHICLE TRIP REDUCTION ORDINANCE

In 1992, Cambridge enacted the [Vehicle Trip Reduction Ordinance](#) with a goal of making the city more livable by reducing automobile use and promoting non-polluting forms of transportation. The ordinance established the Bicycle and Pedestrian Mobility Program and a requirement to “design and implement a program to encourage greater use of bicycles as alternatives to single-occupancy vehicles within the city.” The ordinance also required the development of a Bicycle Plan and the implementation of a bicycle network.

COMPLETE STREETS POLICY

While Cambridge has been designing streets using “Complete Streets” principles for a long time, this practice was formalized in March 2016, when the City Council adopted a Complete Streets Policy, defining the City’s vision for Complete Streets as “safe and healthy streets for everyone” that “are designed and operated to enable safe access for all users, with a particular emphasis on vulnerable road users” like people biking. The policy commits the City to “designing, constructing, maintaining, and operating our streets to provide for a comprehensive and integrated street network of facilities for people of all ages and abilities with a commitment to Complete Streets principles.” This includes incorporating Complete Streets principles into all publicly and privately funded projects and requiring all project designs to follow the most up-to-date design guidance from government agencies and nationally recognized organizations.

CYCLING SAFETY ORDINANCE

Adopted by the City Council in 2019, the [Cycling Safety Ordinance](#) seeks to advance the City's Vision Zero goals through safety improvements and the construction of a connected network of permanent separated bike lanes across the City. The ordinance required the City to install separated bike lanes on streets undergoing reconstruction if those streets are identified as part of the Cambridge Bicycle Network Vision.

In October of 2020, the [Cycling Safety Ordinance](#) was amended to require the implementation of separated bicycle lanes through "Quick-Build" tools in a more immediate time frame. Appendix H further discusses the process for implementing bicycle facilities.



River Street is an example of a street being reconstructed with fully separated bicycle lanes following the [Cycling Safety Ordinance](#). [Click here](#) to visit the project website.

TRANSIT STRATEGIC PLAN

In 2015, the City published a [Transit Strategic Plan](#) to guide the City's efforts to improve public transit. This plan is based on the understanding that public transit is an important way for Cambridge residents, workers, students, and visitors to get around. In addition, together with bicycling and walking, public transit is key for the City to realize its environmental, social equity, economic development, and livability goals.

Putting focus to actions that the City and its departments can take to support public transit, the Transit Strategic Plan provides a framework of seven goals:

- + Maximize public transit's ability to serve all trips
- + Increase and prioritize funding for public transit
- + Increase efficiency and reliability of public transit services
- + Expand service
- + Improve usability, accessibility, and safety
- + Improve public outreach and participation
- + Improve resiliency and preparedness for climate change

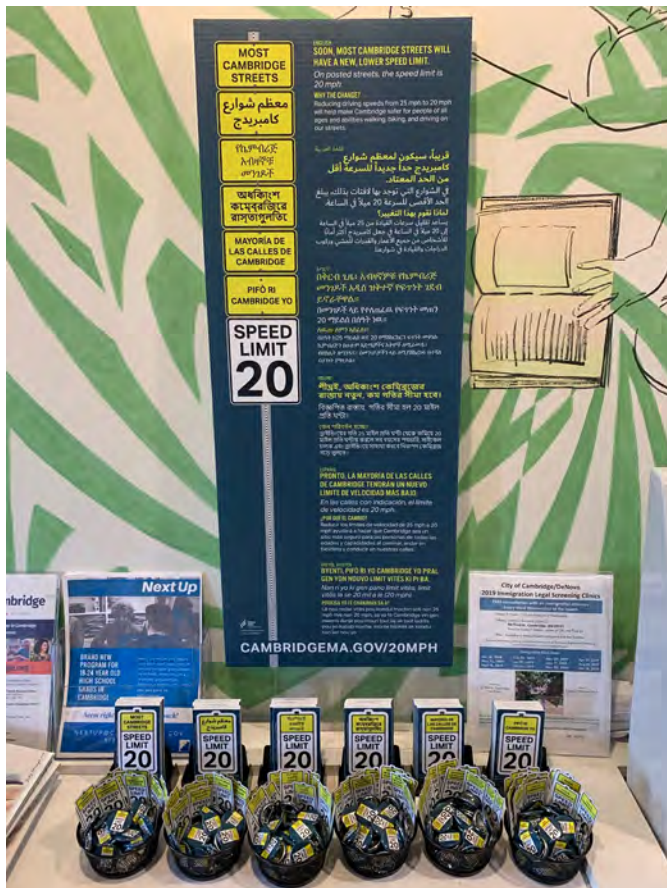
CAMBRIDGE VISION ZERO

In March of 2016, the City Council adopted [Vision Zero](#), a strategy to eliminate all traffic fatalities and serious injuries by creating a safe, healthy, and equitable transportation network for all. Vision Zero focuses on identifying the steps and collaborative framework necessary to meet the goal of zero fatalities and severe injuries. The City officially released the [Vision Zero Action Plan](#), a blueprint for how the City will achieve its goals, in February 2018.

The overall categories of the Action Plan are:

- + Design and operate safe streets
- + Improve large vehicle, taxi/for-hire vehicle, and TNC safety
- + Ensure equity in all efforts
- + Lead by example
- + Engage the public
- + Create partnerships
- + Use data to direct our efforts and measure our progress

The Vision Zero Action Plan includes initiatives that the City implements proactively and serves as a policy framework for related work across all departments.



Vision Zero program educational and give-away materials.

Among the important initiatives implemented was the adoption of a 25 mph citywide speed limit, with extensive 20 mph zones on most city streets. These changes were implemented in recognition of the fact that limiting motor vehicle speed is essential to having a safe environment for all.

ENVISION CAMBRIDGE

Envision Cambridge (2019) is a citywide plan created over the course of a three-year planning and public engagement process to guide the City's growth and change through the year 2030. Envision Cambridge establishes Core Values for all the work that we do: Livability, Diversity and Equity, Economic Opportunity, Sustainability and Resilience, Community Health and Wellbeing, and Learning. These Core Values are embodied in the Bicycle Plan as well.

Envision Cambridge includes a Mobility Plan, which sets forth that the City will address transportation challenges by "enhancing its multimodal network locally, expanding connections to regional sustainable transportation, and advocating for progressive transportation policies across the region."

Envision Cambridge also established the Alewife District Plan, which aims to develop Alewife as a vibrant mixed-use district. Among the recommendations for guiding this transformation are proposed mobility improvements, including expanding the bicycle facility network and strengthening the overall street connectivity in the district.

CLIMATE ACTION PLAN

The City's Climate Action Plan (CAP), updated in 2018, builds upon the City's first Climate Protection Action Plan originally adopted in 2002, and formalizes the City's commitment and approach to achieving net zero greenhouse gas (GHG) emissions, and thereby being carbon neutral by 2050.

The Climate Action Plan’s chapter on transportation identifies three key strategies and 17 actions to reduce GHG emissions in the transportation sector. Key among these is supporting active transportation. The CAP also estimates the GHG emission reductions that could be achieved from these strategies and actions, further affirming the critical role of active transportation in achieving the City’s carbon neutral goal. Among the specific actions identified:

- + **Formally adopt mode shift targets that increase walking, bicycling and transit trips.**
- + **Increase multimodal access, such as separated bike lanes, to key public facilities.**
- + **Complete Bicycle Network Vision improvements to facilitate safe and comfortable bicycle trips.**

SCHOOL WELLNESS POLICY

The Cambridge Public Schools Wellness Policy and Implementation Procedures support and encourage opportunities for all students to be physically active, including through the use of active transportation, such as walking or riding a bike. This is achieved through in-school programming and education, as well as policies that help to make schools and the surrounding streets safe, convenient, and welcoming for those who choose to travel to and from school on foot or by bike. Examples of these programs and policies include in-school pedestrian and bicycle safety and education, establishing safe and convenient bike parking at schools, and ensuring crossing guards are present at appropriate intersections along key walking and biking routes. The Wellness Policy and Implementation Procedures outline the role, rights, and responsibilities of district administrators, staff, parents, and students, and meet or exceed federal and state guidelines.



ZONING ORDINANCE

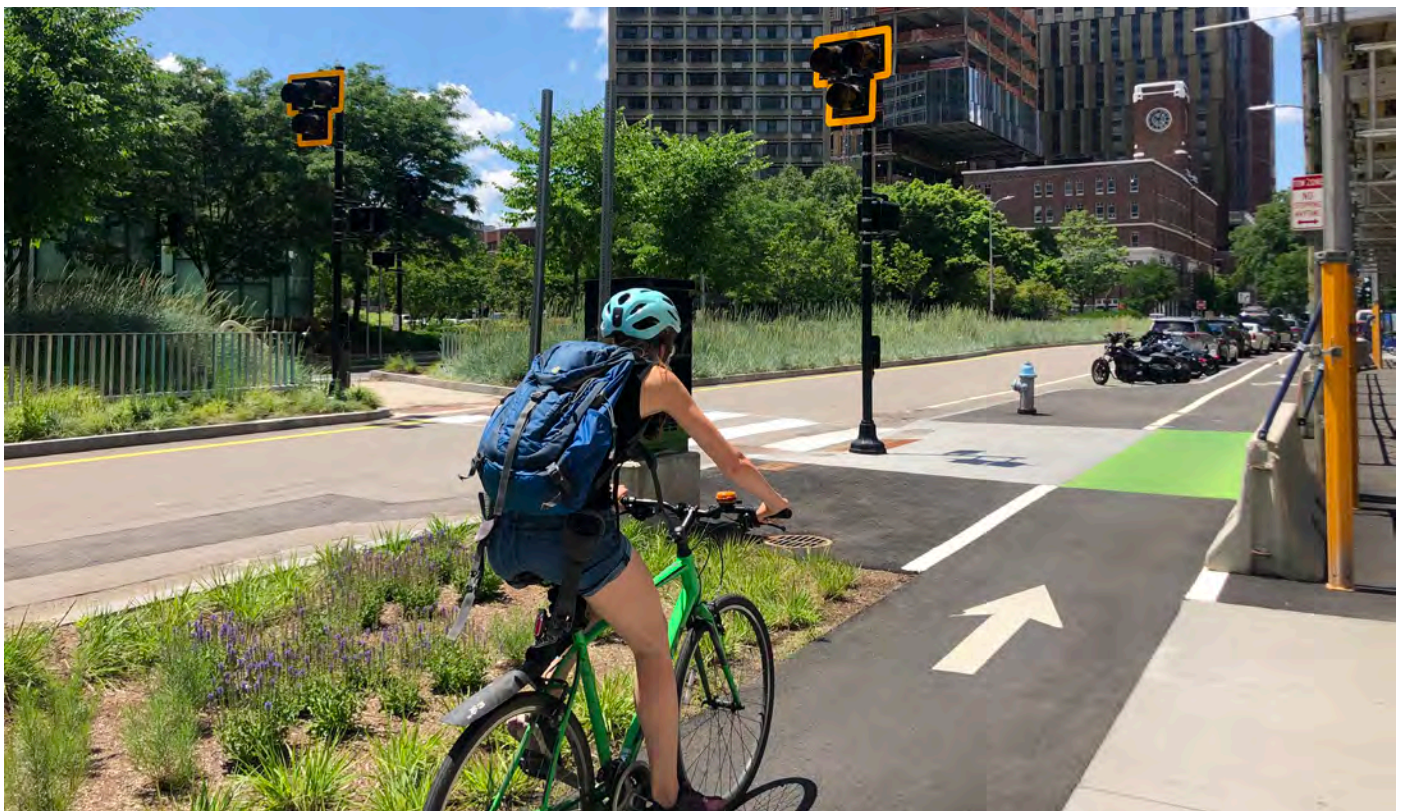
For larger projects requiring a Special Permit, proponents must show that the project does not have an adverse impact on the bicycling environment and may be required to mitigate impacts so that additional support of bicycling is provided. The ordinance states: “Development should be pedestrian and bicycle-friendly...

Pedestrians and cyclists are able to access the site safely and conveniently; cyclists should have secure storage facilities conveniently located on-site and out of the weather. If bicycle parking is provided in a garage, special attention must be made to providing safe access to the facilities from the outside.”

Zoning ordinances are discussed in greater detail in Chapter 6 and Appendix I includes more specific information on bicycle parking requirements.

PARKING AND TRANSPORTATION DEMAND ORDINANCE

Passed in 1998, the Parking and Transportation Demand Management (PTDM) Ordinance requires anyone adding vehicle parking spaces to commit to an approved plan to limit the number of single occupancy vehicle (SOV) trips going to a particular site. The approved plan must include specific ways the proponent will promote non-SOV travel and the projects will have ongoing monitoring to ensure compliance. People who ride bicycles benefit from this policy in several ways. Fewer vehicle trips being made within the city creates an easier environment for bicycle travel, and required improvements and programs promote and enhance conditions for people bicycling. The PTDM ordinance is discussed further in Chapter 6.



NEW MOBILITY PLANNING

A planning process is underway to help the City learn about and plan for new mobility options in a way that aligns with and advances existing values and policies. This process is not intended to change existing transportation plans or current priorities for active mobility, except to preserve or strengthen an existing transportation mode in the face of pressure from new mobility.

The planning process focuses on ride-hail vehicles, carshare, micro-transit, e-scooters, e-bikes, shared and private autonomous vehicles, sidewalk robots and delivery drones, transportation electrification, and Mobility as a Service.

Specific bicycling related ideas being examined include prioritizing street design to ensure easy movement of space-efficient and high-capacity modes in order to serve the highest number of people with the mobility system. It is also considering mobility data specifications for bikeshare, scooters, transit, and, eventually, ride-hail vehicles, private AVs, AV transit and delivery drones/sidewalk robots, in order to have a sophisticated understanding of system operations and oversight needs for these modes. In addition, possible strategies to reduce illegal motor vehicle parking in the public right of way to minimize conflicts between modes and support electrification of the transportation system, including e-bikes, are being explored.

CITY COUNCIL GOALS

The Cambridge City Council sets guiding goals that are updated from time to time. The current list contains several that are relevant to bicycling:

- + **Goal 1: Increase access to affordable housing for all income groups.**
- + **Goal 2: Ensure that Cambridge offers economic and educational opportunity to all.**
- + **Goal 3: Deepen our commitment to sustainable use of energy and strengthen our capacity for resilience.**
- + **Goal 4: Expand and deepen community engagement.**
- + **Goal 5: Develop more proactive, inclusive, and transparent city planning process.**
- + **Goal 6: Make it easy to move safely through the City, especially by sustainable modes of transportation.**
- + **Goal 7: Increase opportunities for all residents to enjoy the City's open spaces.**
- + **Goal 8: Ensure that Cambridge remains an Innovation Hub that integrates businesses of all sizes into a thriving ecosystem.**
- + **Goal 9: Improve Council's capacity to collaborate more effectively, make better decisions, and increase its accountability to the public.**
- + **Goal 10: Ensure City's budget allocates resources responsibly and responsively.**
- + **Goal 11: Ensure Public Safety efforts reflect current and emerging challenges and opportunities in a way that incorporates Cambridge's core values.**
- + **Goal 12: Eliminate Bias within the City workplace and wider community.**

REGIONAL POLICIES

Metropolitan Area Planning Council (MAPC) is the region’s planning agency. Its stated policy is that it “supports, promotes and facilitates the increased use of bicycle transportation..... [and is] dedicated to helping local authorities plan, fund and implement projects that enhance bicycle transportation.”

In 2007, the Regional Bicycle Plan was published, which outlines the following Goals and Strategies for the Greater Boston area, in which Cambridge is located:

- + **Encourage more trips by bicycle in each community.**
- + **Make bicycling and bicycle accommodations a part of standard operating procedure.**
- + **Improve evaluation and prioritization of bicycle project proposals.**
- + **Assist and encourage local initiatives.**
- + **Work with state and federal agencies to simplify and coordinate funding programs.**
- + **Increase regional knowledge about bicycling.**

STATE POLICIES

The Commonwealth of Massachusetts has developed a number of policies and initiatives that support and enhance bicycle transportation. Referenced here are the most relevant.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PROJECT DEVELOPMENT AND DESIGN GUIDE (2006)

In this document, three Guiding Principles are laid out: Multimodal Consideration, Context-Sensitive Design, and a Clear Project Development Process. The document defines Multimodal Consideration as the following:

“To ensure that the safety and mobility of all users of the transportation system (pedestrians, cyclists and drivers) are considered equally through all phases of a project so that even the most vulnerable (e.g., children and the elderly) can feel and be safe within the public right of way.”

In January of 2020, Engineering Directive E-20-001 was implemented to update the MassDOT design criteria for pedestrian, bicycle, transit, and vehicle facilities. The design guidance is ‘intended to provide project proponents with sufficient flexibility to address the unique and diverse conditions encountered on the Commonwealth’s streets and highways”.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION GREENDOT POLICY, JUNE 2010, UPDATED 2012 AND 2014

GreenDOT is the Massachusetts Department of Transportation’s Comprehensive Sustainability Initiative. Through this initiative, policies for promoting and supporting bicycling are articulated.

Key goals:

- + Design a multimodal transportation system.
- + Promote healthy transportation and livable communities.
- + Triple mode share of bicycling, transit and walking by 2030.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HEALTHY TRANSPORTATION POLICY DIRECTIVE, SEPTEMBER 9, 2013

“All MassDOT funded and/or designed projects shall seek to increase and encourage more pedestrian, bicycle and transit trips. MassDOT has established a statewide mode shift goal that seeks to triple the distance traveled by walking, bicycling and transit by 2030, promoting intermodal access to the maximum extent feasible will help the agency meet this goal.”

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION 2019 STATEWIDE BICYCLE TRANSPORTATION PLAN

“The Plan lays out an action-oriented strategy built around three key principles. First, reverse the decades-long practice of prioritizing automobile travel over all other modes by granting people biking the same level of importance as drivers in planning, design and maintenance processes. Second, fix the types of physical gaps and barriers in the transportation system that discourage everyday biking, such as uncomfortable roadway crossings, poorly maintained roads, and lack of bike parking. Third, lead the Commonwealth and support municipalities – municipalities own 80% of the Commonwealth’s roads – to advance everyday biking.”

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION SEPARATED BIKE LANE PLANNING & DESIGN GUIDE 2015

The Guide “presents considerations and strategies for the development of separated bike lanes. The Guide provides a framework for determining when separated bike lanes are appropriate and feasible. It presents design guidance for separation strategies, bike lane configuration, and considerations for transit stops, loading zones, utilities, drainage, parking and landscaping. The Guide defines separated bike lane design principles for intersections, introduces intersection design treatments and provides examples of typical intersection configurations. It clarifies when to consider signalization and provides guidance on signal phasing and timing as well as location of signal equipment. The Guide concludes with maintenance strategies, including seasonal operations and maintenance considerations.”

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION 2019 MUNICIPAL RESOURCE GUIDE FOR BIKEABILITY

“As part of the Bike Plan, MassDOT developed the Resource Guide in recognition of the important role the 351 cities and towns in Massachusetts will play. Created for municipal staff, elected officials, community members, and anyone interested in biking, the Resource Guide introduces core concepts to enhance community bikeability and directs readers to additional resources for more detailed information.”

THE MASSACHUSETTS CLEAN ENERGY AND CLIMATE PLAN FOR 2020

The goal to “Increase Efficiency and Diversity in Transportation Energy Use” includes a recommended action to “Encourage the Increased Use of Bicycling and Walking as Long-Term Alternatives to the Private Automobile”:

“Walking and bicycling represent viable alternatives for short trips if the infrastructure exists to support and encourage non-motorized travel. Especially in suburban work, shopping and even residential settings, the land use and supporting urban design is too often oriented to support only automobile travel. Buildings surrounded by large parking lots are the current norm. DOER (Department of Energy Resources) will work with transportation and municipal agencies to provide a variety of infrastructure facilities and amenities that will promote the use of bicycling and walking and to encourage designated bicycle routes to bus, train and carpooling terminals. This will include evaluating the use of abandoned railroad beds as potential bikeway facilities.”

An update to the 2020 plan, the Clean Energy and Climate Plan for 2030, is currently under development at the time of writing.

FEDERAL POLICIES

Bicycle transportation is supported at the federal level by the United States Department of Transportation Policy Statement on [Bicycle and Pedestrian Accommodation, March 2010](#):

“The DOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide – including health, safety, environmental, transportation, and quality of life – transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes.”

In 2013, FHWA released a [memorandum expressing support for a flexible approach to bicycle and pedestrian facility design](#), citing, among others, AASHTO’s Guide for the Development of Bicycle Facilities and NACTO’s Urban Bikeway Design Guide.

FHWA encourages agencies to use these guides and resources to help fulfill the aims of the 2010 policy statement.

“...DOT encourages transportation agencies to go beyond the minimum requirements, and proactively provide convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities, and utilize universal design characteristics when appropriate.”

More information and details on federal policies and programs can be found [here](#).

PLAN VISION, GOALS & TARGETS

These Plan Vision, Goals and Targets were established for the 2015 Bicycle Plan. They represent aspirational objectives for achieving meaningful progress towards our goals and will be monitored and assessed over time.

VISION

Bicycling is an important component of Cambridge's transportation system. Cantabrigians envision the day when they will be able to bicycle safely and comfortably to all destinations within the city. Streets and roads will be well designed to accommodate bicycling as a mode of transportation for people of all ages, abilities and identities.



GOALS

- ① Make a significant shift towards bicycling as a sustainable transportation mode
- ② Create a transportation system that is safe for and accessible to users of all ages, abilities and identities
- ③ Innovate and be an early adopter of best practices in bicycle infrastructure

TARGETS

- Ⓐ By 2020, 10% of all trips in Cambridge will be made by bicycle
- Ⓑ By 2030, 20% of all trips in Cambridge will be made by bicycle
- Ⓒ By 2020, the percentage of children walking and bicycling to school will increase 20% over 2015 numbers
- Ⓓ Crash rates will continue to decrease with a goal of zero fatalities or serious injuries by 2020
- Ⓔ All streets will be bicycle friendly
- Ⓕ New facilities are prioritized based on the Bicycle Network Vision

PROGRESS TOWARDS TARGETS

The 2015 Plan was ambitious in its goals and in general, positive progress has been made. However, it was not possible to capture measurements in 2020 due to the impacts of the COVID-19 pandemic, as various public health orders and public caution led to significant changes in travel behavior. Due to these circumstances, we plan to measure trip data once conditions have stabilized and adjust the targets accordingly.

In the meantime, here is a snapshot look at data from 2019. From this we conclude that there has been an increase in the number of people using bicycles in Cambridge since the 2015 Plan was published. See Chapter 3 for more in-depth analysis of this and other data.

| Target | 2015 | 2019 |
|--|--|--|
| A. By 2020, 10% of all trips in Cambridge will be made by bicycle | 7%* (work trips) | 8%* (work trips) |
| B. By 2030, 20% of all trips in Cambridge will be made by bicycle | | |
| C. By 2020, the percentage of children walking and bicycling to school will increase 20% over 2015 numbers | 31.6% of students** | 42.8% of students** |
| D. Crash rates will continue to decrease with a goal of zero fatalities or serious injuries by 2020 | 16.2/million BMT (bicycle miles traveled) † (2014) | 12.5/million BMT † (2019) |
| E. All streets will be bicycle friendly | 57% of streets are high comfort ‡ | 63% of streets are high comfort ‡ |
| F. New facilities are prioritized based on the Bicycle Network Vision | n/a | 67% of separated bike lane miles built since 2015 are on streets that were part of the 2015 Bicycle Network Vision |

*These figures are based on American Community Survey Journey to Work data, which only considers the modes people use to travel to and from their jobs. [Research](#)⁶ indicates that in 2009, journey to or from work constituted only 10.9% of trips that Americans take by bike. The other 89.1% of bike trips are for errands, shopping, visiting friends, social outings, recreation, etc.

**Based on surveys of students at four K-8 schools in 2015 and surveys of students at all 17 K-8 schools in 2019.

† See Chapter 3 for details.

‡ For more information on high comfort streets, see Chapter 5.

DEVELOPING THE VISION

Cambridge's high-quality bicycle infrastructure and programs have already made it one of the most bicycle-friendly cities in the country. Its large and passionate bicycling community was an invaluable resource to developing and updating the 2015 Cambridge Bicycle Plan and Bicycle Network Vision, providing information on the experience and needs of those who know local biking conditions best. For the 2020 Update, extended efforts were undertaken to reach as many voices as possible, including those who may not be proactive about engaging in planning efforts. This plan reflects the many voices of those who live, work and travel in Cambridge and who participated in the process at on many levels, both in the original 2015 plan development and this 2020 Plan Update.

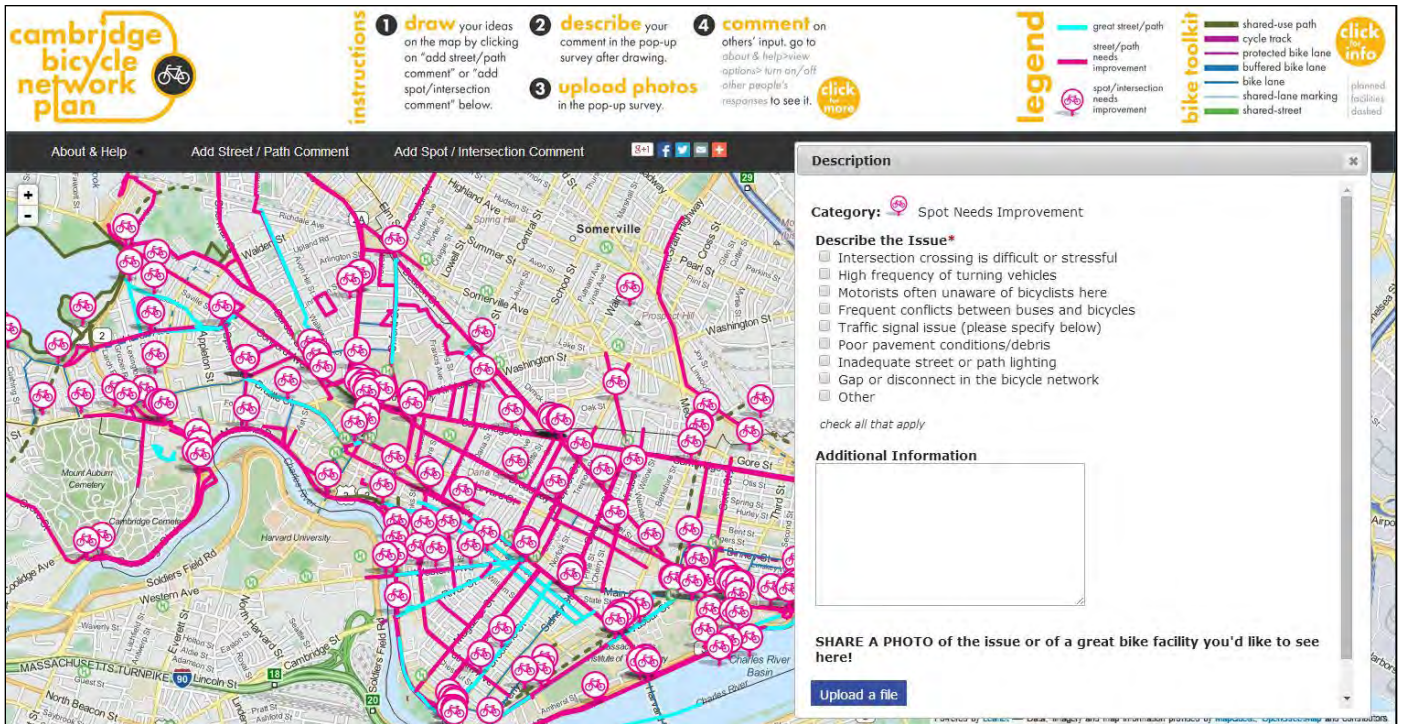
In order to develop a network that provides safe and convenient biking options for people of all ages, abilities and identities, the planning team conducted a variety of activities for both the 2015 and 2020 processes to gather input from the public, assess existing biking conditions in the city, and ultimately develop an updated Bicycle Network Vision.

CAMBRIDGE BICYCLE PLAN 2015

The Cambridge Bicycle Plan 2015 was developed with the input of thousands of people who care about our city. The Plan outlined policies and goals, provided information on the breadth and depth of supporting programs, and presented a vision for an expanded network. The 2015 Plan was developed using a variety of input activities and data analyses to understand what users want, identify concerns and priorities, gain input on important routes and destinations, understand levels of bicycle use, and evaluate safety and comfort. Activities included:

- + **Online survey with 733 responses. Details on the survey results are included in Chapter 3.**
- + **Street teams that collected comments at venues throughout the City.**
- + **Wikimap, on online map tool, and paper map comments collected at events throughout the City gathered over 2,000 comments.**
- + **Bicycle count data evaluation from 17 locations.**
- + **Crash analysis using available 2008-2012 data.**
- + **Bicycle level of comfort analysis on all streets in Cambridge. See Chapter 5 for more information.**

For more information, see the [Cambridge Bicycle Plan 2015](#)



Screenshot of WikiMap #1 from the 2015 Cambridge Bike Plan process.



Gathering public input on the 2020 Update in September 2020.

2020 PLAN UPDATE PROCESS

The 2015 Plan guided City efforts and programs, including expanding the high-comfort bicycle network, but much has already changed in a few short years.

Through this 2020 update, we incorporated new policies, reviewed data, and gathered input on how things are working and what people’s hopes are for the future. We wanted to look at where we are in the development of the network, and plan mindfully for the next opportunities in the near and longer terms.

CHANGES SINCE THE 2015 PLAN

In 2016, the City adopted a Vision Zero Policy and a Complete Streets Policy. In 2019, Envision Cambridge (the blueprint for the city’s growth and change) was published and the Cycling Safety Ordinance was passed and later amended in 2020. Our public bike share system (initially Hubway, now Bluebikes) has grown significantly in terms of reach and membership. Our Safe Routes to School program is now fully established in every public school, with educational programs in elementary, middle and high school. The City’s public bike workshops and outreach events happen every month of the year and the bike network has been expanded by over 20 miles in just five years.

PROCESS FOR THE 2020 UPDATE

The process for the 2020 Update began in a similar manner to the process for the 2015 Plan, but with additional targeted outreach to ensure broader and more in-depth reach. The City began conducting outreach and collecting community input in the spring, summer and fall of 2019. This included a public Open House in June 2019, an online crowdsourcing WikiMap that also went live in June, and tabling at community events across the city throughout the summer. Tabling was done at locations where people already were gathering in order to try to reach people where they were, and to make it easy for people throughout the community

to voice their thoughts. Among places and events included were Danehy Park Family Day; PARK(ing) Day; Cambridge River Festival; Cambridge Bicycle Committee Ride events; and Family Bike Night Event at a local library.

At these in-person events, members of the public provided feedback on maps, visual preference surveys, and feedback forms, as well as verbally to staff. Opportunities to give input were advertised on City and project webpages, on social media, and through public email newsletters. City staff also received direct input from advocacy groups, institutions, and businesses, as well as reviewing the process and input with the Cambridge Bicycle Committee (the City’s official advisory committee; see Chapter 6). This first phase of input in 2019 informed initial updates to the Bicycle Network Vision and a list of Action Items for bicycle improvements.

When the COVID-19 pandemic required the cessation of in-person activities, previously planned activities like open houses were cancelled. Public outreach in modified ways took place in September/October 2020.

Information about the 2020 Bicycle Plan Update and the opportunities for feedback and input were posted on the [Cambridge Bicycle Plan 2020 webpage](#), the City of Cambridge homepage, and on City of Cambridge and Community Development Department social media. Notification was also sent directly to community members through the City of



Lawn signs throughout the city let people know about the Bike Plan Update and how they could participate.



Community members weigh in on the Visual Preference Survey (which streets people identify as being more or less comfortable for traveling on) during PARK(ing) Day in 2019.



Volunteers from the Cambridge Bicycle Committee engaged the public with intercept surveys and bike light giveaways.

Cambridge Daily Update (an e-newsletter with nearly 18,000 subscribers) as well as the Bicycle Plan 2020 and Active Transportation Report e-newsletters. City staff also placed over 50 informational yard signs in public open space throughout Cambridge. The yard sign included a link and a QR code that directed to the webpage for the 2020 Bicycle Plan Update, where community members could access more information and the Community Needs Survey.

The Community Development Department conducted 11 in-person outreach events at outdoor locations across the city between September 17-October 2, following City of Cambridge COVID-19 guidelines (additional in-person outreach events were planned beyond October 2 but were cancelled due to a change in City policy regarding activities during the COVID-19 pandemic). At these outreach events, staff members shared information about the Bicycle Plan, collected paper surveys and other feedback, and provided printed information for those who preferred that to online reading. Outreach locations were chosen to reach community members in as many different areas of the city as possible.

In addition to these efforts, the Cambridge Bicycle Conversations project involved interviewing 75 people living or working in Cambridge about biking and transportation in the city. The interviews were conducted between October 2019 and March 2020 and took place where people already were (such as on the street) or at locations of their choosing. Deliberate efforts were made to hear from people of color (61% of respondents), seniors (31% age 65 and over), people with disabilities, and people participating in the city's affordable housing programs. Efforts were also made to hear from people who cycle for a variety of reasons, including for recreation, to travel to work, to save money and to spend time with their children. The informal interviews lasted from 5-45 minutes and were led by researchers and community volunteers.¹

MAJOR CHANGES FOR THE 2020 UPDATE

- + Comprehensive update of all chapters to incorporate current data and reflect ongoing changes in Cambridge.
- + Explicit identification of more equitable access as a goal and guiding principle.
- + Updated and expanded Bicycle Facility Toolbox that reflects current best practices and new design approaches, including additional information on Bicycle Priority Streets and Quick-Build Facilities.
- + Updated Network Vision Map.
- + The addition of a framework for prioritizing quick-build projects based on factors including safety, connectivity, feasibility, more equitable access, and requirements of the Cycling Safety Ordinance.



Tabling events at local parks enabled people to learn about the plan and provide feedback.

HOW THE BICYCLE NETWORK VISION IS USED

The Bicycle Network Vision creates an aspirational concept for a complete system, enabling people of all ages, abilities and identities to travel more safely and comfortably throughout the city. It is used as a guide and reference for long-, medium-, and short-term infrastructure projects undertaken in the city including projects that are part of the City’s Five Year Plan for Sidewalk & Street Reconstruction.

COMPLETE STREETS

The streets and sidewalks of Cambridge represent the greatest resource of public space in the city. People use them not only for traveling along, but also for “staying” activities such as sitting on benches or enjoying sidewalk cafes, and the spaces are used for green infrastructure including trees, planting areas and stormwater management. Space is also used for motor vehicle use (parking, loading, pick-up and drop-off), parking bicycles and infrastructure that supports transit use, such as bus stops, shelters and subway entrances.

As each street is evaluated for improvements, these components will be taken into consideration, with an emphasis on the overall public policies and goals as referenced earlier in this chapter, and with attention given to public input. The overarching guidance will continue to be in creating Complete Streets, ensuring that they are designed and operated to enable safe access for all users, while enhancing and prioritizing mobility for sustainable transportation modes.

CYCLING SAFETY ORDINANCE

The Cycling Safety Ordinance (CSO) directs that a street identified in the Vision for greater separation must be reconstructed with a separated facility (with rare exceptions, see the 2019 ordinance). In addition, the 2020 Amendment to the CSO requires 22.6 miles of separated bicycle lanes to be completed by 2026 and anticipates a significant expansion of the network to be created using quick-build tools.



FIVE YEAR PLAN FOR SIDEWALK & STREET RECONSTRUCTION

The Department of Public Works maintains a [Five Year Plan for Sidewalk and Street Reconstruction](#) that identifies the streets and sidewalks that are anticipated to be reconstructed each year for the next five years.

GOALS OF THE FIVE YEAR PLAN:

- + **Reconstruct streets, sidewalks and bicycle facilities with an emphasis on a Complete Streets approach: designing the street for all users.**
- + **Provide for comprehensive inspection/repair and upgrading of City utilities, as well as public utilities, so as to ensure new street system integrity is maintained for as long as possible once construction is complete.**
- + **Maintain safe, accessible streets and sidewalks.**
- + **Reconstruct streets, sidewalks and bicycle facilities in a prioritized fashion based on need.**
- + **Construct projects efficiently with minimum disruption to community life.**
- + **Effectively communicate design and construction projects with neighborhoods and facilitate a more integrated design process.**
- + **Provide reasonable access for all users, during street reconstruction.**

The Bicycle Network Vision is used as an overlay on the Five Year Plan, in order to identify and prioritize areas with non-existent or inadequate bicycle facilities, particularly where reconstruction could improve connectivity and route continuity for people who bicycle.

STREET REDESIGN PROCESSES

Street reconstruction projects look at how improvements can be made for all users, with a Complete Streets emphasis, to enable people of all ages, abilities and identities to travel safely. All projects ensure accessibility with reference to the Americans with Disabilities (ADA) and Massachusetts Architectural Access Board (AAB) standards. Project are also implemented following the Cambridge Bicycle Network Vision and the Cycling Safety Ordinance requirements.

Major projects include a public participation process, where public input is given on how specific street designs can best meet the City's policies and the community's goals. Residents and users are encouraged to participate in these opportunities, which are announced through mailings, direct flying, neighborhood and community groups, and City website and social media outlets.

PRIVATE DEVELOPMENT INFRASTRUCTURE IMPROVEMENTS AND MITIGATION MEASURES

Infrastructure improvements are often made in connection with private development projects, particularly for larger projects. For many larger projects, mitigation requirements are part of the project permitting process. These improvements and requirements will be made with reference to the Bicycle Network Vision.

ENDNOTES

- 1 The “Cambridge Conversations” project was performed under a special grant (Mellon/ACLS Scholars & Society Fellowship) and led by Jonathan Shapiro Anjaria, professor of Anthropology at Brandeis University, Cambridge resident and member of the Cambridge Bicycle Committee; several volunteers from the Committee participated.
- 2 Governors Highway Safety Association. “Pedestrian Fatalities by State: 2020 Preliminary Data.” <https://www.ghsa.org/resources/Pedestrians21>.
- 3 Smart Growth America. “Dangerous By Design 2021.” <https://smartgrowthamerica.org/dangerous-by-design/>.
- 4 Frank R. Baumgartner, Derek A. Epp, and Kelsey Shoub. “Suspect Citizens: What 20 Million Traffic Stops Tell Us About Policing and Race.” Cambridge: Cambridge University Press, 2018. <https://www.cambridge.org/core/books/suspect-citizens/A399F1EEA04CFD9618D750AC0095AD96>.
- 5 Tara Goddard, Kimberly Barsamian Kahn, Arlie Adkins. “Racial bias in driver yielding behavior at crosswalks.” Transportation Research Part F: Traffic Psychology and Behaviour, Volume 33, 2015. https://www.researchgate.net/publication/279313012_Racial_bias_in_driver_yielding_behavior_at_crosswalks.
- 6 J. Richard Kuzmyak and Jennifer Dill. “Walking and Bicycling in the United States: The Who, What, Where, and Why.” <http://onlinepubs.trb.org/onlinepubs/trnews/trnews280.pdf>.

CHAPTER 2

BICYCLE TRANSPORTATION

BICYCLING IN AMERICA

Bicycles gained prominence as transportation vehicles in the late 19th century. In the United States, many early efforts to improve road conditions were sponsored by organizations such as the League of American Bicyclists. After the rise in popularity of the automobile in the mid-20th century, the situation changed rapidly, with motor vehicles dominating the country's roadway infrastructure; bicycles were not taken into consideration in the development of the transportation infrastructure for much of the 20th century.



Katherine Towle (Kittie) Knox (born in Cambridgeport) was a bicycle racer and the first African American to be accepted into the League of American Wheelman (later renamed League of American Bicyclists) in 1893 at a time when few women were members.

In 2019, the City of Cambridge named the Kittie Knox Bike Path in her honor.

In the 1960s, more people started using bicycles for both transportation and recreation, and many off-road bike paths were developed throughout the 1970s. Since the road system provides the majority of public connections between destinations, streets also need to be designed or redesigned to enable people of all ages and abilities to bicycle safely and comfortably on them.

Bicycles are found in many American households, with an average of 0.86 adult-size bicycles per household.¹ Between January and October 2020—during a bike boom triggered by the COVID-19 pandemic, Americans spent \$4.1 billion on bicycles (a 62% increase from the same period in 2019) and \$491 million on electric bikes (up 144%).² The bicycle industry has a positive robust economic benefit. In 2017, people biking spent \$83 billion on 'trip-related' sales and generated \$97 billion in retail spending, while bicycle recreation spending contributed to the creation of 848,000 jobs in the U.S.³ Additionally, in 2018, the Bureau of Economic Analysis estimated that bicycling contributed \$96 billion in annual retail sales.⁴



THE BENEFITS OF BICYCLING

Bicycling is energy efficient, has many health benefits, and is a more affordable transportation option, among many other benefits. Bicycling can also increase freedom of movement for people of all ages and incomes and offers more schedule flexibility than fixed public transportation services, particularly for people who work nontraditional hours (e.g., restaurant workers, night shifts).

Bicycling is an important element of the transportation system and a critical resource for many in Cambridge, where approximately one-third of households have no car.⁵ This has been evidenced by the continued use of Bluebikes by essential workers during the COVID-19 pandemic and even during inclement weather events.

This section explores the variety of benefits of bicycling. For further information, refer to the endnotes section.

I love the exercise. I love that it's free. I love that there's no traffic. I try to encourage people to do this all the time. I'm on Instagram all the time. I'm on Facebook all the time. I'm always putting up the pictures, 'Look at me, not in traffic.'

—Female bicycle commuter between Harvard and Arlington

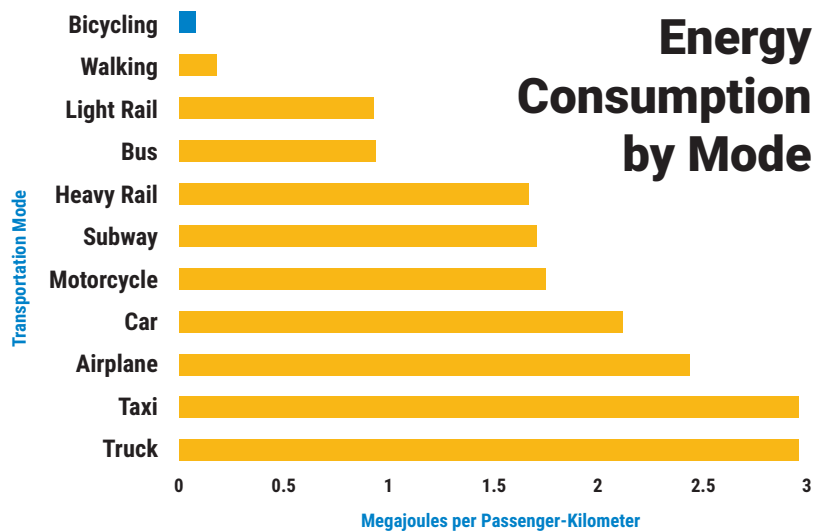


Figure 2.1: Energy consumption by mode. Bicycling is the most energy efficient form of transportation, getting the energy equivalent of over 1,000 miles per gallon.^{6,7}

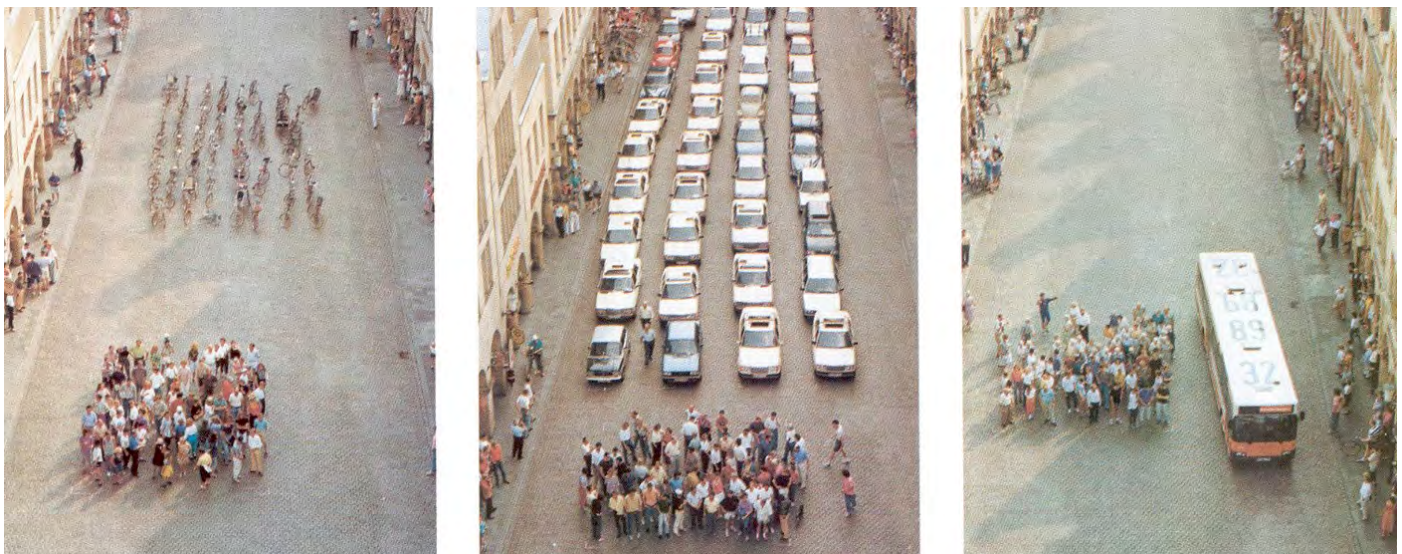


Figure 2.2: Relative space for different travel modes. In this influential photo, the City of Münster, Germany demonstrates the relative space required to move the same number of people by bicycle, car and bus.⁸

ENVIRONMENTAL BENEFITS

Bicycling has significantly lower environmental impact than motor vehicle use:⁹

- + Bicycling consumes the least amount of energy compared to other transportation modes.
- + Reduced greenhouse gas emissions and lower contribution to global climate change. One study in Montreal showed a reduction of close to 2% in transportation-related GHG emissions for an increase of 7% in the length of the bicycle network.¹⁰
- + Reduced pollutants related to air quality and public health.
- + Reduced pollutants that are related to ancillary facilities; the manufacturing of automobiles contributes more pollution than the manufacture of bicycles.

A study of four shared use paths in different Massachusetts communities found that the paths encouraged more than 90,000 active commute trips and reduced motor vehicle travel by over 700,000 miles. This led to \$2.2 million in savings from reductions in the social costs of greenhouse gas and other emissions during the four-month study period.¹¹

TRANSPORTATION INFRASTRUCTURE BENEFITS OF INCREASED CYCLING¹²

When people bike more and drive less, it decreases the amount of public money that needs to be spent on roadway maintenance and other traffic-related services. Benefits include:

- + Less traffic congestion.
- + Greater efficiency: more people can travel in less space.
- + Less wear and tear on our roads.
- + Less consumption of petroleum resources.
- + Fewer costly crashes and property damage.
- + Less need for additional roads, motor vehicle travel lanes, and parking areas – and more space for other priorities such as green space.

The reduction in single-occupancy vehicle trips attributed to shared use path commuting reduces harmful pollutants like particulate matter, nitrogen oxide, volatile organic compounds, and carbon dioxide released into the atmosphere.

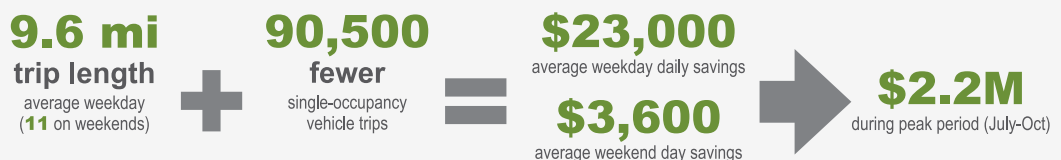


Figure 2.3: Shared use paths can reduce single-occupancy vehicles trips, which reduce harmful pollutants.¹¹

HEALTH BENEFITS

- + Reduced air and noise pollution for everyone. Operating a bicycle results in 92% less CO₂ emissions per mile than driving a car.¹³ Air pollutants generated by motor vehicles are associated with a range of health impacts, including asthma and other respiratory symptoms, impaired lung function, total and cardiovascular mortality, and cardiovascular morbidity.¹⁴ A San Francisco Bay Area study found that increasing biking and walking from 4 to 22 minutes a day on average would decrease greenhouse gas emissions by 14%.¹⁵

I'm in the union, I do construction. The wear and tear on my hip just wore it down. I got real severe arthritis. It's so bad that they have to give me a total hip replacement. I'm stuck in the house all day. I'm out of work now. The only exercise I can get is riding my bike. Riding a bike – you're not putting any weight on the hip, you're just doing a pedal motion. It's the only exercise I can get all day. If I don't go for a bike ride all day, I'm going crazy.

—Roofer who rides daily with his son

- + Improved health and well-being through regular exercise. Numerous studies have shown a positive link between exercise and health in a wide range of areas, notably cardiovascular health, weight control, mental health, cholesterol, hypertension, stress, cancer, and other diseases.^{16,17} The Centers for Disease Control and Prevention recommends changing the built environment in communities to make it easier for people to bicycle and walk as a strategy to prevent chronic disease.¹⁸ Regular bike riding through adulthood protects against a variety of health issues.¹⁹



- + Bicycling provides regular exercise opportunities for children. Children who walk or cycle to school are more attentive and concentrate better.²⁰ Bicycling helps boost learning and memory in children and increases cognitive performance for teenagers with intellectual and developmental disabilities.
- + Children who walk or bike are more likely to maintain a healthy weight, have better cardiorespiratory fitness, and have more physical strength and extension.^{21,22}
- + Bicycling provides exercise opportunities without requiring gym memberships or specialized equipment.
- + Bicycling can help reduce depression, improve sleep quality, and has been shown to improve cognitive functions for older adults.

I'm 86 years old. And it if it wasn't for the bike I wouldn't get out much. I have sciatica in my legs. It's a nerve thing. I can't stand up too long. But with a bike I can be out all day long. I love bikes. If they took this bike I'd be heart-broken, crying every day. I take it home, keep it inside, right next to me, right next to my bed so I can get up and jump on it!

—Street interview at Carl Barron Plaza

- + People who bicycle often report greater satisfaction with their commute than people who drive to work.²³ Bike commuters report lower stress and greater feelings of freedom, relaxation, pleasure, and excitement than car commuters.²⁴ One study found that women that commute by bike have higher levels of satisfaction than men.²⁵

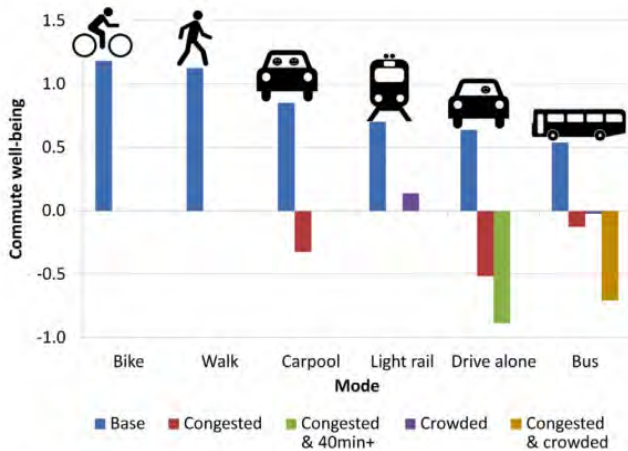


Figure 2.4: Bicycling has the highest predicted commute well-being of various modes.²⁶

- + Even after adjustment for other risk factors, including leisure time physical activity, those who did not bicycle to work experienced a 39% higher mortality rate than those who did.²⁷
- + In studies across multiple countries (including the U.S.), the health benefits of bicycling outweigh the mortality risks related to traffic crashes and air pollution.²⁸ Additionally, bicyclists are exposed to less pollution than drivers, bus riders (including school buses), or taxi passengers because enclosed vehicles tend to capture and recirculate air pollution.²⁹

³⁰ ³¹

The Impact of Bicycling on Life Expectancy

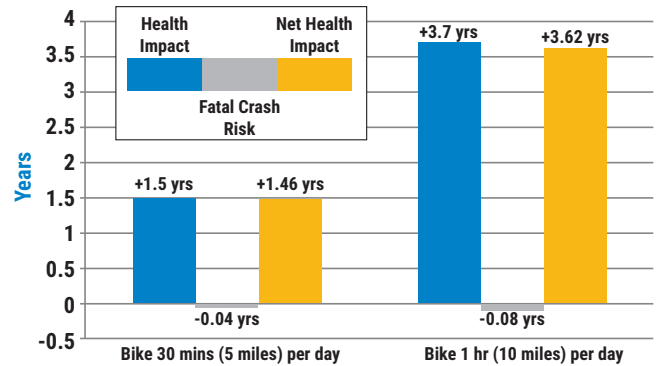


Figure 2.5: Bicycling has positive impacts on life expectancy, even with crash risk factored in.²⁸

- + Transportation made up 41.5 percent of 2017 greenhouse gas emissions in the state of Massachusetts and is the sector that generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes.³²
- + A study of four shared use paths in Massachusetts found that they increased the level of physical activity for those who live nearby, saving a combined \$2.8 million on healthcare expenditures across the four paths in 2019.¹¹

I never have to worry about traffic or where to park. It takes the same time every trip and is faster than driving. Also, even though I don't drink coffee, I come in raring to go. Regardless of how much sleep I had the previous night. That is the greatest feeling in the world, especially as a school teacher.

—Cambridge public school math teacher

ECONOMIC BENEFITS

- + Bicycling is a low-cost means of transportation, being the least expensive way to get around next to walking. Estimates of annual costs for a personal bicycle range from less than \$100 to around \$300 annually (annualized over 10 years).³³ Average cost for car ownership in 2019 were \$9,282/year or \$773.50/month.³⁴ The relative affordability of bike ownership compared to car ownership make bicycling an important part of creating more equitable access for people of all incomes and ages.

I live in Cambridge and bike to save money. It is less expensive transportation. In the past twenty years I've used public transportation maybe twenty times. That's more money in my pocket!

—Cook at Harvard Square restaurant

- + For those who cannot or don't wish to own their own bike, bike share can be another affordable and convenient option. A membership for Bluebikes, Greater Boston's bike share, costs as low as \$109/year for unlimited 45-minute rides (2021). Many people living and working in Cambridge are eligible for even lower rates through their employers or Bluebikes' income-eligible program. Income-eligible members pay \$50/year or \$5/month.
- + A quality bicycling environment reduces economic barriers and creates opportunities for people to participate in the social, cultural, and economic life of the community without using a car.
- + Evidence from around the country shows that bicycle or multi-use paths foster new and expanded business.³⁵

- + People who walk or bike are more likely to shop locally and therefore spend more in local businesses.³⁶ Research in Portland, Oregon, found that customers arriving by bike spend \$75.66 per month on average at bars, restaurants, and convenience stores.

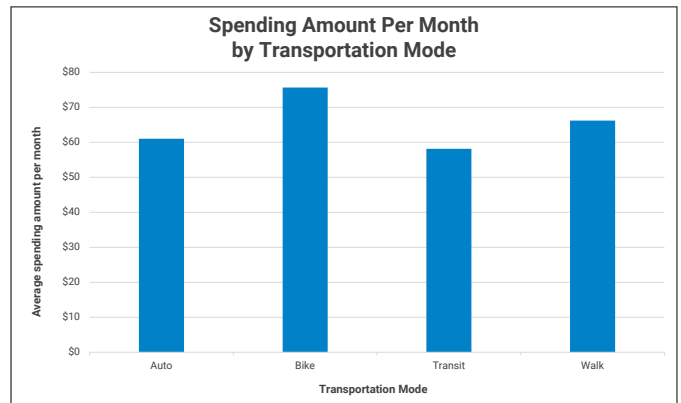


Figure 2.6: Portland customers who arrive by bike spend more per month on average at bars, restaurants, and convenience stores than people that arrive by other modes.³⁷



- + Investments in bicycle facilities have been correlated with increases in retail sales. Research on 14 street projects around the US found that additions of active transportation infrastructure have either no significant impact or significant positive impact on retail sales and employment.^{20 35 38}
- + Tourism is an important industry, and a bicycle-friendly environment can attract many riders from elsewhere. A bicycle-friendly environment also allows and encourages tourists to bike as a means of transportation when visiting.^{39 40 41}
- + Cities with higher bicycling populations have been shown to have lower overall crash rates, which in turn reduces related costs, such as for police, medical care, and insurance.^{42 43 44}
- + Greater reliance on bicycling and other sustainable transportation modes enables economic growth on a large scale. The Kendall Square area of Cambridge added 4.6 million square feet of development in a decade and increased commercial and institutional space by 40 percent without a concomitant rise in automobile traffic.
- + Safe and easy opportunities to bike to jobs can reduce the burden on households with limited motor vehicle access. Biking expands mobility choices and is a powerful strategy for improving upward economic mobility.⁴⁵
- + People who bicycle to work are healthier, with fewer sick days per year.⁴⁶ Employees who engage in regular physical activity have lower healthcare costs, require less sick leave, and are more productive at work.⁴⁷ In addition, employees who spend more time actively commuting have greater mental wellbeing.⁴⁸



I like biking because it's an effective way to travel, it reduces my carbon footprint and it tones my calves

- Salam Tesfaye

- + A 2015 study by the National Highway Transportation Administration estimated the economic cost of traffic crashes in the United States at \$242 billion, the equivalent of \$784 per US resident or 1.6% of US gross domestic product. The economic burden of traffic-related injuries and deaths includes costs associated with emergency response, medical care, legal proceedings, and lost productivity.
- + Biking is much cheaper than driving a private car. In 2017, 17% of the average U.S. household's annual expenditures were transportation-related, making transportation the second largest expense category after housing.⁴⁹ Bicycling for some trips

I use the bike for commuting, going to work, taking the kid to the doctor, taking the kid to the day care and going grocery shopping. Before we used to take Uber to Market Basket. I would say that in the past seven months, we have saved easily about \$500.

—Cargo biker who rides daily with his daughter

saves money, even without going car-free. Considering congestion reduction, roadway costs, vehicle costs, parking costs, air pollution, energy use, and traffic safety - replacing a car trip with a bike trip saves people individuals and society \$2.73 per mile.⁵⁰

- + A significant proportion of people arrive by bike to commercial districts in Cambridge and that number is increasing. Surveys performed over time have shown substantial increases at Porter Square and Inman Square. See Chapter 3 for additional information.
- + A recent study found that shared use paths in Massachusetts improved the local economy by generating between \$367,000 and \$9.2 million per path for businesses near the trails during the four-month study period alone.¹¹

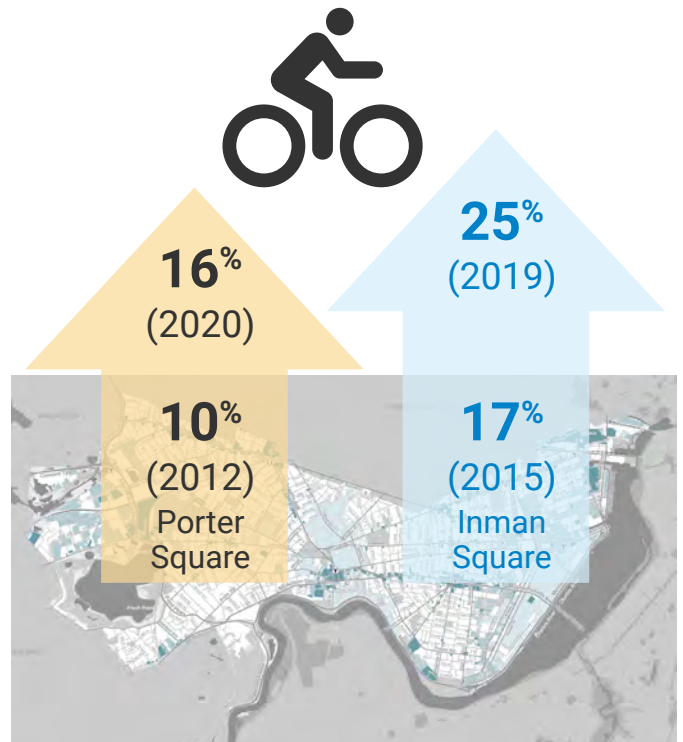


Figure 2.7: The proportion of customers that arrive by bike to Cambridge shopping districts is increasing.



QUALITY OF LIFE AND SOCIAL BENEFITS

The number of people who feel comfortable walking or riding bicycles is a measure of the quality of life in a city. The presence of many people walking and bicycling in a city indicates that there is a strong sense of community, people feel safe being outdoors, social interactions can occur openly, and people of all ages and incomes can have access to public and private facilities.

Safe bikeways increase the independence of children – helping to enable them to bike to school, providing much-needed physical activity and reducing the need for busing or automobile trips by parents. Children in cities such as Cambridge are often more mobile than suburban children because they can get around more easily on foot, by bicycle, or by transit. Studies have even shown that children who walk and bicycle to school do better academically.^{21 22}

The most memorable time riding my bike was when I was 8 years old. I was riding down Memorial Drive going to Dunkin Donuts. This is during one of those Sundays that they would close off a part of Memorial Drive to cars so that people would be able to ride bikes, skate or walk. It was the best time for me because I decided to make a grown-up decision and ride around the block ALONE after getting my donut. I considered it to be my first biking milestone. Getting a donut alone... check. Riding around the block alone...check, check. I felt GREAT!!!

—6th grader [6th grade bike joys]⁵¹



Harvard University students enjoying car-free Memorial Drive on a weekend.

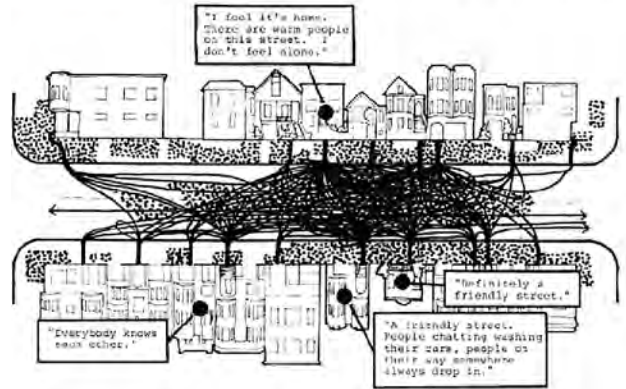


Comparison of Social Connections on Streets with Light, Moderate and High Traffic Volumes

Light Traffic

2,000 Vehicles per Day
200 vehicles per peak hour

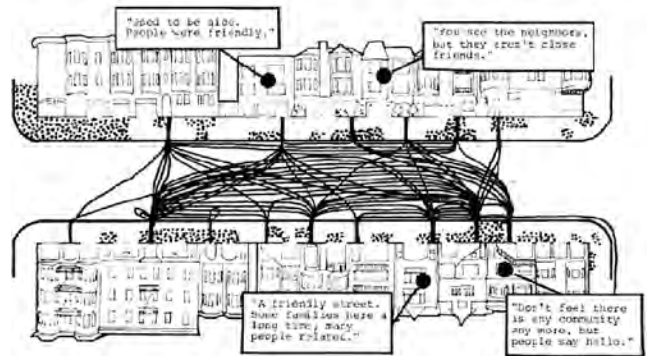
3.0 friends per person
6.3 acquaintances



Moderate Traffic

8,000 vehicles per day
550 vehicles per peak hour

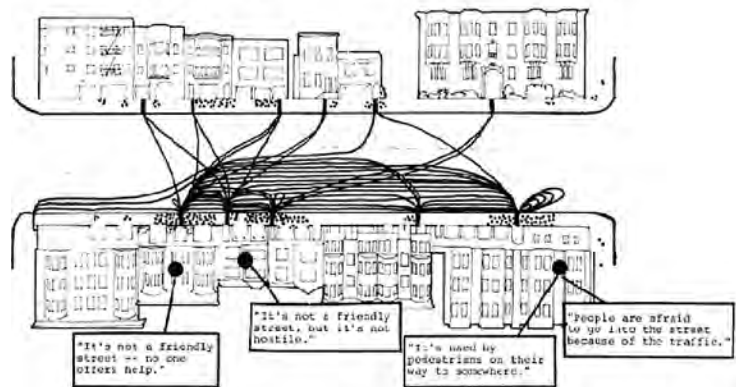
1.3 friends per person
4.1 acquaintances



Heavy Traffic

16,000 vehicles per day
1,900 during peak hour

0.9 friends per person
3.1 acquaintances



Traffic has a profound impact on community life. A renowned study by University of California, Berkeley professor Donald Appleyard compared three residential streets in San Francisco that were similar except for traffic levels. Published in the influential book “Livable Streets,” the research showed that residents of the street with the lightest traffic volumes reported having the highest average number of friends and acquaintances on their street when compared to residents of the streets with higher traffic volumes (see Figure 2.8).⁵²

Figure 2.8: Comparison of social connections on streets with light, moderate and high traffic volumes. Lines on the diagram represent social connections. Adapted from the original illustration created by Betty Drake in “Livable Streets” and used with permission from Bruce Appleyard.⁵²

THE POTENTIAL FOR BICYCLING

Bicycling is an enormously popular activity. In 2019, Americans ages 6 and older went on over 100 million bicycling outings.⁵³ People use bicycles for many purposes, not just for commuting. Commute trips make up less than 20% of all bicycle trips.⁵⁴ Bicycling gets people to work, to school, to shops, to visit friends, to parks, to soccer practice, to music lessons, to the T, or to see the sights.

MAJOR REASONS PEOPLE BICYCLE

- + Primary mode of transportation.
- + More convenient or faster than other modes of transportation.
- + Recreation/pleasure.
- + Fitness.
- + An activity to do with family or friends.
- + Concern for the environment.
- + Less expensive than other modes of transportation.
- + Many trips are within easy bicycling distance: 40% of all trips nationwide are shorter than two miles, no more than a 10-minute bike ride.²⁵
- + Any combination of the above.

