

# BIKE SCHENECTADY

**CITY OF SCHENECTADY BIKE INFRASTRUCTURE MASTER PLAN**

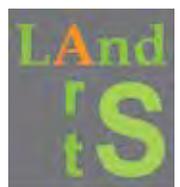
**AUGUST 2017**

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## EXECUTIVE SUMMARY

The City of Schenectady is becoming a leader in deploying advanced technologies that support sustainability, efficiency and improved quality of life. As demand for sustainable transportation choices has increased, Schenectady initiated the Bicycle Infrastructure Master Plan to provide the framework for creating a bike friendly City.

The Master Plan sought to update past bike plans through an extensive public process and resulted in an extensive set of bicycle infrastructure projects, policies and programs that the City can undertake to become bike friendly.

### PLAN PURPOSE

With funding support from the Capital District Transportation Committee (CDTC), the Metropolitan Planning Organization for the Capital Region, the City of Schenectady Bicycle Infrastructure Master Plan builds on the foundation laid by the Schenectady Urban Bike Route Master Plan completed in 2001.

The bicycle priority network developed in the 2001 plan was dated and needed to consider new development and redevelopment in the City,

new trail infrastructure being pursued by Schenectady County and other parties and increased public support for a more balanced multi-modal transportation system.

The goals of this initiative were to:

- Update the Bicycle Priority Network identified in the 2001 Urban Bike Route Master Plan
- Undertake an extensive public input process to guide the development of the plan
- Develop recommendations for implementing a range of bicycle facilities that overcome barriers to travel and create a comfortable biking environment
- Develop bicycle wayfinding recommendations for bike routes throughout the City
- Identify policies and programs that would further support biking
- Identify key locations for the roll out of bike share stations

AS DEMAND FOR SUSTAINABLE TRANSPORTATION CHOICES HAS INCREASED, SCHENECTADY INITIATED THE BICYCLE INFRASTRUCTURE MASTER PLAN TO PROVIDE THE FRAMEWORK FOR CREATING A BIKE FRIENDLY CITY.

## PLANNING PROCESS

As part of the planning process, the City of Schenectady and CDTC retained a team of consultants, led by Alta Planning and Design, to undertake the study. A technical study advisory committee, including staff from the City and CDTC, Schenectady Metroplex, Schenectady County, CDTA, NYSDOT, CDRPC and Schenectady Downtown Improvement Corporation, was used to guide the consultant team and to provide direct feedback on products.

Several opportunities for public comment on biking conditions and to get input on potential bicycle network routes in the city were made available. A project website allowed for ongoing public input throughout the planning process including an online survey which was open for several months in summer 2016 and received over 240 responses.

In addition, a pop up table was made available at the Schenectady Greenmarket in May 2016 and a stakeholder meeting with over 30 representatives from diverse organizations such as General Electric, Electric City Bicycle Co-op, YMCA, Plaine and Son/ New York Bicycle Co., Union College and many others was held at Proctors in August 2016.

A final public meeting was held at the Schenectady Public Library in June 2017 with over 35 attendees to share the details of the draft plan and begin a public comment period.

## BICYCLE DEMONSTRATION PROJECTS

An innovative approach to public education and engagement undertaken as part of this plan was two City-led bicycle infrastructure demonstration projects.

The first was on Washington Avenue in the Stockade neighborhood where a contra-flow bicycle lane and a mini-roundabout were installed for a four day period in July 2016. The Washington Avenue contra-flow lane demonstration attracted over 800 riders in one day as it coincided with the Cycle the Erie Canal Annual Bike Tour, sponsored by Parks and Trails New York.

The second demonstration project was connected to a larger event in partnership with the Boys and Girls Club of Schenectady called Bike Fest. In September 2016, Craig Street was restriped with a bicycle lane, a shared use lane and new crosswalks.



Contra-flow bike lane installation on Washington Ave. from State St. to Union St.

At both locations, riders were provided with information on the installed infrastructure and were encouraged to ride their bikes and provide feedback on the various components. Tying the second demonstration to the Bike Fest event brought out over 200 participants.

## PROPOSED PRIORITY NETWORK

After a complete review of public input, past planning studies, proposed development and existing conditions in the City, the project team developed a proposed bicycle priority network. The maps on pages i-4 through i-7 depict the complete proposed bicycle network as well as three phases of potential implementation. The proposed bicycle infrastructure treatments are conceptual in nature and will need further design before construction is undertaken. The phases are based on the relative ease of implementation as follows:

### Phase 1 includes:

- Streets/trails for which there is a current funding commitment
- Streets/trails that are exceptionally wide allowing for a simpler design process
- Projects that would be low cost
- Streets/trails that would be necessary to develop an initial network throughout the City

### Phase 2 includes:

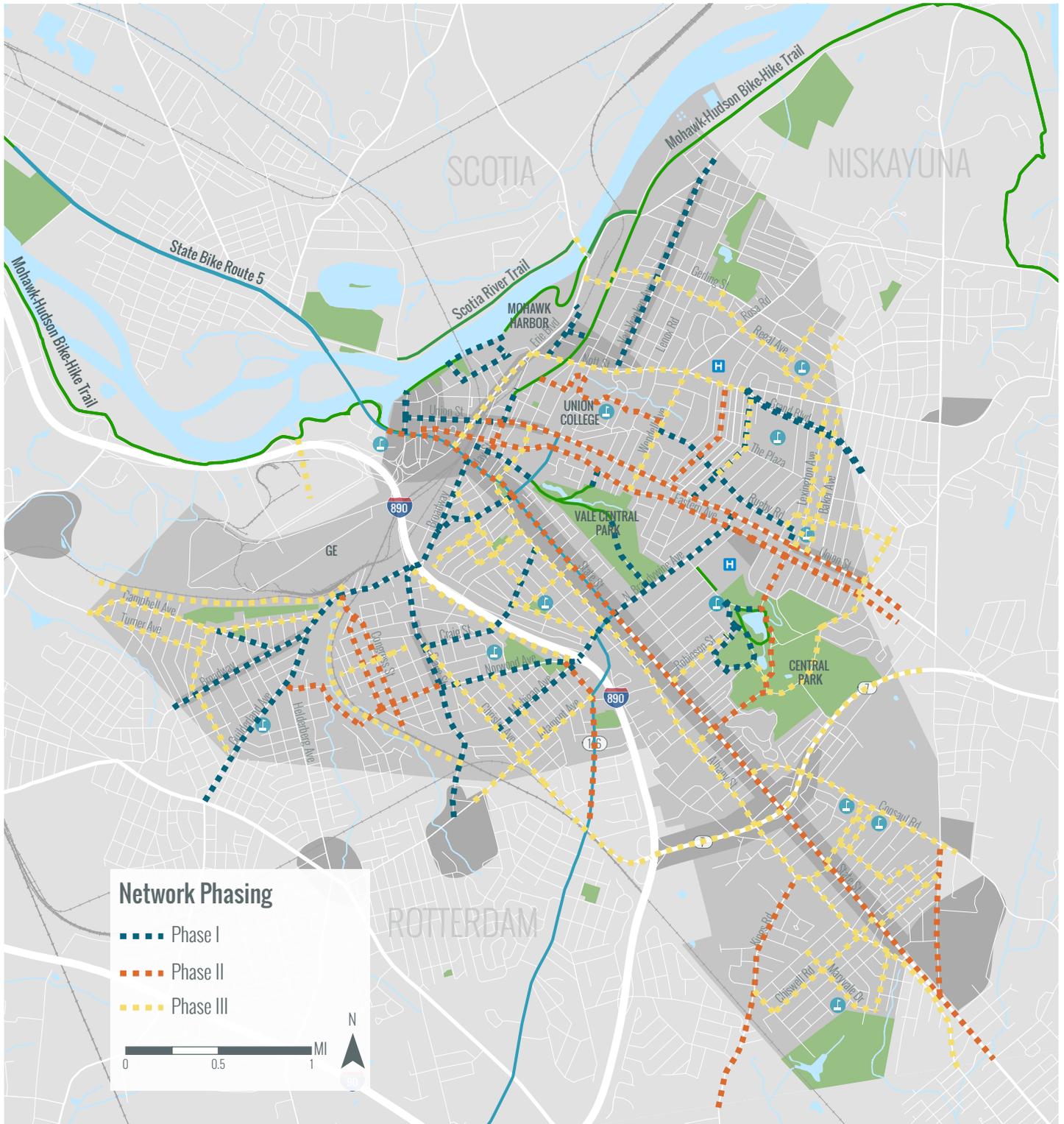
- Streets/trails that will require a slightly more complex design process
- Locations that may have a higher cost such as new trails or paths
- Streets/trails that rose to the top of public input priorities

### Phase 3 includes:

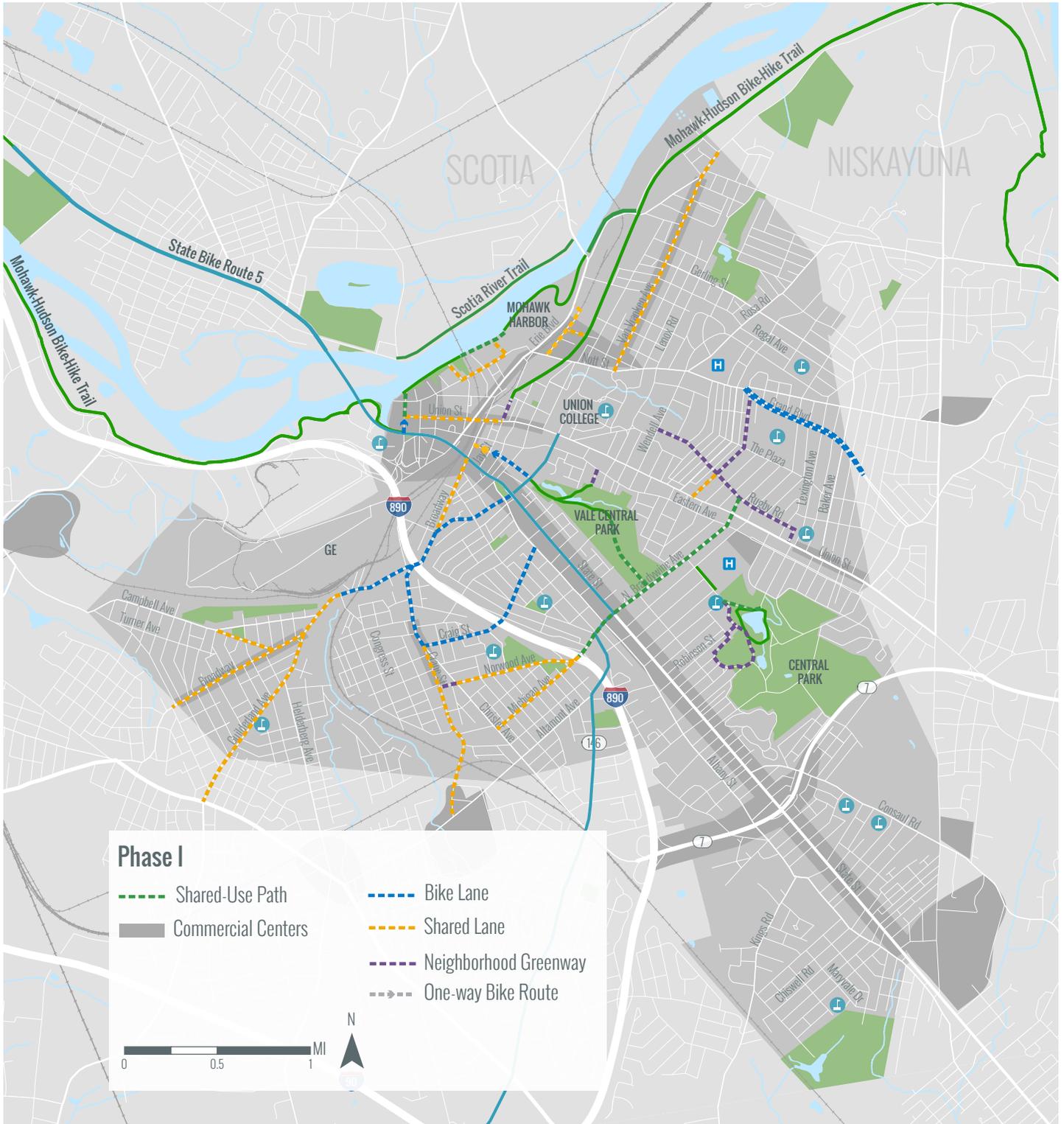
- Streets/trails that may require cooperation with developers, community groups, or other municipalities due to potentially complex designs
- A large number of the neighborhood greenway routes that build upon the evolving network throughout the City
- Streets/trails that have recently been invested in that would not be due for additional investment for some time to come.

Additional details on the recommended priority network including street cross sections being considered can be found in Chapter 4.

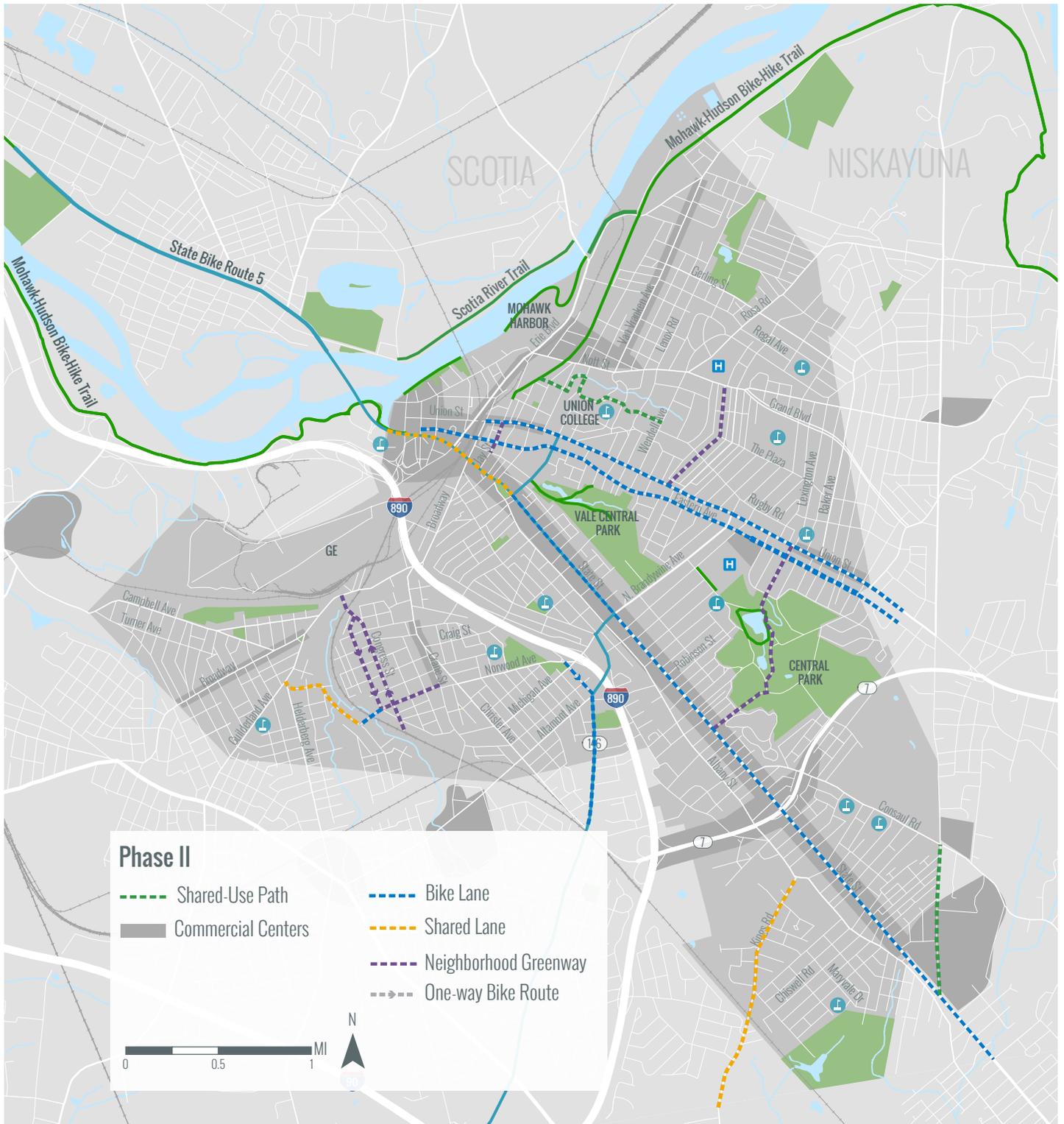
## Infrastructure Recommendations by Phases



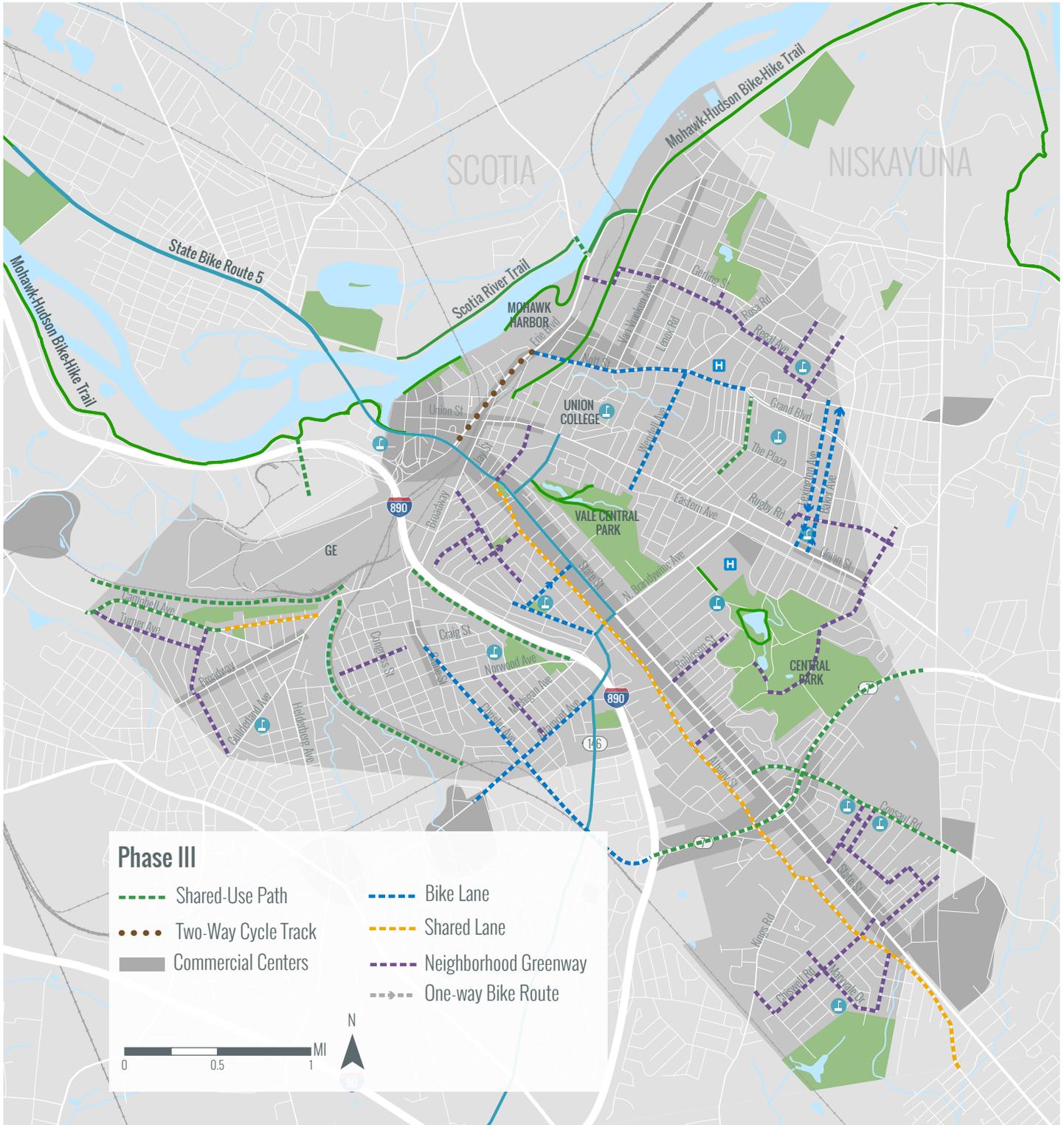
# Phase I - Infrastructure Recommendations



## Phase II - Infrastructure Recommendations



## Phase III - Infrastructure Recommendations



## PROPOSED BICYCLE INFRASTRUCTURE FACILITY TYPES

A variety of facility types were considered during the planning process. As the City of Schenectady is an older, historic city with relatively narrow streets, creative implementation of bicycle infrastructure will be needed. After much discussion, the following facility types will first be considered on the priority network. As design processes unfold, additional treatment options may arise. The basic facility types include:

**Neighborhood Greenways:** Neighborhood greenways are low speed, low volume street corridors that do not have designated lanes but rather allow all street users to share the street-space together. They often pass through residential neighborhoods and represent a very family-friendly facility when implemented properly. Infrastructure elements include wayfinding and traffic calming techniques (design features that help to slow motor vehicle traffic down).



**Shared-Use Path/Sidepath:** Shared-use paths/ Sidepaths are facilities that provide bicyclists and pedestrians with a completely separate facility from motorists. While they do not necessarily need to be bound to any particular existing corridor, they

often follow the path of streets, rail-lines, or utility corridors. They may either be shared use with mixed travel lanes for pedestrians and bicyclists, single use trails, such as hiking trails or mountain biking tracks, or separated use trails, where bicyclists and pedestrians may both use the trail facility, but have separated travel lanes.



**Shared Lanes:** A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM). The shared lane markings are used to encourage bicycle travel and proper positioning within the shared travel lane. Shared lane markings are also placed outside the area where a bicyclist is most at risk for being struck by a car door, known as the 'door zone'. The width of the door zone can vary depending on the types of motor vehicles typically parked on a given street.



**Bicycle Lanes:** Bicycle lanes, or linear facilities, provide bicyclists with a clear right-of-way for travel, by providing a delineated separated facility along a given corridor. There are many types of bicycle lanes including traditional, contra-flow, left side, buffered and climbing lanes.



**Cycle Tracks:** Two-way cycle tracks are physically separated bike lanes that allow bicycle movement in both directions on one side of the road. A two-way cycle track may be configured as a protected cycle track at street level with a parking lane or other barrier between the cycle track and the motor vehicle travel lane and/or as a raised cycle track to provide vertical separation from the adjacent motor vehicle lane.



Additional details on all the facility types can be found in Appendix B

## WAYFINDING RECOMMENDATIONS

To provide signage on the emerging bicycle priority network, the plan recommends the installation of four types of signage as described below. The exact design of some of the route signs will be determined by the City.

**Mohawk Hudson Bike Hike Trail Signage:** Due to the regional significance of this trail, special attention should be given to installing easily recognizable wayfinding signage that is part of the Mohawk Hudson Bike Hike Trail branding.



**Bike Route Signage:** Signage identifying routes with on street infrastructure including bike lanes, cycle tracks and shared lanes will be included for all bike routes on streets. The bicycle route sign is the most basic of the bicycle network signs. This sign should be posted on all routes throughout the network, unless the routes have customized wayfinding signage or markings. The purpose of the bike route sign is to provide confirmation for bicyclists that they are traveling on a designated bicycle route. This also helps motorists recognize that they are on a bicycle route and should watch for bicyclists in the travel lane or along the shoulder.



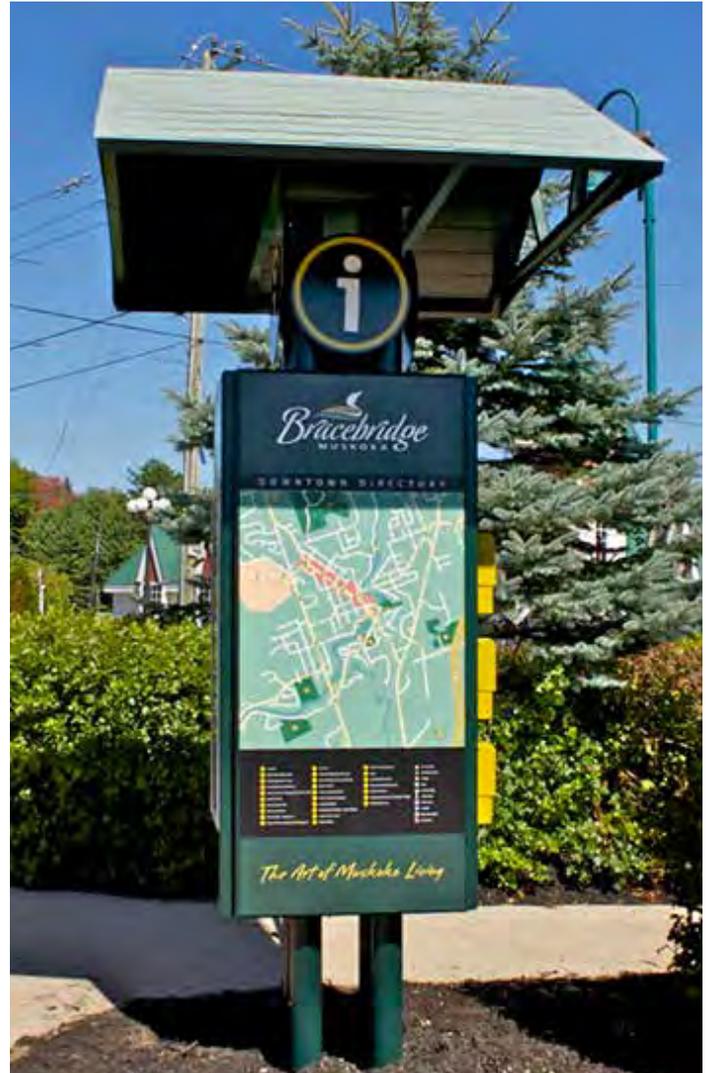
**Neighborhood Greenway Signage:** Neighborhood greenway signage should be installed throughout each designated corridor for which this facility type is installed. Confirmation signs and turn signs should be incorporated and branded to indicate to riders which route they are on.

**Information Kiosks:** Kiosks with area and/or citywide orientation maps can provide helpful navigational information, especially where bicyclists may be stopping long enough to digest more information (i.e. transit stations or stops, busy intersections, trail heads, etc.). Kiosks with maps are also a useful resource for trail users. Kiosks should contain information on the rules and regulation for trails or paths including allowed uses. Kiosks may also have pamphlet holders filled with take-away maps that allow users to bring the maps with them to help further navigation.

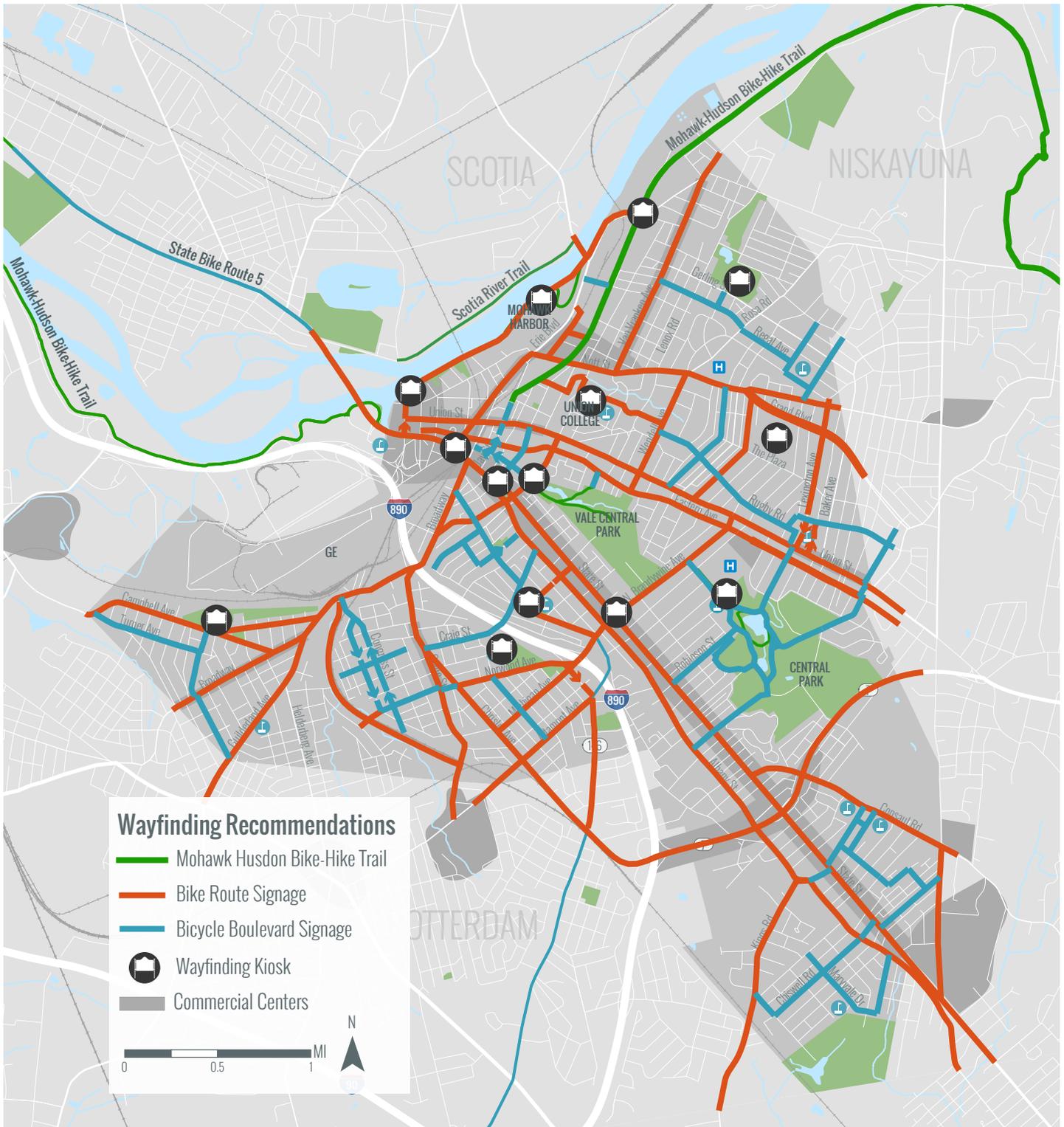
Wayfinding signage should also point users to local neighborhood destinations such as schools, shopping areas and parks. The suggested location of each signage option is depicted on the map on page i-11.

## POLICY AND PROGRAM RECOMMENDATIONS

A number of policies and programs are suggested for implementation in the City of Schenectady to further support the City's efforts in becoming a bike friendly Smart City. Pages 4-31 and 4-32 provide the complete set of recommendations.



## Wayfinding & Signage Recommendations



## NEXT STEPS

With the completion of this document, the city should consider the following as the immediate next steps to begin plan implementation.

**Adopt the Bike Master Plan:** The City can develop bike infrastructure using national best practices such and the priority network outlined in this plan. Adoption will create consistency in capital project design, city priorities and will improve the City's competitiveness in grant programs.

**Implement and Encourage Bike Supportive Infrastructure and Programs:** Both the public and private sectors have a role to play in supporting a bike friendly transportation system. Bike racks, bike lockers, shower facilities at businesses, employer parking cash out programs and tax cut incentives are just a few of the tools that should be considered in the City.

**Update City Policies:** As an older City, Schenectady's policies and ordinances have in some cases not kept up with innovations in transportation system design. Contra-flow bike lanes, park path policies, and a complete streets policy are all in need of updating or adoption. The City should also consider adopting more flexible street design guidelines such as the National Association of City Transportation Officials (NACTO) Urban Street Design and Bikeway Design Guides.

**Develop Bike Education Programs:** For any biking program to be successful education of bicycle riders and drivers is a critical component and may even be the most important aspect of a program. Bus bike rack demonstration stations, educational handouts, utilization of CDTC's Capital Coexist campaign materials (bike/driver education), street festivals and other events all serve to support this very important aspect of public safety. The City should develop a balanced program that not only addresses education but also addresses enforcement, encouragement, evaluation and equity.

**Consider Public Private Partnerships:** Schenectady has the potential to collaborate with community leaders, organizations, businesses, philanthropists and other public agencies to implement a first class bicycle system in the City. A Bicycle Friendly Community Partnership group can serve as a coordinating entity to support the City's efforts.

# CHAPTER ONE



Welcome To  
THE STOCKADE DISTRICT  
Stockade  
Historic  
District  
Est. 1661  
historicstockade.com

# EXISTING CONDITIONS



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## PROJECT BACKGROUND

The Schenectady Bike Infrastructure Master Plan builds on the foundation laid by the Schenectady Urban Bike Route Master Plan which the Capital District Transportation Committee (CDTC) and the City of Schenectady co-drafted in 2001. Since the plan's completion, many things have changed in the City of Schenectady including:

- The redevelopment in the Proctors Theatre area (buildings and streetscape).
- Redevelopment and new development around Schenectady County Community College, the Schenectady YMCA, and Erie Boulevard.
- New mixed use developments with new apartment dwellings in the downtown core.
- Opening of the Schenectady Public Library Phyllis Bornt Branch Library & Literacy Center on State Street.
- Reconstruction of Liberty Park (underway in 2017).
- Funding has been secured to reconstruct the Schenectady Train Station.
- Schools along Craig Street have been redeveloped as community oriented projects with residential components.
- The Upper Union Street Business District has been created.

- The Hillside Avenue Area abutting the City border has experienced new development.
- The Mohawk Harbor and Rivers Casino will be finished on the ALCO site.
- The City has begun to address vacant and abandoned buildings.

These and many other changes throughout the City create a different landscape than the one planned for in 2001. For this reason, a reassessment of the recommendations in the 2001 Urban Bike Route Master Plan, and other plans, is needed along with the identification of new opportunities and challenges that the City's bicycle infrastructure faces.

## PROJECT GOALS

The primary goal of this study is to update the 2001 Urban Bike Route Master Plan for the City of Schenectady by re-evaluating the priority network established in the 2001 plan and by developing guidance for bicycle infrastructure and implementation. The plan will also:

- Develop bicycle wayfinding recommendations for neighborhoods and routes throughout the City of Schenectady.
- Develop recommendations for implementing a range of bicycle facilities to overcome barriers to travel and create a comfortable environment.
- Identify key locations for the roll out of future bike-share stations within the City as part of a regional system.



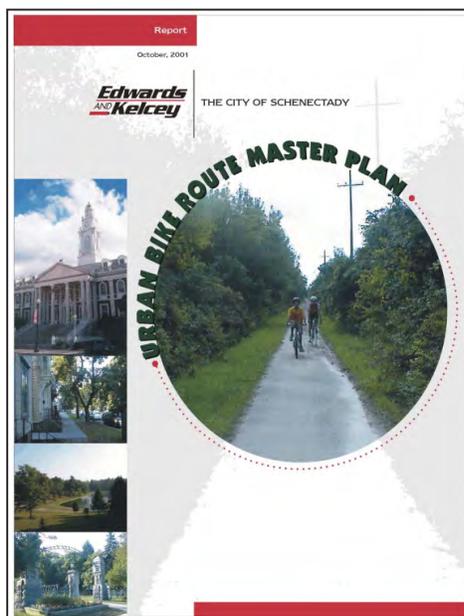
## SUMMARY OF PAST PLANNING

### URBAN BIKE ROUTE MASTER PLAN (2001)

The City of Schenectady received funding from the CDTC to evaluate trail route options, ultimately creating a connected bicycle network throughout the City. A steering committee made up of individuals from local organizations and stakeholder groups guided the plan.

The plan identified a series of routes throughout the City of Schenectady and the larger metropolitan region that would connect bicyclists from residential neighborhoods to desirable destinations. The routes were broken up into priority routes, regional routes, and local connectors. The plan also developed a set of design guidelines, recommended infrastructure improvements, and identified funding and maintenance resources for the implementation of these routes.

Another focus of the plan was the enhancement of the Canal Trailway system in the region as a source of generating bicycle and recreational tourism.



### CDTC NEW VISIONS: BICYCLE AND PEDESTRIAN ACTION PLAN (2015)

This more recent Plan addresses the bicycle and pedestrian planning portion of New Visions 2040, which is "CDTC's official long-range regional transportation plan for Albany, Rensselaer, Saratoga, and Schenectady counties." Recommendations included in the Plan were identified following extensive research of the bicycling and walking conditions in the Capital District, from input from CDTC's Bicycle and Pedestrian Advisory Committee (BPAC), and from an extensive public comment process.

### ADDITIONAL PLANNING EFFORTS

While the 2001 Urban Bike Route Master Plan and CDTC's New Visions 2040 Plan provide the framework for this new bicycle plan update, many other planning efforts, ranging from individual corridor plans, to regional plans, have supported bicycling in the City of Schenectady. Some of these plans include:

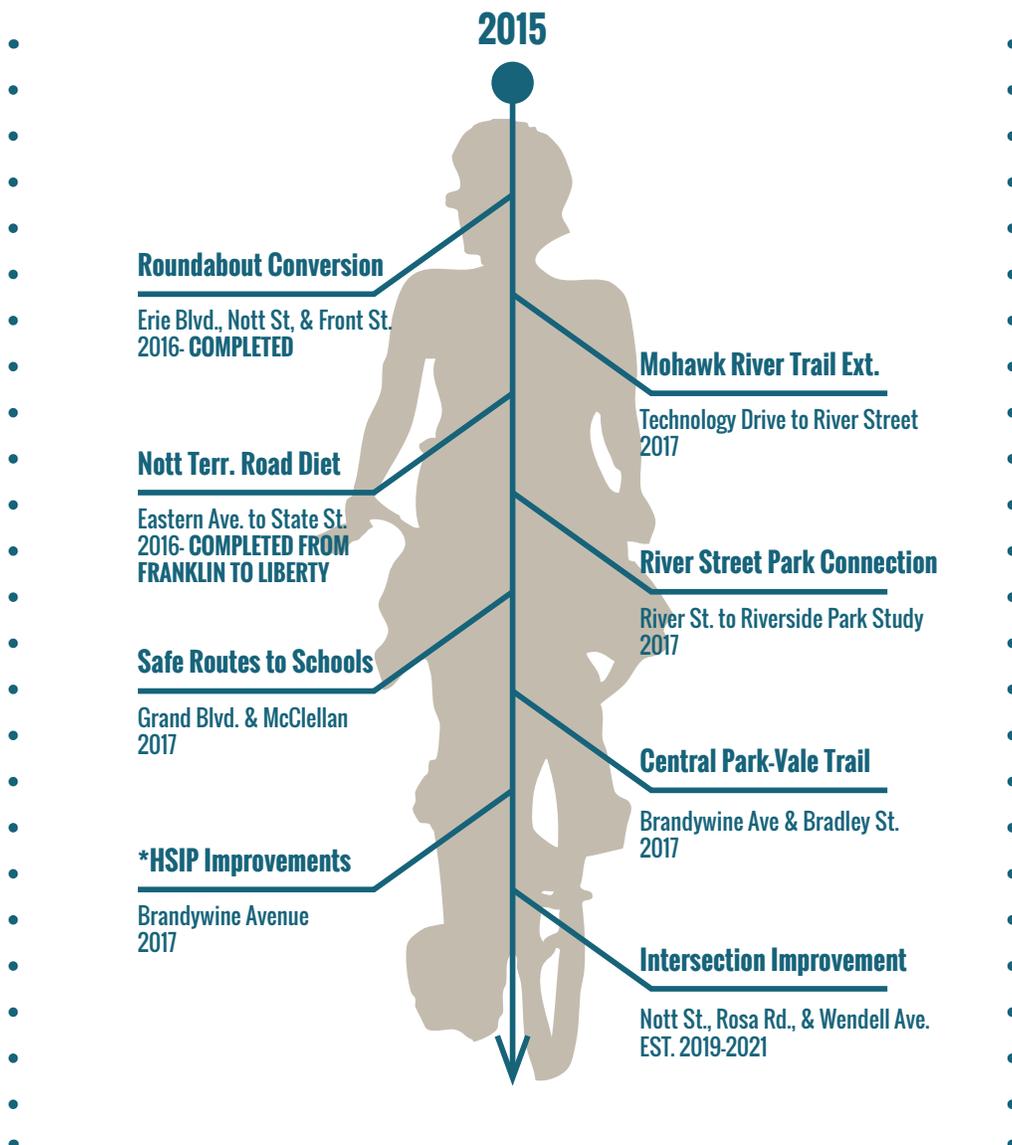
- Gateway Implementation Plan (2012)
- Northern Schenectady Urban Renewal Plan (2010)
- Route 5 Transit Gateway Plan (2010)
- Mohawk River Waterfront Revitalization Plan for Schenectady County (2010)
- Mohawk River Blue-Way Trail Plan (2009)
- Schenectady 2020 Comprehensive Plan (2008)

Summaries for these plans, as well as others, can be found in Appendix A of this report.

## CURRENT PROJECTS

The City of Schenectady is currently undertaking and preparing several transportation related projects that may effect the accessibility and mobility of bicyclists within Schenectady. The projected timeline is illustrated below. These projects represent both a changing landscape of the city

corridors, as well as opportunities to implement bicycle facility and network improvements that can be funded and designed as part of these larger capital projects. These changes and opportunities will play an important role in the development of the recommendations.



\*HSIP stands for Highway Safety Improvement Program, a federal aid program currently authorized in the FAST Act (Fixing America's Surface Transportation Act).

## EXISTING BICYCLE NETWORK

The City of Schenectady has several facilities that offer different levels of protection and comfort for bicyclists, both on and off the streets. There are also other amenities that benefit the bicyclists that the City or other entities have installed throughout Schenectady, such as wayfinding, information boards or kiosks, and bicycle parking infrastructure.

### BICYCLE ROUTES

The City of Schenectady has several signed bicycle routes. This includes State Bike Route 5, which follows NYS Route 146 on Hamburg Street coming from the South, and then follows NYS Route 5, heading northwest on State Street. State Bike Route 5 is 365 miles long and connects Niagara Falls with the Massachusetts State Line.

The bicycle routes have wayfinding signage associated with them, which are incrementally installed along the designated routes. The signage shows bicyclists that the route either continues straight or turns. The routes do not have any separated facilities for bicyclists on the street, with the exception of a short bike lane approaching the intersection of Erie Blvd. and Nott St. There is also no indication of which route a bicyclist may be on, with the exception of State Bike Route 5. Many of these roads are quite narrow, steep, and/or frequented by speeding vehicles, making them dangerous for cyclists.

The Bike routes are primarily present in the Downtown area of the City and northeastern section. There are, however, a lack of routes in the western and southern areas of the City.



#### Bicycle Route Signage

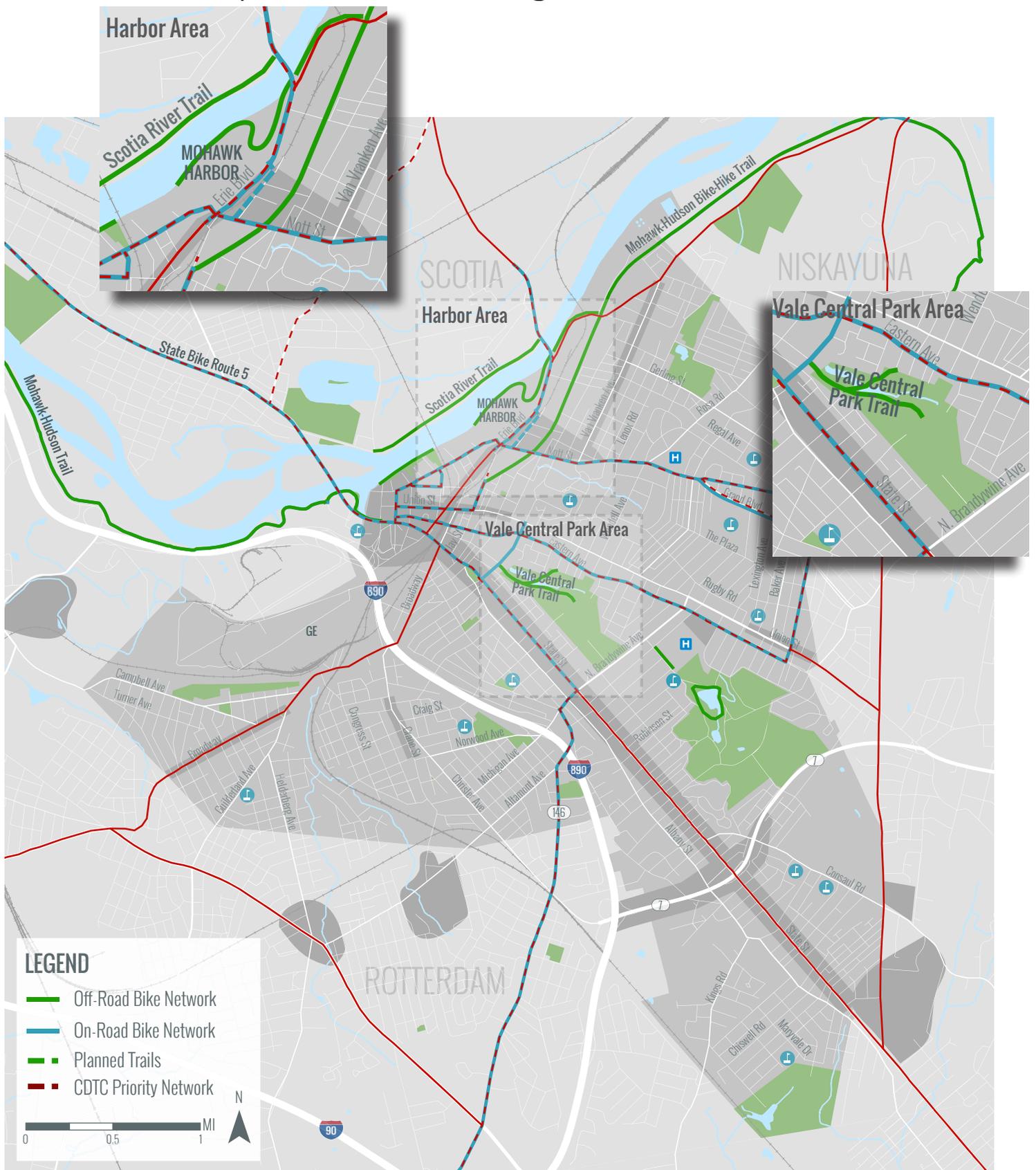
An example of bicycle route signage on Nott Street showing cyclists the changing direction of the route.



#### Share the Road

The bicycle routes are accompanied with share the road signage in addition to the bike route signage.

Map 1 - Schenectady's Existing Bicycle Network 2017





## TRAIL NETWORK

### Shared Use Paths

Shared use paths are a unique bicycle infrastructure feature, as they provide a dedicated facility for pedestrians and bicyclists separate from ones for motor vehicles. They generally follow their own alignment, separated from other corridors, but the path can also follow rail corridors or rivers.

The most notable shared use path within the City of Schenectady is the Mohawk-Hudson Bike Hike Trail (MHBHT). This shared use path is part of the Erie Canalway Trail and Proposed Empire State Trail that connects the City of Albany to the City of Buffalo, passing through several municipalities along the way, including the City of Schenectady. The MHBHT is a 26 mile long shared use path that follows the Mohawk River and Hudson River corridors. While it does provide a connection between Schenectady and other destinations within the Capital District, it does not connect to the southern neighborhoods of Schenectady, and there is no facility providing separated, on-road bike travel or off-road bike travel that makes that connection. The path also terminates at Washington Avenue where it goes on road until the next section of the trail which begins on Union Street.

The City of Schenectady also has a number of shared use paths within both Central Park and Vale Park. While these are not strong transportation connections, they do have high recreational value, as users are able to enjoy the peaceful nature settings.

### Side-paths

Side-paths are a specific kind of shared use path. They provide a wide, off-road facility that can allow pedestrians and bicyclists to comfortably share the designated space. They do, however, follow street corridors, similar to sidewalks. To install a side-path and have it designated as such, it is highly recommended to have some form of buffer between the path and roadway. There are recommendations on these buffers from the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO). Buffers generally take the form of a grass area with trees or fences within them.

Currently, the City of Schenectady has very few built side-paths within its borders. There are plans to install side-paths on N. Brandywine Ave. and Bradley Street, with Bradley Street currently having a sidepath between Monument Hill and McClellan Street. These will provide a connection between Central Park and Vale Park, increasing the transportation value of the paths within the parks, as someone will be able to travel from the east side of Central Park to the west side of Vale Park, without having to travel on a road. Since Vale connects to the Downtown, it has tremendous potential, but the internal isolation and lack of visibility is a major obstacle.



### Vale Park Gateway

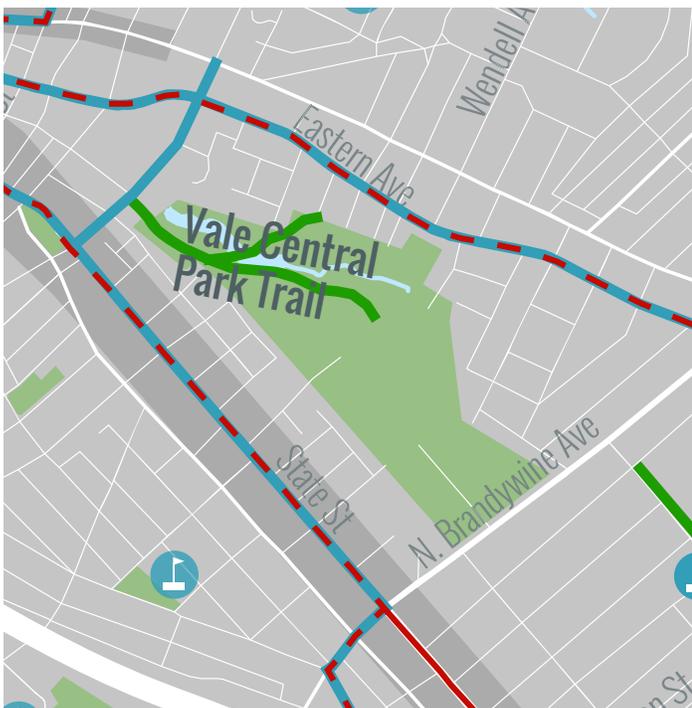
The trail in Vale Park provides useful connections, including linking neighborhoods to the downtown; however, due to the isolation of the park, security concerns likely discourage many potential users.



### Mohawk Hudson Bike-Hike Trail

A view from the Mohawk Hudson Bike-Hike Trail near Schenectady.

## Vale Central Park Area



## INFRASTRUCTURE BARRIERS

For bicycling, one of the largest barriers to travel is infrastructure barriers. Infrastructure barriers can come in several forms. For the purpose of this report, infrastructure barriers shall be defined as any constructed facility or structure that hinders or deters bicycle travel to a destination, such as:

- MPH** high speed corridors
- AAADT** high traffic
- ROW** narrow right-of-way (ROW)
- %** steep grade
- B#** bridges
- I#** wide and complex intersections
- R#** at-grade rail crossings

The presence of these examples does not necessarily mean they are infrastructure barriers, but if bicycle facilities are not provided to mediate them, they can present formidable obstacles to bicycle travel. It is important to note that a structure or facility does not need to completely prevent bicycle travel to be considered a barrier, as infrastructure that creates an uncomfortable environment can also deter bicyclists from traveling through it.

## High Speed Corridors

Due to bicyclists' limited speeds and higher vulnerability compared to motor vehicles, corridors with high speed limits can be intimidating and dangerous to bicyclists. Certain factors, such as the availability of wide shoulders to ride on, or separated bicycle facilities, can diminish the intimidation factor of the corridors. Bicycle facilities such as off road trails are good alternatives to on-street facilities when motor vehicle speeds are high. Alternative corridors, such as trails, can also be a strong

alternative to on-street bicycle facilities on high speed corridors. Examples of high speed corridors that can act as a barrier to bicycle travel include:

- Troy-Schenectady Road
- Erie Boulevard

## Bridges

Bridges present a unique infrastructure barrier to bicyclists. Bridges are built to overcome an existing barrier, through river crossings or overpasses, yet the environment they create may be intimidating to many bicyclists.

Bridges often leave little room for shoulders, and broken glass and debris tends to collect on the sides of bridge decks. This makes flat tires more likely, creating an undesirable route and larger debris often forces cyclists into the travel lane. Most bridges that do not have bicycle facilities and whose conditions are not maintained are often barriers to travel, with few or no other routes around.

Examples of bridges that create an infrastructure barrier in the City of Schenectady, along with their posted speed limits, include:

- B1** State Street Crosstown Connection Overpass (loud environment & high volumes) -35 mph
- B2** Freemans Bridge (high volume, narrow shoulder, & high speeds) -40 mph
- B3** Kings Road Railway Overpass (narrow bridge with no shoulder) -30 mph
- B4** I-890 Bridge over Broadway (creates physical barrier between residential neighborhoods and downtown, wide intersection)
- B5** A pedestrian bridge at Notts Street has been removed but has received public support for a new bridge to be installed.
- B6** Michigan Avenue Bridge Project

## Intersections

Most intersections have been designed to allow the highest possible throughput of vehicles. Widening intersections has allowed vehicles to comfortably travel at high speeds, causing dangerous situations for bicyclists and pedestrians. For the average bicyclist, wide intersections with corners that have a high turning radius can be intimidating.

The presence or timings of traffic signals can also play a major role in intimidating bicyclists at intersections. Most traffic signals are timed for motor vehicle movements. This means that the yellow phase is timed to accommodate motorists traveling through the intersection, resulting in bicyclists, who are generally slower, potentially being unable to pass through the intersection by the end of the yellow phase. This problem becomes even more apparent with wider intersections.

Major intersection barriers within the City of Schenectady include:

- 11 Veeder Ave. & State St. (wide intersection)
- 12 Erie Blvd. & State Street (wide intersection)
- 13 Washington Ave and Union St (conflicting uses)

- 14 Erie Blvd. & Nott St. (roundabout)
- 15 State St. & Consaul Rd./Myrtle Ave. (legs of intersection do not line up)
- 16 Brandywine Ave. & State St.

## At-Grade Rail Crossings

At-grade rail crossings can be intimidating to bicyclists, especially if the rail line is active and heavily used. The rail crossing can also be a barrier to travel if long trains use the rail line. They can create delays, and discourage bicyclists, as well as motorists, from using these roads. The below roads intersect the rail lines:

- R1 Maxon Rd.
- R2 Seneca St.

## Construction Zones

Construction zones are a temporary barrier, but one that can greatly diminish the mobility of bicyclists. Since these barriers are temporary in nature, they are not shown in the barriers map.

The impact of construction zones can vary based on the type of project. Building or lot based



Erie Boulevard and State Street in Schenectady



Prospect Street and Broadway Street in Cambridge MA

*These intersections have similar AADT, with ~20,000 vehicles per day on each street.*

construction can result in the loss of a sidewalk, generally directing pedestrians onto the shoulders of the road, eliminating that area for bicycle travel. On-street construction can also eliminate shoulders or direct traffic onto shoulders.

In addition, construction can come in phases, and roadways may be left with a temporary fix. These temporary fixes often leave the roadway surfaces uneven and rugged, which creates an uncomfortable ride for many bicyclists.

It is important to remember that while these identified barriers are hindrances to the general public, what qualifies as an infrastructure barrier may vary from bicyclist to bicyclist. A 'strong and fearless' bicyclist may be completely comfortable in the environments described, yet someone on the verge of going from 'no way no how' to 'interested but concerned' may find such conditions to be unnavigable.

## BARRIERS & OPPORTUNITIES

As noted in the previous section, there are a number of barriers to bicycling within the City of Schenectady. Map 2 identifies several of the major barrier corridors, such as:

- Route 7: given its speed, width, and traffic volumes, it is both difficult to travel along and cross.
- I-890: as a limited access highway, there is no opportunity to provide bicycle and pedestrian accommodations along the corridor. There are also few places to cross utilizing existing bridges or underpasses.

However, there are also plenty of opportunities and demand for safe and comfortable routes for bicyclists. The high demand corridors shown in Map 2 depict the primary direction of travel for bicyclists

to and from destinations and serve as a basis for identifying new or improved routes.

## TOPOGRAPHY CHALLENGES

The elevation gradient in Schenectady, from 220 feet near the Mohawk River to 480 feet at the east side of the City, creates varying slopes for people bicycling toward versus away from the riverfront and downtown areas. The downhill slope when traveling toward the river allows many people to easily ride above 20 miles per hour, while the gradual incline when riding south and east, away from downtown, makes it harder for bicyclists to retain their speed. Therefore, elevation will be taken into account when recommending bicycle facilities on some streets.

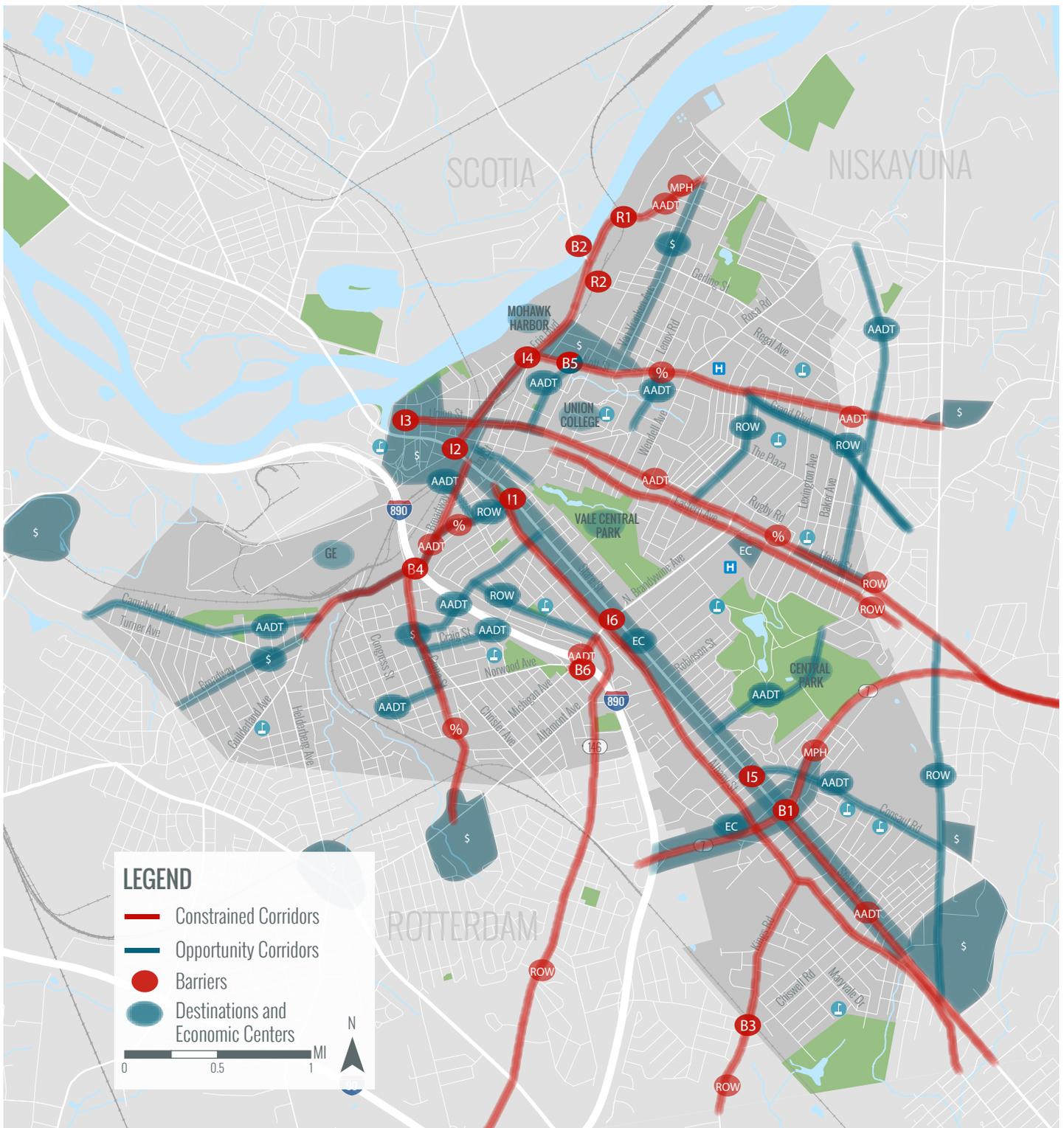
## OPPORTUNITIES

Many of the existing streets within the City of Schenectady that have steeper grades may only have enough space to accommodate one bicycle lane. In these cases, uphill lanes should be given priority, unless a history of collisions or identified conflicts prove the necessity of a bike lane on the downhill lanes. Accommodating an uphill bicycle lane often includes delineating on-street parking (if provided), narrowing travel lanes and/or shifting the centerline if necessary.

