

Bikeshare Exploration in the CMRPC Region

Prepared by the CMRPC



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Chapter 1: Introduction to Bikeshare

What is Bikeshare?

Bikeshare is an active mode of transportation that provides community members access to a fleet of public bicycles for on demand travel. As a public transportation service, bikeshare can act on its own or be an extension of an existing service like bus or rail. On its own, bikeshare accommodates short trips within a community. As an extension of an existing service, bikeshare can provide the first and last mile connection either from the trip origin to the bus or rail station, or from the bus or rail station to a destination. It also provides an alternative for trips within a few miles.

Bikeshare has taken on many forms over the past decade to provide the latest in smart technology and system modularity. The customizability of bikeshare has made it possible to be implemented on varying geographies and be adapted to accommodate tailored needs. This chapter breaks down key elements in designing and planning for a bikeshare program that best suits community needs while also providing insight to potential barriers that may limit ridership.

Benefits of Bikeshare

Active modes of transportation, like bikeshare, have a host of social, economic, and environmental benefits. These include:

- Expands access to public transportation
- Extends transportation options for people without access to a personal vehicle
- Promotes investments in multi-modal infrastructure
- Stimulates economic development
- Promotes community engagement and recreational opportunities for visitors/tourists
- Reduces traffic congestion and emission from vehicles
- Supports an active lifestyle

While this is not an exhaustive list, bikeshare has been proven a holistic benefit to transportation for communities of all sizes. Additionally, as will be explored in more detail in future chapters, bikeshare is implementable at all scales and is able to support multiple populations needs. Bikeshare drives tourism, recreation, and residential engagement with local trails, businesses, and destinations.

Business Models

A bikeshare business model lays out the foundation of ownership, operation, and maintenance of the system, and provides the fundamental expectation of the participating entities. The



following schemes represent business model strategies that can be replicated on different modes of bikeshare.

Publicly Owned and Operated

The appointed governing body owns and operates both the system and assets, but also the financial risk of initial and operational expenses¹. Design, planning, implementation, and expansion of the bikeshare system is also designated to the governing body. An advantage to this system is that the governing agency is able to prioritize goals of the system including placement of stations and the pricing structure, among others. However, public funding can often put a snag in bikeshare efforts as communities are not able to solely fund these programs through user revenues. Governing bodies can include municipalities, public universities and colleges, transit authorities, and regional planning agencies¹.

Publicly Owned and Privately Operated

This type of bikeshare business model features public ownership through a government entity. This can include a single or multiple municipalities, publicly owned colleges or universities, a regional transit authority, or a regional planning agency¹. The governing agency may appoint a dedicated staff person to oversee initial capital costs associated with bikeshare implementation and the recurring operational costs of the system. However, capital expenses and other associated costs can be supplemented using federal, state, or local grants and sponsorships¹.

While the governing agency owns the bicycles and station infrastructure for the system, operational activities are outsourced to a private vendor. Operational activities include customer service, marketing strategies and implementation, bicycle rebalancing, and routine maintenance of the bikes and station equipment. This type of business model is characteristic of larger systems where the number of bicycles and stations may be out of the public entity's ability to maintain¹.

Non-Profit Owned and Privately Operated

Bikeshare systems owned and operated by non-profit organizations works very similarly to those under public ownership and private operation. The non-profit organization receives funding, through grants or local sponsorship, to administer the bikeshare program, but contracts overall operations to a private vendor. The private vendor is often a local bike shop or organization that has ties to the community. This business model is characteristic of small to medium sized bikeshares as it is more community focused and relies heavily on local partnerships¹⁷.

Privately Owned and Operated

A bikeshare system that operates under the privately owned and operated business model is handled by a for-profit company. Because there is no financial or authoritative liability for the municipality, the bikeshare is independent on the interest of the public sector. Because of this, the model may not always address the equitable and accessible needs of the community that is being served. However, the private sector is obligated to operate the system within some regulation from the local government¹.

Bikeshare Systems



Dockless (Smart) Bikeshare

Dockless bikeshare was introduced in 2015, which provided a less capital-intensive alternative to traditional dock-based systems². Dockless systems utilize GPS integrated smart bikes to allow bicycles to be “docked” to a standard bike rack or be left free-standing within a pre-geocoded area³. Because there are no docks, there isn’t a distinct need to have bikes be the same size to fit the locking system. Instead, dockless systems provide the ability to acquire bikes of varying types and sizes³. This can include adult and child bikes, tricycles, pedicabs, or even a tandem.

Image 1: Limebike Virtual Station in Seattle



Image from Alta Planning and Design

To use the system, riders simply use an app on their smartphone to lock and unlock bikes, which diminishes the need for payment kiosks. Because there is limited equipment involved in the implementation of dockless systems, geocoded areas can be easily moved to continually support shifts in ridership. This is also more conducive and cost effective in system expansion³. Additionally, the integration of technology on the bikes provide real-time user data collection capabilities. Data can include the number of users per bicycle, the number of trips taken on a given bicycle, the duration of the trip, destinations, and the demographics of the user, among others².

Because of the lower initial capital and operational expenses, dockless bikeshare systems can be offered at a lower cost to the end user². In many communities, local and state funding or sponsorship and advertising revenues can often fully cover municipalities bikeshare expenses, allowing for end-user costs to be either very low or free. This makes dockless options enticing in smaller systems or in more rural settings or within targeted areas of a community.

Dock-Based Bikeshare

Docked bikeshare systems feature station-based hubs that encompass all of the features a user needs to utilize the system. This includes the bikes, docks, wayfinding, and payment kiosks². While stations act as a one-stop shop for bikeshare, it often is favored in densely populated urban settings due to heavy capital investment and high monthly operational expenses³. However, because initial and monthly expenses can be higher than other models, without other funding or revenue sources, end user costs are often higher. Sometimes, this can create a financial barrier.

Despite relatively inflated system costs, dock-based bikeshare signifies high levels of integration and modularity within existing urban transportation systems². Stations are often located within

close proximity to other public transit modes including train or bus stations where the bikeshare can act as a first and last mile option. Because many newer versions of the dock-based model are solar-powered, stations can be easily adapted or moved to meet shifts in demand².

However, because bikes have to be docked at the end of a trip, stations often have to be in larger abundance and within a manageable proximity between each other to make the system feasible for users. A general rule of thumb is that stations should be within a quarter to a half mile of each other to reduce the distance a user has to walk to use the system or to dock their bike and walk to their destination⁴.

Utilizing existing mobility hubs presents as an effective option for bikeshare station integration. Mobility hubs are centers of activity that “seamlessly integrate different modes of transportation” including transit stops or layover zones, bikeshare stations, among other types of public or private transportation services⁵. With all transportation options centrally located, first and last mile solutions between services and destinations are maximized.

Hybrid Bikeshare

Hybrid bikeshare models integrate characteristics from both dock-based and dockless systems. This often reflects a system that is based within a georeferenced hub that has both docking stations and “virtual stations”. Virtual stations can include marked bicycle parking (image to the right) or simply a bike rack that is geocoded in the GPS system². The reduction in physical stations drastically reduces costs of the overall system and increases the systems adaptability. Integration of both models also provides the reliability of a docked bikeshare and the flexibility of a dockless bikeshare, while reducing some of the risk associated with both³.

Similarly, to both dock-based and hybrid systems, a hybrid bikeshare is easily adaptive and modular in terms of shifting with demand. Because there are virtual stations, systems operators

Image 2: Chattanooga Bikeshare Station



Image from Bike Chattanooga

Image 3: Nice Ride Virtual Station in Minnesota



Image from Bloomberg CityLab

can use collected data to determine where new physical stations should be located and where virtual stations can be added to expand the reach of the overall system². Like the dockless model, smart bikes are utilized to minimize the amount of technology needed. Physical stations may have payment kiosks, but there is some freedom with the use of a smart phone to unlock and lock free-floating bicycles throughout the system³. Lastly, this type of smart technology also provides system operators the ability to analyze and track user and locational data.

Bike Library:

Bike libraries are similar in ways to the hybrid model, but are characterized by community scale partnerships. Bike libraries first began in actual libraries, in partnership with local health departments, as a mechanism for libraries to continue interacting with residents and to promote active living through integrated community resources⁶. Operations have continued to evolve to incorporate other community or visitor centers and businesses. Often, other additional partnerships with local bike

Image 4: Staffed Bike Library in Golden, Colorado



Image from the City of Golden

shops, advocacy groups, or businesses are used to obtain new or used bicycles and other materials for the system, which are owned by the community thereafter⁶. Bike libraries are often tied with local tourism and recreational amenities. This includes local multi-use and bike trails, shops, restaurants, bars, breweries, as well as larger-scaled town events⁷.

Because bicycle libraries are tied to community centers, they are easily accessible to a wider variety of users. An existing library membership card or valid I.D may be all that is needed to “check out” a bike for the day⁶. These models are often free or at a nominal fee. Because bike libraries operate similar to a hybrid model, their primary check-out “stations” are not technologically equipped with docking stations which allow for the display and use of several types of bicycles. This can include children’s bikes, varying sizes of adult bikes, tricycles, among others. Aside from primary “stations”, there are often bike racks where users are able to lock up their bikes for intermediate destinations⁷.

Although this bikeshare model is equitable and accessible to many users at a relatively low cost for bike library operators, this system is not without its drawbacks. As these systems are usually tied to community groups and businesses and does not receive usership trends like larger bikeshare systems, it often requires consistent funding streams for operational expenses⁸. However, these expenses are significantly lower than traditional systems and there is far less equipment and technology involved.

Barriers to Bikeshare

While there are numerous barriers to bikeshare, this section explores the challenges associated with both infrastructure and implementation within the system. These key elements ensure that users experience all of the benefits associated with micromobility and its connection of existing transit facilities. Limitations within these elements are consequential in securing equitable access for all users, particularly to historically underserved communities.

Limited Infrastructure

Bikeshare provides a level of service that acts both as a first and last mile solution for existing public transit options while also providing an opportunity to make short trips to everyday destinations that may be too long for a walk and too short for a vehicle. However, this system can only be as successful as the network surrounding it; meaning a well-developed bicycle network of on and off-road facilities is needed in order to

Image 4: Roadway in Worcester



Image from the Worcester Telegram and Gazette

provide a level of comfort where users will want to utilize bikeshare as an alternative mode of transportation⁹. Without this infrastructure users may be left riding along arterials not conducive to bicyclists, potentially rendering a bikeshare service inaccessible to the average user.

However, this does not necessarily mean that bikeshare models should not be implemented in areas with limited or dispersed bicycle facilities. Operators should utilize community outreach and engagement strategies to educate users where it is safe to ride as well as promote the integration of a future network to support the bikeshare system.

Payment Structure

More often than not, bikeshare rentals are conducted through an automated service. This can include a payment kiosk, smartphone app, or online registration. These services often require a debit or credit card to secure a bicycle, and do not support the use of cash as an option. This creates a barrier for those who don't have access to either a credit or debit card or for those that have limited access to internet and technology⁹.

An additional financial constraint of these systems is that they often require a hold on a credit or debit account while using a bike. This hold secures the bikeshare payment for overage fees or in the case of a lost or stolen bicycle. However, most low-income individuals are unable to afford this hold in addition to the potentially high, initial, rental fees. Ultimately, these constraints create limitations in access for users that would otherwise rely heavily on the system as a dominant source of transportation⁹.

Some ways to alleviate these barriers include creating discounted memberships or short-term fees, removing credit card holds, providing a cash option at kiosks, as well as fare integration with public transportation systems. While many of these solutions have been beneficial across numerous bikeshare models, they are not without their own limitations.

For example, providing a cash option at a kiosk and not requiring a credit hold increases accessibility for low-income users. However, this may limit where these users are able to access a bicycle. In hybrid or dockless bikeshare models, there are numerous locations that require the use of smart technology to utilize the system, which may only be accessed through purchase with a credit or debit card. Ultimately, it is at the discretion of system operators to determine where and what methods are needed to increase accessibility for these populations.

Resource Distribution

While bikeshare systems are designed for functional access to everyday destinations within a service area, there are a few constraints that limit the desire to utilize the system. These include the distribution of stations, the distance between a station and destination, and the distance between a station and place of residence. Station distribution refers to the number of stations in the given geographic area and the distance between stations. The average distance between bikeshare stations should be around a quarter to a half of a mile, which equates to a 5-10-minute walk¹.

Not only is bike station distribution important between stations but also between the start and end points of a user's trip. Like the suggested distance between stations, the same can be said about the distance between a bikeshare station and the user's residence or destination. In instances where users have to walk over a half mile to get to the bikeshare station or to return their bike then walk to their destination, a car may seem to be a more accessible option⁹.

Prior community engagement efforts can help identify everyday destinations and trip generators where bike stations should be located. Mapping or surveying of the service area will identify densely populated areas to locate additional station locations. This may also identify areas where underserved or underrepresented communities are located to support equitable access to the system.

Engagement and Outreach of Underserved Populations

While previous barriers have addressed how to promote accessible and equitable access for all users, there are other constraints that may limit usership in underserved populations. This can include a lack of bike stations in underserved communities and a lack of community engagement⁹. The term underserved represents a broad category of communities including low-income, minority, language isolated, and aging, among others. Bikeshare systems are typically centered around a city, business, or recreational center, one that is often gentrified and attractive to the average user. These areas envelope attractions, restaurants, businesses, and higher income housing that is integrated into the commercial hub.

Because of this, underserved populations are, well, underserved or underrepresented in the overall bikeshare system. In addition to the limited number of stations within reach to these populations, there is also a lack of community engagement and outreach associated with the bikeshare⁹. These communities often have a language barrier or don't understand how they are able to utilize the system. While many bikeshare systems provide some degree of community engagement to kickstart their programs, these communities often need additional engagement as new features, expansions, or new connections are introduced. Without the continued support from bikeshare partners and operators, underserved populations are left in the dark and may not be able to fully utilize the system.

Participation in community events or meetings, demonstration projects, and informational signage in these communities are a few of successful strategies for continued engagement. Coordination with community leaders may also foster relationships to help operators understand the accommodations needed to promote bikeshare use.

Physical Barriers

Bikeshare systems often roll out hundreds, if not thousands, of bicycles to be distributed and used across a wide service area. These bikes are retrofitted to fit within the parameters of standard docking sizes and to support the “average” user. While this is intended to provide equal opportunity to all, it diminishes the system’s equitable access to users that do not fall within the “average” bike size or style⁹. This includes children, people of different heights, as well as people of different abilities. These users are unintentionally excluded from this service.

Image 5: Equality vs. Equity – Better Bikeshare



Image from Better Bikeshare

In some bikeshare models, like a dock-based system, it can be hard to retrofit other sizes and types of bikes to the existing infrastructure. This means that operators are then tasked at integrating different types of bicycles through additional docking systems entirely. While this can be cost inducive it provides the level of equity to accommodate all users. Other models, like a hybrid, dockless, or a bike library rely less on docking structures to secure bikes and can be more conducive to include more options to users.

Chapter 2: Rural vs. Suburban and Urban Bikeshare Systems

Rural Bikeshare

Bikeshare and micromobility services immersed U.S cities beginning in 2010, and have adapted to meet the evolving transportation needs of users in an urban setting. In rural settings, low population and destination densities, lack of transit and bike infrastructure, and limited municipal funding precede sustainable and effective bikeshare efforts¹⁰. These differences in urban and rural geographies highlight the need for planning and implementation strategies that are receptive and adaptive in varying contexts.

Because bikeshare is not one size fits all, the aforementioned barriers to rural bikeshare affect communities differently. A methodology to analyze communities individually is needed to understand how bikeshare can supplement gaps within public transit, as well as be supported within a rural community without the need of large capital expenses. The Rural Shared Use Mobility (SUM) toolkit, identifies a methodology to do just that. Five key elements within this SUM toolkit are to¹¹:

1. Identify mobility gaps and determine service needs
2. Determine the SUM category that best suits rural community needs
3. Establish partnerships
4. Evaluate challenges, accessibility, and impacts
5. Secure funding for implementation

Identify Mobility Gaps and Determine Service Needs

To fully understand mobility gaps and service needs within a community, population-based analysis is needed to understand how people are currently moving within the geographic space. This includes identifying existing modes of public transportation, determining the number of households with and without personal vehicles, as well as those who meet or fall below the poverty line that do not have access to public or personal transportation. Through these data collection efforts, identified mobility gaps will highlight service needs. In terms of a bikeshare program, this may highlight areas where bike stations are needed to service low income populations, as well as other areas along a gap intensive route in need of a public service system¹¹.

