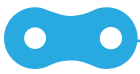




ROCHESTER, NY



alta
PLANNING + DESIGN



DISCLAIMER

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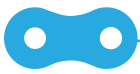


EXECUTIVE SUMMARY

The City of Rochester has committed itself to becoming a safer bicycling city for riders of all ages and abilities. The Bicycle Boulevard Plan is evidence of this commitment to create a network of comfortable biking streets. There are two key factors which affect bicyclists stress levels while riding, and bicycle boulevards overcome both. These factors include traffic volumes, which dictate how many vehicles are passing the rider, and traffic speeds. As speeds and traffic volumes increase, stress levels associated with riding increase as well. Bicycle boulevards counteract these stress inducing variables by their very design, by reducing travel speeds through the implementation of traffic calming elements, and reducing traffic volumes by diverting traffic onto alternate streets that can accommodate increased traffic flows.

To develop the network, the City coordinated with multiple stakeholders and the public to evaluate Rochester's street system, and identify roads that could be incorporated into the bike boulevard network. Roads that were the best candidates for inclusion exhibited low traffic volumes, filled gaps in the bike network, and connected key destinations. Several rounds of input were solicited to inform the selection of streets to be included in the network. Ultimately a preferred network was determined that will connect Rochester's many neighborhoods to locations where residents and visitors live, learn, work and play, all along an integrated network





of low-stress bikeways. The network will serve all of Rochester's neighborhoods, providing an important transportation option for those who do not have access to a vehicle and increase the utility of Rochester's transit system.

Over 50 miles of streets comprise the bicycle boulevard network, which will be implemented in phases over the next several years. To determine the routes that should be implemented first, a prioritization process was undertaken that identified the most important routes for the community. In all, 20 miles of the network were selected as priority routes, distributed evenly throughout the City. These routes will serve as the foundation of the network, and accelerate Rochester's transformation into a more bicycle friendly city, one that prioritizes the development of infrastructure aimed at improving levels of comfort and safety for all bicyclists.

BICYCLE BOULEVARD BEST PRACTICES

Bicycle Boulevards (also known Neighborhood Bikeways or Neighborhood Greenways), are low stress, active transportation corridors that have been optimized for bicycle and pedestrian travel. These corridors take advantage of the existing low speed and low volume local street network, and utilize enhanced crossings where routes cross major roadways. Due to their design, bicycle boulevards create a low-stress bicycling environment and have been shown to appeal to the widest range of bicyclists. Many cities across the United States have developed bicycle boulevards by examining their roadway network and selecting streets that meet several criteria that are important for successful bicycle boulevards. These criteria include:

1. Streets that are direct and connect to destinations, and limit circuitous travel
2. Streets that are low volume (<3000 vehicles per day) and low speed (ideally posted speed limit of 25 mph or less)
3. Connect to existing on-and-off street bicycle network

Once streets have been selected for inclusion in the bicycle boulevard network, enhancements can be made to make them even more comfortable for bicycle travel. Many of these enhancements have been tested and successfully implemented that achieve two primary goals: to slow motor vehicles down and to divert traffic away from the bicycle boulevards onto larger streets that can accommodate more traffic. These goals have been achieved through the use of several design strategies, described below:

1. **Signs and Pavement Markings:** Signs and pavement markings comprise the basic elements of a bicycle boulevard. These elements differentiate the facility from other local streets and identify the bicycle boulevard as a shared street that has been optimized for bicycle and pedestrian travel. Signage helps to guide users along the boulevard, and pavement markings help to communicate to motorists to be aware of the presence of bicyclists along the route.
2. **Speed and Volume Management:** Creating a bicycle boulevard environment that is comfortable for bicyclists of all ages and skill levels requires minimizing the impact of motor vehicle speeds and volumes. To achieve lower speeds, several methods can be employed, including horizontal deflection methods that force vehicles to make a lateral shift along the roadway, and in doing so, slow down, as well as vertical deflection methods, such as speed humps, which moderate vehicle speeds. Volume reduction along bicycle boulevards is also critical, as fewer cars results in a less-stressful bicycling environment. Strategies to reduce volumes include converting two-way streets to one-way streets with two-way bicycle travel, and restricting turns onto streets at intersections.
3. **Intersections:** Intersections are the most difficult aspect of bicycle networks to make comfortable. Treatments can be used to make crossing them safer and less stressful by slowing vehicles down through intersections, and also by providing protected spaces for bicyclists to position themselves as they cross the street.

HORIZONTAL DEFLECTION

Mini-Traffic Circles reduce speeds through intersections



Curb extensions increase turn radii and reduce turning speed



Chicanes deflect cars and reduce mid-block speeds

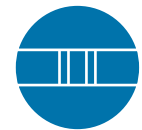


Chokers create pinch-points that reduce speeds mid-block



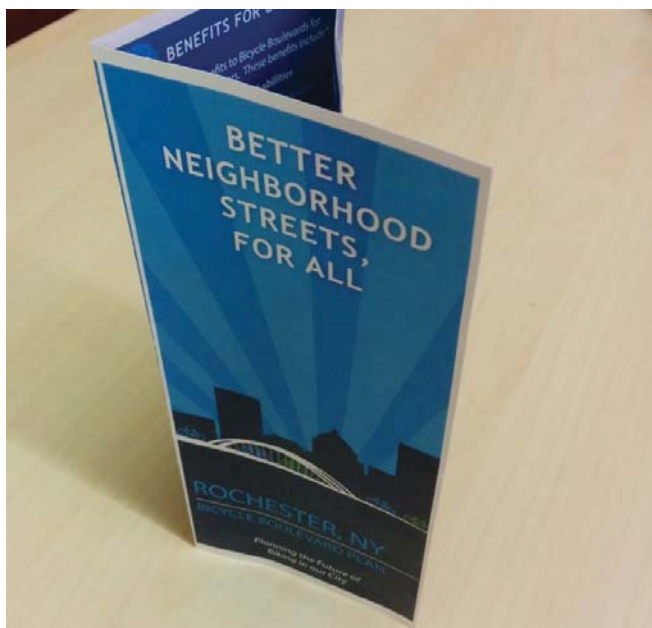
VERTICAL DEFLECTION

Speed bumps slow down motor vehicles



Medians deflect cars and reduce mid-block speeds





Marketing bicycle boulevards is critically important

4. Marketing: In many communities, bicycle boulevards are a new type of street, and their purpose and intent may not be readily understood. A coordinated and consistent marketing campaign should be undertaken that helps to explain to the public what a bicycle boulevard is. This campaign can be enhanced by branding the bicycle boulevard routes with unique signs that can be integrated into the campaign.

NETWORK DEVELOPMENT

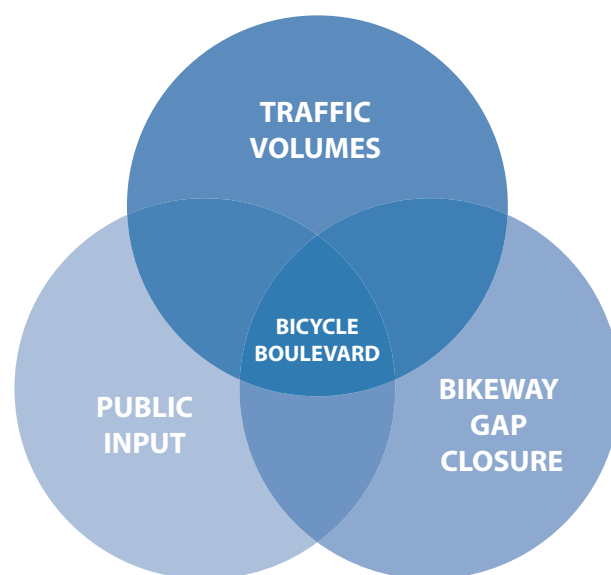
In Rochester, bicycle boulevard routes were selected using a combination of objective data and feedback from the community. In total, three inputs were used to develop the bicycle boulevard network, including: traffic volumes, whether or not the street filled a gap in the existing/proposed bicycle network, and public feedback regarding route desirability.

The first step in the planning process was to identify which streets in the City carried relatively low traffic volumes. The City, in coordination with Monroe County, regularly collects motor vehicle traffic speed and volume data. This information was used to isolate roadways that met established thresholds for bicycle boulevards, which include traffic volumes less than 3,000 vehicles per day (vpd)

and speeds of 25 mph or less. In total, 65% of the streets in the City of Rochester were determined to carry less than 3,000 vpd.¹ The prevalence of streets with relatively low traffic volumes provided many opportunities for bicycle boulevards. In instances where there were no streets that carried less than 3000 vpd between two key destinations, roads with up to 5000 vpd were examined, and in some circumstances, included in the bicycle boulevard network. Although these streets carry more traffic than is ideal, traffic calming features would be installed on these streets that would likely cause volumes to be reduced, and over time to become more consistent with the 3,000 vpd threshold.

The next step in determining the preferred bicycle boulevard routes was to understand how the potential routes integrated with the existing and proposed bike network, and select routes that filled gaps in the network. Connectivity in any bike network is critical to its overall success. Bicycle boulevards, being a low-stress type of facility, were seen as an opportunity to provide an 'all ages and abilities' bikeway in areas where other types of facilities were not feasible. Careful comparison between potential bicycle boulevards and the existing/proposed bike network helped to identify several routes that would close gaps in the network, making bicycling city-wide more comfortable and connected.

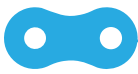
The final step in identifying routes to be included in the network relied on public input. Traffic volumes and gap closures were both key criteria, but understanding where the community wanted routes weighed heavily on the selection process. The desirability of potential routes was determined through several public involvement efforts, including a large February 2014 public meeting and ongoing web site comments. The more frequently the public identified a given bicycle boulevard opportunity, the higher a priority the route became in the selection process.



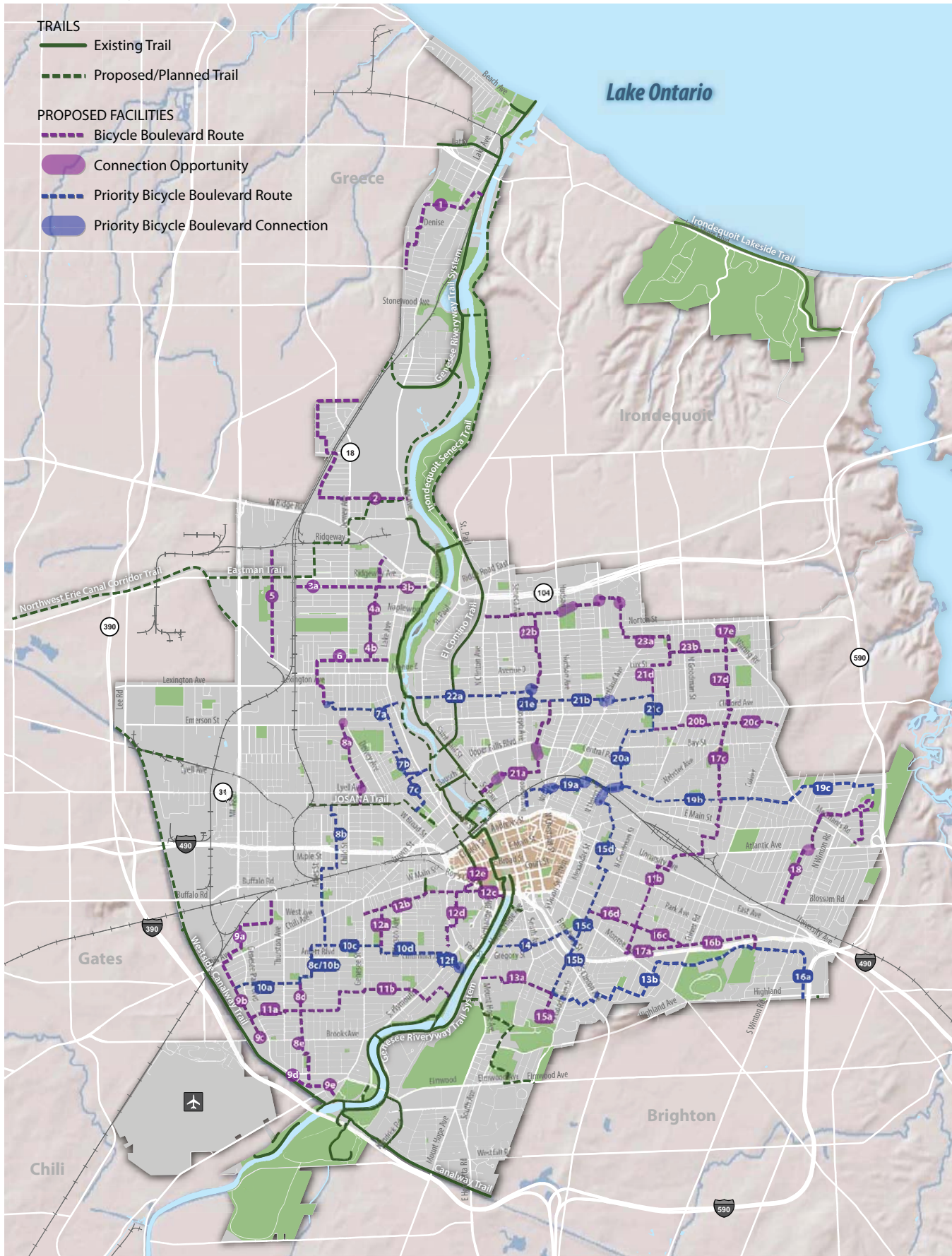
Three key criteria were used to select routes

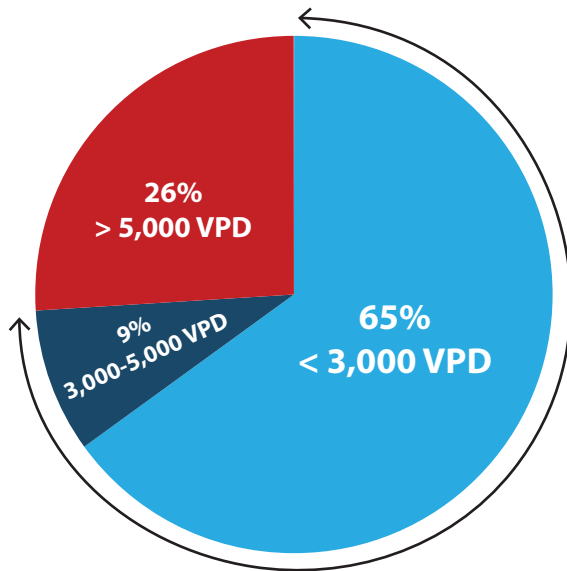
The identification of the preferred bicycle boulevard network was an iterative process, and several preliminary networks were developed and further refined until the final network was selected. This final 52 mile network was the culmination of months of effort aimed at identifying low volume streets that connected key destinations, filled gaps in the bike network, were evenly distributed throughout Rochester's neighborhoods, and ultimately were deemed to be desirable by the public.

¹ There are approximately 948 miles of roads in the City that have ADT data available (there are some streets for which no data is available). Of these streets, 65% (614.2 miles) carry less than 3,000 vpd, and 74% (702.8) carry less than 5,000 vehicles per day. These figures were calculated in GIS by the planning team using MCDOT traffic count data.



Recommended Bicycle Boulevard Routes





ROCHESTER'S STREETS

The majority of Rochester's streets (74%) carry relatively low volumes, between 100 & 5,000 vehicles per day. Lower volume roadways are better candidates for conversion into bicycle boulevards because vehicles pass bicyclists less frequently, reducing bicyclist stress.

PRIORITY NETWORK

The final bicycle boulevard network will be implemented in phases over the coming years. In order to understand which routes should be implemented first, the selected routes were evaluated against nine criteria to determine implementation priority. These criteria included:

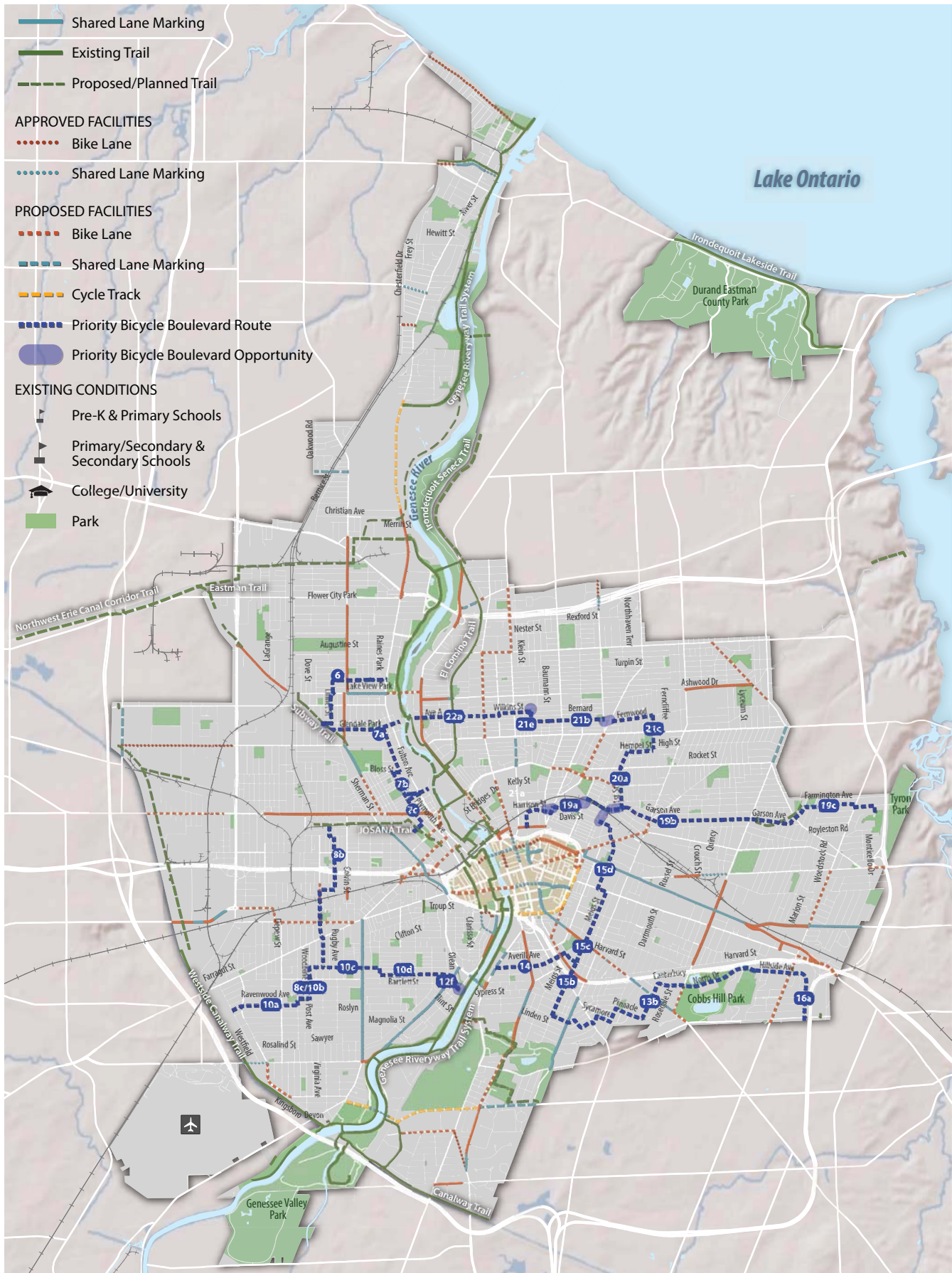
1. Does the route fill a gap in the bike network?
2. How heavy are the traffic volumes?
3. Is the route desired by the public, as evidenced by public feedback relating to the route?
4. Does the route travel through a Priority Census Tract, or a historically underserved part of the City, and therefore would provide an important transportation option?
5. Does the route connect to Rochester's trail system?
6. Does the route connect key destinations?
7. Is the route proximate to a transit route, and could it help to increase the catchment area of transit stops along the route?
8. Has traffic calming along the route been requested through the City's traffic calming program in the past?
9. Is it a quality route, in that traffic calming can be implemented along it, major street crossings are minimized, and the route is direct

The criteria received different weights, ranging from 0-8, depending on how important it was to the prioritization process, as determined by the City, stakeholders and the planning team. The most heavily weighted prioritization criteria was if the route traveled through a Priority Census Tract. Each route was scored against the nine criteria, and the scores were summed to generate a total score that could be used to prioritize the routes. In general, one to two priority routes were selected per City quadrant, and then additional routes were chosen that formed a loop around the City connecting the quadrants. The scores generated via the prioritization matrix informed the priority route selection to a high degree, but careful judgement and local knowledge also played a critical role. In all, 20 miles of routes were selected, which if implemented, would provide a strong foundation of bicycle boulevards that would provide key connections between live, learn, work and play destinations.

The Bicycle Boulevard Master Plan provides extensive details regarding best practices for developing a bicycle boulevard network, how the Rochester network was determined, and design guidelines for converting streets into bicycle boulevards.



High Priority Bicycle Boulevard Routes



INTRODUCTION TO BICYCLE BOULEVARDS



Marketing + Branding

In an effort to appeal to a greater number of bicyclists and those interested in bicycling more often, Rochester is pursuing the development of a Bicycle Boulevard network. Bicycle Boulevards (also known Neighborhood Bikeways or Neighborhood Greenways), are low stress, active transportation corridors that have been optimized for bicycle and pedestrian travel. These corridors take advantage of the existing low speed and low volume local street network, and include enhanced crossings where routes intersect major roadways. When implemented, Bicycle Boulevards become low-stress, bike-friendly streets that provide an alternative to higher volume roadways that can be uncomfortable to bike upon. Due to their low-stress design, they have been shown to appeal to the widest range of bicycle users.

This chapter provides a general overview of best practices for developing a bicycle boulevard network, and details the traffic calming elements that are used to make bicycle boulevards comfortable for bicyclists of all ages and abilities.

BENEFITS OF BICYCLE BOULEVARDS

There are numerous benefits to bicycle boulevards, including:

- Good for all ages, all abilities - Many bicyclists, or people interested in bicycling, are not comfortable riding in bike lanes on major roads
- Lower speeds and traffic volumes - More comfortable, attractive facility due to fewer interactions with motor vehicles and lower overall traffic speeds
- Connects to destinations - Connect cyclists to key destinations while reducing the amount of time spent in on-street bikeways on major roads
- Great “bang for the buck” - Jurisdictions like them because they take advantage of existing facilities (local roads) and provide a low cost alternative to other types of bicycle accommodations.
- “Quiet” street environment - Create a slower and quieter street environment for adjacent residents.
- There is a demonstrated preference in the real estate market for homes adjacent to a bicycle boulevard



TOOLBOX

Throughout the report, blue boxes are placed in the margin to highlight key bicycle boulevard tools and methodologies.



Based on current best practices for the routing of bicycle boulevards, the following section strategizes potential route development tools and criteria.

BICYCLE BOULEVARD ROUTING BEST PRACTICES

Planning an effective bicycle boulevard network requires foresight and creative problem solving. In general, a successful Bicycle boulevard network:

- Is logical and devoid of excessive out-of-direction travel
- Avoids higher speed and volume roads wherever possible. Where jogs in the route require riding on higher order streets protected bikeway facilities should be considered.
- Connects people to the places they want to access (e.g. libraries, schools, parks, cultural centers, etc.)
- Connects to existing on-street and off-street bikeways. Good Bicycle boulevards complement, and provide a seamless connection to, these facilities. This helps to improve the overall usability of the bikeway network for transportation purposes.
- Helps accomplish a density of bikeway facilities that are spaced approximately every ¼- to ½-mile



Bicycle boulevards should be placed along lower speed and volume roads.

Based on these best practices, the following strategy outlined on the following pages is recommended for identifying a bicycle boulevard network in Rochester.

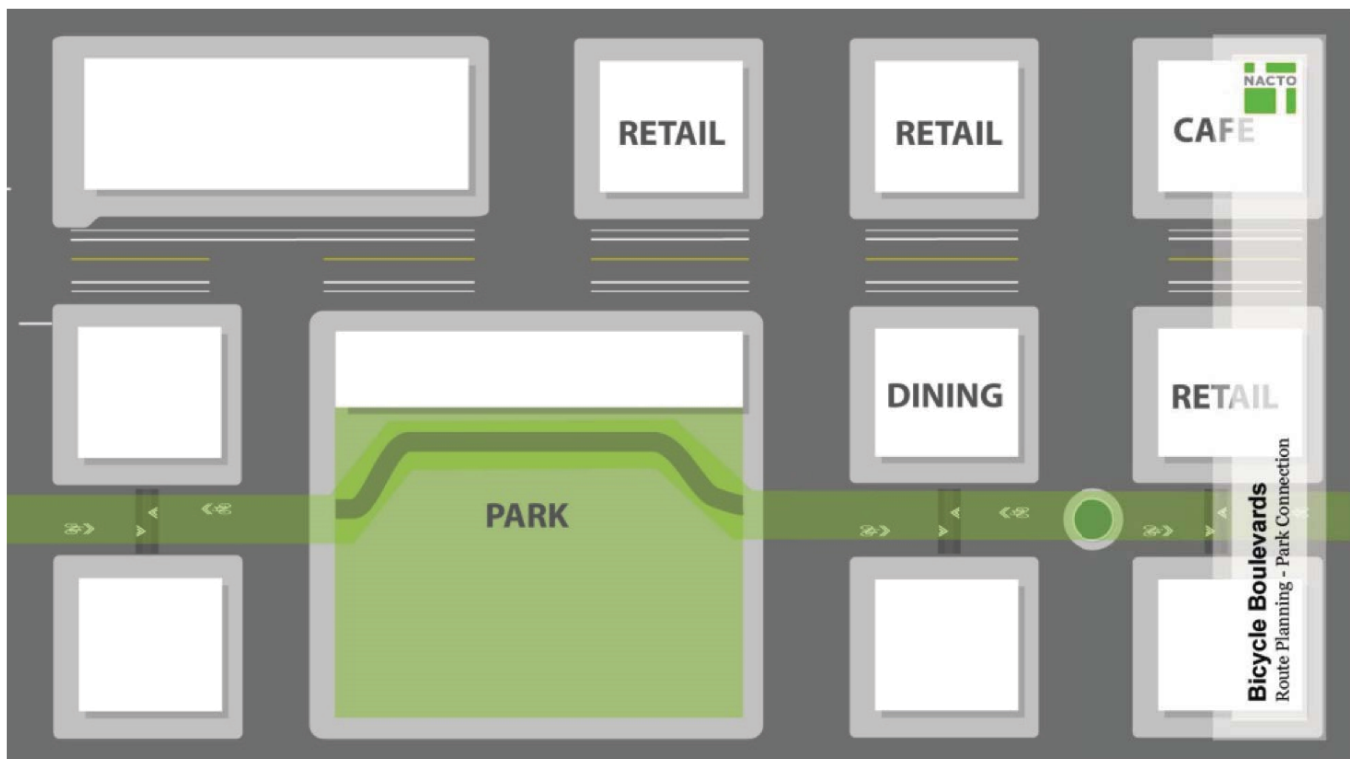


Figure 1. Bicycle boulevard routes should take advantage of existing facilities and connect individuals to key destinations (Source: NACTO Urban Bikeway Design Guide)

BICYCLE BOULEVARD SELECTION PROCESS

BIKEWAY NETWORK

Identifying a possible network begins with good data. Having a good understanding of the planned and implemented bikeway facilities helps isolate areas where connections can be made.

ATTRACTORS/DESTINATIONS

A good bikeway network connects people to the places they want to go. Having a good understanding of the various attractors, such as schools, parks, commercial centers, libraries, etc. will help planners identify those popular destinations that are, and are not, currently being served by the bikeway network.

ROADWAY SPEEDS AND VOLUMES

The City, in coordination with Monroe County, regularly collects motor vehicle traffic speed and volume data. This information can be used to isolate roadways that meet established thresholds for bicycle boulevards, which include volumes less than 3,000 vpd and speeds of 25 mph or less. 65% of the streets in the City of Rochester carry less than 3,000 vpd.¹ The prevalence of streets with relatively low traffic volumes provided many opportunities for bicycle boulevards. In this plan, streets with volumes up to 5,000 vpd were included in bicycle boulevard network, with the logic being that traffic calming features installed on these streets would divert traffic, reducing volumes over time to be more consistent with the 3,000 vpd threshold.



Schools and parks can be popular destinations for individuals, families, and educational groups.

IDENTIFY OPPORTUNITIES TO CONNECT EXISTING/PLANNED BIKEWAY FACILITIES

The bicycle boulevard network has the potential to complement and seamlessly connect with the existing on- and off-street bikeway network. When planning the bicycle boulevard network every effort should be made to take advantage of existing facilities to connect users with key destinations.

VISUALLY IDENTIFY NETWORK GAPS

There can be many different kinds of “gaps” in a bikeway network. In general, gaps can be classified in one of six ways, described in the text below and illustrated in Figure 2 on the following page:

1. **Spot Gaps:** point locations lacking active transportation facilities or with an observed / documented safety issue e.g. missing crosswalks, bike lane “drops”, etc.
2. **Connection Gaps:** missing segments (typically less than ¼-mile long) between routes or connecting to land uses.
3. **Linear Gaps:** missing segments or barriers along an otherwise well connected corridor, e.g. bike lanes “dropping” for several blocks or a missing bridge crossing along a trail.
4. **Corridor Gaps:** missing links longer than one mile that can encompass an entire street where facilities are desired but do not currently exist.
5. **System Gaps:** larger geographic areas (e.g., a neighborhood or business district) where few or no bikeways exist.
6. **Facility Quality Gaps:** In some cases, a formalized bikeway itself may represent a gap despite its status as part of a designated network. This condition typically occurs when a corridor (often a major street) lacks the type of bicycle facilities to comfortably accommodate a broader user base, including infrequent or less confident cyclists. Other examples include roadway corridors lacking formalized facilities (e.g., bike lanes) where conditions such as higher vehicle speeds and volumes would otherwise justify greater separation between motorists and cyclists.

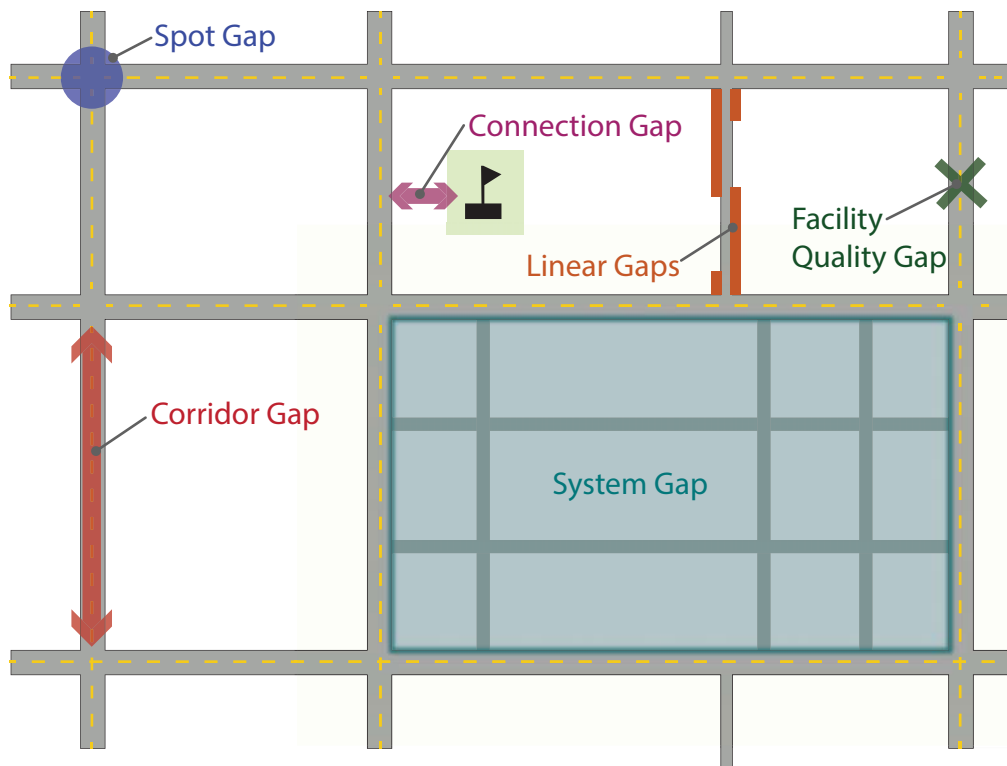


Traffic diversion limits the amount of vehicular traffic on bicycle boulevards, making the routes more comfortable for people biking.

¹ There are approximately 948 miles of roads in the City that have ADT data available (there are some streets for which no data is available). Of these streets, 65% (614.2 miles) carry less than 3,000 vpd, and 74% (702.8) carry less than 5,000 vehicles per day. These figures were calculated in GIS by the planning team using MCDOT traffic count data.



Figure 2. There are several different categories of “Gaps” in the Bikeway Network. See previous page for explanations of each gap type:



OTHER CONSIDERATIONS

Emergency Vehicle Access

Concerns about a negative impact on response time as a result of bicycle boulevard treatment may crop up. Steps should be taken early in the planning process to involve emergency services, so as not to create adverse impacts to their operations.

Impact to Travel Patterns

Motorists' route preferences often change following a bicycle boulevard installation. Traffic engineers should examine and account for the potential for increased traffic on parallel routes to the bicycle boulevard as a result of its development.

DESIGN STRATEGY

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 bicycle boulevards. At a minimum, bicycle boulevards should include distinctive pavement markings and wayfinding signs (which must be in compliance with the National MUTCD and NYSDOT Supplement). 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 bicycle boulevards 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 bicycle boulevard.

BICYCLE BOULEVARD TOOLS

The following section provides a discussion of potential Bicycle boulevard tools, organized into three key elements to a successful bicycle boulevard:

1. Effective Wayfinding through Signs + Pavement Markings
2. Speed and Volume Management
3. Intersection Design + Management



Effective wayfinding signage is one key element of a successful bicycle boulevard.

SIGNS AND PAVEMENT MARKINGS

Signs and pavement markings comprise the basic elements of a bicycle boulevard. These elements differentiate the facility from other local streets and identify the bicycle boulevard as a shared street that has been optimized for bicycle and pedestrian travel. The treatments included in this category are discussed below.

WARNING SIGNAGE

Warning signage alerts motorists to the presence of bicyclists on a Bicycle boulevard. Signage is especially important near high bike use areas (e.g., schools). The standard NYS MUTCD Bicycle Warning Sign combined with the 'In Lane' sign is recommended by NYSDOT.

MODIFIED STREET SIGNS

Modified street signs, using a visual cue such as a unique stencil, help users quickly identify the street as a Bicycle boulevard. These signs provide an opportunity to uniquely brand the Bicycle boulevard network. The current MUTCD does not allow for different street sign colors.

Berkeley uses a vivid purple color and bicycle stencil to identify its bicycle boulevards.

WAYFINDING SIGNAGE

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. The MUTCD provides guidance on the use of signs on bikeways. There are three general types of wayfinding signs:

Confirmation Signs:

- Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.
- Can include destinations and distance/time. Do not include arrows.

Turn Signs

- Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.
- Include destinations and arrows.
- A turn sign is added to a confirmation sign to identify a change in the direction of the bike route.

Decisions Signs

- Mark the junction of two or more bikeways.
- Inform bicyclists of the designated bike route to access key destinations.
- Provides information about destinations with arrows, distances and travel times.