Opportunities consist of:

-  Low traffic volumes
-  Wide right-of-way (ROW)
-  Economic Center
-  Connects to economic centers
-  Connects to destinations

## Map 2 - Barriers & Opportunities



## EXISTING BICYCLE PARKING INFRASTRUCTURE

Bicycle parking facilities are an essential piece to any bicycle network. Providing ample and convenient bicycle parking ensures that bicyclists have a place to store their vehicles when they reach their destinations, such as stores, schools, places of employment, or events. Not providing adequate bicycle parking can deter individuals from choosing bicycling as their mode of transportation and result in more motor vehicle traffic on the roadways. A lack of bike parking in certain areas can also deter cyclists from traveling there, which can have a detrimental effect on local businesses.

There are a wide variety of bicycle parking options to choose from. Each offers a different level of security and answers different needs. Bicycle storage needs depend upon two primary variables, which are capacity and storage times. Options for bike parking include:

- Standard bike racks
- High capacity bike racks
- Bike Lockers
- Bicycle corrals
- Bicycle Secure Parking Areas (Bike SPAs)
- Covered Bike racks



### Downtown Bike Parking

Bike rack on State Street in Downtown Schenectady.

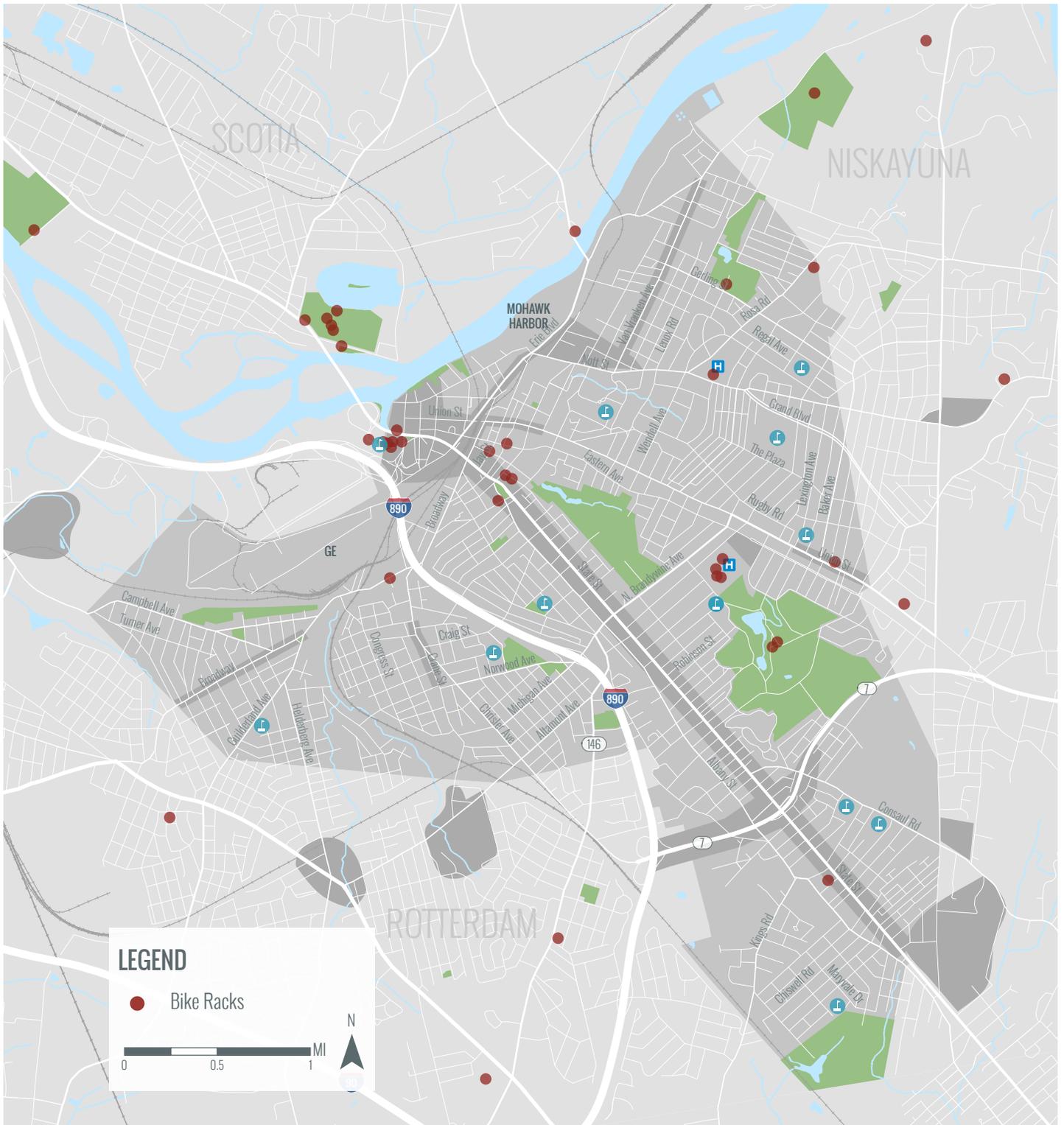
Schenectady has an assortment of public bike racks available throughout the City, including bike racks in the downtown area installed on the sidewalks, racks installed at BusPlus stops, racks at public buildings such as libraries or schools, and racks within some of Schenectady’s numerous parks, such as Central Park. The City of Schenectady does not have any higher security bicycle facilities though, such as bike lockers. Map 3 shows the locations of documented public bike parking facilities. Unfortunately, several of the bike racks located downtown are not fixed to the ground and are therefore not viewed as secure bicycle parking options.



### Bike Parking Options

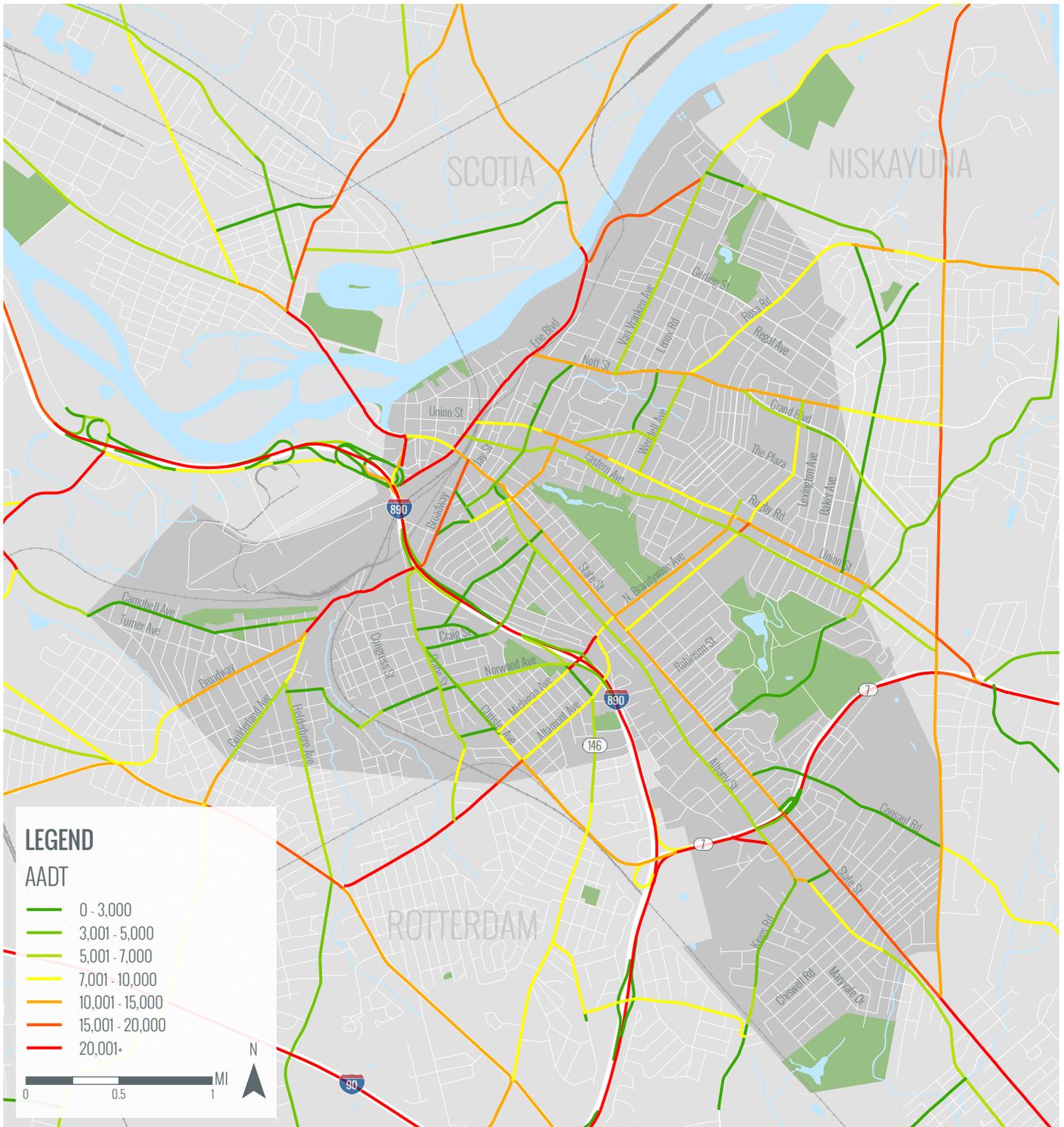
The ideal styles of bike parking facilities are based upon the two variables of capacity and storage time.

### Map 3 - Existing City and Surrounding Area Public Bike Parking as of 2016





Map 4 - Average Annual Daily Traffic 2013 (AADT)



## COLLISION ANALYSIS

Within the years of 2010 through 2015, 11,560 collisions occurred within the City limits of Schenectady (approximately 1,930 collisions on a yearly average). These included 352 collisions involving pedestrians and 177 collisions involving bicyclists. Of these collisions, 2 of them were between cyclists and pedestrians and did not involve motor vehicles. These collisions varied in type, location, severity, and surrounding conditions, but through analysis of the data, patterns begin to emerge. Map 5 shows the number of collisions within the City of Schenectady and illustrates the bicycle related collision densities. This analysis shows that crashes are concentrated around State Street and a few other key areas. Safety improvements should be focused in these areas. The data used in this analysis was based upon reported collisions only, as recorded by the Department of Motor Vehicles and Police Department.

## Severity

- 2,556 of all collisions (22%) involved reported injuries, while 309 collisions involving pedestrians (86%) and 140 collisions involving bicyclists (79%) involved reported injuries.
- 236 of the total collisions (2%) involved severe injuries,\* and of those 236 collisions, 50 involved pedestrians and 15 involved cyclists (14% and 8% of the pedestrian and bicyclist collisions reported, respectively).
- Among the 11,560 collisions, 11 involved fatalities (<1%). Of those 11 fatalities, 5 involved pedestrians (1%). There were no reported collisions that involved bicyclist fatalities.

\*A Severe Injury is defined as an injury that causes significant brain damage, paraplegia, quadriplegia, amputation of one or more limbs, permanent blindness, burns to more than 50% of the body, or results in severe difficulties in performing mobility, communication, and self care tasks.

## Conditions

Among the collisions involving pedestrians or bicyclists, 62% occurred between dusk and dawn, 8 of which were reported to be on unlit roads. All other collisions did not record the scale or quality of the lighting present.



34% of collisions with pedestrians or bicyclists occurred at or near a signalized intersection, 12% involved stop sign controlled intersections, and 54% involved uncontrolled intersections or were mid-block.



19% of collisions involving pedestrians or bicyclists were described as 'wet' conditions, while 2% of those collisions were described as 'snowy' or 'icy'.

52% of pedestrians involved in collisions were crossing without a crosswalk.

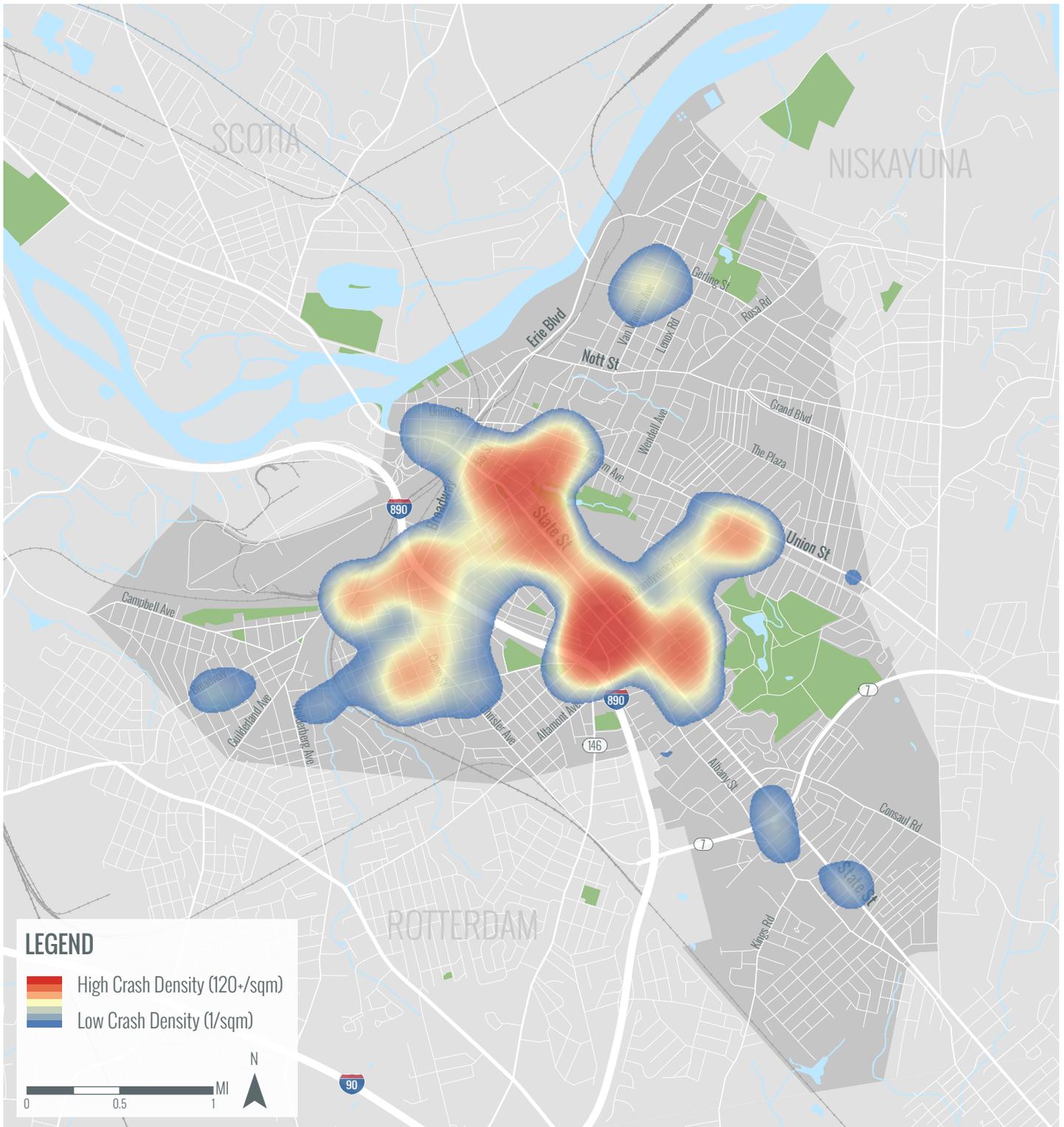


51% of collisions involving pedestrians or cyclists were between the months of June and September.

Data based on all reported vehicle collisions by the Department of Motor Vehicles and Schenectady Police Department from 2010-2015.

In 2011, there were just over 6000 crashes in New York State that involved bicyclists. When these crash rates are compared based on population, Schenectady is slightly higher at 0.5% versus New York State at 0.3%.

## Map 5 - Bicycle Collision Density (2010-2015)



Data Sources: NYSDOT, CDTC

Disclaimer: Crash data provided by the NYS Department of Transportation's Accident Location Information System

# CHAPTER TWO





# FACILITY TYPES

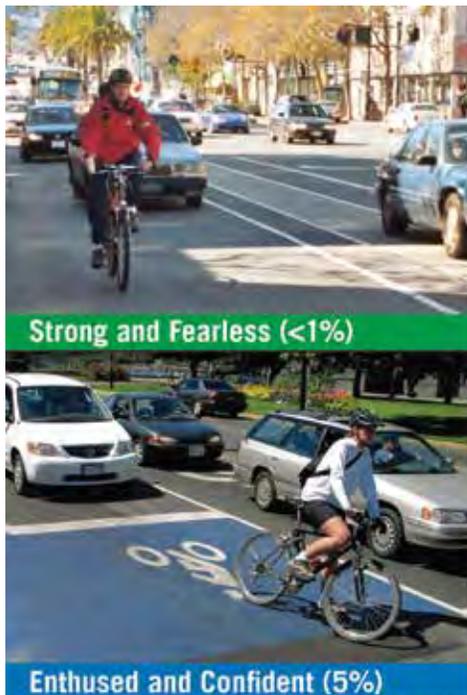
## TYPES OF BICYCLISTS

To understand the conditions of the bicycle network within the City of Schenectady, one must also understand those who will be using the facilities, or those who may be deterred from bicycling due to the facilities or environment.

Research from Portland, Oregon and elsewhere has shown that in general, there are four categories of bicyclists, including<sup>1</sup>:

- **Strong & Fearless (<1%):** These are the cyclists who will likely ride in any environment, regardless of stress, traffic volumes, traffic speeds, or motorist attitudes.
- **Enthusied & Confident (5%):** This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared use paths when traveling.
- **Interested but Concerned (60%):** This user type comprises the bulk of the bicycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or shared use paths under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of bicycling, specifically traffic and other safety issues. These people may become “Enthusied & Confident” with encouragement, education and experience.
- **No Way, No How (35%):** Persons in this category are not experienced bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

1 [www.portlandoregon.gov/transportation/article/264746](http://www.portlandoregon.gov/transportation/article/264746)



## FEASIBLE BICYCLING DISTANCE

When identifying possible bicycling connections for commuters and other types of trips, it is important to identify what would be considered a feasible distance to expect individuals to ride their bicycles. While this distance is different for each rider, an average rider would have a distance that would mark where they feel riding a bicycle is not an option, and they will either choose a different destination, such as finding a store closer to them, or choose a different mode of transportation, such as driving to work instead of biking.

## OTHER FACTORS ACKNOWLEDGED

There are also many other factors that can affect how far a bicyclist is willing to ride, beyond distance. These can include grade changes, weather or temperatures, availability of bicycle infrastructure, physical fitness, and availability of time. However, assessing a feasible bicycling distance for an average rider, or range of average riders, under average conditions, is important for identifying priority improvements.

## “MODE LESS TRAVELED” SURVEY

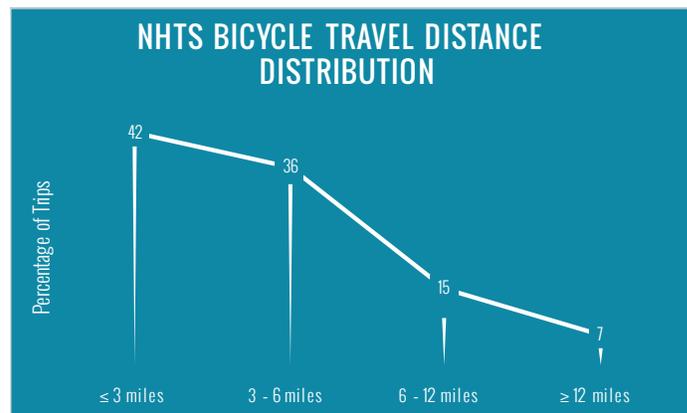
There have been many studies that have assessed the average feasible bicycling distance for commuting and other trips. One source that stands out is 2014 American Community Survey “Mode Less Traveled,” which identifies the average bicycle commute time as 19.3 minutes. With an average bicycling speed of 10 miles per hour, an average bicycling commute nationwide would be 3.2 miles. It is important to note though, that the 3.2 mile distance is considered to be the average, which, in general terms, means that approximately half of all bicycle commutes are longer than 3.2 miles.<sup>1</sup>

<sup>1</sup> <https://www.census.gov/prod/2014pubs/acs-25.pdf>

## 2009 NATIONAL TRAVEL SURVEY DATA

To address the issue of an average commuting distance not necessarily reflecting a maximum feasible distance, a distribution of bicycle trip lengths should be identified. The National Household Travel Survey (NHTS) of 2009, identified average distribution of bicycle commuting trips in the United States. This data can be seen in the chart below. It is also reasonable to assume that the ‘types’ of bicyclists, outlined on the previous page, correlate to the bicyclists making these trips, as speculated in the chart.<sup>2</sup>

<sup>2</sup> <http://nhts.ornl.gov/2009/pub/stt.pdf>



Adopted from the NHTS 2009 Data Sets

## TRIPS BY TYPE

Utilizing the same data from the 2009 NHTS Data Set, a study was conducted for the Vermont State Bike Plan that broke the data down even further to address the bicycling trip distance average thresholds for different types of trips. The results were:

- Work/Commute: 2.5 miles
- Errands/Shopping: 1 mile
- Leisure/Pleasure: 1 mile
- School/Religious: 1.5 miles

The study also addressed the distribution of the lengths of these trip types. This is shown in the graphic below.<sup>3</sup>

<sup>3</sup> <http://vtransplanning.vermont.gov/bikeplan/documents>



Adopted from the 2016 VTRANS On Road Bicycle Plan\*

## DATA ANALYSIS

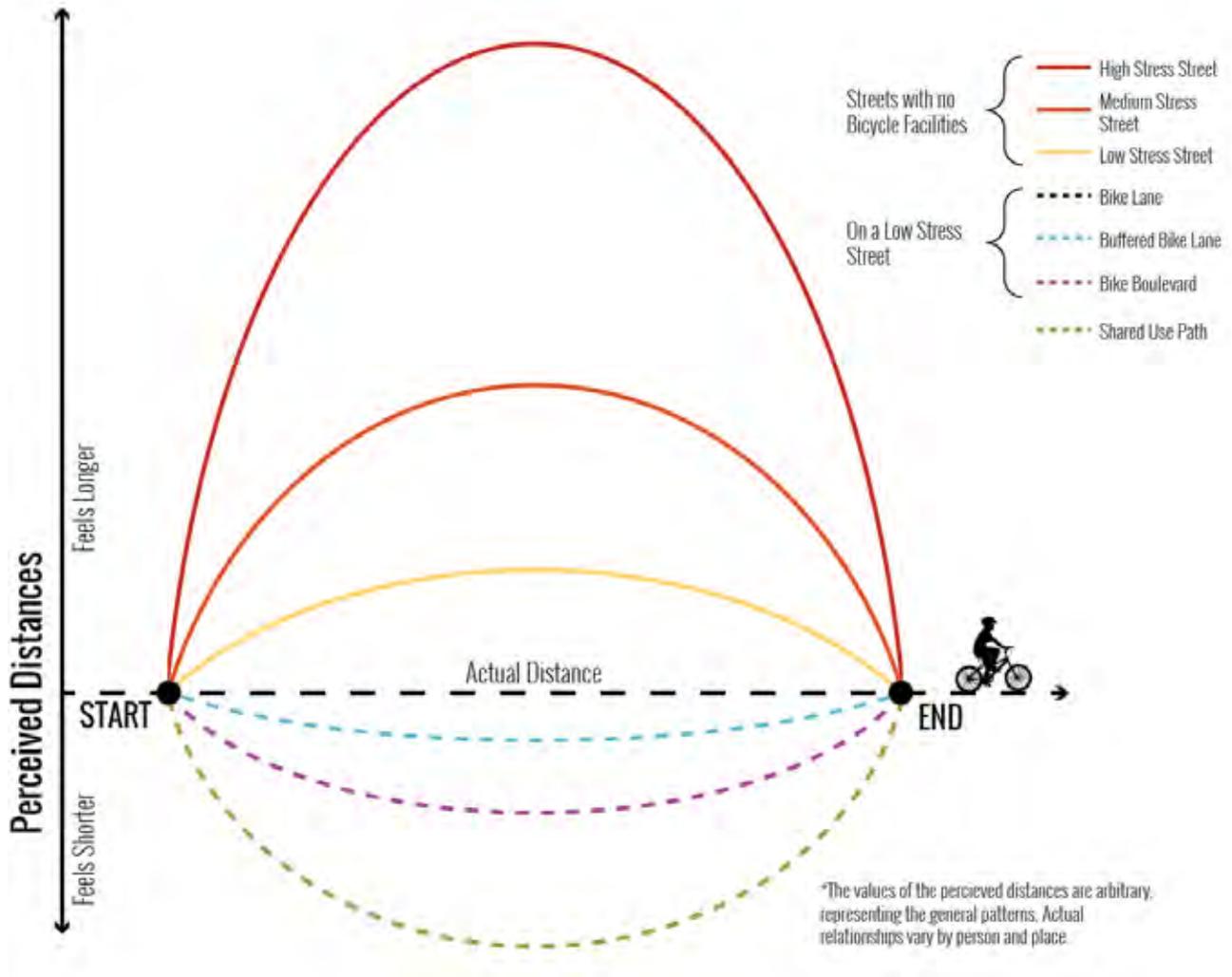
Utilizing the data from the noted sources, it can be assessed that the feasible bicycling distance for an average commuter lies between 2.5 and 6 miles, averaging around 3 miles.

## PERCEIVED TRAVEL TIME

As mentioned before, there are more factors to bicycle mode choice than just distance. One of those factors that is important to keep in mind when identifying a feasible travel distance for bicyclists is the perceived travel time. Perceived travel time is arbitrary and best measured by having bicyclists estimate how long a trip took them and comparing that value to the actual time traveled. There are factors that influence perceived travel time as well, such as weather or temperature and the stress induced by the roadway network.

One of the largest influences on perceived travel time is availability of bicycle infrastructure. While perceived travel time can vary greatly from person to person, different facilities generally have the same proportional influence on this phenomenon. The graph below illustrates how this may be reflected for certain facilities.

### Perceived Distance by Facility



Source: VTRANS On Road Bicycle Plan

## TYPES OF FACILITIES

The facilities within this plan have been broken down into four primary classifications: corridor facilities, trail facilities, neighborhood greenways, and intersection facilities. Each identified facility has design guidance associated with it in Appendix B, along with design guidance for signage, supportive infrastructure, wayfinding, and road diet treatments.

### Interested but Concerned PROTECTED FACILITY



### Interested but Concerned NEIGHBORHOOD GREENWAY



### Enthusied and Confident BIKE LANE



### Strong and Fearless SHARED LANE MARKINGS/STRIPED SHOULDERS



### Designing Facilities For the Range of Bicyclists

Different types of bicycle facilities are more appropriate for different types of bicyclists. In general, the more protected a facility is from motor vehicle traffic, the more comfortable the facility will be for the majority of riders. Separated or designated facilities should be provided where there is excess pavement width available. This chart displays the range of facility options that are recommended in this plan as they relate to the type of bicyclist that would benefit from their implementation. The facilities are cumulative, in that a 'strong and fearless' type rider would be comfortable on any 'interested but concerned' type facility. A complete bicycle network will include a variety of bicycle facilities but will include connectivity between facilities for the "interested but concerned" group.

## CORRIDOR FACILITIES

Corridor facilities, or linear facilities, provide bicyclists with a clear right-of-way for travel, by either creating mixed travel facilities, such as shared travel lanes, or providing a separated facility along a given corridor.

### Marked shared roadway

A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane. In constrained conditions, the SLMs are placed in the middle of the lane to discourage unsafe passing by motor vehicles. On a wide outside lane, the SLMs can be used to promote bicycle travel to the right of motor vehicles. In all conditions, SLMs should be placed outside of the door zone of parked cars. Marked Shared Roadways may be signed with Bike Route and/or In Lane signage. Refer to the NYS DOT Shared Lane Marking Policy (TSMI 13-07).



## Bicycle Lanes

Bicycle lanes designate an exclusive space for bicyclists with pavement markings and signage. The bicycle lane is located adjacent to motor vehicle travel lanes and bicyclists ride in the same direction as motor vehicle traffic. Bicycle lanes are typically on the right side of the street (on a two-way street), between the adjacent travel lane and curb, road edge or parking lane.



## Buffered Bicycle Lanes

Buffered bicycle lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.



## Climbing Lanes

When roadways have a steep grade, uphill bike lanes can be combined with shared lane markings to create a safe and comfortable bike experience for both uphill and downhill cyclists. Uphill bike lanes should be 6-7 feet wide (wider lanes are preferred because extra maneuvering room on steep grades can benefit bicyclists). Shared Lane Markings can then be used for downhill bicyclists who can more closely match prevailing traffic speeds.



## One-Way Separated Bicycle Lanes (cycle track)

One-way cycle tracks are physically separated from motor traffic and distinct from the sidewalk. Cycle tracks are either raised or at street level and use a variety of elements for physical protection from passing traffic. They are typically implemented on roadways with higher vehicle volumes and/or speeds. Driveways and minor street crossings are a unique challenge for cycle tracks and require extra consideration. These facilities can be used in conjunction with on-street parking.



## Two-way Separated Bicycle Lanes (Cycle track)

Two-way cycle tracks are physically separated cycle tracks that allow bicycle movement in both directions on one side of the road. Two-way cycle tracks require extra consideration at all crossings, especially roadway and driveway crossings. These facilities can be used in conjunction with on-street parking.



## Shoulders/signed routes

Shoulders of at least four feet wide should be maintained the length of each of these roadways, including at intersections. Where right turn lanes exist, bike lanes should be created between the through and right turn lanes. Shoulders should be maintained as part of the travelway. Bike route signs can be added to these routes and in the future, bike lane markings can be considered to denote the preferential (but not exclusive) use of the shoulder by cyclists.



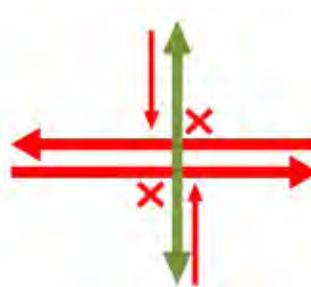
## NEIGHBORHOOD GREENWAYS

Neighborhood greenways are low stress, low volume street corridors that are comfortable for all users to share the street-space together. They often pass through residential neighborhoods and present a very family-friendly facility when implemented properly. Infrastructure elements should concentrate on wayfinding and traffic calming. Aspects of neighborhood greenways include horizontal and vertical traffic calming and traffic diversions. While these elements specifically speak towards the design and development of neighborhood greenways, it should be noted that traffic calming and traffic diversion may be implemented for alternative purposes as well, if implemented with engineering judgment.

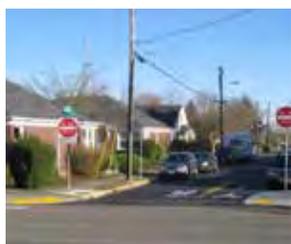


## Strategies for Reducing Volume

Maintaining motor vehicle volumes below 3,000 AADT (annual average daily traffic), where 1,000 - 1,500 AADT is preferred, significantly improves bicyclists' comfort. To manage volume, physical or operational measures can be taken on routes that have been identified as a bicycle boulevard. These volume management elements also provide an opportunity for landscaping, stormwater management, and other pedestrian and bicycle supportive amenities.



Volume management tactics help to divert traffic away from neighborhood bikeways, reducing volumes along the bikeway.



### Traffic Restriction Signage:

The most straightforward traffic volume reduction strategy is signage restricting motor vehicle through movement.



### Stop Sign Placement:

At minor intersections, stop signs on bicycle boulevards should be placed on side street approaches in a way that favors through traffic on the bicycle boulevard.



### Choker Entrances:

Choker entrances are used to reduce motor vehicle volumes by restricting/constraining vehicle passage while allowing full bicycle passage.



### Median Traffic Diverters:

Median diverters restrict through motor vehicle movements while providing a refuge for bicyclists to cross in two stages.

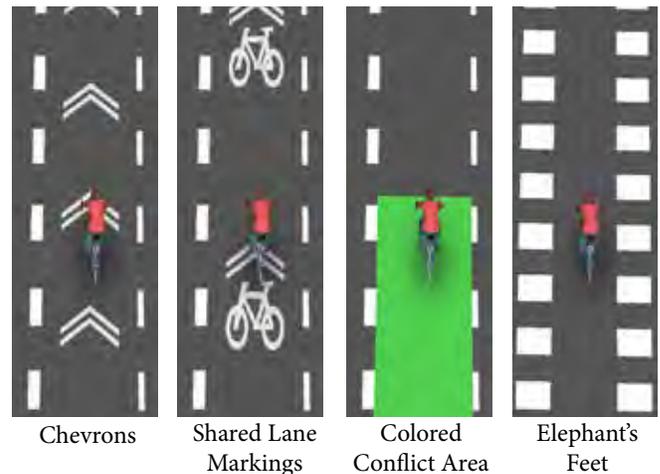
## INTERSECTION FACILITIES

Intersections are a source of many of the conflicts between bicyclists and other users as their paths of travel cross. Intersection improvements in particular should concentrate heavily on increasing the visibility of and for bicyclists, as well as reduce the number of possible conflict areas between different street users. Examples of these types of treatments include:

- Bicycle Intersection Markings
- Bike boxes
- 2-Stage turn boxes
- Prolonged All Red Times
- Bicycle Detection
- Hybrid Signals
- Bicycle Signals
- Roundabout Considerations
- Protected Intersections

## Intersection Crossing Markings

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.



## Colored Bike Lanes in Conflict Areas

Colored pavement within a bicycle lane increases the visibility of the facility and reinforces priority of bicyclists in conflict areas. The colored surface should be skid resistant and retro-reflective. A "Yield to Bikes" sign should be used at intersections or driveway crossings to reinforce that bicyclists have the right-of-way in colored bike lane areas.



Image of a protected intersection treatment

## Bike Boxes

Bike boxes are used at signalized intersections to allow cyclists to wait in front of queued vehicles. This allows cyclists to remain visible and to travel through the intersection before vehicles. The bike box is a green color, easily visible to motorists. It is located behind the crosswalks. Caution should be used when using a bike box when the intersection is located at the bottom of a steep grade. When bike boxes are installed, right turns on red should be restricted for that approach. For intersections with both bike boxes and bicycle signals, cameras have been recommended to take the place of signal loops to detect the cyclists. This change should be discussed with local traffic signal programmers to determine bicycle detection best practices.



## TRAIL FACILITIES

Trails are a unique facility that completely separate bicyclists from motor vehicle traffic. They may either be shared use with mixed travel lanes for pedestrians and bicyclists, single use trails, such as hiking trails or mountain biking tracks, or separated use trails, where bicyclists and pedestrians may both use the trail facility, but have separated travel lanes. This plan identifies and provides guidance for the following trail types that either exist or may be implemented within the City of Schenectady:

- Shared Use Paths
- Side Paths
- Natural Surface Trails
- Rails to Trails/Rails with Trails
- Utility Corridor Trails



Image of a separated trail facility

# CHAPTER THREE



MOH  
BIKE



**PUBLIC  
OUTREACH AND  
DEMONSTRATIONS**

## OVERVIEW

Throughout the development of this plan, the consulting team and the City of Schenectady staff have engaged public entities, individuals, key stakeholders, and local activists in order to ensure that the plan's recommendations reflect the needs of the communities they will be serving and that the public understands the purpose of each recommendation. This public engagement took the form of four separate methods: stakeholder meetings, public engagement workshops, demonstration projects, and an online survey. The implementation and result of each of these are described below and in the following pages.

## STAKEHOLDER MEETINGS

Throughout the process of developing this plan, a group of identified key stakeholders were engaged. The over 30 stakeholders included public officials, representatives of major employment centers within the City like GE, representatives from community groups such as the YMCA, and members of local bicycle advocacy groups such as Electric City Bicycle Co-op.

These stakeholders were utilized to:

- Assist in identifying challenges and opportunities within the existing conditions of the bicycle network in Schenectady
- Convey the needs and desires of groups within the communities of Schenectady
- Garnish support and awareness for the plan and associated bicycle demonstration projects.

Stakeholder priorities included providing bike storage, providing incentives for bike friendly businesses, encouraging proper bicycling habits, and providing bike lanes along major City roads.

## PUBLIC ENGAGEMENT

Throughout the development of the plan, there have also been a number of public workshops used to engage members of the City and allow the public to express concerns, desires, and observations.

The main take aways from the public engagement efforts were:

- Increase driver and bicyclist education
- Increase public bike parking
- Stripe more bike lanes
- Make major roads through the City (State Street, Erie Boulevard, etc.) more accessible to bicyclists

A final public meeting was held at the Schenectady Public Library in June 2017 with over 35 attendees to share the details of the draft plan and begin a public comment period.

## DEMONSTRATION PROJECTS

The development of this plan involved the implementation of two temporary demonstration projects within the City of Schenectady. The purpose of these demonstration projects was to:

- Illustrate the feasibility of certain infrastructure installations on the streets of Schenectady
- Identify the challenges of installing said infrastructure improvements
- Gather public opinion of the infrastructure improvements
- Increase public awareness of the development of the Schenectady Bike Infrastructure Plan

## WASHINGTON AVENUE CONTRA-FLOW LANE

The first of the two demonstration projects involved the installation of a contra-flow bike lane on Washington Avenue from State Street to Union Street. On this stretch of Washington Avenue, traffic is one-way restricted, allowing for northbound movement only. Installing the contra-flow lane allowed for bicyclists to also travel southbound, linking a gap in the Mohawk Hudson Bike Hike Trail. The demonstration project also included the installation of a neighborhood traffic circle at the intersection of Washington Avenue and Union Street, the installation of shared lane markings along Washington Avenue from Union Street to Front Street, and the installation of wayfinding signs along the corridor.

The reaction of the public around the demonstration project was one of mixed opinions. Some local residents offered concerns over the installation, mostly related to the neighborhood traffic circle and the moving of on-street parking from the west side of Washington Avenue to the east side. It should be noted, though, that several residents that opposed the installation expressed a changed opinion on the demonstration project by the end with some expressing a desire to have at least parts of the project installed permanently. Other locals expressed how they enjoyed the separated bicycle facility, allowing them to legally ride southbound on the street, and how they appreciated the slower speeds of motor vehicles.

The results of the demonstration project showed that there is strong desire and utility for the counterflow bike lane. The traffic circle is a useful traffic calming tool for the City but the demonstration project showed this may not be the appropriate location.



**Contra-flow bike lane installation on Washington Ave. from State St. to Union St.**



**Neighborhood traffic circle installation at the intersection of Washington Ave. and Union St.**

## CRAIG STREET BIKE DEMONSTRATION

The second demonstration project was installed in the Hamilton Hill Neighborhood of Schenectady. This installation primarily demonstrated the installation of bike lanes along Craig Street, showing the interaction of the bike lanes with challenges, such as transit stops and on-street parking. The project also included the installation of advisory bike lanes along Stanley Street. The project was kicked off with a 'Bike Festival' held in the Schenectady Boys and Girls Club parking lot, which involved giveaways, group rides, and information tables hosted by local agencies and advocates.

The public reactions to the demonstration project were largely positive, with many residents expressing a desire for the facilities to be permanently installed. However, it should be noted that while popular, the parking restrictions associated with the advisory lanes were largely ignored, especially on weekends, leaving the lanes blocked along the corridor. Enforcement should be beneficial for a successful permanent installation.

For more information regarding either demonstration project, including their design, implementation, and results, see Appendix F.



Image of the bike festival that kicked off the installation of advisory bike lanes on Stanley St.



Image of the installation of the advisory bike lanes

## ONLINE SURVEY

An online survey was used during part of the plan's development to gather public comments and identify opportunities and challenges that community members saw in their surroundings.

The survey was available to the public from the beginning of the project's development until the end of August 2016. It included a combination of multiple choice and written response questions. In that duration, a total of 243 participants took the survey and the main take aways from the results were:

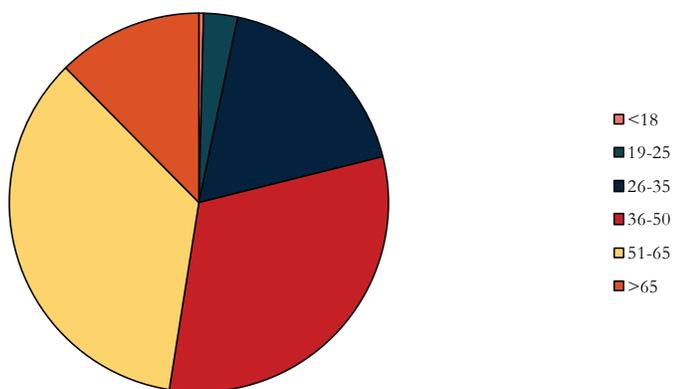
- 42% of respondents found that biking in Schenectady was somewhat dangerous
- 95% of respondents felt that public funds should be used on improving bicycling conditions
- 70% of respondents felt cars pass bicyclists too closely and 55% felt bicyclists fail to comply with traffic laws
- 60% of respondents felt inconsiderate motorists deter them from biking on the streets, and likewise, 60% of respondents felt

poor roadway conditions prevent them from biking on the streets.

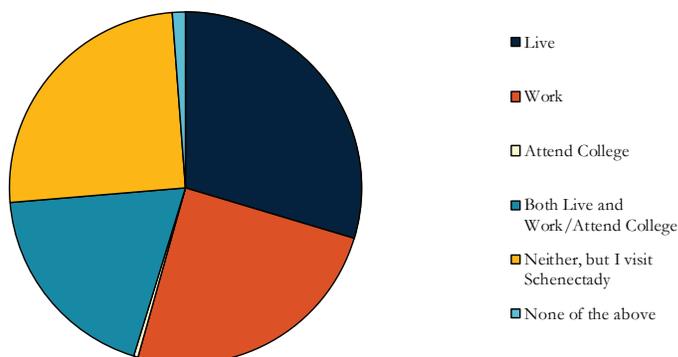
In addition to the survey, the project website included the opportunity for visitors to leave comments. The comments ranged from general opinions on bicycling, to reviews of material provided, and to comments from the demonstration projects. Several notable comments include:

- "I live in Woodlawn, by the elementary school. It is nearly impossible for me and my family to safely ride from our neighborhood into downtown."
- "I can't stress enough the value of a bike path on Rte. 5 given its proximity to our best attractions such as SCCC, Proctor's the Train/ Bus Station, Central Park, and others too numerous to mention."
- "As a local user, I would like to see... A clear and safe plan to routing cyclists west on Nott, through the roundabout, and either north or south on Erie Blvd., or to a connection to the new bike path being developed along the riverfront in front of the casino."

What is your age?



Do you live or work in the City of Schenectady?



# CHAPTER FOUR



# BICYCLE NETWORK RECOMMENDATIONS

## OVERVIEW

The following chapter consists of the proposed bicycle network recommendations. This chapter is broken down into four main components:

- Infrastructure Recommendations
- Wayfinding Recommendations
- Policy Recommendations
- Programming Recommendations

**These recommendations are conceptual in nature and are presented to characterize the types of improvement that are desirable, and that may be implemented as part of future land use and transportation improvement projects. The cross section concepts were developed based on the average street width. All transportation concepts will require further engineering evaluation and review.**

## INFRASTRUCTURE RECOMMENDATIONS

### PHASING

The infrastructure recommendations in this plan have been separated into three phases. The phases represent the recommended chronological order in which the recommendations are to be implemented. The phases are based on the potential ease of implementation for each recommended action.

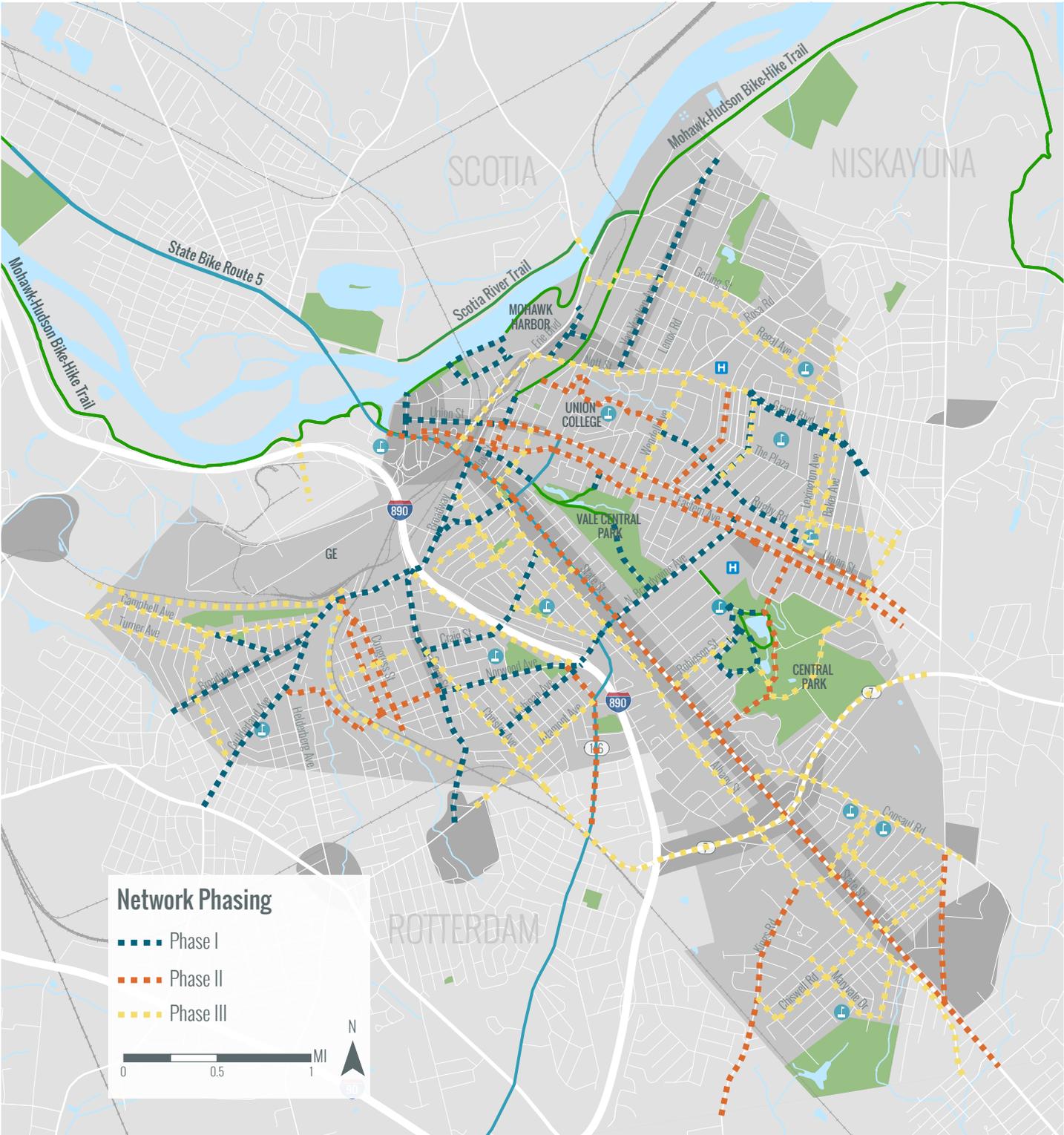
Phase 1 represents the most feasible improvements, policies and programs that can be implemented quickly. These include low cost improvements, improvements with implementation funding secured, and improvements to existing facilities and programs. Some of the facility recommendations are intended initial improvements that could be replaced or supplemented by more robust improvements in phases 2 or 3 as opportunities arise.

Phase 2 represents recommendations that will require further study, are located on streets with more challenges and are in some cases higher cost such as new paths and trails.

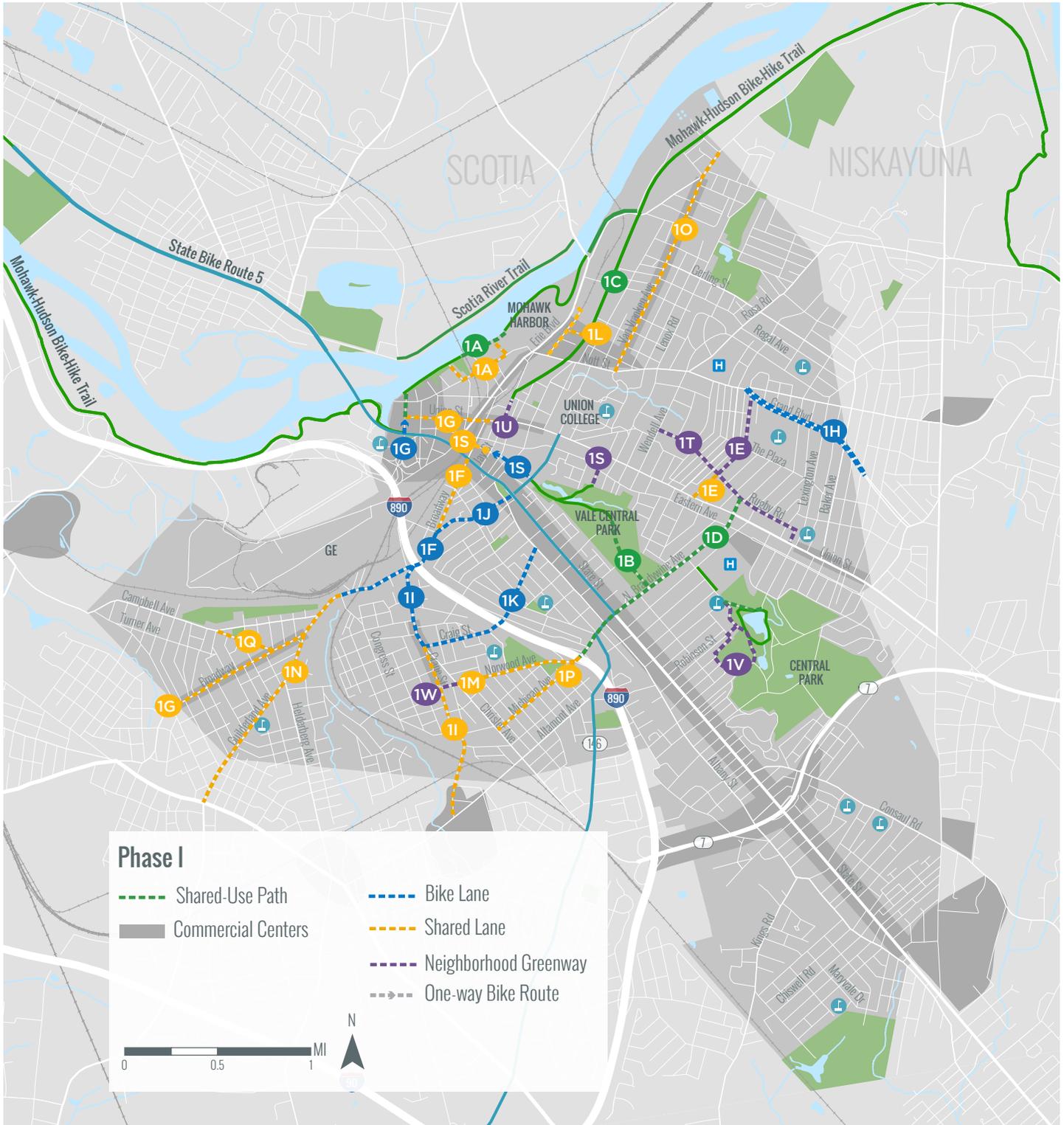
Phase 3 represents longer term recommendations that may require more involved design processes, major roadway reconstruction, may be very high cost or require cooperation with developers, community groups, or other municipalities. A large number of the neighborhood bikeway routes are proposed for Phase 3.

The Bicycle Network Map is a compilation of the existing conditions and the three implementation phases.

# Infrastructure Recommendations by Phases



## Phase I - Infrastructure Recommendations



## PHASE 1

### SHARED-USE PATHS

#### 1A Railroad Bridge

The Riverside Trail runs through Riverfront Park in the Stockade District. This path grants users a comfortable ride through the Stockade area, which connects to the Mohawk Hudson Bike Hike Trail, as well as Downtown. This trail also provides a link to the Mohawk Harbor development and the Mohawk Harbor Trail that is located through the development's campus.

A key piece of the trail that needs to be completed for pedestrians and bicyclists to have safe access to Mohawk Harbor is the railroad bridge section. Before the railroad bridge portion of the trail is opened for use, some improvements shall be implemented to ensure that the trail remains safe and comfortable to both bicyclists and pedestrians. Some residents, trail users, and stakeholders had expressed concerns over the following issues:

- Morning fog often blocks the view in front of trail users making fast bicycling dangerous for all users.
- There is a lack of sight distance around some of the trail's bends due to the presence of trees.
- The path is currently too narrow at certain choke points to meet multi-use path guidelines.

- 1A For further safety measures an alternate on-street route should be designated during construction of the railroad bridge west of Mohawk Harbor. The study to evaluate these alternative route options is currently underway.

#### 1B Vale Park Trail

The Vale Park Trail runs through Vale Park between Nott Terrace and N. Brandywine Avenue. It provides an off-street connection within the bike network through the Vale and Eastern Ave Neighborhood, which has some of the most highly trafficked corridors within Schenectady.

However, it has been noted through public outreach that the trail through Vale Park is secluded and uncomfortable for single bicyclists. It is also a closed trail during evening hours.

In order to improve the bicycle network, it is recommended that wayfinding signage is installed to encourage more bicyclists to use the trail, and it is recommended that the trail is opened during evening hours, with trail lighting installed. Completing the sidepath connection between Vale Park and Central Park will also help increase the trail usage and reduce the secluded feeling of the trail.



## 1C Mohawk Hudson Bike Hike Trail

The Mohawk Hudson Bike Hike Trail is the most prominent trail in the Capital Region. The section within the City of Schenectady is part of other statewide trail systems including the Erie Canalway Trail.

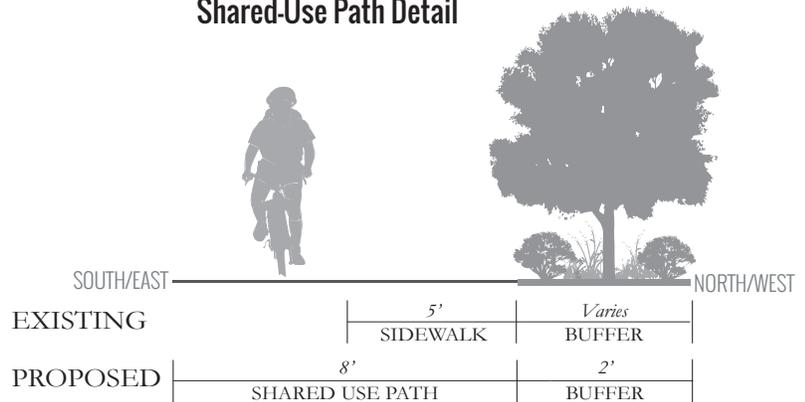
The on-road portions of the trail have various recommended improvements and are listed separately in Phase 1, 2 and 3. In addition to proposed on-street infrastructure, the city should install wayfinding signage throughout Schenectady, particularly in Downtown, at the Amtrak & Greyhound Stations, from Vale Park and around Union College to increase trail visibility.

Additionally, where the trail crosses Nott Street, a pedestrian bridge had provided a separated crossing of the busy street for trail users. This bridge has been removed but the City has received public support for a new bridge to be installed. It is recommended that a new bridge is built and is accessible for both pedestrians and bicyclists.

## 1D Brandywine Avenue

Brandywine Avenue is one of the most trafficked corridors within the City of Schenectady and is the most prominent northeast-southwest bound corridor within the City limits. It is also a crucial piece to connecting Vale Park to Central Park. There are already plans to install a sidepath on N. Brandywine between Bradley Street and Vale Park. It is recommended that this sidepath is extended throughout the corridor and ends at the proposed Rugby Road neighborhood greenway.

### Brandywine Avenue Shared-Use Path Detail



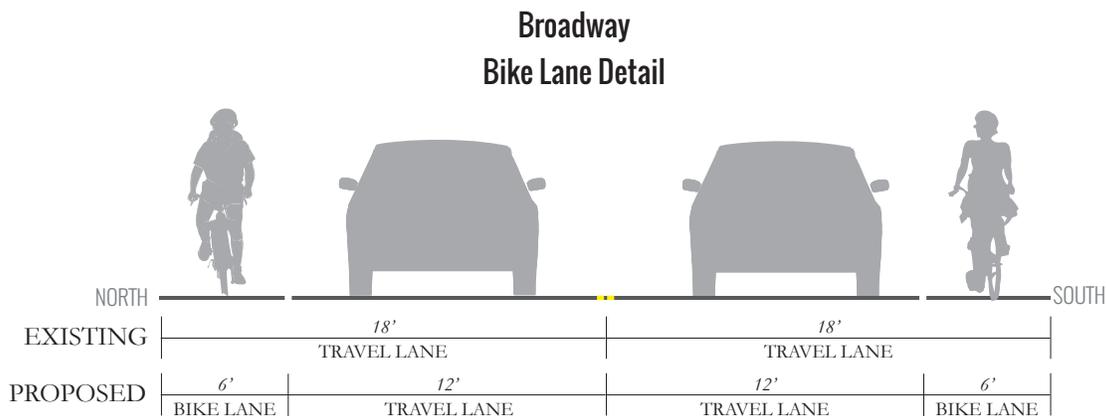
## BIKE LANES

### 1F 1F Broadway

Broadway is one of the farthest reaching thoroughfares in the City of Schenectady. It begins within the downtown core of the City and terminates beyond the City line in the heart of Rotterdam. It passes through the neighborhoods of Downtown, Mont Pleasant, and Bellevue. Many of the other routes mentioned within the bicycle network branch off of Broadway as well.

The highest points of tension along the Broadway Corridor are the underpasses for I-890 and the rail lines. Between these two points, there are also industrial facilities with heavy vehicle traffic and large, empty lots. Climbing bike lanes should be installed on inclines where necessary.

For this corridor, it is recommended that shared lane markings are installed with proper signage. However, for the section of the corridor between Congress Street and Edison Avenue, it is recommended that bike lanes are installed on either side of the corridor in order to provide more comfortable passage through the freeway and rail line underpasses.



## BIKE LANES

### 1G 1G Washington Ave./Union St. On-Street Trail

Washington Avenue from State Street to Union Street and Union Street from Washington Avenue to N. Jay Street are both part of the Mohawk Hudson Bike Hike Trail connection recommended route. They are also considered a part of the City Connector bike network and provide access through the Stockade Neighborhood.

For Washington Avenue, it is recommended that a contra-flow lane be installed. For Union Street, it is recommended that shared lane markings be installed in the center of the travel lanes and curb extensions be installed along the corridor.