Determine the SUM Category that Best Suits Rural Community Needs

While there are numerous SUM solutions to public transportation in rural communities, a narrowed focus on bikeshare will be identified through this step. It should be noted that while many bikeshare models have been successful throughout cities within the U.S, rural communities are often unable to support the large capital investment needed to support intensive infrastructure¹¹. With a focus on service needs, municipal funding and investment,

and demand for technology-based infrastructure, a feasible bikeshare model will pose a solution that is cost-effective and sustainable.

This will include analyzing different models like dockless and bike libraries, as well as identifying the level of investment the municipality is willing to expend on implementation, operation, and maintenance¹¹. While rural bikeshare may not be seen as a business per-se, understanding the level of municipal investment will denote key partnerships needed to usher a successful business model within the planning phase. Additional thought will be needed to understand the necessity for a “smart” system. In larger systems, smart-bikes are utilized to track needed shifts in rebalancing and stations locations, while also collecting usership data. However, this may be excessive for rural communities simply providing public transportation within a limited geographic space. Eliminating some of these more “advanced” features will also drastically reduce capital costs and provide a system that is both cost effective for the municipality as well as the end user.

Establish Partnerships

Partnerships play a key role throughout the planning, implementation, and maintenance phases of bikeshare. Bike sharing becomes a realistic opportunity through partnerships with regional planning agencies, local businesses, local non-profit organizations and advocacy groups, colleges and universities, and other municipalities. These partnerships can be utilized to support efforts in¹¹:

- Data collection
- Planning and design
- Operation of the system (rebalancing, seasonal storage, customer service)
- Financial support
- Maintenance (bike repairs)

While this is not all inclusive, it highlights areas where technical assistance and organizational partnerships can be invaluable assets to a community’s bikeshare program.

Evaluate Challenges and Impacts

Throughout the feasibility analysis of rural bikeshare programs, municipalities and their partners should be able to identify the challenges and impacts that the system will have on the community. These largely include the barriers identified in Chapter One. These challenges and impacts should be at the forefront of the decision-making process towards implementation to promote the most accessible and equitable use of the system¹¹.

Securing Funding for Implementation

Following the aforementioned steps in the SUM toolkit process, securing funding for implementation is the last push in piloting or launching a bikeshare program. Partners and stakeholders may provide funding through public and private revenue streams, but additional funding is usually needed. Potential funds may be sourced through federal, state, and local grants. In addition, as bikeshare programs usually require monthly or yearly expenses,



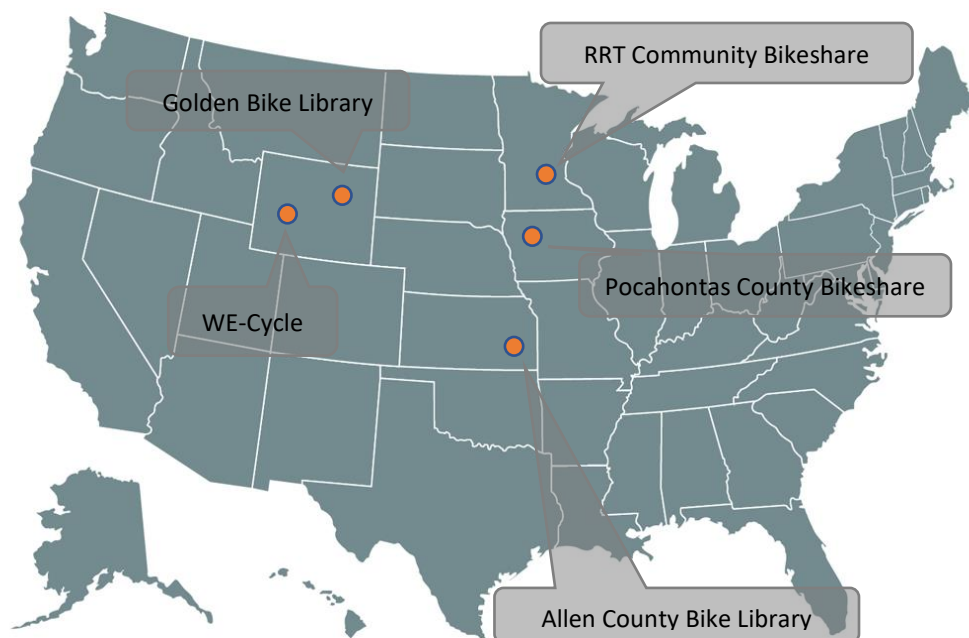
continuous funding streams are needed to continually support the program¹¹. This may be the case more so in rural communities where bikeshare is offered at a lower cost to the end user. However, partnerships will become useful after the implementation phase as well, particularly in the form of advertising and sponsorship revenue.

While the Rural SUM toolkit provides keystone elements to the success of rural bikeshare implementation, investments are needed to encourage and maintain community support. Community outreach and engagement strategies are integral to the success to bikeshare, particularly within rural communities, because it fosters meaningful participation between users, the bikeshare, and bikeshare partners. These outreach and engagement strategies come in many forms including:

- Hosting public events or rides
- Participation in community-led events
- Interactive boards or posters in the vicinity of bikeshare stations (wayfinding, community boards)
- Incentive programming built into the bikeshare
- Creative placemaking with local businesses (breweries, bikes shops, restaurants)
- Conducting community forums

There are few examples within the rural realm of bikeshare that have exceeded community expectation in terms of delivering an accessible and equitable public transportation system, while also highlighting extensive engagement strategies. These include the Golden Bike Library and WE-Cycle in Colorado, Pocahontas County Bikeshare in Iowa, Allen County Bike Library in Kansas, and Root River Trail Towns Community Bikeshare in Minnesota.

Figure 1: Rural Bikeshare Case Studies



Golden Colorado Bike Library

Golden Colorado is a relatively small community (approx. 21,000 people), that experiences a large seasonal influx of tourists every year. Through a grant of \$164,000 from the Denver Regional Council of Governments and Golden's \$34,000 match, the Town's bikeshare program was launched in 2016⁸. The program features a dockless, hybrid, "library" model where a fleet of 60

Image 6: Bike library outside of Golden's Visitor Center



Image from the City of Golden

bikes are stationed at 4 locations throughout Golden⁷. There are currently two types of bicycles that cater to youth and adult riders. To ensure equitable access to the bike library, adult bikes range in size from 13-inch, 15-inch, to 18-inch. The "library" model allows users to check out bikes at the varying staffed locations using a valid I.D and credit card. Two-hours rentals are free, but users have 24-hour access to their bike⁷ for \$10. All bike rentals come with a bicycle, helmet, lock, reusable water bottle, and a Golden Ticket¹².

Golden Tickets are used as an incentive for the bikeshare program, and are offered with each rental⁷. The Golden Tickets are savings vouchers that can be used once at any of the over 75 participating locations throughout the community. These include restaurants, shops, attractions, healthcare facilities, and businesses. Savings can be up to 20% off at a participating location to winnings of up to \$500¹³. Other incentivizing opportunities include the Golden Breweries Bike Tour Route that includes an on-road and off-road bike network connecting six different breweries in town, as well as the Bike Library Route that highlights all of the available on and off-road facilities surrounding the bike library locations⁷. Popularity of the system, in part due to successful community engagement and promotion strategies, equated to 6,247 users during 2018⁸.

Golden represents a bikeshare model geared towards tourism within a rural community setting. Like Allen County, because Golden owns and operates all of the equipment to run the bikeshare, initial capital and monthly operational expenses are covered by grants, sponsorships, and advertisements. This allows the bikeshare to be available at a relatively low cost that is accessible to most, if not all, users.

Colorado's WE-Cycle

WE-Cycle is a community supported 501(c)(3) non-profit organization that owns and operates the WE-Cycle Bikeshare program within the communities of Aspen, Basalt, and Snowmass Village Colorado. Launched in 2013, WE-Cycle became the first rural community in the United States to have a bikeshare program¹⁰. While serving only a mere 19,000 local residents, the communities of Aspen, Basalt, and Snowmass Village are vibrant, tourist-friendly communities with high population densities and multiple attractions that bring in thousands of visitors annually. Due to

the high seasonal influx of visitors, WE-Cycle offers an active alternative to driving for shorter trips across town.

The program features a smart-lock docking and kiosk system, with 49 stations and 230 pedal-bikes and 25 e-bikes¹⁴. Unlike many other bikeshare models, in 2018 WE-Cycle withdrew membership and day passes and began offering seasonal free passes for residents and visitors, providing unlimited 30-minute trips throughout the day using pedal-bikes. E-bikes were introduced in 2018, with unlimited 20-minute trips on a given day. And, while the bikeshare is only intended for short trips, WE-Cycle promotes the numerous bike rentals within the participating communities for longer term recreational use¹⁴.

Image 7: Solar-Powered Bikeshare Station in Aspen



Image from WE-Cycle

To promote equitable access, WE-Cycle launched *Movimiento en Bici* in 2016¹⁵. *Movimiento en Bici* is a program designed to target the largely Latin American community within Aspen, Basalt, and Snowmass Village. This program features bilingual staff that focus on community engagement and outreach strategies. Group rides and adult bike classes are coordinated within these communities to provide an avenue for beginner and novice bike riders, as well as a platform for continued engagement¹⁵.

The program has also partnered with Roaring Fork Transit Authority (RFTA) to provide access to the bikeshare through the RFTA's Zone Pass Card, to promote first and last mile trips to and from the bus¹⁴. In addition, VelociRFTA Bus Rapid Transit (BRT) program travelling between Aspen and Glenwood Springs expands micromobility opportunities for those outside of the service area. Residents in Glenwood Springs are able to utilize the WE-Cycle bikeshare as a last mile solution upon alighting the bus, with stations located at the BRT terminal¹⁴. This partnership between WE-Cycle and the RFTA is the first of its kind in terms of rural micromobility and supports the framework of a combined public transportation system.

Pocahontas Iowa Bikeshare

Image 8: Free-floating Smart Bikes in Pocahontas County, IA



Image from the Shared Use Mobility Center

The Pocahontas County Bikeshare program was initially piloted in 2016 with the rental of 15 refurbished bicycles from Koloni, a local bikeshare platform¹⁶. However, the program didn't officially launch until 2018 with a fleet of 25 bicycles. The bikeshare features a hybrid, smart bike, model that utilizes standard bike racks that are georeferenced at designated parking and trail locations. Pocahontas County previously leased the bicycles and software from Koloni at \$40 per month¹⁶. Through a shift in Koloni's payment structure, bikes are

now sold to communities with a continued monthly expense for rights to the ridership tracking software¹¹. Due to the low initial capital costs of the program and the leasing of equipment, local grants and advertising revenue cover the initial and monthly rental expenses. This platform significantly reduces the cost to use the system. Residents and visitors are able to rent a bike for \$2 per hour with an additional \$0.50 per transaction using the Koloni app¹⁶.

Due to the small population serviced by the bikeshare program (approx. 4,000 people), municipal employees and volunteers are charged with the rebalancing and routine maintenance of the bicycles. Because the county utilizes a hybrid model, implementation of new types of bicycles and expansion of the system is easier and less expensive comparative to larger bikeshare systems. Recent developments of the Pocahontas County Bikeshare include the potential expansion of the bicycle fleet with more adaptive bicycle varieties¹⁶.

Pocahontas highlights the advantages to a dockless system for rural bikeshare that focuses more on community need rather than viewing bikeshare as a revenue stream. Low initial capital and monthly costs allow grant funding, sponsorships, and advertising to sustain the system and prevent financial burden on bikeshare users. This inherently increases equity of the system to support low-income users.

Allen County Kansas Bikeshare

Allen County, Kansas is a popular bicyclist destination that boasts numerous trail systems for visitors and residents within the community. These trails include the 52-mile Prairie Spirit Trail, the 5-mile Humboldt Bicycle Route Network, and the 7.5-mile Lehigh Portland Trail, among others; designating Allen County as the "King of Trails" in Kansas¹⁷. However, in this small rural community setting with a slowly declining population of 13,000 people and a median household income of \$25,762 (2019), there has been a profound access barrier for residents to use these

recreational facilities. In addition, Allen County does not have a public transportation system in place to secure transit access for those low-income families that may not have a vehicle¹⁷.

The Allen County Bikeshare was made possible through generous donation by the Blue Cross Blue Shield Kansas Trailblazer program and partnerships with Velo+, the local bike shop, and local non-profit Thrive Allen County¹⁷. Not only does the bikeshare provide opportunity for all residents to enjoy the existing bike trail network, but also access to everyday destinations that may have otherwise been inaccessible. The bikeshare program features a dockless “library” model where users can check out one of 42 bikes at 7 locations throughout Allen County, simply using a valid I.D and a signed waiver for a duration of minutes to days¹⁷. Because the bikeshare model utilizes

Image 9: Allen County Bike Library



Image from Thrive Allen County

low-cost bike racks and locally sourced single-speed bicycles, donations and partnerships with local organizations funded the initial capital costs of the system. This secured the ability to provide free fare for users. Galvanized by the free-fare system, Allen County has experienced a remarkable increase in community wellbeing. With 463 total users in 2019, the Allen County bikeshare system provides a glimpse of success for micromobility in rural communities¹⁷.

Newer installments of the bikeshare program seek to enhance the accessibility and equity of the program through additional bike racks in and around community centers and everyday destinations. To ensure equitable access to the system, a pedicab was introduced for users that are unable to ride a standard bicycle¹⁷. Unlike larger bikeshare models, the dockless library model allowed Allen County to utilize local resources to fund a program that better supports the communities financial, health, and recreational needs, while creating a sustainable system that is not fed by large capital dollars.

The Root River Towns Community Bikeshare

The Root River Towns Community Bikeshare is a product of the partnership between the Root River State Bike Trail System and the surrounding communities of Chatfield, Fountain, Preston, Peterson, Harmony, Lanesboro, Whalen, Rushford, Rushford Village, and Houston Minnesota¹⁹. This partnership was utilized to develop a 501(c)(3) non-profit organization that promotes the Root River and Harmony-Preston Valley State Trail systems as regional destinations¹⁹.

The Root River and Harmony-Preston Valley State Trail systems are 60-miles of paved multi-use pathways maintained by the Minnesota Department of Natural Resources. The trails system promotes bicycling, hiking, skating, and cross-country skiing and support community and regional events throughout the year¹⁹. In support of local use of these trails, the Root River Towns non-profit curated a free bikeshare system throughout the communities of Fountain, Harmony,

Peterson, Preston, and Rushford. The goal of the bikeshare is to promote active transportation and recreation of local trail users¹⁹.

The community bikeshare resembles a bike library model in which residents visit a municipal or visitor center with an I.D to register a bicycle on a first come first serve basis. These centers include Fountain City Hall, Harmony and Preston Visitor Centers, Peterson Station Museum, and Rushford Public Library. Each bike library is equipped with five to seven adult bicycles, helmets, bike locks, and a bike rack provided through sponsorship of the Fillmore County Statewide Health Improvement Project¹⁹.

