Athens IN MOTION

Athens-Clarke County
UNIFIED GOVERNMENT

BICYCLE AND PEDESTRIAN MASTER PLAN

Final Report
August 2018

ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

01

INTRODUCTION

Athens-Clarke County is a vibrant, thriving community located in northeast Georgia. Home to the University of Georgia (UGA), Athens-Clarke County has a diverse population, including long-time residents, college students, young professionals, and a workforce encompassing a variety of industries. Downtown Athens is the walkable commercial core of the community. The proximity of UGA and Downtown Athens creates a hub that is beginning to foster an active lifestyle, and the Unified Government of Athens-Clarke County is continuously investing in active transportation infrastructure to support it.

To encourage this development, Athens in Motion, the Athens-Clarke County Bicycle and Pedestrian Master Plan, identifies clear strategies for improving active transportation in the area. The Plan presents a network of safe and connected infrastructure, providing access to key destinations and encouraging active transportation throughout Athens-Clarke County. The Plan serves as a guiding document for future implementation of local bicycle and pedestrian projects that can transition from planned facilities into design and construction.

Athens in Motion frames the current state of active transportation within Athens-Clarke County in order to identify clear leverage points from planning efforts and existing infrastructure. It also summarizes public perception of active travel within Athens-Clarke County; public-identified assets and challenges ensure that the proposed plan best serves citizens. Building off existing conditions and public desires, the proposed network serves to improve overall mobility by connecting people to important destinations. The network is accompanied by prioritization metrics that identify how the system should be implemented, as well as strategies for moving projects to design and construction. Finally, educational programming recommendations are provided to encourage more use and to ensure that those using the network understand how to enjoy a safe and active lifestyle.

GOALS AND OBJECTIVES

Athens in Motion creates a vision for a future of biking and walking through strategic goal setting. By identifying clear and measurable goals, Athens in Motion illustrates what Athens-Clarke County hopes to become as it continues to evolve into a more bikable, walkable community. The goals listed in **Table 1-1** shaped the Plan's development, public engagement strategies, and network development.

Table 1-1: *Goals and Objectives*

	CONNECTIVITY	EQUITY	MORE USERS	EDUCATION	IMPLEMENTATION
GOALS	Design a connected network of low-stress bicycle and pedestrian facilities	Improve safe access to opportunity for all citizens of Athens-Clarke County	Encourage those who do not normally use active transportation to use the network for trips	Inform residents and businesses about benefits and laws for active travel and bicycle/pedestrian safety	Provide a variety of different funding mechanisms to finance and maintain the network
OBJECTIVES	• Build connected facilities • Fill gaps in the sidewalk network • Improve active transportation connections to other forms of transportation, especially transit • Provide active transportation linkages to important destinations	• Provide infrastructure equitably throughout Athens-Clarke County • Create a safe network of infrastructure for all ages and abilities	• Create a bike/ped counting program • Collect yearly crash data • Encourage low-stress connectivity throughout the network	• County-wide education campaigns for pedestrians, bicyclists, and motorists • Walking and biking demonstrations and activities for K-12 aged children • College student programs for new students about multimodal transportation, including safety, laws, and opportunities	• Identify funding mechanisms • Prioritize projects for a clear implementation plan • Provide design guidelines for consistent design across the network

Athens in Motion not only identifies the above goals and objectives, but it also prescribes success measures to articulate measurable milestones for moving toward its vision. These success measures (**Table 1-2**) also serve as a general timeline during which steps from the Plan should be implemented.

Table 1-2: *Success Measures*

WHAT DOES SUCCESS LOOK LIKE?		
GOALS	**PROGRESS**	**SUCCESS**
CONNECTIVITY	• 25% of identified sidewalk gaps have been addressed • All transit stops along the top 50% most frequently used routes have bicycle and pedestrian connections	• Sidewalk improvements included in capital improvement plan by 2020 • At least one bicycle facility in each square mile of Athens-Clarke County • All transit stops have immediate access to bicycle and pedestrian facilities
EQUITY	• First/last mile bicycle and pedestrian connections to transit stops for 30% of bus stops across the county • Safe routes to school, biking and/or walking, for 50% of students within 1 mile of elementary or middle schools • Implement a system for recording and mapping bicycle and pedestrian crashes within 2 years of Plan adoption	• First/last mile bicycle and pedestrian connections to transit for greater than 50% of bus stops across the county • Safe routes to school, biking and/or walking, for 50% of students within 2 miles of elementary or middle schools • Use crash data to inform Vision Zero benchmarking
MORE USERS	• Implement bicycle and pedestrian counting systems within 2 years of plan adoption • On-street facilities • Place bicycle parking alongside major cyclist attractors (parks, schools, etc).	• Crashes reduced by 25% from adoption year crash records within 5 years of Plan adoption • Complete network of trails across Athens-Clarke County • Protect, separate, and/or buffer on-street facilities • Provide adequate wayfinding that identifies clear routes for network users
EDUCATION	• Within one year of adoption of Plan, host an active transportation event, such as Car-Free Day, Open Streets Events etc. • Host bicycle and pedestrian safety programs with interested schools • Host Bike to Work Day event	• Within 5 years of adoption, bicycle and pedestrian safety programs are available in public schools • Host recurring signature event to promote active transportation • Offer annual bicycling skills class • Annual Bike to Work Day events
IMPLEMENTATION	• At least 10 "low hanging fruit" projects are implemented (including temporary or pilot projects) • At least 3 capital projects, or larger-scale projects, are implemented • Create Bike/Ped Coordinator position • Become a silver-level Bicycle Friendly Community by 2020	• Entire bicycle and pedestrian network implemented by 2040 • Fill Bike/Ped Coordinator position that is supported by permanent Citizens Advisory Council • Become a platinum-level Bicycle Friendly Community by 2050.

STUDY AREA AND EXISTING CONDITIONS

Today, pedestrian and bicycle infrastructure exists throughout the study area on a variety of scales and in multiple forms, as illustrated in **Figure 1-1**. There are, however, key gaps and a lack of pedestrian connectivity throughout the county, especially in rural contexts. Also, the existing infrastructure does not encompass the entire study area, and some existing facilities are substandard and/or damaged. These types of barriers can limit mobility for those who already use active transportation, as well as discourage new users. Athens in Motion has identified these barriers and provides recommendations to address them.

Athens-Clarke County has invested in infrastructure and other facilities to support their growing culture of active transportation. An existing conditions active transportation image library has been assembled and is presented in **Appendix A**. Images include crosswalks, mid-block crossings, curb-ramps, signage, wayfinding signage, pavement markings, and street furniture.

In addition, Athens-Clarke County supports a robust transit network that includes over 500 fixed-route stops (**Figure 1-2**). In the last 18 years, nearly 400 bus stop improvements have been completed. Each of the top 23 most heavily used bus stops have immediate access to some type of bicycle and pedestrian facilities.

Figure 1-1: *Existing Active Transportation Facilities*

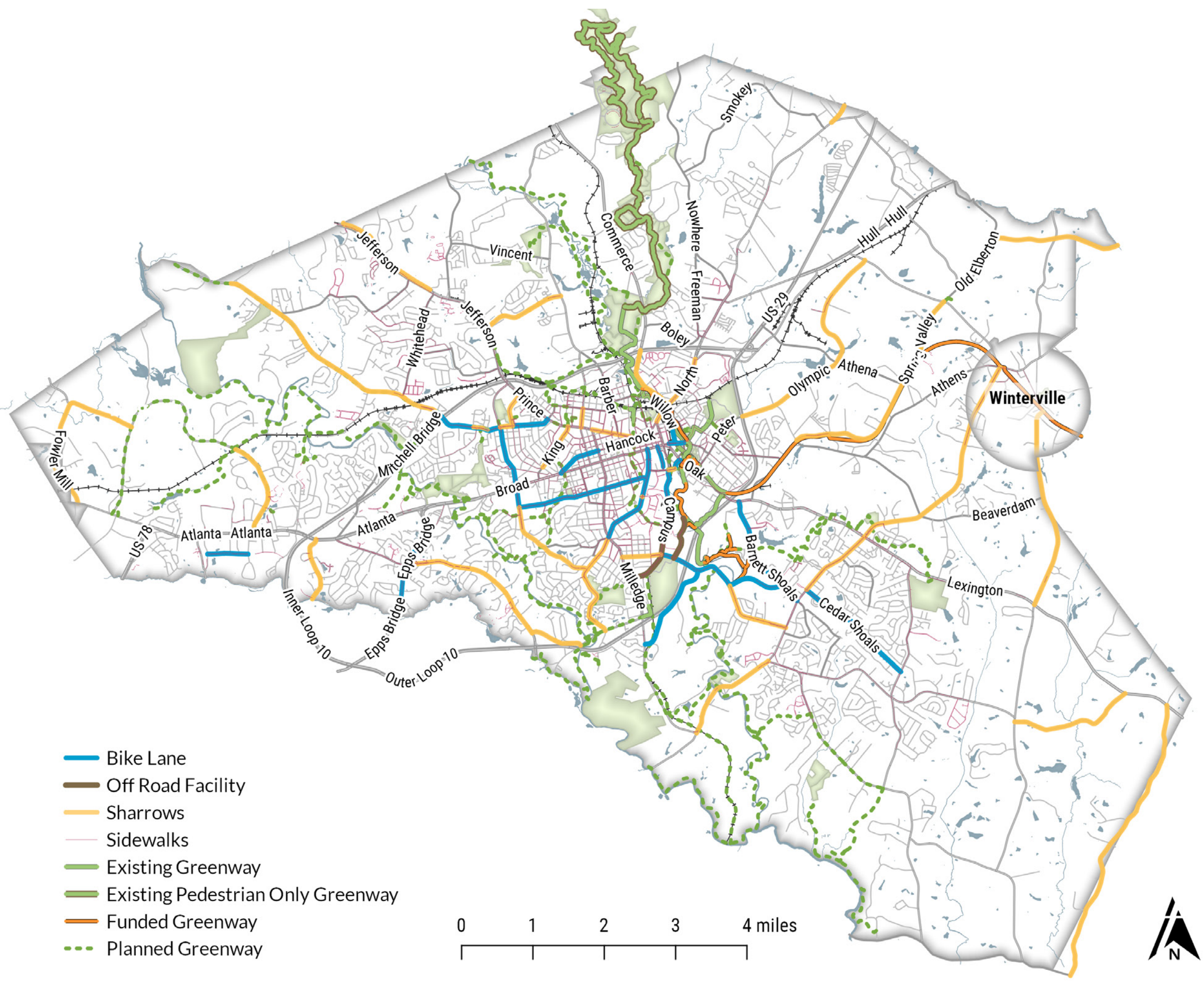
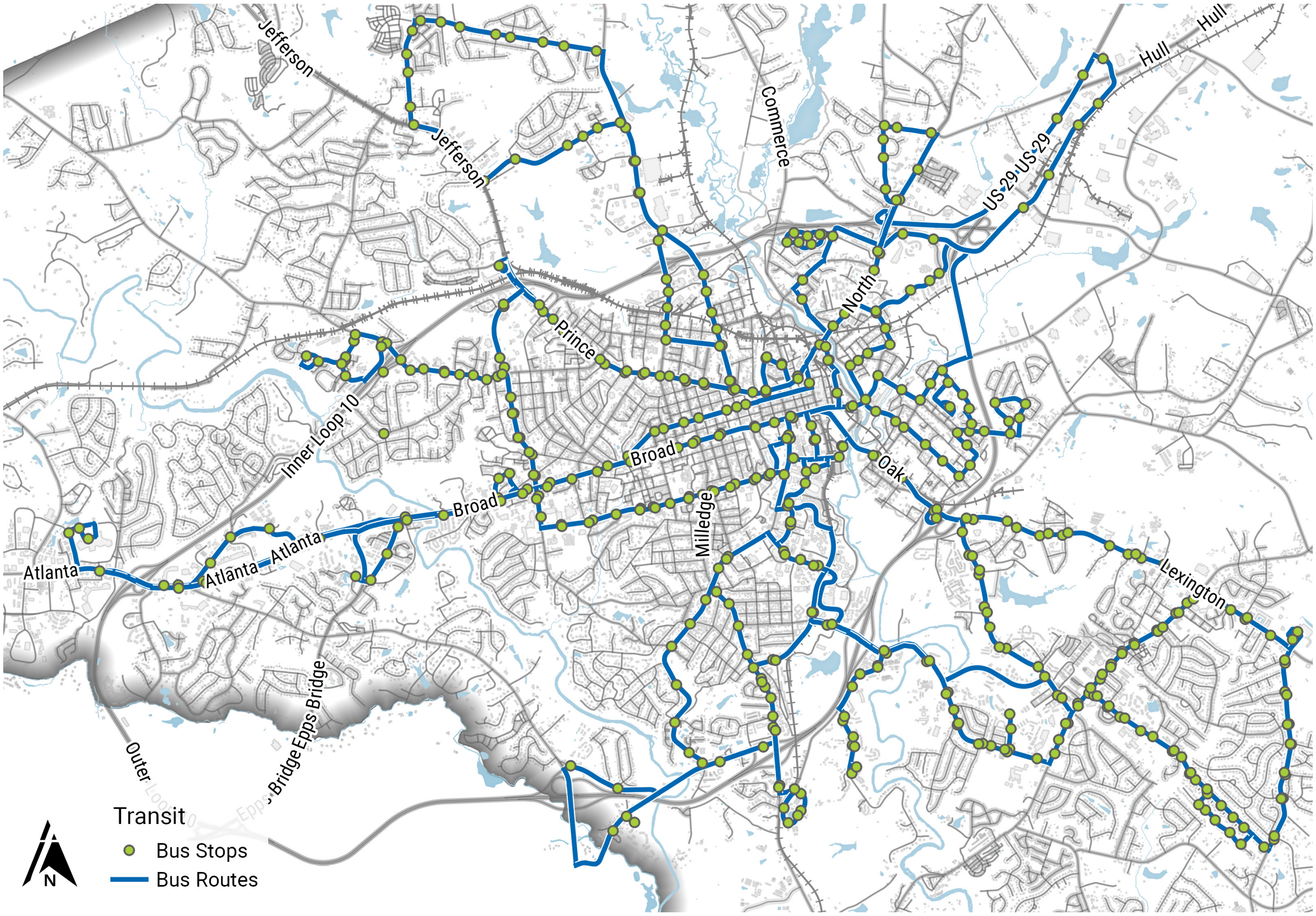


Figure 1-2: *Existing Bus Stop Locations*



However, opportunities still exist for improving the transit system, particularly regarding active transportation infrastructure. Bicycle and pedestrian infrastructure are critical to the success of a transit system. Transit users will likely bike/walk to and from transit, so it is critical that safe, well-maintained infrastructure connect users to their destinations. This is true for all transit stops, but it is especially important along the most utilized routes. Presently, many stops lack shelters and/or have no or limited pedestrian infrastructure creating these "first- and last-mile connections" surrounding them, especially in non-urbanized areas.

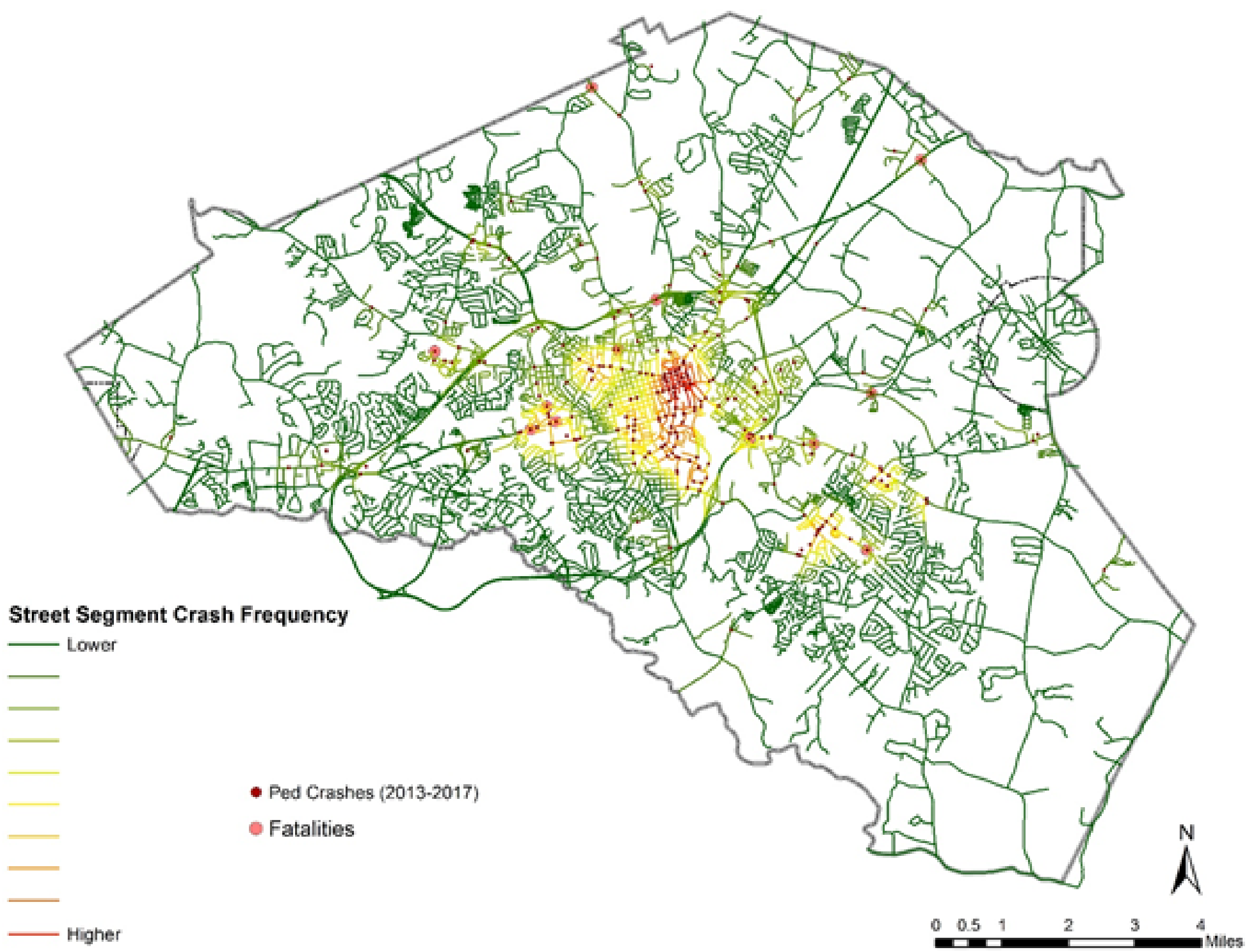
ART AND INFRASTRUCTURE

Active transportation facilities provide the opportunity to integrate art into the community in creative ways. For example, Athens Transit has implemented artistic bus shelters along its routes through the program "You, Me, and the Bus." Similarly, combining art into bicycle and pedestrian infrastructure can create community buy-in for projects, as well as make infrastructure itself into a unique, beautiful destination.

HISTORICAL CRASHES

Georgia Department of Transportation (GDOT) pedestrian crash data was reviewed. **Figure 1-3** presents crashes that occurred between 2013 and 2017; it shows that crashes are concentrated in Downtown Athens where there is likely already more walking. Bicycle crash data was not readily available from existing sources.

Figure 1-3: *Pedestrian Crash Hot Spots*



EXISTING PLAN REVIEW

Athens in Motion supports existing planning efforts within Athens-Clarke County, and desires to build upon these previous endeavors. A complete review of previous planning documents is included in **Appendix A**; a summary of emerging themes is as follows:

01 ***Safety:*** implementing design standards or other recommendations to encourage cycling facilities that are safe for all ages and abilities.

02 ***Connectivity:*** concentrating active transportation infrastructure around areas that: 1) best support biking and walking, like dense commercial areas, residential neighborhoods, and mixed-use facilities; and 2) connect users to important amenities for equity, including transit, community centers, and parks.

03 ***Leveraging existing infrastructure:*** connecting planned infrastructure with existing and/or funded bicycle and pedestrian facilities cuts down on costs and contributes to greater overall network connectivity.

Table 1-3: *Existing Plan Review Summary*

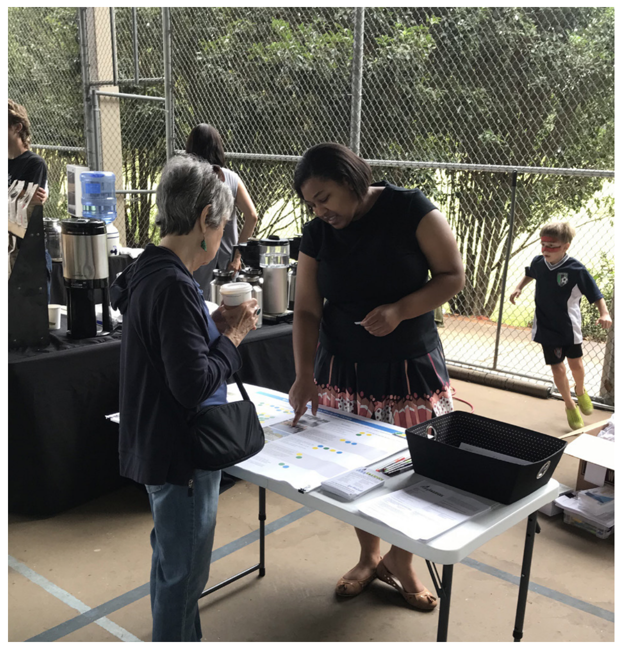
Plan	Year	Connectivity	Safety	Leveraging Existing Conditions
Completed Bicycle Facilities Report	2017	N/A	N/A	N/A
Proposed Facilities Score Sheet	2017	N/A	N/A	N/A
Sidewalk Gap Program	2017	X	X	X
Athens Transit Feasibility Study	2016	X		X
Oconee Rivers Greenway Network Plan	2016	X	X	X
Athens-Clarke Country Bicycle Access Improvement Project Evaluation Manual	2011	X	X	X
Athens-Clarke County Bicycle Master Plan	2003	X		X

PUBLIC ENGAGEMENT

Hearing the voice of the public regarding biking and walking was crucial in forming the recommended network and will be essential for sustaining momentum and attracting new users as the Plan is implemented. The goal of public engagement efforts was twofold: 1) to ensure that Athens in Motion will comprehensively address citizens' needs; and 2) to inform the public about the Plan and the benefits of biking and walking. Athens-Clarke County staff and the consultant team engaged people in a variety of ways, encouraging a broad cross-section of the public and key stakeholders to participate. Key methods of engaging Athens-Clarke County citizens and resulting themes are summarized here.

COLLABORATION

A Citizens Advisory Committee directed the strategic planning process and development of the network. Comprised of people who are invested in active transportation in Athens-Clarke County, the Citizens Advisory Committee met monthly and at other key milestones throughout plan development; their feedback on public participation efforts, study methods, and draft network recommendations ensured that Athens in Motion reflected the community's needs. Meetings of the Citizens Advisory Committee were open to the public, attracting many biking and walking enthusiasts.



CITIZEN ADVISORY COMMITTEE

Throughout the Athens in Motion planning process, a Citizens Advisory Committee provided feedback to Athens-Clarke County and the consultant team. Membership was comprised of representatives from:

- BikeAthens
- UGA
- Firefly Trail, Inc.
- Athens-Clarke County Transportation and Public Works
- Oconee River Greenway Commission
- Athens-Clarke County Leisure Services
- Complete Streets Athens
- Athens-Clarke County Transit
- City of Winterville

POP-UP EVENTS

To reach a diverse and broad cross-section of the public, numerous informal "pop-up" events were held to distribute informational materials about the Plan, promote active transportation, and receive valuable feedback. A pop-up style strategy engages the community at events that are already well-attended. Postcards with project information and the link to the online interactive Wikimap were distributed at all pop-up events.