SIGNAGE TOOLBOX

NYS Bicycle Warning Sign



Berkeley Modified Street Sign



MUTCD Confirmation Sign



Turn Sign



Decision Sign from Portland Oregon



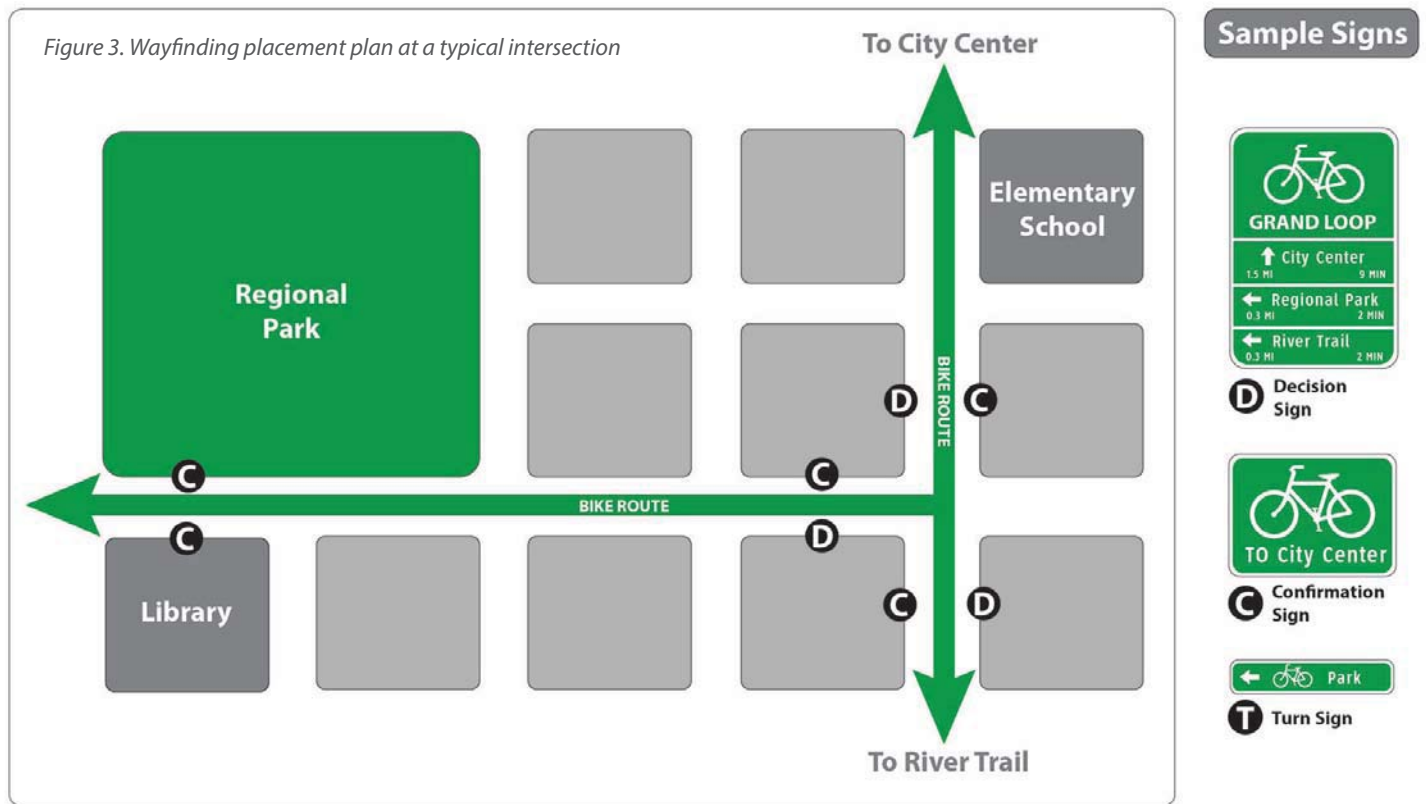
Bicycle boulevard signage helps to guide bicyclists and alerts motorists that the route is a designated bikeway



WAYFINDING PLACEMENT

In most situations two wayfinding signs are recommended in each direction at an intersection. These comprise a decision sign before the turn and a confirmation sign after the turn. In some situations it may also be useful to add turn fingerboards to provide clarity at complex intersections, or waymarkers to highlight routes.

This image to the right displays the typical configuration of wayfinding signs at a decision point with two intersecting bikeways. Each direction has a decision sign on the approach and a confirmation sign on the exit. In normal situations the default approach is to use two signs for each arm of an intersection. If one of the intersecting roads is not a designated bike route, signs would not be necessary along that street, and only confirmation signage would be necessary on the opposing street.



PAVEMENT MARKINGS

Pavement markings increase visibility of Bicycle boulevards and reinforce that cyclists are on a bicycle facility. The pavement markings also help direct riders through jogs in the route. Pavement markings vary widely by jurisdiction. Some communities develop unique, custom markings to reinforce the branding of the bicycle boulevard network. However, custom marking development does require FHWA experimentation approval or acceptance of increased municipal liability.

SHARED LANE MARKINGS

SLMs used on bicycle boulevards should be applied using the same basic principles as any other street. The center of the marking should be a minimum of 4' from the pavement edge, or parking lane (if present). However, placing SLM in the center of the travel lane increases the life of the markings because there is less tire wear from motorists.



Bicycle boulevard pavement markings are an opportunity to develop unique branding with wayfinding



Shared Lane Markings encourage motorists to share the road



Where authorized, 20 mph speed limits on bicycle boulevard help to keep the speed differential between motorists and bicyclists low

SPEED AND VOLUME MANAGEMENT

Creating a bicycle boulevard environment that is comfortable for bicyclists of all ages and skill levels requires minimizing the impact of motor vehicle speeds and volumes.

VEHICLE SPEED IMPACT ON INTERACTIONS

When reviewing and establishing the appropriate thresholds for vehicle speeds and volumes on a bicycle boulevard, it is important to consider how these impact the number of interactions between bicyclists and motor vehicles. The chart below shows how many vehicles pass an average bicyclist (travel speed = 12 mph), depending on the posted speed and average daily traffic (ADT). At the extremes, a bicyclist on a bicycle boulevard at 1000ADT/20 mph is passed by a vehicle every 90 seconds. That same bicyclist on a bicycle boulevard at 5000 ADT/30 mph is passed by a vehicle every 10 seconds. That is 9 times as many interactions between bicyclists and motor vehicles on the higher volume/higher speed road.

Frequency  are passed by 

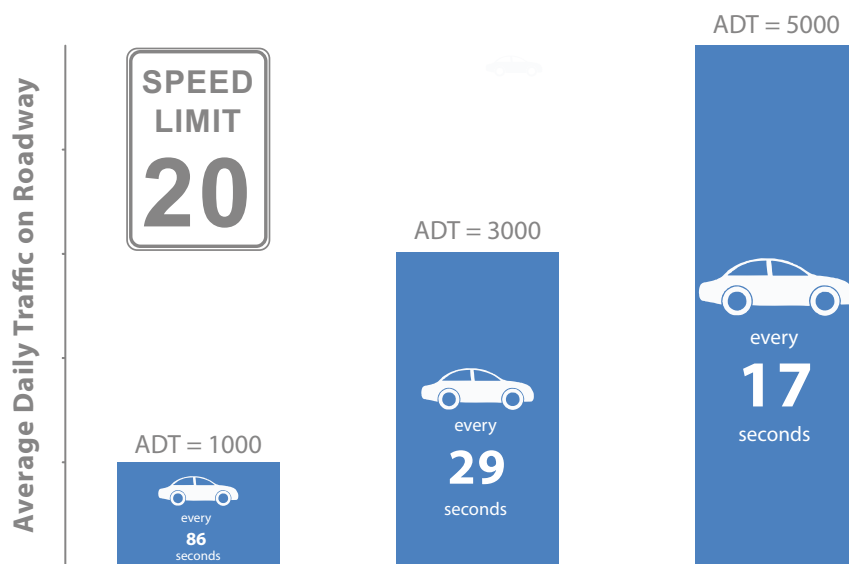


Figure 4. Bicyclists are passed more frequently by cars as traffic volumes increase

Frequency  are passed by 

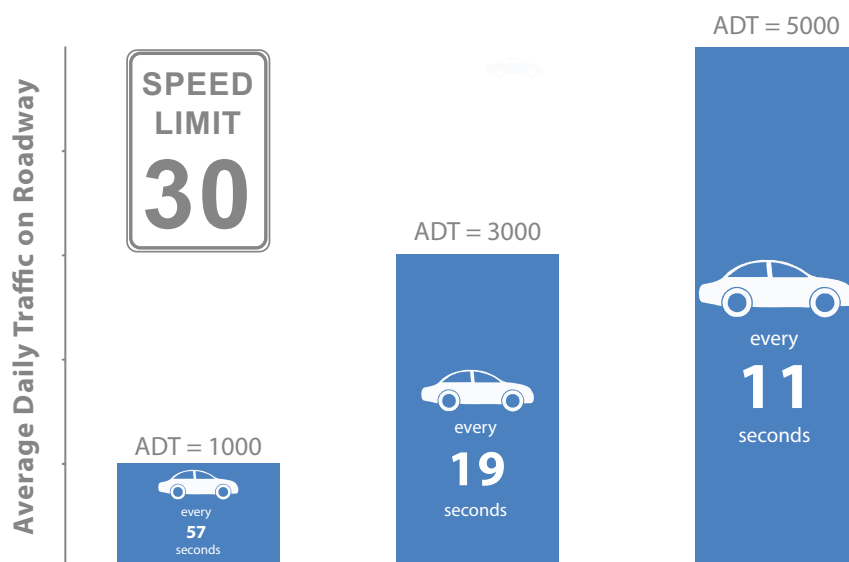


Figure 5. Bicyclists are passed more frequently by cars as traffic and speeds increase

Chart Assumptions:

- Local street peak hour is 10 percent of ADT.
- 65 percent of peak hour traffic is in one directional
- Cars are evenly spaced along the street: no platooning.
- Cars are travelling the posted speed limit (speed management techniques may be necessary)
- Note: Cars may pass bicyclists more or less frequently depending on how well these assumptions reflect reality.



STRATEGIES FOR REDUCING SPEED

A good rule of thumb is to design bicycle boulevards in a manner that causes the speed differential between motorists and bicyclists to be as small as possible. The closer that the operating speeds of bicyclists is to moving vehicle traffic the more comfortable it is for bicyclists. A small speed differential also has the added benefit of improving motorist's reaction time, thereby decreasing the chances of a crash involving a bicyclists and motorists and reducing the chance of injury should a crash occur. Treatments to reduce speed are discussed in further detail below.

Reduced Speed Limits:

Reducing speed limits is one of the more straightforward speed reduction strategies. Lowering speed limits from 30 to 25, or from 25 to 20 can make a significant improvement for conditions along bicycle boulevards. Slower travel speeds don't just benefit bicyclists either, they improve conditions for residents, walkers, joggers, and other street users too. Lower vehicle travel speeds and volumes are also known to help reduce traffic injuries, and 20 mph is widely considered as a dividing line between pedestrian injury and fatality. Reducing the City speed limit would require an act of the state legislature.



HORIZONTAL AND VERTICAL DEFLECTION

Horizontal traffic calming devices cause drivers to slow down by constricting the roadway space or by requiring careful maneuvering. Vertical speed control measures are composed of slight rises in the pavement, which cause motorists and bicyclists to slow down to travel over.

Mini Traffic Circles:

Mini traffic circles are a type of horizontal traffic calming that can be used at minor street intersections. Traffic circles reduce conflict potential and severity while providing traffic calming to the corridor. Design, including landscaping, should allow for adequate sight distance.



Curb Extensions:

Curb extensions, placed on both sides of the street, narrow the travel lane and encourage all road users to slow down. When placed at intersections, they reduce the crossing distance for pedestrians and increase visibility of individuals crossing the street. They reduce curb radii and further lower motor vehicle speeds. Curb extensions are also an opportunity to beautify the street with attractive landscaping.



Chicanes & Chokers:

Chicanes are raised curbs that create a horizontal shifting of the travel lanes along a roadway. The shifting lanes reduce speeds by eliminating long stretches of straight roadway where motorists can pick up speed and forcing motorists to shift laterally. Chokers are curb extensions at the mid-block that narrow the street. The pinch point can permit two way traffic flow (two narrow lanes) or just have space for one lane and force cars to alternate who goes through the pinch point.



CHICANE

HORIZONTAL DEFLECTION

Mini-Traffic Circles reduce speeds through intersections



Curb extensions increase turn radii and reduce turning speed



Chicanes deflect cars and reduce mid-block speeds

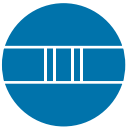


Chokers create pinch-points that reduce speeds mid-block





VERTICAL DEFLECTION



Speed bumps slow down motor vehicles



Medians deflect cars and reduce mid-block speeds



Speed Cushions:

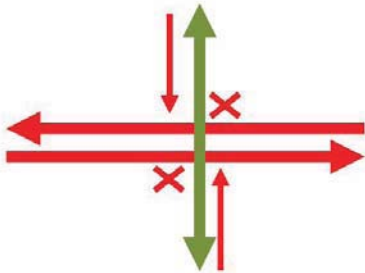
Speed cushions are used to decrease motor vehicle speeds on local roads. They are raised areas, usually placed in a series across both travel lanes. In contrast to a typical speed hump, the gaps with speed cushions may be designed to accommodate the wheel tracks of emergency vehicles. Some jurisdictions prefer the use of speed cushions over traditional speed humps

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. If volumes less than 3,000 AADT are not possible for a short segment of the bicycle boulevard, then a protected on-street bikeway, such as a cycle track, should be considered. These volume management elements also provide an opportunity for landscaping, stormwater management, and other pedestrian and bicycle supportive amenities.



VOLUME REDUCTION



Traffic Restriction Signage:

The most straightforward traffic volume reduction strategy is signage restricting motor vehicle through movement. However, if signage is not combined with more intensive traffic calming it is not very effective, due to low compliance. The curb extension pictured here reduces the chance of right turns from the through roadway. Traffic restriction signage is a low cost treatment for reducing motor vehicle volumes



Choker Entrances:

Choker entrances are used to reduce motor vehicle volumes by restricting/constraining vehicle passage while allowing full bicycle passage to a boulevard. Choker entrances allow motor vehicle access in one direction only, reducing overall volumes.



Diagonal Traffic Diverters:

Diagonal diverters require motorists to turn at the intersection, but allow bicyclists to travel through.



Median Traffic Diverters:

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



INTERSECTION DESIGN

The level of design emphasis required at intersections along a bicycle boulevard is dependent on whether the intersection occurs at a major or minor street and the complexity of the intersection. These factors dictate the level of treatment that is required to make it safe, convenient, and comfortable for bicyclists. Striking a balance between maximizing bicyclist safety and minimizing bicyclist delay will lead to a successful bicycle boulevard that feels logical and comfortable for all roadway users. To this end, the following diagram from the NACTO Urban Bikeway Design Guide is helpful. This figure clearly illustrates the optimal conditions as intersection complexity increases

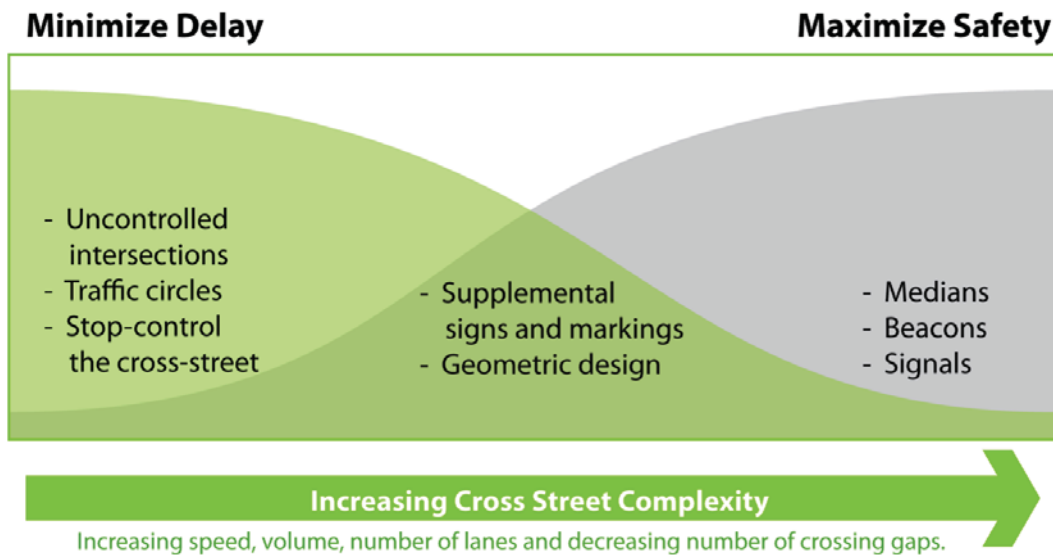


Figure 6. Striking a balance between bicyclist safety and convenience on a Bicycle boulevard is best accomplished by assessing intersection complexity and adjusting the design accordingly (Source: NACTO Urban Bikeway Design Guide)

MINOR STREET CROSSINGS

Using the guidance from NACTO, intersections with minor streets should be modified to reduce bicyclist delay. This means that, where possible, the user traveling on the bicycle boulevard should be given priority—creating fewer stops for bicyclists. Fewer stops reduce travel time, minimize effort required to get started after stopping, and help improve compliance with traffic control devices. Minor street crossing intersection treatments include the following.

Stop Sign Placement:

Stop signs on bicycle boulevards should be placed on side street approaches in a way that favors through traffic on the bicycle boulevard. This creates fewer stops and starts for bicyclists. This treatment is only appropriate at minor intersections and should be used judiciously. This treatment should also be used in conjunction with traffic calming to discourage an increase in traffic volumes. Turning stop signs to prioritize movement on the bicycle boulevard is a low cost way to improve conditions for bicyclist. Traffic analysis of bike and motor vehicle movements should precede any sign placement changes.

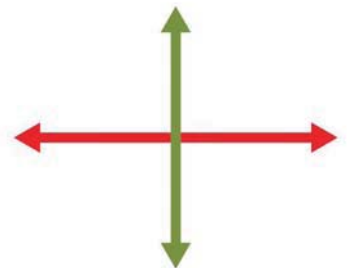


Mini Traffic Circles:

In addition to being a horizontal traffic calming device, mini traffic circles are an intersection treatment. These raised or delineated islands help reduce vehicle turning and through speeds (narrowed travel lanes).

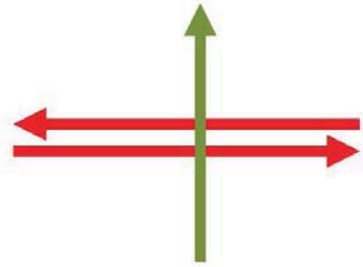


MINOR CROSSING





MAJOR INTERSECTION



MAJOR STREET CROSSINGS

At intersections with major roadways, safety takes precedence above minimizing delay for bicyclists. There are many different kinds of treatments that help to improve safety at major intersections. There can be significant costs that are associated with additional bike protection. Major street crossing intersection treatments include the following:



Bicycle Detection at Intersections:

Video detection, loop detectors, and activated push buttons are three types of bicycle detection devices for use at intersections. Bicyclist detection at intersections improves safety and compliance with traffic control devices. Signage placed at intersections lets bicyclists know how to activate a green light. MCDOT will install video detection for all approaches where bicycle detection is required, and remove loop detectors.



Bike Boxes:

Bike boxes help increase bicyclist visibility to motorists at intersections. This treatment reduces the danger of right "hooks" by providing a space for bicyclists to wait at signalized intersections.

Note: Bike boxes in Portland, OR have led to a higher crash rate (during the 'stale green') when installed on downhill grades with high speed bicycle travel (>15 mph).



Median Refuge Island:

Median refuge islands can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time. They also create a visual "pinch point" for approaching motorists, reducing motor vehicle speeds on the approach. Median refuge islands allow one direction of traffic to be crossed at a time.



Mid-block Crossings:

Mid-block crossings provide a crossing opportunity where there is no intersection. At mid-block locations, crosswalks are marked where there is a demand for crossing, and there are no nearby marked crosswalks.

Tier 1: Crosses a 2-lane street with or without an Island/refuge--install high visibility signs and markings (curb extensions considered)

Tier 2: Crosses a 3-lane street with island/refuge--install high visibility signs and markings (flashing beacons considered)

Tier 3: Crosses a 3-lane street without island/refuge--install high visibility signs and markings or pedestrian actuated signal

Tier 4: Crosses a 4-lane or greater street without island/refuge-- install pedestrian actuated signal (pedestrian actuated signal, pedestrian over or undercrossing considered)





Connections along Major Streets:

Since bicycle boulevards utilize local streets, they do not always follow a perfectly linear path, especially in the suburban context. These “jogs” in the route can be challenging for Bicycle boulevard users navigating the route.

Bike Left Turn Lanes can be used to help address this issue where bicycle boulevards intersect with streets at off-set locations. However, these treatments involve the bicyclist navigating out into the roadway to wait and turn. This can be uncomfortable for less confident bicyclists.

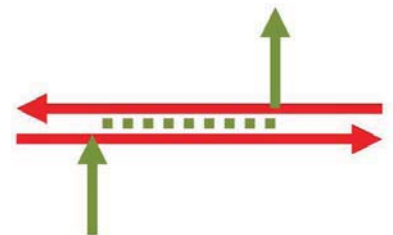
Two-way Cycletracks with High Visibility Crossings can be used in place of bicycle left turn lanes to create an additional level of separation for Bicycle boulevard users. An example of this treatment is the NE Going St intersection at NE 33rd Ave in Portland, OR.



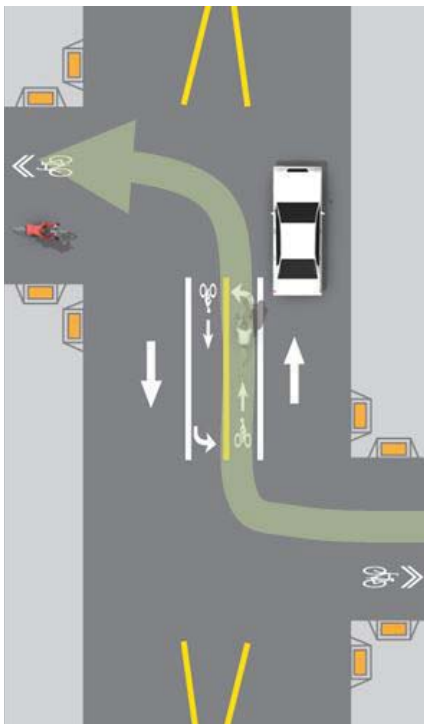
OFFSET CROSSINGS

The ideal crossing for a bicycle boulevard travels straight across an intersection. Inevitably, some crossings will be offset, and a variety of treatments can be used to make off-set crossing more comfortable for bicyclists travelling along the route. If offset crossings are not properly designed, they can become significant barriers. The following treatments can help improve off-set crossing conditions.

OFF-SET INTERSECTION



Bike Turn Lane:

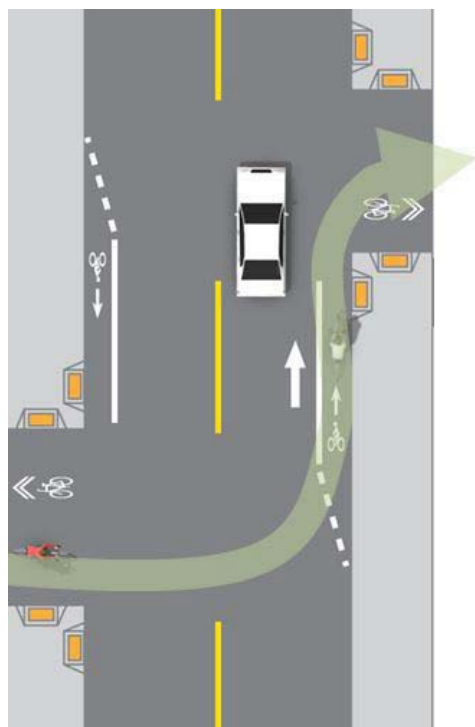


Provides space for bicyclists to make crossing in two stages.

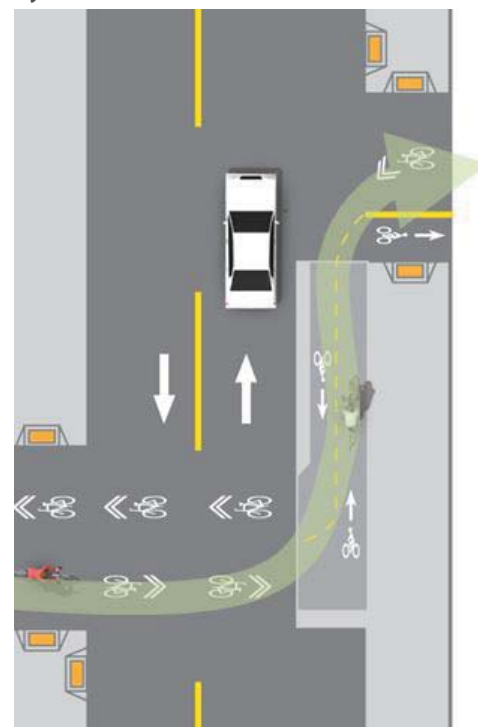
Two Stage Turn Box:



Two Stage Turn Boxes also provide designated spaces for bicyclists to make a crossing in two stages. This treatment should be implemented with signage to show bicyclists & motorists how the treatment works.

Bike Lane Connection

Provides a short bike lane segment that can be used to accept bicyclists crossing the street and provide a higher level of comfort as they cross.

Cycle Track Connection:

When volumes are higher in one direction, a protected bicycle facility can be installed to provide a safe crossing connection.

MARKETING AND BRANDING

Public Outreach for bicycle boulevards is three-fold. The first phase occurs during the planning and identification of potential bicycle boulevard routes. The second, and more robust outreach phase, happens when the project is ready for implementation. The final, and optional phase, is the active promotion of the network. The final phase celebrates the success of active travel along bicycle boulevards and is important for establishing the value of these facilities for the community. This section summarizes the experiences of several jurisdictions that have planned and implemented bicycle boulevards.

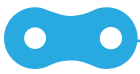
BEST PRACTICES

PUBLIC OUTREACH FOR PLANNING THE NETWORK

Planning for all bikeways, not just bicycle boulevards, typically takes place during a large bicycle and pedestrian master planning process. Using a variety of media (e.g. project websites, posters/flyers, and email lists), jurisdictions spread the word about upcoming planning events and open houses. In this way, the jurisdiction collects and disseminates public feedback concerning which routes would make acceptable bikeways and which do not. During this stage the public has the opportunity to address concerns about specific routes and the potential impacts of on-street bikeway facilities.

PUBLIC OUTREACH FOR IMPLEMENTATION

Public outreach at the implementation phase is crucial. Residents are often sensitive to proposed changes in their neighborhood and on their local streets. Reaching out to adjacent property owners early in the process helps to alleviate concerns about traffic impacts, parking issues, and property access before major planning is underway. The bicycle boulevard concept can also be confusing because it is not just any one facility, but a combination of treatments, that together, make the



street more comfortable for active transportation. Postcard mailers and flyers that explain the concept of bicycle boulevards and their benefits can help attract support for the project before the first public open house is held. Successful outreach at this stage can include:

- Postcard mailers and/or door hangers at adjacent property owners' homes
- Flyers at schools, parks, farmers markets, and community centers
- Announcements on City, County, or separate project websites
- Community Walk/Bike Audits of the route being considered for bicycle boulevard implementation
- Community workshops
- Neighborhood Association presentations
- Social media announcements
- Public Service Announcement on TV and radio

One new and innovative strategy that is increasingly popular, involves the use of temporary traffic calming to simulate how the street will function following implementation. By implementing the treatments for a single day, the community has the opportunity to get a feel for the proposed street environment and provide feedback prior to a permanent installation. These temporary installations are sometimes marketed as a street event, complete with food, fun activities, and music. Public comment can be collected onsite and it gives planning/engineering staff an opportunity to explain the design to people that may be unfamiliar with traffic calming treatments.

PUBLIC OUTREACH TO ACTIVELY PROMOTE THE BICYCLE BOULEVARD NETWORK

Calmer, quieter streets are great places for people walking, biking, and skating. The promotion of the bicycle boulevard network as a great place to spend time outdoors being active, is a good way to increase positive sentiment in the community about these facilities. Many jurisdictions host annual events that celebrate walking and biking by completely restricting motor vehicle access on select routes (e.g. Sunday Parkways, Open Streets, Summer Streets, or Play Streets). These events encourage people to get outside, talk with neighbors, walk, bike, and play in a place that is usually reserved for the use of cars. Bicycle boulevards are excellent places to host street events because they are already low traffic and have a strong neighborhood feel. These events help reinforce the value of Bicycle boulevards for the community and can help increase support for their development in other areas of the community.



Community workshops allow local residents to engage in the design process.

SPECIFIC ITEMS TO ADDRESS WITH RESIDENTS/PROPERTY OWNERS:

ACCESS TO PROPERTY

Residents may be concerned about how the proposed changes to the street will affect access to their properties. Sometimes the elements that are used on a bicycle boulevard can require residents to change the route they use to access their properties.

PARKING ISSUES

Residents are often very concerned about potential negative impacts to parking. It is important to discuss that bicycle boulevard treatments do not necessarily eliminate or restrict on-street parking. Some treatments, such as curb bump outs or chicanes may replace a few on street parking spaces.

BICYCLE BOULEVARD NETWORK

BICYCLING IN ROCHESTER

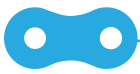
Bicycling in Rochester is constantly evolving; this plan is another important step of that evolution. In 2011, the City completed a Bicycle Master Plan focused on developing an on-street bicycle network that provided a framework for investments to improve conditions for bicyclists in the city. The plan was focused on developing a bicycle network that would qualify the City for full Bicycle Friendly Community status, a designation granted by the League of American Bicyclists. Since the plan's adoption, progress has been made on building the envisioned bicycling network and elevating the profile of bicycling as a viable part of Rochester's multi-modal transportation system. The City was recognized as a Bronze-level Bicycle Friendly Community in fall 2012; the City's goal is to achieve Silver or higher status in coming years.

As of winter 2014, the bicycle network in Rochester is over 72 miles, including 26 miles of bicycle lanes, 18 miles of shared lane pavement markings, and 28 miles of multi-use trails. Bicycle Boulevards are viewed as a way to better connect city neighborhoods with existing and proposed bicycle facilities and enhanced the attractiveness of bicycling as a means of transportation for all types of potential cyclists.

The following chapter provides information and analysis that was used to inform the selection of Bicycle Boulevard facilities within the City of Rochester.

A bicycle boulevard is a low-speed, low volume street ideal for bicycle travel (Photo: Payton Chung)





BICYCLE BOULEVARD ROUTE SELECTION

There are several factors that were considered in the selection of the Bicycle Boulevard Routes. These factors include:

- Existing and proposed bicycle infrastructure
- Annual average daily traffic (AADT)
- Street connectivity
- Equity Analysis
- City and public input

EXISTING AND PROPOSED BICYCLE INFRASTRUCTURE

The primary objective of the bicycle boulevard network is to connect and supplement the existing and proposed bicycle infrastructure throughout the City of Rochester. There are several major transportation corridors that cannot accommodate other dedicated bicycle facilities, such as bike lanes or a cycle track. The proposed bicycle boulevard network fills gaps in this system by providing a low stress bike route alternative to connect destinations within the City. A near term goal of Rochester's bicycle network is to provide quality bicycle accommodations within a half mile of every home and business within the City. The existing and proposed bicycle accommodations are shown in Map 2-1.

AVERAGE ANNUAL DAILY TRAFFIC (AADT)

Average annual daily traffic plays an important role in bicycle boulevards. Lower traffic volumes result in a cyclist being passed less frequently by vehicles, creating a more comfortable riding environment. Arterials and collector roadways, which tend to be higher volume roadways, are not eligible for traffic calming and therefore were not considered as Bicycle Boulevard candidates. Local roadways with less than 5,000 AADT were considered appropriate for a bicycle boulevard. Volumes of 3,000 AADT or less were optimal; however, traffic diversion techniques can be utilized to reduce cut-through traffic on local streets, reducing the daily traffic volumes to more comfortable levels for cyclists. Map 2-2 shows the current counted or estimated daily traffic volumes on the City's streets.

STREET CONNECTIVITY

Navigating the bicycle boulevard network should be easy for users, and should provide the most direct route possible to one's destination. The current street network within the City of Rochester was considered closely to identify routes with the least amount of turning movements to get between destinations. Minimization of major roadway crossings was also a key consideration. If a portion of a higher volume roadway is needed to connect portions of the network, the shortest segment possible was identified.

CITY AND PUBLIC INPUT

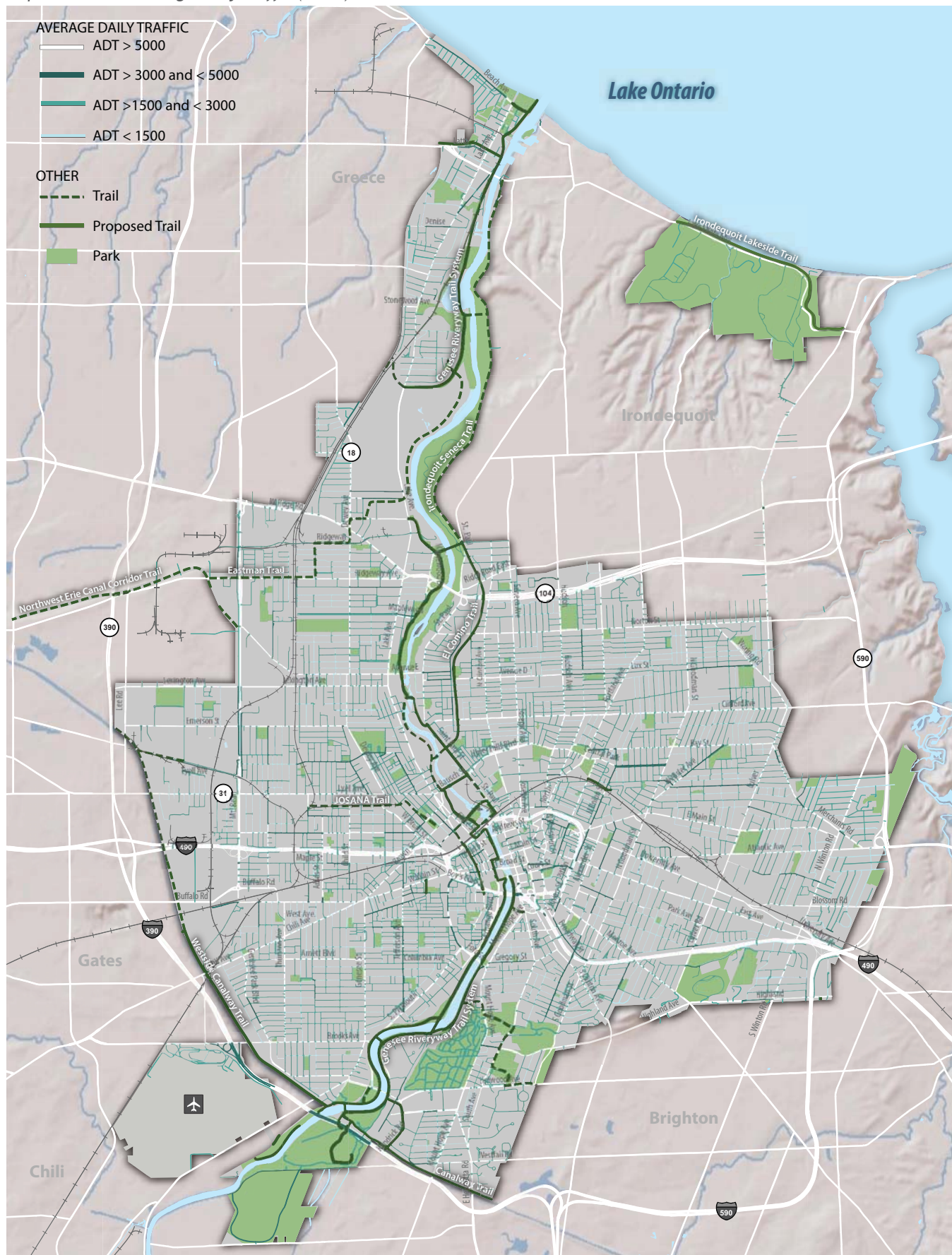
Roadway and route suggestions were solicited from City Staff, the Steering Committee, and the public. Public input was received during the February 2014 public meeting. Maps of the existing and proposed bicycle infrastructure, and current AADT were provided for residents to identify preferred and desired routes.