### 1H Grand Boulevard

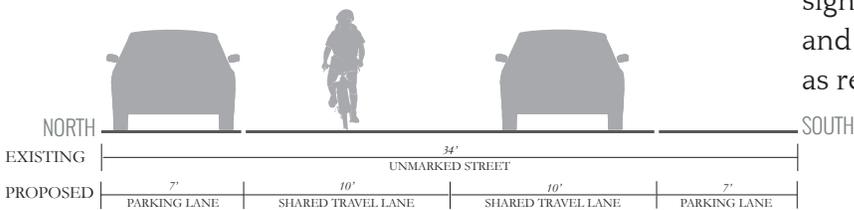
Grand Boulevard is a wide corridor, with wide travel lanes, and a large, landscaped median separating the two directions of travel. The corridor meanders along the northern border of the Union Street Neighborhood. It also provides direct access to Schenectady High School, but is otherwise largely residential.

It is recommended that bike lanes are installed along Grand Boulevard from Nott Street to the City Line. It is also recommended that the City of Schenectady works with Niskayuna to continue the bike lanes east, beyond the City Line.

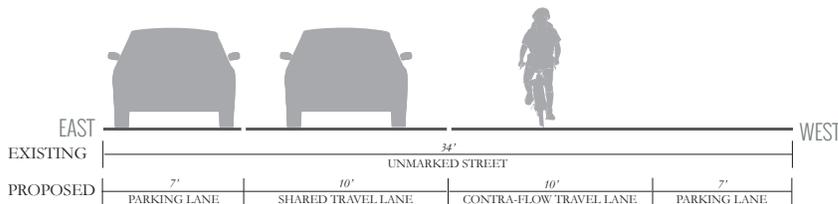
For the bike lanes, it is recommended that green conflict pavement markings are used at intersections that are wider than the average intersection for Grand Boulevard, or where the intersecting streets approach at an angle.

Along Grand Boulevard, striping and wayfinding signage shall point users toward the High School and the neighborhood greenways that it connects to as recommended in the three phases of this plan.

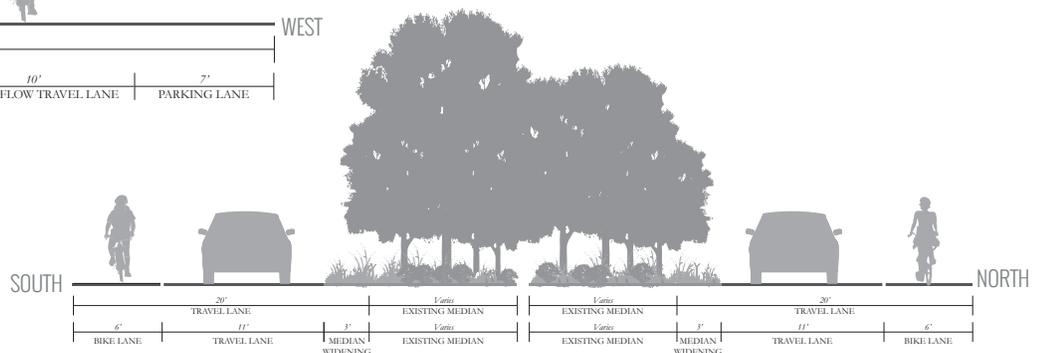
Union St.



Washington St.



Grand Blvd.



\*Parking is only prohibited in the city section

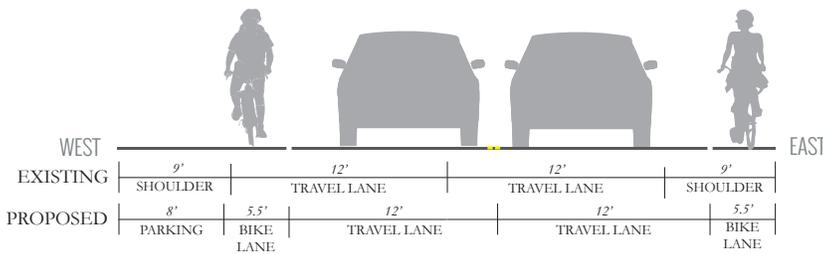
## 1I Crane Street

Crane Street is a thoroughfare in the Mont Pleasant Neighborhood that branches off of Chrisler Avenue and has a mix of commercial and residential uses.

There is on-street parking on the west side of the corridor for the majority of its length. It also has an overcrossing and undercrossing when it meets the rail lines to the south, as it exits the City limits.

The corridor is recommended to have bike lanes in the northern half from Craig St. to Broadway and shared lane markings south of Craig St. leading in both directions. This will allow bicyclists to move away from the 'door zone' of the parked cars and make them more visible to motorists.

### Crane Street (Craig St. to Broadway)

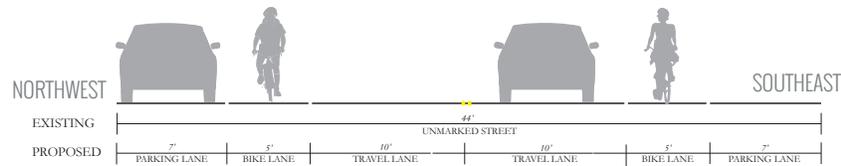


## 1K Main Avenue/Craig Street

Bike lanes along Main Avenue and Craig Street will become the spine of what will be a robust bicycle network through the Hamilton Hill Neighborhood.

The street itself is wide, and traffic calming features shall include chicanes, curb extensions, and other techniques used to narrow the travel lanes. It shall also provide access over Interstate 890, providing Access to the Mont Pleasant Neighborhood and Mont Pleasant Middle School.

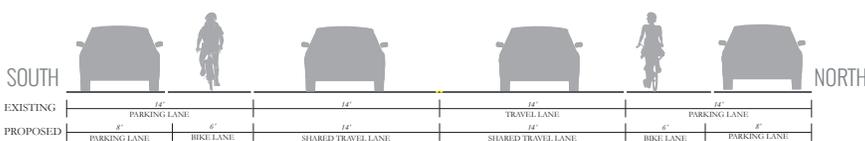
### Main Ave./Craig St.



## 1J Millard Street/Veeder Avenue

Millard Street, which transitions to Veeder Avenue, runs from Broadway to State Street. The corridor varies greatly in width and has a large grade change as it goes up the hill from Broadway. It is recommended that for the entirety of the aforementioned corridor, bike lanes are striped on either side of the street.

### Millard St./Veeder Ave.



## SHARED LANES

### 1L Maxon Road & Peek Street

Maxon Road is a short, low volume road that connects Erie Boulevard to Nott Street on the east side of the rail line that parallels Erie Boulevard. A traffic signal was installed at the Erie Boulevard intersection which provides Maxon Road users controlled access to Erie Boulevard and the Mohawk Harbor development. The rail line underpass near the signal is narrow and reduces the visibility and sight distance of turning vehicles.

It is recommended that Maxon Road is fitted with shared lane markings along its entire stretch. It is also recommended that the underpassing of the rail line be equipped with lighting fixtures to increase visibility of bicyclists and other users during evening hours.

Peek Street is also a short, low volume road with wide right-of-way and wide sidewalks. Shared lane markings may also be extended along Peek Street from Maxon Road to the Mohawk Hudson Bike Hike Trail, providing trail access.

### 1M Norwood Avenue

Norwood Avenue branches off of Michigan Avenue near the Interstate 890 overpass. It continues west until it meets Chrysler Avenue, where it turns into Ostrander Place.

The corridor is primarily residential and Mont Pleasant Middle School is on the north side of Norwood Avenue. During school hours, the speed limit along this corridor is limited to 15 MPH, and with the exception of school drop offs and pickups, the corridor experiences relatively light traffic volumes.

For these reasons, it is recommended that Norwood Avenue is fitted with shared lane markings. This will make the corridor more welcoming to bicyclists and increase the visibility of bicyclists to motorists during the drop off and pickup times for the school.

The shared lane markings shall also be coupled with wayfinding signage that points bicyclists towards the school and other local points of interest.

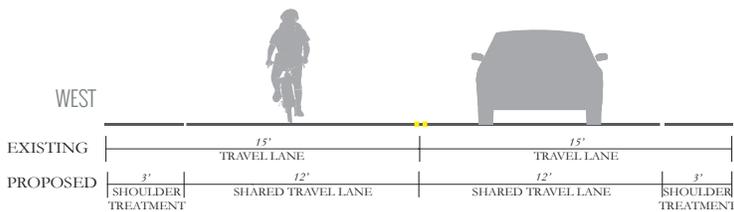


Image of shared lane markings

## 1N Guilderland Avenue

Guilderland Avenue is a corridor that branches off of Broadway and leads to Rotterdam beyond the City line. For this corridor, shared lane markings are recommended with bicycle wayfinding signage. It is also recommended that traffic calming measures, such as curb extensions, are installed along the corridor near the intersections.

Guilderland Ave.

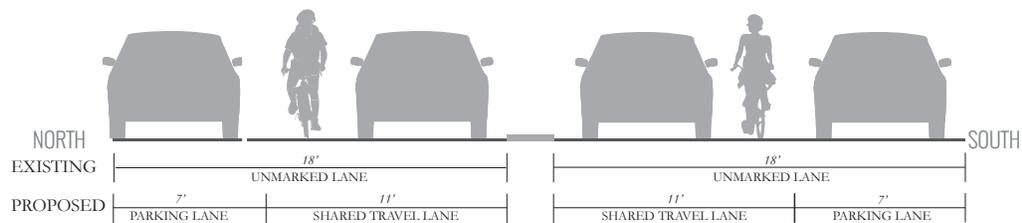


## 1P Michigan Avenue

Michigan Avenue runs from Chrisler Avenue to the I-890 overpass, where it converts to Brandywine Avenue. This makes it a highly traveled route within the Mont Pleasant Neighborhood. This spring, work will begin on a bridge project on Michigan Avenue over I-890. The bridge will include treatment for biking. This project will be consistent with the City of Schenectady and NYSDOT projects.

The corridor is split by a narrow, curbed median that hosts a utility line. It is recommended for this corridor that shared lane markings are installed and curb extensions are placed at the intersections.

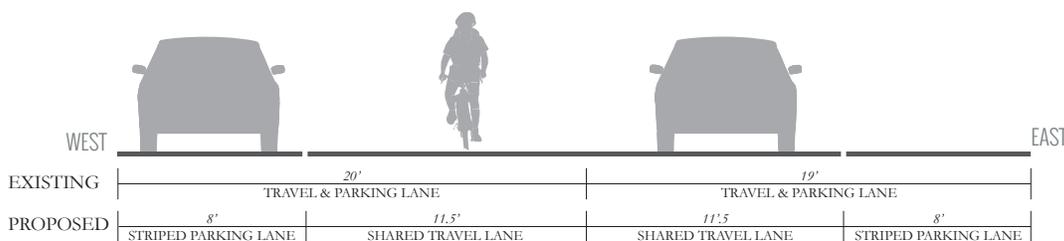
Michigan Ave.



## 1O Van Vranken Avenue

This corridor is a thoroughfare for its neighborhood and CDTA services. For this corridor, it is recommended that shared lane markings be installed in the center of the travel lanes. These markings shall be paired with bike route signage, bicycle warning signage, and bicycle wayfinding signage.

Van Vranken Ave.



## 1Q Fairview Road

Fairview road branches off of Campbell Avenue where Campbell Avenue bends. Fairview continues south for three blocks until it reaches Broadway. It is recommended for this stretch of road, the corridor be striped with shared lane markings in both directions.

### 1S 1S 1S Vale Park Connectors

A mixed bicycle facility recommendation in Schenectady provides a connection between the Downtown Core and Vale Park. The first stretch of bike lane connects the Vale Park trail at Nott Terrace to Broadway, traveling along Franklin Street. This will also provide a connection to City Hall, the Amtrak Station, and the Jay Street Shopping District.

As a part of this bicycle facility, it is recommended that contra-flow facilities are provided for Franklin Street between Broadway and Jay Street, which is currently one-way. It is also recommended that this include a partial closure at Broadway, to ensure motorists do not use the contra-flow facilities. Other traffic calming features shall be implemented throughout the corridor as well.

In addition to Franklin Street, this neighborhood greenway shall include Degraff Street, providing a connection between the Vale Park Trail and Eastern Avenue. This corridor shall also have traffic calming installed along it.

This facility will expand to a network through the downtown area in the subsequent phases.

## NEIGHBORHOOD GREENWAYS

The neighborhood greenways connect residential areas to local destinations, or filter bicyclists to other bike routes that can carry bicyclists farther distances. They consist of low-volume, low speed corridors. They are implemented through the use of multiple traffic calming and traffic diversion installations and they also include signage and shared lane markings.

The first phase of neighborhood greenway implementation involves five connections that provide access to trails and neighborhoods.

Neighborhood greenways shall be uniquely branded according to the neighborhoods and corridors that they are located in, with wayfinding and confirmation signage.

### 1E 1E Waverly Place

Waverly Place connects Union Street and Grand Boulevard. It is also the route that bicyclists will be placed on from Grand Boulevard before the intersection of Grand Boulevard and Nott Street is retrofitted to be more accommodating for bicyclists.

In the short term, traffic calming and wayfinding should be installed along Waverly Place to make it more accommodating to bikes.

### 1T Rugby Road

Another neighborhood greenway is recommended along Rugby Road. This will provide a comfortable route through the mostly residential neighborhood. The route will expand throughout the neighborhood, and provide access to Schenectady High School in the subsequent phases.

It is recommended that this neighborhood greenway includes a neighborhood traffic circle at the intersection of Rugby Road and Parkwood Boulevard, a partial or full closure (to be evaluated in future phasing) at its terminus at Wendell Avenue (see below traffic diverter image), and a connection to Union Street through the alleyway at the southern terminus of Rugby Road.

### 1U Mohawk Hudson Bike Hike Trail - Jay Street

A neighborhood greenway treatment shall be installed along Jay Street from Union Street to the Mohawk Hudson Bike Hike Trail trailhead. This will provide a comfortable connection for the trail.

This includes recommendations for a neighborhood traffic circle at South Avenue in order to slow down traffic along the corridor.



### 1V Central Park Connection

A neighborhood greenway is recommended to create a loop between the park and the adjacent neighborhood, utilizing the loop formed by Central Park Road.

### 1W Ostrander Place

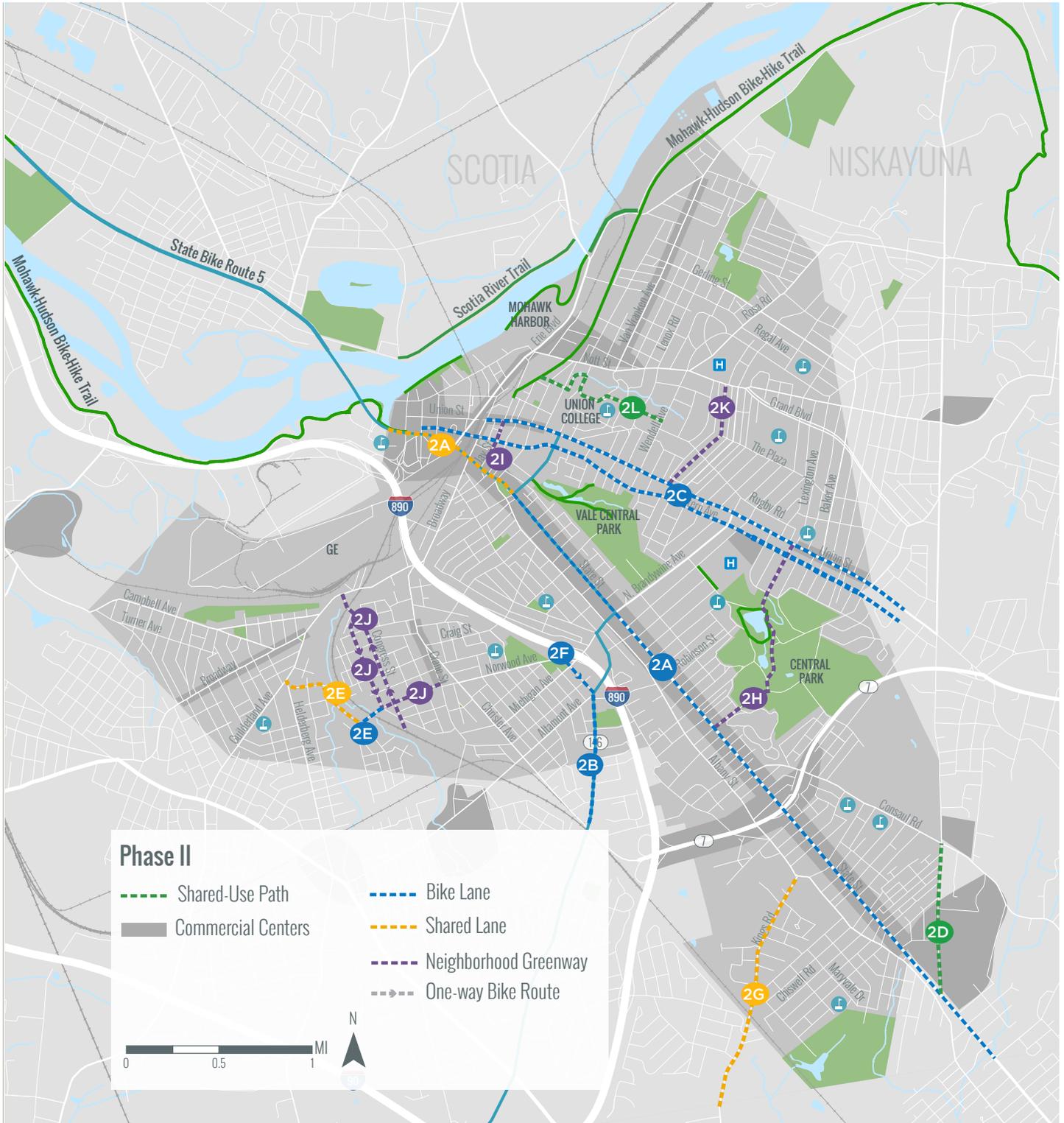
Ostrander Place is a 500 foot corridor that is recommended to be treated as a neighborhood greenway. This corridor, while short, will provide an important connection between the neighborhoods at either side of the corridor, and provide access between Crane Street and Chrysler Avenue.

This shall include the implementation of major street crossing treatments for neighborhood greenways (shared lane markings) at either end of the corridor, and midblock traffic calming.

#### Neighborhood Greenway Traffic Diverter

An example of a neighborhood greenway with a diagonal traffic diverter allowing only bicyclists and pedestrians the ability to travel straight.

## Phase II - Infrastructure Recommendations



# PHASE 2

## SHARED USE PATHS

### 2L Union College Trail

It is recommended that the City of Schenectady work with Union College, which owns all of the streets within its campus, to identify a bicycle route through the campus that can be open to the public and connects to the City's bicycle infrastructure network.

On the recommendations map for Phase 1, a route is proposed, utilizing existing paths through the College. However, it is recommended that the College weigh in on the possibility of such a route and offer guidance on its alignment.

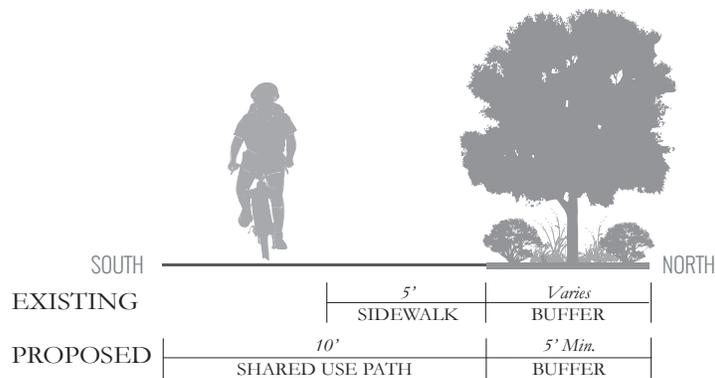
The route, when chosen, shall include branded signage endorsed by the City and the College, and an agreement shall be made between the two entities regarding the route's maintenance.

### 2D Balltown Road Sidepath

Balltown Road is a major thoroughfare on the outskirts of the City. It defines some of the eastern edge of the City and provides a connection to major shopping centers.

From Consaul Road to State Street, there are large building setbacks and tracts of empty land to the east of Balltown Road. It is recommended that a multi-use sidepath be installed on this side of the corridor between these two intersections. The path shall be placed in the unpaved separation between parking lots and the corridor when applicable, and should have landscaping separating it from Balltown Road.

### BALLTOWN ROAD SIDEPATH



## BIKE LANES

### 2A 2A State Street

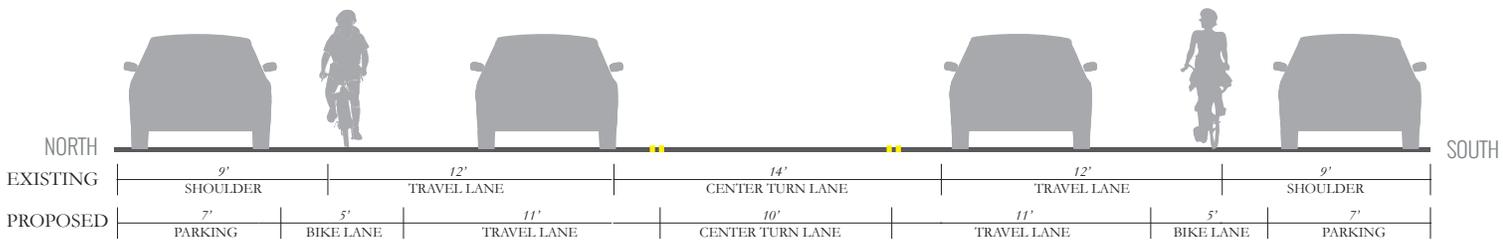
State Street is the spine of the City and the main connection between Schenectady and Albany. The shared use path on the Western Gateway Bridge to the northern end of the corridor also provides a connection for bicyclists to Scotia. It is one of the busiest corridors in Schenectady, and has various streetscapes that change based upon their surroundings. It cuts through the downtown core of the City, and also carries one of CDTA's BusPlus BRT lines. On its southern edge, the corridor is filled with large commercial lots with large setbacks and parking lots.

It is recommended that the parking lane be narrowed to 7', that the travel lanes be narrowed to 11' and the center turn lane be narrowed to 10'. This will allow for the installation of bike lanes from Veeder Street to the City line. Through downtown, from Veeder Street to the Western gateway bridge, shared lane markings are recommended with wayfinding signage and intersection markings.

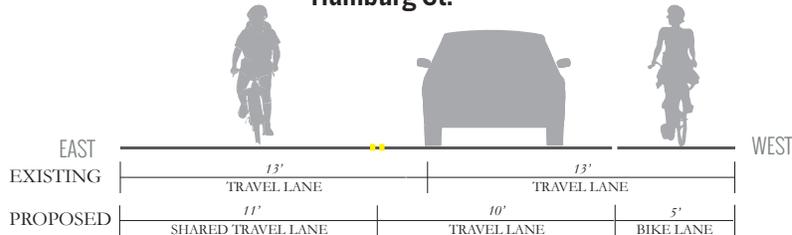
### 2B Hamburg Street (Route 146)

Hamburg Street is a narrow thoroughfare that sees high volumes of traffic, high speeds, and provides a direct route to Rotterdam. Considering the narrow width of the pavement along the street, it is recommended that in the short term, a bike lane is installed and the travel lanes are narrowed. Given the curvature of the road and its effects on sight distance, it is recommended that the bike lane is installed on the southbound side of the corridor. Shared lane markings shall be installed on the northbound travel lane.

State St. from Veeder St. to Niskayuna town line



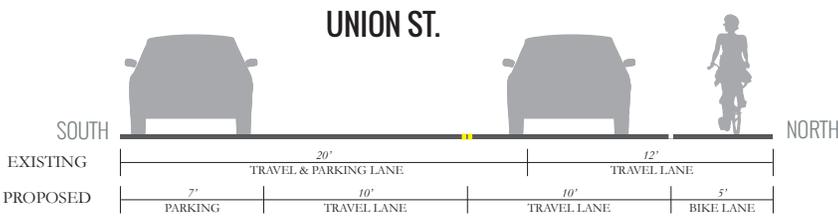
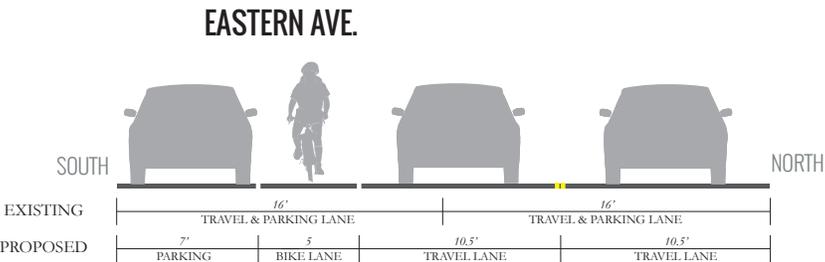
Hamburg St.



## 2C Union Street/Eastern Avenue/Liberty Street

Union Street and Eastern Avenue/Liberty Street are used as a pair in the bicycle network. They are both regional connectors, leading out of the City towards Niskayuna, and are both highly trafficked corridors for motor vehicle traffic within the City. They both have on-street parking and Union Street carries a CDTA bus route. They both also have large changes in elevation from the downtown core to the City line. Due to the curving path of the corridor, Eastern Avenue has a gentler grade.

It is recommended that for these corridors, Union Street be fitted for a bike lane leading westbound and downhill, and a buffered bike lane be installed on Eastern Avenue in the eastbound direction as a bicycle climbing lane.



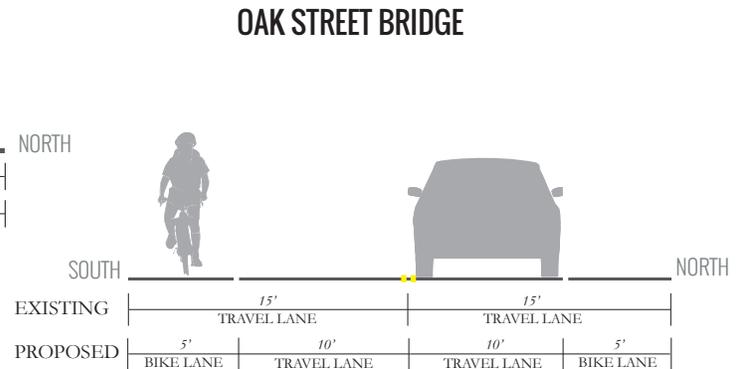
## SHARED LANES/BIKE LANES

### 2E 2E Oak Street Bridge/Cheltingham Ave/Osterlitz Ave

The Oak Street Bridge is a low volume rail overpass with wide lanes. It bridges the gap between the Mont Pleasant and Bellevue Neighborhoods.

The connection currently is not very comfortable for bicyclists, due to the change in grade, lack of shoulder, and protruding guide rails on the edges of pavement. In order to improve this crossing, it is recommended that the street be fitted with shared lane markings in the centers of each travel lane. This will help encourage bicyclists to move away from the guide rails and discourage bicyclists from riding on the narrow sidewalks.

For better connection to Bellevue neighborhood, the recommendation is to add shared lane markings to Cheltingham Avenue and Osterlitz Avenue.



## 2F California Avenue

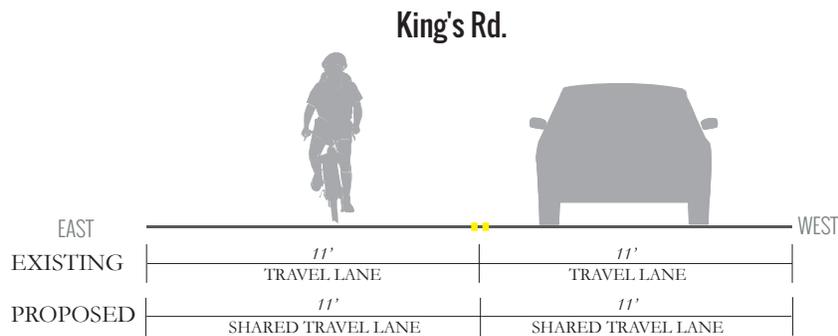
California Avenue is a one-way, southbound corridor leading between Michigan Avenue to Altamont Avenue in the Mont Pleasant Neighborhood. It also provides a connection to the Mont Pleasant Middle School sports facilities.

It is recommended that this street have a contra-flow bike lane installed on the east side of the corridor, moving the on-street parking to the west side. It is also recommended that the one-way travel lane be equipped with shared lane marking in its center.

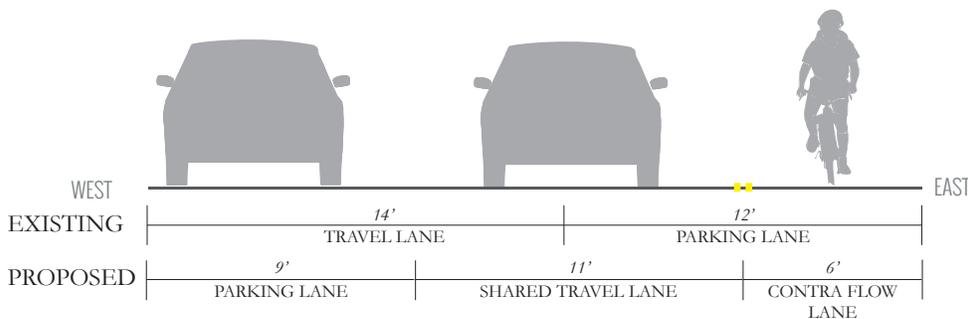
These improvements will provide two way travel for bicyclists in the constrained conditions of the narrow roadway.

## 2G Kings Road

Kings Road is a regional connection from Schenectady to Rotterdam. It is a 30 mph corridor with a mix of residential, commercial, and industrial uses. The narrow right-of-way, which ranges from 22 feet to 26 feet, does not allow space for dedicated bicycle facilities. In order to make this corridor more comfortable for bicyclists, it is recommended that shared lane markings be installed along the corridor with signage. A roundabout is recommended as part of Phase 3.



## California Ave.



## NEIGHBORHOOD GREENWAYS

The neighborhood greenways connect residential areas to local destinations, or filter bicyclists to other bike routes that can carry bicyclists farther distances. They consist of low-volume, low speed corridors. They are implemented through the use of multiple traffic calming and traffic diversion installations and they also include signage and shared lane markings.

Phase two of the development of the neighborhood greenway network throughout the City of Schenectady builds off of the initial networks started in Phase 1, as well as through the introduction of new networks.

### 2H Central Park Through Route: Wright Ave/ Iroquois Way/Fehr Ave

Building from the Central Park neighborhood greenway connection recommended in Phase 1, a shared route through the park, connecting Union Street and State Street is proposed. It will use Fehr Avenue, Iroquois Way, and Wright Avenue. Connection to the neighborhood greenway in phase 1 will be made through the paths in the park. Traffic calming such as chicanes and plantings shall place specific emphasis on slowing down vehicles coming around curves in the park.

### 2I Jay Street

The Jay Street connection for Phase 2 is recommended between Union Street and Franklin Street, connecting the neighborhood greenways on Jay Street north of Union Street, and on Franklin Street, both recommended in Phase 1. This shall be a northbound connection, or shall involve the installation of a contra-flow facility for bicyclists. The City of Schenectady should explore options to allow bike accommodations on the pedestrian plaza.

### 2J Congress Street/Cutler Street/8th Street

Connecting to the Ostrander Place neighborhood greenway recommended in Phase 1, this neighborhood greenway provides a grid through the western half of the Mont Pleasant Neighborhood. It shall use 8th Ave to connect to Ostrander Place, and use Congress Street as a northbound route, and Cutler Street as its southbound route. It will also provide a connection over the rail lines to the north, connecting to Broadway.

### 2K Glenwood Boulevard

It is recommended that neighborhood greenway treatments are installed along Glenwood Boulevard. This will provide a comfortable facility between Union Street and Nott Street. It will also connect to the neighborhood greenway established on Rugby Road in Phase 1, providing a north and south route for bicyclists on Rugby Road.



**Neighborhood Greenway**  
An example of a neighborhood greenway on a low-volume, urban corridor with on street parking and a striped centerline



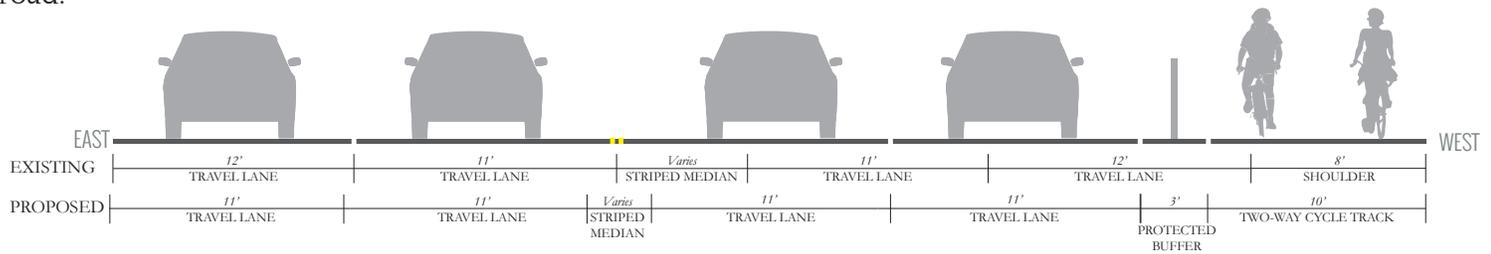
## PHASE 3

### CYCLE TRACK

#### 3A Erie Boulevard

Erie Boulevard is one of the most heavily trafficked corridors within the City. It is recommended that Erie Boulevard is treated with a two-way cycle track from State Street to Nott Street. A cycle track on Erie Blvd. is a long term option to be considered when reconstruction or major paving work is done on the road.

Erie Blvd.  
from State St. to Nott St.

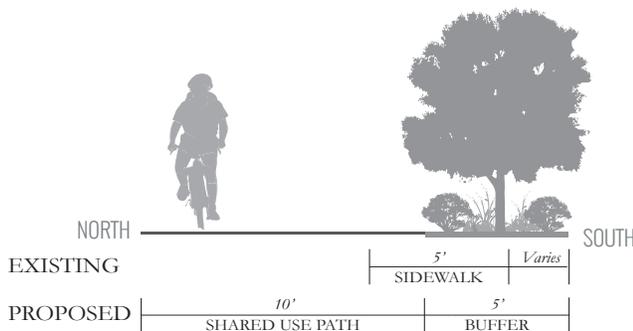


### SHARED USE PATHS

#### 3B Campbell Avenue

Campbell Avenue branches off of Broadway and leads to Rotterdam. It also connects to I-890 and Rotterdam Square Mall. It is recommended that for this corridor, the northern sidewalk be expanded into a shared use path, utilizing the excess of the city's unpaved right of way. The right of way is 70 feet to 80 feet, permitting plenty of room for sidewalk expansion or a sidepath.

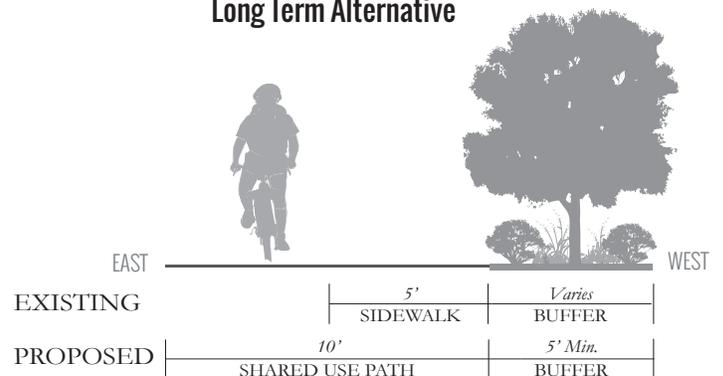
Campbell Ave.



#### 3C Waverly Place

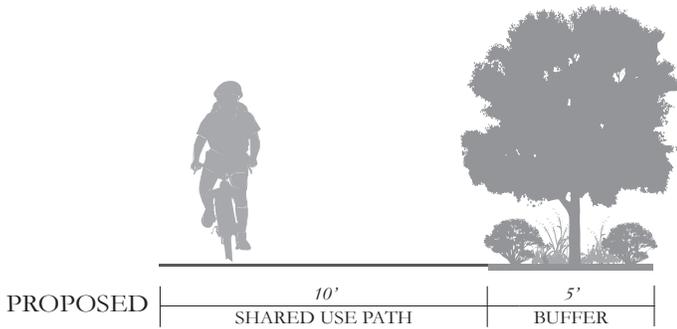
Waverly Place connects Union Street and Grand Boulevard. The corridor has a wide right of way, with more than half of it not a part of the paved street. As a long term alternative, it is recommended that the sidewalk on the east side is converted to a 10-foot sidepath. High visibility crosswalks should be installed at the path's street crossings.

Waverly Place  
Long Term Alternative



### 3L Consaul Road

Consaul Road is a curved corridor that connects to State Street, Crosstown Connection, and Balltown Road before continuing south beyond the City line. It is recommended that a shared use path be installed on the north side of the corridor. Installing on the north side will require fewer roadway crossings, and will reduce cost by not requiring the removal of the sidewalk on the southern side of the corridor.



### 3M Cross-Town Connection Sidepath

The Crosstown Connection is the segment of Route 7 that runs through the City of Schenectady. It is a high speed corridor with four travel lanes and a wide median. For this corridor, between Interstate 890 and the City line, it is recommended that a sidepath be installed. Due to the high speeds and nature of the corridor, it is recommended that the path be situated 15 to 20 feet from the edge of pavement when possible. This will draw it away from the intimidating roadway and closer to the tree line that follows a large portion of the corridor.

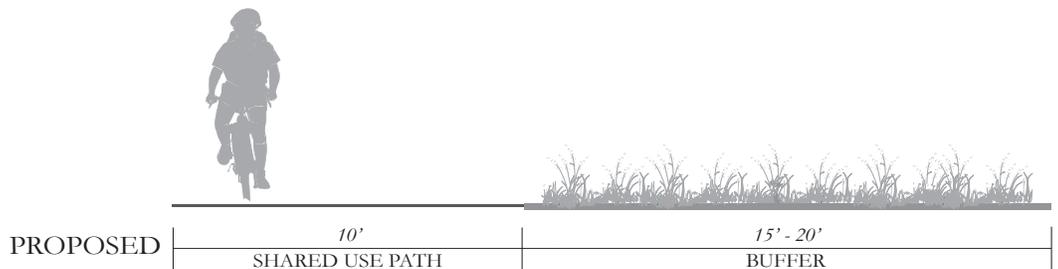
Pedestrians and cyclists are currently prohibited from the Route 7 right of way, since it is classified as a Principle Arterial Expressway. There are procedural ways of getting around the classification to add a sidewalk or shared-use path. The shared use path will also require a Highway Work Permit and possibly a Use and Occupancy Permit. All of this is applicable for any portion of the shared use path that falls within the right of way for Route 7 where Route 7 is classified as a Principle Arterial Expressway.

### 3AA Freeman's Bridge Path

As of June 2017, potential improvements to Freeman's Bridge are being explored as part of a linkage study conducted by the CDTC. While the final recommendation has not been determined at this time, a shared use path across this bridge would connect the Scotia River Trail to the Mohawk-Hudson Bike-Hike Trail.

### 3Z Stub Under Path

A shared-use path connecting the Mohawk-Hudson Bike-Hike Trail to the General Electric campus is recommended beneath I-890.



### 3N I-890 Corridor Trail

Along high-speed freeways, such as I-890 in Schenectady, bicycle facilities cannot be provided on street. The FHWA prohibits it and the vehicles are traveling too quickly to create safe conditions for bicyclists. As such, it is recommended that I-890 be paired with an off-street trail facility that runs on the western side of the corridor from Broadway and Crane Street to the overpass at Michigan Avenue.

A regional example of such a trail that has proven to provide great access and encourage bicycling is the Mohawk Hudson Bike Hike Trail along I-787, which is used as a commuting route between Albany and Troy.

Installing this trail will allow bicyclists to utilize the corridors and provide a separated facility with minimal street crossings. It will also provide access to Mont Pleasant Middle School.

In the long term, it is recommended that the City install a trail along both sides of the corridor, to allow access from neighborhoods on either side.

If this trail falls within the right of way for I-890, it will require all of the various procedures previously mentioned for Route 7 and the other NYSDOT owned facilities.



Example of Sidepath

Installing trails along rail lines is a popular option for many communities. The rail corridors tend to be cleared and leveled already, making construction simpler. Two locations have been identified within the City of Schenectady for installing rail trails.

### 3O Lower Broadway Rail Trail

The second identified location for a rail-with-trail would begin near the intersection of Broadway and Congress Street, near the rail-line overpass. It would follow the rail line on its western side and terminate at Crane St. This trail would provide an off-street connection between the Mont Pleasant and Bellevue neighborhoods.

### 3P Bellevue Rail Trail

The first location for a rail-with-trail in Schenectady exists from Grand Street, following the rail line to the north, terminating at West Campbell Road. This will provide an off-street connection that can be continued along the utility line through Rotterdam, and will also provide a connection to Hillhurst Park.



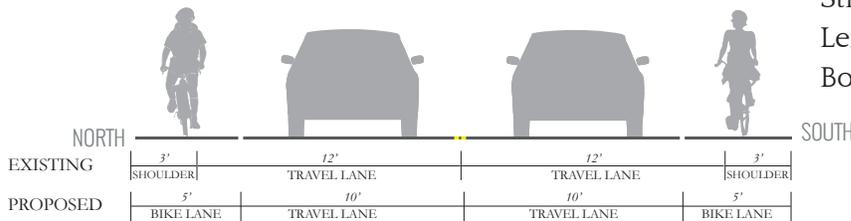
Potential Rail to Trail Corridor

## BIKE LANES

### 3D Altamont Avenue

Altamont Avenue is a major thoroughfare and commercial corridor for the Bellevue Neighborhood in Schenectady. In order to open up bicycle access along this corridor, it is recommended that the corridor be equipped with bike lanes in both directions of travel. Special consideration should be given to conflict areas caused by commercial curb cuts.

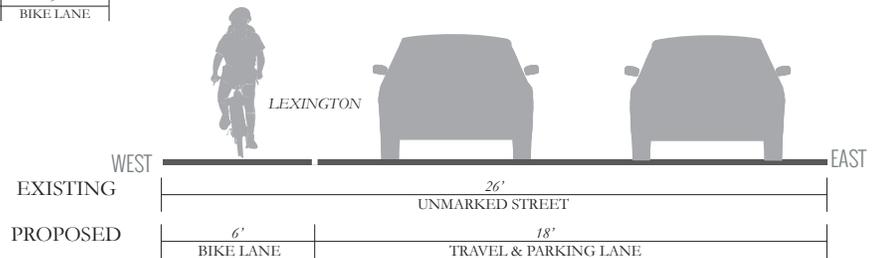
#### Altamont Ave



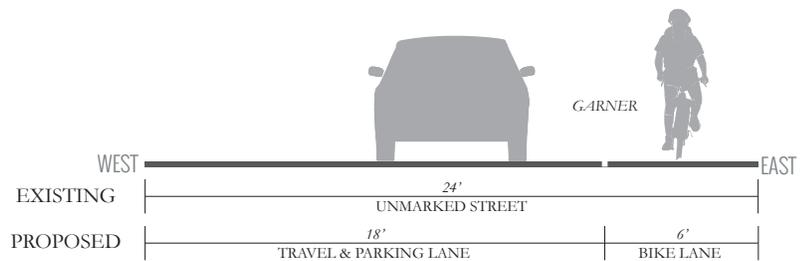
### 3E Lexington Avenue/Garner Avenue

Lexington Avenue and Garner Avenue are paired recommendations, with Lexington Avenue providing southbound travel and Garner Avenue providing northbound travel for bicyclists. They provide a connection between Union Street, Grand Boulevard, and Nott Street. It is recommended that a bike lane be added to each street in the aforementioned direction of travel. The corridors should be converted to one-way travel for motor vehicle traffic, with vehicles traveling in the same direction as bicyclists. The blocks from Union Street to Plum Street are already one-way streets in these directions. Parking will remain on the opposite side of the street from the bike lane. North of Plum Street, bike lanes are provided in both directions on Lexington Avenue, providing a connection to Grand Boulevard.

#### Lexington Ave



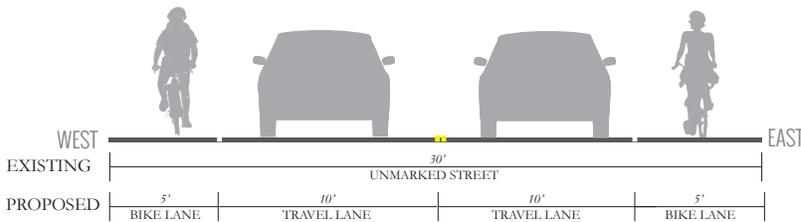
#### Garner Ave



### 3F Wendell Avenue

Wendell Avenue is a corridor that runs through the western edge of the Union Street Neighborhood and the center of the Northside Neighborhood. The corridor is a boulevard with a large median and wide travel lanes. From Nott Street to Union Street, the corridor narrows and does not have a median. There is also a short stretch of the street that is one-way between Oxford Place and Union Avenue on Sundays from 9 AM to 1 PM. For this corridor, bike lanes are recommended for both directions. Additionally, bicycles should be exempt from the one-way rule and "EXCEPT BIKES" plaques shall be placed below the "DO NOT ENTER" signs.

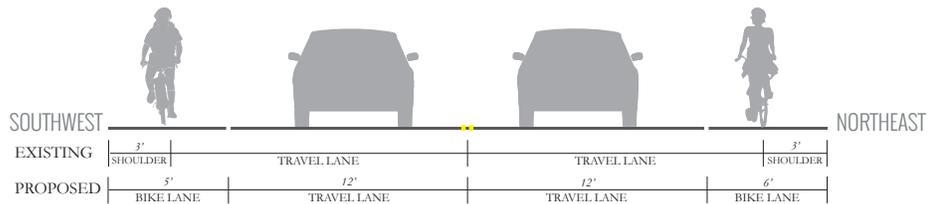
Wendell Ave



### 3G Chrisler Avenue

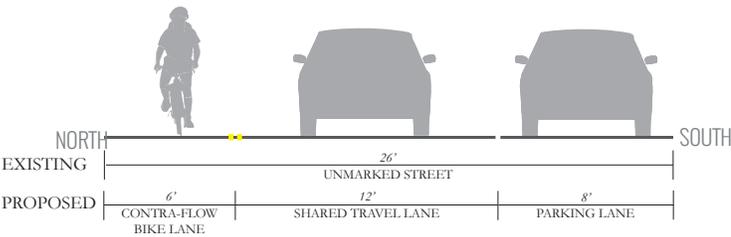
Chrisler Avenue is a corridor that starts in the Mont Pleasant Neighborhood in Schenectady. It is a mixed use corridor, with varying businesses and residents along its stretch. Chrisler Avenue receives heavy traffic and high speeds, despite its speed limit of 30 MPH. For this corridor, it is recommended that Chrisler Avenue be fitted with a bike lane on both sides when on-street parking is not present, and a southbound bike lane when on-street parking must be provided. This project should be coordinated with the Town of Rotterdam.

Chrisler Ave



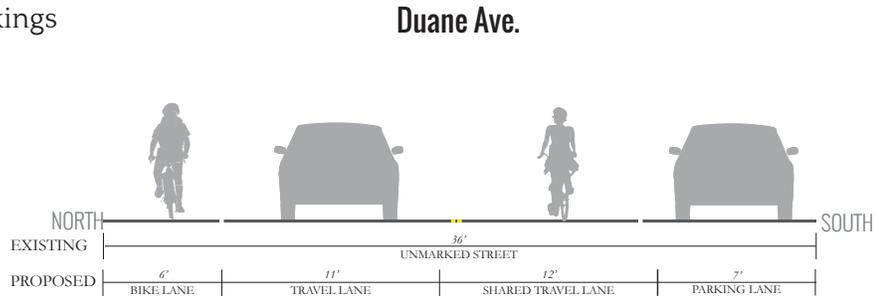
### 3H Stueben Street

Stueben Street, from Delamont Avenue to Duane Avenue is dedicated as the connection between the two spines of the Hamilton Hill Neighborhood. It is a one way street adjacent to Martin Luther King Elementary School and Schenectady Park. For this stretch of the corridor, it is recommended that a contra-flow bike lane be installed on the north side of the street and parking be restricted to the south side. The travel lane shall have shared lane markings installed at the center of it.



### 3I Duane Avenue

Duane Avenue is a wide, unmarked corridor that connects to Brandywine Avenue. For this corridor, it is recommended that a bike lane be installed on the north side of the street and shared lane markings installed on the southern travel lane.



## SHARED LANES

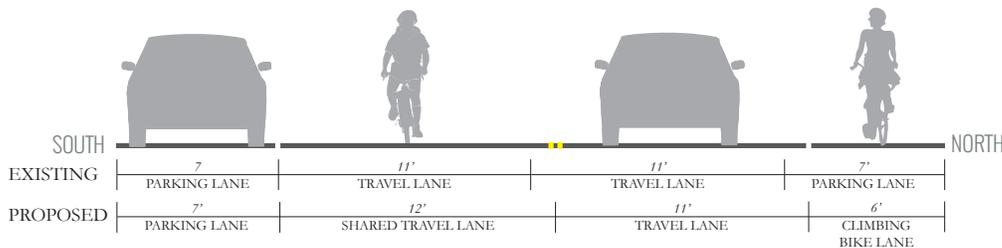
### 3K Nott Street

Nott Street is one of the more heavily trafficked east-west thoroughfares within the City. It also has large grade changes and several intersections that are difficult to navigate for bicyclists. For this corridor, it is recommended that a bicycle climbing lane be installed from the Mohawk-Hudson Bike-Hike Trail to Lowell Road. Parking should be limited to the downhill side of the corridor when a lane is required to be removed, but when there is parking on the uphill side, the bike lane shall have a buffer zone on the parking side to remove bicyclists from the door zone.

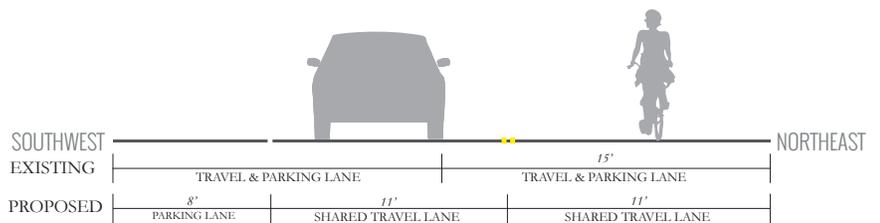
### 3J Albany Street

Albany Street runs parallel to State Street. It is largely a residential corridor. However, it is a thoroughfare for the City and has high speeds and high traffic volumes. In order to improve this corridor for bicycle comfort and safety, it is recommended that shared lane markings be installed along the corridor, along with traffic calming measures, such as mini traffic circles, curb extensions, and textured shoulders.

#### Nott St.



#### Albany St.



## NEIGHBORHOOD GREENWAYS

The neighborhood greenways connect residential areas to local destinations, or filter bicyclists to other bike routes that can carry bicyclists farther distances. They consist of low-volume, low speed corridors. They are implemented through the use of multiple traffic calming and traffic diversion installations and they also include signage and shared lane markings.

The third phase of neighborhood greenways complete the grids and loops of the proposed networks that have been developed through phases 1 and 2. While these are the final phase of recommendations in this plan for neighborhood greenways, the City of Schenectady is recommended to continue to develop networks of neighborhood greenways throughout the City.

### 3Q **Downtown: Lafayette Street**

In order to provide more access through neighborhood greenways within the Downtown area, it is recommended that the network expand along Lafayette Street. It will connect with the neighborhood greenway corridors recommended in Phases 1 and 2 at Franklin Street.

### 3R **Hamilton Hill & Mont Pleasant: Delamont Avenue/ Summit Avenue/ Schenectady Street/ Van Voast Street/ Santa Fe Street**

Building off of the bike lanes and traffic calming features proposed for Craig Street in Phase 1, it is recommended that a network of neighborhood greenways expands north through the neighborhood to Broadway. Corridors may include Delamont Avenue, Summit Avenue, Schenectady Street, and Van Voast Street.

In order to provide a route south in Mont Pleasant, it is recommended that Santa Fe Street also be added to this neighborhood greenway network.

### 3S **Bellevue: Turner Ave/ Eleanor St/ Cleveland Ave**

Bellevue is the westernmost neighborhood in Schenectady. It is recommended that a neighborhood greenway be implemented in the neighborhood along Turner Avenue, Eleanor Street, and Cleveland Avenue, with special consideration given to the crossing at Broadway.

### 3T **Woodlawn: Chiswell St/ Maryvale Dr/ Clement Ave/ Lorraine Ave/ Van Dyke St/ Croner Ave**

Woodlawn is the southernmost neighborhood in Schenectady and is divided by State Street. It is recommended that a neighborhood greenway network be implemented in this neighborhood, given special considerations for crossing both State Street and Albany Street, and have spines stretching into the neighborhoods to the north and south. The suggested north/south routes are Chiswell Street, Clement Avenue, and Lorraine Street. The suggested east/west routes are Maryvale Drive and Van Dyke Street. There is an opportunity for future access to the Woodlawn Preserve on Maryvale Drive and the City should consider installing bicycle parking at this location for hiking access to the preserve.

### 3U **Central Park: Robinson St/ Duck Pond Dr/ Fehr Ave/ Elbert St**

It is recommended that the Central Park neighborhood greenway network established in phases 1 and 2 be expanded along Robinson Street, Duck Pond Drive, and Fehr Avenue. The Fehr Avenue connection would cross Albany Street at Elbert Street. This will provide more connections between the park and the surrounding neighborhoods.

### 3V Morningside Ave/Plum St/Palmer Ave

In order to expand the neighborhood greenways established in phase 1 with Rugby Road as its main spine, it is recommended that the facility reach east, along Morningside Avenue, Plum Street, and Palmer Avenue. The City should coordinate with Niskayuna in order to continue this neighborhood greenway even farther east.

### 3W Northside: Regal Ave/Raymond St/ Lancaster St/McClellan St/Manhattan St

Northside is the northernmost neighborhood in Schenectady. It is recommended that a neighborhood greenway network be established with Regal Avenue and Raymond Street as the primary east/west spine, with routes branching off to the north and south. Potential routes highlighted are Lancaster Street and McClellan Street. This will also provide a connection to the Jessie T Zoller Elementary School. Manhattan Street adds a connection to the Mohawk Hudson Bike-Hike Trail.

It is recommended that special consideration be given to the crossing of Rosa Road in the design phase of this network.

### 3X Seneca Street

It is recommended that Seneca Street between the Mohawk Hudson Bike Hike Trail be converted to a neighborhood greenway. This will provide a connection between the trail and the newly developed Mohawk Harbor and riverfront. Special consideration should be given to the crossing at Erie Boulevard at the terminus of this facility and the at-grade rail crossing.

### 3Y 5th Street

It is recommended that 5th Street would connect onto Main Street and Craig Street and into downtown, adding an east/west connector boulevard from Congress Street and Cutler Street's neighborhood greenway.



#### Neighborhood Greenway

An example for a neighborhood greenway along a residential corridor.



## WAYFINDING RECOMMENDATION LOCATIONS

The map on the following page identifies the recommended locations for bicycle related signage. There are four kinds of identified bicycle related signage categories identified within the map. They include:

- Mohawk Hudson Bike Hike Trail Signage (route based)
- Bike Route Signage (route based)
- Neighborhood Greenway Signage (route based)
- Information Kiosk (location based)

### MHBH TRAIL SIGNAGE

Considering the significance of the Mohawk Hudson Bike Hike Trail for the City and the region, it is recommended that special attention be given to installing easily recognizable wayfinding signage for bicycle routes that are part of the Mohawk Hudson Bike Hike trail.

Attempts should be made to coordinate with other municipalities that the Mohawk Hudson Bike Hike Trail runs through, the CDTA, and the New York State Canal Corporation to ensure that the wayfinding signage associated with the trail within Schenectady can be associated with the signage for the rest of the trail. The signage within Schenectady may have its own unique markers to help trail users identify that they are in Schenectady.

For the onstreet section of the trail, it is recommended that the streets' sign blades are retrofitted to indicate that it is a bicycle route, in addition to the bike route signage and trail wayfinding signage.

## BIKE ROUTE AND NEIGHBORHOOD GREENWAY SIGNAGE

For the neighborhood greenways, neighborhood greenway signage should be installed throughout each designated corridor that they incorporate. This should include confirmation signs and turn signs. They should all be branded to their unique neighborhood greenway network to indicate to the users which route they are on. Wayfinding signage should point users to local, neighborhood destinations, such as schools, shopping areas, and parks.

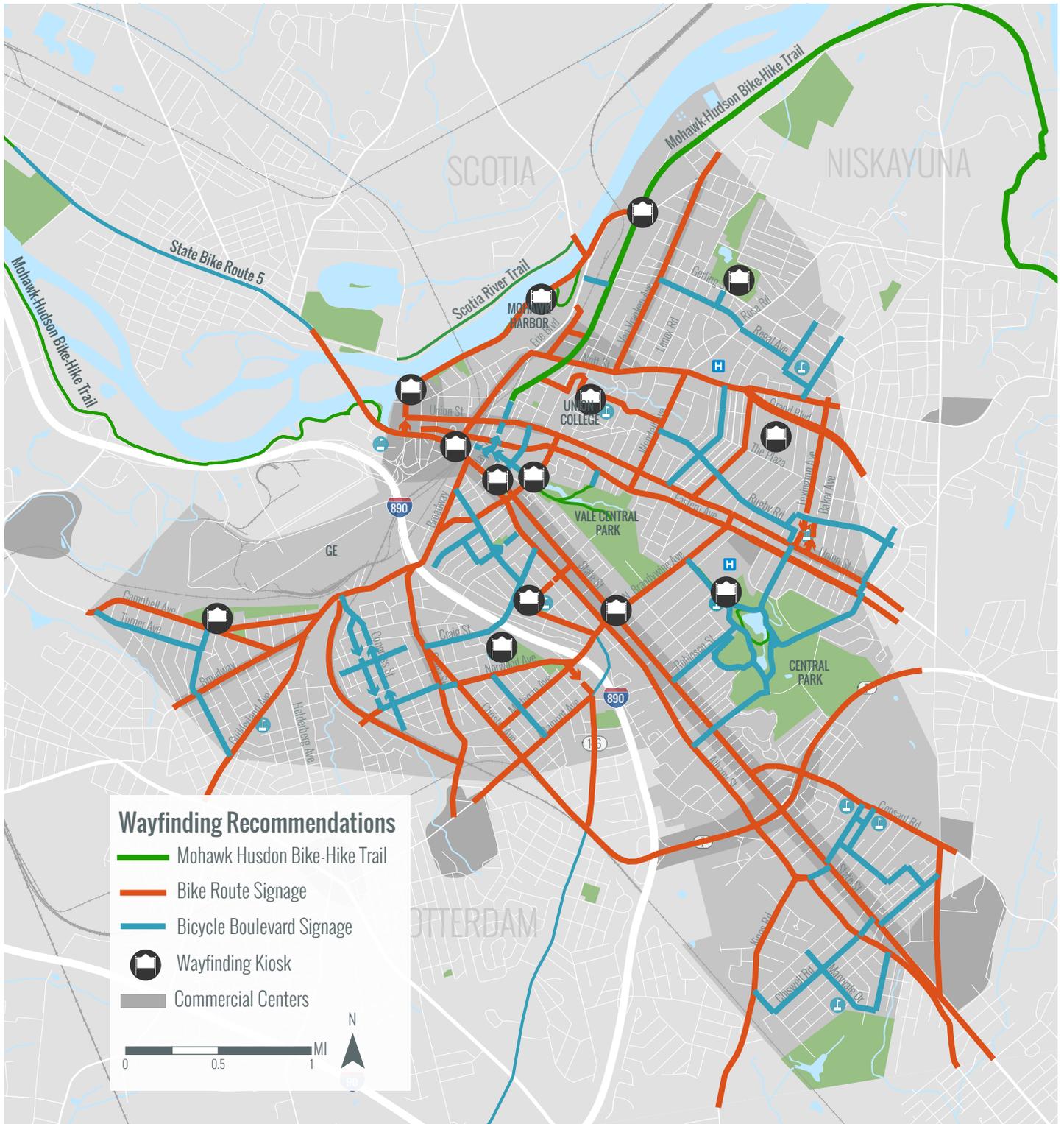
For the remaining recommended bicycle routes, bike route signage shall be installed along the corridor. In addition, bicycle wayfinding signage may be installed at the discretion of engineering judgment throughout these corridors.