Image 10: Root River & Harmony-Preston Valley State Trails System

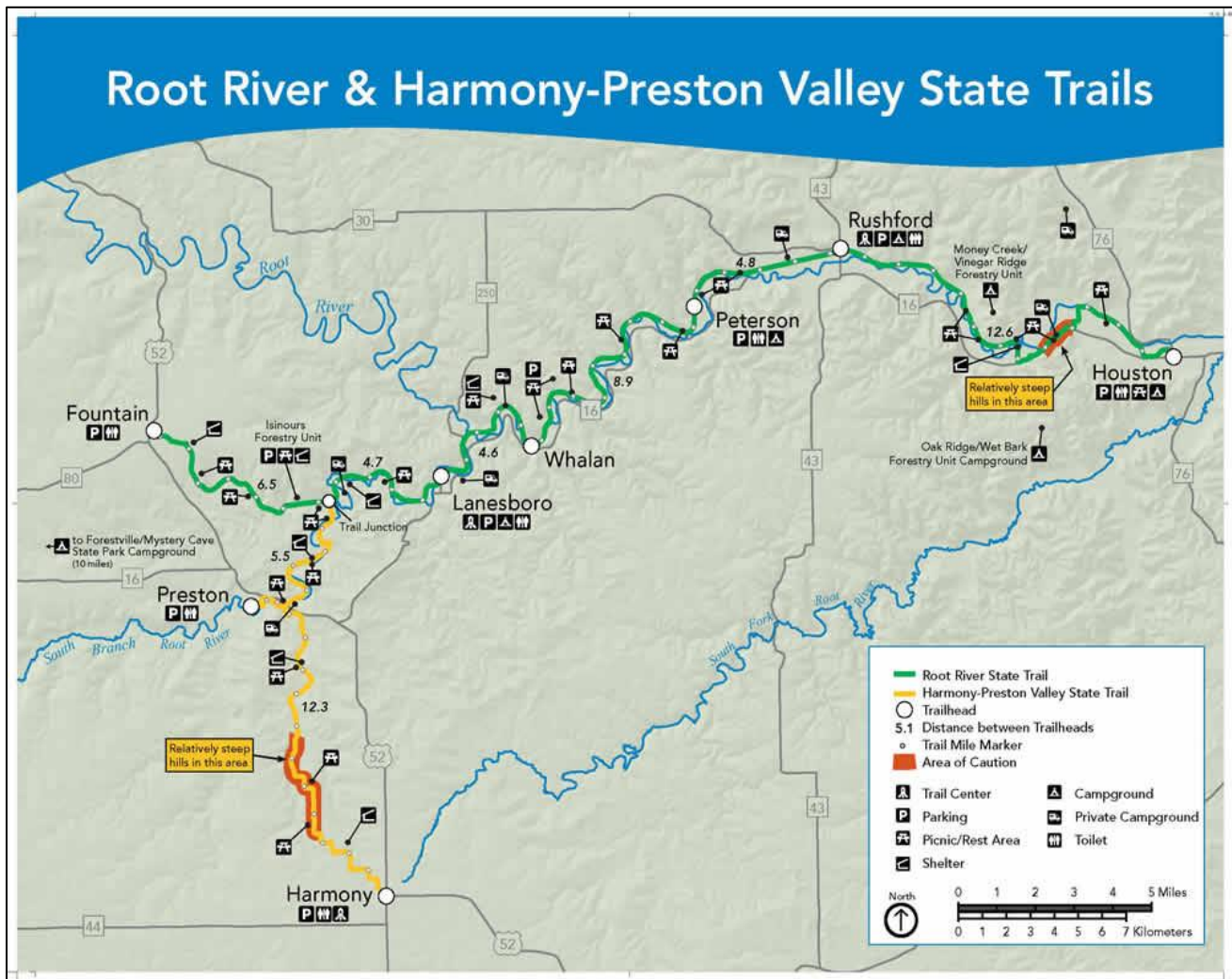


Image from the Root River Trail Towns

In light of promoting residential use of the regional trail systems within Fillmore County, the bike library locations are within proximity or along trailheads, trail intersection, or trail centers¹⁹. Because the bicycles are checked out for an entire day, users are not restricted by 30-minute or hour-long windows time restrictions. Without limited time restrictions users are more likely to participate in longer rides.

System	WE-Cycle (CO)	Pocahontas County Bikeshare (IA)	Allen County Bikeshare (KS)	Golden Bike Library (CO)	Root River Trail Towns Community Bikeshare
Location(s)	Aspen Basalt Snowmass Village El Jabel	Pocahontas Rolfe Laurens Fonda	Iola Humboldt Savonburg Moran	Golden	Fountain Harmony Peterson Preston Rushford
Total Population Served	18,786	3,952	7,694 (13,000 people throughout Allen County)	20,693	4,661
Number of Stations	49	N/A	7	4	5
Number of Bicycles	255	25	42	60	Approx. 35
Station/System Model	Dock-Based Stations	Dockless	Bike Library	Bike Library	Bike Library
Hours of Operation	24/7 during season	6 A.M - 12 A.M	Unknown	10 A.M - 4 P.M (Th-Su)	Preston: 8 A.M - 4:30 P.M (M-F) Rushford: varying hours (M-Sa)
Months of Operation	May - October	May - November	Unknown	April - October	Unknown
Equipment Ownership	WE-Cycle	Pocahontas	Allen County	Golden	Root River Trail Towns
Equipment/Technology Provider(s)	PBSC Urban Solutions Transit App Motivate Bcycle Bewegen D8	Koloni	Velo + Iola (local bike shop)	Jami's Bikes	Fuji Bikes
Operator(s)	WE-Cycle		Allen County	Golden	Root River Trail Towns
Business Model	Non-Profit Owned and Operated		Publicly Owned and Operated	Publicly Owned and Operated	Non-Profit Owned and Operated
Initial Cost	Unknown		\$16,800 (bikes)	\$44,486 (bike equipment) \$198,266 (total cost for implementation)	Unknown
Initial Annual Cost of Equipment/Bike Rental	N/A	\$40/Month	N/A	N/A	Unknown
Funding Sources	Title, Impact, and Stations Sponsorship, CMAQ	Advertising, Sponsorships, Community Grants	Blue Cross Blue Shield Kansas, Thrive Allen County, Health Forward Foundation	Federal Grants, and Partner Sponsorships	Fillmore County Statewide Health Improvement Partnership (SHIP)

System	WE-Cycle (CO)	Pocahontas County Bikeshare (IA)	Allen County Bikeshare (KS)	Golden Bike Library (CO)	Root River Trail Towns Community Bikeshare
Total Number of Annual Users (most recent)	N/A	27 (2019)	N/A	N/A	N/A
% of Trips Made by Annual Members	0%	2%	0%	0%	N/A
% of Trips Made by Short-Term Users	100%	98%	100%	100%	N/A
Total Number of Trips (most recent)	58,707 (2019)	1,232 (2019)	855 (2019) - checkouts	Unknown	Unknown
Membership Pricing	N/A	Annual: \$25	N/A	N/A	N/A
Short-Term Pricing	7-Day Pass: \$25 3-Day Pass: \$15 Day Pass: \$7 Free (20-30 minute rides - dependent on bike type)	Pay per Hour: \$1	Day Pass: Free	2-Hour Ride: Free Day Pass: \$10	Day Pass: Free
Overage Fees	\$0.50/minute for pedal bike \$5/minute for electric bike \$2,200 after consecutive 24-hours	N/A	N/A	N/A	Preston: \$565
Connection with Other Multi-Modal Systems	Partnered with RFTA, Zone Pass works for bus and bikeshare	N/A	N/A	N/A	N/A

Suburban and Urban Bikeshare

While there are several factors that led to the burgeoning urban sprawl of the 1950's, it was largely tied to federal support of economic and housing development and increased dependence on the automobile. Expansion into the urban periphery provided the opportunity for people to enjoy "contemporary American life" while also being within a short distance of the city for work and play²¹. However, suburbia has been largely shaped by the automobile both in the physical development of suburban communities and the lives of those within them²¹.

Commuter enabled traffic congestion and neglected active infrastructure are derivative of this type of development. Heavy reliance of vehicles has historically limited the implementation of public transportation infrastructure, and reduced the need and integration of bicycle and

Image 11: Old MA-128 in Lexington, MA Connecting the Suburbs to Major Highways and the City



Image from the Town of Lexington

pedestrian accommodations. In more recent decades, transportation shifts have promoted better integration of bicycle and pedestrian facilities into road reconstruction and resurfacing projects. However, the historically car-centric foundations upon which suburban life was built paved the way to a discontinuity between the recent modal shift and the support of public bikeshare services.

Therefore, like rural communities, suburban bikeshare opportunities have been left to the wayside.

Although, suburban densities and geographies are more favorable to this type of infrastructure. Because suburbs exist within the urban periphery, suburban residents often work and recreate within cities. This distinct connection of movement has begun inducing expansion of public transportation, particularly with bus and commuter rail. However, these services are not always provided throughout the entire community and are more distinct along city limits or major travel routes. This forms a barrier of limited access and requires the use of a personal vehicle to reach public transit. In some cases, the desire to use public transportation is diminished all together.

Integration of bikeshare systems pose the opportunity to promote commutes fully supported by public transportation between urban and suburban geographies, as well as provide an active mode for short trip destinations. An additional incentive is imposed on the municipality to implement infrastructure that supports active transportation. In short, public bikeshare can accommodate additional transportation options while also supporting an enhanced quality of life.

Across the United States there are few examples of urban bikeshare systems that have begun expanding into peripheral communities. In more recent years, usership trends within the metro Boston area have emphasized the need for bikeshare expansion into neighboring suburbs. BlueBikes operates within the City of Boston and larger suburban communities including Brookline, Cambridge, Everett, and Somerville²². In 2018, an official launch of Limebike bikeshare, following a 2017 pilot in Malden MA, supported the remaining communities within the metro Boston core:

- Arlington
- Bedford
- Belmont
- Chelsea
- Everett
- Melrose
- Milton
- Medford
- Needham
- Newton
- Quincy
- Revere
- Waltham
- Watertown
- Winthrop

In November of 2019, the Metropolitan Area Planning Council (MAPC) conducted an analysis of the first 18 months of the bikeshare’s ability to support active transportation in the region. The MAPC identified that “2/5 of all trips start in town center and commercial districts” and extend “into outlying neighborhoods” that were not easily accessible by walking or existing public transportation²². Many of the trips recorded were used as first and last mile solutions to the transit system. And in many cases, including those previously mentioned, users were trekking along high stress corridors with high volumes of traffic and limited to no bicycle facilities. Limebike had a profound effect on the communities’ ability to access areas uncharted by public transportation, which was reflected in the high ridership within the first year of the program. Between April of 2018 and November of 2019, Limebike had nearly 300,000 trips made between the 15 municipalities²².

Image 12: Graphic from MAPC Story Map “First Miles”

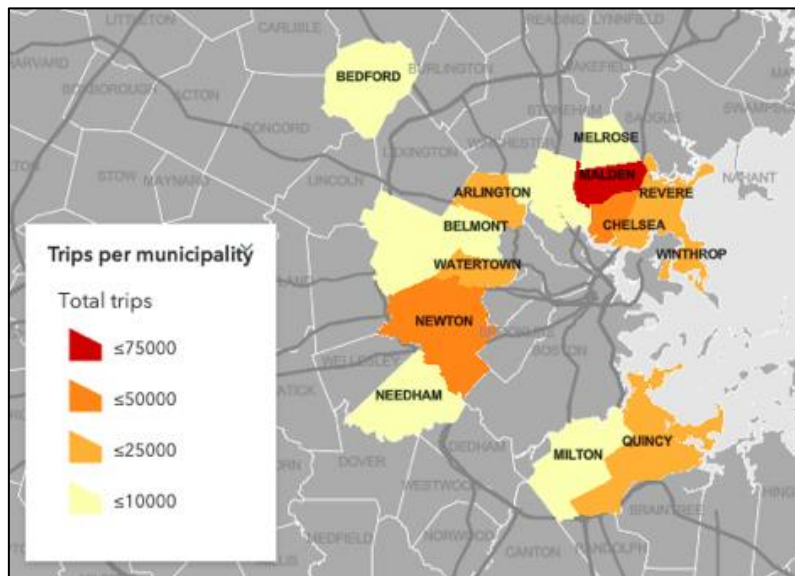


Image from MAPC

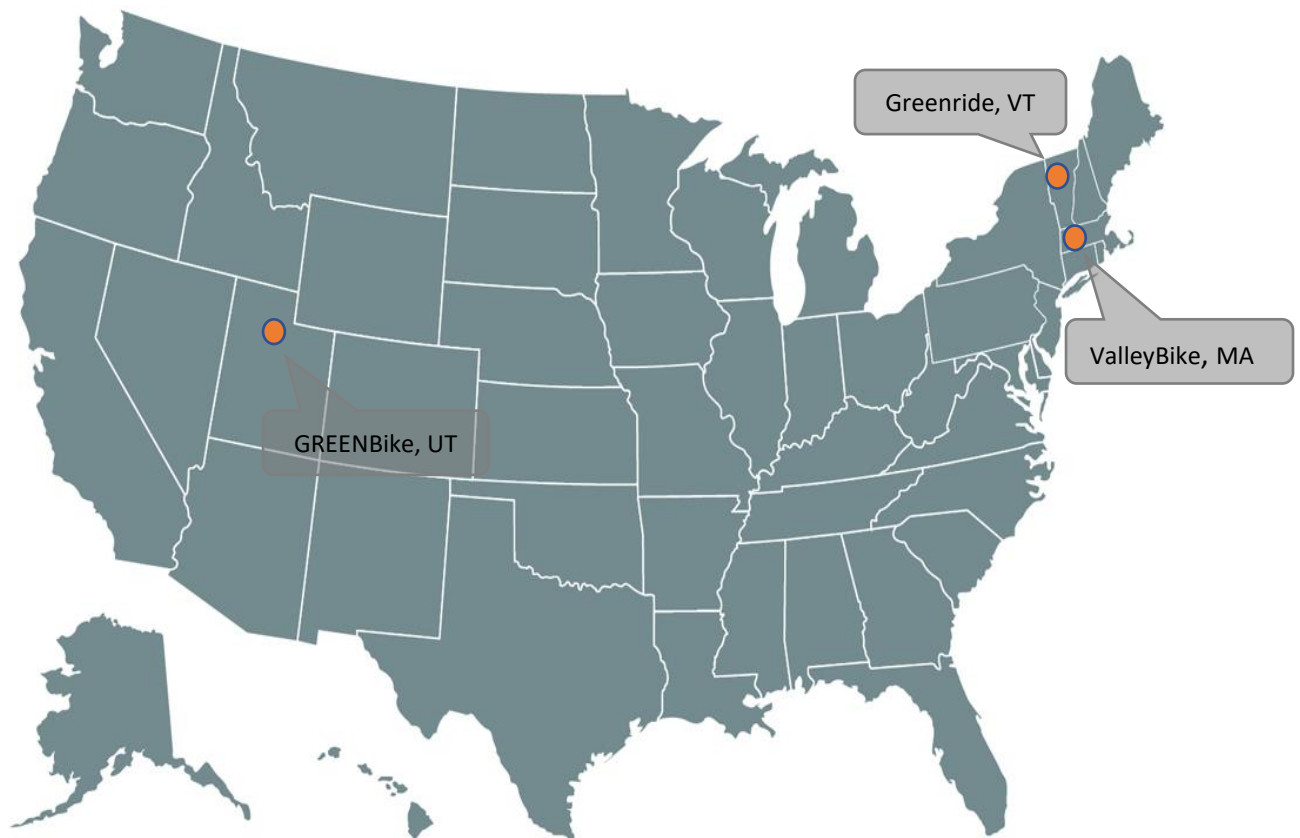
Stemmed from the analysis, MAPC has continued to work with municipalities and other stakeholders to implement Complete Street policies and infrastructural improvements that support their multi-modal framework. While there has been success of this system within the suburban context, Limebike decided not to reinstate their contract with most

The success of the system also illuminated the need for multi-modal infrastructure to increase the level of safety for users²². While there has been success of this system within the suburban context, Limebike decided not to reinstate their contract with most

of the communities beginning in 2020²². Although Limebike is not operating at the capacity it once was, the success of the system highlights active transportation's significance to community access and equity needs. In hindsight, there is a unique role that bikeshare plays in communities of all sizes.

Similar to planning, designing, and implementing rural bikeshare, the SUM Toolkit (either rural or urban) can provide context to support priorities within suburban communities. However, there should be additional emphasis on the connection to other forms of public transportation as it directly relates to the environments in which people live, work, and play. The following case studies highlight a connection between the suburban and urban bikeshare, while maintaining a similar demographic to the Central MA region. These include ValleyBike in Massachusetts, Greenride in Vermont, and GREENBike in Utah.