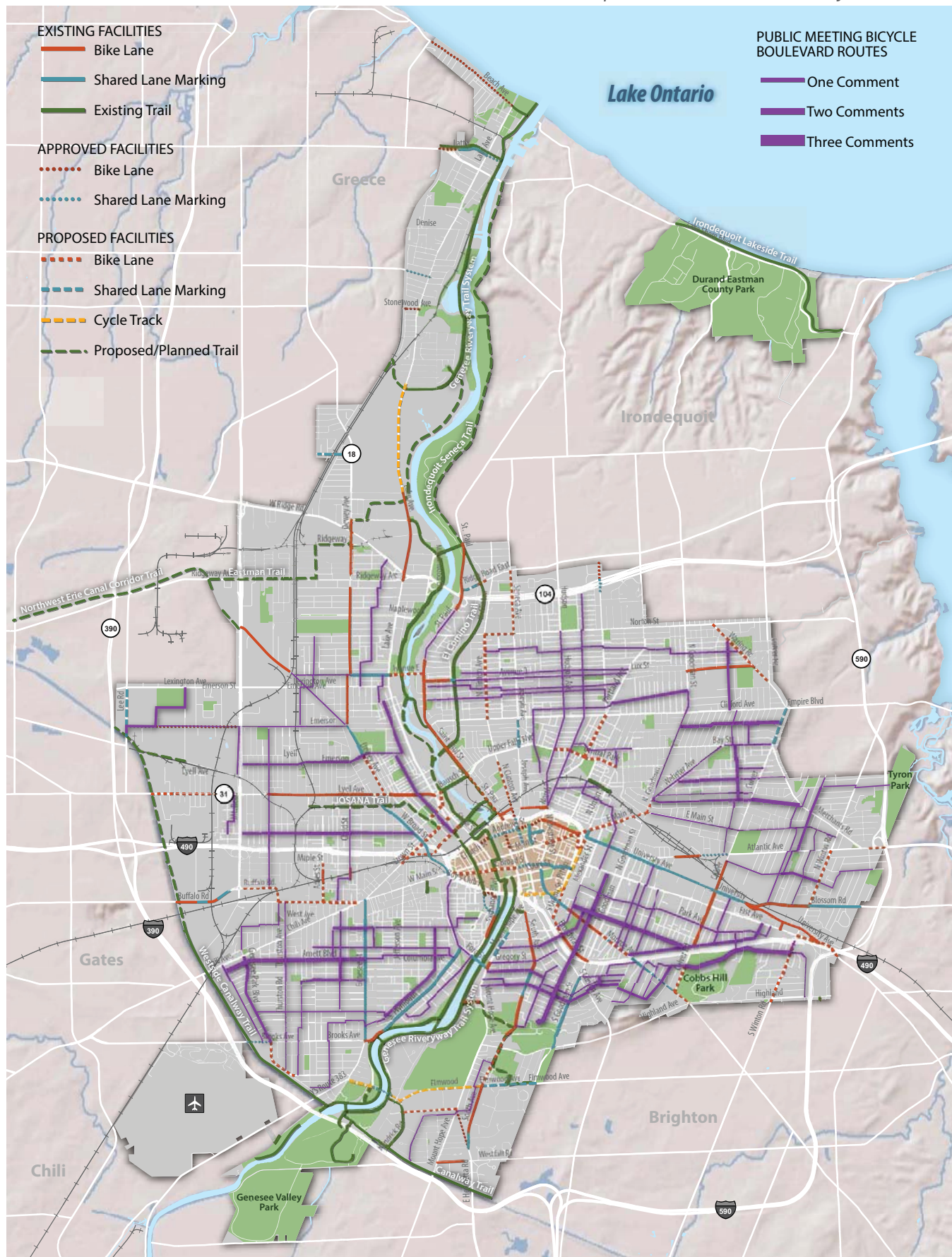




Map 2-2: Annual Average Daily Traffic (AADT)



Map 2-3: Public Comments on Bicycle Boulevards





EQUITY ANALYSIS

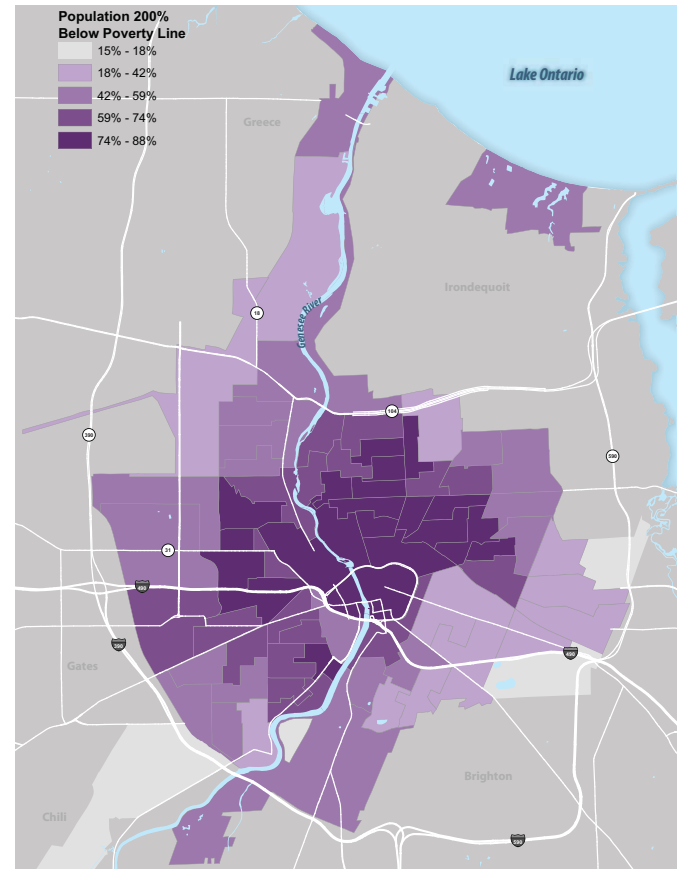
The proposed bicycle boulevard network will serve all areas of Rochester, including areas that have a high density of historically under served populations. An equity analysis examined the distribution of these populations to allow this factor to be included in the evaluation of priority routes through the City.

DEMOGRAPHIC EQUITY SCORE

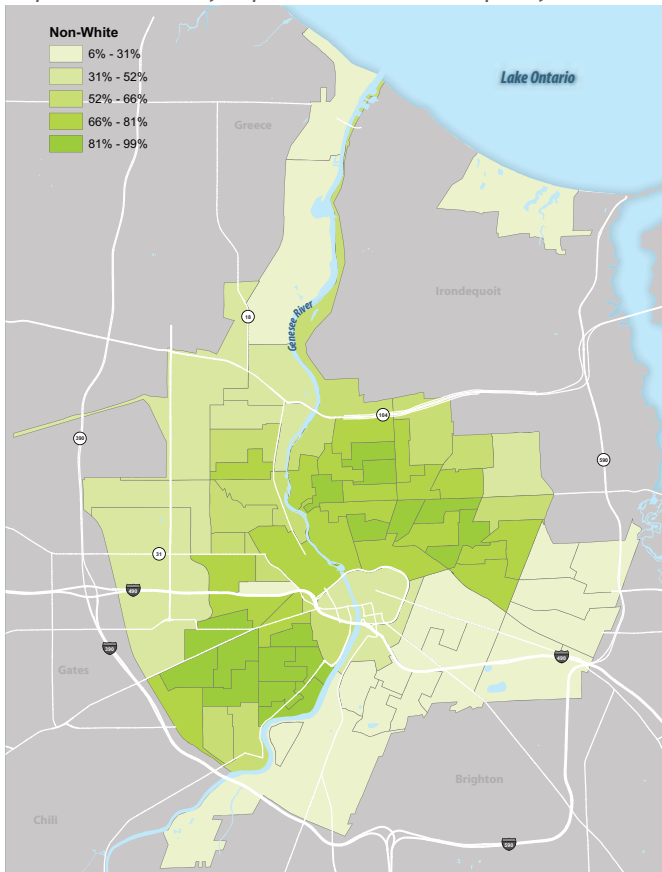
Several maps were created to visually display demographic information for the City of Rochester. For purposes of the analysis, the following socioeconomic indicators define under served populations, as shown on Maps 2-4 to 2-8. Each of the maps were evaluated independently and scored. The scores of these indicators were then summed to create the Demographic Equity Score Map (2-9).

- Percentage of population that are people of color
- Percentage of households below 200% of poverty level (defined by the U.S. Census Bureau)
- Percentage of households within the census tract with no automobile available for daily use
- Population of people under 18 years of age
- Population of people over 64 years of age

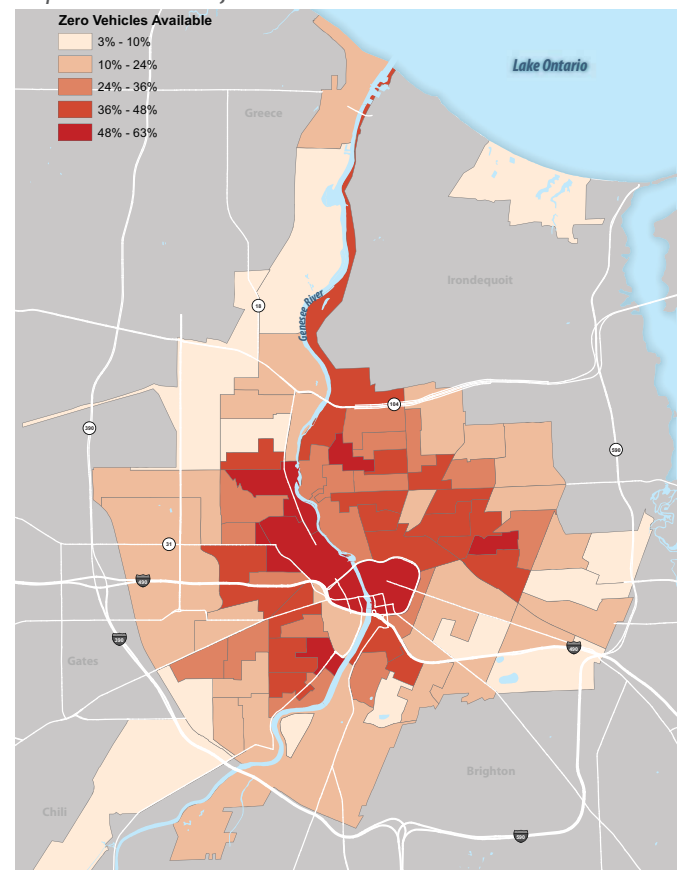
Map 2-4: Percent of Population Under 200% of Poverty Level



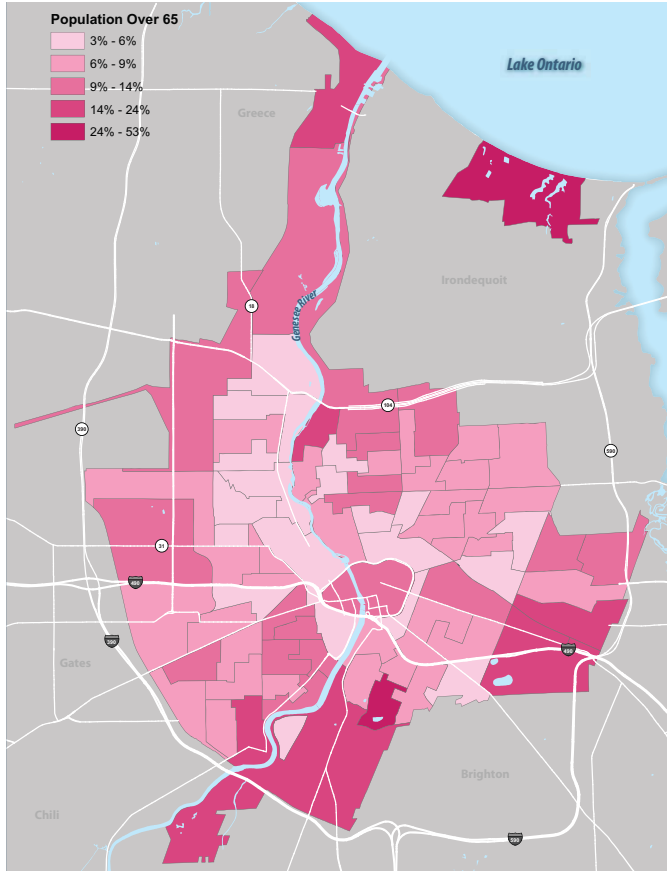
Map 2-5: Percent of Population that are People of Color



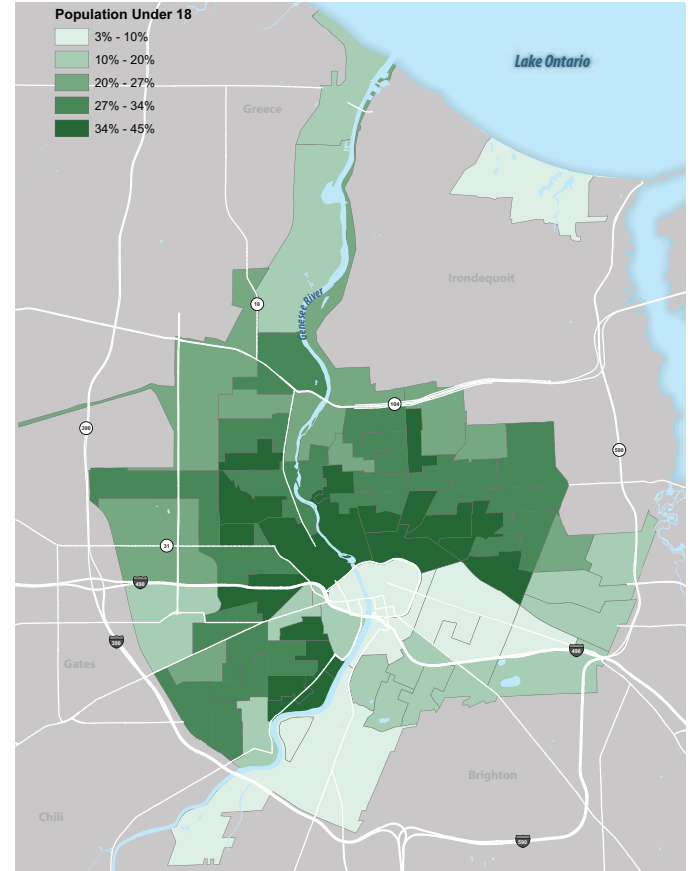
Map 2-6: Percent of Households Without Access to a Car



Map 2-7: Percent of Population that are Over the Age of 65



Map 2-8: Percent of Population that are Under the Age of 18



The analysis used a threshold for each of the above indicators, so that those census tracts that had a greater value than the mean value for any given indicator was given a score of one (1). For example, if a census tract had an above average number of people of color and an above average number of people 65 years of age or older, the census tract was given a score of one (1). Equity mapping will be a consideration in

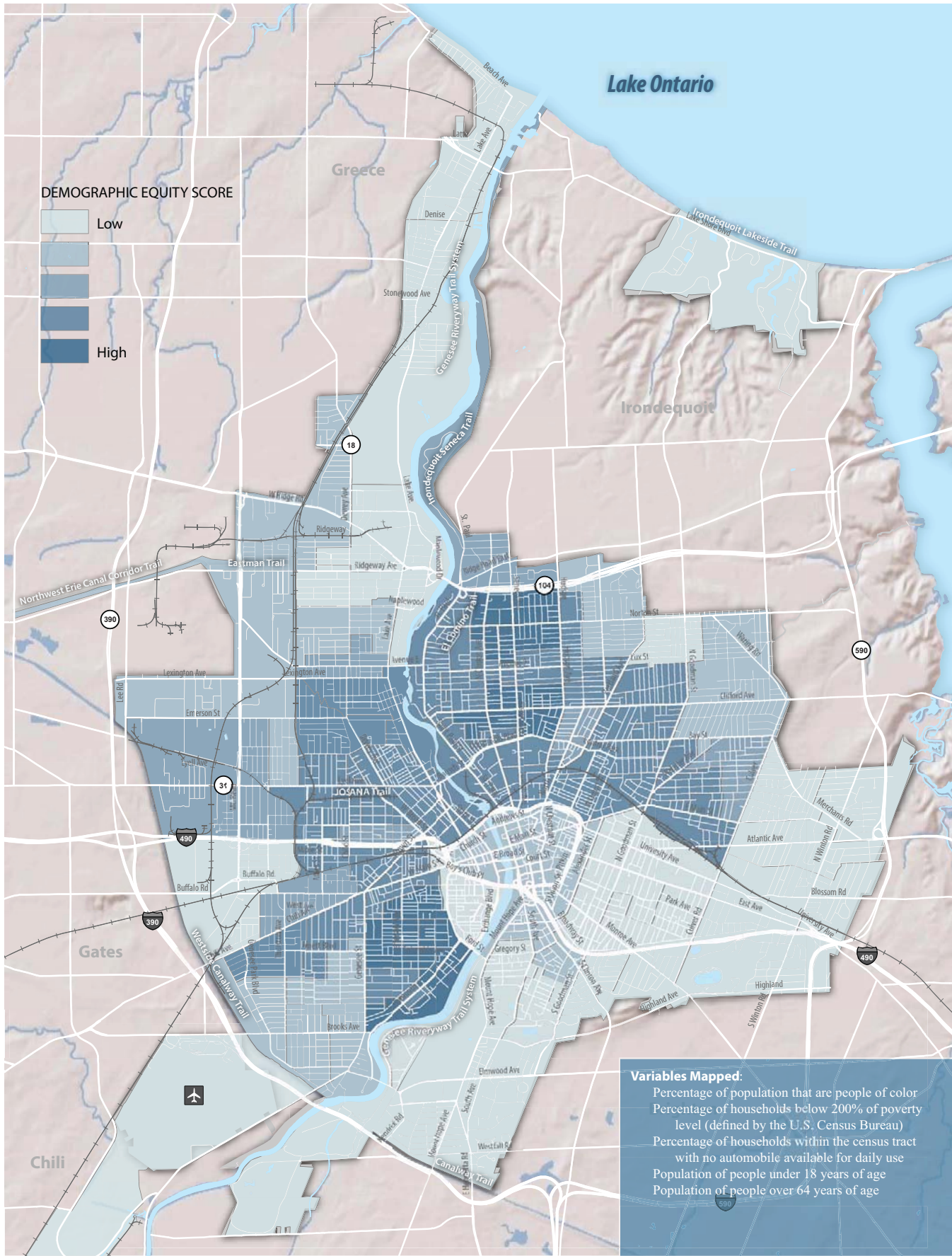
the prioritization of Bicycle Boulevard routes, with the high equity score having a maximum possible value of five and a low equity score having a minimum possible value of zero. The proposed bicycle boulevard routes were overlayed on top of the demographic data to determine how well the different routes serviced areas with high densities of underserved populations.



Bicycle Boulevards were planned for all areas of Rochester



Map 2-9: Demographic Variables Equity Score



BICYCLE BOULEVARD PRIORITIZATION

A total of 23 bicycle boulevard routes were proposed with varying lengths. A collection of 9 different factors were selected to evaluate each route. The different factors were given a weight corresponding to their importance for the City of Rochester and the proposed bicycle boulevard network. The bicycle boulevards are to be ranked based on their score out of a total of 40 points. Each of these factors are described below:

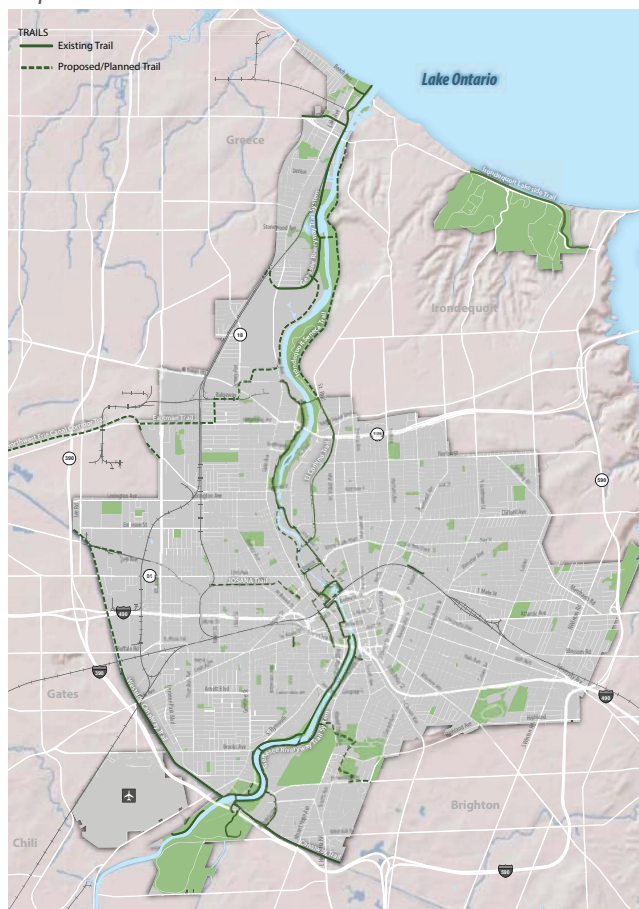
1. Fills Gap (scored 0 through 5): The proposed bicycle boulevard network fills gaps in the City's transportation system by providing a low-stress bike route alternative to connect destinations. Each bicycle boulevard is scored based on the length and difficulty of the transportation gap that the route connects. The existing and proposed bicycle network and the Bicycle Boulevard connections are shown on Map 2-1.

2. AADT (scored 1 through 3): Traffic volumes are an important consideration. A quieter roadway provides a higher level of comfort for users, which results in a higher score. Map 2-2 displays the AADT of the majority of the City's streets.

3. Public Input (scored 0 through 3): The public priority level is determined through the results of public involvement efforts, including a large February 2014 public meeting and ongoing web site comments. Many streets and routes have been identified as opportunities and challenges. Destinations that are visited frequently, such as the Public Market, and destinations that are currently difficult to get to, such as the area's college campuses, have also been discussed. The more frequently the public identified a given bicycle boulevard opportunity, the higher the resultant score, as shown in Map 2-3.

4. Priority Census Tract (scored 0 through 8): Historically under-served parts of Rochester were identified in the previous section using variables such as poverty and the number of households without access to a vehicle. This score is determined by the equity score in the demographic variables analysis, shown in Map 2-9.

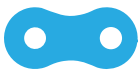
Map 2-10: Trail Connections



5. Connects Trails (scored 0 through 5): The City of Rochester has made great strides in building a first-class trail system, which continues to expand. If a bicycle boulevard connects to one of the City's trails, it will be given a score of 1, and 0 if it does not connect to any trails. If the bicycle boulevard connects several trails, it will be given a score of 2 through 5 depending on the number and quality of trail connections. The potential trail connections are shown in Map 2-10.



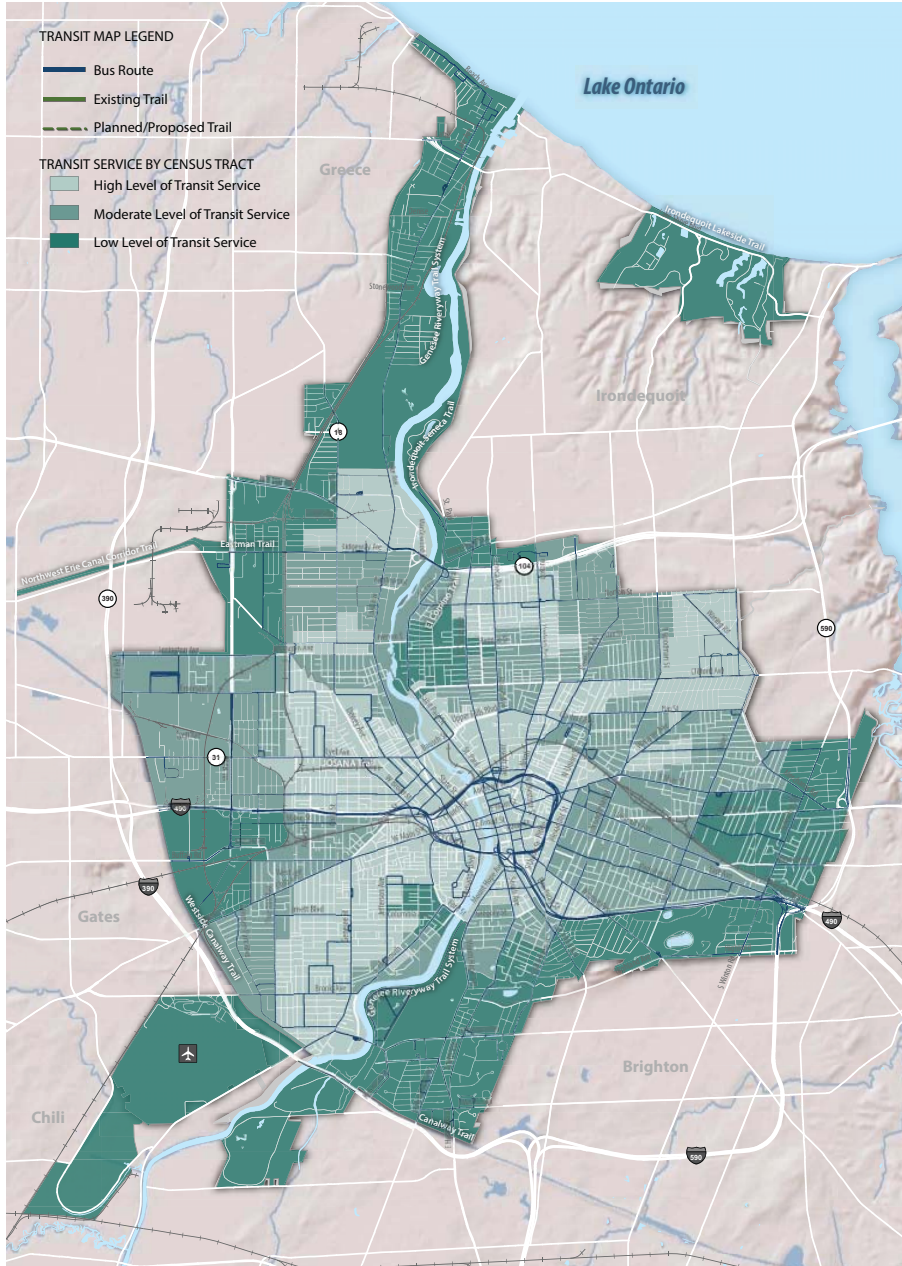
Shared Use Paths, such as the Genesee Riverway (shown above, right) provide low stress connections for bicycle boulevards (Source: City of Rochester)



Map 2-11: Destination Connections



Map 2-12: Transit Density Analysis



6. Connects Destinations (scored 0 through 5): Connecting residential neighborhoods to parks, schools, retail, and employment centers is one of the primary goals of the bicycle boulevard network. How each route connects these destinations, and how many unique destinations it reaches overall, determines a score ranging from 0 to 5. These destinations are shown in Map 2-11.

7. Proximity to Transit (scored 0 through 3): Rochester's bicycle network can work hand-in-hand with its transit system. While it has been suggested that bus stops typically have a catchment area of about half a mile, transit-adjacent bicycle accommodations could increase this catchment area to between 1 and 2 miles by providing more comfortable non-motorized access to these bus stops. This score is determined by the potential for a given bicycle boulevard route to extend the existing transit service area. Bus routes and the transit analysis that was used to determine this potential are shown in Map 2-12.

8. Prior Traffic Calming Request (scored 0 through 3): Rochester's traffic calming program allows residents and neighborhoods to request the installation of traffic calming features. Such traffic calming features are a primary component of bicycle boulevards. Local streets that have pre-existing traffic calming features will be given the highest score of 3, while streets where traffic calming has been requested, but just narrowly missed qualifying for installation, will be given the next highest score. A score of 1 will be

given to streets that did not qualify for several reasons, and a score of 0 will be attributed to streets that have not applied for traffic calming at all.

9. Route Quality (scored 1 through 5): Route quality will depend on several elements, such as the ability to implement traffic calming, roadway width, the number of major roadway crossings, and the clarity and directness of the route.

SUMMARY OF BICYCLE BOULEVARD ROUTE EVALUATION

Evaluating each potential bicycle boulevard based on these factors results in the prioritization matrix in Table 2-1. When the system is built in full, it will result in more than 50 miles of bicycle boulevards. The proposed bicycle boulevard network is shown in Map 2-13, with priority routes highlighted in blue. The prioritization matrix has been colored based on the evaluation score. Routes that scored 25 or above are highlighted in blue and routes that scored 24 are highlighted in light blue.

The evaluation served to identify the highest priority routes in and around the City of Rochester. While this evaluation serves as the primary guide for a phased implementation, it is important to consider the full recommended network to take advantage of opportunities such as street resurfacing projects or implementation of neighborhood traffic calming requests.



Map 2-13: Recommended Bicycle Boulevard Routes

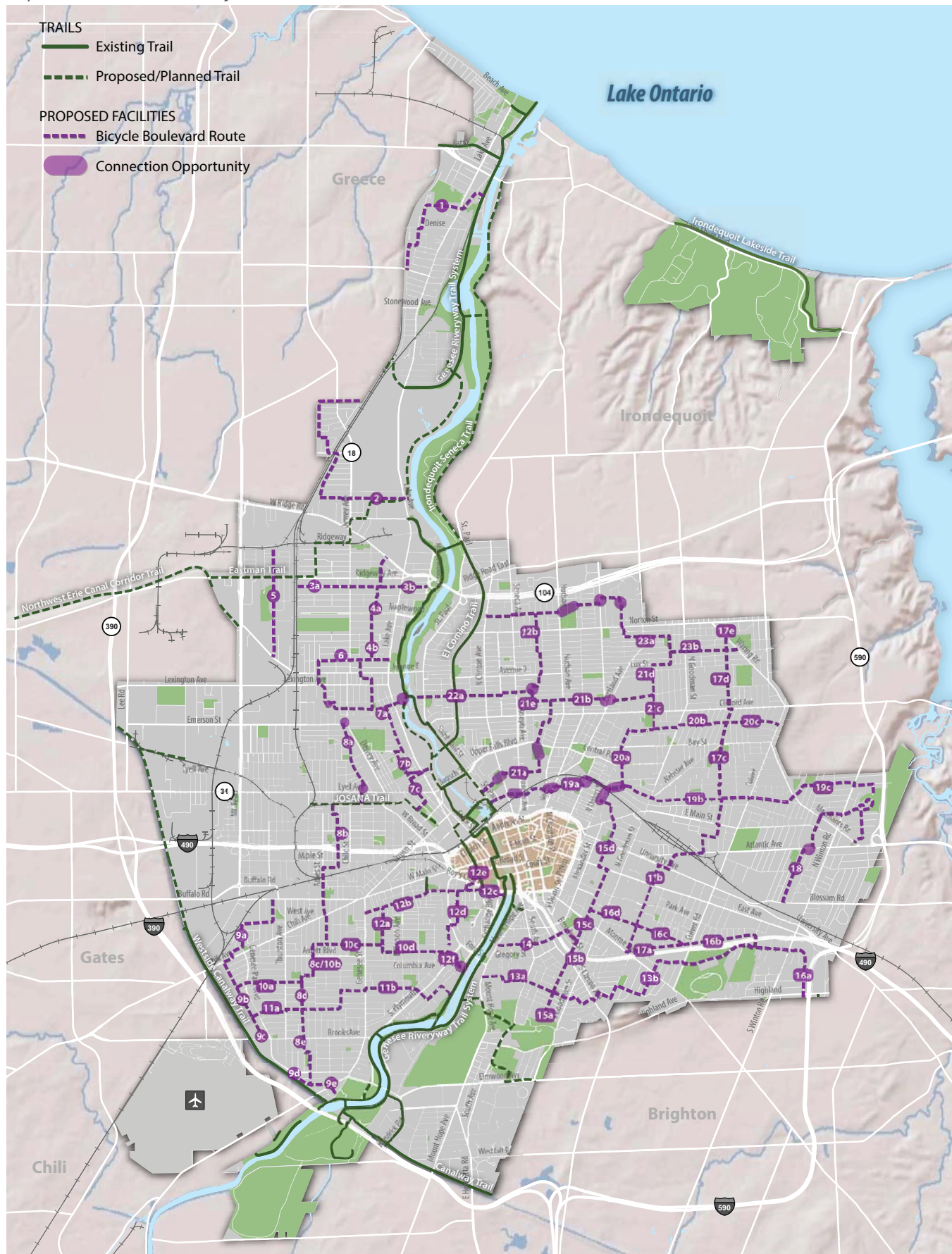


Table 2-1: Bicycle Boulevard Route Prioritization Matrix (sorted by Route ID number and Quadrant)

				Fills Gap	AADT	Public Input	Priority Census Block	Connects Trails	Connects Destinations	Proximity to Transit	Traffic Calming Requests	Route Quality	Total
Quad	Route No.	Route Name	Length (miles)	5	3	3	8	5	5	3	3	5	40
NW	1	River-Frey-Chesterfield	1.37	4	3	0	0	3	2	0	2	2	16
NW	2	Merrill - Bernice - Oakwood	2.34	3	2	0	1	2	2	1	3	4	18
NW	3a	Avis St	0.97	3	2	0	0	3	3	2	2	4	19
NW	3b	Flower City Park	0.44	3	2	0	0	3	3	2	3	4	20
NW	4a	Raines Park	0.53	2	2	1	2	3	3	2	0	4	19
NW	4b	Raines Park - Lakeview Park	0.40	2	2	1	2	3	3	2	0	4	19
NW	5	LaGrange	1.02	2	2	0	2	1	2	0	2	5	16
NW	6	Tacoma - Pierpont - Lake View - Lark - Linnet	1.66	3	2	0	5	2	2	3	3	3	23
NW	7a	Glendale - Fulton	1.09	2	2	3	6	2	3	3	2	3	26
NW	7b	Plymouth Ave N - Jones - Ambrose - Cliff	0.67	2	2	3	6	3	3	3	2	2	26
NW	7c	Bloss - N Plymouth	0.75	2	1	3	6	4	3	3	2	2	26
NW	8a	Santee - Austin	0.83	3	2	0	6	2	2	3	2	2	22
SW	8b	Massey - Colvin - Ames - Rugby	1.71	3	2	0	5	2	2	3	2	2	21
SW	8c / 11b	Frost - Woodbine - Aberdeen	0.59	5	2	0	4	3	3	1	2	3	23
SW	8d	Post	0.26	5	3	0	5	3	3	1	2	4	26
SW	8e	Post - Congress - Virginia	0.78	5	2	0	4	3	3	1	2	4	24
SW	9a	Depew - Copley - Stanton - Farragut - Westfield	1.27	3	3	1	3	3	4	1	3	1	22
SW	9b	Westfield (Ravenwood to Hillendale)	0.32	3	3	1	4	3	4	1	3	2	24
SW	9c	Westfield (Hillendale to Brooks)	0.23	3	1	1	3	3	4	1	3	1	20
SW	9d	Kingsboro - Devon - Mineola	0.55	3	2	1	2	3	4	1	3	1	20
SW	10a	Ravenwood	0.63	4	2	1	5	2	3	3	2	2	24
SW	10c	Frost	0.53	4	3	1	6	3	3	3	2	2	27
SW	10d	Epworth - Bartlett	0.64	4	3	1	8	4	3	3	2	2	30
SW	11a	Rosalind - Seward	0.51	3	2	1	3	3	3	1	2	3	21
SW	11b	Seward - Roslyn - Magnolia - Exchange - Flint	1.75	3	2	1	5	4	3	1	3	3	25
SW	12a	Epworth	0.36	4	3	0	8	2	3	2	2	3	27
SW	12b	Clifton - Troup	0.92	4	1	0	6	3	3	2	3	4	26
SW	12d	Clarissa - Olean	0.60	4	2	0	3	3	3	2	2	4	23
SW	12c	Troup	0.46	4	2	0	2	3	3	2	3	4	23
SW	12e	Livinston Park - Ped Bridge - Spring	0.24	4	2	0	3	4	3	2	2	4	24
SE	12f	Bartlett - Edith - Doran	0.20	4	2	0	6	4	3	2	2	4	27
SE	13a	Cypress - Linden	0.75	4	2	3	1	1	4	0	2	3	20
SE	13b	Linden - Howard - Raymond - Fountain - Sycamore - Field - Pinnacle - Rosedale - Hinsdale - Norris	2.43	4	2	3	1	1	4	0	3	3	21
SE	14	Averill - Pearl	0.83	3	2	2	1	3	4	3	1	5	24
SE	15a	Meigs	0.21	2	1	3	2	0	5	2	2	4	21
SE	15b	Meigs (Linden to Pearl)	0.55	2	1	3	1	0	5	2	2	4	20
SE	15c	Meigs (Pearl to Harvard)	0.30	2	0	3	1	0	5	2	2	4	19
SE	15d	Arnold Park - Prince - Champeney Terrace	1.32	2	2	3	2	0	5	2	2	3	21
SE	16a	Hillside	0.90	5	2	3	0	1	2	1	3	5	22
SE	16b	Harvard	0.81	5	2	3	0	1	2	1	2	5	21
SE	16c	Harvard	0.48	5	1	3	0	1	2	1	2	5	20
SE	16d	Harvard	0.39	5	1	3	0	1	2	1	2	5	20
SE	17a	Cantebury - Dartmouth	0.81	4	2	2	0	0	4	2	3	2	19
SE	17b	Dartmouth - Vick Park B - Portsmouth Terrace - Russell - Crouch - Leighton - Herkimer - Quincy	1.76	4	2	2	2	0	4	2	2	2	20
SE	17c	Quincy - Denver - Pershing	0.81	4	2	2	5	0	4	2	1	3	23
NE	17d	Pershing - Lyceum (to Ashwood)	0.72	4	1	2	2	0	4	2	1	3	19
NE	17e	Lyceum (Ashwood to Waring)	0.12	2	2	1	2	0	3	2	1	3	16
SE	18	Marion - Woodstock - Marsden - Edmonton - Monticello	2.01	2	3	1	0	0	3	0	2	2	13
NE	19a	Ward - Harrison - Davis	1.57	5	2	1	6	2	5	2	1	1	25
NE	19b	Peck - Garson	1.01	5	2	1	6	2	5	2	1	3	27
NE	19c	Garson - Sheldford - Farmington - Tryon	1.63	5	3	1	2	2	5	2	1	2	23
NE	20a	1st - High - Hempel	0.79	4	2	2	6	0	2	2	2	3	23
NE	20b	Hempel - Rocket	0.73	4	2	2	4	0	2	2	2	3	21
NE	20c	Rocket	0.50	4	2	2	2	0	2	2	3	3	20
NE	21a	St Bridgets - Kelly - Holland - Henry - Barons	1.10	4	2	1	7	2	3	2	2	1	24
NE	21b	Bernard - Fernwood	0.90	4	2	1	5	2	3	2	2	1	22
NE	21c	Ferncliffe - 6th	0.32	4	2	1	6	2	3	2	2	1	23
NE	21d	Ferncliffe - Randolph - Midland	0.58	4	2	1	5	2	3	2	2	1	22
NE	21e	Bernard - Thomas	0.26	4	2	1	8	2	3	2	2	1	25
NE	22a	Ave A - Wilkins - Thomas	1.12	4	2	1	6	3	2	2	3	1	24
NE	22b	Berlin - Bradford - Baumann - Klein	0.80	4	2	1	7	3	2	2	2	1	24
NE	23a	Nester - Rexford - Northaven - Turpin - Pomeroy - Midland	1.85	4	2	0	5	3	4	1	3	2	24
NE	23b	Perkins - Ashwood	0.64	4	3	0	3	3	4	1	2	2	22

53.61

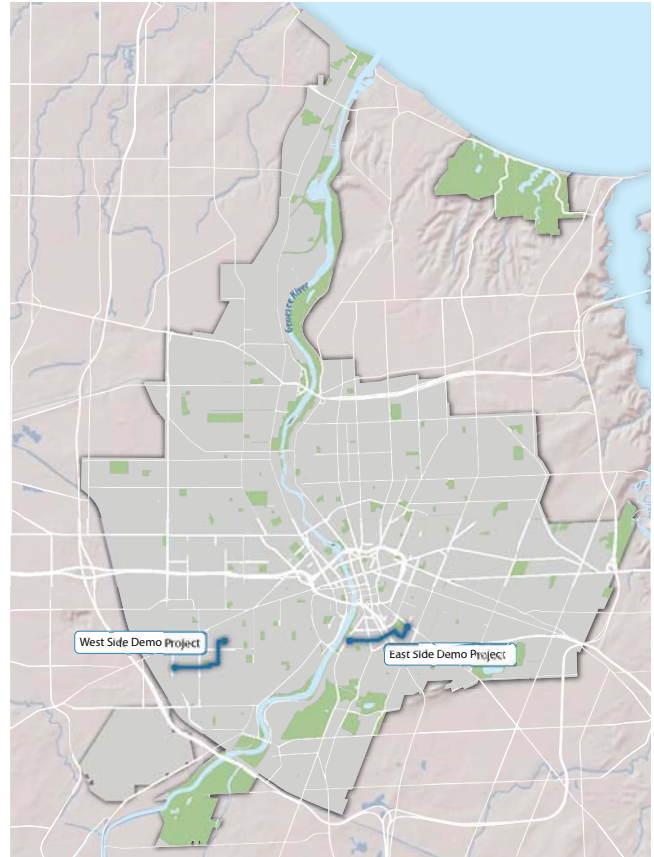


PUBLIC OUTREACH AND DEMONSTRATION PROJECTS

One of the primary objectives of the Rochester Bicycle Boulevard Plan was to help the community understand what a Bicycle Boulevard is, and how they can help slow vehicles on designated streets and make them more comfortable for all modes of travel. A report or flyer can help to educate people as to how bicycle boulevards function, and what different treatments can do to improve bicycling conditions, but it was determined that a two week demonstration project would be most helpful in communicating what a bicycle boulevard looks like and how they operate.