### WAYFINDING & INFORMATION KIOSKS

Wayfinding and information kiosks are recommended for the following locations within the City of Schenectady:

- Steinmetz Park
- Mohawk Harbor Development
- Riverside Park
- Union College Campus
- Schenectady High School
- Veteran's Park
- Vale Park, Nott Terrace Entrance
- State Street at N. Brandywine Street
- Central Park, Elm Street Entrance
- Hillhurst Park
- Forest Road Elementary (Pleasant Valley Park)
- Martin Luther King Magnet Elementary
- State/Erie
- Maxon Rd Ext/MHBHT

## Wayfinding & Signage Recommendations



## POLICY RECOMMENDATIONS

### PHASE 1

#### Adopt Plan

Adopt this bicycle infrastructure master plan to allow the City to move forward with implementing the identified improvements, programs, policies, and methodologies that the plan outlines. Adopting this plan will make the policies and programs an official part of the City of Schenectady's set of policies and provide the means to start moving forward. (See Appendix D page D-11).

#### Adopting NACTO Design Guidelines

Adopt the policies incorporated within the NACTO Urban Bikeway Design Guide. The Urban Streets Design Guide can be an authoritative standard for street planning and design within the City. Or the City can develop their own design guides that will meet the specific needs of the community but are still based upon the NACTO Urban Street Design Guide. (See Appendix D page D-9).

#### Contra-Flow Policy

Adopt a policy into the City Code that specifically calls out contra-flow bike lane installations. As it stands, the City of Schenectady's codes and policies are vague about the implementation of contra-flow lanes. Contra-flow lanes are a great resource for the City's bicycle network, allowing connections to be made across the barriers that one-way streets create. (See Appendix D page D-11).

#### Complete Streets and Safe Routes to School Committee

Establish a committee to oversee the development of complete streets and the safe routes to school program within the City of Schenectady. (See Appendix D pages D-9 and D-12).

#### Park Path Policy

Adopt a policy into the City Code that opens access of park pathways to bicyclists. The current codes for the City of Schenectady prohibit bicycle use of paths and trails within the parks in the City. This greatly inhibits the ability for bicyclists to travel to and through the parks, which generally offer much greater comfort than street riding. However, the issue of pedestrian comfort and safety arises when discussing the opening up of paths to bicyclists. (See Appendix D page D-11).

#### Complete Streets Law

Adopt a law requiring the development of complete streets. A complete streets law will require new development within the City's limits to assess the impact that the development will have to all modes of travel and identify the need in the area for alternative modes of travel. (See Appendix D page D-12).

#### Union College Campus Plan

Work with Union College to develop a campus bicycle master plan. Campus master plans help colleges and other institutions establish priority projects for improving the lives of students, faculty, and staff. Implementing a campus master plan for the campus of Union College that is partnered with the City of Schenectady will help ensure that both communities' needs are met. (See Appendix D page D-9).

## PHASE 2

### Reduce Building Setbacks

Adopt a policy to reduce the setbacks of buildings. It is recommended that the City require closer building set backs in order to allow bicyclists and pedestrians to get to the businesses or developments without having to cross such large parking lots. Having smaller building set backs will also produce a lane-narrowing illusion along these corridors, which will in turn create a traffic calming effect and reduce speeds. (See Appendix D page D-10).

### Reduce Parking Requirements

Amend and reduce the parking requirements for development within the City and allow for mass transit subsidies to residents in lieu of parking spaces. It is recommended that the City reassesses the parking needs of developments and limits their parking requirements for commercial and residential developers, especially among business districts, so that these underutilized spaces can be activated. (See Appendix D page D-10).

### Consolidate Commercial Curb Cuts

Adopt a policy to require developers to consolidate commercial curb cuts. As it stands, many commercial corridors within the City have extensive numbers of curb cuts and this can create an excessive number of turning conflicts for bicyclists that are encouraged to ride to the right of the road, putting them in harms way of turning vehicles. (See Appendix D page D-10).

### Tax Cut Incentives

Institute tax cut policies for businesses that work to improve the conditions of bicycling within Schenectady. These tax cuts may either be implemented for corporate campuses and developments that create Campus Bicycle Master plans or for locations that receive recognition by the League of American Bicyclists for being bicycle friendly. (See Appendix D page D-10).

### Bicycle Facility Requirements

Add a requirement to the zoning code that requires certain types of new development to provide bicycle racks/lockers, showers, and other bicycle amenities. (See Appendix D page D-10).

### Space Activation Plan

Adopt a policy to fast-track the development of low-impact, space activating developments, such as permanent parklets. It is recommended that the City of Schenectady adopts a policy that allows community supported projects that fall under the umbrella of tactical urbanism and space activation to be streamlined in such a way they can occur legally without providing a burden upon the community members. (See Appendix D page D-12).

## PROGRAM RECOMMENDATIONS

### PHASE 1

#### Bus Bike Rack Stations

Include bus bike rack demonstrations at open street events to teach bicyclists to use on-bus bike racks. Bus bike racks are an excellent addition to any transit system, and have become a cornerstone of developing multi-modal trip opportunities. Bus bike racks allow bicyclists to ride buses during their trips, greatly expanding their possible reach by bike. (See Appendix D page D-3).

#### Educational Handouts

Pamphlets and similar media that educates on topics such as bicycle etiquette, bicycle law, bicycle rights, and bicycle maintenance/repair. The City of Schenectady should build off of its own educational programs and the programs of the Capital Region in order to develop bicycle specific educational handouts that can be distributed throughout the City. (See Appendix D page D-4).

#### Bike to School/Work Days

Continue to expand programming revolving around Bike to School and Bike to Work Days. National Bike to Work Week is the third week of May each year, with Bike to Work Day being the Friday of that week. Bike to School Day is the Wednesday of the second full week of May. Cities, organizations, schools and employment centers nationwide organize events on these days to help encourage bicycling. (See Appendix D page D-5).

#### Open Streets Festivals

Continue to expand the number of open street festivals and events within the City. Open Streets days and festivals are opportunities for streets to be closed down to motor vehicle traffic or have motor vehicle traffic restricted, in an effort to use the streetscapes for other activities. A strong example of a successful open streets event is the Schenectady Green Market. (See Appendix D page D-6).

#### PARKing Day Events

Create programming around PARKing Day. PARKing Day is the third Friday in September. It is an international event where participating cities and communities allow individuals and/or organizations to create "parklets" by converting on-street parking spaces to parks for a day. (See Appendix D page D-6).

#### Bike Support Infrastructure Installations

Install bike amenities, such as bike racks and bike lockers, and create a bike amenity sponsorship program. Bike amenities can provide secure bike parking opportunities and encourage people to travel to businesses and recreational amenities. (See Appendix D page D-8).

#### Bike Share

Begin introducing bike share to the City of Schenectady. (See Appendix C).

## PHASE 2

### Bike Safety Education

Create bike safety education programs to teach residents how to ride safely and legally. This could include the establishment of a bike playground where riders-in-training could practice following traffic rules. CDTC's Capital Coexist bicycle/driver education campaign materials and numerous other bike safety campaigns can serve as the foundation for this program. (See Appendix D page D-4).

### Driver Awareness Program

Create a program to educate drivers on the rules and rights of bicycling. This campaign may include hand-outs, billboards, classes, and other methods for generating awareness. This campaign should encourage drivers to check their mirrors before pulling out of parking spaces, encourage them to give bicyclists at least three feet of clearance when passing, and to look for bicyclists at intersections. (See Appendix D page D-4).

### Bicycle Patrols

Increase bicycle patrols by the Police Department. Bike patrols provide a strong presence that is more personable than patrol cars, and provide an example of proper bicycle etiquette for bicyclists. Examine the feasibility of storing Police Bikes at Fire Stations and other City buildings to encourage use of bicycle patrols. (See Appendix D page D-7).

### Sponsor Community Parklets

Create a sponsorship program for parklets. Utilizing community resources to install support infrastructure that the communities desire can be a low-cost option for the City to roll-out new installments. (See Appendix D page D-8).

### Safe Routes to School

Expand the safe routes to school program. The City should continue to pursue the funds to develop Safe Routes to School programs for each of the viable schools within the City. (See Appendix D page D-2).

### Trail Buddy Program

Create a program to find 'riding buddies' and 'commuting buddies'. This program can address the oft-repeated comment from public outreach that there is a uneasiness of riding through secluded areas for individuals who may ride alone during evening hours. (See Appendix D page D-7).

### Speed Trailers

Install speed trailers with an emphasis along new bicycle routes. Corridors that experience traffic calming and speed limit reductions, such as the neighborhood greenways network, should have speed trailers installed to ensure slower vehicle speeds. (See Appendix D page D-7).

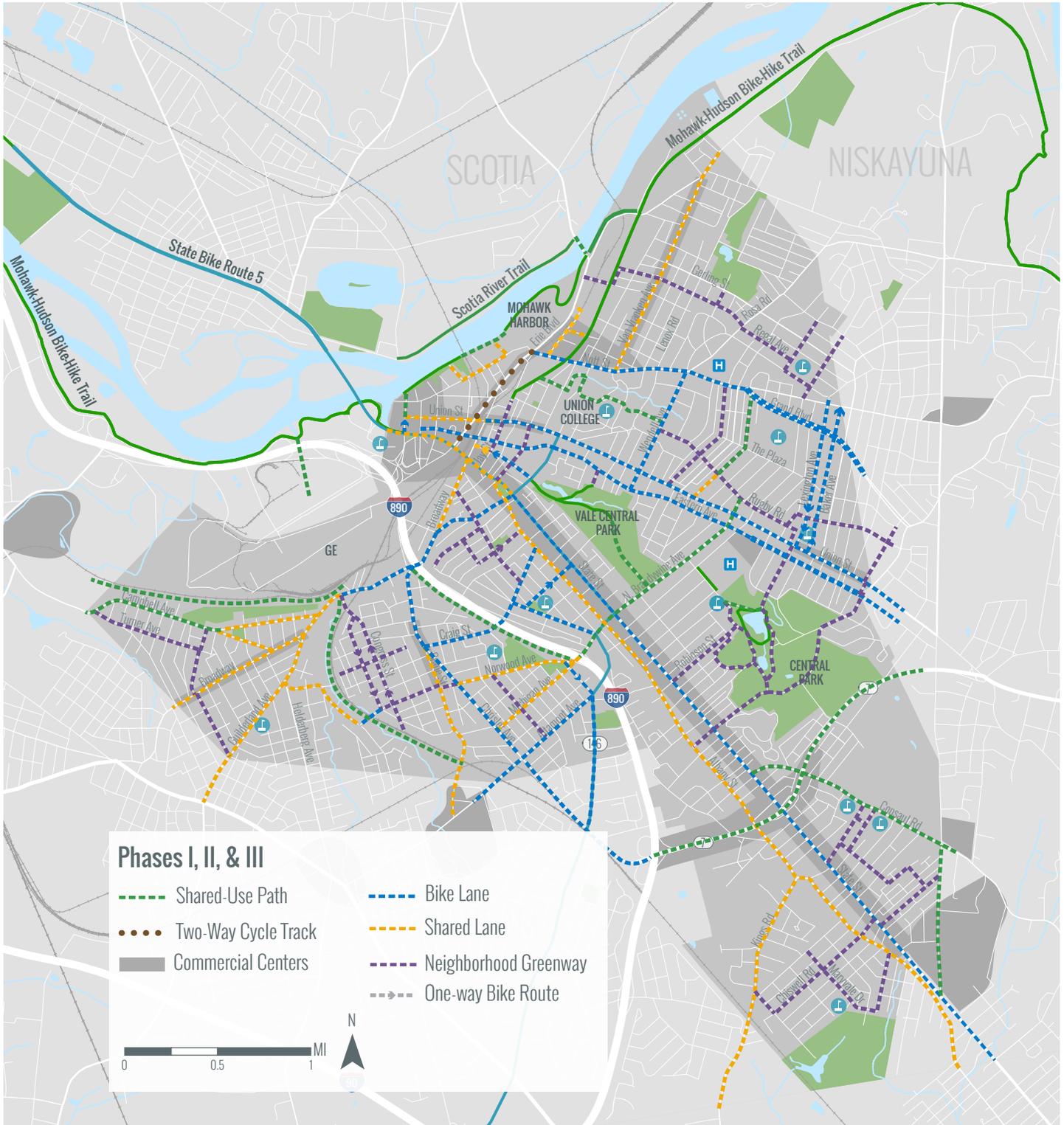
### Bike Lane Ticketing

Create a ticketing campaign to deter motorists from parking in bike lanes. Parking in bike lanes forces the bicyclists using the bike lane to temporarily merge into the travel lanes, often mid-block. This places them in a dangerous scenario, as motorists may not expect bicyclists in the travel lane due to the presence of the bike lanes, and may lead to collisions. (See Appendix D page D-7).

### Online Surveys

Conduct online surveys to gather public opinion on the development of the bicycle network. The City should maintain surveys on public websites to allow the public to provide continual feedback on the newly installed facilities and their respective maintenance. This will give the City an opportunity to hear from daily users and affected community members. (See Appendix D page D-8).

## All Phases - Infrastructure Recommendations



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# APPENDICES

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# APPENDIX A



# EXISTING CONDITIONS (CONT.)



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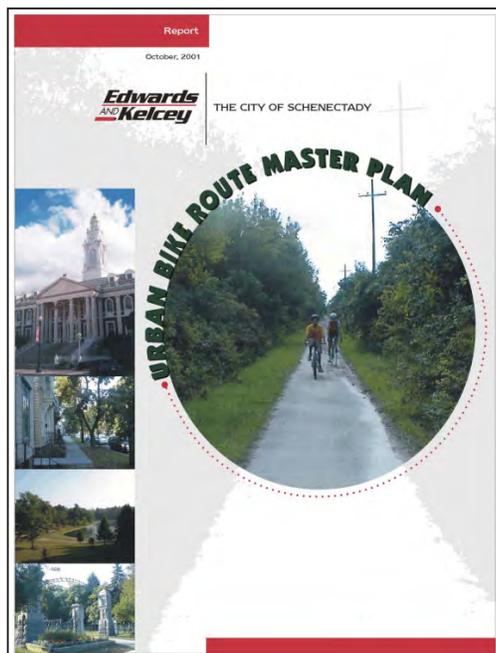
## SUMMARY OF PAST PLANNING

### URBAN BIKE ROUTE MASTER PLAN (2001)

The City of Schenectady received funding from the CDTC to evaluate trail route options, ultimately creating a connected bicycle network throughout the City. A steering committee made up of individuals from local organizations and stakeholder groups guided the plan.

### Canal Trailway System Revitalization

In addition to transforming Schenectady into a bicycle-friendly environment, the Urban Bike Route Master Plan served the New York State Canal Corporation's goal of revitalizing the Canal Trailway System. Revitalization of the Canal Trailway System has been projected to increase tourism and recreational use. As the Mohawk-Hudson Bike-Hike Trail runs through Schenectady, the City will likely see an increase in trail usage as well. An increase in trail users further supports the creation of a connected bicycle network throughout the City.



### Plan Objectives

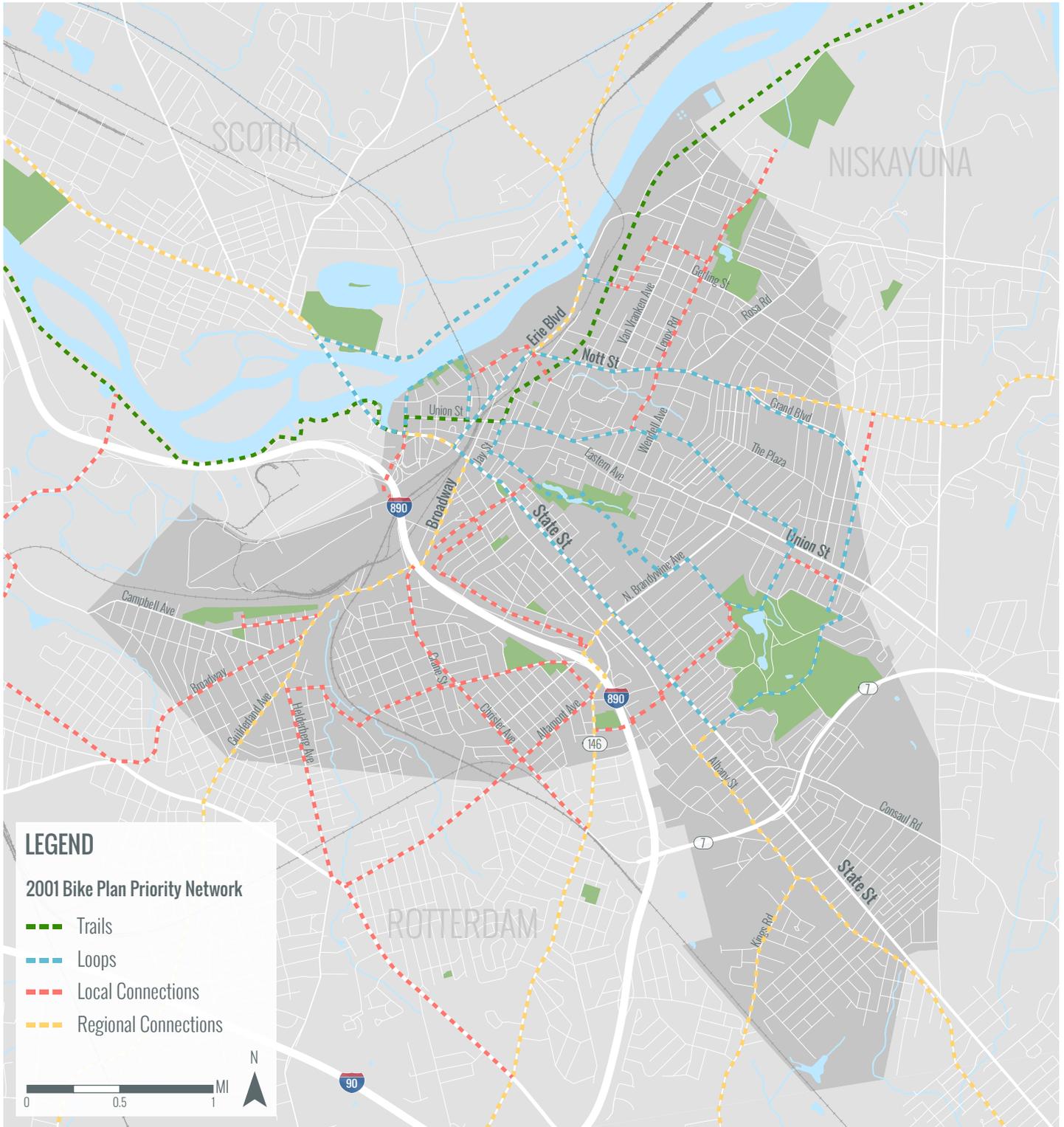
The Plan had three primary objectives:

- “Identify preferred routes through the core study area of downtown and adjacent neighborhoods connecting the Mohawk-Hudson Bike-Hike Trail and North Jay Street to the trail-head at the Western Gateway Bridge adjacent to Schenectady County Community College.”
- “Identify destinations within and near downtown and define preferred routes linking these features.”
- “Establish Capital District urban bike path design standards and guidelines to be piloted in Schenectady and distributed to other municipalities in the Capital Region for use in similar bike route related projects.”

### Plan Recommendations

The Plan recommended a hierarchy of routes connecting various destinations throughout the City. These destinations were chosen based on an analysis of important and frequently visited locations in Schenectady at that time. The final recommendations built off of the Mohawk-Hudson Bike-Hike Trail, the CDTC Regional Priority Bicycle/Pedestrian Network, NYS Bike Route 5, multiple bike route loops, and local connector routes. The network created by the plan can be found in Map 1, alongside existing bicycle infrastructure in the City.

# Map 1 - Urban Bike Route Master Plan Priority Network



## Mohawk Hudson Bike-Hike Trail

There were both short and long term recommendations for improvements to the Mohawk-Hudson Bike-Hike Trail. In the short term, the Plan urged the City to “retain the existing alignment with some modifications to accommodate...redevelopment efforts.” In the long term, the City should consider creating a new alignment along the southern edge of the Mohawk River. Today, the Mohawk Harbor development in this area provides a promising opportunity for a new trail alignment along the Mohawk River.

## Priority Loops

The Plan recommended four bike loops that stem from the Mohawk-Hudson Hike-Bike Trail. These loops act as connections to various neighborhoods and parks throughout and surrounding the City of Schenectady.

The Four Loops:

- Scotia/Glenville Loop
- Downtown/Stockade Loop
- Park Loop
- Outer Park Loop

## Regional Routes

The regional routes were recommended to provide bicyclists from the surrounding region with access to downtown Schenectady.

The Regional Route Streets:

- Albany Street
- Kings Road
- Route 146
- Broadway
- Route 5
- Freeman’s Bridge Road
- Maple Avenue
- Nott Street

## Local Connectors

The final recommendations included local connectors to provide seamless travel among the Mohawk Hudson Bike-Hike Trail, the loops, and the regional routes.

## Design Guidelines

In addition to spatial recommendations, the Plan recommended design guidelines to promote trail use and improve safety and user understanding of the citywide bike system. Design standards were provided for:

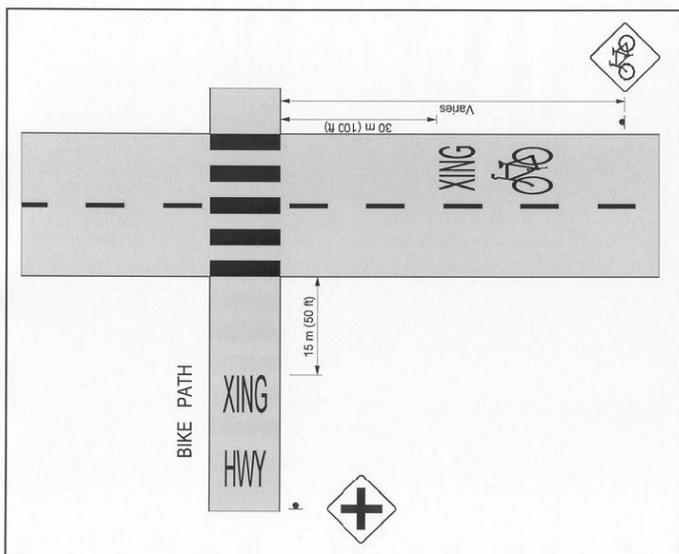
- Shared Roadway/Wide Curb Lane
- Signed Shared Roadway
- Bike Lane
- Paved Shoulders
- Shared Use Paths
- Bike Parking
- Signage/Markings
- Intersection Treatments
- Railroad Crossings
- Refuge Islands
- Inter-modal Connections

## Management Guidelines

Implementation, management, and maintenance of the recommendations of any plan is vital to a project's success. This Plan recommended the formation of a Bikeway Advisory Committee made up of local stakeholders to provide "input, support, and oversight in the implementation of the Master Plan and the development of a Management Plan."

## Financial Resources

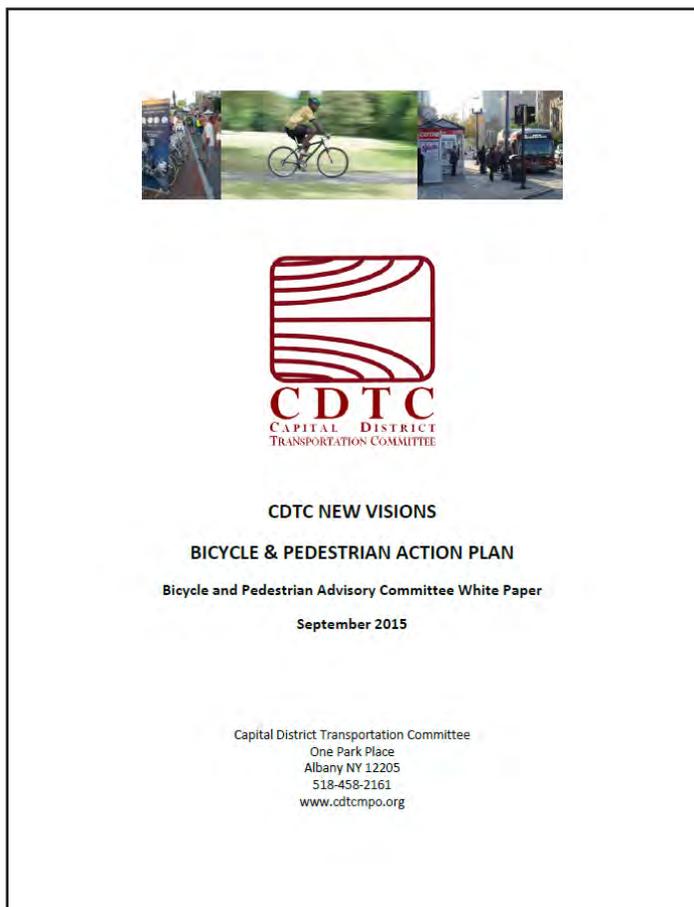
The Plan recommended a diversified funding mechanism that included support from private companies and public sources such as federal, state, and local funds.



Example recommendation from the 2001 Bike Plan

## CDTC New Visions: Bicycle and Pedestrian Action Plan (2015)

This more recent Plan addresses the bicycle and pedestrian planning portion of New Visions 2040, which is “CDTC’s official long-range regional transportation plan for Albany, Rensselaer, Saratoga, and Schenectady counties.” Recommendations included in the Plan were formed through extensive research of the bicycling and walking conditions in the Capital District and input from the Bicycle and Pedestrian Advisory Committee (BPAC).



## Importance of Updating the Bicycle & Pedestrian Priority Network

The official strategy regarding the Bicycle & Pedestrian Priority Network as stated in the Plan is to:

“Update the Priority Network on a regular basis to include facilities that meet the criteria and use the Network as the primary performance measure for determining success in accommodating bicyclists and pedestrians.”

It is important to re-evaluate the needs of a community as development occurs. Places that were once large trip generators may not be as important today while new residential, commercial, and mixed use developments may draw more people to areas that were once rarely visited. The Plan suggests identifying these trip generating locations and relevant travel corridors that lack bicycle facilities on a regular basis to ensure the priority network represents the needs of bicyclists within the community.

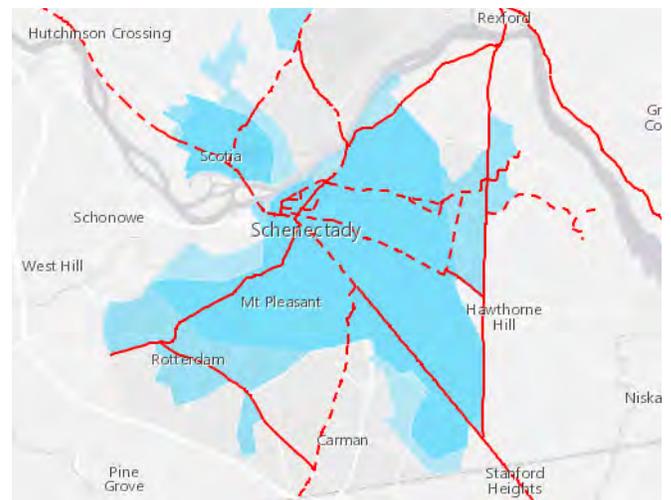
## Revisions to the Bicycle & Pedestrian Priority Network

Many changes have been made to the previous Bicycle & Pedestrian Priority Network. The changes specifically relating to bicycle infrastructure include:

- Priority network is no longer limited to Federal Aid-eligible roadways.
- The new Priority Network includes two separate components – pedestrian districts and a linear bicycle network.
- Introduction of roads located within a Tier 1 or Tier 2 Pedestrian District (automatic inclusion).
- Introduction of roads that are part of a designated bike route (automatic inclusion).
- Introduction of roads located within a population and employment density area (automatic inclusion).
- Introduction of roads that are part of the Mohawk Towpath Scenic Byway (automatic inclusion).
- Identification of roads that do not meet any of the automatic inclusion criteria but do connect at least two pedestrian generators (schools, parks, trails, hospitals and shopping areas).

## Project Prioritization & the Priority Bicycle Network

The resulting Priority Bicycle Network was developed based on the criteria above. The purpose of this Network is to help determine project priority and funding allocation. The Schenectady Bike Infrastructure Plan should take this identified Priority Bicycle Network into account when determining important routes through the City. A project located on the Priority Bicycle Network has a higher likelihood of receiving funding and, therefore, may be more easily implemented than other options. Considering this Priority Bicycle Network will also enhance the regional connections throughout the Capital District.

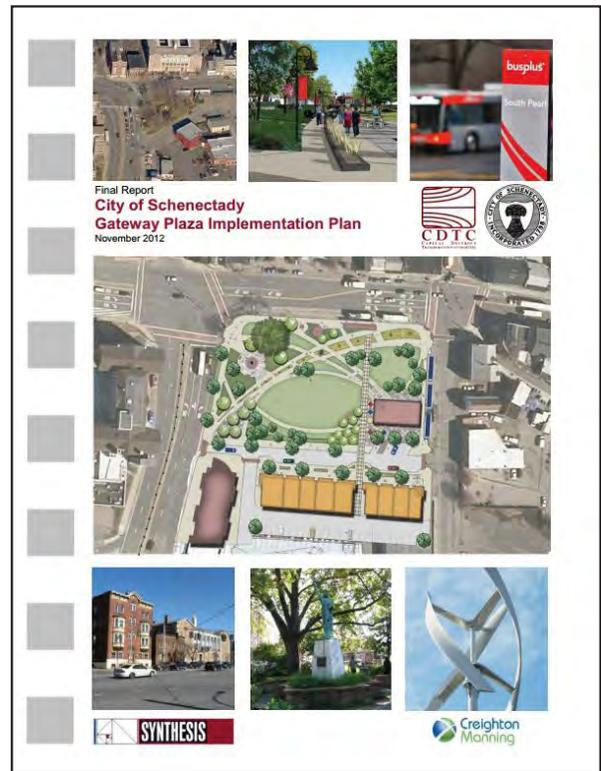


Schenectady Portion of CDTC Bike Ped Priority Map

The complete interactive Capital District Transportation Committee Bike Ped Priority map can be found at this link: <http://arcg.is/2jTRgNS>

## GATEWAY IMPLEMENTATION PLAN (2012)

The City of Schenectady Gateway Plaza Implementation Plan is part of a continuing effort by the City and other stakeholders to beautify the area around the Western Gateway Bridge, making this entrance to the City more welcoming and more pedestrian and bicyclist friendly. This primarily revolved around the redevelopment of a park on the southeast corner of State Street and Washington Avenue. The park would boost economic growth around the area and provide amenities for all users, including new bicycle storage throughout the park.



## NORTHERN SCHENECTADY URBAN RENEWAL PLAN (2010)

The Northern Schenectady Urban Renewal Plan made recommendations for redeveloping the area between the ALCO site (now Mohawk Harbor) and Union College. This involved housing redevelopments and the creation of new open spaces. The plan also looked at creating better access to the Mohawk-Hudson Bike-Hike Trail and providing connections for pedestrians and cyclists from the trail to open spaces, commercial centers, and Union College within Northern Schenectady.



## ROUTE 5 TRANSIT GATEWAY PLAN (2010)

Making way for the CDTA Bus Rapid Transit Program, BusPlus, the Route 5 Transit Gateway Plan identified ways to promote transit oriented development and create multi-modal connections along State Street in Schenectady. The plan identified the following important connections for bicycle travel along and to the corridor:

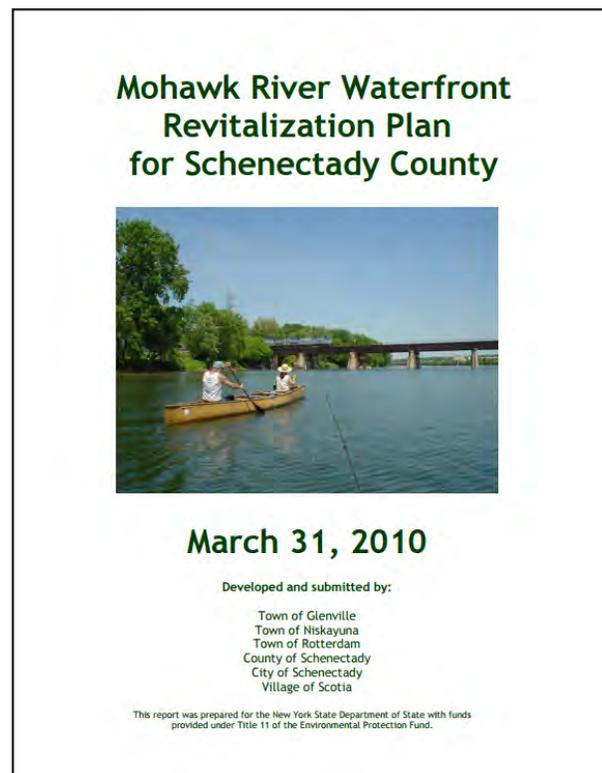
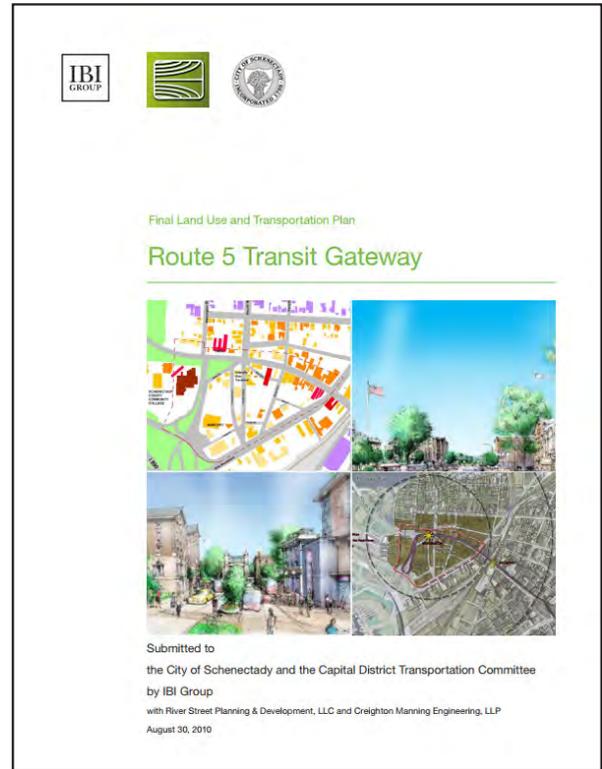
- Making connections to the Mohawk-Hudson Bike-Hike Trail.
- Providing bike lanes along Erie Boulevard and other corridors in the downtown area.
- Developing a safer and community oriented street-scape.

## MOHAWK RIVER WATERFRONT REVITALIZATION PLAN FOR SCHENECTADY COUNTY (2010)

The waterfront revitalization plan addressed land and water use challenges, opportunities, and recommendations for locations along the Mohawk River within Schenectady County. It included several bicycle network connections, including expanding the Mohawk-Hudson Bike Hike Trail.

Bike-Hike Trail recommendations within the City of Schenectady include:

- Enhance the existing Bike-Hike Trail from Washington Avenue to the entrance at the Community College.
- Expand access to the river with the connection of Riverside Park to East Front Street Park.



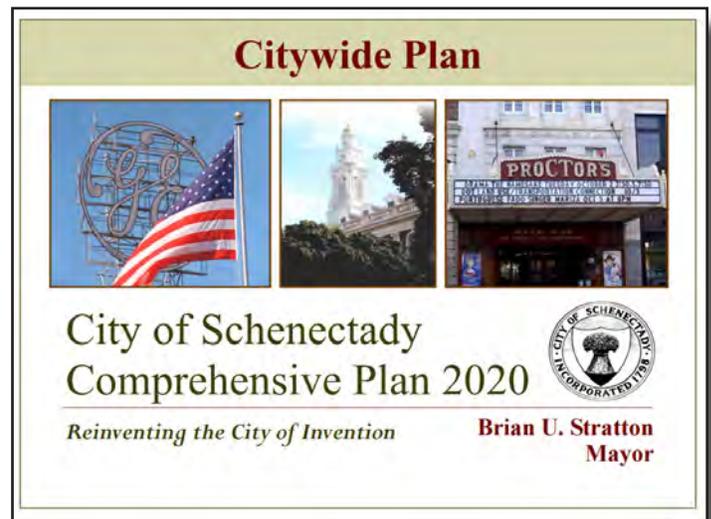
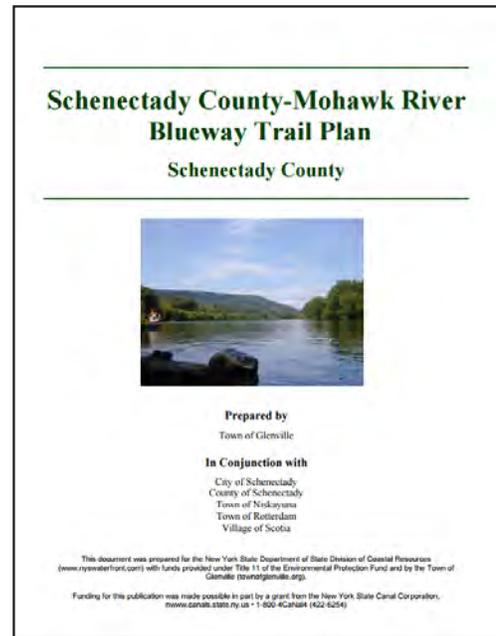
## MOHAWK RIVER BLUE-WAY TRAIL PLAN (2009)

The Town of Glenville prepared the Blue-Way Plan for Schenectady County in conjunction with the City of Schenectady and other municipalities. The Blue-Way Plan concentrated on opening up access to the waterfront for paddle craft use and included making connections to the Mohawk-Hudson Bike-Hike Trail within the City of Schenectady, creating a new form of multi-modal travel and recreation within Schenectady.

## SCHENECTADY 2020 COMPREHENSIVE PLAN (2008)

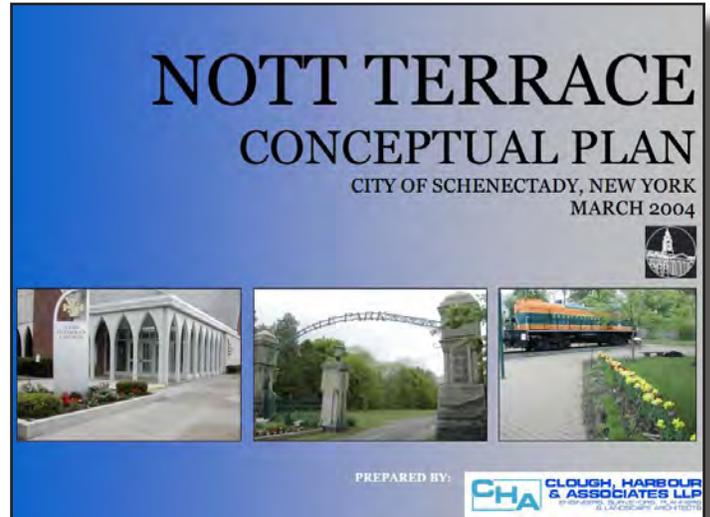
The City of Schenectady adopted its first Comprehensive Plan since 1970 in 2008. The plan focused on zoning, neighborhood development, and recreational development. It included several catalyst projects, such as the implementation of the CDTA BusPlus Bus Rapid Transit routes and inter-modal opportunities. Other bicycle relevant priorities that the plan established include:

- Introducing new waterfront park and green-space amenities.
- Implementing a new green-way from Central Park to Vale Park.
- Linking neighborhoods through bike-ways and shared use paths.
- Promoting a 'sense of place' and social interaction along trails.



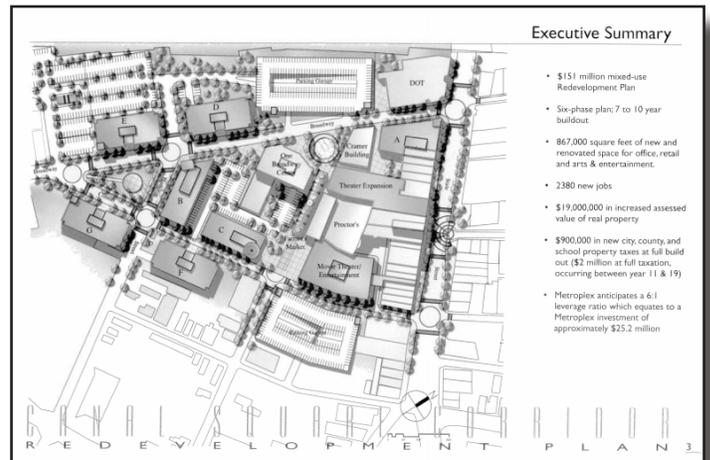
## NOTT TERRACE CONCEPTUAL PLAN (2004)

The Nott Terrace Conceptual Plan assessed the needs of the Nott Terrace corridor and created a proposed streetscape that involved a road diet, a new parking lane, and new shoulders. The plan built off of the 2001 Urban Bike Route Master Plan which identified sections of Nott Terrace as a priority route. The Nott Terrace Conceptual Plan expanded the priority to incorporate the entire length of Nott Terrace. The Plan recommended the corridor to be converted to a shared roadway, and the recommended roadway would also provide some traffic calming, which would make the corridor more comfortable for bicyclists.



## CANAL SQUARE REDEVELOPMENT PLAN (1999)

The Canal Square Redevelopment Plan was drafted to create a stronger 'sense of place' in the Schenectady downtown area, introduce new open spaces, improve circulation, and identify key connections to the downtown area. It concentrated heavily on creating a walkable, livable, mixed use downtown with lively businesses and an urban environment, while preserving the historic character of the area.



## TRAIL NETWORK

### Shared Use Paths

Shared use paths are a unique bicycle infrastructure feature, as they provide a dedicated facility for pedestrians and bicyclists separate from ones for motor vehicles. They generally follow their own alignment, separated from other corridors, but the path can also follow rail corridors or rivers.

The most notable shared use path within the City of Schenectady is the Mohawk-Hudson Bike Hike Trail. This shared use path connects the City of Albany to the City of Buffalo, passing through several municipalities along the way, including the City of Schenectady. The shared use path follows the Mohawk River and Hudson River corridors. While it does provide a connection between Schenectady and other destinations within the Capital District, it does not connect to the southern neighborhoods of Schenectady and there is no facility providing separated, on-road bike travel or off-road bike travel that makes that connection. The path also terminates at Washington Avenue, where users must follow a local bike route to the next continuation of the trail which begins on Union St.

The City of Schenectady also has a number of shared use paths within both Central Park and Vale Park. While these are not strong transportation connections, they do have high recreational value, as users are able to enjoy the peaceful nature settings.

### Side-paths

Side-paths are a specific kind of shared use path. They provide a wide, off road facility that can allow pedestrians and bicyclists to comfortably share the designated space. They do, however, follow street corridors, similarly to sidewalks. To install a side-path and have it designated as such, there must be some form of buffer between the path and roadway. There are federal regulations on these buffers, but they generally take the form of a grass area with trees or fences within them.

There are plans to install side-paths on N. Brandywine Ave. and side-path extension on Bradley Street. These will provide a connection between Central Park and Vale Park, increasing the transportation value of the paths within the parks, as someone will be able to travel from the east side of Central Park to the west side of Vale Park, without having to travel on a road. Since Vale connects to the Downtown, it has tremendous potential, but the internal isolation and lack of visibility is a major obstacle. There is also a side path along the Western Gateway Bridge, leading to Scotia.



### Vale Park Gateway

The trail in Vale Park provides useful connections, including linking neighborhoods to the downtown; however, due to the isolation of the park, security concerns likely discourage many potential users.



### Mohawk Hudson Bike-Hike Trail

A view from the Mohawk Hudson Bike-Hike Trail near Schenectady.



### Avenue of the Pines

An example of a well-used side-path in Saratoga Springs, NY.



### Paved Buffer

This side-path installed with pavers uses a paved buffer for certain sections where bike parking and parking meters are installed in the buffer zone before being replaced by tree pits.

## CITY DEMOGRAPHICS

In total, the City of Schenectady has a population of 66,565 across 20 census tracts. An analysis of the City’s demographic characteristics helps determine areas in need of additional bicycle facilities. This report analyzes three dimensions including:

- Poverty
- Commute to Work
- Vehicle Access

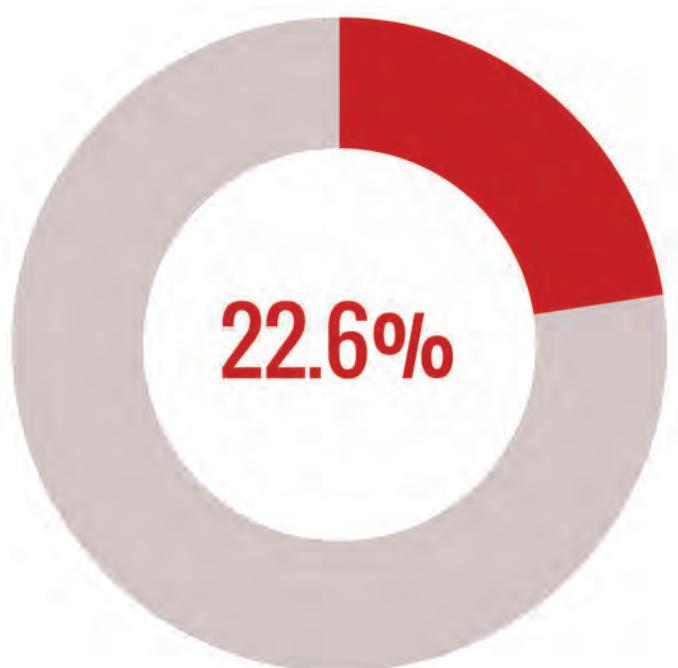
## POVERTY LEVEL

According to the 2014 American Community Survey, a total of 15,000 Schenectady residents, or 22.6 percent of the population, live below the poverty level. This rate is higher than the United States as a whole. Currently, 14.8 percent of the Country live in poverty.

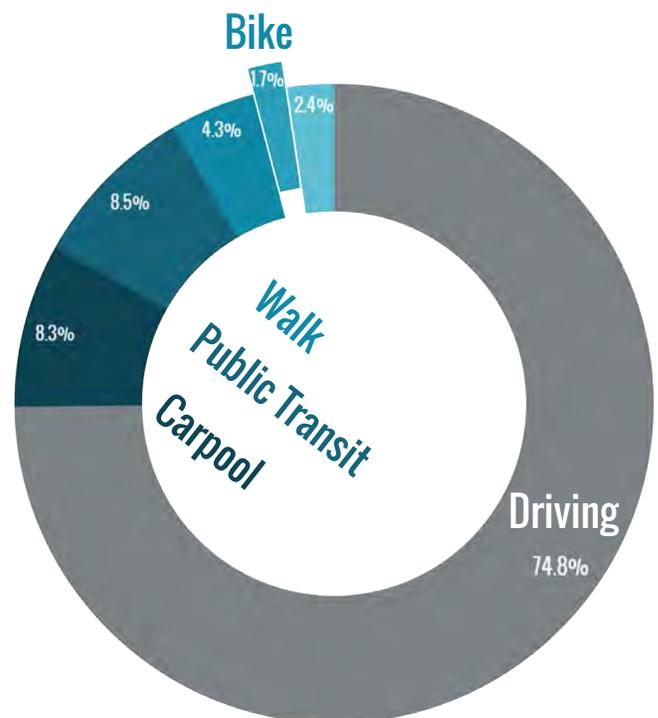
The poverty level is set by the United States Census Bureau and represents the dollar amount of annual income that is necessary to meet minimum basic needs, such as food. The poverty level thresholds for United States households in 2014 are as follows:

- Single individual: \$12,071
- Two-person: \$15,379
- Four-person (with 2 children): \$24,008

Percent of City Residents Living Below the Poverty Level



Commute to Work Mode Share



## COMMUTE TO WORK

Data representing how Schenectady residents travel to work can be found in the graphic on the previous page.

According to the 2014 American Community Survey (ACS), almost 75 percent of people drive themselves to work. Public transit and carpooling are the next most common modes at 8.5 and 8.3 percent, respectively. Those who walk to work make up 4.3 percent of commuters while about 1.7 percent of Schenectady workers, or 480 people, ride a bike to work.

Additional bike facilities may help increase the number of people who choose to ride a bike for both transportation and recreation.

## VEHICLE ACCESS

Analyzing access to vehicles helps determine areas in need of additional transportation options. Providing alternative transportation opportunities, such as bicycling, to areas with little access to vehicles will greatly improve a person’s mobility throughout the City as well as the accessibility of key destinations.

This report will analyze the City as a whole as well as break down vehicle access by individual census tracts.

### Citywide

A total of 2,163 households, just under 9 percent of the City’s households, do not have a vehicle.

The next section discusses the areas within Schenectady that have a high number of households with no access to a vehicle.

City Vehicle Accessibility by Household



2014 American Community Survey, 5-Year Estimates

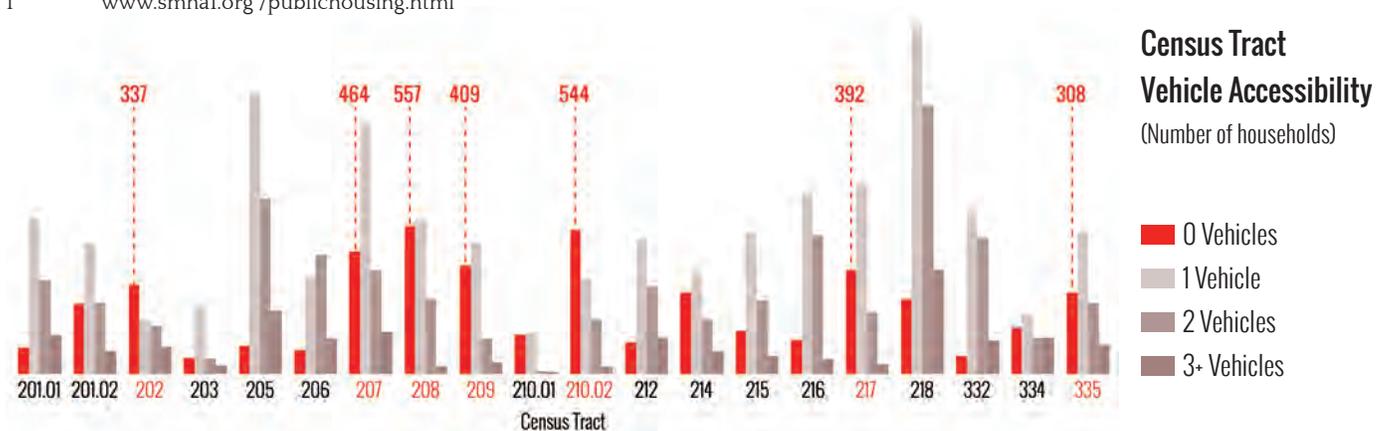
## Census Tract Breakdown

Analyzing vehicle access by census tract determines areas that need additional transportation options. Using data available from the 2014 American Community Survey, the graphic below compares the number of vehicles available to each household by census tract. The red bars indicate households that do not have any vehicle availability. The graphic highlights the seven census tracts with the highest number of households without access to a vehicle.

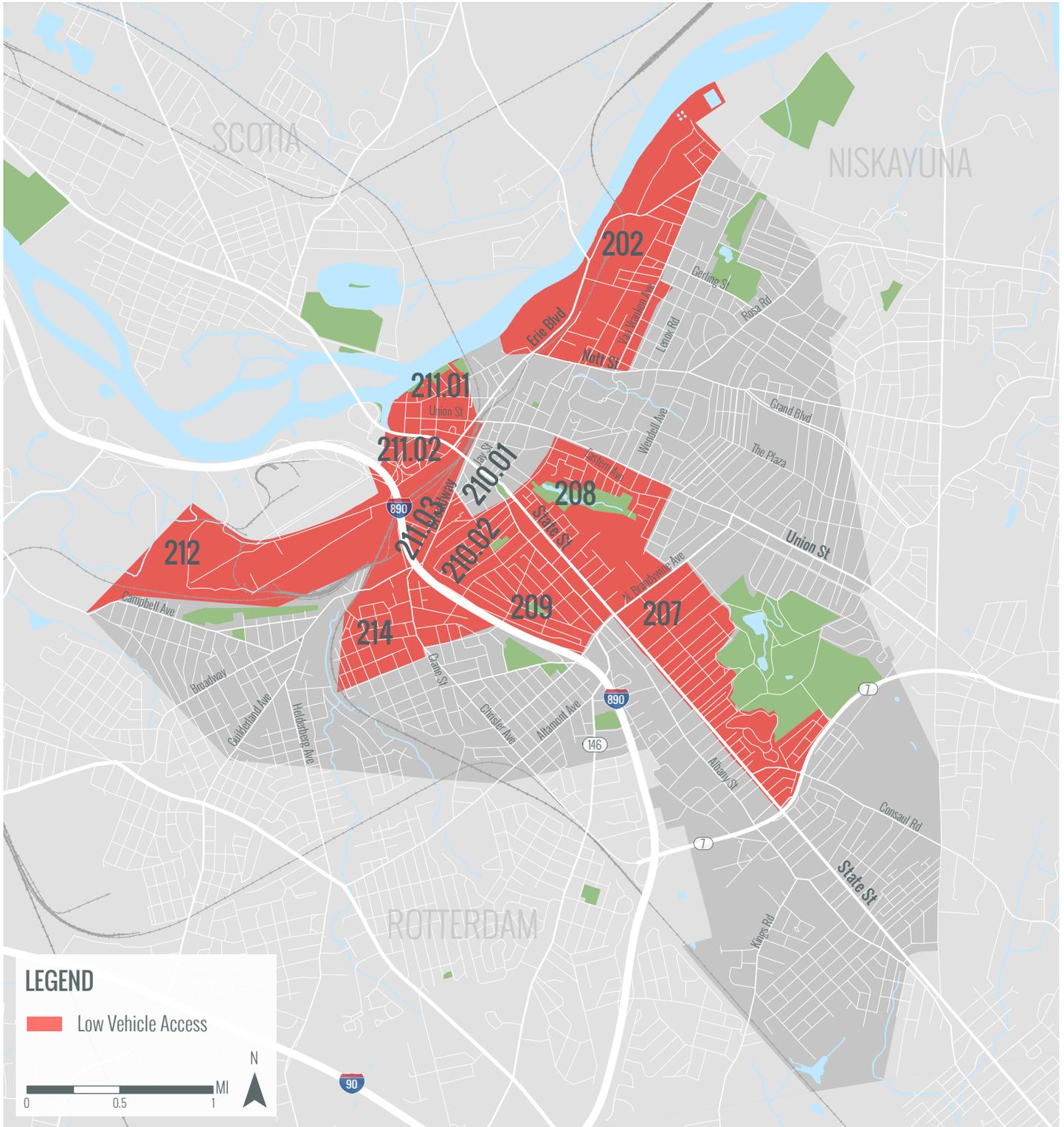
In two of the tracts, 202 and 210.02, there are more households without a vehicle than any other category (1, 2, 3+). Additionally, there are two tracts, 210.01 and 210.02, in which almost 50 percent of households do not have access to a vehicle for daily travel. Multiple complexes run by the Schenectady Municipal Housing Authority are located in these tracts, including Lincoln Heights, which provides public housing to the elderly and disabled, two groups who are statistically less likely to drive.<sup>1</sup> It is also important to note that tract 210.01 has a relatively small population.

Map 2 visualizes the tracts highlighted in the graphic below. There is a clear pattern surrounding State Street and the downtown area surrounding Broadway.

<sup>1</sup> [www.smha1.org/publichousing.html](http://www.smha1.org/publichousing.html)



## Map 2 - Census Tracts with Low Vehicle Access (0 Vehicles/Households)



2014 American Community Survey, 5-Year Estimates

## CITY LAND USE

### PARKS & OPEN SPACE

The City of Schenectady has a large range of open spaces, including parks, environmental preserves, golf courses, trails, and public plazas. Noteworthy open-spaces include:



**Trails through Central Park**

### Central Park

Central Park, known as “Schenectady’s Crown Jewel,” is the largest park facility within the City. The park has multiple facilities within it, including playgrounds, a public pool, sports facilities, pavilions, a rose garden, disc golf, paddle craft rentals, the Music Haven Amphitheater, and several trails.

The park is also used as a gathering point for community events, ranging from concerts at the Amphitheater to fireworks on Iroquois Lake, to statewide tennis tournaments.



**The Hiker Monument - Central Park**

Several of Schenectady’s parks are filled with monuments, public art, and pieces of history, increasing their recreational and aesthetic value.

## Vale Park

Vale Park is the second largest park in the City of Schenectady. Situated between Vale Cemetery and the Museum of Innovation and Science, it is a historic landmark providing access for visitors to beautiful nature trails and lakeside views.

There are concerns however among community members regarding the security of Vale Park, due to its isolation, topography, and low amount of foot traffic. Funds have been acquired to build sidepaths connecting Vale Park and Central Park.

## Woodlawn Preserve

The Woodlawn Preserve sits in the southern area of the Woodlawn Neighborhood. Abutting Woodlawn Elementary School, the preserve offers children an insight into the natural environment as it is a popular field trip location.

While the preserve does have several natural surface trails, plans have been proposed to make the preserve more inviting to visitors and to include it in the Albany Pinebush Preserve Commission network.



**View of Vale Lake in Vale Park**

## EMPLOYMENT CENTERS

The City of Schenectady has several major employers, including General Electric (GE), MVP Healthcare, Golub Corporation, New York State Lottery, New York Worker's Compensation Board, and Transfinder. Opening in February 2017, the Rivers Casino and Resort will also be a major employer.

These businesses create high volumes of traffic during peak hours within the City of Schenectady and the surrounding areas.

These large employers represent a great opportunity to increase bicycling rates in the area. Robust indoor bicycle parking, locker rooms, showers, and bicycle maintenance stands would decrease barriers for employees to cycle to work.



GE's Schenectady Campus

## SCHOOLS & COLLEGES

The City of Schenectady has 21 educational facilities including public schools, charter schools, private schools, and higher education institutions, including Union College and Schenectady County Community College.

### Safe Routes to School

Several schools in Schenectady have had Safe Routes to School programs. These programs include measures to provide students with opportunities to walk and bike to school. The programs follow the 5 E's method, building on:

- Engineering
- Education
- Encouragement
- Enforcement
- Evaluation

As a result of these programs, New York State Department of Transportation awarded Schenectady a \$380,000 grant to install a sidewalk, crosswalk, and pedestrian signal near Zoller Elementary School in 2011. The Grand Boulevard and McClellan projects scheduled for 2017 were part of the Safe Routes to School Plans.<sup>1</sup>

<sup>1</sup> <http://www.schenectady.k12.ny.us/News/2012-2013/>

## Union College

Union is an independent liberal arts college within the City of Schenectady. The college, founded in 1795, has 2,200 full time students from around the world. The campus offers students on-campus housing options, including dorms and Greek housing.