Figure 2: Suburban and Urban Bikeshare Case Studies



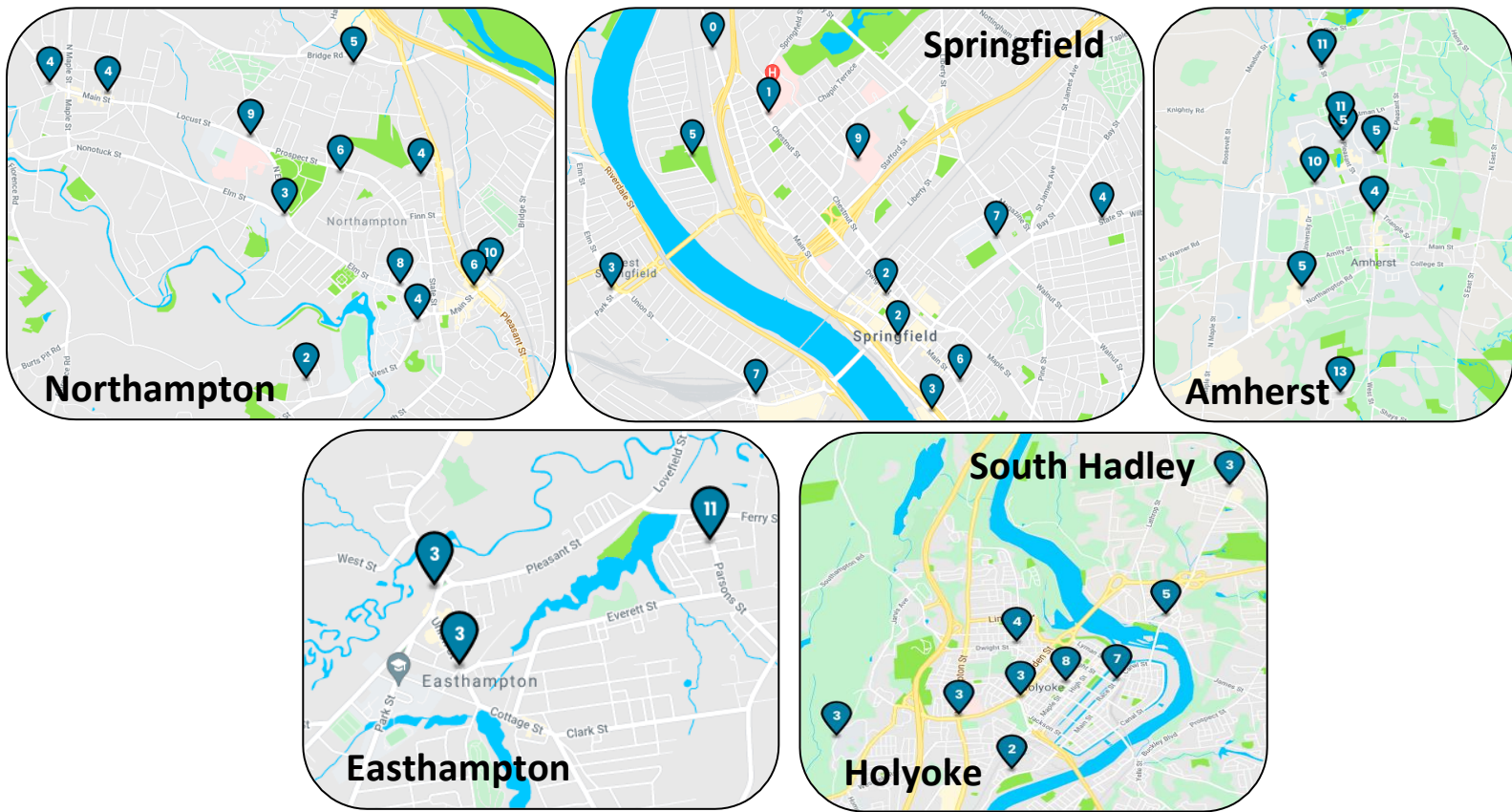
The Pioneer Valley's ValleyBike Share

The Pioneer Valley Planning Commission (PVPC) conducted a feasibility study in 2015 to analyze the region's ability to support a regional bikeshare network. Similar to the Central MA region, Pioneer Valley is characterized by largely rural communities with a sparse suburban mix. Urban centers, like Springfield and Northampton, are densely populated and feature noteworthy attractions, historical and cultural landmarks, and colleges and universities, among others, that create the ideal environment for bikeshare implementation. In 2018, the feasibility study was

utilized to develop a successful pilot program which evolved into ValleyBike Share, located throughout the communities of Amherst, Easthampton, Holyoke, Springfield, South Hadley, and Northampton²³.

Phase 1 of the bikeshare system began with 26 stations with 234 bikes located throughout Amherst, Northampton, Holyoke and Springfield. The program has grown to 53 stations and 450 bikes and expanding into the additional communities of Easthampton and South Hadley¹. The bike share system exhibits a divided ownership in which the participating municipalities own and oversee the operations of the stations within their jurisdiction. However, operations are conducted by a private venter, Alta Bicycle Share. The bikeshare system features a “smart-lock” kiosk system that is activated through the purchase of a membership or limited time pass¹.

Figure 3: Station locations take from ValleyBike website



**Does not include virtual stations*

The program provides numerous types of memberships and daily passes that are able to suit the needs of the community. ValleyBike offers discounted annual rates for students at \$60 for an unlimited number of 45-minute day trips for a year, and an Access Pass for qualifying residents at \$10 for an unlimited number of 60-minute day trips for a year²⁴.

In addition to providing financially accessible options for users, ValleyBike has been well integrated into the existing transit system. Many bikeshare stations are located at or within close

proximity to major transit stations and popular PVRTA bus stops. This includes Mercy Medical Center Station located at Springfield Union Station, Pleasant Station located at the Holyoke Amtrak Station, the station at the Northampton Train Station, as well as numerous bus stops along North Pleasant Street in Amherst. Additional bikeshare stations have been strategically placed along multi-use path intersections to allow residents to commute along non-motorized routes. These include the Rail Trail @ Union Street and Rail Trail @ Millside Park located in Easthampton, among others.

The integration of bikeshare with public transportation has drastically improved mobility within the Pioneer Valley. Due to the success of the program, ValleyBike will be expanding into Chicopee and West Springfield. Stations in West Springfield became open to the public in April of 2021²⁴.

Salt Lake City's GREENBike

GREENBike is a 501(c)(3) non-profit organization that owns and operates the GREENBike bikeshare program in Salt Lake City, Utah²⁵. While GREENBike is not located throughout the entire

Image 13: GREENBike Station in Salt Lake City, UT



Image from the Salt Lake Tribune

city, the bikeshare program is centered at the city's core to target the areas of high population density and trip generators including employers, attractions, and public transit. The bikeshare supports the high-density population with stations located every quarter of a mile, focusing on locations that supports low-income users, public transit users, and the existing bicycle infrastructure²⁶.

GREENBike features a dock-based station system with 47 stations and 330 pedal and pedal-assist bikes. Users are able to utilize the system through purchase of a membership or short-term

pass²⁵. Annual memberships are \$75 per year and allow users an unlimited number of 1-hour trips per day. The Office Pass is a discounted annual membership (\$35-\$65) that can be purchased in bulk through a local employer. Go Passes are reserved for users that meet or are below the 200% Federal Poverty Guidelines, and require a \$5 annual fee for unlimited 1-hour trips for qualifying users. Short-term passes include the Day Pass (\$7) and the 4-Day Pass (\$15). These passes provide users an unlimited number of 30-minute rides per day. Seniors, teachers, veterans, and students are eligible for discounted memberships and passes, excluding the Go Pass²⁵.

Similar to the ValleyBike program, GREENBike continues to promote accessibility not only through various forms of membership, but also through integration with existing public transportation systems²⁶. The Utah Transit Authority (UTA) offers numerous public transportation options including commuter rail, light rail, streetcar, and bus rapid transit.

GREENBike has strategically placed bikeshare stations at popular transit stops to promote equitable access and ease of use. Some of these integrated stops include the Salt Lake City Train Station, the City Creek Parking garage, City Center Bus Station, and the West Trax Station²⁶. Due to the program's success, GREENBike will be expanding to Ogden²⁵.

Burlington Vermont's Greenride Bikeshare

Greenride Bikeshare is a publicly owned, privately operated, system that was launched in 2018²⁷. The bikeshare was formed out of a partnership between the University of Vermont, Champlain College and CATMA, a 501(c)(3) non-profit transportation management group servicing the Chittenden County area. Currently, the bikeshare program is only in its first phase of implementation with 17 hubs and 105 bicycles, including e-bikes²⁷. The 17 hubs are centrally located throughout the densest portions of Burlington, South Burlington, and Winooski targeting a population of nearly 69,000 residents.

The Greenride system features a hybrid smart bike system that operates out of central hubs, while also offering users the ability to park bicycles anywhere in the hub system using a georeferenced smart bike locking system²⁷. There are numerous types of annual memberships to satisfy the needs of all users. These include the regular annual membership, as well as the discounted student, CATMA, and EBT eligible access plans. Discounted plans are \$25 for eligible users and allows for 60 minutes per day of free use²⁹. Monthly memberships are offered at \$15 per month with a discounted rate of \$5 per month for EBT eligible users. This provide 60 minutes of free use of the bikeshare system per day. Quick trips are the programs only short-term use option that acts as a pay per ride method of use. For \$2, users are allowed 30 minutes of free riding per day²⁹.

Image 14: Greenride Hybrid Station in Burlington, VT



Image from Burlington Free Press

As previously mentioned, Greenride is only within its first cycle of implementation, and plans to expand its reach with additional hubs and both pedal and e-bikes. Greenride expects to have a total of 54 hubs including 18 new stations and 19 virtual, georeferenced, stations by the end of its implementation cycle²⁷. As the Greenride bikeshare program relies on a dockless-based system and a bike rental approach, expansion costs are significantly less than programs that pay for the costs of stations and the bikes. Moving forward, Greenride is looking to expand their e-bike fleet to 200 bikes to continue supporting the community's multi-modal transition within Burlington's hilly terrain²⁷.

System	ValleyBike Share (MA)	GREENBike (UT)	Greenride (VT)
Location(s)	Amherst Easthampton Holyoke Northampton South Hadley Springfield	Salt Lake City	Burlington South Burlington Winsooki
Total Population Served	294,574	28,896 (GREENBike service area 2013)	68,930
Number of Stations	53	47	17 Stations 30 Total Mobility Hubs
Number of Bicycles	450	330	200
Station/System Model	Dock-Based Stations	Dock-Based Stations	Hybrid Smart Bike Model
Hours of Operation	4 A.M – 12 A.M	24/7 during season	24/7
Months of Operation	April – December	April - December	All Year
Equipment Ownership	Municipalities and UMASS Amherst	GREENBike	SoBi, Bolt, and Gotcha Bike
Equipment/Technology Provider(s)	Bewegen	BCycle	Social Bicycle (SoBi) Gotcha Bike
Operator(s)	Alta Bike Share		Gotcha Bike
Business Model	Publicly Owned – Privately Operated		Publicly Owned – Privately Operated
Initial Cost	\$32,000 - \$50,000 (per station)		\$5,250 (per hub-not including bicycles)
Initial Annual Cost of Equipment/Bike Rental	N/A	N/A	\$175,500/Month
Funding Sources	Title and Station Sponsorship	Title, Station, and Handlebar Sponsorship, UDOT, UTA, WFRC, Salt Lake City	Title Sponsorships and Partner Sponsorships, Partners

System	ValleyBike Share (MA)	GREENBike (UT)	Greenride (VT)
Total Number of Annual Users (most recent)	Unknown	6,100 (2013)	600 (2018)
% of Trips Made by Annual Members	15.50%	35%	45%
% of Trips Made by Short-Term Users	58%	65%	39%
Total Number of Trips (most recent)	77,283 (2019) 32,415 (2020) – Likely due to limitations from COVID-19	25,361 (2013)	9,000 (2018)
Membership Pricing	Founding: \$90 Annual: \$80 Monthly: \$20	Annual: \$75 Office Pass: \$35-\$65 Go Pass: \$5	Annual: \$99.99 CATMA Plan: \$69.99 Bolt Forward Annual: \$29.99 Student Annual: \$39.99 Monthly: \$15 Bolt Forward Monthly: \$5
Short-Term Pricing	Day Pass: \$6 Pay per Ride: \$2 Single-Trip Pass: \$2	Day Pass: \$7. 4-Day Pass: \$15	Pay as You GO: \$1 to unlock \$0.35 per minute
Overage Fees	\$0.15/minute \$2,000 after consecutive 24-hours	\$5 after 31-60 minutes (Day Pass Only) \$5 after 61-120 minutes (Membership Only) \$5/hour after 121 minutes (after 61 minutes for day pass)	\$5 for each additional 30 minutes (Quick Trip) \$10 for each additional 60 minutes (Annual Plans) \$5 Out-of-Hub fee \$50 Out-of-System fee \$1,500 lost/stolen fee
Connection with Other Multi-Modal Systems	All major transit hubs (bus and rail) have bikeshare stations	All major transit hubs (bus and rail) have bikeshare stations	Bikeshare hubs are located near major transit hubs

Key Takeaways:

Bikeshare is NOT one size fits all. As learned through the numerous case studies, bikeshare systems have been adapted to unique community needs. This includes tailoring the business models and station types, partnerships, design and implementation strategies, maintenance, and system expansion.

Bikeshare systems should be an extension to existing public transportation systems. While not all communities within the examples provided have public transportation infrastructure, those that do prove the importance of integrating modes to create a robust and accessible system. This not only simplifies the use of public transportation, but increases accessibility for those with limited access or financial constraint.

Fare integration provides a seamless transition between transportation modes by utilizing the same form of payment. As highlighted by WE-Cycle in Colorado, a re-loadable payment card is easy to use and is acceptable throughout multiple municipalities and between the bikeshare and the regional transit authority. Collaboration with a local regional transit authority or city may be needed to have successful fare integration.

Image 15: Zone Pass Card Fare Integration



Image from WE-Cycle

Incentives through local partnerships or sponsorships can promote bikeshare use. As highlighted by the example in Golden, Colorado, a Golden Ticket is received each time a bike rental is made which unlocks discounts or cash prizes at local businesses. Incentivized strategies can be replicated in other communities to promote the use of a bikeshare system or engagement of the local economy.

Bikeshare systems can be successful in communities of all sizes, not just high-density urban environments. As explored in the case studies, bikeshare can accommodate communities from 4,000 residents to 270,000 people. As emphasized by ValleyBike, rural, suburban, and urban demographics can be supported within the same bikeshare system.

Some institutions within the bikeshare scheme can create barriers to access and equity within the system. Functions like payment structures, connectivity to public transportation, access to bicycle infrastructure, or bike variety can limit who is able to utilize the system. These functions should be minimized to provide an equitable system that is accessible to all users.

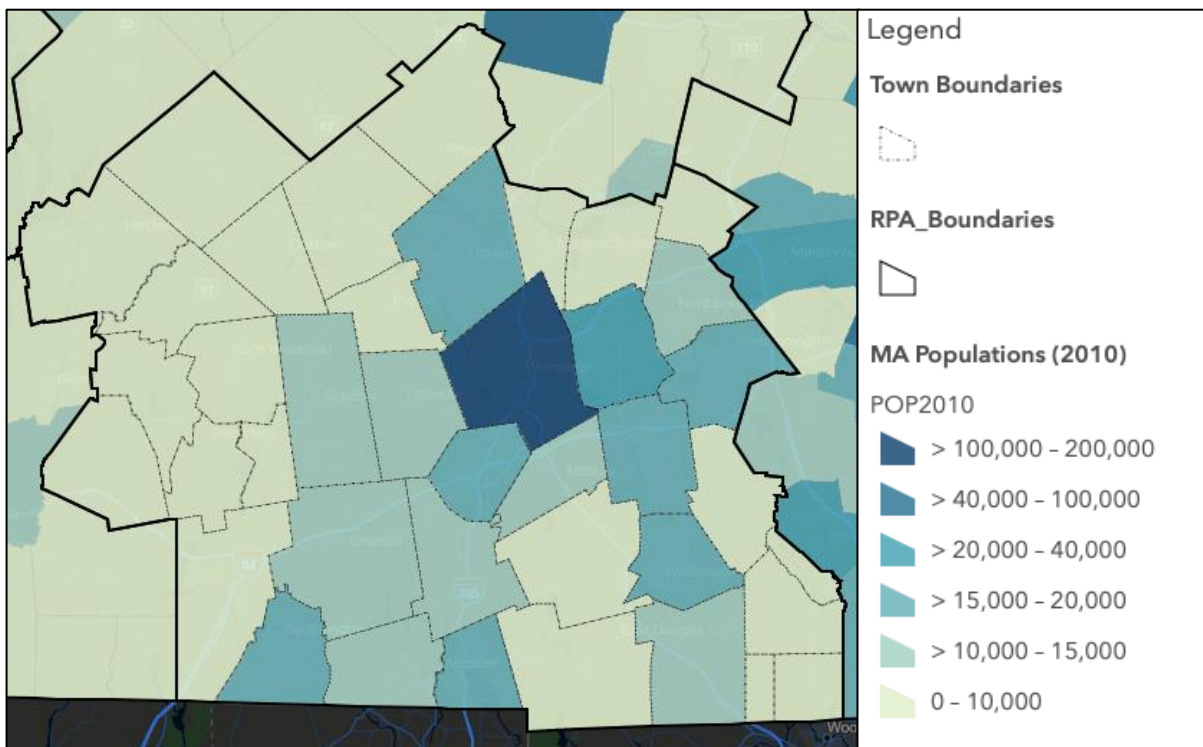
Bikeshare systems can support more than just commuter populations. They have the potential to support tourism and recreational users as well, as highlighted in the examples of WE-Cycle and Golden bike library in Colorado and Allen County bike library in Iowa. It is important to note, however, that tourism, recreation, and commuting are not unilateral. Often, these are interconnected in varying bikeshare models.

Chapter 3: Exploring Bikeshare Opportunities in the CMRPC Region

The CMRPC region is comprised of 40 unique communities, 23 of which are small rural towns with populations less than 10,000 residents. Not only are the 23 communities limited in population, sparse densities average nearly 303 people per square mile. Eight additional rural communities scatter the region, but are collectively larger with population sizes ranging between 10,000 and 15,000 people. The remaining municipalities encompass eight largely suburban bedroom communities and the city of Worcester, a gateway city at the heart of the region with second largest population in Massachusetts at 185,143 residents.