POP-UP EVENT HIGHLIGHTS

- Over 650 impressions made at UGA event in September 2017
- Over 500 impressions made at East Athens Community Center Events in August 2017
- Over 1,300 personal engagements

Events at the following:

- First Friday
- UGA Bike and Pedestrian Safety Day
- West Broad Farmers Market
- Front Porch Bookstore Concert Series
- Athens Farmers Market, Bishop Park
- Winterville Marigold Festival
- West Fest at Georgia Square Mall
- Hot Corner Festival

EAST ATHENS FIRST FRIDAY

UGA SAFETY DAY

ATHENS FARMERS MARKET

WINTERVILLE PORCH CONCERT

SURVEYS

The Athens in Motion planning process was informed by nearly 700 survey responses. The survey's focus was to inform the planning what would encouraging more biking and walking in Athens Clarke County. The survey was available via the project website and in hardcopy format and was published in both English and Spanish. Each of the following figures (**Figure 1-4 through Figure 1-7**) illustrate some of the key responses that resulted from the surveys.

Figure 1-4: *Athens Bicycle User Types*

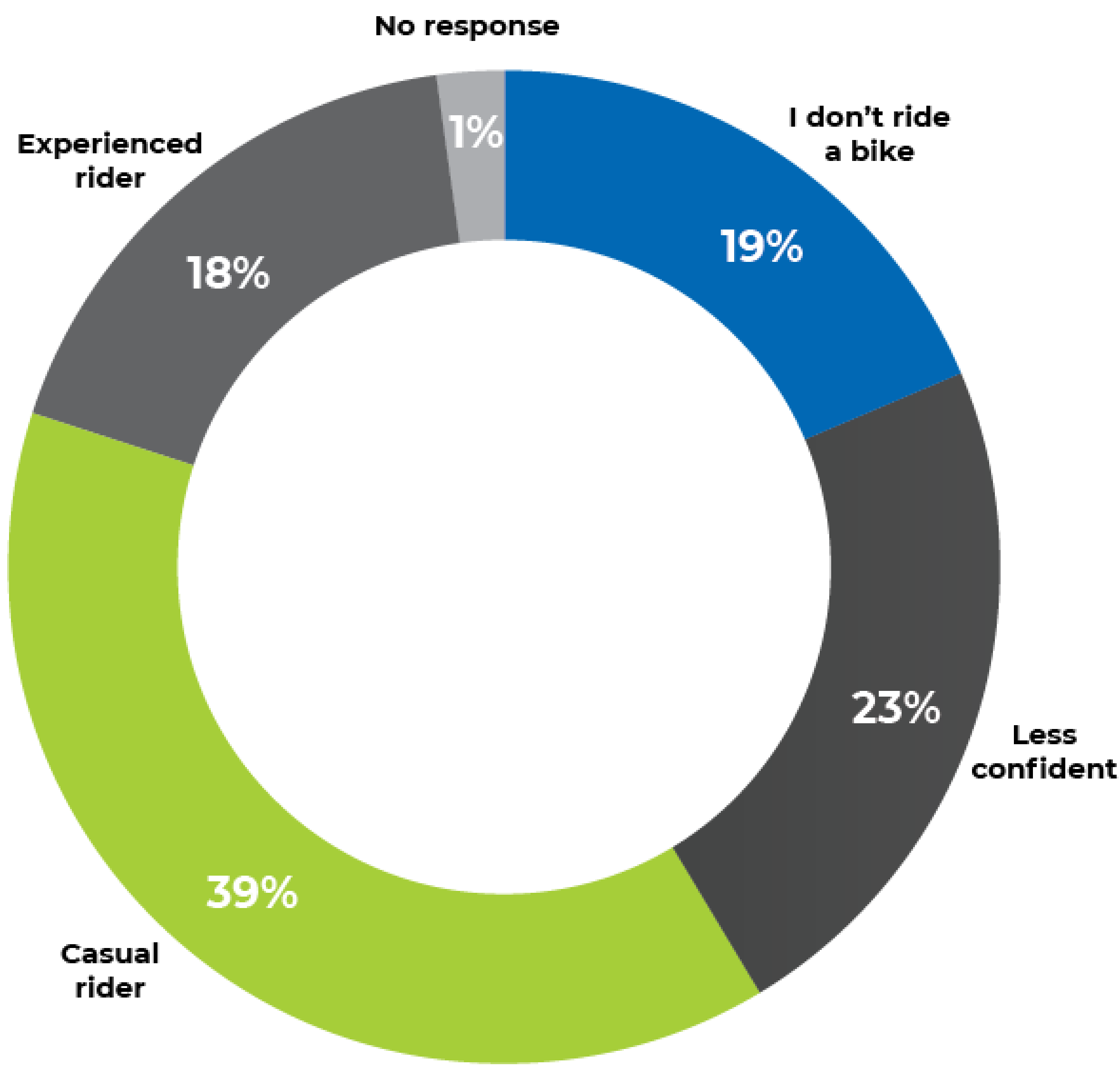


Figure 1-5: *Bicycle Improvements Desired*

What would encourage respondents to BICYCLE more?

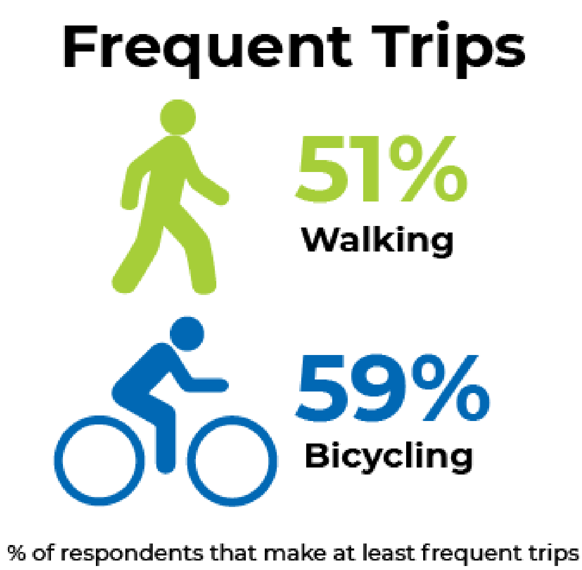
- More bike lanes on major streets
- Larger network of bicycle paths
- More bike lanes on minor streets

Figure 1-6: *Pedestrian Improvements Desired*

What would encourage respondents to WALK more?

- Better lighting and security
- Improved sidewalks
- Paths and trails closer to my home

Figure 1-7: *Percent of Users Making Frequent Trips on Foot/Bicycle*



NETWORK DEVELOPMENT

NETWORK DESIGN APPROACH

UNDERSTANDING USERS

ANALYSIS PROCESSES

REGIONAL NETWORK

02

NETWORK DESIGN APPROACH

Walking and biking in Athens-Clarke County are important parts of the culture and transportation network. To continue to support biking and walking, the Athens in Motion plan proposes partnering with stakeholders and agencies (**Figure 2-1**),as well as a bicycle and pedestrian network that utilizes existing facilities as its foundation. The recommendations are based on several guiding principles, as outlined below.

First, high quality infrastructure can make the entire network more accessible and enjoyable for all types of users, regardless of age, income, or ability level. Implementing safe and well-designed bicycle and pedestrian facilities can encourage more people to use the network, building upon the existing culture for active transportation.

Second, the location of the proposed infrastructure should satisfy multiple criteria, including land uses that best support biking and walking, the community's desires, existing facilities, and equity.

Third, the type of infrastructure proposed for each route should suit the existing context and provide the highest degree of safety for users.

Finally, a network of connected and continuous bicycle and pedestrian infrastructure is more powerful for increasing mobility and accessibility than the sum of its parts. A network approach to bicycle and pedestrian improvements—rather than a piecemeal approach— is a more strategic investment for Athens-Clarke County; a complete network of facilities serving the entire area enhances mobility more than a single trail, sidewalk, or bike lane alone.

Figure 2-1: *Potential Partnerships*

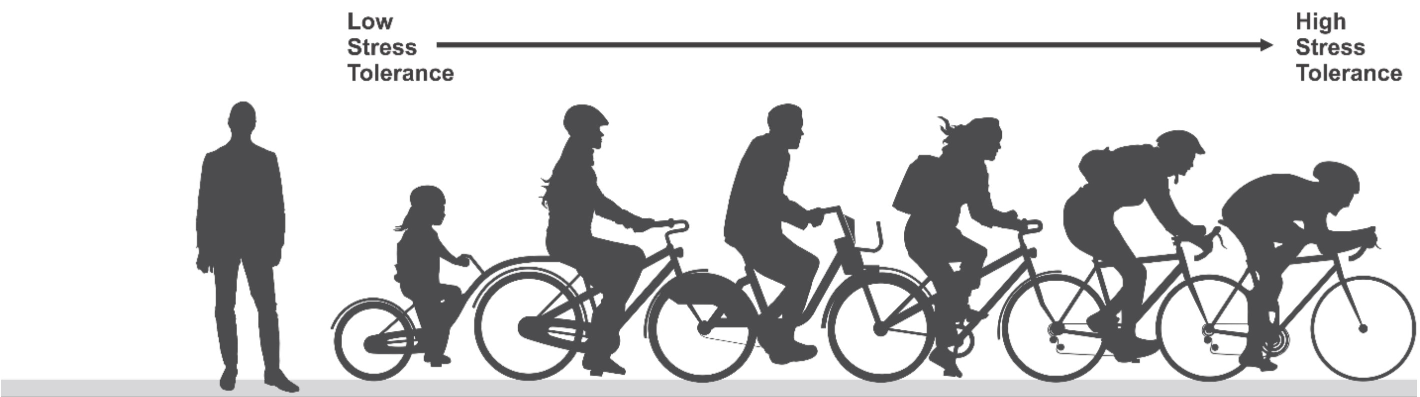
WHAT DOES SUCCESS LOOK LIKE?

A successful network is one that provides safe, connected infrastructure that improves mobility for all ages, incomes, and abilities within Athens-Clarke County.

UNDERSTANDING USERS

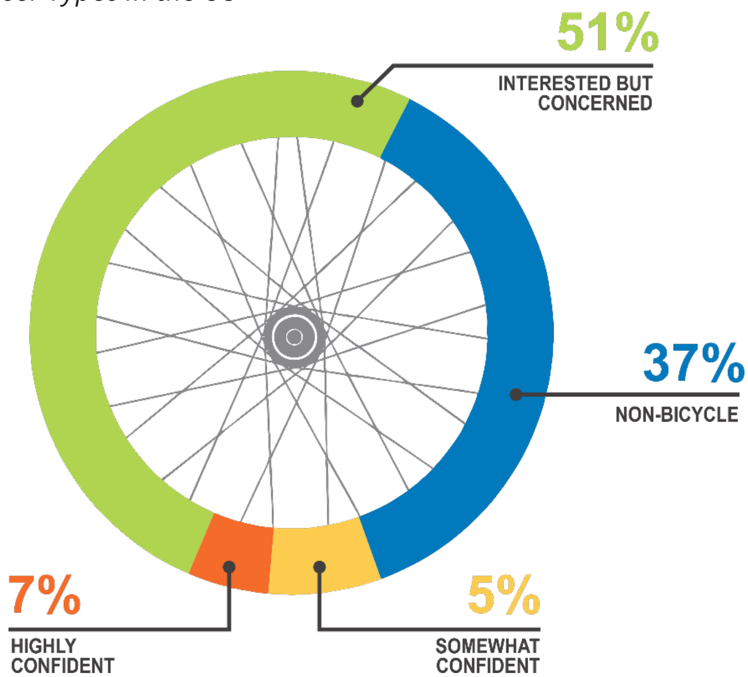
Bicycle and pedestrian facilities have evolved from serving as “alternative transportation” facilities to filling a critical gap in transportation networks. For many years, bicycle facilities placed people riding bikes in or directly adjacent to vehicle travel lanes. While this approach meets the needs of confident cyclists, it does not attract new users or encourage a broader bike culture, as desired by Athens-Clarke County. As shown in **Figure 2-2** and **Figure 2-3**, we now understand that a variety of bicyclists exist, each with different needs and stress tolerances.

Figure 2-2: *User Types*



NON-BICYCLE	INTERESTED BUT CONCERNED	SOMEWHAT CONFIDENT	HIGHLY CONFIDENT
Uncomfortable bicycling in any condition, have no interest in bicycling, or are physically unable to bicycle.	Often not comfortable with bike lanes, may bike on sidewalks even if bike lanes are provided; prefer off-street or separate bicycle facilities or quiet or traffic-calmed residential streets. May not bike at all if bicycle facilities do not meet needs for perceived comfort.	Generally prefer more separated facilities, but are comfortable riding in bicycle lanes or on paved shoulders, if necessary.	Comfortable riding with traffic, will use streets without bike lanes.

Figure 2-3: *Breakdown of User Types in the US*



Source: McNeil, Nathan; Mosere, Christopher M; and Dill Jennifer, "The Influence of Bike Lane Buffer Types on Perceived Comfort and Safety of Bicyclists and Potential Bicyclists" (2015).

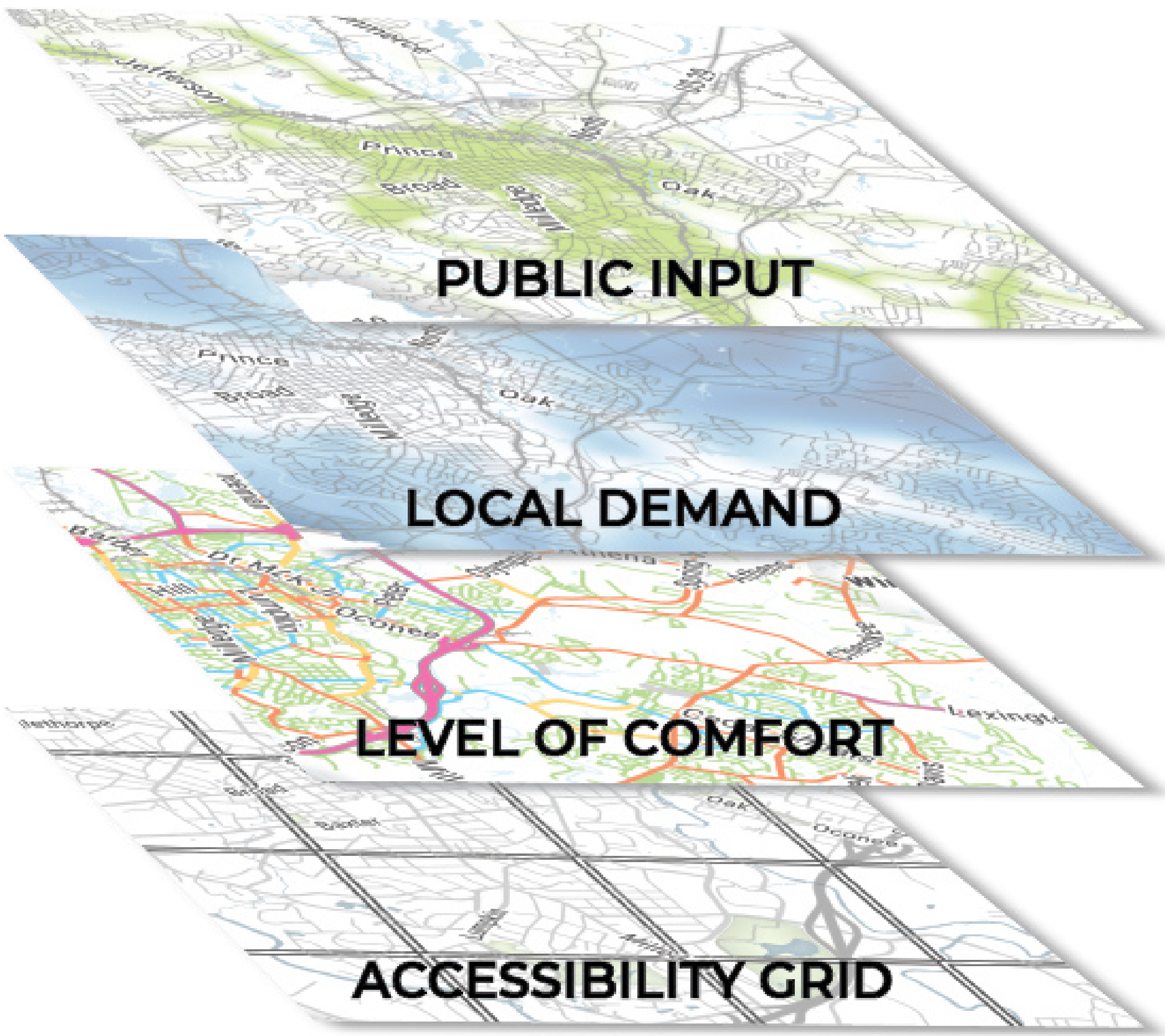
Nationally, over 50% of people indicate that they are "Interested but Concerned" in bicycling and would like to ride more often. Over 50% say they are worried about being hit by a car, and nearly 50% say they would more likely ride a bike if physical separation were provided between motor vehicles and bicycles.

While the prescribed user types and cited research are specific to bicyclists, pedestrians also prefer to be placed further away from the curb and/or have a buffer between themselves and motor vehicle traffic. Lower stress environments result in increased numbers of people biking and walking because lower stress design typically accommodates both user types through the combination of sidewalks, separated bike lanes, and shared-use paths.

ANALYSIS PROCESSES

Athens in Motion used four distinct analyses for creating the proposed network: 1) public input; 2) demand analysis; 3) level of comfort analysis; and 4) accessibility analysis (**Figure 2-4**). The demand analysis highlights places that are currently hubs of bicycle and pedestrian activity and that could become active transportation centers. The level of comfort (LOC) analysis shows what it is currently like to ride a bike on a given street. Finally, the accessibility grid analysis ensures that the network is spread across all of Athens-Clarke County. Together, these analyses create a network that promotes equity, encourages new users, and truly enhances mobility.

Figure 2-4: *Network Development Process*



PUBLIC INPUT

Results from the Wikimap were included in the analysis to identify key destinations, barriers to biking and walking, and intersections and roads in need of improvement. The heatmap presented in **Figure 2-5** shows where higher densities of comments were located. The results of the Wikimap, along with other public input, was used comparatively with the LOC and demand analyses. The proposed network considered the key destinations that users desired to access by biking or walking in order to recommend facilities that would increase safety and connectivity for all existing and potential users. Additionally, barriers and problem intersections identified by the public were reviewed for targeted improvements as part of the overall network, as well as serving as a key consideration for prioritization of projects.

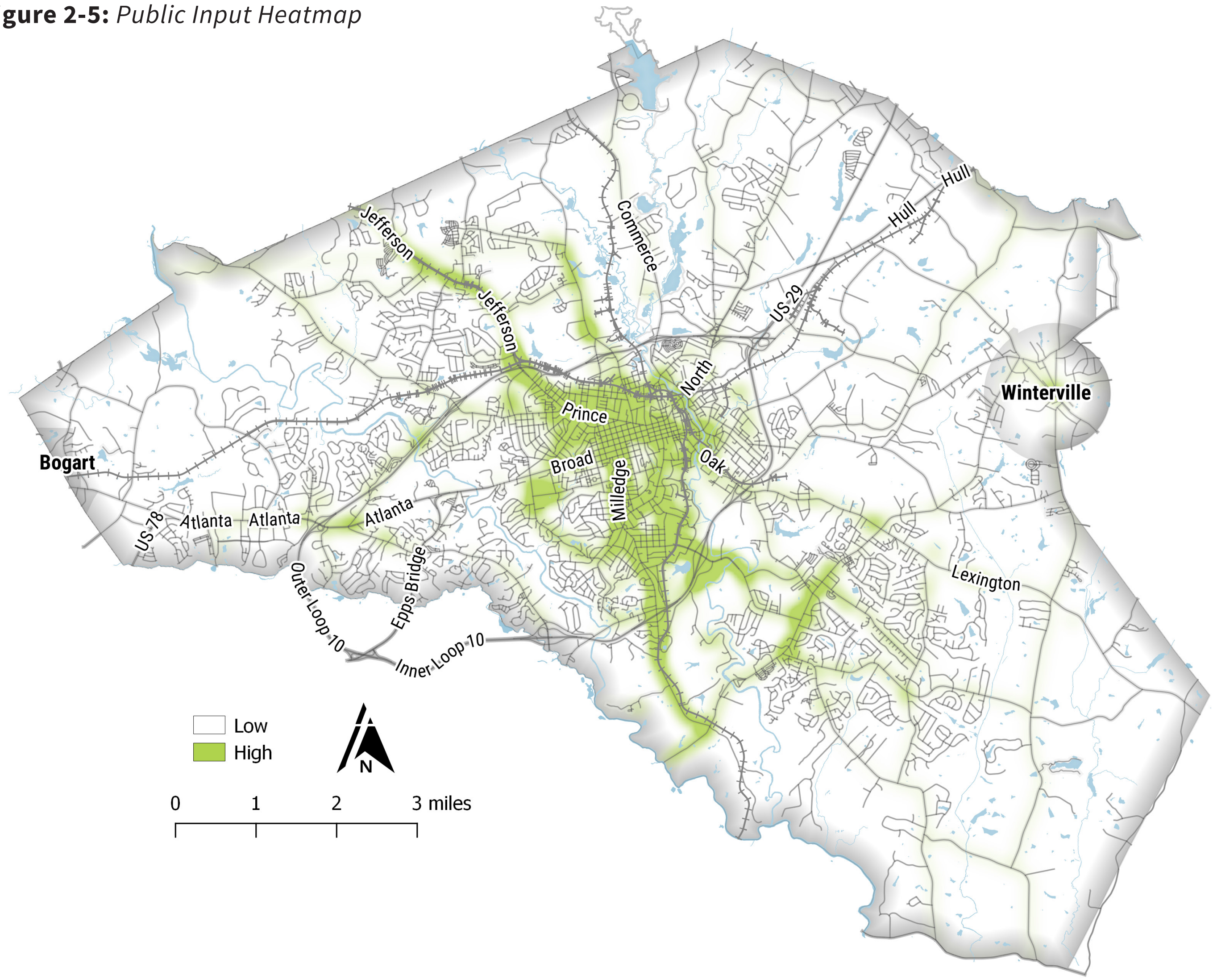
GOALS:

MORE USERS

EQUITY

Using the results from the WikiMap as a factor in building the network ensured that connections identified by the public regardless of age, gender, socioeconomic status, etc.—were included in the network. Also, some people may not bike/walk for trips because there is not adequate infrastructure between destinations. Implementing infrastructure to fill these gaps will encourage this "Interested but Concerned" group to consider biking and walking for trips.

Figure 2-5: *Public Input Heatmap*



DEMAND ANALYSIS

The demand analysis for Athens-Clarke County highlights places that are either: 1) currently hubs for bicycle and pedestrian activity; or 2) may be hubs of activity in the future. These places create demand for high quality infrastructure to support existing users and attract new users. Places that are already "hotspots" of active transportation can serve as nodes of a network of bicycle and pedestrian infrastructure. The activity centers in Athens-Clarke County will be used to inform future network recommendations.

The demand analysis illustrates the best locations for bicycle and pedestrian infrastructure using a heat map, as presented in **Figure 2-6**. These areas were identified considering multiple factors with differing weights, including existing active transportation infrastructure, schools, and transit facilities. Each factor and its weight was chosen based on its likelihood to generate biking and/or walking trips. Bus stops, for example, are places that have higher levels of pedestrian activity and therefore require safe "first and last mile" connections. An exhaustive list of all factors included in the analysis is included in **Appendix A**.