Union College has several shared use paths that traverse the campus. The college also has ample bicycle parking throughout its campus, though it does not have any official bicycle parking report or campus bicycle circulation plan.<sup>2</sup>

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SafeRoutesGrant\_01113.htm

2 <https://www.union.edu/about/>



### Union College Campus

Trails surrounding Nott Memorial Hall on the Union College Campus.

## Schenectady County Community College (SCCC)

SCCC is a public, two-year college and part of the State University of New York (SUNY) network. The school has over 2,700 full time students and over 1,500 part time students, making it the largest student body in the City of Schenectady.<sup>3</sup>

The college's primary campus sits on the northern boundary of the City, at the intersection of Washington Avenue and State Street. It is also just east of the Western Gateway Bridge. These are high volume 6 lane roadways near the campus. There is a dedicated shared use path to Washington Street and State Street and Western Gateway Bridge has been redone to include a shared use path. The Mohawk-Hudson Bike Hike Trail does currently terminate near the campus at Washington Avenue. The campus only has a single bike rack, as well.

SCCC uses several facilities within the heart of the downtown, including the YMCA, for classes and athletic programs. It is estimated that students make over 2000 walking trips a day between the campus and the downtown. Even though State Street is the designated State Bike Route, there are no designated bicycle lanes, which is likely a strong deterrent for students who might otherwise choose a bicycle to make this commute.

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3 <http://www.sunysccc.edu/about/factfig.htm#facts>



### SCCC Bike Parking

## ECONOMIC CENTERS

The City of Schenectady has several economic centers. An economic center is defined in this case as a cluster of retail or service businesses that produce a relatively large trip generation outside of employee commuting traffic. For the City, this primarily takes the form of commercial plazas or strip malls. However, Schenectady's downtown is also a busy economic center, and the Mohawk Commons and the Shoprite Plaza are noteworthy shopping centers in the Capital District.

In addition, the downtown area also has a weekly destination market, known as the Schenectady Greenmarket. From May to October, the market gathers around the outside of City Hall, and the remainder of the year it is moved inside of Proctors Theatre. The market provides access to local

produce and products, and also has additional amenities, such as live music.<sup>1</sup>

Most of these economic centers, especially the plazas and strip malls, offer little to no bicycle parking options. They also often have large building setbacks to accommodate large storefront parking lots. This layout creates a very auto-oriented environment, which can be intimidating and deter individuals from choosing bicycling as their mode of transportation.

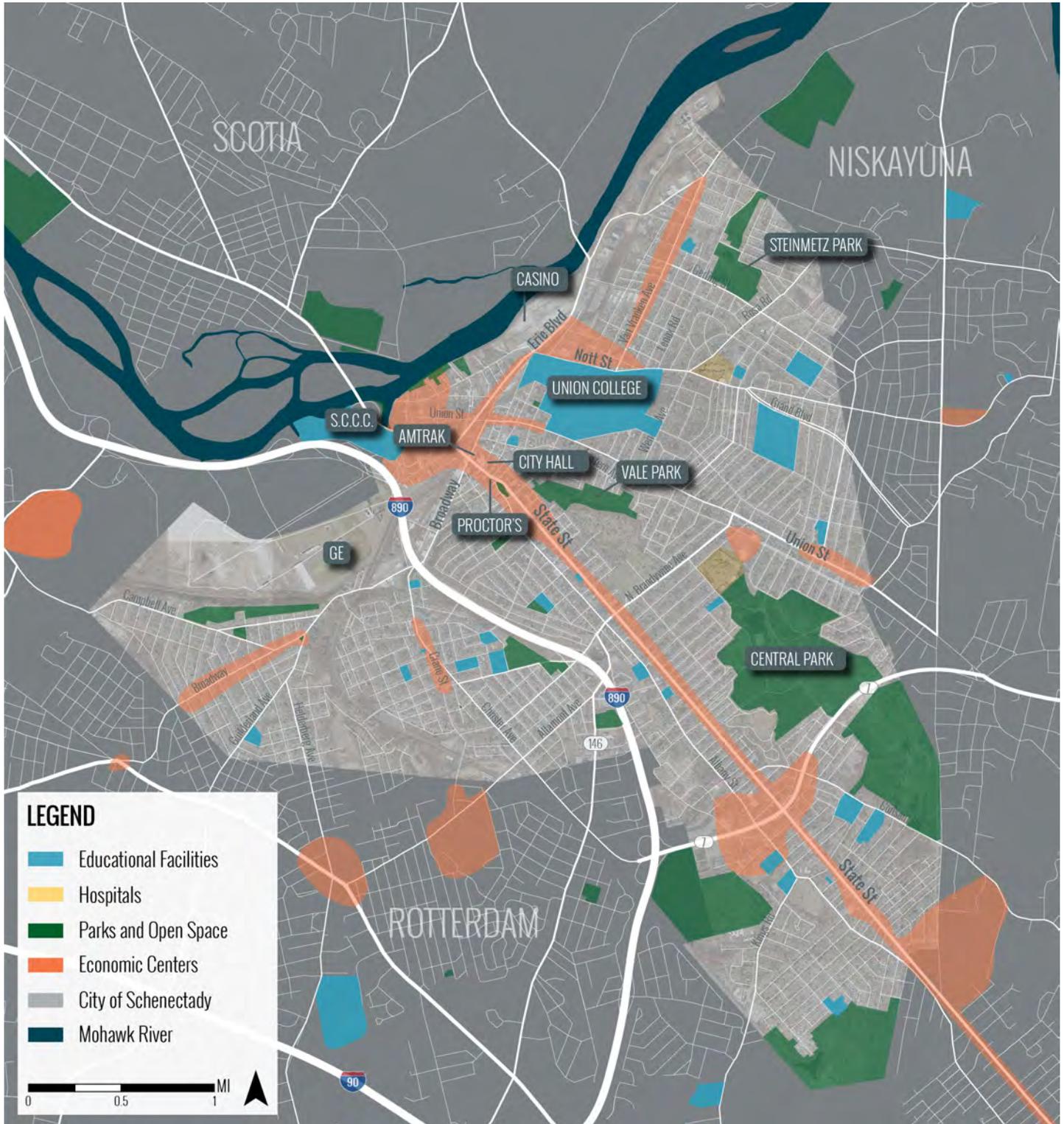
While the downtown area has bicycle parking scattered throughout and offers much more comfortable streetscapes for bicyclists, there is still room for improvement.

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1 <http://schenectadygreenmarket.org/>



### Map 3 - Schenectady's Key Destinations



## STRAVA HEAT MAPS

Strava Heat Maps is a powerful tool for understanding bicycling patterns within a specific area. Strava is a web-based and app-based mapping company that provides users with information on their runs or bicycling trips. Users turn the app on when they begin their journey, and they receive results, such as speed, length, and other factors after their journey. It is widely used by commuters and bicycle enthusiasts alike.<sup>1</sup>

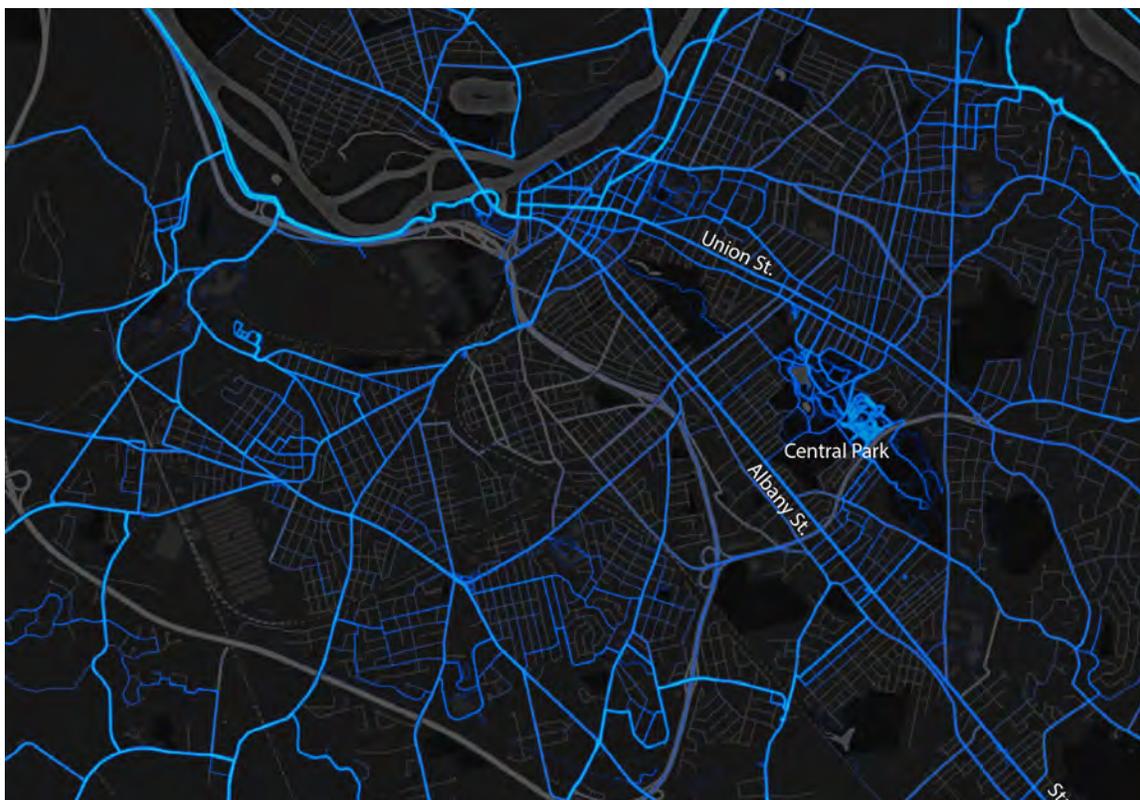
As an additional feature, Strava collects the data on the routes that are taken during these journeys and generates heat maps based on the most popular routes.<sup>2</sup>

1 <https://www.strava.com/>  
2 <http://labs.strava.com/heatmap>

The Strava Heat Map for the City of Schenectady provides insight into the bicycling habits of the Schenectady app-users. The map, featured below, indicates that the most popular facility to ride on is the Mohawk Hudson Bike-Hike Trail. Other routes; such as State St., Nott St., and the downtown corridors, are also heavily used.

Strava, while a great tool, is not a perfect resource. To provide information on ridership patterns, bicyclists must be using the app, which means that the data is likely missing information from individuals who do not know about the app, choose not to use the app, or do not have access to a smart-phone. The app is generally more popular among recreational users as well, and may not be as widely used in the City by bicycle commuters.

Strava Heat Map - City of Schenectady

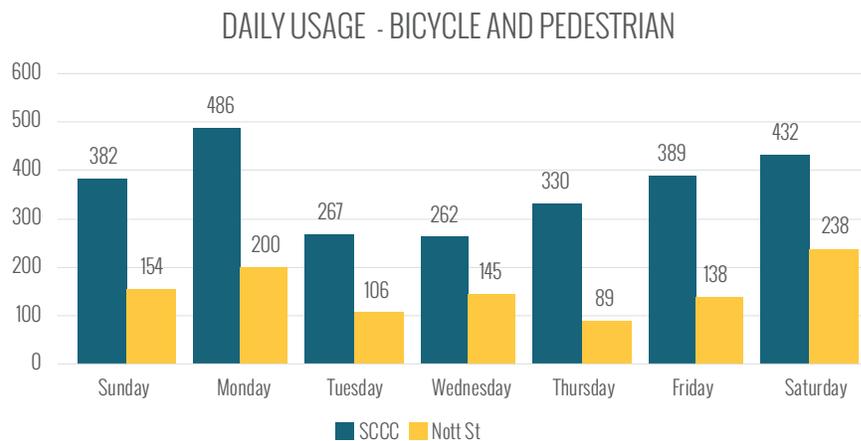


## MOHAWK-HUDSON BIKE-HIKE TRAIL COUNTS

Parks & Trails New York, with support from the Capital District Transportation Committee, monitored the usage on Mohawk-Hudson Bike Hike Trail, and other trails throughout the Capital District, over the summer of 2016. Additional count data and analysis of trends can be found in the CDTC’s Regional Trails Perspectives publication from 2006<sup>3</sup>. The accompanying table illustrates the count information at two survey locations, the Schenectady County Community College and the trail access point near Nott Street, in the City of Schenectady. As demonstrated by the two tables, the Mohawk Hudson Bike Hike Trail experiences high daily and annual usage.

3 <http://www.cdtcmpto.org/page/2-uncategorised/66-bicycle-pedestrian-resources>

| MONTHLY USAGE PROFILE<br>BICYCLE AND PEDESTRIAN |               |               |
|---|---------------|---------------|
|   | SCCC          | NOTT ST       |
| January   | 2,981         | 1,252         |
| February  | 2,981         | 1,252         |
| March   | 6,956         | 2,921         |
| April   | 10,931        | 4,590         |
| May   | 10,931        | 4,590         |
| June  | 11,925        | 5,008         |
| July  | 12,918        | 5,425         |
| August  | 13,912        | 5,842         |
| September                                       | 10,931        | 4,590         |
| October   | 5,962         | 2,504         |
| November  | 5,962         | 2,504         |
| December  | 2,981         | 1,252         |
| <b>2016 Total</b>                               | <b>99,372</b> | <b>41,730</b> |



Daily usage data collected Summer 2016

## MOHAWK-HUDSON BIKE-HIKE COUNTS - ALL TRAIL USERS

| ESTIMATED SEASONAL USAGE |        |         |
|--------------------------|--------|---------|
| SEASON                   | SCCC   | NOTT ST |
| Winter                   | 11,607 | 4,874   |
| Spring                   | 32,147 | 13,500  |
| Summer                   | 38,089 | 15,995  |
| Fall                     | 17,529 | 7,361   |

| ESTIMATED ANNUAL USAGE                      |        |
|---|--------|
| Schenectady County Community College (SCCC) | 99,372 |
| Nott Street                                 | 41,730 |

| USAGE MODE SPLIT |      |         |
|------------------|------|---------|
| MODE             | SCCC | NOTT ST |
| Bicyclists       | 59%  | 66%     |
| Pedestrians      | 38%  | 34%     |
| Other            | 2%   | 0%      |

| DAILY USAGE PROFILE |                   |                    |
|---------------------|-------------------|--------------------|
|                     | SCCC              | NOTT ST            |
| Average Weekday     | 347               | 136                |
| Average Weekend     | 407               | 196                |
| Maximum Weekday     | Monday            | Monday             |
| Maximum Weekend     | Saturday          | Saturday           |
| Per Weekday Usage   | Thursday, 2-4 PM  | Monday, 11 AM-1 PM |
| Per Weekend Usage   | Saturday, 12-2 PM | Saturday, 1-3 PM   |

| USAGE MODE SPLIT |            |            |            |            |
|------------------|------------|------------|------------|------------|
| MODE             | SCCC       |            | NOTT ST    |            |
|                  | FEMALE     | MALE       | FEMALE     | MALE       |
| Bicyclists       | 19%        | 42%        | 28%        | 38%        |
| Pedestrians      | 20%        | 20%        | 8%         | 26%        |
| <b>Overall</b>   | <b>39%</b> | <b>61%</b> | <b>36%</b> | <b>64%</b> |

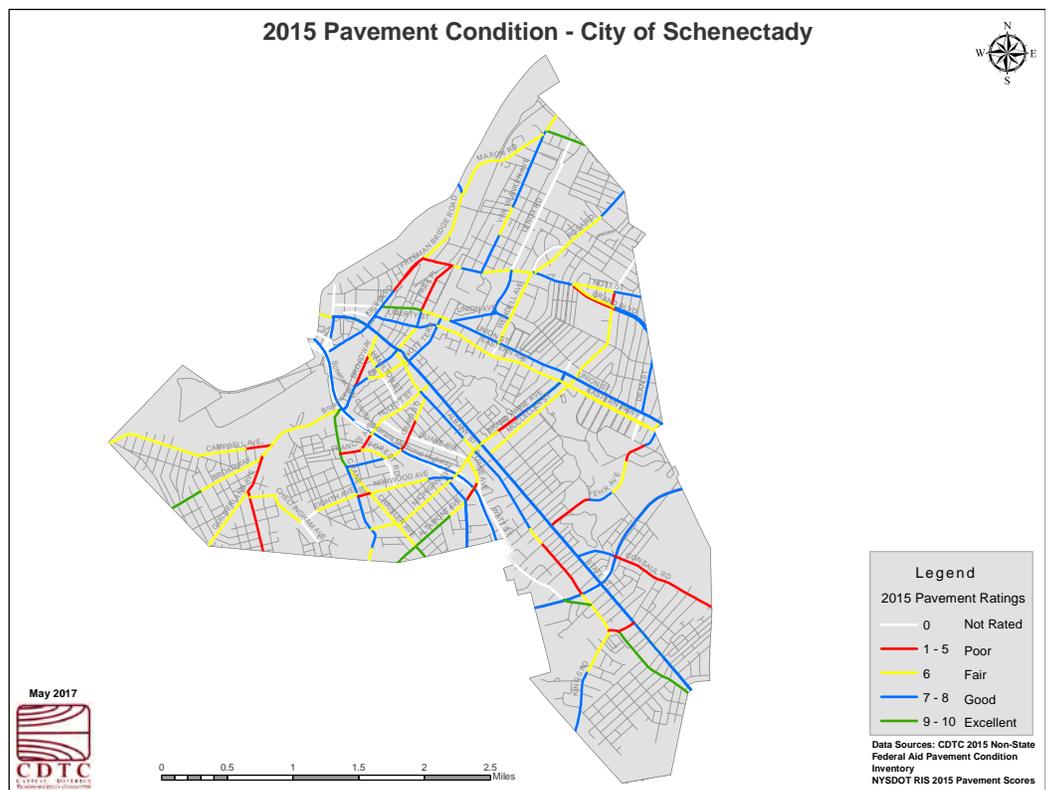
## PAVEMENT CONDITIONS

Pavement conditions can have a large impact on the behavior of vehicles, capacity of a roadway, and accessibility for bicyclists.

Poor pavement conditions generally include large gaps, holes, and heaves. Poor pavement increases sporadic movement of motorists and bicyclists as they often swerve to avoid large bumps and cracks, creating unpredictable and dangerous situations. Poor pavement can also be a distraction to motorists. If they are concentrated on avoiding areas of poor pavement, they are less likely to see pedestrians, bicyclists, other motorists, or traffic control devices, increasing the likeliness of collisions.

Poor pavement takes a toll on the vehicles too, for both motorists and bicyclists. Damage over time and from specific incidents regarding pavement conditions increase costs to maintain bicycles and cars.

The City of Schenectady currently has a pavement paving schedule, where each City owned corridor is prioritized based on its condition and how long ago it was paved. The New York State Department of Transportation also has a paving schedule for State owned corridors, including those in the City of Schenectady.



## SCHENECTADY POLICE DEPARTMENT MOUNTAIN BIKE PATROL

The Schenectady Police Department has a mountain bike patrol division. This patrol unit consists of officers who have engaged in specialized mountain biking training, and now have the option of riding a mountain bike during patrols if they desire. Several patrol vehicles also have bike racks attached to them, so that members of these patrols may be able to switch from their patrol vehicle to their mountain bike, and vice versa.

These patrolling officers act as good role models for bicyclists. They show bicyclists the proper etiquette of road-cycling, such as the use of hand signals, riding with traffic, and not riding on sidewalks. They also help enforce the idea that bicyclists belong on the streets, a concept that not all motorists know or understand.

There are currently two patrol units in Schenectady that use bicycles. Both patrol the downtown area.<sup>1</sup>



**Schenectady Mountain Bike Patrol Officer**

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<sup>1</sup> [http://www.schenectadypd.com/community/mountain\\_bike\\_patrol.php](http://www.schenectadypd.com/community/mountain_bike_patrol.php)

## ELECTRIC CITY BIKE RESCUE

Electric City Bike Rescue is an advocacy and service group that works to repair, restore, and redistribute unwanted, abandoned, or underused bikes throughout the City of Schenectady.

The group works out of donated space within the Edison Tech Center downtown and holds open shop hours from 5:30 PM to 8:30 PM on Thursdays, where community members can come work on bikes and learn about bicycle maintenance.

The Bike Rescue accepts donations of unused or unwanted bikes. These bikes are either restored or used for parts to create new bikes, and then are redistributed throughout the City to people in need. The bicycle rescue also offers bike parts separately, allowing community members to make repairs to their bikes.

The group identifies their mission as the following:

“Electric City Bike Rescue” will be a resource within Schenectady that will bring people together from all areas of the community; whether they are youth looking for fun ways to exercise, a person looking for a source of alternative transportation, or people of any age who want to learn a new skill.<sup>1</sup>

The Electric City Bike Rescue also participates and hosts several community outreach events throughout the year, including bike fix-up days at various locations.



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1 <https://www.facebook.com/ElectricCityBikeRescue>

## TRANSIT FACILITIES

### LOCAL BUS TRANSIT

The City of Schenectady is a key link in the transit network of the Capital District Transit Authority (CDTA). The bus service provided by CDTA offers the City 11 separate routes, including one BusPlus route, which is CDTA’s version of bus rapid transit services. Bus stops are located throughout the City with varying levels of amenities, such as shelters, benches, bike parking, maps or wayfinding, bus stop signage, and trash receptacles.

The most prominent transit corridors in the City of Schenectady include Nott Street (Route 354), Van Vranken Avenue (Route 351), and State Street (Route 905 Bus Plus). CDTA also provides regional connections between Schenectady and the following municipalities:

- Troy (Route 370)
- Albany (Route 763 and Route 905 BusPlus)
- Colonie (Route 355)
- Scotia (Route 353)
- Saratoga Springs (Route 450)

Key Trip generators within the City and region that can be reached by transit routes that serve Schenectady include:

- Rotterdam Square Mall (Routes 354 & 530)
- Hannaford Plaza (Route 352)
- GE Schenectady Campus (Route 351)

Downtown Schenectady can also be reached through routes 450, 351, 353, 354, 355, 370, 763, and 905 BusPlus, providing access to additional trip generators, such as Proctors, the Historic Stockade, and the Schenectady Train Station.<sup>1</sup>

<sup>1</sup> [www.cdta.org/routes-and-schedules](http://www.cdta.org/routes-and-schedules)



**Bike Racks outside of the BusPlus stop at State Street and Moyston Street**

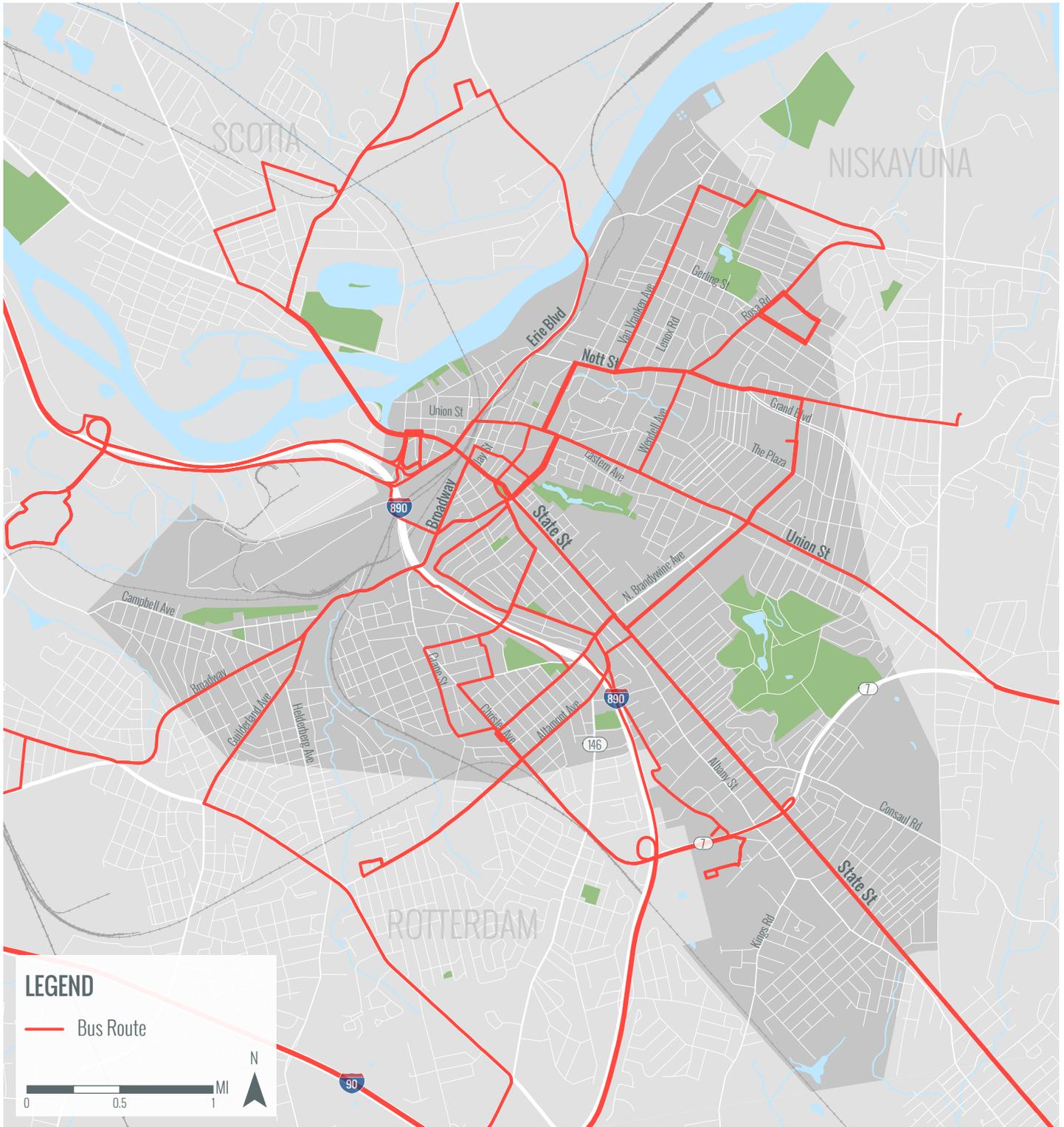


**Bike being placed on a CDTA on-bus bike rack.**



**CDTA bus picking up passengers.**

## Map 4 - CDTA Transit Routes



## INTERMODAL OPPORTUNITIES

CDTA has made great strides throughout the Capital District in creating intermodal connection opportunities, including bike-bus connections. CDTA has established a bus bike rack program, where every CDTA bus is equipped with an on-bus bike rack.<sup>1</sup> This greatly increases the mobility of cyclists, as they can use CDTA buses for certain legs of their journey without having to leave their bikes behind. It also creates a sense of comfort for cyclists when they have the opportunity to keep their bikes with them, rather than leave them locked to a bike rack where they can be stolen.

Having bike racks on the buses also allows for cyclists who traveled one direction by bike, to use transit to travel the other direction. A major deterrent for bicycling is the predictableness of weather. With the ability to travel by bike one way, and transit on the return trip without having to leave behind your bike, bicycling becomes more of a viable option.

CDTA has begun to integrate bike racks at highly trafficked bus stops as well. In particular, these bike racks have been implemented heavily along the BusPlus routes.<sup>2</sup> Bus stop racks are effective for creating intermodal connections for cyclists who do not have access to bicycle storage at their final destination. Cyclists can leave their bicycle locked to a rack when they board the bus, and then retrieve it on their journey back. Bicyclists may also be more comfortable using bike racks at BusPlus stops, as opposed to other bike racks, as these frequented bus stops have higher foot traffic than most places, which deters vandalism and theft.

1 <https://www.cdta.org/news/free-bike-racks-available/7663>

2 <https://www.cdta.org/cdta-busplus/167>

## LONG DISTANCE TRANSIT

### Long Distance Train Services

Schenectady has a train station that offers passenger service on Amtrak. The station is located in downtown Schenectady and offers services south towards New York City, west towards Buffalo, and north towards Canada. Five train lines use the station, including:

- Adirondack Service (New York City, NY to Montreal, QC)
- Maple Leaf (New York City, NY to Toronto, ON)
- Extended Empire Service (New York City, NY to Buffalo, NY)
- Ethan Allen Express (New York City, NY to Rutland, VT [plans to expand to Burlington])
- Lake Share Limited (New York City, NY to Chicago, IL)

The train station, located between State Street, Liberty Street, Erie Boulevard, and Broadway,<sup>3</sup> is being prepared to undergo a renovation and remodel. The plan is still under development, but is said to include a public open space as one of its main features. Construction should begin this year and should be completed by 2018.<sup>4</sup>

Currently, there are no Amtrak trains that service Schenectady that allow bicycles to be checked as baggage. Trains do exist that allow this though, and the feature may be added to other trains.

3 <https://www.amtrak.com/train-schedules-timetables>

4 <http://downtownschenectady.org/department-of-transportation-announces-plans-for-schenectady-rail-station/>

## Long Distance Bus Services

Schenectady has a Greyhound bus terminal that is located on State Street in Downtown Schenectady. The Greyhound lines provide direct access to many metropolitan areas in the Northeast and connections to destinations throughout the country.<sup>5</sup>

5 <https://www.greyhound.com/>



**Proposed Renovation of the Schenectady Train Station**

## CORRIDOR LEVEL OF SERVICE

The Florida State DOT Corridor level of service (LOS) analysis is the method used in general practice for assessing the entire length of corridors or sections of corridors between intersections.. It is based upon several different factors, including:

- traffic volumes
- number of lanes
- location
- vehicle speeds

In addition, this analysis offers a level of service for bicycle modes based upon the presence of shoulders and the traffic volumes. It should be noted, however, that these bicycle levels of service are not all-telling, and lack several important factors that can influence the comfort and feasibility of a corridor for a cyclist. The corridor levels of service also do not represent the intersection levels of service, which are a separate, more in-depth, analysis.

The table below outlines these two levels of service for the primary corridors mentioned in the Traffic Volumes section. These may not represent the level of service throughout the corridors in their entirety, but should be considered general conditions of the corridor.

“Level of Service represents the relationship between the capacity of a roadway and the existing volumes of traffic that the roadway carries. The higher the level of service (A being the highest ranking), the lower the congestion on that road. The lower the level of service (F being the lowest ranking), the higher amounts of congestion on that road. The average corridor level of service in America for all roadways is C. An F represents a failing roadway (a roadway whose traffic volumes have exceeded its capacity) and an E is generally considered acceptable, though undesirable.”

*- Highway Capacity Manual, Transportation Research Board*

| Corridor Name | Corridor LOS | Bicycle LOS |
|---------------|--------------|-------------|
| Route 7       | C            | D           |
| Erie Blvd.    | D            | D           |
| Broadway      | F            | E           |
| State St.     | F            | E           |
| Nott St.      | D            | E           |
| Union St.     | C            | E           |

## CORRIDOR LEVEL OF SERVICE VISUAL REPRESENTATIONS



### Level of Service: A

No congestion along the roadway and traffic travels at the freeflow speed.



### Level of Service: B/C

Traffic speeds are minimally reduced due to the presence of light congestion.



### Level of Service: D/E

Traffic begins to slow and congestion builds.

### Level of Service: F

Traffic is at a minimal speed or completely stopped in bumper-to-bumper congestion.



## PARKING INFRASTRUCTURE

The City of Schenectady has multiple sources of parking for motorized vehicles, including several public parking lots, parking garages, and on-street parking.

Schenectady's downtown parking facilities have been improved greatly in the last few years. In particular, on-street parking on parts of State St. and Erie Blvd. have had buffers installed on them, separating them from the travel lanes, essentially turning them into miniature public parking lots. This was done as part of a road diet project, and the separation allows parking vehicles to diminish their impact on traffic as they attempt to park. It also reduces conflicts. As motorists back out of the parking spaces, they are no longer backing out into live traffic. This is especially important for cyclists, as they are often more difficult to see when backing out of a parking stall since they are smaller and tend to stay as far right as they can.

Outside of Erie Blvd. and State Street, most streets in Schenectady provide on-street parking in the form of the standard parallel parking stalls, unless otherwise posted. Most corridors in the downtown area also have metered parking that applies for weekdays between 9 AM and 6 PM or during events.<sup>1</sup>

Parking garages and lots for motor vehicles are relevant to the bicycle network for several reasons. For one, they represent large trip generators for motor vehicles. For the City of Schenectady, they are where most commuters or visitors park when traveling downtown. The streets around them during peak hours and events can become uncomfortable for bicyclists. In addition, excessive



**Buffered Parking Areas on State St.**



**Schenectady Municipal Parking Garage**

amounts of parking can discourage bicycling due to the car-centric atmosphere of such locations.

However, lots and garages also present a great opportunity for installing bicycle parking facilities. Garages in particular offer great facilities, as they already provide a roofing structure for the bike parking, which is ideal.

1 [www.parkschenectady.com](http://www.parkschenectady.com)

## Lots and Garages

The City of Schenectady has a number of off street parking facilities as well, including numerous public lots and garages.

Most public lots require a permit or charge a fee for parking in them for more than 2 hours during the hours of 9 AM to 5 PM or during events. Each facility has its own designated daily, hourly and monthly rates, with the exception of the South Broadway lot, which only offers a monthly rate.

The Schenectady Municipal Parking garage, which is entered from Hamilton St, just off of Broadway, is the one parking facility that is a full, covered, parking garage.

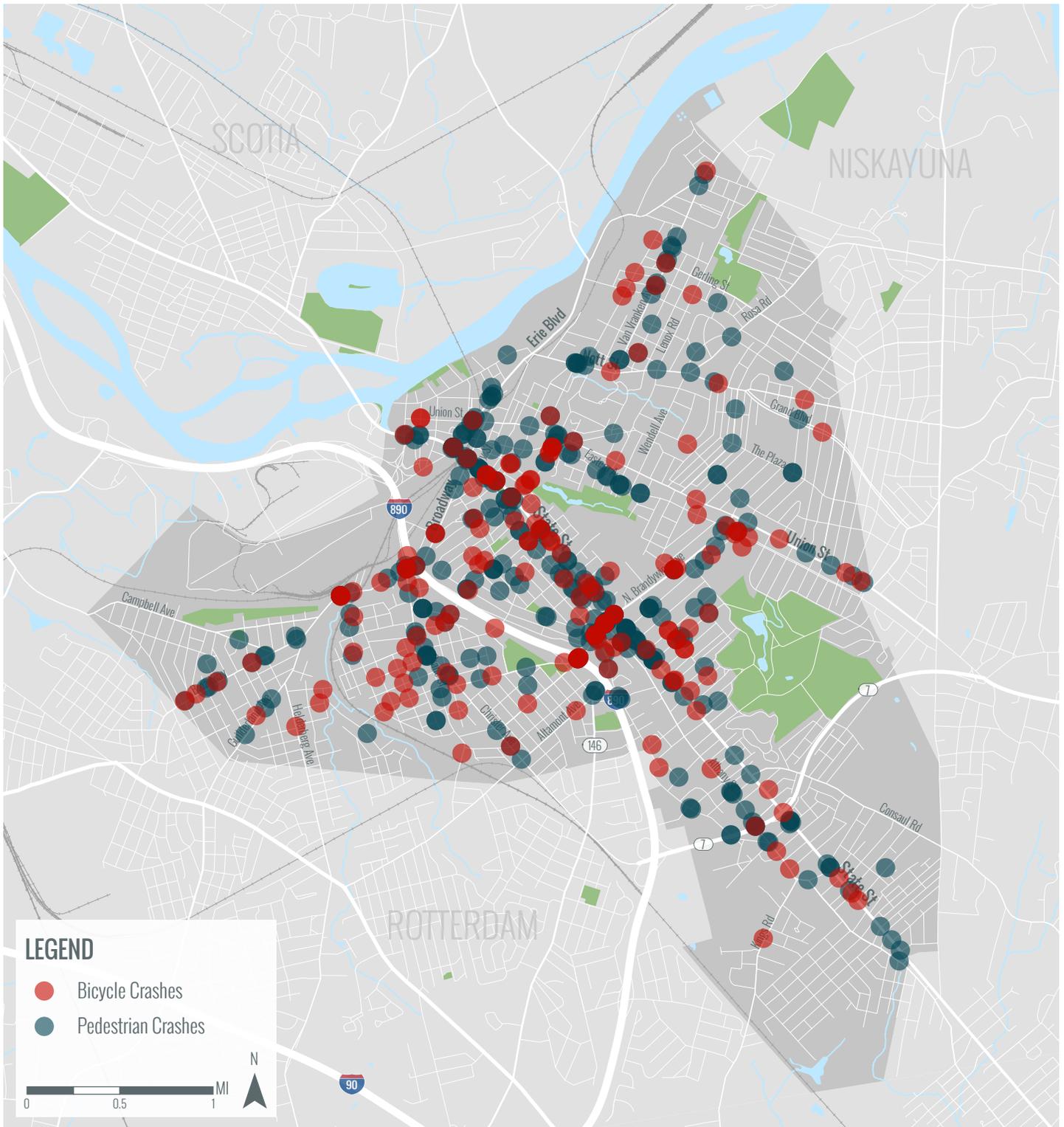
In addition to these public facilities, there are numerous private lots and garages in the City. Most of the lots are in front of private retail stores or other buildings. There is currently no code or ordinance dictating the maximum size of store front parking in the City of Schenectady.

More information on the parking rates and locations can be found on: [www.parkschenectady.com](http://www.parkschenectady.com)

Map 5 - Public Parking Lots & Garages



### Map 6 - Collision Point Data (2010-2015)



Data Sources: NYSDOT, CDTC

Disclaimer: Crash data provided by the NYS Department of Transportation's Accident Location Information System

# ENVIRONMENTAL JUSTICE

## INTRODUCTION

Per federal requirements, the Capital District Transportation Committee (CDTC) undertakes an analysis of Environmental Justice in all Community and Transportation Linkage Planning Program (Linkage Program) initiatives to evaluate if transportation concepts and recommendations impact Environmental Justice populations. Impacts may be defined as those that are positive, negative and neutral as described in CDTC's Environmental Justice Analysis document, published March 2014 (available at [http://www.cdcmpo.org/images/Documents\\_reports/cdtk\\_products/EnvironmentalJustice2014.pdf](http://www.cdcmpo.org/images/Documents_reports/cdtk_products/EnvironmentalJustice2014.pdf)). The goal of this analysis is to ensure that both the positive and negative impacts of transportation planning conducted by CDTC and its member agencies are fairly distributed and that defined Environmental Justice populations do not bear disproportionately high and adverse effects.

This goal has been set to:

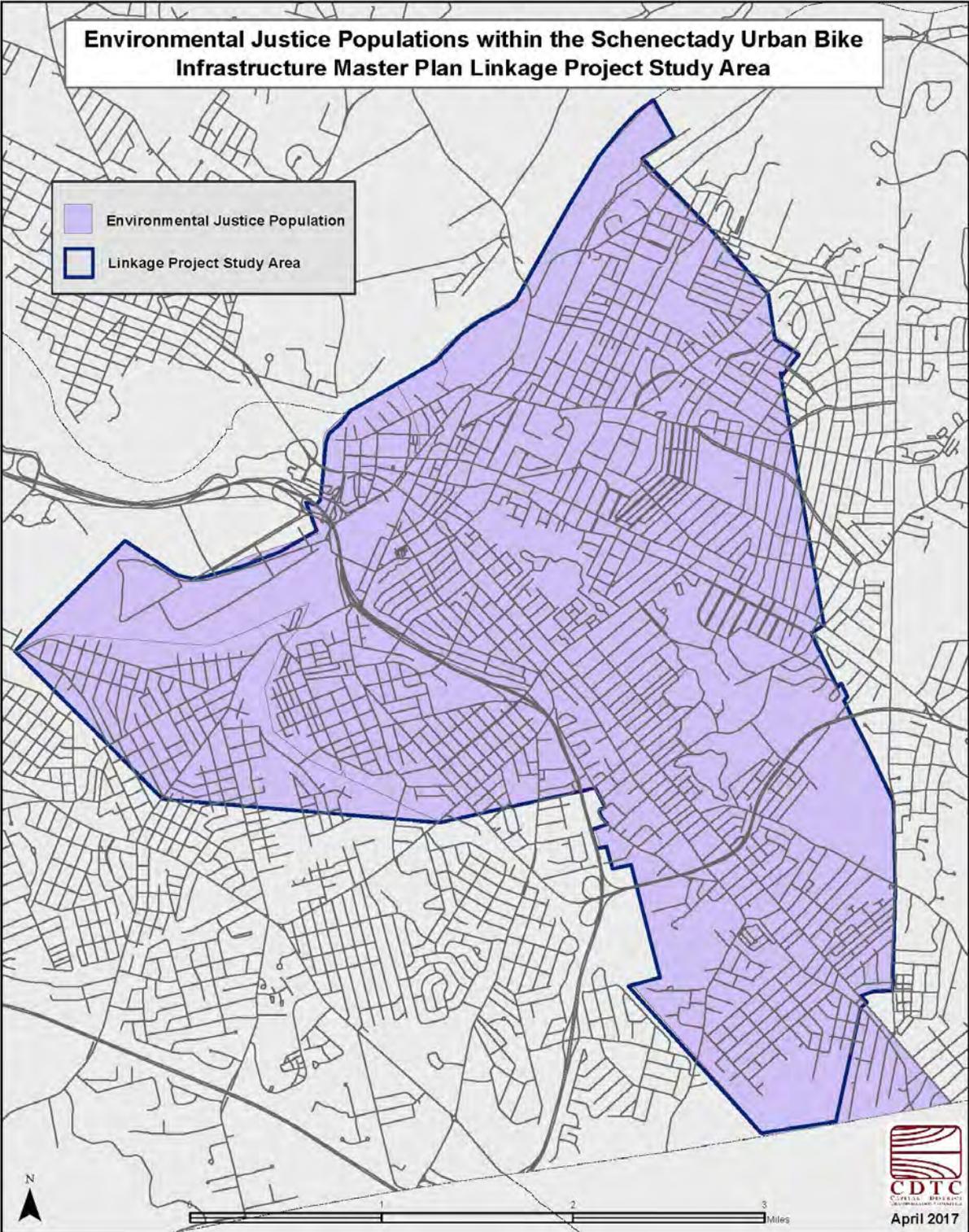
- Ensure CDTC's compliance with Title VI of the Civil Rights Act of 1964, which states that "no person in the United States shall, on the basis of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance,"

- Assist the United State Department of Transportation's agencies in complying with Executive Order 12898 stating, "Each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."
- Address FTA C 4702.1B Title VI Requirements and guidelines for Federal Transit Administration (FTA) recipients, which includes requirements for Metropolitan Planning Organizations (MPOs) that are some form of a recipient of FTA funding, which CDTC is not.

## DATA AND ANALYSIS

In developing a methodology for analysis, CDTC staff created demographic parameters using Summary File 1 data from the 2010 United States Census as well as data from the 2007-2011 American Community Survey (ACS). Threshold values were assigned at the census tract level to identify geographic areas with significant populations of minority or low-income persons. Tracts with higher than the regional average percentage of low-income or minority residents are included on Map 7 as Environmental Justice populations. Minority residents are defined as those who identify themselves as anything but white only, not Hispanic or Latino. Low-income residents are defined as those whose household income falls below the poverty line.

# Map 7 - Environmental Justice Populations



The transportation patterns of low-income and minority populations in CDTC’s planning area are depicted in the Table Commute Mode 4-County NY Capital Region, using the commute to work as a proxy for all travel. The greatest absolute difference between the defined minority and non-minority population is in the Drive Alone and Transit categories: The non-minority population is 17.5% more likely to drive alone, slightly more likely to work at home, 10.1% less likely to take transit, and is also less likely to carpool, walk, or use some other method to commute. The greatest absolute difference between the defined low-income population and the non-low-income population follows the same trend, with the non-low-income population 20.9% more likely to drive alone and 11.7% less likely to commute via transit.

The Schenectady Bike Infrastructure Master Plan study area is entirely included in an Environmental Justice area as the entire City of Schenectady meets the criteria for Census Tracts with a higher than

regional average percentage of minority residents. Consideration for including these populations in the planning process was given in the following ways:

- The Internet was used to display and advertise information about the study.
- Social media was used to provide information and input opportunities.
- A bicycle infrastructure demonstration project was held in a section of the City to specifically engage environmental justice populations.
- Two formal public participation opportunities were provided, with meetings held in the evening in transit accessible locations to neighborhood residents.
- Public comment was accepted throughout the study process.
- Final products will be posted to CDTC’s website, the City of Schenectady’s website and on social media.

### COMMUTE MODE 4-COUNTY NY CAPITAL REGION

| BY RACE                            | DRIVE ALONE | CARPOOL | TRANSIT | OTHER | WALK | WORK AT HOME |
|------------------------------------|-------------|---------|---------|-------|------|--------------|
| All Workers (16+)                  | 80.0%       | 8.3%    | 3.2%    | 1.2%  | 3.6% | 3.7%         |
| White Alone Not Hispanic or Latino | 82.5%       | 7.8%    | 1.8%    | 1.0%  | 2.9% | 3.9%         |
| Minority                           | 65.0%       | 11.0%   | 11.9%   | 2.1%  | 7.4% | 2.6%         |

| BY INCOME   | DRIVE ALONE | CARPOOL | TRANSIT | OTHER | WALK | WORK AT HOME |
|---|-------------|---------|---------|-------|------|--------------|
| All Workers (16+) for whom poverty status is determined | 80.7%       | 8.3%    | 3.2%    | 1.2%  | 3.0% | 3.6%         |
| At/Above 100% Poverty Level                             | 81.7%       | 8.2%    | 2.6%    | 1.1%  | 2.8% | 3.6%         |
| Below 100% Poverty Level                                | 60.8%       | 10.2%   | 14.3%   | 3.1%  | 7.7% | 3.9%         |

Data: American Community Survey 2011 5-year estimates, tables B08105H + B08122. Other incl. taxi, motorcycle, bicycle.

## CONCLUSION

CDTC defines plans and projects with a primary or significant focus on transit, bicycling, walking, or carpool as being “positive”. As the primary purpose of the Schenectady Bike Infrastructure Master Plan is to develop a master plan that supports the implementation of infrastructure, policies and programs that encourage bicycling as a form of transportation in Schenectady, it has been determined that the Plan will have a positive impact on effected populations. The Master Plan provides guidance to City officials for developing an ongoing bicycling program in the City that incorporates important on street facilities, education programs and other support for this low cost mode of transportation for all residents and visitors in the City of Schenectady.

## ENVIRONMENTAL FEATURES SCAN

CDTC’s New Visions 2040 regional transportation plan encourages smart growth as well as investment and development in urban areas as a method to protect natural resources.

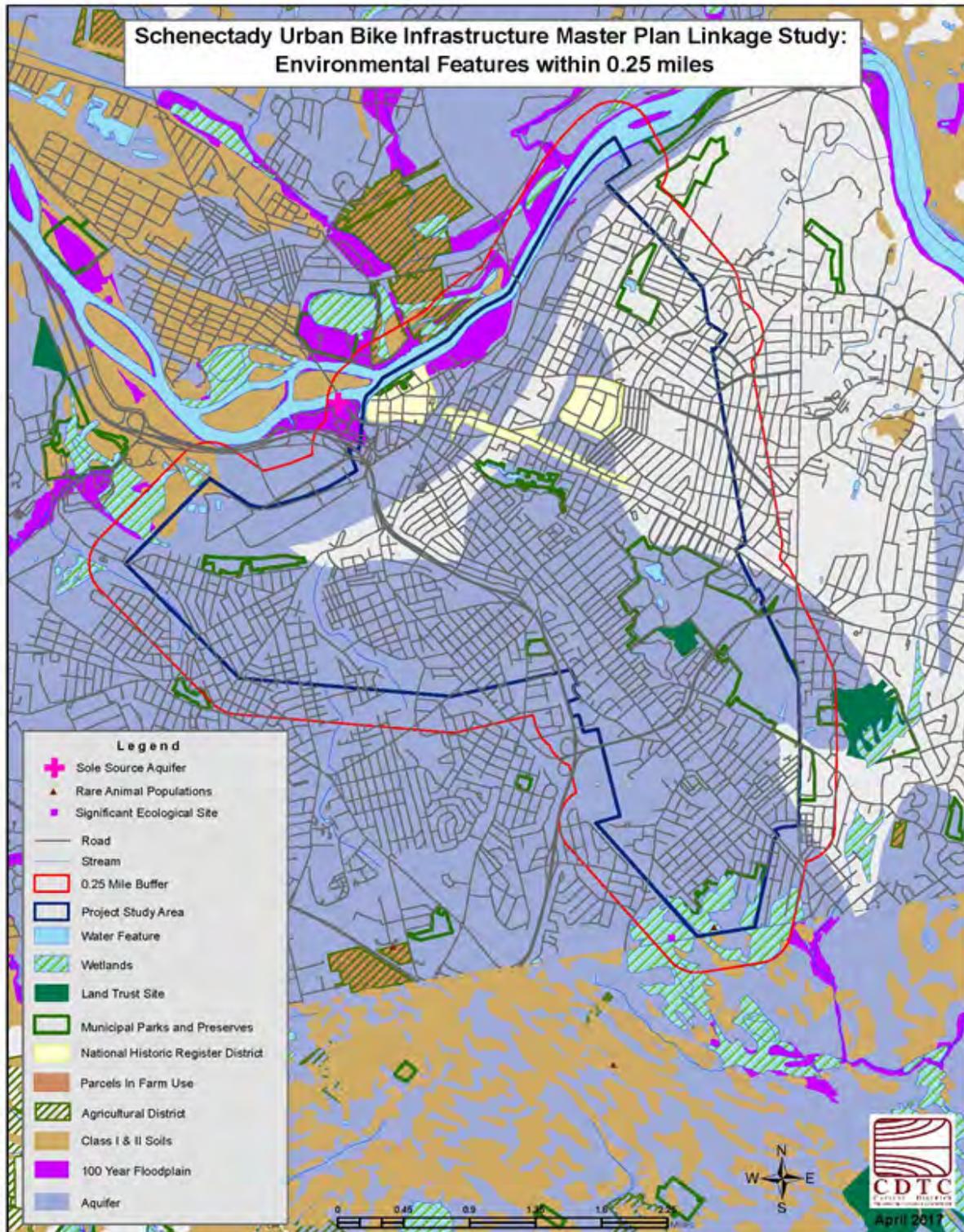
Smart growth policies also help to protect rural character and open space, and protect quality of life in the Capital Region.

CDTC has undertaken review of natural and cultural resource mapping, and for the development of the Regional Transportation Plan consulted with federal, state and local agencies on environmental issues as an important part of the environmental mitigation process. Along with evaluating the impacts to environmental systems of candidate transportation projects for federal funds, CDTC documents the environmental systems present in the study areas for Linkage Program planning initiatives.

Map 8 provides an overview of the environmental systems in the Schenectady Bike Infrastructure Master Plan study area. CDTC uses GIS mapping of the environmental systems to screen for potential project impacts. Features within 0.25 miles of the study area are included in Map 8. The Master Plan recommendations are not expected to impact any identified features since the study area is largely already developed or protected, such as parkland throughout the City.

| ENVIRONMENTAL FEATURES                  |                                      |                                       |
|---|--------------------------------------|---------------------------------------|
| sole source aquifers                    | significant ecological sites         | county forests and preserves          |
| aquifers                                | significant ecological communities   | municipal parks and lands             |
| reservoirs                              | state historic sites                 | land trust sites                      |
| water features (streams, lakes, rivers) | national historic sites              | NYS DEC lands                         |
| wetlands                                | national historic register districts | Adirondack Park                       |
| watersheds                              | federal parks and lands              | agricultural districts                |
| 100 year flood plains                   | state parks and forests              | agriculture parcels taxed as farmland |
| rare animal populations                 | state unique areas                   | agriculture parcels in farm use       |
| rare plant populations                  | state wildlife management areas      | Class I & II soils                    |
| rare animal populations                 | state parks and forests              | agricultural districts                |

# Map 8 - Environmental Features



# APPENDIX B



# STREET DESIGN GUIDELINES

## GUIDELINES OVERVIEW

One of the strongest, and most prevalent tools that a city has at their disposal for improving bicycling comfort, safety, and access is the wide variety of infrastructure improvements that can be implemented on existing street corridors, at key intersections, or through other facilities, such as utility or rail corridors.

Infrastructure improvements for bicyclists should fulfill one of the following purposes:

- Increase visibility of bicyclists for motorists or pedestrians
- Increase visibility of motorists or pedestrians for bicyclists
- Increase bicyclists' accessibility to the existing transportation system
- Increase accessibility of specific locations for bicyclists
- Encourage slower traffic speeds
- Reduce collision rates
- Increase bicyclists' comfort
- Reduce conflict areas between bicyclists, motorists, and pedestrians
- Educate street users on interactions between pedestrians, bicyclists, and motorists
- Guide bicyclists to key destinations and routes
- Provide supportive services such as parking options and maintenance facilities
- Encourage bicycling as a form of transportation or recreation

In order to accomplish these goals of the infrastructure improvements, a set of design guidelines have been developed for the implementation of each facility. They should be addressed whenever a street or trail construction project within the City is being considered.

While the guidelines listed are extensive, they are not necessarily all-inclusive. Each construction project has a series of variables that cannot be completely predicted by any set of guidelines, and for this reason, engineering judgment should be used when implementing any of the described facilities, and any design concept for implementing the facilities should be reviewed by a City engineer for approval.

## CORRIDOR FACILITIES

Corridor facilities, or linear facilities, provide bicyclists with a clear right-of-way for travel, by either creating mixed travel facilities, such as shared travel lanes or shared use paths, or providing a separated facility along a given corridor. The corridor facilities identified within this plan include:

- Shared Lanes
- Traditional Bike Lanes
- Buffered Bike Lanes
- Separated Bike Lanes
- Contra-flow Bike Lanes
- Bicycle Climbing Lanes
- One-Way Cycle Tracks
- Two-Way Cycle Tracks

Considerations have also been prepared for on-street parking facilities and colored bikeway treatments.

## TRAIL FACILITIES

Trails are a unique facility that provide bicyclists and pedestrians with a completely separate facility from motorists. While trails do not necessarily need to be bound to any particular existing corridor, they often follow the path of streets, rail-lines, or utility corridors. They may either be shared use with mixed travel lanes for pedestrians and bicyclists, single use trails, such as hiking trails or mountain biking tracks, or separated use trails, where bicyclists and pedestrians may both use the trail facility, but have separated travel lanes. This plan identifies and provides guidance for the following trail types that either exist or may be implemented within the City of Schenectady:

- Natural Surface Trails
- Shared Use Paths
- Side Paths
- Rails to Trails
- Rails with Trails
- Utility Corridor Trails

## NEIGHBORHOOD GREENWAYS

Neighborhood greenways are low stress, low volume street corridors that are comfortable for all users to share the street-space together. They often pass through residential neighborhoods and present a very family-friendly facility when implemented properly. Infrastructure elements should concentrate on wayfinding and traffic calming. Aspects of neighborhood greenways that are identified within this plan include:

- Bicycle Boulevards
- Horizontal Traffic Calming
- Vertical Traffic Calming
- Traffic Diversion

While these elements specifically speak towards the design and development of neighborhood greenways, it should be noted that traffic calming and traffic diversion may be implemented for alternative purposes as well, if implemented with engineering judgment.

## INTERSECTION FACILITIES

Intersections are a source of many of the conflicts between bicyclists and other users as their paths of travel cross. Intersection improvements in particular should concentrate heavily on increasing the visibility of and for bicyclists, as well as reduce the number of possible conflict areas between different street users. This plan has provided guidance for the following intersection facilities:

- Bicycle Crossing Markings
- Bike boxes
- 2-Stage turn boxes
- Prolonged All Red Times
- Bicycle Detection
- Hybrid Signals
- Bicycle Signals
- Roundabout Considerations
- Protected Intersections

## SIGNAGE & WAYFINDING

Signage and wayfinding markings are tools that provide information to street users about destinations, roadway uses, directions and restrictions. This section of the design guidelines addresses the following aspects of bicycle wayfinding and signage:

- Bicycle Routes
- MUTCD Guidelines
- Branding
- Information & mapping Kiosks

## SUPPORTIVE INFRASTRUCTURE

Supportive bicycle infrastructure features are any facilities or utilities offered to bicyclists in order to encourage bicycling and meet the needs of bicyclists. They can include parking facilities, maintenance facilities, or facilities dedicated to allowing bicyclists to overcome obstacles unique to their user group. The features identified in this section include:

- Bike Racks
- Bike Lockers
- Bicycle Corrals
- Bike SPAs (Secure Parking Areas)
- Bicycle Repair Stations
- Bicycle Stairway Rails

## BICYCLE EDUCATION & MISCONCEPTIONS

Bicycle education is a major cornerstone to creating a safe and growing bicyclist community in any region. Bicycle education can come in many forms, including teaching individuals how to ride a bike, teaching bicyclists the legal requirements to riding on the road, and teaching motorists the rights of bicyclists. Without proper education, several misconceptions about bicycling can become popular.

### EDUCATION

Currently, there is no formal education program in the City of Schenectady to teach bicyclists the rules of the road or the necessary skills for riding in the streets. However, several neighboring communities, such as Albany, Niskayuna, Saratoga, and Troy, have held festivals and events in the past dedicated to teaching these concepts.

### MISCONCEPTIONS

Due to the lack of available education for the citizens of Schenectady about bicycling, several misconceptions have become popular, leading to poor bicycling habits.

## Contraflow Riding

Contraflow riding is one of the most common, yet most dangerous habits for bicyclists. Bicyclists are required to ride with motor vehicle traffic when on public streets, and follow all motor vehicle rules. The only time contraflow riding is allowed is when there is a contraflow bicycle lane present, and there are not any in the City of Schenectady.

Many cyclists believe that contraflow riding is the correct form though, and do not realize it is incorrect. Others are just more comfortable riding on the opposite side of the road against traffic, as they can see the vehicles coming towards them, rather than be struck from behind by a vehicle they didn't see.

This practice is not only illegal; it is also very dangerous. While cyclists may be more prone to seeing the motor vehicles coming at them, turning motor vehicles are less likely to see a bicyclist riding on the wrong side of the street, increasing the likelihood of striking the bicyclist.

In addition, collisions with bicyclists are generally more severe when the bicyclist is riding on the wrong side of the street. When a bicyclist is struck while riding on the correct side of the street, it is generally from behind, so their forward momentum reduces the impact caused by the motor vehicle's forward momentum. Bicyclists riding on the wrong side of the road are more likely to be struck on a head on collision, where their forward momentum will increase the severity of the impact caused by vehicles traveling in the opposite direction. Both forms of collisions can be very dangerous to bicyclists, but the head on collisions are more likely to cause severe or fatal injuries.

## Sidewalk Riding

Many bicyclists, as well as motorists, believe that bicycles belong on the sidewalk. This misconception can lead motorists to harass bicyclists that are riding in the street. It is not uncommon for motorists to drive close to a bicyclist while passing them to tell them to ride on the sidewalk. Regardless of the motorist's intentions, this can be dangerous for the cyclists, as close vehicles increase the chance of the cyclist being clipped or being run off the road.

Sidewalk riding is dangerous as well, as it increases the chance of bicyclists colliding with pedestrians, and can decrease visibility between bicyclists and motorists.

# DESIGN NEEDS OF A BICYCLE FACILITY

## THE OPERATING ENVELOPE

The operating envelope refers to the expected spacial requirements for operation of a bicycle. They are defined by the following constraints:<sup>1</sup>

### 1. Physical Operating Width (2'6")

The physical operating width is the minimum amount of space that a bicyclist uses while in motion. However, bicycle facilities shall not be limited to this width, as it does not account for the width required for a comfortable ride or unexpected actions, such as avoiding debris or rough surfaces.