As there are varying geographies within the CMRPC region, a one size fits all approach is not feasible to implement a successful bikeshare program. Instead a unique and tailored strategy for individual or groups of communities will be needed to identify different bikeshare models that will be appropriate across geographies.

Figure 4: CMRPC Town Populations



Previous Bikeshare Efforts in the Region

In 2017, the City of Worcester is the first community within Central MA Region to integrate bikeshare into its transportation system. Following discussions with other stakeholders including the CMRPC, Worcester Regional Transit Authority (WRTA), and the Higher Education Consortium of Central MA, the City explored various options that would support multi-modality at a cost that

was accessible to all users³⁰. Zagster, a venture funded bikeshare startup based in Boston, supported these efforts by providing a bikeshare feasibility study for the City in June of 2017. The study developed a community profile that analyzed population characteristics, topography, transportation, and economic demographics that are both supportive and unsupportive of bikeshare within the City³⁰.

Image 16: Ofo flyer from 2017 (CMRPC)



After feasibility of numerous bikeshare models, the city coordinated with Ofo, a dockless bikeshare company based out of China³⁰. As mentioned in Chapter One, a dockless model utilizes smart technologies attached to the bicycle which eliminates the need for costly infrastructure. In addition, Ofo's business model prompted bikeshare integration without the need of government subsidies³⁰. Without the need of the City's financial contribution, Ofo launched their Worcester program in

September of 2017. Nearly 400 bikes were consciously divided across the city at colleges and universities, major transit stations, hospitals, and downtown, among others. And, at just \$1 per hour, it quickly gained traction. During the three-month launch, Ofo recorded 27,471 rides, nearly 350 rides per day³¹.

Unfortunately, the mere three-month launch marked the beginning and end of Ofo's stake in Worcester's transportation realm. Ofo, pulled out of Worcester and other cities in the U.S and globally³¹. With the abrupt retraction, Worcester has yet to implement a different bikeshare scheme.

Regional Characteristics that Support Bikeshare

Colleges and Universities

There are 11 colleges and universities within the CMRPC region, totaling over 35,000 students commuting and living on campus across the region. Eight of these colleges are located within Worcester. Anna Maria College located in Paxton resides along the city line, with close access to urban amenities and public transportation. The Cummings School of Veterinary Medicine at Tufts University, located in Grafton, is within close proximity to both the Westborough and Grafton town centers and Grafton MBTA Commuter Rail Station. Nichols College, located in rural Dudley, is within potential biking distance to public transportation and amenities located within downtown Dudley and Webster.

Currently, WPI, WSU, and Clark University have university-wide bikeshare system for use by students and faculty. Additional bikeshare services would allow for an extended network across the city and surrounding communities for student residents and commuters alike. For communities like Paxton, Dudley, and Grafton where schools may not have public transportation services within walking distance, students may utilize a bikeshare system as a first and last mile solution to public transportation or as an active alternative to short-trip destinations.

Public Transportation

There are numerous public transportation services located within the CMRPC region including the WRTA bus and Quaboag Connector bus systems, as well as the MBTA commuter rail. The WRTA provides fixed route services for 13 of the 40 communities in the region including:

- Auburn
- Brookfield
- Charlton
- East Brookfield
- Leicester
- Millbury
- Oxford
- Shrewsbury
- Southbridge
- Spencer
- Webster
- West Boylston
- Worcester

The WRTA also offers limited shuttle services for the communities of Dudley, Grafton, Northbridge, Southbridge, Webster, and Westborough, as well as paratransit services for the entire service area³². The MBTA Commuter Rail has a Worcester Line that extends through the communities of Westborough and Grafton to Union Station in Worcester. The Worcester Line connects to Boston’s South Station, as well as provides numerous opportunities to connect with other commuter and rail lines within the MBTA system³³. Both the WRTA fixed route and MBTA commuter rail systems operate out of the Union Station Hub in Worcester.

The Quaboag Connector is a request-based shuttle that supports the communities of Brookfield, East Brookfield, Hardwick, Warren, and West Brookfield, as well as a few communities within the Pioneer Valley Region. The Quaboag Connector prioritizes trips requested by seniors, people with disabilities, as well as requests to medical appointments or employment-based needs to enhance the accessibility and equity of the shuttle service³⁴.

Bikeshare has the ability to support public transportation as a first and last mile solution to and from origin and destination. During the work week, the influx of commuters can utilize the bikeshare system as the connection between work and the Union Station Hub, or vice versa as

Figure 5: Student Enrollment of Colleges and Universities in the CMRPC Region

Name of College	Municipality	Number of Students Enrolled
Anna Maria College	Paxton	1,500
Assumption University	Worcester	2,443
Clark University	Worcester	3,122
College of the Holy Cross	Worcester	2,997
Cummings School of Veterinary Medicine at Tufts University	Grafton	1,200
MA College of Pharmacy and Health Services (MCPHS)	Worcester	1,464
Nichols College	Dudley	1,313
Quinsigamond Community College (QCC)	Worcester	7,263
UMASS Medical Center University Campus	Worcester	1,157
Worcester Polytechnical Institute (WPI)	Worcester	6,870
Worcester State University (WSU)	Worcester	6,462
Total		35,791



commuters from varying parts of the CMRPC Region commute to other parts of the state. Similarly, bikeshare can be used to interact with different modes of public transportation, like making a connection between the Quaboag Connector and the WRTA in Brookfield for example.

Existing Bicycle Infrastructure

The CMRPC Region is home to a variety of on-road and off-road bicycle facilities in its emerging multi-modal network. Across the region are five multi-use path networks that are envisioned to join an interconnected system of on-road facilities to support tourist, recreational, and commuting endeavors. These include the:

Blackstone Valley Bikeway: The Blackstone Valley Bikeway is a north-south facing multi-use pathway that parallels MA-146, acting as a major active commuting and recreational route between Worcester and the Rhode Island border. Currently, 17-miles of the bikeway has been constructed and paved, with 6-miles completed in the CMRPC region. These segments extend from the Blackstone Heritage Corridor Visitor Center in Worcester to Main Street in Millbury, and Adams Street in Uxbridge to Depot Street in Blackstone. Segment 7 of the bikeway is under construction under the MassDOT State Transportation Improvement Program (STIP) as of 2019³⁵. The bikeway extension spans 0.82 miles continuing from the Blackstone Heritage Corridor Visitor Center to a paved on-road segment located at Union Station³⁵. The remaining portions are unpaved or require roadway access to connect the segments. The bikeway is envisioned to stretch

Image 17: Blackstone Valley Bikeway in Blackstone, MA



Image from the IBI Group

48-miles between Worcester and Providence Rhode Island, and have connections to other major multi-use pathways like the Southern NE Trunkline Trail.

Grand Trunk Trail: The Grand Trunk Trail is 6-mile stretch that extends through portions of Sturbridge and Southbridge, but serves the larger 66-mile Titanic Rail Trail. The trail provides a direct linkage to historic and recreational area including Old Sturbridge Village in Sturbridge and Westville Lake Recreation Area in Southbridge. Currently, a segment of the Grand Trunk Trail is a designated TIP project, which plays to the overall significance of the trail to regional connectivity.

Mass Central Rail Trail: The Mass Central Rail Trail (MCRT) extends horizontally across the North sub-region running between MA-31 in Holden and Oakdale Village in West

Boylston, as well as just north of the Rutland town center to Powder Mill Pond in Barre. Wachusett Greenways, an all-volunteer 501(c)(3) non-profit organization, has played an integral part in completing segments within the CMRPC region, completing over 20 miles of trail³⁶. The MCRT is a state-wide priority multi-use corridor spanning 104 miles between Northampton and Boston. Numerous segments have been completed throughout the state, and in 2020 MassDOT published a feasibility study to address a methodology in advancing the remaining portions of the corridor.

Southern New England Trunkline Trail: The Southern New England Trunkline Trail (SNETT) is a 22-mile trail that extends through the southeast subregion from Franklin State Forest, outside the CMRPC region, to Douglas State Forest. This includes the towns of Blackstone, Millville, Douglas, and Uxbridge. Currently, a nearly 4-mile segment of the SNETT is being developed as a paved multi-modal portion of the Blackstone River Bikeway, serving as a connection point between the two major transportation routes.

Image 18: SNETT in Douglas, MA



Image from Google Images

Boston Worcester Airline Trail: The Boston Worcester Airline Trail (BWALT) is a proposed multi-use and on-road bicycle network spanning from Framingham to Shrewsbury. The nearly 20-mile network is proposed to connect the Kenneth Burn Bridge at the Worcester-Shrewsbury line to the Bruce Freeman Trail in Framingham³⁷. The network will run parallel and along the MA-9 to support an alternative commuting route for active modes as well as a recreational bikeway for multiple communities. In addition to the main BWALT pathway, two branches are proposed to connect other trail systems to the main line. One branch will extend north through Southborough into Marlborough connecting to the Assabet River Rail Trail. The second branch will continue into the CMRPC region extending through Westborough, Northborough, and Berlin connecting to the MCRT³⁷.

In addition to the growing network of protected bicycle infrastructure throughout the region, is the heightened demand for an interconnected on-road system to support the off-road network. As identified by the CMMPO's Regional Bicycle Plan and the CMRPC's Bicycle Compatibility Index, an interconnected system is crucial to connecting municipal and city centers to trip generating locations like major employers, tourist and cultural destinations, and entertainment districts, as well as recreational facilities. Through adoption of municipal Complete Streets policies and through federal, state and regional funding programs like the Transportation Improvement

Program, Safe Routes to School, and the Shared Streets and Spaces, multi-modal investments are continually advancing the network.

Major Employers

The CMRPC region has numerous major employers throughout the six subregions, with a large concentration in Worcester. Leading occupations within the CMRPC region include healthcare, education, manufacturing, and agriculture. Employers like Saint Gobain, UMASS Medical Hospital, and the Worcester Public School system bring in thousands of people into Worcester and the surrounding communities each day. In Worcester alone, the Worcester Public Schools and Universities in the city bring in nearly 8,000 commuting educators throughout the week.

Figure 6: Major Employers in the CMRPC Region

Name	Municipality	Type	# of Employees
Abbott Laboratories	Worcester	Healthcare	775
Polar Beverages	Worcester	Manufacturing	369
Saint Gobain	Worcester	Manufacturing	3,500
	Northborough	Manufacturing	400
Worcester Public Schools	Worcester	Education	1,900
UMASS Medical Health Care	Worcester	Education/Healthcare	6,000
Harrington Hospital	Southbridge	Healthcare	1,400
The Overlook Retirement Community	Charlton	Healthcare	500
Reliant Medical Group	Auburn	Healthcare	2,265
	Framingham		
	Holden		
	Leominster		
	Milford		
	Southborough		
	Westborough		
	Worcester		
Vibram	North Brookfield	Manufacturing	238
Total			17,347

In terms of commuting populations, bikeshare has the opportunity to create an active alternative in and around the City of Worcester and surrounding communities. It can also promote a first and last mile solution to those commuting within the region who rely on the public transportation system. Because of the immense number of commuters going into Worcester each day, bikeshare also prompts positive environmental impacts, as active modes of transportation reduce congestion along major arterial routes and carbon emissions.

Figure 7: Number of Employers at Colleges and Universities in the CMRPC Region

Name of School	Number of Instructors
Anna Maria	197
Assumption University	407
Clark	364
Cummings	111
Holy Cross	328
MCPHS	420
Nichols College	66
QCC	771
UMASS Medical	2,390
WPI	498
WSU	425
Total	5,977

To encourage bikeshare as an option for commuting populations, coordinating efforts with major employers to include end-of-trip facilities including showers, lockers, and bicycle storage will be needed. A strategy to coordinate this effort would be to develop a Transportation Management Association (TMA). A TMA provides and promotes transportation options with the intention to reduce traffic congestion, single car commutes, and air quality, through the distinct partnerships between municipalities, employers, and colleges and universities, among others. TMA’s utilize strategies like improved bicycle and pedestrian accommodations, coordination with residential complexes, and bike-sharing as opportunities to increase access to transportation and improve upon their respective goals.

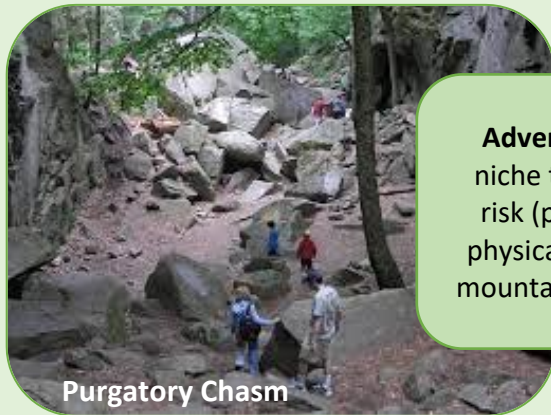


Tourist and Cultural Destinations

Tourism is a highly sought-after economic prospect that generates trips all over the world. Tourism allows communities to utilize historic, cultural, natural, or recreational resources as stimulants for economic growth, education, and preservation while promoting interaction from visitors and local residents. Central Massachusetts' historic and geologic past and more newly acquired beer culture and sporting complexes, suggest atmospheres for visitors of all types.

The Central Massachusetts' region is vibrant and eclectic, and therefore opportunities for tourism are not singular. Rather, the region boasts activities that fall under different categories within the tourism umbrella. This includes, but is not limited to adventure tourism, sports tourism, agritourism, cultural tourism, and ecotourism.

Tourism Typologies within the CMRPC Region



Purgatory Chasm

Image from Patch

Adventure Tourism: Also known as adventure travel, is a niche type of tourism, involving exploration with a level of risk (perceived or real) which may require special skills or physical exertion. This may include bungee jumping, hiking, mountain biking, canoeing, and rock climbing, among others.

Sports Tourism: Refers to travelling to observe or participate in a sporting event while staying apart from the tourist' usual environment. This can include visiting a city to attend a sporting event, visiting halls of fame or meeting with professional athletes, or participating in a sporting event, like golf.



Image from the Boston Globe



Agritourism: Any agriculturally based operation or activity that brings visitors to a farm or ranch. This may refer to farm stays, buying products directly from a farm stand, picking fruit, feeding animals, among other activities.

Old Sturbridge Village

Cultural Tourism: Tourism within urban areas, particularly historic or large cities and their cultural facilities such as museums and theatres. It can also include rural areas showcasing the traditions, values, or lifestyle of indigenous cultural communities.

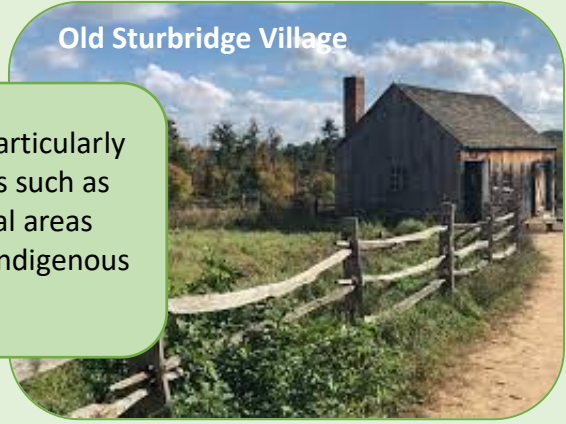


Image from Trip Advisor

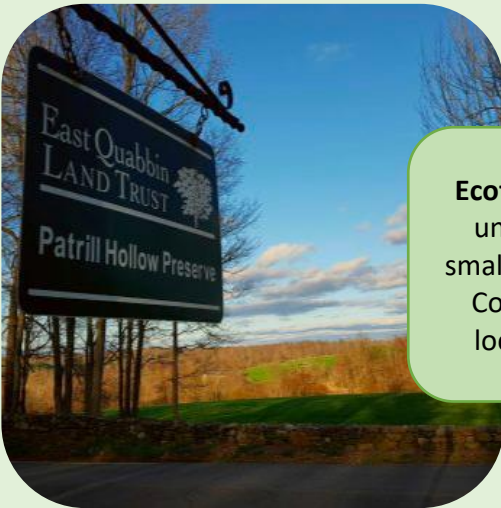


Image from East Quabbin Land Trust

Ecotourism: Refers to visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low-impact and small-scale alternative to standard commercial mass tourism. Conserving the environment and improving well-being of local residents are some of the intentions of ecotourism.

Across the CMRPC region are several parks, historic and cultural museums, and tourist destinations that attract thousands of visitors within and outside the region. The Central MA's geographic and cultural history has been preserved within the over 10 state parks and state designated forests in the region. Notable examples include Purgatory Chasm State Reservation in Sutton which preserves and highlights the remains from the region's geologic and glacial past, and the Rutland State Park's historic ruins of a prison encampment. Old Sturbridge Village located in the Southwest Subregion acts as a living museum to recreate rural life in New England between the 1700's and 1800's. This location alone sees 250,000 visitors annually, including 55,000 students from the surrounding communities³⁸. Other tourist and cultural destinations like the Ecotarium and Worcester Art Museum in Worcester, Southwick Zoo in Mendon, and Tower Hill Botanic Garden in Boylston, preserve history, art, and nature from around the region and the world.