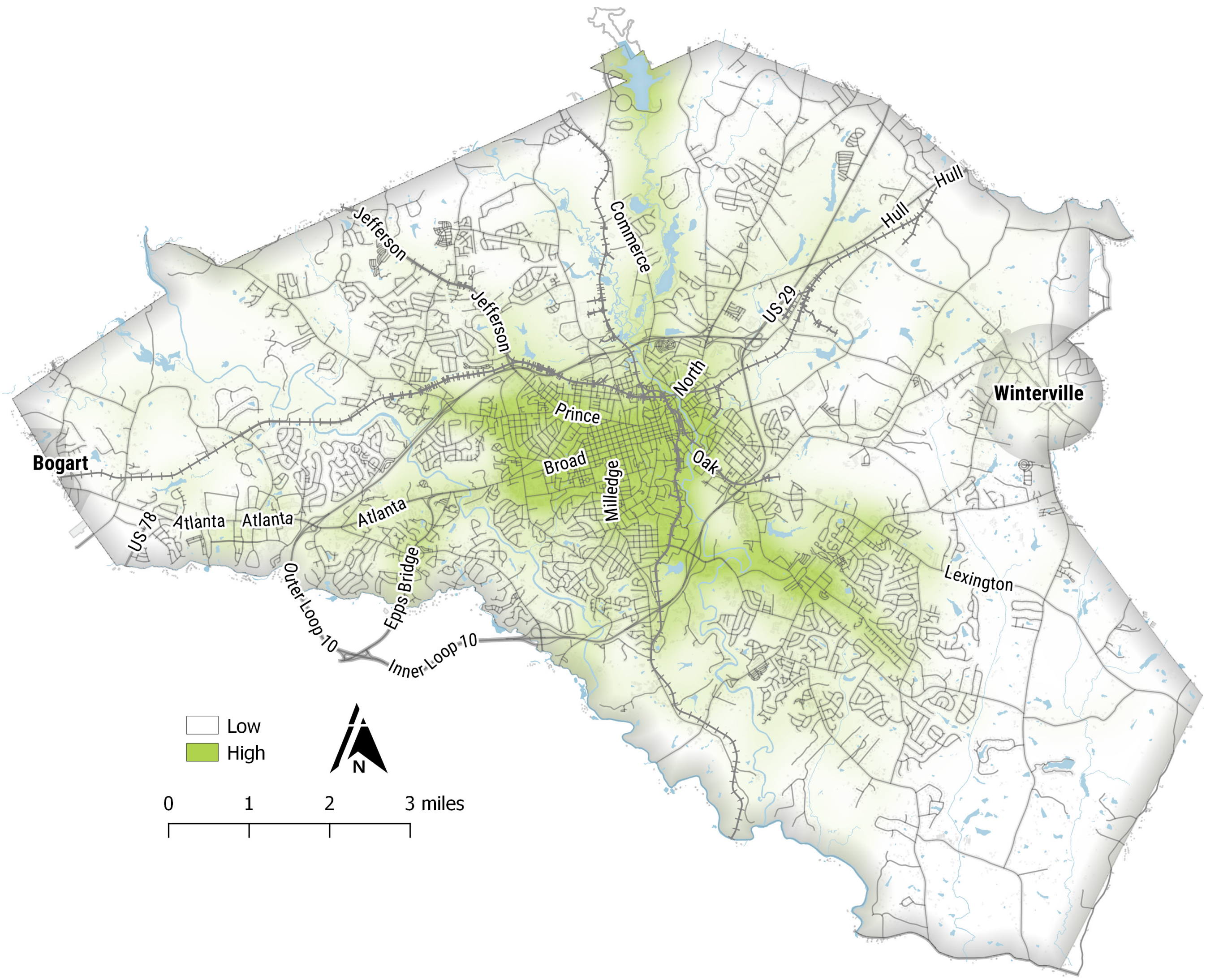
GOALS:

CONNECTITY

MORE USERS

Providing infrastructure between key destinations where there are already active transportation users enhances connectivity and accessibility throughout the region while also providing an attractive alternative for those who currently do not walk or bike to these destinations.

Figure 2-6: *Demand Analysis Map*



LEVEL OF COMFORT ANALYSIS

As described previously, bicyclists have varying levels of tolerance for traffic and the stress created by volume, speed, and proximity of adjacent traffic. Their tolerance may vary by time of day or trip purpose, and it may change over time and with bicycling experience. To quantify a cyclist's comfort, a Level of Comfort (LOC) analysis was performed for Athens-Clarke County.

The LOC analysis is based on a concept developed in a report from the Mineta Transportation Institute that assigns a "score" to a given piece of street or bicycle infrastructure based on its characteristics, such as the level of separation from traffic, road speeds, traffic volumes, and safe crossings on major roadways.

This analysis was customized for Athens-Clarke County's road network and available data. While it may not reflect the experience of every individual bicyclist, the LOC ratings reflect a conservative estimate, which is appropriate for infrastructure's long-term nature. The network should be planned to serve the "Interested but Concerned" rider in order to attract more users, and the LOC analysis illustrates the type of infrastructure needed to improve bicyclist comfort to attract these riders. Methods used to develop this analysis are shown in **Appendix A**.

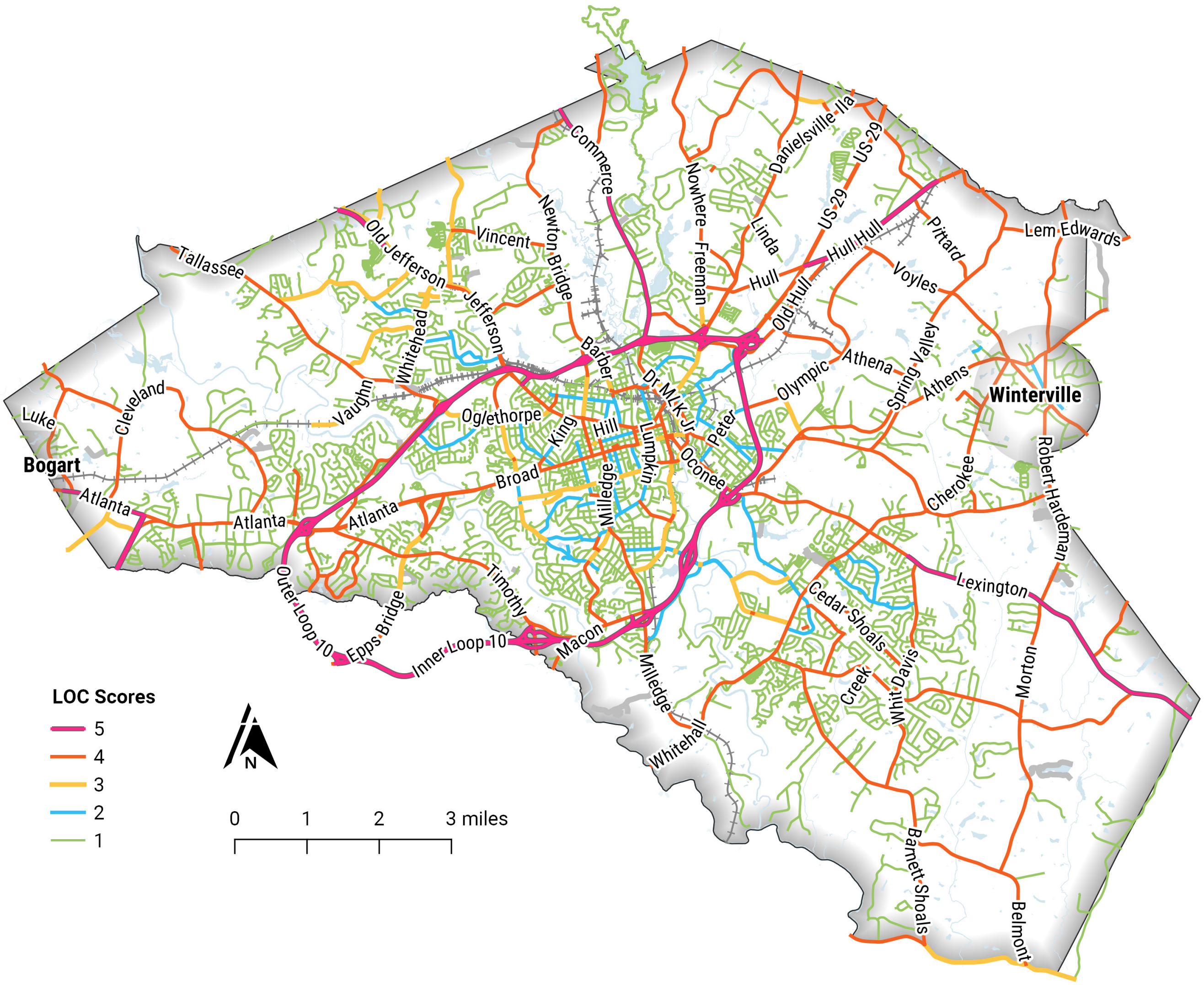
Figure 2-7 shows the five scores used in the Athens in Motion analysis. Additionally, parts of the analysis extend beyond the study area limits because it is important to understand the LOC of streets entering and exiting the study area to provide a clear and accurate depiction of the existing conditions for regional bikeability.

GOALS:

MORE USERS

The LOC analysis supports the "More Users" goal by identifying which routes may be barriers to those who are not comfortable biking and walking in heavy traffic for improvement.

Figure 2-7: *Level of Comfort Results*

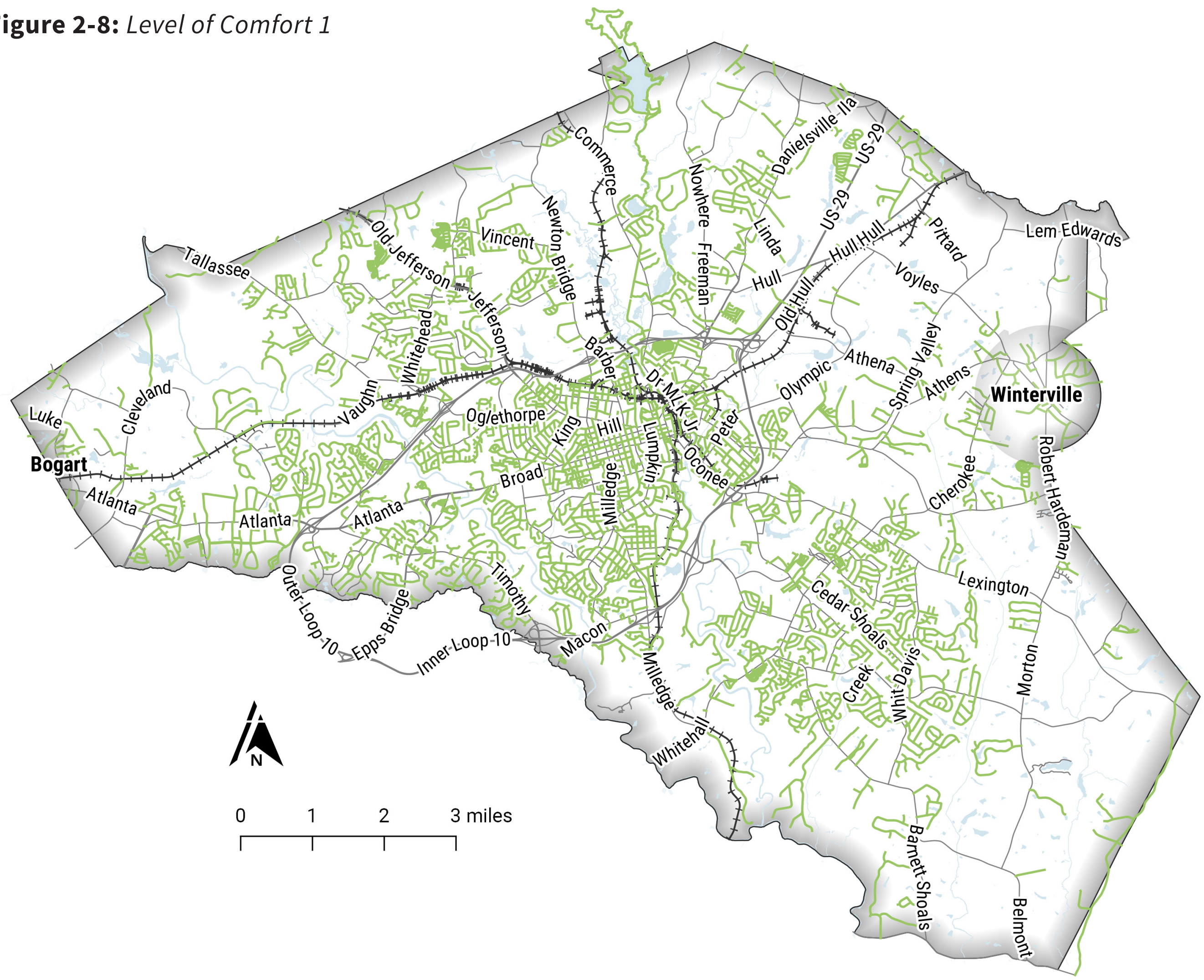


LEVEL OF COMFORT 1 is assigned to areas where riding a bike is comfortable for a wide range of ages and abilities. Off-street bike facilities such as multiuse paths, trails, and greenway trails are included in this category. Roads within this category are characterized by slower speeds (<25 MPH or 30 MPH with bike lanes).

Representative streets and facilities include but are not limited to:

- First Street Greenway
- Morton Avenue

Figure 2-8: *Level of Comfort 1*

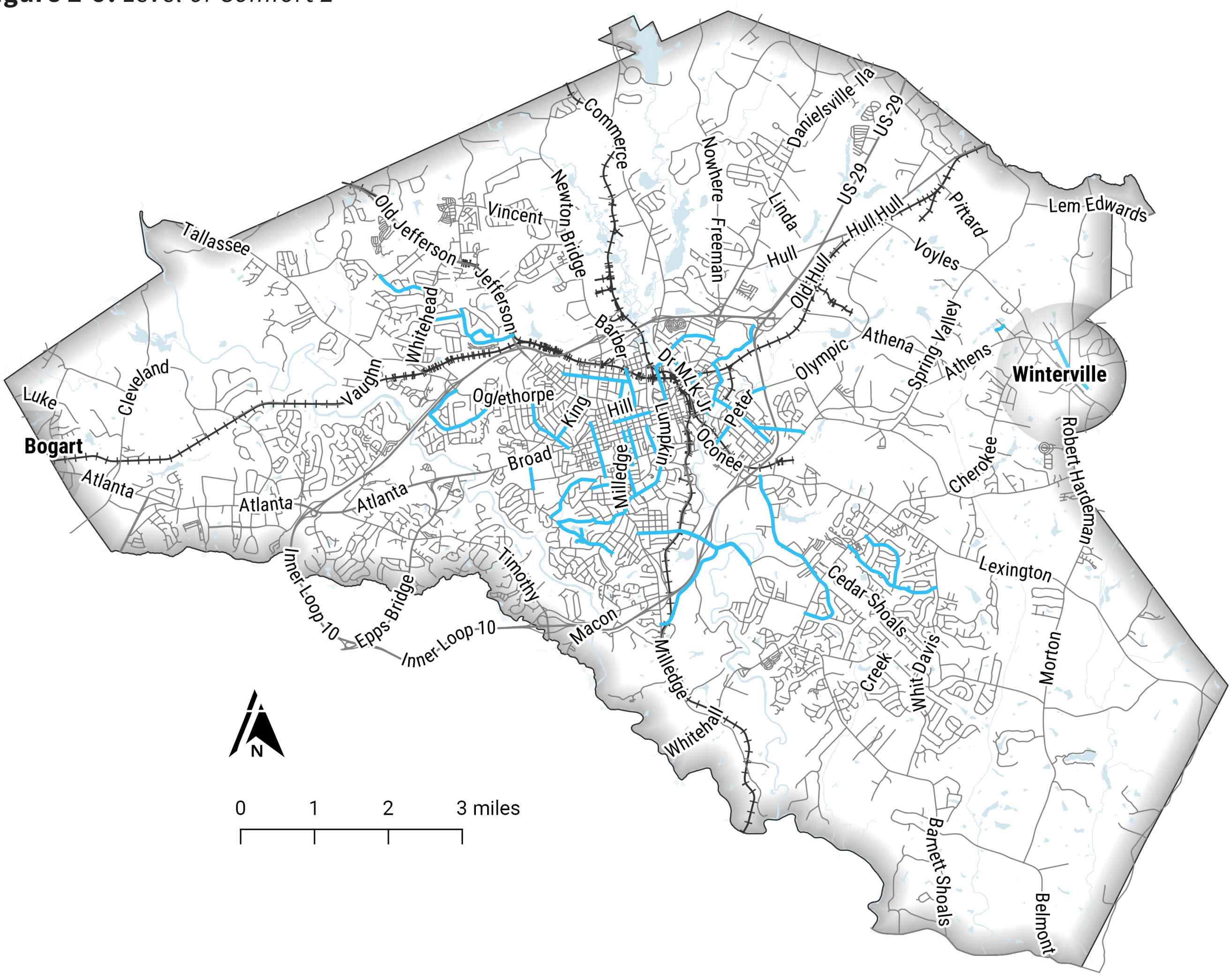


LEVEL OF COMFORT 2 is assigned to roads that may be comfortable for adults that don't ride a bike often. Roads within this category are characterized by designated bike lanes, moderate speeds (30-40 MPH).

Representative streets include but are not limited to:

- College Station Road
- South Lumpkin Street (between West Broad Street & Milledge Avenue)

Figure 2-9: *Level of Comfort 2*

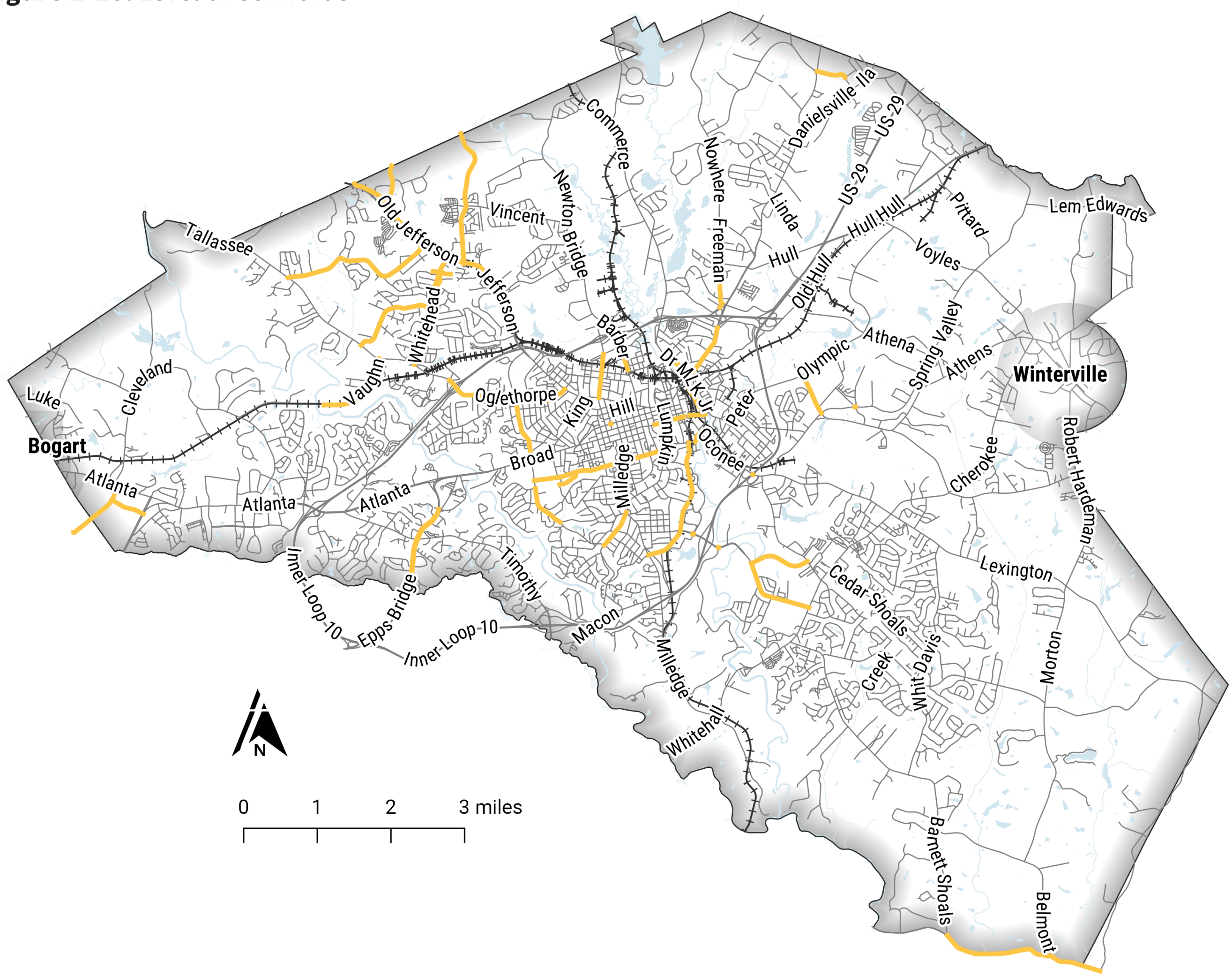


LEVEL OF COMFORT 3 is assigned to areas well suited for enthusiastic cyclists that are confident in their abilities and comfortable riding in mixed traffic. Roads within this category are characterized by designated bike lanes, moderately high speeds (35-45 MPH).

Representative streets include but are not limited to:

- Baxter Street
- Chase Street (between Prince Avenue & Oneta Street)

Figure 2-10: *Level of Comfort 3*

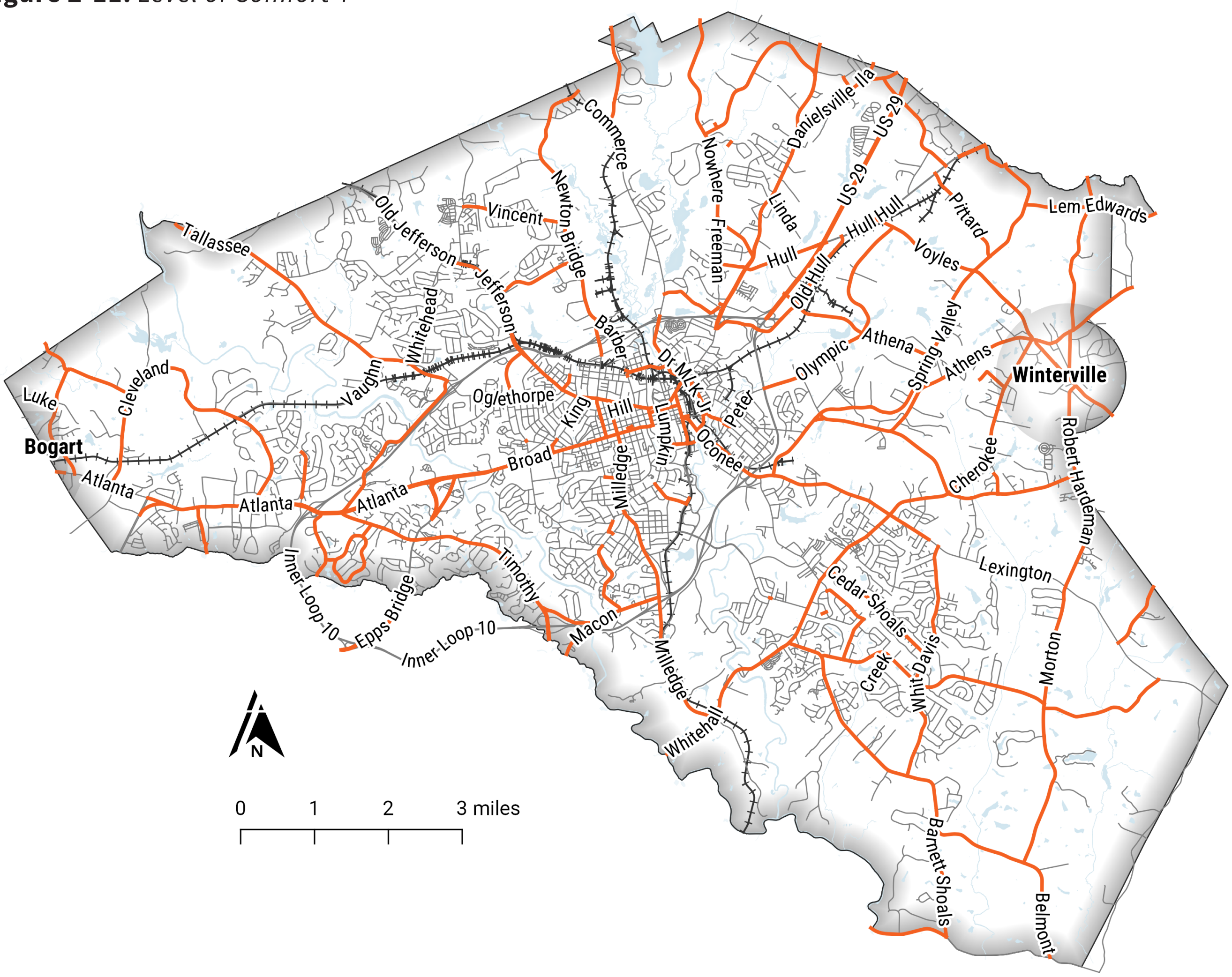


LEVEL OF COMFORT 4 are streets that are not comfortable for bicycle travel and may only be suitable for the most advanced level of cyclist, the strong and fearless, in rare circumstances. Roads within this category are characterized by high speeds and one or more adjacent travel lanes.