### 2. Minimum Envelope Width (4')

The minimum envelope width is the minimum width that a bicycle facility may incorporate per bike lane. Bike lanes should only be constricted to this width in constrained conditions, as it represents a generally uncomfortable width.

### 3. Preferred Operating Width (5')

The preferred operating width is the preferred width for bicycle facilities per bike lane, not including the width of any buffer areas. A 5' width gives bicyclists a comfortable ride and allows for faster paced bicyclists to pass slower bicyclists.

### 4. Maximum Envelope Width (8')

The maximum envelope width recognizes the maximum width of a bicycle lane for dedicated bicycle facilities. A larger width may result in higher bicyclist speeds. If a facility has a wider lane for a single direction of bicycle travel, the lane shall be divided down the center by a dashed white line.

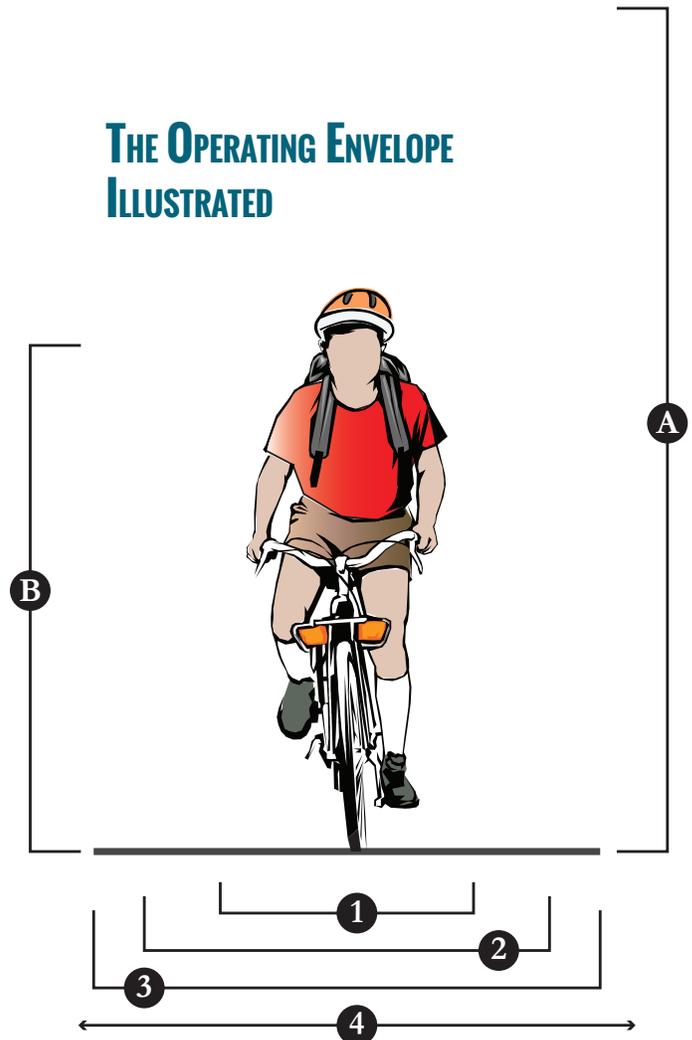
<sup>1</sup> AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition

## A. Vertical Envelope Limit (8'4")

The vertical envelope limit marks the maximum height that bicyclists and their equipment are expected to reach while in motion, with a comfort buffer of approximately 2'.

## B. Typical Eye Level (5')

Typical eye level is the height of a bicyclists eyes while in motion. Signs intended for use by bicyclists shall not be installed below this operating level.



## TYPICAL DIMENSIONS

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. The figure and table below summarize the typical dimensions for bicycle types.

## DESIGN SPEED EXPECTATIONS

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as shared use paths. The table to the right provides typical bicyclist speeds for a variety of conditions.

Standard Bike: 5' 10"



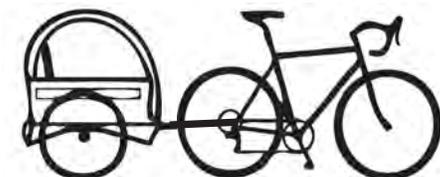
Tandem Bike: 8'



Recumbent Bike: 8'



Child Trailer: + 4' 2"



| Bicycle Type                      | Feature   | Typical Dimensions |
|-----------------------------------|---|--------------------|
| <b>Upright Adult Bicyclist</b>    | Physical Width  | 2' 6"              |
|                                   | Operating Width (Minimum)                                       | 4'                 |
|                                   | Operating Width (Preferred)                                     | 5'                 |
|                                   | Operating Width (Maximum)                                       | 6'                 |
|                                   | Physical Length   | 5' 10"             |
|                                   | Physical Height of Handlebars                                   | 3' 8"              |
|                                   | Operating Height  | 8' 4"              |
|                                   | Eye Height  | 5'                 |
|                                   | Vertical Clearance for Infrastructure (tunnels, lighting, etc.) | 10'                |
| <b>Recumbent Bicyclist</b>        | Physical Length   | 8'                 |
|                                   | Eye Height  | 3' 10"             |
| <b>Tandem Bicyclist</b>           | Physical Length   | 8'                 |
| <b>Bicycle with Child Trailer</b> | Physical Length   | 10'                |
|                                   | Physical Width  | 2' 8"              |

| Bicycle Type                   | Feature                | Typical Speed |
|--------------------------------|------------------------|---------------|
| <b>Upright Adult Bicyclist</b> | Paved Level Surface    | 15 mph        |
|                                | Crossing Intersections | 10 mph        |
|                                | Downhill               | 30 mph        |
|                                | Uphill                 | 5-12 mph      |
| <b>Recumbent Bicyclist</b>     | Paved Level Surface    | 18 mph        |

Source: AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition

# CORRIDOR FACILITIES



## SHARED LANES

### OVERVIEW

A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane. Shared lane markings are also placed outside of the 'door zone,' and are used to encourage bicyclists to ride outside of the zone.

### GUIDANCE

- In constrained conditions, preferred placement is in the center of the travel lane to minimize wear and promote single file travel.
- Minimum placement of the SLM marking centerline is 11 feet from the edge of curb where on-street parking is present, or 4 feet from the edge of curb with no parking. If the parking lane is wider than 7.5 feet, the SLM should be moved further out accordingly.



### DISCUSSION

Bike Lanes should be considered on roadways with outside travel lanes wider than 15 feet, or where other lane narrowing or removal strategies may provide adequate road space. SLMs shall not be used on shoulders, in designated Bike Lanes, or to designate Bicycle Detection at signalized intersections. (MUTCD 9C.07)

SLMs also shall not be placed on corridors with speed limits greater than 35 MPH.

### ADDITIONAL RESOURCES

AASHTO. (1999). Guide for the Development of Bicycle Facilities.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

NACTO. (2011). Urban Bikeway Design Guide.

### MATERIALS & MAINTENANCE

Placing SLMs between vehicle tire tracks will increase the life of the markings and minimize the long-term cost of the treatment. SLMs can be applied with paint or thermoplastic.

## TRADITIONAL BIKE LANES

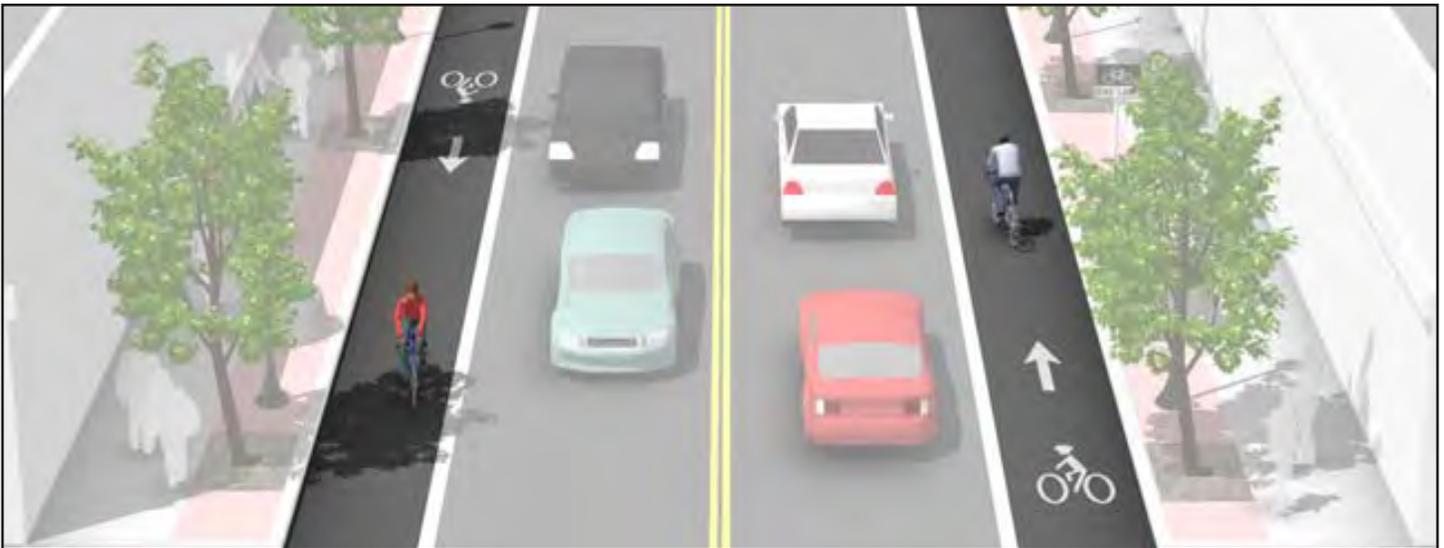
### OVERVIEW

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is typically located on the right side of the street, between the adjacent travel lane and curb, and is used in the same direction as motor vehicle traffic.

A bike lane width of 7 feet makes it possible for bicyclists to ride side-by-side or pass each other without leaving the bike lane, thereby increasing the capacity of the lane.

### GUIDANCE

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane. See buffered bicycle lanes when a wider facility is desired.



### DISCUSSION

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Consider Buffered Bicycle Lanes when further separation is desired.

### ADDITIONAL RESOURCES

AASHTO. (1999). Guide for the Development of Bicycle Facilities.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

NACTO. (2011). Urban Bikeway Design Guide.

### MATERIALS & MAINTENANCE

Bike lane striping should be applied with traffic paint and replaced when the other street striping is replaced. Bike lane symbols can be applied with paint or thermoplastic.

## BUFFERED BIKE LANES

### OVERVIEW

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Buffered bike lanes are allowed as per MUTCD guidelines for buffered preferential lanes (section 3D-01).

Buffered bike lanes are designed to increase the space between the bike lane and the travel lane or parked cars. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.



### DISCUSSION

Frequency of right turns by motor vehicles at major intersections should determine whether continuous or truncated buffer striping should be used approaching the intersection. Commonly configured as a buffer between the bicycle lane and motor vehicle travel lane, a parking side buffer may also be provided to help bicyclists avoid the 'door zone' of parked cars.

### ADDITIONAL RESOURCES

FHWA. (2009). Manual on Uniform Traffic Control Devices. (3D-01)

NACTO. (2011). Urban Bikeway Design Guide.

### GUIDANCE

- Buffers should be at least 2 feet wide. If 3 feet or wider, mark with diagonal or chevron hatching.
- For clarity at driveways or minor street crossings, consider a dotted line for the inside buffer boundary where cars are expected to cross.

### MATERIALS & MAINTENANCE

Buffers should be applied using white traffic paint, unless the buffer is being used for a contra-flow lane, in which case yellow traffic paint is required.

## SEPARATED BIKE LANES

### OVERVIEW

Separated bike lanes may also be referred to as one-way cycle tracks.

Protection is provided through physical barriers and can include bollards, parking, a planter strip, an extruded curb, or on-street parking. Cycle tracks using these protection elements typically share the same elevation as adjacent travel lanes.

### DISCUSSION

Sidewalks or other pedestrian facilities should not be narrowed to accommodate the separated bike lane as pedestrians will likely walk on the bike lane if sidewalk capacity is reduced. Visual and physical cues (e.g., pavement markings & signage) should be used to make it clear where bicyclists and pedestrians should be traveling. If possible, separate the cycle track and pedestrian zone with a furnishing zone.

### MATERIALS & MAINTENANCE

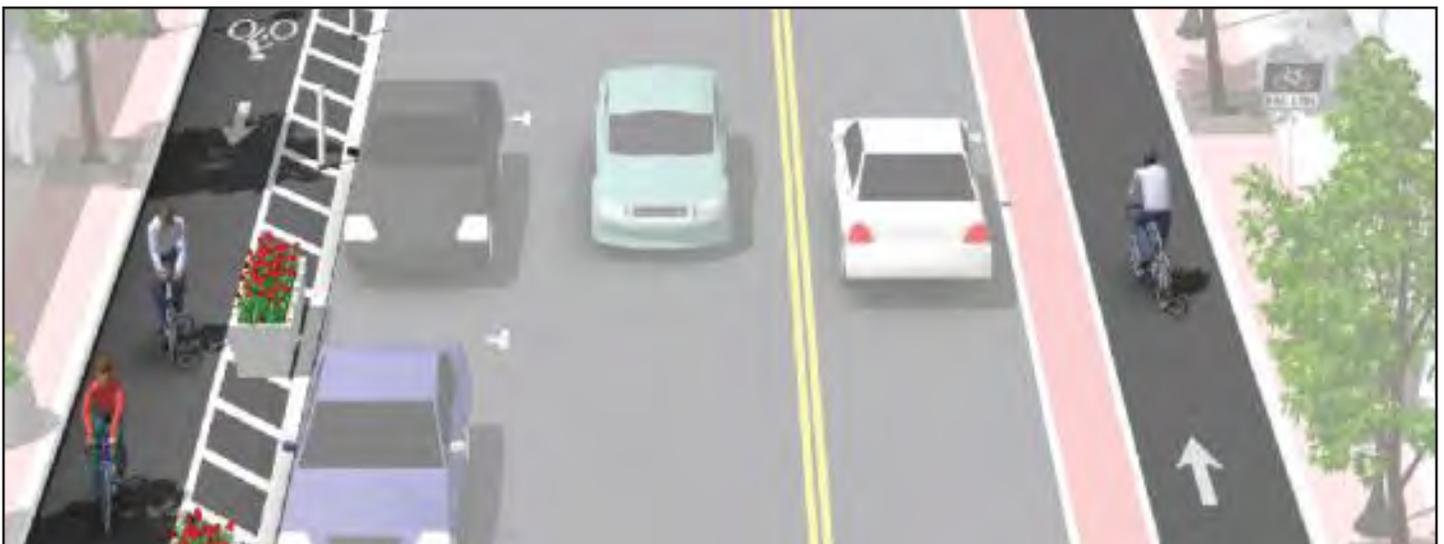
Barriers may require special equipment for snow removal or may be removed during winter months, turning the separated bike lane into a buffered bike lane.

### GUIDANCE

- Separated bike lanes should be placed along streets with long blocks and few driveways or mid-block access points for motor vehicles. Cycle tracks located on one-way streets have fewer potential conflict areas than those on two-way streets.
- Separated bike lanes shall be located between the parking lane and the sidewalk where parking on-street is permitted.

### ADDITIONAL RESOURCES

NACTO. (2011). Urban Bikeway Design Guide.



## CONTRA-FLOW BIKE LANES

### OVERVIEW

Contra-flow bike lanes provide bidirectional bicycle access on a roadway that is one-way for motor vehicle traffic. This treatment can provide direct access and connectivity for bicyclists and reducing travel distances. Contra-flow bike lanes can also be used to convert two-way motor vehicle traffic to one-way to reduce traffic volumes where desired.

### GUIDANCE

- The contra-flow bike lane should be 5-7 feet wide and marked with a solid double yellow line and appropriate signage. Bike lane markings should be clearly visible to ensure that the contra-flow lane is exclusively for bicycles. Coloration should be considered in the bike lane.
- Signage specifically allowing bicycles at the entrance of the contra flow lane is recommended.



### DISCUSSION

Because of the opposing direction of travel, contra-flow bike lanes increase the speed differential between bicyclists and motor vehicles in the adjacent travel lane. If space permits consider a buffered bike lane or cycle track configuration to provide additional separation.

### ADDITIONAL RESOURCES

FHWA. (2009). Manual on Uniform Traffic Control Devices.  
NACTO. (2011). Urban Bikeway Design Guide.

### MATERIALS & MAINTENANCE

Yellow traffic paint should be used when installing the double yellow line to delineate the contra-flow lane.

## BICYCLE CLIMBING LANE

### OVERVIEW

Uphill bike lanes (also known as “climbing lanes”) enable motorists to safely pass slower-speed bicyclists, thereby improving conditions for both travel modes.

### GUIDANCE

- Uphill bike lanes should be 6-7 feet wide (wider lanes are preferred because extra maneuvering room on steep grades can benefit bicyclists).
- Can be combined with Shared Lane Markings for downhill bicyclists who can more closely match prevailing traffic speeds.

### DISCUSSION

This treatment is typically found on retrofit projects as newly constructed roads should provide adequate space for bicycle lanes in both directions of travel. However, many of the existing streets within the City of Schenectady that have steep grades may only have enough space to accommodate one bicycle lane. In these cases, uphill lanes should be given priority, unless a history of collisions or identified conflicts prove the necessity of a bike lane on the downhill lanes. Accommodating an uphill bicycle lane often includes delineating on-street parking (if provided), narrowing travel lanes and/or shifting the centerline if necessary.



### ADDITIONAL RESOURCES

- NACTO. (2011). Urban Bikeway Design Guide.  
AASHTO. (1999). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.

## TWO-WAY CYCLE TRACKS

### OVERVIEW

Two-way cycle tracks are physically separated cycle tracks that allow bicycle movement in both directions on one side of the road.

A two-way cycle track may be configured as a protected cycle track at street level with a parking lane or other barrier between the cycle track and the motor vehicle travel lane and/or as a raised cycle track to provide vertical separation from the adjacent motor vehicle lane.

### GUIDANCE

- 12 foot recommended minimum for two-way facility.
- 8 foot minimum in constrained locations.
- When placed adjacent to parking, the parking buffer should be three feet wide to allow for passenger loading and to prevent door collisions.



### DISCUSSION

Two-way cycle tracks require a higher level of control at intersections to allow for a variety of turning movements. These movements should be guided by separated signals for bicycles and motor vehicles. Transitions into and out of two-way cycle tracks should be simple and easy to use to deter bicyclists from continuing to ride against the flow of traffic. At driveways and minor intersections, bicyclists riding against roadway traffic in two-way cycle tracks may surprise pedestrians and drivers not expecting bidirectional travel. Appropriate signage is recommended.

### ADDITIONAL RESOURCES

NACTO. (2011). Urban Bikeway Design Guide.

### MATERIALS & MAINTENANCE

The buffer may be installed with flexible delineators, planters, a curbed median, or another physical barrier.

# ON-STREET PARKING CONSIDERATIONS

## OVERVIEW

The most common form of on-street parking is parallel stall parking (pictured to the left, below). In certain areas with high parking demand such as urban commercial areas, diagonal parking can be used to increase parking supply.

## DISCUSSION

Conventional front-in diagonal parking is not compatible or recommended in conjunction with high levels of bicycle traffic or with the provision of bike lanes, as drivers backing out of conventional diagonal parking have limited visibility of approaching bicyclists. Likewise, perpendicular stalls shall not be used on roadways with bicycle facilities, and are generally not recommended for public streets as they greatly diminish the visibility of the drivers.

## ADDITIONAL RESOURCES

NACTO. (2011). Urban Bikeway Design Guide.

## GUIDANCE

- If a roadway with diagonal parking is marked with SLMs, they shall be placed in the center of the travel lanes.
- Diagonal parking stalls shall be at least 18' deep when adjacent to a bike lane so that parked vehicles do not block the lane.
- Parallel parking stalls shall be at least 7.5' wide when adjacent to a bike lane so that parked vehicles do not block the lane, unless a parking-side buffer is provided.
- Parking lanes may be used to provide a physical buffer between bicycle facilities and travel lanes.
- On-street parking shall not be placed in such a way that causes motor vehicle traffic to cross a contra-flow lane or two-way cycle track.



## COLORED BIKEWAY CONSIDERATIONS

### OVERVIEW

Colored pavement within a bicycle lane increases the visibility of the bicycle facility. Use of color is appropriate for use in areas with pressure for illegal parking, frequent encroachment of motor vehicles, clarify conflict areas, and along enhanced facilities such as contra-flow bicycle lanes and cycle tracks.

### DISCUSSION

Colored pavement is also used to identify potential areas of conflict, and reinforces priority to bicyclists in these conflict areas. See Colored Bike Lanes in Conflict Areas for more guidance.



### GUIDANCE

The color green has been given interim approval by the Federal Highway Administration in March of 2011. See interim approval IA-14 for specific color standards

The colored surface should be skid resistant and retroreflective.

Colored facilities may be used in conjunction with shared lane markings to create a “lane within a lane” to further clarify proper bicyclist positioning on shared roadway streets.

When applied along full corridors, driveway and intersection areas shall be identified through the absence of color, or the use of an alternate marking pattern to identify potential conflict areas.

### ADDITIONAL RESOURCES

FHWA. (2011). Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10  
NACTO. (2011). Urban Bikeway Design Guide.

### MATERIALS & MAINTENANCE

Colored facilities can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations. Facilities shall be installed with traffic paint, Durable Liquid Pavement Markings (DLPMS), Thermoplastic, or colored pavement.



# TRAIL FACILITIES

## NATURAL SURFACE TRAILS

### DESCRIPTIVE

Sometimes referred to as footpaths or hiking trails, the natural surface trail is used along corridors that are environmentally-sensitive but can support bare earth, wood chip, or boardwalk trails. Natural surface trails are a low-impact solution and found in areas with limited development or where a more primitive experience is desired.

Some natural surface trails may have dangerous grades, poor sight distances, or rough surfaces, and as such, prohibiting bicycle use of the trails should be considered. Safety of the bicyclists, as well as other users, such as hikers, should be considered before opening up a natural surface trail to bicyclists.

A common use for bicycles on natural surface trails is mountain biking. Mountain biking is a recreational activity where bicyclists enjoy the challenge of rougher terrain. However, mountain biking has a tendency to cause more damage to trail surfaces, and should be prohibited in environmentally-sensitive areas. If natural surface trails within an area are to be restrictive to mountain bikers, other trails within the community should be specifically designed around mountain biking use, with higher impact surfaces and the inclusion of obstacles.

### GUIDANCE

Trails can vary in width from 18 inches to 6 feet or greater; vertical clearance should be maintained at nine-feet above grade.

Base preparation varies from machine-worked surfaces to those worn only by usage.

Trail surface can be made of dirt, rock, soil, forest litter, or other native materials. Some trails use crushed stone (also known as “crush and run”) that contains about 4% fines by weight, and compacts with use.

Provide positive drainage for trail tread without extensive removal of existing vegetation; maximum slope is five percent.

### DISCUSSION

Trail erosion control measures include edging along the low side of the trail, steps and terraces to contain surface material, and water bars to direct surface water off the trail; use bedrock surface where possible to reduce erosion.

### ADDITIONAL RESOURCES

Flink, C. (1993). *Greenways: A Guide To Planning Design And Development*.



# SHARED USE PATHS

## OVERVIEW

Shared use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.



## MATERIALS & MAINTENANCE

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

## GUIDANCE

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations. 10 feet is recommended in most situations and will be adequate for moderate to heavy use. 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.
- A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.
- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.
- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines. This may be applied along curves, through under-crossings and over-crossings, and in constrained conditions. They may also be applied along high volume corridors.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

## ADDITIONAL RESOURCES

AASHTO. (1999). Guide for the Development of Bicycle Facilities.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

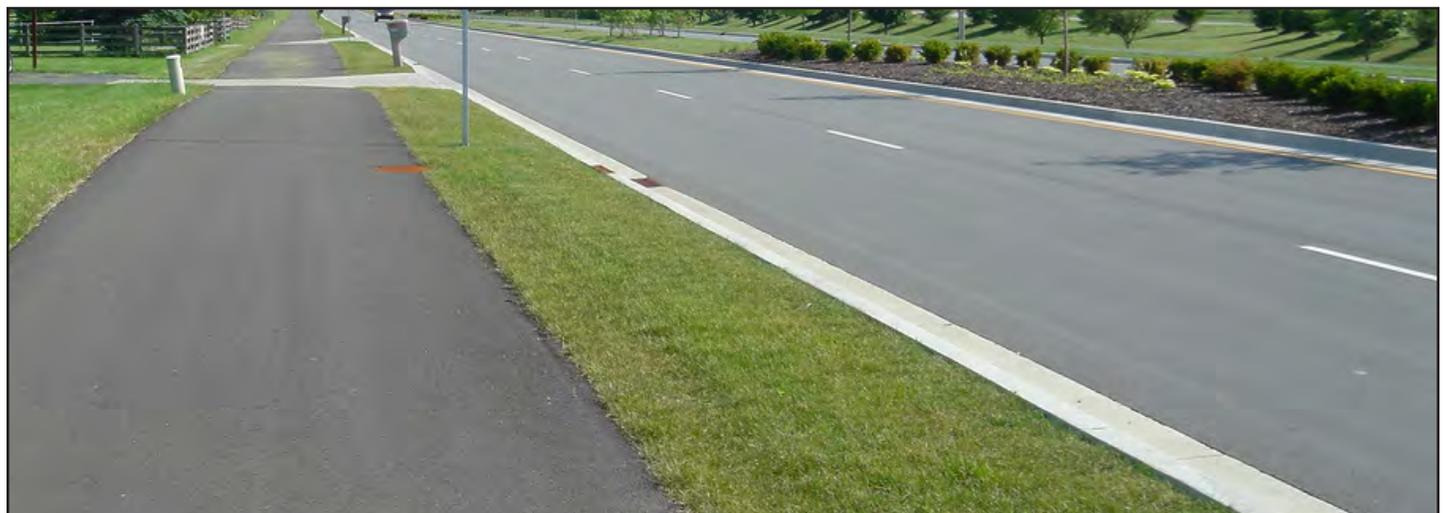
Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

## SIDE-PATHS

### OVERVIEW

A shared use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles.

Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path. The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared-use paths directly adjacent to roadways.



### DISCUSSION

When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the “sidepath” for experienced bicyclists and those who are cycling for transportation purposes.

### GUIDANCE

- 8 feet is the minimum allowed for a two-way bicycle-permitted path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians. A separate track (5' minimum) can be provided for pedestrian use.
- Bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible.
- Crossings should be stop or yield controlled for path users.

### ADDITIONAL RESOURCES

AASHTO. (1999). Guide for the Development of Bicycle Facilities.

NACTO. (2011). Urban Bikeway Design Guide. See entry on Raised Cycle Tracks.

## RAILS TO TRAILS

### OVERVIEW

Commonly referred to as Rails-to-Trails or Rail-Trails, these projects convert vacated rail corridors into off-street paths. Rail corridors offer several advantages, including relatively direct routes between major destinations and generally flat terrain.

In some cases, rail owners may rail-bank their corridors as an alternative to a complete abandonment of the line, thus preserving the rail corridor for possible future use.

The railroad may form an agreement with any person, public or private, who would like to use the banked rail line as a trail or linear park until it is again needed for rail use. Municipalities should acquire abandoned rail rights-of-way whenever possible to preserve the opportunity for trail development.

### GUIDANCE

Greenways in abandoned rail corridors should meet or exceed general design practices. If additional width allows, wider paths, and landscaping are desirable.

In full conversions of abandoned rail corridors, the sub-base, superstructure, drainage, bridges, and crossings are already established. Design becomes a matter of working with the existing infrastructure to meet the needs of a rail-trail.

### DISCUSSION

It is often impractical and costly to add material to existing railroad bed fill slopes. This results in trails that meet minimum path widths, but often lack preferred shoulder and lateral clearance widths.

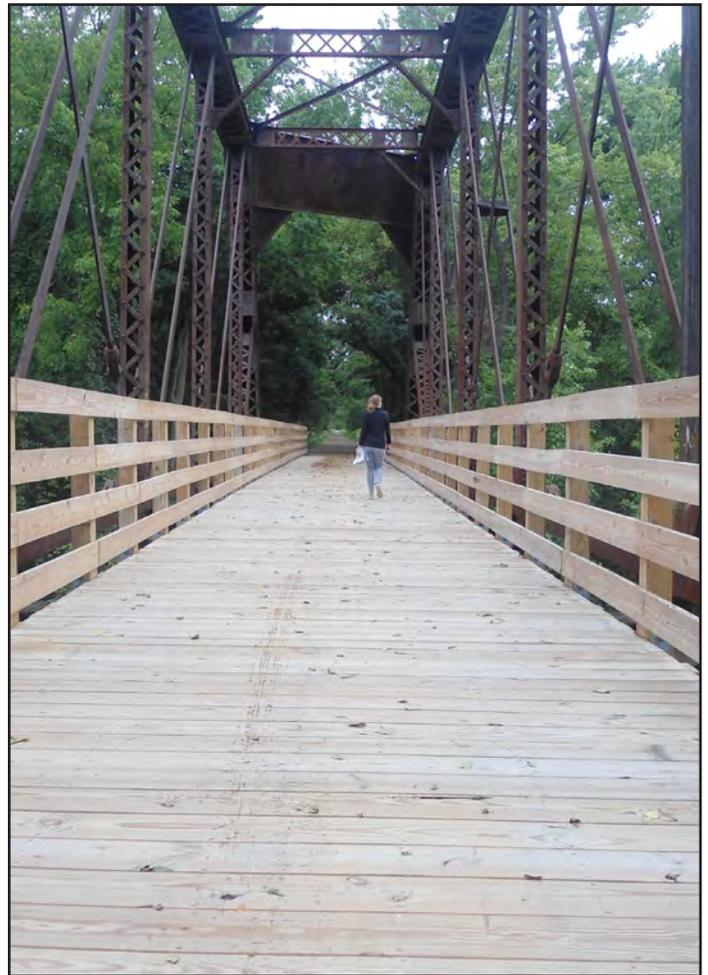
Rail-to-trails can involve many challenges including the acquisition of the right of way, cleanup and removal of toxic substances, and rehabilitation of tunnels, trestles and culverts. A structural engineer should evaluate existing railroad bridges for structural integrity to ensure they are capable of carrying the appropriate design loads.

### ADDITIONAL RESOURCES

AASHTO. (1999). Guide for the Development of Bicycle Facilities.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

Flink, C. (1993). Greenways: A Guide To Planning Design And Development.



# RAILS WITH TRAILS

## OVERVIEW

Rails-with-Trails projects typically consist of paths adjacent to active railroads. It should be noted that some constraints could impact the feasibility of rail-with-trail projects. In some cases, space needs to be preserved for future planned freight, transit or commuter rail service.

In other cases, limited right-of-way width, inadequate setbacks, concerns about safety/trespassing, and numerous mid-block crossings may affect a project's feasibility.

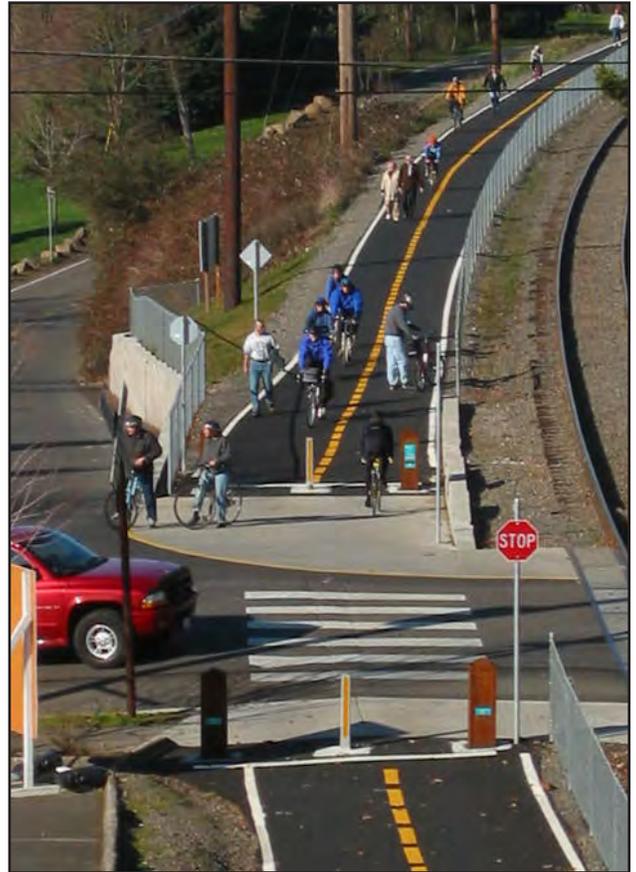
## GUIDANCE

Greenways in utility corridors should meet or exceed general design standards. If additional width allows, wider paths and landscaping are desirable.

Fencing should be a minimum of 5 feet in height with higher fencing usually next to sensitive areas such as switching yards. Setbacks from the active rail line will vary depending on the speed and frequency of trains, and available right-of-way.

## DISCUSSION

Railroads typically require fencing with all rail-with-trail projects. Concerns with trespassing and security can vary with the amount of train traffic on the adjacent rail line and the setting of the bicycle path, i.e. whether the section of track is in an urban or rural setting.

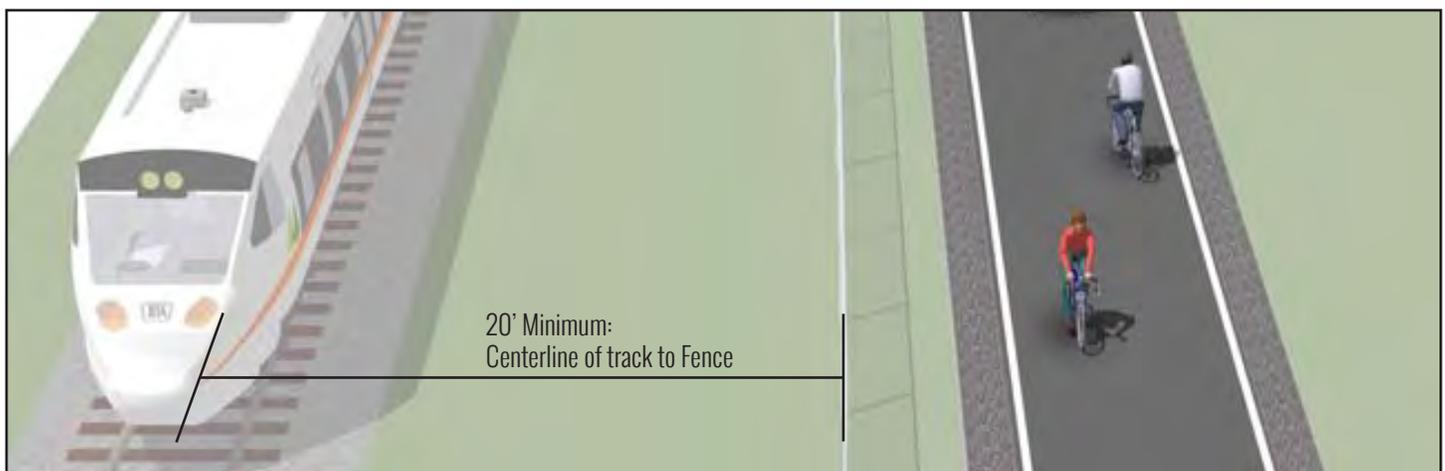


## ADDITIONAL RESOURCES

AASHTO. (1999). Guide for the Development of Bicycle Facilities.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

FHWA. (2002). Rails-with-Trails: Lessons Learned.



## UTILITY CORRIDOR TRAILS

### OVERVIEW

Utility and waterway corridors often offer excellent greenway development and bikeway gap closure opportunities. Utility corridors typically include power line and sewer corridors, while waterway corridors include canals, drainage ditches, rivers, and beaches. These corridors offer excellent transportation and recreation opportunities for bicyclists of all ages and skills.



### GUIDANCE

Greenways in utility corridors should meet or exceed general design practices. If additional width allows, wider paths, and landscaping are desirable.

Any access point to the path should be well-defined with appropriate signage designating the pathway as a bicycle facility and prohibiting motor vehicles.

Public access to the greenway may be prohibited during the following events:

- Canal/flood control channel or other utility maintenance activities
- Inclement weather or the prediction of storm conditions

### DISCUSSION

Similar to railroads, public access to flood control channels or canals is undesirable by all parties. Hazardous materials, deep water or swift current, steep, slippery slopes, and debris all constitute risks for public access. Appropriate fencing may be required to keep path users within the designated travel way. Creative design of fencing is encouraged to make the path facility feel welcoming to the user.

### ADDITIONAL RESOURCES

AASHTO. (1999). Guide for the Development of Bicycle Facilities.

FHWA. (2009). Manual on Uniform Traffic Control Devices.

Flink, C. (1993). Greenways: A Guide To Planning Design And Development.



# NEIGHBORHOOD GREENWAYS

## OVERVIEW

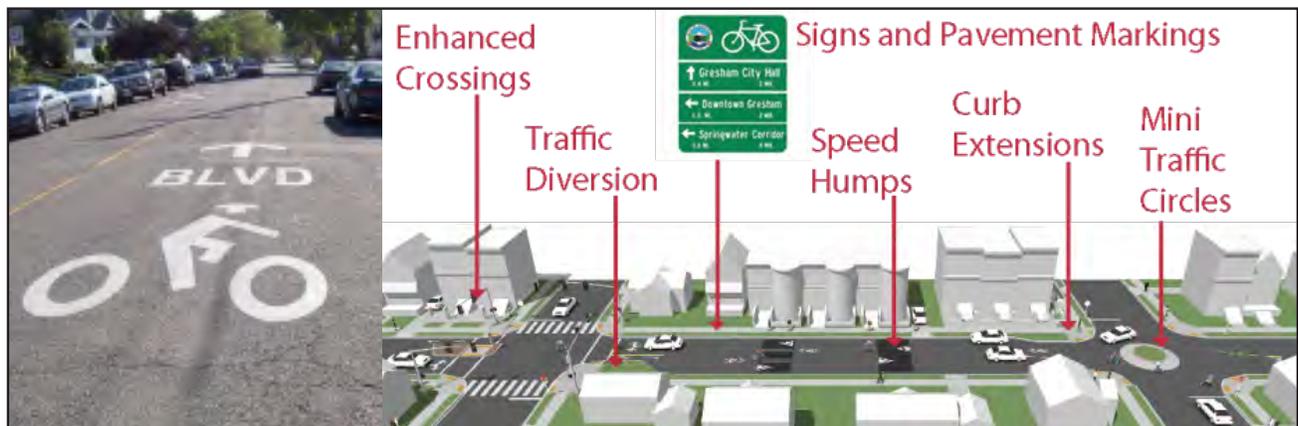
Neighborhood greenways are low-volume, low-speed streets modified to enhance bicycling by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

Jurisdictions throughout the country use a wide variety of strategies to determine where specific treatments are applied. While no federal guidelines exist, several best practices have emerged for the development of neighborhood greenways. At a minimum, neighborhood greenways should include distinctive pavement markings and wayfinding signs. They can also use combinations of traffic calming, traffic diversion, and intersection treatments to improve the bicycling environment. The appropriate level of treatment to apply is dependent on roadway conditions, particularly motor vehicle speeds and volumes.

Traffic conditions on neighborhood greenways should be monitored to provide guidance on when and where treatments should be implemented. When motor vehicle speeds and volumes or bicyclist delay exceed the preferred limits, additional treatments should be considered for the neighborhood greenway.

## GUIDANCE

- Streets are signed at 25 mph or less to improve the bicycling environment and decrease the risk and severity of crashes.
- Traffic volumes are limited to 3,000 vehicles per day (ideally less than 1,500) to minimize passing events and potential conflicts with motor vehicles.
- Use of streets that parallel major streets can discourage non-local motor vehicle traffic without significantly impacting motorists.
- Use of streets where bicyclists have right-of-way at intersections or where right-of-way is possible to assign to bicyclists is encouraged.
- Neighborhood greenways should be developed on streets that improve connectivity to key destinations and provide a direct route for bicyclists.
- Local streets with existing traffic calming, traffic diversions, or signalized crossings of major streets are good candidates, as they tend to be existing bicycle routes and have low motor vehicle speeds and volumes.



## HORIZONTAL TRAFFIC CALMING

### OVERVIEW

Horizontal traffic calming devices cause drivers to slow down by constricting the roadway space or by requiring careful maneuvering.

Such measures may reduce the design speed of a street, and can be used in conjunction with reduced speed limits to reinforce the expectation of lowered speeds.

### GUIDANCE

- Maintain a minimum clear width of 20 feet (or 28 feet with parking on both sides), with a constricted length of at least 20 feet in the direction of travel.
- Chicanes are a series of raised or delineated curb extensions, edge islands, or parking bays on alternating sides of a street forming an “S”-shaped curb, which reduce vehicle speeds by requiring motorists to shift laterally through narrowed travel lanes.
- Pinch-points are curb extensions placed on both sides of the street, narrowing the travel lane and encouraging all road users to slow down. When placed at intersections, pinch-points are known as chokers or neck-downs. They reduce curb radii and further lower motor vehicle speeds.
- Traffic circles are raised or delineated islands placed at intersections that reduce vehicle speeds by narrowing turning radii and the travel lane. Traffic circles can also include a paved apron to accommodate the turning radii of larger vehicles like fire trucks or school buses.



### ADDITIONAL RESOURCES

Alta Planning + Design and IBPI. (2009). Bicycle Boulevard Planning and Design Handbook.

BikeSafe. Bicycle countermeasure selection system.

Ewing, Reid. (1999). Traffic Calming: State of the Practice.

Ewing, Reid and Brown, Steven. (2009). U.S. Traffic Calming Manual.

## VERTICAL TRAFFIC CALMING

### OVERVIEW

Motor vehicle speeds affect the frequency at which automobiles pass bicyclists as well as the severity of crashes that can occur. Maintaining motor vehicle speeds closer to those of bicyclists' greatly improves bicyclists' comfort on a street. Slower vehicular speeds also improve motorists' ability to see and react to bicyclists and minimize conflicts at driveways and other turning locations.

Vertical speed control measures are composed of slight rises in the pavement, on which motorists and bicyclists must reduce speed to cross.



### DISCUSSION

Emergency vehicle response times should be considered where vertical deflection is used. Because emergency vehicles have a wider wheel base than passenger cars, speed lumps/cushions allow them to pass unimpeded while slowing most other traffic. Alternatively, speed tables are recommended because they cannot be straddled by a truck, decreasing the risk of bottoming out.

Traffic calming can also deter motorists from driving on a street. Monitor vehicle volumes on adjacent streets to determine whether traffic calming results in inappropriate volumes. Traffic calming can be implemented on a trial basis.



### GUIDANCE

- Neighborhood greenways should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph. Cities in New York State can only set speed limits below 30 mph under certain conditions.
- Speed humps are raised areas usually placed in a series across both travel lanes. A 14' long hump reduces impacts to emergency vehicles. Speed humps can be challenging for bicyclists; gaps can be provided in the center or by the curb for bicyclists and to improve drainage. Speed humps can also be offset to accommodate emergency vehicles.
- Speed lumps or cushions have gaps to accommodate the wheel tracks of emergency vehicles.
- Speed tables are longer than speed humps and flat-topped. Raised crosswalks are speed tables that are marked and signed for a pedestrian crossing.
- Slopes should not exceed 1:10 or be less steep than 1:25. Tapers should be no greater than 1:6 to reduce the risk of bicyclists losing their balance. The vertical lip should be no more than a 1/4" high.

### ADDITIONAL RESOURCES

Alta Planning + Design and IBPI. (2009). *Bicycle Boulevard Planning and Design Handbook*.  
 BikeSafe. (No Date). *Bicycle countermeasure selection system*.  
 Ewing, Reid. (1999). *Traffic Calming: State of the Practice*.  
 Ewing, Reid and Brown, Steven. (2009). *U.S. Traffic Calming Manual*.

## TRAFFIC DIVERSION

### OVERVIEW

Motor vehicle traffic volumes affect the operation of a neighborhood greenway. Higher vehicle volumes reduce bicyclists' comfort and can result in more conflicts.

Implement volume control treatments based on the context of the neighborhood greenway, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day, above which the route should be striped as a bike lane or considered a signed shared roadway.

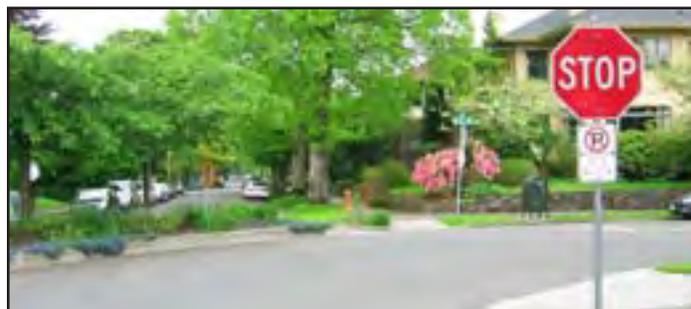
Traffic diversion treatments reduce motor vehicle volumes by completely or partially restricting through traffic on a neighborhood greenway.

### GUIDANCE

- Partial closures allow full bicycle passage while restricting vehicle access to one way traffic at that point.
- Diagonal diverters require all motor vehicle traffic to turn.
- Median diverters restrict through motor vehicle movements while providing a refuge for bicyclists to cross in two stages.
- Street closures create a "T" that blocks motor vehicles from continuing on a neighborhood greenway, while bicycle travel can continue unimpeded. Full closures can accommodate emergency vehicles with the use of mountable curbs (maximum of six inches high).
- Traffic Diverters should not be used on major streets or multi-lane corridors. They should only be applied on local, neighborhood corridors.



Partial Closure



Diagonal Diverter



Median Diverter



Full Closure

### ADDITIONAL RESOURCES

Alta Planning + Design and IBPI. (2009). Bicycle Boulevard Planning and Design Handbook.

Ewing, Reid. (1999). Traffic Calming: State of the Practice.

Ewing, Reid and Brown, Steven. (2009). U.S. Traffic Calming Manual.

Oregon Department of Transportation. (1998). Right-In Right-Out Channelization.



# ROAD DIETS

## LANE NARROWING

### OVERVIEW

Lane narrowing utilizes roadway space that exceeds minimum standards to provide the needed space for bike lanes. Many roadways have existing travel lanes that are wider than those prescribed in local and national roadway design standards, or which are not marked. Standards allow for the use of 10 foot travel lanes to create space for bike lanes.

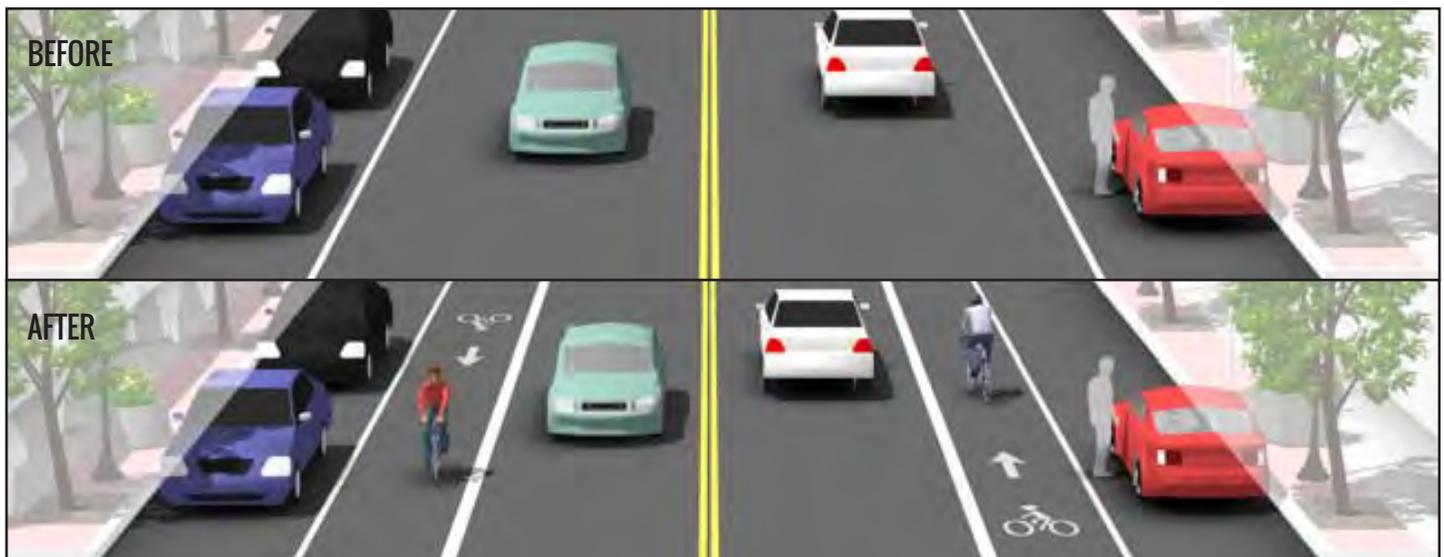
### GUIDANCE

The American Association of State Highway and Transportation Officials supports lane narrowing in A Policy on Geometric Design of Highways and Streets: “on interrupted-flow operation conditions at low speeds (45 mph or less), narrow lane widths are normally adequate and have some advantages”

Lanes shall not be less than 10’ in width (11’ for trucking routes, transit routes, or streets with high heavy vehicle volumes)

### ADDITIONAL RESOURCES

AASHTO. (2004). A Policy on Geometric Design of Highways and Streets.



## LANE RECONFIGURATIONS

### OVERVIEW

The removal of a single travel lane will generally provide sufficient space for bike lanes on both sides of a street. Streets with excess vehicle capacity provide opportunities for bike lane retrofit projects.

### GUIDANCE

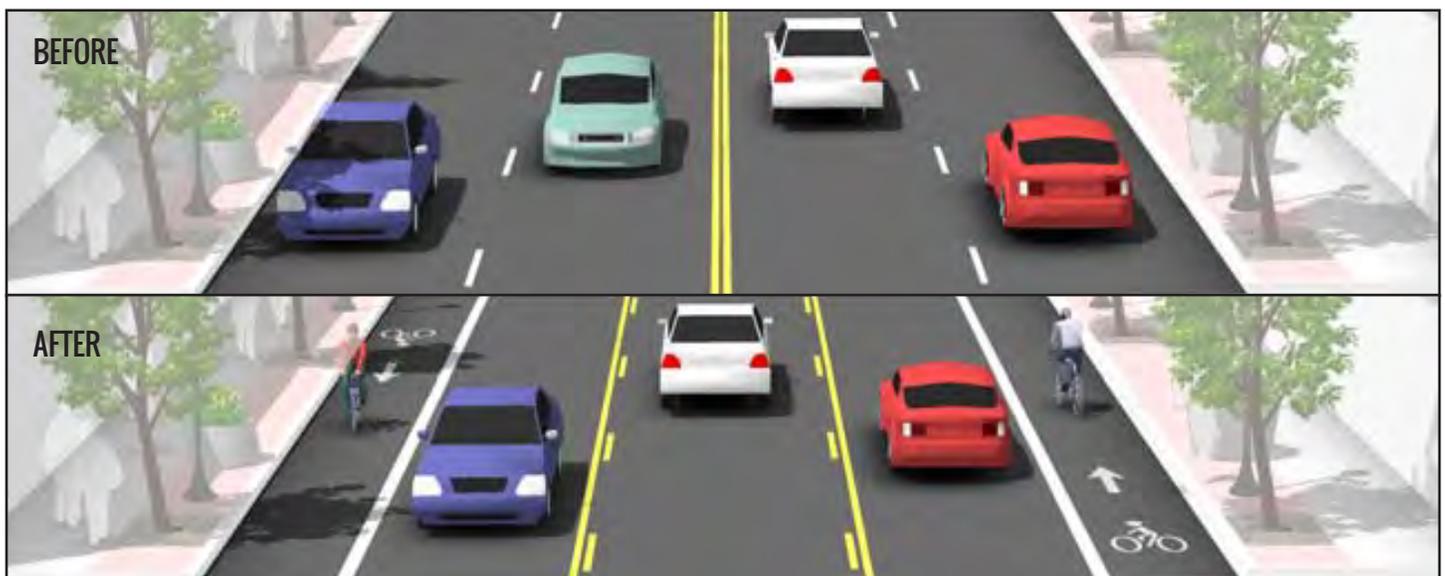
Before conducting a lane reconfiguration, a traffic analysis shall be conducted to assess the impact of the conversion. The resulting configuration shall not cause a corridor or intersection to receive a failing level of service grade of F. If the proposed conditions receive an E or D grade for intersections, engineering judgment should be used to assess the need and feasibility of the conversion.

### DISCUSSION

Depending on a street's existing configuration, traffic operations, user needs and safety concerns, various lane reduction configurations may apply. For instance, a four-lane street (with two travel lanes in each direction) could be modified to provide one travel lane in each direction, a center turn lane, and bike lanes. Prior to implementing this measure, a traffic analysis should identify potential impacts.

### ADDITIONAL RESOURCES

FHWA. (2010). Evaluation of Lane Reduction "Road Diet" Measures on Crashes. Publication Number: FHWA-HRT-10-053





# INTERSECTION FACILITIES

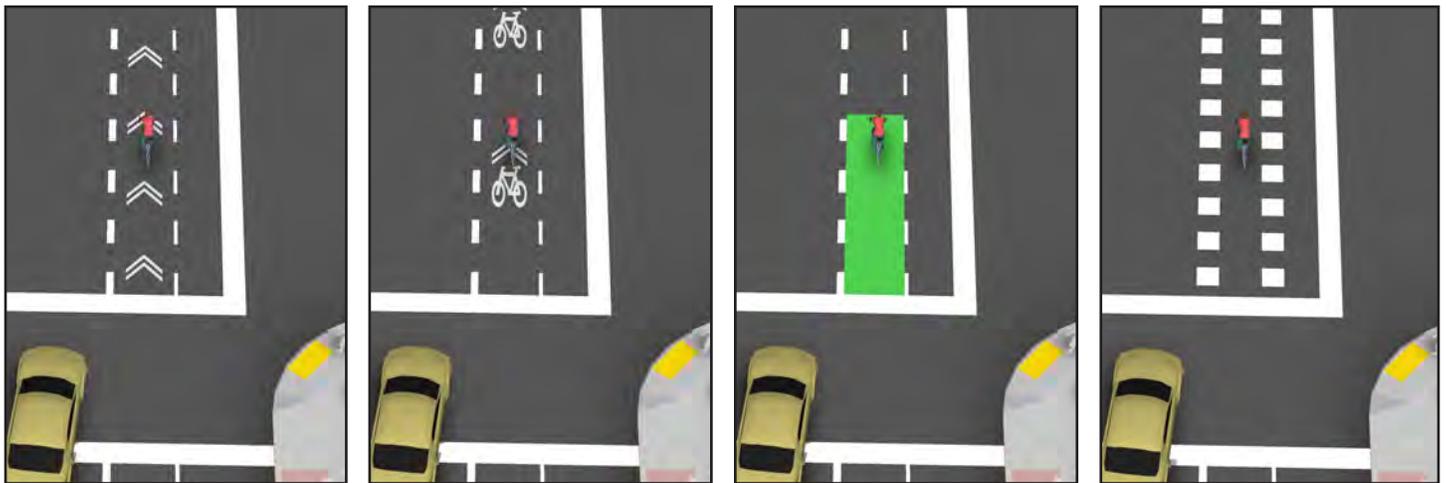
# BICYCLE INTERSECTION MARKINGS

## OVERVIEW

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane.

## GUIDANCE

- See MUTCD Section 3B.08: “dotted line extensions”
- Crossing striping shall be at least six inches wide when adjacent to motor vehicle travel lanes. Dotted lines should be two-foot lines spaced two to six feet apart.
- Chevrons, shared lane markings, or colored bike lanes in conflict areas may be used to increase visibility within conflict areas or across entire intersections.



## DISCUSSION

Additional markings such as chevrons, shared lane markings, or colored bike lanes in conflict areas are strategies currently in use in the United States and Canada. Cities considering the implementation of markings through intersections should standardize future designs to avoid confusion.

## MATERIALS & MAINTENANCE

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. White striping shall be installed with the same materials as the bicycle facilities leading into the intersection and colored bike lanes shall be installed with traffic paint, durable liquid pavement markings (DLPs), thermoplastic, or colored pavement.

## ADDITIONAL RESOURCES

AASHTO, Guide for the Development of Bicycle Facilities. 2012

FHWA, Manual on Uniform Traffic Control Devices, 3A.06. 2009

NACTO, Urban Bikeway Design Guide. 2012

## BIKE BOXES

### OVERVIEW

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing motorized traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box.

### DISCUSSION

Bike boxes should be placed only at signalized intersections, and right turns on red shall be prohibited for motor vehicles when placed in front of a shared through-right lane. Bike boxes should be used in locations that have a large volume of bicyclists.



### GUIDANCE

- 14' minimum depth
- A "No Turn on Red" (MUTCD R10-11) sign shall be installed to prevent vehicles from entering the Bike Box.
- A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.
- A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.
- An ingress lane should be used to provide access to the box.
- A supplemental "Wait Here" legend can be provided in advance of the stop bar to increase clarity to motorists.

### MATERIALS & MAINTENANCE

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority. White striping shall be installed with the same materials as the bicycle facilities leading into the intersection and colored bike lanes shall be installed with traffic paint, durable liquid pavement markings (DLPs), thermoplastic, or colored pavement.

### ADDITIONAL RESOURCES

NACTO, Urban Bikeway Design Guide. 2012

FHWA, Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10. 2011

## 2-STAGE TURN BOXES

### OVERVIEW

Two-stage turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a bike lane.

At multi-lane intersections with left-turning bays, bicyclists are often unable to merge into traffic to turn left due to physical separation, making the provision of two-stage left turn boxes critical.

### GUIDANCE

- The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or bike lane buffer area.
- 6' minimum depth of bicycle storage area.
- Bicycle stencil and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning.
- A “No Turn on Red” (MUTCD R10-11) sign shall be installed on the cross street to prevent vehicles from entering the turn box.

### DISCUSSION

While two stage turns may increase bicyclist comfort in many locations, this configuration will typically result in higher than average signal delay for bicyclists due to the need to receive two separate green signal indications (one for the through-street, followed by one for the cross street) before proceeding.

### ADDITIONAL RESOURCES

NACTO. (2011). Urban Bikeway Design Guide.



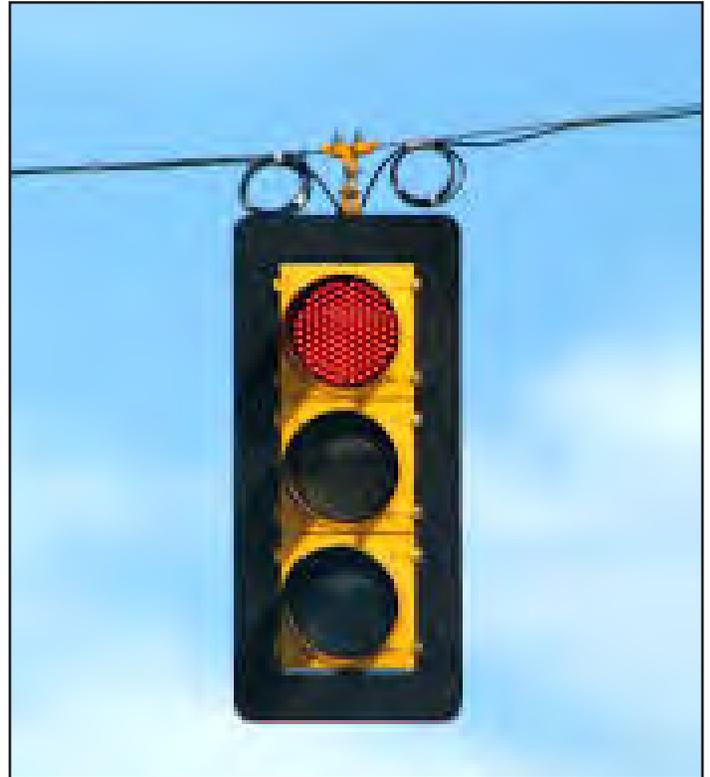
## PROLONGED ALL-RED-TIMES

### OVERVIEW

At many signalized intersections, traffic signal timings include several seconds where all signal faces are red. This allows vehicles that are passing through a yellow light that changes to exit the intersection before other traffic movements begin. This time is referred to as the all-red-time.