DESIRE AND SUPPORT FOR BICYCLING

In many parts of the country there are structural deficiencies in the environment that pose major obstacles to increasing the rate of bicycling and walking, such as sprawling development and highways that dissect communities. Fortunately, Cambridge is well-suited to support bicycling and walking as a compact city with many destinations in close proximity.

Even with Cambridge's great foundation for bicycling, two points ring true here as well as around the country:

1. **Most people would like to bicycle more than they do now. This is true across the US as well as in Cambridge, where 85% of people who biked in the past year want to bike more than they do now, as do 53% of people that did not bike in the past year.**
2. **The biggest barrier to bicycling is the lack of safe facilities. More and better bicycling facilities have dramatically increased bicycle share trips in cities without any tradition of cycling for daily travel.⁵⁵ 73% of people say they do not feel safe riding on some Cambridge Streets and that is a barrier to them biking more. Nearly half say that providing more or better bicycle facilities would help them bike more often.**

These findings came from the 2020 Bicycle Plan Update Community Needs Survey and the 2020 Resident and Telephone Online Survey. See Chapter 3 for additional survey responses.

People also consistently articulate their support for public spending on providing better facilities. In a 2020 survey of US voters, 60% wanted to see the level of federal funding for bicycling and walking facilities increased, up from 58% in 2016 and 47% in 2012.⁵⁶ In the 2020 survey, Cambridge residents listed bike issues as the 7th most important issue for the City to focus on.

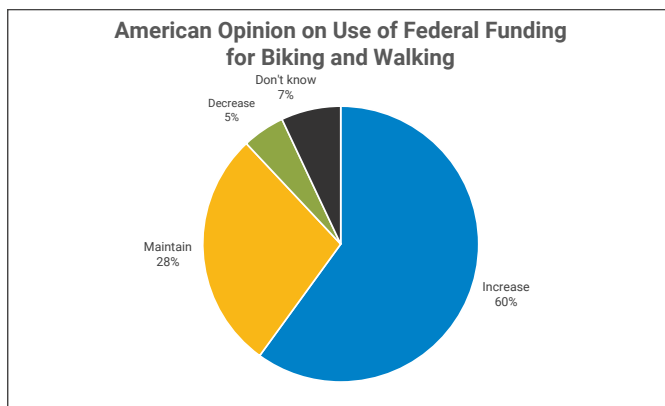


Figure 2.9: 88% of Americans polled want to maintain or increase federal funding for biking and walking.⁵⁶

HOW PEOPLE RELATE TO BICYCLING

In 2006, the City of Portland, Oregon’s Office of Transportation proposed that people differ in terms of their comfort riding a bicycle on different types of bikeways.⁵⁷ The hypothesis was that while some people are comfortable interacting with motor vehicle traffic while bicycling, most people are not and prefer off-road paths or quiet neighborhood streets. Because paths and neighborhood streets do not make complete connections to where people need to go, people do not bike as much as they might. This perspective was a significant shift compared to the decades-old Federal Highway Administration approach of classifying people based on skills and training.

Follow-up research in 2012⁵⁸ and 2016⁵⁹ surveyed nearly 4,000 people combined and confirmed that most people (88%) feel uncomfortable interacting with motor vehicle traffic while biking. The research found that more than half of people are both interested in biking more and uncomfortable biking on most streets. These perspectives were generally consistent across genders, income levels, education levels, and race. This population reported the highest level of comfort on separated paths and quiet residential streets, closely followed by riding in separated bike lanes on busy streets (30 to 40 mph), a dramatic improvement over the comfort level reported for striped bicycle lanes or riding in mixed traffic without a facility. The analysis indicated that reducing traffic speeds and increasing separation between bicycles and motor vehicles increases levels of comfort and bicycling rates.

I ride on the sidewalk because it is safe and I don’t feel comfortable biking on roads without paths. I only feel safe on Western Ave.

—Cambridge Bicycle Conversations Participant

In the same studies, women and the elderly were underrepresented among the more confident adults and those who currently ride bicycles for transportation. Particularly telling was the finding that survey respondents who said they are not interested in biking – approximately one third of the total population – reported that they would feel “comfortable or very comfortable” with a separated bicycle facility. Therefore, providing additional bikeways with separation from motor vehicle traffic presents a significant opportunity for increasing bicycling for transportation.



Further explorations of population attitudes revealed variability in how groups feel about bicycling. One 2020 study specifically targeted areas of the US where bicycling was less prevalent (Alabama and Tennessee). There, the research authors found that people with higher income and younger people perceive bicycling as safer and more comfortable, and are more willing to bike, than people with lower income and older people who did not bike. Additionally, females and people who are Black were found to be less willing to try bicycling than males and people of other races, respectively. The research does not explain why some people are less willing, but the authors recommended developing targeted educational, outreach, safety, and promotional programs along with infrastructure improvements to improve perceptions among or to investigate the needs of these populations.⁶⁰

A different 2016 study performed on a national level revealed that people who identified as White (non-Hispanic) were actually the most likely to fall into a category of not being interested in bicycling; people who identified as African-American, Asian, Multiracial, Hispanic-Mexican or “Other” were more likely to be interested in bicycling while remaining concerned about issues like traffic safety.⁵⁹

A separate nationwide survey found that the key factors that encourage adults age 50 and older to continue bicycling are safety, good infrastructure conditions, and separation from motor vehicle traffic.⁶¹

These studies together do show overall that most of the people in the US would like to bicycle more, but that barriers exist and must be addressed if we are to truly make bicycling accessible to all.

THE EXPERIENCE IN CAMBRIDGE

People in Cambridge have reported similar experiences and perspectives on comfort while bicycling. In the Community Needs Survey, over half of the responses to a question about barriers indicated that the most significant barrier to bicycling was not feeling safe riding on Cambridge streets. Women were more likely to select this barrier than male respondents (78% of women compared to 68% of men). Going deeper, the survey revealed that the reason most people don't feel safe riding on Cambridge streets is due to feeling unsafe around motor vehicles, which are perceived to be driven too fast and not safely. Lack of adequate lighting at night was also identified as a significant barrier. See Chapter 3 for additional survey results.

Cambridge Bicycle Conversations, which prioritized engaging with and learning from people of color, revealed that most participants who bike frequently cited dangerous and inconsiderate drivers as the biggest source of stress. Barriers to biking include fear of dangerous driving, self-perceptions of their lack of physical ability or a sense that biking is not something commonly done in their culture or community. Lack of access to high-comfort bicycle facilities is also a barrier for some, and many seniors reflected a self-perception that they cannot bike due to age and ability.



WHAT IS NEEDED TO SUPPORT PEOPLE OF ALL AGES, ABILITIES AND IDENTITIES?

Since Cambridge began planning for bicycle transportation in earnest in the 1990s, we have consistently seen that the greatest impact comes from creating facilities: people ride where there are places for them to ride.

Many studies conducted locally and across the country—such as those described earlier in this chapter—have clearly demonstrated that the most significant increases in bicycling rates happen when people are provided with safe, direct, low-stress facilities. These include separated bike lanes, multi-use paths, quiet streets with low-speed traffic, and streets with good lighting to help people feel safe and comfortable.

While facilities are a necessary condition for enabling people to bicycle, studies have also shown the importance of providing supporting programs that help build a bicycle culture, encourage more people to try biking, and increase people's access to affordable bikes. These programs are especially important for increasing the diversity of bicyclists in a community in terms of gender, race, and other identities.

We have seen the importance of providing supporting programs in Cambridge such as Bluebikes bike share, including a reduced fee membership option, which allows more people access to bikes, and Safe Routes to School, which has demonstrably increased the number of students biking and walking to school. See Chapter 6, 7, and 8 for more information on bicycle programs in Cambridge.

SAFETY IN NUMBERS

In addition to all of the quality of life, environmental, health, and economic benefits for supporting people of all ages, abilities and identities to bicycle more (as described in this chapter), more people bicycling improves safety for everyone.

- + **People perceive a safety-in-numbers effect. Potential bicyclists feel that a higher density of people bicycling would increase safety because drivers would be conditioned to expect cyclists.⁶⁰ They also feel that this would reduce harassment.**
- + **The safety-in-numbers phenomenon is not only a perception though – it's an actual effect. The phenomenon was first published in a study by Jacobsen in 2003, where the author found that the likelihood of a person bicycling to be struck by a motorist varies inversely with the amount of people bicycling (i.e., the more people bicycling, the less likely they are to be struck by a motorist). The pattern was consistent across communities of varying size, from specific intersections to cities and countries, and across time periods.⁶²**
- + **A 2019 meta-analysis of safety-in-numbers studies confirmed this effect for bicyclists when looking at the relationship between traffic volume and number of crashes, particularly at the macro level (e.g., a city).⁶³**

INCREASE SAFETY, COMFORT AND SEPARATION

Not all bicycle facilities are created equally. To support people of all ages, abilities, and identities, bicycle facilities need to be “high comfort.” This is more fully defined in Chapter 5, but in short, high comfort bike facilities feel safe for everyone and reduce interactions with motor vehicle traffic. The following outlines key strategies for creating a high comfort system.

BUILD SEPARATED BIKE LANES

Major streets (arterials and major collector streets) often provide direct connections and access to destinations. On these streets, the ideal facility type is a “separated bike lane” (also known as “protected bike lanes” and “cycle tracks”).

Separated bike lanes provide an exclusive space for people to ride that is separated from motor vehicle and pedestrian traffic by a vertical element, which can include plastic flexposts, parked cars, curbs, grade separation, and/or landscaping.



Standard bicycle lane, Hampshire Street

Transitive benefit: more separated facilities > more riders > greater safety



Separated bicycle lane, Western Ave

The rationale for and safety benefits of separated bicycle facilities are extensive:⁵⁸

- + **Barrier- or buffer-separated bicycle facilities are most comfortable and the preferred facility type on major roads for bicyclists and potential bicyclists.**
- + **The degree of separation for bicycle lanes matters more to bicyclists and potential bicyclists than the number of vehicle lanes on the roadway.⁶⁰**
- + **Curbside parked cars, the dangers of opening doors and drivers parking or leaving the curb, are the most consistent concerns noted among bicyclists and potential bicyclists.⁶⁰ Buffered and separated bicycle lanes with a physical barrier such as bollards or planters are viewed as substantially improving comfort for bicyclists.**
- + **Where separated bicycle facilities have been established, marked increases in the number of people riding has been demonstrated.**
- + **Where separated bicycle facilities have been established, there is a dramatic decrease in sidewalk bicycling, thereby improving pedestrian comfort.⁶⁴**

In a survey of people who travel on a major commercial street, streets with barrier-separation between moving non-motorized and motorized traffic were consistently found to be the most comfortable for not only for those on bicycle, but for those driving as well. The survey also indicates that the risk of being hit by a car door is a consistent worry for everyone who biked, many of whom have been hit or almost hit in this situation. As parking-related crashes are a substantial portion of crashes in Cambridge (see Chapter 3), this is a significant issue here as well.⁶⁵

Another study found that the presence of buses along a route decreases bicycling satisfaction levels for all genders. The same study found that one of the most significant factors for increasing satisfaction was the presence of fully-separated paths for bicycling.⁶⁶

When Paris installed pop-up separated bike lanes during a transit strike, a report found that approximately 60% of users were new to bicycling. Women represented a significant portion of these new bicyclists, increasing women's representation amongst Parisian bicyclists from 36% before the pop-up lanes to 41% after installation.⁶⁷

Studies of the effects of separated bicycle facilities on Cambridge Street and Brattle Street, installed in the summer of 2017, align with these national trends. Bicycle ridership increased dramatically on both streets post-construction, while the clear majority of people walking, biking, or taking transit surveyed stated they were satisfied or very satisfied with the new design. These studies are discussed in greater detail in Chapter 3, with the full studies available on the City's website.

Separated bicycle lanes enhance the comfort and safety of bicycling on urban streets and encourage people of all ages and abilities to ride.

In a study conducted in Portland, OR, air quality was found to be 8% to 38% better in a separated bike lane than a standard bicycle lane. Researchers also found that the highest differences between the two facilities corresponded with higher traffic volumes, supporting the conclusion that the distance created by a physical barrier between a bicycle facility and moving traffic affects air quality and exposure to ultrafine pollutant particles for people on bicycles.⁶⁸

CREATE BICYCLE PRIORITY STREETS

Some streets can be comfortable places for bicycling without separated bike lanes. Many streets, like quiet neighborhood streets, are great for riding without any added facilities. Other streets may be on the threshold of comfort but cannot have separated bike lanes added for various reasons. These streets are opportunities to create bicycle priority streets.

Bicycle priority streets have low motorized traffic volumes and speeds and are designated and designed to give bicycle travel priority. To achieve and maintain high-comfort bicycle priority streets, bicycle priority streets may involve physical treatments to manage motor vehicle speeds and volumes and/or designated space (e.g., bike lanes). These treatments have positive side-effects, like making the street more comfortable for walking and reducing speeding.

Bicycle priority streets are referred to by a variety of names in other communities, such as neighborways and bicycle boulevards. The benefits of these types of streets are numerous and include:

- + **Increasing safety by reducing motor vehicle speeds and cut-through traffic on residential streets.**
- + **Improving livability by preserving neighborhoods and reducing traffic noise.**
- + **Enhancing the environment by reducing motor vehicle emissions.**
- + **Supporting healthy lifestyles by making it easier to engage in physical activity.**
- + **Increasing access by providing connections that are safe and comfortable.**

A study of the SE Salmon Street bicycle boulevard in Portland, Oregon, found that residents along the street saw positive impacts on convenience for bicyclists, sense of community, quality of life, home value, air quality, and noise after the implementation of the bicycle boulevard.⁶⁹

Research in Palo Alto, California, found that while motor vehicle volumes remained constant and property access was maintained, bicyclist volumes increased significantly after the City installed a bicycle boulevard on Bryant Street.



PROVIDE ADEQUATE LIGHTING

Lighting is important for encouraging people to bicycle, by increasing traffic safety and personal security through increased visibility. A study of crashes in Cambridge found that crashes involving people biking and walking disproportionately occur at areas without adequate street lighting. The risk is greatest at dusk and dawn, when crashes are 21% and 35% more likely to occur at unlit locations, respectively.⁷⁰ Other research indicates that better lighting can promote bicycling after dark, both on street and on shared use paths.⁷¹



SUPPORTIVE PROGRAMS

As mentioned, while establishing a safe, comfortable, and inviting environment for riding is a fundamental condition to making bicycling available to all, other elements are important as well. These are further described in Chapters 6-9.



The Safe routes to school program includes a variety of activities, including on-the-bike practice for children.

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CHAPTER 3

INFORMATION AND REPORTING

INTRODUCTION

The City regularly gathers information about conditions in the city, the needs and preferences of the community, and the effects of its programs and activities. This information is gleaned in a variety of ways, including through direct contact with the people who live, work and visit here, by providing opportunities through online and virtual mechanisms, through analysis of on-the-street activities, and by undertaking evaluations of programs and projects.

In this Chapter we share some of the key information that helps to inform our work as well as assess its impact.



SURVEYS ON BICYCLING

Community preferences and priorities provide important information for planning in our city. The specific input activities undertaken for the Bicycle Plan are described in Chapter 1. We review here several surveys on bicycling habits, preferences, and comfort levels, including three surveys specifically for the Plan and a more general survey undertaken by the City on a broad range of topics.

The Cambridge Community Survey (2014) was conducted for the 2015 Cambridge Bicycle Plan. The online survey collected 733 responses. The Community Needs Survey (2020) was conducted for the Bicycle Plan Update. The survey was conducted online and in-person at outreach events across the city and collected 305 responses. The Visual Preference Survey (2019) was conducted in-person, with approximately 200 people participating. The Resident Telephone and Online Survey (2020) provides a snapshot of public sentiment toward various issues and public services. Typically conducted by phone every two years, the 2020 survey also reached people online and had 2,951 responses. For more information on the surveys conducted, and how they related to the Plan update process, see Chapter 1.

While a variety of important information can be taken from the results, the biggest takeaway is that people who bicycle in Cambridge would like to see more separated bicycle facilities and bicycle-friendly street designs. This applies whether the respondent rides frequently or rarely.

The surveys gathered information on:

- + **Top issues that the City should focus more attention on.**
- + **Comfort level with bicycling on various street and bicycle facility types (sample photographs were shown for each condition).**
- + **Comfort level allowing children to ride on different street and bicycle facility types.**
- + **Preferred bicycle facility type.**
- + **Frequency that people rode their bikes.**
- + **Ability to get around the city by bicycle and desire to bike more.**
- + **Barriers to biking and what the City could do to help.**

More details on survey results can be found in Appendices A and B.

WHAT ISSUES SHOULD THE CITY FOCUS ON?

In Cambridge’s 2020 Resident Telephone and Online Survey (a survey that is conducted biennially), people were asked what two or three issues the City should focus more attention on. The list included a variety of topics related to housing, transportation, public safety, and more. Infrastructure ranked 2nd out of 17 topics and was selected by 18% of respondents. The bicycle-related issues topic ranked 7th and was selected by 10% of respondents.¹

WHAT ARE PEOPLE’S PERCEPTIONS ABOUT THE ABILITY TO GET AROUND THE CITY BY BICYCLE?

People’s perceptions about the ability to get around the city by bicycle have been steadily improving. Seventy-four percent (74%) of survey respondents rated their ability as “good” or “excellent” in 2020, compared with 72% in 2018 and 70% in 2016.¹

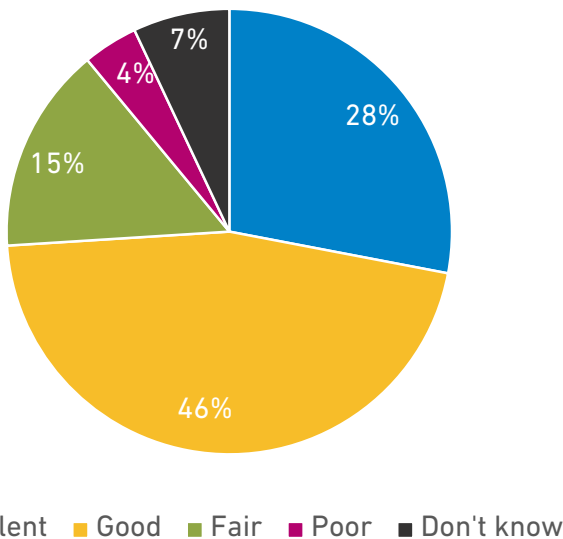


Figure 3.1: Ability to get around town by bicycle (Resident Telephone and Online Survey, 2020)

HOW OFTEN ARE PEOPLE RIDING THEIR BIKES?

The number of new people riding in the city has been increasing. The percent of survey respondents who rode at least once during the year and the percent that biked at least twice per month increased from 2018 to 2020. In addition, the percent of people who have never ridden a bike in the city decreased over the same period.¹

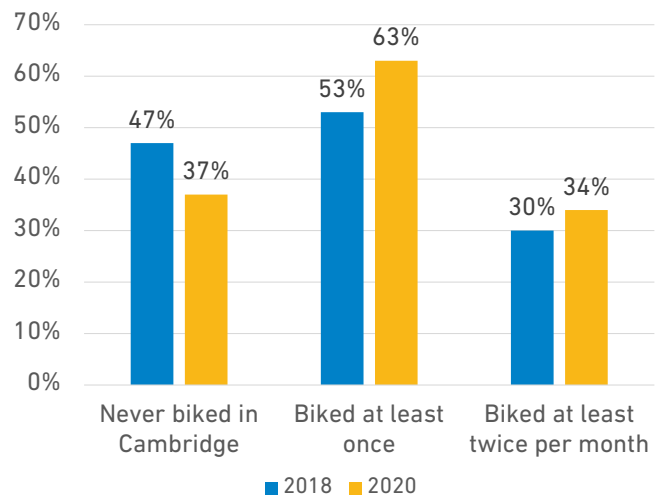


Figure 3.2: How often do you bike in Cambridge? (Resident Telephone and Online Survey, 2020)

WOULD PEOPLE LIKE TO BIKE MORE IN CAMBRIDGE?

People also want to bike more in Cambridge, regardless of whether they have ridden recently or not. In the Community Needs Survey (2020), 85% of survey respondents who rode in the past year, and 53% of those who did not ride in the past year, said they wanted to bike more in Cambridge.²

Would you like to bike more in Cambridge?

YES!

85%

of people that have biked in Cambridge in the last year want to bike more

53%

of people that have not biked in Cambridge in the last year want to bike more

WHAT BARRIERS TO BIKING DO PEOPLE FACE?

When asked to select from a list of barriers to biking, the most common response by far was “I don’t feel safe riding on Cambridge Streets” (89%). Women were more likely to select this barrier than men (94% of women compared to 83% of men).^{2,3}

Other barriers people identified included not having a storage space at work or home (13%), not owning a bike (11%), not knowing how to use Bluebikes (8%), and not knowing how to bike (1%). While these barriers are relatively less common, some people are more impacted by them than others. For example, men were more likely (21%) to identify a lack of storage space at work or home than women.²

Barriers: Which of the following apply to you?

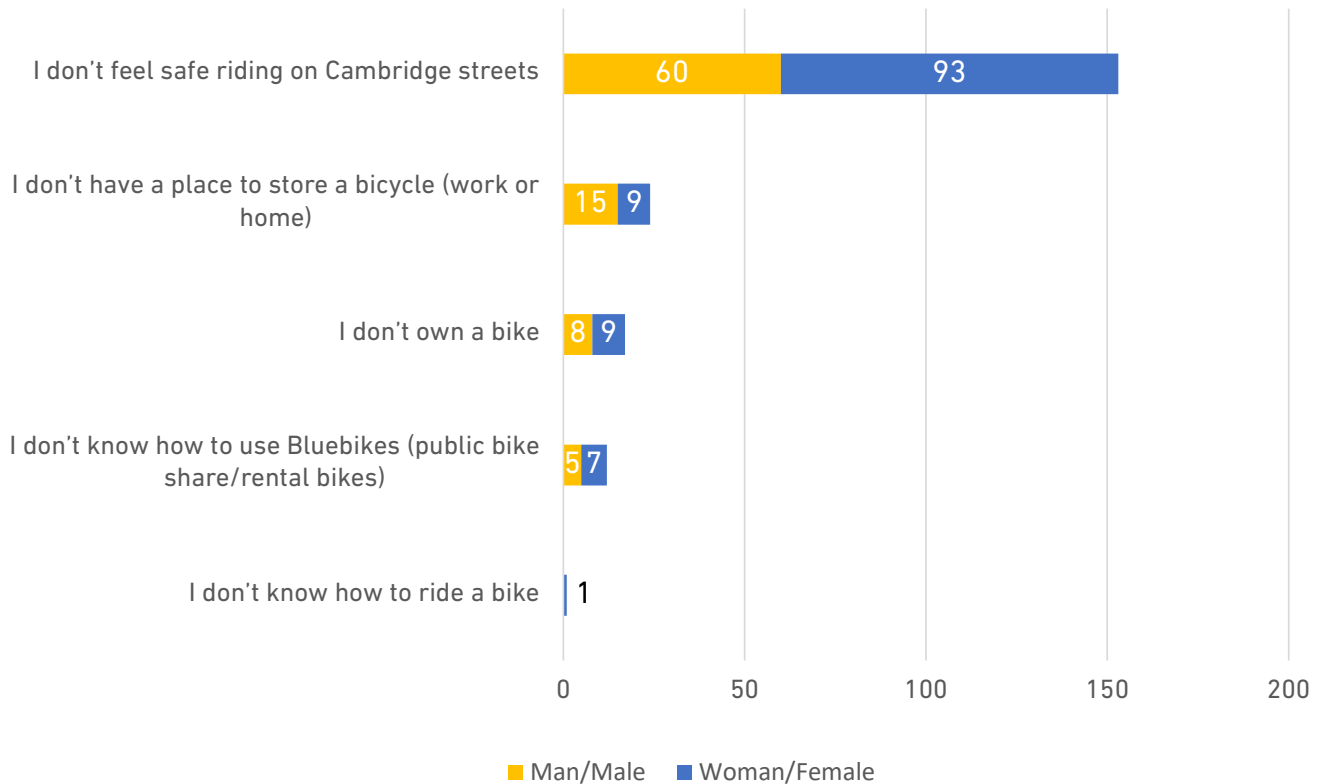


Figure 3.3: Survey participant reported barriers (Community Needs Survey, 2020)

Further evidencing why safety is a barrier to biking, many people stated feeling unsafe around motor vehicles (87%) and some feel there aren't good connections to where they want to go (48%). People were also concerned with dark streets at night (14%), personal safety/crime (10%), and being harassed by officials (4%). Women were more likely than men to be concerned about motor vehicle speed and unsafe driving, amount of traffic, and inadequate street lighting.²

While most questions in this survey were multiple choice, respondents were also given the opportunity to provide open responses. In response to an open question about what prevents people from biking as much as they would like to, over half of the responses (51%) were tied to the lack of safety around motor vehicles (lack of safe spaces/separation for bikes, dangerous intersections, bad/aggressive drivers, vehicle speeds, cars in bike lanes, dooring, and large trucks). Other barriers to biking include the lack of a connected network (11%), dangerous intersections (4.5%), and bad weather/winter (4.5%).²

Safety: Which of the following concerns apply to you?

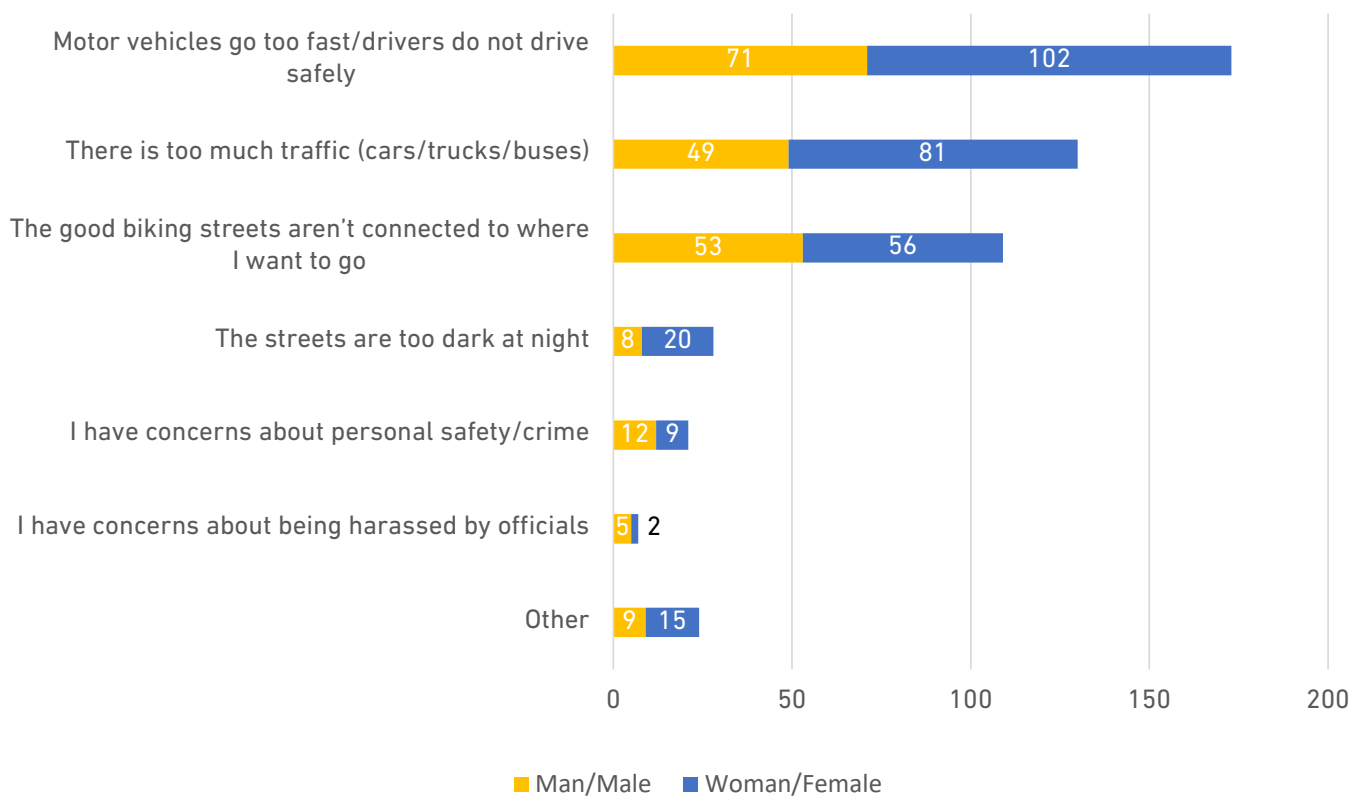


Figure 3.4: Survey participant reported safety concerns (Community Needs Survey, 2020)

WHAT CAN THE CITY DO TO HELP PEOPLE BIKE MORE?

The lack of feeling safe around motor vehicles is reflected in the answers to an open question on what the City can do to help people bike more. The top response was “to provide more protected/ separated bike lanes and paths” (29% of 413 responses). Nearly half of responses (48%) were tied to having more or better street infrastructure (e.g., contraflow lanes, bike signals, bike boxes, safer intersections, path lighting). Other requests include enforcement for drivers (6%), enforcement for cyclists (5%), bike parking (3%), and driver education (3%).²

This next section explores how people feel on various types of streets and with different bicycle infrastructure.

One of the great things that Cambridge is doing, they're starting to install these [separated] bike lanes, which make a complete difference. First of all, I'm shielded by people who are parked so that a motorist who might be under the influence or just reckless or not thinking cannot reach me.

–Cambridge conversations participant

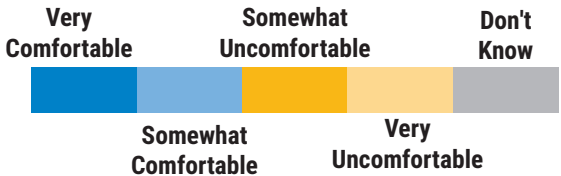


HOW DO PEOPLE FEEL BICYCLING ON COMMERCIAL (MAJOR) STREETS?

In the Cambridge Community Survey (2014), people were asked to rank how comfortable they would feel riding a bicycle on a busy commercial street based on facility type, including no accommodations at all, shared lane markings, a standard bike lane, a buffered bike lane, a separated bike lane, or raised cycle track. Protected bike lanes and raised cycle tracks are both separated bike lanes, but were presented as different facility types for this exercise. Survey responses are shown by all respondents and broken out by concerned respondents (those who reported that they bike only some places or are not comfortable biking in the city).⁴

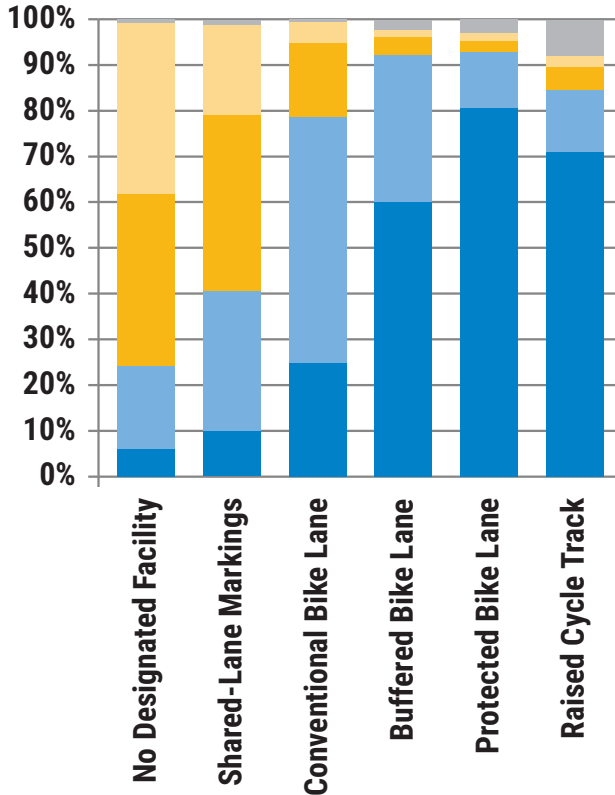
81% of all respondents and 68% of concerned respondents feel “very comfortable” on separated bicycle facilities.

Only 25% of all respondents and 4% of concerned respondents in Cambridge feel “very comfortable” using conventional bicycle lanes.



ALL RESPONDENTS

How comfortable do you feel with these bicycle facilities on busy, commercial streets?



CONCERNED BICYCLISTS

How comfortable do you feel with these bicycle facilities on busy, commercial streets?

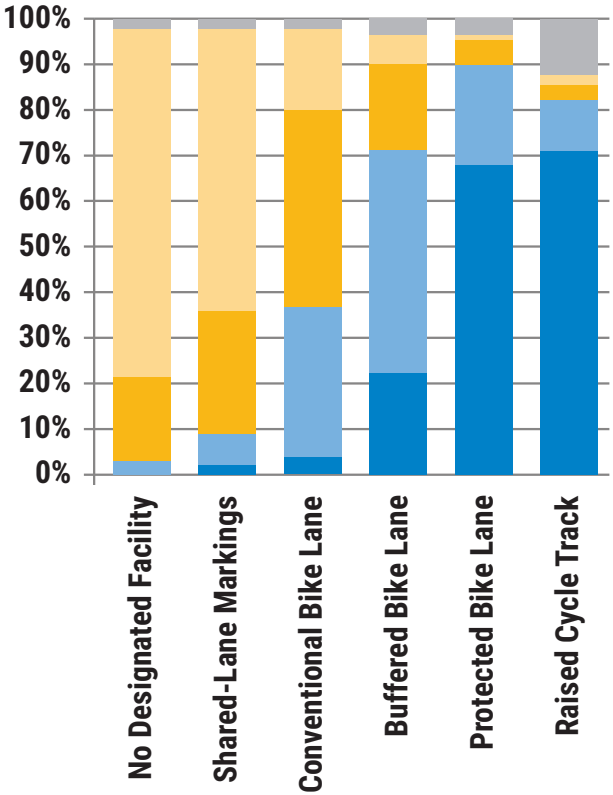
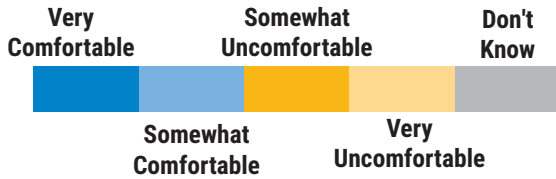


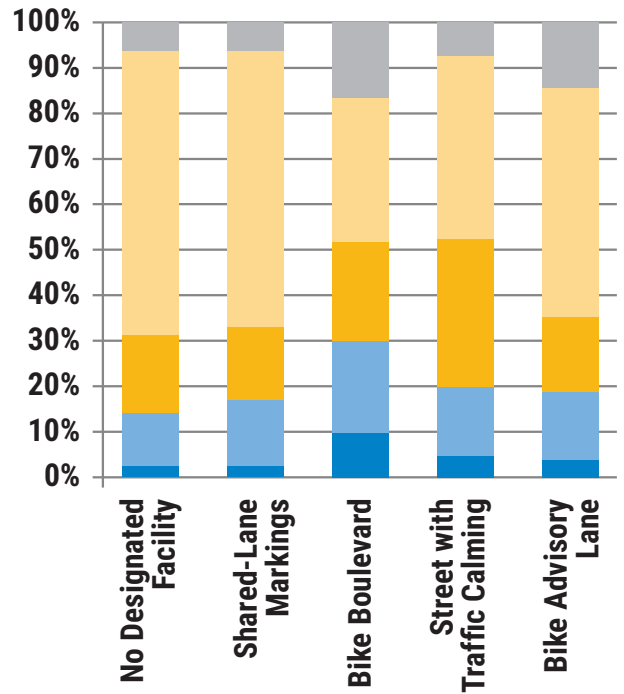
Figure 3.5: Level of comfort using bicycle facilities on commercial (major) streets. (Cambridge Community Survey, 2014).

HOW DO PEOPLE FEEL BICYCLING WITH CHILDREN?

Respondents were asked about their comfort levels for children traveling on streets, either with an adult or on their own.⁴



How comfortable do you feel about your children on these bicycle facilities on non-commercial streets, **WITHOUT** an adult?



How comfortable do you feel about your children on these bicycle facilities on non-commercial streets, along **WITH** an adult?

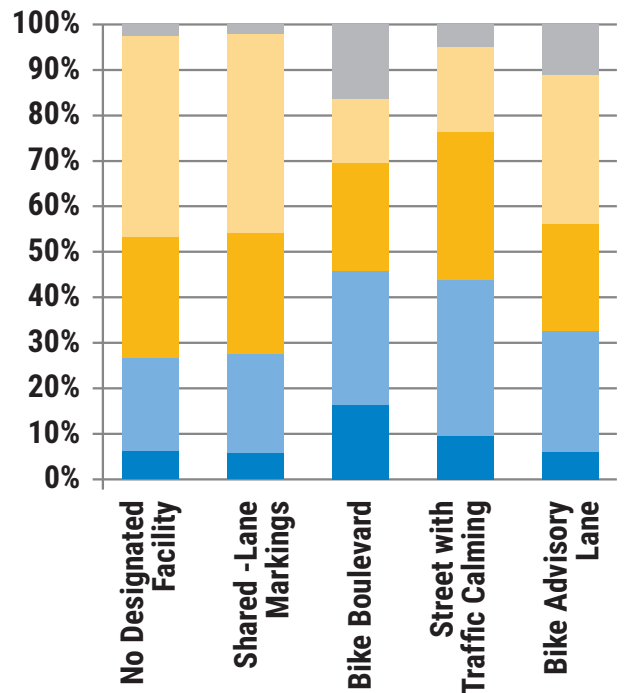


Figure 3.6: Level of comfort biking with children on non-commercial streets. (Cambridge Community Survey, 2014).

HOW DO PEOPLE FEEL BICYCLING ON NON-COMMERCIAL STREETS?

People were also asked about other street design treatments that would be relevant for non-commercial streets, such as traffic calming, bicycle priority lanes, and bicycle boulevards. There was somewhat more uncertainty about some of these, primarily because of the lack of familiarity; while traffic calming is extensive in Cambridge, at the time the survey was taken, there were not yet bicycle boulevards or bicycle priority lanes in the city.⁴



I am a nurse and I visit seven homes a day, sometimes riding twenty five miles. I ride because there is often no parking.
 -Ashlie Taylor, Nurse and home healthcare supervisor

BICYCLE FACILITIES ON NON-COMMERCIAL STREETS



Street with shared lane markings



Street with shared lane markings



Bicycle boulevard



Bicycle boulevard



Street with traffic calming



Street with traffic calming

Examples of bicycle facilities on non-commercial streets shown to survey respondents. See Chapter 4 for details on various facility types.

Traffic calming can improve the bicycling experience by slowing vehicular speeds and making sharing the road more comfortable.

WHAT TYPES OF BIKE FACILITIES DO PEOPLE WANT TO SEE?

Survey respondents were asked to rate the importance of various bicycle facility options that they would like to see implemented in Cambridge.⁴

Protected bicycle lanes received the highest rating, with 92% of respondents saying that implementing them in Cambridge was important, and two-thirds saying it was "very important."



Concord Ave. separated bike lane



Vassar St. separated bike lane



Norfolk St. contra-flow bike lane

What design features would you like to see implemented?

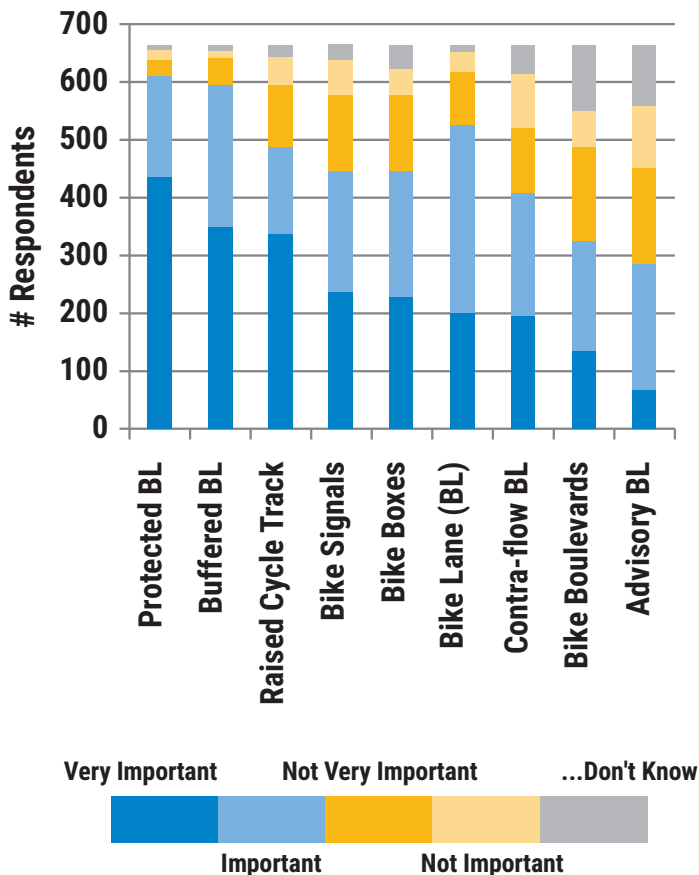


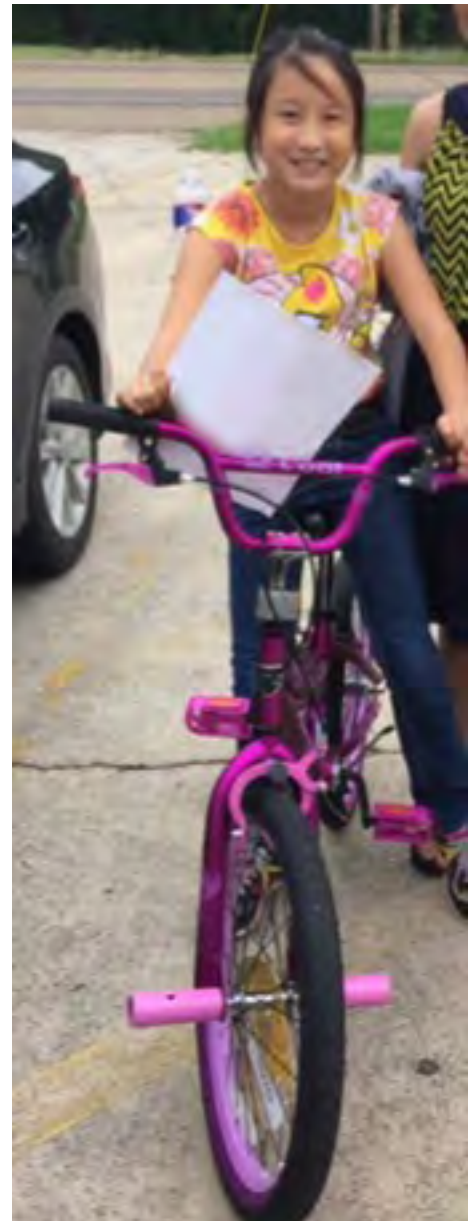
Figure 3.7: Bicycle facility type preferences. (Cambridge Community Survey, 2014).

In a 2019 in-person survey, people were asked to indicate whether they liked, disliked, or were neutral about various street design elements based on photos of facilities located mostly in Cambridge.⁵

| Facility | Like | Neutral | Do not like |
|----------------------------|------|---------|-------------|
| Raised intersection | 44 | 16 | 11 |
| Curb extensions | 29 | 18 | 22 |
| Crossing islands | 39 | 21 | 1 |
| Chicanes | 17 | 10 | 28 |
| Low-volume street | 40 | 14 | 6 |
| Traffic circle | 22 | 20 | 34 |
| Bicycle priority markings* | 10 | 22 | 47 |
| Shared lane markings | 10 | 4 | 60 |
| Bus-Bike lane | 26 | 19 | 49 |
| Bicycle lane | 60 | 28 | 1 |
| Buffered bicycle lane | 86 | 15 | 3 |
| Street level separated | 162 | 7 | 6 |
| Sidewalk level separated | 142 | 10 | 9 |

*a type of shared lane marking with dashed lines indicating preferred lane positioning
 Note: Darker colors indicate a higher level of agreement among participants.

Figure 3.8: Bicycle facility type preferences. (Visual Preference Survey, 2019)



When I'm biking, I can feel the wind in my hair, I can speed or slow down to catch a glimpse of the trees, birds, and buildings, and my legs never stop moving.
 –Jessica, Cambridge

BICYCLE COUNTS

HOW MANY BIKES DO WE OWN?

The 2009 CitySmart survey⁵ showed that 65% of households owned at least one bicycle and those households owned 2.6 bicycles on average. This means that for every 100 households, there were 169 bicycles.

Other studies in the U.S. also show substantial bicycle ownership rates.

- + **Denver Regional Council of Governments (2018): 77% of households have at least one bike and 58% have two or more bikes**
- + **National Household Travel Survey (2001): 1 working adult bike/household.**

HOW MANY PEOPLE ARE CHOOSING TO TAKE TRIPS BY BIKE?

Cambridge has among the highest rates of walking and bicycling in the United States; about a third of Cambridge residents walk or bicycle to work (see Figure 3.9). Commute trips tend to be the focus of transportation analysis and surveys, yet they represent less than 20% of all trips taken. Other trip purposes – shopping, leisure, personal business, recreation – constitute approximately 80% of trips.

CENSUS DATA

The American Community Survey, a U.S. Census Bureau survey conducted yearly, provides data on how residents, age 16 and over, commute to work. There has been a steady increase of Cambridge residents biking to work, with the percent of people biking changing from 6.9% in 2011-2013 to 8.1% in 2017-2019. While the percent of residents biking,

walking, and working from home have all gone up, the percent of residents driving to work has decreased. For Cambridge residents, drive alone commuting has decreased from 29.8% in 2011-2013 to 26.9% in 2017-2019 and carpooling has decreased from 4.1% in 2011-2013 to 3.5% in 2017-2019.

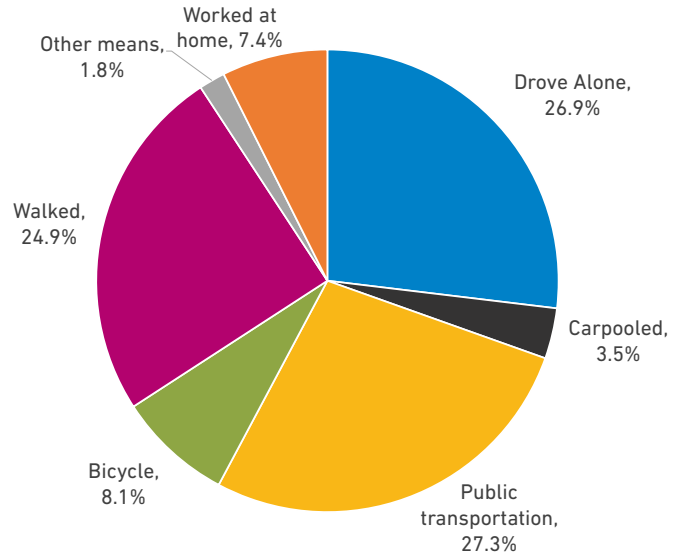


Figure 3.9: Work Commute Mode Split for Cambridge Residents, age 16+ (2017-2019).

Note: Weighted average (by relative size of labor for the stated year) of ACS 1-year data (table B08301).

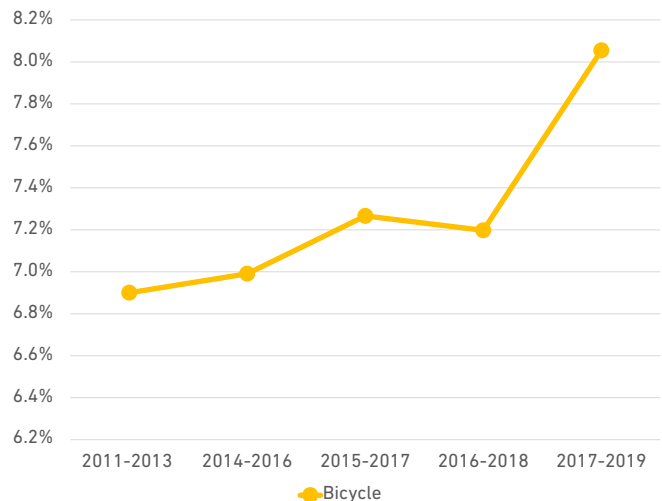


Figure 3.10: Work Commute Bicycle Mode Split for Cambridge Residents, age 16+ (2011-2013 to 2017-2019).

Note: 2011-2013 uses ACS 3-year data and 2014-2016 to 2017-2019 uses weighted averages (by relative size of labor for the stated year) of ACS 1-year data (table B08301).

CITY SURVEYS

Between 2009 and 2011, Cambridge undertook a series of in-depth surveys to learn more about residents' travel patterns. Respondents used a bicycle for a trip approximately 6-9% of the time, depending upon the neighborhood and type of trip.⁶ The 2011 CitySmart survey showed an average of 65% of bicycle users took a shopping trip on the survey day. The survey also found that people who use bicycles for transportation take more trips per day than users of any other mode – about 5 trips per day on average.

Similarly, surveys of visitors to six of Cambridge's commercial districts show that a significant portion of visitors travel by bicycle. The results of these surveys, conducted between 2012 and 2020, are shown in the table below. Of note are the increases in the number of people biking to Porter Square between 2012 and 2020 (10% to 16%) and Inman Square between 2015 and 2019 (17% to 25%).

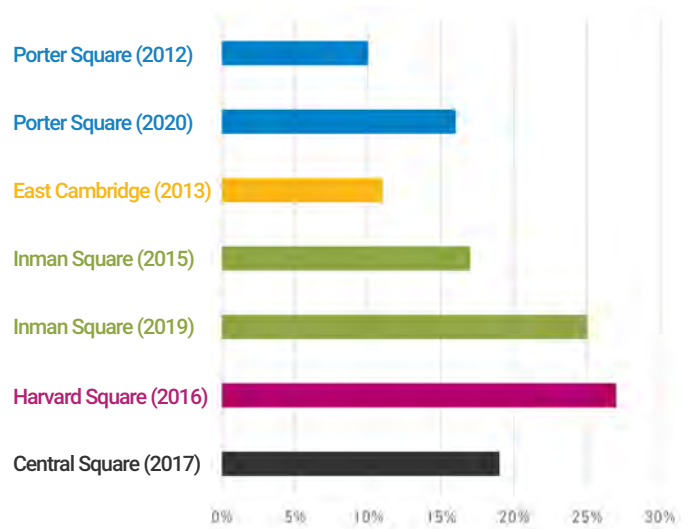


Figure 3.11: Percent of customers who traveled by bike.



HOW MUCH ARE PEOPLE BIKING IN CAMBRIDGE?

Cambridge typically conducts regular bicycle counts every other year at locations throughout the city. This data can be viewed on the City's new [bicycle count data portal](#).

There has been a steady upward trend in bicycling over the years. In total, bicycling increased fourfold between 2002 and 2019. Some locations have seen significantly larger increases than others.

The City has also increased bicycle facility lane miles significantly over the past 15+ years. From 2004 – 2019, the total miles of bicycle facilities doubled, with increases in the number of people bicycling occurring at an even higher rate. The figures on this and the following page demonstrate these trends.

Additionally, the use of scooters, one-wheels, and other wheeled micro-mobility devices has increased. The City is working to ascertain how its counting and crash data collection practices can most accurately reflect this evolution.

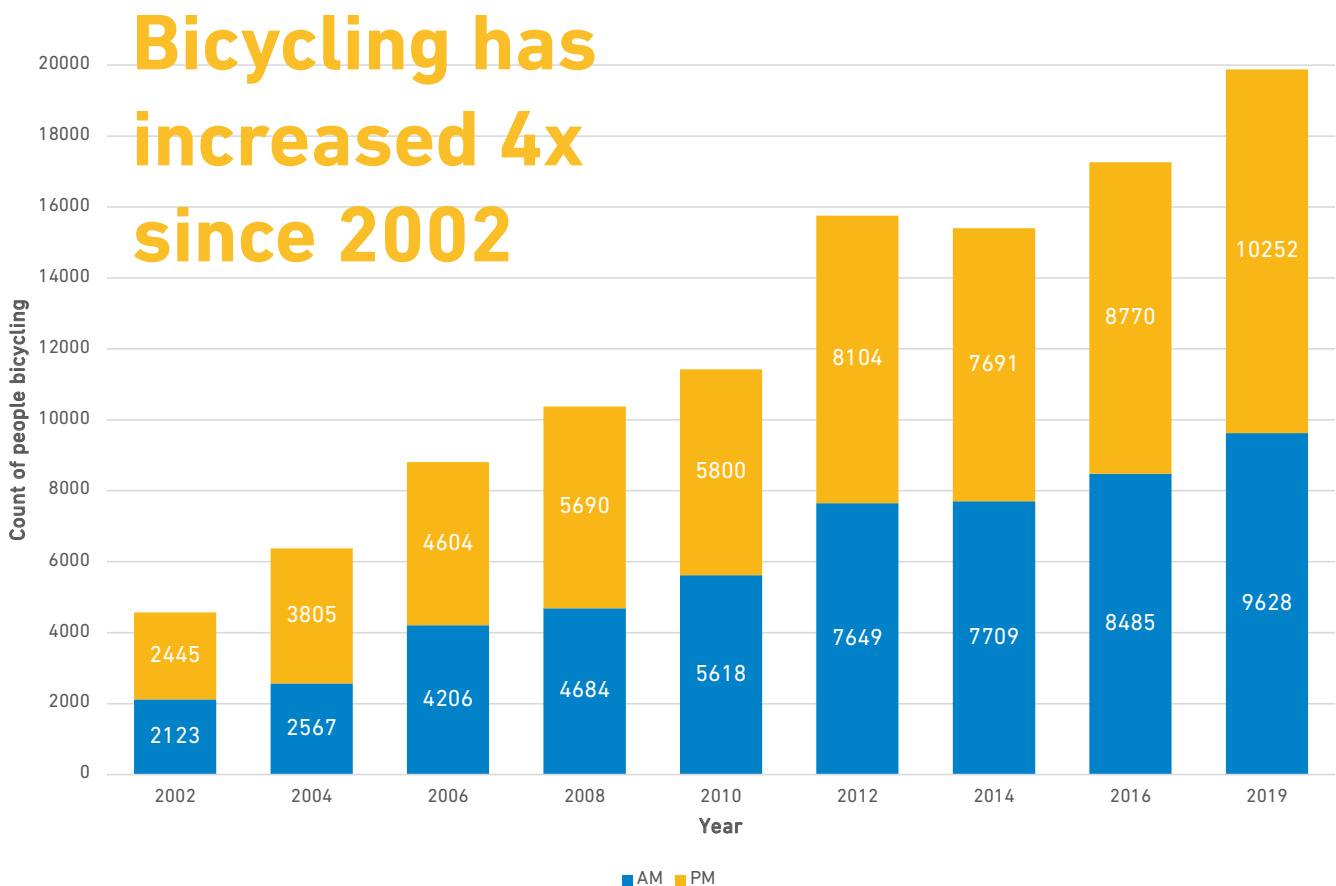


Figure 3.12: Cambridge Bicycle Count Chart, 2002-2019, Combined AM and PM Peak Counts.

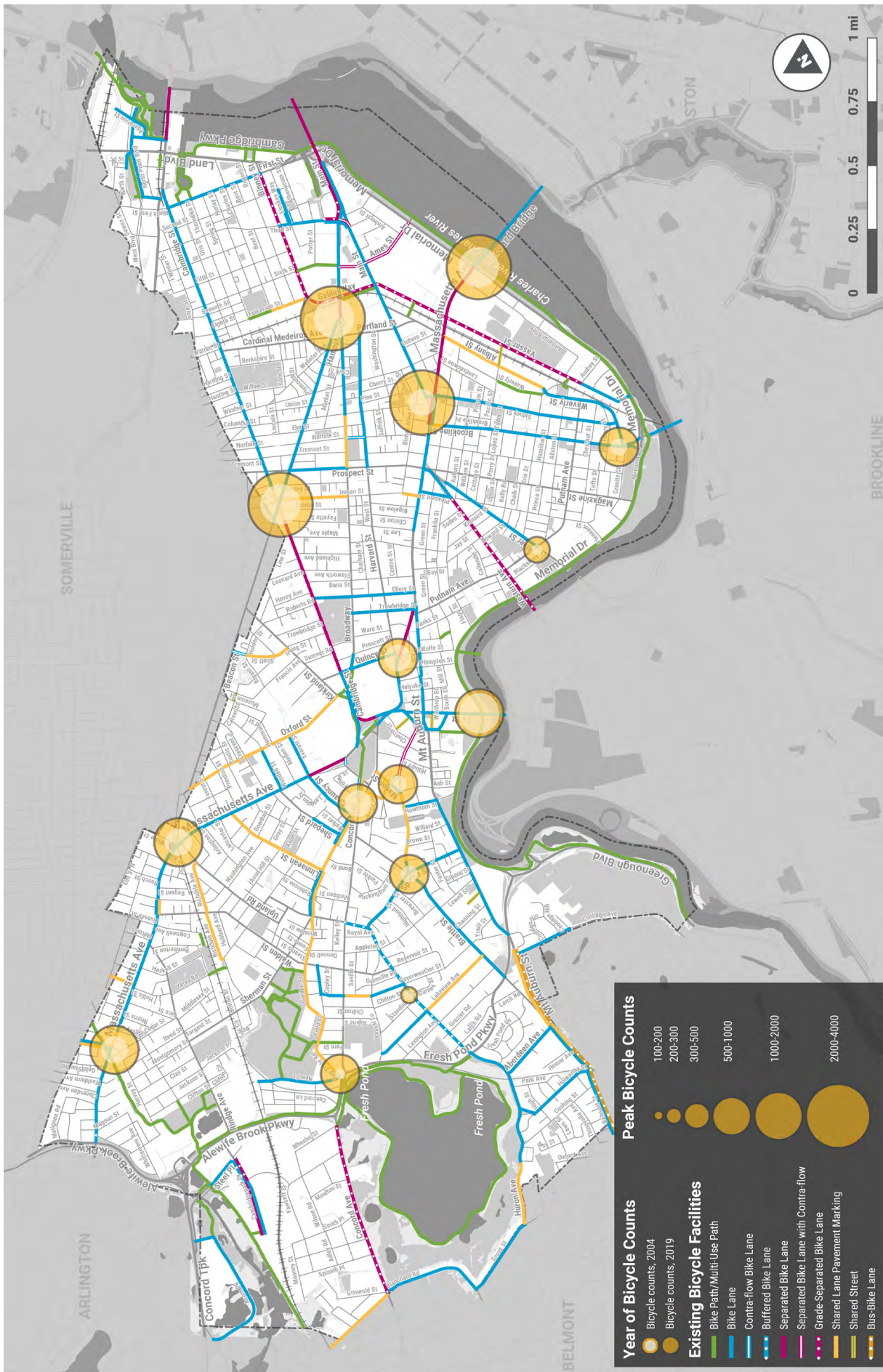


Figure 3.13: Map of Cambridge Bicycle Counts, 2004 to 2019, Combined AM and PM Peak Count.

NUMBER OF PEOPLE BIKING CORRELATES WITH MILES OF BICYCLE FACILITIES

Bicycle Facility Lane Miles and Number of People Bicycling (2004-2019)

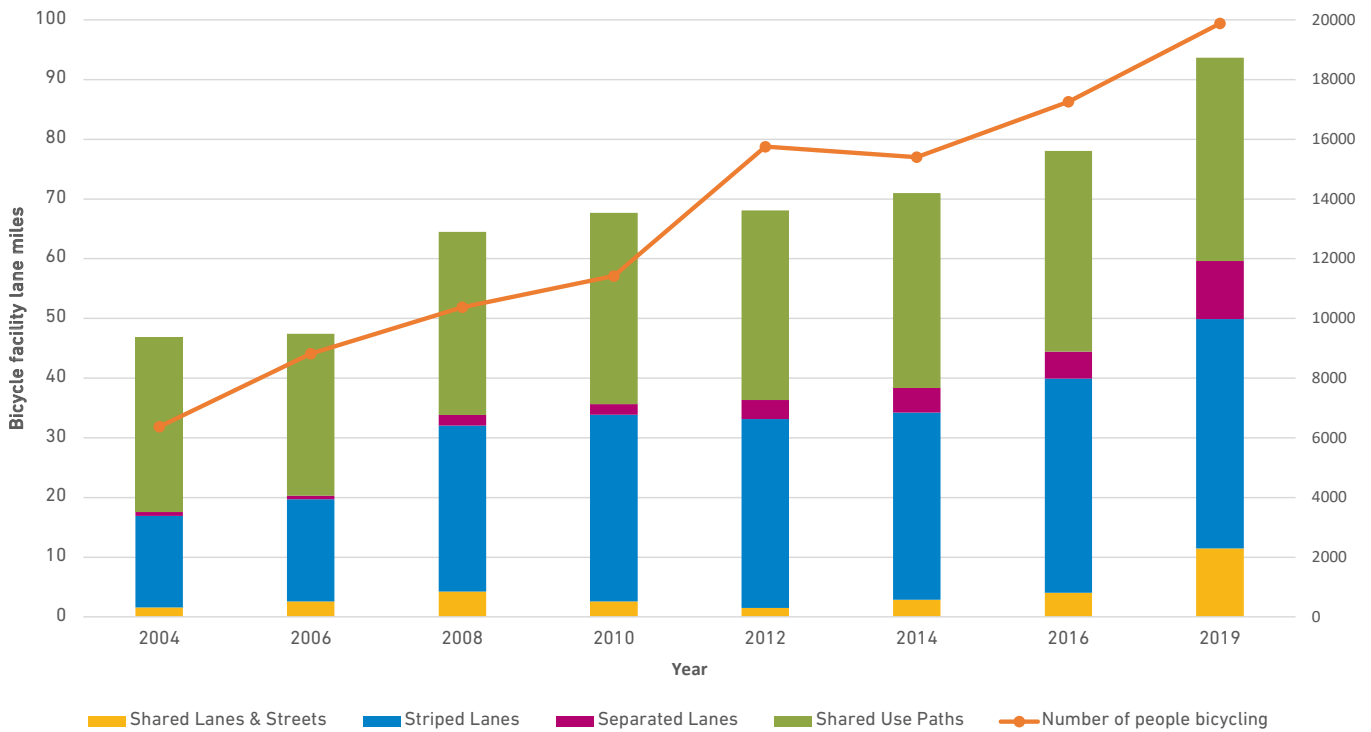


Figure 3.14: Relationship Between Bicycle Facility Lane Miles and Number of People Bicycling (2004-2019).

Note: Bicycle facilities are reported as lane miles. The number of lane miles increased from 46.9 in 2004 to 93.7 in 2019. Bicycle use is the total count of people bicycling in the time periods counted, i.e., turning movement counts across 16 intersections in the AM peak hours (7:30 to 9:30) and PM peak hours (4:30 to 6:30 PM). Bicycle use increased from 6,372 people in the count periods in 2004 to 19,880 people in 2019.



EVALUATING THE IMPACT OF NEW BIKEWAYS

The City often undertakes analyses of its infrastructure projects to understand and evaluate the changes that occur after construction. Some projects have extensive changes, of which the bicycle elements are just one part, such as the [Western Avenue reconstruction project](#). Here are examples of quick-build changes done specifically to create separated bike lanes.

BRATTLE STREET AND CAMBRIDGE STREET CASE STUDIES

Separated bike lanes were installed on Brattle Street between Brattle Square and Mason Street and Cambridge Street between Fayette Street and Quincy Street in 2017. Analysis of bicycle counts pre- and post-implementation show an increase in the number of people biking on these corridors, shown in Figures 3.15 and 3.16. Online and in-person intercept surveys were performed post-implementation, showing the majority of respondents (84% for Brattle Street and 63% for Cambridge Street) were very satisfied, satisfied, or neutral about the new designs. Favorability ranked higher with those who typically walk, bike, or take transit to these locations.



Separated bike lane on Cambridge Street.



Separated two-way bike lane on Brattle Street.”

Brattle Street Bicyclist Count Comparison - Both Directions

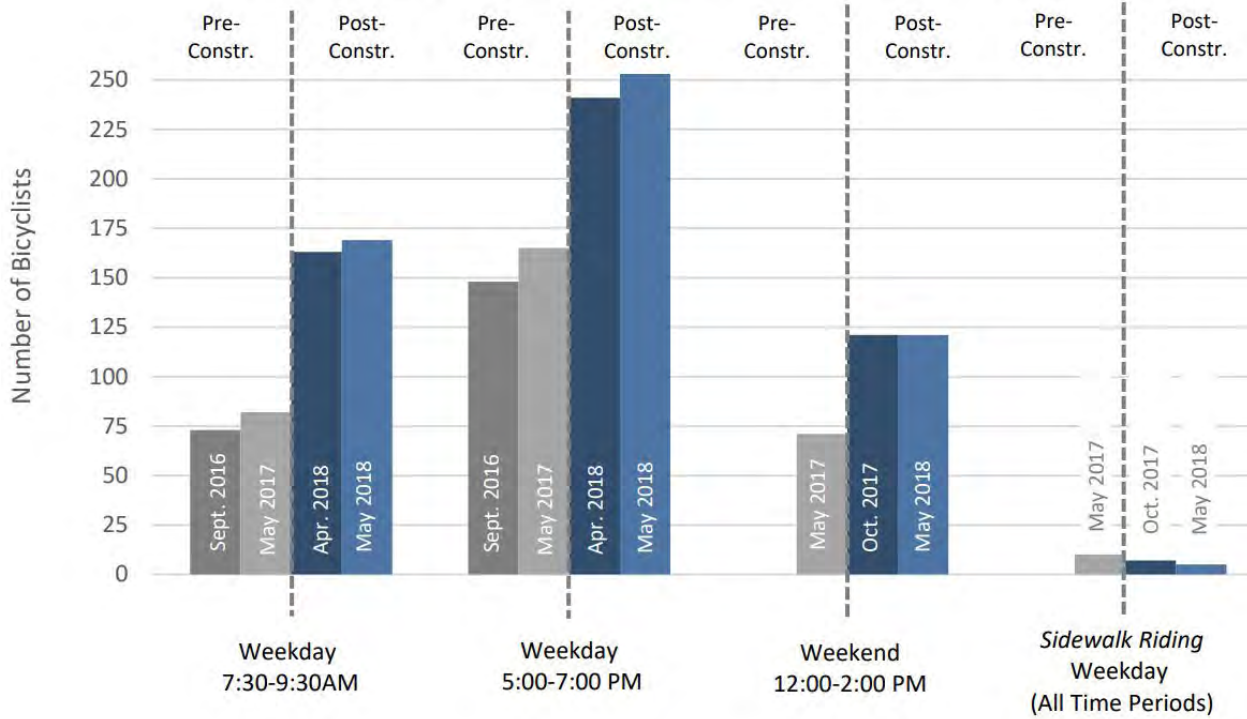


Figure 3.15: Number of bicyclists pre- and post-implementation of Brattle Street separated bike lanes.