Representative streets include but are not limited to:

- Broad Street/Atlanta Highway
- Prince Avenue

Figure 2-11: *Level of Comfort 4*

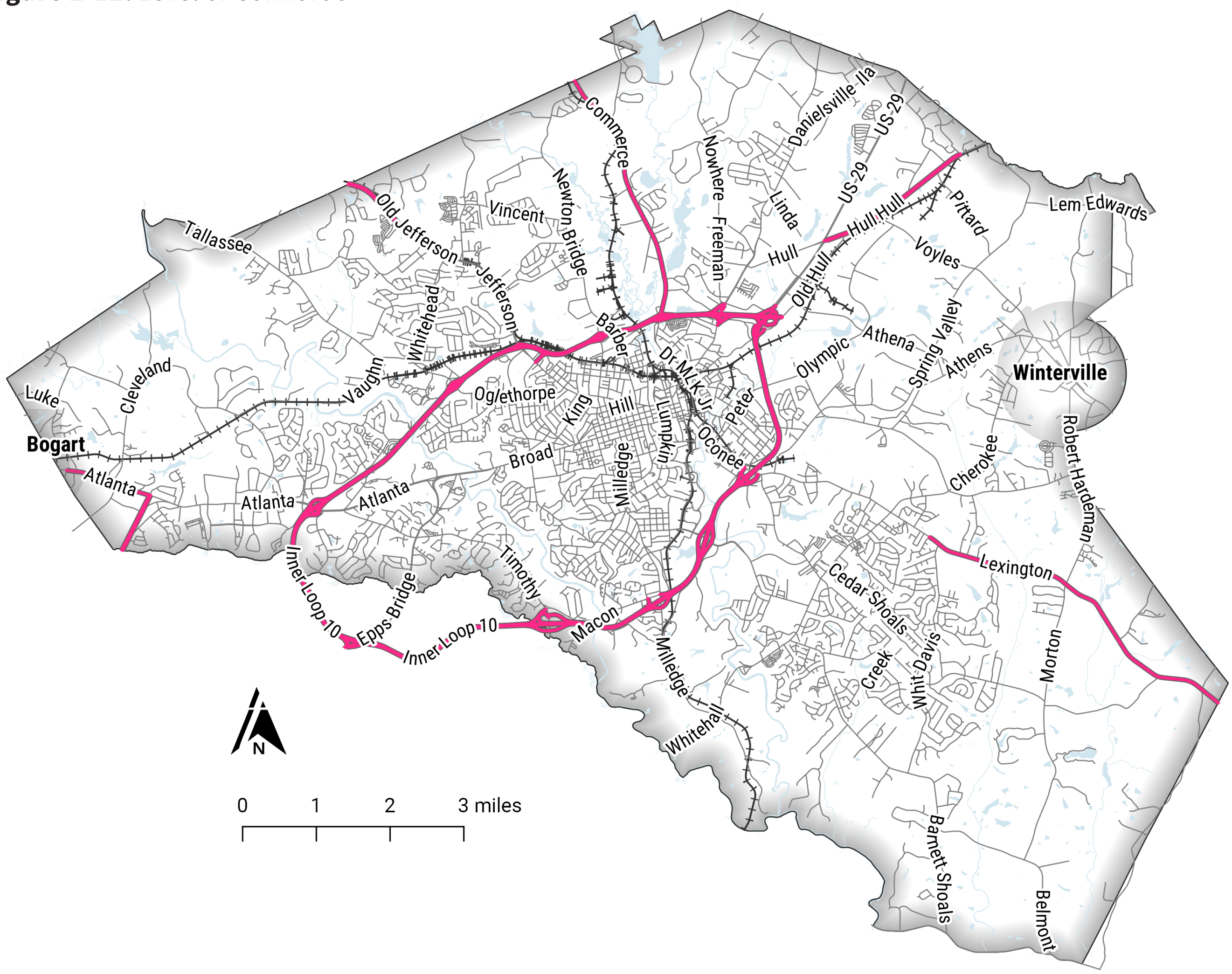


LEVEL OF COMFORT 5 is a category that is intolerable for even the most experienced adult cyclists. Roads within this category are characterized by very high speeds (45+ MPH), multiple adjacent travel lanes, and limited access.

Representative streets and facilities include but are not limited to:

- US 441
- Lexington Road (from Whit Davis Road east)

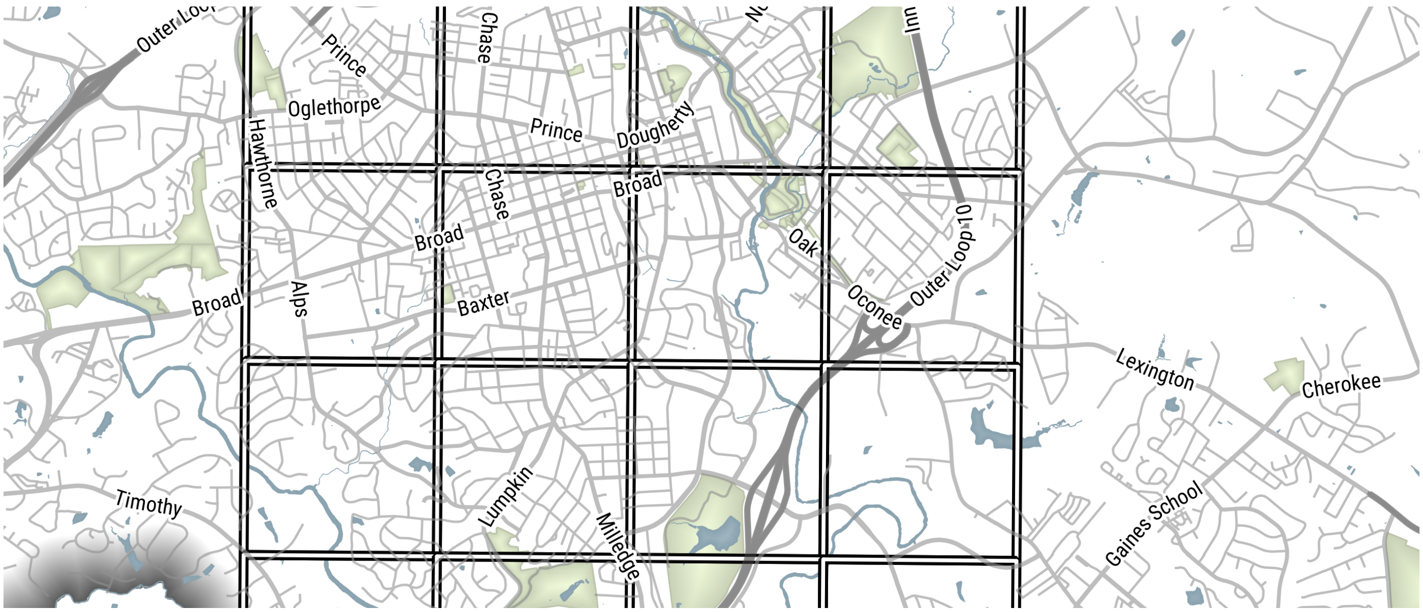
Figure 2-12: *Level of Comfort 5*



ACCESSIBILITY GRID

To ensure that the network connected destinations equitably across all of Athens-Clarke County, an "accessibility grid" was used as another factor for selecting roads for improvement. A 2-square-mile grid was overlaid on Athens-Clarke County while a 1 square-mile grid was used for downtown Athens (**Figure 2-13**), and the network was designed such that each block in the grid that contained amenities (e.g., schools, destinations identified by the public, parks, etc.) had roughly one north-south connection and one east-west connection.

Figure 2-13: *Accesibility Grid Map*



GOALS:

MORE USERS

EQUITY

The accessibility grid ensured that the proposed network of active transportation facilities equitably reached all areas of Athens-Clarke County having amenities.

REGIONAL NETWORK

The proposed infrastructure improvements form a connected network of streets and trails that have been strategically selected to improve mobility for active transportation users throughout Athens-Clarke County. The network is the culmination of multiple analyses, public input, and vetting from Athens-Clarke County staff, the Citizens Advisory Committee, and the public. The network utilizes existing streets that balance connectivity to existing facilities, serving all of Athens-Clarke County, and connection to amenities within the community.

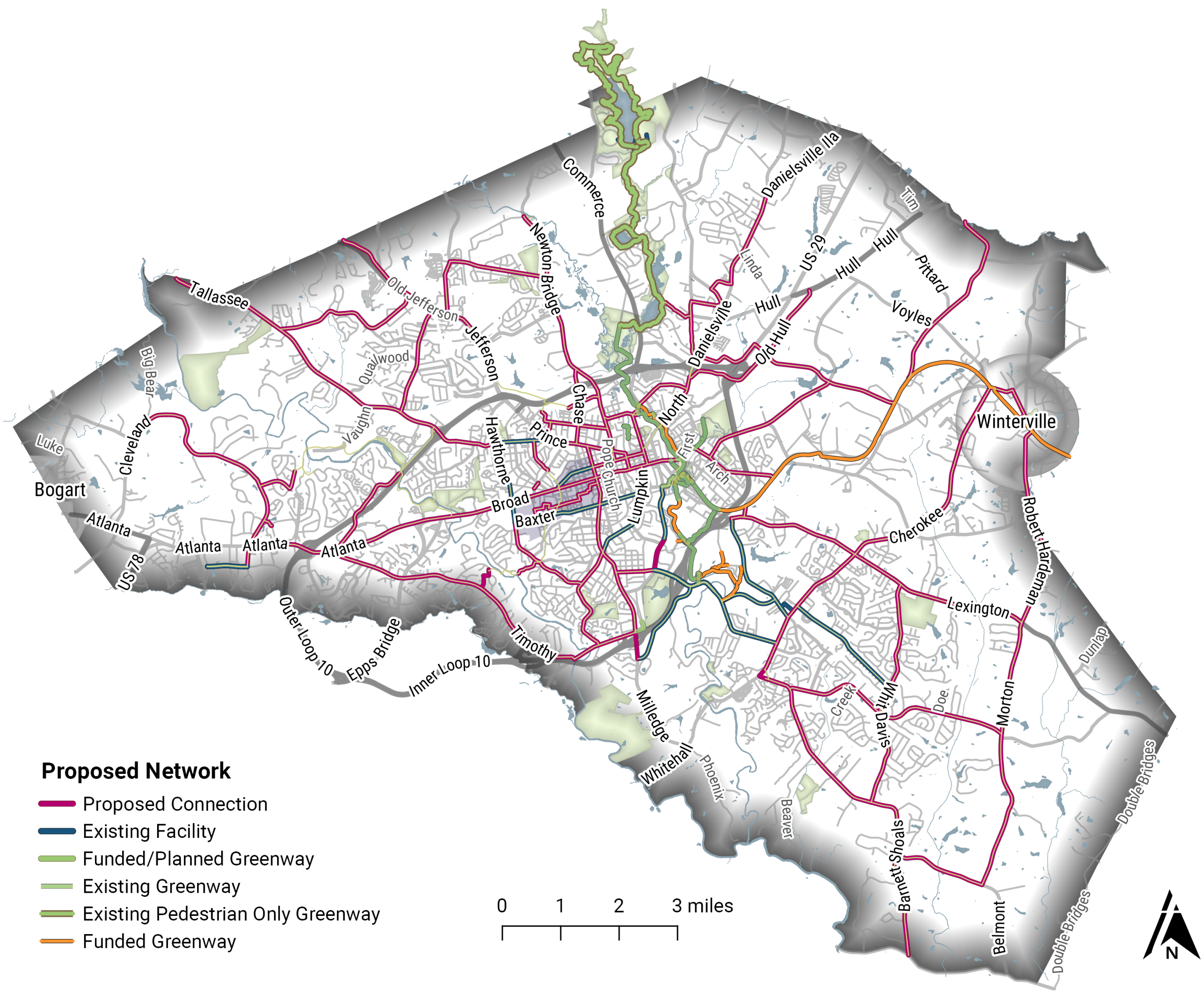
The development of this network is the most important step for Athens-Clarke County to continue to cultivate the active transportation environment. Providing a low-stress network that is connected, safety-focused, convenient, and comfortable will help Athens-Clarke County achieve the goals set forth in this plan. The following bullets explain how each of the Plan goals guided network design.

- Equity: Network recommendations cover the entirety of Athens-Clarke County, ensuring all residents in all neighborhoods are served by the low-stress network. Streets that are more active with bicyclists and pedestrians can also promote the personal interactions that form the foundation for neighborhood livability and vitality.
- Connectivity: Network recommendations create continuous safe travel routes throughout the area, connecting neighborhoods to one another and to major destinations such as schools, trails, institutions, and downtown.
- More Users: Providing a complete, low-stress network that includes a range of facility types will enable more people to walk and bike safely for more of their trips. This can contribute to economic growth and community-wide health improvements.
- Educate: Developing a network with a variety of bicycle and pedestrian facility types will require a commitment to educating residents and visitors on how to appropriately use and/or travel adjacent to new infrastructure. The education, safety, and encouragement section of this plan is intended to assist in forming strategies for educating the public as the proposed network is incrementally implemented.

The proposed network was developed through an iterative process of existing conditions analysis, field work, public and stakeholder interview and discussion, level of comfort assessment, and demand analysis. Using these inputs, a draft network was developed and reviewed by the public and stakeholders. Their input was incorporated into the final recommended network.

Increasing bicycle ridership is best done by creating a low-stress network of facilities so that those who may not feel comfortable riding in stressful traffic conditions can confidently use the active transportation network. With this in mind, the proposed routes have been paired with one or more types of recommended facility improvements that would provide a rider the experience of LOC 1 or LOC 2. The proposed bicycle and pedestrian network is presented graphically in **Figure 2-14** and **Figure 2-15**. In addition to route improvements, key intersection improvements are also included. All recommended facilities are further outlined in Section 4 of the Plan, where prioritization, cost, and phasing are articulated.

Figure 2-14: *Proposed Regional Network*

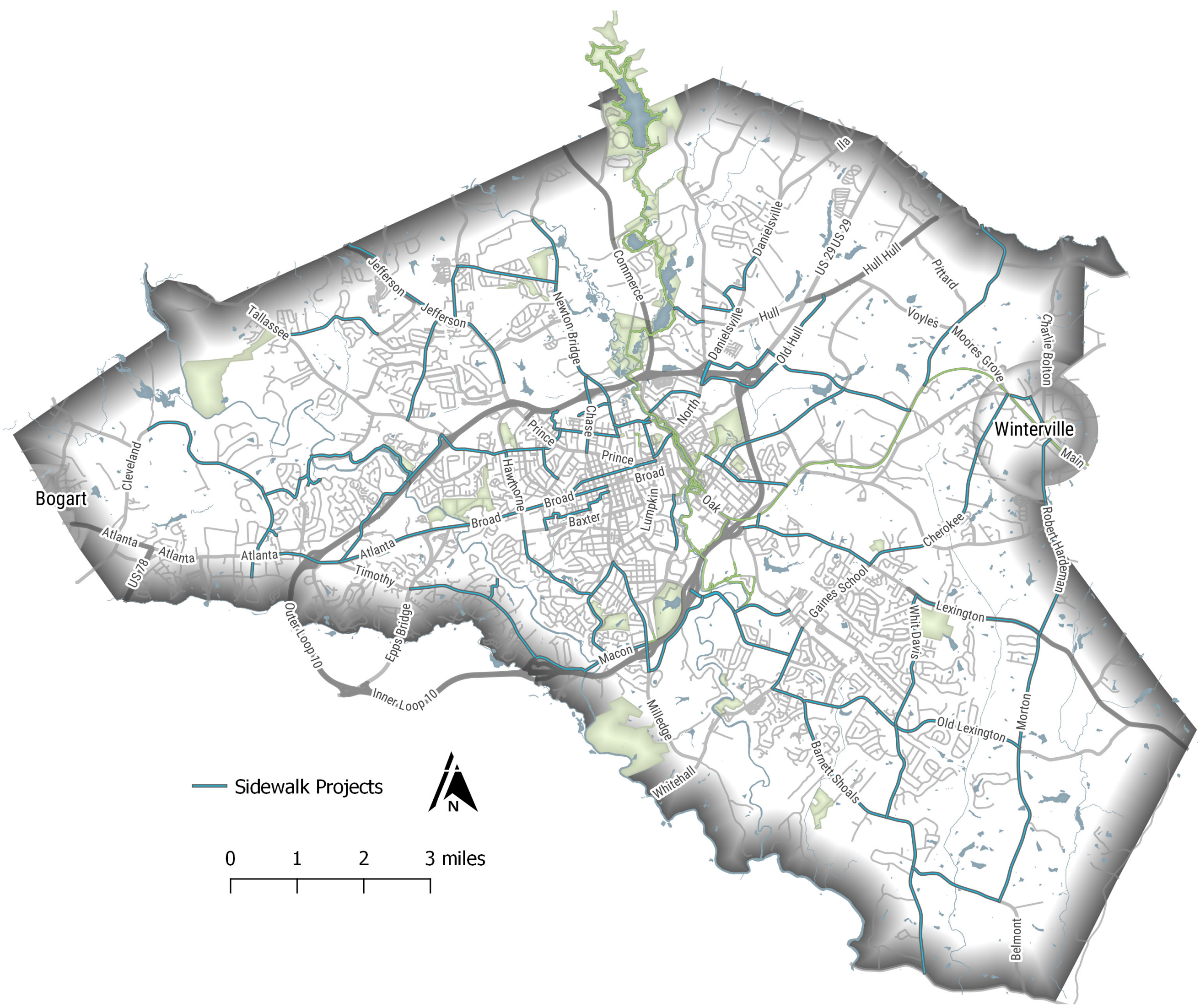


Pedestrian connectivity, like bicycle connectivity, is essential to promoting active transportation in Athens-Clarke County. Pedestrian connectivity requires that key destinations in the region be easily accessible by foot without unsafe crossings, missing sidewalk routes, or damaged sidewalks. **Figure 2-15** highlights the portions of the Athens in Motion network that presently disrupt pedestrian connectivity.

Gaps in pedestrian connectivity were identified using different standards for each context zone:

- The urban core and urban contexts typically see the highest volumes of pedestrian traffic. Projects in these contexts should have high quality sidewalks on both sides of the street. Within the network, road segments were marked as gaps if they lacked sidewalks on one side of the street or altogether.
- In the suburban and rural contexts, which typically have less pedestrian activity, roads were required to have sidewalk in at least one travel direction. Those that lacked sidewalks on both sides of the street were considered gaps.
- For the rural town context, sidewalks were required to both sides of the road or the segment was identified as a gap. While there is less pedestrian activity when compared to urban or urban core contexts, rural towns have the opportunity to promote safe pedestrian connectivity in places where there may typically be more automobile traffic.

Figure 2-15: *Sidewalk Needs along Proposed Network*




Firefly
TRAIL

EDUCATION, SAFETY, AND ENCOURAGEMENT

03

ENCOURAGEMENT INITIATIVES

There is a basic equity argument for making walking and cycling safer, more attractive, and comfortable modes of travel in Athens-Clarke County: at least one-third of the population is too young, too old, or infirmed, or unable or unwilling to drive. In addition, one quarter of households have only one car or no access to a car, leaving a substantial percentage of the population reliant for transportation via something other than a motor vehicle.

Finally, the Athens in Motion Plan lays out an ambitious schedule of projects, most notably an active transportation network for the area, that will be completed in the coming years. Somewhat uniquely, a significant investment of local transportation funds on pedestrian and bicycling infrastructure is already approved for projects in this plan. This is a once-in-a-generation opportunity to transform the community, guided by a detailed, forward-looking plan, with funding in place.

Therefore, the focus of this chapter is on a series of initiatives that will facilitate project development and implementation, as well as creating a culture of safety around walking and bicycling.

A deliberate and thoughtful public information and education campaign focused on facilitating implementation of the Plan can help ensure that this investment is able to be made efficiently, effectively, and with continued broad public support.

Encouragement activities can play a key role in preparing the community for change, celebrating changes as they occur, and helping the community discover and realize the new choices that are available to them because of this investment.

EXPERIMENTAL PROGRAMS

One of the greatest inhibitors of change is fear of the unknown or things that are different. People in the community need to see, feel, touch, and experience the kinds of infrastructure changes that are recommended by the Plan, even before they are implemented. Interactive, engaging programs are recommended to encourage community leaders to bike and walk their own neighborhood streets, carrying out audits and learning about problems and solutions on the ground.

Organize a regular series of discovery events. Short, easy, family-friendly bike rides and walks can be an effective tool to introduce people of all ages and abilities to existing challenges, potential solutions, and new infrastructure in the community. Community events such as these can help identify gaps in the existing network (especially in advance of public meetings or hearings), demonstrate examples of potential solutions, and effectively inform people about the connections made by new pieces of the active transportation network as they come online. Discovery events are fun social activities as well as informative educational opportunities to engage more people in the implementation of the Plan.

Host informational Community Walkshops or Walking Audits, which are typically more structured and technical than a discovery event. These three- to four-hour walking workshops introduce people to issues around walking, connectivity, accessibility, safety, and traffic management in an informative and engaging way. These audits are ideal for agency staff, neighborhood associations, and community organizations to help build awareness around walking (and biking) issues, and to build informed support for changes to the roadway and trail system that make walking and bicycling safer and more enjoyable in the region.

EVENT-BASED ACTIVITIES

Participatory events are often successful in changing people's perceptions and behavior about walking and bicycling, especially if they are demonstrably championed by the local government itself (i.e., elected officials, administrators, and departmental managers). Open Streets Events, for example, are very effective at demonstrating what streets could look and feel like without motor vehicle traffic, or if they were configured in a different way with protected bike infrastructure, wider sidewalks, and traffic calming measures. The impact is magnified if these events are officially sanctioned and organized by the local government; effectiveness also increases if they occur consistently and frequently.

Active promotion by Athens-Clarke County of events such as Bike to Work Day, Bike to School Day, Walk to School Day, and Car-Free Day also send a strong signal that local leaders are walking the talk and personally believe in the importance of active transportation.

INTERNAL EDUCATION

The design of roadways to accommodate pedestrians and bicyclists is evolving rapidly with the introduction of new technology; innovative geometric designs; updated signs, signals and markings; improved accessibility guidance; and more holistic "complete streets" and "safe system" approaches. These changes have profound implications for the planning, design, operation, and maintenance of area roadways. Athens-Clarke County should provide ongoing training and professional development opportunities for agency staff, local consultants who regularly work in the community, elected officials, and community groups to ensure a shared understanding of best practices.