### GUIDANCE

Since New York State Vehicle Traffic Law indicates a permissive yellow policy (vehicles may enter the intersection during yellow phases), all-red-times are required for all signalized intersections.



### DISCUSSION

Providing extended all-red-times allow for bicyclists, who move through intersections at a slower rate than other vehicles, to pass through the intersection before other traffic movements receive their green phase.

All-red-times vary in duration based upon the geometry, constraints, and other variables of the intersection. The MUTCD advises that the all-red-time's duration should be within the range of 0.5 seconds to 2 seconds, but shall not exceed 6 seconds.

Extending all-red-times should be considered at intersections where there are high volumes of bicycle traffic, when the current all-red-times do not meet clearance time for bicycle travel speeds at intersections, or where there is a high rate of bicycle collisions that are determined to occur during phase changes.

### ADDITIONAL RESOURCES

FHWA. (2009). Manual on Uniform Traffic Control Devices.

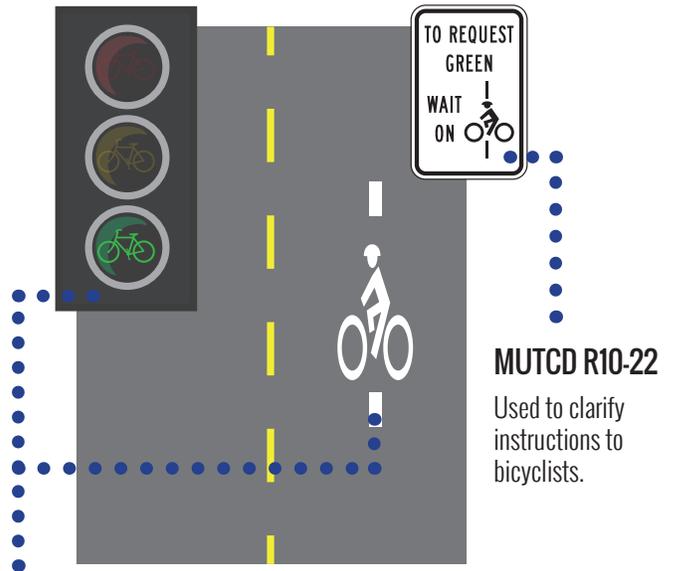
FHWA. (2008). Traffic Signal Timing Manual.

# BICYCLE DETECTION

## OVERVIEW

There are four primary forms of bicycle detection used to trigger actuated traffic signals or bicycle signals. They are:

- **Push Button Actuation**  
User-activated button mounted on a pole facing the street.
- **Loop Detection**  
Bicycle detection loops are installed in the roadway. This allows the bicyclist to stay within the travel lane while still triggering the signal change. They should be supplemented with the street marking pictured to the right.
- **Video Detection**  
Digital Image processing identifies changes in an image of a video camera mounted at the intersection.
- **Remote Traffic Microwave Sensor Detection (RTMSD)**  
RTMSD is a system which uses frequency modulated continuous wave radio signals to detect objects in the roadway. This method marks the detected object with a time code to determine its distance from the sensor. The RTMSD system is unaffected by temperature and lighting, which can affect the standard video detection equipment.



The bicycle signal is activated when a bicyclist waits over the bicycle signal symbol in the cycle track, bike lane, or shared lane.

## DISCUSSION

Proper bicycle detection should meet two primary criteria: 1) accurately detects bicyclists and 2) provides clear guidance to bicyclists on how to actuate detection (e.g., what button to push, where to stand).

Bicycle loops and other detection mechanisms can also provide bicyclists with an extended green time before the light turns yellow so that bicyclists of all abilities can reach the far side of the intersection.

## MATERIALS & MAINTENANCE

Signal detection and actuation for bicyclists should be maintained with other traffic signal detection and roadway pavement markings.

## ADDITIONAL RESOURCES

- AASHTO. (1999). Guide for the Development of Bicycle Facilities.
- FHWA. (2009). Manual on Uniform Traffic Control Devices.
- NACTO. (2011). Urban Bikeway Design Guide.

# HYBRID SIGNALS

## OVERVIEW

A hybrid beacon, also known as a High-intensity Activated Crosswalk (HAWK), consists of a signal-head with two red lenses over a single yellow lens on the major street, and pedestrian and/or bicycle signal heads for the minor street. There are no signal indications for motor vehicles on the minor street approaches.

Hybrid beacons are used to improve non-motorized crossings of major streets in locations where side-street volumes do not support installation of a conventional traffic signal or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street. Hybrid beacons may also be used at mid-block crossing locations.

## GUIDANCE

Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable user crossing.

- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.

## ADDITIONAL RESOURCES

FHWA. (2009).  
Manual on  
Uniform Traffic  
Control Devices.

NACTO. (2011).  
Urban Bikeway  
Design Guide.

## DISCUSSION

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.



## BICYCLE SIGNALS

### OVERVIEW

Bicycle signals are typically used to improve identified safety or operational problems involving bicycle facilities. Bicycle signal heads may be installed at signalized intersections to indicate bicycle signal phases and other bicycle-specific timing strategies.

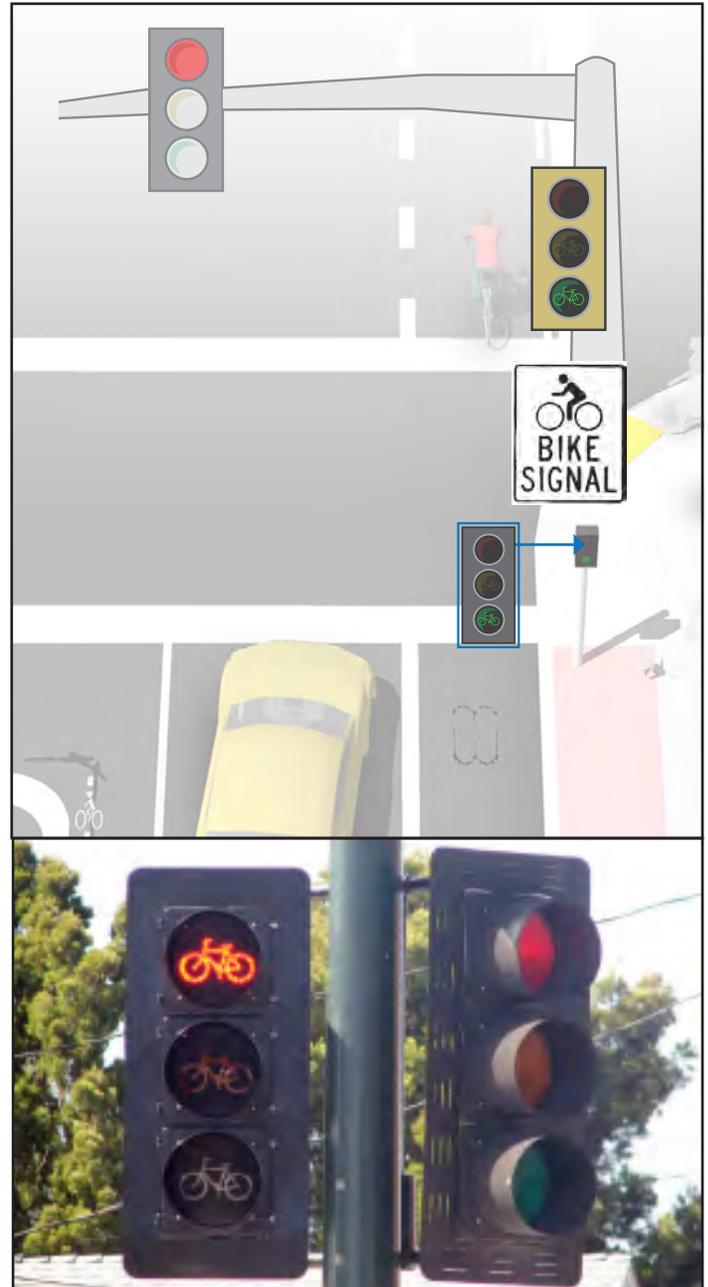
### GUIDANCE

Specific locations where bicycle signals have had a demonstrated positive effect include:

- Those with high volume of bicyclists at peak hours
- Those with high numbers of bicycle/motor vehicle crashes, especially those caused by turning vehicle movements
- At T-intersections with major bicycle movement along the top of the “T.”
- At the confluence of an off-street bike path and a roadway intersection
- Where separated bike paths run parallel to arterial streets

### DISCUSSION

Per EDSM No: IV.7.1.5, new signal installations shall be performed by, or under the direction of traffic operations as requested from the District Traffic Operations Engineer and/or Traffic Engineering Management. For improved visibility, smaller (4 inch lens) near-sided bicycle signals should be considered to supplement far-side signals. When a two-way cycle track is installed through a signalized intersection, bicycle signal heads shall accompany it.



### ADDITIONAL RESOURCES

NACTO, Urban Bikeway Design Guide. 2012

The National Committee on Uniform Traffic Control Devices has formed a Task Force that is considering adding guidance to the MUTCD on the use of bicycle signals.

DOTD, EDSM No: IV.7.1.5. Engineering Directives And Standards, DOTD Traffic Signal Manual. 2012

## SINGLE LANE ROUNDABOUT BICYCLE CONSIDERATIONS

### OVERVIEW

In single lane roundabouts it is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.

### DISCUSSION

Research indicates that while single-lane roundabouts may benefit bicyclists and pedestrians by slowing traffic, multi-lane roundabouts may present greater challenges and significantly increase safety problems for these users. If multi-lane roundabouts are installed, sidepaths shall be installed on all approaches.



### GUIDANCE

- 25 mph maximum circulating design speed.
- Design approaches/exits to the lowest speeds possible.
- Encourage bicyclists navigating the roundabout like motor vehicles to “take the lane.”
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks. This may be done with lane narrowing, pedestrian crossing signage, active warning beacons, and raised crosswalks.
- Provide separated facilities for bicyclists who prefer not to navigate the roundabout on the roadway.

### ADDITIONAL RESOURCES

FHWA. (2000). Roundabouts: An Informational Guide

FHWA. (2010). Roundabouts: An Informational Guide, Second Edition. NCHRP 672



SAN LUIS OBISPO — 8.1 MILES  
(Mission)

PORT SAN LUIS — 3 MILES  
(The Pier)



SHELL BEACH — 2.7 MILES  
(Spyglass Liquor)

AVILA BEACH — 1.7 MILE  
(Front St.)



HWY. 101 — 1.1 MILE  
(Bridge)

GOLF COURSE — 1.4 MILE  
(Mulligans)



# SIGNS & WAYFINDING

## BICYCLE ROUTE SIGN

### OVERVIEW

The bicycle route sign is the most basic of the bicycle network signs. This sign should be posted on all routes throughout the network, unless the routes have customized wayfinding signage or markings.

The purpose of the bike route sign is to provide confirmation for bicyclists that they are traveling on a designated bicycle route. This also helps motorists recognize that they are on a bicycle route and should watch for bicyclists in the travel lane or along the shoulder.



# GUIDELINES & STANDARDS

## OVERVIEW

The Manual on Uniform Traffic Control Devices, or MUTCD, is a document issued by the Federal Highway Administration. The MUTCD specifies the standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel. The MUTCD was established in order to achieve uniformity and consistency in traffic control devices (wayfinding signage is considered a traffic control device) so that information would be readily recognized and understood by travelers. Both on-street and off-street bicycle facilities are required to follow the standards within the MUTCD.

## ADDITIONAL RESOURCES

FHWA. (2009). Manual on Uniform Traffic Control Devices.

NYS Department of Transportation (2010). Supplement to the MUTCD.



## DISCUSSION

The MUTCD provides specification for the following characteristics of various signs:

- Size
- Shape
- Color
- Composition
- Lighting & Retro-reflection
- Contrast
- Legibility/Font
- Font Size
- Placement & Orientation
- Allowed Text
- Sign Combinations
- Sign Customizations
- Mounting

In addition to the national MUTCD, New York State also has an established supplement to the MUTCD that all street, highways, bikeways, and private roads must conform to when in New York State.

While many of the rules and regulations are rigid and must be precise, there are also many areas where the guidance allows communities to personalize their signage to reflect their character and values.

All signs within the City of Schenectady established for public use along roadways and bikeways shall be in compliance with the national MUTCD guidelines and state supplement, as well as City codes and standard construction details.

## SIGNAGE BRANDING

### DISCUSSION

Wayfinding signs, which allow for an expression of community identity and pride, reflect local values and character, and may provide more information than signs which strictly follow the basic guidance of the MUTCD. Section 2D.50 of the MUTCD describes community wayfinding signs as follows:

1. Community wayfinding guide signs are part of a coordinated and continuous system of signs that direct tourists and other road users to key civic, cultural, visitor, and recreational attractions and other destinations within a city or a local urbanized or downtown area.
2. Community wayfinding guide signs are a type of destination guide sign for conventional roads with a common color and/or identification enhancement marker for destinations within an overall wayfinding guide sign plan for an area.

Using customized and branded wayfinding signage will help separate routes or areas within a community. Examples of good branding practice include installations:

- along bicycle boulevard routes
- within downtown area, shopping centers, or commercial districts
- within park facilities
- within educational or employment campuses
- along historic or cultural routes through a city

### GUIDANCE

- The standard MUTCD arrow has been deemed by engineering study to have superior legibility and shall be used on all relevant wayfinding signage.
- Enhancement markers may occupy up to 20% of the sign face on the top or side of the sign.



### ADDITIONAL RESOURCES

FHWA. (2009). Manual on Uniform Traffic Control Devices.

National Committee on Uniform Traffic Control Devices, "Wayfinding Signs for Shared-Use Paths." Spring 2014.

## STREET NAME SIGN BLADES

### OVERVIEW

Municipalities across the nation have enhanced street name sign blades to provide additional recognition of bikeways. Enhancements include supplemental signs and sign toppers added to existing MUTCD standard street sign blades and graphic embellishments integrated into new street name sign blades.

### DISCUSSION

Good wayfinding practices include the installation of sign blades along off-street paths, trails, and bikeways. Numerous cities follow the practice of indicating cross streets at bridges, underpasses, and at-grade mid-block roadway crossings to inform pathway users of their location.

Sign blade enhancements may also prove to be a good alternative to bicycle boulevard branding signage in communities that fear that sign clutter may detract from the character of the neighborhood.

### GUIDANCE

- Sign blades shall be colored blue, green, or brown and their colors shall be consistent across all sign blades installed along that corridor.
- Sign blades enhancements, toppers, or embellishments shall not block the view of the street names.
- Sign blade enhancements, toppers, or embellishments shall not be larger than the base sign blade and may not contain text, numbers, or text-based symbols (e.g. @, #, &, etc.)
- All sign blades shall be compliant with MUTCD standards.

### ADDITIONAL RESOURCES

FHWA. (2009). Manual on Uniform Traffic Control Devices.

National Committee on Uniform Traffic Control Devices, "Wayfinding Signs for Shared-Use Paths." Spring 2014.



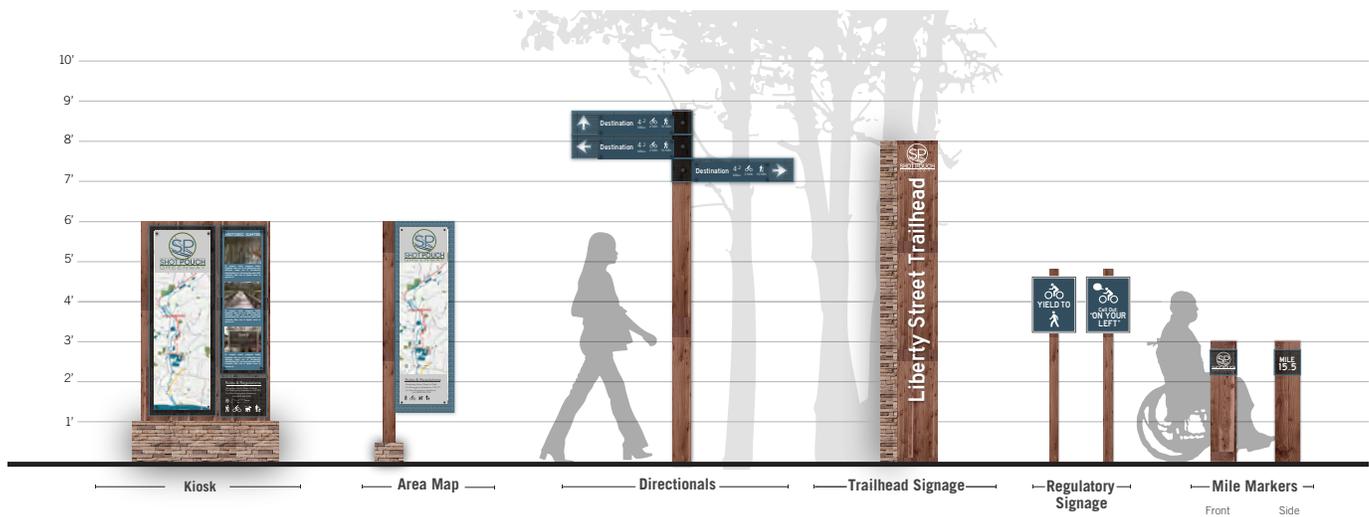
# TRAIL SIGNAGE

## OVERVIEW

Trail signage falls into three basic types: trail head signage, turn signs, and mile markers. Each provides a specific purpose and can be customized to the trail, trailhead, neighborhood, park, or city that they are located in. Examples of customized trail signage are illustrated below.

## GUIDANCE

- Trail signage shall be made legible, using block-based fonts against a high contrast background differentiable to individuals with color perception impairments. Lettering can be raised to improve contrast and signs shall be posted at a height that is visible to those using mobility devices.
- Trail Head Signage: Identifies entrances and access points to the path or trail. Trail head signage should identify the location of the trail head in relation to the street network and can identify trail amenities at the trail head, such as public parking, restrooms, picnic areas, or water access.
- Directionals: Give trail users direction towards popular destinations at cross-streets. Turn signs shall be posted at each cross-street, and may provide distances and/or travel times to the destinations.
- Mile Markers: Gives trail users a sense of the direction and distance. Mile markers provide pathway managers and emergency response personnel points of reference to maintenance needs or locations of emergency events. Mile markers should be placed every 1/4 to 1/2 mile and point zero should begin at the southern and westernmost terminus points. Mile numbering is often reset at zero as a pathway crosses a jurisdictional boundary. Mile markers should be placed on the right hand side of the path facing bicycle traffic, but may also be installed on one side of a pathway, on a single post back-to-back.



## ADDITIONAL RESOURCES

FHWA. (2009) Manual on Uniform Traffic Control Devices.  
 US Access Board (2012) Accessibility Standards.

## WAYFINDING KIOSKS

### OVERVIEW

Kiosks with area and/or citywide orientation maps, can provide helpful navigational information, especially where bicyclists may be stopping long enough to digest more information (i.e. transit stations or stops, busy intersections, trail heads). Kiosks with maps are also a useful resource for trail users. Kiosks should contain information on trail or path rules and regulations including allowed uses.

Kiosks may also have pamphlet holders filled with take-away maps that allow users to bring the maps with them, in order to help further navigation. This can prove helpful for trail and park maps in particular, as these facilities do not always show up in online navigation applications like street networks do. These maps can also help bicyclists identify routes with bicycle facilities.



### GUIDANCE

- The icons and high contrasting colors shall be used to make maps understandable to a wide audience and legible to those with visual impairments.
- Emergency contact information shall be placed on each wayfinding kiosk.
- Trailhead kiosks built with federal funds shall (and kiosks built and maintained by other funding sources may) include: length of trail, surface type, typical and minimum tread width, typical and maximum running slopes, and typical and maximum cross slopes [ADA regulations].
- Kiosks that provide text based information should also be considered for providing the information in multiple languages, such as languages prevalent in the local communities or braille for the visually impaired.
- Information should be attempted to be portrayed visually rather than textually in order to provide access to those whose primary language may not be represented and allow the information to be absorbed by users as quickly as possible.

### ADDITIONAL RESOURCES

- AASHTO. (1999). Guide for the Development of Bicycle Facilities.
- FHWA. (2009). Manual on Uniform Traffic Control Devices.
- US Access Board, 2012. Accessibility Standards.

ENTRANCE

Fresh, low-cost  
**Fruits & veggies**  
available here!  
HEALTHY STORES

# SUPPORT FACILITIES



## BICYCLE RACKS

### OVERVIEW

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that:

- Supports the bicycle in at least two places, preventing it from falling over.
- Allows locking of the frame and one or both wheels with a U-lock.
- Is securely anchored to ground.
- Resists cutting, rusting and bending or deformation.

### GUIDANCE

- 2' minimum from the curb face to avoid 'dooring.'
- Close to destinations; 50' maximum distance from main building entrance.
- Minimum clear distance of 6' should be provided between the bicycle rack and the property line.
- Should be highly visible from adjacent bicycle routes and pedestrian traffic.
- Locate racks in areas that cyclists are most likely to travel.



### DISCUSSION

Some types of bicycle racks may meet design criteria, but are discouraged except in limited situations. This includes undulating "wave" racks, schoolyard "wheel bender" racks, and spiral racks.

### ADDITIONAL RESOURCES

APBP. (2010). Bicycle Parking Guide 2nd Edition.

APBP. (2015). Essentials of Bike Parking: Selecting and Installing Bike Parking that Works.

### MATERIALS & MAINTENANCE

Use of proper anchors will prevent vandalism and theft. Racks and anchors should be regularly inspected for damage. Educate snow removal crews to avoid burying racks during winter months.

## BICYCLE LOCKERS

### OVERVIEW

Bicycle lockers are intended to provide long-term bicycle storage for employees, students, residents, commuters, and others expected to park more than two hours. Long-term facilities protect the entire bicycle, its components and accessories against theft and against inclement weather, including snow and wind-driven rain.

Bicycle lockers provide space to store a few accessories or rain gear in addition to containing the bicycle. Some lockers allow access to two users - a partition separating the two bicycles can help users feel their bike is secure. Lockers can also be stacked, reducing the footprint of the area, although that makes them more difficult to use.

### GUIDANCE

- Minimum dimensions: width (opening) 2.5'; height 4'; depth 6'.
- 4 foot side clearance and 6 foot end clearance.
- 7 foot minimum distance between facing lockers.
- Locker designs that allow visibility and inspection of contents are recommended for increased security.
- Access is controlled by a key or access code.



### DISCUSSION

Long-term parking facilities are more expensive to provide than short-term facilities, but are also significantly more secure. Although many bicycle commuters would be willing to pay a nominal fee to guarantee the safety of their bicycle, long-term bicycle parking should be free wherever automobile parking is free.

### ADDITIONAL RESOURCES

- APBP. (2010). Bicycle Parking Guide 2nd Edition.
- APBP. (2015). Essentials of Bike Parking: Selecting and Installing Bike Parking that Works.

## BICYCLE CORRALS

### OVERVIEW

Bicycle corrals (also known as on-street bicycle parking) consist of bicycle racks grouped together in a common area within the street traditionally used for automobile parking. Bicycle corrals are reserved exclusively for bicycle parking and provide a relatively inexpensive solution to providing high-volume bicycle parking. Bicycle corrals can be implemented by converting one or two on-street motor vehicle parking spaces into on-street bicycle parking. Each motor vehicle parking space can be replaced with approximately 6-10 bicycle parking spaces.

Bicycle corrals move bicycles off the sidewalks, leaving more space for pedestrians, sidewalk café tables, etc. Because bicycle parking does not block sight-lines (as large motor vehicles would do), it may be possible to locate bicycle parking in 'no-parking' zones near intersections and crosswalks.

### DISCUSSION

In many communities, the installation of bicycle corrals is driven by requests from adjacent businesses, and is not a city-driven initiative. In such cases, the city does not remove motor vehicle parking unless it is explicitly requested. In other areas, the city provides the facility and business associations take responsibility for the maintenance of the facility. Communities can establish maintenance agreements with the requesting business. Bicycle corrals can be especially effective in areas with high bicycle parking demand or along street frontages with narrow sidewalks where parked bicycles would be detrimental to the pedestrian environment.

### ADDITIONAL RESOURCES

APBP. (2010). Bicycle Parking Guide 2nd Edition.

APBP. (2015). Essentials of Bike Parking: Selecting and Installing Bike Parking that Works.



### GUIDANCE

See guidelines for sidewalk Bicycle Rack placement and clear zones.

- The corral should have an entrance clear width from the roadway of 5'6".
- Can be used with parallel or angled parking.
- Parking stalls adjacent to curb extensions are good candidates for bicycle corrals since the concrete extension serves as delimitation on one side.

### MATERIALS & MAINTENANCE

Physical barriers may obstruct drainage and collect debris. Establish a maintenance agreement with neighboring businesses. The bicycle corral may need to be removed during the winter months.

## SECURE PARKING AREAS (BIKESPA)

### OVERVIEW

A Secure Parking Area for bicycles, also known as a BikeSPA or Bike & Ride (when located at transit stations), is a semi-enclosed space that offers a higher level of security than ordinary bike racks. Accessible via key-card, combination locks, or keys, BikeSPAs provide high-capacity parking for 10 to 100 or more bicycles. Increased security measures create an additional transportation option for those whose biggest concerns are theft and vulnerability.



### DISCUSSION

Long-term parking facilities are more expensive to provide than short-term facilities, but are also significantly more secure. Although many bicycle commuters would be willing to pay a nominal fee to guarantee the safety of their bicycle, long-term bicycle parking should be free wherever automobile parking is free. BikeSPAs are ideal for transit centers, airports, train stations, or wherever large numbers of people might arrive by bicycle and need a secure place to park while away.

### GUIDANCE

Key features may involve:

- Closed-circuit television monitoring.
- Double high racks & cargo bike spaces.
- Bike repair station with bench.
- Bike tube and maintenance item vending machine.
- Bike lock “hitching post” – allows people to leave bike locks.
- Secure access for users.

### MATERIALS & MAINTENANCE

Regularly inspect the functioning of moving parts and enclosures. Change keys and access codes periodically to prevent access to unapproved users.

### ADDITIONAL RESOURCES

APBP. (2010). Bicycle Parking Guide 2nd Edition.

APBP. (2015). Essentials of Bike Parking: Selecting and Installing Bike Parking that Works.



## BICYCLE REPAIR STATIONS

### OVERVIEW

Bicycle repair stations offer bicyclists a location with basic tools to be used to make simple repairs to bicycles during travel. They are generally associated with wrenches, screwdrivers, air pumps, and lifting bars; all of which are affixed to the main unit to prevent theft.

### DISCUSSION

Bicycle repair stations should be implemented along main bicycling commuting routes, along shared use paths with long stretches, and in dense areas such as the downtown area. They should also be installed within parks that allow for bicycle use and near public bicycle racks so that they may be used by bicyclists if their bikes are vandalized while parked.

### GUIDANCE

Bicycle repair stations shall not be placed within a pedestrian or bicycle path of travel. They shall be installed in sidewalk furnishing zones if available, or installed on concrete pads off to the side of pathways.



## Bike Repair Station Recommendations



## STAIRWAY BIKE RAILS

### OVERVIEW

Stairwell bike rails are a form of infrastructure that allows existing stairwells to be retrofitted so that bicycles can be rolled up and down them, rather than carried.

### GUIDANCE

- Tire tracks in stairway bike rails shall be at minimum 3" and at maximum 5" in width.
- Stairway bike rails shall not be placed in such a way that they reduce the pedestrian pathway on the stairwell.



### DISCUSSION

Stairway bike rails are a powerful tool that allow bicyclists to overcome the barrier of stairwells within public spaces or public right-of-ways. Without the bike rails, bicyclists are forced to carry their bicycles up or down the stairwells, which can be difficult with heavier bikes and often causes bicyclists to find another way around.

These rails should only be considered a tool for retrofitting existing facilities, as new stairwells should be built with ADA compliant ramps to accompany them. When implemented, the path of pedestrians should be considered and the bike rails should not impede a pedestrian's ability to reach handrail.

### MATERIALS & MAINTENANCE

Rails may be made from wood, metal, or concrete, but shall not have sharp edges that could damage bicycle tires. The rails should be permanently attached to the stairwells that they are associated with, and should span the full length of the stairwells.

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# APPENDIX C



# BIKE SHARE

## OVERVIEW

### WHAT IS BIKE SHARE?

Bike share is designed to provide a cost effective, environmentally friendly and convenient travel option for individuals who may not own a bicycle of their own or do not wish to address the hassle of finding adequate bicycle parking at their destination. A bike share system typically consists of a fleet of user friendly and robust bikes placed at conveniently located stations. Bike share is a relatively inexpensive and quick infrastructure extension to a city's public transportation system and can be well-utilized by transit users to address that 'final leg' of travel between the transit stop and their destination.

Bike share systems are typically structured to operate like automated bike rental for short periods of time. The structure encourages shorter, spontaneous trips whereby bikes are checked out, ridden for a short period of time and returned to any station in the system for other users to take out. Most systems employ some form of pricing schedule that encourages short, frequent trips and discourages bikes being in use for long periods of time, such as applying a fine for having a bike checked out for more than 30 minutes or an hour. The focus is getting to nearby destinations quickly and conveniently. Generally, it is not intended to compete with bike rental, which is designed for those interested in using a bicycle continuously for longer periods of time.

### CDPHP CYCLE!

In June 2017, CDTA and CDPHP launched CDPHP Cycle!, a Capital Region-wide bike-share program. CDPHP Cycle! has 160 bikes distributed among 41 bike stations in Albany, Schenectady, Troy, and Saratoga Springs. In Schenectady, there are bike-share locations distributed throughout the city including:

- Riverside Park
- Schenectady County Community College (State & Washington)
- North Jay & Hudson
- Union College (Union & Nott Terrace)
- Vale Park
- Proctors (State & Jay)
- Schenectady County Public Library (Clinton & Liberty)

#### CDPHP Cycle! Schenectady Station Locations



## SCHENECTADY BIKE SHARE

### Challenges

Even with the implementation of CDPHP Cycle! in Schenectady, there are challenges that the City and the region have to face in order to create a well-integrated and healthy bike share culture.

### Cross-City Commuting

- Provide stations for bike transfers (docking a bike when time runs out and immediately taking out a new one) along State Street to get to Albany
- Offer cross-city memberships with extended use of bikes to allow users to make it to Albany without adding up the additional fines

### Divisiveness of the Terrain

The City of Schenectady has a diverse, yet divisive terrain. There are many hills, rail corridors, bodies of water, and other factors that make bicycling between different communities or neighborhoods within the city a difficult or uncomfortable experience, which can deter bike share use, especially for commuting users.

Many of the recommendations within the other chapters of this plan address these barriers. For this reason, the priority routes and projects of this plan should be implemented to support bike share programs in the City.

## BENEFITS OF BIKE SHARE

There are many benefits of a bike share network, including:

- Health Benefit:  
Cities with bike share networks experience a higher level of active and healthy residents.
- Safety Benefits  
The presence of a bike share system increases the number of bikes on the roads. Motorists become more aware of bicyclists when there are more bicyclists present. Recent studies have also shown that bike share users tend to be more reserved and cautious than the general bicyclist, and are less likely to take risks than a typical bicyclist. This decreases bicyclist collisions.

## NETWORK CONSIDERATIONS

### DEFINING THE USERS

In order to properly plan a bike-share network, one must first understand the wants and needs of the network users. In particular, there must be an understanding of the intended uses of the bike share network. Experience in previous bike share networks reveals that there are three primary uses for bike share. These are:

- **Commuting:** Commuting is the most common use for existing bike share networks. The monthly or yearly membership programs naturally lend themselves to users who anticipate using the network on a daily basis. The most common daily trips are work-related, commuting trips. Commuters are expected to be the most common users in the Schenectady system as well. Commuters desire a network that will have stations near their place of residence as well as their place of employment.
- **Tourism:** Tourism of bike share systems. Bike share can help a city boost its tourism, and tourists enjoy bike share systems as a low cost transportation option in their destination cities. Bike share systems that have daily membership pricing options are much more likely to get tourist participation. The City of Schenectady's current development, including the Rivers Casino, will likely generate some tourist bike share use. Tourists prefer stations around major hotels and tourist destinations, such as downtowns or major attractions.
- **Recreation:** Bike share systems tend to not lend themselves well to recreational use due to the time restrictions on each bike's use. However, recreational users are still a presence and prefer stations near parks and trails.

### Visibility

Visibility is a large factor in planning bike share stations and encouraging bike share use. Including stations in heavily trafficked or heavily visited locations helps to spread the word about the network and make more people aware of its existence.

Visibility should be one of the top priorities for implementing the first wave of the bike share network.

### Placement Criteria

#### Site Visibility

While site visibility is an important aspect to overall network placement, it is also an important aspect for choosing the location for placement, once the area for a station is determined.

Site visibility is usually the highest at intersections, rather than mid-block, unless there is a highly trafficked facility, such as a school or park, at a mid-block location.

#### Turning Movements

Planning stations at intersections is highly dependant on turning movements if they are going to be placed in the street. Ample room should be given to allow vehicles of all sizes to make the necessary turns at usual speeds for that intersection.

## NETWORK RECOMMENDATIONS

### 2013 BIKE SHARE FEASIBILITY

The 2013 Bike Share Feasibility Study for the City of Albany recognized the City of Schenectady as a “satellite” City for developing a regional bike share network. The plan recommended 3-5 locations within the City of Schenectady to begin the advancement of a bike share system directly linked to the City of Albany.

The Feasibility Study indicated the top 5 locations for a bike share system’s stations within Schenectady are:

- Schenectady County Community College
- Amtrak Station
- Central Park
- Casino
- Union

These recommendations match some of the locations of the CDPHP Cycle! stations established in June 2017, including Schenectady County Community College and Union.

The Feasibility Study locations were chosen based upon their likeliness of use by City users, and Albany users. However, the likeliness of a bike share user to utilize the system to travel between cities is very low. Relying purely upon a regional version of a potential system in Albany is not recommended if the City of Schenectady desires to establish a healthy bike share system within the City.

The City of Schenectady shall work with CDTA to implement the locations outlined in Phases 1 and 2 in the long term, taking into account that some of the proposed Phase 1 and Phase 2 locations already have CDPHP Cycle! stations.

### PHASE 1

Priorities:

- Downtown
- Union College
- Central/Vale Park
- Casino
- Schools
- State Street/BusPlus Stops

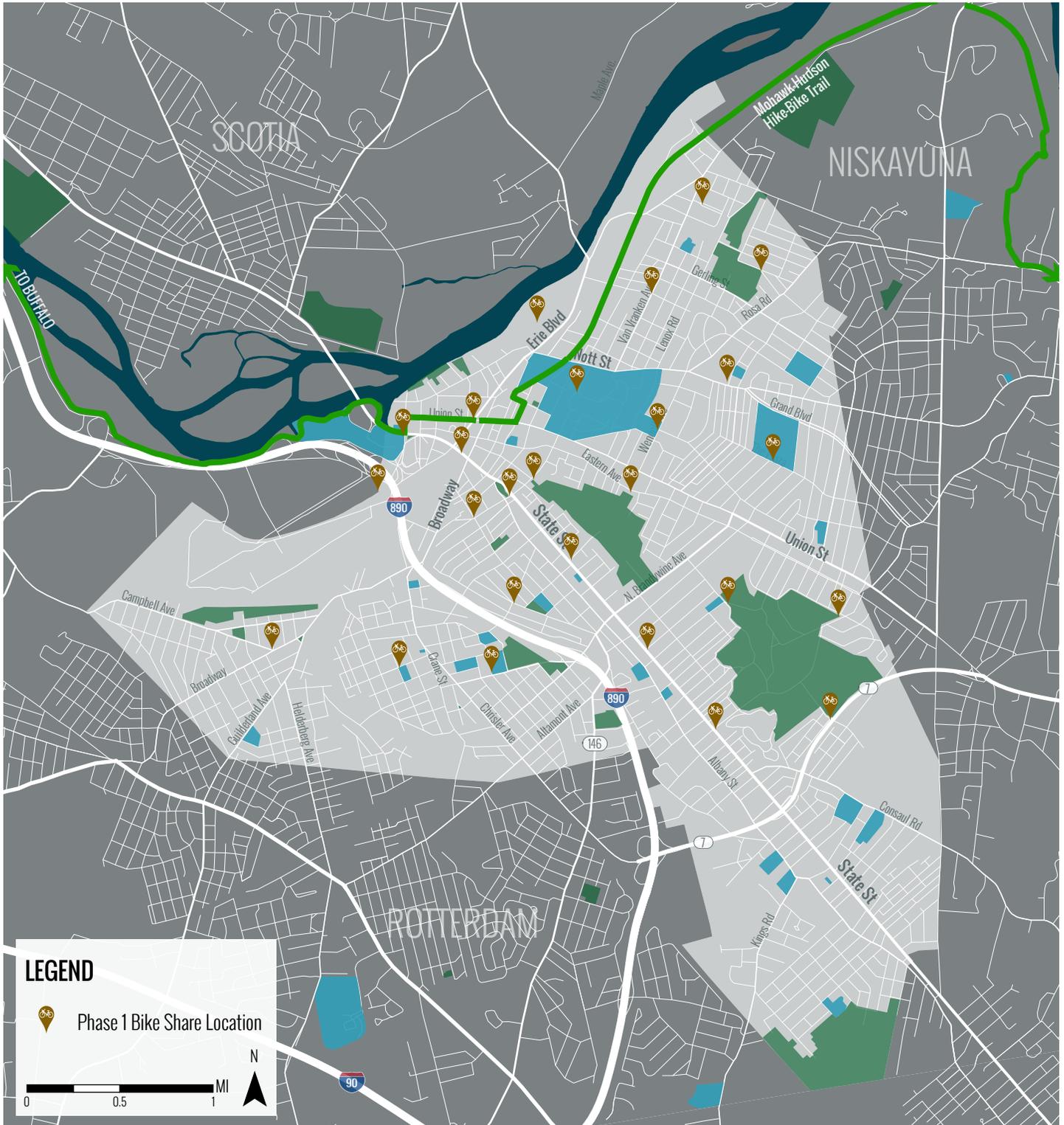
### PHASE 2

Priorities:

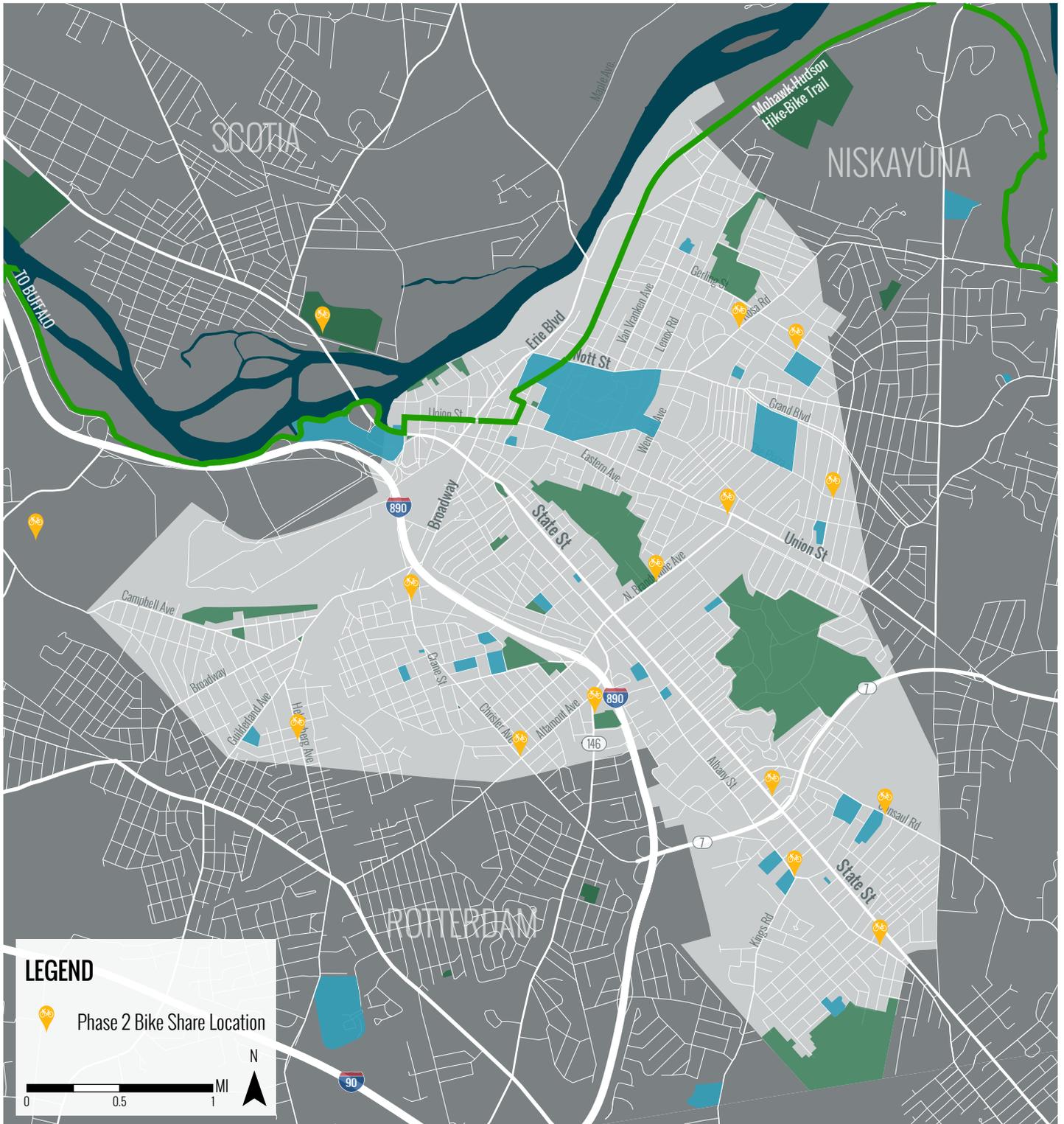
- Filling gaps
- Outer-neighborhoods
- User Input

Phase 2 only has 15 illustrated station locations, reserving the remaining 10 or more stations of the wave for user input.

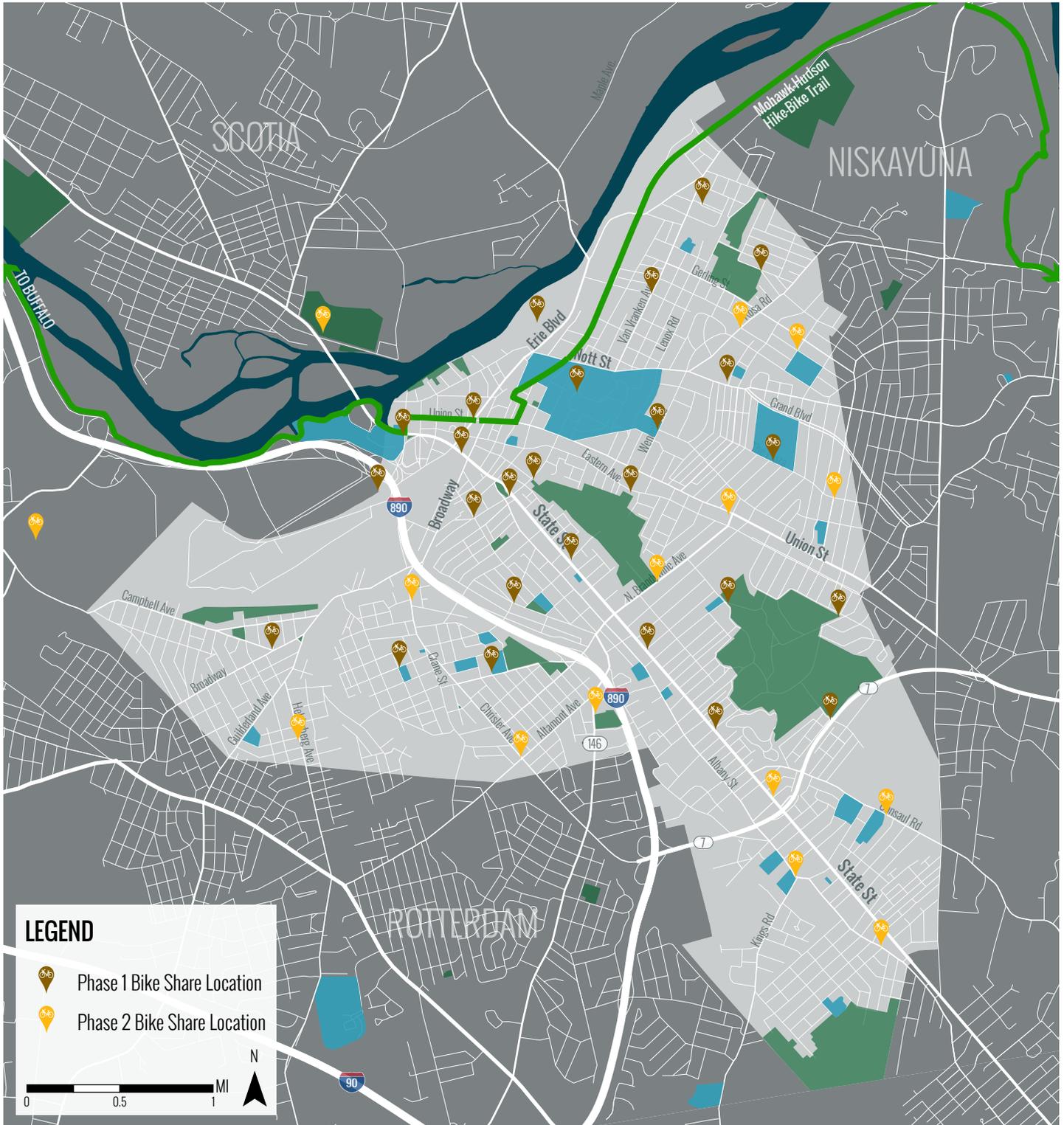
## Map 19 - Bike Share Station Location Recommendations - Phase 1



## Map 20 - Bike Share Station Location Recommendations - Phase 2



# Map 21 - Bike Share Station Location Recommendations - Full System



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# APPENDIX D



# PROGRAM & POLICY RECOMMENDATIONS

## 6 E'S OF BICYCLE FRIENDLY COMMUNITIES

The league of American Bicyclists identifies 6 qualities of a community that determine whether or not it is bicycle friendly. These include:

- **Engineering**  
Creating safe and convenient places to ride and park through the design and construction of physical infrastructure.
- **Education**  
Giving people of all ages and abilities the skills and confidence to ride through education programs, campaigns, and the availability of information.
- **Encouragement**  
Creating a strong bike culture that welcomes and celebrates bicycling as both a mode of transportation and a recreational activity.
- **Enforcement**  
Ensuring safe roads for all users through enforcing the laws that pertain to the protection and regulation of bicycle travel within a community.
- **Evaluation**  
Assessing the impacts of implemented infrastructure, policies, and programs, and planning ahead with the knowledge gained.
- **Equity**  
Ensuring that bicycling is a safe and welcome activity among all community members through the equitable distribution of bicycle infrastructure and programs in all communities and neighborhoods.

While the infrastructure and recommendations are represented largely in the facility recommendations of this plan, the remaining 5 E's of Bicycle friendly communities are primarily based in the proper installment of programs and policies that directly affect, influence, and support the bicycling culture within a society.

As such, the programs and policies within this plan have been broken down into the remaining 5 E's of Bicycle Friendliness in order to ensure that every aspect is incorporated into the development of the Schenectady bike culture. The adoption of this vast array of policies and programs alongside the recommended network infrastructure improvements will help turn Schenectady into a gold standard of bicycle friendliness.



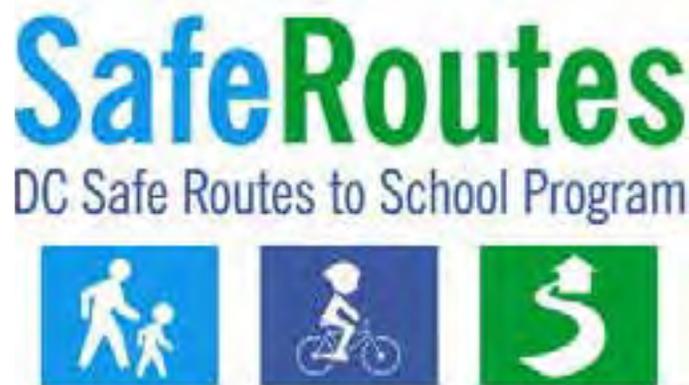
## PROGRAM RECOMMENDATIONS

### EDUCATIONAL PROGRAMS

#### Safe Routes to School

The City of Schenectady should continue to seek programming and facility funding from the Safe Routes to School program, administered by the Federal Highway Administration's Transportation Alternatives Program under Fixing America's Surface Transportation Act (FAST Act). In recent years, the City of Schenectady has received SRTS grants and implemented measures aimed at alerting motorists to their speed and educating the community around the schools in the City (see page 1-20 for reference).

The City should continue to pursue the funds to develop Safe Routes to School programs for each of the viable schools within the City. Safe Routes to Schools programs can apply for funding for Elementary and Middle Schools. For schools that have already conducted SRTS programs and developed action plans, funding should be pursued for the development of the priority projects and implementing them.



#### Bicycle Rodeo Events

Bicycle rodeos are skill courses that assist young or new bicyclists in learning the basics of riding a bike and riding in mixed traffic. Bicycle rodeos can help riders learning essential skills, such as:

- Balancing
- Stopping quickly
- Gaining speed
- Avoiding obstacles
- Using turning hand signals

The courses can be installed with temporary and cost effective materials, such as cones, duct tape, caution tape, and cardboard cut outs.

Bicycle rodeos should be integrated into the Safe Route to Schools programs, but should also be introduced to other community events, such as the Green Market during their open-air season. The rodeos can be sponsored by the events where they take place, by the police department, by schools and community organizations, or by activist groups, such as Electric City Bike Rescue.

The bicycle rodeos can also be paired with helmet or bicycle giveaways to increase attendance, give children access to bicycles, and increase the safety of bicyclists on the streets and trails throughout Schenectady.

## Bus Bike Rack Stations

Bus bike racks are an excellent addition to any transit system, and have become a cornerstone of developing multi-modal trip opportunities. Bus bike racks allow bicyclists to ride buses during their trips, greatly expanding their possible reach by bike.

One of the biggest deterrents from bicyclists using the bus bike racks is their own unfamiliarity with the racks. While the racks are designed to be simple and quick to use, their appearance can be daunting, and an individual who has never used them before may feel uncomfortable using them in a real-time scenario, where they may fear delaying the bus and its passengers.

However, allowing bicyclists to test-drive the racks allows them to become familiar with the feature and be more comfortable using the racks on the bus. CDTA currently runs a program where an out-of-service bus is brought to open-streets events and other gatherings to allow bicyclists to test drive the bike racks. It is recommended that this program continues and is integrated into events throughout the City of Schenectady, such as the Green Market when the market is in its open-air season, and any

open-street festivals that the City will integrate. This program should also be integrated into the schools as an educational tool for students who may take public transit to and from class.

Additionally, it is recommended that the City coordinates with CDTA for installing mock-bus bike racks at heavily trafficked bus stops. These mock racks can be installed onto the side of existing bus shelters or installed as kiosks and can allow bicyclists to test using the bike rack before their bus arrives. This type of program has proven successful in Chicago, where the Chicago Transit Authority has participated in city-wide bike events and installed permanent mock-bus bike racks at locations throughout the city.<sup>1</sup>

These proposed mock racks should be associated with clear, step-by-step instructions on how to use the bus racks. It should also be stressed at these mock stations that the racks are an educational tool and are not intended for use as a bike rack at the bus stop for bike storage. To emphasize this, bike racks should be installed at each bus stop that has the mock-bus bike racks.

1 <http://www.transitchicago.com/bikeandride/>



### Chicago Bike to Work Day

A mock-bus bike rack is set up and staffed at a bike to work station in Chicago during Bike to Work Day.



### CTA Bike Rack Testing Station

A mock-bus bike rack is permanently installed at a the CTA Building in Chicago for bicyclists to test the equipment.

## Educational Handouts

The City of Schenectady should build off of its own educational programs and the programs of the Capital Region in order to develop bicycle specific educational handouts that can be distributed throughout the City.

Educational materials focus on safe behaviors, rules, and responsibilities. Information may include important bicycle laws, bulleted keys for safe bicycle travel, helmet requirements, safe motor vehicle operation around bicycles, and general facility rules and regulations. Educational handouts can also provide City maps of bike routes, trails, one-way corridors, and bike parking facilities. The information should be made clear and precise, and the pamphlets should not be perceived as cluttered.

Pamphlets can be made available at City Hall, within schools, at public events like the Schenectady Green Market, at police stations, and at wayfinding kiosks throughout the City. The pamphlets should be regularly inventoried and replenished.

## 'Fix It Yourself' Handouts

One of the biggest fears that deter individuals from biking as a form of transportation is the fear of being stranded with a broken bicycle. A recent study done by the Voorhees Transportation Center revealed this fear to be the 4th leading barrier to bicycle travel, with 11% of individuals identifying it as their primary deterrent for bicycling.<sup>1</sup>

Providing individuals with the working knowledge of how to perform simple repairs of a bicycle, such as fixing a flat, adjusting brakes, and tightening seats, will help interested parties in overcoming this barrier of fear.

These pamphlets can be made available in schools, at information kiosks, at open streets events, and at repair stations. It can be sponsored by advocacy groups, such as the Electric City Bike Rescue, or local bike shops. Bike shops can purchase advertising spots on the back of the pamphlets, where they can present resources and tools that they sell for bicycle repairs.

## Bike Safety Education

Add bike safety education programs for adults and children to teach residents how to ride safely and legally. This could include the establishment of a bike playground where riders-in-training could practice following traffic rules.

## Driver Awareness Program

It is recommended that the City of Schenectady begins a campaign for driver awareness that relates to seeing and interacting with bicyclists on the street. This campaign may include hand-outs, billboards, classes, and other methods for generating awareness. This campaign should encourage drivers to check their mirrors before pulling out of parking spaces, encourage them to give bicyclists at least three feet of clearance when passing, and to look for bicyclists at intersections.

<sup>1</sup> Charles T Brown, MPA, Voorhees Transportation Center

## ENCOURAGEMENT PROGRAMS

### Incentive Programs

Using incentives is a strong tactic for boosting bicycle mode share, proper bicycle etiquette, and safe bicycle habits. This is especially true for younger riders. Incentivising children to ride their bikes and do so safely at a young age results in stronger positive habits later in their lives and long-lasting effects on their mode share choices.

One program that currently exists within the City of Schenectady is a partnership program between the Schenectady Police Department and Stewart's Shops. If a police officer spots a child riding with a proper helmet on, they are able to give that child a coupon for a free ice cream cone at Stewart's Shops. This incentivises children to wear helmets when riding their bikes. The long lasting effects of these kinds of programs is stronger than punishment based programs for children who do not wear their helmets.

It is recommended that the City works with Stewart's Shops or a similar partners to continue the program for years to come, and programs similar to it. Examples of other programs include:

- **School Pizza Parties**  
Encourage students to ride to school with helmets. The classroom with the most helmets at the end of the day (one helmet per student) get a free pizza party from a participating partner business.
- **High School Street Riding Class**  
Host a street riding class for the basics in riding in busy streets at the high school. Students can be encouraged and incentivised with prizes. Prizes can include riding gear, or a bike giveaway, sponsored by local bike shops.

### Bike to School/Work Days

May is National Bike Week. National Bike to work Week is the third week of May each year, with Bike to Work Day being the Friday of that week. Bike to School Day is the Wednesday of the second full week of May. Cities, organizations, schools and employment centers nationwide organize events on these days to help encourage bicycling.

Having the City of Schenectady partner with its schools, employers, and advocacy groups to organize events throughout the month of May and on these specific days can help grow ridership and educate the public. Events can include organizing 'commuter convoys' for large employment centers in the City, providing bicycle-specific route planning resources, such as in the form of an app, or city-wide maps, and providing bike month 'pit stops' in the form of parklets with fix-it stations and free water for bicyclists. More information and ideas can be found in the League of American Bicyclists' National Bike Month Guide<sup>1</sup> and at the National Center for Safe Routes to School's 'Walk Bike to School' homepage.<sup>2</sup>

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1 <http://www.bikeleague.org/BikeMonthGuide>

2 <http://walkbiketoschool.org/>

## Open Street Festivals

Open Streets days and festivals are opportunities for streets to be closed down to motor vehicle traffic or have motor vehicle traffic restricted, in an effort to use the streetscapes for other activities. A strong example of a successful open streets event is the Schenectady Green Market. Encouraging communities to develop these events can help residents view the streets as a place for more than just car travel.

Another great example of a successful open streets event would be the Craig Street Bike Festival that corresponded with the second bicycle demonstration project of this plan. The bike festival generated strong community support, and was praised by the City, residents, police department, and county staff as a large success.

## PARKing Day Events

PARKing Day is the third Friday in September. It is an international event where participating cities and communities allow individuals and/or organizations to create “parklets” by converting on-street parking spaces to parks for a day. These spaces have historically been converted parklets, which encourage community and create traffic calming by narrowing the roadway. Having people using the parklets in the streets also encourages slower traffic speeds, which increases safety for bicyclists.

Parklets can feature bicycle friendly infrastructure, such as bicycle corrals or fixit stations, in addition to the typical cafe spaces and open spaces. PARKing Day has also introduced opportunities for communities to turn on-street parking into bicycle facility demonstrations, such as converting a parking lane into a buffered bike lane, as was done in Seattle’s 2015 PARKing Day competition.



## ENFORCEMENT PROGRAMS

### Bicycle Patrols

The presence of bicycle patrols in the downtown area of the City of Schenectady is a great element to the enforcement of laws within Schenectady. They provide a strong presence that is more personable than patrol cars, and provide an example of proper bicycle etiquette for bicyclists.

It is recommended that the Schenectady Police Department expands bicycle patrols into the Stockade District, towards the Mohawk Harbor development, and into the Central/Vale Park area. As bicycle infrastructure is implemented throughout the City, it is recommended that the police department expands its bicycle patrols into those areas as well.

### Speed Trailers

Corridors that experience traffic calming and speed limit reductions, such as the neighborhood greenways network, should have speed trailers installed to ensure slower vehicle speeds.

Trailers should be moved regularly between calmed corridors (on a 2 week to 1 month rotation) in order to reduce the effect of motorists becoming jaded to the trailers. The trailers should also be paired with patrol cars at unpredictable intervals in order to help reduce this effect.

Areas around schools or areas with excessive speeding may have pole mounted speed displays for a permanent installation.

### Trail Buddy Program

A comment that was repeated numerous times from among the public meetings and stakeholder sessions throughout the development of this plan was the uneasiness of riding through secluded areas for individuals who may ride alone during evening hours. One area that stood out in these discussions was riding through Vale or Central Park during evening hours. Off-street trails are also intimidating areas for evening bicycling. Identifying similarly intimidating areas within the City and introducing a 'buddy system' for these areas would open up access to routes for individual riders. This can be done through informal means, such as developing a 'commute buddy' sign up where bicycle commuters sign up to ride together, or through formal means, such as introducing police bicycle patrols in these areas or having volunteers act as 'guides' through the areas. Eventually, as bicycle traffic increases in these areas, they will become more welcoming and less secluded. Having a buddy system will also decrease the likeliness of crimes against bicyclists, such as robbery or assault.