Bikeshare may support tourism by acting as a first and last mile connection between destinations and public transportation, or as a singular resource to connect residents and visitors within a community to parks, amenities, and attractions. In support of typologies like agritourism and ecotourism within the tourism umbrella, aside from being a transportation resource bikeshare can support the preservation and responsible travel of visitors in efforts to reduce one's carbon footprint or disruption of the natural environment.

Entertainment Districts

Worcester has become an emerging destination for entertainment, with a renowned restaurant and bar scene and vibrant night life. Entertainment districts include the Canal District, Central Business District, and Shrewsbury Street. The Canal District, located surrounding the newly built Kelley Square peanut-shaped rotary, is an actively developing area of the city welcoming new developments like the Worcester Public Market, Baystate Brewery and Tap Room, and Polar Park. The Central Business District, while home to many municipal buildings like the Worcester Police Department, City Hall, and District Court among others, remains busy after business hours. The Central Business District boasts a vibrant night life with event venues like the DCU Center, Mechanics Hall, Palladium, and Hanover Theatre, while also providing a substantial food and bar scene. With some of the most popular bars restaurants in the city, Shrewsbury Street is an emerging destination for foodies. Outside the City of Worcester, many communities have well developed downtown areas that support local entertainment.

Regional Characteristics that Do Not Support Bikeshare

Central MA Hilly Topography

Worcester County is known for its hilly topography which poses a challenge to cyclists naturally. This raises concerns about commuter population’s ability to be supported by a transportation

Figure 8: Topography of Communities within the CMRPC Region

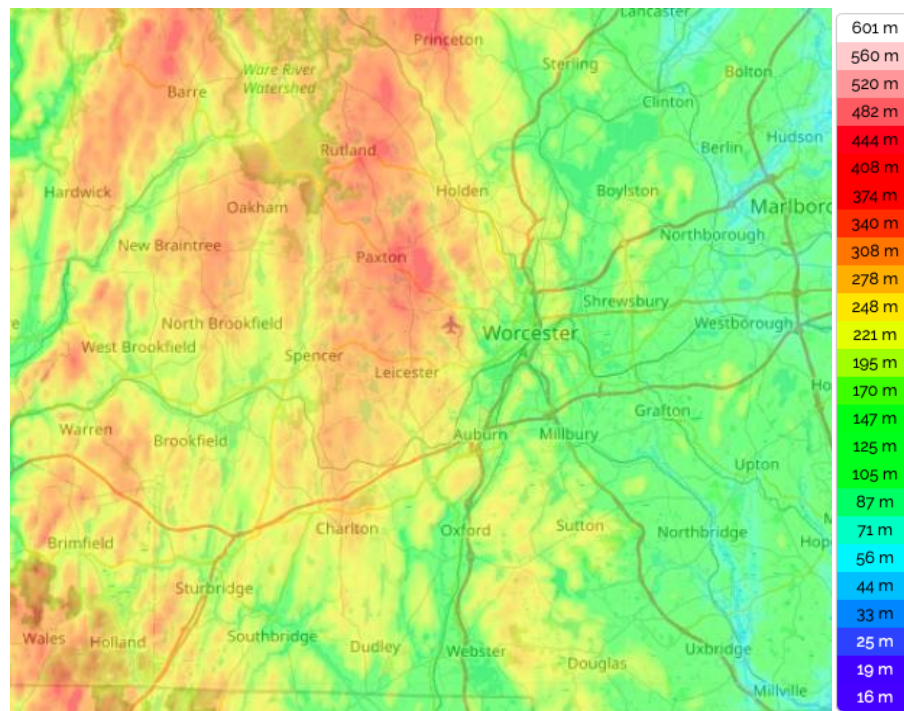


Figure from topographic-map.com

option that is efficient, but also doesn’t leave users winded and perspiring commuting to work or school. To address this, considerations about e-bikes or pedal-assist bikes should be made for longer trips or for areas surrounding downtowns, major employers, or higher education.

Additionally, major employer and college campuses where bikeshare stations may be located should include end of trip facilities. This includes showers, lockers, and hydration stations.

Population Densities

Much of the CMRPC region is characterized by its sparse, rural demographic characteristics. Dispersed populations make it difficult to integrate accessible bikeshare stations that are within reach to the majority of residents. The City of Worcester and the region's suburban town centers are more conducive due to the densities needed to support more heavily trafficked bikeshare systems. However, a different demographic characteristics appears within the suburban periphery as people, homes, and destinations become few and far between. This rural/suburban mix provides unique challenges for bikeshare design and implementation within the scale of a single community or the region.

Fragmented Bicycle Network

Although the region does have a significant amount of on-road and off-road bicycle facilities, they are fragmented. Through community efforts with the MassDOT Complete Streets and Shared Streets and Spaces, as well as the CMMPO's TIP process, streets are progressively being added to the multi-modal network. Continued efforts to build out the on and off-road network will be needed to ensure mobility for users of all abilities.

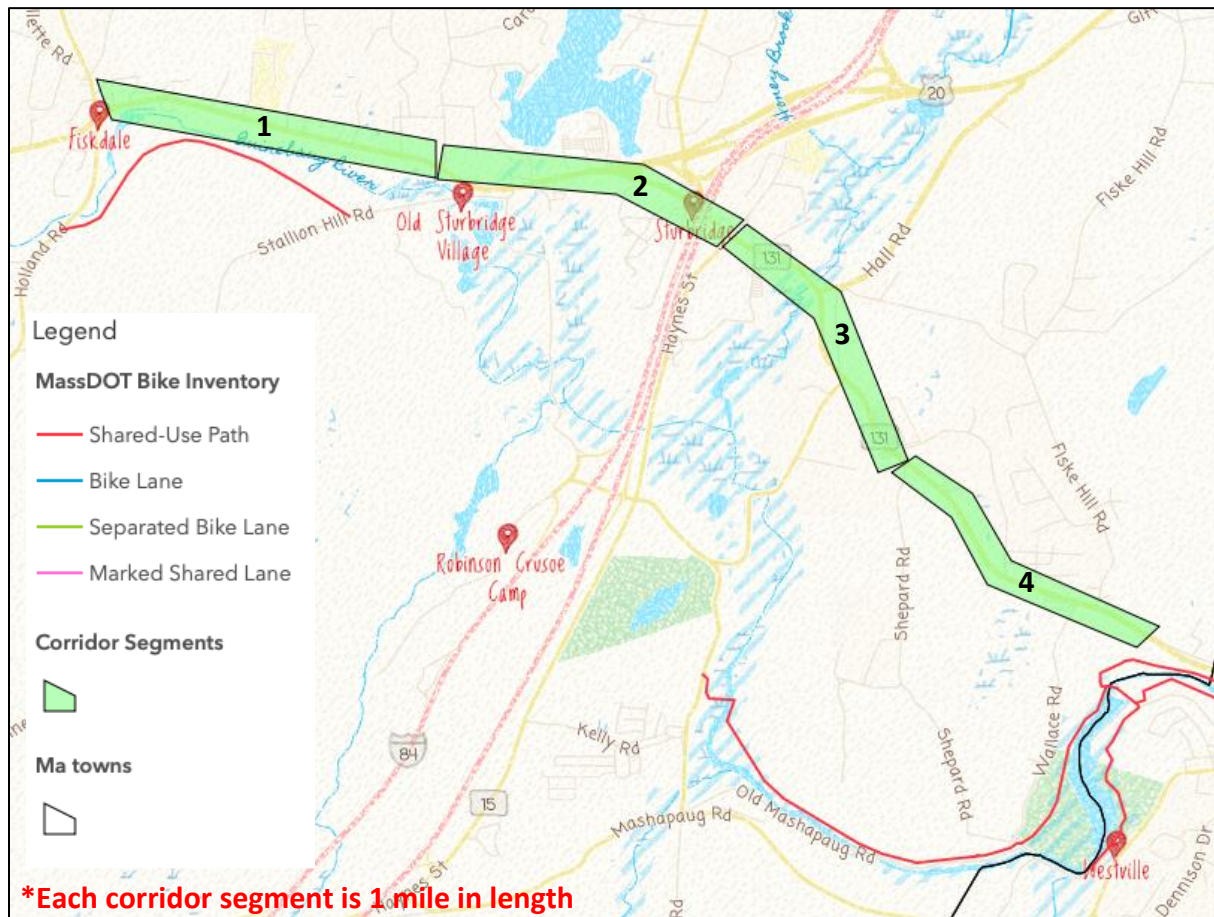
Chapter 4: Opportunities for Bikeshare within the CMRPC Region

With a specific focus on tourism, recreation, and commuting as drivers for bikeshare within the CMRPC region, this next section highlights examples of how bikeshare could be implemented in a community to support one of those functions. These examples are not intended to be direct recommendations for bikeshare within these communities, but rather potential opportunities where it may be successful.

Tourism

Sturbridge, located within the Southeast Subregion, is a highly visited tourist destination that features numerous restaurants, breweries, antique shops, recreational trails and parks, farms, and the historic Old Sturbridge Village. Old Sturbridge Village boasts the largest tourist attraction in the community, with 250,000 visitors annually³⁸. Due to this high density of destinations, a bikeshare system would provide an active mode of exploration for tourists and residents within the community.

Figure 9: MA-20 Main Street Corridor in Sturbridge



Much of the excitement within the community is centered around Main Street, which extends from MA-148 near the Brimfield town line, along MA-20, and diverts to MA-131 to the Southbridge town line. Main Street is also a heavily trafficked route for commuters entering and exiting the community with its connection to MA-20 and major highways I-84 and I-90.

Figure 10: Trip Generators along the Main Street Corridor

Segment #	Places to Eat & Drink	Places to Stay	Shopping	Destinations
1	Altruist Brewing Company Baba Sushi Cedar Street Café Cedar Street Grille Churchill's Village Eatery Enrico's Brick Oven Pizza Jimmy D's Kaizen Sushi Bar & Grille Rapscaillon Taproom Stone & Sparrow Stonewall Tavern & Grille Sturbridge Porterhouse The Duck & Avellinos	La Quinta Inn & Suites Sturbridge Country Inn	Chickadees Gift Shop Sturbridge Flea Market The Bird Store & More Thrifty Gipsy Gift Shop Yankee Candle Yankee Pedlar	Brush It Off Mill Pond Trail
2	BT's Smokehouse Saw Dust Coffee House Sturbridge Coffee House Sturbridge Seafood Thai Place	Old Sturbridge Inn Sturbridge Host Hotel Ecno Lodge Sturbridge Hampton Inn Sturbridge Super 8 by Wyndam		Old Sturbridge Village Sturbridge Visitor Center
3	Publick House Teddy G's Whoopie-Doo & Cupcakes Too	Hamilton Inn Publick House Historic Inn Green Acres	Surbridge Plaza Sadie Green's Curiosity Shop	Historic Joshua Hyde Library Sturbridge Town Common Escape the Pike Escape Rooms
4	Anne's Country Kitchen Kahula Wild Flour Kolaches	Scottish Inns		

The Main Street corridor is home to over 24 restaurants, 11 hotels and inns, numerous gift shops and specialty stores, and nearly 10 destinations that attract not only tourists and visitors, but residents alike. Beyond the parameters of the corridor are other trip generating origins and destinations like Westville Dam and Recreation Area, Wells State Park, Grand Trunk Trail, Pine Lake RV and Cottages, and the Leadmine Mountain Trails to name a few.

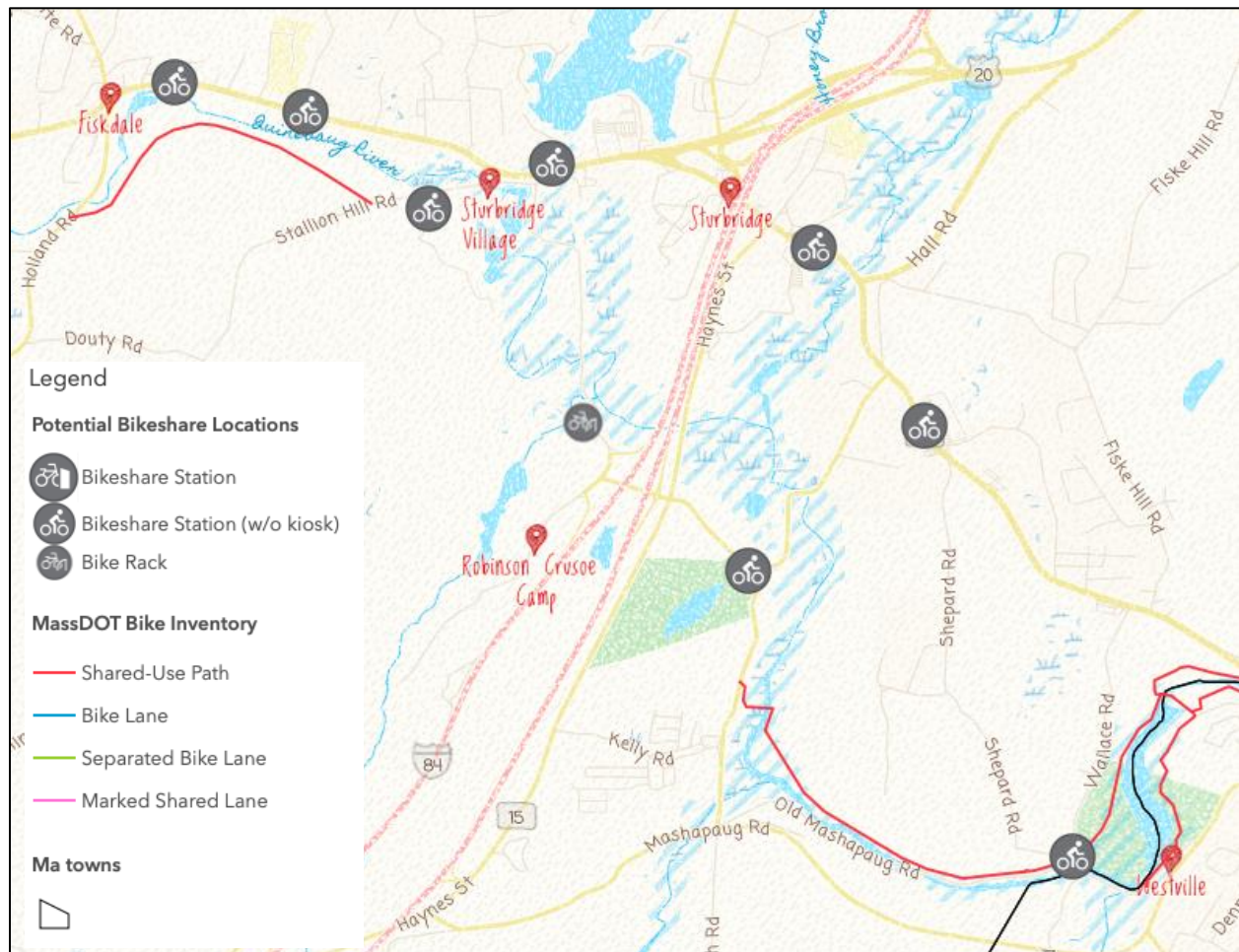
The Grand Trunk Trail provides an additional route for multi-modal activity that runs relatively parallel to MA-20 Main Street (shown in Figure 9 in red). Connections to this trail system from MA-20 should be as it connects several recreation sites including Old Sturbridge Village, Leadmine Trail System, Pine Lake RV and Cottages, and Westville Dam and Recreation Area.

While future considerations for on-road multi-modal improvements are needed, the Main Street corridor is a hub of activity within the community and therefore should be centric to a bikeshare system. This includes focusing the majority of bikeshare stations along the corridor, particularly within close proximity to hotels and inns where tourists may be vacationing. There should also be a similar focus on these location's connections to the community as residents will likely utilize the system for short trips throughout the town.