INFORMATION ARCHITECTURE

The Firefly Trail is a notable example of the kind of signature project that is both transformational and highly marketable, provided the opportunity to promote the facility is seized by the community. Effective branding and wayfinding for the trail (and the broader active transportation network), highlighting its connectedness to the community, is needed to ensure that residents and visitors alike feel ownership and pride towards it, as well as making it really easy for people to find and use the network as it grows. The Firefly Trail has done a good job of extending its brand through its logo, a web presence, videos, and major events; it will be important to continue these efforts and expand them to the whole network as it is implemented.

Athens-Clarke County should develop an outreach campaign using infographics, social media, and public information channels to inform people about new infrastructure and roadway designs – particularly where these affect driving and parking. Separated bike lanes, protected intersections, trail crossings, new pedestrian signals, and traffic calming projects all benefit from campaigns to hasten their acceptance by the community.

Information about the growing network of active transportation facilities should also be readily available to visitors to the community. Engaging visitors in active tourism has the potential to attract new visitors, extend the stay of existing visitors, and reduce the environmental footprint of travel within the community. For example, we recommend the Athens Convention and Visitors Bureau work with local bicycling and walking organizations to provide itineraries – short, out and back, self-guided, themed tours – people can make starting from The Classic Center (or downtown hotels). Many of these will feature trails such as the Firefly and the North Oconee River Greenway Trail.

VISION ZERO APPROACH TO TRAFFIC SAFETY

Athens-Clarke County has a significant traffic safety issue. The Georgia Department of Transportation (GDOT) reports that the Unified Government is consistently one of the top 5 worst counties in the state for crash and injury rates (per vehicle miles traveled). Local statistics document 14 traffic fatalities in 2016 and 15 in 2015; two pedestrians and a bicyclist were killed in 2016, 5 pedestrians died in 2015.

- State and local data show a dramatic increase in crashes since 2012. Athens-Clarke County has responded in a number of ways.
- In 2014, the Police Department was awarded a 3-year HEAT Grant from the Georgia Office of Highway Safety to combat impaired and aggressive driving.
- The Transportation and Public Works Department has ramped up implementation of the 2007 Neighborhood Traffic Management Program to reduce crashes, traffic volumes, and speed in neighborhoods.
- High crash corridors for bicyclists and pedestrians were identified from 2011-2015 crash data. Roadway safety audits were carried out to identify solutions; 21 of 34 projects have been implemented and follow-up studies are scheduled for 2018.

While initial results are encouraging, Athens-Clarke County realizes that further action – and a different approach – is necessary to eliminate fatal and serious injury crashes in the foreseeable future.

ADOPT “VISION ZERO” GOAL

Vision Zero is an aggressive target, based on a Safe System approach to traffic safety, that is fundamentally different from business as usual, described in **Table 3-1**. A safe system approach systematically eliminates the opportunity for people to crash in circumstances that are likely to cause death or serious injury.

For example, the vulnerability of pedestrians to serious or fatal injuries in a collision with a motor vehicle rises dramatically with increased speed (**Figure 3-1**). A safe system approach seeks to eliminate any opportunity for a pedestrian to be hit by a car traveling in excess of 30 mph – either by reducing vehicle speeds to less than 30 mph where pedestrians are going to be crossing the street, or by physically separating crossing movements by time and/or space.

Figure 3-1: *Speed/Impact Crash on Pedestrians*

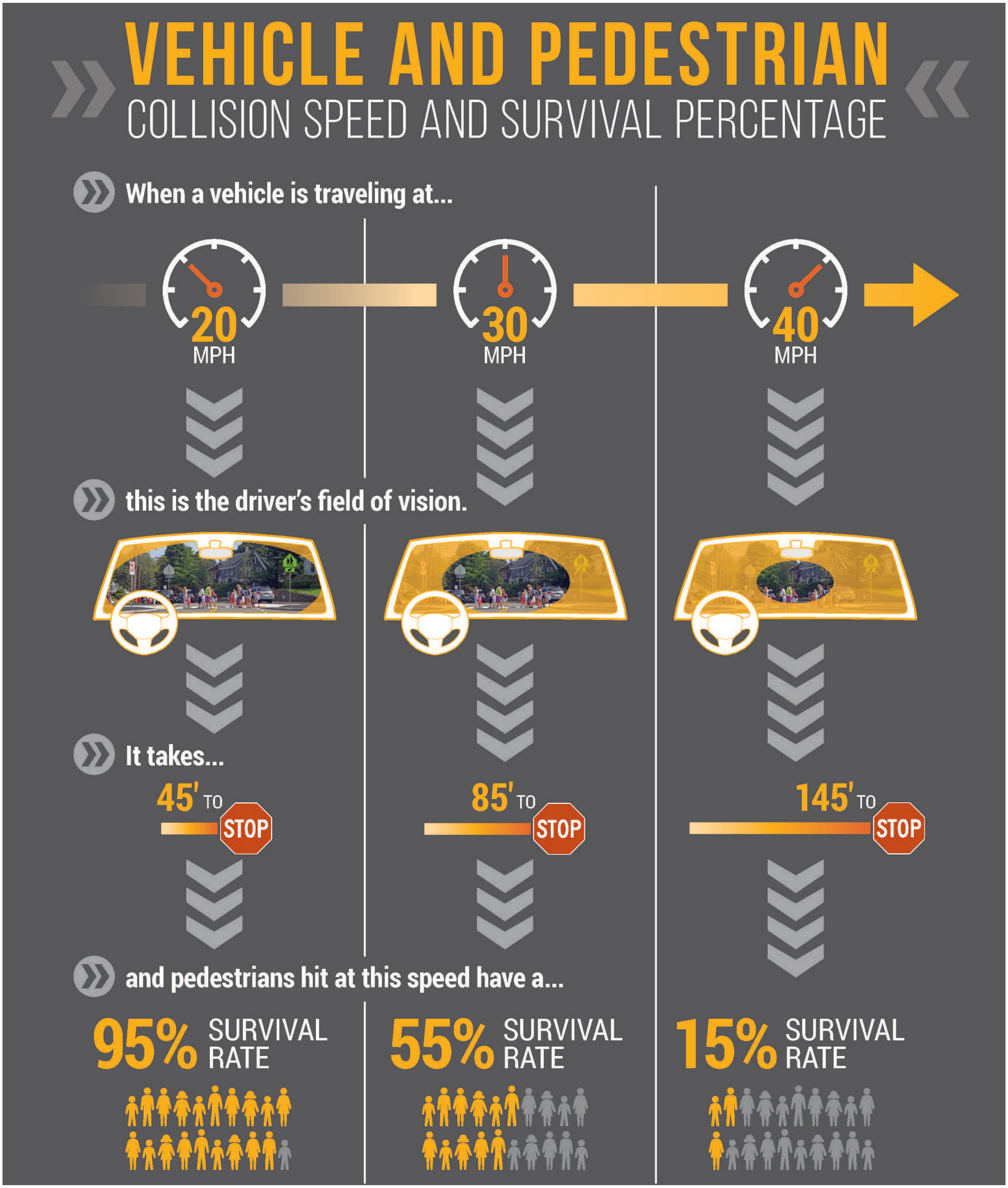


Table 3-1: *Traditional Approach Compared to Safe System Approach*

	TRADITIONAL APPROACH	SAFE SYSTEM APPROACH
What is the problem?	Try to prevent all crashes	Prevent crashes from resulting in fatal and serious casualties
What is the appropriate goal?	Reduce the number of fatalities and serious injuries	Zero fatalities and serious injuries
What are the major planning approaches?	• Reactive to incidents • Incremental approach to reduce the problem	• Proactively target and treat risk • Systematic approach to build a safe road system
What causes the problem?	Non-compliant road users	People make mistakes and people are physically fragile/vulnerable in crashes. Varying quality and design of infrastructure and operating speeds provides inconsistent guidance to users about what is safe use behavior.
Who is ultimately responsible?	Individual road users	Shared responsibility by individuals with system designers
How does the system work?	Is composed of isolated interventions	Different elements of a Safe System combine to produce a summary effect greater than the sum of the individual treatments, so that if one part of the system fails other parts provide protection.

Source: Swedish Transport Agency. https://www.dvr.de/download2/p4645/4645_1.pdf

The Vision Zero Network, a national network of cities committed to eliminating traffic fatalities by a set date, identifies six key elements that sets Vision Zero apart from traditional road safety efforts.

1. Traffic deaths are preventable. Zero is upheld as the only acceptable number of traffic fatalities and the word “accident” is eliminated from the traffic safety vocabulary. Serious and fatal **crashes** are entirely preventable; they are not accidents and they are not inevitable.

2. System failure is the problem. In the Vision Zero framework, individuals are not the problem. It is flaws in the system – from planning through design, construction and maintenance – that allow roads to have no safe crossings or which set up conflicts between high-speed motor vehicles and pedestrians and bicyclists. Ticketing pedestrians for jaywalking where there are no crosswalks or sidewalks is not going to solve the issue or change people’s behavior.

3. Road safety is a public health issue. While traditional approaches to transportation safety have prioritized reducing or preventing collisions, Vision Zero focuses on preventing injuries and fatalities. Engineers are challenged to eliminate the circumstances in which a human body may be exposed to crash forces it cannot survive.

4. The Safe System approach is holistic. Roadway design is a part of the issue, but so are land use and development decisions, school siting choices, housing policies, and a host of factors that affect our transportation options and choices. The tension between speed and safety in Athens-Clarke County has as much to do with land use as it does road design.

5. Data drives decisions. Vision Zero demands a relentless focus on eliminating fatalities and serious injuries first. Preventing red light running and speeding through automated enforcement, for example, may increase rear-end collisions…but reduces fatal and serious injury crashes.

6. Social equity is a key goal and component of Vision Zero. Traffic crashes in Athens-Clarke County disproportionately affect vulnerable populations, particularly among those who do not have access to a motor vehicle and who are more likely to be dependent on walking, biking, and transit. Communities of concern must be meaningfully engaged in addressing the safety, personal security, accessibility, and larger cultural and societal issues around road safety and community development.

A CULTURE OF SAFETY

In a landmark 2017 report, the National Transportation Safety Board (NTSB) identified speeding as one of the most common factors in motor vehicle crashes in the United States and concluded that "the current level of emphasis on speeding as a national traffic safety issue is lower than warranted." Input gathered during the development of the Athens in Motion Plan suggests that this lack of concern in Athens-Clarke County extends to many other aspects of traffic safety, including distraction among all roadway users.

Vision Zero campaigns in New York City and San Francisco, two of this nation's oldest, are bucking the national trends. Their relentlessly data driven approach has led them to focus on behavior that has the most impact, audiences that can be reached, and the most effective messaging to reach them. It is suggested that Athens-Clarke County do the same.

RESPECT AND ATTENTION CAMPAIGNS

General "show respect" and "pay attention" messages may be necessary and can be effective, even if tangible improvements may be difficult to document. While such campaigns should be balanced, it is very important to not succumb to victim-blaming. Several examples of quality methods for increasing awareness, respect, and attention are included below.

BICYCLES MAY USE FULL LANE

Debate abounds as to the most effective roadway signage to increase cyclist safety and respect from motorists. While not conclusive, a study performed in 2015 by George Hess and M. Nils Peterson supports the use of the "Bicycles May Use Full Lane" signage, as it delivered the most consistent message about the rights and responsibilities of both bicyclists and motorists. Shared lane markings were also effective, but not as effective as "Bicycles May Use Full Lane" signs. The study suggested that a combination of "Bicycles May Use Full Lane" signage and shared lane markings would be the most comprehensive approach. Interestingly, the study concluded that "Share the Road" signage was the least effective countermeasure for increasing comprehension of bicyclist's and motorist's rights and responsibilities.

SHARE THE ROAD

Given that "Share the Road" is part of the lexicon though, helping people understand how to do it safely is important. One of the best efforts documented for teaching people how to share the road came from former pro cyclist, Dave Zabriskie. He developed a program called Yield to Life, and although it does not seem very active these days, the basic concepts remain sound. A balanced approach is put forth, with the below steps providing guidance for both bicyclists and motorists; these steps are mostly from Yield to Life, with some adaptations.

10 WAYS BICYCLISTS CAN SHARE THE ROAD WITH MOTORISTS

01 PRACTICE CYCLING CITIZENSHIP

The right to ride on the road comes with responsibilities. Motorists will be more willing to accept bicyclists' rightful place on the road when bicyclists ride lawfully, respectfully and responsibly. Riding responsibly will ease tensions, and foster a more harmonious environment between motorists and cyclists.

02 RIDE ON THE RIGHT

It is illegal to ride towards oncoming traffic. Ride with traffic, staying as far to the right as is practical. Be sure to wait for a safe opportunity to change lanes and use proper hand signals.

03 JOIN IN WITH TRAFFIC

Joining other traffic is sometimes necessary because the road is simply too narrow for both a bike and a car. This is called "taking the lane" by many bicycling advocates. When you do join the traffic, make sure you never pass on the right. By waiting directly behind a vehicle, you can see a car's signals; otherwise, you never know if the motorist is about to make a right turn and hit you.

04 PROTECT YOUR HEAD

Whether going to the corner store or heading out on a marathon ride, always wear a helmet.

05 MAKE SURE TO SEE EYE TO EYE WITH MOTORISTS

Make eye contact with drivers whenever possible, this ensures that the motorists see you. This personal connection also helps motorists remember you are a human being deserving of attention, protection, and respect.

06 TRAVEL STRAIGHT AND TRUE

Ride consistently and predictably. At an intersection, do not veer into the crosswalk and then suddenly reappear on the road again. Don't thread through parked cars. Riding erratically puts you at danger and scares drivers.

07 BE SURE TO ALWAYS BE ON THE DEFENSE

Be aware of your surroundings. Know what is behind you and watch out for what is in front of you. Be on the lookout for road hazards; sand and gravel, glass, railroad tracks, and the like. Watch for parked cars where people may be opening doors on the driver side of the vehicle without looking. Make sure you have ample time to make any move, whether you are changing a lane or turning a corner. Do not expect to be granted the right of way in any instance.

08 WEAR VISIBLE GEAR

Make your presence felt. Wear bright colored clothing. Black may be cool but its invisible at night. At night or in bad weather, use reflective lights - front, side, and rear - to make yourself visible.

09 BE READY TO RESPOND

Emergencies happen. Keep a hand on your handlebars. Know and use your hand signals whenever you are changing lanes or making a turn.

10 BRAKE AWAY

Make sure your brakes are always in top-notch condition. Be aware of how weather and road conditions can affect your ability to brake.

10 WAYS MOTORISTS CAN SHARE THE ROAD WITH BICYCLISTS

01 UNDERSTAND BICYCLISTS ARE DIFFERENT BUT EQUAL

Bicyclists are drivers of vehicles and under the law entitled to use the road. Just like drivers, they need to follow the law. Don't be surprised by bicyclists on the road. Expect them. Watch for them and treat bicycles like any other slow-moving vehicle. Plenty of tractors and other things slow us down all the time. Bikes are no different.

02 BE PATIENT AND DON'T CREATE PATIENTS

Patience remains a virtue. It saves lives. Patience includes things like: waiting until it is safe to pass; giving bicyclists the right-of-way when the situation calls for it; allowing extra time for bicyclists to go through intersections – don't rush to make that turn; and recognizing road hazards that are safe for cars may be dangerous for cyclists – be sure and provide the rider enough space to deal with hazards. When there are hazards on the edge of the roadway don't be surprised that cyclists are in the lane of traffic, as it is perfectly legal. Don't let some poorly behaved rider ruin your day. Understand that bicyclists are people too and most are responsible. Let the police handle the bad ones.

03 PASS SAFELY

Do not pass a bicyclist until you can do so without putting anyone at risk. Allow at least 3 feet between your vehicle and the bike, more if possible. Make sure you do not place the bicyclist or an oncoming motorist in danger.

04 BE CAREFUL WHEN MAKING RIGHT TURNS

Do not speed ahead of a bicyclist thinking you can negotiate the turn before they reach your car. Bicyclists often are going faster than you think. As you slow to make a turn, the bicyclist may not be able to avoid crashing into the passenger side of your vehicle. Right turns into bicyclists (right hook collisions) can ruin everyone's day and the bicyclist's life. A bicyclist may be to the right of you and planning to go straight at the same intersection.

05 BE CAREFUL WHEN MAKING LEFT TURNS

Often it is even harder to remember to look for bicyclists when making a left turn. Bicyclists crossing straight in the opposite direction are frequently approaching at a higher rate of speed than you think. Open eyes and awareness can prevent these "left-cross" wrecks.

06 BE OBSERVANT WHEN BACKING

When backing out of your driveway, an alley, or a parking stall always look to see if someone is riding in your path. Children on small bikes can be hard to see. Bicycles, and the people who ride them come in all shapes and sizes. The key is to drive slowly and look repeatedly with cyclists and pedestrians in mind.

07 PREVENT "DOORING" INJURIES

After parking, look before opening the car door to exit. One way to do this is to develop the habit of reaching across your body and opening your driver's door with your right hand. This will cause you to look back before you open the door. It will help you make sure there are no cyclists riding alongside you or approaching. Bicyclists often can't see a driver who is about to open a door. Drivers, on the other hand, can usually detect a bicyclist if they are looking.

08 THINK OF BICYCLISTS AS HUMAN BEINGS - BECAUSE THEY ARE!

One of the reasons there is a conflict between cyclists and motorists is the effect of "othering." Forgetting that a cyclist is a person allows you to justify behavior that would embarrass you in other settings. Yes, bicyclists are a kind of traffic, but, much more importantly, they are also your neighbors – policemen, delivery drivers, construction workers, carpenters, doctors, someone's son, daughter, husband, or wife – people from all walks of life. Also, a bicyclist riding to work means there is one less car on the road.

09 PLEASE DON'T HONK!

Bicyclists do not find it helpful when motorists come up behind and honk their horns. In fact, it often creates danger. The noise itself can cause a bicyclist to lose his or her bearings. They then lose control of the bike. If you must honk, do it at a respectful distance and make it a respectful tap.

10 TRY IT, YOU MAY LIKE IT

Get a bike. Ride it. Bikes have a way of changing lives. Riding is good for you and good for your environment.

ROAD SAFETY MEDIA CAMPAIGNS

Many of the tips outlined above have been used in broad road safety media campaigns. Through posters, billboards, flyers, and advertisements, general road safety for bicyclists, pedestrians, and motorists can be effectively communicated.

Research has been done on a variety of media campaigns to determine their effectiveness. One such study identified the following key takeaways:

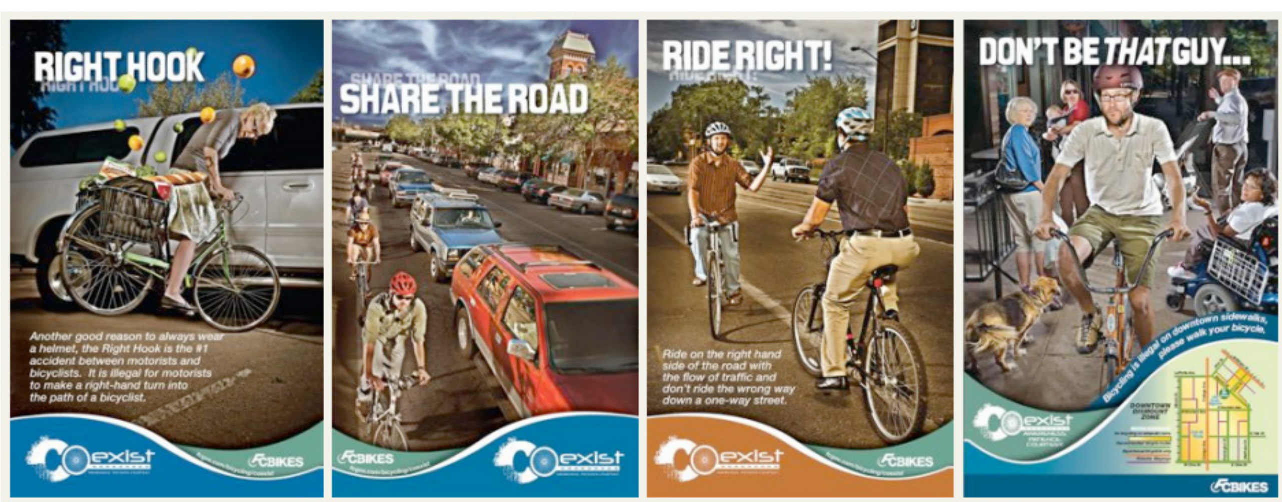
1. Identify a clear behavior change theory;
2. Use data to identify target behavior and audience;
3. Define measurable campaign objectives;
4. Integrate media campaigns with enforcement, legislation, and education;
5. Combine different types of media;
6. Industry standard: three exposures to the message for effectiveness; and
7. Set realistic expectations for the campaign.

In the past, fear-based campaigns were in vogue, with the intent to “scare straight” bicyclists, pedestrians, and motorists. While it is important to emphasize the very real dangers, and potential for loss of life, results of research on fear-based campaigns are mixed. If a fear-based campaign is used, it should:

- Describe a threat (severity, relevance, vulnerability);
- Provide a specific plan (safe behavior); and
- Be perceived as effective (target audience must believe they are capable of performing the safe behavior).

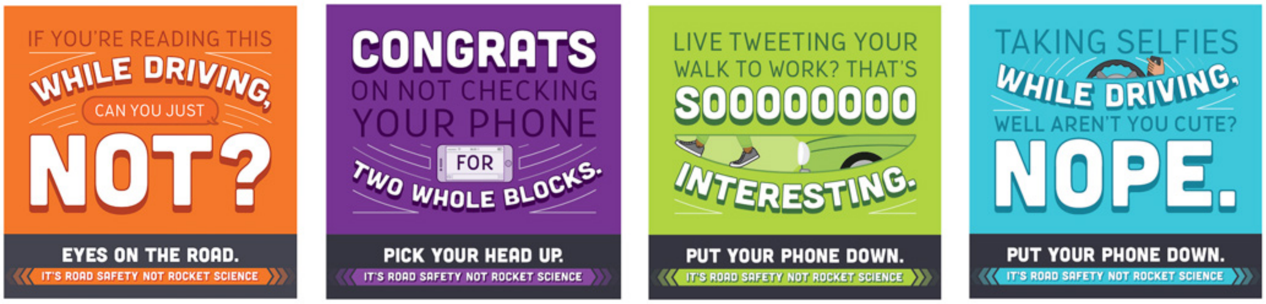
All of the above elements must be present for fear-based campaigns to be effective. However, they should be used with caution. Gender may influence the effectiveness of emotional campaigns; in fact, humor may work better for males than fear.

EXAMPLE 1
FCBikes, Fort Collins, Colorado



EXAMPLE 2

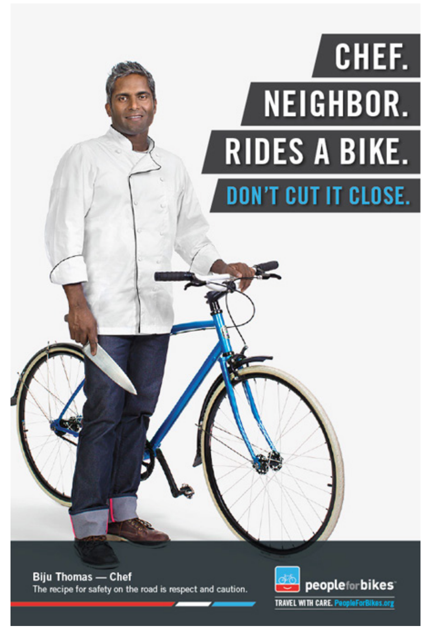
Mayor's Office of Transportation and Utilities, Philadelphia, Pennsylvania



EXAMPLE 3

Bike Pittsburgh, Pittsburgh, Pennsylvania

EXAMPLE 4
People for Bikes



BICYCLE FRIENDLY DESIGNATIONS

Many peer communities have used the Bicycle Friendly Community (BFC) program, administered by the League of American Bicyclists, to guide and measure their progress, and we recommend that Athens-Clarke County do likewise. Today, Athens-Clarke County is a bronze-level BFC, whereas Gainesville, Florida is Silver, Eugene, Oregon is Gold and both Fort Collins and Boulder, Colorado are Platinum.