Cambridge Street Between Trowbridge Street and Roberts Road: Bicycle Activity (Sidewalk and On-Street)

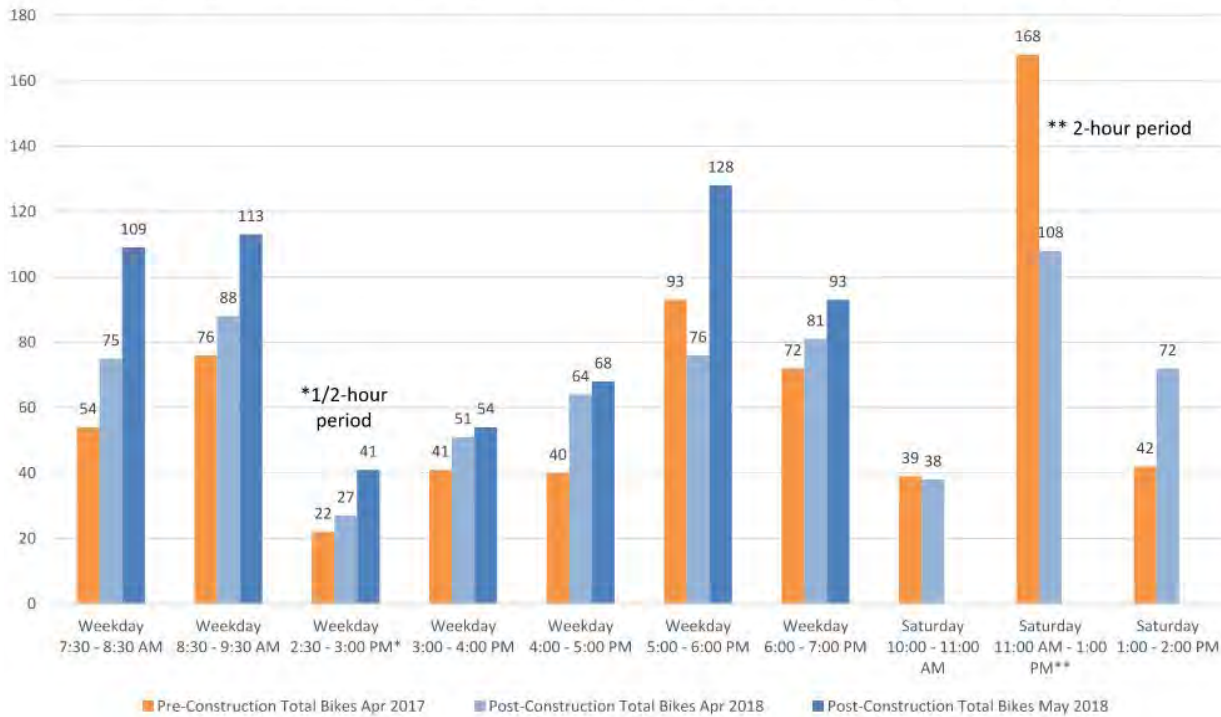


Figure 3.16: Number of bicyclists pre- and post-implementation of Cambridge Street separated bike lanes.

AUTOMATED COUNTING

In 2015, Cambridge installed a permanent bicycle counter in Kendall Square. Funded by a grant from the Helen & William Mazer Foundation, the “Eco-Totem”² counts people biking via in-ground loop detectors, and displays on the monitor how many people ride by. The counter displays daily and cumulative totals and also captures weather data to use for analytical purposes. Nearly two million trips have been captured at this location. The data can be used in many ways:

- + To publicly show how many people are bicycling and make a statement that “people who ride bikes count.”
- + The 24/7 data can be used to analyze daily, weekly, monthly and seasonal patterns. This can be used to help extrapolate data from other counts.
- + The data assist with determining crash rate analyses.
- + Data can be viewed [online](#).

While a powerful tool, Cambridge’s Eco-Totem does have limitations. One challenge is that it under-counts the number of people biking through Kendall Square to a small but significant degree, because it can only count people that ride in the bike lane, tracking over the loop. Another challenge is that the counter exists at only one location. The City is working on opportunities for additional permanent counters in different locations to gain supplementary information and enable more robust data analyses.

For example, the City recently installed automatic counting devices at 13 signalized intersections. These devices count people walking and bicycling as well as motor vehicle traffic. The City is currently evaluating the efficacy of these counters at counting people walking and biking.

Automated counting systems – when accurate – are powerful tools that offer the possibility of collecting data more often than the biennial manual traffic counts. Continuous counts can better illustrate seasonal and time-of-day variations.



The City added directional information on the pavement as one way to communicate the need for a bicycle to track over the loop in order to trigger the Eco-Totem counter.



Cambridge Eco-Totem in Kendall Square.

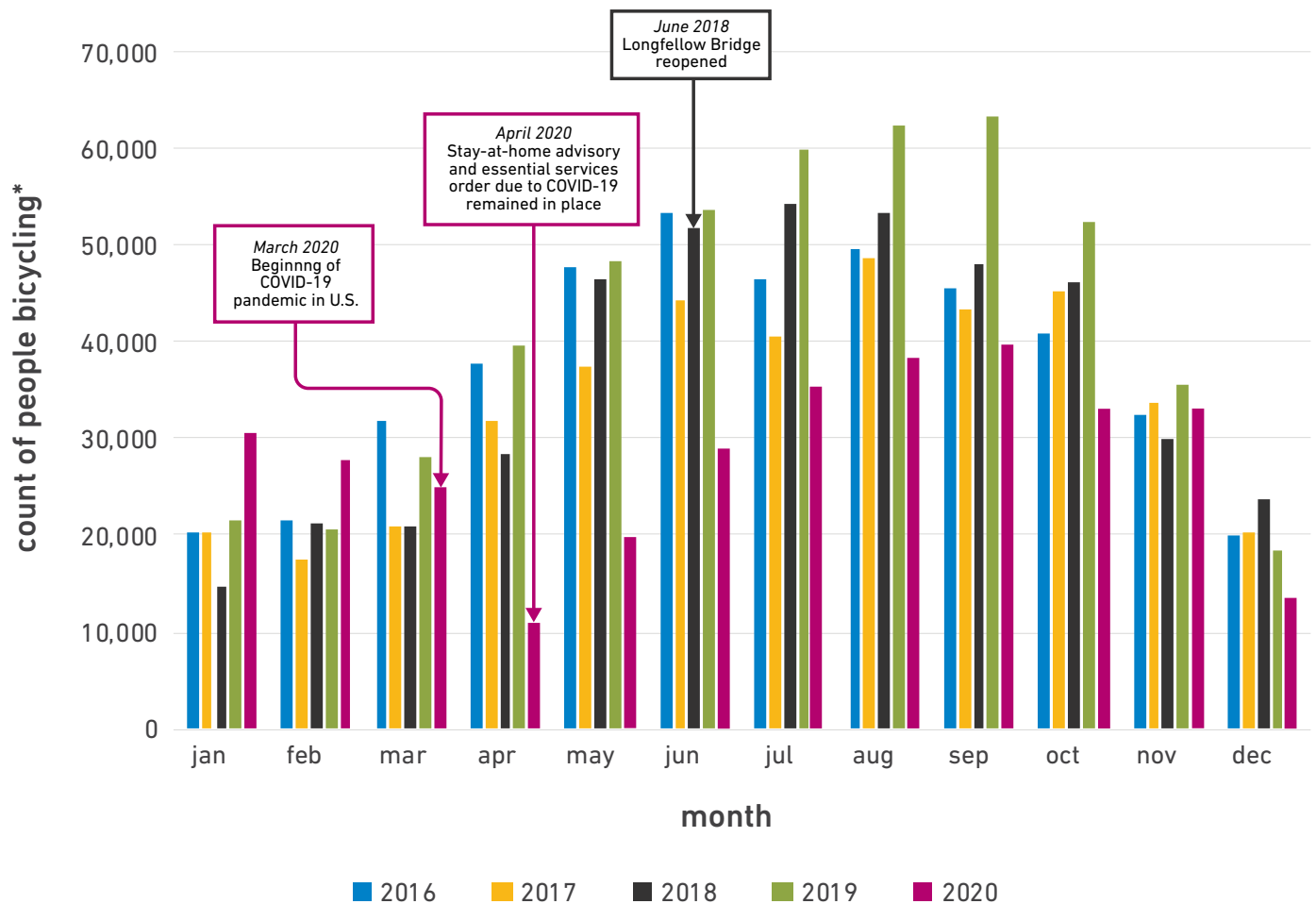


Figure 3.17: Summary of Counts Collected by Eco-Totem on Broadway in Kendall Square, 2016-2021.

*Count of people bicycling is adjusted by a factor of 1.167 to account for people who travel in the general travel lane or on the sidewalk and do not cycle over the ground loop detector. This factor was derived based on comparisons with counts using pneumatic tube technology and manual counts.

Note: This figure illustrates both the impacts of the Longfellow Bridge construction in 2017 and 2018, and the significant travel pattern disruption triggered by the beginning of the COVID-19 pandemic. Note that after the initial stay-at-home advisory, ridership began to increase as essential services resumed.



BIKE TRAFFIC AND CONSTRUCTION

Extensive construction projects throughout the city can have a significantly negative impact on bike trips. Even if the end result of construction projects is better infrastructure and safer streets, the process of getting there can be months or even years of disruption and stressful travel.

Pavement quality, noise, and exposure to construction are all factors people consider when choosing routes. During construction periods, some people may alter their route significantly, or they may choose another mode of transportation. When construction activities conclude, ridership numbers can be expected to rebound, especially if improvements have been made to the bicycling infrastructure.

This effect has been experienced in Cambridge several times since bicycle count collection began. The 2015 Cambridge Bicycle Plan discussed the

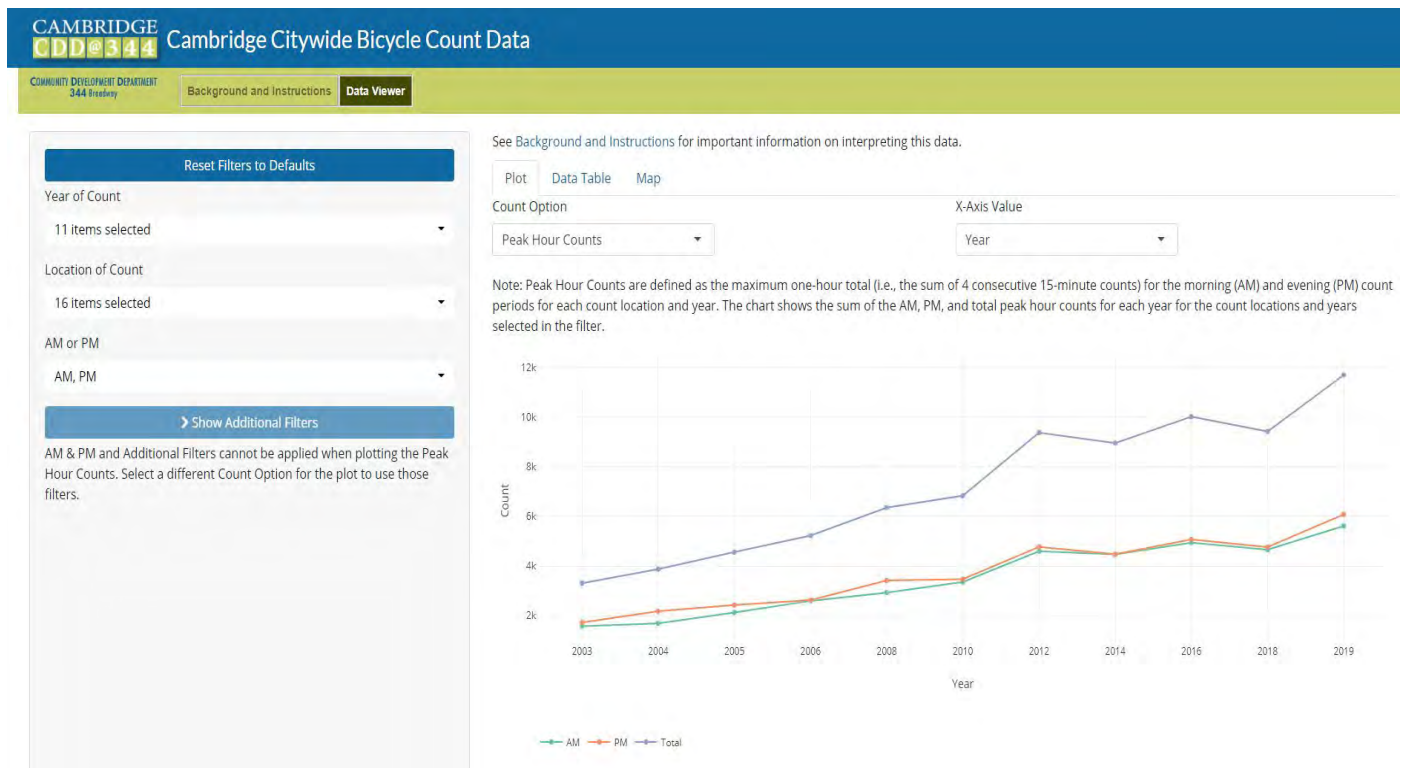
impact that intersection construction had on bike counts at eight locations. After construction was complete, ridership rebounded at those locations.

Similarly, bike counts in Kendall Square dropped significantly while the Longfellow Bridge was under construction in 2017 and 2018. Once construction was complete, ridership increased and reached record levels the next month.

BICYCLE COUNT DATA PORTAL

The City of Cambridge has released a new [public data application for its regular citywide bicycle counts](#). These bicycle counts have been collected in the mornings and evenings, typically in September, at intersections throughout the city, annually from 2002-2006 and every other year since then (plus an additional count in 2019 due to poor weather in 2018).

The application additionally features a city map showing the change in bicycle facilities over time and intersection graphics for all count locations.



Screen Shot of the Citywide Bicycle Count Data Portal.

BICYCLE CRASH DATA AND ANALYSIS

In the United States, bicycle crashes are generally considered to be under-reported, and few crashes that don't involve a motor vehicle are reported. There is also no reliable source of exposure data in the U.S. to really ascertain crash risk; there are no reliable statistics on how many miles people travel on bicycles each year, or how long it takes them to cover these miles, and thus how long they are exposed to motor vehicle traffic. Therefore, it is difficult to gain a comprehensive picture of bicycle crash statistics.

Since 2004 Cambridge has made a significant effort to gain a clearer picture of local crash risks for people who ride bicycles and to use that data to reduce the frequency and severity of crashes. The City's findings are included in the sections below.

DATA COLLECTION

Since 2004, Cambridge has collected robust data for all reported bicycle crashes. It is recognized that this may be a limited reflection of all crashes that occur. The reported crashes tend to be ones that are more severe, and those that involve a motor vehicle. In addition, these are only crashes on Cambridge streets and do not include the streets within the city under state jurisdiction, such as parkways and highways.

Nonetheless, the crash data collected in Cambridge is much more comprehensive than the data collected in many other municipalities. It includes any time any kind of incident is reported to the police. Unfortunately, most places do not collect good bicycle crash data, and do not collect records where no injury occurred. This makes any comparisons between communities difficult.

CRASH LOCATION AND FREQUENCY

Figure 3.18 shows the frequency of reported crashes according to location; this is a sum of all crashes over the six-year period from 2015-2020. One crash is represented by a light blue color; places with multiple crashes are darker blue, and yellow/orange highlights where crashes were most frequent.

However, as discussed above, in order to assess risk and safety, we look at crash numbers together with the number of people bicycling, translated to number of miles traveled. In the 2015 Bicycle Plan, we illustrated the crash rate per million bicycle miles traveled on selected corridors to identify areas with higher than expected crash rates. While we had planned to include an updated version of that analysis, factors such as the COVID-19 pandemic disruption of travel patterns prevented us from having adequate data to do so in this update.

Crash data provide Cambridge with information to help address the most common types of crashes occurring. As the City continues to collect and analyze data related to bicycle crashes, we can input the analysis into design and policy solutions to improve bicycle safety. Strategies will include infrastructure improvements as well as education and enforcement for all road users. These various tools are discussed in detail throughout this plan.



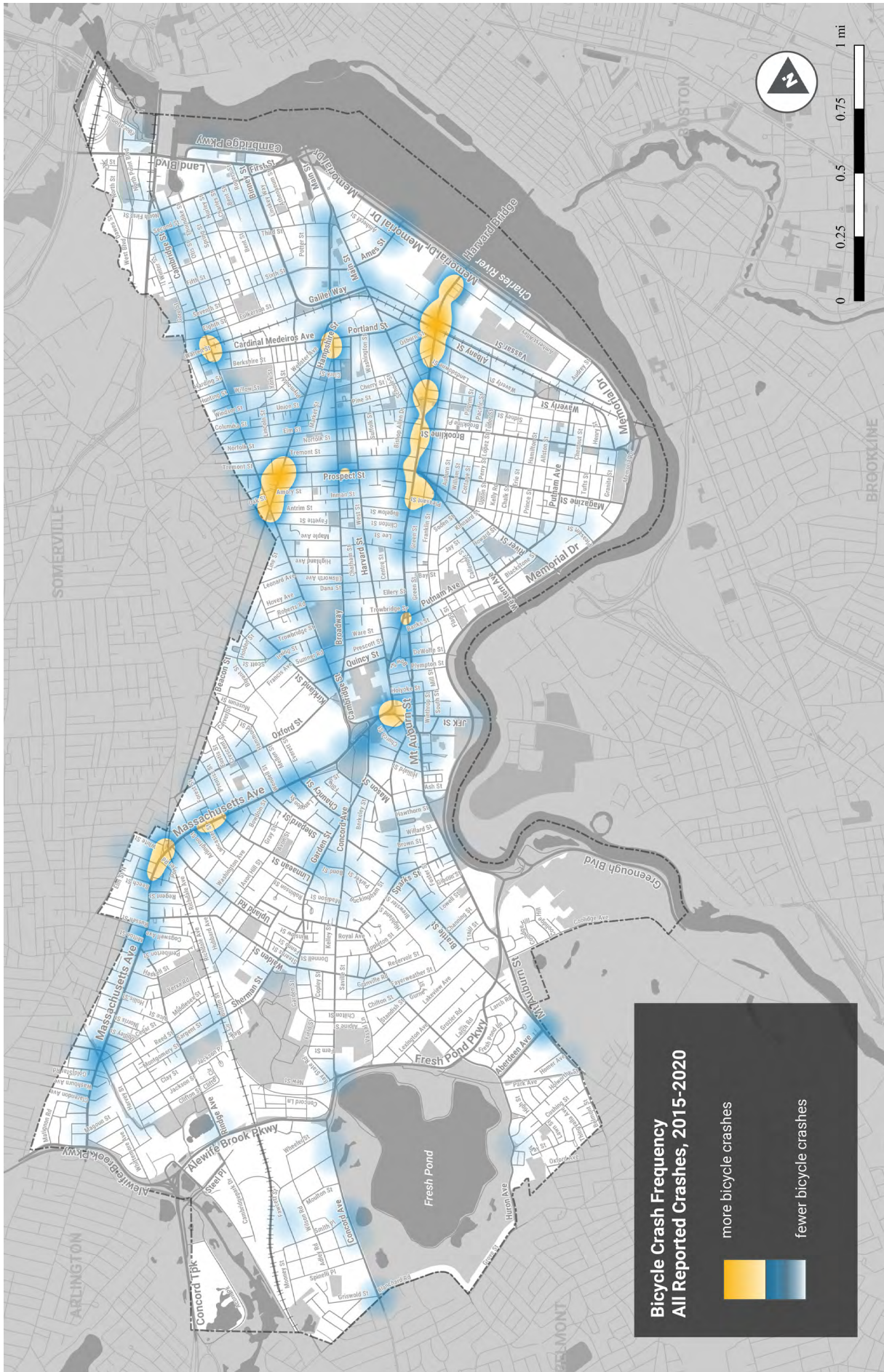


Figure 3.18: Location and frequency of reported bicycle crashes, 2015-2020.

BICYCLE COUNT AND CRASH TRENDS

In order to match annual crash numbers with annual count numbers, the biennial count data were extrapolated to annual counts using a permanent bike count station as a reference, and national analysis standards. The Federal Highway Administration Vehicle Miles Travelled formula was applied to the annual counts to attain citywide Bicycle Miles Travelled (BMT).

As shown in Figure 3.19, BMT has grown from 4.1 million in 2004 to 11.9 million in 2019, an increase of 190% over 15 years. This is based on counts along 21 corridors.

Over the same period, reported crashes involving a bicycle have increased as well. Ninety-one (91) crashes were reported to Cambridge Police Department in 2004 and 149 in 2019. While total crashes are higher in 2019, the number of crashes per BMT (crash rate = crashes/BMT) has decreased.

Bicycle miles traveled in Cambridge increased by

190%
in 15 years

Bicycle Miles Traveled (BMT) is an adaptation of the traditional traffic planning tool Vehicle Miles Traveled (VMT). It is an estimate of overall usage during a specific timeframe and is useful for calculating exposure to crashes. The BMT along these corridors is derived by applying national standards for estimating usage to the bicycle counts recorded throughout the city.

Million Bicycle Miles Traveled (BMT) and Bicycle Crashes (2004-2019)

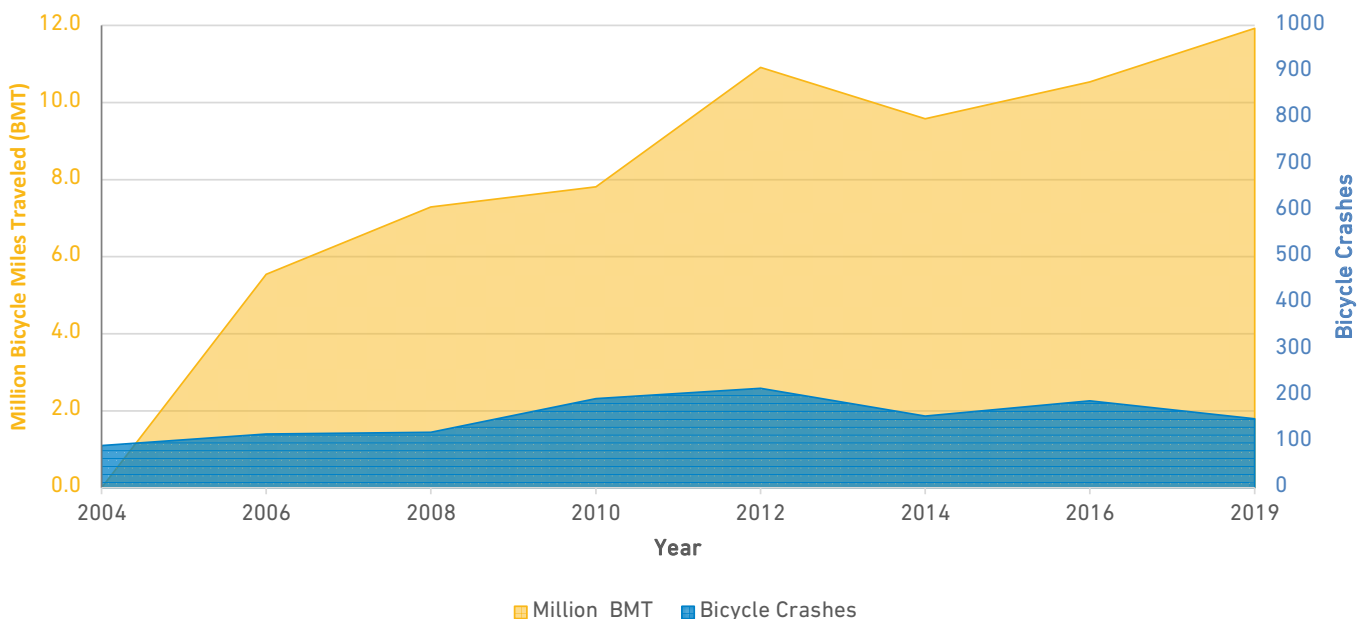


Figure 3.19: Million Bicycle Miles Traveled (BMT) and Number of Bicycle Crashes (2004-2019)

CRASH RATES

The best way to describe the relative change in the level of safety of travelling by bicycle is with a crash rate. A rate accounts for changes in volume of use. With this data, a rate can be shown, i.e. the number of crashes per bicycle mile traveled (BMT) each year. As shown in Figure 3.20, the crash rate has declined from 19.6 crashes per million BMT in 2004 to 12.5 in 2019, a drop of 36%.

The good news: The bicycle crash rate has been decreasing in Cambridge over the period of time that we have been tracking data to enable us to determine a crash rate.

Bicycle crash rates have decreased in Cambridge by 36% in the same time period

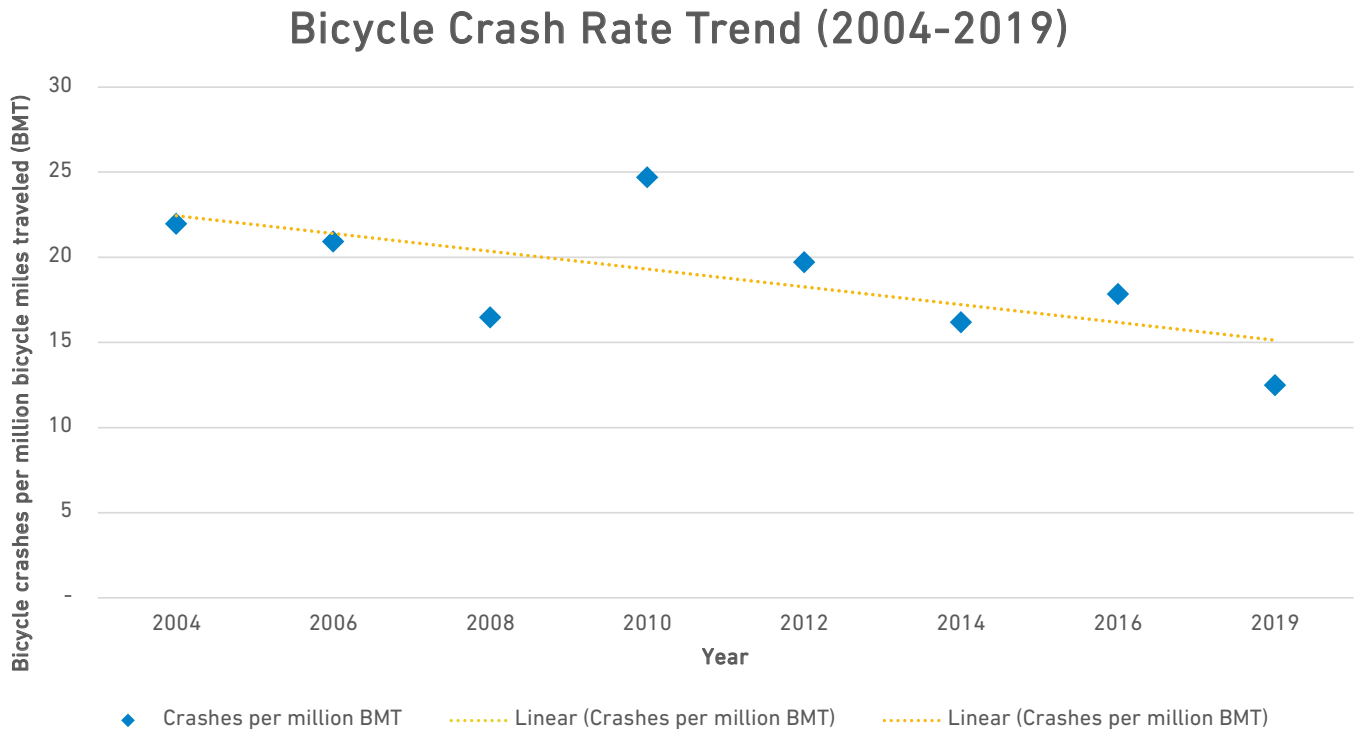


Figure 3.20: Bicycle Crash Rate (2004-2019)

SAFETY IN NUMBERS

The Cambridge bicycle trends correspond with international research demonstrating that as more people start riding bicycles, a person riding a bicycle is far less likely to collide with a motor vehicle or suffer injury and death. This holds for pedestrians as well. It's not necessarily because there are fewer cars on the roads, but because motorists seem to change their behavior and drive more safely when they see more people biking and walking around. There is safety in numbers.

Studies have shown consistently that the number of motorists colliding with people walking and bicycling doesn't increase equally with the number of people walking or bicycling.⁷ For example, a community that doubles its bicycling numbers can expect a one-third drop in the per-person frequency of a crash with a motor vehicle.

One of the most rigorous and frequently cited studies on this topic concludes unequivocally that in locations where more people walk or ride bicycles, the overall injury rate due to motor vehicle collisions decreases.⁸



CRASH TYPES

Each bicycle crash is categorized by type, which helps us understand why crashes occur and how we may prevent future crashes. These types are illustrated in Figure 3.21.

Between 2015 and 2020 in Cambridge, angle crashes were the leading type of bike crash, with dooring and sideswipe crash types prevalent as well.

Preliminary analysis of a limited set of data points to a new type of dooring crash different than the typical scenario of dooring associated with on-street parking. This analysis shows a trend that points to ride-hailing passengers opening doors and dooring people riding bikes. For example, approximately half of dooring crashes along JFK Street involved ride hailing/taxi vehicle passengers exiting their vehicles into the bike lane. The remaining doorings, apart from one driver exiting their parked vehicle, all involved passengers exiting vehicles stopped in the travel lane.

One evening after dark I was biking toward Central Square and a driver opened his door right in front of me—the corner of his door caught me right behind my ear and I went sprawling—luckily I wasn’t run over, but got pretty banged up.

—Julie, North Cambridge; Cambridge Bike Stories

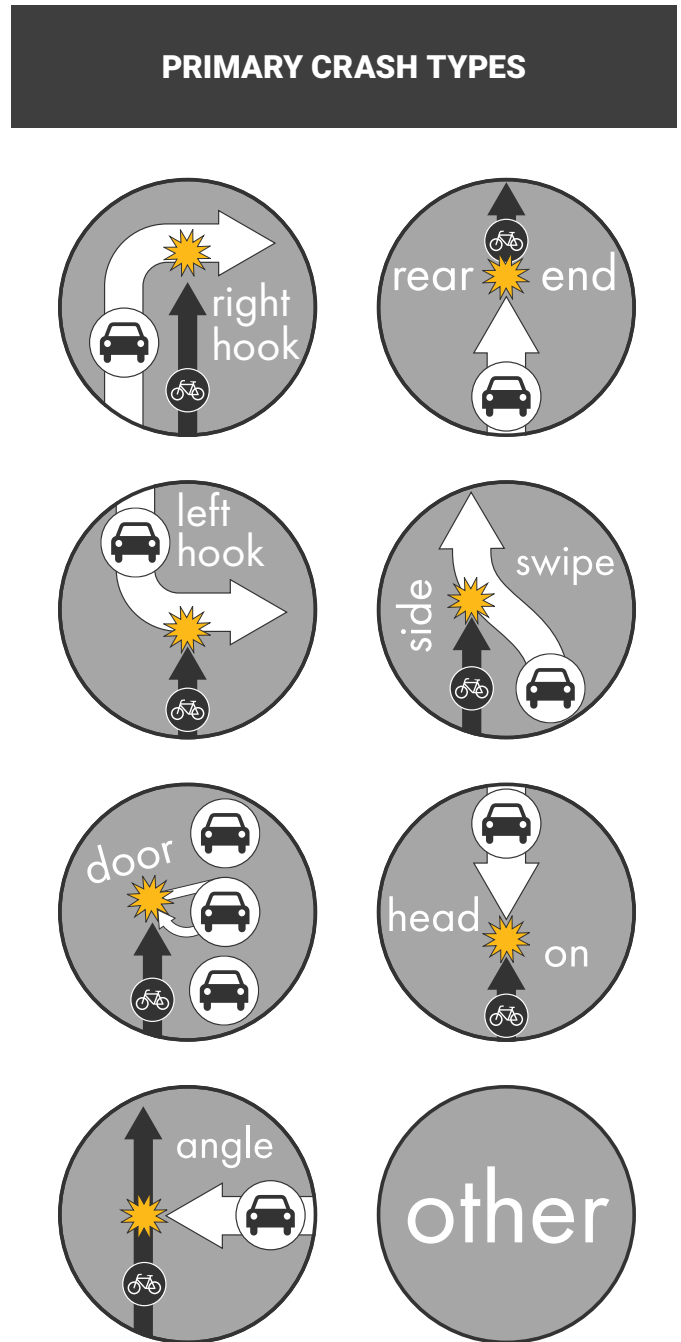


Figure 3.21: Primary Bicycle Crash Types.

INJURY SEVERITY

The severity of the injury in each crash is recorded with crashes reported in Cambridge. Crashes with injuries in 2015-2020 decreased significantly in comparison to crashes with injuries in 2004-2012. In 2015-2020, 46.4% of crashes were reported to have no injuries for the person bicycling while it was 18.3% in 2004-2012. Injuries also decreased significantly. Non-incapacitating injuries decreased from 45.1% in 2004-2012 to 14.7% in 2015-2020 and incapacitating injuries decreased from 5.2% in 2004-2012 to 1.3% in 2015-2020. Incapacitating injuries are those where the injured person was not mobile (e.g., having a broken leg or head trauma). However, crashes with unreported injuries went up from 31.4% in 2004-2012 to 37.6% in 2015-2020. See Figure 3.22.



Injury Severity for Bicyclists in Crashes (2004-2012 vs 2015-2019)

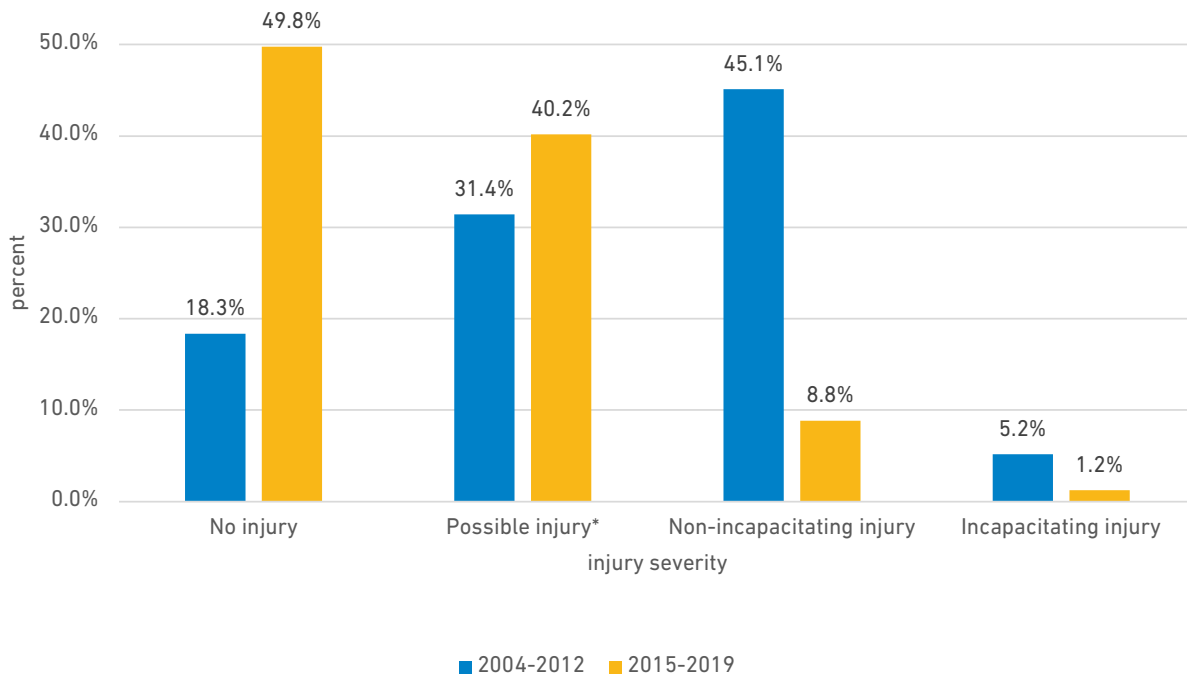


Figure 3.22: Injury Severity for People Bicycling in Crashes (2004-2012 vs 2015-2020).

*The “Possible injury” category includes injuries that were unreported by people bicycling. This includes the following observations: no apparent injury, possible non-fatal injury, suspected minor injury, suspected serious injury, and unknown.

SAFETY AROUND TRUCKS

Crashes involving large trucks are more likely to result in the fatality of a person walking or biking than crashes involving passenger vehicles (all of the five fatalities of people on bicycles in Cambridge that have occurred since 2004 have involved trucks). Truck crashes are also more likely to be side-impact crashes.

Side guards on large trucks protect people biking and walking from being swept underneath the vehicle in a side-impact crash. According to a [literature review](#) conducted by the U.S. Department of Transportation⁹, truck side guards are estimated to be 50 to 74 percent effective in preventing fatalities of people biking and 17 to 27 percent effective in preventing fatalities of people walking for parallel/overtaking crash types. Enhanced mirrors substantially improve sight lines for drivers, particularly for seeing cyclists riding on the right-hand side of the vehicle.

In order to address safety issues related to large trucks, the City has been working with Volpe, the National Transportation Systems Center, since 2015 on vehicle design strategies.¹⁰ Standard specifications for the City-owned truck fleet now include truck side guards, blind spot mirrors, and other vehicle-based safety features. The City has also retrofitted its older vehicles with these technologies.

In November of 2020, the Cambridge City Council adopted the Truck Safety Ordinance to mitigate the negative impacts of large vehicles on Cambridge streets. The ordinance requires that City vendors with contracts of \$10,000 or more equip their large vehicles with safety equipment to protect people walking or cycling. The required equipment includes side guards, convex mirrors, cross-over mirrors, and safety decals. The ordinance went into effect in May of 2021.

Harvard University and MIT have adapted their relevant trucks with these safety modifications and will ensure that new vehicles are similarly equipped.



Cambridge Department of Public Works employees demonstrating truck side guards on City trucks.

ENDNOTES

- 1 Resident Telephone and Online Survey (2020), conducted by phone every two years and also online in 2020 (2,951 responses). [Additional results can be viewed online.](#)
- 2 Community Needs Survey (2020), conducted for the 2020 Bicycle Plan Update (online and in-person; 305 responses). Additional results can be viewed in Appendix B. The percentages reported in the section on barriers are based on total number of people that responded to that particular question, not total responses. Many respondents skipped one or both questions.
- 3 People responding to the survey had the option to select “other/nongender.” However, a very small number of people selected that option so while their input is valuable and appreciated, cross-tabulating their responses is not statistically significant.
- 4 Cambridge Community Survey (2014), conducted for the 2015 Cambridge Bicycle Plan (online; 733 responses). Additional results can be viewed in Appendix A.
- 5 Visual Preference Survey (2019), conducted for the 2020 Bicycle Plan Update (approximately 200 participants; in-person).
- 6 CitySmart Survey: www.cambridgema.gov/citysmart.
- 7 University of New South Wales (2008, September 7). A Virtuous Cycle: Safety In Numbers For Bicycle Riders. ScienceDaily. Retrieved December 4, 2008, from <http://www.sciencedaily.com/releases/2008/09/080903112034.htm>
- 8 P L Jacobsen, “Safety in numbers: more walkers and bicyclists safer walking and bicycling,” *Inj. Prev.* 2003; 9; 205-209
- 9 Federal Motor Carrier Safety Administration, “A Literature Review of Lateral Protection Devices on Trucks Intended for Reducing Pedestrian and Cyclist Fatalities,” United States Department of Transportation, 2020, https://rosap.nhtl.bts.gov/view/dot/49250/dot_49250_DS1.pdf
- 10 Volpe National Transportation Systems Center, “Truck Lateral Protective Device (LPD) Resources,” United States Department of Transportation, 2021, <https://www.volpe.dot.gov/LPDs>

CHAPTER 4

BICYCLE FACILITY TOOLBOX

GOALS AND PRINCIPLES

PLANNING PRINCIPLES FOR URBAN BICYCLING NETWORKS

This chapter provides of an overview of the variety of tools to consider when designing streets to be welcoming and comfortable for people of all ages, abilities, and identities to bicycle.

Planning and designing for people who bicycle is similar to other transportation modes, where safety, travel demand, user delay, convenience, and economics are all taken into consideration.

KEY DESIGN PRINCIPLES

- + Bicycle travel on all streets should be direct, continuous, safe, and convenient.
- + Facility improvements will aim to accommodate people of all ages, abilities and identities.
- + All streets will be evaluated for how they can be improved for bicycling as they are constructed or reconstructed; improvements will be considered for all streets, whether or not they are specifically identified in the Network Vision.
- + Streets on the Bicycle Network Vision will be designed with respect to their role as designated in the Vision and in accordance with the Cycling Safety Ordinance.
- + Off-road facilities will be expanded and connected to existing networks within the city and region. Off-road facilities are desirable along high-speed and high-volume roadways, along rail corridors, and to provide access to parks and recreational areas. Note that many off-road facilities in the city are owned by other entities (e.g., the state Dept. of Conservation and Recreation) so coordination with others will be needed.

Although all roads - except for limited access highways - are bikeways, the type of facility will vary depending on the street type, usage, and conditions.

The City aims to create a high-comfort bicycle network using techniques such as separating people biking from motor vehicle traffic and reducing speed and volume where appropriate to create a comfortable shared environment for all users.

- + Local street improvements will be made to create Bicycle Priority Streets following the Network Vision and using a variety of treatments described in this chapter; the specific treatments used will be determined on a case-by-case basis.



Try it. Once you realize it is ok to bike, you'll do it. Go out and bike with your kids. With protected bike lanes in Cambridge it makes biking so much easier.

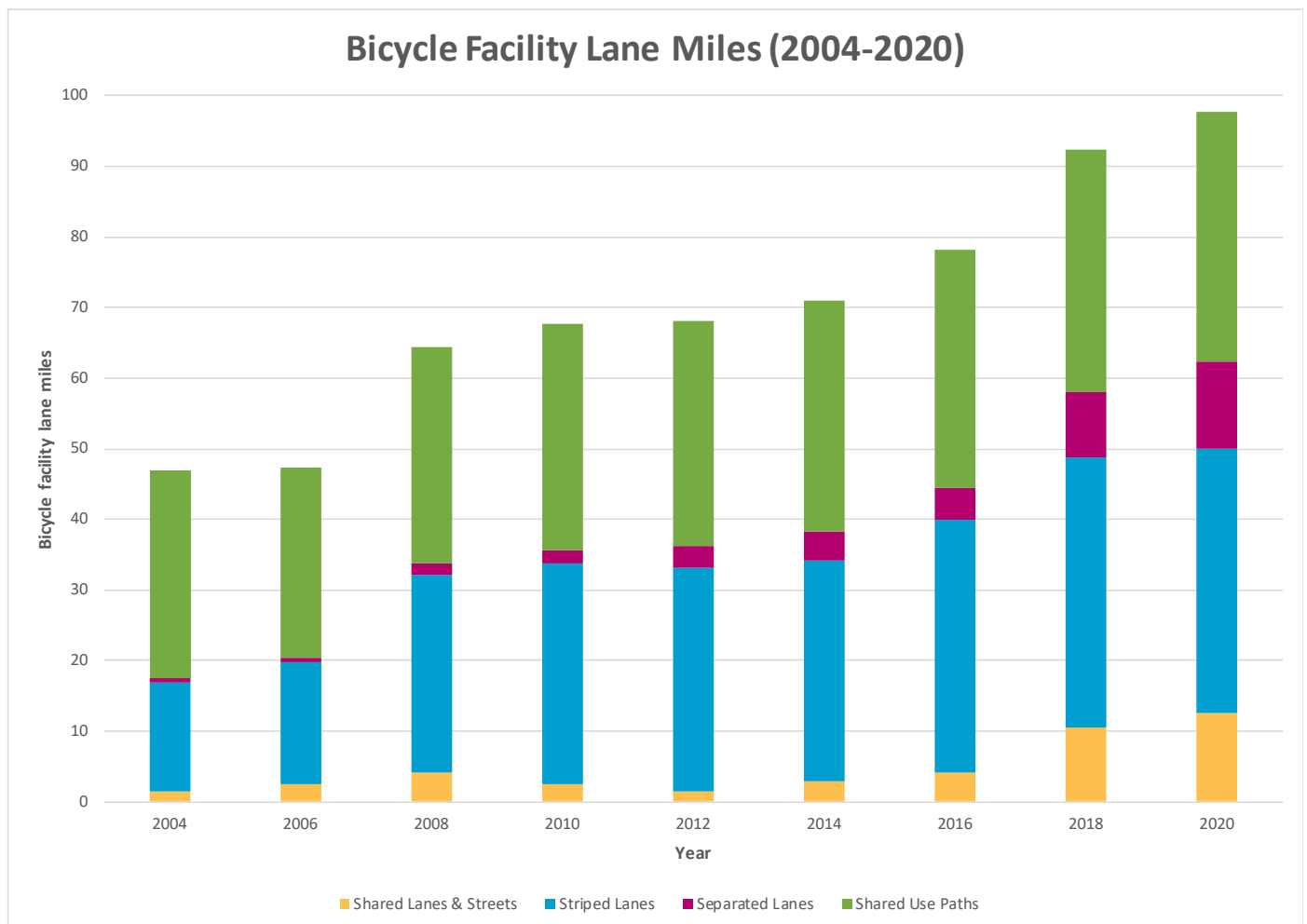
Melissa Dullea at Technology Square

BICYCLE FACILITY PLANNING AND TRACKING

Cambridge aims to improve its bicycle facilities each year through an ongoing planning and design process. A Bicycle Facility Map is used to track projects; once a project is designed or in an active design process, it is added as a “planned” facility, and the map is updated once or twice per year to document completed projects as “existing.” There is an additional, separate tracking system for the quick-build projects being implemented under the Cycling Safety Ordinance, and those projects will be added to the map as they are completed.

| Bicycle Facility Type | Existing (Miles) | Planned (Miles) |
|----------------------------|------------------|-----------------|
| Bike Path/Multi-Use Path | 36.5 | 6.7 |
| Conventional Bicycle Lanes | 35.5 | 1.2 |
| Separated Bicycle Lane | 12.3 | 5.7 |
| Buffered Bike Lane | 1.9 | 0.4 |
| Contra-flow Bicycle Lane | 1.9 | 0.4 |
| Shared Lanes | 13.5 | 3.2 |
| Shared Street | 0.4 | 0 |
| Total | 100.5 | 17.0 |

A map of existing and planned bicycle facilities is included in the Appendix D.



IMPROVEMENT POLICIES

Bicycle facilities are considered at the inception of all Cambridge transportation projects and become incorporated into the design of each project. The [Five Year Plan for Sidewalk and Street Reconstruction](#) is the City's primary planning document for this important infrastructure work. City departments coordinate their work to ensure that all construction is reviewed in the design phase of every project to address the needs of bicycle transportation. Often these improvements can be made at a low cost, benefitting people who walk, bike and drive.

Separated bicycle lanes are also fast-tracked through quick-build projects, as mandated by the Cycling Safety Ordinance. These are implemented on streets identified for separation in the Bicycle Network Vision but are not scheduled for repaving or reconstruction. The implementation process and associated strategies for quick-build projects are outlined in Appendix H.

TECHNICAL REFERENCES FOR FACILITY DESIGN

Bicycle facility designs are developed using engineering judgment with reference to state of the art technical guidance, current research, best practices, and professional experience. National and international guides used include but are not limited to:

- + [NACTO Urban Bikeway Design Guide](#),
- + [NACTO Urban Street Design Guide](#),
- + [NACTO Designing for All Ages & Abilities](#),
- + [NACTO Transit Street Guide](#),
- + [CROW Design Manual for Bicycle Traffic](#),
- + [AASHTO Guide for the Development of Bicycle Facilities](#),
- + [AASHTO Guide for Geometric Design of Transit Facilities on Highways and Streets](#),
- + [MassDOT Separated Bike Lane Planning & Design Guide](#),
- + [FHWA Manual on Uniform Traffic Control Devices](#),
- + [FHWA Shared Use Path Guidance](#),
- + [FHWA Bikeway Selection Guide](#), and
- + [FHWA Separated Bike Lane Planning and Design Guide](#).

Cambridge has also developed reference materials for guidance, such as the [Cycle Tracks: A Technical Review of Safety, Design, and Research](#) (June 2014) and [Shared Bus/Bike Lanes Technical Memorandum](#) (August 2020). The City also has a robust [Traffic Calming Program](#) that incorporates designs to support bicycle travel, with particular attention to supportive design for streets identified as Bicycle Priority Streets in the Network Vision.



SEPARATED BIKE LANES

ONE-WAY SEPARATED BIKE LANES

Separated bicycle facilities are bicycle lanes that are vertically separated from motor vehicles and may be at sidewalk level or roadway level. For sidewalk level facilities, the furnishing zone may be between the separated bicycle lane and the motor vehicle travel lane, and/or pedestrian area to increase separation and comfort. For roadway level facilities, separation from motor vehicles may be achieved through delineator posts, parked vehicles, or concrete barriers. Benefits include clear separation between bicycle, pedestrian and motor vehicle operating space. This facility type is also known as a cycle track or protected bicycle lane.

Separated bike lanes have been shown to increase ridership on corridors where they are implemented, and to make bicycling more appealing to a wider range of people, especially those who express concerns about interacting with motor vehicle traffic. See Chapter 2 for details.

Design considerations:

- + Preferred facility for roadways with high vehicular volumes, significant bus routes or heavy vehicle use, higher speeds, and/or complex traffic patterns.
- + Bicycle lane may be elevated to sidewalk level or at roadway level.
- + Typically 5-7 feet wide plus 1-3 foot wide roadway buffer.
- + Operational requirements for street sweeping and snow plowing.
- + Bus stop operations, where applicable, including considering opportunities for constructing floating bus stops.



One of the most dangerous spots used to be around the crosswalk on Mass Ave at MIT in front of the School of Architecture ... until the city installed flex posts and more clearly marked the bike path. Since then, I have had no trouble in this crowded section of Mass Ave. These kinds of improvements, though not quite as secure as a bike path that is separated from cars through a raised lane, still make a huge difference. I'd now love to see more of this kind of solution all over the city!

– Greg, Mid-Cambridge

TWO-WAY SEPARATED BIKE LANES

Two-way separated bicycle facilities are physically separated bicycle lanes that allow bicycle movement in both directions on one side of the road. This facility dedicates and protects space for people biking and improves perceived comfort and safety.

Pairs of one-way separated bike lanes are generally preferred, but two-way facilities are sometimes desirable, such as when one side of the street has significantly fewer curb cuts and/or intersections than the other. They may also be considered where space constraints would preclude two one-way facilities but enable a two-way facility. They are also useful for one-way streets where two-way bicycle travel would provide better connectivity for people bicycling.

Design considerations:

- + Preferred along roadways with high vehicular volumes, and/or speeds, major bus routes or heavy vehicle use, and/or complex traffic patterns.
- + May improve connectivity for people biking when used on one-way streets.
- + Typically 8-14 feet wide plus a 1-3 foot wide roadway buffer.
- + Usually requires additional signing and marking at intersections; may require specialized signalization treatments.
- + Operational requirements for street sweeping and snow plowing.
- + Bus stop operations, where applicable, including considering opportunities for constructing floating bus stops.



QUICK-BUILD SEPARATED BIKE LANES

Quick-build separated bicycle lanes are vertically and/or horizontally separated bicycle lanes, typically at roadway level, which are established with materials requiring minimal or no construction.

These facilities are implemented in a shorter time frame than standard roadway reconstruction, sometimes in response to conditions of safety that require urgent action but also in order to enable the buildout of a bicycle network in a reasonable time frame. Quick-build separated bicycle lanes use materials such as pavement markings to delineate horizontal buffers, and flexible bollards, planter boxes, parked cars, or other elements to provide vertical barriers between people biking and moving motor vehicles. Quick-build separated bicycle lanes are often seen as interim facilities that allow cities to implement a more complete network until streets can be fully reconstructed. Because the materials are often non-permanent, cities have increased flexibility to test new layout options and adjust designs as necessary.



Design considerations:

- + Preferred facility for roadways with high vehicular volumes, speeds, and/or complex traffic patterns, where more permanent separation that requires construction will require a long time frame.
- + Typically 5-7 feet wide plus 2-3 foot wide roadway buffer. There must be a minimum of 7' between vertical objects, including curbs and flex posts, in order to allow for street cleaning and snow plow operations.
- + Roadway buffer should contain vertical elements such as flexposts, bollards, planters, parking stops, etc.
- + Vertical element can be chosen based on durability, maintenance considerations, and costs.
- + If adjacent to parked vehicles, buffer should be 3 feet wide to provide space for motorists to exit their vehicles and have space for door openings.
- + Accommodate bus stop operations, where applicable.

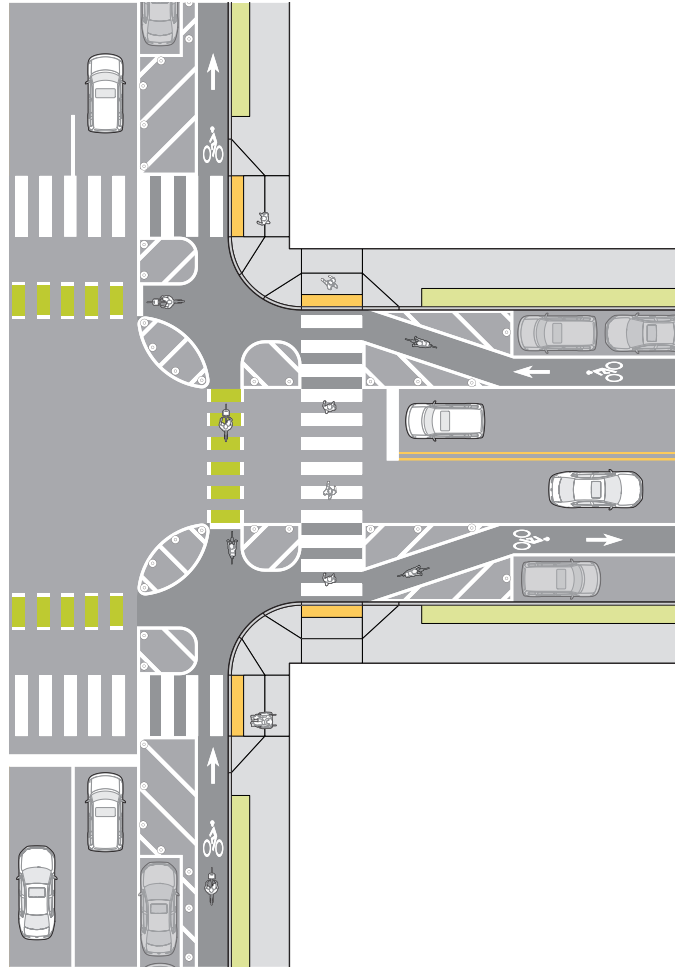
PROTECTED INTERSECTIONS

Protected intersections provide people bicycling with vertical and horizontal separation from motor vehicles at the intersection and provide separated space for queuing at signals. They may be designed for use with conventional bike lanes or separated bike lanes. Full-construction protected intersections use curbs and medians to provide separation between people biking and motor vehicle traffic.

Quick-build protected intersections are modified extensions of existing curblines that provide separation through an intersection without construction. These facilities are implemented on an accelerated schedule in response to conditions of safety or connectivity. Quick-build protected intersections use materials such as pavement markings to delineate horizontal buffers, and flexible bollards, planter boxes, or other elements to provide vertical barriers. They are generally considered interim facilities that are put in place until a street can be fully reconstructed, but can also be valuable in providing the flexibility to make design modifications as the facility is evaluated.

Design considerations:

- + Should be considered at large intersections with multiple travel lanes.
- + Quick-build materials, such as pavement markings and flexposts, can be used to outline a curb extension at intersection corners, reducing curb radii, and preventing vehicle encroachment.
- + Queuing space should be allocated for people biking to wait before proceeding through the intersection.
- + Consider operational requirements for street sweeping and snow plowing.



SHARED USE PATHS

A shared use path is defined as a trail permitting more than one type of user. Paths serve as part of the transportation circulation system and support multiple recreation opportunities, including walking, bicycling, and in-line skating. A shared use path is physically separated from motor vehicular traffic with an open space or barrier.

To improve the comfort and safety of path users, separation of people biking and people walking should be considered when volumes of users are high.



Design considerations:

- + Often located along active or abandoned rail corridors, utility easements, or along streams, rivers, or other linear features.
- + Cambridge's standard is 14 feet wide plus 2-3 foot buffers (narrower widths may be considered only where space constraints exist and may not be narrower than 10 feet plus buffers). Buffers must be level and safely traversable by people bicycling with no vertical obstructions.
- + May require specialized intersection treatments.
- + Must be ADA-compliant.
- + Provides low-stress, higher comfort connections for people walking and bicycling.
- + Separation of people walking and biking may be appropriate where there are more than 300 total users in the peak hour with more than 30% of the users being people walking.
- + Separation between people walking and biking can be achieved through pavement markings, contrasting pavement types, or physical separation (such as a grass buffer).
- + Consider using permeable asphalt; this not only has green infrastructure benefits but helps to minimize slippery conditions when wet or icy.
- + Ensure that paths are well-lit, for reasons of safety, equity and accessibility. Depending on the conditions, pedestrian-level lighting fixtures may be viable. Most lighting infrastructure enables varying lighting levels to adjust to local conditions or respond to environmental situations.

BICYCLE PRIORITY STREETS

Bicycle Priority Streets are roadways with low motorized traffic volumes and speeds that are designated and designed to give bicycle travel priority. Bicycle Priority Streets use signs, pavement markings, and speed and volume management measures to discourage through trips by motor vehicles. Bicycle Priority Streets can also include safe, convenient bicycle crossings of busy arterial streets. Bicycle Priority Streets often resemble what is also known as a bike boulevard, but may also include designated space for biking, such as bike lanes.

Achieving high comfort on a Bicycle Priority Street requires both low motor vehicle speeds and low motor vehicle volumes. Bicycle Priority Street implementation will aim to achieve the values identified in the table below. These thresholds are consistent with national best practices.

| | Peak Hour Volume (VPH) | Average Daily Traffic (VPD) | Operating Speed (MPH)* |
|------------------------------------|------------------------|-----------------------------|------------------------|
| Ideal | ≤150 | ≤1,000 | ≤20 mph |
| Preferred | ≤300 | ≤2,000 | ≤20 mph |
| Maximum (without designated space) | ≤450 | ≤3,000 | ≤25 mph |
| Maximum (with designated space) | ≤450 | ≤6,500 | ≤25 mph |

*85th Percentile Speed

To achieve and maintain high-comfort Bicycle Priority Streets, speed management treatments, volume management treatments, or designated space may be used. Effective speed management tools include neighborhood traffic circles, raised crosswalks/intersections, and one-lane pinch points. Tools to help achieve volume management include directional street management, median diverters, forced turn diverters, and diagonal diverters.

Bicycle lanes (including advisory bicycle lanes and contra-flow lanes) may be useful on Bicycle Priority Streets, particularly where speeds and/or volumes are higher than the preferred threshold values.

Design considerations:

- + May require speed management devices such as neighborhood traffic circles, raised crosswalks/intersections, or pinch points.
- + May require volume management devices such as diverters or directional street management.
- + May require delineated space for people biking such as bike lanes or contra-flow lanes.
- + May require wayfinding signage to direct people biking. Shared lane markings can be used as a wayfinding aid in this context.
- + Opportunity for plantings, rain gardens, and green infrastructure.



Credit: Alta

OTHER BICYCLE LANES

STANDARD BICYCLE LANES

Bicycle lanes designate an exclusive lane for people biking through the use of pavement markings and signage. The bicycle lane is located adjacent to motor vehicle travel lanes and usually flows in the same direction as motor vehicle traffic (see Contra-flow Lanes for additional options). Bicycle lanes are typically on the right side of the street but placement on the left side may be considered in order to avoid conflicts or to enable connections under relevant circumstances. Benefits include providing clearly delineated space on the road for people biking and sending a message to other road users to expect people biking. When bike lanes are next to on-street parking without a buffer, there is the potential for “dooring” from drivers exiting their vehicles without looking. A bicycle lane traveling along a curb may be a high comfort facility on some streets with low to moderate speeds and traffic volumes.

Design considerations:

- + Most appropriate for medium to low volume streets with vehicular speeds of 25 mph or less.
- + Typically 5-6 feet wide.
- + May require delineation at complex intersection or treatments to facilitate left turns.
- + Parking lanes should be marked to ensure vehicles park as close to the curb as possible.
- + Enforcement may be required to keep motorists from parking or stopping in the bicycle lane.

I especially appreciate the curbside designated bike lanes. They provide a sense of security on what would be otherwise very treacherous routes.

- Alyson, Riverside



BUFFERED BICYCLE LANES

Buffered bicycle lanes are conventional bicycle lanes with a designated buffer space separating the bicycle lane from the parking lane and/or the travel lane (a buffer against the parking lane is a higher priority). Benefits include reduced risk of “dooring” and greater space for people biking to maneuver.

For streets with no on-street parking, the buffer can be placed between the bike lane and the adjacent travel lane to provide additional separation from motorized traffic. A potential disadvantage of buffered bike lanes is that they are more liable to encroachment from people driving who illegally park their vehicles (personal, ride hail, delivery) in the bike lane, since the wider space makes drivers feel that they can park without impeding the flow of moving motor vehicle traffic.

Design Considerations:

- + Preferred treatment where separated bike lanes are not feasible on higher volume streets.
- + Provides further separation from parked vehicles and opening car doors, especially in areas with high parking turnover.
- + Typically a 5–6 foot wide bicycle lane and a minimum 3 foot wide buffer zone against parking.



LEFT-SIDE BICYCLE LANES

Left-side bicycle lanes are conventional bicycle lanes placed on the left side of one-way streets or two-way median divided streets. They are usually implemented where the majority of bicycle traffic is going straight or accessing streets or other connections on the left side. Benefits include avoidance of potential conflicts on the right side of the street, such as buses, opening car doors, and people accessing parked vehicles.

Design considerations:

- + Most appropriate for medium to low volume streets with vehicular speeds of less than 25 mph.
- + Typically 5-6 feet wide.
- + Avoids conflicts with parked vehicles and bus stops.
- + May require delineation at complex intersection or treatments to facilitate right turns.



ADVISORY BICYCLE LANES

An advisory bicycle lane is used on low-volume two-way streets that are too narrow to fit bicycle lanes and car travel lanes separately. An advisory bicycle lane is marked with a dashed line to the left, directing cars to travel outside the lane if possible. These markings give people biking a space to ride, but are also available to motorists if space is needed to pass oncoming traffic.

Design considerations:

- + Most appropriate for low volume and speed roadways without centerlines.
- + Central vehicle lane should be between 16 and 18 feet to allow most motorists to pass with minimal to no encroachment into the advisory lane, or between 10 and 13.5 feet to force yielding and encroachment.
- + The remaining width should be divided and delineated with a white dashed lane line on each side of the roadway, preferably 6-7 feet when adjacent to parking or 5-7 feet when adjacent to a curb.
- + May require education to instruct road users (people driving and bicycling) how to travel correctly on the corridor.



CONTRA-FLOW BICYCLE LANES

Contra-flow bicycle lanes are bicycle lanes designed to allow people bicycling to ride in the opposite direction of motor vehicle traffic. They convert a one-way street into a two-way street: one direction for motor vehicles and bicycles, and the other for bicycles only. Such facilities provide more direct connections for people bicycling and allow them to avoid streets that are less conducive for bicycling.

Separated bike lanes and buffered bike lanes can also be used to facilitate contra-flow bicycle movement.

Design considerations:

- + Preferred on the standard side of the roadway for the direction of travel.
- + Typical width matches concurrent-flow bike lanes.
- + May also be separated with flex posts or other separators.
- + May require additional pavement markings, signs, and traffic control devices at intersections.



CORRIDOR TREATMENTS

SHARED LANES

Shared lanes are facilities intended to be used by multiple types of users, such as people biking, driving, or taking transit. Shared lane markings (SLM) are road markings used to indicate a shared lane environment for people biking and driving. They reinforce the legitimacy of bicycle traffic on the street, recommend proper positioning for people biking, and may be configured to offer directional and wayfinding guidance.

Another type of shared lane is a shared bus/bike lane (SBBL). While generally meant for exclusive use by people traveling by bike and bus operations, the lanes are also often used by general motor vehicle traffic as a turn lane. Because of the nature of bus operations, as well as expectations regarding the purpose of a bus lane, there are heightened areas of concern regarding the safety and comfort in these types of lanes for people biking. In addition, given the nature of a shared lane with large vehicles, the SBBL is not a design that is considered to meet high-comfort criteria and therefore should generally not be thought of as part of an all ages, abilities, and identities network.

Design considerations (SLM):

- + Markings provided on roadways with speeds less than or equal to 25 mph, where there is no opportunity to install dedicated bicycle facilities.
- + Markings are typically positioned a minimum of 10 feet from the curb with on-street parking and 4 feet from curb without parking.
- + May be accompanied by “BIKES MAY USE FULL LANE” signs.

Design considerations (SBBL):

- + Recommended width of a full-time SBBL is 10-12 feet width.
- + Bicycle and bus traffic should not mix at high speeds.
- + SBBLs should only be used where buses will have operating speeds of 20 mph or less, and headways of 4 minutes or longer.
- + Separate bus and bicycle facilities are preferred over shared bus-bike lanes.
- + No vertical separation or significant pavement changes should be used between SBBLs and mixed-traffic lanes.
- + Corridors that are parallel and supplemental to higher-comfort bikeways are candidates for SBBLs.