The graphic below highlights potential locations for bikeshare stations within the Town of Sturbridge. As depicted in the legend, different types of bikeshare “stations” may be appropriate in varying locations. These locations include:

- Parking lot next to the Sturbridge Marketplace
- Corner of Main Street and Arnold Street in front of the Council on Aging
- Old Sturbridge Village parking lot
- Sturbridge Visitor Center parking lot
- Sturbridge Town Common
- Pine Lake RV Resort and Cottages
- Teddy G’s or Shaws parking lot
- Westville Dam and Recreation Area
- Leadmine Mountain Main Trailhead (bike rack)

Figure 11: Potential Locations for Bikeshare Stations in Sturbridge



Potential bikeshare locations presented off of the Main Street corridor correspond to other desirable destinations where visitors and residents may be staying or exploring. The newly

developed Pine Lake RV Resort and Cottages, former Yogi Bear’s Jellystone Park, is a popular camping destination, located nearly 1.5 miles from the Main Street corridor. A bikeshare station located within the park may provide an active mode of transportation for visitors and nearby residents to downtown and nearby sites including the Leadmine Mountain Trail System, Sturbridge Town Common, and Sturbridge Shopping Plaza. Other destinations like, Westville Dam and Recreation Area would provide access to the Grand Trunk Trail and Community Trail Loop for those visiting without access to a bicycle. Because there are also campsites available, visitors would be able to utilize the bikeshare for short trips to the Main Street corridor nearly 2-miles north. While these are known tourist locations throughout the Town, wider community engagement efforts will be needed to determine other potential locations to support residents and visitors.

Station considerations should include implementation of a hybrid or bike library model. A hybrid, “smart bike”, model minimizes infrastructure needed to implement the system. This would include technology on the bicycles and bike racks at georeferenced, virtual, bikeshare stations. To accommodate payment options, a phone app could easily accommodate visitors and residents. Similar to the examples in Golden and Allen County, a bike library model may also be appropriate at highly trafficked tourist locations including the Visitor Center, Old Sturbridge Village, Pine Lake RV Resort and Cottages, or the Publick House located across from the Town Common. Coordinating payment options with tourist establishments has the potential to attract a wider range of users that may not have a smartphone, or access to the internet during their stay.

Lastly, because of the volume of restaurants, shops, and attractions within the community, there is an opportunity to incentivize bikeshare through partnerships with local businesses. As highlighted by Golden, Colorado, with each bikeshare rental users were given a discount card for select locations within the community. Not only does this incentivize the use of the bikeshare system, but also invites visitors and residents alike to invest in the local economy. Continuing with the notion that bike check-outs could take place at popular tourist destinations, incentives could be centered around those attractions as well. An example of this could include a discounted visit to the Publick House with each bike rental that is checked out at the Publick House, free tickets to Old Sturbridge Village with each prolonged bike rental, or one free ride with each check, courtesy of Pine Lake RV Resort and Cottages.

Recreation

The CMRPC region boasts numerous opportunities for recreation including its network of multi-use pathways designed specifically with bikes in mind. The MA Central Rail Trail (MCRT) is a growing multi-use path

Image 19: MCRT Trailhead and Parking Area on Barre Paxton Road in Rutland



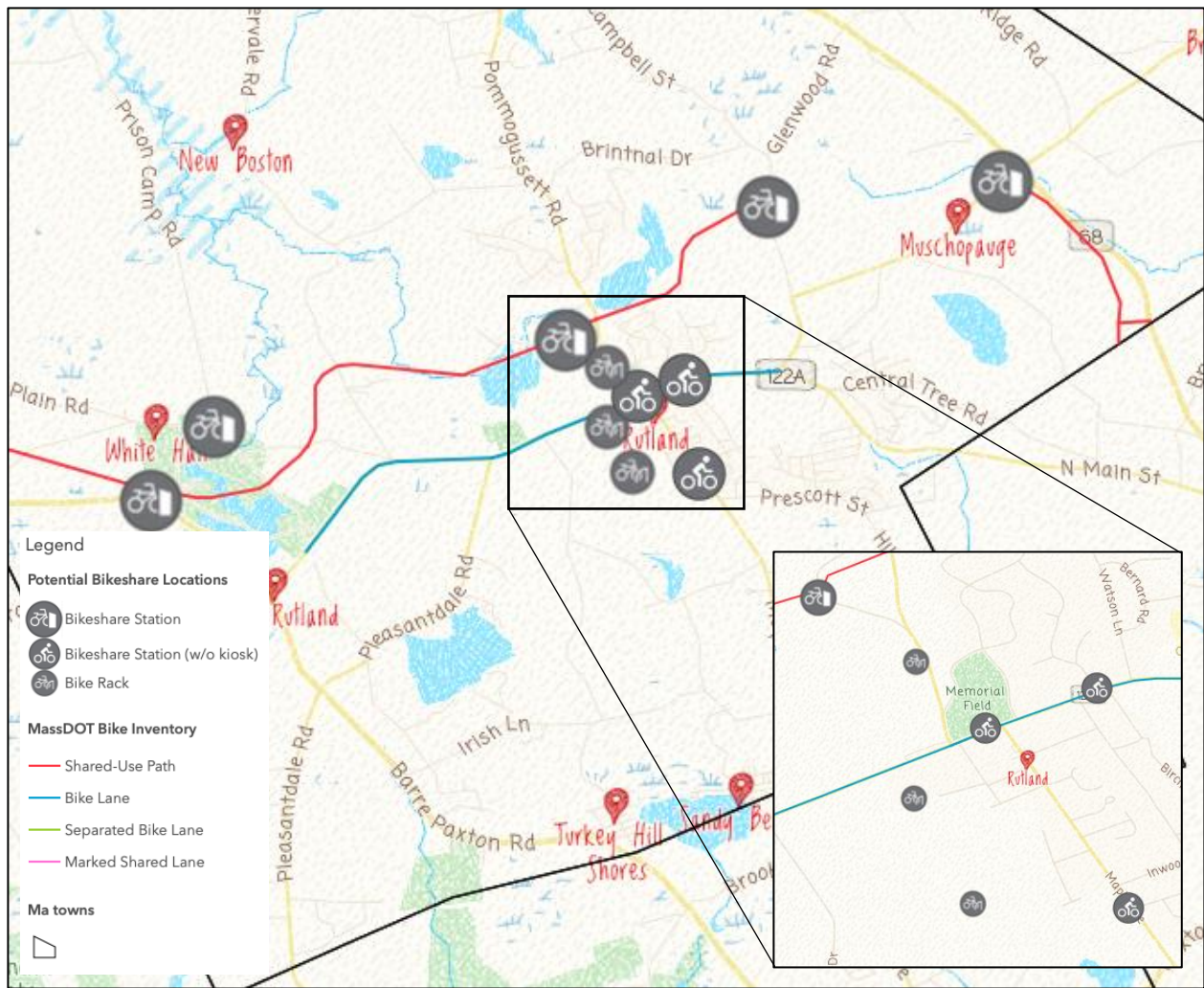
Screenshot from Google Streetview

intended to span between Northampton in the Pioneer Valley Region and Boston. While many sections of this trail are not paved or completed, the Town of Rutland hold some of the longest completed section in the CMRPC Region. The trail has connections extending into the Towns of Barre, Oakham and Holden, as well as passes through portions of the Rutland State Park.

Rutland State Park is a 300-acre park offering historic site-seeing and recreation activities. In addition to its access points to the MCRT, there is a network of dirt and stone-dust non-motorized roadways that are available for off-road biking and hiking. This includes the historic site and ruins of the Rutland Prison Camp.

Aside from the trail systems, Rutland has been building on-road network of bicycle facilities with existing bike lanes along MA-122A Main Street. With close proximity to multiple MCRT roadway intersections and the center of town, the on-road corridor has the ability to link trail users to downtown for a bite to eat or enjoy other amenities Rutland has to offer.

Figure 12: Potential Locations for Bikeshare Stations in Rutland



The map above hypothesizes bikeshare station and bike rack locations based on the recreational opportunities mentioned earlier, and includes locations downtown to further accommodate visitors and residents. These locations include the:

- MCRT Trailhead on Barre Paxton Road
- Intersection of Prison Camp Road and Whitehall Road
- MCRT Trailhead on Miles Road
- MCRT Trailhead on Glenwood Road
- MCRT Trailhead on Wachusett Street
- The Green in front of the Rutland Fire Department
- Intersection of Main Street and Ten Road
- Intersection of Maple Street and Rutland State Hospital Road

As shown in the map, there are varying bikeshare stations “types” based on their location. The “Bikeshare Station”, depicted as the bike parked against a wall, represents fixed station locations that may include a payment kiosk, wayfinding signage, or docking stations intended for longer rentals along the trail network. While these features are not required for a bikeshare station of this type, wayfinding signage is highly recommended at each of the trail heads. “Bikeshare Stations w/o Kiosks”, depicted as the person riding a bicycle, represents hybrid or free-floating stations where payment can be secured through an online forum. Wayfinding signage at these locations should also be taken into consideration. The reasoning for different hypothesized station types is intended for ease of use on the trail. New and returning trail users may be deterred from using the bikeshare system impending the need to download an app and follow a lengthier process to access a bike. However, this station type is typically more expensive than its counterpart, which should be taken into consideration in the end product.

Additional locations presented on the map include potential bike racks stationed at the Central Tree Middle School, Naquag Elementary School, and Ball Field located on Pommogussett Road. These locations are not necessarily locations where recreating visitors may explore, but represented frequented locations in Rutland’s town center for residents of the community. Other considerations should include incorporating connections to the Rutland Public Library, Council on Aging, and Glenwood Elementary School.

Commuting

Commuting to work and school is a familiar experience for most within the CMRPC region, and the country. Bikeshare has an opportunity to incorporate active transportation into one’s daily commute as a first and last mile solution to public transportation or as an alternative for shorter commutes. By connecting a bikeshare system into existing public transportation, public modes become more accessible to a broader network of people. Westborough, located on the periphery of both the CMRPC region and the Metro-West, is a bustling community with professionals that travel in and out of the community each day. Supported by both the MBTA Commuter Rail and the WRTA’s Via on-demand transit service, numerous public transportation options are available

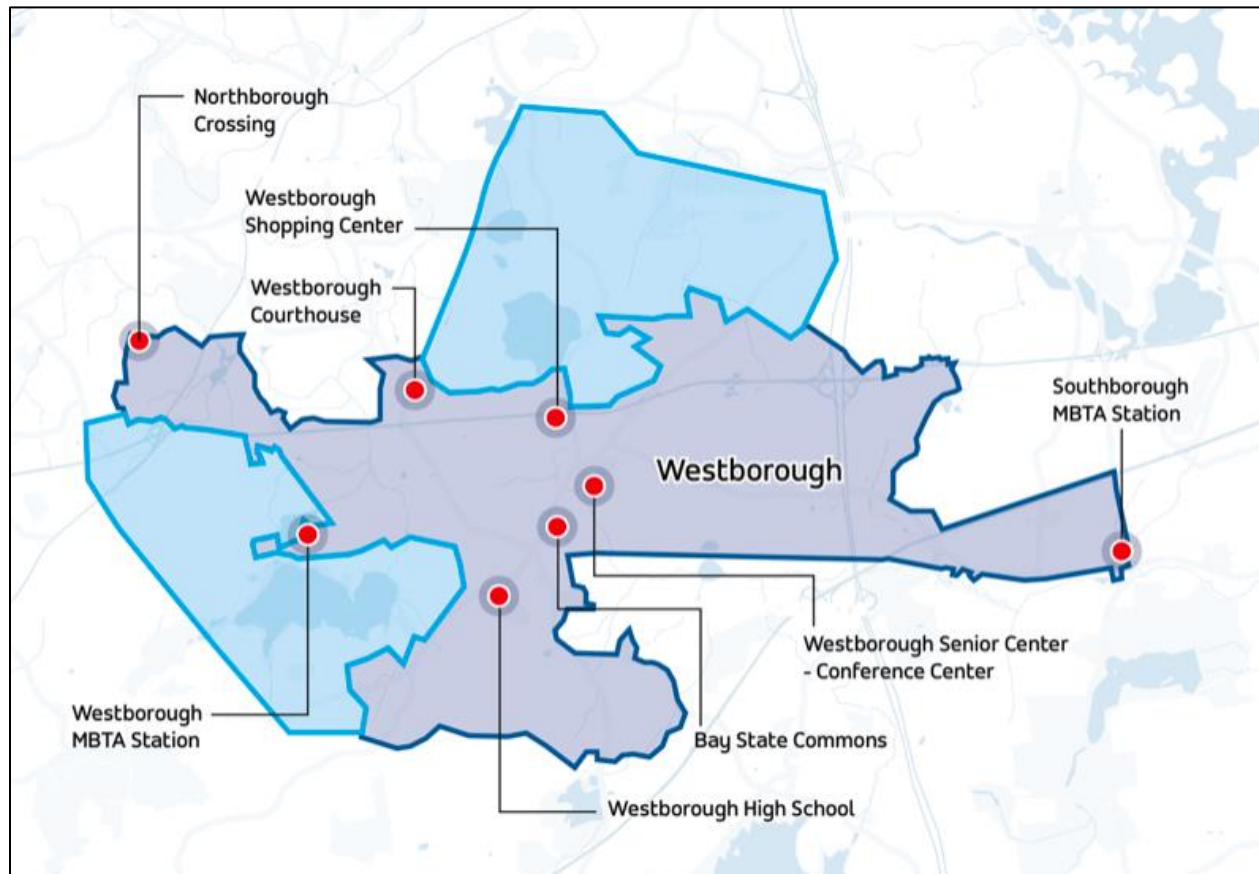


to the residents and professionals within the community. For these reasons, Westborough is an ideal location for a bikeshare system that supports public transportation, commuter populations, and labor force. Before delving into opportunities of bikeshare in Westborough, it's important to understand the role of public transportation within the community.

The Westborough MBTA Commuter Rail Station, located on Smith Valve Parkway, is part of the larger Worcester Line connecting Boston to Worcester³³. The Commuter Rail provides numerous payment options including one-way, round trip, 10-trip, monthly, and discounted passes.

The WRTA Via service is an on-demand shuttle that services the communities of Northborough, Shrewsbury, Southborough, and Westborough³⁹. Popular destinations within the Town of Westborough include the Westborough MBTA Commuter Rail Station, Westborough Shopping Center, and Bay State Commons. As of January of 2021, trips to and from the Westborough MBTA Station are \$1, while all other origin and trip destinations are \$2 between Monday through Friday, 7 A.M to 7 P.M³⁹. All requests through the Via shuttle service are easily accessible through the Via app³⁹.

Figure 13: WRTA Via Service Area in the Town of Westborough



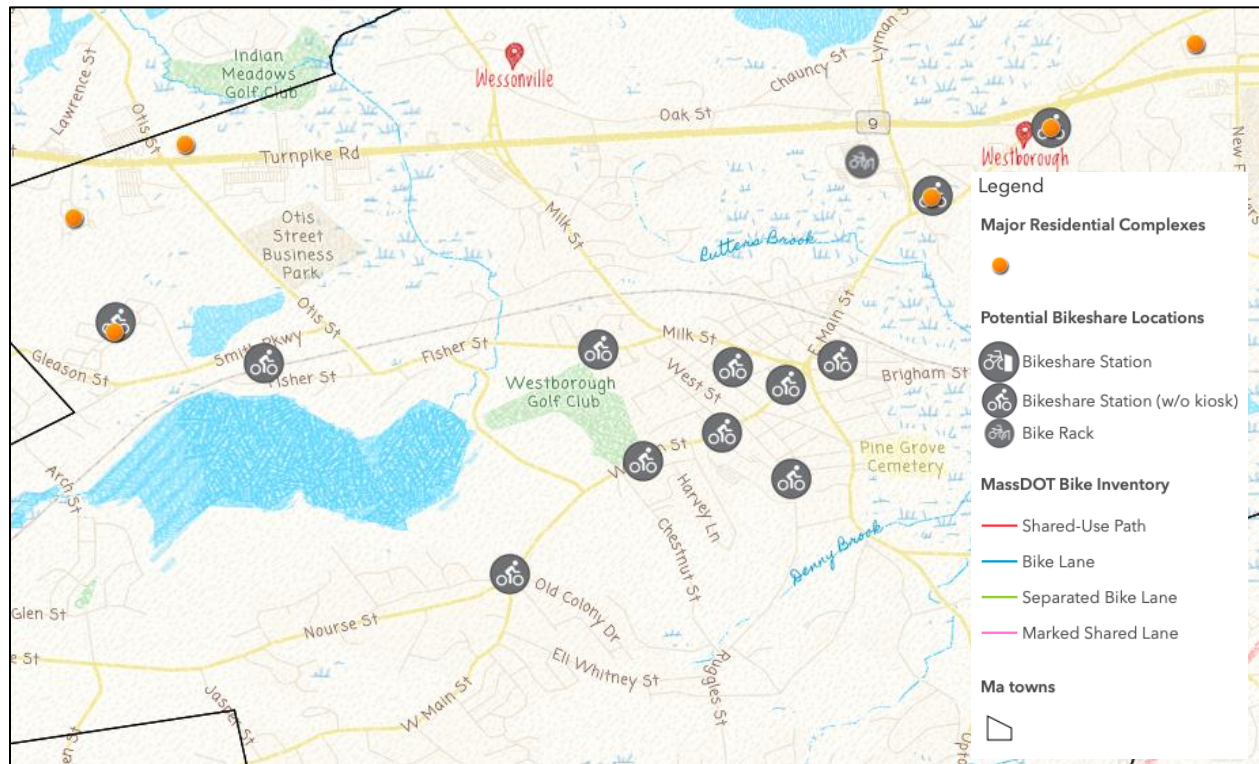
Screenshot from WRTA Via

In light of the numerous public transportation and commuting opportunities in the Town of Westborough, many high-density residential complexes have been established within close

proximity to major access routes and commuter amenities. These include the Arrive Westborough and Parc Westborough Apartments located off of MA-9, Park Village West and Windsor Ridge on East Main Street, the Residences at Westborough Station, and the Willows at Westborough. The Willows is a residential complex for independent and active adults ages 60 and up. As the ties between residential complexes, industrial parks and jobs, and immediate access to commuter routes and transportation is tightly bound within Westborough and the MA-9 corridor, considerations for a commuter-centric bikeshare system linking these characteristics will prove successful.