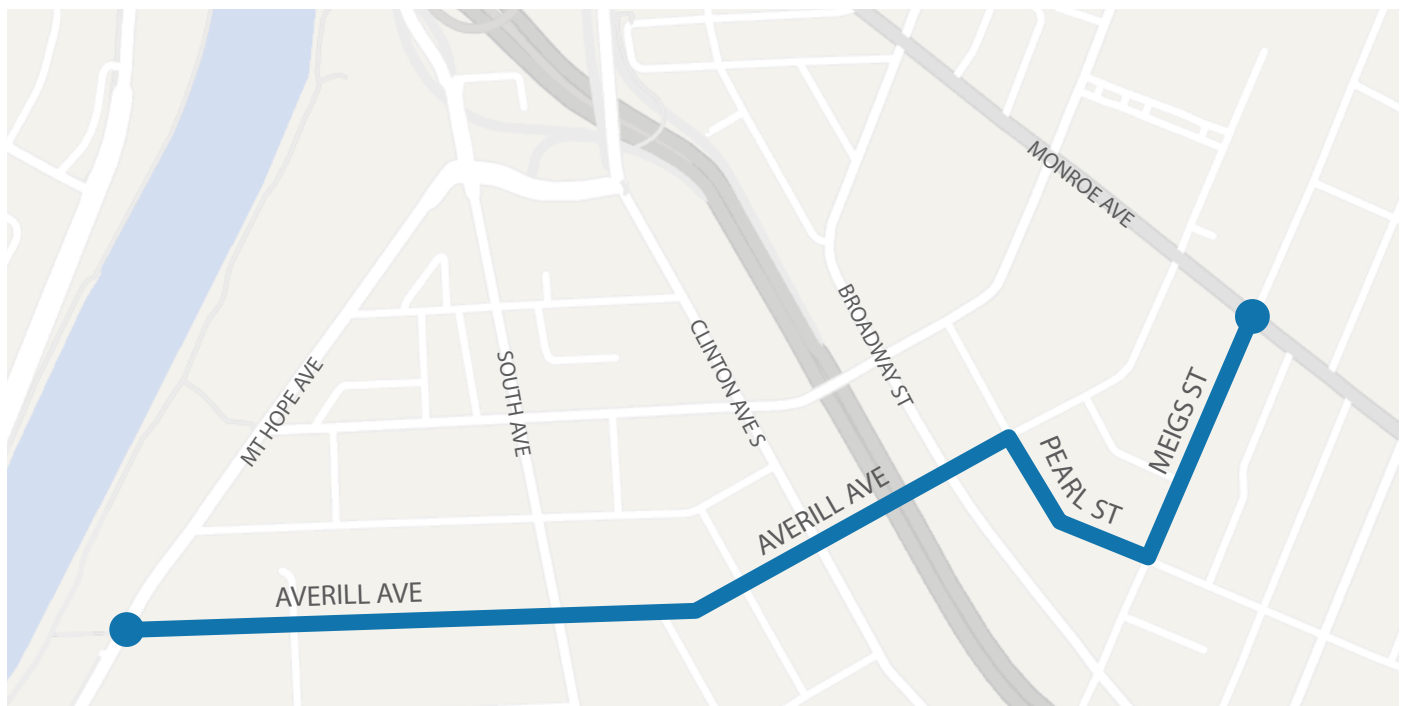
Two routes were selected to serve as bicycle boulevard demonstration routes (highlighted on the map to the right). These routes were chosen because of their location, length and fact that they had been identified as priority routes. The two projects were located on the east and west sides of the city so that a larger number of Rochester's residents could be exposed to the projects, and each measured about 1.5 miles in length. This distance was selected because the routes were long enough to create a connected bicycle boulevard, and short enough to be managed as a demonstration project.

The east side demonstration route was routed upon Averill Ave, Pearl St and Meigs Street from Mt. Hope Ave to Monroe Ave. The context map below shows where the route was located.



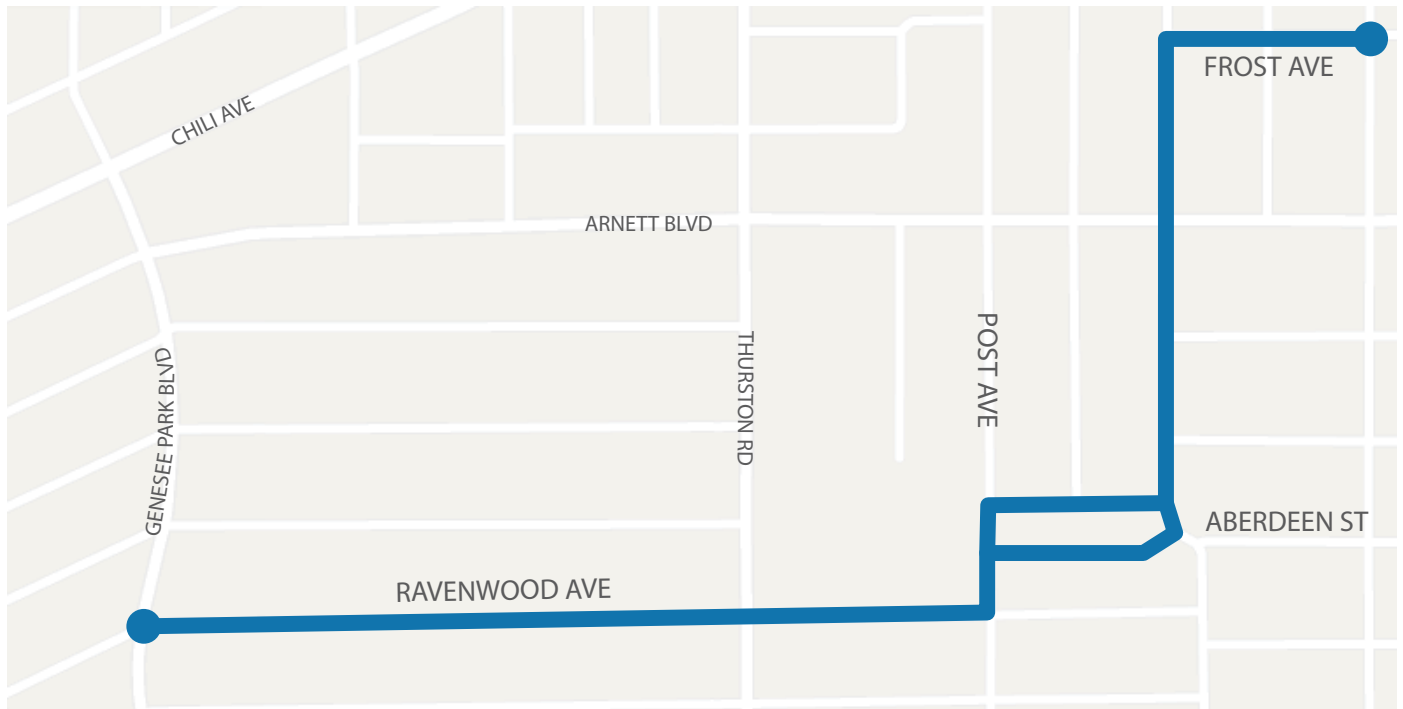
Two demonstration projects were undertaken, one on the west and the other on the east sides of the city.

EAST SIDE DEMONSTRATION ROUTE



The west side demonstration route started along Ravenwood Ave at Genesee Park Boulevard, and meandered through the neighborhood along local streets, ending at the intersection of Rugby Ave and Frost Ave. The context map below shows where the route was located.

WEST SIDE DEMONSTRATION ROUTE

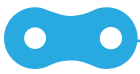


Signs such as the one above were installed throughout the two demonstration project routes. It should be noted that the signs used do not comply with the MUTCD/NYSS as currently written.

For each route, temporary signage was installed to highlight the route's designation as a bicycle boulevard. The signs were populated with local destination information and distances, and were placed at intersections along the routes. The graphic below shows an examples of one of the signs installed along the east side route. In all, 36 signs were installed for the two demonstration routes, 21 for the west side route and 15 for the east side route.

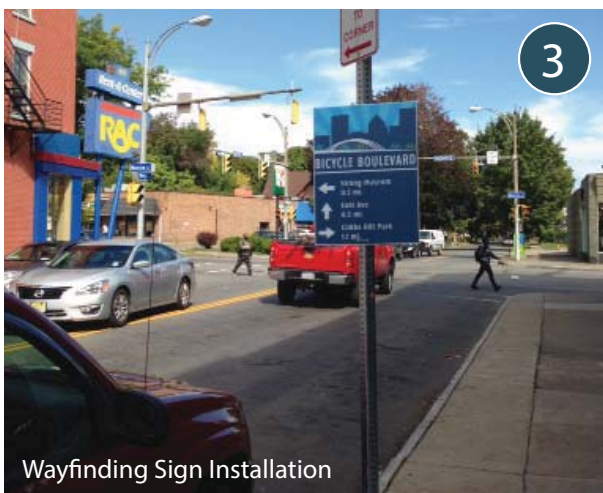
In addition to signage, temporary shared lane pavement markings (sharrows) were painted on both routes. Typically, sharrows are installed every 250' in both directions of travel, but since this was a demonstration project, sharrows were installed in only one direction of travel at 250' intervals. When combined with the route signage, the sharrows helped to reinforce the fact that the road had been designated a temporary bicycle boulevard.

It is important to coordinate the installation of signage and pavement markings with traffic calming features, such as speed humps, mini traffic circles, chicanes and chokers. Since this was a temporary installation, not all traffic calming elements could feasibly be installed along the designated routes. Temporary speed cushions, provided and installed by the city, were placed along the routes to moderate the speed of motor vehicles and make bicycling along the routes more comfortable. Before the boulevard elements were placed, residents received notices that signs, pavement markings, and speed humps were going to be installed. Bicycle boulevard information brochures were also available



throughout the project. The installation of the temporary treatments took place over a week period. First, the signage and pavement markings were placed. Thereafter, city crews worked to install the speed humps along the routes. Two public meetings were held after the installation of the boulevard elements. These meetings were well attended, and were used as an opportunity to further explain the intent of a bicycle boulevard, allow residents to ask questions, and understand the resident's perspectives about how the boulevards were performing. Generally, the reception to the demonstration projects was positive. Comments varied, but some key conclusions are listed below:

DEMONSTRATION PROJECT PROCESS



- About one third of the comments were in direct support of the work related to the boulevard elements (meaning residents appreciated the signs, pavement markings and speed humps)
- Quite a few of the comments anecdotally remarked that there was a doubling of bicycling on the demonstration routes as a result of the treatments
- Many of the comments were very specific to a person's perception of the boulevard, or desire to have a boulevard be placed along another street (ie - 'did you consider this route'; 'you should put treatments here instead').
- The boulevards were such a success, that at the end of the two week demonstration period, the city removed the speed humps from the routes, but kept the signs up and did not wash away the pavement markings from the street. Initially, all elements used in the demonstration project were going to be removed after the two week period had ended.

Overall, the Rochester Bicycle Boulevard Demonstration projects were successful. It was a unique way to engage the community and educate them as to what a Bicycle Boulevard is and how they function. When the markings were being installed, residents would ask what the crew was doing, and this gave the planning team an opportunity to explain the premise of a bicycle boulevard, and how the different elements we were installing worked together to create a more comfortable bicycling environment. This interaction provided a chance to educate the public, people that may not have been engaged through other outreach methods. Since the team was interacting with people who lived and worked along the demonstration routes, we could provide information to them that they could then share with their friends and families. The actual installation process then became a particularly effective public engagement opportunity and further emphasized the myriad benefits of the demonstration projects.

The installation process provided a unique opportunity to engage with the public. This gentleman asked to have his picture taken with the crew.



PRIORITY ROUTES AND RECOMMENDATIONS

Chapter Contents:

Introduction

Priority Projects

Supporting
Recommendations

INTRODUCTION

This chapter provides a strategy for implementing the plan's bicycle boulevard recommendations, and elaborates upon opportunities to support the implementation of bicycle boulevards through education, evaluation, and enforcement strategies. Phased implementation of the recommended routes and programs will take several years to complete and are subject to a number of variables. The most important variables include the availability of funding for non-motorized transportation and traffic calming, the City of Rochester's success in obtaining competitive grant funding, and local support.

In the short term, it will be critical to focus on a select group of achievable, high priority projects. These high priority projects could be implemented in the next one to three years. While the full bicycle boulevard system represent a significant investment, recent trends have illustrated Rochester's desire to become a more bicycle-friendly community. Building on this momentum, the Bicycle Boulevard Plan will position the city for implementation and inevitably, higher bicycle friendly community status.

PRIORITY ROUTES

The bicycle boulevard evaluation described in the last chapter served as a guide for developing the priority routes for short term implementation. Priority routes were selected by the project steering committee using the the highest priority route for each quadrant of the City as a base. Rather than selecting the next highest ranked routes, the committee selected connecting routes for these four highest priority routes. This prioritization provides a connected bicycle boulevard network after the first phase of implementation, as a opposed to disjointed bicycle boulevards throughout the City. When several routes served as connections preference was given to the route that scored higher. Conceptual plans for each of these priority routes are provided in the following section.

The routes and evaluation provided in this Plan should be considered flexible concepts over time. The route evaluation and individual route segments may warrant changes over time as a result of changing bicycling patterns, traffic patterns, land use trends, constraints, opportunities, and the development of other transportation facilities. The City of Rochester should review the project list and project ranking at regular intervals to ensure it reflects the most current priorities, needs, and opportunities for implementing the bicycle network in a logical and efficient manner. Map 3-1 displays the highest priority projects for the City of Rochester, and table 3-1 provides a summary of these routes.



The bicycle boulevard network will support the growing demand for bike facilities in Rochester

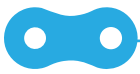
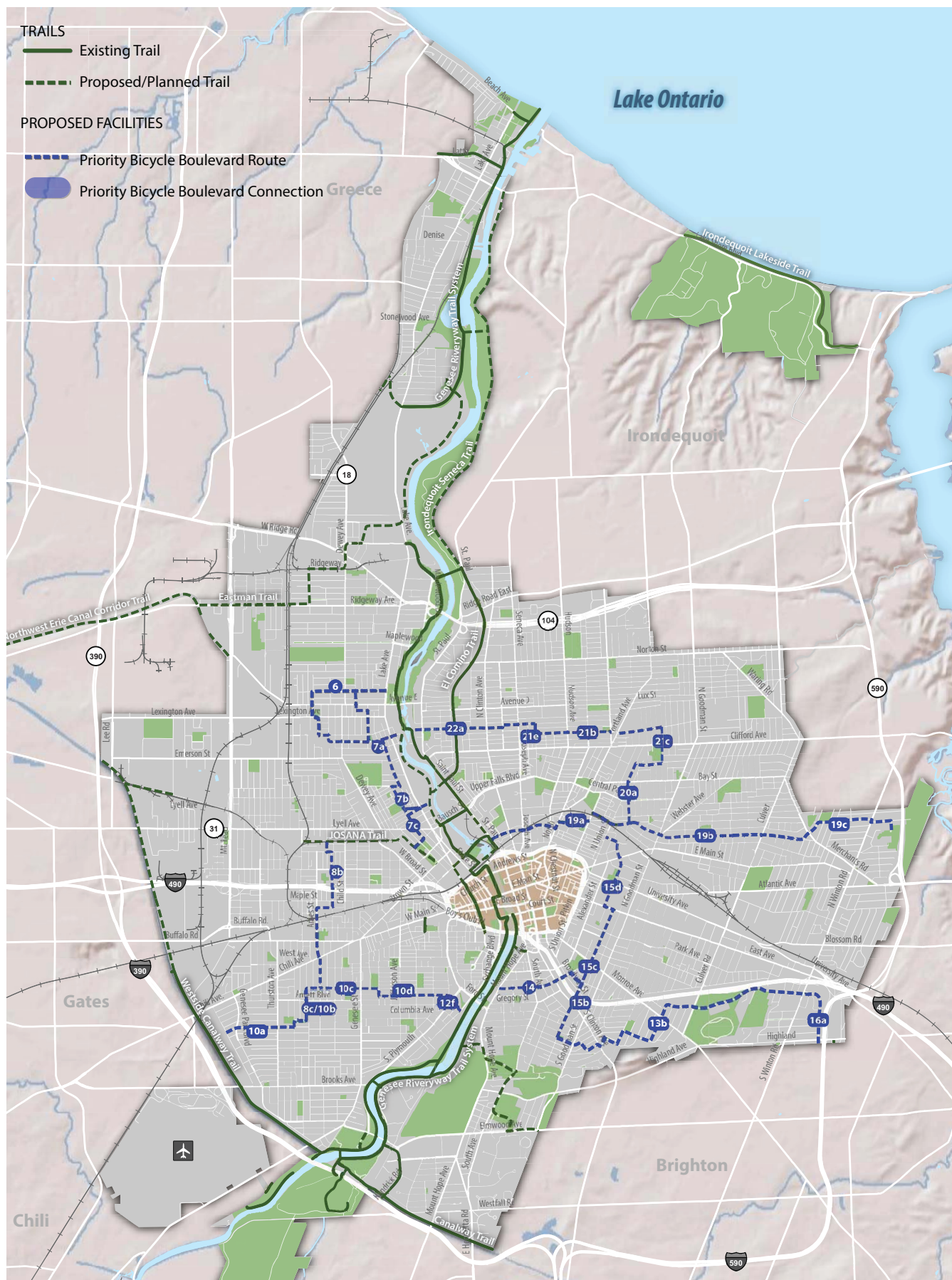


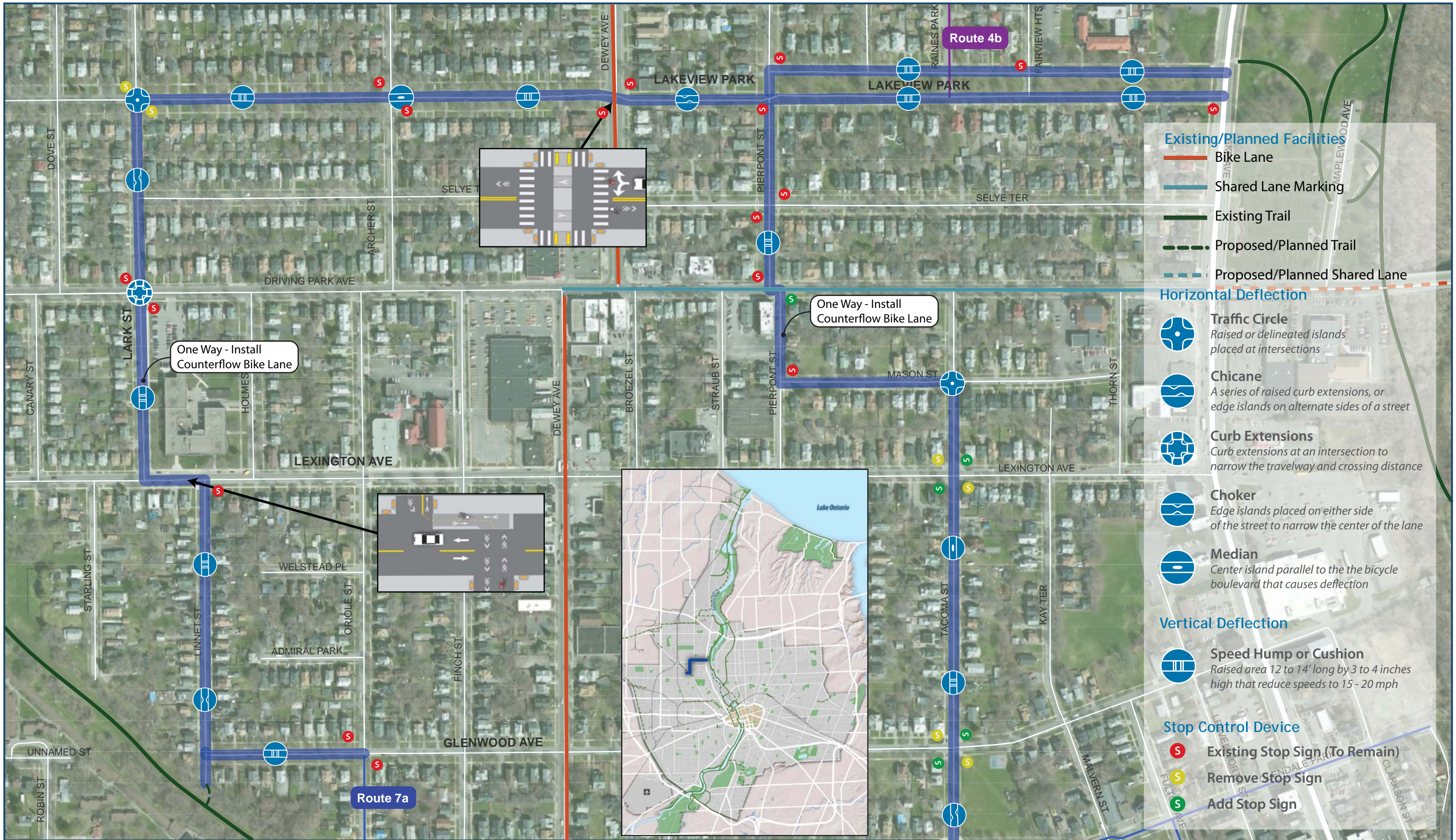
Table 3-1: High Priority Bicycle Boulevard Routes (See Map 3-1 for map of High Priority Routes)

Quadrant	Route #	Streets	Distance (mi)
NW	6	Lake View - Lark - Linnet	1.10
NW	7a	Glendale - Fulton	1.09
NW	7b	N Plymouth - Jones - Ambrose - Cliff	0.67
NW	7c	Bloss - N Plymouth	0.75
SW	8b	Maseth - Colvin - Ames - Rugby	1.71
SW	8c / 11b	Frost - Woodbine - Aberdeen	0.59
SW	10a	Ravenwood	0.63
SW	10c	Frost	0.53
SW	10d	Epworth-Bartlett	0.64
SW	12f	Bartlett - Edith - Doran	0.20
SE	13b	Linden - Howard - Raymond - Fountain - Sycamore - Field - Pinnacle - Rose-dale - Hinsdale - Norris	2.43
SE	14	Averill - Pearl	0.83
SE	15b	Meigs (Linden to Pearl)	0.55
SE	15c	Meigs (Pearl to Harvard)	0.30
SE	15d	Arnold Park - Prince - Champeney Terrace	1.32
NE	19a	Ormond - Harrison - Davis	1.11
NE	19b	Peck - Garson	1.01
NE	19c	Garson - Wyand - Farmington - Tryon	1.63
NE	20a	1st - High - Hempel	0.79
NE	21b	Bernard - Fernwood	0.90
NE	21c	Ferncliffe - 6th	0.32
NE	21e	Bernard - Thomas	0.26
NE	22a	Ave A - Wilkins - Thomas	1.12
Total Distance			20.48

The priority route concept diagrams on the following pages should be considered guides for implementation of the bicycle boulevard priority routes. The frequency of traffic calming elements can be reduced when speeds and traffic volumes are low. Additional traffic calming elements can be added at a later time if warranted. When implementing traffic calming along bicycle boulevard routes, design guidelines should be followed and a variety of traffic calming elements used.

Map 3-1: High Priority Bicycle Boulevard Routes



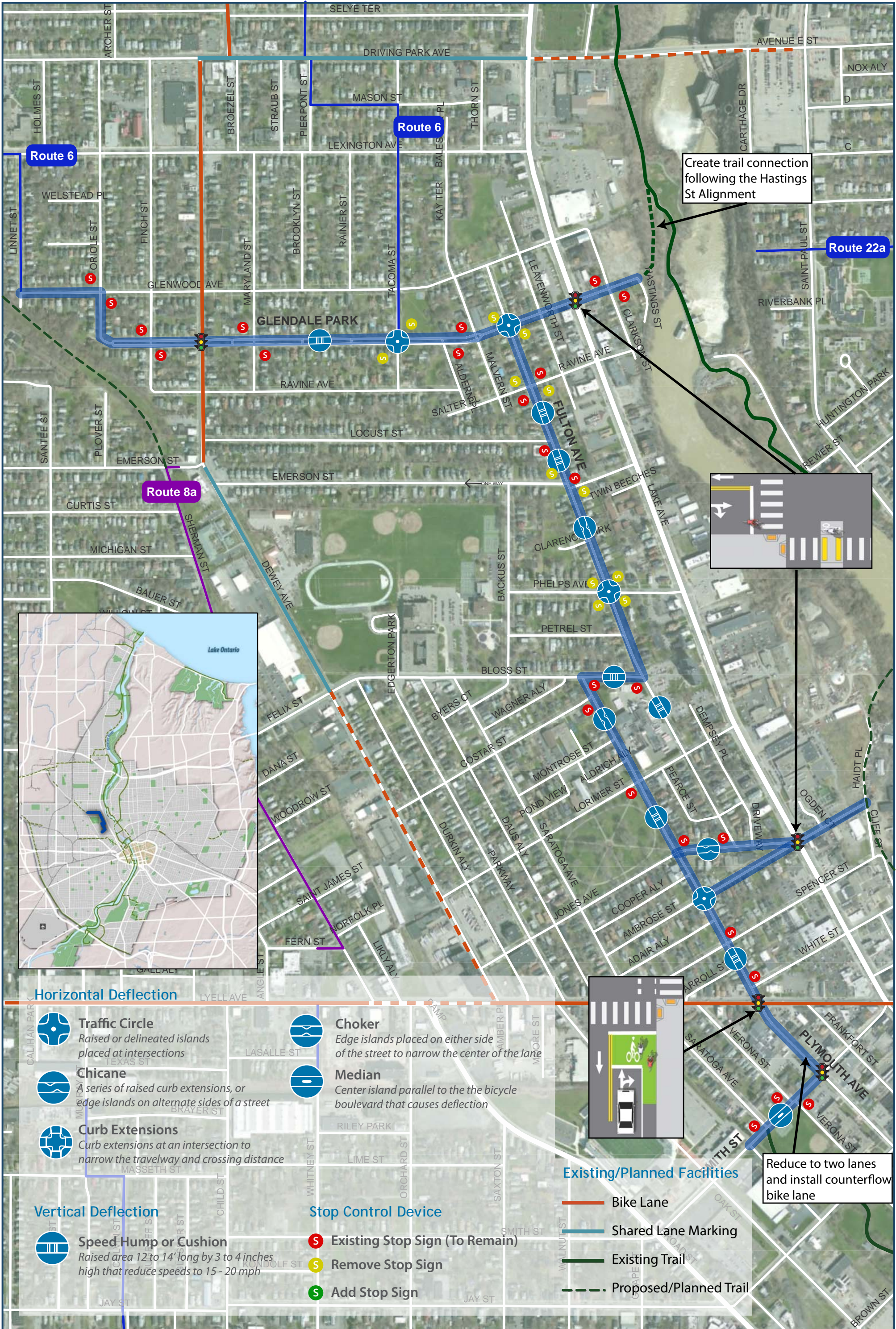


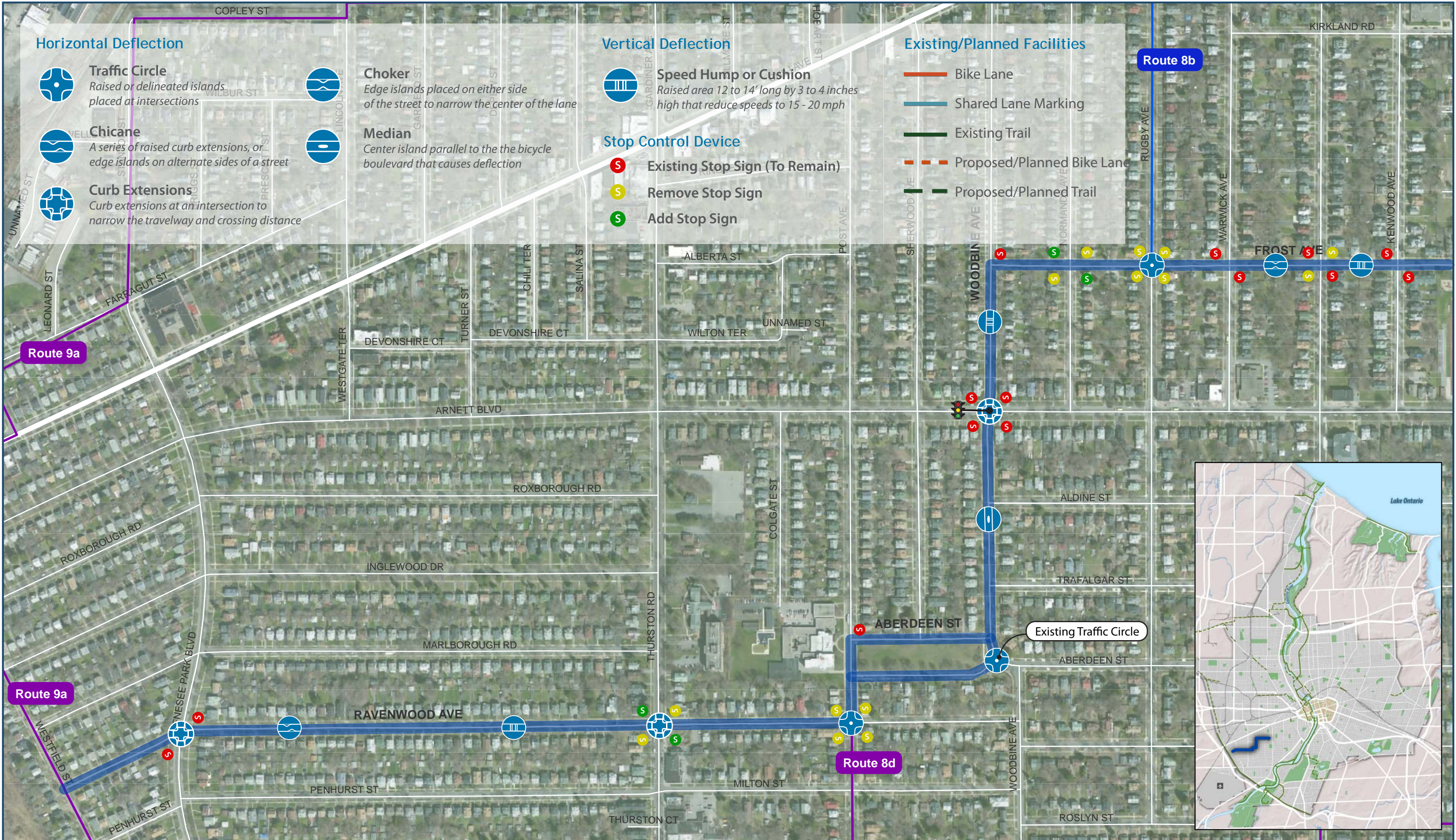
Rochester Bicycle Boulevard Plan: Priority Route 6



Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

- Existing/Planned Facilities**
 - Bike Lane
 - Shared Lane Marking
 - Existing Trail
 - Proposed/Planned Trail
 - Proposed/Planned Shared Lane
- Horizontal Deflection**
 - Traffic Circle**
Raised or delineated islands placed at intersections
 - Chicane**
A series of raised curb extensions, or edge islands on alternate sides of a street
 - Curb Extensions**
Curb extensions at an intersection to narrow the travelway and crossing distance
 - Choker**
Edge islands placed on either side of the street to narrow the center of the lane
 - Median**
Center island parallel to the the bicycle boulevard that causes deflection
- Vertical Deflection**
 - Speed Hump or Cushion**
Raised area 12 to 14' long by 3 to 4 inches high that reduce speeds to 15 - 20 mph
- Stop Control Device**
 - Existing Stop Sign (To Remain)
 - Remove Stop Sign
 - Add Stop Sign