SHARED STREETS

A shared street is one in which there is no vertical curbed delineation dividing the roadway and sidewalk (these streets are also known as “woonerfs” or “winkelerfs,” from the Dutch). The roadway and sidewalk surfaces are at the same level to create a continuous space. The space is shared between people driving, walking, and biking.

Design considerations:

- + Most appropriate for low volume and low speed roadways.
- + Ideally for roadways of 1,000 average daily motor vehicle traffic or less and speed limits of 10 mph.
- + May require coordination of loading activities for adjacent buildings.



SPEED MANAGEMENT - VERTICAL DEFLECTION

Vertical traffic calming treatments compel motorists to slow speeds and are commonly used on Bicycle Priority Streets. By lowering the speed differential between people biking and driving, safety and comfort are increased. Typical treatments in Cambridge include raised crosswalks or intersections.

Design considerations:

- + Raised crosswalks at intersections help to slow turning traffic at intersections.
- + Raised intersections and crosswalks are flush with the sidewalk.
- + Slopes should be designed per Cambridge standards.



SPEED MANAGEMENT - HORIZONTAL DEFLECTION

Horizontal traffic calming treatments may include one-lane pinch points or neighborhood traffic circles. Both can effectively slow and reduce motor vehicle traffic on Bicycle Priority Streets.

Pinch points consist of vertical objects on either side of the street to narrow the center of the lane such that oncoming drivers cannot pass through simultaneously and must yield. Neighborhood traffic circles are implemented at minor intersections to slow vehicles and potentially increase safety.

Curb extensions, bollards, flexposts, planters, and other materials can serve as the vertical elements that form the pinch point or the traffic circle.

Design considerations:

- + Pinch point widths need to be narrow enough so that drivers are not tempted to squeeze past each other but wide enough to enable emergency vehicles to pass through unimpeded. A space of 15 – 16 feet would typically achieve this goal.
- + Cut-through passageways should be provided to the outside of the pinch point to accommodate people biking; these should be carefully designed with maintenance requirements in mind. On very low volume streets, it may be acceptable to design a street without cut-throughs where people biking use the center travelway.
- + There should be approximately 15 feet of clearance around the traffic circle to provide emergency service access.



TRAFFIC VOLUME MANAGEMENT

Traffic volume management strategies are used to reduce traffic volumes on Bicycle Priority Streets and other intentionally low-traffic streets. They allow access by people driving, biking, and walking but facilitate continuous through-movement only for people biking and walking. Treatment types include:

- + **Median diverters** – This type restricts through vehicle movements on the Bicycle Priority Street and left turns from the cross street, but allows right turns to and from the cross street.
- + **Partial closures or forced turn diverters** – This type restricts through vehicle movements on the Bicycle Priority Street, as well as turns from the cross street.
- + **Diagonal diverters** – This type forces drivers to make right or left turns in certain directions, but allows bicycle and pedestrian traffic in all directions.
- + **One-way street segments that provide contra-flow bike lanes or permit two-way bicycle travel.** This can be the simplest implementation, requiring only signage.
- + **Diverters are designed to accommodate emergency vehicle access.**



Design Considerations

- + **Diverters shall provide bicycle access through a minimum 7-foot opening between vertical curbs in order to allow proper maintenance.**
- + **Closures and diverters should be clearly signed and marked to alert drivers to expect people biking emerging from or not turning at the feature.**
- + **Temporary materials may be used to test diversion impacts before permanent, curbed diverters are installed. However, 7 feet should be provided between vertical treatments to accommodate bike access and enable maintenance to be carried out.**
- + **Consultation with emergency services will be necessary.**
- + **Curb heights lower than 6 inches and/or beveled may be used on diverters and median barriers to allow emergency vehicles to mount and cross barriers.**



BICYCLE ROUTE WAYFINDING

A bicycle wayfinding system consists of signage and/or pavement markings to guide people biking to their destinations.

Design considerations:

- + Used to direct people biking to destinations along low-stress routes.
- + Indicates route direction, destination, and travel distance.
- + Relatively inexpensive to implement and maintain.



SIGNED CONTRA-FLOW STREETS

A signed bicycle contra-flow street is on a one-way street which is signed for two-way bicycle travel. Unstriped, signed bicycle contra-flow streets are roadways with low vehicular speeds and volumes that can assist people traveling by bike with making direct connections.

Design considerations:

- + Only compatible on low volume and low speed roadways.
- + May require additional considerations at intersections, including signs and markings.



LIGHTING

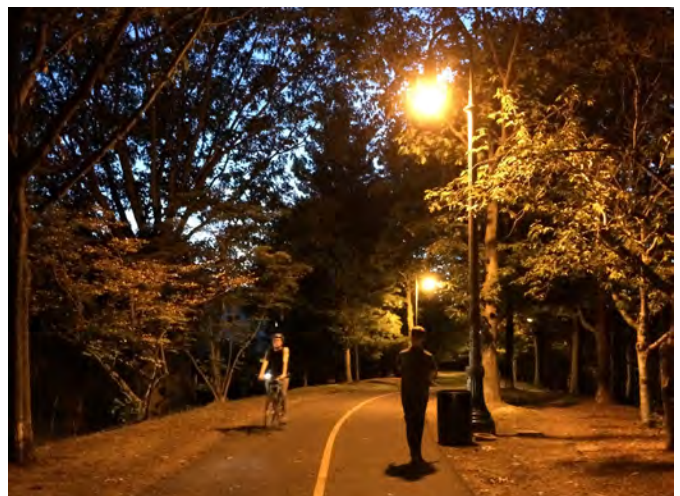
Adequate lighting is essential for safe nighttime travel for all road and path users. Good lighting on roads helps people driving, walking, and biking to see each other and potential hazards on the pavement. Nighttime lighting on shared use paths increases comfort and safety for people bicycling and walking, especially during the months when daylight hours are short and through areas that don't receive other light such as underpasses. Lighting is also a key element of ensuring more equitable access for all people. Visibility is particularly important for those with low vision and the ability to see pavement conditions is essential for wheelchair users. Some shared use paths are key parts of a transportation network for those who rely on walking or bicycling and do not have access to other means of transportation.

Installation of lighting along shared use paths should be continuous to avoid creating intermittently dark sections. To avoid creating a silhouetting effect, lighting should be placed to illuminate people crossing from the side instead of overhead.



Design considerations:

- + Conventional street lighting may adequately illuminate on-street bike facilities but should be evaluated. Adequate lighting at intersections is especially important. Attention should be given to light spacing and interference from trees and other obstructions to avoid the creation of dark spots.
- + Pedestrian-scale lighting also increases visibility of and for people bicycling. It is often used in commercial, mixed-use, and high-density residential neighborhoods. It is also used along shared-use paths and should be considered along sidewalk-level separated bike lanes.
- + The potential for light trespass should be considered in the selection of lighting components, especially in residential areas. Design elements such as shields help avoid light trespass. In addition, lighting levels can be adjusted during different times of the day. Research has shown that dawn and dusk are particularly risky for non-motorists in Cambridge and that lighting levels need to be kept higher throughout the city during those hours. Light levels may be modified in the late/overnight hours in residential districts.
- + LED lights, while more energy efficient, may provide less illumination on the ground than older sources if simply retrofitted, and therefore may need adjustment.



SPOT TREATMENTS

COLORED PAVEMENT MARKINGS

Colored pavement markings within a bicycle lane increase the visibility of the facility, identify potential areas of conflict, and reinforce priority to people biking in conflict areas.

Design considerations:

- + Preferred treatment at conflict locations such as driveways, intersections, turn lanes, etc.
- + Typically about the width of the bicycle lane.
- + May be solid or dashed and supplemented with bicycle symbols and white edge lines.
- + Material must be high friction surface to reduce skidding when pavement is wet.



BICYCLE BOXES

A bicycle box is an area at the head of a traffic lane at a signalized intersection. It provides people biking with a safe and visible way to get ahead of queuing traffic during the red signal phase. Bicycle boxes increase visibility of people biking, thereby mitigating conflicts with right-turning vehicles and reducing “right hook” crashes. They can also reduce signal delay for people biking. Bicycle boxes that extend across an entire intersection can also facilitate bicyclist left turn positioning during red lights, but the use of two-stage turn queue boxes are preferred for facilitating left turns, as they are more comfortable for users.

Design considerations:

- + Typically located between the stop line and the crosswalk.
- + Typically 10-16 feet in width.



TWO-STAGE TURN QUEUE BOXES

A two-stage turn queue box is a designated space for people biking to make a turn in two movements, located in front of the crosswalk on a perpendicular street at a signalized intersection. They are typically implemented to help people biking make left turns from right-side bicycle facilities, but could also be used to help people biking make right turns from left-side bike lanes.

To turn, people biking travel straight through the intersection during a green light, pull right and wait in the queue box. When the cross street receives a green light, the person biking proceeds straight through the intersection, completing the turn in two stages.

Design considerations:

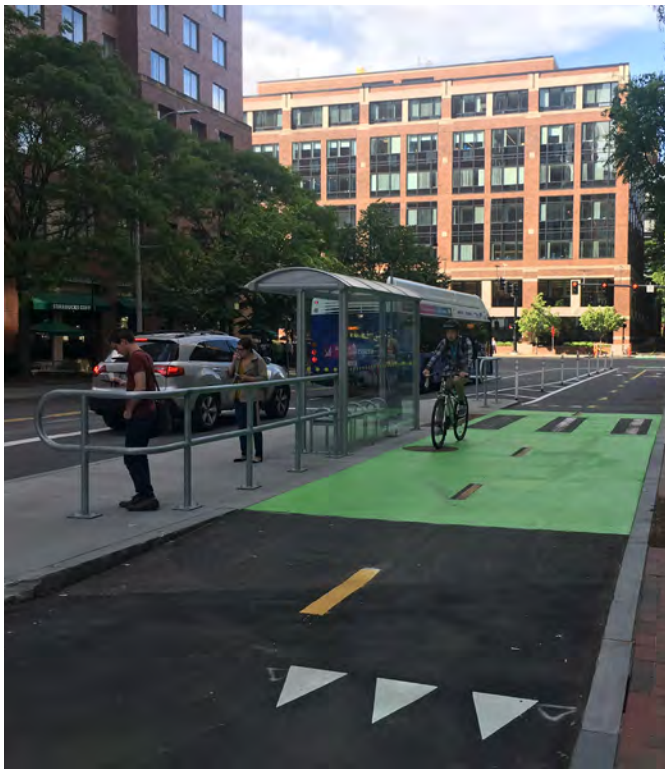
- + Provides people biking a method to make turns from bicycle facilities.
- + Most important at high-volume signalized intersections where vehicular-style turns are difficult for people biking.
- + Typically located at signalized intersections in front of the crosswalks on a perpendicular street.
- + May require explanatory signage for users.



FLOATING BUS STOP

Floating bus stops can be used where bike lanes or separated bike lanes intersect transit stops. They provide accessible boarding and alighting spaces between travel lanes and bike lanes. This configuration reduces conflicts between people biking, transit vehicles, and people who are boarding, waiting to board, and alighting. In all cases, signs and markings should communicate that people walking have the right of way over people biking, and floating bus stops must comply with Americans with Disabilities Act (ADA) requirements.

Floating bus stops are preferred on streets with separated bike lanes adjacent to bus stops with high frequency bus service and/or high transit ridership. Operational constraints are considered, such as the distance bus drivers must traverse in order to reach the curb and downstream left turns in the bus route.



Design considerations:

- + A clear boarding and alighting area must be preserved. This may require slight realignment of the bike lane in advance of and beyond the stop.
- + At least one crosswalk across the bike lane connects the boarding and alighting area to the sidewalk. Two crosswalks are preferred to line up with both front and rear bus doors.
- + Shelters and other vertical objects that are 36 inches or higher are located a minimum of 6-12 inches from the bike lane edge.
- + Railings or planters (3 feet maximum height) may be located at the back of the platform for high ridership stops or along two-way separated bike lanes to channelize pedestrians to designated crossings. Ends of railings should be flared inward toward the bus stop and away from the bike lane for safety.
- + Where less than 8 feet of space is available, the bike lane may be tapered to create space for the bus stop. If the bike lane is narrowed to 4 feet (for a one-way bike lane), it is elevated to sidewalk level to minimize pedal strike risks on curbs. In the case of two-way facilities, the minimum width is 8 feet.
- + The bike lane may be elevated to sidewalk level to provide level pedestrian crossings. In these cases, bicycle transition ramps are located near crosswalks and outside of any lateral shifts of the bike lane.

BICYCLE SIGNALS

Bicycle signals are traffic signals intended for the exclusive use of bicycle traffic and facilitate people biking crossing at signalized intersections. They are typically used at complex intersections with unique bicycle traffic patterns that require additional control. Facilities they are applicable to include but are not limited to contra-flow bicycle lanes, separated bicycle lanes, protected bicycle lanes, and two-way separated bicycle lanes.

Design considerations:

- + Ability to provide an exclusive bicycle signal phase.
- + Ability to provide an advance start for cyclists at concurrent signals similar to a Leading Pedestrian Interval.



BICYCLE DETECTION

Bicycle detectors are installed at signalized intersections to allow traffic signals to detect the presence of people biking. Standard loop detectors may not detect people biking; therefore, bicycle detectors are recommended where needed.

Design considerations:

- + Required at locations where vehicle detection is installed and bicycle travel is permitted.
- + May be used to provide bicycle specific signal timings.
- + Typically, signage and pavement markings are used in addition to the bicycle detector.



CHAPTER 5

THE BICYCLE NETWORK VISION

OVERVIEW

Providing a bicycle network that is safety-focused, comfortable, connected, and convenient for people of all ages, abilities, and identities will help the City achieve the goals set forth in this plan. The planning team conducted a variety of assessments, as outlined in Chapter 1, in order to gather input from residents and visitors and gauge the existing and future bikeability of the Cambridge's streets and paths. The result of this input and analysis is the Bicycle Network Vision, a selection of streets and paths in the city identified as priorities for high-quality bicycle infrastructure improvements. Priority streets in the Bicycle Network Vision are categorized into one of three types: off-street paths, streets with reduced vehicle speed and/or volume, and streets with increased separation between people biking and motor vehicle traffic.

In order for the City to achieve its bicycling goals and objectives, the Bicycle Network Vision follows three guiding principles:

- 1. Safe:** People will be able to bicycle in the city without the threat of real or perceived danger from motor vehicles or other people.
- 2. Comfortable:** People of all ages, abilities, and identities will experience a well-designed, low stress, attractive street and path network.
- 3. Connected:** People will be able to use the network to make convenient connections both locally and regionally to the places they need to go for work, school, shopping, recreation, and socializing.



When I first started riding my bike, it was very exciting. I was able to explore areas of my neighborhood that I've never seen before and go to my friends' homes without a ride from my mom. It gave me a lot of independence...Now, I live in Boston and I love biking to work in Cambridge. Traffic and bus schedules make my commute unpredictable, but when I ride, it always takes the same amount of time everyday. This takes a lot of stress out of getting to work. I also love getting a little work out in the morning. When I bike to work, I have more energy and focus throughout the day. Luckily there are lots of great bike lanes in Cambridge so I feel safe.

– Kathryn Copley, CRLS Teacher

PUBLIC INPUT

In addition to the network principles, the formulation of the Bicycle Network Vision was based on inputs from the public, the bicycle level of comfort analysis, bicycle count and crash data, and other factors as described throughout this chapter.

Nearly 3,000 members of the public provided input in 2015 and 1,500 provided input in 2020 through a combination of in-person and online forums. Further comments and refinements were received from various representatives, including the Cambridge Bicycle Committee, advocacy groups, businesses, institutions, and city staff.

For the 2020 update, outreach media and feedback included flyers, written or emailed comments, an online user survey, numerous street teams, a public open house hosted at Cambridge Rindge and Latin School, two online mapping programs, and narrated videos explaining the process and how to provide input. Results of user surveys are discussed in Chapter 3.



ONLINE MAPS

Two map-based online survey tools were used to collect public input. The first was a WikiMap aimed at evaluating existing conditions. Members of the public were able to log onto the WikiMap website and indicate where there are great streets or paths, where corridor or spot improvements are needed, and provide comments on existing bicycling infrastructure. The second goal of the WikiMap was to identify desired changes to the Network Vision map. People identified streets they believed should be added to, removed from, or reclassified in the Network Vision. The first online map was open for comments from June to October 2019.

A second online map (ArcGIS) was active from September to October 2020. This map collected public comments on the Draft Updated Bicycle Network Vision. Members of the public could indicate their support for the additions as shown in the updated version, their preference to change a designation, or identification of additional streets or paths to include.

Approximately 285 people logged onto the two online maps and generated 674 comments. Figure 5.1 shows which places were most frequently identified as “improvement needed”; this input was used during the development of the Bicycle Network Vision to identify locations deemed important by the public.

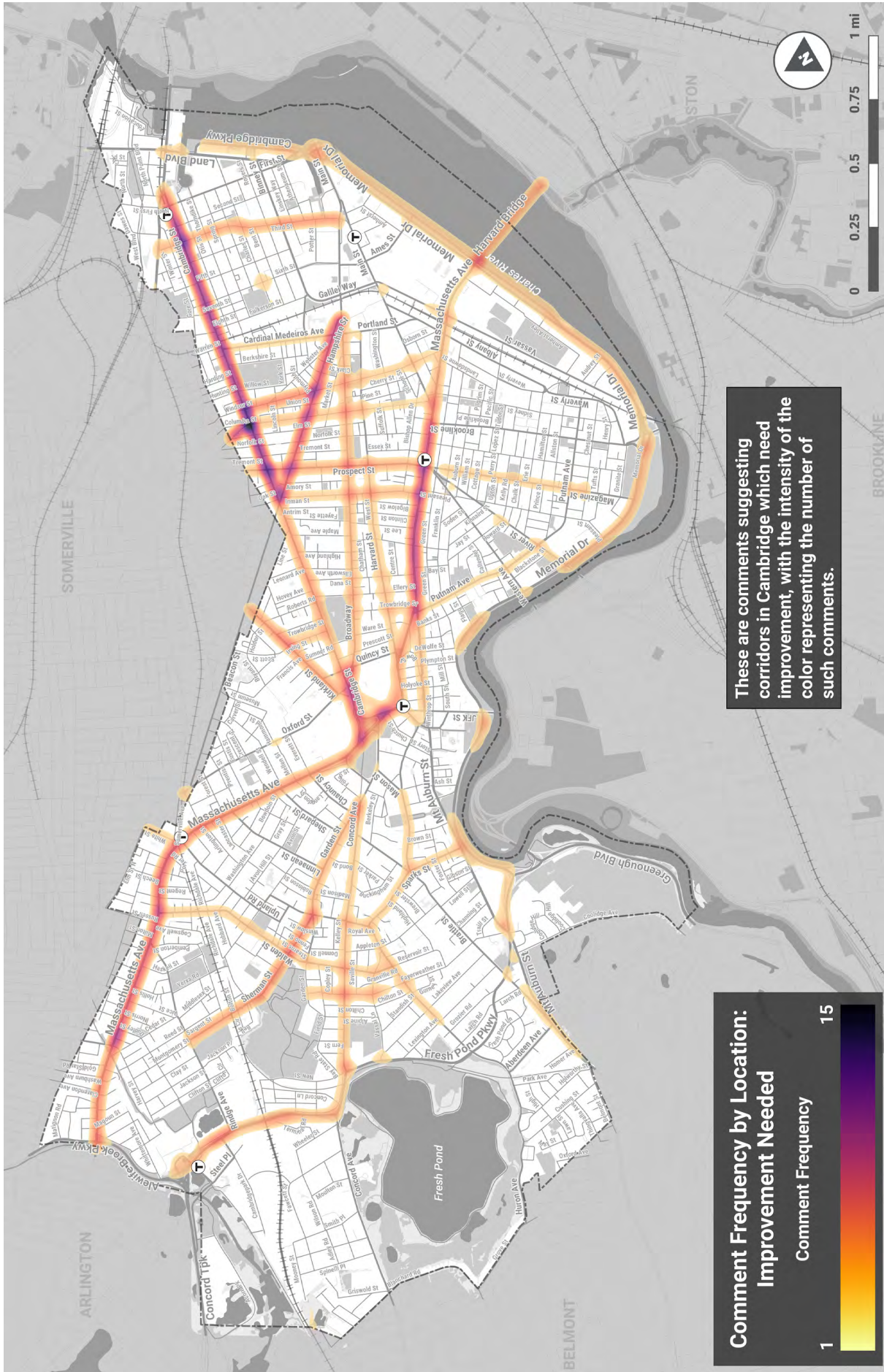


Figure 5.1: WikiMap Comment Frequency by Location: Improvement Needed

IN-PERSON INPUT

A public open house was held on Thursday, June 13, 2019 at the Cambridge Rindge and Latin School. Approximately 50 people attended the open house. A number of stations were established for visitors to speak with Bicycle Program staff; respond to the online user survey; provide comments on the existing bicycle network and 2015 Network Vision map; discuss potential bicycle facility types; review the Bicycle Level of Comfort Analysis and bicycle crash trends; and discuss programs and projects with staff from the Public Health Department, Police Department, and Department of Public Works.

Additionally, large scale paper maps of the existing bicycle network and 2015 Network Vision were presented at seven public events throughout 2019. Attendees were encouraged to identify and comment on locations in the city where bicycling issues need to be addressed as well as changes they wished to see to the Network Vision. These paper-based comments were then compiled digitally with online map comments to provide a database of needs to be addressed in this Plan.



INPUT DURING THE COVID-19 PANDEMIC

Due to the COVID-19 pandemic, significant changes were made to the public engagement process in 2020. Planned additional open house events were cancelled and virtual input opportunities were developed. This included a series of narrated videos explaining the plan and key elements. The videos explained how the Network Vision was updated and the process for planning and prioritizing quick-build separated bike lanes. An online user survey (also available in hard copy) was developed to gain a better understanding of what barriers exist to people biking or biking more in Cambridge.

City staff also developed a portable “tabling” toolkit to use at outdoor events like concerts. The toolkit included maps, informational posters, and printed materials that people could take with them. Participants were able to provide input through online or paper surveys. This extended the reach of the project and allowed people to provide input in a manner that followed safety protocols.

Information about the bicycle plan update and how people could participate was publicized in numerous ways. Over 50 lawn signs were prominently displayed in public locations throughout the city, and the information was shared through City e-newsletters, on the city website, and similar outreach mechanisms.



BICYCLE LEVEL OF COMFORT

The Cambridge Bicycle Level of Comfort Analysis (BLC) is a planning tool used to quantify the level of comfort that a person bicycling is likely to perceive while riding on any street or path. The analysis correlates comfort with the physical and operational characteristics of roadways and crossings. It is based on the premise that a person's level of comfort on a bicycle increases as separation from vehicular traffic increases and as traffic volume and speed decrease. The result of the analysis is a numerical comfort ranking for every street and path in the city, from greatest comfort (BLC 1) to least comfort (BLC 5).

The BLC Analysis is the starting foundation of the Bicycle Network Vision. It allowed the planning team first to identify existing assets, by determining a network of comfortable streets on which people bicycle, and second to prioritize infrastructure improvements by closing critical gaps in the high-comfort network. This approach recognizes that the city's bicycle network is not just a handful of streets with bicycle-specific infrastructure, but rather every street is a potential route for someone biking and that people have varying tolerances for the stress caused by biking near motor vehicles.



METHODOLOGY

The BLC Analysis is based on the Mineta Transportation Institute’s pioneering research on Low-stress bicycling and network connectivity.¹ The Cambridge BLC used Mineta’s ranking criteria for Level of Traffic Stress (analogous to BLC) as a baseline for the comfort ranking of each street or path. Roads segments are scored based on their most uncomfortable portions, recognizing that a bicycle route is only as appealing as its least comfortable or highest stress feature.

Following an initial stage of analysis, BLC rankings were vetted by City Staff, the City’s Bicycle Committee, and the public to test the accuracy of the model. This ensured that the results matched with the actual experience of people most familiar with roadway conditions. Based on this feedback, the model was refined using additional criteria specific to Cambridge. This included ranking criteria such as narrow one-way, single-travel-lane streets with parking on two-sides, streets with high- frequency bus routes, and the addition of a fifth level of comfort to address state highways and parkways. For specific ranking criteria see Appendix E. Ultimately, each street or path in the city received a BLC ranking from 1-5, described on the following pages.

¹ Mekuria, M., Furth, P., and Nixon, H., Low-stress bicycling and network connectivity, Mineta Transportation Institute (2012).

It should be noted that a large amount of data about each street was collected from a variety of sources, but certain values had to be assumed due to the unavailability of data. In particular, roadway volume and speed data were not available on many residential/local roadways. Values typical of local roadways were assumed for these streets, resulting in typically low stress rankings. Nevertheless, many of these streets may be less comfortable than the analysis suggests, due to actual volume and speed being higher than assumed.

The BLC analysis attempts to provide a general assessment of bicycling comfort, and as a result does not take into account factors that are of a seasonal or temporary nature. Pavement quality and accumulation of precipitation are not considered in the BLC. While surface quality can be a significant factor in bicycling comfort, it is typically not a permanent feature and often too dispersed along a roadway to affect the comfort of the entire corridor. Additionally, fluctuation in vehicle speed and volume at peak travel hours is not reflected in the analysis. A particular roadway may be comfortable for much of the day, but very uncomfortable during peak hours due to substantial increases in traffic.



BLC 1

Who: Your grandmother who enjoys riding to errands on Sunday afternoons; a young family of four, with the youngest child in a bicycle seat up front followed by his sister riding behind on her first bicycle; or you - enjoying a slow, quiet ride through your neighborhood.

What: Places where only people on bicycles or foot are allowed, like off-street paths or separated bicycle facilities; quiet neighborhood streets with only occasional vehicular traffic travelling at low speeds.

Where: Brattle Street (Eliot-Mason); Fern Street (shared use path), Minuteman Commuter Bikeway, North Point Park path systems, Kittie Knox Bike Path, Western Avenue cycle track; Spring Street.

BLC 2

Who: Your friends from out of town who have never ridden a bike on city streets; a Bluebikes rider who hasn't been on a bike in years but would like to give it a try; your son, a student at Cambridge Rindge & Latin, who rides to Danehy Park after school for soccer practice.

What: Neighborhood streets with some traffic, not travelling too fast; bike lanes against the curb; wide bike lanes on streets without much traffic that make travel predictable for people in cars and on bikes.

Where: Sidney Street; Ellery Street; Cambridge Street from Inman Square to Quincy Street; Sixth Street.

BLC 3

Who: Your neighbor, who diligently takes out her bike each morning to make the trip to work; MIT students riding for ice cream after class for a group study session; your friend from Somerville who rides to the supermarket every week for groceries.

What: Roads with frequent car traffic that may travel fast at times; bicycle lanes that are often blocked by vehicles – whether trucks making deliveries, cars pulling in and out of parking spaces, or car doors opening into the adjacent bicycle lane; narrow, often one-way, single-lane streets with frequent car traffic that can't pass people biking due to parking on either side.

Where: Cambridge Street from Inman Square to Lechmere, Magazine Street, Pearl Street, Hampshire Street.

BLC 4

Who: The bartender working in Central Square whose bike messenger days are behind him; your cousin who rides to her job in Kendall Square from Arlington, rain or shine.

What: Roads that have fast and/or constant motor vehicle traffic and no bicycle lane; streets with steady bus traffic making frequent stops; bicycle lanes that are often blocked by illegal parking.

Where: Mount Auburn Street (Fresh Pond Parkway – Belmont Street), Prospect Street; Concord Avenue (Garden Street – Fresh Pond Parkway).

BLC 5

Who: Your coworker who is confident in their abilities, capable of riding fast, and prefers the shortest route possible.

What: Roads designed as highways, meant to carry extremely high volumes of very fast moving motor vehicle traffic travelling between cities.

Where: Memorial Drive, Fresh Pond Parkway.



Figure 5.2: Bicycle Level of Comfort Criteria and Examples

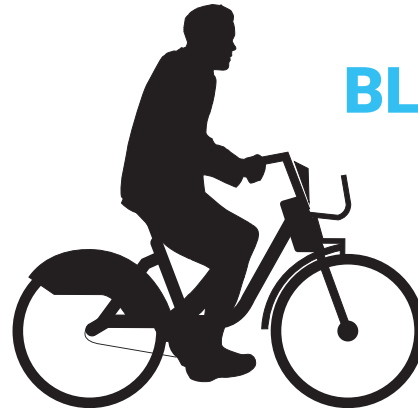
CURRENT CONDITIONS

1. Shared use paths provide continuous high-quality regional connections, but often only at the edges of the city. Separated bike lanes on Vassar Street, Massachusetts Avenue, and Western Avenue connect paths to commercial, institutional, and employment centers along high-comfort routes. However, there are many parts of the city where it is difficult to find a convenient high-comfort route to and from the paths.
2. BLC 1 and 2 streets/paths represent twice the mileage (appx. 119 miles, including 36.5 miles of paths) of BLC 3, 4, and 5 streets combined (appx. 59 miles). BLC 1 and 2 streets, however, do not form a cohesive network of continuous high-comfort bicycle routes. They are fragmented by low comfort (BLC 3, 4, 5) streets, particularly around commercial and employment centers. Sometimes an otherwise good street has a barrier such as a difficult intersection. Fragmentation is also increased due to many local streets operating in a discontinuous one-way street pattern. High comfort streets that physically connect often do not provide a continuously bikeable route due to frequent changes in the direction of operation.
3. Most primary roads in Cambridge that provide access to commercial, institutional, and employment centers provide a lower comfort biking experience (BLC 3, 4, or 5). These streets, such as portions of Massachusetts Avenue, Broadway, Hampshire Street, and Concord Avenue, are in high demand by all modes of traffic, but may act as barriers for people who are not comfortable riding in such conditions. Often these streets are the only route to major activity centers aside from alternatives that require a significant detour. Finally, these streets and their intersection with other BLC 3-4 streets are also locations with the highest frequency of bicycle crashes.

BLC 1



BLC 2



BLC 3



BLC 4



BLC 5



Figure 5.3: Bicycle Level of Comfort Sample User Types

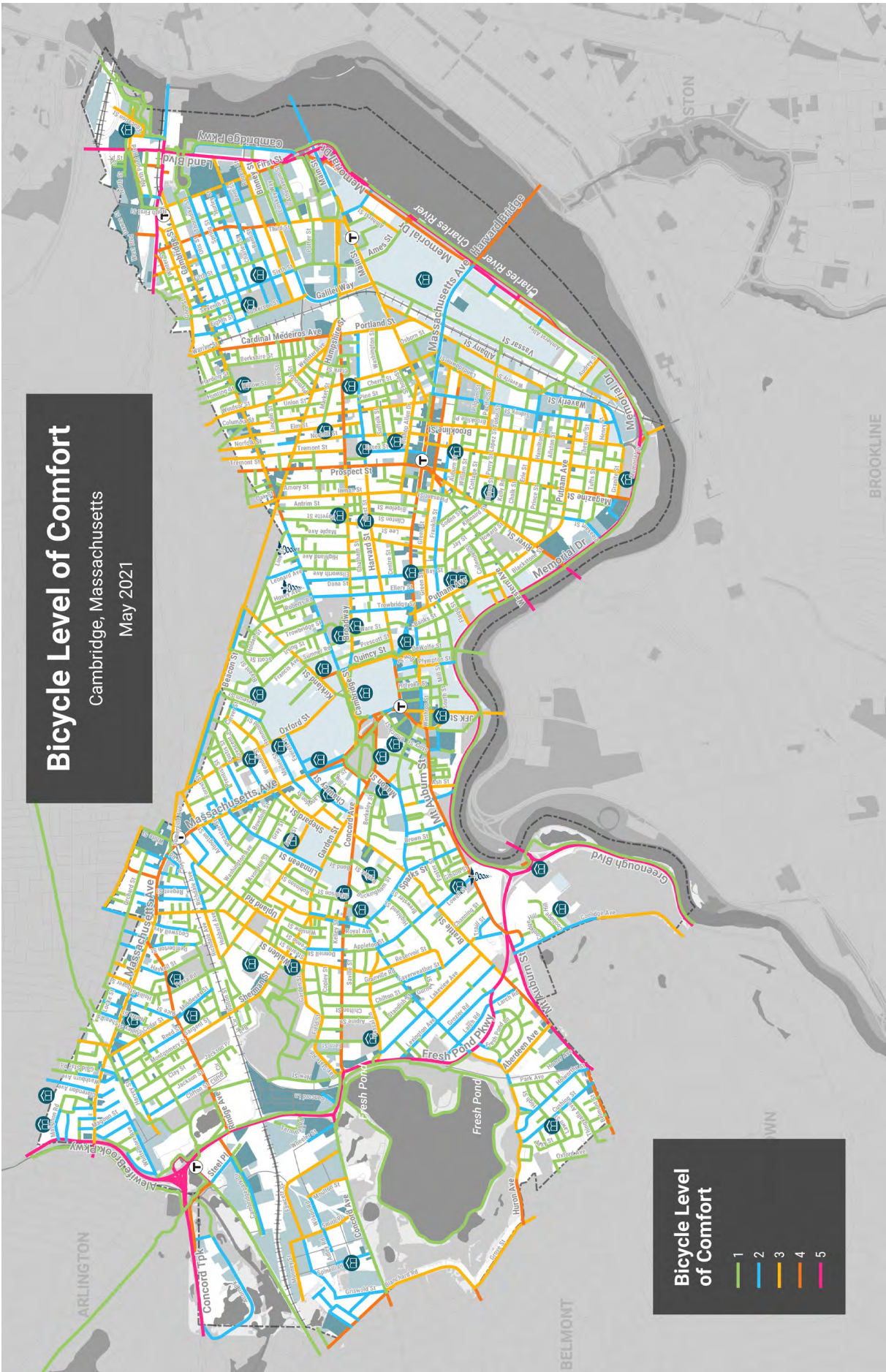


Figure 5.4: Existing Bicycle Level of Comfort (Based on Current Conditions)

BICYCLE COUNTS AND CRASH DATA

Cambridge conducts biennial bicycle counts and analyzes bicycle crash data collected from the Cambridge Police Department crash reports. Both data sources were used in the development of the Bicycle Network Vision. Details on bicycle counts and crashes are discussed in Chapter 3.

LEVEL OF ACCOMMODATION

Infrastructure recommendations in the Bicycle Network Vision take the form of a “level-of-accommodation” for each street or path. These recommendations do not propose specific facility type; rather they provide infrastructure goals for each street or path which may be reached through a variety of design treatments. Specific bicycle facility types, as provided in Chapter 4, will be determined through a design process for each street/path which will include public outreach and will be informed by the latest best practices in bicycle infrastructure design at that time.

Since streets have different characteristics and functions, different street types need different levels of accommodation. Busy commercial streets like Massachusetts Avenue typically require separation

from vehicular traffic and parking in order to provide comfort and safety for all users. Quieter residential streets like Harvard Street often benefit from lowering the speed and/or motor vehicle volume through traffic calming so that people biking are more safe and comfortable sharing the road.

The proposed levels of accommodations are:

- 1. Off-street:** Paths, primarily through parks or open space and along linear corridors such as rail lines and rivers – motor vehicle traffic is prohibited.
- 2. Separated:** Physical separation from traffic with raised bicycle lanes, protected bicycle lanes, or other means which provide a vertical and horizontal barrier between bicyclists and motor vehicles. Separation is required primarily on major through-streets with higher traffic volumes and speeds. These streets often provide access to shopping, jobs, neighboring communities, and regional trails.
- 3. Bicycle Priority Street (also referred to as “Lower volume and/or speed”):** Lower motor vehicle volume and/or speed with bicycle-friendly speed and traffic volume management treatments, primarily on residential and less busy through-streets. These streets often provide access within and between neighborhoods, local parks, or schools.



Tools for Creating Off-Street Paths

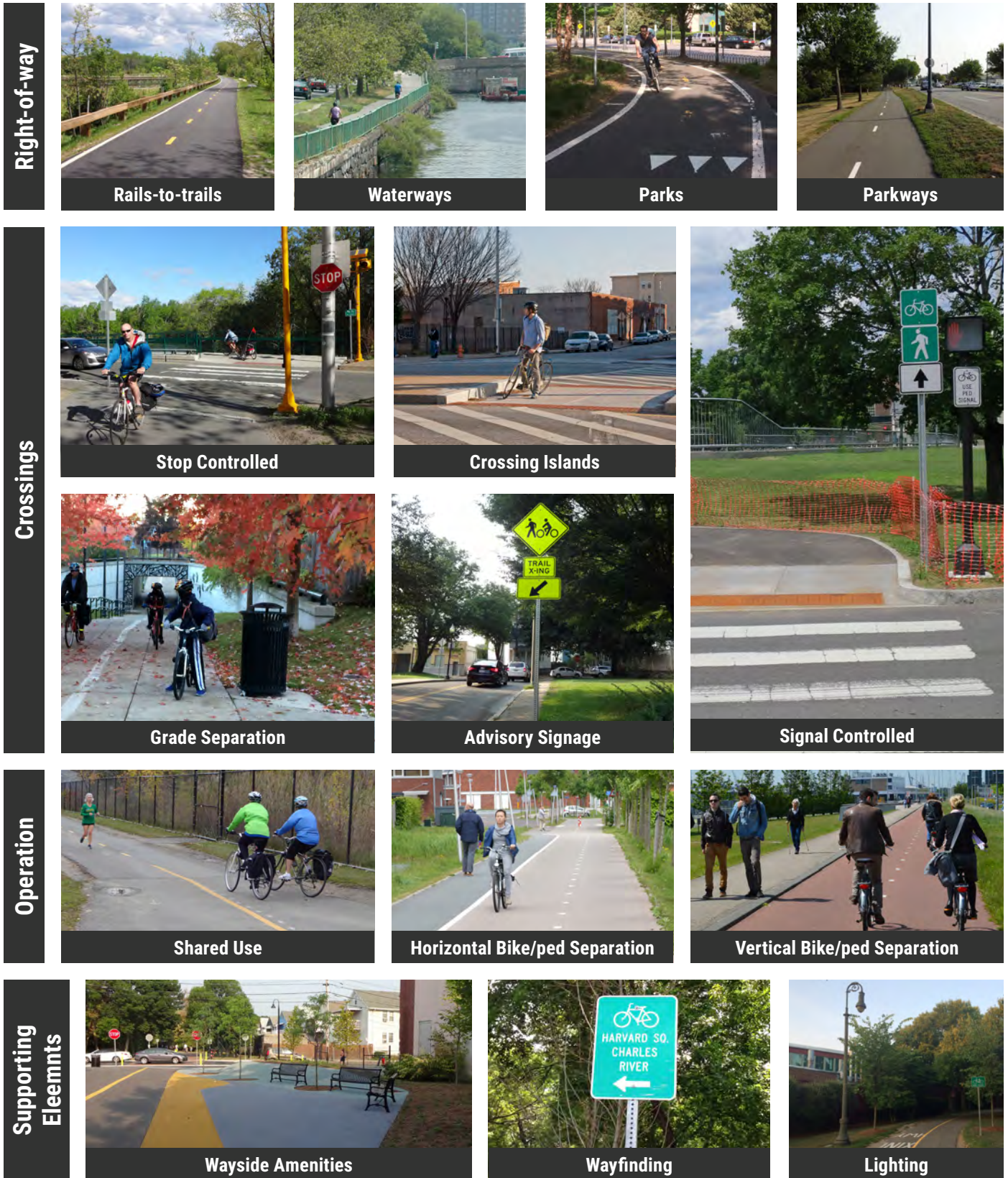


Figure 5.5: Level of Accommodation Example for Off-Street Paths

Tools for Creating Separation

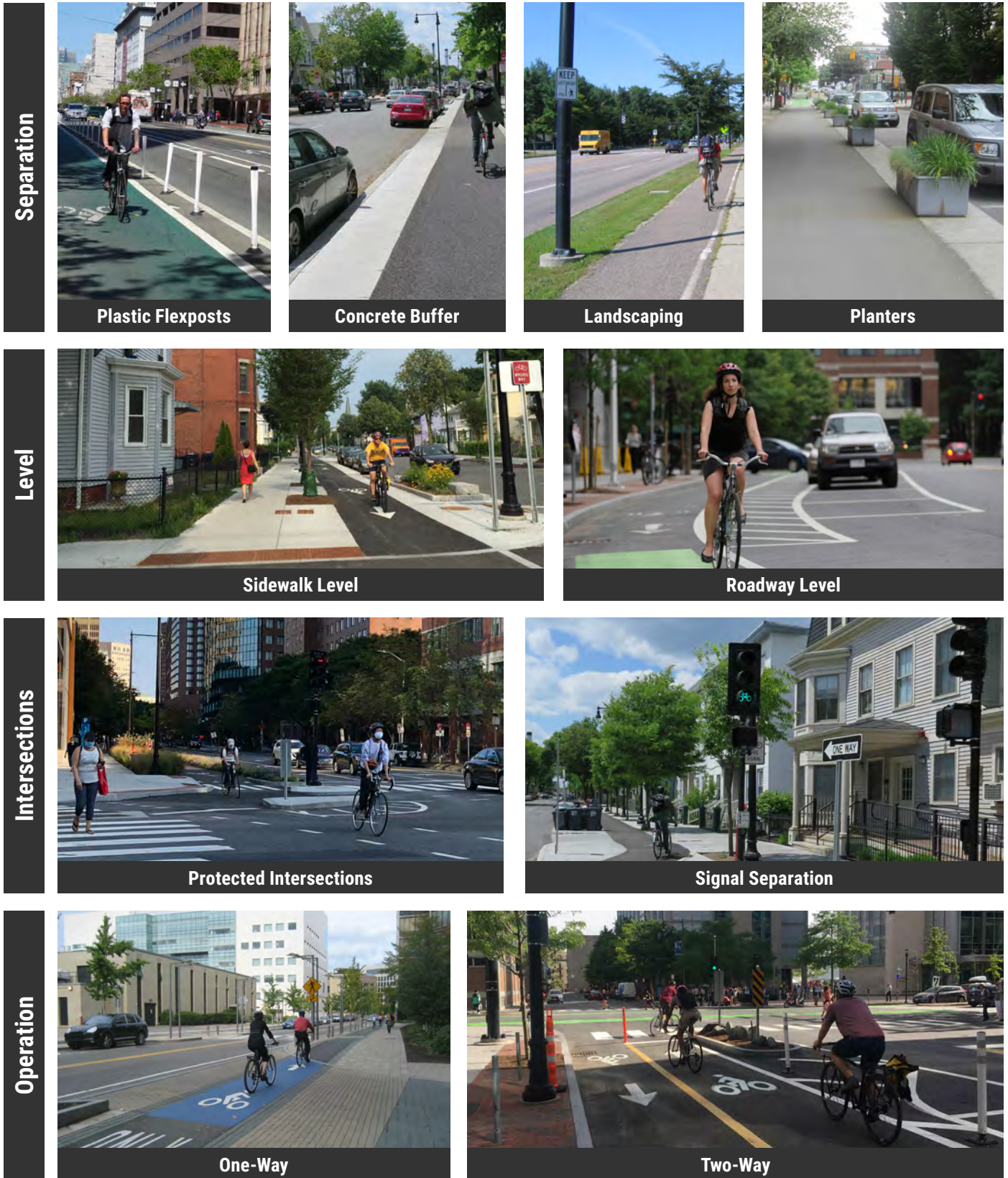


Figure 5.6: Level of Accommodation Example for Separated Bike Lanes

Tools for Creating Bicycle Priority Streets

with Lower Volumes or Speeds



Figure 5.7: Level of Accommodation Example for Bicycle Priority Streets

BICYCLE NETWORK VISION

The 2015 plan established a 115-mile Bicycle Network Vision to guide bicycle facility implementation. In this 2020 plan update, the 2015 Network Vision was assessed for its ability to create comfortable connections for biking to key destinations including jobs, shopping, open space, and schools. Land use, public comments, the BLC analysis, crash data, and other roadway conditions were used to identify potential additions and changes. This resulted in the updated 130-mile Bicycle Network Vision that focuses on providing high-comfort routes between all major origins and destinations in the city.

The Bicycle Network Vision includes existing and planned high-comfort bicycle facilities, separated bike lanes identified in the Cycling Safety Ordinance, existing and proposed off-street paths, and lower volume and/or speed streets that create primary connections to destinations.

The resulting network is a long term vision for a safe, comfortable and connected network of streets and paths that seamlessly links key destinations throughout the city.

While all streets in Cambridge are used by people biking, the Bicycle Network Vision will prioritize the funding, redesign, reconstruction, and maintenance of projects to promote the completion of a connected high-comfort network (BLC 1 & 2) that provides a bicycling option for people of all ages, abilities, and identities. Improvements will continue to be made to other streets as opportunities arise.

The continued development of a comfortable, safe and connected bicycle network is an important priority for Cambridge.

For example, buffered bike lanes are planned for Belmont Street (which is not on the Bicycle Network Vision) which will raise the street from a BLC 4 to a BLC 3. The Bicycle Network Vision will be a living document, updated regularly as new ideas and opportunities emerge.

My wishlist for pro-biking infrastructure and policy in Cambridge is long only because I truly believe that the city has the bones and resources to become a true haven for bikers. While I understand that biking is not an accessible mode of transport for everyone, I do think that we should do everything in our power to make biking safe and accessible for those who DO want to start or maintain the practice. Promoting biking is also an invaluable piece of the climate action puzzle-- the easier it is to bike, the fewer cars will be in the road. Cambridge should be a leader when it comes to bike infrastructure and policy! Every member of the community stands to benefit.

– Resident, Mid-Cambridge



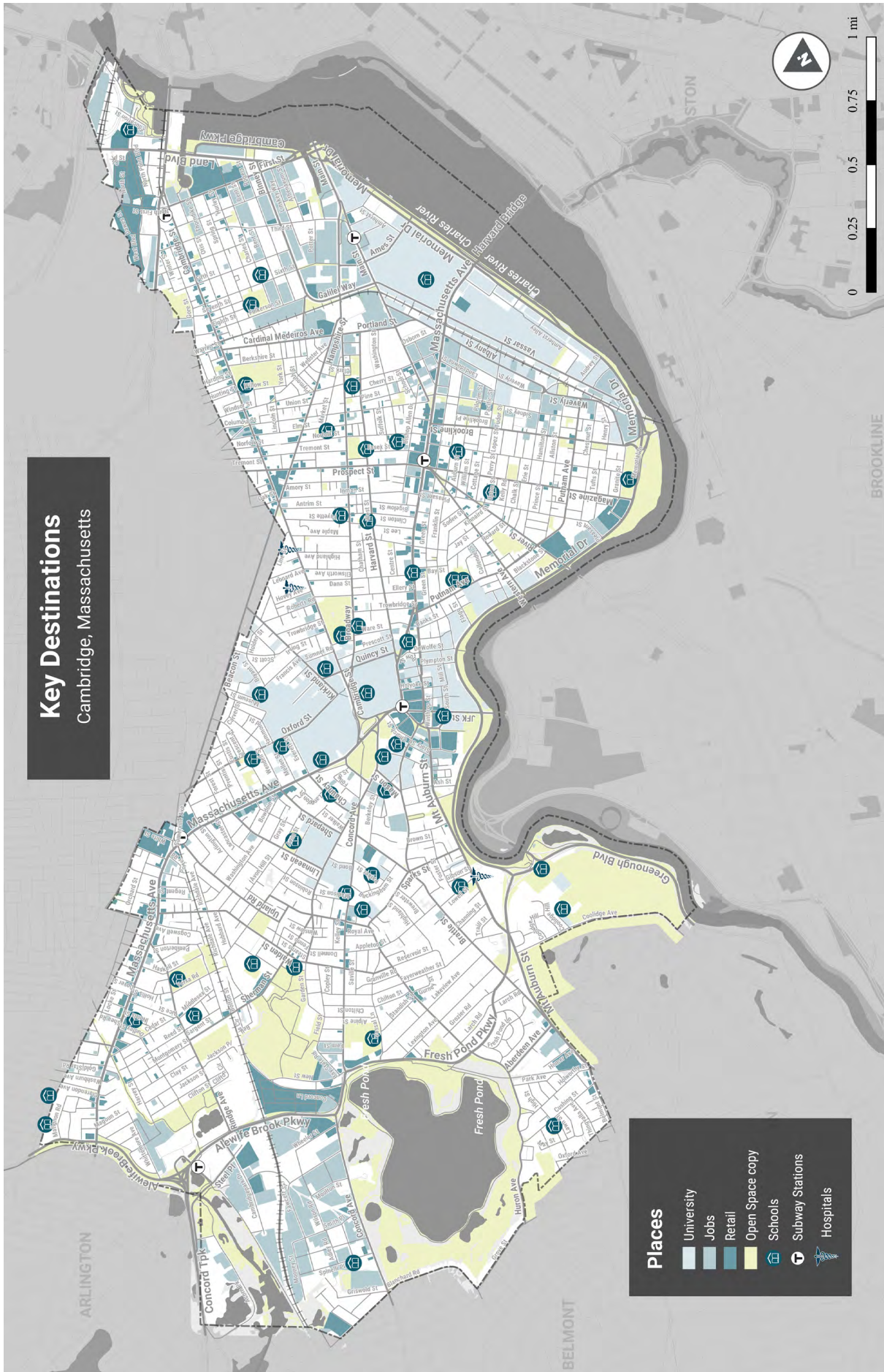


Figure 5.8: Key Destinations in Cambridge

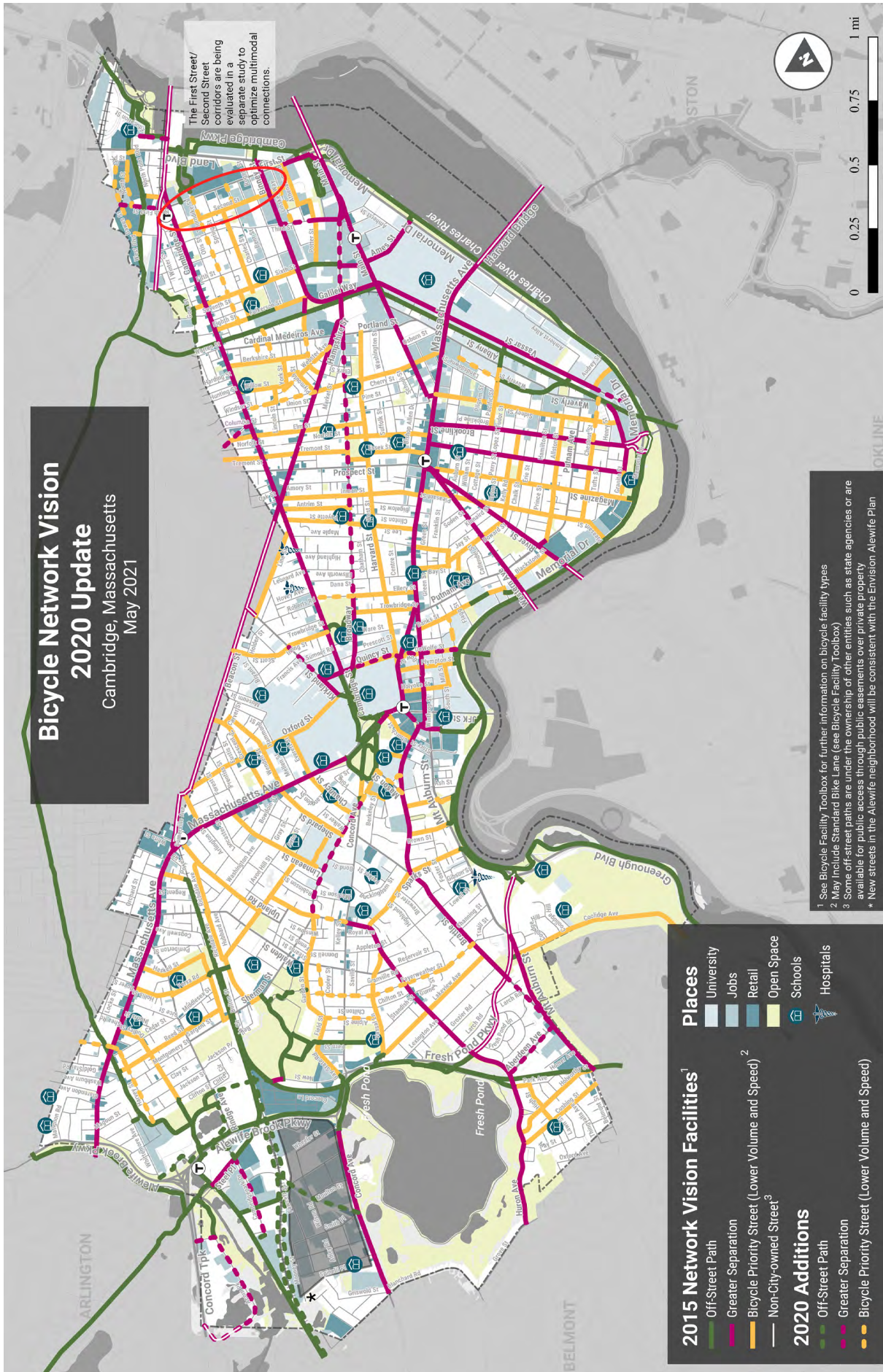


Figure 5.9: Bicycle Network Vision

CHAPTER 6

BICYCLE PROGRAMS

OVERVIEW

Cambridge promotes and encourages bicycling through a variety of programs in addition to establishing a supportive physical environment. These include:

- + offering extensive educational opportunities, both in schools and in the broader community;
- + providing materials and resources to community members;
- + establishing zoning requirements to ensure that new development is bicycle-friendly;
- + the adoption of a Parking and Transportation Demand Management program to help reduce the use of single-occupancy vehicles; and
- + providing support to community partners and organizations.

Since the publication of the 2015 Bicycle Plan, the City's bicycle programs have expanded and diversified, enhancing outreach and working to create more equitable access in urban cycling. Cambridge's programming is designed to support and empower the community by providing information, materials, technical and other resources as needed, with a special focus on underrepresented demographics and people new to urban cycling.

In order to ensure all Cambridge residents have access to the resources and information they need to participate in bicycling and make effective use of sustainable transportation, Cambridge offers free classes and resources such as maps, guides, online tips, public transportation schedules, helmets, bicycle lights, and translated materials.

The City works collaboratively with the community to consider the full scope of planning, engineering, education, and outreach around transportation. Some of the standing entities are described below, and much of the work routinely involves interagency

efforts and collaboration in the form of coordinating committees. Residents, advocacy and community organizations, businesses, and institutions are all important partners in advancing our common vision of a sustainable, livable city.



"There's nothing like starting off the day with a brisk bike ride! ... I also appreciate moments when pop up bike events happen... It's so much greater when we advocate for safer biking together! I look forward to even more bicycle volume and appreciate advocacy for Cambridge kids (my middle schooler included) to get outside and learn to ride. Recently he surprised me when borrowing a friend's bike, that he did learn in gym class! I know there's more work to be done there but it was a nice thing to see for a kid who needs to get out more. During the shut-in times, although I'm not commuting, getting out on the bike always cheers me up and is probably the only exercise I get. Very important health topic!"

—Heather Gockel, Cambridgeport

COMMUNITY OUTREACH PROGRAMS

EDUCATION

Cambridge's goal is to enable people to make safe, effective, and sustainable transportation choices. Education is an important part of this, and the City's educational programming covers practical issues like how to be safe around vehicles and pedestrians, bicycle maintenance, rules of the road, urban cycling techniques, and tips for cycling in the winter or carrying items like groceries. It also addresses big-picture topics, including how transportation is connected to issues like energy use, climate change, personal and public health, and the livability of a community.

The City creates and widely distributes a variety of bicycle outreach and educational materials, hosts free bike workshops and skill-building sessions for the public and City employees, and provides support for local organization and private entities engaged in outreach and education.

FOR PEOPLE WHO DRIVE

Effective driver education is critical to the safety of people on bikes and most driver education programs in the United States are inadequate at teaching people how to operate motor vehicles safely around people walking or bicycling. This is a problem nationwide and it is difficult for any single municipality to make significant inroads, as driver education falls under state jurisdiction. Enhanced motorist education that teaches how to look for and interact with people bicycling should be part of the driver education curriculum.¹ To help address this and improve safety for all modes, Cambridge makes efforts to engage with and include drivers in its outreach and education around transportation (see materials and information discussed below). Additionally, the City works with statewide advocacy groups to encourage changes to driver education

curriculum, in addition to creating substantive training programs, like those listed below.

People driving personal vehicles are not the only drivers on streets in Cambridge. The MBTA serves as a critical piece of our public transportation infrastructure, and the City works with the agency to regularly update training protocols for operators, ensure that bus-bike interactions are as safe as possible, and advocate for policy and systems changes as needed. In 2020, the City, in collaboration with the Livable Streets Alliance, MassBike, The Loop Lab, and the MBTA, created a new training series for MBTA bus operators, including 11 video modules outlining proper bus operator behaviors around people biking, focusing on turns, speed, communication, and empathy. In addition to this video series, the training curriculum was also updated to incorporate more bike-bus scenarios.



There are also many commercial vehicles operating on the streets of Cambridge. Cambridge has reached out to companies and organizations operating ride hail and rideshare vehicles to share educational materials and discuss ways of promoting safe driving. The City has also hosted various educational and marketing campaigns to highlight the particular role that drivers have for ensuring safety for everyone; this includes maintaining safe vehicle speeds, watching for people bicycling before opening a car door, and looking for people walking or bicycling before making a turn (the photo on page 8 shows an example from the public safety posters installed at Bluebikes stations).

FOR PEOPLE WHO BIKE

When people bicycle, they need to know traffic laws and benefit from gaining experience navigating the urban environment. The City creates outreach and educational materials geared towards bicycling, hosts free workshops and skill-building sessions for the public and City employees, and provides support for private entities engaged in outreach. Also addressed are important tips on how to travel safely around motor vehicles and how to be mindful and careful around people walking. In addition to programming for adults, the City manages a robust Safe Routes to School (SRTS) Program, educating second- and sixth-grade students on walking and cycling safety, and engaging high school students in hands-on skills-building classes. See below for more information on the SRTS Program.



Various events and classes, such as bicycle maintenance clinics, are offered for a people with a wide range of backgrounds and experiences.

EDUCATIONAL MATERIALS AND FUNCTIONAL GIVEAWAYS

Cambridge creates and provides resources to support people in making safe and sustainable transportation choices. These materials are distributed at community events, available to the public in City buildings, and sold at cost to institutions and organizations in the private sector.

GETTING AROUND CAMBRIDGE MAPS

This free map serves as the City's primary educational piece for people who bike, walk, use transit or drive in Cambridge. It includes practical information for traveling in the city by all modes and information is presented in a visually engaging manner.

GETTING AROUND CAMBRIDGE STREET CODE

The Street Code was created to demystify getting around Cambridge and is made up of five main sections:

1. Rules of the Road
2. Reduce Risk: Be Alert
3. Reduce Risk: Be Predictable
4. Responsibility
5. Respect Others.

In 2019, the Street Code was translated into Bangla, Amharic, Spanish, French, and Portuguese, in addition to English.

GETTING AROUND CAMBRIDGE MAGAZINE

The Getting Around Cambridge Magazine is an annual publication; previously it was mailed to 50,000 households in Cambridge, but moved online in 2020 because of COVID-19 restrictions. It is a creative way to update residents about new programs, street projects, educational opportunities, and resources related to getting around our community. Guest writers have included students of the Cambridge Public Schools, the Pedestrian, Transit, and Bicycle Committees, and various City departments, including the Council on Aging, Department of Human Service Programs, DPW, Transportation, Public Health, and Cambridge Committee for Persons with Disabilities.

BICYCLING IN CAMBRIDGE



**GettingAround
Cambridge**

FAST. FLEXIBLE. FUN.

Examples of educational materials available at www.cambridgema.gov/bike

DOORS ARE DANGEROUS

Vehicle doors pose a very serious threat to people biking. Look before opening a car door — It could save someone's life.

People driving or riding in cars, trucks, taxis, or any other motor vehicle with a door:

- 1 Check your rear-view mirror.
- 2 Check your side-view mirror.
- 3 Open the door with your far hand. The "Dutch Reach" forces your body to turn, making it a habit to look for bicyclists.

People biking should ride outside of the "door zone"

People biking should ride at least 3 feet from parked cars to avoid doors, on streets with and without bike lanes.

City of Cambridge
Massachusetts
www.cambridgema.gov/visionzero

The Cambridge Street Code includes visuals that demonstrate how to safely use the various kinds of infrastructure found on streets in Cambridge.

GETTING AROUND CAMBRIDGE

COMMUTING FOR HEALTH

BUS PRIORITY

SAFE ROUTES TO SCHOOL

2018

GIVEAWAYS

Cambridge's approach is to make its free promotional materials, distributed at community events, functional and educational. These giveaways include bicycle lights, reflective leg bands, bells, tire patch kits, activity books, and reflective vests. People who attend bicycle workshops are eligible for one free helmet each year.



Giveaways like lights and reflective bands are useful for people biking.

RESIDENT PARKING PERMITS

Tips about safe travel, Vision Zero, and related information are often included in the annual residential permit parking packet sent out by the Traffic, Parking & Transportation Department.

"WATCH FOR BIKES" DECALS

Cambridge provides small mirror and window decals with the saying "Watch for Bikes" that are intended to be placed in vehicles where they will be seen by people exiting the vehicle including mirrors and windows. These are distributed at community events and with City informational materials, and are installed on the passenger windows of taxi cabs in Cambridge. Installation on cabs has become institutionalized and is part of the biannual inspection undertaken by the Cambridge License Commission. Zipcar has installed these decals in their cars, and Uber has distributed them to local drivers. Brochures with this important message have been included in citywide mailings and in the Traffic, Parking & Transportation brochure that is given to everyone receiving a parking sticker or visitor permit.



Watch for Bikes stickers.

COMMUNICATIONS

MEDIA OUTLETS

Outreach through local and regional media outlets provides the opportunity to publicize information and promote bicycling to a wider audience.

VIDEOS

Videos are useful for visual instruction and information and can often be more engaging than written information. The Cambridge Police Department has used video for traffic safety education, emphasizing bike safety. The Food and Fitness Policy Council created a short video with Cambridge Community Television on active transportation as a good source of physical activity in Cambridge, which can be found at <http://www.cctvcambridge.org/healthheroes>.

During the COVID-19 pandemic, a pivot was made to virtual (online) educational workshops, which provided the opportunity to record the workshops and post them online. Examples include videos from the Healthy Aging and Cycling series, the Urban Cycling Basics workshop, the ABCs of Bike Maintenance series, and the Safe Routes to School curriculum. Additionally, video clips demonstrating how to use the Bluebikes system are posted.

SOCIAL MEDIA AND ONLINE PRESENCE

The City has a [webpage](http://www.cambridgema.gov/bike) dedicated to bike resources, [cambridgema.gov/bike](http://www.cambridgema.gov/bike), which is regularly updated with materials and information about projects, programs, workshops and rides, bike-related data, and more. The City also regularly distributes an active transportation e-newsletter, where subscribers can get updates about meetings, events, and announcements related to biking and walking. These updates are also posted frequently on the City's social media accounts.

Healthy Aging and Bicycling in Cambridge Virtual Series

Do you **enjoy cycling** and are looking for ways to be active while respecting social distancing?

Do you want to **try bicycling again**, but are feeling rusty?

Are you interested in learning about cycling considerations for older adults **from the comfort of your home**?

Cambridge's Community Development Department, in partnership with the Council on Aging, is launching a **Healthy Aging and Bicycling in Cambridge program** this October. Five 1-hour workshops followed by a 15-minute question and answer session will be held virtually over Zoom. Participants and instructors will be able to see and engage with each other. For more information, visit cambridgema.gov/bikeworkshops.

Classes on Tuesdays (Oct. 13, 20, 27 and Nov. 3, 10) from 9:30 AM to 10:45 AM

[Click Here to Register](#)
or call the Cambridge Council on Aging at 617-349-6220

| Class | Date | Time |
|--|-------------|------------------|
| Cycling Basics for Older Adults | October 13 | 9:30am - 10:45am |
| Getting Back on the Bike | October 20 | 9:30am - 10:45am |
| Urban Cycling Basics | October 27 | 9:30am - 10:45am |
| Design for All Ages: Bike Lanes in Cambridge | November 3 | 9:30am - 10:45am |
| Adaptive Cycling | November 10 | 9:30am - 10:45am |

Digital announcement for virtual workshops held during the COVID-19 pandemic.



The Community Development Department uses social media as one way to communicate events and public service announcements.

BLUEBIKES PUBLIC SERVICE ANNOUNCEMENTS

The map panels of the Bluebikes Bike Share stations provide space on one side for Public Service Announcements (PSAs), and the City has used this opportunity to promote Bluebikes, sustainable transportation, energy efficiency, local business promotion, speed limit changes, messages about sharing the roads respectfully, youth-designed projects of the EF Global Challenge, public health communications around COVID-19, and more.



PSA's at Bluebikes stations are one way to get important public messages out.

REAL-TIME TRANSIT DISPLAYS

Located at 11 municipal buildings and in bus stops around Cambridge, these real-time transit displays show when the next bus and train arrives. They also display the location of nearby Bluebikes stations and the availability of bikes and docks at each.

COMMUNITY EVENTS

Community events are excellent outreach and engagement opportunities, drawing people with a diversity of experience and interest in biking. At these events, City staff and volunteers engage with the public informally, often through tabling, to distribute materials and information, ask for feedback on projects, give away freebies like bike lights and bells, and play educational games. At citywide events such as Fresh Pond Day and Cambridge Fixit Clinics, Cambridge provides free bicycle check-ups and repair instruction to help keep people riding.

The City's Community Development Department also hosts a crew of high school interns through the summer to assist with dozens of outreach events. College-aged interns (with the assistance of a few high school representatives) create the outreach calendar based on where they believe young people will most often be throughout the summer months to increase engagement with that age group. A year-round high school intern provides feedback on outreach efforts and helps develop effective methods for reaching high school-aged residents.