Similarly, UGA is a bronze-level Bicycle Friendly University compared to Silver for the University of Florida, Gold for the Universities of Colorado and Oregon, and Platinum for Colorado State University in Fort Collins. None of the major employers in the community, including the Unified Government, the University, or the School District, has applied for designation as a Bicycle Friendly Business. Athens-Clarke County should strive to become a silver-level BFC by 2020 and a platinum-level BFC by 2050.

IMPLEMENTATION

04

PRIORITIZATION

Previous sections presented the planning process that led to the development of the active transportation network for Athens in Motion. While that process was essential to developing the recommended network, realization of individual projects from those recommendations is critical to advancing Athens-Clarke County as a community where walking and biking are modes of choice. This requires that a connected, safe, and comfortable network of low-stress facilities be implemented. To that end, this section provides:

- Summary of the project prioritization process and methodology;
- Overview of applications based on context;
- Review of cost estimating methodology;
- Identification of initial projects to advance with available funding;
- Future considerations for partnerships;
- Policy and programmatic recommendations; and
- Action Plan to guide implementation.

Athens in Motion identifies a network of facilities to encourage bicycling and walking throughout the community. Ongoing efforts to complete sidewalk gaps, extend greenway trails, and develop on-street bicycle facilities demonstrate that the community currently has a desire and momentum for an overall active transportation network. The proposed network leverages work that has previously been accomplished and builds on it.

Developing a project list for Athens in Motion used a quantitative approach to determine how each project should be prioritized. The criteria shown in **Table 4-1** were used to prioritize the project list into multiple tiers for implementation. Note that **Table 4-1** shows criteria that were used to prioritize both bicycle and pedestrian projects, while **Table 4-2** shows additional criteria that were used specifically for bicycle projects and Table 4-3 for pedestrian project prioritization. The prioritization criteria used in both analyses were a proxy for identifying where the improvements would be most impactful. Although not every project can be a high priority, each project on the proposed network is a critical piece of improving connectivity and safety for bicyclists and pedestrians in Athens. Projects that rank lower but fill essential gaps in the network may be considered for more rapid implementation or in conjunction with adjacent projects.

PRIORITIZATION METHODS

To prioritize the network, each part of the primary network was identified as discrete segments of roadway between major intersections. During the prioritization, each segment was scored independently and then averaged with all other segments within the respective project. Calculating the prioritization score in this manner ensured that each criterion was captured at a detailed level for scoring of the overall projects.

Table 4-1: *Bicycle and Pedestrian Prioritization Criteria*

BICYCLE AND PEDESTRIAN PRIORITIZATION CRITERIA			
BICYCLE AND PEDESTRIAN CRITERIA	**DESCRIPTION**		**SCORING METRIC**
EQUITY	A variety of factors, shown in the following rows, were considered for the equity prioritization criterion. Each factor was weighted and summed to provide an overall equity score aggregated at the elementary school boundary level. Census data was reviewed using the Athens Wellbeing Project's Social Mapping Atlas.		High = 10 Medium = 7 Low = 5
Public Sidewalk to Road Ratio	Areas with fewer sidewalks compared to roads are given higher priorities.	• Lowest Ratio = 10 • Low Ratio = 8 • High Ratio = 6 • Highest Ratio = 4	
Bus Service Area Coverage	Areas with more bus service are given higher priority to encourage overall mobility within Athens-Clarke County.	• Highest % = 10 • High % = 8 • Low % = 6 • Lowest % = 4	
Households with No Vehicle	Areas where there are more households without access to personal transportation are given higher priority.	• Highest % = 10 • High % = 8 • Low % = 6 • Lowest % = 4	
Population Community by Public Transit	Those who commute by public transit require active transportation infrastructure for first- and last-mile connectivity; districts with more people using transit receive higher priority.	• Highest % Commuting = 10 • High % Commuting = 8 • Low % Commuting = 6 • Lowest % Commuting = 4	
Percent in Poverty Over 65	Those who are in poverty and are over 65 are increasingly vulnerable without means to safe transportation.	• Highest Poverty = 8 • High Poverty = 6 • Low Poverty = 4 • Lowest Poverty = 2	
Percent in Poverty Under 18	Children in poverty are considered a vulnerable population; to provide more access to this population, areas with the highest poverty in those under 18 years old are given higher priority.	• Highest Poverty = 8 • High Poverty = 6 • Low Poverty = 4 • Lowest Poverty = 2	
LAND USE *Parks & Schools*	Parks are destinations for recreation within a community and often attract active transportation users. Additionally, parks are often community assets where residents desire to walk or bike. Educational facilities were included to capture a population that may have less access to a personal vehicle and could benefit from or take advantage of other forms of transportation. Network segments closest to these uses received the highest scores.		1/8 Mile = 10 1/4 Mile = 7 1/2 Mile = 5
LAND USE *Commercial & High Density Residential*	Properties that were identified as commercial or high density residential land uses were included in the analysis due to opportunity for pedestrian activity from patrons or high number of residents within a walkable scale. Network segments closest to these uses received the highest scores.		1/8 Mile = 8 1/4 Mile = 5 1/2 Mile = 3

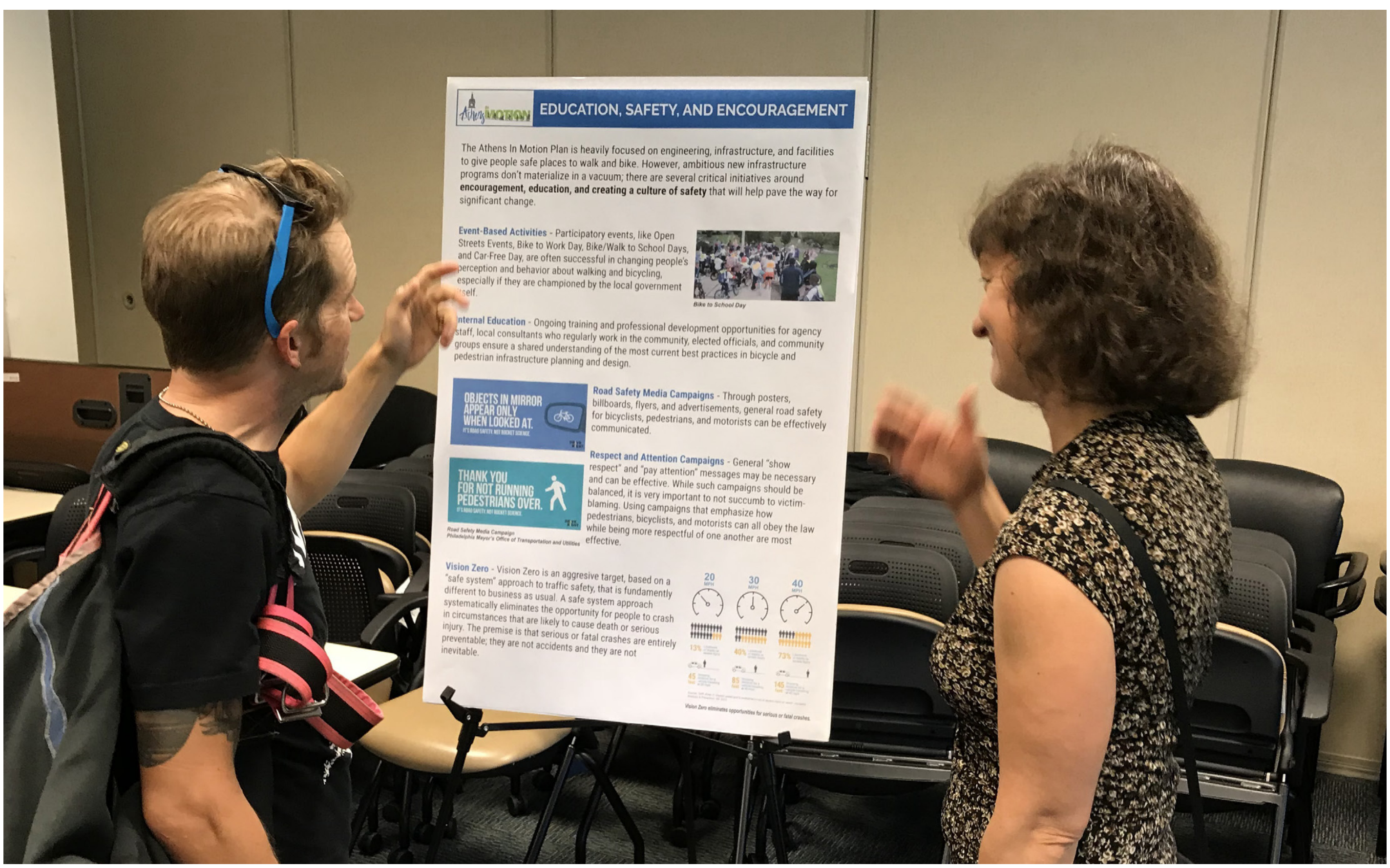
BICYCLE AND PEDESTRIAN PRIORITIZATION CRITERIA (CONTINUED)		
BICYCLE AND PEDESTRIAN CRITERIA	**DESCRIPTION**	**SCORING METRIC**
TRANSIT	Transit stops provide for local and regional mobility. Access to transit stops is often a key factor for pedestrians and bicycles.	1/8 Mile = 10 1/4 Mile = 7 1/2 Mile = 5
CRITICAL CORRIDORS	Critical corridors are those that connect the core of Athens to destinations outside of Loop 10. These high volume corridors are often the most direct routes in Athens-Clarke County, and they should be considered for bicycle and pedestrian enhancements. Critical corridors include: • Atlanta Highway • Broad Street • Lexington Highway • Prince Avenue • North Avenue • Milledge Avenue	On/Along Corridor = 8 Intersects = 5
PUBLIC INPUT	A robust public outreach process was part of Athens In Motion. Comment density was analyzed to understand areas that received more attention from the public regarding bicycle and pedestrian improvements.	High Density = 10 Medium Density = 7 Low Density = 5

Table 4-2: *Bicycle Specific Prioritization Criteria*

BICYCLE SPECIFIC PRIORITIZATION CRITERIA		
BICYCLE SPECIFIC CRITERIA	**DESCRIPTION**	**SCORING METRIC**
SAFETY	Categories of bicycle facilities were developed to score the proposed bicycle network. Each of these categories may include several facility types but vary based upon the amount of separation needed based on existing conditions. Facilities with a higher degree of separation received the highest scores due to increased safety.	Separated Facility = 10 Buffered Facility = 7 Delineated Facility = 5 Shared Facility = 3
EXISTING FACILITIES	The Level of Comfort (LOC) analysis scores were used to score the recommended network. Segments that are currently uncomfortable received a higher score due to the increased need for bicycle and pedestrian enhancements to improve the network.	LOC 4 = 4 LOC 3 = 3 LOC 2 = 2
CONNECTIVITY	To leverage existing and funded bicycle infrastructure, proximity to these facilities were prioritized. Increased connectivity may be achieved by expanding the existing network that the community has already implemented. Segments along the network were scored based upon the proximity to existing or funded infrastructure to determine the connectivity weight.	1/8 Mile = 10 1/4 Mile = 7 1/2 Mile = 5

Table 4-3: *Pedestrian Specific Prioritization Criteria*

PEDESTRIAN SPECIFIC PRIORITIZATION CRITERIA		
PEDESTRIAN SPECIFIC CRITERIA	**DESCRIPTION**	**SCORING METRIC**
SAFETY	Increased separation from vehicular travel and slower speeds were considered important safety factors for pedestrians. To prioritize safety for pedestrians, the bicycle LOC score was used to understand existing facility conditions for cyclists and the impact it had on pedestrians. Less comfort, indicated by a higher LOC score, for bicyclists was used as rationale for higher pedestrian safety scoring. Note that the LOC score was used to measure unique criteria for bicycle and pedestrian priorities respectively.	LOC 4 = 4 LOC 3 = 3 LOC 2 = 2
CONNECTIVITY	Pedestrian connectivity was based upon existing sidewalk and the land use context for the proposed network segments. A segment was considered complete in the Urban Core and Urban contexts if sidewalk has been installed on both sides of the street. For the Suburban, Rural, and Rural Town contexts, sidewalk along one side of the road was considered complete. A connectivity score was given to segments that intersected completed sidewalk segments, based upon the conditions above, and either had an existing gap in the sidewalk or where no sidewalk was present. A single score was given to segments that met these criteria.	Connectivity = 7



PROJECTS

CONTEXT AND DESIGN FLEXIBILITY

Bicycle and pedestrian facility selection and design for a given road depends on circumstances, such as existing right-of-way, lane widths, budgetary constraints, etc. These details are specific to each project and may change between the finalization of this Plan and implementation of the project. Specific facility selection and design should be left to the judgment of design professionals at the time of implementation.

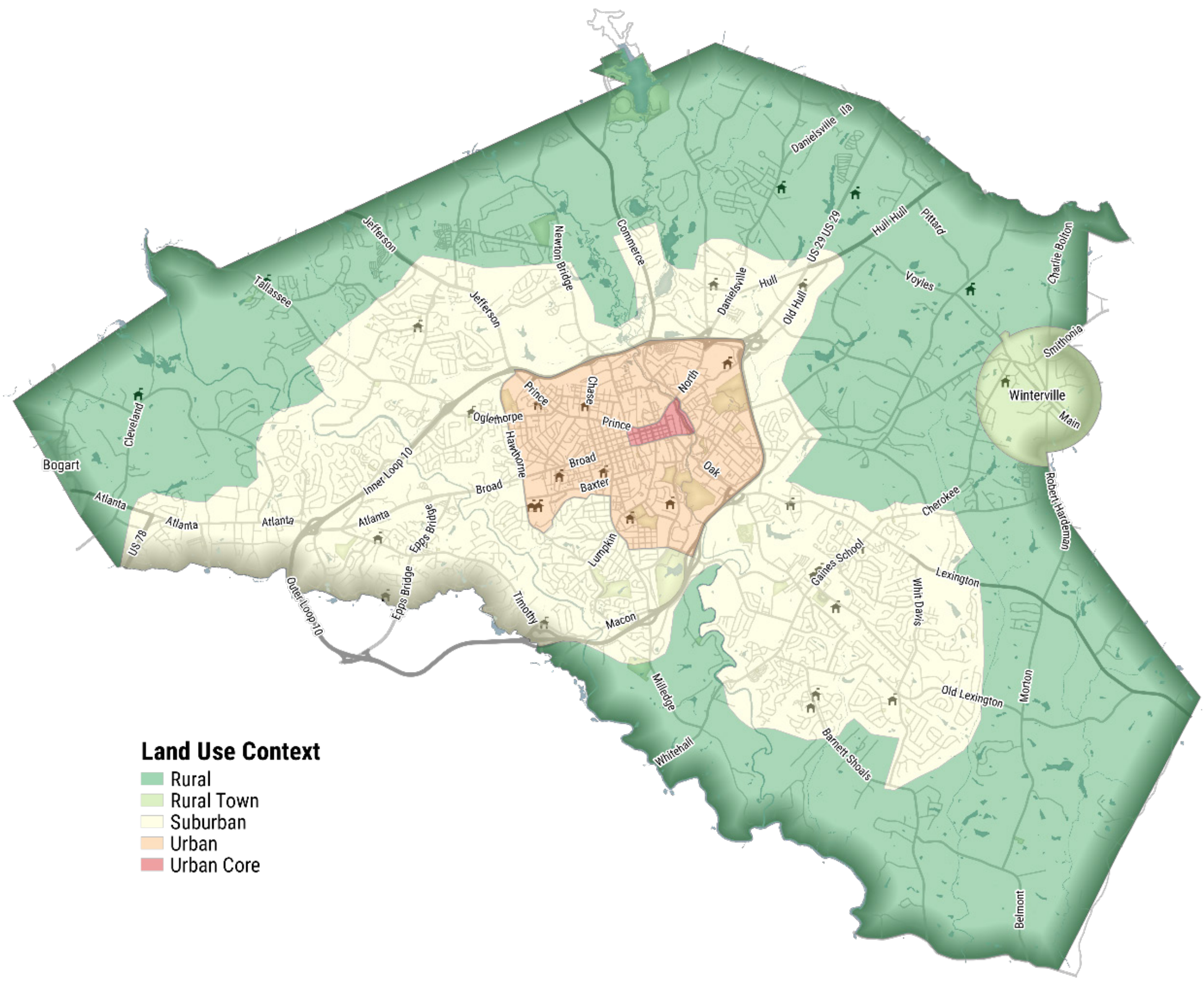
Athens in Motion identifies pedestrian needs along with bicycle facility categories for each project. The Plan also provides strategies for design decisions through: 1) a series of context-specific design menus and 2) design guidelines for common facility types (**Appendix D**). Notable benefits to this approach include:

- Flexibility: A contextual approach allows designers to use their professional judgment to make certain decisions about facility design based on specific conditions during implementation.
- Appropriateness: Not all bicycle and pedestrian projects in the network require the same type of facility; recommendations in a densely developed urban area may not be appropriate for a rural or suburban setting due to differences in land uses, road design, typical users, etc.
- Streamlined Implementation: Creating foundational guidelines for bicycle and pedestrian facility design can expedite design and construction of facilities throughout the region.

Not all bicycle or pedestrian facilities are appropriate for the entire roadway network within Athens-Clarke County. Land use context is an important factor to consider when implementing any transportation project, but especially when dealing with the human scale of active transportation facilities. **Figure 4-1** illustrates the different land use contexts within the study area.

Along with context, designers should consider the speed and volume of roads when determining the appropriate bicycle and/or pedestrian facility to implement. Higher speeds and volumes for vehicles should result in more separation for more vulnerable users, such as bicycle users and pedestrians

Figure 4-1: *Land Use Context*



LOCAL CONTEXT EXAMPLES

URBAN CORE: Lumpkin Street

URBAN: Prince Avenue

SUBURBAN: Barnett Shoals Road

SUBURBAN: S. Milledge Avenue

RURAL: Newton Bridge Road

RURAL TOWN: Winterville

FACILITY TYPES AND COSTS

Actual design and construction of each recommended project may present a variety of circumstances that a typical cross section cannot capture. Therefore, a comprehensive list of facility cost estimates has been developed to help guide implementation of recommended projects. The estimates for the proposed facility types provide several possible variations to implementing the same type of bicycle or pedestrian facility based upon existing conditions. For example, implementing a buffered bike lane on a street with surplus width and existing curb and gutter may only require striping, pavement markings, and signage. However, implementing a buffered bike lane on a narrow roadway without curb and gutter that also needs a sidewalk requires additional steps in construction (e.g., right-of-way acquisition, road widening, installation of curb and gutter, etc.). The cost estimates developed for this Plan provide guidance for these situations and others, including but not limited to:

- Bicycle facilities on existing asphalt
- Pedestrian facilities with existing curb and gutter
- Bicycle/pedestrian facilities without curb and gutter
- Bicycle facilities with the addition of a standard sidewalk
- Bicycle facilities with the addition of a wide sidewalk
- Traffic calming countermeasures

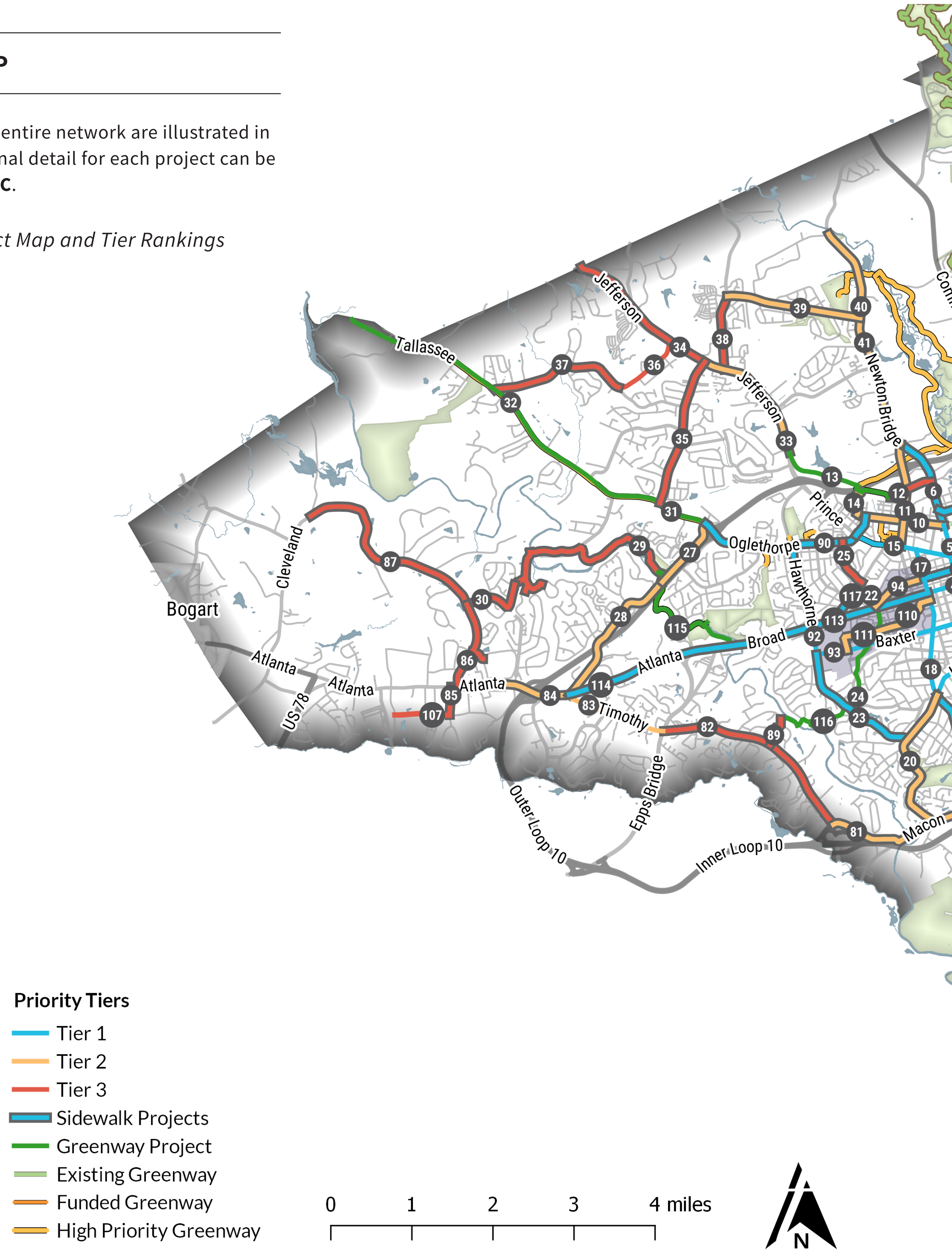
Order-of-magnitude estimates of probable costs by linear foot were generated for each facility type. Linear foot costs were developed by identifying pay items and establishing rough quantities. Unit costs are based on 2018 dollars and were assigned based on historical cost data from GDOT and other sources. Note that the estimates do not include any costs for engineering analysis and design, easement or right-of-way acquisition, or the cost for on-going maintenance. Also, note that rough costs have been assigned to some generalized categories such as utility adjustments, maintenance of traffic, and mobilization. These costs, however, can vary widely depending on the exact details and nature of the work. A 20 percent contingency has been included.