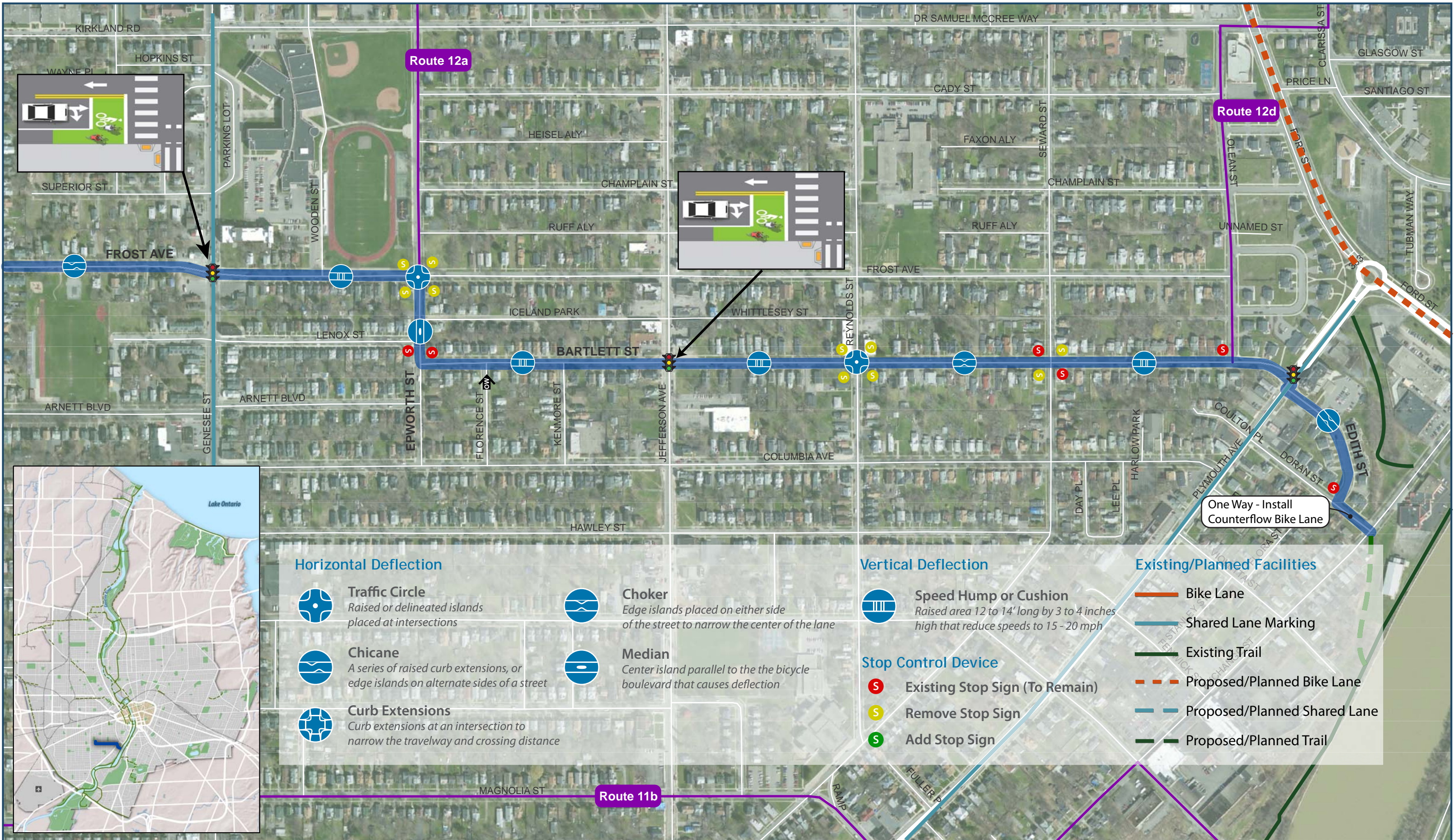
Rochester Bicycle Boulevard Plan: Priority Route 10a

0 0.25 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT



Author: SP/LZ



Rochester Bicycle Boulevard Plan: Priority Route 10b

0 0.25 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT



Author: SP/LZ

Spring 2015

Horizontal Deflection



Traffic Circle

Raised or delineated islands placed at intersections



Chicane

A series of raised curb extensions, or edge islands on alternate sides of a street



Curb Extensions

Curb extensions at an intersection to narrow the travelway and crossing distance



Choker

Edge islands placed on either side of the street to narrow the center of the lane



Median

Center island parallel to the the bicycle boulevard that causes deflection

Vertical Deflection



Speed Hump or Cushion

Raised area 12 to 14' long by 3 to 4 inches high that reduce speeds to 15 - 20 mph

Stop Control Device



Existing Stop Sign (To Remain)



Remove Stop Sign



Add Stop Sign

Existing/Planned Facilities

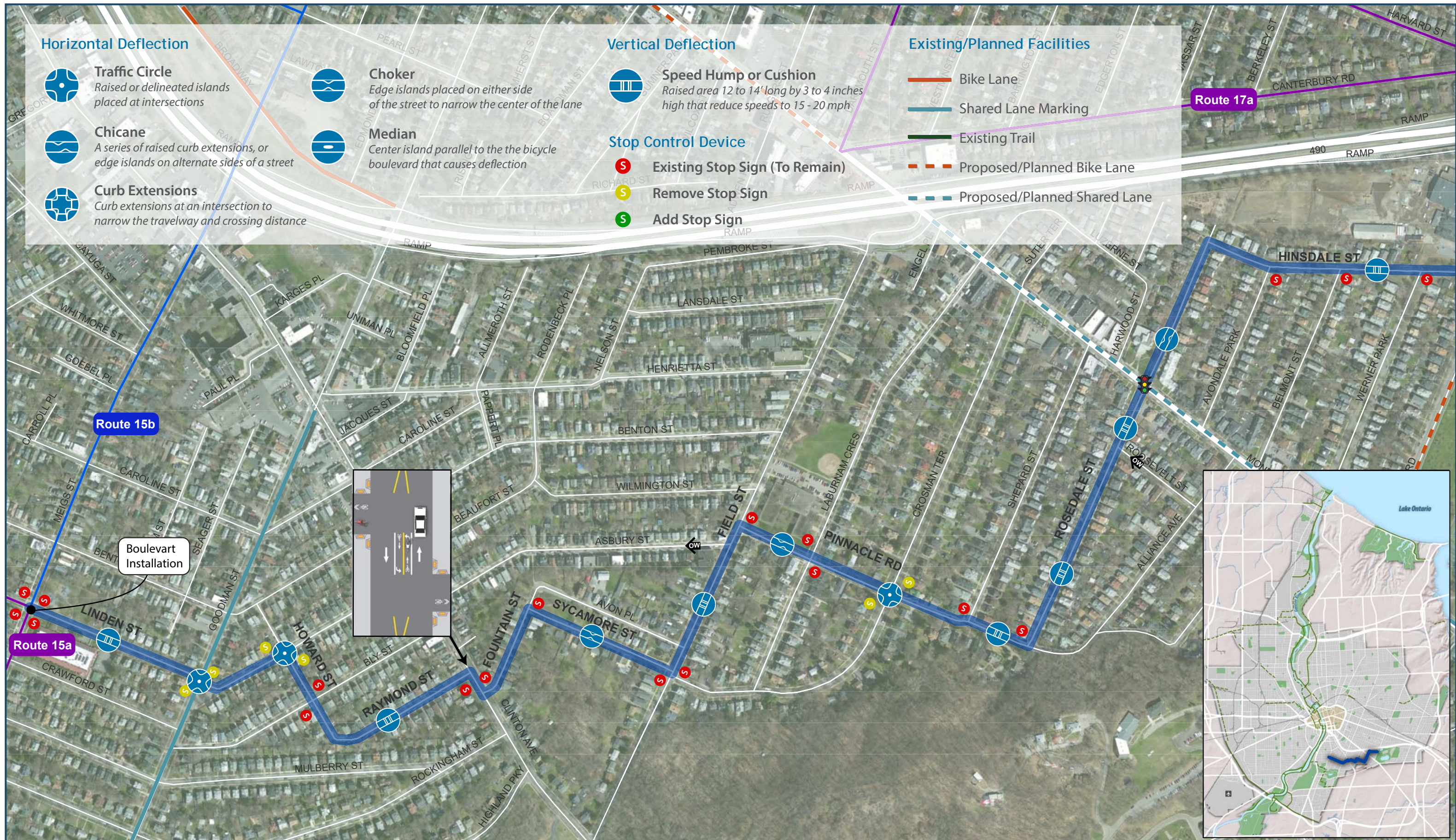
Bike Lane

Shared Lane Marking

Existing Trail

Proposed/Planned Bike Lane

Proposed/Planned Shared Lane



Rochester Bicycle Boulevard Plan: Priority Route 13b

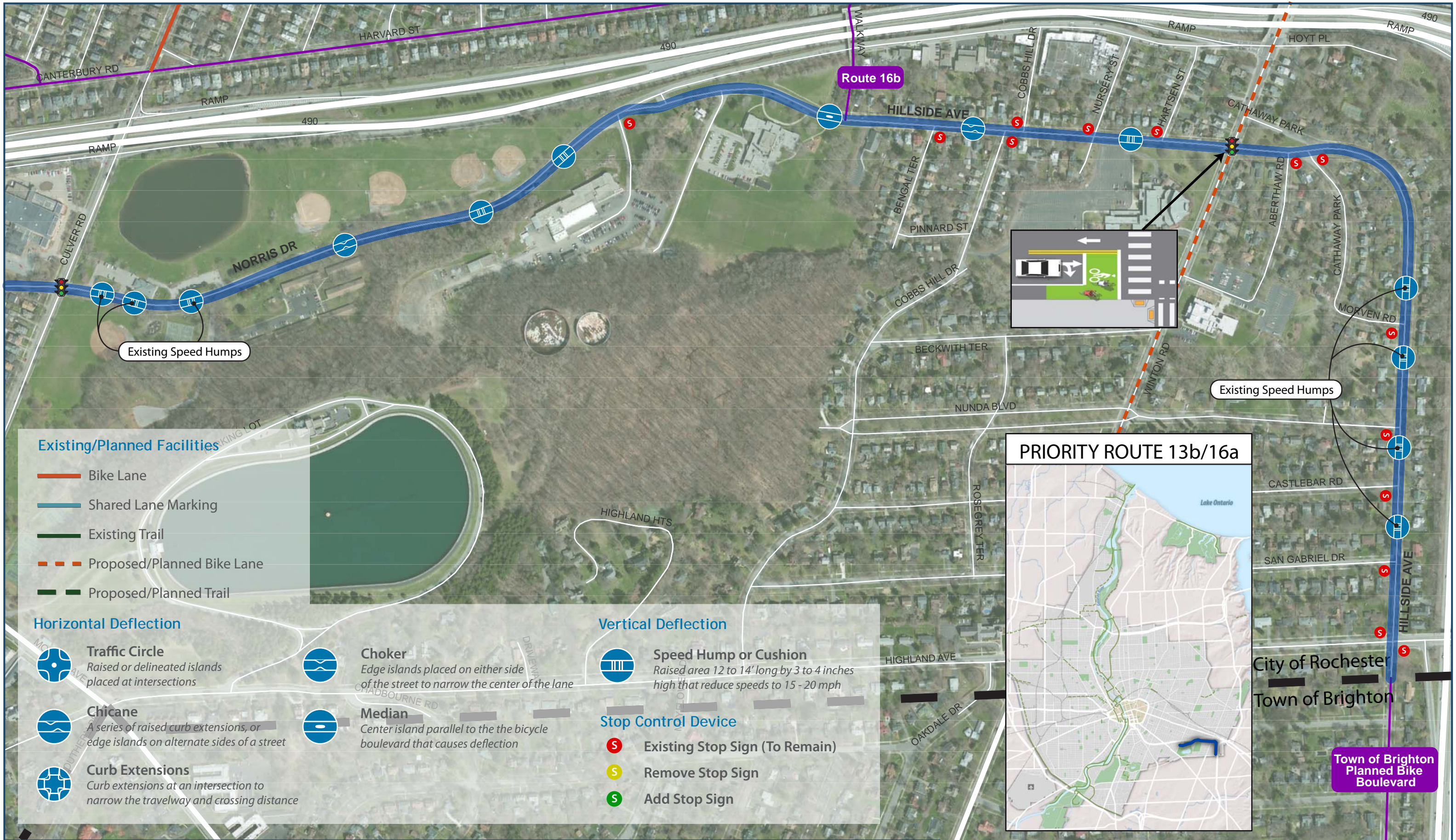
0 0.25 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT



Author: SP/LZ

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Rochester Bicycle Boulevard Plan: Priority Project 13b/16a

0 0.25 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT



Rochester Bicycle Boulevard Plan: Priority Route 14

0 0.25 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT



Author: SP/LZ

Spring 2015



Horizontal Deflection

- Traffic Circle**
Raised or delineated islands placed at intersections
- Chicane**
A series of raised curb extensions, or edge islands on alternate sides of a street
- Curb Extensions**
Curb extensions at an intersection to narrow the travelway and crossing distance
- Choker**
Edge islands placed on either side of the street to narrow the center of the lane
- Median**
Center island parallel to the the bicycle boulevard that causes deflection

Vertical Deflection

- Speed Hump or Cushion**
Raised area 12 to 14' long by 3 to 4 inches high that reduce speeds to 15 - 20 mph

Stop Control Device

- Existing Stop Sign (To Remain)**
- Remove Stop Sign**
- Add Stop Sign**

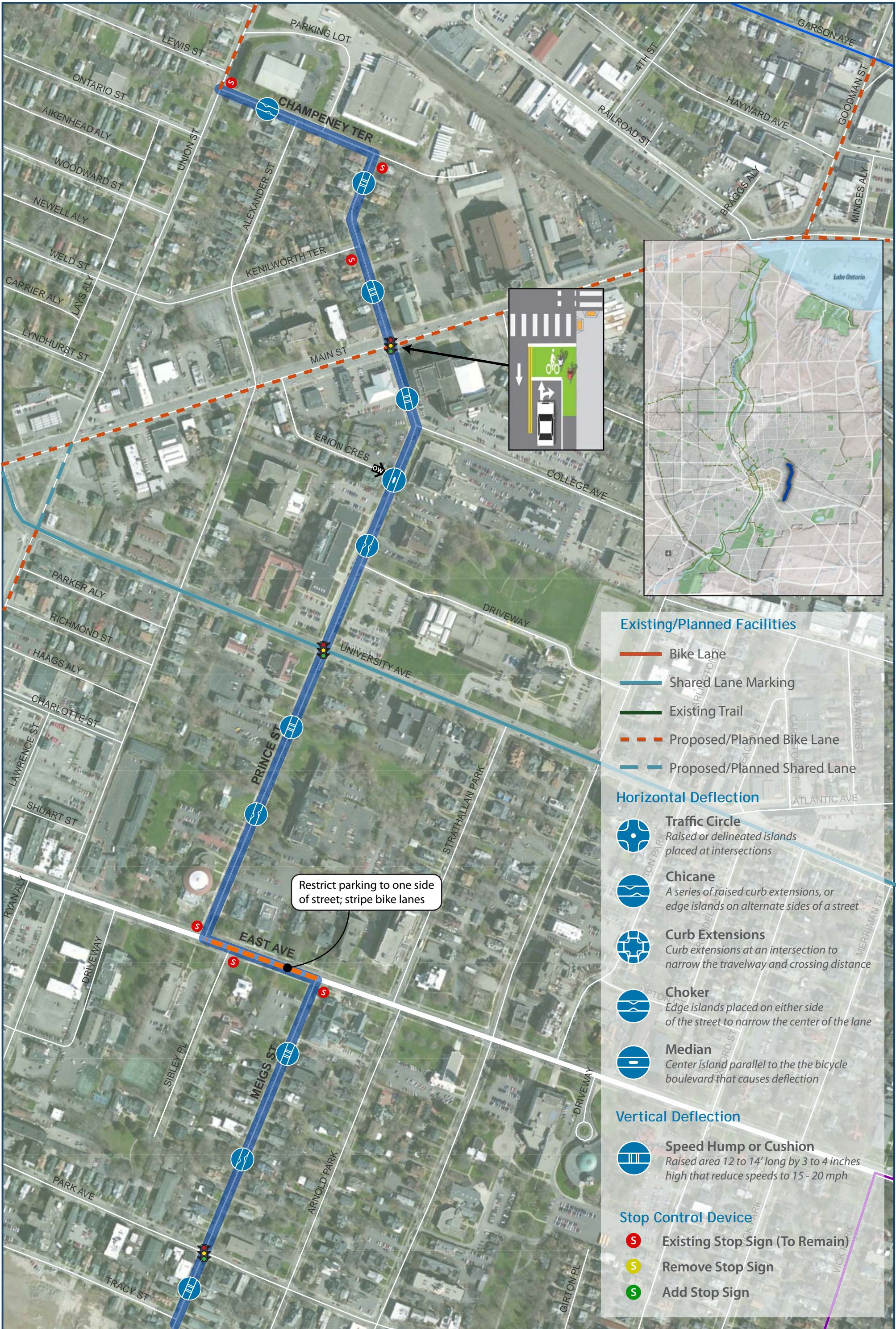
Existing/Planned Facilities

- Bike Lane**
- Shared Lane Marking**
- Existing Trail**
- Proposed/Planned Bike Lane**
- Proposed/Planned Trail**

Rochester Bicycle Boulevard Plan: Priority Route 15b/c

0 0.25 0.5 miles





Existing/Planned Facilities

- Bike Lane
- Shared Lane Marking
- Existing Trail
- Proposed/Planned Bike Lane
- Proposed/Planned Shared Lane

Horizontal Deflection

- Traffic Circle**
Raised or delineated islands placed at intersections
- Chicane**
A series of raised curb extensions, or edge islands on alternate sides of a street
- Curb Extensions**
Curb extensions at an intersection to narrow the travelway and crossing distance
- Choker**
Edge islands placed on either side of the street to narrow the center of the lane
- Median**
Center island parallel to the the bicycle boulevard that causes deflection

Vertical Deflection

- Speed Hump or Cushion**
Raised area 12 to 14' long by 3 to 4 inches high that reduce speeds to 15 - 20 mph

Stop Control Device

- Existing Stop Sign (To Remain)
- Remove Stop Sign
- Add Stop Sign



Rochester Bicycle Boulevard Plan: Priority Route 19a/19b

0 0.25 - 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT



Author: SP/LZ



Horizontal Deflection



Traffic Circle

Raised or delineated islands placed at intersections



Chicane

A series of raised curb extensions, or edge islands on alternate sides of a street



Curb Extensions

Curb extensions at an intersection to narrow the travelway and crossing distance



Choker

Edge islands placed on either side of the street to narrow the center of the lane



Median

Center island parallel to the the bicycle boulevard that causes deflection

Vertical Deflection



Speed Hump or Cushion

Raised area 12 to 14' long by 3 to 4 inches high that reduce speeds to 15 - 20 mph

Stop Control Device



Existing Stop Sign (To Remain)



Remove Stop Sign



Add Stop Sign

Existing/Planned Facilities

Bike Lane

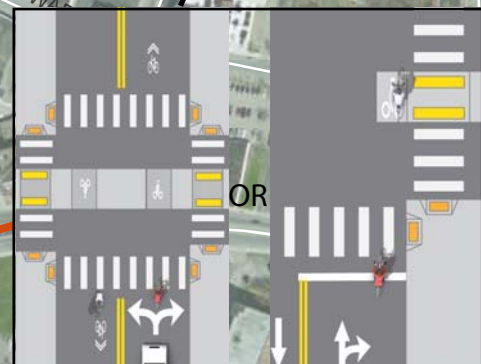
Shared Lane Marking

Existing Trail

Proposed/Planned Bike Lane

Proposed/Planned Trail

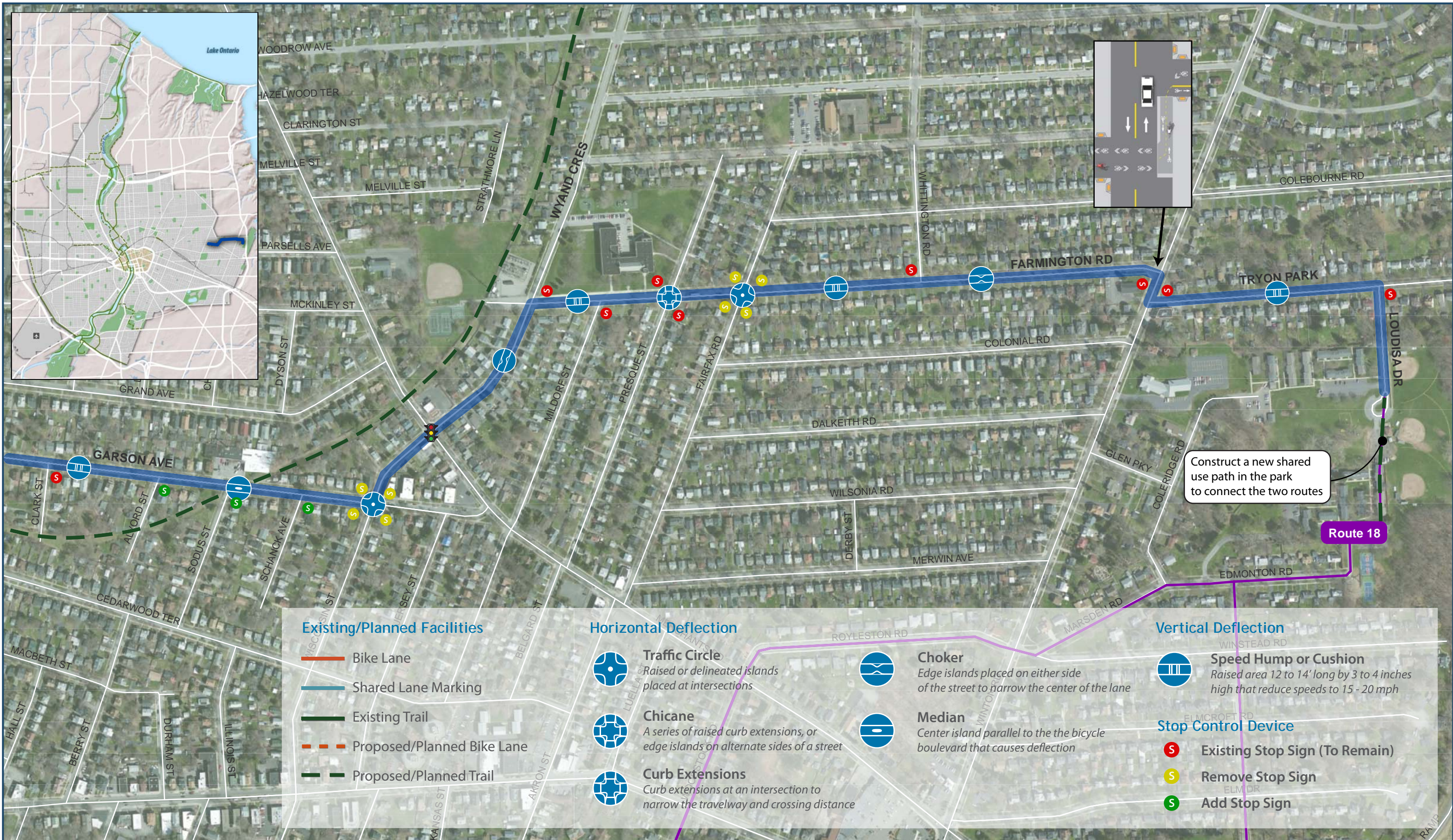
Diagonal Diverter - allows only cyclists to make the through movement



Rochester Bicycle Boulevard Plan: Priority Route 19b/19c

0 0.25 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

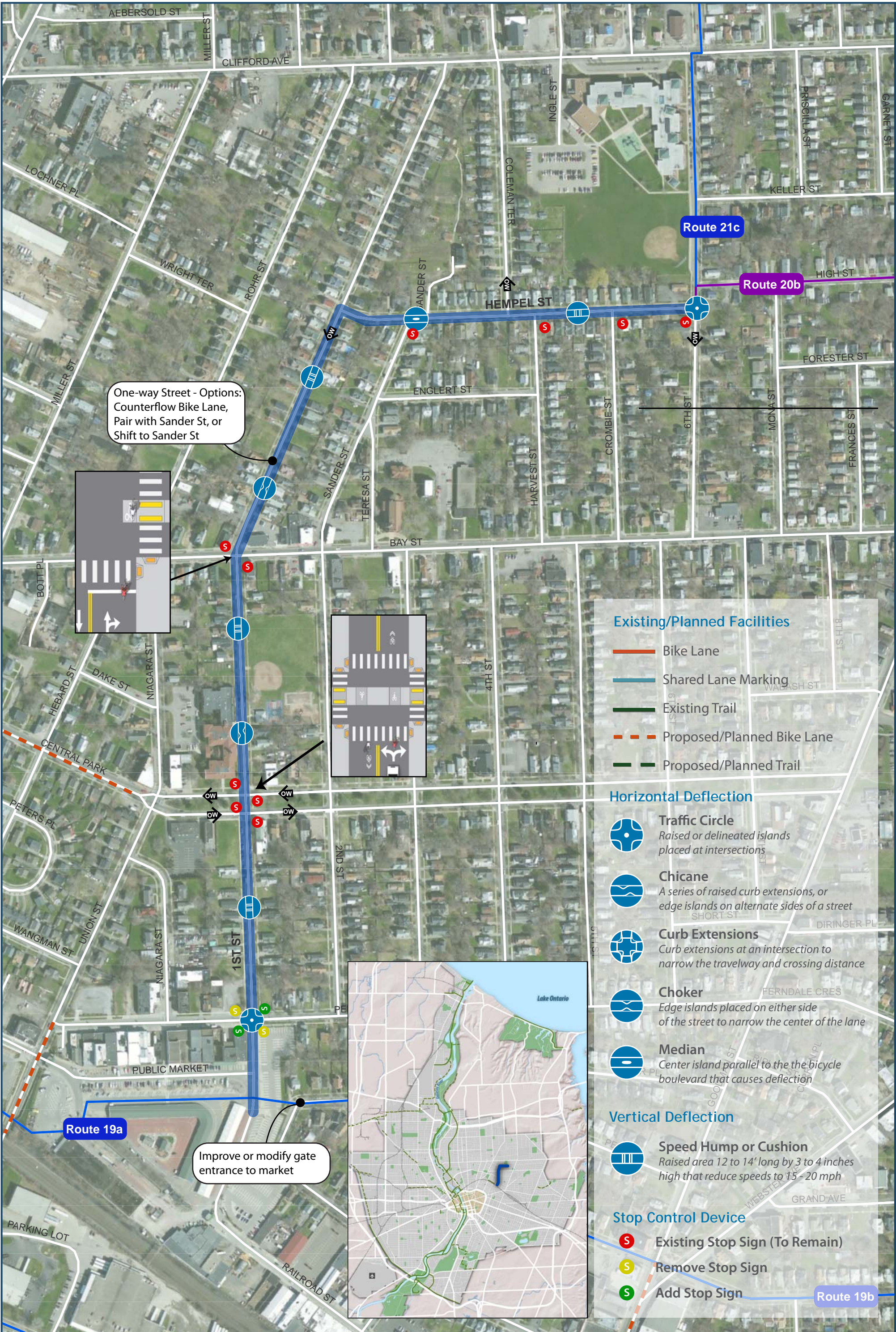


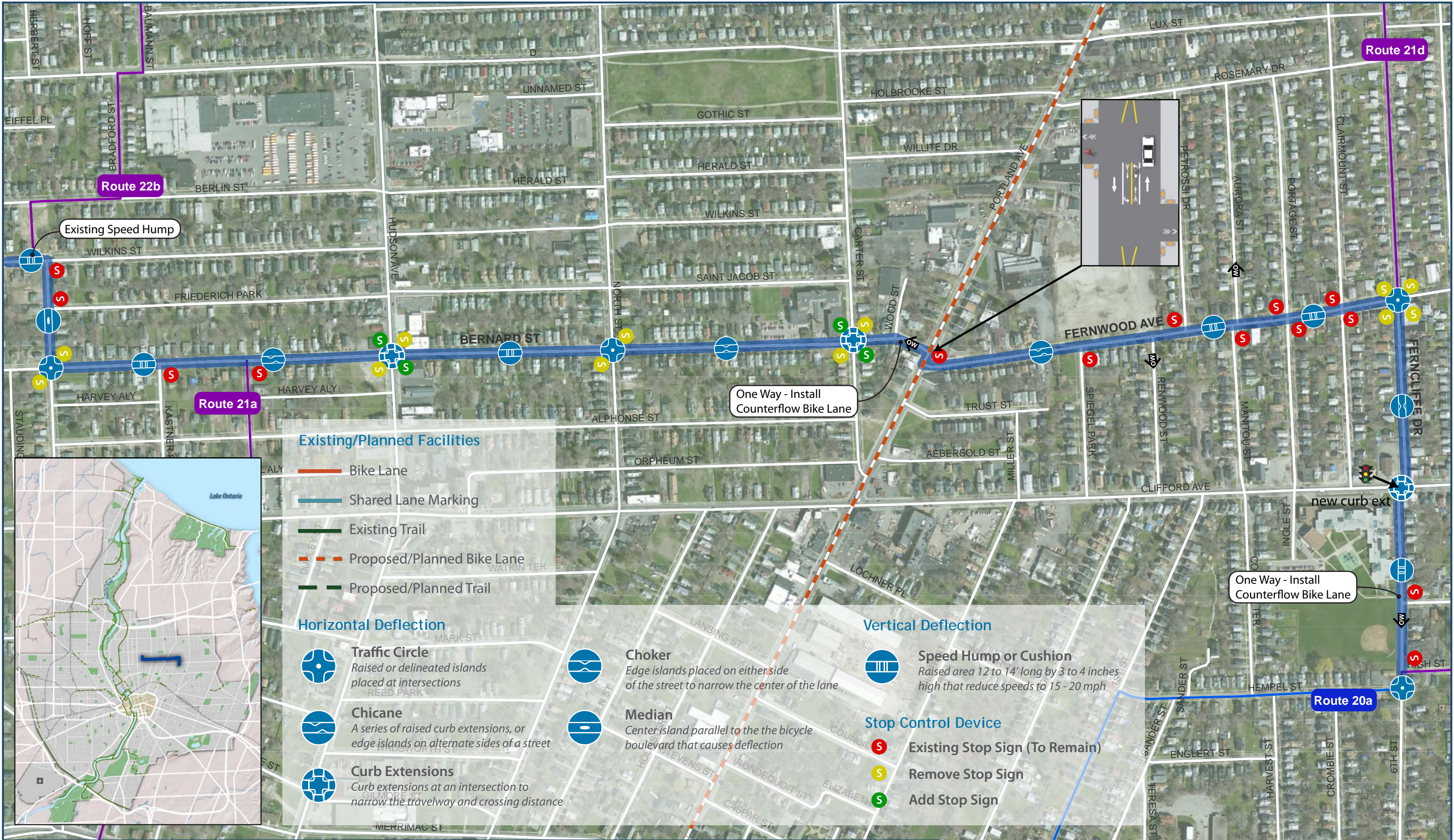
Rochester Bicycle Boulevard Plan: Priority Route 19c

0 0.25 0.5 miles

Spring 2015

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT





Rochester Bicycle Boulevard Plan: Priority Route 21b/21c/21e

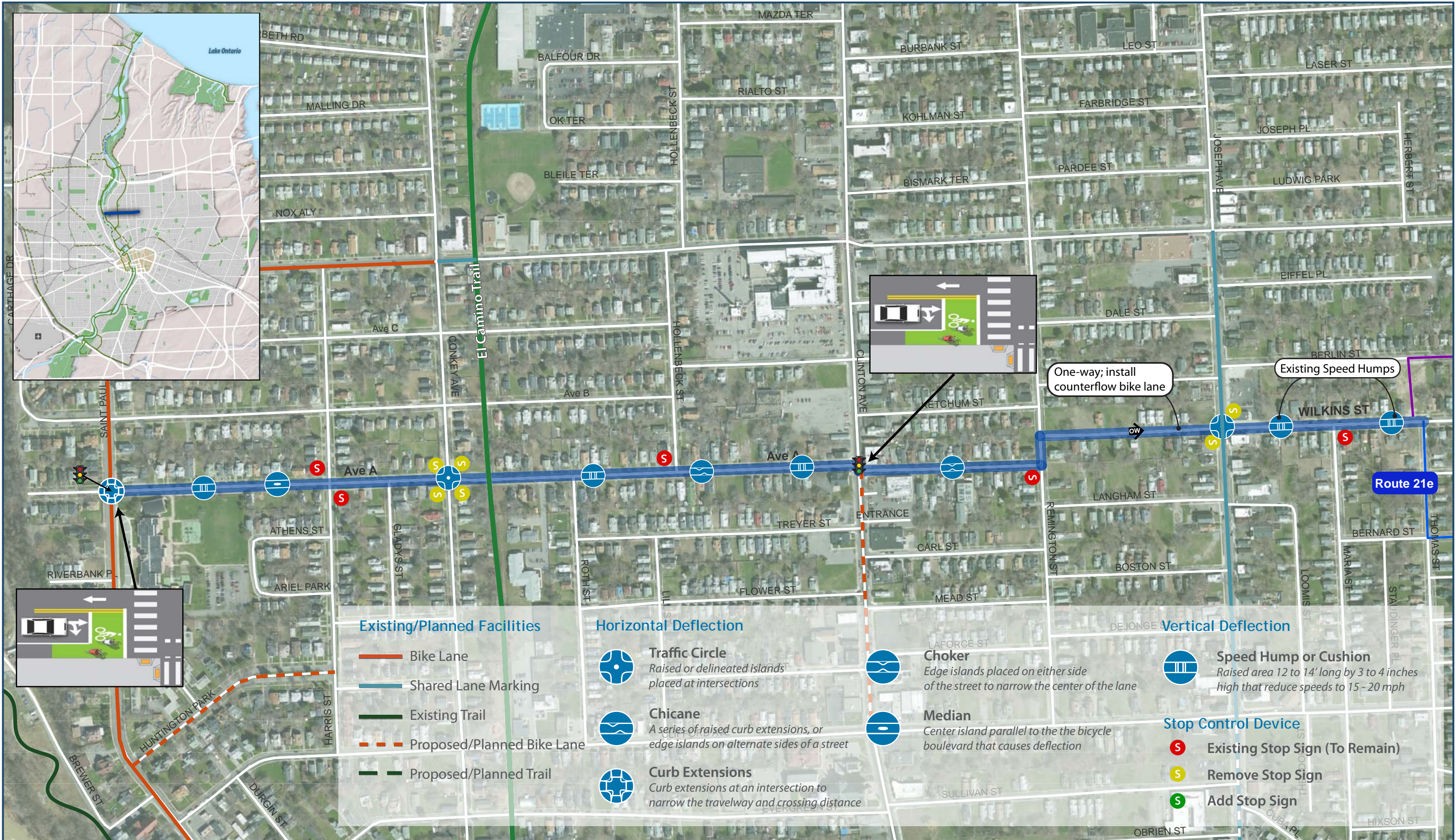
0 0.25 0.5 miles

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT



Author: SP/LZ

Spring 2015



Rochester Bicycle Boulevard Plan: Priority Route 22a

0 0.25 0.5 miles

Spring 2015

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

SUPPORTING RECOMMENDATIONS

To have an effective Bicycle Boulevard network, it is important to implement supporting programs and policies. This includes the installation of a wayfinding system, encouragement programs, and proper enforcement for both bicyclists and motorists. These recommendations are described here.

WAYFINDING PLAN

A primary component of a successful bicycle boulevard network is a comprehensive wayfinding system that helps designate routes and guides users through the bicycle boulevard network. General design standards are provided in Chapter 1, but a wayfinding study should be carried out to maximize the effectiveness of a wayfinding system and to ensure its successful and long-term integration with other aspects of the City's transportation infrastructure.

The wayfinding plan should be considered a priority recommendation and should be completed within one year, in advance of the installation of the Phase 1 Bicycle Boulevards.

Intuitive wayfinding can:

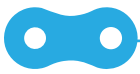
- Help familiarize users with the bikeway system;
- Help users identify the best routes to significant destinations;
- Direct bicyclists to preferred routes;
- Help to address misconceptions about time and distance, and;
- Help to overcome a "barrier to entry" for people who do not bicycle often, but who wish to get started.

Essential components and questions that should be addressed in a wayfinding plan include:

- **What is the desired signage type?** A generic bike route sign may be desirable, or alternatively, a sign that is more creative could be preferred. Many cities have developed bicycle boulevard signs that are distinguished from other signs by their design. This has been achieved through unique branding elements applied to the signs, such as logos and/or city-specific colors. Any signage that is non-standard requires permission from New York State Department of Transportation and the Federal Highway Administration.
- **What destinations should be signed?** The identification of the destinations to signed is critical to any wayfinding plan. A methodology should be established to develop a list of destinations that people will be guided via the signs. The methodology would determine if specific facilities, like a private office campus, would be signed, or if destinations should only include larger public attractions, such as parks
- **What is the hierarchy of destinations?** The development of a hierarchy of the destinations that establishes priority is used to determine how information on the sign will be populated. Typically, destinations that draw more people, such as a neighboring city or large neighborhood, will be listed on a sign before less frequented destinations, such local libraries, hospitals, schools or other specific places.
- **What are the signage distance thresholds?** Determining distance thresholds is key to establishing a standard for when to start including a destination on a sign given its location within the system. For example, at what distance should different types of destinations begin to be signed? Should major destinations like City Hall or a stadium be included in signage at a further distance than smaller generators like a local library?