Danehy Park Family Day, Summer 2019.

PARK(ING) DAY

The City hosts an entire day devoted to engaging the community in transforming parking spaces into something else for the day. The goal of this international event is to allow the community to realize just how much space a parking spot takes up, and to explore other possible uses of that precious real estate. Several bicycle-related spots have been hosted in the past, including bicycle tune-ups, pop-up bike lanes, and bicycle parking.

CAMBRIDGE GROUP RIDES

Cambridge encourages people from all backgrounds to participate in City-sponsored group rides. Designed to be fun and engaging, group rides foster community and serve as an opportunity for people seeking to gain more experience bicycling in an urban environment. City staff support the Cambridge Bicycle Committee in organizing themed group rides each May for National Bike Month, the annual Bowtie Ride, and specialized rides such as the kids' Halloween Bike Ride or winter rides. The City also hosts various group rides for young people, including the annual Youth Rock 'N Ride, which promotes the Bluebikes Youth Discount program offered to Cambridge high school students ages 16+. We also co-sponsor and assist with many community-led rides throughout the year.



Bow Tie Ride, September 2015



"I had an incredible experience going on the 'Cycle to the Source' bike ride with the Cambridge Water Department. City employees were friendly and informative. We learned a lot, and got to bike right across the top of the earthen dam to see the gatehouse at Stony Brook Reservoir!"

—David Lawrence, West Cambridge

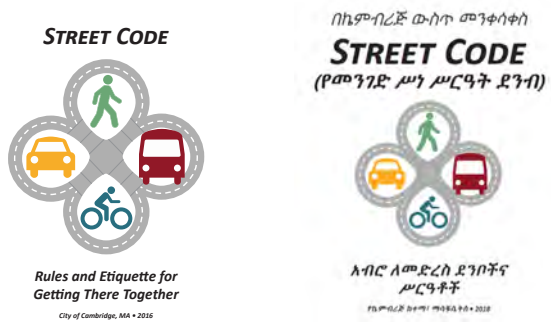
BICYCLE WORKSHOPS

The City offers bicycle education workshops throughout the year, free to those who work or live in Cambridge. Cambridge engages hundreds of residents in these classes, covering topics such as bicycle maintenance, winter bicycle commuting, "urban cycling basics," "women-powered cycling," and on-bike refresher training. In FY21 (July 2020-June 2021), approximately 530 people participated in classes. In addition to supporting the general cycling community, these classes are particularly important in addressing identified barriers to cycling and continually evolve to best promote equity and accessibility. Cambridge collaborates with [MassBike](#) (Massachusetts Bicycle Coalition) and local organizations to create new materials, updated curricula, new workshops, and instructor professional development, such as the cultural competency and English Language Learning training. Cambridge also leads customized trainings for various City-affiliated departments and programs, including the Cambridge Community Learning Center and Mayor's Summer Youth Employment Program counselors.

BROADENING COMMUNITY ENGAGEMENT

Cambridge has conducted significant bicycle and public health related outreach to traditionally underrepresented populations, i.e., groups who are not seen in the bicycling community at levels equal to their presence in the broader community. This includes some racial and ethnic groups, as well as women, older individuals, and some immigrant communities. Among the actions taken is the translation of resources into multiple languages (Amharic, Bengali, French, Spanish, English).

Cambridge is continually building out new programs to promote equity and meet the needs of Cambridge residents for a range of abilities and identities.



THE COMMUNITY ENGAGEMENT TEAM (CET) ²

Working through this team, City staff focused on determining what the barriers are to bicycling for underrepresented groups. After hosting a series of focus groups, specific issues were identified, leading to actions including training bicycle class instructors in cultural competency, hosting bicycle education workshops for immigrants, and creating a PSA campaign designed to invite all members of the Cambridge community to bicycle.

ENCOURAGING WOMEN TO BIKE

While women have been represented in the Cambridge bicycling community at higher levels than average in the US, the percentage is still significantly less than representative. In order to

support the needs of women who would like to bicycle, the City has put on “women-powered” cycling workshops and promotes women cycling through other venues. Bluebikes promotes an annual Women’s Month in October and the Bicycle Committee created a celebratory ride for the 19th Amendment 100-year anniversary.

THE MEN’S HEALTH LEAGUE (MHL)

MHL is an initiative of the Cambridge Public Health Department that addresses the prevention of cardiovascular disease and type 2 diabetes, especially in men of color. MHL runs several events, including a series of outdoor bike rides for this group through its Fit for Life and Fitness Brothers programs, which have the aim of increasing physical activity, supporting healthy eating habits, and educating men about important topics related to their health.



“For people who have one or more jobs and have kids it’s best to have an activity that is part of their daily routine.”

—Arif Hussain, Fit for Life program mentee turned mentor.



“Dads and Kids” Bike Ride, organized by Cambridge Dads (a program of the Cambridge Public Health Dept. and Dept. of Human Services) and the Men’s Health League (Public Health).

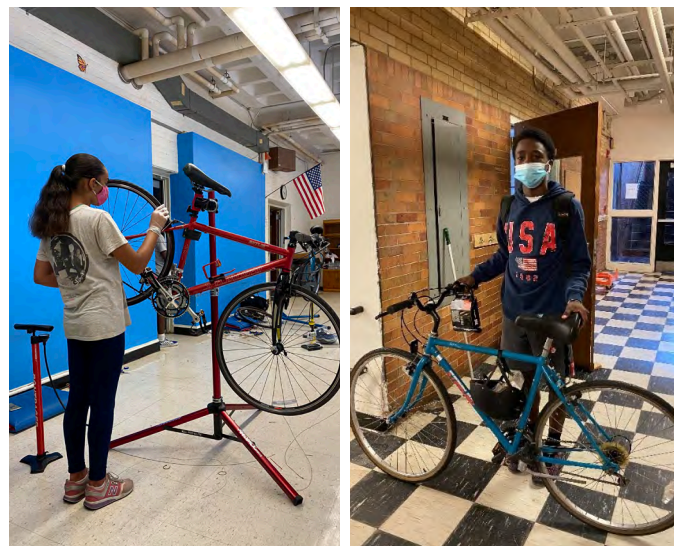
HEALTHY AGING

The Healthy Aging and Cycling Program launched in 2015. As part of the original initiative, the City engaged with over 250 people over age 50 to talk about barriers to bicycling in our community.³ The outreach included focus groups and “street team” tabling all over the city. It also included a series of bicycle education workshops, with free bicycle tune-ups. Ideas articulated through these conversations mirror those that were captured through the public process of the 2015 Bicycle Network Plan.

In 2021, a new program was launched to further promote accessible and sustainable mobility. The new Healthy Aging program was designed to address barriers to cycling for older adults identified in a 2020 program interest survey answered by more than 50 older adults in Cambridge. The three primary barriers identified include: fear of motor vehicle traffic, concerns about physical ability to ride a bicycle, and not owning a bicycle. This program addresses these barriers through a progressive 3-unit program including: spin and strengthening classes, a refresher on the rules and safety aspects of biking in an urban environment, and training on renting bike share bicycles for individuals who do not own a bike. The City continues to seek innovative ways to support and engage older adults around bicycling in Cambridge.

TEAM CDD

The Community Development Department in collaboration with the Cambridge Police Department created a new Earn-A-Bike program working with Cambridge High School students. As part of the program, students complete a mechanics training program and then work under the supervision of an experienced mechanic to refurbish and repair bicycles that have been discarded or donated to the program. In the future, we would like to grow this program, working with local tenant councils and organizations to identify Cambridge youth in need of bicycles and matching them with repaired bicycles. Before receiving bicycles, helmets, and lights, each cohort will participate in a mandatory course on bicycle safety and urban cycling basics.



Students learning to maintain and repair bikes.

ADAPTIVE BICYCLING SUPPORT PROGRAMS

In the future, Cambridge would like to explore programming and formats specifically tailored to adaptive bicycling. In 2020, in order to assess program needs, Cambridge surveyed people about the barriers to biking for people with disabilities and/or limitations inhibiting them from cycling; 93% of respondents communicated interest in trying adaptive bicycles if made available.



Examples of educational materials available at www.cambridgema.gov/bike

OUTREACH AND EDUCATION FOR CHILDREN IN CAMBRIDGE PUBLIC SCHOOLS

As noted in Chapter 1, the Cambridge School Wellness Policy supports and promotes active transportation for the health and well-being of its students and staff

SAFE ROUTES TO SCHOOL

In spring 2015, Cambridge launched a formal Safe Routes to School (SRTS) program to support and encourage safe walking and biking to school.

As a first step, parents were surveyed to learn more about students' travel patterns and identify barriers to walking and biking to school. Two schools, Vassal Lane Upper School and Tobin Montessori School, began piloting outreach programs, including

twice-a-year walk/bike to school day celebrations, frequent walker/biker punch cards to earn raffle prizes, and in-school pedestrian and bicycle training.

As of 2017, SRTS program had expanded to all Cambridge elementary and upper schools, where all second- and sixth-grade students complete trainings in pedestrian and cycling safety. SRTS staff also engage with high school students at CRLS (Cambridge Rindge and Latin, the only public high school in Cambridge), including offering bicycle skill-learning opportunities and helping age-eligible students to access Bluebikes. In addition, there are school district-wide events to promote Safe Routes to School, including Massachusetts Walk and Bike to School Day and a number of kid-focused activities at Fresh Pond Day such as a bike rodeos, bicycle decorating, a kid's bike parade, and bike tune ups.

For more information, visit the City's [Safe Routes to School webpage](#).



SECOND GRADE PEDESTRIAN AND BICYCLE SAFETY

The SRTS program oversees a four-lesson Pedestrian and Bicycle Safety Unit for all second-grade students. The pedestrian lessons teach the importance of safe walking behaviors and the basic elements of pedestrian infrastructure. The bicycle safety lesson includes how to correctly fit a helmet, rules of the road, and basic bicycle maintenance. In 2020, a series of education videos were developed to serve as a resource for teachers and parents/ caregivers, so the training could still be held during times when students were not physically in school.



On-bike training class.

"The time I went SUPER fast down a huge hill! Let me tell you, it was kind of hard getting up to the top, but when you go down, you feel like you are flying! I remember when I went down a hill for the first time, it was one of the coolest feelings I have ever had! I like when you feel the wind blowing on your face. I LOVE biking!"

—6th grade Bike Joys

SIXTH GRADE ON-BICYCLE TRAINING

SRTS on-bike training is given to all sixth-grade students. While many young people initially learn how to ride a bicycle in parks and on sidewalks, this program is designed to help students transition to bicycling on roads, to enable them to bicycle in their neighborhoods, or while traveling to school, a park, or library. In order to navigate streets safely, students learn about effective riding techniques, rules of the road, riding on roads with or without bike lanes, avoiding being “doored,” intersection strategy, balancing at low speeds, dealing with potholes and other roadway obstructions, and basic bicycle repair and maintenance. Students utilize a city-owned bike fleet of child specific bicycles for off-road drills and an on-road group bike ride that visits local bicycle infrastructure and allows students to practice the skills they learned with the additional supervision of Cambridge Police Officers.



Students taking part in an on-bike class.

BIKE WEEK CONTEST

In 2020, due to restrictions around in-person trainings, Cambridge moved its sixth grade SRTS program online and created a series of short videos covering the curriculum. To give students an incentive to take part in the training virtually, Cambridge created a Bike Week contest: students who watched all the videos and completed corresponding assignments over the week would be entered into a drawing for a new bicycle. In total, 10 Cambridge students were awarded bicycles in the Bike Week contests.

BICYCLE RODEOS

Cambridge routinely organizes skills and informational clinics for youth as a fun and engaging way to introduce concepts around bicycle safety while providing the opportunity to practice skills necessary to become better and safer while biking. These bicycle rodeos cover helmet fit, bicycle handling, basic maintenance, and usually include an obstacle course designed to mimic the urban cycling streetscape.

During the COVID-19 pandemic, the City's after-school recreation program offered socially and physically distant bicycle rodeos during the 2020-2021 school year. Students in grades JK-8 participated in condensed versions of the usual in-school SRTS program, learning bicycle helmet fit, ABC bicycle safety checks, hand signaling, and basic bicycle handling skills, with an obstacle course and short rides on off-street bicycle facilities to practice.



Participants at a Bike Rodeo.

Bicycle Rodeos

COMING TO SPRING IN THE SUN

**Tuesdays, Wednesdays, & Thursdays
in May and June**

Where: Hoyt Field basketball courts, 1 Montague St

When: Wednesdays 2:30PM to 6PM May 5 - June 17, 2021

Who: Any students grades JK-8 participating in the Department of Human Service Program's (free) After-School Recreation Program

A bicycle rodeo is a fun clinic to practice riding skills, try your hand at maintenance, and learn about safety!

Bring your own bicycle or use one of our fleet bicycles (will fit students grades 4 to 8). Students in grades JK to 3 are welcome to participate on their own bicycles. **Helmets will be required in order to participate** (City of Cambridge will have a limited number of helmets to give out for keeping).

Participants, instructors, and caregivers will be required to follow physical and social distancing measures.



"I believe in public education. I invest a lot of my time and effort in the public schools of Cambridge, and respect anyone else with a good heart who invests in the betterment of their community, specifically Cambridge. To be involved in collaborative efforts with the Cambridge Community Development Department in organizing a Bike Week program to educate and ultimately give away free bicycles to the youth of Cambridge was inspiring. It made me realize that what we do directly affects people in a positive way; supporting healthy habits, education for healthy living, and a healthy respect among our community."

—Timothy Gill, Physical Education Teacher, Tobin Montessori School

LOCAL STREET AUDITS FOR STUDENTS

In 2019, students from Qualls, an after-school program geared for boys of color at Fletcher Maynard Academy (a K-5 school in Cambridge), performed a “street audit,” in the Port neighborhood. A street audit is an in-person exploration of an area to assess the condition of the public street environment—including sidewalks, intersections and bicycle parking infrastructure—and then make suggestions for improvement. During this audit, the twenty-four third-, fourth- and fifth-graders specifically identified concerns about the lack of covered and secure bicycle parking, both at their residences and near the schools, and the impact of snow in blocking bike racks and bike lanes.



Students in the Qualls Program



Shawn Miles with Fletcher Maynard Academy students



The Annual Rock 'N Ride event for high school

HIGH SCHOOL

The City hosts a number of events catering specifically to high school students. Rock 'N Ride is an annual celebration of spring and bicycling and is an outreach event introducing high school students to the Bluebikes bikeshare system. The festival involves lawn games, music from local youth bands, snacks from local vendors, giveaways, Bluebikes one-on-one intro sessions, as well as a group ride on Bluebikes around Cambridge.

Cambridge high school youth ages 16-19 are also eligible for very low-cost Bluebikes memberships (\$25/year for unlimited rides), sponsored by the City.

MSYEP MINI WORKSHOPS

Each year Cambridge hosts mini-workshops for Cambridge high school students during lunch and during the Mayor's Summer Youth Employment Program (MSYEP), where students are introduced to bicycle safety checks and maintenance, rules of the road, route planning, and proper bicycle locking technique. While many of the students may already have previously learned this material, mini workshops are excellent opportunities to reinforce information.

ADVISORY COMMITTEES AND INTERDEPARTMENTAL COORDINATION

CAMBRIDGE BICYCLE COMMITTEE

In 1991, the Cambridge Bicycle Committee was officially created as a permanent advisory committee appointed by the City Manager. It comprises people who live or work in Cambridge, representatives from Harvard and MIT, and staff from related departments: Community Development (CDD), Traffic, Parking, and Transportation (TP&T), Public Works (DPW), Public Health (DPH), and Police (CPD).

The purpose of the Committee is to work to improve conditions for bicycling in Cambridge, to promote bicycling as transportation for all members of the community, and to improve safety for people biking. The Committee reviews projects, provides advice and assistance to City departments, and advocates for improvements. Committee members also undertake projects on their own or in conjunction with City staff.

The Committee organizes free community rides throughout the year. There are traditionally rides in May held as part of Bike Week/Bike Month celebrations, which have themes that highlight and celebrate the riches of Cambridge. These have included overview of public art, history tours, famous people, architecture, and more. Police Department staff accompany the rides, which are specifically designed to encourage casual riders, and enable people who may not feel comfortable traveling on city streets to do so. In September an annual “BowTie” ride follows the Cambridge geographical layout. These rides, which typically draw 200 - 250 people, are created and led by members of the Committee, and supported by

community businesses. Additional special rides have included a Halloween Ride for children and winter rides to support people learning tips for riding in colder weather.



Cambridge Bicycle Committee Ride.

Information on all Cambridge Bike Committee rides can be found at: cambridgema.gov/bikerides.

COORDINATION AMONG CITY DEPARTMENTS AND WITH OTHER AGENCIES

Many bicycle-related issues and projects have overlapping jurisdictions within City departments. To coordinate the planning and implementation of transportation projects, Cambridge staff who deal with transportation issues meet monthly.

There are several standing interdepartmental committees who work together on projects and programs to support and encourage bicycling:

- + **Transportation-related committees and meetings (DPW, TP&T, CDD, Disabilities Commission): Regular coordinating meetings are held to review City projects with transportation elements. Subjects include but are not limited to major infrastructure projects, traffic calming projects and quick-build bicycle projects.**

- + **Development Project Coordination (CDD, DPW, TP&T).** Coordinate the review of development projects under review by City staff, including Planning Board Special Permit projects as well as others requiring multidepartment review.
- + **Healthy Children’s Task Force (Health; Schools, TP&T, CDD, Community Groups:** Promotes the health of children in Cambridge through identification of priority topics and resources and development of strategies for addressing issues. Supports youth physical activity, including walking and bicycling to school. The 5-2-1 Committee focuses particularly on promoting physical activity.
- + **Food and Fitness Policy Council (Health, CDD, Schools, Human Services, Community Organizations, Universities):** Promotes health through improving access for all residents to healthy foods and to physical activity.
- + **Vision Zero (TP&T, CDD, DPW, Human Services, Police, City Manager’s Office, Human Resources, Cambridge Public Schools, Information Technology):** Interdepartmental group to coordinate City efforts on implementing the Vision Zero Action Plan. A Vision Zero Citizen Committee also is in place.

- + **VISION ZERO AND THE EVOLVING ROLE OF THE CAMBRIDGE POLICE DEPARTMENT**
- + **Until recently, the role of the Cambridge Police Department was primarily focused on enforcement and education. The goal of enforcement and education was to increase compliance with existing laws with a corresponding reduction in frequency and severity of injuries. These efforts were often dictated by community concerns or in response to a serious crash. While well intentioned, these efforts did not always match up with high crash locations and did not always address the full range of community concerns. Two major shifts have influenced a refocusing of efforts. The adoption of Vision Zero (see also Chapter 1) means utilizing a more data-driven decision-making approach to identify high crash locations. The types of enforcement under Vision Zero are closely scrutinized to ensure they are addressing the identified concerns. The Police Department has incorporated Vision Zero training for all new officers, at veteran officer annual training, and for newly promoted supervisors. The second major shift concerns the evolving discussions about the overall role of policing in the community and thinking about the level of enforcement desired by the community.**



Speed trailers remind drivers about safe travel speeds gather information on traffic speed and volume.

One example of this shifting focus is enforcement of blocked bicycle lanes. In 2016, in recognition of the seriousness of this action, a new state law was passed that has given added options for addressing the issue and which has proved to be much more effective in keeping vehicles out of bicycle lanes. Another shift was to think about moving violations in terms of their value in reducing the frequency and severity of crashes. Enforcement that doesn’t support these goals is discouraged.

Another way to support Vision Zero is to ensure that investigations of serious bodily injury or fatal crashes receive a thorough investigation in collaboration with the District Attorney’s Office, the Massachusetts State Police, and other stakeholders as appropriate. Crash investigators for the Police Department have completed extensive training in

crash reconstruction and analysis. A new system that allows a detailed map of a crash scene to be generated via 360-degree laser measurement. This allows for a permanent and detailed record of the crash scene at the time of the crash as well as enabling roadways to be reopened sooner after an incident. The Police Department works as part of a team of City staff that meets as soon as possible after a serious crash occurs to analyze factors that may have contributed to the crash. The team also identifies short- and long-term changes that could improve safety.

Together, these changes provide a more nuanced approach to improving roadway safety and not just relying on enforcement to achieve our vision of a safer, more accessible, and more just experience for every roadway user.

The Police Department continues to be a partner in sponsored community rides, helmet and light giveaways, Safe Routes to School planning and neighborhood meetings.

HEALTH-RELATED INITIATIVES AND COORDINATION

CAMBRIDGE PUBLIC HEALTH DEPARTMENT

The Cambridge Public Health Department has a central role in encouraging bicycling as part of promoting active lifestyles and obesity prevention in policies, outreach efforts, and promotional activities and many of their activities are done in partnership with other departments.

COMMUNITY HEALTH IMPROVEMENT PLAN

The Community Health Improvement Plan (CHIP) is a comprehensive plan that sets the Public Health Department's health agenda for five-year periods. This interdepartmental, community organization, and resident-driven plan addresses some of the most challenging public health issues facing Cambridge. The plan describes actionable goals,

objectives, and strategies for making tangible progress in these health priority areas for the city:

- + Mental health and substance abuse
- + Violence
- + Healthy, safe, and affordable housing
- + Healthy eating and physical activity
- + Health access
- + Health equity/social justice

CAMBRIDGE IN MOTION

Cambridge in Motion (CIM) aims to create an environment that makes it easier for residents and people who work in the city to be physically active. CIM supports the City's Public Health, Community Development, and School Departments in expanding existing initiatives and piloting new ones. The program partners with community organizations and other City departments to promote healthy eating and physical activity through policy, systems, and environmental approaches. Funded by a federal Community Transformation Grant, it is part of the statewide Mass in Motion initiative.



Ride leaders at a Cambridge community bike ride.

OTHER PUBLIC AGENCIES

The City of Cambridge engages regularly with the Massachusetts Department of Transportation (MassDOT), the Massachusetts Bay Transportation Authority (MBTA), and the Massachusetts Department of Conservation and Recreation (DCR) to coordinate on transportation planning and safety initiatives, as well as roadway design projects. The MBTA operates the region's transit system and DCR owns and manages several important parkways and paths in Cambridge. The Cambridge Office for Tourism provides information on getting around Cambridge by bike for visitors.

CAMBRIDGE REDEVELOPMENT AUTHORITY

The Cambridge Redevelopment Authority (CRA), an independent public authority working in Cambridge, collaborates with the City to establish comprehensive streetscape designs to facilitate multi-modal infrastructure in Kendall Square. The CRA constructed the first portion of the Grand Junction multi-use path, staffs the Kendall Square Transit Enhancement Program (KSTEP), and conducts annual multi-modal traffic counts in Kendall Square. The CRA undertakes an annual transportation report page, available on their website.



The first portion of the Grand Junction multi-use path was constructed by the Cambridge Redevelopment Authority.

WORKING WITH COMMUNITY PARTNERS

Local organizations and institutions are important partners in supporting bicycling in Cambridge. This section describes some of these partners but is not an exhaustive list.

EDUCATIONAL INSTITUTIONS

HARVARD UNIVERSITY

Distributes outreach materials to incoming students; promotes bicycling extensively through the Commuter Choice Office; donated seven Bluebikes stations in Cambridge (and seven in Boston); invested in improved bicycle infrastructure in the public realm.



Harvard constructed the bicycle facilities along the Quincy-DeWolfe corridor, to help people travel to and from the Charles River to Harvard Square and Harvard Yard.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

Promotes bicycling through its transportation services and planning offices; provided four Bluebikes stations; constructed the country's first true cycle track on Vassar Street (2004).



Vassar Street with a fully grade-separated bicycle facility.

EF EDUCATION FIRST

Donated a large Bluebikes station; constructed expanded off-road paths in the North Point area; supports and helps to promote the expansion of the path system.



Connected paths were constructed in North Point as part of EF's campus expansion.

LESLEY UNIVERSITY

Promotes bicycling as transportation; has an internal bike share system; added a Bluebikes station in 2015.

PRIVATE SECTOR

TRANSPORTATION MANAGEMENT ASSOCIATIONS

Charles River TMA (CRTMA). Helps local businesses develop convenient programs, improve mobility and promote accessibility to the Kendall Square and East Cambridge area. Promotes bicycling with information and support. Runs the EZRide Shuttle, open to the public, between Kendall Square, Fort Washington, Lechmere, and North Station carrying nearly a half million passengers per year.

Alewife TMA. A partnership between businesses, developers, and residential buildings who join together to reduce traffic congestion and air pollution and improve transportation options in the Alewife area. Runs the Alewife TMA Shuttle, open to members.

CHAMBER OF COMMERCE, BUSINESS ASSOCIATIONS AND CAMBRIDGE LOCAL FIRST

These work to support vibrant livable cities and recognize that Cambridge is a city where people who bicycle and walk are likely to support local businesses. For references, the Economic Development division of CDD provides information about [Cambridge Commercial Districts](#).

LOCAL BICYCLE SHOPS/ENTERPRISES

There are five bicycle shops located in Cambridge (as of 2020): Broadway Bicycle, Cambridge

Bicycle, Cambridge Used Bicycles, CrimsonBikes and Quad Bikes. Bicycle Belle and Wheelworks Somerville are in Somerville just on the city borders. UrbanAdventours is a Boston-based company that rents bicycles and leads guided tours of Cambridge.

Park&Pedal is a network of parking stations in communities surrounding Cambridge located to be withing cycling distance of the city’s employment centers, allowing people to park a car in a designated spot, and pedal a bike to work, avoiding “last-mile” congestion and parking in the city.

INDIVIDUAL BUSINESSES/COMPANIES AND BLUEBIKES CHAMPIONS

Many companies choose to locate in Cambridge specifically for its livability and the desire of their employees for a community that supports active lifestyles. Several companies have voluntarily donated Bluebikes stations to support their employees (Biogen, BioMed Realty, EF Education First, CambridgeSide, Alexandria Real Estate, Verizon, and Google). In addition, as of 2020 there

are 340 companies, universities, and institutions system-wide – including almost 90 in Cambridge – who partner with Bluebikes through the Corporate Membership Program. That program offers discounted memberships to employees and students of participating organizations. This demonstrates the high support and interest for companies and organizations to provide this benefit to their employees.

The CambridgeSide Galleria partners with the City on the annual Run & Ride event to promote active health and fitness for children.

ADVOCACY AND COMMUNITY ORGANIZATIONS⁴

BICYCLE BENEFITS

Promotes the partnership of bicycling and businesses; a Bicycle Benefits sticker will provide discounts to member businesses. Free stickers for Bluebikes members.

BOSTON CYCLISTS UNION

Advocacy organization to promote bicycling as a normal way to get around for people of all walks of life. Works primarily in Boston but also in neighboring communities, including Cambridge and Somerville.

CAMBRIDGE BIKE GIVE BACK

Community organization started during the COVID-19 pandemic in response to needs the founders saw in the community for affordable and safe transportation. “We build community resiliency through recycling, restoring abandoned / broken bikes and reducing the unsightly waste in our city. The goals of this project are to alleviate transportation insecurity, build community, and create local self-sufficiency in transit as well as health and wellness.”



Hey kids! Save the Date!

Do you love to ride your bike and run? Compete in the **sixth annual, kids only FREE duathlon** with biking and running in and around CambridgeSide! For kids ages 5-13 years old, with prizes, race T-shirts, giveaways, entertainment and more. Registration opens in June.

iPad awarded for each race winner!

Sunday, July 26, 2015

8:30am Registration • 10am Event Begins
CambridgeSide - Canal Park
100 CambridgeSide Place, Cambridge, MA

FREE family fun!



www.shopcambridgeside.com

*iPad awarded to first place winner for both boy and girl category in each age bracket. Eight will be awarded.



CambridgeSide Galleria Event Poster

CAMBRIDGE BIKE SAFETY

Advocacy organization that identifies as “a group of Cambridge residents interested in promoting safety for cyclists of all ages and abilities in Cambridge, Massachusetts.”

CYCLEKIDS

Dedicated to teaching children to ride, the CYCLE Kids program teaches children in schools..

GREEN STREETS INITIATIVE

A Cambridge-based organization “Dedicated to celebrating and promoting the use of sustainable and active transportation.”

LIVABLESTREETS ALLIANCE

Advocacy organization to promote livable communities that rely on sustainable transportation.

MASSBIKE

The statewide bicycle advocacy organization; partners with the City to lead bicycle workshops; advocates on a state-wide level for legislation to support bicycling.

SOUL ON WHEELS

Cambridge native James Adius Pierre organizes bike rides for Black men and other men of color. Some rides have topical and serious meaning, such as a 2020 “Celebration of Life” bike ride inspired by the summer’s unrest and the March on Washington anniversary; others are more social, such as a 2019 ride with a focus on fashion.



Soul on Wheels Ride

CITY OF CAMBRIDGE EMPLOYEES

ENGAGEMENT OF CITY STAFF

Cambridge encourages biking as an option for City staff through training opportunities and other bicycle benefits.

BIKE EDUCATION WORKSHOPS

City employees are invited to attend all community bike workshops. Additionally, staff-only workshops are scheduled and offered as official professional development trainings for City employees.

TRANSPORTATION WORKSHOPS

The City hosts departmental trainings for City staff on the transportation benefits offered to City employees. These workshops focus on all sustainable modes of transportation and teach employees the rules of the road when on bike, on foot, or in a car.

BICYCLE TUNE-UPS

The City offers free bicycle tune-ups for City employees every spring and summer. Dozens of City staff take advantage of these workshops each year.

BLUEBIKES MEMBERSHIP

The City offers its employees free or discounted Bluebikes membership. A priority of the Bluebikes system is to have stations near municipal buildings (including schools), so City staff often have the option to commute to work, travel between city buildings, or conduct work-related site visits using Bluebikes.

CITY BICYCLES

Some City departments use bicycles as fleet vehicles.

- + **Police.** The Police Department's Community Relations unit patrols by bike. It has led bicycle education programs in the Cambridge schools and at special events, engaged in targeted enforcement activities with people in Cambridge, and worked on preventing bicycle theft. Members of the Department accompany community bike rides, like those held by the Cambridge Bicycle Committee, and support student on-bike learning at bicycle rodeos and SRTS trainings.
- + **Fire Department.** The Fire Department uses bicycles for EMT responders; members of the department frequently accompany the Cambridge Bicycle Committee community rides to provide support.
- + **DPW Operations.** Bicycles are used for some recycling pickup and for street tree watering.



DPW staff watering trees using bicycles and bike

REGULATIONS THAT SUPPORT BICYCLING

CAMBRIDGE ZONING ORDINANCE

The policies imbued in the Cambridge Zoning Ordinance are focused on creating a sustainable, human-scale environment. In particular, Article 19 of the Zoning Ordinance has specific requirements intended to ensure that new developments create a pedestrian and bicycle-friendly environment. Article 6 of the ordinance also has detailed requirements related to bicycle parking, specifically the number and placement of parking spaces. See Chapter 7 and Appendix I for further details on bicycle parking.

ARTICLE 19

Article 19 of the Cambridge Zoning Ordinance is a special permit process for large projects that requires a rigorous analysis of transportation impacts, including bicycle and pedestrian circulation. Its goal is to “encourage applicants to adopt a development program that reduces the number of single occupancy vehicles coming to the site. Such a program would encourage pedestrian and bicycle access to the site and throughout the neighboring district and reduce potential negative impacts on abutting properties of the vehicles coming to the site.”

Part of the requirements are for new development projects to undertake a Traffic Impact Study, including bicycle and pedestrian counts, an evaluation of the access and connectivity that people have when traveling by bicycle and foot to the development site, and an analysis of the impacts of new traffic generated by the development on the safety of people walking and cycling. Developers are often required to undertake mitigation measures such as adding bicycle facilities on roads adjacent to the project.



Short-term racks located near building entrances ensure convenient and easy access for people bicycling

PARKING AND TRANSPORTATION DEMAND MANAGEMENT ORDINANCE

The PTDM Ordinance requires property owners to provide transportation programs to ensure that people traveling to those sites primarily use sustainable transportation. Examples of required programs include showers and locker rooms, bicycle fixit stations, financial incentives for people walking or bicycling, and flexible parking arrangements options for people who usually arrive by sustainable mode but occasionally need to drive a car.

The PTDM Ordinance is a national model for improving mobility and access, reducing congestion and air pollution, and increasing safety by promoting walking, bicycling, and public transit. Evaluation of the program shows that many companies give commute benefits voluntarily because employees have come to expect them, such as on-site bike repair service, loaner bikes, and bike-buddy matching.

The PTDM Ordinance in 2019 covered 48,000 employees (33% of total Cambridge employees), and only 36% of people in monitored properties drove alone to work. The success of the PTDM Ordinance can be seen in its ability to limit traffic. In the Kendall Square area alone, where more than 6 million square feet of development occurred over a decade, traffic on area streets did not increase. Much of this new development is in the high tech and biotech/R&D field, where attracting employees is competitive and many of those workers want to be able to bike to work. For more information about the program, visit [the PTDM website](#).

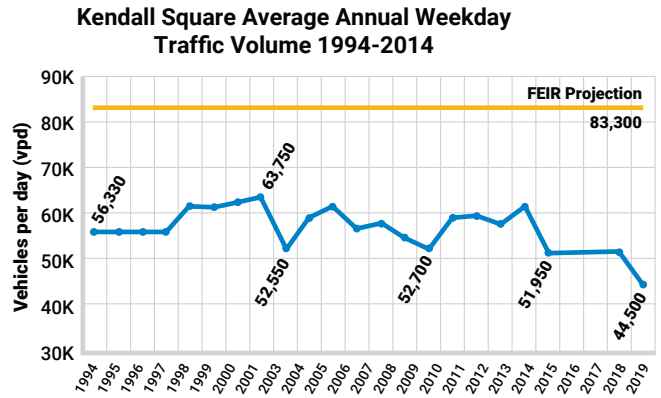


Figure 6.1: Average weekday traffic volumes for Kendall Square measured between 1994 - 2019. Data suggests that motor vehicle traffic remains significantly below initial projections.

ENDNOTES

- 1 The Governor's Highway Safety Bureau in Massachusetts is responsible for changes to the driver's education manual and tests.
- 2 The Community Engagement Team is a multi-agency collaboration housed in the Department of Human Services that reaches out to underserved Cambridge families and connects them to community events and resources, develops community leaders, and supports agencies in working with a diverse community. The Community Engagement Team hires and trains community members (American Born Black, Bangladeshi, Brazilian, Ethiopian, Haitian, Somali and Spanish and Portuguese speaking) as outreach workers to reach out to and engage underserved families in their native communities. <http://www2.cambridge.ma.gov/dhsp2/cet.cfm>.
- 3 This engagement, funded by the Massachusetts Councils on Aging, was a partnership between the Fresh Pond Apartments (low-income housing), the Agassiz Baldwin Community Center, the Council on Aging, MassBike, the Volunteer Health Advisors, the Community Development Department, and the Cambridge Public Health Department.
- 4 The advocacy and grassroots community organizations here are those whose primary focus is at least partly on promoting and supporting people bicycling; there are other groups who may also get involved in related events. There are also new groups that arise on a regular basis, so these are those known as of the date of publication.



DPW uses bicycles for a variety of tasks; recycling bin operations are shown here.

CHAPTER 7

BICYCLE PARKING AND PUBLIC BICYCLE REPAIR FACILITIES

OVERVIEW

Bicycle parking facilities are a fundamental element of bicycle transportation infrastructure. People are more likely to use a bicycle if they are confident that they will find convenient and secure parking at their destination.

Providing a designated area for bicycle parking gives a more orderly appearance to a building and prevents people from locking their bicycles to unacceptable fixtures, such as trees, benches, or railings, which may interfere with walkway accessibility. However, if a bicycle rack appears insecure, does not fit bicycles well, or is in an inconvenient location, people will not use it.

Another element that supports bicycling is the public repair stand, which provides tools for basic maintenance. Since many people do not carry tools with them, an unexpected malfunction could leave them stranded. When people have the ability to make on-the-spot fixes or fill up a flat tire, it instills confidence that they will be able to continue to ride even when something unexpected happens.



In the past 20 years the changes that have occurred around biking are nothing short of amazing. Of course, there is safety inherent in simply having more bicyclists on the streets... However, combined with all of the signage/pavement markings and safety outreach programs, bicycling has become such a wonderful way to move about and have fun at the same time! I've been encouraging friends who seem fearful to give it a try!

– Chas Studen, Cambridgeport



PUBLIC BICYCLE PARKING

RACKS

Cambridge has established standards for bicycle racks for city sidewalks and other public property (parks, schools, etc.). These standards are based on ease of use, size, flexibility of placement, design quality, and cost. The most common model is the “post and ring,” but the “swerve” and “u-rack” models are also used as more whimsical and artistic designs that also meet the standards (see Figure 7.1 - Figure 7.6 for examples of rack types). Most racks are set individually, but occasionally “rail” systems are used where more permanent installations are not feasible (Figure 7.4).

Through the bicycle parking program, public bicycle parking for approximately 3,000 bicycles has been installed throughout the city to date, including at every public building, with high concentrations in business districts. A map of bike parking locations in Cambridge is available [online](#). Individuals or businesses can also request a bicycle rack installation on public property by visiting the [Bicycle Parking Program webpage](#).



Figure 7.1: Curb extensions are sometimes built in order to provide space for added bicycle parking, and the “post and ring” model has a compact footprint.



Figure 7.2: Bike rack designs need to accommodate the diversity of bike shapes and sizes, including cargo bikes and adaptive bikes.



Figure 7.3: Weather-protected bicycle parking is desirable where bikes are parked for long periods.



Figure 7.4: The “Swerve” rack on a rail system enables racks to be located where it is not feasible to drill into pavement.

ON-STREET BICYCLE CORRALS

Sidewalk space in Cambridge is often limited by competing uses, including space for pedestrians and outdoor seating, especially in dense urban areas. To make room for bicycle parking in these areas, the City seasonally installs temporary bicycle parking stalls in some on-street parking spaces. Each stall fits in one vehicle parking spot and provides parking for 7-14 bicycles. Stalls are put into storage for the winter months to allow for unhampered snow plowing operations.

REGULATIONS

The City has regulations regarding where people are permitted to park their bicycles on the public way. For these purposes, the public way primarily means city sidewalks, but also includes public plazas and parks. The principal intent of these regulations is tri-fold:

1. Provide short-term parking for bicyclists in commercial districts
2. Ensure that bicycles are parked in a safe and secure manner
3. Reserve bicycle racks for bicyclists only and not for motorized vehicles such as scooters and motorcycles.

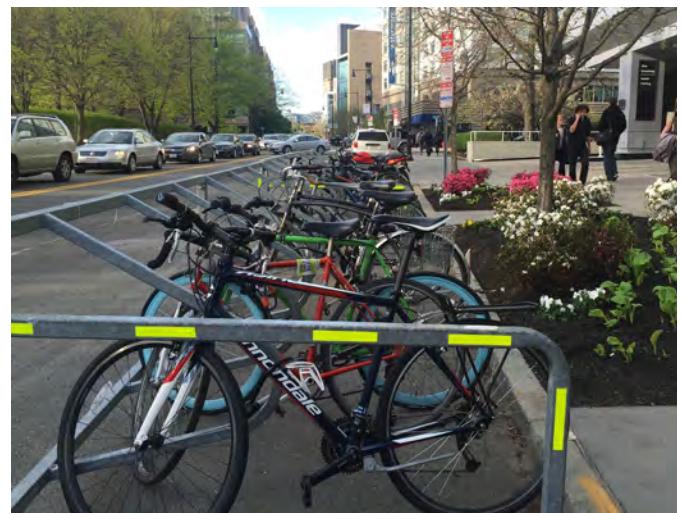


Figure 7.5: On-street bike corral.



Figure 7.6: “Post and ring” style bicycle parking provided in front of EF Education First Building adjacent to North Point Park.

One of the important ways of maintaining bicycle parking is to remove bicycles locked to racks that have been abandoned. A 72-hour maximum time frame for bicycle parking was instituted for bicycle spaces in designated commercial and retail districts, as these are not intended for long-term storage. This is to ensure that those coming to the districts by bicycle are able to find parking quickly and easily.

The regulations also address the fact that parking a bicycle to some fixtures is not acceptable: trees can be damaged, benches rendered unusable, or hand railings be unavailable to those who need them for accessibility reasons. Bicycles may not be attached to handicap placard sign posts. Finally, the regulations prohibit motorized vehicles from being parked at the bicycle racks, including motorcycles and motorized scooters.

For complete regulations, please visit the [Bicycle Parking Program](#) webpage.

Members of the public can report abandoned bicycles or broken bicycle parking racks using **Commonwealth Connect** (powered by SeeClickFix).

<http://commowealthconnect.io>



PRIVATE BICYCLE PARKING

ZONING REGULATIONS FOR BICYCLE PARKING

The City of Cambridge, through its Zoning Ordinance, has required bicycle parking as part of new development since 1981. The early adoption of bicycle parking benefitted Cambridge's ability to support increased bicycling over time. These requirements, along with other improvements and investments made by the City, have helped to support bicycling as a preferred transportation option in Cambridge. With the dramatic increase in bicycling in Cambridge over the past decade, demand for bicycle parking has grown significantly.

In June 2013, the requirements for bicycle parking in new development underwent a major revision. The zoning codified the appropriate standards for bicycle parking design, layout and location and established required quantities of bicycle parking to meet the needs and goals for Cambridge.

By requiring appropriate types and quantities of bicycle parking, the City is able to more effectively, systematically and efficiently manage the needs of the bicycling population, as well as to support the goal of increasing and promoting sustainable transportation use.

For more information about, please visit the [Bicycle Parking Zoning](#) webpage.



Indoor bike parking room.

BICYCLE PARKING GUIDE

The **Cambridge Bicycle Parking Guide**⁵, released in 2013 to complement the revised zoning regulations, is a resource for developers to ensure compliance with zoning regulations. The guide showcases the City's preferences for types of bicycle racks, spacing between racks, and siting of racks. This is also helpful for property owners who are interested in upgrading existing bicycle parking facilities or supplying additional bicycle parking.

For new buildings and significant renovations, zoning requires that these design standards be met, but they should be followed for any new bicycle parking, as they will provide the most useful and effective bicycle parking and will be accessible and visible to people of all ages and abilities.

Full details on bicycle parking layout and zoning requirements are available [online](#) and in Appendix I.



City of Cambridge Bicycle Parking Guide



Long-term bicycle parking at an MIT Dormitory.

BICYCLE RACK DESIGN STANDARDS

There are a variety of designs for bicycle racks produced by many manufacturers. Bicycle racks can be purchased as single units, with a capacity of locking 2 bicycles (one on each side), or as multiple units attached together, with a larger capacity. However, not all manufactured bicycle racks meet Cambridge's standards.

Features of an acceptable bicycle rack:

- + Installed on a permanent foundation (e.g., concrete pad) to ensure stability.
- + Securely anchored into or on the foundation with tamper-proof nuts if surface mounted.
- + Support for an upright bicycle by its frame horizontally in two (2) or more places.
- + Keeps both bicycle wheels on the ground.
- + Design that prevents the bicycle from tipping over.
- + Ability to support a variety of bicycle sizes and frame shapes.
- + Space to secure the frame and one or both wheels to the rack with a cable, chain, or u-lock.
- + Diameter of locking pole is no more than 1.5 inches.
- + Galvanized or stainless steel racks are recommended (and required for racks on public property) because they hold up best.

Acceptable racks, like the "Inverted U," "Swerve," and "Post and Ring" racks, have two-point support and fit a variety of bicycle types. Custom designs and "artistic" racks can also be used, provided they meet the performance criteria for bicycle racks.



Whimsical racks welcome students at Cambridge Schools.

PUBLIC BICYCLE REPAIR STANDS

To support people bicycling, the City has installed public bicycle repair stands around Cambridge. These stands have tools to help fix minor maintenance issues, such as adding air to a tire, tightening a loose chain, or adjusting your handlebars.

There are thirteen stands currently in the city, eight of which were funded through the City's 2015-2016 Participatory Budgeting Process. A [map of all public repair stands](#) helps people easily locate stands and any issues with the stands can be reported via the City's [SeeClickFix portal](#). In addition, the universities in the city and several private entities have these facilities available.

For more information, please visit the [Getting Around Cambridge By Bike](#) webpage.



Public bike repair stand in use.



Example of a public repair stand and bike parking located in Kendall Square.

CHAPTER 8

PUBLIC TRANSPORTATION AND PUBLIC BIKE SHARE

MULTI-MODAL TRIPS: PUBLIC TRANSPORTATION

Most transit trips – bus and rail – in Cambridge begin or end with a walk or bike ride. Improving links between biking and transit benefits people who use both modes and progresses the City’s transportation and sustainability goals in a number of ways:

- + **Bicycling increases the distance people can travel to transit stations, so better bicycle connections expand the number of people who have access to and from transit—a solution to the so-called “first and last mile problems.”**
- + **Bicycle-on-transit services give people who bike the option to take transit for part of their trip to avoid riding after dark or in areas that are not comfortable to bike. Being able to take a bike on transit can also serve as a contingency plan in the event of poor weather, mechanical issues, or needing to get home quickly in an emergency.**
- + **Integrating bicycling and transit supports the goals of increasing sustainable transportation options, decreasing single-occupancy vehicle use, and reducing negative impacts of climate change emissions, air pollution, and congestion.**

These benefits help communities support sustainable travel and make transportation systems work more efficiently. As a result, bicycle and transit integration has become increasingly common. Transit agencies can support integration in a number of ways, including having bicycle racks on buses, allowing bicycles on trains and boats, installing secure bicycle racks and lockers at transit stations, and providing space for bike share (Bluebikes) stations and valet services (bike share valet services are provided during peak travel periods, to ensure that people can drop off or pick up a bike at key destinations).

The Massachusetts Bay Transportation Authority (MBTA) is the transit agency serving Cambridge and Greater Boston, operating five rapid-transit lines, commuter rail, commuter ferry, and many bus routes throughout the region.

The City also works to improve bicycle and transit integration, such as improving roads for biking, providing additional bike parking on public property near transit stations, and siting bike share stations in close proximity to transit stations.



Bikes loaded onto MBTA buses.¹



Bike CharlieCards allow users to access Pedal & Park stations.

BICYCLES ON THE MBTA

The MBTA provides some form of bike transport on most of its vehicles:

- + **Folding bikes are allowed on all transit vehicles when folded.**
- + **Almost all MBTA buses have racks to carry two or three bicycles on the front of the bus.**
- + **Bikes are allowed on the Red, Orange, and Blue Lines, except during peak commuting hours. Bikes are not allowed on the platforms of the Park Street, Government Center, and Downtown Crossing stations.**
- + **Bikes are allowed on the Commuter Rail most of the time, except when noted on the schedule. The Newburyport/Rockport and Cape Flyer lines have bike storage cars on certain trains during the summer.**
- + **Bikes are allowed on commuter ferries at all times.**

For full rules and tips for bringing bikes on the MBTA, visit <https://www.mbta.com/bikes>.

PARKING AT TRANSIT STATIONS

In Cambridge, outdoor bicycle racks are located at all MBTA subway stations. At select high-traffic stations the MBTA provides “Pedal and Park” facilities, which are secure, enclosed parking areas for 50-150 bikes. The Pedal and Park facilities are monitored by surveillance cameras and have controlled door access. In Cambridge, Alewife Station at the end of the Red Line has three Pedal and Park facilities, each accommodating up to 150 bikes. As part of the construction of the Green Line Extension to Somerville and Medford, the future Lechmere Station on the Green Line will also have a Pedal and Park facility.

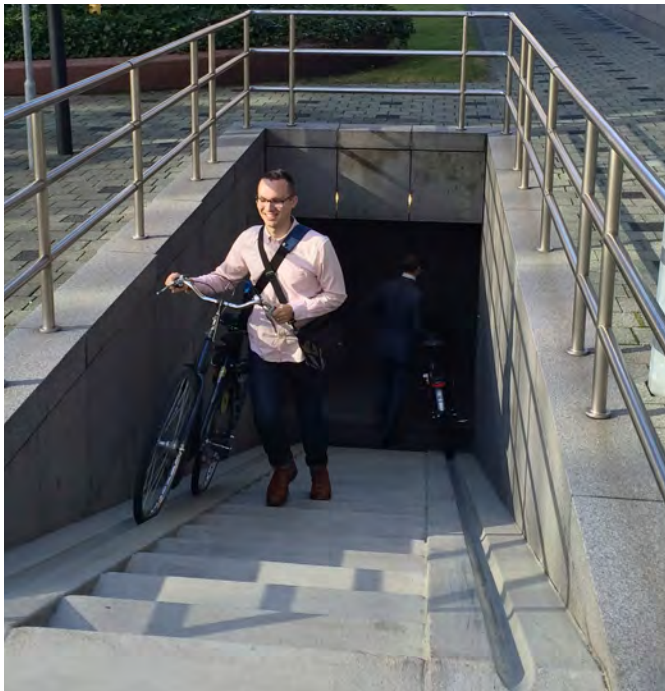
CharlieCard holders can use the Pedal and Park facilities for free by registering their CharlieCard online at <https://www.mbta.com/bikes>. The CharlieCard is the reusable fare card for MBTA buses and subways, and they are available at select subway and bus stations. In Cambridge, CharlieCards are available at the Alewife and Harvard Stations. For more information about CharlieCards and where to get one, visit <https://www.mbta.com/fares/charliecard>.



Pedal & Park at Alewife MBTA Station

IMPROVING BIKE ACCESS TO TRANSIT

As the MBTA makes changes and improvements to their public transit vehicles and facilities, the City of Cambridge will continue to pursue opportunities to make the system friendlier to people with bicycles. Future infrastructure improvements could include better bike storage on vehicles, low-floor buses, more widespread elevator access, and stair channels, which are grooves along the edge of a stairway for rolling bikes up and down stairs. Policy changes, such as expanding the hours when bikes can be brought on transit, can complement infrastructure improvements and further enhance bike access.



Stair channels allow people to easily roll their bicycles up and down stairs.

BIKE SHARE

Bike share is a public transportation system for bikes and enables people to borrow a bike for the length of time that they need it. Nationwide, most bike share systems are station-based, with stations located throughout the service region. People can borrow a bike from one station and return to it any station in the system. There are several options for using bike share: typically, memberships may be annual or monthly and those riding infrequently or using a system as a visitor or tourist may be able to buy a single ride or a time-limited multi-ride pass.

Bike share is great for different kinds of transportation needs, including commutes and point-to-point trips, one-way bike trips, and exploration for locals and visitors. One of the many advantages of bike share compared to transit systems is the relative ease and flexibility of placing new stations in areas of high demand, as well as near transit stations. This flexibility makes bike share an effective way to connect people to a bus or train for longer trips.



Bluebikes stations are located near key destinations such as parks and in convenient places for people to access from their homes.

Another advantage of bike share is that it eliminates many of the barriers associated with bike ownership, making biking more accessible and encouraging new riders. Below are some of the benefits of bike share.

- + **Low-cost option for those who don't own a bike or can't afford a bike.**
- + **Eliminates the need for bike maintenance and repair.**
- + **Eliminates the need for bike storage.**
- + **No worrying about bike theft or damage.**
- + **Bikes come equipped with safety and comfort features, like lights, bells, baskets, and fenders.**
- + **More return-trip flexibility in the event of bad weather or change of plans.**
- + **Convenient and flexible way to explore and make spontaneous trips.**

At my house, there's no storage. Well there's storage for bikes, but it's outside. So, the Bluebikes is super convenient for us...

– Cambridge Bicycle Conversations Participant

The value of bike share systems is evidenced by their growing popularity. In 2019, approximately 50 million bike share trips were taken in the United States, up from 22 million in 2015 and 321,000 in 2010.²



BLUEBIKES: GREATER BOSTON'S BIKE SHARE

Bluebikes is the regional bike share system for Greater Boston, providing service in 11 municipalities and approximately 400 stations. Established in 2011 as Hubway, the original system had stations throughout Boston, Cambridge, Somerville, and Brookline. The system was renamed Bluebikes in 2018 when Blue Cross Blue Shield (BCBS) of Massachusetts became the title sponsor, supporting system growth and accessibility, including system upgrades and marketing. Since then, the system has continued to grow the number of stations in the original four municipalities and expanded to Everett, Arlington, Chelsea, Revere, Newton, and Watertown. In the summer of 2021, Bluebikes will launch in Salem, and there are additional municipalities in negotiation. Bluebikes is owned by the municipalities it operates within, and they contract with an operator to manage operations. The system is fully integrated amongst the participating municipalities, so users can borrow and return bikes across municipal boundaries.

In addition to sponsorship from BCBS of MA, funding for Bluebikes is provided through a combination of municipal funds, developer mitigation, and private sponsorships and donations (the initial launch of the system in 2011-2012 also included federal and state grants). In Cambridge, a number of organizations have donated stations, including Harvard University, Massachusetts Institute of Technology (MIT), CambridgeSide, Museum of Science/Barr Foundation, BioMed Realty, Biogen, Verizon, EF/Education First, and Alexandria Real Estate, and many other stations have been added as part of development projects.

As a senior citizen and Cambridge resident, I am a daily user of the Bluebikes...I rely on the bikes for my activities of daily living: errands, shopping, medical appointments, and frequent visits with my 91-year-old mother who lives 3 miles from my Central Square apartment. I get plenty of exercise this way...I love the feeling when my leg muscles reach that threshold of being in "bike shape" and I am able to manage hills and inclines without getting winded...I am grateful for the program, as owning a bike would be problematic for me in terms of storage issues and bike maintenance costs, which I can't afford, together with my lack of mechanical aptitude...I love that the program keeps my stats, and I was pleased to learn that I have made 545 trips, traveled a total distance of more than 1,500 miles, and saved 66 gallons of gas and 1,290 lbs. of CO2 emissions.

– Paul, Healthy Aging and Cycling program participant



MEMBERSHIPS AND PASSES

Bluebikes offers membership and pay-per-use options. Members pay an annual or monthly fee (\$109/year or \$25/month) for unlimited shorter rides (up to 45 minutes), with increasing charges for longer rides. Pay-per-use riders have two options: 1) Single Trip (\$2.95) or 2) Adventure Pass (\$10). A Single Trip is designed for people who need to make one short point-to-point trip, while the Adventure Pass allows users to take longer rides within a 24-hour period, ideal for those exploring the area or taking a recreational ride.

Bluebikes have made getting around Cambridge by bike fun and easy. I used them to commute to work for three years before buying my own bike. I hop on them for quick lunch trips to restaurants a bit too far to walk to. I use them to cross the MIT campus for meetings. I love the bike [valet] that exists to handle all the overflow bikes during the morning commute. I cannot wait to see the Cambridge Bicycle Plan be enacted and have even more bikes on the roads.

– Tim Russell, North Cambridge Resident and parent whose use of Bluebikes has changed over time



DISCOUNT PROGRAMS

On top of improving access to biking with new stations and service expansions, Bluebikes has become more accessible with the establishment of discounted membership programs. Through the systemwide Income-Eligible program, discounted memberships (\$50/year or \$5/month) are available for individuals aged 16+ who participate in qualifying public assistance programs or who meet income guidelines. Trends from winter 2020-2021 suggest that income-eligible members represent a greater percentage of riders on bad weather days, highlighting that Bluebikes is an important resource for making necessary trips.

Additionally, many companies, universities, and institutions partner with Bluebikes through the Group/Corporate Membership Program to offer discounted memberships to their employees and students. There are 340 Group/Corporate Members in the system (as of 2020), demonstrating the high support and interest for companies and organizations to provide this benefit to their employees.

Cambridge is also exclusively supporting a Youth Discount program for high school students. Through the program, high school students ages 16-19 are eligible for an annual Bluebikes membership for just \$25. This program was the outcome of a project undertaken as part of the EF Glocal Challenge, an annual contest facilitated by Education First, Cambridge Public Schools, and the City of Cambridge, in which teams of Cambridge high school students design solutions to environmental challenges.



Cambridge's Bluebikes Youth Pass is available to Cambridge high school students ages 16-19.



Bike valets ensure that bikes can be picked up or dropped off at busy stations.

GROWTH OF BLUEBIKES

Bluebikes has experienced significant growth in Cambridge and systemwide since its launch, both in ridership and number of stations. The system had more than 2.5 million rides in 2019 alone, compared to just over 500,000 in its first full year of operation in 2012. Launching with 61 stations in four municipalities in 2011, Bluebikes ended 2020 with 378 stations in 10 municipalities. In Cambridge, the number of stations has more than tripled since 2012 and at the end of 2020 the City owned about 21% of the entire system’s bike station docks. The Cambridge stations are also among the most utilized in the system, accounting for 35% of all trips.

Much of the system’s growth followed the 2018 sponsorship of BCBS of MA and the expansion of participating municipalities. From 2017 to 2019 total annual ridership jumped by over 1 million and between 2018 and 2020 the total number of stations approximately doubled. Bluebikes’ 42% growth in ridership in 2019 was the largest of the major US bike share systems, and the system’s 34% growth in 2018 was the second largest that year. Bluebikes also had the second highest bike utilization of the major bike share systems in 2019 with 3.3 rides per bike per day (behind only New York City). For several weeks in 2019, Bluebikes’ total ridership even surpassed Washington D.C.’s Capital Bikeshare system, despite Bluebikes having fewer stations and bikes. By the end of 2020, Bluebikes surpassed 12 million lifetime trips and had 378 stations. The system is poised to top 400 stations by summer, 2021.

Figure 8.1: Top 10 Most Popular Bluebikes Stations, 2018 - 2020 (Cambridge Stations in bold)

| Station Name | Station Visits 2018 - 2020 |
|--|-------------------------------|
| MIT at Mass Ave / Amherst St | 278,418 |
| Central Square at Mass Ave / Essex St | 246,444 |
| MIT Stata Center as Vassar St / Main St | 214,956 |
| Nashua Street at Red Auerbach Way | 190,112 |
| Ames St at Main St | 181,712 |
| South Station - 700 Atlantic Ave | 181,424 |
| MIT Pacific St at Purrington St | 168,639 |
| Harvard Square at Mass Ave / Dunster | 167,708 |
| Kendall T | 156,103 |
| Charles Circle - Charles St at Cambridge St | 148,524 |



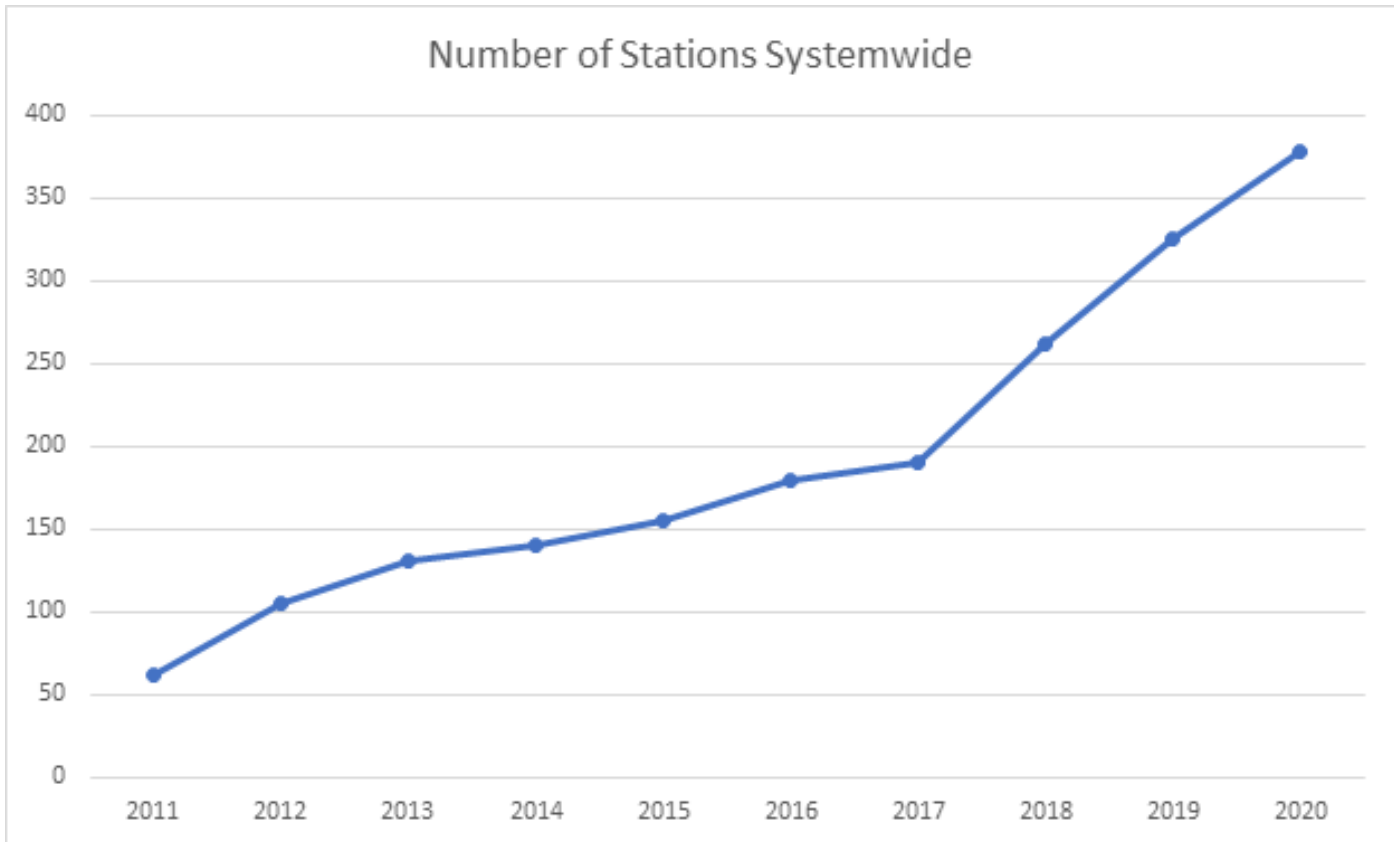
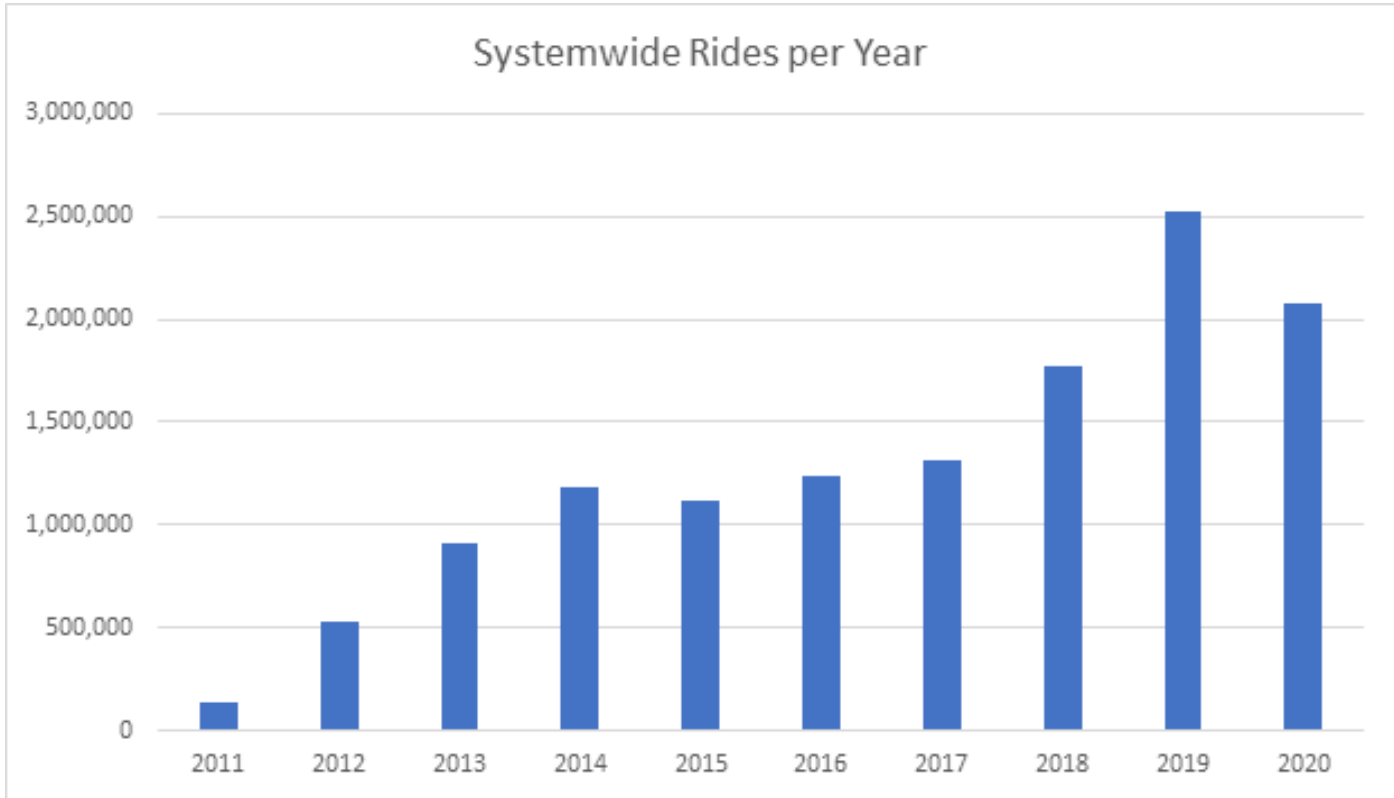
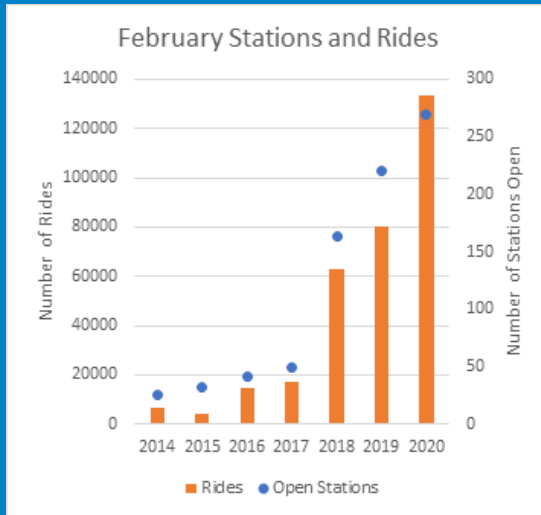


Figure 8.2: The Bluebikes system and ridership has continually grown since 2011. A significant expansion occurred in 2018, which correlated with a significant increase in Bluebikes use. From 2017 to 2019 total annual ridership jumped by over 1 million and between 2018 and 2020 the total number of stations approximately doubled.