A bikeshare service that supports public transportation needs to utilize existing bus stops as well as provide stations, virtual or fixed, that are within close proximity to those stops and users. A general rule of thumb for urban environments, as indicated in Chapter Two, is that bikeshare stations should be within a quarter to a half-mile to create a density of bikes that supports a high volume of residents. Westborough has a population size of around 18,000 with a population density of nearly 900 people per square mile. Although not the typical demographic of a dense urban environment, Westborough’s downtown suburbia boasts numerous restaurants, shops, and access to public transportation. By targeting Westborough’s downtown, a pilot bikeshare system can provide insight information about the travel patterns of residents and professionals within the community, as well as those commuting out of it.

Figure 14: Potential Locations for Bikeshare Stations in Westborough



In light of the multiple public transportation options, residential complexes, and dense downtown core, potential station locations have been suggested at:

- The Residences at Westborough Station
- Westborough MBTA Commuter Rail Station
- Sarah Gibbons Middle School
- Westborough High School (front and back entrances)
- Good Sheppard Lutheran Church
- Harvey Building Historic School
- Westborough Country Club
- Bay State Green
- Westborough Public Library
- The Willows at Westborough
- Park Village West
- Westborough Shopping Center (bike rack only)

These locations reflect areas of high population density and frequented Via shuttle destinations in relation to downtown and the MBTA station. The downtown area has the ideal characteristics to support a hybrid stations a quarter to a half mile apart which supports the use of bikeshare for short trips to downtown destinations. Encouragement of active transportation within a downtown core reduces traffic congestion and emissions from vehicles, boosts economic growth, and creates a vibrant community environment that can be enjoyed by residents and visitors.

In the downtown periphery, particularly surrounding the MBTA station and East Main Street – Lyman Street intersection, station locations meet the quarter to half mile proximity between each other, but have greater distances between them and the downtown core. These stations serve as connections to large residential complexes and commuter amenities, and are within reasonable distances to allow travel into downtown on a bicycle.

For example, the MBTA Commuter Rail Station is located approximately 3.2 miles away from Park Village West, the west-most potential bikeshare station. The average rider is estimated to take about 10-15 minutes to travel 2 miles, meaning that a ride of this magnitude would only take roughly 18-23 minutes. The Bay State Commons, a popular destination within the Town, is 2.8 miles from the Residences at Westborough Station. A ride of this length would be less than 20 minutes.

Image 20: The Evolution of the Boston-Worcester Airline Trail



Image from the Town of Southborough

As mentioned in Chapter Three, the Boston-Worcester Airline Trail intersects Westborough, travelling parallel to the MA-9 corridor. Currently, the nearly 0.35-mile Trolley Line Trail is one of the only existing segments within the scope of the suggested bike-share station locations. The trail connects Lyman Street and East Main Street, creating a direct connection between the station located on East Main Street and the Westborough Shopping Center. The Trolley Line Trail has the potential to serve as an alternative route for short trip destinations between the station located at Park Village West. As additional sections of the Boston-Worcester Airline are completed, considerations should be made to connect the bikeshare system to the multi-use path network to provide safe passage for commuters and recreational users alike along the MA-9 corridor. This is particularly for those needing access to the system on the northern side of MA-9. In its current condition the MA-9 corridor is not conducive to bicycle travel.

Appendix

Figure 15: Massachusetts Segments of the Blackstone River Bikeway from the Blackstone Heritage Corridor



Figure 16: CMRPC Regional Segments of the Boston Worcester Airline Trail

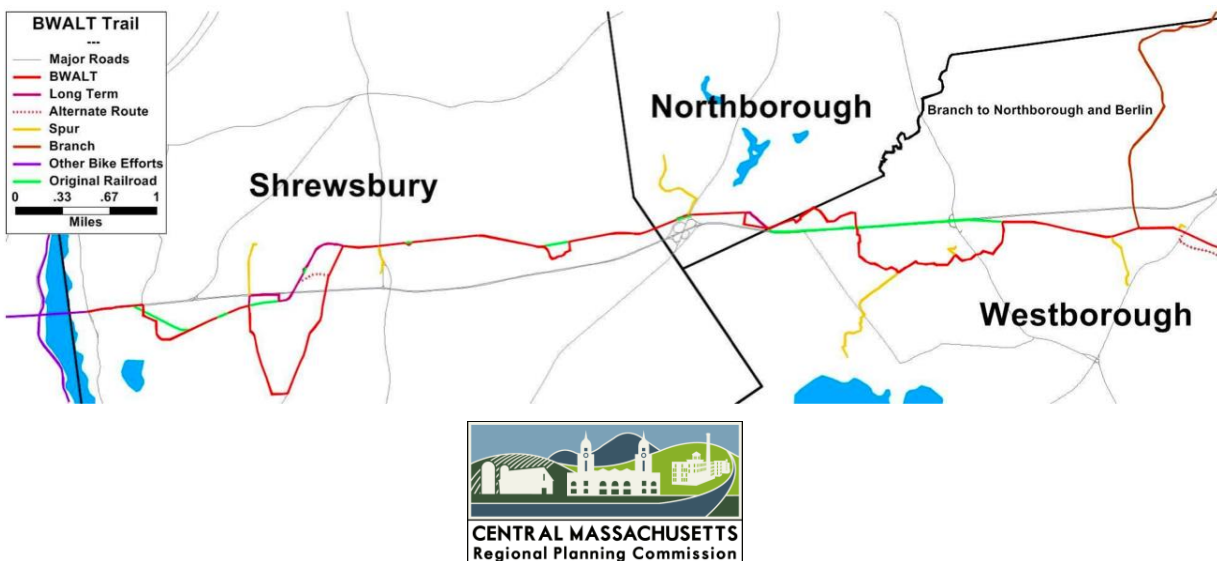


Figure 17: Grant Trunk Trail – A Portion of the Titanic Rail Trail Provided by the Town of Sturbridge

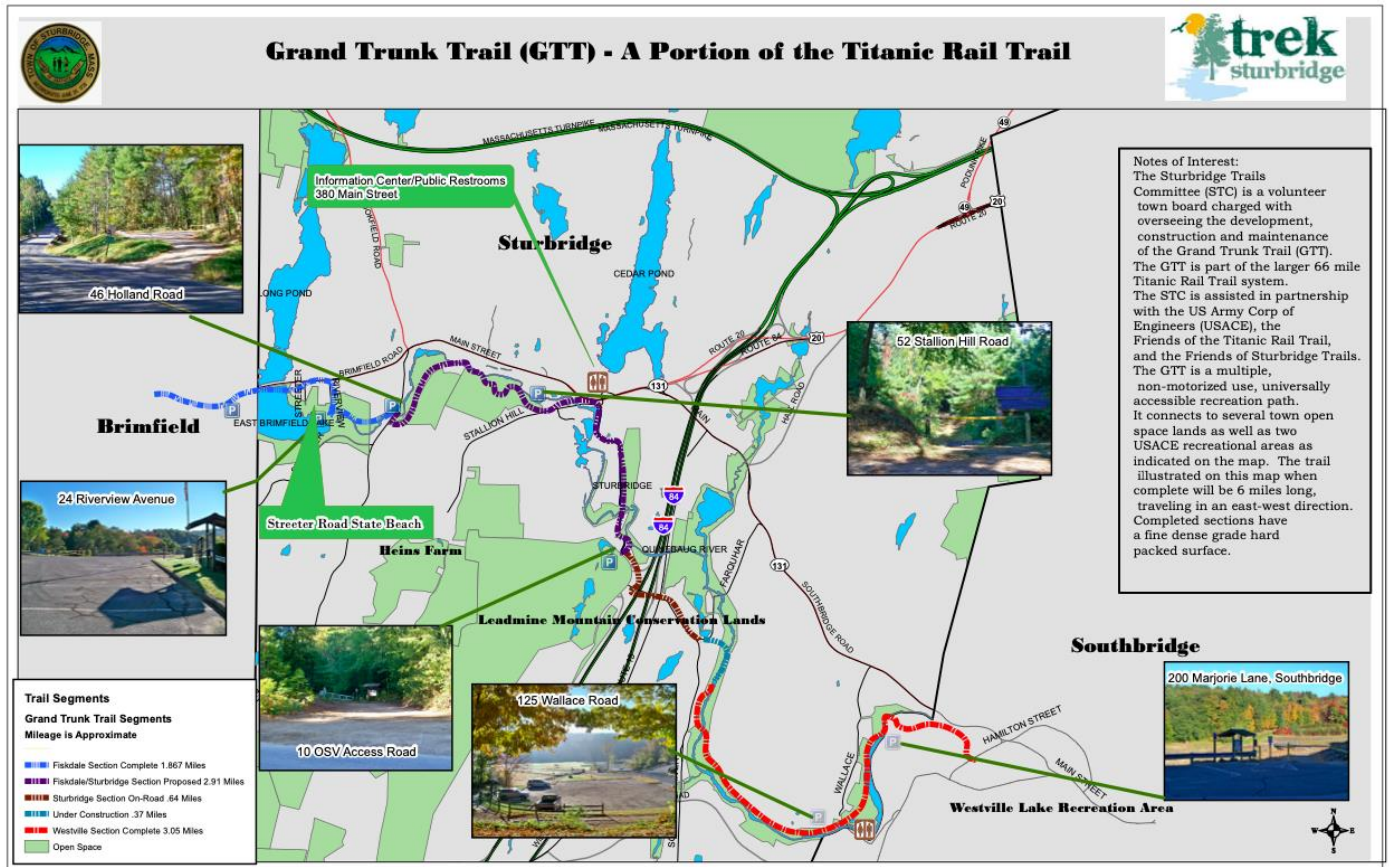


Figure 18: MA Central Rail Trail - 104 miles from Northampton to Boston

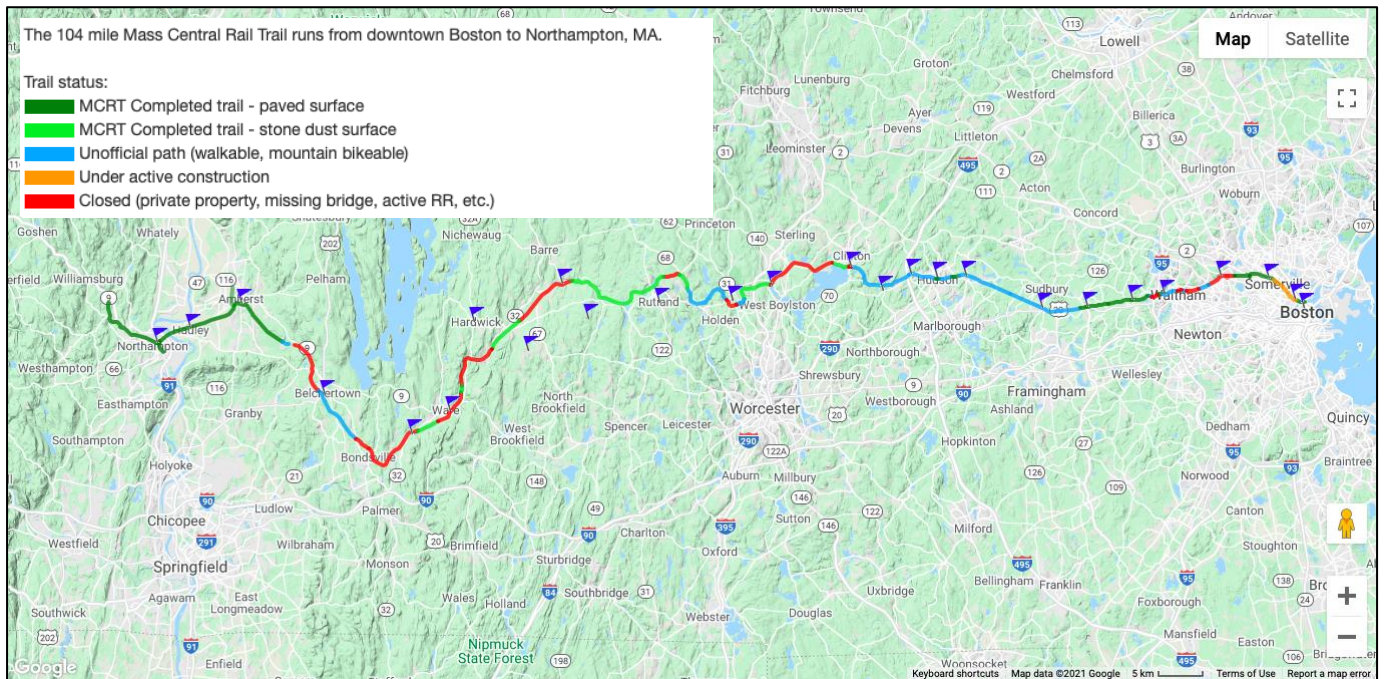
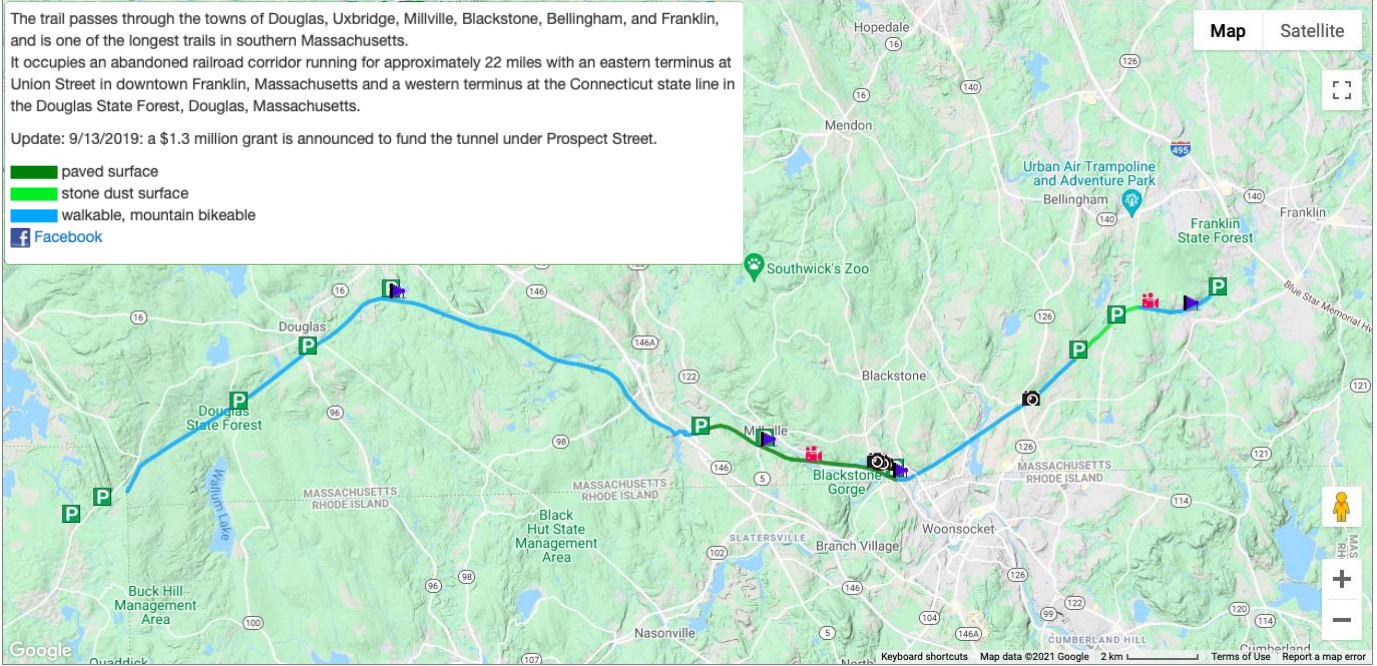


Figure 19: CMRPC Regional Portions of the [Southern NE Trunkline Trail](#)



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