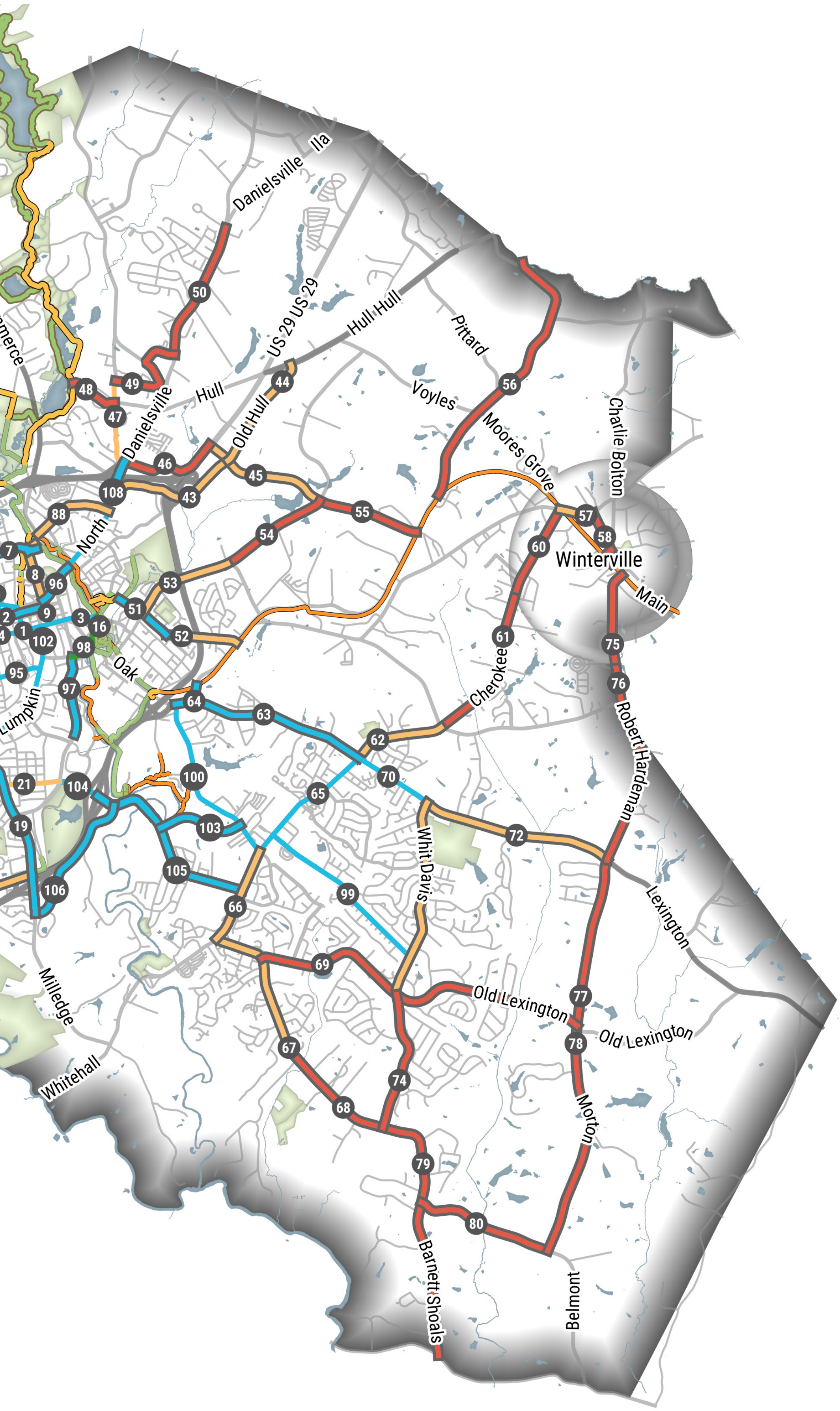
The estimates are intended to be general and used for planning purposes. Construction costs will vary based on the ultimate project scope (i.e., potential combination or segmentation of projects) and economic conditions at the time of construction. **Appendix C** presents linear foot costs by facility type for a variety of potential conditions. Each recommended project can have a lower and higher implementation cost based upon existing conditions or desired facility amenities (e.g., striped buffer vs. landscaped buffer).

PROJECT MAP

Projects across the entire network are illustrated in **Figure 4-2**. Additional detail for each project can be found in **Appendix C**.

Figure 4-2: *Project Map and Tier Rankings*




Danielsville
Ila
US 29
US 29
Hull
Hull
Pittard
Voyles
Hull
Danielsville
Old Hull
Moores Grove
Charlie Bolton
North
Winterville
Main
Oak
Cherokee
Lumpkin
Robert Hardeman
Whit Davis
Lexington
Milledge
Old Lexington
Old Lexington
Whitehall
Morton
Barnett Shoals
Belmont
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TRANSPORTATION SPECIAL PURPOSE LOCAL OPTION SALES TAX

The advancement of active transportation in Athens-Clarke County will greatly benefit from the Transportation Special Purpose Local Option Sales Tax (TSPLOST) passed in 2017. Many communities complete bicycle and pedestrian master plans with great fanfare and excitement only to struggle to build early momentum through implemented projects. Often, this is the result of not having a reliable funding source(s) to support implementation. In pursuing and passing the TSPLOST, Athens-Clarke County was highly proactive and innovative, placing the community in an enviable position for generating not only early, but lasting, self-sustaining momentum.

The TSPLOST began collecting a one percent sales tax in April 2018, and it is anticipated to generate approximately $110 million over a five-year period. Nineteen projects were identified as part of the TSPLOST program. Seven projects, as shown in **Table 4-4**, have bicycle and pedestrian elements, and account for nearly one-third of the total TSPLOST funding; of these, five projects have been designated for specific geographic areas, including the West Broad Neighborhood, Lexington Highway, Atlanta Highway, and Prince Avenue at $4 million each, and the City of Winterville with $678,300. The remaining two allocations are directed to bicycle ($6 million) and pedestrian ($11 million) projects throughout Athens-Clarke County; Athens in Motion was tasked with assigning these funds.

Table 4-4: *TSPLOST Funding for Active Transportation Projects*

PURPOSE	TSPLOST FUNDING
BICYCLE IMPROVEMENTS PROGRAM	$ 6,000,000
PEDESTRIAN IMPROVEMENTS PROGRAM	$ 11,000,000
WEST BROAD AREA PEDESTRIAN IMPROVEMENTS	$ 4,000,000
LEXINGTON HIGHWAY CORRIDOR IMPROVEMENTS	$ 4,000,000
ATLANTA HIGHWAY CORRIDOR IMPROVEMENTS	$ 4,000,000
PRINCE AVENUE CORRIDOR IMPROVEMENTS	$ 4,000,000
WINTERVILLE PEDESTRIAN AND SIDEWALK IMPROVEMENTS	$ 678,000
TOTAL	**$ 33,678,000**

As previously reviewed, Athens in Motion includes 117 projects. These projects were classified based on their geography and ability to be funded through the various TSPLOST categories. If a project occurs within the specific geographic boundary of one of the five designated categories (i.e., West Broad, Lexington Highway, Atlanta Highway, Prince Avenue, and Winterville), then it was listed with other projects that also are in that geography. The remaining projects were then classified as either bicycle or pedestrian, and these were included in prioritized project tiers that allow for easier determination of projects that should be implemented first.

The sections below outline the Tier 1 projects classified as either bicycle or pedestrian. Following those, the five designated geographies are presented.

BICYCLE IMPROVEMENTS PROGRAM

Eighteen bicycle projects are included as Tier 1 projects, as shown in **Table 4-5**. A bike category was identified for each project. These categories have been included to guide facility selection. A delineated facility may include a striped shoulder or standard bike lane, while a buffered facility includes a painted buffer for separation. Separated bike lanes may include a variety of facilities with a physical barrier between vehicular traffic, and sidepaths/shared use paths (SUP) are parallel routes outside of the curbs and may be shared with pedestrians. Because the exact configuration of these projects will need to be determined during the design phase, low and high costs were developed based on a range of possible design solutions from simple to more complex. The range of total costs for all 18 projects is $12.8 million to $51.8 million, and right-of-way acquisition and engineering design fees are not included. With only $6 million available through the TSPLOST for bicycle improvement projects, **Table 4-6** provides recommendation of projects to advance first along with justification for these recommendations.

Table 4-5: *Tier 1 Bicycle Projects*

ID	NAME	LOW BIKE COST	HIGH BIKE COST	BIKE CATEGORY	FROM	TO	LENGTH (MI)
1	Pulaski St	$256,970	$842,149	Buffered Facility	Prince Ave	W Broad St	0.2
2	E/W Hancock Ave	$823,459	$2,698,662	Buffered Facility	N Milledge Ave	College Ave	0.8
4	West Broad St	$748,447	$3,526,337	Separated Bike Lane	N Milledge Rd	S Lumpkin St	0.7
5	Barber St/N Finley St	$254,144	$1,311,382	Delineated Facility	Boulevard	E/W Hancock Ave	0.5
6	Barber St	$1,358,133	$4,664,187	Sidepath/SUP	N Chase St	Boulevard	1.0
8	College Ave	$158,939	$221,339	Shared Facility	Elizabeth St	E Dougherty St North Ave	0.6
9	College Ave	$125,575	$647,968	Delineated Facility	E Dougherty St North Ave	E Broad St	0.2
17	S/N Milledge Ave	$963,471	$4,539,432	Separated Bike Lane	Prince Ave	Baxter St	0.9
18	S Milledge Ave	$773,651	$3,645,087	Separated Bike Lane	Baxter St	S Lumpkin St	0.7
19	S Milledge Ave	$1,714,267	$5,887,245	Sidepath/SUP	S Lumpkin St	Riverbend Rd	1.3
42	North Ave	$1,140,936	$3,918,273	Sidepath/SUP	Willow Street Greenway	Old Hull Rd Danielsville Rd	0.9
51	Vine St	$306,100	$1,579,477	Delineated Facility	Oakridge Ave	Nellie B Ave	0.6
64	Winterville Rd	$219,997	$755,528	Sidepath/SUP	Winterville Rd	Lexington Rd	0.2
65	Gaines School Rd	$1,479,013	$6,968,429	Separated Bike Lane	Barnett Shoals Rd	Lexington Rd	1.3
91	Hawthorne Ave	$953,629	$3,125,258	Buffered Facility	Oglethorpe Ave	W Broad St	0.9
95	Baxter St	$328,672	$1,695,945	Delineated Facility	N/S Milledge Rd	S Lumpkin St	0.6
98	Williams St/ Baldwin St	$264,073	$865,427	Buffered Facility	E Campus Rd	Oconee St	0.2
99	Cedar Shoals Dr	$952,323	$4,913,986	Delineated Facility	Gaines School Rd	Whit Davis Rd	1.8
TOTAL		$12,821,798	$51,806,109				13.4

Table 4-6: *Bicycle Improvement Projects Recommended for Implementation with TSPLOST Funds*

NAME	FROM	TO	JUSTIFICATION
Barber St	N. Chase St	Boulevard	Completes a project that appears on both the bicycle and pedestrian Tier 1 lists
S/N Milledge Ave	Prince Ave	Baxter St	Provides bicycle access to Clarke Central High School
North Ave	Danielsville Rd	Willow St. Greenway	Connects a heavily residential area to both the greenway network and downtown
Hawthorne Ave	Oglethorpe Ave	W. Broad St	Connects a heavily residential area to a principle commercial corridor
Cedar Shoals Dr	Whit Davis Rd	Gaines School Rd	Provides bicycle access to Cedar Shoals High School

PEDESTRIAN IMPROVEMENTS PROGRAM

Twenty-three pedestrian projects are included as Tier 1 projects, as shown in **Table 4-7**. Because the exact configuration of these projects will need to be determined during the design phase, low and high costs were developed based on whether new curb and gutter would be required. The range of total costs for all 26 projects is $11.7 million to $14.6 million, and right-of-way acquisition and engineering design fees are not included. **Table 4-8** provides recommendation of projects to advance first along with justification for these recommendations.

Table 4-7: *Tier 1 Pedestrian Projects*

ID	NAME	LOW BIKE COST	HIGH BIKE COST	SIDEWALK COST	SIDEWALK + CURB/ GUTTER COST	FROM	TO	LENGTH (MI)
6	Barber St	$1,358,133	$4,664,187	$589,787	$735,881	N Chase St	Boulevard	1.0
7	Willow St/Cleveland Ave	$592,702	$1,942,420	$215,761	$269,206	Barber St	Elizabeth St	0.6
12	Oneta St	$126,276	$126,276	$275,281	$343,470	Normaltown Connector Greenway	Barber St	0.5
25	Normal Ave/Belvoir Hts	$133,511	$227,111	$291,054	$363,150	Olgethorpe Ave	Brooklyn Creek Middle Greenway	0.5
33	Old Jefferson Rd	$2,572,035	$8,429,145	$1,387,880	$1,731,667	Whitehead Rd	Buena Vista Ave Nantahala Ext	2.4
38	Jefferson River Rd	$844,190	$2,766,603	$455,528	$568,366	Old Jefferson Rd/ Greenway	Vincent Dr	0.8
39	Vincent Dr	$1,531,488	$5,019,035	$826,397	$1,031,101	Jefferson River Rd	Newton Bridge Rd	1.4
40	Newton Bridge Rd	$1,332,541	$4,576,297	$578,673	$722,014	Vincent Dr	Saxon Woods Dr	1.0
41	Newton Bridge Rd	$1,900,887	$6,528,144	$825,485	$1,029,962	Vincent Dr	N Chase St	1.4
43	Old Hull Rd	$1,426,889	$4,676,241	$443,983	$553,961	North Ave	Athena Dr	1.3
44	Old Hull Rd	$1,222,651	$4,006,906	$659,747	$823,171	Athena Dr	Hull Rd	1.1
45	Athena Dr	$1,354,256	$4,438,205	$730,762	$911,776	Collins Industrial Blvd	Olympic Dr	1.3
51	Vine St	$306,100	$1,579,477	$296,348	$369,755	Oakridge Ave	Nellie B Ave	0.6
53	N Peter St/Olympic Dr	$531,653	$2,743,327	$552,503	$689,362	Vine St	Indian Hills Rd	1.0
62	Cherokee Rd	$987,569	$4,652,969	$313,444	$391,086	Beaverdam Rd	Lexington Rd	0.9
64	Winterville Rd	$219,997	$755,528	$95,537	$119,202	Winterville Rd	Lexington Rd	0.2
81	Macon Hwy/Timothy Rd	$2,290,418	$7,865,897	$890,024	$1,110,489	Timothy Rd	S Milledge Ave	1.7
89	St James/Devonshire/ Somerset	N/A	N/A	$56,493	$70,486	Timothy Rd	Brooklyn Creek South Greenway	0.1
96	North Ave/ E Dougherty St	$543,784	$1,867,499	$129,384	$161,434	College Ave	North Oconee River Greenway	0.4
97	E Campus Rd	$829,922	$2,719,845	$447,829	$558,760	Williams St Greenway	E Green St	0.8
106	Riverbend Rd	$731,557	$3,774,833	$797,397	$994,917	S Milledge Ave	College Station Rd	1.4
108	Danielsville Rd/ North Ave	$173,661	$173,661	$378,581	$472,358	Old Hull Rd	Freeman Dr	0.7
117	King Ave	N/A	N/A	$56,493	$70,486	Sunset Dr	Old West Broad St	0.1
122	Pulaski St	N/A	N/A	$304,655	$380,120	Prince Ave	Cleveland Ave	0.5
125	Oak St	N/A	N/A	$19,655	$24,480	Poplar St	Grove St	0.1
126	King Ave	N/A	N/A	$103,659	$129,336	Hill St	Mathews Ave	0.2
TOTAL		**$21,010,221**	**$73,533,605**	**$11,722,341**	**$14,625,996**			**22.0**

Table 4-8: *Pedestrian Projects Recommended for Implementation with TSPLOST Funds*

NAME	FROM	TO	JUSTIFICATION
Barber St	N. Chase St	Boulevard	Completes a project that appears on both the bicycle and pedestrian Tier 1 lists
Jefferson River Rd	Old Jefferson Rd./Greenway	Vincent Dr	Connects a highly residential corridor that has no existing sidewalks
Cherokee Rd	Beaverdam Rd	Lexington Rd	Extends existing sidewalk from commercial area into residential area
Riverbend Rd	S. Milledge Ave	College Station Rd	Extends a sidewalk that has been requested and is partially funded by UGA
King Ave	Sunset Dr	Old West Broad St	Completes a high priority, low cost sidewalk from the former sidewalk gap program

WEST BROAD AREA PEDESTRIAN IMPROVEMENTS

The TSPLOST defines the West Broad Area Pedestrian Improvements as including, "land acquisition, design, constructing sidewalks, multi-use trail, installing pedestrian traffic lights, traffic management devices and other general streetscape improvements to improve pedestrian movement within the W. Broad neighborhood area." Based on these parameters, TSPLOST funding assigned to the West Broad neighborhood should have a nexus to pedestrian improvements. Therefore, any bicycle-exclusive projects in the West Broad neighborhood have been placed in the overall bicycle project list. If a project provides benefit to pedestrians, it is shown in **Table 4-9**, and is eligible for the TSPLOST funding assigned to the West Broad neighborhood.

Table 4-9: *West Broad Area Pedestrian Improvement Projects*

ID	NAME	LOW BIKE COST	HIGH BIKE COST	SIDEWALK COST	SIDEWALK + CURB/ GUTTER COST	BIKE CATEGORY	FROM	TO	LENGTH (MI)
94	W. Hancock Ave	$158,929	$252,529	$346,464	$432,286	Sidepath /SUP	Glenhaven Ave	S. Milledge Ave	0.6
109*	Henderson Ext/ Pedestrian Bridge	N/A	N/A	$271,288	$338,488	N/A	Henderson Ext/ Pedestrian Bridge	S. Milledge Ave	0.5
110	Wadell/Clarke Central/Dearing	N/A	N/A	$111,943	$139,672	N/A	S. Milledge Ave	Henderson Ext/ Pedestrian Bridge	0.5
111	Evans St/ Hancock Ave/ Wadell Ext	N/A	N/A	$111,488	$139,104	N/A	Rose St/ Magnolia St	Henderson Ext/ Pedestrian Bridge	0.2
112	Rose St/ Magnolia St	N/A	N/A	$74,759	$93,277	N/A	Baxter St	Evans St/ Hancock Ave/ Waddel St	0.3
TOTAL		**$797,821**	**$2,739,928**	**$915,942**	**$1,142,827**				**3.6**

*Cost does not include replacing pedestrian bridge

In addition to the projects listed above, Athens-Clarke County should consider a comprehensive crosswalk upgrade program for the West Broad neighborhood. High visibility, continental style crosswalks should be striped at intersections throughout the neighborhood. This may also require the upgrade of some ADA curb ramps. The intersection of Hancock Avenue and West Broad Street is of particular concern, as it currently presents a significant barrier to pedestrian travel. Improving pedestrians' ability to safely cross at this intersection should be considered a priority within a broader crosswalk upgrade program for the neighborhood.

LEXINGTON HIGHWAY CORRIDOR IMPROVEMENTS

The TSPLOST includes funding for improvements in three specific corridors; the first of these is Lexington Highway. As defined in the TSPLOST, improvements eligible for the funding include, but are not limited to, landscaped/concrete median(s), additional sidewalks, multi-use trail, separated bike lanes, and improvements of intersections at Winterville Rd, Gaines School Road, and Whit Davis Road. Projects identified as part of Athens in Motion that would qualify for the use of these funds are prevsented in **Table 4-10**. Coordination with GDOT's ongoing and planned efforts in the corridor will be essential.

Table 4-10: *Lexington Highway Corridor Improvement Projects*

ID	NAME	LOW BIKE COST	HIGH BIKE COST	SIDEWALK COST	SIDEWALK + CURB/ GUTTER COST	BIKE CATEGORY	FROM	TO	LENGTH (MI)
63	Lexington Rd	$2,555,689	$8,776,906	$1,003,112	$1,251,589	Sidepath /SUP	Barnett Shoals Rd	Gaines School Rd/ Cherokee Rd	1.9
70	Lexington Rd	$1,064,698	$3,656,453	N/A	N/A	Sidepath /SUP	Gaines School Rd/ Cherokee Rd	Whit Davis Rd	0.8
72	Lexington Rd	$2,008,820	$6,583,361	$837,106	$1,044,463	Buffered Facility	Whit Davis Rd	Morton Rd/ Robert Hardeman Rd	1.9
TOTAL		**$5,629,207**	**$19,016,721**	**$1,840,218**	**$2,296,052**				**4.6**

ATLANTA HIGHWAY CORRIDOR IMPROVEMENTS

The second corridor outlined in the TSPLOST is Atlanta Highway. Improvements eligible for the funding include, but are not limited to, landscaped/concrete median(s), interconnecting parcels, additional sidewalks, multi-use trail, separated bike lanes, and potential intersection improvements. Projects identified as part of Athens in Motion that would qualify for use of these funds are presented in **Table 4-11**. Coordination with GDOT will be critical to project success.

Table 4-11: *Atlanta Highway Corridor Improvement Projects*

ID	NAME	LOW BIKE COST	HIGH BIKE COST	SIDEWALK COST	SIDEWALK + CURB/ GUTTER COST	BIKE CATEGORY	FROM	TO	LENGTH (MI)
84	Atlanta Hwy	$1,698,919	$5,834,535	$737,778	$920,530	Sidepath/SUP	Commerce Blvd	Mitchell Bridge Rd	1.3
113	W. Broad St	$1,690,884	$5,806,940	N/A	N/A	Sidepath/SUP	Hawthorne Ave/ Alps Rd	N Milledge Rd	1.3
114	Atlanta Hwy/ W. Broad St	$3,581,723	$12,300,577	$1,333,888	$1,664,301	Sidepath/SUP	Mitchel Bridge Rd	Hawthorne Ave/ Alps Rd	2.7
TOTAL		**$6,971,526**	**$23,942,052**	**$2,071,666**	**$2,584,831**				**4.6**

PRINCE AVENUE CORRIDOR IMPROVEMENTS

The third corridor included in the TSPLOST is Prince Avenue. Improvements eligible for the funding include, but are not limited to, landscaped/concrete median(s), additional sidewalks, multi-use trail, separated bike lanes, and intersection improvements at the intersections of N. Milledge Avenue, King Avenue, and Park Avenue/ Talmadge Drive. Projects identified as part of Athens in Motion that would qualify for use of these funds are presented in **Table 4-12**. GDOT recently completed a Road Safety Audit for a portion of Prince Avenue, and is in the process of developing conceptual recommendations for improvements. This work should be closely coordinated with any planned TSPLOST projects in the corridor.

Table 4-12: *Prince Avenue Corridor Improvement Projects*

ID	NAME	LOW BIKE COST	HIGH BIKE COST	BIKE CATEGORY	FROM	TO	LENGTH (MI)
15	Prince Ave	$1,346,801.65	$6,345,507.76	Separated Bike Lane	Oglethorpe Ave	Pulaski St	1.2

WINTERVILLE PEDESTRIAN AND SIDEWALK IMPROVEMENTS

A portion of TSPLOST funding has been allocated for improvements to transportation within the City of Winterville. While the title of the funding implies only pedestrian improvements, the actual project description states that sub-projects may include sidewalk improvements, other transportation infrastructure improvements, pavement rehabilitation, and acquisition of associated right-of-way and/or easements. While specific sub-projects will be selected and managed by the City of Winterville, Athens in Motion has identified several eligible projects that should be considered. These are shown in **Table 4-13**.