### Bike Lane Ticketing

Parking in bike lanes forces the bicyclists using the bike lane to temporarily merge into the travel lanes, often mid-block. This places them in a dangerous scenario, as motorists may not expect bicyclists in the travel lane due to the presence of the bike lanes, and may lead to collisions.

In order to reduce these scenarios, an emphasis should be placed on patrolling newly installed bike lanes throughout the City, and creating a parking ticketing campaign to dissuade motorists from parking within the bike lanes.

## EVALUATION PROGRAMS

### Online Surveys

The City should maintain surveys on public websites to allow the public to provide continual feedback on the newly installed facilities and their respective maintenance. This will give the City an opportunity to hear from daily users and affected community members about the effectiveness and unforeseen influences of the new facilities. If this is not done as a continual program, a survey should be developed on an annual basis. The results of the surveys should be made public and utilized to prioritize future development of the bicycle network.

Advertising for these surveys can be done through city-run social media outlets, partnerships with community organizations and advocacy groups, handout and flyering campaigns, and through billboard or side-of-bus advertisements for larger projects. A partnership can also be made with CDTA to have QR codes installed at bus stops that lead people to surveys that they can take while waiting for their bus to arrive. These surveys in particular should not take longer than 3-4 minutes to complete, and should be relevant to the community that the bus stop is located in.

## EQUITY PROGRAMS

### Facility Maintenance

In order to ensure the implemented bicycle infrastructure is effective at providing comfortable spaces for bicyclists to ride, the City of Schenectady shall set up continual maintenance programs for all of the facilities installed. This maintenance plan will include, when relevant to the facility, but is not limited to:

- Debris removal & landscaping
- Repaving and pavement patching
- Snow removal
- Restriping & resigning efforts

### Community Sponsorship Program

Utilizing community resources to install support infrastructure that the communities desire can be a low-cost option for the City to roll-out new installments. Two popular options for community sponsorship programs include bike racks and parklets.

- Having community sponsored bike racks allows for funds to be acquired for bike rack installations and allows for the community to identify where they would like to install their bike racks. Incentives for businesses, organizations, and individuals to sponsor such racks can include personalized plaques on each rack.
- Sponsored parklets are also a great way to get them installed in a city. It allows residents and businesses to identify where they want parklets and allows for the sponsors to personalize each parklet to either their, or the community's, uniqueness, such as a workout station outside a local gym.

## POLICY RECOMMENDATIONS

### ENGINEERING POLICIES

#### Adopting NACTO Design Guidelines

The City of Schenectady can adopt the Urban Streets Design Guide as an authoritative standard for street planning and design within the City, or develop their own design guides that will meet the specific needs of the community but are still based upon the National Association of City Transportation Officials (NACTO) Urban Street Design Guide. Any created design guides should still be based upon the six overarching principles and should accommodate all street users.

The National Association of City Transportation Officials (NACTO) has recognized the need to create design guidelines specifically for urban street systems. They have recognized that urban streets differ greatly from suburban, urban, and highway corridors, and as such, have their own specific design needs. The NACTO Urban Street Design Guide is based off of these needs and contains six overarching principles:

- Streets are public spaces
- Great streets are great for business
- Streets can be changed
- Design for safety
- Streets are ecosystems
- Act now

When cities embrace these principles in their street design process, streets become more friendly for all user groups and communities flourish.

### EDUCATIONAL POLICIES

#### Safe Routes to School Committee

The City of Schenectady has had numerous Safe Routes to Schools programs established that have led to many great improvements within the City's networks of infrastructure, as well as many great educational programs for students within the City. In order to ensure the continual growth of the safe Routes to School programs in Schenectady, the City should establish an SRTS committee to oversee the expansion of the SRTS programs to new schools, ensure the implementation of the existing SRTS plans and programs, and identify SRTS programs that need to be updated or renewed.

#### Union College Campus Plan

As Union College plays a large role in the community of Schenectady and has a large property within the City, it is recommended that the City work with the college to prepare a campus master plan for bicycle travel or general active transportation. Campus master plans help colleges and other institutions establish priority projects for improving the lives of students, faculty, and staff. Implementing a campus master plan for the campus of Union College that is partnered with the City of Schenectady will help ensure that both communities' needs are met. It will also help solidify an official bicycle route through the campus that is supported by both the college and the City if the college is willing to do so.

## ENCOURAGEMENT POLICIES

### Reduce Building Set Backs

On the larger thoroughfares and commercial strips, such as the southern section of State Street, there are commercial properties with large building set backs that separate the roadway from the buildings with massive, private parking lots.

It is recommended that the City require closer building set backs in order to allow bicyclists and pedestrians to get to the businesses or developments without having to cross such large parking lots. Having smaller building set backs will also produce a lane-narrowing illusion along these corridors, which will in turn create a traffic calming effect and reduce speeds.

Building set backs may be reduced by enforcing the installation of rear parking for buildings or developing plazas where parking is spread out and internally located within the property.

### Reduce Parking Requirements

Across the country, cities are reducing or eliminating their parking requirements for commercial buildings in an effort to utilize that space for community development, infrastructure improvements, or more development space. It is recommended that the City also reassesses the parking needs of developments and limits their parking requirements for commercial and residential developers, especially among business districts, so that these underutilized spaces can be activated. The City shall also require the installation of adequate bicycle parking to encourage bicycle trips to and from the developments, as well as proper pedestrian infrastructure to allow pedestrians to comfortably, safely, and quickly move through parking lots.

### Consolidate Commercial Curb Cuts

It is proposed that the City's codes be adopted to better regulate the number of curb cuts along a corridor. As it stands, many commercial corridors within the City have extensive numbers of curb cuts and this can create an excessive number of turning conflicts for bicyclists that are encouraged to ride to the right of the road, putting them in harms way of turning vehicles.

### Tax Cut Incentives

It is recommended that the City offers developers, corporations, businesses, and other complexes tax cuts for developing more bicycle friendly communities. These tax cuts may either be implemented for corporate campuses and developments that create Campus Bicycle Master plans or for locations that receive recognition by the League of American Bicyclists for being bicycle friendly. These incentives may be set on a tier based system depending on the bicycle friendly designation (bronze, silver, gold, or platinum) and the level of depth or topics addressed in the master plans.

### Bicycle Facility Requirements

Add a requirement to the zoning code that requires certain types of new development to provide bicycle racks/lockers, showers, and other bicycle amenities.



## ENFORCEMENT POLICIES

### Adopt Plan

Adopting this plan will allow the City to move forward with implementing the identified improvements, programs, policies, and methodologies that the plan outlines. Adopting this plan will make the policies and programs an official part of the City of Schenectady's set of policies and provide the means to start moving forward.

### Contra-Flow Policy

As it stands, the City of Schenectady's codes and policies are vague about the implementation of contra-flow lanes. Contra-flow lanes are a great resource for the City's bicycle network, allowing connections to be made across the barriers that one-way streets create. One-way streets have a much bigger impact on bicyclists, as the time and effort it takes to get to the next corridor that allows them to travel in the direction they desire is much greater than that of a motorist.

The enabling of contra-flow lanes within the City of Schenectady also is a key element to the proposed connection of the Mohawk Hudson Bike Hike Trail. Without it, the trail will have to either be rerouted, or will not be a complete trail network in both directions.

Adopting an amendment to the City's codes that specifically exempts bicyclists from the one-way street policies when a contra-flow lane is present is recommended.

### Park Path Policy

The current codes for the City of Schenectady prohibit bicycle use of paths and trails within the parks in the City. This greatly inhibits the ability for bicyclists to travel to and through the parks, which generally offer much greater comfort than street riding. However, the issue of pedestrian comfort and safety arises when discussing the opening up of paths to bicyclists.

For this reason, it is recommended that the City of Schenectady adopts a policy where bicyclists are allowed to use shared use paths that meet the criteria outlined in the Guidance Chapter and an engineering assessment of the trail corridor shall be conducted before any trail is opened to bicycle use.

## EVALUATION POLICIES

### Complete Streets Committee

It is recommended that the City establishes a complete streets committee that oversees the implementation of the recommendations from this plan, as well as any other plan that involves the implementation of pedestrian, bicycle, and transit improvements within the City. This committee will also be called upon to assess redevelopment plans within Schenectady and address any complete street mitigations that the plans will require, as well as identify any opportunities for large capital projects to incorporate the improvements outlined in this plan.

### Complete Streets Law

It is recommended that the City of Schenectady adopts a new law that requires any new development within the City's limits to assess the impact that the development will have to all modes of travel and identify the need in the area for alternative modes of travel. Other Capital District cities with Complete Streets Ordinances include:

- City of Albany
- City of Troy
- City of Saratoga Springs

## EQUITY POLICIES

### Space Activation Plan

Many projects that involve tactical urbanism and space activation require by law the issuance of a permit and the evaluation of engineering studies. The same permitting policies that are required for the installation of a building may in some cases also apply to a temporary parklet. As a result, lower income areas and other communities that do not have the resources to pull together these permits and afford the necessary studies miss out on great community investments like tactical urbanism or street art projects.

It is recommended that the City of Schenectady adopts a policy that allows community supported projects that fall under the umbrella of tactical urbanism and space activation to be streamlined in such a way they can occur legally without providing a burden upon the community members. This law shall only affect projects that will have insignificant to no negative environmental or community impacts.

# APPENDIX E



# FUNDING OPPORTUNITIES



## CAPITAL PROJECT INTEGRATION

Wherever possible and relevant, the recommended elements of the proposed bicycle network in this plan shall be integrated into ongoing capital projects, such as paving schedules and redevelopments. This process may include planning board site plan reviews, traffic or environmental impact mitigation, inclusion in public works projects, and collaboration with developers or state agencies.

## FEDERAL FUNDING

CDTC receives federal funding under the Fixing America's Surface Transportation (FAST) Act. The FAST Act was signed in 2015 to provide long-term funding for surface transportation infrastructure planning and investment.

## NEW YORK STATE FUNDING

An important grant source for communities within New York State is the New York State Consolidated Funding Application (CFA). This application opens up opportunities for projects to be eligible for a number of grant opportunities. A large number of these grants require a combination of grant funds and matching funds to be used for projects.

## NYS DEPARTMENT OF HEALTH - PREVENTATIVE HEALTH AND HEALTH SERVICES (PHHS) BLOCK GRANT

The PHHS Block Grant provides funding for health problems in New York State. This may range from tuberculosis to adult physical activity. This funding source may be used for the implementation of plans, programs, and policies that will increase adult physical activities.

## CONSOLIDATED LOCAL STREET AND HIGHWAY IMPROVEMENT PROGRAM (CHIPS)

A New York State-funded program administered through the NYSDOT to assist localities in financing the construction, reconstruction, or improvement of local highways, bridges, highway-railroad crossings, and other local facilities. Eligible CHIPS bicycle-related projects include:

- bike lanes
- wide curb lanes
- shoulder improvements
- roundabouts
- new signs
- traffic signal installation or upgrade
- traffic calming installations

## TRANSPORTATION ALTERNATIVES PROGRAM

The Federal Highway Administration's Transportation alternatives program was introduced under the Moving Ahead for Progress in the 21st Century (MAP-21), and now falls under MAP-21's replacement; Fixing America's Surface Transportation Act (FAST Act). The TAP consolidates three previously separate federal funding programs:

- Transportation Enhancement Program (TEP)
- Safe Routes to School (SR2S)
- Recreational Trails Program (RTP)

These funding Sources are now a set-aside for the Surface Transportation Block Grant Program (STBG). The block grants provide funds for bicycle and pedestrian projects.

### TRANSPORTATION ENHANCEMENT

This funding source encompasses a range of bicycle and pedestrian infrastructure. It may be used for planning, design, and construction of these facilities. The range of facilities may include both on- and off-road facilities for bicyclists, pedestrians, and other non-motorized modes of transportation.

### SAFE ROUTES TO SCHOOL

The City of Schenectady should continue to seek programming and facility funding from the Safe Routes to School program, administered by the Federal Highway Administration's FAST Act and TAP . This funding source may be used to develop safe routes to school plans and implement their recommendations. It may be used for elementary and middle schools, though other funding sources may be used for high school plans.

## RECREATIONAL TRAIL

The funding of the Recreational Trail Program as a part of TAP may be used for the development and maintenance of recreational trails or trail related facilities for both motorized and non-motorized recreational trail uses. Examples of trail uses may include, but is not limited to:

- hiking
- bicycling
- in-line skating
- equestrian use

The funds are available for both paved and unpaved trail facilities. The funds may be used for the following trail related uses:

- Maintenance and restoration of existing trails
- Purchase and lease of trail construction and maintenance equipment
- Construction of new trails, including unpaved trails
- Acquisition or easements of property for trails
- State administrative costs related to this program
- Operation and education programs to promote safety and environmental protection related to trails (limited to five percent of state's funds)



## COMMUNITY DEVELOPMENT BLOCK GRANTS

The Community Development Block Grants (CDBG) program provides federal funding for streetscape revitalization, which may be largely comprised of pedestrian and bicycle improvements. Federal CDBG grantees may “use Community Development Block Grants funds for activities that include (but are not limited to): acquiring real property; reconstructing or rehabilitating housing and other property; building public facilities and improvements, such as streets, sidewalks, community and senior citizen centers and recreational facilities; paying for planning and administrative expenses, such as costs related to developing a consolidated plan and managing Community Development Block Grants funds; provide public services for youths, seniors, or the disabled; and initiatives such as neighborhood watch programs.” For more information, visit:

[www.hud.gov/cdbg](http://www.hud.gov/cdbg)

## LOCAL RESOURCES

Local resources are a great way to implement a range of recommendations, especially low-cost facilities, such as parklets or temporary improvements, or programs that may be volunteer led. Local resources can come in the form of funds, volunteer hours, or materials. Sources of local resources may include:

- local grants and fund-raisers
- activist groups
- businesses and employers
- developers
- community groups
- interested individuals

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# APPENDIX F



# PUBLIC INVOLVEMENT SUMMARY & SURVEY

## DEMONSTRATION PROJECT

Throughout the development of this plan, two demonstration projects were conducted. These projects involved the installation of temporary facilities on existing streets within the City of Schenectady, as well as efforts to engage with the public regarding the demonstrations and overall plan.

### WASHINGTON AVENUE CONTRA-FLOW LANE

The first of the two demonstration projects was on Washington Avenue, north of State Street. The project included the following facilities:

- southbound contra-flow bike lane on Washington Avenue from State Street to Union Street
- mini traffic circle at the intersection of Washington Avenue and Union Street
- shared lane markings on Washington Avenue in both directions from Union Street to Front Street
- wayfinding signage along Washington Avenue

The demonstration project was set up for a full week, and staffed during several days during different times of day.

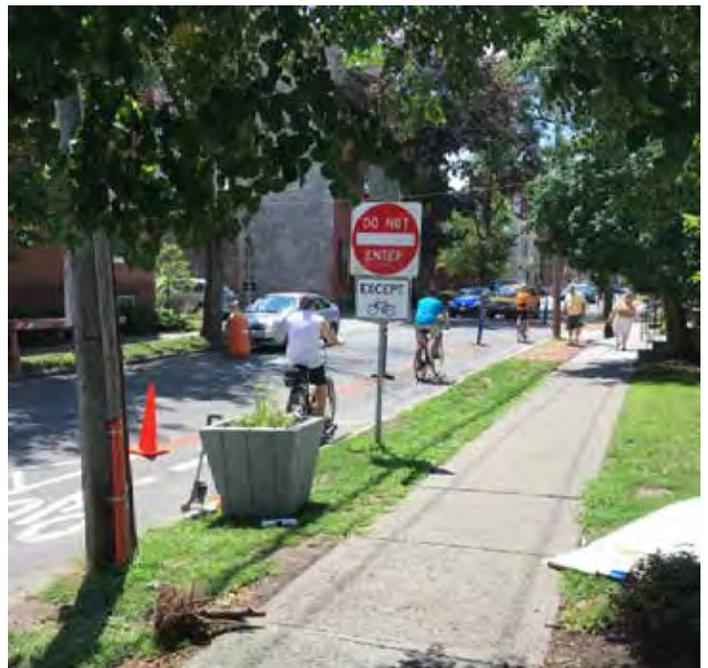
The project's intention was to illustrate different options for street treatments, fill the missing gap of on street facilities for the Mohawk Hudson Bike Hike Trail that is routed along the corridor, and spread word of the plan's development.

## Materials Used

The following items were used to establish the demonstration project on Washington Avenue:

- chalk paint used for temporary striping
- colored duct tape used for temporary striping
- templates used for applying shared lane markings and bike lane markings
- channelizer posts for providing a buffer between bicyclists and motor vehicles
- traffic cones to provide physical deflection for the mini traffic circle
- corrugated plastic signs for traffic and wayfinding signage
- wooden posts to hold the temporary signs

The materials for this demonstration project were provided by the consulting team, the City, and Capital Roots.



## CRAIG STREET BIKE DEMONSTRATION

The Craig Street Bicycle Demonstration included the bicycle infrastructure on Craig Street and other corridors in the Hamilton Hill Neighborhood. It also included a bicycle festival hosted in the YMCA parking lot.

### Facilities

The facilities implemented during the demonstration project included:

- Bike Lanes along Craig Street
- Advisory Bike Lanes along Stanley Street
- Crosswalks along Craig Street
- Signage implemented along Craig Street, Stanley Street, Stueben Street, Emmett Street, and Albany Street

### Materials Used

The following items were used to establish the demonstration project on Washington Avenue:

- traffic tape for temporary striping
- chalk paint for temporary striping
- templates for the bike lane markings and text symbols
- corrugated plastic signs for temporary signage

Much of the striping was installed through an agreement met between the City of Schenectady and their striping contractor. Some of the features, such as the crosswalks, were installed permanently as a part of this project and this agreement.





## **SURVEY RESULTS**

An online survey, utilizing the Survey Monkey online platform, was open to the public from the beginning of the development of the existing conditions to the conclusion of August, 2016. The survey included 18 multiple choice questions and one written response question.

The survey had 243 participants. The survey could be found on the project's website and was advertised on hand outs that were passed out during public outreach efforts.

Respondents were given the opportunity to skip questions. 5 questions had all participants give a response, the remaining questions had at least one participant skip it.

All survey responses were anonymous.

The response tallies may be found on the following pages.

| What gender do you most identify with? |                  |                |
|--|------------------|----------------|
| Answer Options                         | Response Percent | Response Count |
| Male                                   | 63.0%            | 150            |
| Female                                 | 37.0%            | 88             |
| <i>answered question</i>               |                  | <b>238</b>     |
| <i>skipped question</i>                |                  | <b>5</b>       |

| What is your age?        |                  |                |
|--------------------------|------------------|----------------|
| Answer Options           | Response Percent | Response Count |
| <18                      | 0.4%             | 1              |
| 19-25                    | 2.9%             | 7              |
| 26-35                    | 17.8%            | 43             |
| 36-50                    | 31.4%            | 76             |
| 51-65                    | 35.1%            | 85             |
| >65                      | 12.4%            | 30             |
| <i>answered question</i> |                  | <b>242</b>     |
| <i>skipped question</i>  |                  | <b>1</b>       |

| Do you live or work in the City of Schenectady? |                  |                |
|---|------------------|----------------|
| Answer Options                                  | Response Percent | Response Count |
| Live  | 29.6%            | 72             |
| Work  | 24.7%            | 60             |
| Attend College                                  | 0.4%             | 1              |
| Both Live and Work/Attend College               | 18.9%            | 46             |
| Neither, but I visit Schenectady                | 25.1%            | 61             |
| None of the above                               | 1.2%             | 3              |
| <i>answered question</i>                        |                  | <b>243</b>     |
| <i>skipped question</i>                         |                  | <b>0</b>       |

| Does your household own a motor vehicle? (select one) |                  |                |
|---|------------------|----------------|
| Answer Options  | Response Percent | Response Count |
| no vehicle  | 1.2%             | 3              |
| one vehicle   | 24.8%            | 60             |
| two vehicles  | 59.1%            | 143            |
| three or more vehicles                                | 14.9%            | 36             |
| <i>answered question</i>                              |                  | <b>242</b>     |
| <i>skipped question</i>                               |                  | <b>1</b>       |

| How frequently do you bicycle? (select one) |                  |                |
|---|------------------|----------------|
| Answer Options                              | Response Percent | Response Count |
| never                                       | 4.2%             | 10             |
| few times per week                          | 47.5%            | 114            |
| 5+ times per week                           | 25.4%            | 61             |
| few times per month                         | 12.5%            | 30             |
| few times per year                          | 10.4%            | 25             |
| <i>answered question</i>                    |                  | <b>240</b>     |
| <i>skipped question</i>                     |                  | <b>3</b>       |

| Which statement best describes your comfort level on a bicycle?  |                  |                |
|--|------------------|----------------|
| Answer Options   | Response Percent | Response Count |
| I am comfortable bicycling on the road with automobiles in       | 42.0%            | 100            |
| I am most comfortable in a clearly designated bicycle lane or on | 38.7%            | 92             |
| I don't feel comfortable sharing any roadway with cars and       | 19.3%            | 46             |
| Other (please describe)  |                  | 28             |
| <i>answered question</i>   |                  | <b>238</b>     |
| <i>skipped question</i>  |                  | <b>5</b>       |

| Which aspect of bicycling is most appealing to you? (select all that apply) |                  |                |
|---|------------------|----------------|
| Answer Options  | Response Percent | Response Count |
| Increased health and fitness  | 94.2%            | 229            |
| Money saved on fuel   | 33.3%            | 81             |
| More time outdoors  | 83.5%            | 203            |
| Faster commute  | 8.6%             | 21             |
| Easier to find convenient parking   | 16.5%            | 40             |
| Fewer traffic jams  | 15.2%            | 37             |
| Reducing the amount of time spent driving in a car                          | 39.1%            | 95             |
| Reduce negative impact on the environment/preserving the                    | 51.9%            | 126            |
| I do not bicycle  | 1.2%             | 3              |
| Other (please specify)  | 8.6%             | 21             |
| <i>answered question</i>  |                  | <b>243</b>     |
| <i>skipped question</i>   |                  | <b>0</b>       |

| In general, bicycling in and around the City of Schenectady is: |                  |                |
|---|------------------|----------------|
| Answer Options  | Response Percent | Response Count |
| Very Safe   | 1.2%             | 3              |
| Somewhat Safe   | 22.6%            | 55             |
| Neutral   | 23.5%            | 57             |
| Somewhat Dangerous  | 42.0%            | 102            |
| Very Dangerous  | 10.7%            | 26             |
| <i>answered question</i>  |                  | <b>243</b>     |
| <i>skipped question</i>   |                  | <b>0</b>       |

| How important to you is improving bicycling conditions in Schenectady? (select one) |                  |                |
|---|------------------|----------------|
| Answer Options  | Response Percent | Response Count |
| Very important  | 67.8%            | 164            |
| Somewhat important  | 28.5%            | 69             |
| Not important   | 2.1%             | 5              |
| I've never really thought about it  | 1.7%             | 4              |
| <i>answered question</i>  |                  | <b>242</b>     |
| <i>skipped question</i>   |                  | <b>1</b>       |



| What destinations would you most like to get to by bike? (select all that apply) |                  |                |
|--|------------------|----------------|
| Answer Options   | Response Percent | Response Count |
| Neighbor's house   | 20.6%            | 50             |
| Downtown   | 65.8%            | 160            |
| Schools  | 13.6%            | 33             |
| Grocery stores   | 37.4%            | 91             |
| Picnic areas   | 31.3%            | 76             |
| Places of work   | 41.6%            | 101            |
| Restaurants  | 42.4%            | 103            |
| Public Transportation  | 11.9%            | 29             |
| Community centers  | 17.7%            | 43             |
| Other Shopping (retail stores)   | 22.6%            | 55             |
| Parks  | 75.3%            | 183            |
| Entertainment  | 28.8%            | 70             |
| Greenways and biking trails  | 84.8%            | 206            |
| Farmers markets/community gardens  | 53.1%            | 129            |
| I don't bicycle  | 1.2%             | 3              |
| Other specific location (please specify)   | 12.3%            | 30             |
| <i>answered question</i>   |                  | <b>243</b>     |
| <i>skipped question</i>  |                  | <b>0</b>       |

| Which of the following changes would encourage you to bike more often? (select all that apply) |     |       |    |                |
|--|-----|-------|----|----------------|
| Answer Options   | Yes | Maybe | No | Response Count |
| Bicycle racks at destinations  | 170 | 49    | 16 | 235            |
| Showers or locker rooms at workplace   | 103 | 54    | 53 | 210            |
| Lower automobile speed limits on roads   | 82  | 84    | 57 | 223            |
| Better roadway maintenance   | 207 | 21    | 8  | 236            |
| Sidepaths (paved trails adjacent to roadways)  | 196 | 30    | 10 | 236            |
| Greenways (paved trails removed from roadways)   | 200 | 20    | 16 | 236            |
| Bicycle lanes (on-road facilities)   | 186 | 42    | 10 | 238            |
| Neighborhood roads prioritized for bicycle traffic   | 149 | 69    | 14 | 232            |
| Directional signage along bicycle routes   | 129 | 69    | 26 | 224            |
| Other (please specify)   |     |       |    | 31             |
| <i>answered question</i>   |     |       |    | <b>243</b>     |
| <i>skipped question</i>  |     |       |    | <b>0</b>       |

**Which of the following resources or programs would most interest you? (select all that apply)**

| Answer Options   | Response Percent | Response Count |
|--|------------------|----------------|
| Bicycle Safety Education for Adults and Seniors              | 35.6%            | 84             |
| Bicycle Safety Education for Child and Youth Cyclists        | 34.7%            | 82             |
| Materials Describing Bicyclists' Rights and Responsibilities | 46.2%            | 109            |
| Materials Promoting the Benefits of Bicycling                | 23.7%            | 56             |
| Motorist Education for Sharing the Road                      | 69.5%            | 164            |
| Bicycling Maps, Guides, and Informational Website            | 74.2%            | 175            |
| Guided Bicycle Rides for Novice Bicyclists and Families      | 22.5%            | 53             |
| Special Events with a Variety of Bicycle Activities          | 37.7%            | 89             |
| Increased Enforcement on Automobile Speeding                 | 55.9%            | 132            |
| Commute-by-bike Incentives at Work or at School              | 56.4%            | 133            |
| <i>answered question</i>                                     |                  | <b>236</b>     |
| <i>skipped question</i>                                      |                  | <b>7</b>       |

**Which of the following factors prevent you from bicycling or from bicycling more often? (select all that apply)**

| Answer Options                                    | Response Percent | Response Count |
|---|------------------|----------------|
| Lack of bicycle facilities or paths               | 38.8%            | 93             |
| Gaps in bicycle facilities                        | 30.4%            | 73             |
| Narrow lanes                                      | 47.9%            | 115            |
| Other travel modes are safer or more comfortable  | 20.8%            | 50             |
| Crossing busy roads                               | 45.8%            | 110            |
| Terrain (steep hills, long climbs, etc.)          | 10.0%            | 24             |
| Poor conditions, such as loose gravel or potholes | 60.8%            | 146            |
| Drainage grates                                   | 23.3%            | 56             |
| Lack of adequate lighting                         | 12.9%            | 31             |
| Concern for personal safety                       | 47.5%            | 114            |
| Physical ability                                  | 7.1%             | 17             |
| Travel time or distance                           | 13.3%            | 32             |
| Heavy traffic                                     | 46.3%            | 111            |
| High-speed traffic                                | 42.9%            | 103            |
| Inconsiderate motorists                           | 60.4%            | 145            |
| Lack of bicycle parking                           | 18.3%            | 44             |
| Lack of showers and lockers at workplace          | 8.8%             | 21             |
| Nothing prevents me from bicycling                | 12.1%            | 29             |
| Other (please specify)                            |                  | 23             |
| <i>answered question</i>                          |                  | <b>240</b>     |
| <i>skipped question</i>                           |                  | <b>3</b>       |

**How do you feel drivers in your area typically behave around bicyclists? (select all that apply)**

| Answer Options                                      | Response Percent | Response Count |
|---|------------------|----------------|
| Courteous, yield, and give bicyclists space         | 28.3%            | 68             |
| Drive too fast                                      | 52.5%            | 126            |
| Pass bicyclists too closely                         | 70.4%            | 169            |
| Tolerate bicyclists not following rules of the road | 15.8%            | 38             |
| Harass bicyclists                                   | 25.4%            | 61             |
| Fail to yield to bicyclists crossing a street       | 38.3%            | 92             |
| Other (please specify)                              | 20.4%            | 49             |
| <i>answered question</i>                            |                  | <b>240</b>     |
| <i>skipped question</i>                             |                  | <b>3</b>       |

**How do you feel bicyclists in your area typically behave? (select all that apply)**

| Answer Options  | Response Percent | Response Count |
|---|------------------|----------------|
| Courteous, obeying all traffic laws                     | 36.6%            | 82             |
| Cycle in the roadway the opposing direction as vehicles | 41.1%            | 92             |
| Fail to comply with traffic laws                        | 55.4%            | 124            |
| Ride too slowly   | 2.7%             | 6              |
| Are young and/or inexperienced                          | 19.6%            | 44             |
| Multiple cyclists ride abreast in the same travel lane  | 25.0%            | 56             |
| Behave rudely   | 12.1%            | 27             |
| Don't signal turns or stops                             | 51.3%            | 115            |
| Ride on sidewalks                                       | 49.1%            | 110            |
| Ride at night without lights                            | 41.1%            | 92             |
| Other (please specify)                                  |                  | 51             |
| <i>answered question</i>                                |                  | <b>224</b>     |
| <i>skipped question</i>                                 |                  | <b>19</b>      |

| Should public funds (federal grants, local taxes, state funds, other public grants, etc.) be used to improve bicycling conditions? |                  |                |
|--|------------------|----------------|
| Answer Options   | Response Percent | Response Count |
| Yes  | 95.4%            | 229            |
| No   | 4.6%             | 11             |
| <i>answered question</i>   |                  | <b>240</b>     |
| <i>skipped question</i>  |                  | <b>3</b>       |

If you had \$100 to spend on bicycle facility improvements in Schenectady, how would you spend it? You can spend all of your money on one thing or spread it around as you feel appropriate. (Be sure your total equals

| Answer Options                          | Response Average | Response Total | Response Count |
|---|------------------|----------------|----------------|
| Bike lanes (on-road facilities)         | 42.72            | 7,775          | 182            |
| Sidepaths (parallel to road facilities) | 32.40            | 5,896          | 182            |
| Greenways (off-road paved trails)       | 35.84            | 6,882          | 192            |
| Other bicycle related improvements      | 16.52            | 2,148          | 130            |
| Programs related to bicycling           | 12.60            | 1,499          | 119            |
| <i>answered question</i>                |                  |                | <b>242</b>     |
| <i>skipped question</i>                 |                  |                | <b>1</b>       |

What do you think are the top three roadway corridors (in Schenectady) most needing bicycling improvements?

**Common Responses: Erie Boulevard, Union Street, Route 50, State Street, Route 5, Nott Street, Balltown Road**

## PUBLIC COMMENTS

The following are the comments collected from the public through the website, emails, and collected in person at meetings and at the demonstration projects. All names and personal information has been removed from the comments. Some comments are in reference to the specific demonstration projects and some are in reference to the development of the plan.

- Nott Terrace is an enormously wide stretch of road that could easily accommodate -- and would be greatly improved by --- a separate bike lane
- Next I rode westward on Union to check out the Contra Lane demo on Washington Ave and found workers/volunteers still busy painting lines etc. On my return a couple hours later, they were still painting the mini-circle but had lane markings for the contra lane in. I rode it northward and through Riverside Park, then looped around and rode southbound taking advantage of the new Contra Lane. I was surprised at how much of a difference the paint made – my initial impression from riding the bare street a couple days ago and early this morning before the lane demarcations were on the ground wasn't that enthusiastic. Now, I believe this will work and would be a definite benefit, especially as the new bike trail through the Casino develops and folks are encouraged to explore that and its connections with existing Canal Trail and the trail through Riverside Park. I plan to be in that area again tomorrow and will submit comments to the City after seeing what the mini circle is all about
- I watched cyclists and motorists navigate through the contra-lane and mini traffic circle for about an hour total. I plan to drive my full-size pickup truck through there while the demo is still in place to experience it from the motorist's perspective, but my current feeling is that the contra lane works well for both motorists and cyclists and would have great value to west bound cyclists. From my observations of the mini-circle, I saw no real benefits to cyclists and considerable issues for motorists.
- I stopped to chat with the folks from CDTC and the city who had a table set up outside the YWCA on Washington Avenue to discuss the circle and the contra lane. Like [name redacted], I thought the contra lane worked great, but I'm not sure what purpose the circle serves.
- The drivers were doing a slightly better job of navigating the mini roundabout. [referring to the demonstration project]
- All the cones and half the bollards were removed and placed on the curb, drivers were mixed in following the pavement markings, there were no bicyclists in the time I was there and the speeds anecdotally were up. Several residents approached me to ask when this would be over... Overall though, and even from the woman I spoke with this morning, folks seemed to like the bike lane and were more skeptical about the roundabout. [referring to the demonstration project]

- I want to thank you for the trial this weekend (15-19 July) on Washington Ave. I truly appreciate the attempt to enhance the connection of the bike path through Schenectady. Early Saturday morning I rode from Scotia to Nott street and on to Blatnik park for the first time this year, making use of the counter flow lane. I also tried to follow the temporary signs and markings, as I do not know the stockade streets well. I did get a bit off track, but made it to Nott st. It is unfortunate construction at the intersection makes that part of the trip tough right now. I hope the new traffic circle at Erie and Nott is going to be bicycle friendly. Further, I hope development around the casino will enhance biking in that area. I ride the bike path from SCCC headed west weekly, but if permanent improvements are made linking the path east at SCCC, I will certainly ride through Schenectady more often. Thanks again.
- Contra flow can work very well, but is best applied to one-way streets. Often they work better without designated bike lanes. Also, it requires extensive signage (everywhere) to provide constant reminder to car drivers that cyclist have the same right to the streets as car drivers. Roundabouts serving bicycles and cars can work very well and are very accommodating for bicycles because it is more difficult to stop and start a bicycle than a car (as at intersections), so allows for continual motion for the cyclist. They also slow vehicular traffic residential neighborhoods. We could use modified roundabouts with better designed entry points (realigned street curbing and lanes) at Ferry/Front/Green Streets and at Front and Church Streets. Good job, guys. Keep going
- Saratoga Springs has a Complete Streets Committee. Does the city of Schenectady have one? If not, it should.
- I ride to and through Schenectady from my home in Rotterdam several times a week and visited the Washington Ave bike demo several times in the past week. The contra-lane worked very well and should be made permanent as soon as possible. It provides a valuable connection for west bound cyclists on the Canalway trail system. The mini circle offered no benefit that I could see to cyclists, and was confusing and impractical for motorists due in part to the limited turn radius. I believe that inclusion of the mini traffic circle at this location would reduce overall support for bike friendly infrastructure improvements, and see no need to link it to the contra-lane, at least at the Washington Ave/Union Street location. Feel free to contact me to discuss further, I will also follow up with an email to [name redacted] to expand on my thoughts, not sure how many characters I'm allowed on this form. Regarding wayfinding, improved maintenance of existing signage is needed - e.g., the sign at Union and Church directing cyclists to turn left is overgrown and obstructed, the sign in front of 208 Union is missing, except for the "To" and an arrow. I encounter many cyclists who have yet to successfully navigate the onstreet portion of the Canalway Trail to connect Jay Street to the SCCC area.

- I already took the survey monkey, but wanted to comment specifically on the demo on Washington Ave. I travelled through several times on foot, in a car and also by bicycle, to give a better perspective. While my general impressions are favorable regarding the bike lanes and auto traffic interface, the circle at the intersection of Washington and Union is confusing to pedestrians. No crosswalks were marked, and traffic coming down Washington around the circle takes vehicles into the path of pedestrians. I had to nearly stop when a pokemon go pedestrain nearly stepped off the curb in front of me. This would not have mattered so much if the crosswalk had been marked on the pavement. Since the corners have ADA compliant ramps, why not use the circle as a pedestrian island so they only have to deal with one way traffic by crossing half way, like on lower Erie Boulervard? The pedestrian crossings can then make an "X" across the intersection, instead of a three or four sided box. I have seen crosswalks in California that had both the X and the box pedestrian lanes but an island circle alleviates the need for the box to an extent. Also, on Washington (off State St entrance, we should have the speed limit lowered to 20 mph, as 30 is way too fast for that section to be safe. Too many driveways and parked cars causing poor visibility, which can spell disaster for a cyclist being overtaken from behind by traffic.
- Contra flow can work very well, but is best applied to one-way streets. Often they work better without designated bike lanes. Also, it requires extensive signage (everywhere) to provide constant reminder to car drivers that cyclist have the same right to the streets as car drivers. Roundabouts serving bicycles and cars can work very well and are very accommodating for bicycles because it is more difficult to stop and start a bicycle than a car (as at intersections), so allows for continual motion for the cyclist. They also slow vehicular traffic residential neighborhoods. We could use modified roundabouts with better designed entry points (realigned street curbing and lanes) at Ferry/Front/Green Streets and at Front and Church Streets. Good job, guys. Keep going
- Bike awareness in general needs to be increased. This probably requires a campaign of some sort. This should address the rules that bikers [bicyclists] have to adhere to. I'd would say that all bikes need lights when they drive in the dark. Bikes need to drive on the right side of the road and not on the left or on the side-walk. I think it would be good if police gets involved here to give tickets to people not adhering to these rules.
- It would be good if new infra-structure is looked at through the lens of bike-safety. I always have to cross Erie Blvd on my way to work and home. There used to be a traffic-light at Nott-street and Erie, which made crossing pretty safe. Now with the traffic circle for where the casino is coming, one has to watch out much more. So that change may help cars, but makes it worse for bicyclist.

- Traffic lights in general need a time where all lights are red. Many places the light turns green when the other light turns red. This is dangerous because of people just trying to make it.
- Where there are traffic lights, there needs to be a mechanism for bikes to activate the sensor that tells the light that somebody wants to cross. At the old Nott-Erie crossing, the sensor would know that I arrived on my bike and would turn the Erie to red and give me green. The same is not true if you want to cross at Green street. There you can wait for hours for a green light and the traffic light will only turn to green if a car wants to cross.
- The letter below to the Times Union Getting There column (Aug. 22, 2016) is by the Executive Director of the New York Bicycling Coalition. It states his concerns about the hazards he sees as inevitable on our shared bike-ped trails without significant public safety education and enforcement. I hope you will share this email letter and attachments with colleagues and staff members who are or should be concerned with such safety and legal issues. I believe we must take such concerns seriously, especially with regard to the planned bike-ped path through Riverside Park, which will be quite narrow; tempt riders (especially commuters) to increase speed on the level, uninterrupted straightaway (.7 miles long); come within a few yards of an unfenced kiddie play lot; and frequently be obscured by morning fog; and which has for decades been used for many leisurely pedestrian and passive-park purposes. (see collage below) Also, as I have written previously, the bicycling safety rules for all Schenectady Parks are reasonable and appropriate. They require that bikes only be used on Park driveways-

roadways, and at a speed less than 15 mph. Similarly, citywide provisions ban those over ten years old from using a bicycle on a public footpath or sidewalk that is intended for use by pedestrians (see Code sections below). Ignoring those limitations, and indeed encouraging bicycling in Riverside Park, without at least providing a separate pedestrian path (an alternative suggested in the City Urban Bike Route Master Plan; excerpted image below), seems inappropriate for municipal leaders who talk so often about fearing liability issues, and have recently taken still-viable playground equipment from our parks, and threatened to take down healthy shade trees when repairing sidewalks (due to potential liability far in the future from severed roots) The final attachment shows a Share Path Design sketch from the City website, combined with a photo I took a few minutes ago at the west entryway of Riverside Park. With no signage anywhere in the Park concerning bicycle safety or etiquette, and with no two-foot graded safety edge on the narrow asphalt trail or adequate space for path signs, the Bike Schenectady sign that has been placed next to the entry column seems, at best, premature. These issues are not going to be addressed if we do not get leadership at the City and County level, with public participation that embraces the perspectives and needs of all segments of the public likely to use the Park and any shared bike-ped path traversing it. Especially with the City and County expecting revenue expansion from the Casino and Mohawk Harbor, which is being gifted with a valuable bike-ped path amenity that will benefit greatly from its connection to Riverside Park, the existence of potential State funds for a bike-ped path should not be used as a reason to rush such a path into existence through Riverside Park without significant

public discussion and transparency. Please take the time to think this through and do it right. Thank you for your time and consideration – and for taking leadership on this important safety issue. [attachments are not included]

- I would like to see marked bike lanes on our big wide streets, such as Liberty, and Erie Blvd.
- I would like to see b. A rational and safe connection and crossing of Nott St. from the path behind Union College to the bike path that goes behind the old social services building. The current condition is both unsafe and irrational. Unsafe because the path ends at Nott without a curb cut. There is no way to cross Nott St. at that point without (a) cutting your front tire going down the granite curb, or (b) turning right onto the sidewalk, riding up the sidewalk to the corner, and then turning left to cross Nott in order to access the rest of the bike path. Who would know how to do that? It's unsafe, irrational, and unmarked.
- The overnight in Schenectady was changed from Collins Park to the JCC last year, the route through the city was changed; cyclists could not be routed on the Mohawk-Hudson Bike Hike Trail north of Nott St. because there is the huge hill up Balltown Road to deal with (at the end of a day of riding!), and because there is no way to bring cyclists off the path over to the JCC. Consequently we route the tour up Nott to Grand Blvd., and then over Dean St. It worked, and it was a fairly low-traffic route.
- Below is a little video I found on the website of the Dutch Embassy, from which it seems that there is some cooperation between the Netherlands and the US. It is about 15 minutes on a city in the north of the Netherlands, with ~90,000 inhabitants, whose city center is car-free, and the focus is a lot on biking. It is a student town, so population a bit different than Schenectady, but still good examples of what can be done. [website address redacted]

## PUBLIC COMMENTS ON DRAFT MASTER PLAN

The following are comments received about the draft bike infrastructure master plan at the public meeting and through the project website:

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I completely support bicycles in Riverside park and extension of the bike path into the park.

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I like many others I walk the path in Riverside Park along the Mohawk River because I do not have to worry about traffic and it is a peaceful place without the sound of vehicles whizzing by. It is a most tranquil place where children play on the playground equipment, also. Many times they wander near the path and I would hate to think a bicycle coming down that path and kids being kids will be unaware and be in the path of a bicycle. The path as it now stands is just fine for walking but if bicycles were on it, do not know how much wider it could be made. For one thing, new benches were put all along one side of the path which are set in concrete and on the side of the river bank every now and then there is a tree which would eliminate widening the path or it would be in a zig zag fashion. All in all why spoil the park as it now fills the needs of many residents especially the elderly who eliminate traffic by not walking on city streets. I have even seen caretakers walk people in wheelchairs. There is a noticeable increase in traffic on Front St. since the opening of the casino and the park gives people the alternative to use the park. Don't fix it if it isn't broken!

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The riverside park in the stockade is too small for bikes, they will be riding too fast and dodging small children and people walking leisurely with pets. I

don't think it's a good fit for that area.

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I think this is a bad idea, my child and I were almost run over by a cyclist who was riding silently behind us, and then used vulgar language to us as we were in "his" way!!!

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I am writing to request that the planners and officials making decisions about the Schenectady Bicycle Infrastructure seriously consider the concerns of Riverside Park users and the entire Stockade neighborhood about the Riverside Park portion of the Bike Plan. We believe there will be serious negative impact on the Park and its users if any significant number of cyclists traveling at more than a leisurely pace begin to regularly use the Park's only path as a shared-use trail. The more successful the shared-used path is in attracting fast-paced commuters and other cycling enthusiasts, the more like it is that current users will be literally scared away from Riverside Park. We were surprised to see that the Plan already considers Riverside Park to be part of the City's Off-Road Bike Network, despite there having been no official or public announcement of that designation, much less a chance for direct, focused, SEQR-like input from our community on any proposal to create a shared-use path out of a path that is itself an integral part of Park usage and enjoyment. My hope is that it is not too late to start a serious process of listening to our concerns and looking for alternative ways to achieve the cyclist-transportation goals of Bike Schenectady planners and proponents, without gravely damaging Riverside Park. At my photography and Stockade-oriented website "suns along the Mohawk," I have posted an extensive discussion of the issues raised, with many photos capturing the current (but longstanding) uses of the Park's paved path, which I have come to think of as a "long, narrow public square." For fuller commentary, therefore,

please see the posting at <http://tinyurl.com/RiversideBikes2>. As I hope you know, Schenectady's Riverside Park is only 6 acres in size, stretching less than one-third of a mile along the Mohawk Riverbank; in many places it is only 150 - 200 feet wide. Riverside Park's only path is much more than a thoroughfare from point A to B. It has for decades been used by people of all ages and abilities for many leisurely pedestrian, passive-park and public-square purposes that are especially convenient on its paved surface. For example, many neighbors take advantage of the path for dog-walking (often more than dog at a time), scenic exercise, romantic and platonic strolling with a friend, stopping to admire babies and puppies, catching up on family and neighborhood news, teaching a tyke how to ride a tricycle, complaining about City Hall, and watching sunsets and watercraft on the River. The path is bordered by benches, many large trees, an unfenced children's play-lot at the east end, a Pump Station & Esplanade at its center, and small gardens with flowers and ornamental grasses on its especially narrow west end. Visibility along the path can be hampered by thick morning fog off the Mohawk River, and its pavement is spotted with many wide and deep puddles long after any significant rainfall. In the River's floodplain, the path is inundated with river water several times a decade (or more). Despite its 79-page length, the draft Bike Schenectady Plan shows no indication that our City and County planners and politicians have fully considered how different from a policy, practicality or public-relations perspective it is to impose a shared-used transportation function on a path used for decades for passive-park recreational purposes. Conversion of a established recreational path is far different from "merely" constructing a path through a hitherto unused or underused portion of land along a river, or through a new development, where a culture of shared-use etiquette and expectations can be nurtured. We fear you are creating a Scared-

Use Path that will greatly diminish the use and enjoyment of Riverside Park as a Park, rather than a thoroughfare that happens to be along a lovely stretch of River.

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You need dedicated bike lanes going on central ave,too, and involve Albany county as well. There is no excuse not to provide bicycle lanes in the entire area,especially if you want to encourage people to exerise and keep in shape.

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Please do not place a bike path in Riverside Park. Bikes have no place there. I stroll along the path several times a week and am often am startled by the bikers appearing from nowhere. Two days ago I almost collided with a cyclist in the narrow section by the pump house: I was coming down north ferry, turning left at the cannon, and a cyclist going East at a fast clip was also startled to see me. When walking side by side with another person, we are subjected to shouts and horns to get out of the way.....and the bikes aren't supposed to be on the path in the first place!

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I live at 227 Green Street and use the Riverside Park for walking and I believe Riverside Park is the best place for the bike trail. All that is needed is signs that say: "Caution Hikers on Trail"

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Although referred to as a "park", Riverside in the Stockade is more a walking path along the Mohawk River front. This narrow path does not lend itself to widening, and cannot be made safe for both pedestrians and cyclists as part of a major Mohawk/Hudson bike trail. Riverside is praised as a unique place in a Historic District and presently serves the very young, to the very old, in multiple ways. It cannot be all things to all people without ultimately serving no one.

I grew up in the Stockade and am strongly opposed to the plan for a Mohawk/Hudson bike path going through what is an extremely small area along the historic riverfront. Already widened and still narrow, the current walking path is now very close to a series of trees hundreds of years old, treasures for the City that must be preserved for future generations. Just last week on a stroll along the riverfront, I saw many children playing (and crossing the path to look at the river, throw stones, etc), the elderly - many with canes, people pushing baby carriages, people in wheelchairs. Most joggers and walkers are wearing headphones, listening to music. The thought of many more cyclists whizzing by this peaceful strip of riverfront enjoyed by residents and visitors from all walks of life is a recipe for disaster (and likely lawsuits). I am long time competitive runner and biker. I have seen it all - including blood from collisions. The Plan is a bad idea for Schenectady's Riverside Park. I respectfully urge you to find an alternative. Please keep people safe and preserve this sliver of historic riverfront - it is a gem.

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I think putting a bike path in Riverside Park is definitely not a good idea. For one thing I am elderly and walk through the park so that I could omit the heavy traffic on Front St. and area. I see caretakers either walk their people with walkers or even wheelchairs because they also want to eliminate the heavy street traffic. The children in the play area also usually wander to the path so it is not a safe idea for children, elderly and even younger people if a bicycle comes zooming down the path when people are on it.

Riverside Park in the over 90 years that I have used it. is a quiet tranquil park and should stay that way for all the Stockaders, surrounding area and even people who drive down, park their cars and walk the path to enjoy the quietness from any traffic. This quietness would be lost for sure if there was

a bike path. If at all necessary, the park should be bypassed. Part of the park is at the foot of North St.

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When I spoke to each of you at the Bike Schenectady public meeting two weeks ago, you each appeared to be willing to give serious consideration to the concerns of many users of Riverside Park and Stockade residents. We sincerely believe that a shared-use path would almost certainly become a "scared-use" path that would keep a significant number of current users from continuing to visit the Park, and would very likely result in serious injuries to pedestrians, especially children and the elderly (and dogs), and to cyclists.

I hope you have visited "suns along the Mohawk" [at the post "The City's Bike Plan: a Crucial Battle for Riverside Park," <http://tinyurl.com/RiversideBikes2>]. And, I hope the discussion and images have convinced you that imposing shared-use on our "village square" raises important issues that need to be addressed by bike planners and City leaders before any final Bike Schenectady Plan is released or approved by City Council.

The Slideshow at the posting mentioned above now has four dozen images of typical users and uses of the Park's only paved path. Generations have made that path their destination in the Park, which they use far more for leisure recreation than for transportation.

Below is a collage I put together yesterday, and posted along with two others at my website. The message is that even if kept at the minimum width of 10' (which I frankly believe would be reckless, given the kinds of users), the addition on each side of the required two-foot graded shoulders and 3-foot clearance from obstacles, would require removing grand old shade trees that add much to the Riverside Park experience. The trees represent perhaps a majority of such trees in Riverside Park.

Another collage posted yesterday raises the issue of the “blind” interface of the path with Washington Avenue, which places pedestrians, cyclists and motorists at risk.

Thank you for your time and consideration. I hope you and your charming children are enjoying “real summer” in Schenectady.

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I am submitting comments for consideration in revision of the draft bicycle master plan. Thank you for your hard work (and the others who have contributed). This is certainly a big improvement from the 2001 plan, and I am glad the city is making a strategic investment in this critical infrastructure.

General background:

I would describe myself as an “enthused and confident” cyclist. I bicycle several times a week during the summer and commute home from Albany each day, utilizing signed bicycle route in Niskayuna to reach my home from the Mohawk-Hudson bikeway.

In general:

I think the neighborhood greenway proposals are strong, but the plan seems too constrained and narrow when it comes to how to deal with busier corridors. I don’t see the point in proposing significant investments in bike lanes where they are not adequate to provide a safe space for cyclists to use busy travel corridors. I also think the plan is missing some of the key tools/details other metros are using to make their infrastructure effective. I felt that the recommendations often lack crucial context needed to evaluate them. Finally, it seems like the plan does not do enough to address regional connectivity, especially with neighboring local bike routes.

Comment on chapter 1:

There is no discussion and maps do not show CDTC 2015 plan priority routes. It seems to me that these regional connections are especially important.

Locally designated bike routes adjacent to the city are not shown and narrative suggests they may not have been considered in plan formulation. For example, I use Niskayuna’s signed bike route network several days a week to connect to the Mohawk Hudson trail via Lexington Ave and Baxter Ave.

Comments by page:

p. 2-6: There is no mention of parking-buffered bicycle lanes. This seems to me a really important design consideration, especially given the narrow nature of many rights of way in the city and the need for snow clearance in the winter. Parking-buffered lanes provide a relatively space-efficient way to create a protected lane without constructing barriers that eat up space or interfere with snow plows in winter. Combined with a two-way cycle track flow, they could also be relatively space efficient, requiring less than 10 feet (3’ for the buffer from the parking lane and 6.5’ for the cycle track). It is unclear from appendices that this approach was concerned at all in development of the plan.

p.2-8: Two neighborhood greenway elements mentioned are speed humps and curb extensions. In my experience in this area, I have found neither to be implemented in a way that helps cyclists. In fact, I have found them to be barriers to cycling. A curb extension only adds value if it is designed to allow bikers to pass through without entering traffic. I am not aware of any curb extensions in the region that are designed this way (although I have seen many examples in other metros). Here a curb extension is typically a complete block that requires the cyclist to merge with traffic and interferes with later attempts to reconfigure lanes to provide space for cyclists. Likewise, speed bumps are often a hassle for me as a

cyclist, because there is no break in them to make it easy to pass through.

p. 3-2: It is not clear from data/analysis provided what the traffic circle experiment at Washington Ave. and Union St. showed. It does not seem to have demonstrated that this feature is desired at this location.

p. 3-3: Likewise it is not clear why the Craig St. demonstration lane was blocked for part of the demonstration period. Does this indicate enforcement was needed or will be needed long term? Or was there something about the way it was implemented, such as confusion from temporary signage, that would not be an issue with a more permanent installation.

p. 4-1: In general, recommendations are problematic to me because the methods for their formulation are not spelled out anywhere. What were the criteria to consider and their relative importance. I could speculate that they included AADT, accident rates, connectivity, route characteristics, but without clear specification it is hard to understand how specific recommendations were reached and to offer information that might alter those recommendations. It is concerning that every recommendation is a single preferred alternative. In a network as diverse and complex as this, I would expect at least in some cases that multiple options should be available.

p. 4-1: Because of the uniquely close links between Schenectady, Rotterdam, and Niskayuna infrastructure, it makes no sense that recommendations are made without reference to any specific existing or planned infrastructure in those districts. Recommendations should include explicit reference to those systems and offer approaches for collaboration to assure they are linked as much as feasible. I know first-hand there are many potential links in the North Side and East

Side. These include:

- Lexington Ave/Baxter Ave - connection to Mohawk Hudson Bikeway
- Potential link to north end of city via River Road from Mohawk Hudson Bikeway
- Potential link from north end/Steinmetz Park to Niskayuna Recreation Complex just north of the city line.
- Linkages along Balltown road

p. 4-5: Is there any traffic data that has been systematically collected about M-H trail use since before the Nott St. bridge was dismantled? If so, it might provide support for the proposal to construct a new bridge. I do find this crossing especially challenging. A stop sign for vehicular traffic might be helpful here.

p. 4-6: I think the need for cyclist protection extends beyond the proposed area for Broadway. I doubt that a bike lane in the underpass would be enough to make most comfortable traveling through that intersection, which is a choke point between downtown and points south. I think buffered cycle track would be more appropriate. Consider example of Syracuse Connective Corridor, which utilizes a cycle track to connect bicycle traffic from Syracuse University to the downtown neighborhood under and heavily traveled elevated highway. A cycle track likely would take up less than the proposed 12' bike lanes proposed and perhaps could extend farther up Broadway on the south end.

p. 4-8 illustration of "Crane Street (Craig st. to Broadway)" should probably be "Crane St. (Maine Ave. to Broadway)". Since parking is already limited to one side, this seems like an ideal candidate for a parking-protected cycle track. South side of Millard St./Veeder Ave. seems to have relatively few intersections and also might be a good candidate

for a parking-protected cycle track or parking-protected bike lanes in each direction. From a quick look on Google aerial photo maps, I doubt that Main Ave/Craig St. is wide enough along its whole length for the proposed treatments.

p. 4-10: Not sure if proposed treatment for Guilderland Ave would really fix the issue. If travel lanes were narrowed to 11', that would leave 8' for cycle-track or side path. Should consider whether parking lane can be eliminated on one side of Michigan Ave or Van Vranken Ave to provide a dedicated, protected space for cyclists. I do not know those streets well enough to understand the parking demands, but think I should be able to understand from the plan that the possibility was considered.

p. 4-14: The Connective Corridor experience of Syracuse might be a good model to cite in support of the proposed Union College Trail. Balltown Road Sidepath proposal would be strengthened if it connected with any planned Niskayuna infrastructure. Should address whether this has been investigated.

p. 4-15: On such a high-traffic road as State St., I do not see bike lanes as adequate, and maybe even harmful if they give people a false sense of security. As proposed without buffers, they put cyclists at risk of being doored from the right or crowded from the left. I think a buffered (and where feasible, parking-buffered) cycle-track or side path would be a much better way to accommodate cyclists and generally calm traffic/protect pedestrians. This is the most dangerous (and heavily traveled) corridor in the city for pedestrians and cyclists so special investment is warranted. The potential for later extension to provide connectivity to Albany is of interest to me as someone who commutes there daily and would love to have a direct, safe cycling route home. I presently follow a 22 mile route to avoid dangerous corridors like State St.

p. 4-16: I live on Eastern Pkwy. I think the proposed pairing of Union and Eastern could work, but again am disappointed that no buffered/parking protected treatment appears to have been considered. Where possible, I think the proposed bike lane should be parking-protected. Where not, I think parking should be on the opposite side of the street so the cyclist only has to worry about traffic on the left side and not being doored from the right. Additionally, it does not appear that the report recognizes that the eastern end of Eastern Ave and Eastern Pkwy have very different configurations from the part nearer downtown. I am not sure that a bike lane is feasible on Eastern Pkwy because of the median configuration. If it is, it will come at a cost of on-street parking (which I think would be okay because off-street parking is amply available on Eastern Pkwy and most do not feel comfortable parking their cars because they perceive travel lanes to be too narrow).

p.4-17: California Ave could be configured with a buffered, parking-protected contra-flow lane. I think that would provide better protection in available space.

p. 4-18: Fehr Ave does not seem so lightly traveled to me. I think a sidepath that reclaims the largely disintegrated sidewalk on the west side of Fehr Ave or a climbing bicycle lane is warranted and feasible within the right of way. Otherwise, I think the proposed greenway would be a great addition.

p. 4-20: I think the proposed treatment for Erie Blvd. would greatly enhance access along this corridor. I think the proposed paths along Consaul Rd and Crosstown Connector would be game-changers for bicycle access in these neighborhoods. Great ideas!

p. 4-23: I do not think bicycle lanes offer adequate protection on Altamont Ave, and I would suggest consideration of cycle track there on one side. Lexington Ave/Garner Ave pairing is interesting, but I wonder whether it was recommended with

awareness of adjacent bike route in Niskayuna. That route runs down Baxter Ave and I think ends at the Baxter/Lexington intersection. I use it frequently to reach Lexington Ave and proceed toward Union St. I do not think Lexington is wide enough (or busy enough) to bother with a bicycle lane. Just eliminate some of the stops (or make intersecting traffic stop), add signage, and the route is great as-is.

p. 4-24: Chrysler Ave seems to be wide enough to accommodate some kind of buffering of bicycle lanes. What if travel lanes were restricted to 10' or 11' instead of proposed 12'? Also proofing note "Town of Rotterdam", not "City of Rotterdam".

p. 4-25: Steuben St. is consistently misspelled as Stueben. There is room to configure a parking-buffered contra-flow lane here as I suggested for California Ave. Suggest consideration of parking-protected treatment for Duane Ave as well.

p. 4-26: I think a parking-protected treatment should be considered for Nott St.

p. 4-31: I did not see mention of strategies for inducing construction of secure bike parking facilities. One decisive factor in my use of bicycle to commute is my office building includes secure, free bike storage on premises. Why did they build it -- Some kind of credit? New building requirement? Does not seem to be addressed in policy recommendations.