A sample wayfinding concept



LEGAL CONSIDERATIONS

Although few legal barriers to the implementation of bicycle boulevards appear to exist, the following law requires children under the age of 12 to bicycle on sidewalks in the City of Rochester and could be detrimental to the widespread use of the network:

“Children under 12 years of age shall ride bicycles, velocipedes or tricycles only on the sidewalk and must walk bicycles, velocipedes or tricycles across all streets. All persons over 12 years of age may ride bicycles upon any sidewalk except in the Central Traffic District^[2] but may not ride bicycles on any plot in the roadway planted with grass, flowers or shrubs or on any ornamental parkway in any roadway. The prohibition against riding bicycles upon sidewalks in the Central Traffic District shall not apply to police officers in the performance of their duties.”¹

The City also places restriction on where children under the age of 12 may ride:

“Bicycle riding by children under 12 years of age is forbidden in the Central Traffic District.”²

A full implementation of the bicycle boulevards network is expected to foster a safe on-street bicycling environment for people of all ages. To mitigate these bicycle laws’ potential negative effects on the utilization of bicycle boulevards in Rochester, the City should consider revising them to explicitly permit children aged 12 or above - unaccompanied or accompanied by an adult; and children of all ages - when accompanied by an adult - to ride both on the sidewalk and on-street along designated bicycle boulevard routes,

EDUCATION

Rochester should build on existing bicycle education programs by continuing to develop a variety of safety materials and distribute them throughout the community. Educational materials should focus on describing bicycle boulevards and highlighting safety-enhancing rules that should be followed when using them. Information may include important bicycle laws, keys for safe bicycle travel, helmet requirements, safe motor vehicle operation around bicycles, and general facility regulations. General safety information is often available for download from national pedestrian advocacy organizations like the Pedestrian and Bicycle Information Center website (www.pedbikeinfo.org).

Information can be distributed locally through brochures, newsletters, newspapers, bumper stickers, and other print media that can be integrated with routine mailings. It can also be posted on municipal web sites and shown on local cable access television.

Local programs such as earn-a-bike programs, bicycle commuter mentoring, and summer camps can be organized by the City and can be utilized to distribute information using a booth to display related print media (these programs could be modeled after existing programs). Brown bag luncheon events and clinics are also excellent ways to provide education, especially for adults. Local events, such as the farmers market, should also be utilized as venues for distributing information. A representative could volunteer at the booth to answer general questions about bicycling in Rochester.

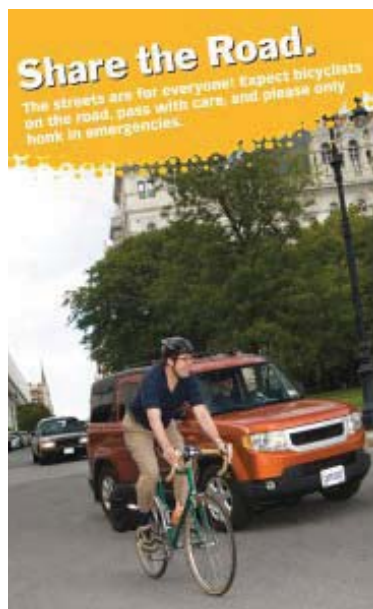


Education campaigns can help youth to develop the skills and confidence to bicycle.



Bicycle rodeos provide fun opportunities for children to learn the ‘rules of the road’

¹ City of Rochester Code, Chapter 34: Bicycles. 34-6 Regulations: C and G <http://ecode360.com/8674476>
² City of Rochester Code, Chapter 34: Bicycles. 34-6 Regulations: C and G <http://ecode360.com/8674476>



Capital Coexist, a Capital District Transportation Committee developed project, produces and distributes several resources throughout the Capital Region to help motorists, bicyclists and pedestrians coexist. For more information, visit: www.capitalcoexist.com (Source: Capital Coexist)

SafeRoutes

Safe Routes to School Program



"In July 2005, Congress passed federal legislation that established a National Safe Routes to School program to improve safety on walking and bicycling routes to school and to encourage children and families to travel between home and school using these modes" (saferoutesinfo.org)

MOTORIST EDUCATION

Many motorists do not recognize that a bicycle is considered a vehicle by New York state law, and this impasse often affects how bicyclists are treated when drivers encounter them. The Capital District Transportation Committee's (CDTC) "Capital Coexist" campaign and the New York State Bicycle Coalition are examples of organizations that provide materials for driver education on bicycle traffic. The "StreetSmart" public awareness campaign in Washington, DC is another example.

Cultural habits relating to driving and rights-of-way can be difficult to change, but proper education coupled with increased exposure to bicycle traffic can help shift attitudes over time.

INTERNAL TRAINING

Internal training refers to educating people who are involved in the actual implementation of the Bicycle Boulevard Master Plan. Internal training will be essential to institutionalizing bicycle issues into public works operations, planning activities, parks & recreation activities, and other City endeavors. In addition to relevant City staff, members of the Genesee Transportation Council (GTC), Region 4 of the New York State Department of Transportation, and Monroe County should be included in training sessions whenever possible. This training should cover all aspects of the transportation and development process, including planning, design, development review, construction, and maintenance. This type of 'in-reach' can take the form of brown bag luncheons, professional certification programs, and special sessions or conferences. Even simple meetings to go review the Bicycle Boulevard Master Plan and communicate its strategies and objectives can prove useful for staff and newly-elected officials that may not be aware of the plan. Bicycle planning and design issues affect all modes of transportation, and standards continue to evolve. Therefore, such training sessions should be updated and repeated on a regular basis for maximum effect.

In many communities, police do not always fully understand the rights of bicyclists, which can affect how they are handled in local reports. Proper interpretation of individual circumstances and events is critical for proper enforcement and respect between motorists and bicyclists, so law enforcement should be trained in the accurate reporting of bicycle crashes involving automobiles. Special training sessions should focus on laws relating to bicycle travel, and should recur annually to bring new officers up to date.

ENCOURAGEMENT EMPLOYER PROGRAMS

To encourage commuting by bicycle, employers often provide supportive programs and incentives. When bicycling is encouraged, the employer benefits from improved employee health and morale along with a potentially enhanced community reputation by attempting to reduce local traffic and vehicle emissions. Specific promotions could include a Bike to Work Day, or an intermittent morning pit-stop station where employees can receive free refreshments after their morning pedal.

Employers can also provide educational workshops, bicycle parking options, and tailored incentives. Incentives could include perks like prize drawings, T-shirts, free tune-ups at a local bicycle shop, and printed bicycle maps.

SCHOOL PROGRAMS

There are models for a number of programs that can aid communities in developing safer bicycling facilities around school facilities. Information is available to encourage group travel, prevent bicycle-related injuries, and sponsor commuter-related events. After-school programs, summer Bike Camps, bicycle rodeos, and Family Fun Rides can be created to provide a supportive environment for children to learn how to ride a bike comfortably and safely with friends, learn how to repair and maintain a bicycle, and tour their city and its destinations by bicycle.



- **Safe Routes to School:** The City of Rochester should continue with its current safe routes to school efforts. Bicycle boulevard funding from the Safe Routes to School program, which is administered by the NYSDOT Local Programs Bureau, may be available for implementation of routes located near City schools.

AWARENESS DAYS/EVENTS

A specific day of the year can be devoted to a bicycling theme to raise awareness. Major holidays and popular local events serve as excellent opportunities to distribute bicycling information. The following are examples of national events that the City of Rochester can use to improve usage of bicycle facilities:

- **Bike-to-Work Day:** Held annually on the third Friday of May, Bike-to-Work Day is a national event that promotes bicycling as a viable and accessible option for commuting to work. Leading up to Bike-to-Work Day, national, regional, and local bicycle advocacy groups encourage people to try bicycle commuting as a healthy and safe alternative to driving. Encouragement can include providing route information, and spelling out tips for new bicycle commuters. On Bike-to-Work Day, these groups often organize bicycle-related events and, in some areas, offer pit stops along anticipated bicycle routes.
- **Car-Free Day:** Car Free Day, held annually on September 22nd, is an international event that celebrates the possibilities of non-motorized mobility. This autumn event coincides with the beginning of the school year, and is the perfect way to kick-off programs that promote bicycling and raise awareness for environmental issues. Car-Free events can last for an entire week or month, featuring alternative transportation promotional activities, fitness expos, transit-use incentives, walking and jogging group activities, running and bicycling races / rides, etc.
- **National Trails Day:** This event is held every year in June. Other events, competitions, races, and tours can be held simultaneously to promote trail use within Rochester.

ENFORCEMENT

MOTORIST ENFORCEMENT

Based on crash data analysis and observed patterns of behavior, law enforcement can use targeted enforcement strategies to focus on key issues such as motorists speeding, dangerously passing practices, parking in bicycle lanes, etc. These issues should be targeted and enforced consistently, with the goal of encouraging bicyclists and motorists to recognize and respect each other's rights on the roadway.

BICYCLIST ENFORCEMENT

Observations made by local trail and bicycle facility users can be utilized to identify any conflicts or issues that require attention. To maintain proper use of bicycle facilities, volunteers could be used to patrol trails and bicycle boulevard routes, particularly on the most popular trails and on days of heavy use. The volunteer patrol could report any suspicious or unlawful activity, and could also answer any questions a trail user may have.

In addition, when users of the bicycle network witness unlawful activities, they should have a simple way of reporting the issue to police. A central hot line should be created, which would complement any other patrol programs. People could call in and talk to a live operator, or leave a voice message about the activity that they witnessed. Crashes could also be reported to this hot line, which could then be mapped to prioritize facility improvements.

Local law enforcement should address unsafe cycling (e.g. riding on the wrong side of the street, without lights at night, or children riding without helmets), with an understanding that there may be a learning curve for new or inexperienced cyclists. Again, the goal is for bicyclists and motorists to recognize and respect each other's rights on the roadway.

EVALUATION

After implementing the first bicycle boulevard routes, it will be important to immediately begin evaluating their usage and condition over time. If the bicycle boulevards are well-used, documenting this success via an ongoing evaluation policy would enhance the justification for continued implementation of the bicycle boulevard network.

DESIGN GUIDELINES

Chapter Contents:

Bicycle Boulevard

Pavement Markings and Signage

Vertical Traffic Calming

Horizontal Traffic Calming

Traffic Diversion

Minor Intersection Treatments

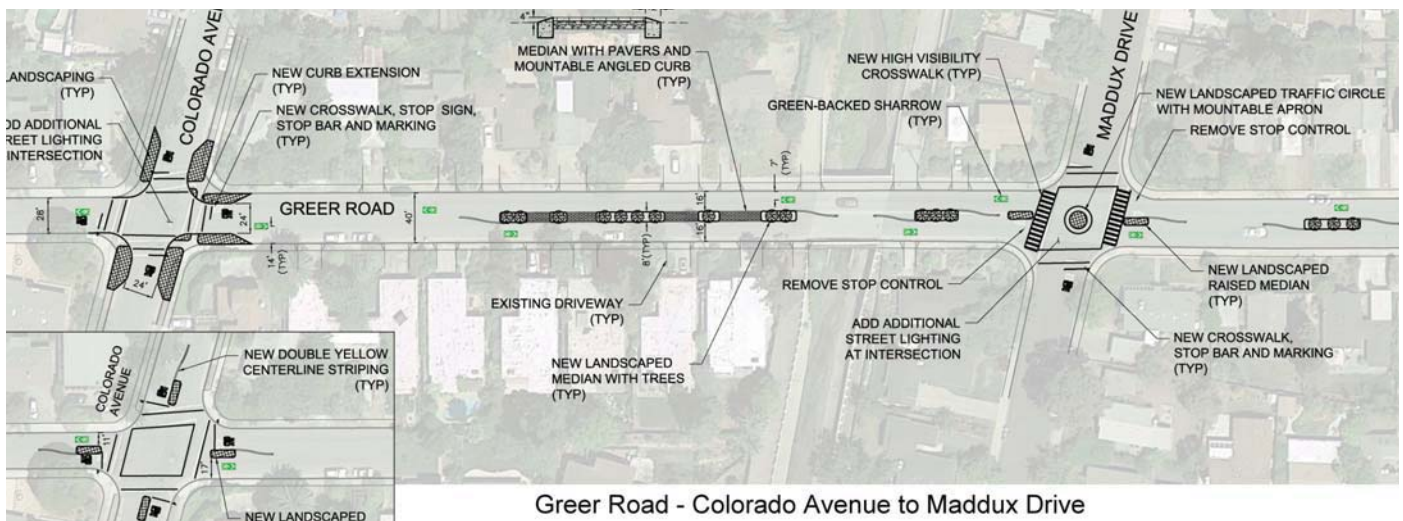
Major Intersection Treatments

Offset Intersection Treatments

INTRODUCTION

These design guidelines are intended to assist the City of Rochester with the design of bicycle boulevards. The following chapter pulls together best practices from public agencies and municipalities nationwide. Within the design guidelines, treatments are covered within a single sheet tabular format relaying important design information and discussion, example photos, schematics (if applicable), and existing summary guidance from current or upcoming draft standards. Existing standards are referenced throughout and should be the first source of information when seeking to implement any of the treatments featured here.

Sample Bicycle Boulevard Plan Set from Palo Alto, CA



Greer Road - Colorado Avenue to Maddux Drive



BICYCLE BOULEVARD

DESCRIPTION

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort 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.

GUIDANCE

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Bicycle boulevards should have a maximum posted speed of 25 mph. Use traffic calming to maintain an 85th percentile speed below 22 mph.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes range from 1,000 to 3,000 vehicles per day.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists.

DISCUSSION

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety.

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

Enhanced Crossings use signals, beacons, and road geometry to increase safety at major intersections.

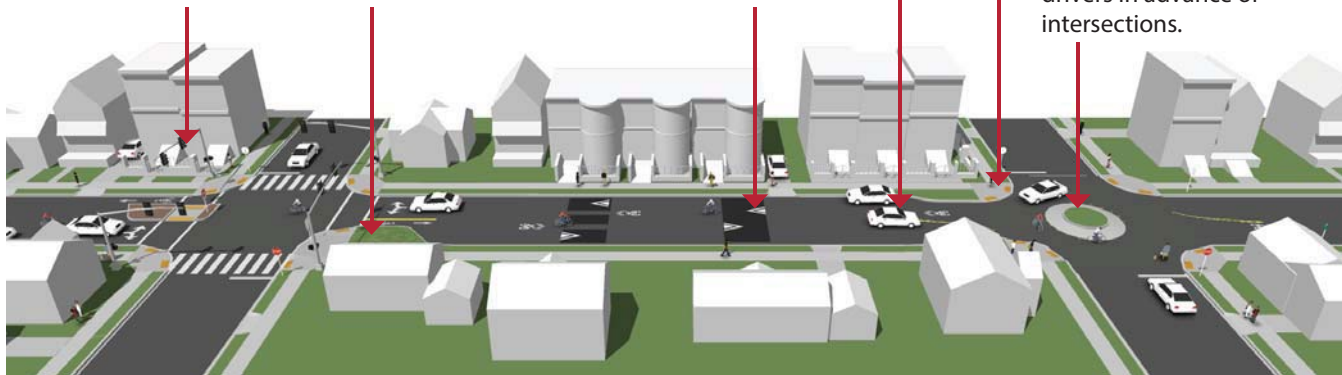
Partial Closures and other volume management tools limit the number of cars traveling on the bicycle boulevard.

Speed Humps manage driver speed.

Signs and Pavement Markings identify the street as a bicycle priority route.

Curb Extensions shorten pedestrian crossing distance.

Mini Traffic Circles slow drivers in advance of intersections.



ADDITIONAL REFERENCES AND GUIDELINES

- Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
- BikeSafe. *Bicycle countermeasure selection system*.
- Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
- Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.

MATERIALS AND MAINTENANCE

Vegetation should be regularly trimmed to maintain visibility and attractiveness.

PAVEMENT MARKINGS AND SIGNAGE

DESCRIPTION

Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard. Together, they visibly designate a roadway to both bicyclists and motorists. Signs, and in some cases pavement markings, provide wayfinding to help bicyclists remain on the designated route.

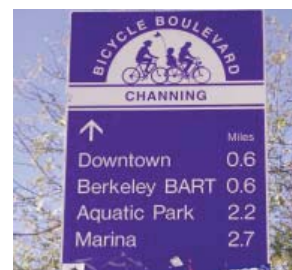
GUIDANCE

PAVEMENT MARKINGS

- Place symbols every 250-800 feet along a linear corridor, as well as after every intersection.
- On narrow streets where a motor vehicle cannot pass a bicyclist within one lane of traffic, place stencils in the center of the travel lane.
- See Marked Shared Roadway guidance for additional information on the use of shared lane markings.
- A bicycle symbol can be placed on a standard road sign, along with distinctive coloration.

SIGNS

- Some cities have developed unique logos or colors for wayfinding signs that help brand their Bicycle Boulevards.
- Be consistent in content, design, and intent; colors reserved by the Manual on Uniform Traffic Devices (MUTCD) for regulatory and warning road signs are not recommended.
- Signs can include information about intersecting bikeways and distance/time information to key destinations.



DISCUSSION

Wayfinding signs displaying destinations, distances, and “riding time” can dispel common misperceptions about time and distance while increasing users’ comfort and accessibility to the bicycle boulevard network. Bicycle Boulevards frequently include offset intersections or ‘jog’ onto another street. Signs and pavement markings can help bicyclists remain on the route. In addition, fewer businesses or services are located along local streets, and signs inform bicyclists of the direction to key destinations, including commercial districts, transit hubs, schools and universities, and other bikeways.

ADDITIONAL REFERENCES AND GUIDELINES

- City of Milwaukie. *Milwaukie Bicycle Wayfinding Signage Plan*. 2009.
- City of Oakland. *Design Guidelines for Bicycle Wayfinding Signage*. 2009.
- NACTO. *Urban Bikeway Design Guide*. 2012.

MATERIALS AND MAINTENANCE

Pavement markings should be repainted and signs replaced as needed. Wayfinding signs should be regularly updated with new major destinations and bikeways.



VERTICAL TRAFFIC CALMING

RAISED CROSSWALKS AND SPEED TABLES/HUMPS

DESCRIPTION

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

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.

Speed humps are rounded raised areas, while speed tables are longer than speed humps and flat-topped. A raised crosswalk is a speed table that is marked and signed for pedestrian crossing. It extends fully across the street and can be longer and higher than a typical speed table. Speed cushions are rounded or flat-topped raised areas across the road that include wheel cut-outs to allow large vehicles to pass unaffected while acting as speed humps to passenger cars.

GUIDANCE

- For all vertical traffic calming, 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.
- 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 be offset to accommodate emergency vehicles (only recommended with solid yellow center lines to discourage motorists from alternating lanes to avoid the calming element).
- The height of raised crosswalk ends should be the same as the curb height but should not impede drainage.



Speed Hump



Offset Speed Hump



Raised Crosswalk



Temporary Speed Cushion

Speed cushions are divided to allow emergency vehicles to pass unaffected.

VERTICAL TRAFFIC CALMING (CONTINUED)

- Decorative surface material may be used to call attention to raised crosswalks.

RAMP SHAPE

- The ramp shapes of vertical traffic calming features are typically either sinusoidal, circular or parabolic, each offering motorists and bicyclists a differing level of comfort and effectiveness in reducing speed:
 - Sinusoidal ramps are most comfortable for motorists and bicyclists but are least effective in reducing traffic speeds and are difficult to construct.
 - Circular ramps offer a moderate comfort level for motorists and are moderately effective in reducing traffic speeds.
 - Parabolic ramps (City of Rochester standard) are least comfortable for motorists and bicyclists but are most effective in reducing traffic speeds.

Sinusoidal



Circular



Parabolic



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 cushions allow them to pass unimpeded while slowing most other traffic. This can also be applied to priority transit routes. Alternatively, speed tables are recommended because they cannot be straddled by a truck, decreasing the risk of bottoming out. Before installing raised crosswalks, designs should be approved by emergency vehicle operators including the fire department.

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 or temporary basis and is more easily accomplished with vertical traffic calming.



This raised crosswalk incorporates curb extensions that facilitate drainage. Source: East Bay Bicycle Coalition

ADDITIONAL REFERENCES AND GUIDELINES

- AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
- Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
- BikeSafe. *Bicycle countermeasure selection system*.
- Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
- Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.
- NACTO. *Urban Street Design Guide*. 2013.
- VTA *Bicycle Technical Guidelines* recommend a "speed lump" height of seven cm with a sinusoidal ramp.
- Institute of Transportation Engineers - <http://www.ite.org/traffic/table.asp>

MATERIALS AND MAINTENANCE

Traffic calming should be designed to minimize impacts to snowplows. Consider temporary speed humps or cushions on snow emergency routes.

Vegetation should be regularly trimmed to maintain visibility and attractiveness.



HORIZONTAL TRAFFIC CALMING

DESCRIPTION

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.
- Pinchpoints 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, pinchpoints are known as chokers or neckdowns. 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.



Temporary Curb Extension



Chicane



Choker or Neckdown



Pinchpoint with Bicycle Access

DISCUSSION

Horizontal speed control measures should not infringe on bicycle space. Where possible, provide a bicycle route outside of the element so bicyclists can avoid having to merge into traffic at a narrow pinch point. This technique can also improve drainage flow and reduce construction and maintenance costs. 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.

ADDITIONAL REFERENCES AND GUIDELINES

- AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
- Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
- BikeSafe. *Bicycle countermeasure selection system*.
- Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
- Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.
- NACTO. *Urban Street Design Guide*. 2013.

MATERIALS AND MAINTENANCE

Traffic calming should be designed to minimize impacts to snowplows. Vegetation should be regularly trimmed to maintain visibility and attractiveness.

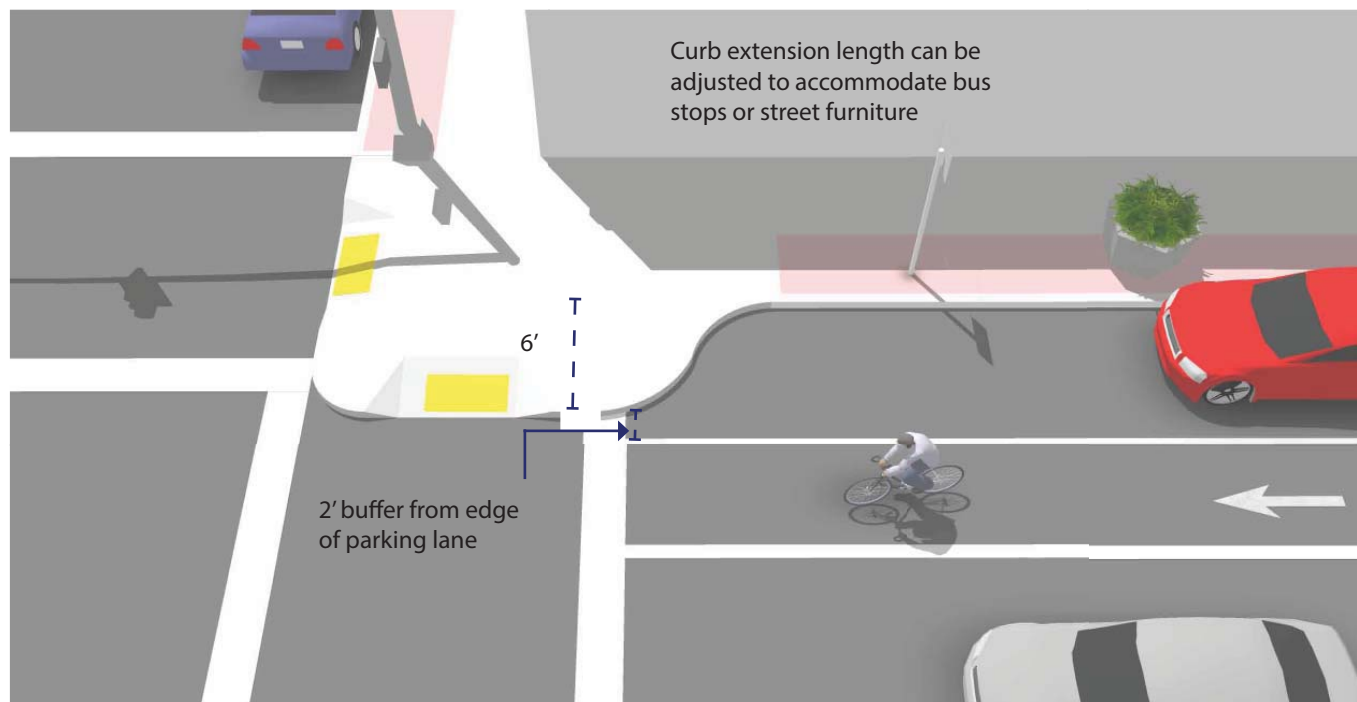
CURB EXTENSIONS

DESCRIPTION

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They may also provide additional space for street furniture and bike parking, and increase sight distance for drivers and pedestrians. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb. In certain contexts without curb-side parking, small curb extensions are still desirable but need to be carefully designed so as not to negatively impact vehicle operations, especially bicyclists.

GUIDANCE

- In most cases, the curb extensions should be designed to transition between the extended curb and the running curb in the shortest practicable distance.
- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 ft and the two radii should be balanced to be nearly equal.
- Curb extensions should terminate two feet short of the parking lane to maximize bicyclist safety.



DISCUSSION

If there is no parking lane, adding curb extensions may be a problem for bicycle travel and truck or bus turning movements. The designer must carefully weigh the impacts to bicycle accessibility and safety. When implemented in areas with parking lanes, curb extensions should be 2 feet shorter than the parking lane. This assists with bicycle travel and allows for easier winter maintenance. Consider installing a vertical object on the curb extensions to guide plows.

ADDITIONAL REFERENCES

- NACTO. (2013) *Urban Street Design Guide*.
- Ewing & Brown. (2009) *U.S. Traffic Calming Manual*.
- AASHTO. (2004). *Guide for the Planning, Design, and Operation of Pedestrian Facilities*.
- AASHTO. (2004). *A Policy on Geometric Design of Highways and Streets*.

MATERIALS AND MAINTENANCE

Planted curb extensions may be designed as a bioswale, a vegetated system for stormwater management.



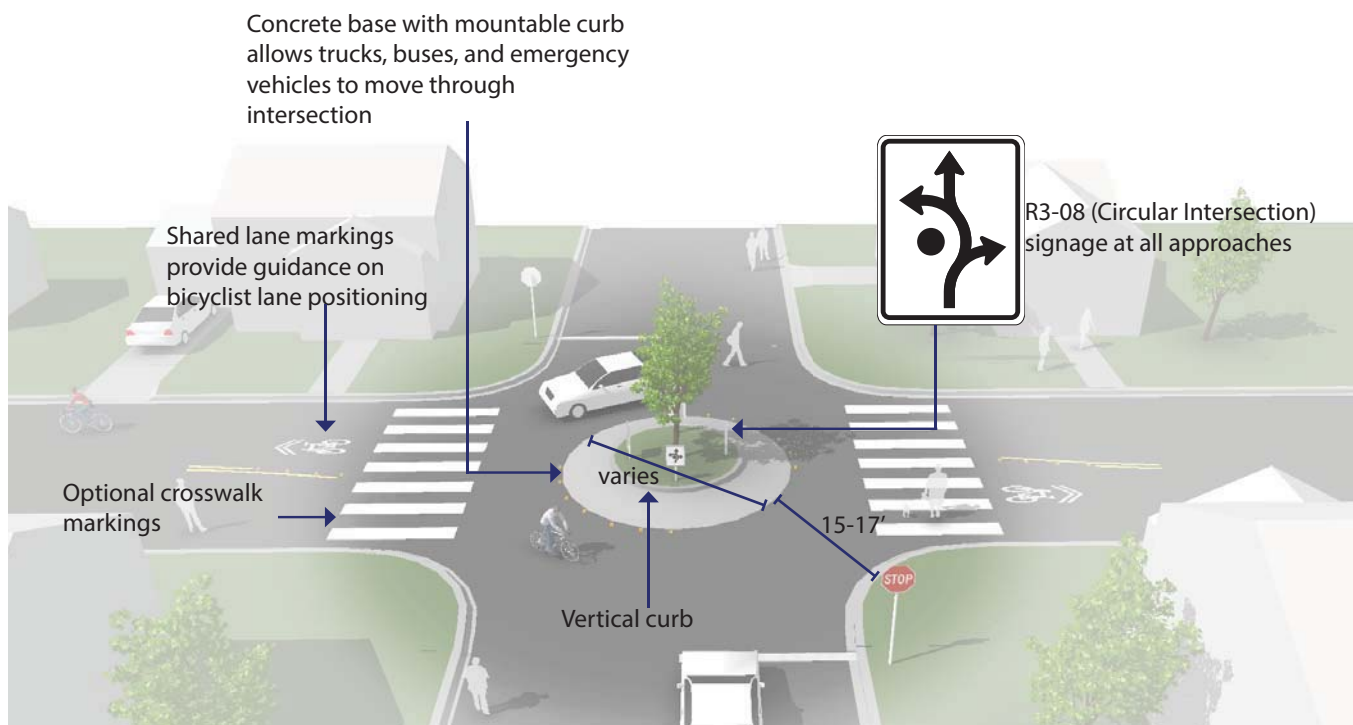
MINI TRAFFIC CIRCLES

DESCRIPTION

Mini traffic circles are raised, circular islands placed in the middle of local roadway intersections that control turning movements and help reduce vehicle speeds by forcing slow turns in a predictable manner. Additional benefits include reductions in local air and noise pollution from the removal of stop-and-go traffic, as well as visual and environmental benefits of added landscaping and tree planting opportunities.

GUIDANCE

- Best suited for low-volume, local streets.
- Design must have low turning radii to reduce vehicular turning speeds, which improves pedestrian and bicyclist safety.
- Install signage and pavement markings to guide motorists, pedestrians, and bicyclists through the allowed turning movements and crossing areas.
- May be Stop- or Yield- controlled.



DISCUSSION

Work with emergency service providers when considering mini traffic circles. Traffic circles can also include a paved apron to accommodate the turning radii of larger vehicles including fire trucks and school buses where necessary. Temporary mini traffic circles can be constructed using pre-made rubber materials or simply painting a circle in the middle of the intersection. A temporary traffic circle can be used to gauge neighborhood response and the ability for larger vehicles to navigate different diameters.

ADDITIONAL REFERENCES

- Ewing & Brown. (2009) *U.S. Traffic Calming Manual*.
- NACTO. (2013) *Urban Street Design Guide*.
- FHWA. (2009). *Manual on Uniform Traffic Control Devices*.



MATERIALS AND MAINTENANCE

Raised concrete planters provide opportunities to integrate landscaping or green stormwater features such as bioswales. Temporary mini traffic circles created with paint and/or removable raised features can be useful in gauging support and finalizing design.

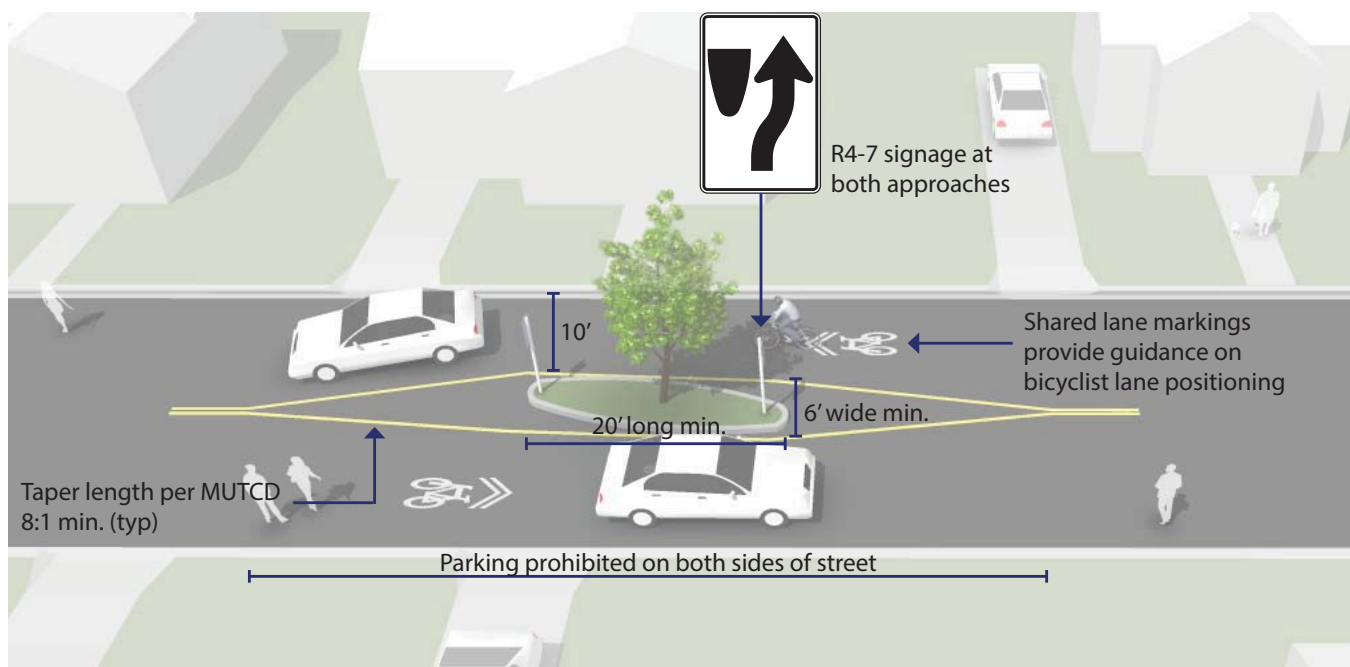
PLANTED MEDIAN ISLANDS

DESCRIPTION

Planted median islands are horizontal traffic calming features placed in the center of a street. Planted median islands increase visual interest and narrow the street, encouraging drivers to reduce speeds. They may integrate pedestrian refuge islands and be paired with other traffic calming features such as speed humps or textured paving. Width, length, and the amount of horizontal deflection created will vary based on context.

GUIDANCE

- Use short median islands on neighborhood streets to slow traffic and indicate that drivers are entering a residential area.
- Long planted medians may be used on multi-lane streets as a visual narrowing technique.
- Median islands can also be configured as diverters at intersections (with pedestrian and bicycle refuges) in situations where volume management is desired.



DISCUSSION

Consider midblock pedestrian refuges where blocks are long and crossing demand is high.

Local plantings can enhance sense of place. Median islands may also incorporate green stormwater infrastructure such as bioswales and flow-through planters.

ADDITIONAL REFERENCES

- NCDOT. (2012). *Complete Streets Planning and Design Guidelines*.
- NACTO. (2013) *Urban Street Design Guide*.
- Ewing & Brown. (2009) *U.S. Traffic Calming Manual*.

MATERIALS AND MAINTENANCE

Hardscaping may be used at narrow points or at pedestrian crossing points. At crossing points, landscaping and tree limbs should be maintained to allow pedestrian and motorist visibility.



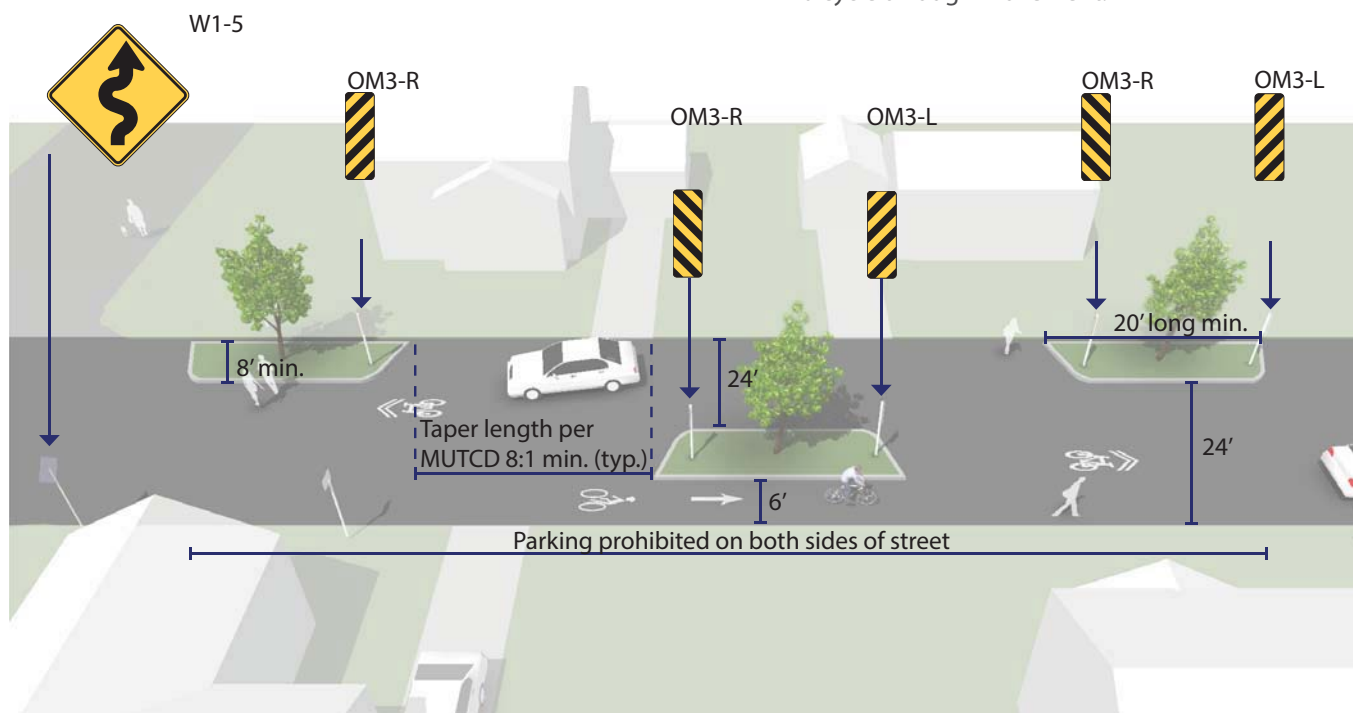
CHICANES

DESCRIPTION

Chicanes introduce horizontal deflections in the roadway through the use of alternating curb extensions, edge islands, or parking bays. The intent of chicanes is to slow traffic speeds thereby increasing the comfort of pedestrians and bicyclists. They may also be used to indicate a roadway transition such as from a commercial corridor to a low-speed residential area.