Bluebikes in Winter

In 2013-2014, Bluebikes (then Hubway) first piloted winter operations with 26 stations in Cambridge.³ Since then, the number of stations operating through the winter has grown each year, reaching 270 in 2020, and winter ridership has skyrocketed. Between 2014 and 2020 February ridership grew nearly 2000%!



BIKESHARE IS ESSENTIAL TRANSPORTATION

Due to the COVID-19 pandemic, Bluebikes experienced an overall dip in ridership from 2019 to 2020 but still recorded its second highest yearly ridership numbers. Bluebikes provided continuous service throughout 2020 and took additional measures to ensure that people had access to safe, reliable transportation. During the summer of 2020, free memberships were offered to healthcare workers, and over 1,000 healthcare workers from 15 participating hospitals took more than 20,000 trips. Bluebikes' participating municipalities also sponsored free 90-day memberships for essential workers in the grocery, pharmacy, retail, and restaurant industries, which helped over 300 workers take more than 6,000 trips in 2020. Bluebikes, like bike share systems across the country, was an important transportation alternative for essential workers and others who were less comfortable using public transit or had their transit options reduced during the pandemic.⁴

Despite challenges, Bluebikes hit several records and milestones in 2020. The number of casual rides (pay-per-use) continued to grow, hitting an annual record at nearly 571,000 and showcasing that bike share served as a way for people to be active outdoors during the pandemic. September 14, 2020 set an all-time daily ridership record with 14,403 rides and November 7, 2020 had the highest ridership of any November day in system history with 12,220 rides. In April 2021, system ridership exploded again, with one day coming close to the all-time record. The Income-Eligible program also had its highest use year with 900 members.

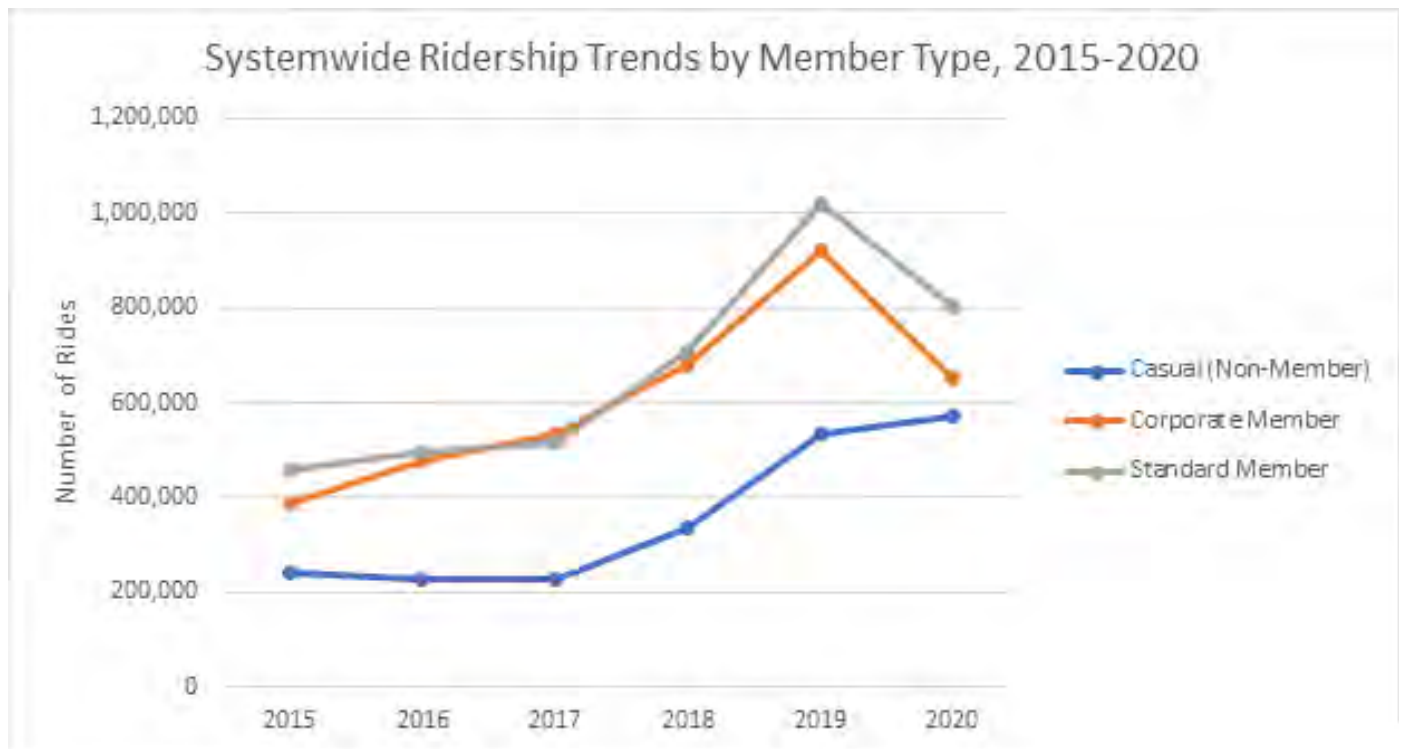


Figure 8.3: While rides from standard and corporate members dipped in 2020, the number of casual rides continued to increase.

Special Events & Initiatives

Over the past few years, Bluebikes has run a number of special events and promotions to encourage biking and provide greater access to its system. On Election Day, November 3, 2020, Blue Cross Blue Shield of Massachusetts sponsored Bike to Vote, providing free 24-hour passes for all riders to have an easy and socially distanced option for getting to the polls. Nearly 250 people took advantage of the free passes, the second highest number among Bike to Vote campaigns across the US. (New York City had 700, but has a system about 10 times larger.)

In celebration of Pride Month (June), 100 Bluebikes were wrapped with the signature rainbow colors, courtesy of title sponsor BCBS. In addition, for every ride taken on a rainbow-wrapped “Proud” bike during the month, Blue Cross donated \$1 to Fenway Health, a Boston-based organization that enhances the wellbeing of the lesbian, gay, bisexual and transgender community and beyond through access to the highest quality health care, education, research and advocacy.

In April 2019 Bluebikes hosted a Rock ‘N Ride youth-led celebration at Joan Lorentz Park in Cambridge, a free public event geared toward high school students during April vacation and the Cambridge Science Festival. The event featured a Bluebikes group ride and test rides, as well as youth-led bands, giveaways, and games.

Other special events and initiatives have included a group ride for Women’s Bike Month, valet services for the Boston Pride Parade, and systemwide free and discounted ride days to celebrate National Bike Month, during MBTA construction closures, and on Small Business Saturday.



THE FUTURE OF BLUEBIKES

The high demand for Bluebikes, both within Cambridge and in the Metro Boston area demonstrates that it is here to stay as a public transportation system. Cambridge's growth continues, with over 20 new stations already set to be implemented, and more being planned. Some new stations will be implemented in connection with new development projects, but the City is also working to reach all residents near where they live. The ultimate goal is that every person in Cambridge will have access to at least one station within a 5-minute walk of their home or office.



Unicorn Bikes

In 2019, the City of Cambridge launched its first "Unicorn" bike, which are special bikes in the Bluebikes fleet with unique artwork celebrating local communities, culture, and achievements. For its Unicorn bike, Cambridge held a design contest for high school students. Winner Alba Cruz-Pimentel is pictured below with her winning bike design.



"I feel like Cambridge is very diverse, so I put a lot of color. I added some other things that reminded me of Cambridge, like the names of schools, and a few other little fun things just for people to look at."

- Artist Statement from Alba Cruz-Pimentel

2020 MEMBER SURVEY

Bluebikes conducted a member survey in 2020, with 500 survey participants (respondents were self-selected so it was not a randomized survey).

WHY DO PEOPLE USE BLUEBIKES?

- + Over one-third of participants said their main reason for joining Bluebikes was because it is a convenient way to get around.
- + Specifically, a quarter of participants joined mainly because Bluebikes was easier than using a personal bike or saved them time or money compared to other forms of transportation.
- + Discount memberships were a big draw, with over a quarter of participants attributing a free or discounted membership as the main reason for joining.
- + Overwhelmingly, participants consider Bluebikes to be beneficial for a variety of reasons.

HOW DOES BLUEBIKES AFFECT TRANSPORTATION BEHAVIOR?

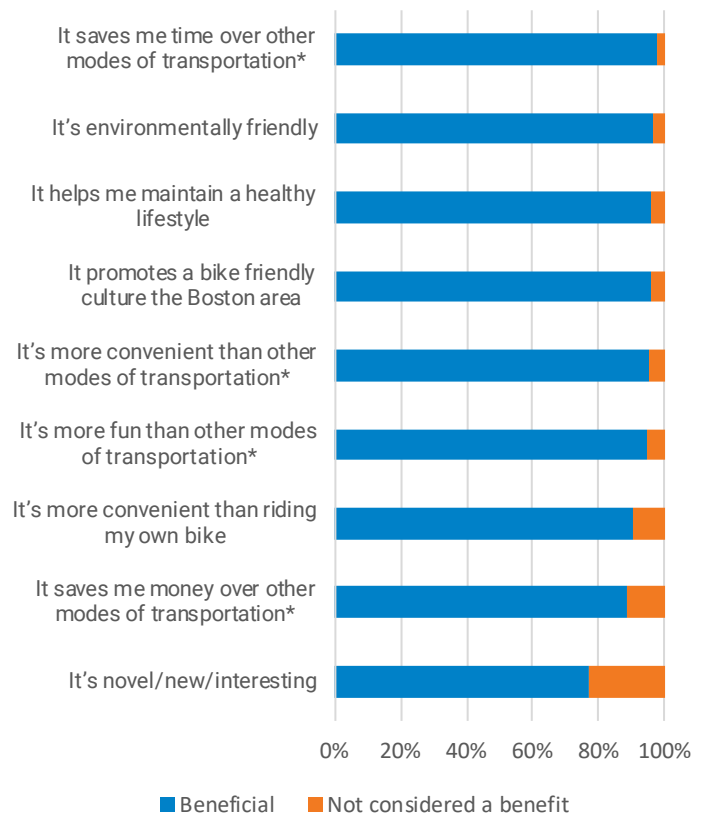
- + Over 50% of participants said they bike more as a result of their Bluebikes membership.
- + About 50% said they use a personal motor vehicle less often since joining Bluebikes, and 65% use rideshare (Uber, Lyft, taxis, etc.) less often.
- + Without Bluebikes, about 10% of participants responded they would have used a personal motor vehicle to make their most recent trip.
- + Almost 20% of participants said their most recent Bluebikes trip was a multimodal trip in combination with MBTA services.

- + 22% of participants said they used Bluebikes to replace another mode of transportation during the COVID-19 pandemic.

WHAT ARE BLUEBIKES MEMBERS' OTHER TRANSPORTATION OPTIONS?

- + About 50% of participants reported owning their own bike, and about 50% said they had a personal motor vehicle available to them on a regular basis.
- + Nearly a quarter of participants said they don't have any personal vehicles available to them on a regular basis.

Which aspects of a Bluebikes membership do you view as beneficial?



* (i.e. driving, train/bus, walking, etc.)

Figure 8.4: Results of a Bluebikes member survey in 2020

ENDNOTES

- 1 Except for routes 71, 73, SL1, SL2, and SL3 (as of January 2021)
- 2 National Association of City Transportation Officials (NACTO), "Shared Micromobility in the US: 2019," <https://nacto.org/shared-micromobility-2019/>.
- 3 In the early years of Hubway, the system shut down during winter months. Now Bluebikes operates year-round, with some stations seasonally removed in some of the municipalities; Cambridge's stations are all off-street and are operational year-round.
- 4 Elaine Glusac. "Farther, Faster and No Sweat: Bike-Sharing and the E-Bike Boom." The New York Times. March 2, 2021. <https://www.nytimes.com/2021/03/02/travel/ebikes-bike-sharing-us.html>

CHAPTER 9

OPERATION AND MAINTENANCE

OPERATION & MAINTENANCE PROGRAM

Proper maintenance helps protect the investment of public funds in bicycle facilities – as well as all public infrastructure – and allow their safe use and enjoyment. Careful construction management allows people to continue to travel safely by bicycle when roadwork is being done or road access is otherwise disrupted.

Street Cleaning. Cambridge operates a street cleaning program from April through December that includes bikeways. Travelway litter – such as broken glass, sand, gravel, and leaves – is a safety and environmental hazard demanding regular pickup and sweeping. All roadways in the city are swept monthly during the program period, with the April, July and November sweepings including the use of a vacuum sweeper in addition to mechanical sweepers to remove excess debris. As the number of separated bicycle facilities in the city has increased, the City has modified its sweeping protocols accordingly. Separated facilities, whether raised or at street-level, are swept twice per month during the April through December period, and vacuum sweepers are used where needed for these cleanings.

Roadway Surface. The City performs yearly maintenance paving through the Department of Public Works (DPW) Miscellaneous Paving contract; more substantial roadway and sidewalk construction activities are completed per the City's Five Year Plan for Sidewalk and Street Reconstruction. DPW also maintains paved surfaces through asphalt patches and crack sealing. Where utilities cuts occur, permanent patches are made per DPW specifications. All new asphalt paving will be flush with utility covers. Traffic control during maintenance activities will include providing safe passage for bicyclists, including clearly marked raised castings and signed detours when bikeways are obstructed.

Signs and Markings. Signs and pavement markings should be inspected regularly and kept in good condition. Every spring the Traffic, Parking, and Transportation Department (TP&T) prepares a pavement marking plan; bicycle facility markings include bicycle lanes, shared lane markings and colored (green) special areas.

Paths. Off-road facilities require specific plans. For example, the path along Fresh Pond Parkway/ Fresh Pond Reservation and the path around the Reservation are maintained by the Cambridge Water Department.



Crew working on bike lanes on Massachusetts Avenue.

UNIQUE CHARACTERISTICS & NEEDS OF USERS

A roadway surface that appears to be adequate for automobiles may actually be treacherous for people riding bicycles. Small rocks can deflect a bicycle wheel, a minor ridge in the pavement can cause a crash, or a pothole can cause a wheel rim to bend. Wet leaves are slippery and can cause a bicyclist to fall. Gravel and sand that are blown off the travel lane by automobile traffic accumulate near the edge of the road, where bicyclists usually ride.

Commonwealth Connect

Commonwealth Connect (powered by SeeClickFix) helps residents reach the City online or via their smartphone to request services or get help fixing issues. People may report issues such as potholes, snowy or icy bike lanes or sidewalks, bike lane obstructions broken bike racks, and many other concerns.

<http://commowealthconnect.io>



From restriping to filling potholes, taking care of roadways and bike facilities is critical to maintaining safe conditions for biking in Cambridge.



Since buying an e-bike in June 2020, I've been using my car to run errands or visit friends (outdoors of course) so much less. I've loved biking home in the dark empty streets after an autumn dinner in a friend's backyard, or to pick up bagels from Mamaleh's on a weekend morning. Best of all, my toddler, who does not always appreciate being loaded into a car seat, LOVES going for a bike ride. It has truly made our lives better, and being able to ride in streets that feel safe is a huge part of it.

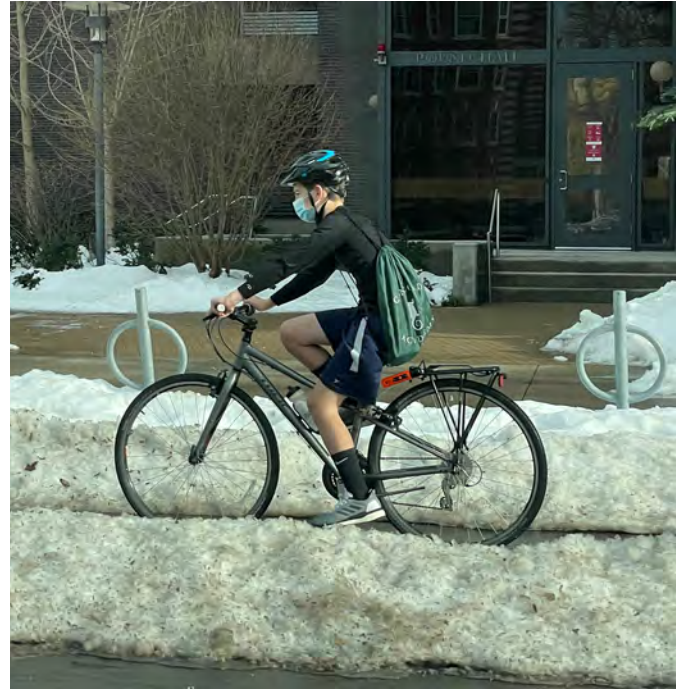
– Parent, Cambridgeport

WINTER MAINTENANCE

Snow management poses particular challenges in a dense urban environment with limited space for snow storage. The City's first priorities are to ensure that emergency vehicles are able to get where they need to go. Toward that end, DPW will clear the streets as soon as possible after a storm event. The goals are to chemically treat all major arteries within three hours of when snow begins, to keep main arteries plowed during all stages of a storm, and to clear all streets and the sidewalks bordering City property once a storm has stopped.

An essential element of ensuring safe travel during and after snow events is proactively reminding the traveling public the importance of sharing the roadway. This is extremely important given that the roadways are typically narrowed during and after a snow event. DPW often deploys variable message boards around the city to highlight these messages.

Special bicycle facilities such as raised separated bicycle lanes are addressed as soon as possible after the essential public ways, including key sidewalks, have been treated. Some of these facilities are maintained under separate agreements; Vassar Street, for example, is maintained by the Massachusetts Institute of Technology (MIT), which clears the separated bicycle lane with the same equipment they use on the adjoining sidewalks. As each of these facilities are designed, snow operations will be a critical consideration in the design details and long-term maintenance expectations.



The City uses a variety of tools to clear snow from streets and separated bike lanes.

CONSTRUCTION MANAGEMENT

GUIDELINES FOR BICYCLE ACCOMMODATION DURING CONSTRUCTION

APPLICABILITY

These guidelines shall apply to all construction projects in the City of Cambridge, whether the work is being undertaken by the City, public and private institutions, developers, contractors, utility companies, or state agencies. The types of projects include:

- + **Street reconstruction and new street construction.**
- + **Sewer, storm drainage and water projects.**
- + **Private site development, involving work within a City street (e.g., utility connections, temporary occupancy of parking or traffic lanes).**
- + **Utility construction.**

GENERAL

As bicycles are legal vehicles on all the streets of Cambridge, through bicycle movement must be maintained during construction and other projects that disrupt travel (e.g., special events), subject to the approved construction management plan. People riding bicycles are particularly susceptible to disruptions in their normal travel routes because of their slower speeds and exposure to noise, dirt, and fumes. Temporary lane restrictions, detours and other traffic control measures instituted during construction or other travel disruptions should be designed to accommodate non-motorized travelers.

For all construction projects, an approved Traffic Management Plan must meet these guidelines for bicycle accommodations.



LED signs placed around Cambridge remind road users to share the road during construction or after major snowfall events.



Construction zone featuring temporary bike lane.



Installation of a new flex post on a separated bike lane.

PAVEMENT SURFACE QUALITY AND STRUCTURE

People riding bicycles, particularly those riding on narrow, high-pressure tires, need to have pavement as free of defects and debris as possible to ensure control of their bicycles. As most road bikes do not have a suspension system, high-pressure tires transmit every bump to the rider. Loss of control on deteriorated pavement with loose aggregates, potholes, litter, etc. is also a major risk.

Pavement seams parallel to the roadway should not be located on the portion of the road where bicycling is expected. Utility covers and drainage grates should be flush with the pavement surface and should be

adjusted with pavement overlays. Approaches to railroad crossings should be improved as necessary to provide for safe bicycle crossings.

Pavement surfaces should be smooth, and the edge of the pavement should be uniform. Narrow slots in the surface that could catch a bicycle wheel, such as a gap in the longitudinal joint between two concrete slabs, should not be more than 1/2 inch wide. Ridges in the pavement that could cause people riding bicycles to lose control should not be more than 3/8 inch high when parallel to travel or 3/4 inch high when perpendicular to travel.

When pavement is overlaid, the edge of the overlay should be matched to the height of the adjacent pavement or smooth transitions should be provided.



BICYCLE TRAVEL THROUGH CONSTRUCTION ZONES

The following general considerations apply to accommodating bicyclists in construction zones:

- + Where construction is occurring on a street that already has a bicycle lane, the area through which the construction is occurring should maintain that space if width is available.
- + Every effort should be made to avoid using bicycle lanes for staging of site construction work or temporary construction signage.
- + Minimize the time that construction work occupies bicycle lanes. For example, if the added work space is only needed for operation of a crane for a limited number of days, that will be the only time that occupancy of the bicycle lane is permitted.
- + Where bicycles lanes are not present, provide a shared vehicle lane as wide as physically feasible.
- + If a bicycle lane is taken or if the area used by bicyclists is impacted by construction, contractors must use the “Bikes May Use Full Lane” sign, standard R4-11 MUTCD sign. Orange signage in construction zones is preferred.



“Bikes May Use Full Lane” sign, MUTCD R4-11

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- + Type II or II Barricades (see MUTCD for description) with flashers should be placed at least 20 feet in advance.
- + Steel plates should have a non-slippery textured surface; this is required within an intersection or a crosswalk.



Street repaving zone featuring manholes painted with reflective pink paint.

Construction excavations or depressions should never be left without physical barriers preventing bicyclists from falling in.

- + The preferred treatment is the provisions of temporary fill and a temporary bituminous concrete patch.
- + Where the excavation is outside the motor vehicle and bicycle lanes, provide traffic barriers (concrete barriers, barricades, or where the depression is less than 18 inches, cones or barrels may be used).
- + If the excavation must be maintained for more than two days and it is located within lanes to be used by bicyclists, temporary steel plates may be used. See guidelines for the use of metal plates above.

Narrow cuts that are parallel with the direction of travel create an extreme hazard for bicyclists, whose tires could get caught. These should never be made and left in an area where bicyclists will be traveling. If necessary, they should be blocked off and bicyclists routed around the hazard.

- + When performing advance pavement cutting for trenching or other roadway excavation, use only saw cutting (approximately 1/4 inch or narrower).

Site access and ramps: Temporary (usually asphalt) ramps are sometimes proposed to access a site from a sidewalk where no driveway or other vehicle access exists. The creation of ramps in the roadway is not desirable unless being created in an area that is otherwise used by on-street parking. If necessary for pedestrian accessibility reasons, the ramp edge will be painted pink and/or a barricade placed alongside so a person bicycling does not inadvertently run into it.

Raised castings: After cold planing of pavement is performed, utility castings (e.g., manhole covers, valve box covers, and catch basin grates) will be 1 to 2 inches higher than the surrounding pavement. This presents a hazard for bicyclists and motor vehicles alike. This condition will also occur during roadway construction just before the next lift of pavement is to be placed. Wherever raised casting are present, the following should be provided:

- + Provide advance warning signs saying: "Caution – Raised Castings Ahead."
- + Spray paint reflective pink on the raised portions of the castings.

Cold planing and pavement installation: After cold planing, there is a vertical lip at the limits of pavement removal. A smooth bituminous

transition slope should be provided to eliminate the jarring hazard of hitting the vertical lip. In roadway construction, there may be a similar vertical lip between the different lifts of pavement installed. In these conditions, a similar transition is also needed.

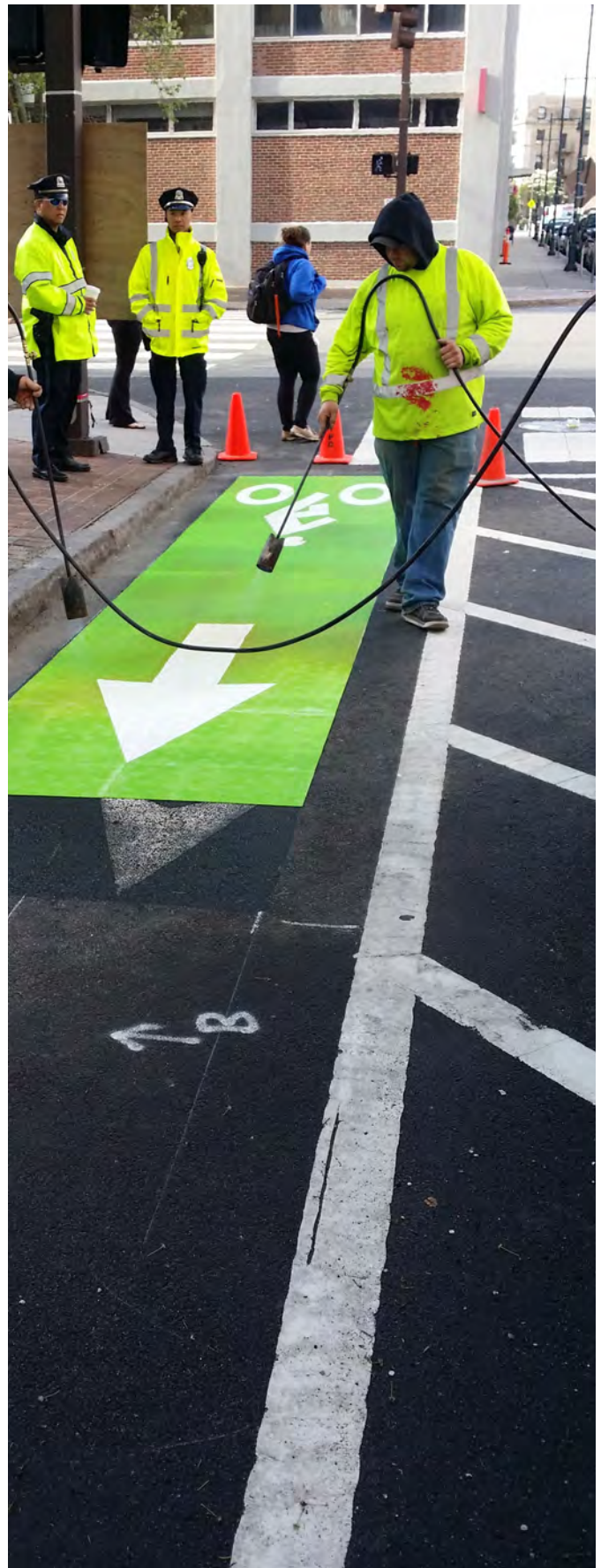
- + Provide advance warning signs saying: “Bump” at these transitions.
- + Paint the transition sloped area in reflective pink.

Pavement Sweeping and Debris Removal: Road surfaces in construction zones may experience a greater build-up of debris than other roadway segments. Special attention must be given to keeping roadway surfaces free of debris, including sand, gravel, stones, trash, and miscellaneous construction debris. Pavement in construction zones should be swept to maintain a reasonably clear riding surface in bicycle lanes and in the outer 5 or 6 feet of roadway.

Potholes: Potholes are more likely to be found in construction zones due to the impact of construction equipment and due to temporary pavement patching. Special attention must be given to monitoring for the development of potholes and for promptly filling in and patching potholes.

Temporary Traffic Sign Placement: The placement of advance construction signs must not obstruct bicyclists’ path. In particular, temporary signs shall not be placed in bicycle lanes.

Restoration of Pavement Markings: As soon as reasonably possible after paving, install pavement markings, particularly bicycle lanes markings and other markings associated with bicycle facilities.



Crew installing bicycle decal and green pavement markings.

CHAPTER 10

ACTION ITEMS

IMPLEMENTATION

Achieving the vision and goals of the Bicycle Plan will be driven by the implementation of the elements outlined throughout this document. Implementation of the Bicycle Network Vision will be the most visible way in which Cambridge works to make bicycling safer and more accessible to people of all ages, abilities, and identities. The Vision will be implemented through:

- + **The Five Year Plan for Sidewalk and Street Reconstruction, which identifies and prioritizes opportunities for bicycle facilities to be implemented as parts of street reconstruction projects.**
- + **The Cycling Safety Ordinance (CSO), which requires the City to install separated bike lanes on streets undergoing reconstruction if those streets are identified for greater separation in the Bicycle Network Vision. The Ordinance also requires the City to implement separated bike lanes through a “Quick-Build” process.**
- + **Private development projects, which often play a role in the implementation of bicycle facilities. This is especially true for larger projects, which may be required to construct bicycle facilities as part of their overall site plans or to mitigate the project’s traffic impacts.**
- + **Quick-build projects, which use lightweight, semi-permanent materials to create separated bike lanes. The prioritization approach for quick-build projects is in Appendix H.**



This two-way separated bike lane on Ames Street uses traditional construction and quick-build materials.

INDIVIDUAL ACTION ITEMS

To complement the longer-range and broader perspective of the Bicycle Network Vision, the City continually collects input from the community on issues like intersection configurations, pavement quality, and traffic signals. This input is screened, categorized, and consolidated to create a list of individual action items.

An Action Item list was developed during the 2015 Bike Plan process. Since that time, the City has completed or programmed over 80 percent of the 2015 action items.

For the new Action Item list, input was received through public forms specific to the 2020 Bicycle

Plan Update (including the 2019 online WikiMap, paper maps at numerous public input sessions and street team outings, and the June 2019 Open House) as well as the City’s ongoing commenting and reporting systems, which include:

- + [The Bicycle WikiMap \(for general bicycle infrastructure comments\)](#)
- + [SeeClickFix \(for repairs, maintenance, broken racks, and obstructions\)](#)
- + [Bicycle parking requests](#)
- + [Bluebikes station requests](#)

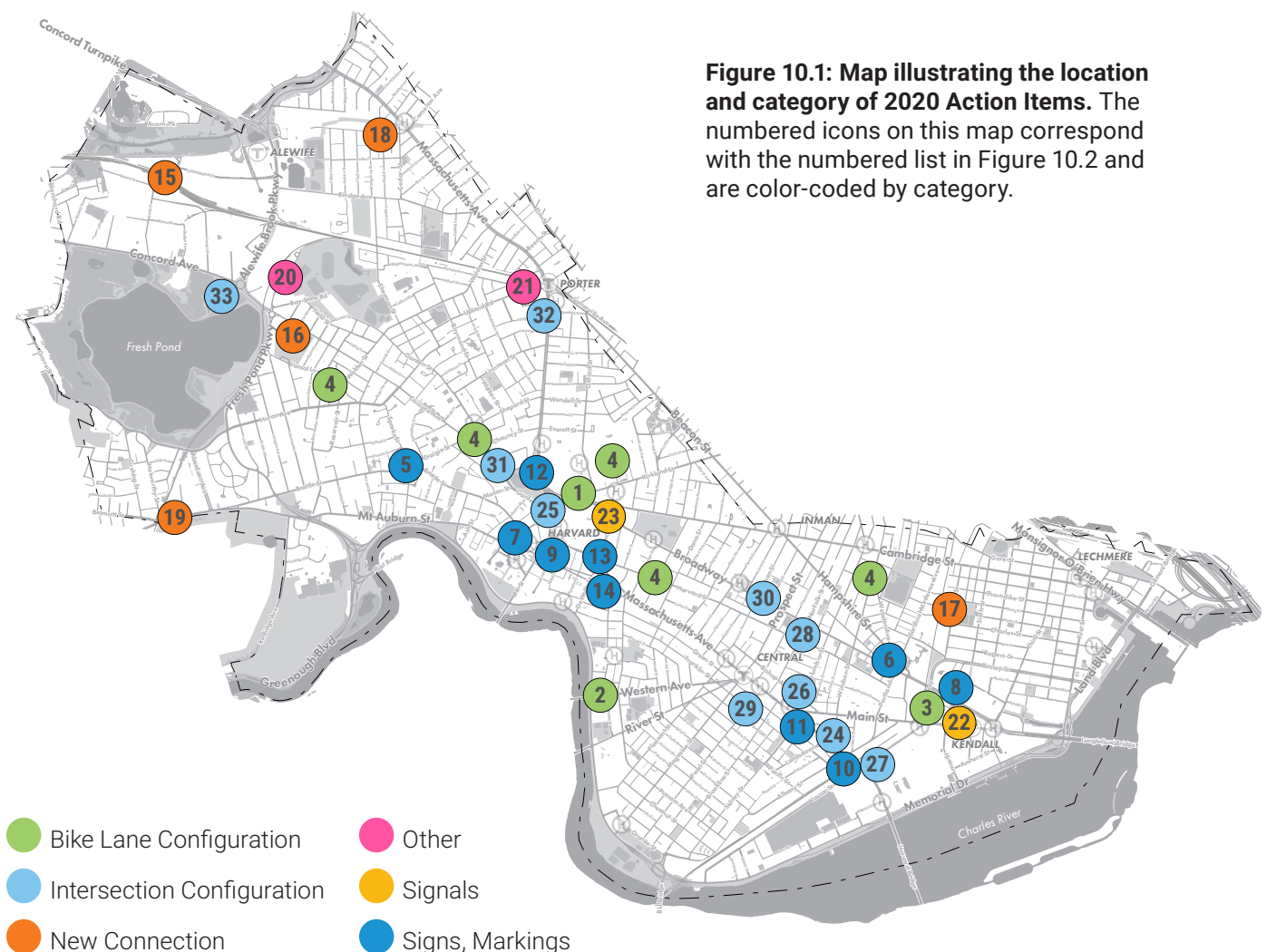


Figure 10.2: List of 2020 Action Items. Status as of Spring 2021.

| ID | CATEGORY | LOCATION | DESCRIPTION | STATUS |
|----|----------------------------|---|---|---|
| 1 | Bike Lane Configuration | Harvard Underpass | Add separation to the buffered bike lane in the underpass as it is stressful to bike in | Underway; Options for surface mount flex post in tunnel being evaluated |
| 2 | Bike Lane Configuration | Western Ave | Make Western Ave grade-separated bike lane two-way | Underway; Travel in the northbound direction will be provided on River Street; design is underway and includes a grade-separated bicycle facility |
| 3 | Bike Lane Configuration | 82 Ames St | Prevent drivers from blocking the bike lane | Complete; Additional bollards added winter 2020 |
| 4 | Bike Lane Configuration | Arsenal Square, Dana St, Fayerweather St, Harvard St, Irving St, Trowbridge St, Vassal Lane, Windsor St | Provide two-way bicycle connections (contraflow lanes) | Requests recorded; each will require more evaluation |
| 5 | Intersection Configuration | Brattle St at Sparks St | Reduce the stress of navigating the intersection of Brattle/Sparks/Craigie on a bike | Longer term; Currently in planning stages for intersection reconstruction |
| 6 | Intersection Configuration | Hampshire St at Webster Ave | Square off Hampshire at Webster intersection to slow right-turning vehicles | Near-term; Construction project within 2 years |
| 7 | Intersection Configuration | Brattle St at Eliot St | Create better connection from Brattle/Eliot to Mt. Auburn Street eastbound | Will be redesigned with future street reconstruction |
| 8 | Intersection Configuration | Broadway at Ames St and Broadway at Galileo Galilei Way | Reduce conflicts between drivers and bicyclists | Underway; Binney/Galileo/Broadway currently under construction |
| 9 | Intersection Configuration | Mass Ave at JFK St | Redesign JFK St northbound onto Mass Ave as it is dangerous for bicyclists to merge | Underway; Intersection reconstruction with Kiosk work; started in 2020-2021 |
| 10 | Intersection Configuration | Mass Ave at Albany St | Improve intersection for bicyclists | Under design, including bus stop improvements |
| 11 | Intersection Configuration | Mass Ave at Sidney St | Reduce stress of taking left turn on a bike from Mass Ave southbound onto Sidney St | Needs more evaluation |
| 12 | Intersection Configuration | Mass Ave at Waterhouse St | Reduce stress of taking a left turn on a bike from Mass Ave onto Waterhouse St | Needs more evaluation |
| 13 | Intersection Configuration | Mass Ave at Harvard St | Add more traffic calming for vehicles merging from Harvard St onto Mass Ave northbound | Complete; Improvements made as part of Quincy/DeWolfe Project |
| 14 | Intersection Configuration | Mt. Auburn at Putnam Ave/Mass Ave | Reduce conflicts between people walking, biking, and driving | Complete; Improvements made as part of Inner Mt Auburn Street project |
| 15 | New Connection | Alewife | Build path over train tracks connecting Alewife Quadrangle and Triangle | Longer term; Planning for bike/ped bridge underway |
| 16 | New Connection | Fern St and Concord Ave | Create better connection between Fresh Pond, Tobin School, and Fern St | Medium term; Will be done along with Tobin School Project |

| ID | CATEGORY | LOCATION | DESCRIPTION | STATUS |
|----|-----------------|---|---|---|
| 17 | New Connection | Grand Junction Path | Add connection between Kennedy-Longfellow School and future Grand Junction Path | Medium term; Evaluating connections and wayfinding to/from the Grand Junction is part of the Grand Junction Path design process |
| 18 | New Connection | Westley Ave at Alewife Linear Park | Create connection between Alewife Linear Park and Westley Ave | Needs more evaluation |
| 19 | New Connection | Mt Auburn St at Star Market | Extend bike lane on Mt Auburn where it currently disappears | Longer term; Street reconstruction required |
| 20 | Other | New St | Remove train tracks that are no longer in use and difficult to bike over | Longer term; Tracks will be removed with street reconstruction |
| 21 | Other | Porter Square | Replace the cables on the bike repair stand as they are too short | Tools have been replaced at this bike repair stand |
| 22 | Signals | Ames St at Main St | Add bicycle signal for northbound bicyclists in two-way bike lane | Complete; New bike signals added |
| 23 | Signals | Cambridge St and Quincy St | Reduce conflict between left-turning northbound bicyclists and right-turning southbound drivers | Complete; raised crossing constructed to improve yielding for people walking and cycling. |
| 24 | Signs, Markings | Mass Ave at Windsor St | Improve visibility of bicyclists at this intersection | Complete; Additional daylighting (pulling back parking) has been created to address visibility issue |
| 25 | Signs, Markings | Mass Ave at Flagstaff Park (Harvard Square to N. Mass Ave connection) | Improve signage/signals for bicyclists traveling northbound on Mass Ave. from Harvard Square | Complete; additional roadway markings installed. |
| 26 | Signs, Markings | Main St at Columbia St | Allow bicyclists to make a right on red here | Near-term; Will add "except bikes" sign |
| 27 | Signs, Markings | Mass Ave at Vassar St | Install a bike box for left turn from Mass Ave to Vassar St | Complete |
| 28 | Signs, Markings | Broadway at Norfolk St | Make crossing Broadway on Norfolk St northbound on a bicycle less stressful | Near-term; Will evaluate for improved lighting/signing |
| 29 | Signs, Markings | Franklin St at Pearl St | Reduce vehicle speeds on Pearl Street, particularly Franklin St intersection | Needs more evaluation |
| 30 | Signs, Markings | Broadway at Prospect St | Add bike boxes for turning left from Broadway onto Prospect in both directions | Needs more evaluation |
| 31 | Signs, Markings | Garden St at Concord Ave | Provide better signage for how to access "Little Concord" | Will be evaluated |
| 32 | Signs, Markings | Mass Ave at Roseland St | Allow bicyclists traveling southbound on Mass Ave to proceed through red light; no conflict with vehicles | Needs more evaluation |
| 33 | Signs, Markings | Concord Ave at Alewife Brook Parkway | Create better wayfinding around the Alewife traffic circles for bicyclists continuing on Concord Ave | Will be evaluated |

ONGOING WORK

To support the Bicycle Network Vision, the City continually monitors, evaluates, and addresses issues while providing supporting programs that help build a bicycle culture, encourage more people to try biking, and increase people's access to bikes.

Below is a list highlighting some of the key aspects of the ongoing work of the City. Note, this is not a comprehensive list: see Chapter 6, 7, and 8 for more information on bicycle programs in Cambridge and Chapter 9 for more information on operation and maintenance.

EVALUATION AND PLANNING

- + Update the map of existing and planned bicycle facilities annually in connection with the timing of the Five Year Plan for Sidewalk and Street Reconstruction.
- + Review bicycle counts and crash analyses; continue to evaluate bicycle count methods and tools to improve the accuracy of these efforts.
- + Evaluate how signals, signs and markings can better support people on bicycles at intersections.

SUPPORTING INFRASTRUCTURE

- + Add public bicycle parking throughout the city, particularly in business districts.
- + Install additional public sheltered bike parking in key locations.
- + Maintain and expand bicycle wayfinding to enhance the ability to find convenient and comfortable routes to destinations.
- + Continue to expand the Bluebikes system so that stations are conveniently located for residents, workers, and visitors.

EDUCATION AND OUTREACH

- + Continue to provide focused programs for students at all levels in schools, at city youth centers, and through community activities.
- + Continue to enhance opportunities for groups who are traditionally underrepresented in bicycling, including women and people who identify as women, BIPOC (Black, Indigenous People of Color), foreign-born/non-native English speakers, lower income, and older adults. Include focused initiatives and opportunities for Bluebikes access in these programs.
- + Engage with the community to receive feedback on issues and concerns and develop opportunities and planning based on their input. Of particular focus is working together with community groups on collaborative programming and events.
- + Continue to enhance outreach and educational materials in different formats and languages.



APPENDICES

APPENDIX A: CAMBRIDGE COMMUNITY SURVEY SUMMARY (2014)

This is an overview of the key results from a survey administered as part of the Cambridge Bicycle Network Plan public outreach.

Conclusion: Although most people who responded to the on-line survey about bicycling in Cambridge ride frequently and extensively, they report that they are not comfortable on many streets and would like to see more protected bicycle facilities and bicycle-friendly street designs.

Survey Background

As part of creating a new Bicycle Master Plan for Cambridge, an on-line survey was administered during June, 2014. The survey was open to anyone, and although outreach about the survey was sent broadly throughout the community, most of the survey participants were regular cyclists, and thus not representative of the population of Cambridge, or of greater Boston. 733 responses were received.

The survey was designed to determine what kind of bicycle facilities are most comfortable for users and what will enable parents and guardians to feel that their kids can bike safely in the City. Survey questions focused on:

- Bicycling habits
- Comfort with bicycling on different streets and various bicycle facility types
- Children's bicycling habits and parents/guardians' comfort allowing children to ride on different streets/facility types

Who Responded to the Survey?

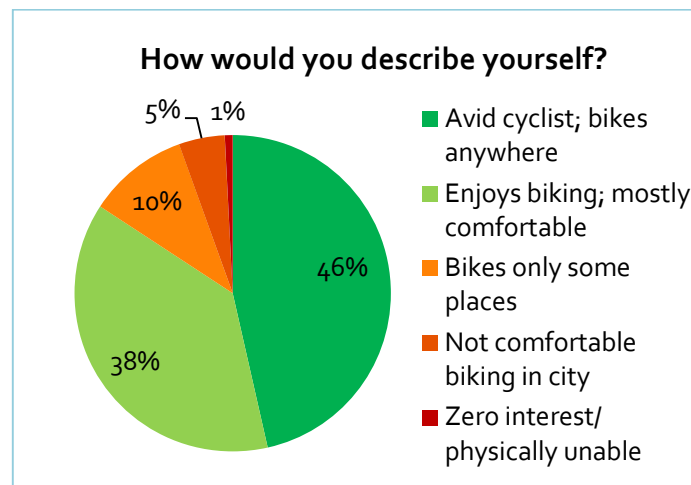
- The majority of respondents (53%) were female
- The majority of respondents were between 25-44 years old. Only 7% were in the 18-24 year old population; this would seem an underrepresentation of the student/young adult population who live and bicycle in Cambridge. This may be because the survey was administered in June, when area schools are out for the summer, although approximately 12% identified themselves as full or part-time students



- Approximately half the respondents are Cambridge residents, with another 35% living in the abutting communities
- 89% identified themselves as white/Caucasian, not representative of the general population in Cambridge
- 28% of respondents have children under age 18 at home

Bicycling Habits of Respondents

- The plurality of respondents consider themselves avid cyclists who bike everywhere, followed closely by people who are enthusiastic cyclists who prefer to ride on main streets with bike lanes or on minor streets with traffic calming/ low traffic speeds/ residential streets. About 15% limit their riding to off-road paths or out of the city.
- The vast majority of respondents ride several days a week outside of winter
- The majority of respondents ride at least sometimes during the winter and almost a quarter continue to ride daily.

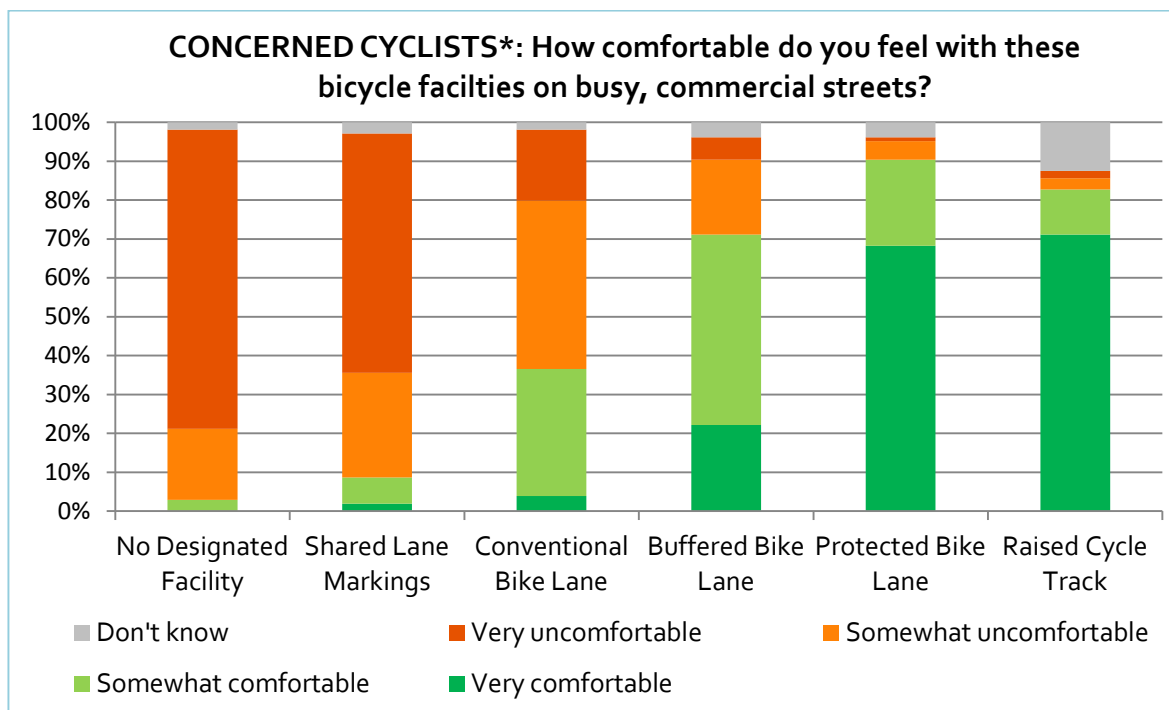
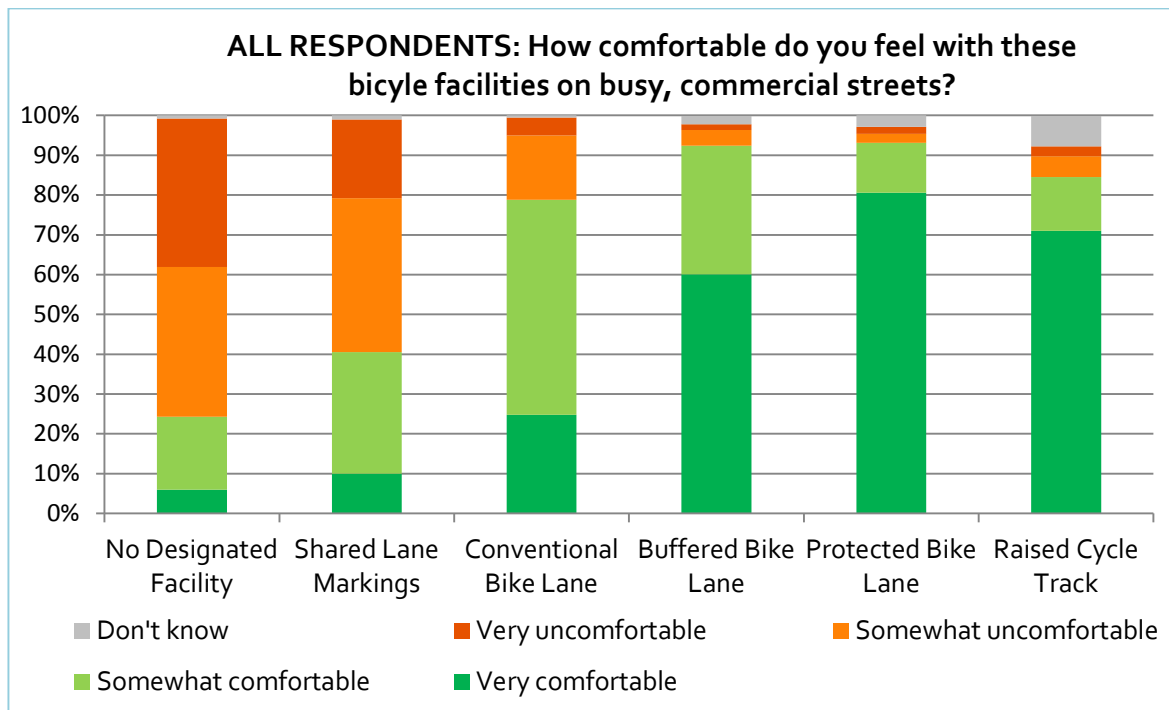


Bicyclist Comfort Levels

Cyclists were asked about their comfort levels cycling on a variety of accommodations. People were asked about their comfort levels on busy commercial streets and on non-commercial streets and sample photographs were shown for each condition.

People were also asked a separate series of questions about bicycling with children, including similar questions about comfort levels on various road types and bicycle accommodations.

Bicycling Comfort on Busy, Commercial Streets



*Concerned cyclists are defined as survey respondents who reported that they bike only some places or are not comfortable biking in the city.

Photos of Bicycle Facilities on Busy, Commercial Streets

Street with Shared Lane Markings



Street with Shared Lane Markings



Conventional Bike Lane



Conventional Bike Lane



Buffered Bike Lane



Buffered Bike Lane



Protected Bike Lane



Protected Bike Lane



Raised Cycle Track



Raised Cycle Track



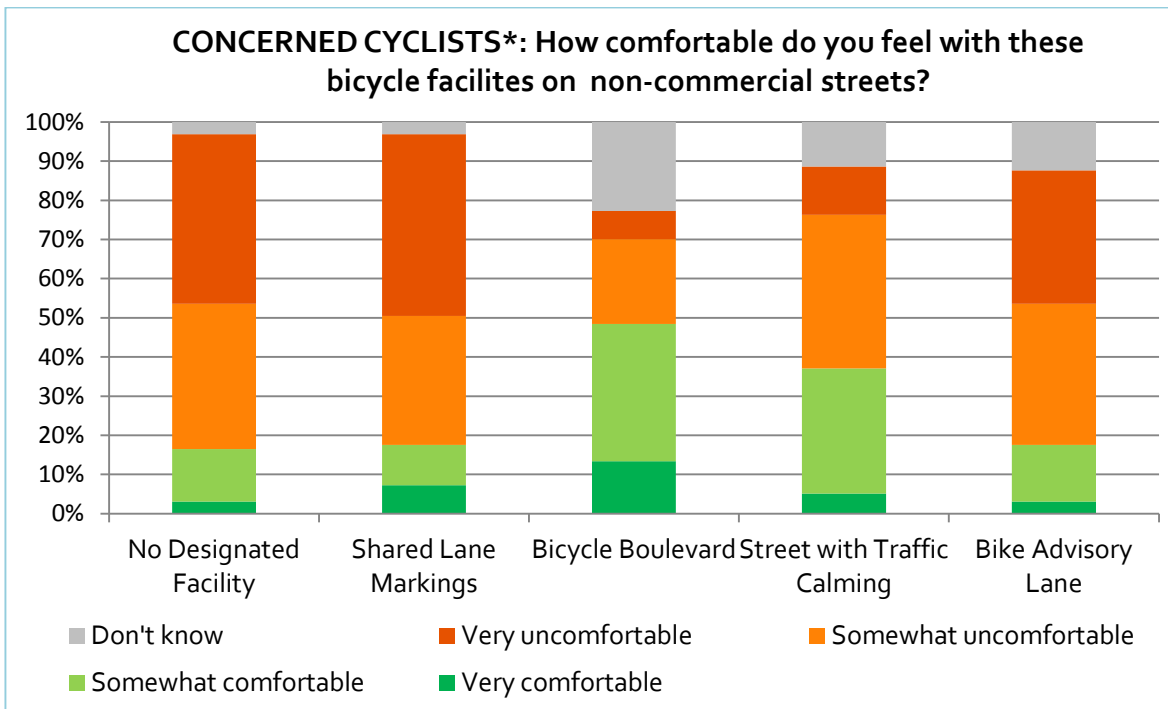
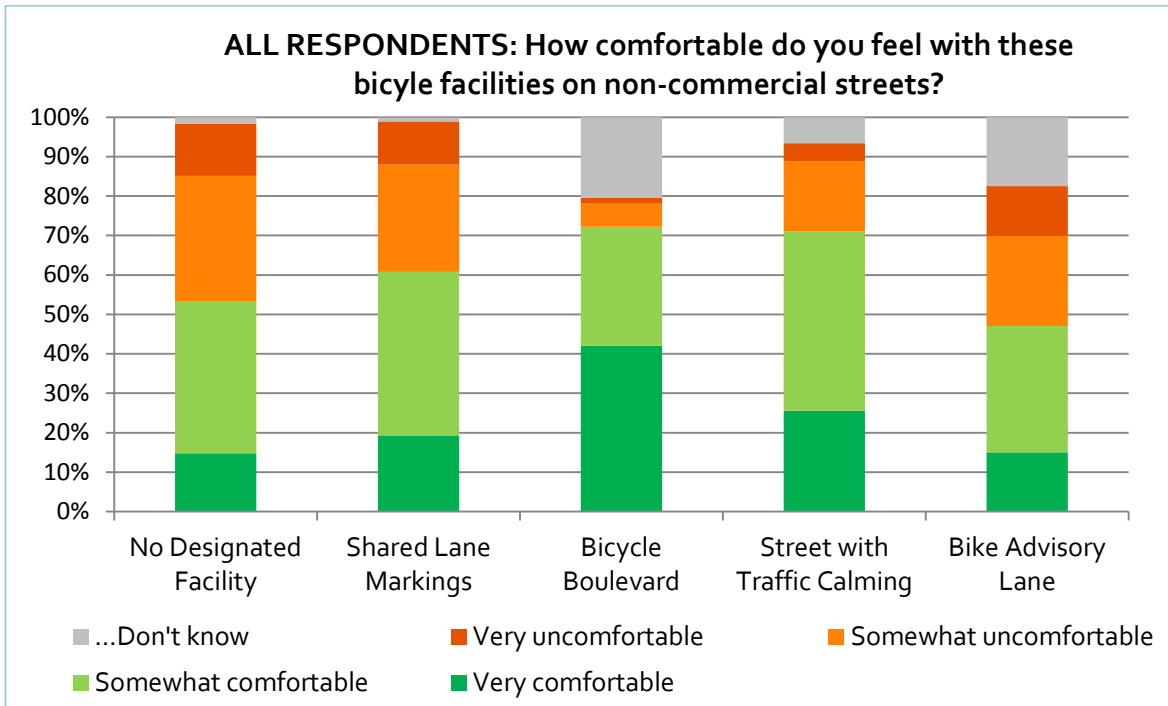
No designated facility



No designated facility



Bicycling Comfort on Non-Commercial Streets



*Concerned cyclists are defined as survey respondents who reported that they bike only some places or are not comfortable biking in the city.

Photos of Bicycle Facilities on Non-Commercial Streets

Street with Shared Lane Markings



Street with Shared Lane Markings



Bicycle Boulevard



Bicycle Boulevard



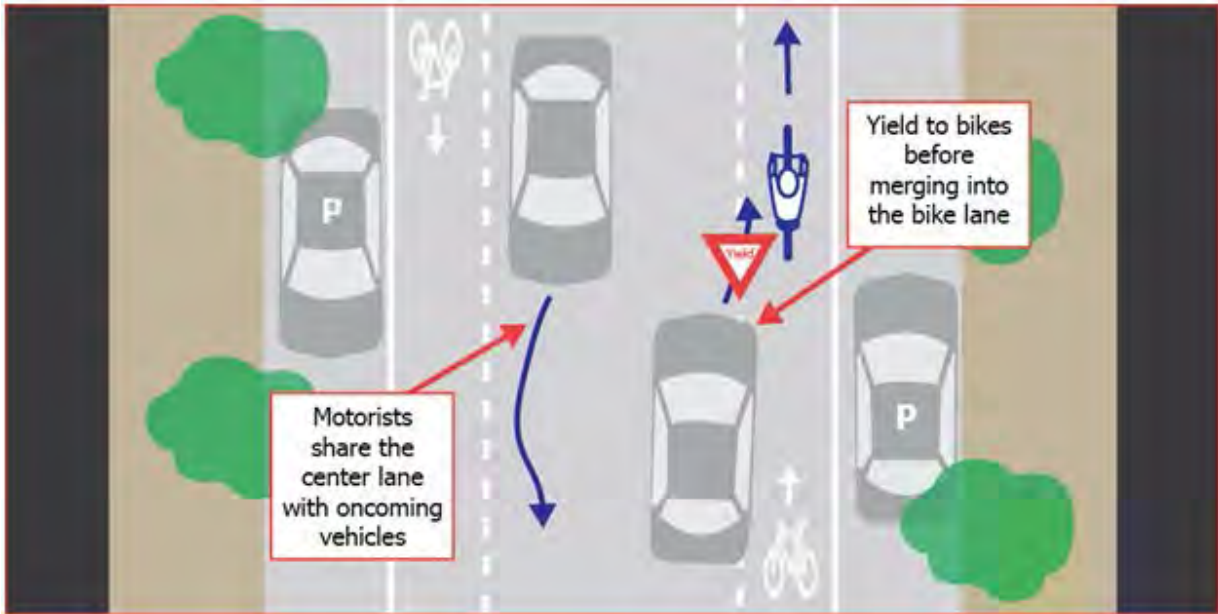
Street with Traffic Calming



Street with Traffic Calming



Bicycle Advisory Lanes



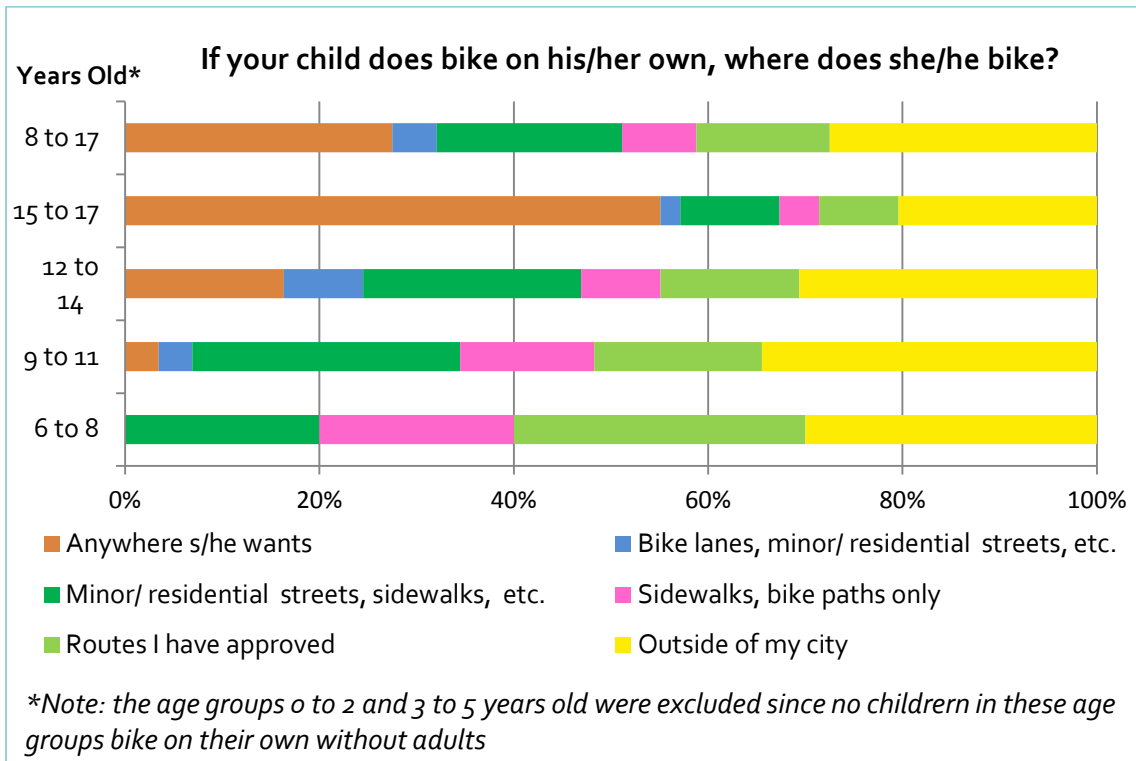
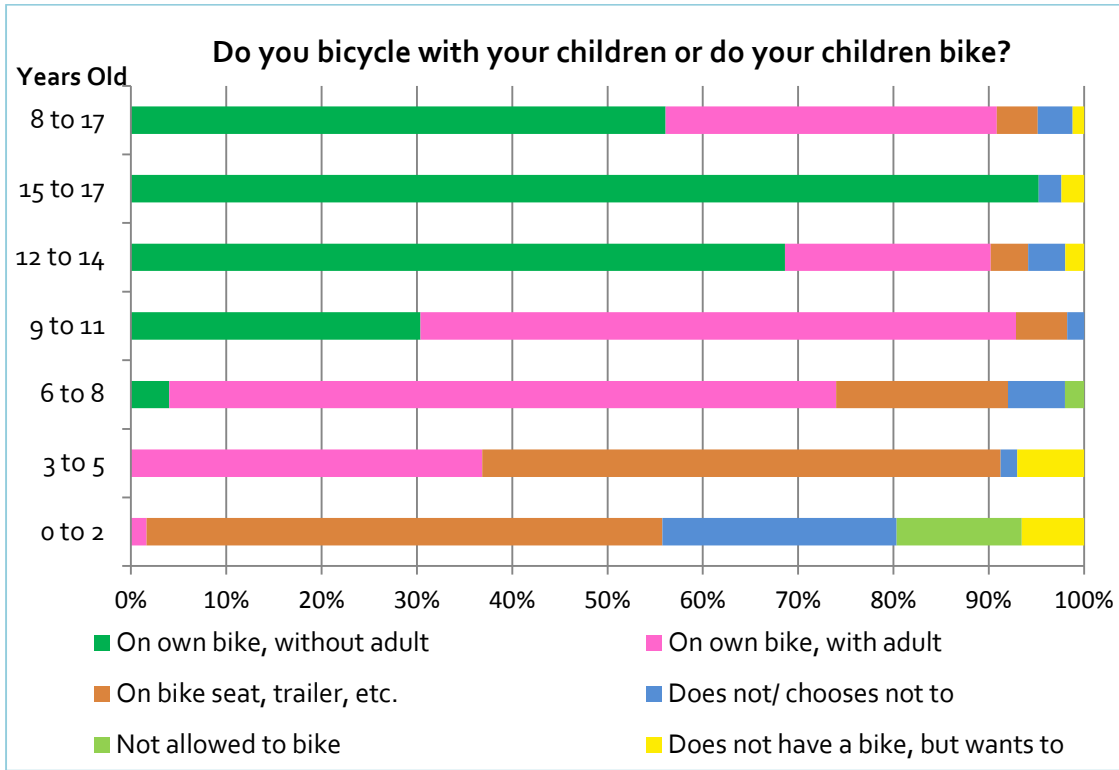
Bicycle Advisory Lanes



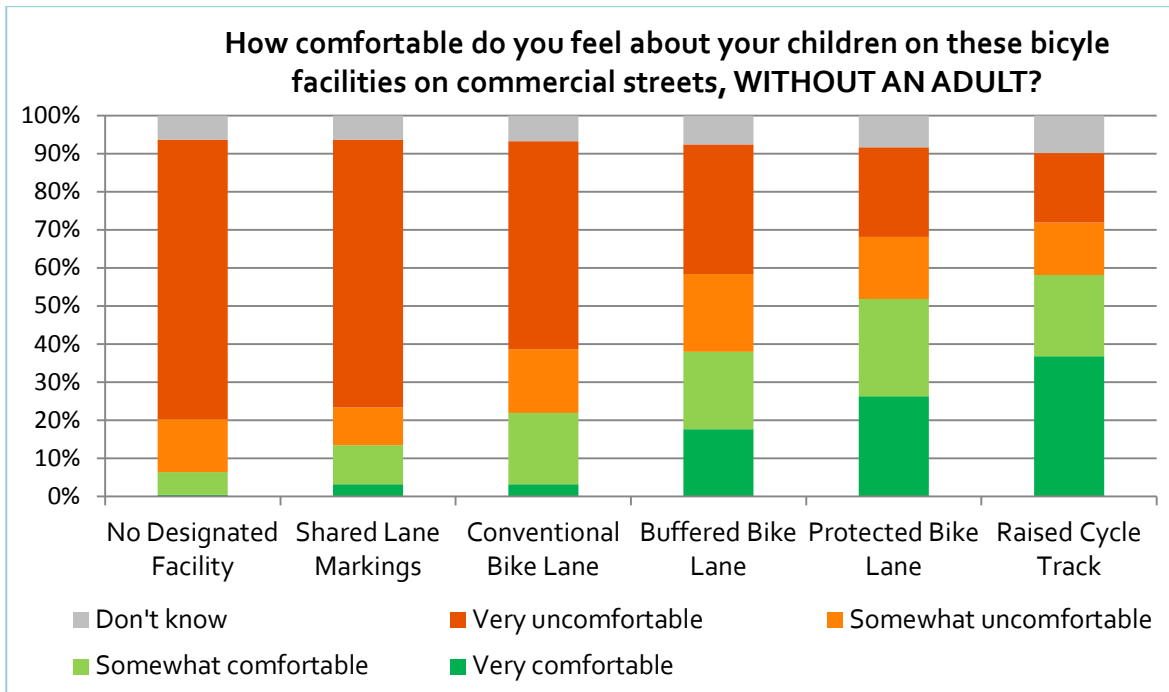
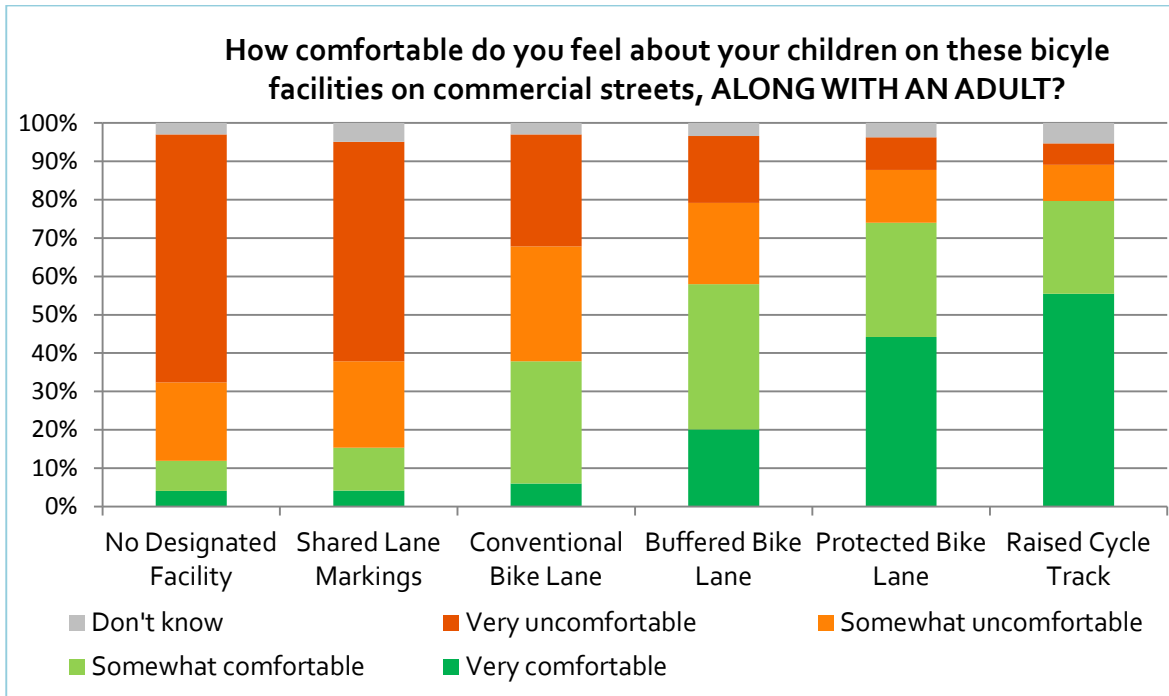
No designated facility



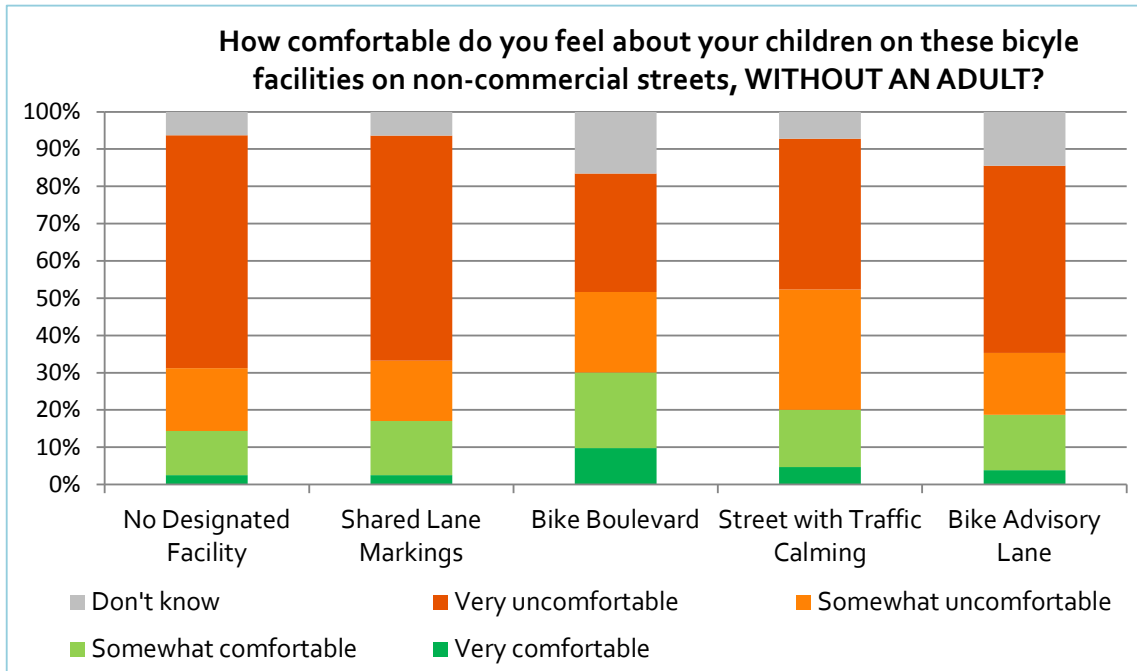
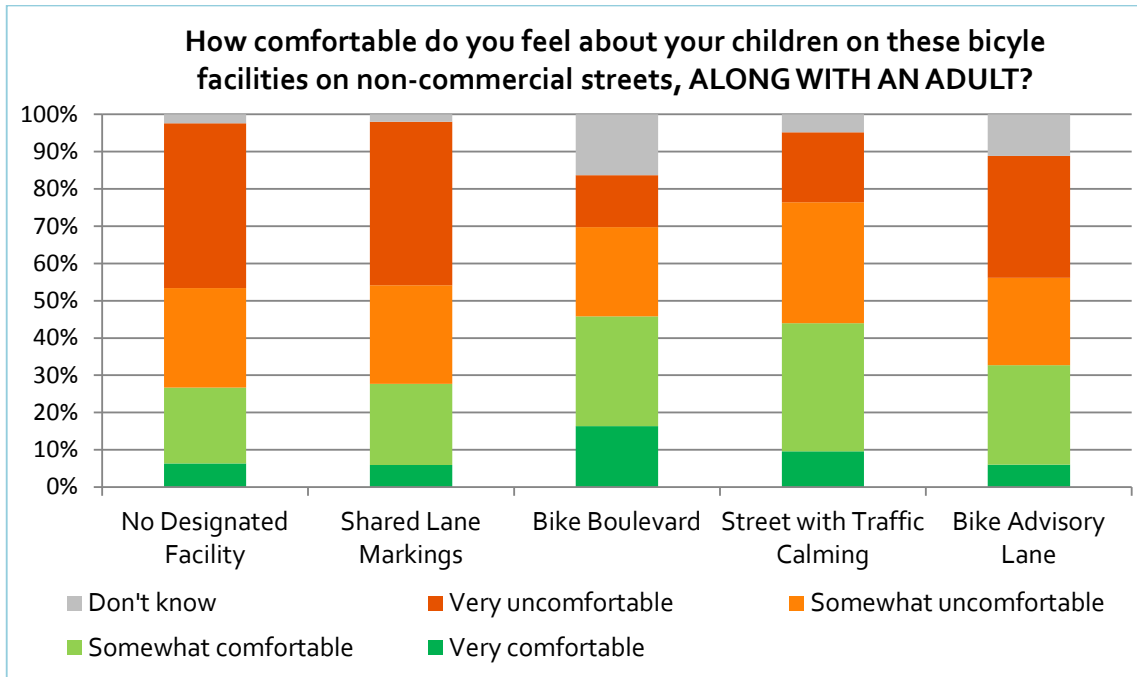
Questions about Bicycling with Children



Bicycling Comfort on Busy, Commercial Streets - Children

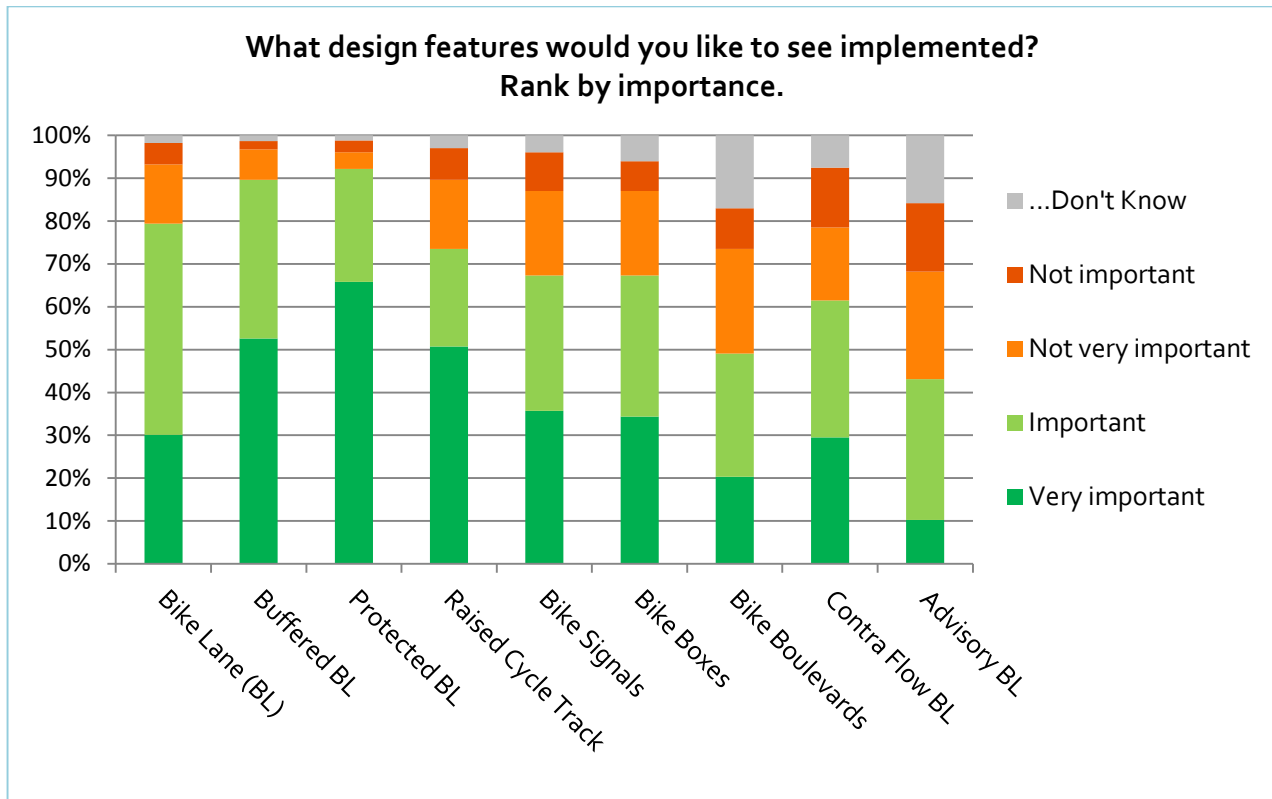


Bicycling Comfort on Non-Commercial Streets - Children



Preferred Bicycle Facilities

Survey respondents were asked to rate the importance of various bicycle facility options that they would like to see implemented in Cambridge.



Photos of Bicycle Design Features

Conventional Bike Lane



Buffered Bike Lane



Protected Bike Lane



Raised Cycle Track



Bicycle Traffic Signals



Bike Boxes



Bicycle Boulevard



Bicycle Boulevard



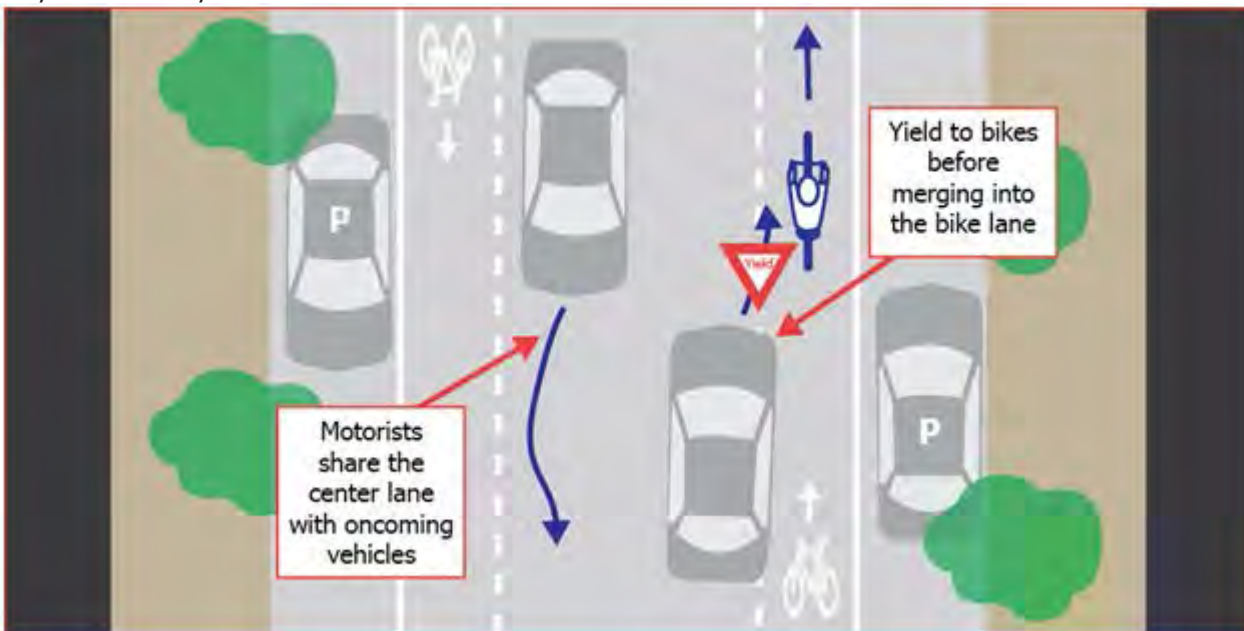
Contra-Flow Bike Lanes



Bicycle Advisory Lanes



Bicycle Advisory Lanes



APPENDIX B: CAMBRIDGE COMMUNITY NEEDS SURVEY SUMMARY(2020)

Background

As part of the community engagement process for the 2020 Bicycle Plan Update, the City of Cambridge conducted a Community Needs Survey. The goal of the Community Needs Survey was to hear from community members about the barriers they experience to biking, and what they feel the City can do to help them bike more. Respondents had the choice to take the survey anonymously or submit contact information if they wanted a City staff person to follow up with them directly. Three-hundred and five (305) surveys were submitted.

The Community Needs Survey was open to the public online from September 17, 2020 through October 10, 2020. Information about the 2020 Bicycle Plan Update and instructions for taking the survey were posted on the Cambridge Bicycle Plan 2020 webpage, the City of Cambridge homepage, and on City of Cambridge and Community Development Department social media. The survey was also sent directly to community members who were subscribed to the City of Cambridge Daily Update, Bicycle Plan 2020, and Active Transportation Report e-newsletters.

In addition to online outreach, the Community Development Department conducted 11 in-person outreach events at outdoor locations across the city between September 17-October 2, following City of Cambridge COVID-19 guidelines (additional in-person outreach events were planned beyond October 2 but were cancelled due a change in City policy regarding activities during the COVID-19 pandemic). At these outreach events, staff members shared information about the Bicycle Plan, collected paper copies of the Community Needs Survey, and provided printed instructions for taking the Community Needs Survey online. Outreach locations were chosen to reach community members in as many different areas of the city as possible.

In-Person Outreach Events

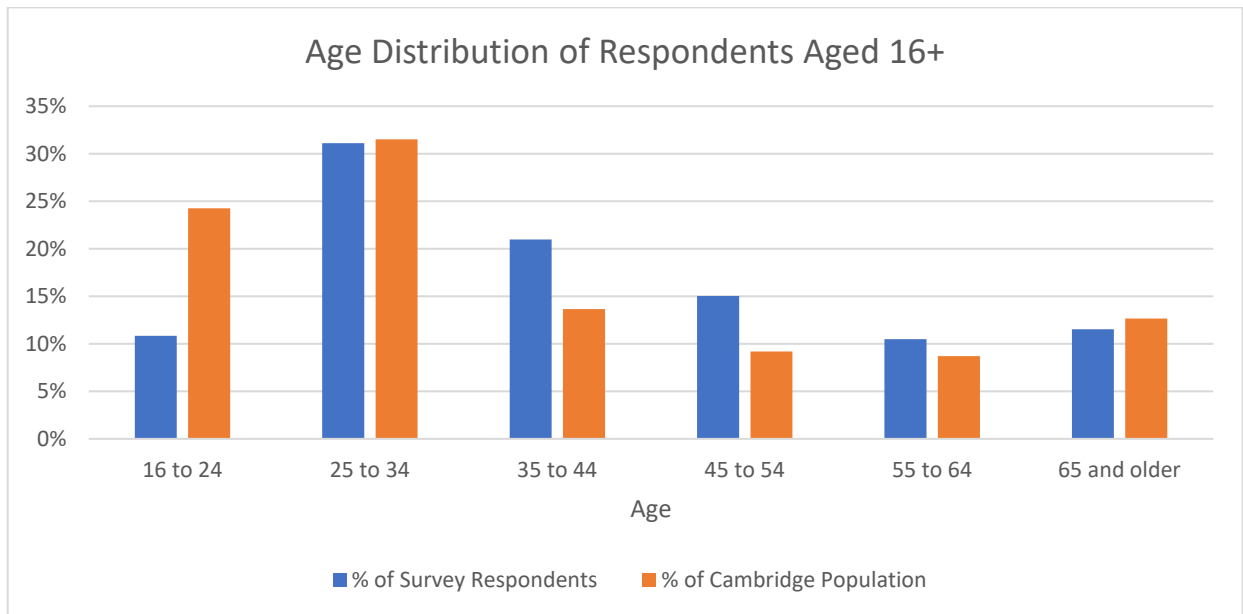
| Date | Location |
|--------------------|--|
| Thursday, 9/17/20 | Starlight Square (Pop-up event space at 84 Bishop Allen Dr.) |
| Sunday, 9/20/20 | Fresh Pond (Cambridge Water Dept.) |
| Tuesday, 9/22/20 | Starlight Square |
| Thursday, 9/24/20 | Gold Star Mothers Park |
| Friday, 9/25/20 | Sennott Park |
| Saturday, 9/26/20 | Danehy Park |
| Sunday, 9/27/20 | Cambridge Common |
| Tuesday, 9/29/20 | Starlight Square |
| Wednesday, 9/30/20 | Russell Field |
| Thursday, 10/1/20 | Dana Park |
| Friday, 10/2/20 | Greene-Rose Heritage Park |

Who took the survey?

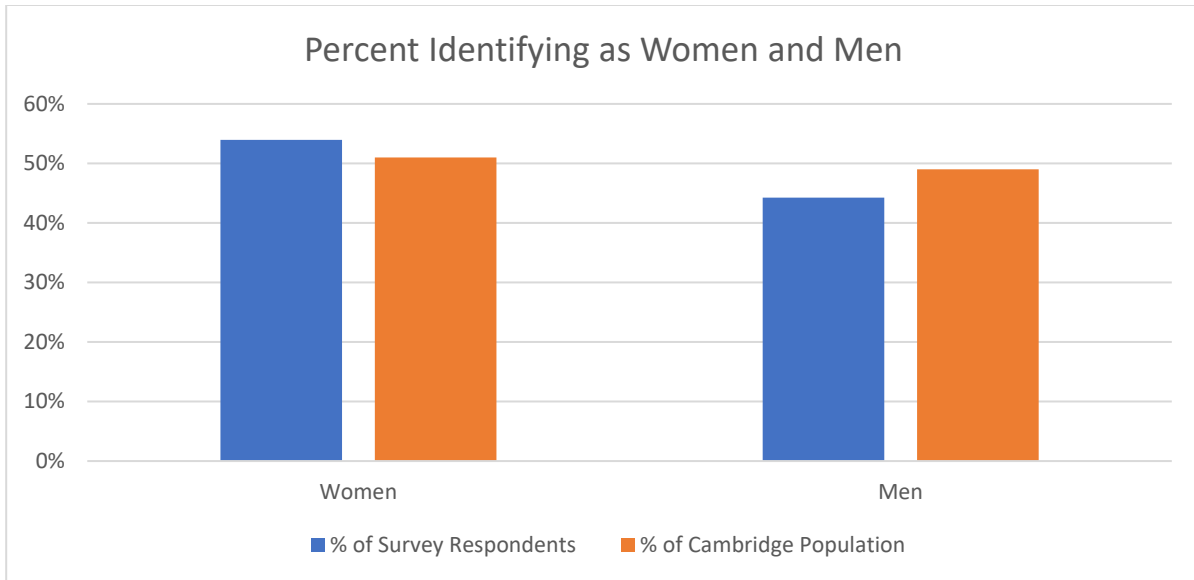
All questions on the survey were optional, so the following are based on the respondents who provided demographic information.

- 92% of respondents lived in Cambridge (294 total responses)
- 54% of respondents identified as women, 44% identified as men; 2 respondents identified as non-binary, 2 identified as queer, and 1 identified as fluid (278 total responses)
- Just over half (52%) of respondents aged 16+ were between the ages of 25-44; 3 respondents were under 16 (289 total responses)
- 77% of respondents identified as White, 9% identified as Asian, 5% identified as Black or African American, 6% identified as other races, 3% identified as two or more races (280 total responses)
- 8% of respondents identified as Hispanic/Latinx (291 total responses)

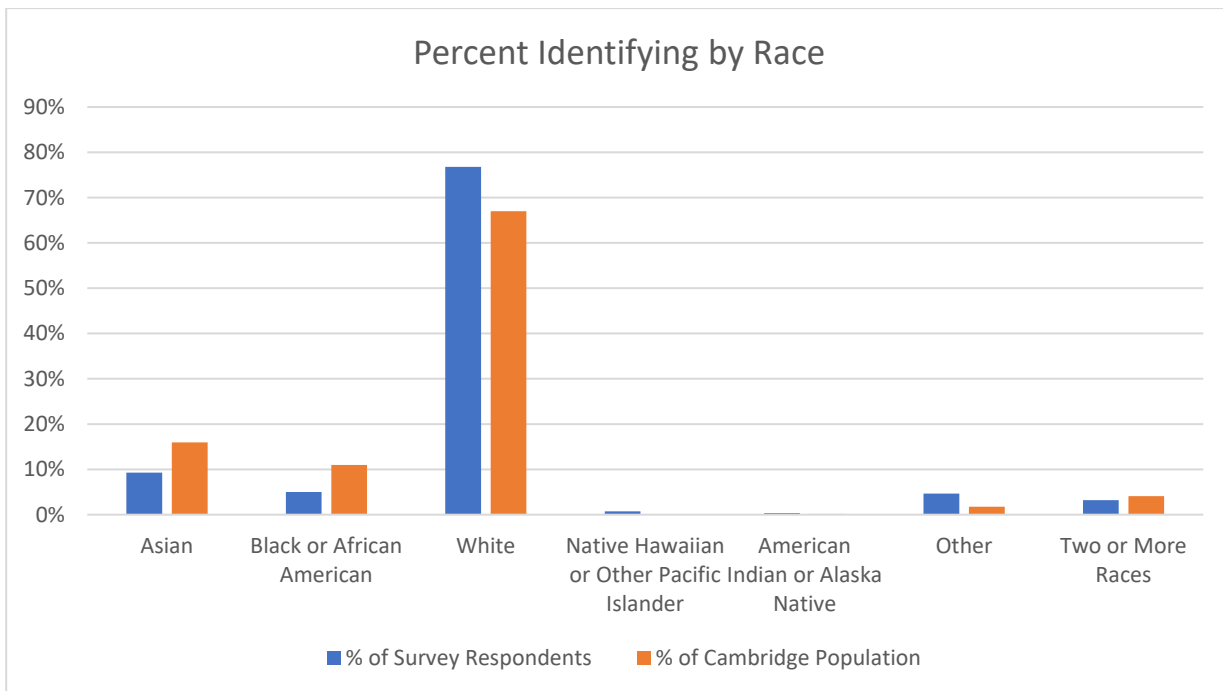
The charts below show how the survey respondent demographics compare to Cambridge overall.



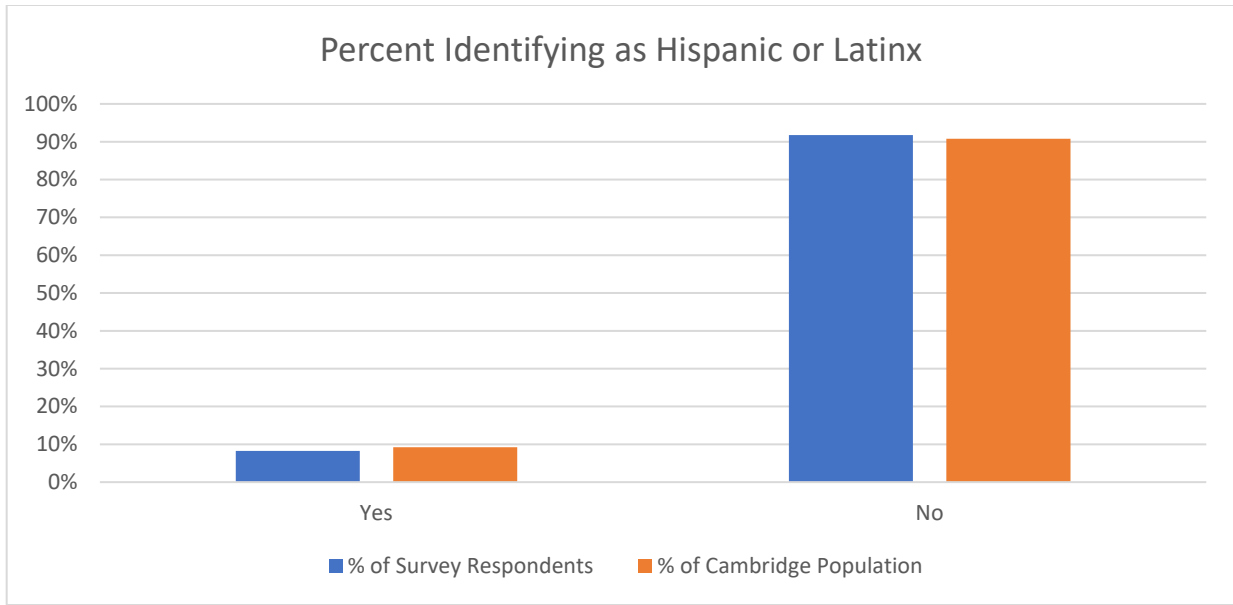
The population aged 16-24 was underrepresented in the survey and the population aged 35-54 was overrepresented.



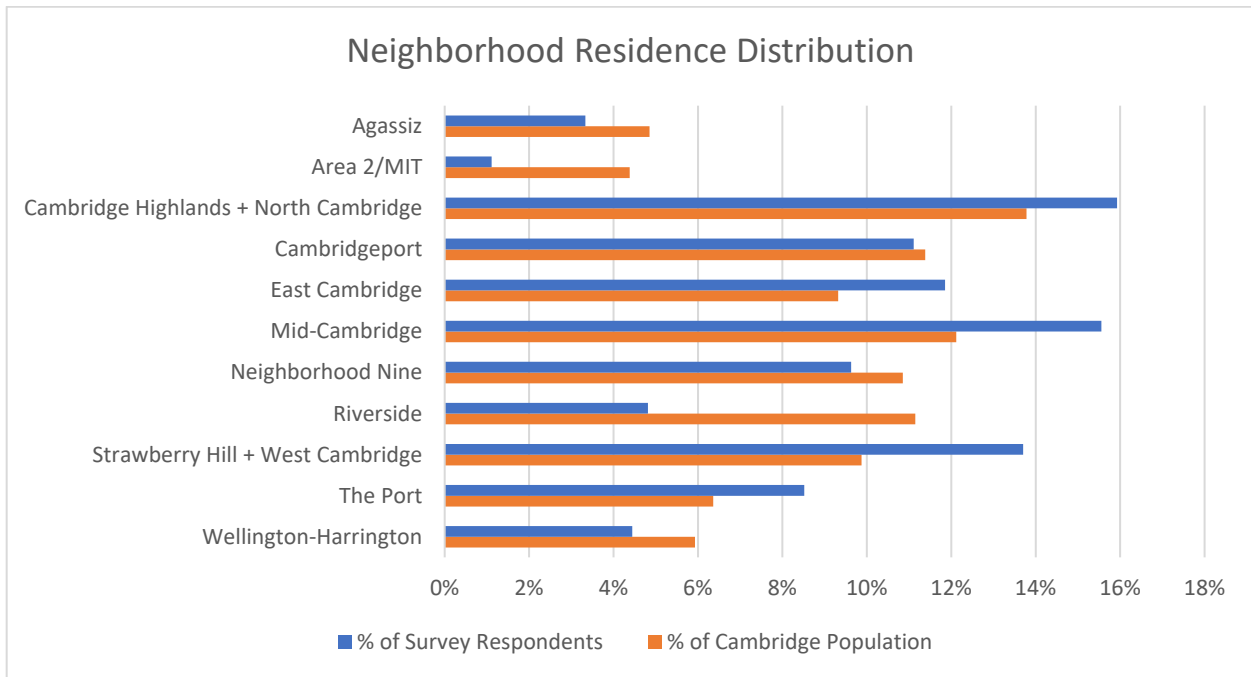
Women were slightly more represented in the survey than men.



People identifying as White were overrepresented in the survey and people identifying as Asian and Black or African American were underrepresented in the survey.



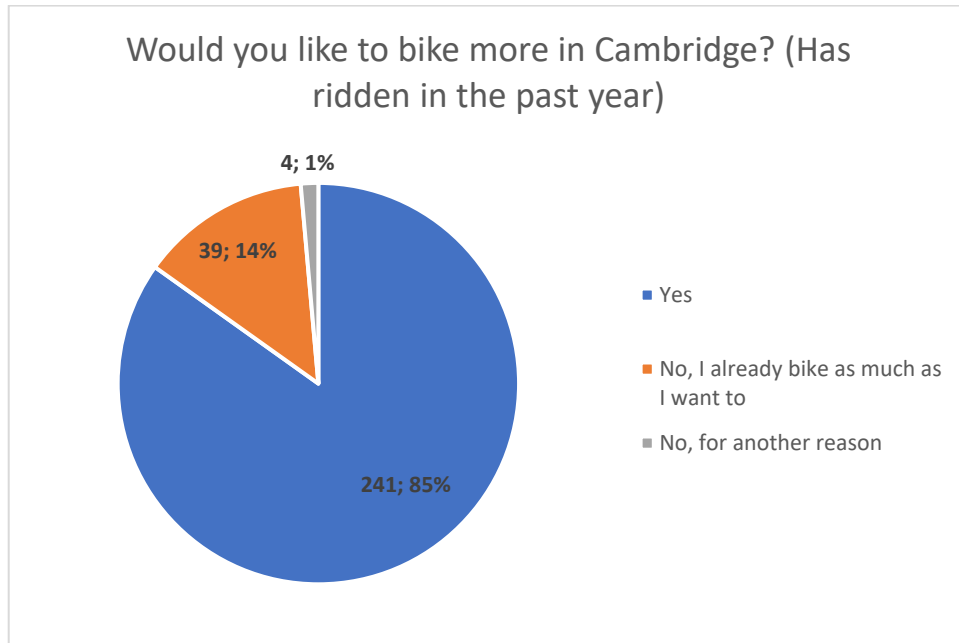
The percent of respondents who identified as Hispanic or Latinx was approximately equivalent to the overall Cambridge population.



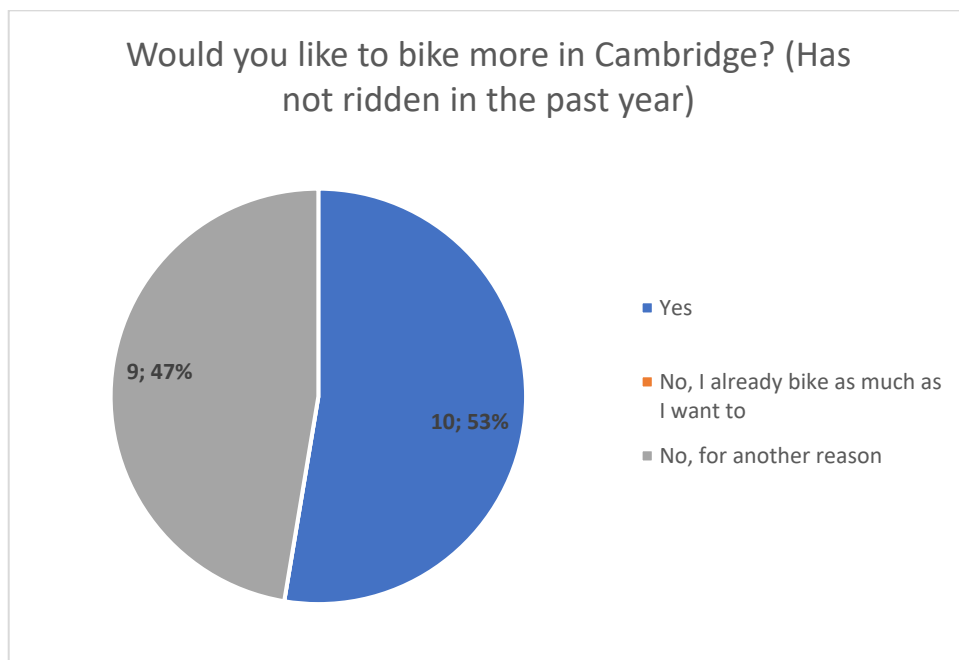
Representation varied widely across neighborhoods. Residents of Area 2/MIT and Riverside were most underrepresented and residents of Mid-Cambridge and West Cambridge were most overrepresented.

Desire to Bike More

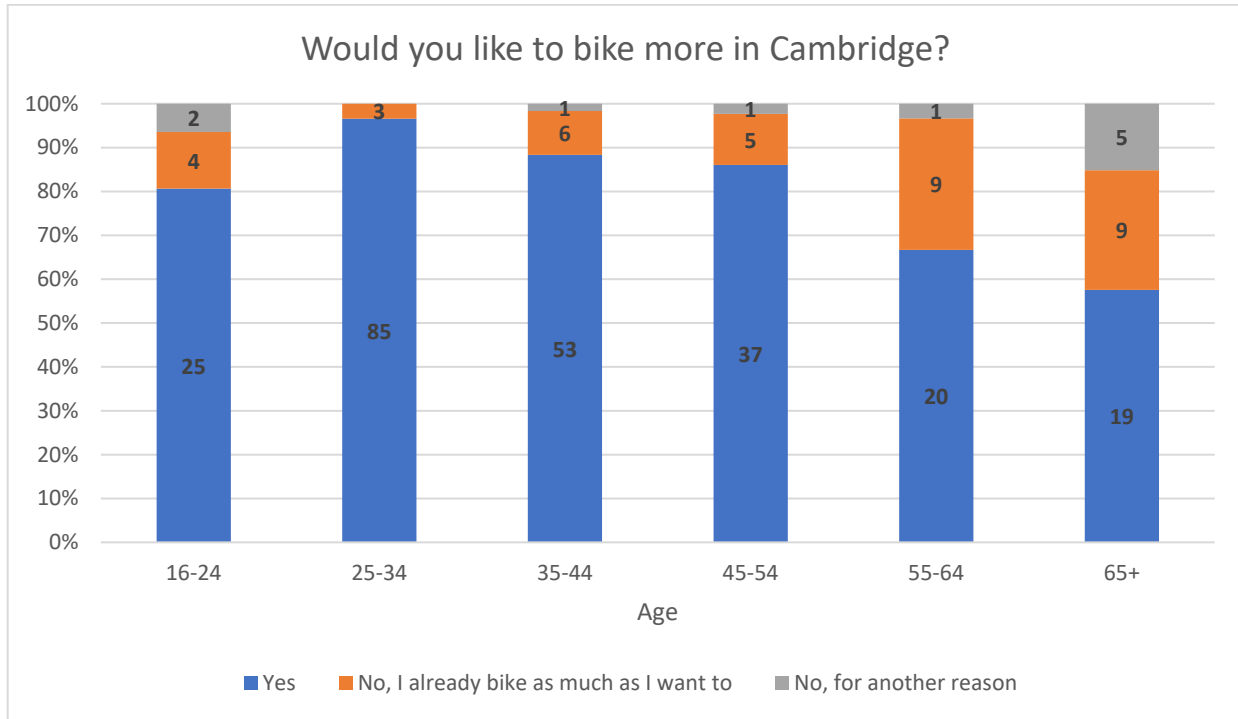
The vast majority of respondents (94%) had ridden a bike at least once within the past year. Of those who have ridden at least once within the past year, 85% responded that they would like to bike more in Cambridge. Among the 43 respondents who answered that they do not want to bike more, 39 said they already bike as much as they want.



The 19 respondents who had not ridden a bike in the past year were almost evenly split between those who want to ride more (10) and those who do not want to ride more (9).



Interestingly, nearly 29% of overall respondents aged 55 or older answered that they already bike as much as they want to, while only 8% of respondents aged 16-54 answered that they bike as much as they want to. Among respondents aged 25-34, less than 3% answered that they bike as much as they want to.



Open Response Questions

The survey asked two open response questions:

1. If you would like to bike more, what prevents you from biking as much as you would like to?
2. If you would like to bike more, what could the City of Cambridge do to help you?

For both questions, City staff read each individual response, grouped together similar answers into “codes”, and counted the number of responses for each code. The codes were then grouped into larger groups of similar “categories”. The top 10 most frequently answered codes for each question are given below. For a full list of codes and categories, see Attachment 1.

If you would like to bike more, what prevents you from biking as much as you would like to?

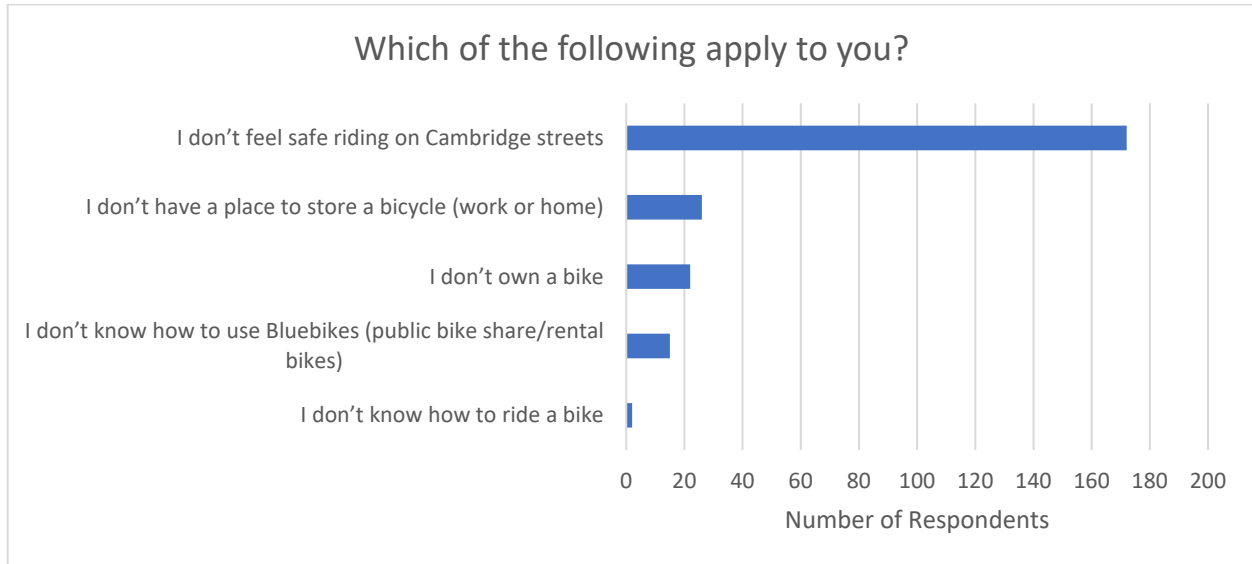
| Rank | Code | Number of Responses |
|------|--|---------------------|
| 1 | Lack of safe spaces/separation for bikes | 152 |
| 2 | Lack of a connected bike network | 45 |
| 3T | Dangerous intersections | 18 |
| 3T | Bad weather/winter | 18 |
| 5T | Bad/aggressive drivers | 16 |
| 5T | Not safe for kids | 16 |
| 7 | Vehicle speeds | 14 |
| 8T | Vehicles in bike lanes | 13 |
| 8T | Poor road surface conditions | 13 |
| 10 | Lack of secure storage/theft | 11 |

If you would like to bike more, what could the City of Cambridge do to help you?

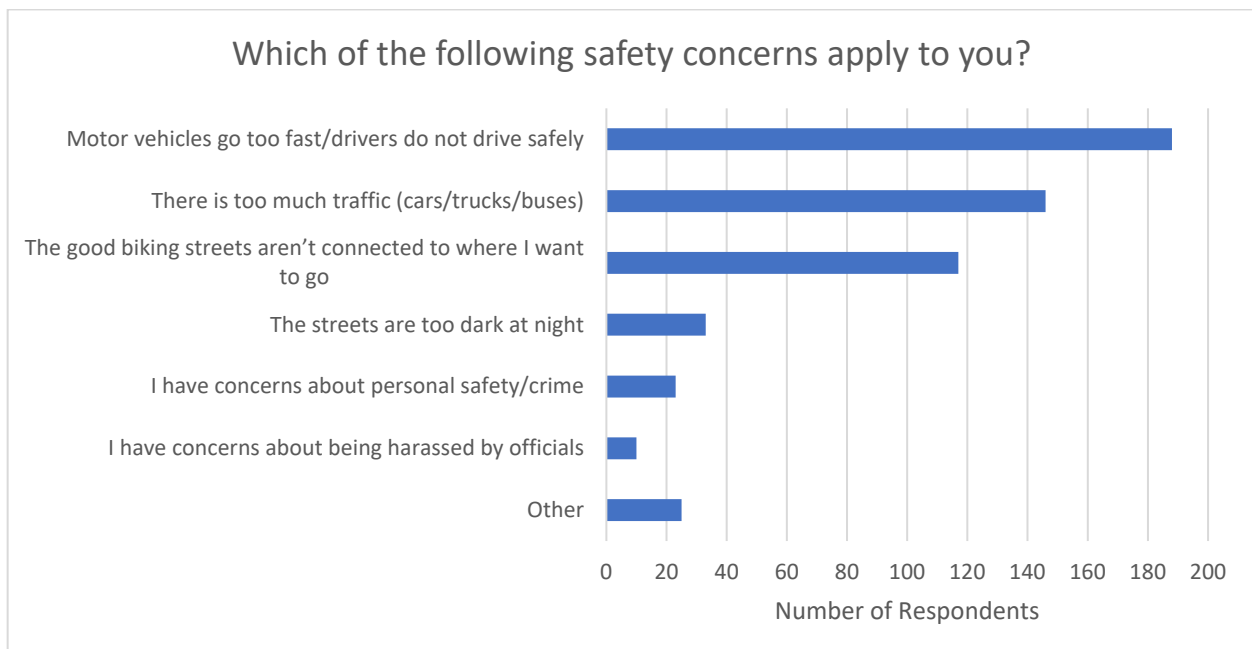
| Rank | Code | Number of Responses |
|------|---|---------------------|
| 1 | More protected/separated bike lanes and paths | 121 |
| 2T | More connected network/more consistency | 28 |
| 2T | More bike lanes | 28 |
| 4 | Enforcement for drivers | 24 |
| 5 | Enforcement and accountability for cyclists | 13 |
| 6T | More bike signals | 12 |
| 6T | More bike parking | 12 |
| 8 | Driver education | 11 |
| 9T | Better road and bike lane surfaces | 10 |
| 9T | Better wayfinding and signage | 10 |

Barriers and Safety Concerns

When asked to select all that apply from a list of barriers to biking, by far the most common response was “I don’t feel safe riding on Cambridge Streets.” This was consistent when comparing across age, gender, and neighborhood. The sample size for racial demographics was not large enough to conduct cross-analyses.



The survey also asked respondents to select all that apply from a list of safety concerns. The most frequently selected safety concerns were “Motor vehicles go too fast/drivers do not drive safely,” “There is too much traffic (cars/trucks/buses),” and “The good biking streets aren’t connected to where I want to go.”



Attachment 1

If you would like to bike more, what prevents you from biking as much as you would like to?

| Category | Code | Number of Responses |
|----------------------|--|---------------------|
| Infrastructure | Lack of safe spaces/separation for bikes | 152 |
| | Lack of connected network | 45 |
| | Dangerous intersections | 18 |
| | Road surface conditions | 13 |
| | Too dark at night | 7 |
| | Multi-use paths too narrow | 6 |
| | Poor maintenance of bike lanes | 6 |
| | Construction blocking bike lane | 3 |
| | Lack of wayfinding/knowing my way | 2 |
| | Don't like separated bike lanes | 1 |
| | Not enough crossings along parkways | 1 |
| Driver Actions | Bad/aggressive drivers | 16 |
| | Vehicle speeds | 14 |
| | Cars in bike lanes | 13 |
| | Dooring | 9 |
| | Large trucks | 3 |
| Bike Parking/Storage | Lack of secure storage/theft | 11 |
| | Lack of bike parking | 10 |
| | Lack of covered bike parking | 4 |
| Barriers to entry | Bad weather/winter | 18 |
| | Don't own a bike | 4 |
| | Cost | 3 |
| | Physical limitations | 2 |
| | Don't own a helmet | 1 |
| | Get too sweaty | 1 |
| | Too hilly | 1 |
| | No bike alternatives for differently-abled | 1 |
| | Not knowing the "rules of the road" | 1 |
| | Being in the way of regular riders | 1 |
| | Lack of confidence | 1 |
| | Don't know how to bike | 1 |
| Bluebikes | Can't afford Bluebikes | 2 |
| | Bluebikes availability | 1 |
| | Need Bluebikes station at Fresh Pond Mall | 1 |
| Other | Not safe for kids | 16 |
| | Bad stories of crashes/deaths | 8 |
| | Other bikers riding dangerously | 5 |
| | Injury from bike crash in Cambridge | 1 |
| | Negative interaction with police | 1 |

If you would like to bike more, what could the City of Cambridge do to help you?

| Category | Code | Number of Responses |
|---------------------------|--|----------------------------|
| Infrastructure - General | More protected/separated bike lanes and paths | 121 |
| | More bike lanes | 28 |
| | More bike signals | 12 |
| | Better road/bike lane surfaces | 10 |
| | Better bike lane clearance/drainage | 5 |
| | Leading signal interval for bikes | 4 |
| | More contraflow | 3 |
| | Safer/protected intersections | 3 |
| | Less separated bike lanes | 2 |
| | Better signal timing | 2 |
| | Better path lighting | 1 |
| | More green paint | 1 |
| | More permanent separation barriers (curbs not flexposts) | 1 |
| | Road diets | 1 |
| | Wider bike lanes | 1 |
| More bike boxes | 1 | |
| Infrastructure - Specific | Separation on Cambridge St | 3 |
| | Improve Mem Dr bike path | 2 |
| | Contraflow on Sparks St | 2 |
| | Better bike facilities on Sherman St | 2 |
| | Bike lane on Putnam Ave | 1 |
| | Bike lane on Prospect St | 1 |
| | Bike lane on Rindge Ave | 1 |
| | Bike lane along Mem Dr | 1 |
| | Cambridge St/Broadway one-way pair | 1 |
| | Keep Inman Sq one-way/contraflow | 1 |
| | Bike lanes on both sides of Cameron Ave | 1 |
| | More space for bikes and peds on Alewife Brook Pkwy bridge | 1 |
| Connectivity - General | Better connections/more consistency | 28 |
| | Better wayfinding/signage | 10 |
| | Connections to neighboring cities | 3 |
| | Connect neighborhoods to schools | 1 |
| Connectivity - Specific | Connect Central, Inman, Union Squares | 3 |
| | Better routing through Harvard Sq | 2 |
| | Connections from Alewife to Porter | 1 |
| | Connect Huron Village to Mem Dr path | 1 |
| | Connect North Cambridge to the heart of Cambridge | 1 |
| | Better bike connections in Alewife | 1 |
| | Safer routes around Fresh Pond | 1 |

| Category | Code | Number of Responses |
|----------------------|--|---------------------|
| Road Users | Enforcement for drivers | 24 |
| | Enforcement/accountability for cyclists | 14 |
| | Driver education | 11 |
| | Better bus driver awareness | 2 |
| Vehicle Restrictions | More car-free areas/streets | 9 |
| | Restricting trucks | 8 |
| | Slow down cars | 8 |
| | Fewer cars | 7 |
| | Lower speed limits | 4 |
| | Close Harvard square to cars | 3 |
| | Extend Mem Dr closures | 2 |
| | More speed bumps | 1 |
| | Keep high speed e-bikes off bike facilities | 1 |
| | More road closures like Mem Dr | 1 |
| | Ban cars from major squares | 1 |
| Shared Streets | Expand shared streets | 9 |
| | Prevent thru-traffic on shared streets | 2 |
| | Slow traffic on shared streets | 2 |
| | Remove shared streets | 1 |
| Bike Parking/Storage | More bike parking | 12 |
| | Improve security/long-term bike parking/reduce theft | 3 |
| | More covered bike parking | 2 |
| | More bike parking at the library | 1 |
| | Bike parking on Harvard St | 1 |
| | Bike parking in parking garages | 1 |
| Bluebikes | More Bluebikes stations | 1 |
| | Improve Bluebikes quality | 1 |
| | Free Bluebikes passes | 1 |
| | Bluebikes options for differently-abled (three-wheel, mobility scooter, etc) | 1 |
| Other | Better guidelines for construction crews | 1 |
| | More public toilets | 1 |
| | Prevent blocked bike lanes in Central Sq | 1 |
| | Map/app with best bike routes | 1 |
| | Helmet rental | 1 |
| | Free air stations | 1 |
| | Allow Idaho stop | 1 |
| | Allow sidewalk riding | 1 |
| | De-escalation training for police | 1 |
| | Give out free lights | 1 |
| | Support Cambridge Bike Give Back | 1 |

| Category | Code | Number of Responses |
|-------------------|-----------------------------------|----------------------------|
| Other (continued) | Make lane paint less slippery | 1 |
| | A place for kids to learn to bike | 1 |
| | More bike repair stations | 1 |

APPENDIX C: CAMBRIDGE BICYCLE CONVERSATIONS SUMMARY

1. Background

Between October, 2019 and March, 2020, 75 people who lived or worked in Cambridge were interviewed about biking and transportation in the city. Deliberate efforts were made to hear from people of color, seniors, people with disabilities and people participating in the city's affordable housing programs. Efforts were also made to hear from people who cycle for a variety of reasons, including for recreation, to cycle to work, to save money and to spend time with their children. Interviews were informal and took place where people were already at (such as on the street) or at locations of their choosing.

2. Summary

Many people mentioned the affordability, convenience, ease and pleasure of biking. Most people who bike frequently cited dangerous and inconsiderate drivers as the biggest source of stress. Barriers to bike include fear of dangerous driving, self-perceptions of their lack of physical ability or a sense that biking is not something commonly done in their community.

These conversations with people about their transportation and mobility experiences help inform directions and next steps that will help support people in the community and work towards more equitable engagement and access.

3. Project overview

Interviews:

Interviews were conducted in person as open-ended or semi-structured conversations. Interviews included intercept surveys on the street or in public places such as in front of a library, in senior centers, at events such as the bicycle installation nights and at pre-arranged locations suggested by the interviewee. All participants were told that the information collected will help the Cambridge Bike Plan 2020. Interviews ranged from 5-45 minutes, depending on people's ability and willingness to talk.

Interviews were conducted by Jonathan Shapiro Anjaria, a professor of Anthropology at Brandeis University, Cambridge resident and member of the Cambridge Bicycle Committee. Two additional members of the Cambridge Bicycle Committee— Dien Ho and Gloria Huangpu—conducted interviews at the November Central Square bike lights give away event and Dien Ho assisted with conversations at the November Fletcher Maynard Academy listening sessions.

At the bare minimum, we asked people why they cycled, what aspect of cycling caused stress and what streets they avoided. Longer conversations included topics such as stories and anecdotes about their experiences cycling, their thoughts on cycling infrastructure in the city and how the city can improve community engagement related to transportation projects. For infrequent cyclists, we emphasized perceptions of cycling as a transportation option.

Interview locations: North Cambridge Senior Center, Cambridge Public Library - Central Square branch, Cambridge Public Library - main branch, Carl Barron Plaza, Porter Square, Inman Square, the intersection of Windsor St. and Broadway, JFK apartments, Central Square Senior

Center, Massachusetts Ave and Western Ave., the Fletcher Maynard Academy, Massachusetts Ave and Albany Street, The War Memorial Recreation Center.

Listening sessions: On November 21, 2019 we held a series of focus group/listening sessions about transportation in Cambridge at the Fletcher Maynard Academy. These sessions coincided with the school’s “Dinner of Thanks” event which attracts students and families from around the city, especially the Port neighborhood. Topics ranged from housing to streets, public safety, gentrification and barriers to bicycling.

Demographics:

We heard from 75 people (37% Black, 39% white, 12% Latinx, 10% Asian, 2% multi-racial; 60% female, 39% male, 1% non-binary; age — 19% 24 and under, 16% 25-34, 22% 35-44, 12% 55-64, 31% 65 and over). Because not everyone filled out the voluntary demographic survey these numbers provide a *rough approximation* of the interviewees and should not be taken as a precise reflection of the demographics of everyone who participated.

4. Why people bike in Cambridge

People bike in Cambridge for many different reasons. A large majority of people we spoke with said they bike because it is convenient and fun, although other reasons include affordability, ease of parking, speed, disability, work arrangements, or to spend time with their children. Here is a sampling of peoples’ responses (some quotes were lightly edited for clarity):

“I never have to worry about traffic or where to park. It takes the same time every trip and is faster than driving. Also, even though I don’t drink coffee, I come in raring to go. That is the greatest feeling in the world, especially as a school teacher.” — Math teacher at a Cambridge public school.

“I am a nurse and I visit seven homes a day, sometimes riding twenty five miles. I ride because there is no parking, I don't get reimbursed for parking tickets and I don't have a parking permit.” — Nurse and home healthcare supervisor.

“I’m 86 years old. And if it wasn’t for the bike I wouldn’t get out much. I have sciatica in my legs. It’s a nerve thing. I can’t stand up too long. But with a bike I can be out all day long. I love bikes. If they took this bike I’d be heart-broken, crying every day. I take it home, keep it inside, right next to me, right next to my bed so I can get up and jump on it!—Street interview at Carl Barron Plaza.

“I’m in the union, I do construction. The wear and tear on my hip just wore it down. I got real severe arthritis. It's so bad that they have to give me a total hip replacement. I'm stuck in the house all day. I'm out of work now. The only exercise I can get is riding my bike. Riding a bike — you're not putting any weight on the hip, you're just doing a pedal motion. It's the only exercise I can get all day. If I don't go for a bike ride all day, I'm going crazy.” —Roofer who rides daily with his son.

“These are my two kids. The one in front, I can just be right next to him. The one in the back, we can talk about what we see and point out different features of the city. It is great we get to go outside together and see the city. I've lived here for eight years and things have improved a lot. I've seen changes to streets that were a bit hairy before. I am excited that there is even more changes that are going to happen.” — Bicycle commuter during the week and leisure rider with children during weekends.

“The T runs on their schedule. When you are ready to go somewhere, you shouldn't have to wait a half hour. On a nice day like this, Sunday, don't wait for the bus, just get on your bike and ride. On a bike you can go anywhere, any route.” — Bicycle commuter at a Bike Fix-it event.

“I live in Cambridge and bike to save money. It is less expensive transportation. In the past twenty years maybe I've used public transportation maybe twenty times. That's more money in my pocket!” — cook at Harvard Square restaurant.

“I came out to Cambridge in 1972 with old Schwinn tied to the roof and when I got here I sold the car and just used the bicycle. Back then, on Massachusetts avenue everything with wheels was out there— rollerbladers, buses, cement mixers and bikes. So I guess I was a cyclist in the city before it was a hip thing.” — Senior who bikes daily to local stores.

“I use the bike for commuting, going to work, taking the kid to the doctor, taking the kid to the day care and going grocery shopping. Before we used to take Uber to Market Basket. I would say that in the past seven months, we have saved easily about \$500.” — Cargo biker who rides daily with his daughter.

“I love the exercise. I love that it's free. I love that there's no traffic. I try to encourage people to do this all the time. I'm on Instagram all the time. I'm on Facebook all the time. I'm always putting up the pictures, 'Look at me, not in traffic.'” — Bicycle commuter between Harvard and Arlington.

“I feel the air. I feel the temperature. I feel more connection with how nature is. I see more actually, I see the sky more. I'm exposed more to things that you wouldn't in a car.” — Senior biker.

“It is lovely biking around here. I find it fun in the morning commuting to work. It is like 30 minutes [driving] with traffic, 29 minutes on the T and 18 minute bike ride! Biking wins again!” — Bike commuter

“I had a kid three years ago. That changed my cycling. It took a year to convince my Husband I ride differently with her. I ride at a quarter of the pace. Now she's like, 'I want to go on the bike' instead of the stroller. People always wave to her on the street.” — Family biker who rides daily with her daughter.

“One of the great things that Cambridge is doing, they're starting to install these bike lanes, which make a complete difference. First of all, I'm shielded by people who are

parked so that a motorist who might be under the influence or just reckless or not thinking cannot reach me.” — Senior biker.

5. Stresses

Dangerous driving was by far the most common source of stress while cycling (mentioned in over 20 interviews). Other stresses included bicycle theft and storage issues, blocked bicycle lanes, weather, and the need to ride on sidewalks. Here is a sample of responses:

“People who drive cars think they own the road and they don't.”

“I am regularly pushed into traffic because there is a car parked in the bike lane.”

“Basically we have to be ultra-defensive, which I guess is good anyways, but it causes us to stop and start again. I don't think drivers know how much energy that takes.”

“I know the laws that you have access to the full road, but genuinely, I try to stay off on the side. Sometimes, especially on left turns, I have to be on the main road to be able to make that turn.

Clothing:

One person noted that the clothes he wears affects how drivers treat them on the road. A crossing guard who bikes to work said: “when I don't wear a uniform, it's bad out there. When I wear a uniform, it is better. I get more respect from drivers when I wear my uniform.”

Sidewalk riding:

Sidewalk riding came up in eleven interviews. Many participants said they felt compelled to ride on the sidewalk in spots where riding on the road felt too dangerous. Riding on the sidewalk, even legally, puts people at risk of harassment or worse from the police. Furthermore, most people (cyclists and non-cyclists) were unaware that it is legal to bike on sidewalks outside of business districts.

“I feel there is no need for a law that bikes can't be on the sidewalk. I don't want to get a ticket! Right here on Mass Ave, they stop people all the time. I don't really see the point. We aren't a vehicle, or motorcycle or moped.”

“I ride on the sidewalk because it is safe and don't feel comfortable biking on roads without paths. I only feel safe on Western Ave.”

“It can be a bit hairy and the only way across is to sort of take the pedestrian path”

“Sometimes I do not ride in the street [Mass Ave.]. Like, I will take my chance riding on the sidewalk.”

Snow clearance:

A few noted drivers become aggressive in the winter: “the first to go are the bike lanes because the snow is pushed to the side. And bike lanes are the least sort of priority in terms of getting plowed.”

Bike lanes:

“I am regularly pushed into traffic because there is car parked in the bike lane.”

6. Problem spots

While it is not the only problem street, the consensus is that Massachusetts Avenue is the worst place to bike on in Cambridge. Despite this, many people report cycling on Massachusetts Avenue because it is such an important artery.

Massachusetts Avenue:

“Central is good if you go in one direction but it is a problem when you need to turn.”

“Mass Ave. I tried to avoid it. There are a lot of buses, a lot of cars. So I use Broadway instead.”

“It is a bit hairy and I think most people don't bike all the way up Mass Ave.”

“But I will not, it's a last resort and only if necessary, bike through Harvard Square.”

“The corner of Mass Avenue and Vassar is a difficult intersection to make a left turn on.”

“Mass Ave could really use some work. — The entire thing. It's so bad. Especially like, yeah, the part from like Harvard to Central, there's like nothing, and people are always angry. So, that's always a frustrating section.”

Quincy St./Broadway intersection:

“you have also cars going straight, as well as to the right. From where you're coming from, it's only left. I think the cars coming straight don't always know that.”

Broadway:

“It's much more nerve wracking because you are so close to cars. The car door opens and sometimes you have to go right into the car lane.”

Prospect St. (especially near Central):

“I'm very careful to avoid Prospect Street and Mass Avenue and Central Square, where there've been a number of accidents”

Bishop Allen Drive:

“I take Bishop Allen to go to work. Lots of [potholes]. There are a lot, especially around construction areas. It is unsettling.”

All intersections with Memorial Drive (such as Western and River St):

“I live by Memorial Drive. That to me is the most negative area. Crossing is impossible. The sidewalks are narrow and bumpy. It is the least pleasant place [to bike], even though the area is so beautiful.”

7. Barriers

While dangerous driving was mentioned by many people as a reason they do not bike, people also mentioned other barriers such the lack of secure bicycle parking, access to age-appropriate bikes and concern over how it would be perceived.

“I used to cycle in Jamaica but not after coming to Cambridge. We saw bicycles like it was a primitive thing.” — Cambridge Senior Center interview.

“I find walking more convenient than biking because you have to worry about stuff. A lot of kids bike to my school and those are always full. So, that's like extra time to wake up in the morning, to ride to school, and try to find a spot that's convenient to park your bike.” —FMA listening session, CRLS student.

“Where I live there are a lot of bikes getting stolen. I refuse to leave it outside. Where I live I always bring it inside. But the building is conservative about it. Saying don't bring it inside.”— Central Square interview

“At my house, there's no storage. Well there's storage for bikes, but it's outside. So, the Blue Bikes is super convenient for us in the summer.” — FMA listening session

“I can't imagine it's pleasant riding a bike in Cambridge. I mean, I think there are advantages for your health, for the environment, but I would think it'd be kind of nerve wracking.” — Cambridge Senior Center

“I just wouldn't bike I wouldn't feel safe, but my son used to bike, but I was always scared for him when he was biking. So anything can happen.”— FMA listening session

9. Equity

Conversations revealed that few people see biking separately from other issues in the city. Effective community engagement begins from the premise that biking does not exist in isolation from other city issues, whether that is affordable housing, racial inequality, gentrification and policing. Intentional efforts need to be made to invite local organizations with deep roots with communities of color in the planning and organizing of fun bike rides. Moreover, opportunities for people to get children's bikes or affordable used bikes will make biking more accessible to low-income households in Cambridge:

Community meetings:

“The city does those hearings but I always feel they already have narrowed it down into a certain option. They will organize public hearings on bike lanes but there has to be a broader conversation. Because the thing is that the issue of transportation does not exist in isolation.” — Family biker

“[Community meetings] it's a waste of my time. And then I have to find childcare for my kids. But if they have a big open events that parents can attend, that kids can attend...like maybe some sort of an event that like, you know, has play time and stuff for kids some parents don't have babysitters can participate.”— FMA listening session

Community-organized fun rides:

“I like that they shut down a section of Memorial Drive. If we can do that somewhere closer to, like, Kendall. Something towards this end [the Port] or even by the mall.”— FMA listening session.

“It would be good to have an easier location for access to cheap bikes. Seems like there isn't a lot of places to buy used bikes.” — Central Square street intercept survey

Senior outreach:

On one hand, there is a sizable population of seniors in Cambridge who bike. Many of whom do so because they find biking to be easier than walking. On the other hand, many seniors have a self-perception that they cannot bike. Offering classes for seniors should help. An 80 year old man who cycle frequently cautioned that these classes need to be marketed carefully. He said that these classes should sound like a fun social activity and not as an obligation and not patronizing. Having tricycles and an elderly instructor present will also help:

“Any statement or invitation should have elements of, ‘Come have fun together with a group of other people who want to explore bicycling.’ Say this isn't about whizzing around Cambridge. This is about exploring healthy, fun, relaxed exercise. Seniors and other people in this society are so overloaded with things that are good for them, which when they try, they can't do. So they say to hell with doing things that are good for you.”

10. Residents' bike-specific suggestions

- Covered bicycle parking so it is easier to park bicycles during snowy weather: “The city can really do is try to have as many covered bike parking. There are spots to park but they're not covered.”
- Bicycle-specific lights at T-junctions, especially along Mass Ave.: “It'd be really nice to have that in a few spots that are completely dead end, and we all have to stop, but there's no way that a car can run in front of you. It'd be nice if we had our own lights.”
- More closed streets: “Like how they do Memorial Drive, like do that more often, with more roads.”
- More attention to details like intersections and the location of bicycle parking: “We are adding bike lanes. But a lot of times, small things can go a long way.”

- “The city is forgetting the small things – like bike racks. There should be thoughtful approach to pick up and drop off zones, such as in front of War Memorial or in front of Cambridge library.”
- More opportunities to buy, sell and trade bicycles and gear: “Don’t make winter biking a rich person’s thing. Find creative ways to make winter biking possible. The city could coordinate community swaps or used bicycle gear events.”
- City bicycle workshops and events should be clubbed with other events: “Like Center for Families Annual literacy day.”
- More bike lanes: “Make sure every single street has a bike lane. That way I feel protected. If a car is not respecting that space, I can call them out. If there is no lane, I don’t feel empowered to call them out.”
- Better enforcement of bike lane blockage: “I think that could immediately improve is for bike lane blocking to be enforced. Now it is a joke. It is a convenient place for an Uber to park, or anyone else. If you go on a bike from Harvard square to Boston, I could take 100 pictures of cars blocking the lane in 24 hours.”
- Opportunities for unhoused people to do bicycle maintenance: “I’m always having problems with maintenance. I need a warm space to do bike repairs. I tried repairing my bike on the MBTA platform at Harvard but they wouldn’t let me do it there. You can’t do mechanical work when hands are cold. Try using tools to screw things, nuts and things, small parts, you can’t work them”

11. Residents’ street and transportation comments

Three non-biking transportation themes that came up frequently were inadequate street lighting, uneven brick sidewalks and the difficulty seniors have on buses.