GUIDANCE

- Use on low traffic residential streets.
- Use a series of at least three curb extensions, islands, or parking bays to effectively slow motorists.
- Narrowing the roadway to one lane with deflection angles of 45 degrees may help prevent “straight line racing.”
- On roadways greater than 37 feet wide, consider leaving a 5-6 foot gap between the curb and Chicane islands on bicycle boulevards to facilitate bicycle through movement.



DISCUSSION

Chicane design must prevent motorists from being able to maintain their speed by cutting across the centerline, and must ensure that passing motorists do not squeeze cyclists at conflict points. Signage and pavement markings can reinforce the need for motorists and bicyclists to share the road if no exclusive bicycle pathway is provided near curbs. Work with emergency service providers when considering traffic calming or street closures/diverters.

ADDITIONAL REFERENCES

- NACTO. (2013) *Urban Street Design Guide*.
- Ewing & Brown. (2009) *U.S. Traffic Calming Manual*.
- FHWA. (2009). *Manual on Uniform Traffic Control Devices*.

MATERIALS AND MAINTENANCE

Raised concrete planters provide opportunities to integrate landscaping or green stormwater features such as bioswales. Temporary chicanes created with paint and/or removable raised features can be useful in gauging support and finalizing design.

TRAFFIC DIVERSION

DESCRIPTION

Motor vehicle traffic volumes affect the operation of a bicycle boulevard. Higher vehicle volumes reduce bicyclists' comfort and can result in more conflicts. Implement volume control treatments based on the context of the bicycle boulevard, 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.

GUIDANCE

- Traffic diversion treatments reduce motor vehicle volumes by completely or partially restricting through traffic on a bicycle boulevard.
- 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 (see Major Intersection Treatments) 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 bicycle boulevard, while bicycle travel can continue unimpeded. Full closures can accommodate emergency vehicles with the use of mountable curbs (maximum of six inches high).



Partial Closure



Diagonal Diverter



Median Diverter



Full Closure

DISCUSSION

Bicycle boulevards on streets with volumes higher than 3,000 vehicles per day are not recommended, although a segment of a bicycle boulevard may accommodate more traffic for a short distance if necessary to complete the corridor. Providing additional separation with a bike lane, cycle track or other treatment is recommended where traffic calming or diversion cannot reduce volumes below this threshold.

ADDITIONAL REFERENCES AND GUIDELINES

- AASHTO. *Guide for the Development of Bicycle Facilities*. 2012.
- Alta Planning + Design and IBPI. *Bicycle Boulevard Planning and Design Handbook*. 2009.
- Ewing, Reid. *Traffic Calming: State of the Practice*. 1999.
- Ewing, Reid and Brown, Steven. *U.S. Traffic Calming Manual*. 2009.
- Oregon Department of Transportation. *Right-In Right-Out Channelization*. 1998.

MATERIALS AND MAINTENANCE

Depending on the diverter type, these treatments can be challenging to keep clear of snow and debris. Vegetation should be regularly trimmed to maintain visibility and attractiveness.



MINOR INTERSECTION TREATMENTS

DESCRIPTION

Treatments at minor roadway intersections are designed to improve the visibility of a bicycle boulevard, raise awareness of motorists on the cross-street that they are likely to encounter bicyclists, and enhance safety for all road users.

GUIDANCE

- On the bicycle boulevard, the majority of intersections with minor roadways should stop-control cross traffic to minimize bicyclist delay. This will maximize bicycling efficiency.
- Traffic circles are a type of horizontal traffic calming that can be used at minor street intersections. Traffic circles reduce conflict potential and severity while providing traffic calming to the corridor.
- If a stop sign is present on the bicycle boulevard, a second stop bar for bicyclists can be placed closer to the centerline of the cross street than the motorists' stop bar to increase the visibility of bicyclists waiting to cross the street.
- Curb extensions can be used to move bicyclists closer to the centerline to improve visibility and encourage motorists to let them cross.



Stop Signs on Cross-Street



Traffic Circles



Bicycle Forward Stop Bar



Curb Extension

DISCUSSION

Stop signs increase bicycling time and energy expenditure, frequently leading to non-compliance by bicyclists and motorists, and/or use of other less desirable routes. Bicycle boulevards should have fewer stops or delays than other local streets. A typical bicycle trip of 30 minutes can increase to 40 minutes if there is a STOP sign at every block (*Berkeley Bicycle Boulevard Design Tools and Guidelines*). If several stop signs are turned along a corridor, speeds should be monitored and traffic-calming treatments used to reduce excessive vehicle speeds on the bicycle boulevard.

ADDITIONAL REFERENCES AND GUIDELINES

- City of Berkeley. *Bicycle Boulevard Design Tools and Guidelines*. 2000.
- City of London Transport for London. *Advanced stop lines (ASLS) background and research studies*.
- Transportation Research Board. *Improving Pedestrian Safety at Unsignalized Crossings*. NCHRP Report # 562. 2006.

MATERIALS AND MAINTENANCE

Vegetation in traffic circles and curb extensions should be regularly trimmed to maintain visibility and attractiveness. Repaint bicycle stop bars as needed.

MAJOR INTERSECTION TREATMENTS

Description

The quality of treatments at major street crossings can significantly affect a bicyclist's choice to use a bicycle boulevard, as opposed to another road that provides a crossing treatment.

Guidance

- Bike boxes increase bicyclist visibility to motorists and reduce the danger of right "hooks" by providing a space for bicyclists to wait at signalized intersections.
- Median islands provided at uncontrolled intersections of bicycle boulevards and major streets allow bicyclists to cross one direction of traffic at a time as gaps in traffic occur.
- Hybrid beacons, active warning beacons and bicycle signals can facilitate bicyclists crossing a busy street on which cross-traffic does not stop.
- Select treatments based on engineering judgment; see National Cooperative Highway Research Program (NCHRP) Report # 562 *Improving Pedestrian Safety at Unsignalized Crossings* (2006) for guidance on appropriate use of crossing treatments. Treatments are designed to improve visibility and encourage motorists to stop for pedestrians; with engineering judgement many of the same treatments are appropriate for use along bicycle boulevards.



Bike Box



Median Island



Hybrid Beacon (HAWK)



Rectangular Rapid Flash Beacon (RRFB)

Discussion

Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety.

Additional References and Guidelines

Transportation Research Board. *Improving Pedestrian Safety at Unsignalized Crossings*. NCHRP Report # 562. 2006.
 Federal Highway Administration. *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations*. FHWA-RD-04-100. 2004.
 NACTO. *Urban Bikeway Design Guide*. 2012.

Materials and Maintenance

Maintain signs, markings, and other treatments and replace as needed. Monitor intersections for bicyclist delay to determine if additional treatments are warranted.



OFFSET INTERSECTION TREATMENTS

DESCRIPTION

Offset intersections can be challenging for bicyclists who are required to briefly travel along the busier cross street in order to continue along the bicycle boulevard.

GUIDANCE

- Appropriate treatments depend on volume of traffic including turning volumes, traffic speeds and the type of bicyclist using the crossing.
- Contraflow bike lanes allow bicyclists to travel against the flow of traffic on a one-way street and can improve bicycle boulevard connectivity.
- Bicycle left-turn lanes can be painted where a bicycle boulevard is offset to the right on a street that has sufficient traffic gaps. Bicyclists cross one direction of traffic and wait in a protected space for a gap in the other direction. The bike turn pockets should be at least 4 feet wide, with a total of 11 feet for both turn pockets and center striping.
- Short bike lanes on the cross street assist with accessing a bicycle boulevard that jogs to the left. Crossing treatments should be provided on both sides to minimize wrong-way riding.
- A cycle track can be provided on one side of a busy street. Bicyclists enter the cycle track from the bicycle boulevard to reach the connecting segment of the bicycle boulevard. This maneuver may be signaled on one side.



Contraflow Bike Lane



Left Turn Bike Lanes



Short Bike Lanes on the Cross Street



Cycle Track Connection

DISCUSSION

Because bicycle boulevards are located on local streets, the route is often discontinuous. Wayfinding and pavement markings assist bicyclists with remaining on the route.

ADDITIONAL REFERENCES AND GUIDELINES

- Hendrix, Michael. *Responding to the Challenges of Bicycle Crossings at Offset Intersections. Third Urban Street Symposium. 2007.*
- NACTO. *Urban Bikeway Design Guide. 2012.*

MATERIALS AND MAINTENANCE

Paint can wear more quickly in high traffic areas or in winter climates. Facilities should be cleared of snow through routine snow removal operations.



APPENDIX

APPENDIX A - REVIEW OF RELAVANT PLANS

ROCHESTER BICYCLE MASTER PLAN

Prepared by Sprinkle Consulting, SRF & Associates, and EDR, and completed in 2011, the Rochester Bicycle Master Plan (“Plan”) recommends how the City should invest in bicycle infrastructure in the future. It identifies the best practices for infrastructure and services nationwide, assesses the feasibility of these for local application, identifies appropriate locations for bicycle facilities, and recommends bicycle-friendly policies. Workshop participants and web respondents in 2010 eagerly requested the development of bike boulevards in Rochester. This desire is consistent with a growing desire for “low stress” bicycling facilities that appeal to a broad range of the public.

The Plan discusses the “one-off” technique of developing bike boulevards using calmer streets one street off of a primary arterial roadway and/or creating bike boulevards along direct, existing routes that shorten trip lengths. Other recommendations for bicycle boulevards in Rochester include, as a first step, wayfinding signage, including destination, direction, and distance (or travel time); as a second step, traffic calming; additionally, improving signal timing and detection on parallel streets where signals exist and enhancing crossing treatments where signals do not exist, including raised medians, activated flashing beacons, or pedestrian hybrid signals.

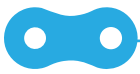
The corridors where bicycle boulevards are mentioned as possible recommendations in this plan are:

- Dewey Avenue (within constraints of the same street’s corridor traffic calming study in 2010), “where a road diet is not feasible” (p. 15)
- Appropriate local streets that may be utilized to improve connectivity (detailed corridor studies needed)

The plan reviews several peer cities and the total mileage of their respective bicycle boulevard networks, including Boulder, CO; Minneapolis, MN; and Madison, WI.

NEIGHBORHOOD TRAFFIC CALMING MANUAL

The desired outcomes of the Neighborhood Traffic Calming Manual (“Manual”) are improving citizen involvement in the traffic calming planning process, livability of neighborhoods throughout the region, the relationship between citizen and government, and pleasant, safe conditions for pedestrians, bicyclists, and other non-motorized street users.



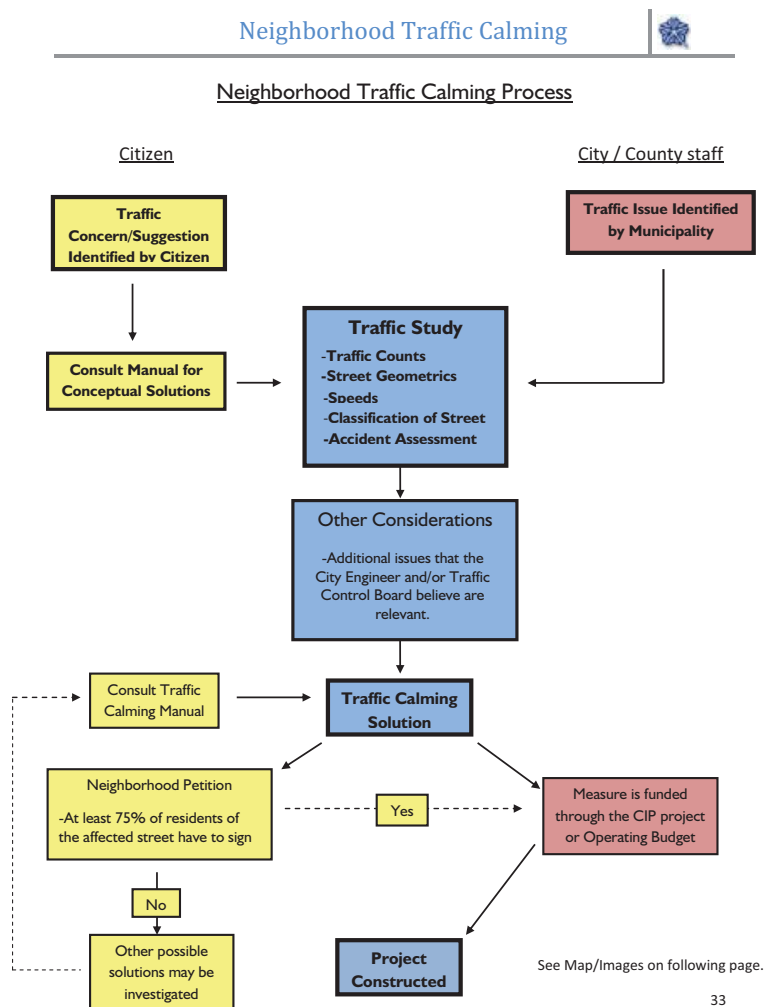
Out of the 44 responses to a neighborhood questionnaire that was sent to sector leaders, neighborhood associations, and other stakeholders, 78% agreed or strongly agreed that traffic issues such as speeding and congestion were significant problems within their respective neighborhoods. The perception of pedestrian safety on city streets varied greatly, with about half answering that they believed that it was very safe and the other half disagreeing. When asked if they thought that traffic calming techniques such as speed humps, raised crosswalks, and the like, would be useful in solving traffic issues, nearly 70% agreed or strongly agreed.

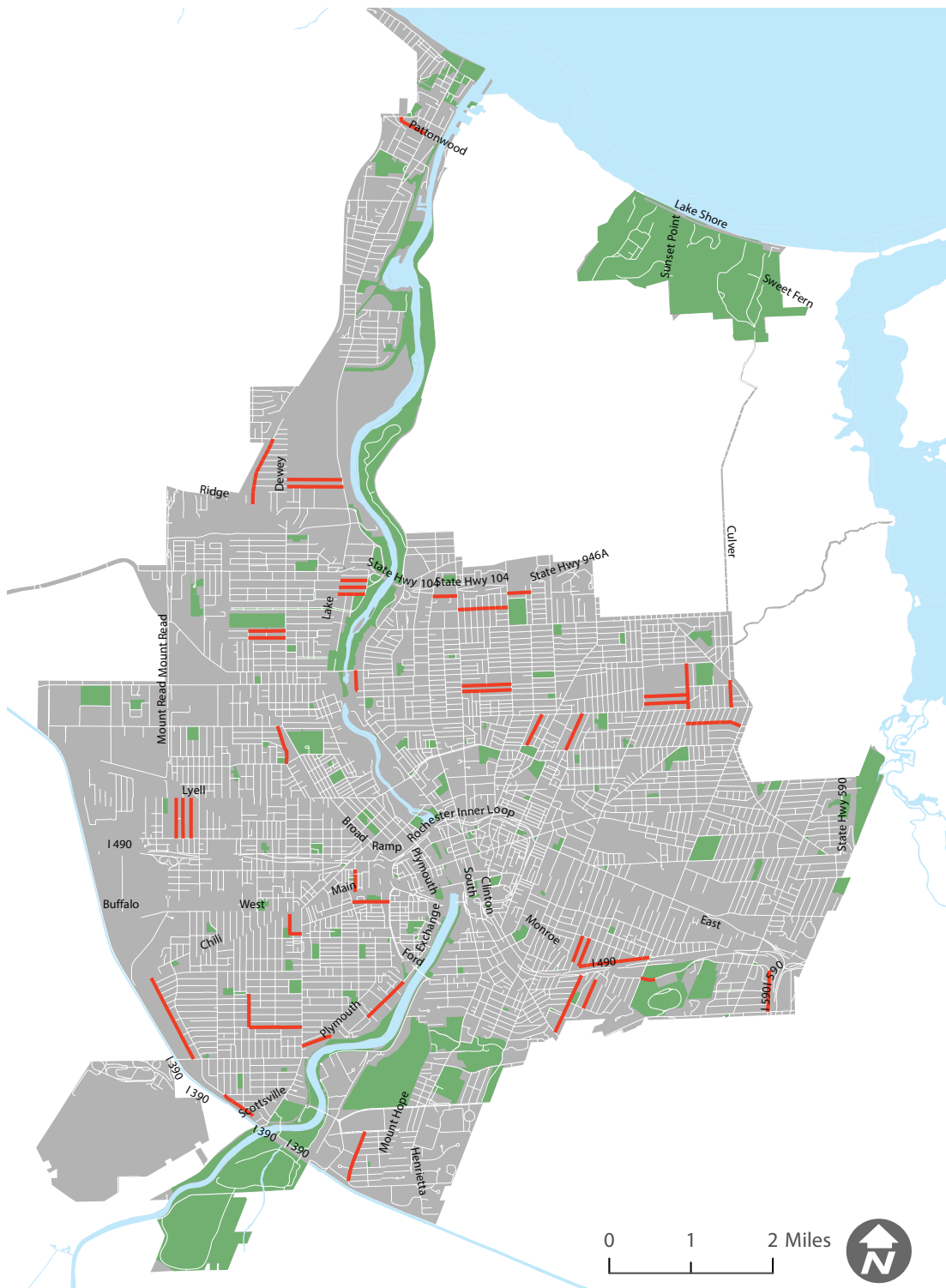
The manual includes helpful tables for determining which calming measures are most appropriate for particular traffic issues (or the combination of multiple issues). Because traffic issues may vary street to street in Rochester, as planners develop a bicycle boulevard network and plan individual corridors, they may consider what problems are specific to that corridor and treat them accordingly while simultaneously implementing bicycle facilities.

Advantages, disadvantages, effectiveness, and criteria for use are outlined for each of the traffic calming measures. The two measures that explicitly mention bicycling (though not bicycle boulevards are not mentioned specifically) are “Full Closures (Dead Ends)”, “Speed Humps”, and “Lane Striping”. The latter is important to consider, but would not apply directly to bicycle boulevards. In addition to these, other measures in the Manual that do not mention bicycling but that are effective traffic calming techniques for bicycle boulevard implementation are “Neighborhood Traffic Circles”, “Chicanes”, “Chokers”, “Bump Outs” (or bulbouts or curb extensions), “Median Barriers”, “Diagonal Diverters”, “Forced Turn Islands”, “Half Closures”, “Semi-Diverters”, and “Speed Enforcement”.

Rochester’s existing neighborhood traffic program, “Safe Passages”, contains mostly non-physical measure that can be employed by citizens without the need for an involved public and political process. Physical traffic calming elements require a comprehensive and possibly lengthy evaluation process. The process is outlined as follows (as well as in a helpful graphic shown to the right):

1. Residents identify a perceived traffic issue
2. Residents consult the Manual to explore possible solutions
3. Local officials analyze complaint
4. Residents of municipality performs a traffic study, recording traffic counts and speeds
5. If it is determined that an issue exists, municipal officials and engineers evaluate the issue using industry technical standards and criteria
6. Begin a neighborhood petition process requiring 75% of affected residents to agree to the calming measure
7. Approval of the calming measure
8. Additionally, the calming measure can be implemented through a street redesign project that the city, county, or state transportation department initiated (possible as a CIP). This follows the same process as steps 1-5, 7. No petition is required.

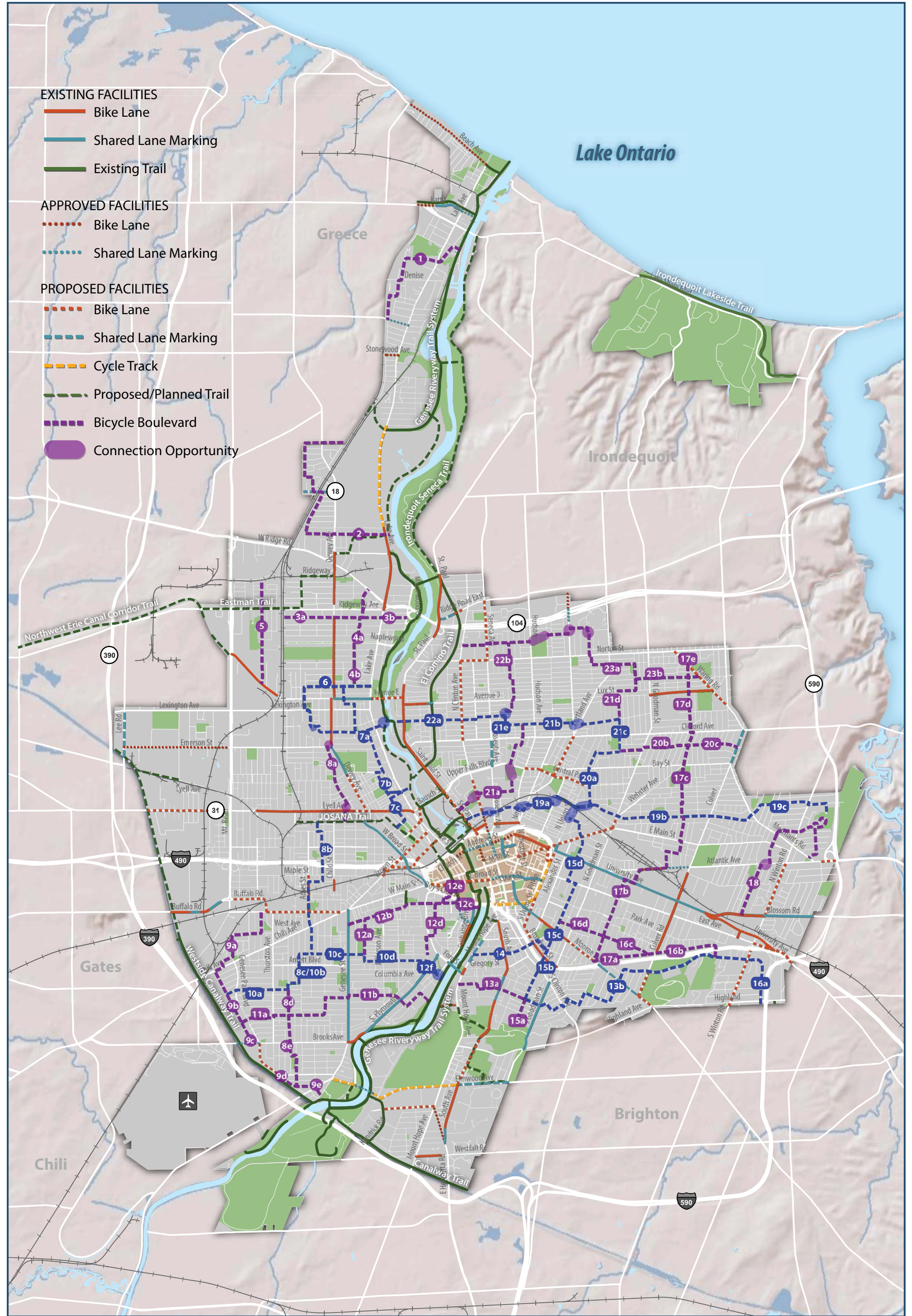




A map of Rochester's traffic calming measures as well as the City's speed hump criteria are provided on pages 35 through 38 of the report. On August 24, 2012, however, the City issued an update to their speed hump policy that now require steps 1, 4, and 6 mentioned above as well as an in-house evaluation of street functional classification and geometric features and consideration of other factors. A current map of the City's traffic calming measures is shown to the left.

BOULEVARD PROGRAM PROCESS CHECKLIST

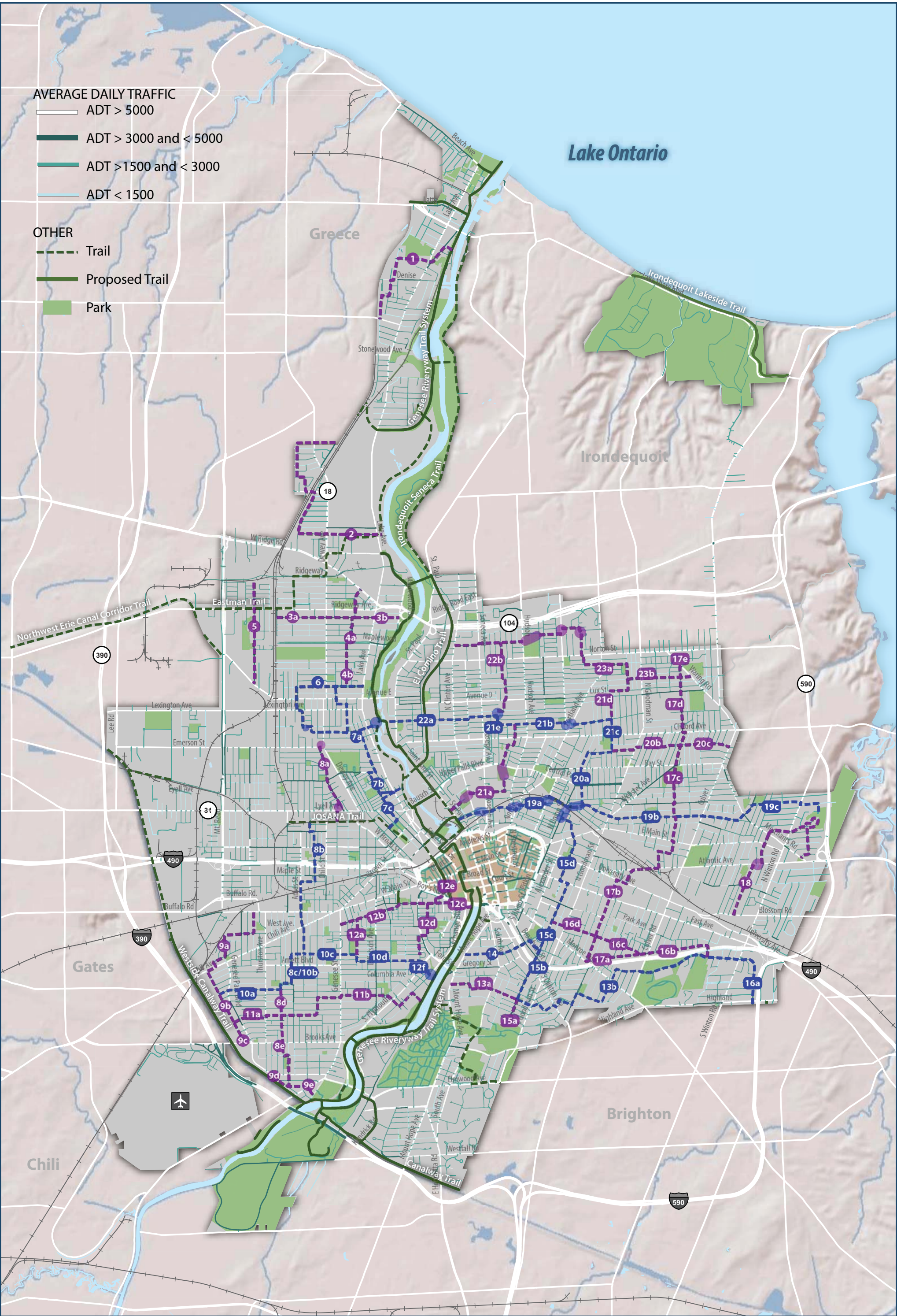
The City's Boulevard program combines neighborhood traffic calming with community building, resulting in a public work of art. No advertising or text is allowed. The program supports residents desiring to create painted murals on their neighborhood residential streets (defined as those with fewer than 3,000 AADT). A 13-step process, including permitting, written descriptions, proof of residency, using skid-proof paint, among others, is required for residents to create a mural on the street.



Bicycle Boulevard Gap Connections

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

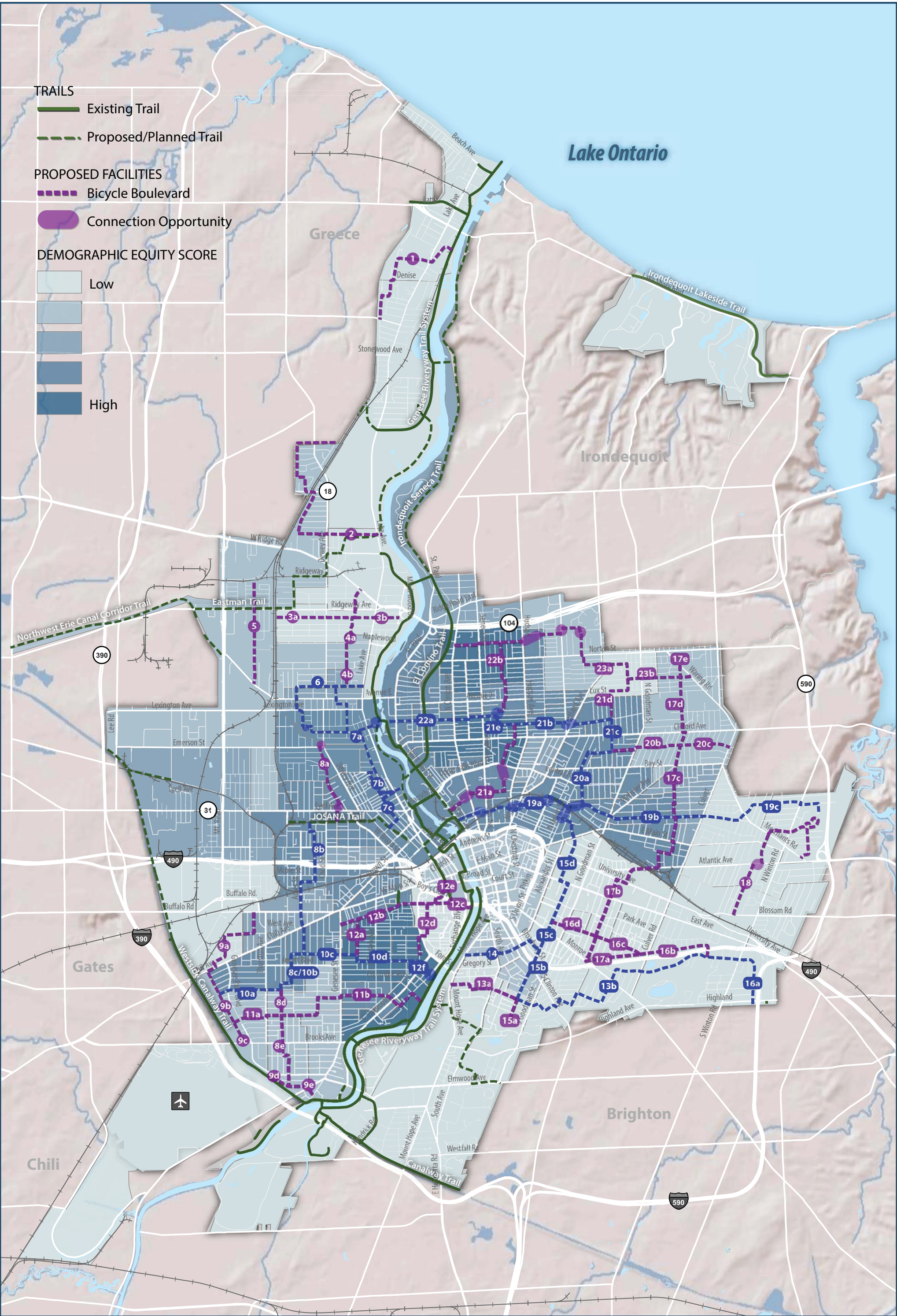
0 0.5 1 Mile



Bicycle Boulevard Traffic Considerations

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

0 0.5 1 Mile



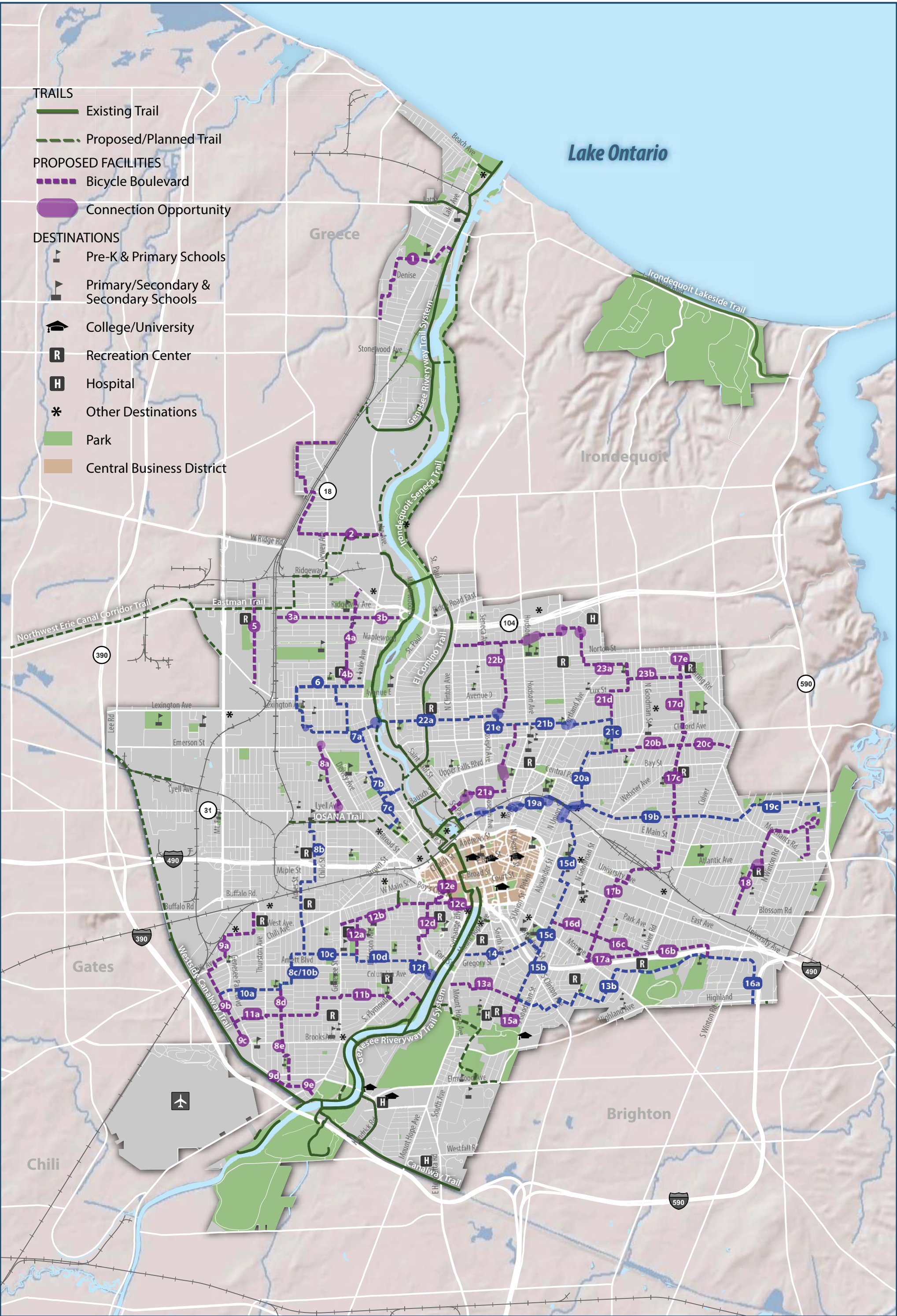
Bicycle Boulevard Demographics Analysis

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

0 0.5 1 Mile



Author: Sam Piper



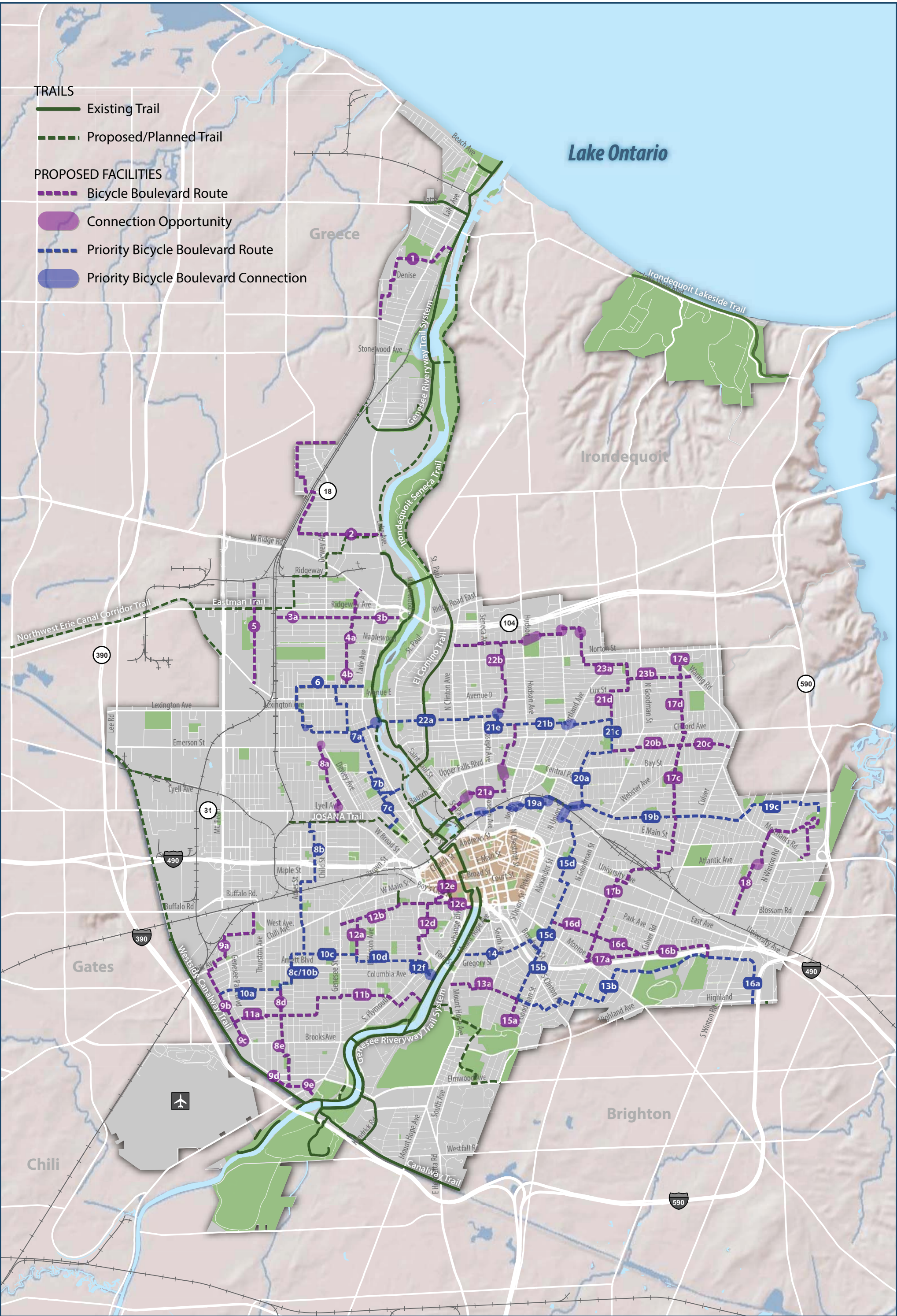
Bicycle Boulevard Destination Connections