Lighting:

“I’m terrified to even walk home tonight because there’s no lighting.”

“I feel like it’s getting darker at the streets of Cambridge. I don’t feel like they’re lit up well.”

“On Cherry street, between Cherry street and Washington street they need to have better light in there to, because there’s a park there and it’s so dark.”

“If you go down this way, Windsor Street is dark. One part it’s light, one part is dark, lighting it’s bad.”

Sidewalk conditions:

“We have a lot of sidewalks that still need to be tended to. I’ve fallen a couple of times because of weirdness on the sidewalks. I also think that at night we don’t have really good

lights when you're walking down certain side streets or neighborhood streets, which can be creepy.”

“There's bricks here and there that are actually raised and some are missing. So it's not easy if you're walking down the street late at night, it's not really lit. You can easily fall and hurt yourself.”

"I broke my ankle and it's just the sidewalks, you got trees growing out.”

Buses:

“There's a lot of seniors on the bus, but they will not wait a few minutes [for us to sit down]”

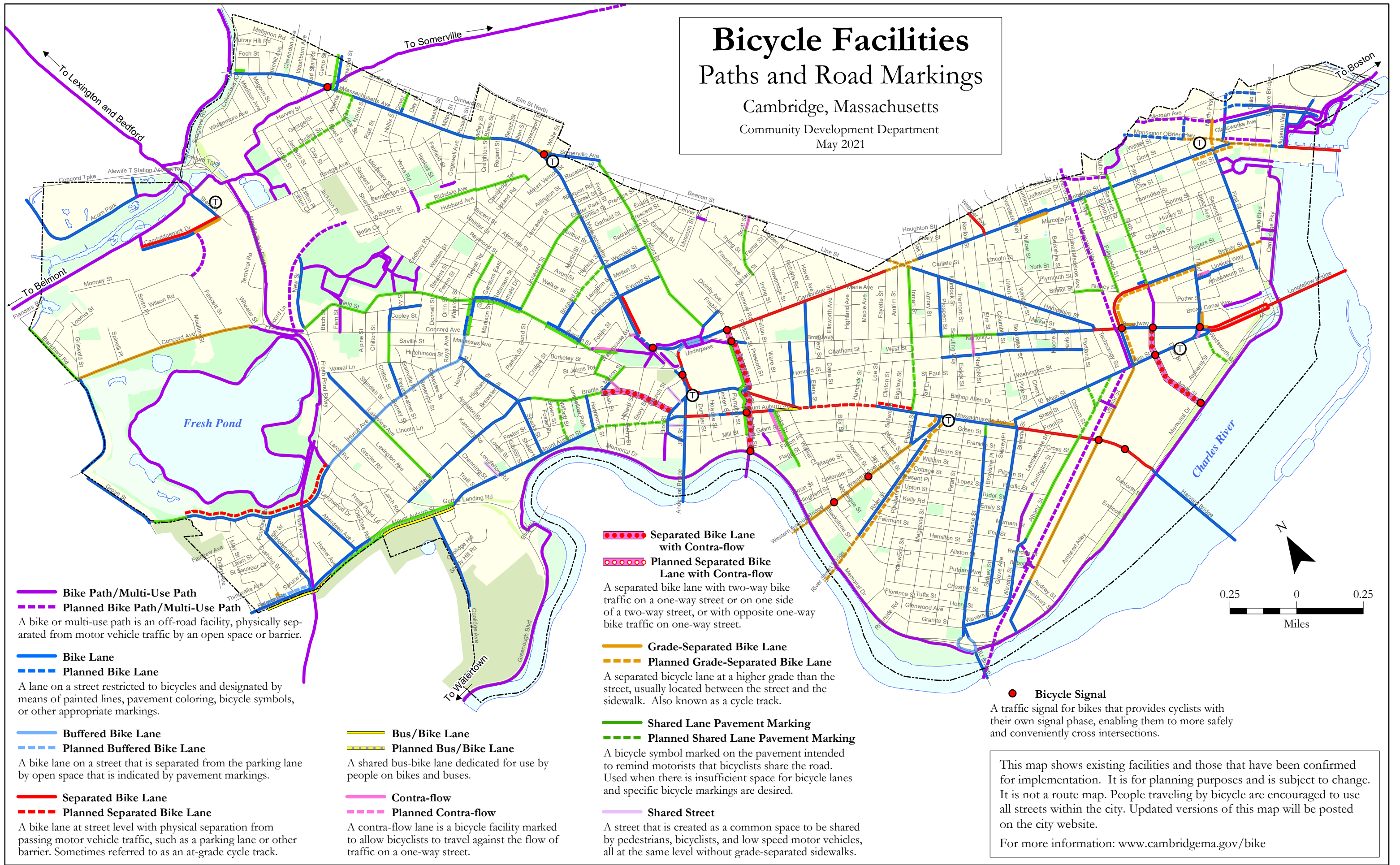
“The problem I have when I take the bus is they don't give you enough time to sit down. And I think it's terrible that they take off before you're able to sit down.”

APPENDIX D: EXISTING AND PLANNED BICYCLE FACILITIES MAP

The following map shows existing and planned bicycle facilities in Cambridge, as of May 2021. Planned facilities include those for which the design process has begun, and does not include all facilities noted on the Bicycle Network Vision.

Bicycle Facilities Paths and Road Markings

Cambridge, Massachusetts
Community Development Department
May 2021



- Bike Path/Multi-Use Path**
A bike or multi-use path is an off-road facility, physically separated from motor vehicle traffic by an open space or barrier.
- Planned Bike Path/Multi-Use Path**
- Bike Lane**
A lane on a street restricted to bicycles and designated by means of painted lines, pavement coloring, bicycle symbols, or other appropriate markings.
- Planned Bike Lane**
- Buffered Bike Lane**
A bike lane on a street that is separated from the parking lane by open space that is indicated by pavement markings.
- Planned Buffered Bike Lane**
- Separated Bike Lane**
A bike lane at street level with physical separation from passing motor vehicle traffic, such as a parking lane or other barrier. Sometimes referred to as an at-grade cycle track.
- Planned Separated Bike Lane**

- Bus/Bike Lane**
A shared bus-bike lane dedicated for use by people on bikes and buses.
- Planned Bus/Bike Lane**
- Contra-flow**
A contra-flow lane is a bicycle facility marked to allow bicyclists to travel against the flow of traffic on a one-way street.
- Planned Contra-flow**

- Separated Bike Lane with Contra-flow**
- Planned Separated Bike Lane with Contra-flow**
A separated bike lane with two-way bike traffic on a one-way street or on one side of a two-way street, or with opposite one-way bike traffic on one-way street.

- Grade-Separated Bike Lane**
- Planned Grade-Separated Bike Lane**
A separated bicycle lane at a higher grade than the street, usually located between the street and the sidewalk. Also known as a cycle track.

- Shared Lane Pavement Marking**
- Planned Shared Lane Pavement Marking**
A bicycle symbol marked on the pavement intended to remind motorists that bicyclists share the road. Used when there is insufficient space for bicycle lanes and specific bicycle markings are desired.

- Shared Street**
A street that is created as a common space to be shared by pedestrians, bicyclists, and low speed motor vehicles, all at the same level without grade-separated sidewalks.

- Bicycle Signal**
A traffic signal for bikes that provides cyclists with their own signal phase, enabling them to more safely and conveniently cross intersections.

This map shows existing facilities and those that have been confirmed for implementation. It is for planning purposes and is subject to change. It is not a route map. People traveling by bicycle are encouraged to use all streets within the city. Updated versions of this map will be posted on the city website.
For more information: www.cambridgema.gov/bike

Map prepared by Brendan Monroe on May 10, 2021. CDD GIS C:\Projects\BikePaths\Facilities11x17.mxd

APPENDIX E: BICYCLE LEVEL OF COMFORT CRITERIA

"The Bicycle Level of Comfort is discussed in depth in Chapter 5; please refer to that Chapter for background and explanation. This appendix supplies some supplemental information. In addition to the level of traffic stress factors based on the Mineta Institute Study*, the Cambridge Bicycle Level of Comfort Analysis includes the additional factors below to account for context specific traffic stress.

Mixed Traffic Stress

| BLC | 1 | 2 | 3 | 4 | 5 |
|---|---------------------------|-------------------------------|-------------------------------|--------------------------------|---|
| ADT (Average Daily Traffic - this refers to motor vehicle traffic) | <2,000 vehicles | 2,000 - 3,000 vehicles | 3,000 - 6,000 vehicles | 6,000 - 15,000 vehicles | 15K+, 4+ travel lanes total, no on-street parking, speed ≥ 30mph |

Operating Space Stress

| BLC | 1 | 2 | 3 | 4 | 5 |
|------------|--------------------|------------------|----------------------|------------------|------------------|
| ADT | no effect** | <2,000 | 2,000 - 4,000 | no effect | no effect |

Applies to streets with the following conditions:

Parking: Both sides

Travel Lanes: One

Direction: One-way

Bike Facility: Mixed Traffic

Bus Frequency Stress

| BLC | 1 | 2 | 3 | 4 | 5 |
|----------------------|--------------------|------------------|---|---|------------------|
| Bus Frequency | no effect** | no effect | Bus frequency greater than citywide average (7 Buses per hour) | Bus frequency greater than citywide average (7 Buses per hour) AND bus stop within 100 ft. of road segment | no effect |

*Mekuria, M., Furth, P., and Nixon, H., Low-stress bicycling and network connectivity, Mineta Transportation Institute (2012).

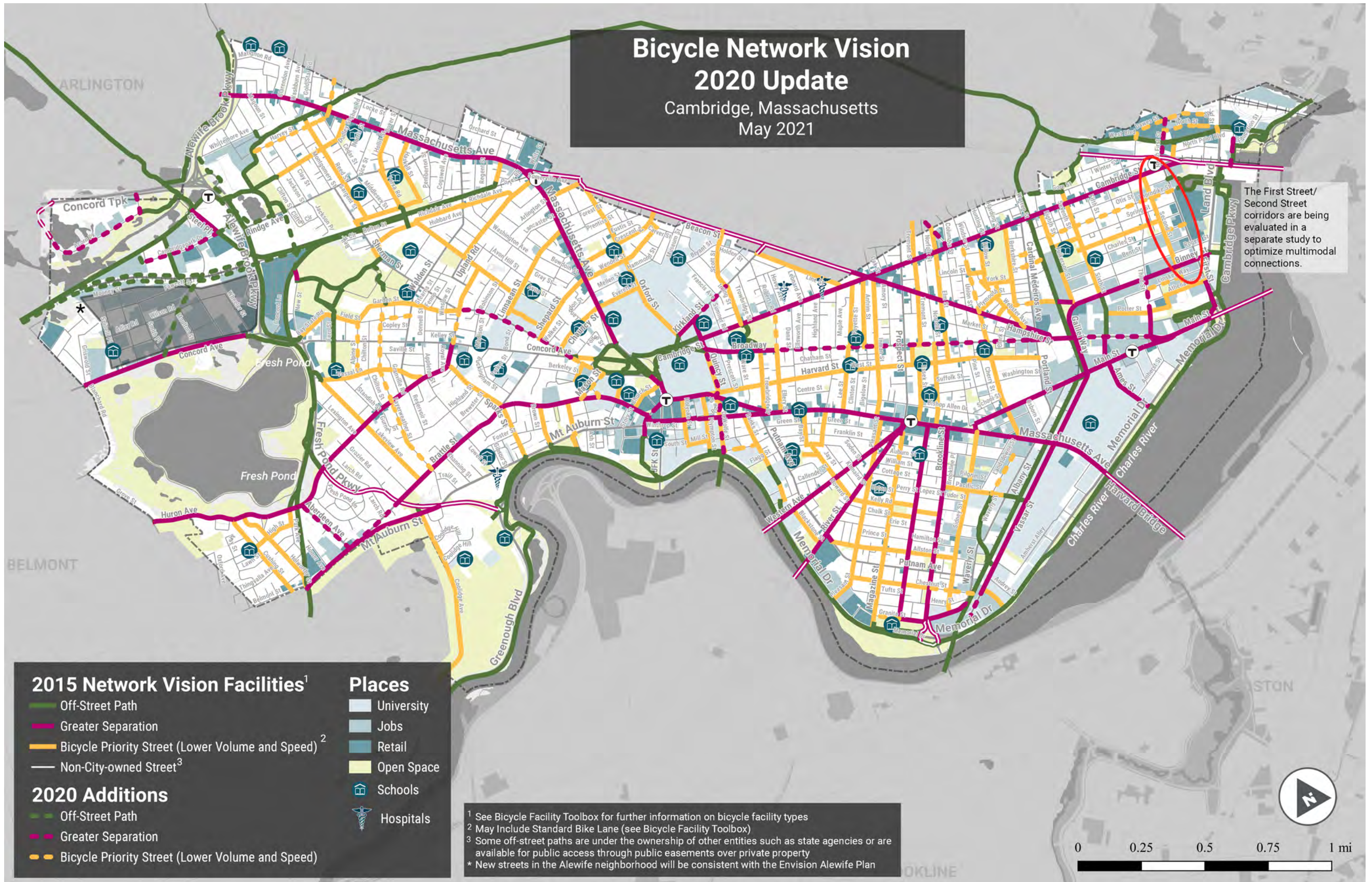
**No effect means this level of comfort is not affected by this particular factor, therefore not applicable.

APPENDIX F: BICYCLE NETWORK VISION MAP

Bicycle Network Vision 2020 Update

Cambridge, Massachusetts
May 2021

The First Street/
Second Street
corridors are being
evaluated in a
separate study to
optimize multimodal
connections.



APPENDIX G: BICYCLE NETWORK VISION RESPONSE

INTENT OF THE NETWORK VISION – ALL AGES, ABILITIES, AND IDENTITIES

The Bicycle Network Vision is a blueprint to create an interconnected system of high-comfort bike facilities suitable for all ages, abilities, and identities that links origins and destinations. The types of routes that make up this high-comfort Network Vision include:

- 1. Off-Street Paths**
- 2. Greater Separation – Major streets that can be made comfortable for biking by adding separated bike facilities (or where separated bike facilities already exist)**
- 3. Bicycle Priority Street (also referred to as “Lower volume and/or speed) – Streets that can be made comfortable for biking by adding interventions that manage vehicle volume and speed (or already are comfortable for biking because volumes and speeds are already lower).**

Streets identified as needing greater separation in the Network Vision are generally significant commercial streets or arterials that serve a travel function for all users (people walking, cycling, driving, riding in a bus, etc.). These often have higher volumes of motor vehicles, and more specifically of heavy vehicles (buses, trucks), and have greater conflicts with bus stops and parked cars.

Streets identified as bicycle priority streets either currently meet the criteria for high-comfort, or can meet the criteria with further countermeasures, such as traffic speed management or traffic volume management treatments. For further guidance on the City’s criteria for high-comfort facilities on a variety of streets, see Chapter 5 in the Bike Plan.

This palette of facility types provides three general bikeway options for creating a network that provides a consistently high level of comfort across a variety of contexts.

HOW YOUR INPUT SHAPED THE NETWORK VISION UPDATE

Community input was a large part of updating the Network Vision from the original 2015 version. This was done through in-person public engagement (including intercept survey opportunities, tabling at neighborhoods throughout the city, and an open house); meetings with the Cambridge Bicycle Committee; questionnaires and surveys available in person (hard copy) and on-line; an online WikiMap and a Cambridge-specific online commenting system. This public feedback was used to create

the updated Network Vision. Notable additions to the category for separated bicycle lanes in the 2020 Network Vision include Broadway, Aberdeen Avenue, Brattle Street between Mount Auburn Street and Fresh Pond Parkway, and Garden Street between Concord Avenue and Huron Avenue. All input was carefully considered, taking into account physical limitations of corridors, transit needs, curbside access needs, and current and likely future vehicle volumes and speeds.

BICYCLE NETWORK VISION DETERMINATIONS

The Network Vision is not intended to represent all bike facilities in Cambridge. Every Cambridge-owned street and path counts as a route for people biking; there are also many paths on state property (e.g., the Dr. Paul Dudley White Bike Path along the Charles River) and some on private property that provide public easements. The Network Vision was developed by looking at key origins and destinations and creating connections among these; those streets are then prioritized for treatment. This process is described in greater detail in Chapter 5. Many other streets currently have bike lanes or other treatments, and streets that are not in the Network Vision are still candidates for a treatment that supports people bicycling. In fact, the City of Cambridge’s goal is to make biking on every City-owned street possible and comfortable, even if the street is not prioritized in the Network Vision. The streets and paths identified in the Network Vision establish a priority network for high-comfort bicycle facilities and will undergo additional scrutiny during the planning and design process to ensure this.

During the input process, community members suggested additions to the high-comfort Network Vision, all of which were considered in the review process. Ultimately, some suggestions were not included in the final Network Vision due to physical constraints and conflicts with other priorities. Notably, there were requests for greater separation on some of the major streets, which we recognize may be desirable for people riding bikes because they provide the most direct path of travel to some destinations. Some of these streets are simply too narrow to add separated bike lanes, which would be necessary for the street to qualify as high comfort. For others, adding separated bike lanes would create excessive impacts on other priorities, such as transit. Additionally, the City has to consider how the street network functions for all uses and users, including people walking, transit, trucks delivering goods to residences and local businesses, and drivers/passengers. Changes to certain trucking and heavily used motor vehicle routes may have the unintended consequence of pushing this traffic onto residential streets. Still, these streets—as with all streets in the city—may be candidates for some other type of treatment that would improve conditions for bicycling.

NOTABLE CORRIDORS RECEIVING MANY COMMENTS ON THE DRAFT NETWORK VISION

The City received hundreds of comments on the Network Vision. While most comments affirmed the Vision, several streets received multiple comments proposing additions to the Network Vision or asking for different designations of specific streets. These streets warrant a more formal response as to why their designations were not changed as part of the

2020 update to the Network Vision. Explanations are provided below, along with identification of existing or planned parallel alternative routes to reach the same destinations—and, where relevant, how the City will work to improve these alternative routes to create a high-comfort connection.

PROSPECT STREET

Prospect Street is the most direct route between Central Square, Inman Square, and Union Square in Somerville, making it a popular street for all roadway users. Prospect also serves several important bus lines. The narrow street width and the need to accommodate bus service and goods deliveries to businesses and residences means that there is not enough room to provide high-comfort, separated bike facilities on Prospect Street. The left-turn lanes on the lower half of the corridor are necessary both for safety, as some intersections experienced high crash volumes before the left turn pockets were installed, and to avoid significant delays to bus service. While most of the corridor does not have on-street parking, even the complete removal of the one side of parking on the upper portion of the corridor would still not provide the appropriate width for adequate separated bike lanes in both directions.

However, it is clear that a safe, convenient, high-comfort bike route between Central, Inman, and Union squares is needed. The map below details an alternative route, both for northbound and southbound directions of travel, to Prospect Street. While these routes have been established (see Wayfinding maps on the [City website](#)) and certain improvements have already been made, such as the contraflow lane on Norfolk Street, the City is working towards implementing a more comprehensive bike priority streets (Lower Volume/Lower Speed) program. This program will include cohesive wayfinding, strategic traffic speed management, and traffic volume management strategies, as needed.



Figure G.1: Prospect Street High-Comfort Alternative Route

KIRKLAND STREET (PORTION)

Kirkland Street is the most direct route between Harvard Square and Union Square for all roadway users, including transit riders on the MBTA Route 86 bus, which is Cambridge's 6th-busiest bus route in terms of ridership. Bus riders currently experience high delays on Kirkland Street, particularly approaching the intersection of Washington Street, the continuation of Kirkland Street, with Beacon Street in Somerville. Given this, Kirkland Street has been identified as a priority transit street for future transit improvements. These improvements are likely to include queue jump lanes or bus lanes, which would eliminate any available space to add separated bike lanes, even if all parking is removed. Somerville recently reconfigured much of Washington Street (between Dane Street and Webster Avenue), the continuation of Kirkland Street, with shared bus/bike queue jump lanes and separated bike lanes. The

current plan for the Washington Street and Beacon Street intersection in Somerville includes a mix of bus/bike lanes and separated bike lanes, slated for implementation at a later date.

The separated bike facilities included in the Network Vision on Kirkland Street between Oxford Street and Irving Street/Scott Street may ultimately extend closer to Beacon Street. However, the Irving Street/Scott Street intersection is currently the most logical spot to continue the high-comfort network with a bike priority (Lower Volume/Lower Speed) street. Improvements at this intersection to facilitate safer, more comfortable left turns between Kirkland Street and Scott Street or Irving Street will be evaluated. The map below details alternative high-comfort routes between Harvard Square and Union Square.



Figure G.2: Kirkland Street High-Comfort Alternative Route

HURON AVENUE (CONCORD AVENUE – GARDEN STREET)

The segment of Huron Avenue between Concord Avenue and Garden Street is not wide enough to accommodate separated bike facilities in both directions while maintaining some level of street parking and loading, something that has been identified as a high priority to the local businesses. Public process for this segment of Huron Avenue has concluded, and the final design includes partial bike lanes and traffic calming treatments. Information can be found on the [project website](#).

GARDEN STREET (HURON AVENUE – NEW STREET)

Garden Street from Huron Avenue to New Street is not physically wide enough for separated bike facilities in both directions, even with parking removed. While the City implemented traffic speed management measures as part of the areawide sewer separation project, we recognize that this segment of Garden Street has not achieved the goals for a high-comfort bike priority (Lower Volume/Lower Speed) street and that more intervention is needed. Additional strategies may include more traffic speed management, such as pinch points, or traffic volume management tools, such as diverters. For more information on the City's bicycle priority street tools, see Chapter 4 within the Bike Plan.

BELMONT STREET

Belmont Street is unique in that the City of Cambridge only has jurisdiction between Mount Auburn Street and Ericsson Street. In addition, the southern sidewalk along this section of the street is part of the City of Watertown. As such, any redesign required agreement from Watertown and Cambridge to foster a continuous street design. The street is being reconstructed starting in 2021, following a two-year design process. Belmont Street is a transit priority street with a high demand for on-street parking and loading serving adjacent businesses. While separated bike facilities are not currently planned for the entire length of Belmont Street, they are proposed in segments where the street width allows, along with traditional bike lane segments. In addition, at the intersection of Belmont Street with Holworthy and Mount Auburn Streets, separated cycling facilities and protected intersection design elements are included, with dedicated connections to the Cambridge Watertown Greenway. Information on the design and project updates can be found on the [project website](#).

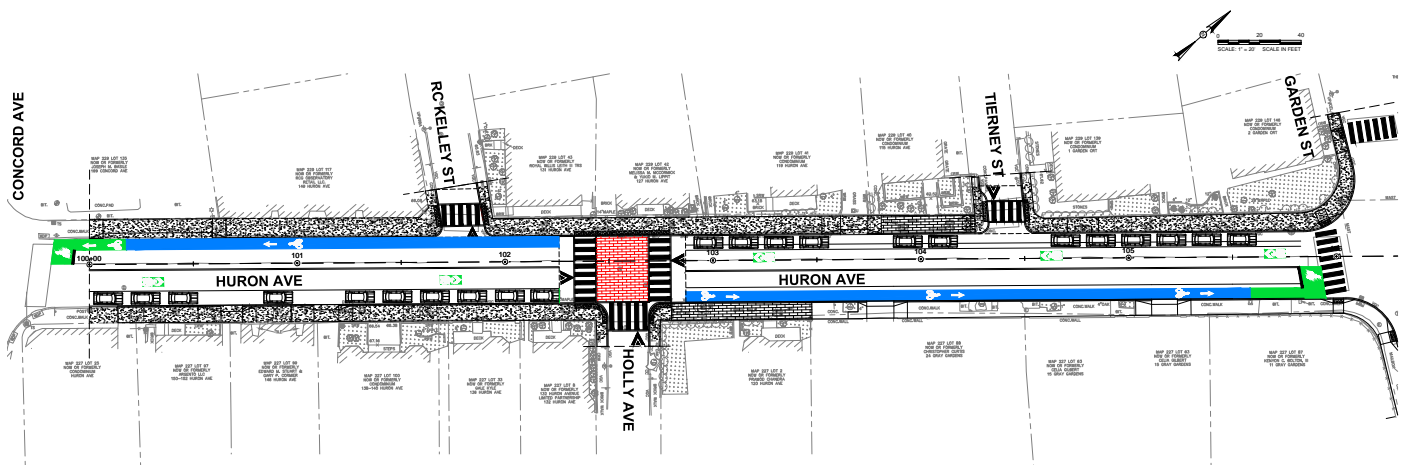


Figure G.3: Huron Avenue between Concord Avenue and Garden Street Design

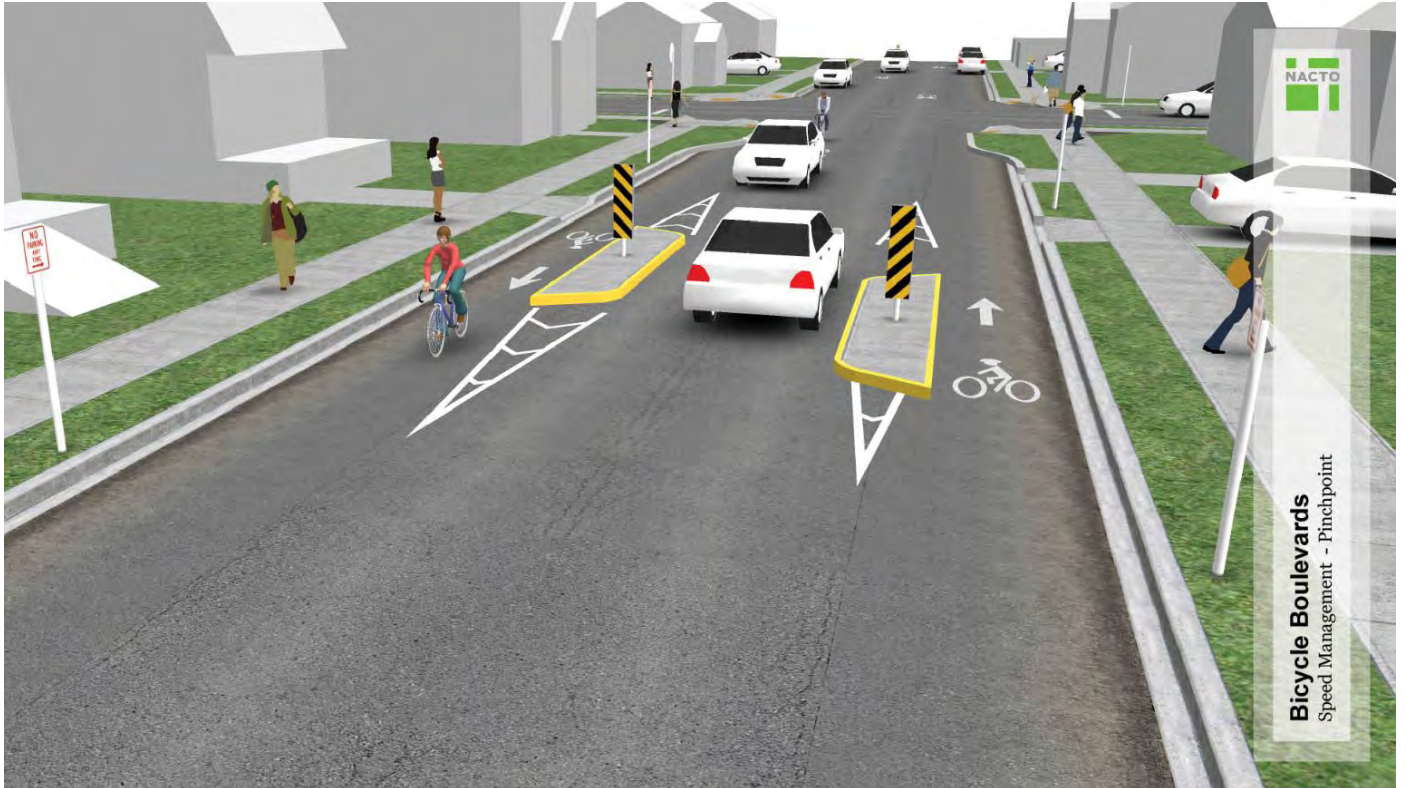


Figure G.4: Diagram of a Pinch Point with Bike Cut-throughs



Figure G.5: Photo of a Pinch Point with Bike Cut-throughs

Belmont and Mount Auburn Intersection

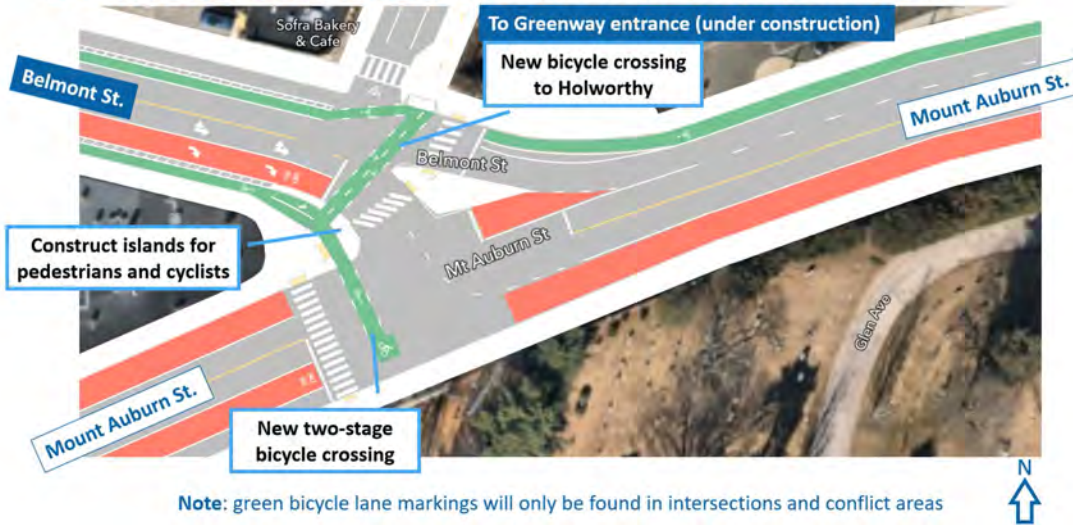


Figure G.6: Diagram of the bicycle facility additions at the Belmont St and Mount Auburn St intersection.

RESPONSES TO OTHER REQUESTS

Several requests were made to redesignate certain streets from Bicycle Priority Street (Lower Volume/ Lower Speed Street) to Greater Separation. The rationale associated with these requests is that the streets are currently not comfortable for bicycling in mixed traffic. The intent of the Bicycle Priority Street designation is that traffic speed and traffic volume management treatments will be used as appropriate to create comfortable conditions for all ages, abilities, and identities (see Chapter 5 of the Cambridge Bicycle Plan), recognizing that these streets may not currently feel comfortable. Therefore, several requests to reclassify were not incorporated; rather, treatments to create comfortable conditions will be considered during implementation of Bicycle Priority Streets.

The First and Second Street corridors are in the design process now. We received comments to designate First Street as having greater separation in the Network Vision, however it is also a transit priority street. As part of this design process, the possibility of creating both separated bicycle facilities and transit lanes will be evaluated, as will the option of designing Second Street to be a high-comfort alternative to First Street with additional bike priority

street treatments. For more information, visit the [project website](#).

The City received many comments regarding the addition of contraflow lanes on a variety of streets. While not all one-way streets are good candidates for contraflow lanes due to width of the roadway or the presence of an adequate parallel route, contraflow lanes will be considered when streets are being resurfaced or when other implementation activities occur.

Requests were made to include Putnam Avenue on the Network Vision. However, Putnam Ave. is too narrow to implement any kind of separated bicycle facility. Parallel routes on various streets are identified instead, including Chestnut Street and Blackstone Street. In addition, recent improvements to Banks Street including a contraflow lane, offer a low-speed, low-volume alternative route between Mt. Auburn Street and Western Avenue.

APPENDIX H: QUICK-BUILD BIKEWAY PROJECT SELECTION, CONCEPT DEVELOPMENT, AND PRIORITIZATION PROCESS

BACKGROUND

The 2015 Cambridge Bicycle Plan and the 2020 Update include an ambitious Bicycle Network Vision containing well over 100 miles of existing, in-progress, and proposed bikeways. Proposed bikeways include three primary categories: off-street paths, streets proposed for increased separation, and streets proposed as Bicycle Priority Streets, with lower volume and/or speeds of motor vehicle traffic. By being included in the Bicycle Network Vision, a corridor is inherently seen as important due to its ability to provide connections to destinations or transit, connectivity with the existing high-comfort network, surrounding land uses, public comments, ability to address safety concerns, and equity considerations.

In general, bike facilities have been constructed as opportunities arise, such as through street resurfacing or as components of major City roadway and utility projects. While this approach is effective, progress towards implementing the full network has been modest. In 2017, the City started implementing stand-alone “quick-build” facilities¹ using City funds allocated through, for example, the City’s Participatory Budgeting process.² Several projects have been completed as quick-build facilities, including separated bike lanes on Cambridge Street, Brattle Street, Inner Mt. Auburn Street, and portions of Massachusetts Avenue.

Completing the Network Vision will continue to involve a combination of methods, including through planned roadway reconstruction (Five-Year Sidewalk and Street Reconstruction Plan), development-related work, and quick-build projects. The Cycling Safety Ordinance identifies specific time frames for some streets. For quick-build projects without a mandated timeframe or where the time frame affects multiple streets similarly, a process for the order in which they will be implemented was needed. That process is explained here.

PROJECT SELECTION

To address gaps in the high-comfort bike network, 15 opportunity corridors for quick-build bikeway implementation were identified as part of the 2020 Update. This determination was made based on the following factors:

- + Corridor is proposed to have separated bike facilities on the Bicycle Network Vision Map;
- + Corridor is under City of Cambridge jurisdiction;
- + Bike facilities for the corridor are not currently in design, under construction, or slated for reconstruction by any other means, such as through private development or within the Five-year Plan for Sidewalk and Street Construction; and
- + Corridor was determined to be eligible for quick-build implementation based on prior high-level analysis.

Feasibility for quick-build separated bicycle facilities was then determined based on the following factors:

- + **Roadway curb lines generally remain the same (projects necessitating very minor changes, e.g., to existing curb extensions, are acceptable);**
- + **Directionality of the motor vehicle travel lanes is maintained (e.g. two-way streets remain two-way)³;**
- + **Project is implementable with minimal traffic signal modifications; and**
- + **Context-appropriate minimum widths for bike lanes, buffers, curbside lanes, and travel lanes with and without buses are achievable.**

CONCEPT DEVELOPMENT

For each corridor, one or two quick-build concepts for separated bike facility implementation were developed. Quick-build separated bike facilities generally make use of flexposts⁴ and/or curb use rearrangement as the primary means to achieve separation. However, constructed elements (curb extensions, drainage improvements, or floating bus islands, etc.) may be incorporated during detailed design to maximize the high-comfort network.

Through the concept development process, the following implementation challenges were highlighted:

- + **Physical features (e.g., MBTA catenary wires, right of way constraints, drainage and utility infrastructure, trees)**
- + **Street usage (e.g., major bus routes, heavy traffic, removal of curb access for vehicles (on-street parking, deliveries, ride hail, and commercial loading))**

Quick-build concepts identify the general approach to reallocating roadway space for each project. Complete corridor development will be determined during the design process.

PRIORITIZATION PROCESS

While each quick-build bike facility project is important for different reasons, resource availability (funds, staff availability, time for public review and ability for the City to manage additional construction projects) preclude all projects being constructed at once. Therefore, a three-step prioritization process was developed to identify the general order in which projects will be implemented.

Step 1 consists of a data-driven analysis of factors selected to advance the City's mode shift and safety objectives as well as address the goal of more equitable access.⁵ In addition to these goal-oriented factors, public comments received via online engagement and in-person outreach and an assessment of implementation feasibility were considered. This results in a ranked list of projects in each of five areas, based on merged neighborhood boundaries (see page 6).

In **Step 2**, projects from Step 1 are divided into three implementation phases. The top-ranked project from each neighborhood in Step 1 is included in the first phase, the second-ranked projects are included in the second phase, and the remaining projects are included in the third phase. The intent is that all projects in the first phase will receive priority for implementation before projects in the second and third phases.

Finally, **Step 3** occurs each year as implementation is beginning. At that point, the City will consider other factors that may impact phasing (e.g., currently unanticipated road work due to infrastructure or development exigences).

The purpose of this prioritization process is to inform decision-making while also helping to explain why the City is focusing on some projects while deferring other projects to later implementation timelines.

STEP 1: DATA-DRIVEN RANKING

The table below illustrates the factors, associated plan goals, and the scoring approach for the first step of prioritization.

| Associated Goal | Factor | Ranking | Description |
|-----------------------|---|---------|--|
| Mode Shift | Connectivity (extent of impact on improving connectivity) | High | Completes a missing link to otherwise connected high-comfort facilities, both existing and in design |
| | | Medium | Extends existing or in-design high-comfort facilities |
| | | Low | Does not connect to or extend existing or in-design high-comfort facilities |
| Mode Shift | Key route to schools (how closely connected to school routes) | High | School located directly on corridor (K-12 schools) |
| | | Medium | School located within ¼ mile of corridor (K-12 schools) |
| | | Low | No schools located within ¼ mile of corridor (K-12 schools) |
| Mode Shift | Key route to major destinations (how closely connected to major destinations) | High | Among top third of corridors ranked by major destination with ¼ mile of corridor |
| | | Medium | Among middle third of corridors ranked by major destination with ¼ mile of corridor |
| | | Low | Among bottom third of corridors ranked by major destination with ¼ mile of corridor |
| Safety | Crashes (extent of impact on improving safety) | High | Among top third of corridors ranked by bicycle crashes ⁶ per mile of corridor |
| | | Medium | Among middle third of corridors ranked by bicycle crashes per mile of corridor |
| | | Low | Among bottom third of corridors ranked by bicycle crashes per mile of corridor |
| Safety | Comfort (level of impact on addressing safety) | High | Existing comfort level on corridor is BLOC ⁷ 4 or 5 (using highest BLOC on corridor) |
| | | Medium | Existing comfort level on corridor is BLOC 3 (using highest BLOC on corridor) |
| | | Low | Existing comfort level on corridor is BLOC 1 or 2 (using highest BLOC on corridor) |
| More Equitable Access | Increasing access for focus populations ⁸ | High | Among top third of corridors ranked by focus population proximity |
| | | Medium | Among middle third of corridors ranked by focus population proximity |
| | | Low | Among bottom third of corridors ranked by focus population proximity |

| Associated Goal | Factor | Ranking | Description |
|-----------------|--|---------|---|
| n/a | Community input (how much input received on the particular corridor) | High | Among top third of corridors ranked by comments received |
| | | Medium | Among middle third of corridors ranked by comments received |
| | | Low | Among bottom third of corridors ranked by comments received |
| n/a | Simplicity of implementation (high = less complicated, low = more complicated) | High | No travel lane removal, minimal parking impacts, minimal construction needs, etc. |
| | | Medium | Travel lane removal on roadway with no bus routes, removal of some curbside uses, parking moderately utilized, moderate amount of construction needed, etc. |
| | | Low | Travel lane removal on roadway with bus routes, removal of all curbside uses, parking heavily utilized, large amount of construction needed, etc. |

Major destinations

The following types of destinations are used to calculate the Key Route to Major Destination factor in Step 1:

- + **Parks and Playgrounds**
- + **Retail Districts**
- + **Recreational Facilities**
- + **University and College Facilities**
- + **Community Centers, Youth Centers, and Senior Centers**
- + **Major Job Centers**
- + **Libraries**
- + **MBTA Stations**
- + **Hospitals**

Step 1 Results (2020 Prioritization): Corridor Ratings (grouped by neighborhood)

Mid-Cambridge, Wellington-Harrington, Area Four & East Cambridge Merged Neighborhood Area

| Merged Neighborhood Area and Segment Name | Connectivity | Key Route to Schools | Key Route to Major Destinations | Crashes | Comfort | More Equitable Access | Community Input | Simplicity of Implementation |
|---|--------------|----------------------|---------------------------------|---------|---------|-----------------------|-----------------|------------------------------|
| Cambridge St | High | High | High | High | High | High | High | Medium |
| Broadway | High | High | High | High | High | Medium | Medium | Low |
| Hampshire St | High | High | High | High | Medium | High | Medium | Low |
| Main St (Sydney to Vassar) | High | High | Medium | High | Medium | High | Medium | Medium |

Neighborhood Nine and Agassiz Merged Neighborhood Area

| Merged Neighborhood Area and Segment Name | Connectivity | Key Route to Schools | Key Route to Major Destinations | Crashes | Comfort | More Equitable Access | Community Input | Simplicity of Implementation |
|---|--------------|----------------------|---------------------------------|---------|---------|-----------------------|-----------------|------------------------------|
| Garden St (Mason to Huron) | Medium | Medium | Medium | Medium | High | Low | High | Medium |

North Cambridge and Cambridge Highlands Merged Neighborhood Area

| Merged Neighborhood Area and Segment Name | Connectivity | Key Route to Schools | Key Route to Major Destinations | Crashes | Comfort | More Equitable Access | Community Input | Simplicity of Implementation |
|---|--------------|----------------------|---------------------------------|---------|---------|-----------------------|-----------------|------------------------------|
| Steel Pl | High | Low | Low | Low | Low | High | Low | Medium |

West Cambridge and Strawberry Hill Merged Neighborhood Area

| Merged Neighborhood Area and Segment Name | Connectivity | Key Route to Schools | Key Route to Major Destinations | Crashes | Comfort | More Equitable Access | Community Input | Simplicity of Implementation |
|---|--------------|----------------------|---------------------------------|---------|---------|-----------------------|-----------------|------------------------------|
| Brattle St (FPP to Mason) | Medium | Medium | Medium | Medium | Medium | Low | Low | Medium |
| Brattle St (Mt Auburn to FPP) | Low | Medium | Low | Medium | High | Low | Low | Medium |
| Huron Ave (Grove to Glacken) | Medium | Low | Low | Low | High | Medium | Low | Medium |
| Aberdeen Ave | Medium | Low | Low | Low | Medium | Medium | Low | Medium |
| Huron Ave (FPP to Concord) | Medium | Low | Medium | Low | Low | Low | Low | Low |

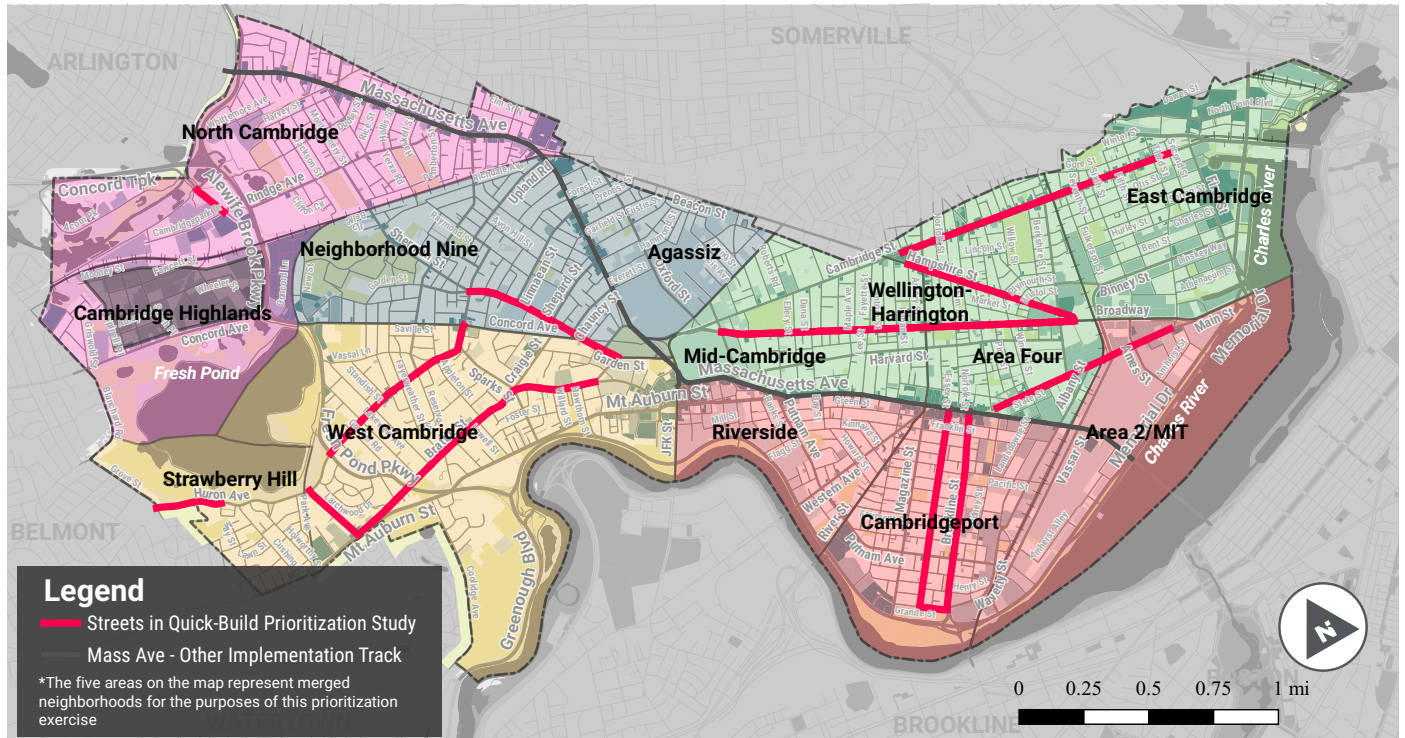
Riverside, Cambridgeport, and Area 2/MIT Merged Neighborhood Area

| Merged Neighborhood Area and Segment Name | Connectivity | Key Route to Schools | Key Route to Major Destinations | Crashes | Comfort | More Equitable Access | Community Input | Simplicity of Implementation |
|---|--------------|----------------------|---------------------------------|---------|---------|-----------------------|-----------------|------------------------------|
| Main St (Vassar to Third) | High | Low | Medium | Low | Medium | High | Low | Medium |
| Pearl St | Low | Low | High | Low | Medium | Medium | Low | Medium |
| Brookline St | Low | Low | High | Low | Low | Medium | Low | Medium |
| Granite St | Low | Low | Low | Low | Medium | Low | Low | High |

STEP 2: PROJECT PHASING

The second step in the prioritization process is used to ensure that projects are distributed as evenly as practicable across the city. The traditional 13 neighborhoods of Cambridge were merged into five (5) distinct neighborhood areas for simplicity. The top ranked corridor in each merged neighborhood area is selected and added to the first implementation phase. The second-ranked corridor in each neighborhood area is added to the second implementation phase, and so on.

Consolidated Neighborhoods used for Step 2 Prioritization



Step 2 Results (2020 Prioritization): Implementation Phases

| First Phase | Second Phase | Third Phase |
|----------------------------|-------------------------------|------------------------------|
| Cambridge St | Broadway | Hampshire St |
| Garden St (Mason to Huron) | Brattle St (Mt Auburn to FPP) | Main St (Sydney to Vassar) |
| Steel Pl | Pearl St | Huron Ave (Grove to Glacken) |
| Brattle St (FPP to Mason) | | Aberdeen Ave |
| Main St (Vassar to Third) | | Huron Ave (FPP to Concord) |
| | | Brookline St |
| | | Granite St |

STEP 3: ADDITIONAL CONSIDERATIONS

There are other factors that may influence the implementation phasing, some of which are as yet unknown, but which will need to be evaluated each year to potentially adjust the order in which the quick-build projects are undertaken. Among these are:

Transit Opportunities or needs. Several of these corridors also have bus routes. The City is continuously evaluating ways in which streets and signals can be changed so that transit can be made more reliable. Should there be an opportunity identified in a specific corridor, that corridor may receive higher priority.

Opportunistic scenarios, such as unanticipated improvements to a roadway in connection with a development project.

Response to COVID-19 planning. As the City responds to evolving needs and conditions in terms of planning and managing public streets to address the challenges presented by COVID-19, adjustments will need to be made. Elements that were modified in 2020-21 include:

- + **Expanded curbside area – some curb space may be dedicated to uses such as expanded transit queuing areas, expanded outdoor dining areas, or for people walking.**
- + **Delivery/pick-up needs – retailers are providing goods via curbside pick-up.**

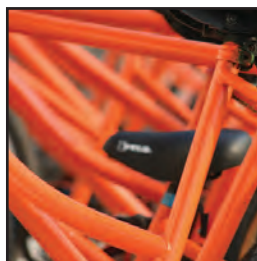
ENDNOTES

- 1 Quick-build facilities are vertically and/or horizontally separated bicycle lanes, typically at roadway level, which are established with materials requiring minimal or no construction. These facilities are implemented in a shorter time frame than standard roadway reconstruction. See Chapter 4 of the Cambridge Bicycle Plan for more information.
- 2 Through the City's Participatory Budgeting process, residents have a direct voice in designating a portion of the City's annual capital budget to selected projects. <https://pb.cambridgema.gov/>
- 3 Two-way bicycle facilities (two-way bicycle travel on one side of a street) were only considered where appropriate (e.g. corridors with minimal crossing traffic)
- 4 Plastic vertical posts that are hollow and mounted to pavement surfaces with adhesive, bolts, or both. They are flexible enough to bend and spring back if driven over by a vehicle, but rigid enough to discourage driving over.
- 5 Innovate and be an early adopter of best practices in bicycle infrastructure—but since it applies to all bikeway projects, it does not influence prioritization.
- 6 2019 crash data were used during the initial scoring analysis, results of which are displayed on the following page. When prioritization scores are recalculated in the future, the latest available crash data should be considered.
- 7 Bicycle Level of Comfort, a measure of the level of comfort that a person bicycling is likely to perceive while riding on any street or path. Defined and explained in Chapter 5.
- 8 People of color, people under 18, people 65 or older, households without a motor vehicle, households below 200% of the poverty level, people with disabilities, and people with no or limited English proficiency. This was measured by creating a composite index of the percent of population in each Census tract associated with each of the seven variables.

APPENDIX I: BICYCLE PARKING GUIDE



City of Cambridge Bicycle Parking Guide



WHY IS BICYCLE PARKING IMPORTANT?

The City of Cambridge promotes bicycling as a healthy, environmentally friendly way of getting around. Cambridge is well suited for bicycling and more people are using their bikes every day for commuting, shopping, and general transportation. Enhancing and promoting sustainable transportation is a cornerstone of Cambridge's policies.

Providing bicycle parking encourages people to use their bicycles as transportation. People are more likely to use a bicycle if they are confident that they will find convenient and secure parking at their destination.

Providing a designated area for bicycle parking gives a more orderly appearance to a building and prevents cyclists

from locking their bikes to unacceptable fixtures, such as trees, benches, or railings. However, if a bicycle rack appears insecure, does not fit bicycles well, or is in the wrong location, cyclists will not use it. Ensure that your bicycle racks are approved and well used by following these guidelines.



photo by Jessica Zdeb

DEVELOPMENT REQUIREMENTS AND ZONING ORDINANCE

Locations and types of bicycle parking must be shown in building site plans at a 1:10 scale and be approved by the Traffic, Parking, and Transportation Department and the Community Development Department. Zoning requirements are found in Article 6.100 of the Zoning Ordinance. This brochure provides an overview of the requirements with some details and graphics for clarification, but it should not be construed as the full set of legal requirements. Please refer to the full text of the zoning ordinance here:

www.cambridgema.gov/CDD/zoninganddevelopment/

WHAT IS A BICYCLE PARKING SPACE?

A bike parking space is an area within which one intact bicycle may be easily and conveniently accessed and securely stored and removed in an upright position with both wheels resting on a stable surface, without requiring the movement of other parked bicycles, vehicles, or their objects to access the space.

HOW MUCH BICYCLE PARKING IS REQUIRED BY ZONING?

The tables below summarize the zoning requirements for some typical land uses. For more detail, review Section 6.100 of the Zoning Ordinance. When calculating the required number of long-term or short-term bicycle parking spaces for a particular use, round up to the nearest whole number.

| Residential Use Type | Minimum Required Bicycle Parking (see pg. 7 for more details) | |
|--|--|--|
| | Long-Term | Short-Term |
| Single-family dwellings Two-family dwellings Rectories, parsonages | No minimum | No minimum |
| Townhouse dwellings Multifamily dwellings | 1.00 space per unit for the first 20 units in a building; 1.05 spaces per unit for additional units | 0.10 space per unit on a lot (for lots with 4 or more units) |
| Elderly oriented congregate housing | 0.50 space per unit | 0.05 space per unit |
| Lodging houses, convents, monasteries, dormitories, fraternities, sororities | 0.50 space per bed | 0.05 space per bed |
| Hotels, motels Tourist houses | 0.02 space per sleeping room | 0.05 space per sleeping room |

Note:

Where four or fewer long-term bicycle parking spaces are required, they may be provided in a covered outdoor location rather than an enclosed structure.



photo by Greg Raisman

HOW MUCH BICYCLE PARKING IS REQUIRED BY ZONING?

| Non-Residential Use Type | Required Bicycle Parking (minimum spaces per 1,000 sq. ft. of floor area) | |
|--|---|------------|
| | Long-Term | Short-Term |
| General or professional offices Arts/crafts studios | 0.30 | 0.06 |
| Technical offices, research labs | 0.22 | 0.06 |
| Banks, financial offices (ground floor) | 0.30 | 0.50 |
| Retail stores, consumer service | 0.10 | 0.60 |
| Food and convenience stores Entertainment, recreation | 0.10 | 1.00 |
| Restaurants, bars | 0.20 | 1.00 |
| Theaters, gathering halls | 0.08 | 1.00 |
| Industrial (manufacturing, storage) Auto repair, auto sales | 0.08 | 0.06 |
| Churches | 0.08 | 0.50 |
| Medical offices | 0.30 | 0.50 |
| Medical clinics | 0.20 | 0.50 |
| Hospitals | 0.20 | 0.10 |
| College or university academic or administrative facilities | 0.20 | 0.40 |
| College or university student activity facilities | 0.20 | 1.00 |
| Primary, secondary or other schools Other uses | <i>see zoning</i> | |

Note:

Up to four required long-term bicycle parking spaces (or up to 20% of the required number, whichever is greater) may be provided as short-term bicycle parking spaces.

WHEN ARE YOU REQUIRED TO PROVIDE BICYCLE PARKING?

Constructing a new building:

Unless the building is a single-family or two-family detached dwelling, bicycle parking is required. Bicycle parking is still allowed and encouraged for single-family and two-family homes.

Expanding an existing building or converting it to a new use:

The zoning provides a set of rules to determine when bicycle parking is required. Here is a simplified way to figure out if the requirements will apply; for more detail, review Section 6.100 of the Zoning Ordinance.

1. Calculate the sum of total long-term and short-term bicycle parking spaces required (under current zoning) for the EXISTING or PRIOR USE on the site: _____
2. Calculate the sum of long-term and short-term bicycle parking spaces required (under current zoning) for the NEW or PROPOSED USE on the site: _____
3. If the number in Calculation 2 is greater than the number in Calculation 1 by at least 15% and at least two (2) spaces, then short-term and long-term bicycle parking is required for the *entire building* (not just for the increase).

PUBLIC CONTRIBUTION FOR SHORT-TERM BICYCLE PARKING

Private developers and property owners may not install racks in the public right-of-way without formal permission from the city. If you have a lot on which short-term parking cannot be provided due to site constraints (e.g. an existing building with zero lot lines is being reused), you must get approval from the city to make a contribution towards parking on public property in lieu of on-site bicycle parking. For more information please e-mail bikerack@cambridgema.gov.



SITING BICYCLE PARKING

Bicycle parking must be designed for convenient daily use, not simply for storage of bicycles. Location is an extremely important factor in the usefulness of a bicycle rack. The rack must be located in a safe and accessible place with adequate space to maneuver a bicycle in and out.

Safe locations are:

- In full view, maximizing visibility and minimizing vandalism, near pedestrian traffic, windows, and/or well-lit areas.
- Under cover, to protect bicycles from inclement weather.
- Far enough away from the street or parking spaces so that bicycles will not be damaged by cars, setback if possible.
- Not obstructing pedestrian traffic.



photo by John Luton

Accessible locations have these characteristics:

- They are between the road/path that cyclists use and the entrance of the building.
- The primary access route is at least 5 feet wide.
- The primary access route does not have a slope greater than 5% (8% if level landing is provided every 30 feet of linear distance).
- Access may be provided by an elevator with interior dimensions of 80" x 54".
- Close to the main entrance that cyclists use for the building. For short-term parking within 25' is ideal but no more than 50' is required.

Weather-protected bicycle parking is desirable where bikes are parked for long periods.



SHORT-TERM AND LONG-TERM PARKING

Some aspects of bicycle parking are different depending on whether it will serve people who are storing bicycles all day long or overnight, or people who are making short trips to and from the site.

Long-Term:

Long-term Bicycle Parking must be located in an enclosed, limited-access area designed to protect bicycles from precipitation and from theft. It may be provided in the following types of facilities:

- Enclosed spaces in a building, such as bicycle rooms or garages.
- Bicycle sheds, covered bicycle cages, or other fully covered and enclosed structures within 200 feet of the main building entrance.
- Bicycle lockers, or fixed-in-place containers wherein single bicycles may be securely stored and protected.
- Weather-protected bicycle parking spaces that are monitored at all times by an attendant or other security system.



photo by Mark Horowitz

Short-Term:

Short-term bicycle parking must be located in a publicly accessible space within 50 feet of pedestrian entrances. Short-term bicycle parking is intended primarily to serve visitors, such as retail patrons making trips of up to a few hours; however, it may serve other bicycle users as needed.

PARKING GARAGES

Bicycle parking in parking garages must be either on the same level as the entrance to the garage from the street or accessible via automobile ramps designed to serve bicyclists (with slope of less than 5% or less than 8% with a landing every 30 feet), or near an elevator that is sufficiently large to accommodate bicycles. Bicycle racks inside parking garages must still meet the security standards of short-term racks or lockers. Where long-term bicycle parking is next to automobile parking or loading, a physical barrier, such as bollards, must be provided.



photo by Norman Cox

ACCEPTABLE BICYCLE RACKS

There are a variety of designs for bicycle racks produced by many manufacturers. Bike racks can be purchased as single units, with a capacity of locking 2 bikes (one on each side), or as multiple units attached together, with a larger capacity. However, not all manufactured bicycle racks meet Cambridge's standards.



Features of an acceptable bicycle rack:

- Installed on a permanent foundation (e.g., concrete pad) to ensure stability.
- Securely anchored into or on the foundation with tamper-proof nuts if surface mounted.
- Support for an upright bicycle by its frame horizontally in **two (2)** or more places.
- Keeps both bike wheels on the ground.
- Design that prevents the bicycle from tipping over.
- Ability to support a variety of bicycle sizes and frame shapes.
- Space to secure the frame and one or both wheels to the rack with a cable, chain, or u-lock.
- Diameter of locking pole is no more than 1.5 inches.
- Galvanized or stainless steel racks are recommended (and required for racks on public property) because they hold up best.



photo by Greg Raisman



Acceptable racks, like the “Inverted U,” “Swerve,” and “Post and Ring” racks, have two-point support and fit a variety of bicycle types. Custom designs and “artistic” racks can also be used, provided they meet the performance criteria for bicycle racks.

UNACCEPTABLE BICYCLE RACKS

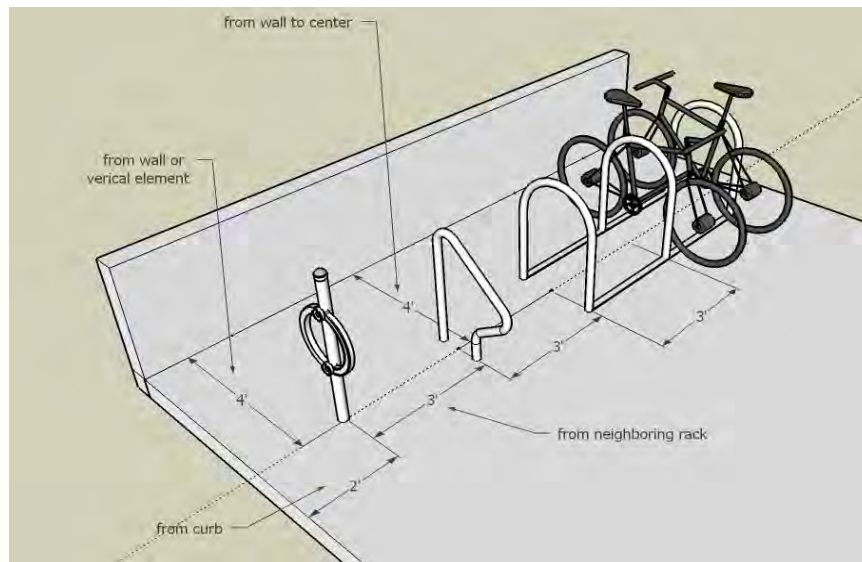
Bicycle racks must *NOT*:

- Support the bicycle at only one point.
- Allow the bicycle to fall, which can damage the bike and block pedestrian right-of-way.
- Have sharp edges, that can be hazardous to the visually impaired.
- Support the bicycle by one wheel.
- Connect to each other with a bar on top (that can block handlebars and baskets).
- Suspend any part of the bike in the air or require that the bicycle be lifted to get it into position.

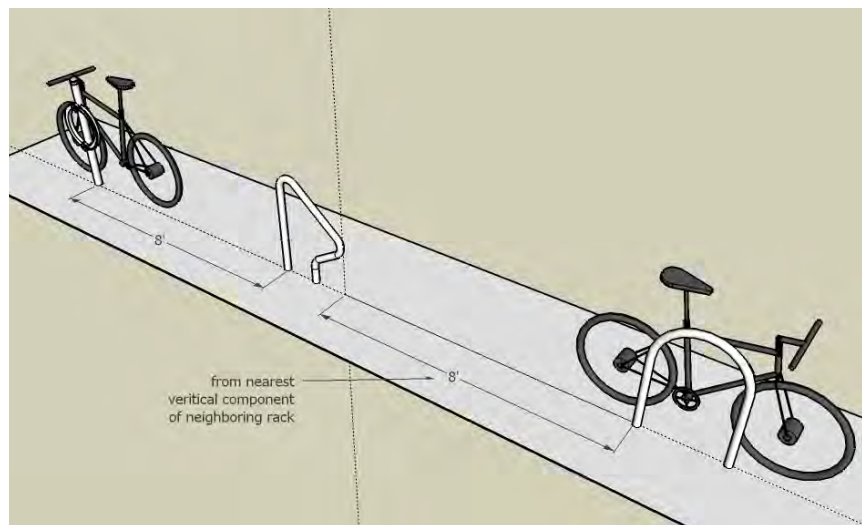


LAYOUT DIMENSIONS

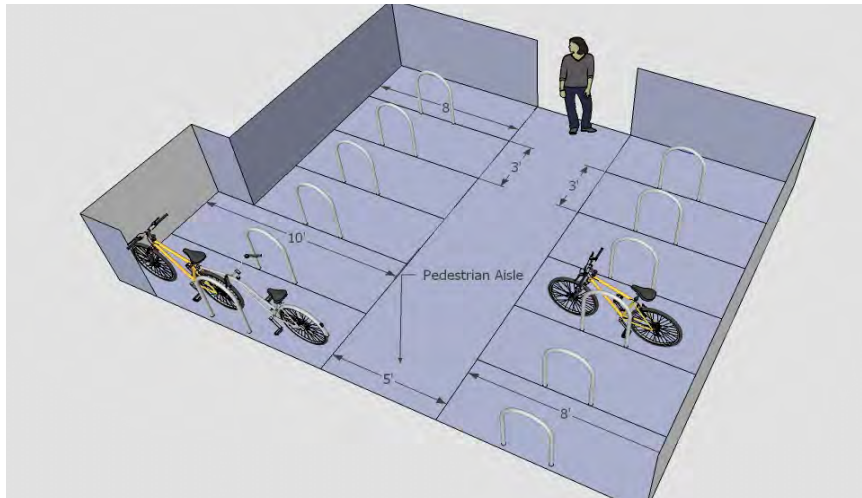
Proper layout of bicycle racks is essential to ensure that they will safely and conveniently accommodate the intended number of bicycles. Layout must follow these minimum dimensions:



Racks aligned side by side



Racks aligned end to end



Enclosed rack area with 20 or more racks, with pedestrian aisle and at least 5% of spaces providing an additional 2 feet of space for tandems and trailers.

Distance to other Racks:

- Rack units aligned parallel to each other (side by side) must be at least 3 feet apart. This includes racks that are sold as multiple rack units attached together.
- Rack units aligned end to end must be at least 8 feet apart.

Distance from Wall:

- Rack units placed perpendicular to a wall must be at least 4 feet from the wall to the center of the rack.
- Rack units parallel to a wall must be at least 3 feet from the rack to the wall.

Distance from a Curb:

- Rack units placed perpendicular to the curb must be at least 4 feet from the curb to the center of the rack.
- Rack units placed parallel to the curb must be at least 2 feet from the curb to the rack.

Distance from a Pedestrian Aisle:

- Rack units perpendicular to a pedestrian aisle must be at least 4 feet from the center of the rack to the edge of the aisle, and have at least a 5 feet wide aisle.
- Where 20 or more bicycle parking spaces are required, at least 5% of the spaces must be 10 feet long instead of 8 feet to allow space for tandems and trailers.

Other Distances:

- Racks should be at least 14 feet from curbside fire hydrants and 6 feet from wall fire hydrants.



City of Cambridge

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