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

0 0.5 1 Mile



Author: Sam Piper



Bicycle Boulevard Priority Routes

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

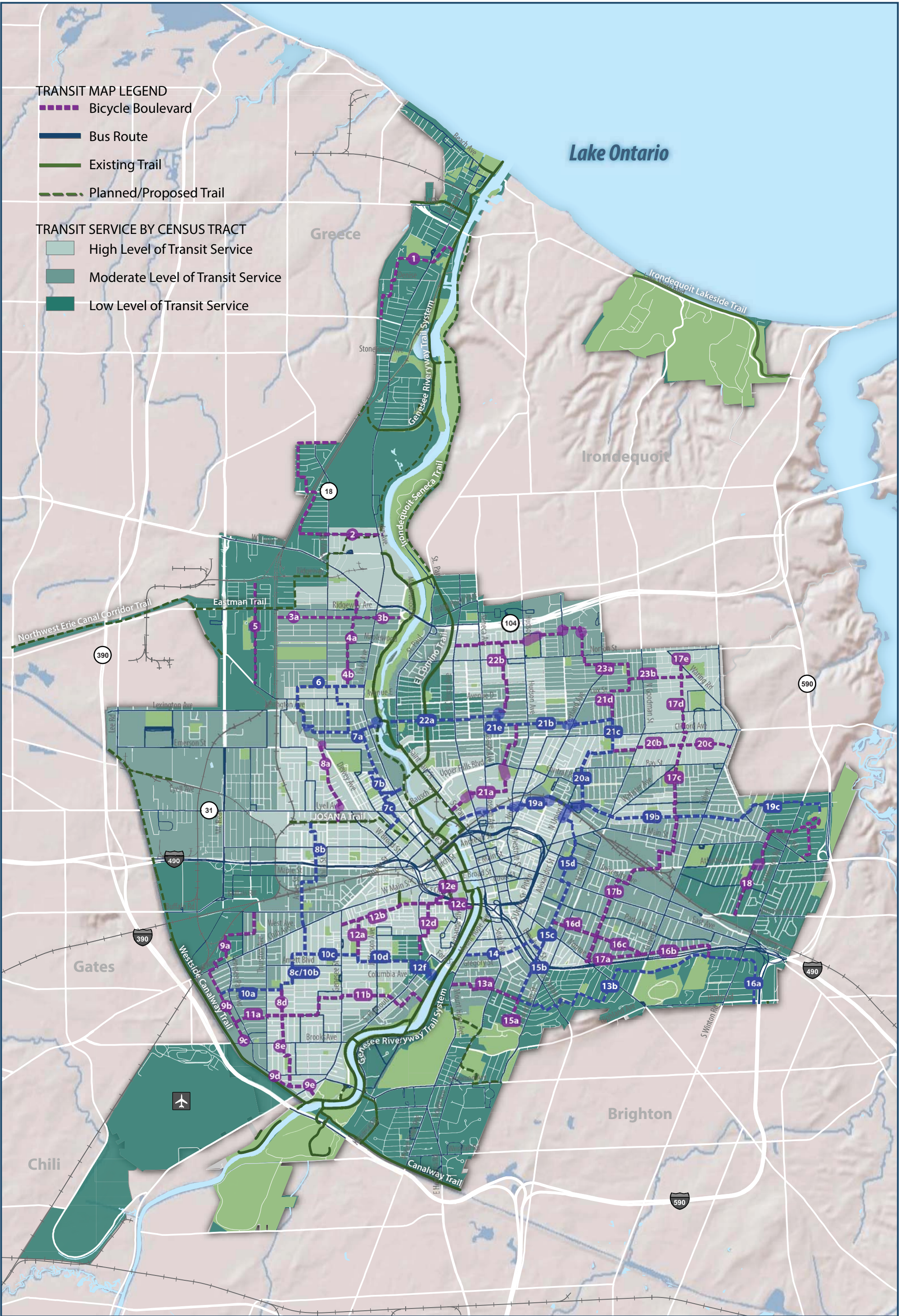
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TRANSIT MAP LEGEND

- Bicycle Boulevard
- Bus Route
- Existing Trail
- Planned/Proposed Trail

TRANSIT SERVICE BY CENSUS TRACT

- High Level of Transit Service
- Moderate Level of Transit Service
- Low Level of Transit Service



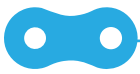
Bicycle Boulevard Transit Analysis

Sources: NYS GIS Clearinghouse, ESRI, US Fish & Wildlife Service, Monroe County DOT

0 0.5 1 Mile



Author: Sam Piper

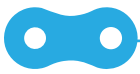


PUBLIC COMMENTS ON THE BICYCLE BOULEVARD NETWORK AND DEMONSTRATION PROJECTS

LIKES

1. THIS IS A WONDERFUL PROGRAM! EXPAND IT!
2. Excellent & needed improvement especially for bike commuters
3. I completely support the development of bicycle blvds and other bike/pedestrian friendly measures in our community. Thank you!
4. Love the speed bump. Live on averill. This is awesome!
5. Wonderful idea for everyone! I know there's a lot of support on Averill because it will slow traffic. There are many bike commuters already!
6. I am all in favor of the Bicycle Boulevard Plan
7. As an Averill resident, the Averill residents I have spoken with STRONGLY SUPPORT using Averill as a bi-cycle boulevard- especially with the traffic calming efforts. Other members of SWPC also strongly support this plan. As a cyclist, I'm thrilled by the connectivity of the plan for bikes.
8. I have been a resident of Averill Avenue for past eight years. I have noticed a great difference since the bike path was laid out and the speed humps put in. I am all for making this a permanent addition to our street.
9. Just wanted to send a note saying how much the bike test has done to slow traffic on Averill. It is so much easier pulling out of my driveway with slower moving cars. I hope the speed bumps become part of our street. Thanks for doing the test.
10. Absolutely LOVE THIS! The more bike-friendly infrastructure we have, the healthier, cleaner, and more efficient our city will be! P.S. Please bring this to Beechwood!
11. I support the addition of Bicycle Boulevards in Rochester. As a resident of the Highland Park neighborhood I'm very pleased that Meigs + Linden St are included in the proposed plan!
12. My neighbor, Barbara Biddy, Averill Street, asked me to convey her enthusiastic support for using Averill as a bike boulevard. And for the traffic calming!!!!
13. Looooove! I LOVE the changes on Averill! We have seen countless animals killed through the years due to speeders. The former resident of my house was even hit by a speeding car out front & spent weeks in the hospital. There has always been a ton of bike traffic, but with the speeders it has been a worry. Suddenly seeing more bikes & less traffic is fantastic! Great job city of Rochester! Let's keep these speed bumps!
14. This is an awesome plan. Lots of hard work went into this study and they have done an excellent job presenting the data as well as the information needed by all of us. I believe downtown Rochester will become a residential village-like city and the Bicycle Boulevards are a sustainable and green solution. Thank you!
15. i am writing to you to express my support for including Ravenwood Ave in the Bicycle Boulevards Plan. as a 20+ year resident of Ravenwood & cyclist, i can tell you that the traffic calming tools associated with the Bicycle Boulevards Plan will not only contribute to making Ravenwood safer for cyclists & pedestrians, but also for the many children who live & play along this street. thank you for your attention to my street.
16. I LOVE this. I just moved onto Averill with my dog and i am terrified that he is going to get hit by a car flying down Averill. Also i have a friend with 3 small children who lives across the street, they cross the street regularly to come to my house. i see cars going 35+ mph regularly in front of my house and i love the idea of having speed bumps. I would love to see another speed bump on Averill closer to Mt hope. thank you so much for doing this on my street, i already can see a marked improvement.
17. The traffic flow on Averill Ave is heavy and very fast...I and many others use Averill to ride our bikes to get to the river path. The speed bump has slowed down the traffic and has made it safer to ride our bikes at least in the area of the speed bump. I would like to see 2 more speed bumps between South and Mt. Hope and a stop sign at Ashland street. This would slow traffic down enough to make us all safe while enjoying our passion of bike riding.....
18. I am thrilled to see that the City of Rochester is taking the next step towards bringing bicycling into the forefront as an alternative to transportation by car. With each new sharrow, bicycle lane, green box and bicycle boulevard laid down in the city, bicycles gain a foothold in the city's transportation landscape and subsequently normalize travel by bike. THANK YOU

19. I do not currently live in the City of Rochester, but my wife and I are planning on moving there within the next year. We will be using bicycles as our primary form of transportation. I think the bike boulevard plan is a great way to increase cycling options in the City, and will help to make even more people feel comfortable cycling in the City. I think the main route that you set up as an example would be a good place to start because it would provide a solid east/west route across the City, to complement the Genesee Riverway Trail, which is a good north/south route.
20. As someone who was hit by a car (that ran off) last week on Monroe ave... Yes to bike boulevards! The Rochester biking community is growing over the past 5 years. Rochester itself is becoming one of the most progressive cities in this region and giving consideration to bicyclists helps everyone. It also attracts younger people trying to live differently. Rochester is dense enough to give priority to cyclists and I appreciate all the city's efforts to improve the bicycle infrastructure and even hit reminding drivers to share the road.
21. I returned from a vacation to this pleasant surprise on my street. I love the idea. It looks great, and brings much needed calm to the traffic flow on my block. I would only note that there should be no parking zones a few feet around the area of the speed bump because it can get a bit congested there. I've been considering bicycling for a while but I've been afraid of the city traffic. This is so exciting, I think I'm gonna get a bike and ride the route. I really hope my block is in the final plan. This is such a great idea for our city. Thanks.
22. I'm really happy to see the emphasis on providing safe biking for residents. The focus on slowing cars on business arterials has been great for businesses that enliven our communities, but sometimes the techniques like bump-outs that make more on-street parking and improve conditions for pedestrians, also make traveling by bike in the City more dangerous. This has the advantage of making biking safer while also slowing cars for residents and pedestrians. I commute to work downtown and to recreational activities by bike. The bike boulevard on Averill will make the most challenging part of my commute safer and more enjoyable. I'm curious about how the signal light at Mt. Hope will be changed to make going East across Mt. Hope safer.
23. I live in the 19th Ward and have noticed signs and speed bumps popping up everywhere. I read the article this morning in The City about the new bike routes and I would like to say how awesome this is. I'm very excited about the city's efforts to do this. I've been jealous in the past after visiting other cities and seeing their strong programs, wishing Rochester was more like other cities where people biked everywhere. I look forward to seeing more great things happen in the city of Rochester! Perhaps the fate of the inner loop and abandoned subway system would include a great focal point to the city's enhanced biking system? I look forward to great things to come.
24. I see many cycling commuters using Averill Avenue daily - coming from the Genesee River trail - going to work or school, as well as recreational cyclists of all ages. As a Bicycle Boulevard with traffic calming features, it will be much safer for everyone. I find that Rochester drivers are far less courteous, responsible and educated than others I have encountered in other states /cities. These designated streets could have such a significant impact on this city - poised to emerge as a very special place to live!! The South Wedge has more and more residents in their 20's and 30's for whom cycling is an important aspect of their lives, as it is for retirees like myself.



DISLIKES

1. I am all for safety and protecting the environment, and I do like to ride my bike. I feel safe because I am cautious and I “share the road” with those who are driving motor vehicles. It is simple. These are the issues I see in general with this sort of “boulevard” concept:
 - Has there been a significant increase in the use, or confirmed desired use, of bicycles in this community? Where are the statistics? What was the methodology for determining this?
 - Cost – do we, the taxpayers, really have the money to spend on something that does not seem to provide much benefit to any significant percentage of the community? If cyclists are going to “demand” dedicated boulevards, then they should pay registration fees like other “vehicles” to cover the expense. Particularly cyclists who stop in your lane at red lights and impede your right of way when the light turns green. (Why don’t they “share the road?”). Or go raise funds from commercial concerns
 - Even with extra plowing attention for these additional spaces (another added expense), how much does anyone really expect that people will ride their bikes in the long, harsh seasons of Rochester weather? Even if part of their trip can be in these specially treated areas, there is very little chance that their whole trip can be in these “boulevards”, so they will not have the ability to safely use their bike. How much student traffic is there between colleges? How many students do you know who attend multiple schools? And, most college student activity is NOT during the summer.
 - I am frequently on city streets during the daytime. I do pay attention and never see people riding their bikes in all of the bike lanes that have already been established. There have been far too many tax dollars already spent in this community in reducing streets that should be 2 lanes in each direction down to 1 lane, with or without bicycle signs/markings. Not to mention the several locations where lanes were put in then scraped away because someone did not think through the layout in advance. Furthermore, how many of our streets are already unsafe for cyclists because potholes and other defects have not been repaired? A case in point: eastbound on Main Street from Goodman to Culver - this is a stretch that was completely rebuilt in 2013. Since early in 2014, there are cracks and holes, particularly in the natural wheel tracks, that are not even healthy for cars to traverse, much less bikes. Whether this was poor design or defective execution or both, it is a big waste of tax money.
 - Aren’t there already laws for vehicles to yield to cyclists? If your response is that drivers are not cautious enough, well that is a different topic that involves enforcement of laws, not re-designing our streets. People are allowed to speed way too much in residential or pedestrian areas.
2.
 - Traffic circles are another big waste of money. Any significant landscaping on them will make visibility by and of cyclists more dangerous.
 - All these prescribed methods for reducing speed are infringing on the rights of the huge majority of road users. Why should the vast minority hold priority?
 - The cities mentioned as examples do not seem to be representative of Rochester...they are bigger cities and/or they have longer bicycling “seasons”.
 - Some of these proposed pathways seem to go through high-crime neighborhoods. Is there any way that can be established that cyclists will be safe from that crime?
 - Many cyclists are seeking the fastest route from point A to point B. If these special boulevards take them out of their way, they will not be useful. On the other hand, if a cyclist wants to use the planned routes, why can’t they use them as is? If someone does indeed decide that this project must be undertaken, I urge that a pilot be established and that an objective party review the seri-

ously, thoroughly quantified results to report on the benefits verses the costs. Thank you for your consideration of my remarks. I have tried to approach this concept from a common sense perspective. There seems no justification to me, particularly in the state of the local, regional and national economy to undertake such a project that will marginally benefit so few and undeniably burden so many.

SUGGESTIONS

1. Great to have a Bike Boulevard on its way thru my neighborhood (Highland Pk.)! I like the design features- but I'd add that all of them, plus trails along the river and elsewhere, need consistent snow removal. Winter riding is more vital than ever!
2. The routes you're choosing are the ones I use anyway. Road lanes are the easiest for a legally blind bicyclist like me to use, I find. Now all I have to do is be more responsible about obeying traffic laws.
3. I usually take alexander but the Averill/Meigs Rt. Is nice. Better signage (wayfinding on lane in paint would help). I take Alexander because the lights are short. The lights can be a little long on Meigs/Averil.
4. Bike boulevards and bike boulevard infrastructure must be contiguous and must connect with popular destinations. Use traffic circles/intersection islands for more effective traffic calming.
5. How can bike boulevards fill in the gaps in ROC's transportation network? Will they be connected to the new regional transport. center?
6. Averill route is nice. Appropriate width to handle sharing. Motorists DO observe speed bumps. Just need to be more frequent. Need a change to Averill/South Ave Crossing- Bikes do not trip the light. Two minute rule in NYS?
7. TRAFFIC SIGNALS MUST BE ABLE TO SENSE BICYCLES!
8. Have bike actuated signals along B.B.'s. Bike boulevards Rule!
9. Adjust traffic lights in order to make them more conducive to cycling along bike boulevard.
10. Need increased public education about bike lanes, etc.
11. can establish publicly how bicyclists are to use the streets? Is "idaho stop" allowed, etc?
12. Can we implement the "Idaho stop" along the boulevard network?
13. Would like warnings for bicyclists in situations where bike lanes disappear at bottom of hill.
14. would like to see as few 'jogs' as possible so that routes are on par with main rds. Love the B.B.s!
15. SAFE connection through Henrietta
16. should be connection from Lake to bridge carrying 104 over the river to St. Paul
17. El Camino not very useful/unsafe. St Paul much safer & much more useful as a north/south commuter route
18. tricky approach to bridge- have to jerk to left to stay on bikeway going toward bridge.
19. Winter maintenance/ clearing is a must!
20. Averill is already not bad. Elmwood is bad Any hope for that one?
21. need more space climbing hill to bridge.
22. Place MORE bike racks around boulevard areas
23. we need this to be the beginning of increased rd traffic safety for cyclists, pedestrians, and all non-motorized traffic.
24. Awesome proposal- want to see more traffic calming devices in the Southeast quadrant, especially Park Ave!
25. I bike to work from the Highland Park neighborhood to the U of R. No matter which way I go, Mt Hope Ave is almost always hard to get across. A colleague at work got seriously injured when hit by a car while he was waiting to get across. I really enjoy biking many places in the city. Of all the places I've been, getting across Mt. Hope between Elmwood and Gregory is the worst. It would be great if there were some way to address this.



26. At 82 years old and limited to Bus or walking, I find myself much more at risk of collision with bicycles being used at high speed on sidewalks than with autos. I have no idea how cyclist education can be accomplished. Bikes are very often the only mode of transportation for low income people. The “need” for speed on sidewalks seems to prevail. To share the walks with people like me could be taught, but how? Overall, the concept of traffic calming is great, but I feel very threatened now as I walk. Thanks!
27. We need bike friendly streets in the city. I would love to be able to ride my bike from park ave to the canal path safely. It would also be nice to have some safe streets to ride with the kids. We love the city of Rochester And are raising our children here. But we have had to make some sacrifices such as biking less compared to our friends who live in pittsford and brighton.
28. Hi, I'd like to express my support particularly for the proposed Averill-Meigs-Prince St. stretch of bicycle boulevard. My family and I live on Sibley Place, south of East Ave. I take my daughter to school at Cobblestone on Prince Street usually either on bike or foot. Crossing East Ave, however, is difficult. I would LOVE to have a safe crossing of East Ave for bicycles and pedestrians in the Prince St/Sibley/Meigs area, which will make it much easier for us (and all the Park Ave people) to get up Prince street and to NOTA. Also, I would love a bike route that gets us to the South Wedge and connect to the Riverway trail at Mt. Hope easier, and the proposed Meigs to Averill route looks like it would do that. Thanks so much for your work on this! If there's a way I could help out, let me know.
29. Suggestions based on my both my MV and bicycle ride-through the east section. Cars accelerated between speed bumps and gained way to much speed, I felt unsafe on my bike. The speed bumps are too far apart to be effective. The street speed limit is still default? 30 mph? that seems way to fast. I'd suggest 15 mph speed limit as Boulder Co. does. It would be good to have several dynamic speed limit / reporting signs. Enforcement of MV speeds should be strict initially. A marked bicycle lane is important to have and a concrete barrier lane would be best. If the city is going to do this it should be done with serious intent to create success and that means dialing back MV speeding, making it clear that the purpose of the street is non MV traffic. Thanks for the effort. Jeff Debes, not affiliated with any biking group, but I often bike in the city.
30. As a South Wedge resident I'm more familiar with the Averill route, and it makes sense. Thanks for making this happen! The next challenge is to address its future connectedness--i.e., at Monroe Avenue--or its usefulness will be limited. With the rise of all the painted bicycle lanes in Rochester, I've noticed how a green lane suddenly will disappear near a major intersection, or turn into a shaky dotted line. My point is that, while BBs look promising, they're not a substitute for protected/separate bike lanes: otherwise, you'll have low-stress tributaries feeding into crazy death traps. Especially on some of Rochester's wider arterials it is possible to use parked cars as the buffer for a bike lane (a la New York City, Copenhagen, etc.). Keep up the good work!
31. Considering the overall poverty level of our city, what is the total cost of this project & how will it affect taxes? 2. At the impression that Rochester drivers are awful and wouldn't care about designated lanes for bicyclists, would these lanes be police enforced? 3. In the effort to create a separate lane for bicyclists, it's a fair assumption that either streets will be reduced a lane or parking will be eliminated indefinitely resulting a higher jam in traffic or irritated residents. While I believe the idea is profoundly exceptional, I'm concerned of what it all entails. Thanks & Good Luck!
32. Firstly, I have spent a lot of time in Boston/Cambridge & Washington, DC where real boulevards & separate lanes have been created for bicycle traffic... & I mean, TRAFFIC. Rush hour is teeming with a smooth flow of bicycles, in the mix of buses, cars, etc. It feels lively & healthy & all the things we'd love to feel in our city. I think the Boulevards are a great tool for getting more people to consider commuting by bicycle if they have not felt comfortable riding on busy city streets. I have commuted since I moved here in 1994 (though never enough & I barely see anyone else on the road who seems to be packing it to work, school, etc.) I have my routes already that best to get me off the craziest roads, so personally, I may or may not find the Boulevards to be the most direct routes for my typical destinations. What I will say for the Beechwood neighborhood heading south, there is sadly no great way to go South. Both of our main artery roads on either end (Culver & Goodman) are both heavily travelled & narrow in many areas AND (especially S. Good-

man), have the worst potholes along the curb from University to 490. While the Boulevard idea & getting off the main roads is a good solution for most, neither makes any sense for me personally since many of my destinations are straight down Goodman (sister's & father's homes, etc). I have studied the situation on my rides & realize, sadly, that there is not much room to work with esp. on Goodman (though maybe creative engineers can figure that one out for us). I am willing & less spooked by the main roads (with treacherous exceptions where I find alternates). If in addition to the Bicycle Boulevards, the City could give more attention to repairing potholes & smoothing the sides of roads where bicyclists move on some of these larger arteries as well, that would be a great help! In the meantime, thumbs up to the boulevards & getting more people riding, esp. as an alternative to fossil fuel-driven vehicles.

33. After receiving an e-mail regarding the bicycle route and the proposed traffic calming features that are being considered for Averill Avenue, I do have a couple of questions. Unfortunately my husband and I were not able to attend the meeting as I had to work late and could not get there in time. I would like to say at the outset that I am very excited about the proposed changes. I have lived on Averill Avenue for over 30 years and find the speeding on Averill Avenue quite a problem. My biggest concern with speed humps and Averill Avenue being a designated a Bicycle Blvd. is how much signage will there be to indicate the correct route for bicyclist and speeders? My concern is what I call "Sign Graffiti". An example would be the circle just beyond the Ford Street Bridge at Plymouth Avenue. I understand the circle was put there to calm traffic down and to some degree this has been successful, although, to me, the signage that was used to instruct drivers where and how to go is beyond acceptable. I can not believe that with all the wisdom within our city government this was the best and only approach to calm the traffic and instruct drivers how to get around the circle. I am concerned that our residential street on Averill Avenue will be proliferated with signs indicating speed bumps and bicycle route signs making us look more like a highway than a wonderful residential street it always has been. I would also like to question you about the intersection at Averill and Ashland Street. The attached map indicates a traffic circle at this intersection with "raised or delineated islands placed at intersection". Can you please tell me what all that means? Are you talking about putting a circle there which I am sure is not the case, but I would like that confirmed. Have stop signs been completely ruled out? I would like to say that I am very excited about the proposed changes, but I would like to make sure exactly what the face of our "residential" street will look like with the proposed changes. Thank you for your time, I look forward to hearing from you.
34. From a drivers perspective, I work in Webster and typically come home via 490 -> Broadway -> Averill -> Mt. Hope. I found the speed bump on Averill to be just fine. No complaints at all. I usually just go 20 mph on Averill anyway since it's a side street. Today I used the South Wedge bicycle boulevard for a trip to the public market. On the way to the market I took Averill to Broadway and then took Union all the way to the market. On the return trip, I took Union -> Champeney Terrace -> Prince -> East -> Meigs. I'd meant to cross Monroe on Meigs then turn on Elmhurst St. to return to Averill, but I forgot to turn and just kept going. Comments: (1) Averill was a good choice for a bicycle boulevard. There was little car traffic and I had a pleasant leisurely ride. (2) The Champeney Terrace -> Prince -> East -> Meigs worked very well to get back from the public market, and might make a good candidate for an extension to the Averill -> Meigs route. The extended boulevard would connect the Genesee River Trail with the S. Wedge, Monroe, Park, NOTA, School of the Arts, and the Rochester Public Market. (3) If there is any way to do it, consider opening up Elmhurst St. to two-way bicycle traffic. Jogging from Averill to Meigs on Monroe will be intimidating to many bicycle riders. (4) If there was a way to add a counterflow lane on S. Union and Broadway that would make an awesome route too, especially once the cycle track on Union goes in as part of the Inner Loop project. (5) I liked the multi-piece speed bump on Averill and would be happy to see more. The gaps made it easy to ride through on my bike, and the bump was gentle enough that I didn't feel like it was destroying my car. Thanks for piloting this. I'm a relatively strong rider, but my wife detests riding on busy streets (even with striped bicycle lanes). I left my spandex at home for this trip and tried to keep in mind how she would experience the trip. I think she would have liked it.



35. I was glad to hear about the Rochester Bicycle Boulevards Plan. I frequently bike to commute, and my route takes me from Beechwood neighborhood along Webster, down East Main St, and then down Alexander all the way to Mt. Hope, where I get on the river trail. I reviewed the materials I found online, and I was glad to see bicycle lanes proposed for East Main St, as it is currently the scariest part of my commute. The current 6 lanes marked for traffic seem excessive and to encourage speeding while making pedestrian crossing a nightmare, and the common use of the side lanes for parking creates confusion. The result is an impression that this stretch of Main St. is an “anti-destination”. I hope that in planning the proposed bike lane, the city will also use one lane on each side to mark dedicated parking spots and bus stops, and consider reducing the total number of lanes even further to just one in each direction with a center lane for turning. I believe this would not only be the best result for cycling considerations, but also do much to enable the revitalization of this section of Main St by encouraging it to be viewed as a proper destination with tenable pedestrian crossings, rather than an empty and dangerous corridor. As for the rest of my route, I would love to see a bike lane or marked bike route on Webster Avenue. It seems like Alexander could be too tight to add a bike lane without removing some parking, but it may be convenient to use the planned cycle track along Union St, especially if it will connect with the river path trails at its end; the connection is not clearly marked on the plan, but it would be a shame not to make it. Not on my commuting route, but on my mind, are the sections of East Main beyond Goodman, and Main St further downtown. I know that there are ongoing discussion about a revitalization plan for East Main after Goodman, and I hope that bicycle encouragement will be a part of that plan. Similarly, I hope that downtown Main St. can be transformed into a bicycle friendly street once the buses are moved into the new terminal. Thank you for being our city cycling advocate.
36. I rode the pop-up bike boulevards today (9/29) with my friend Joe DiFiore (in CC), between 3:30 and 5:00. We had some observations which you may find useful. Although our observations tend towards identifying room for improvement, please be reassured that more generally we are delighted that City officials are pursuing the facilitation of bicycle transportation. The following include Narration (N) and observations (*), found (:) and not-found (X) (N) We started on Parsells, and turned left down Denver, along the proposed future route. We missed the turn right on Garson, and ended up riding down E. Main St, through the intersection at Goodman, and on back along the future route, turning left on Prince, until we jogged on East to Meigs. (*) We very much look forward to more bike lands and fewer car lanes on Main St. (*) The jog on East is very tricky, because it is a left turn onto East from either side, and there is no traffic light. The light at Alexander makes East much easier to cross. Also easier than the Prince/Meigs connection across East is a Meigs/StrathallenPk connection, since it is initiated by a right turn onto East rather than a left; it only requires crossing of one lane of traffic at a time, rather than two. Strathallen Park also leads nicely up to the Art Gallery driveway, across University, which cuts a nice corner over to one of the more pleasant stretches of Goodman. I currently prefer this route (Main/Goodman/Strathallen/Meigs) to the proposed one (Main/Prince/Meigs). (N) We continued down Meigs to the start of the pop-up. (:) We saw the directional signage at Meigs and Monroe. Generally we noticed consistent signage before places where the route turns, and I won't mention it again. (X) We did not find the median marked on the map just after Monroe. (X) We found a single speed cushion on Meigs between Monroe and Pearl, although there were places marked for three. The single cushion was pushed all the way to the curb, and was more in our way (on the return trip) than the cars' way. (:) We saw consistently placed bicycle route markings painted on the road. Although they were reassuring, they were somewhat too far spaced to make following the route fool-proof. Even looking for the signs and markings, we found ourselves wondering if we had missed a turn (we did once or twice) at several points. (X) We did not find a traffic circle at Pearl and Meigs. More generally, we did not find any of the traffic circles marked on the map, so I will not mention it further. (X) We did not find curb extensions at Pearl and Averill, or at least did not notice anything. More generally, we did not find any of the curb extensions marked on the map, so I will not mention it further. (:) We found and enjoyed the bike lanes at the bridge crossing 490. (X) We did not find Chicane on Averill between Walnut and South. More generally, we did not find any pop-up Chicane on our ride. (X) We did not find speed cushions on Averill between South and Ashland (*) We did come across pretty rough roads for cycling on

Averill between South and Mt. Hope. It seems that there is a fair amount of digging ongoing to access beneath the street. (N) We crossed Mt. Hope. at Averill, and went down the River Path to Ford St bridge, where we got onto the road and crossed. (:) The road over the bridge is marked for bikes. (*) School buses are some of the scariest vehicles for cyclists, although the bus drivers also tend to be some of the more respectful ones. (N) We road around the traffic circle, and went on the cross-walk cut through to Coretta Scott Crossing, and onto Frost, then down Frost to the start of the Blvd. (:) We found an intact speed hump (3 pads) on Woodbine, along with a (Beware of Bump, or some such) big yellow traffic sign each way. (X) We did not find the choker. (:) We did find the second speed bump pads. (N) We turned around after reaching Genesee Pk Blvd, and retraced our steps. (N) We missed the turn onto Post Ave on the way back, and continued along Ravenwood, but recognized Woodbine, and picked up the trail again. (*) To prevent the kind of mistake in the preceding narration, it might be useful to keep the route to as few turns as possible. Is there much advantage to turning on Post and Aberdeen rather than routing on Ravenwood and Woodbine? The Post jog, like the East Ave trickiness I mentioned above, requires an undesirable left-hand-turn-first both ways on the cycle-route. Of course cyclists are not restricted to the planned route, but I support the idea of marking well the preferred cyclist route, to make things as easy as possible. (N) Once on the West side return trip, and once on the East side return trip, we were yelled at with great animosity (to the effect of "Get Out Of The Road") by a driver in a car, one approaching us, and one passing from behind. (*) Although not unknown to me as a cyclist, this type of animosity on display in the preceding narration is not a daily occurrence. It is hard to say without more study if this shockingly high frequency of animus was perhaps due to a different style of riding on my part (perhaps due to a sense of boldness about having a marked route for bicycles), perhaps due to the time of day and length of the trip (rush hours?), or perhaps due to less tolerance of bicycles by drivers on these routes than the more main routes I normally take. In any case it really was shocking to be yelled at in this way while riding over marked bicycle indications on the road. (*) It occurred to me that perhaps drivers are using this type of route as a shortcut to bypass main route traffic, rather than travelers headed to a destination on these smaller streets. If that is the case, I hope the traffic calming features that are planned will help, but it may take more drastic measures to convince these drivers to use the main through-fares, such as creating dead-ends for cars which bicycles and pedestrians can pass with ease. I know, what a nightmare-political-football, but I think other cities have implemented this type of measure: Seattle has all sorts of streets which are through ways for pedestrians only, and cars have to go around to continue. (*) Last observation: While many intersections along the route were 4-way stops (applause), there were a few intersections where the bike blvd had a two-way stop, and the crossing street had no stop signs, but were apparently the same type of small neighborhood street (not a busier street). I think this is extremely dangerous, since a biker at this type of intersection is likely to roll through the stop. I hope all these intersections can be converted to 4-way from 2-way stops. As I said at the top of this letter, we would like to convey most strongly (although in fewer words), our appreciation that the city is serious about developing bicycle amenities. I hope that these observations will be useful data to use as you proceed with the proposed plans. Thank you again for being a cycling advocate.



OTHER COMMENTS

1. I like having bike lanes colored near intersections.
2. I like bike boxes.
3. Ensure areas are well-lit
4. Possible to test out bike share?!
5. Maintain bike lanes
6. Please plow off street facilities. Trails etc.
7. Please plow bike paths including Canal, River, etc.
8. Please plow & salt the trail (Genesee River) or more!
9. My wish is: The snow could be plowed off the canal + River path.
10. city plowing- please plow bike lanes too!!!! I see snow plowed ONTO them!
11. I want to bike over the bridge in the picture.
12. I'm 64 years old, Male, Viet Nam Veteran, 40% disabled, have diabetes, working full time and I commute 18 miles round trip to work by bicycle most of the year including Winter. My main suggestion, and many others agree, that we need to have the trails plowed and salted. My main part of the trail commute is on the Genesee River Trail from South Avenue to the University of Rochester. I usually ride through their parking lots from this point and streets the rest of the way on either side of the trail. However, one of my co-workers and a friend ride the canal trail on the East side. Ironically, 2 of the top cycling states in the US are Northern, Minnesota and Wisconsin. A few years ago Minnesota was featured in Bicycling Magazine and when it snows the first place they plow are the trails! Rochester can take a lesson from this. We don't plow our trails at all! How is that promoting 'Green'? Thanks for your time.