Table 4-13: *Winterville Improvement Projects*

ID	NAME	LOW BIKE COST	HIGH BIKE COST	SIDEWALK COST	SIDEWALK + CURB/ GUTTER COST	BIKE CATEGORY	FROM	TO	LENGTH (MI)
57	Athens Rd	$306,658	$1,444,830	$53,077	$66,225	Separated Bike Lane	N. Main St	N. Church St	0.3
58	N Church St	$263,545	$1,359,893	$57,919	$72,266	Delineated Facility	Athens Rd	Marigold Ln	0.5
59	Marigold Ln/ Parkview Dr	$59,792	$106,592	$107,013	$133,520	Shared Facility	N. Church St	Marigold Ln/ Parkview Dr	0.2
60	Cherokee Rd	$1,037,828	$3,401,197	$121,953	$152,162	Buffered Facility	Hickory Dr	Athens Rd	1.0
75	Robert Hardeman Rd	$1,009,520	$3,308,426	$544,741	$679,677	Buffered Facility	S Main St	Martin Meadow Way	0.9
TOTAL		**$2,677,342**	**$9,620,939**	**$884,704**	**$1,103,851**				**2.9**

BEYOND TSPLOST

While the current TSPLOST is a tremendous funding source, it is limited to the five-year period and the amount of money that it will generate. It is recommended that Athens-Clarke County make every effort to leverage the TSPLOST funds by seeking other local, state, and federal funding sources and partners. Staff should constantly be looking for opportunities to make the very most of the available TSPLOST dollars.

The Lexington Highway, Atlanta Highway, and Prince Avenue corridors present clear opportunities for such partnerships. These are corridors where GDOT owns and maintains the street and/or is in varying stages of planning and design. By partnering with GDOT on these corridors, TSPLOST funds can be used to supplement what GDOT is already considering, allowing for more robust solutions to be implemented.

Another area that can be explored is seeking grants where TSPLOST funding can be used as a local match to secure additional public and/or private funding. One such grant program that has direct applicability to bicycle and pedestrian transportation is GDOT's Transportation Alternatives Program (TAP). While administered by GDOT, TAP is authorized through the federal transportation bill, Fixing America's Surface Transportation Act (FAST Act), as a set-aside of the Surface Transportation Block Grant program. A minimum 20 percent local match is required, but higher matches make grant applications more competitive. The majority of infrastructure projects included as part of Athens in Motion are eligible for this program.

As part of the development of Athens in Motion, opportunities to partner with other Athens-Clarke County initiatives and programs were explored. During network development, several greenway trail alignments identified by the 2016 Greenway Network Plan were analyzed to determine if the proposed greenway trails could serve as part of the recommendations of Athens in Motion. While all greenway trails in the 2016 Greenway Network Plan are valuable for both active transportation and recreation, a few have been highlighted as priority connections (**Table 4-14**) because they improve connectivity and fill missing gaps in the overall proposed network, both on- and off-street. Many of the completed greenway trails have been funded through a collected Special Purpose Local Option Sales Tax (SPLOST). Athens-Clarke County has been through several iterations of SPLOST funding. With greenway trail funding as a precedent, Athens in Motion proposed greenway trail projects may be funded through the next round of SPLOST funding and could be prioritized by the Oconee Rivers Greenway Commission, a chartered citizen committee that advises the Athens-Clarke County Mayor & Commission on matters related to the Oconee Rivers Greenway system.

Table 4-14: *Greenway Trail Projects*

ID	NAME	LOW COST	HIGH COST	FROM	TO	LENGTH (MI)
13	Normaltown Connector Greenway	$410,643	$410,643	Old Jefferson Rd/Greenway	Oneta St	0.3
14	Buena Vista Ave/ Nantahala Ext	$396,276	$396,276	Old Jefferson Rd/Greenway	Boulevard	0.3
16	Wilkerson Greenway	$599,592	$599,592	E. Broad St	Williams St Greenway	0.5
22	Brooklyn Middle Creek Greenway	$944,491	$944,491	Baxter St	Normal Ave/Belvoir Hts	0.8
24	Brooklyn Middle Creek Greenway	$977,469	$977,469	Alps Rd/West Lake Rd	Baxter St	0.8
31	Tallassee Rd	$2,363,972	$2,363,972	Turkey Creek Rd	Mitchell Bridge Rd	1.9
32	Tallassee Rd Greenway S.	$3,176,573	$3,176,573	Three Oaks Dr	Turkey Creek Rd	2.6
115	Middle Oconee Greenway	$1,984,323	$1,984,323	Mitchell Bridge Rd	W. Broad St/Atlanta Highway	1.6
116	Brooklyn Creek S.	$1,239,255	$1,239,255	St James St/Devonshire/Somerset	Alps Rd/West Lake Rd	1.0
TOTAL		**$12,092,594**	**$12,092,594**			**2.9**

Finally, as Athens-Clarke County considers the future, it is important that safety for all modes continue to be part of every project in a systematic fashion. As recommended in the Education, Safety, and Encouragement chapter of this document, making a safe systems approach the default for all transportation projects and programs is the right answer. Through implementing a Vision Zero framework, true partnerships will be built throughout all departments within Athens-Clarke County and with related agencies. General fund budgets and the next round of TSPLOST should focus on pulling together the efforts of multiple agencies and interests to point them all in the same direction, so that police, health, housing, schools, transportation and public works, planning, and development all truly center their existing projects and programs on Vision Zero. Vision Zero is not about creating a new mandate with a new program and new budget, it is about refocusing (i.e., through the prism of safety) the money that's already being invested in the community in these different areas.

POLICY AND PROGRAMS

In addition to capital infrastructure recommendations presented above and education, safety, and encouragement recommendations made previously, there are several policy and programmatic changes that should be considered by Athens-Clarke County. While these do not require large capital expenditures, they will require varying degrees of coordination and cooperation among departments and personnel.

POLICY AND PROGRAM ALIGNMENT/REFINEMENT

Athens-Clarke County has several policies and programs that directly affect the delivery of bicycle and pedestrian projects. Of specific importance are the Complete Streets Ordinance, Guidance for Three Lane Conversions, and the Sidewalk Gap Program. While each of these have merit independently, it would be highly advantageous to refine these policies/programs to work more cohesively and reflect Athens in Motion recommendations.

A common criticism of the Complete Streets Policy is that it does not apply to resurfacing projects; however, the Guidance for Three Lane Conversions exclusively applies to resurfacing projects. If these two policies were more closely aligned, or possibly even combined, then this criticism could be resolved. Further, the application of Complete Streets and lane conversion projects in Athens (and other communities across the country) has made it apparent that a broader understanding of context must be achieved prior to making major changes to a street's cross section. This can be accomplished through more comprehensive corridor studies that provide an understanding of the individual context of each project. While this requires resources to be expended for upfront planning, it ensures that time and dollars spent on implementation support the most appropriate solution.

Athens in Motion provides resources that can strengthen these policies and programs as well. Rather than having a list of exemptions at the end of the Complete Streets Policy, it would be appropriate to simply endorse the Athens in Motion network. If Athens in Motion has prioritized a street for bicycle, pedestrian, and/or access to transit improvements, then the Complete Streets Policy would apply. Similarly, many sidewalk gaps have been identified for improvement as part of Athens in Motion; these should replace the Sidewalk Gap Program. Additionally, "To ensure the use of the latest and best design standards, policies, and guidelines" is a primary goal of the Complete Streets Policy. Athens in Motion includes an entire appendix dedicated to design guidelines and best practices that should be integrated into the Complete Streets Policy (see **Appendix D**).

DATA COLLECTION

For many of the Plan's education, safety, and encouragement recommendations to be effective, and for the measures of success to be benchmarked over time, it is important to have data that can support these efforts. Athens-Clarke County should evaluate the methods for which it currently collects traffic and crash data and determine if it is being collected and cataloged in a manner that is useful for determining causes of, and ultimately solutions to, crashes, serious injuries, and deaths. Further, to know and understand what facilities are attracting new users and varied user types, data collection must include the counting of bicyclists and pedestrians on these facilities. Finally, all data must be accessible, easy to understand and interpret, and able to be readily passed between databases and GIS platforms.

BICYCLE AND PEDESTRIAN COORDINATOR AND CITIZENS ADVISORY COMMITTEE

As shown in the Plan's measures of success, it is recommended that Athens-Clarke County create a fulltime Bicycle and Pedestrian Coordinator position. This position is critical to continuing the momentum created by Athens in Motion, as it would be the charge of this position to push forward the recommendations made in this Plan, regularly review and update those recommendations based on changing circumstances, and identify opportunities for the advancement of active transportation in general. Having someone that can exclusively give attention to active transportation, and related programs and policies, will not only increase the effectiveness of bicycle and pedestrian projects and initiatives, but will also allow other staff to focus on their primary areas of responsibility.

In support of the Bicycle and Pedestrian Coordinator, it is also recommended that a Citizens Advisory Committee (CAC) be established. While a CAC was active during the development of Athens in Motion, it was convened to oversee the Plan's creation. The CAC recommended here would be tasked with supporting the Bicycle and Pedestrian Coordinator in the implementation of Athens in Motion and general advancement of and advocacy for active transportation. Members of the CAC would be appointed by the Commission on a term basis, with limits placed on those terms to encourage dynamic representation with some degree of continuity (e.g., two-year staggered terms). Additionally, it will be important that CAC membership be comprised of a broad cross-section of the community, representing a diverse set of perspectives.

CLIMBING LANES RESTRIPING POLICY

Athens-Clarke County has some challenging topography for bicycling. There are also many streets where sufficient right-of-way is not available to implement bicycle facilities on both sides of the street. For these combined reasons, Athens-Clarke County should consider instituting a climbing lane policy. This policy would allow a one-way bike facility to be implemented on the uphill side of streets where right-of-way is sufficient for such, but not sufficient enough for a bicycle facility in both directions. A climbing lane would provide bicyclists the dedicated space needed to feel secure traveling uphill, while also removing the slower bicyclist as an obstruction to vehicular travel going in the same, uphill direction. On many streets, climbing lanes could be implemented as simple restriping projects, being accomplished for very little capital cost. A climbing lane policy could be incorporated into the Complete Streets Policy, Guidance for Three Lane Conversions, or as part of a comprehensive policy if these two policies were combined as recommended above.

SIDEWALK GAPS AND FUTURE DEVELOPMENT

Realizing accessibility for everyone is dependent on making both large and small connections. It is certainly appropriate to focus on the broader vision of the Plan, but smaller, equally critical steps must also be taken to accomplish a cohesive network. One such action is to complete small sidewalk gaps in the network. These sidewalk gaps can occur for a number of reasons. One such reason is when individual developments provide sidewalks along their property frontage but short connections to existing sidewalk are lacking. Consideration should be given these types of sidewalk gap improvements that are not included within the project list due to conditions that arise, like unforeseen development, that may attract or generate pedestrian activity. Therefore, Athens-Clarke County should assign funding to construct minor connections in addition to the defined project list.

ACTION PLAN

The Action Plan presented in **Table 4-15** provides a succinct listing of critical recommendations made throughout Athens in Motion. The Action Plan includes recommended actions, potential partners, and notes to assist in the implementation process. Athens-Clarke County's Transportation & Public Works Department (T&PW) will "own" and lead the implementation of Athens in Motion; therefore, T&PW is not listed as a potential partner in the Action Plan below.

Table 4-15: *Action Plan*

RECOMMENDED ACTION	POTENTIAL PARTNER	NOTES
SHORT TERM (0-2 YEARS)		
Advance five (5) tier 1 pedestrian projects using TSPLOST funding	GDOT; Athens Transit System; Leisure Services Department;	• Use design principles outlined in Athens in Motion • Prioritize projects that accomplish both pedestrian and bicycle connections and/or provide critical connections between land uses
Address five (5) tier 1 bicycle projects using TSPLOST funding	GDOT; Athens Transit System; Leisure Services Department	• Use design principles outlined in Athens in Motion • Prioritize projects that accomplish both bicycle and pedestrian connections and/or provide critical connections between land uses
West Broad Area Pedestrian Improvements	GDOT; Leisure Services Department	• Select priority projects within the West Broad area based on Athens in Motion recommendations • Target intersection improvements to ensure ADA compliance and safe crossings
Create a bicycle and pedestrian counting program	GDOT; Athens Transit System; Leisure Services Department	• Use design principles outlined in Athens in Motion • Prioritize projects that accomplish both bicycle and pedestrian connections and/or provide critical connections between land uses
Host Open Streets event or other event promoting active travel in the area	UGA; Leisure Services; Oconee Rivers Greenway Commission; Firefly Trail; Bike/Ped Advocacy Groups	• Large-scale public events promoting active transportation can break down fears of and biases against active transportation • Positive experiences biking and walking can create community buy-in for future events and infrastructure development
Host first educational seminar about safe active transportation skills in public school(s)	Clarke County School District; UGA; Leisure Services; Oconee Rivers Greenway Commission; Firefly Trail; Bike/Ped Advocacy Groups	• Target audiences can be K-12 students • Differing ages require different types of educational programming, so consider starting with one age group • Leverage non-profits and UGA students/ partnerships for leading educational programming and teaching

RECOMMENDED ACTION	POTENTIAL PARTNERS	NOTES
SHORT TERM (0-2 YEARS) CONTINUED		
Host Community Walkshops/Walking Audits in Athens-Clarke County neighborhoods	Clarke County School District; Leisure Services; Oconee Rivers Greenway Commission; Firefly Trail; Bike/Ped Advocacy Groups	• These events encourage civic engagement and will help to identify gaps/dangerous areas
Begin tracking crash data	GDOT; Athens-Clarke County Police Department; Georgia Department of Public Safety; Local/Regional Hospitals	• Important data to collect includes pre-crash maneuvers, top-crash intersections, and police reports
Conduct wayfinding audit	GDOT; Leisure Services; Oconee Rivers Greenway Commission; Firefly Trail	• Review existing wayfinding signage throughout Athens-Clarke County to determine where modifications and new signage should be added as the network is implemented
Develop a Vision Zero Action Plan	GDOT; Georgia Department of Public Safety; Clarke County School District; UGA; All Athens-Clarke County Departments	• This plan provides direction and systematic actions that should be taken to implement countermeasures to reduce fatal and serious injury crashes
Develop a road safety media campaign to aid in creating a culture of safety	Clarke County School District; UGA; Bike/Ped Advocacy Groups	• Use billboards, flyers, advertisement, and posters to advocate for safe travel for all modes • Use consistent and clear branding and messaging across all media
Create the Athens-Clarke County Bicycle and Pedestrian Coordinator position	-	• A staff member that is solely dedicated to implementing Athens in Motion is vital to achieving the vision set out in the Plan
MID TERM (3 - 5 YEARS)		
Implement two (2) greenway trail projects	Leisure Services Department; Oconee Rivers Greenway Commission;	• Use greenway trail funding
Develop outreach campaign to inform people about new/ updated infrastructure	Clarke County School District; UGA; Leisure Services, Bike/Ped Advocacy Groups	• Outreach should be targeted around neighborhoods/schools where new infrastructure is constructed • Consider interactive options to help potential/ existing users to experience the new type of infrastructure

RECOMMENDED ACTION	POTENTIAL PARTNERS	NOTES
MID TERM (3 - 5 YEARS) CONTINUED		
Create self-guided tours to promote active tourism	Athens Convention and Visitors Bureau; Bike/Ped Advocacy Groups Leisure Services Department	• Tours provide activity for visitors and/or families with young children • Tours should be short and easy to complete for any type of user
Host a series of discovery events, such as easy bikes and walks in various neighborhoods	Bike/Ped Advocacy Groups; Leisure Services Department	• Consider partnering with local nonprofits • Host events at community centers, parks, or other community anchors
Annual crash analysis and ridership reporting	GDOT; Georgia Department of Public Safety; Athens-Clarke County Police Department	• Generate annual report from crash data • Analyze change in crashes and bicycle ridership in response to educational programs and new infrastructure • Use crash reporting to target intersections for improvement
Select and commission design for remaining Tier 1 projects, as TSPLOST and additional funding sources allow	GDOT; Athens Transit System; Leisure Services Department	• Use principles for safe facility design outlined in Athens in Motion
Host/support annual safety training and multimodal education program for college freshmen at UGA	UGA; Bike/Ped Advocacy Groups	• Large-scale public events promoting active transportation can break down fears of and biases against active transportation • Positive experiences biking and walking can create community buy-in for future events and infrastructure development
Host first educational seminar about safe active transportation skills in public school(s)	Clarke County School District; UGA; Bike/Ped Advocacy Groups	• Yearly training ensures that students receive information about safe biking and walking practices at the beginning of their college experience • Within a four-year period, every UGA student will have received training on safe biking and walking and be aware of multimodal options
Update existing wayfinding to reflect new changes in infrastructure	GDOT	• Wayfinding should be consistent both with Athens-Clarke County's existing branding and sign design • Signs should orient users to their location and help them find safe, connected routes

RECOMMENDED ACTION	POTENTIAL PARTNERS	NOTES
MID TERM (3 - 5 YEARS) CONTINUED		
Begin collecting data required for a safe systems approach to traffic safety planning	GDOT; Georgia Department of Public Safety; Athens-Clarke County Police Department; Local/Regional Hospitals;	• These innovative plans require extensive and accurate datasets, including: - Yearly crash data for pedestrian, bike, and vehicle crashes - Intersection geometry (number of lanes, lane widths, etc.) - Injury severity/fatality data - Detailed roadway data - Equity measures (poverty, access to vehicle, etc.) - Traffic counts for all modes - Mid-block crossing data
Apply to be a silver-level Bicycle Friendly Community	UGA; Bike/Ped Advocacy Groups	• Silver level requirements can be found at https://bikeleague.org/content/building-blocks-bicycle-friendly-communities
Apply to be a Walk Friendly Community	UGA; Bike/Ped Advocacy Groups	• Requirements can be found at https://walkfriendly.org
LONG TERM (6-10 YEARS)		
Evaluate the overall network and prepare Athens in Motion update	-	• Updating Athens in Motion allows for analysis of existing conditions and new needs for active transportation
Select priority Tier 2 projects for implementation	GDOT; Athens Transit System; Leisure Services Department	• Use Athens in Motion project lists
Commission design and implementation on highest priority Tier 2 projects	GDOT; Athens Transit System; Leisure Services Department	• Use the design principles and specific guidance outlined in Athens in Motion

SUCCESS MEASURES

While the preceding Action Plan provides a "big picture" roadmap for advancing the various Athens in Motion recommendations, it is important to establish success measures that can be used to evaluate and monitor progress of those individual recommendations. Such measures will be valuable in producing progress reports to document and celebrate success while also demonstrating the benefits achieved by Athens in Motion. **Table 4-16** presents the Success Measure Plan for Athens in Motion.

Table 4-16: *Success Measure Plan*

Success Measure	Short-Term Tasks	Mid-Term Tasks	Long-Term Tasks
Sidewalk improvements included in capital improvement plan by 2020	• Complete in-progress sidewalk gap program segments • Target Tier 1 pedestrian projects that are funded by TSPLOST	• Identify funding to continue pedestrian projects in Tier 1 • Develop a budget line item for on-going sidewalk improvements	• Continue routine sidewalk maintenance • Fill sidewalk gaps to ensure that Athens is a pedestrian friendly environment
At least one bicycle facility in each square mile of Athens-Clarke County	• Target Tier 1 projects first, beginning with those that most support connectivity in the area	• Expand on existing facilities with remaining Tier 1 projects	• Identify gaps in the network and implement comfortable bicycle facilities to complete a county-wide network
All transit stops have first/last mile access to bicycle and pedestrian facilities	• Coordinating with Athens Transit, identify most heavily used routes to create first- and last-mile connections around transit stops	• Select and commission design for projects along most heavily used routes, connecting facilities to existing/planned active transportation facilities	• Commission design for remaining projects within the network that are in proximity to transit
Safe routes to school (biking and/or walking) for 50% of students within 2 miles of elementary or middle schools	• Create inventory of schools and existing infrastructure within 2 miles	• Create Safe Routes to School Plan • Implement projects along roads identified in the Plan for pedestrian improvements near schools that already have funding in place	• Create long-term maintenance plan for sidewalks around schools • Create unified signage design for school system signs

Success Measure	Short-Term Tasks	Mid-Term Tasks	Long-Term Tasks
Use crash data to inform Vision Zero benchmarking	• Begin collecting traffic and crash data • Create annual reports of data to be shared with GDOT and to inform future road design/project selection • Develop and adopt a Vision Zero Action Plan	• Continue collecting data on traffic, street conditions, and street design features • Implement recommendations and actions from Vision Zero Action Plan	• Evaluate Vision Zero Action Plan to strive towards zero traffic deaths in a given target year
Crashes reduced by 25% from adoption year crash records (within 5 years of Plan adoption)	• Conduct review of existing crash data	• Compare number of crashes within Athens-Clarke County each year in response to changing infrastructure • Use data to inform Vision Zero planning and implementation.	• Update facilities around crash-dense locations
Complete network of trails	• Construct trails funded by the TSPLOST (i.e., Firefly Trail and Oconee River Greenway sections)	• Collaborate with the Oconee River Greenway Commission to identify the next phase of greenway trails • Pursue additional funding to accompany SPLOST/TSPLOST funds for trail development	• Complete implementation of trails identified by both the Athens in Motion Plan and the Greenway Network Plan
Implement separate and/or buffered bicycle facilities	• Develop pilot projects that demonstrate how these types of bicycle facilities will look and operate • Implement two (2) projects in these categories from the Tier 1 projects	• Continue to develop bicycle facilities with more separation as part of upgrade to existing facilities and as part of Tier 1 projects • Identify intersections to be converted to protected intersections • Design and implement protected intersections	• Adopt local standards for separated and/ or buffered bicycle facilities and policy on implementation outside of Athens in Motion network
Create mapping initiatives for pedestrian wayfinding signage	• Create an inventory of existing pedestrian wayfinding signage • Map existing signage and key destinations for pedestrians	• Develop a standard for pedestrian wayfinding and approach for implementing signage	• Implement a comprehensive pedestrian wayfinding signage system that ensures key destinations can be easily found by residents or visitors

Success Measure	Short-Term Tasks	Mid-Term Tasks	Long-Term Tasks
Within five years of Plan adoption, bicycle and pedestrian safety programs are available in public schools	• Identify and partner with schools that are interested in participating in safety programs • Select age group(s) to receive the safety training • Review best practices in safety training programming/curricula from FHWA and the Georgia Safe Routes to School Safety Education Toolkit .	• Create pilot program of bicycle and pedestrian safety programming with interested schools • Based on feedback from schools and students, update the curriculum for future trainings	• Expand bicycle and pedestrian safety programming for other age groups and for other schools • Host annual safety programming throughout Clarke County School District
Host recurring signature event to promote active transportation	• Identify type of event Athens-Clarke County should host (Open Streets Event, unique/ signature biking/ walking event, etc.) • Select location/routes for event that is central and/or connects to key destinations within the community • Identify funding mechanism for project	• Create marketing campaign for event • Host first signature event • Design many opportunities for feedback to ensure that the signature event improves each year	• Host annual signature event, potentially expanding in scale as its success grows
Annual Bike to Work Day events	• Organize and promote Bike to Work Day event • Host station at government buildings with water and/or snacks for people biking to work	• Encourage other businesses or organizations to host stations for people that bike to work • Develop a data collection/count worksheet for each station and collect worksheets after the event	• Expand Bike to Work Day stations to include Bike from Work stations • Explore the opportunity to expand the event for other parts of the year
Entire bicycle and pedestrian network implemented by 2040	• Focus on TSPLOST funded projects, including positioning for future rounds of TSPLOST • Leverage TSPLOST funding to secure other public and private funding sources	• Complete Tier 1 projects and begin to design and implement Tier 2 projects • Identify additional funding for active transportation projects	• Celebrate the completion of the network • Budget for continued maintenance of network • Evaluate additional needs and fill in any remaining gaps

Success Measure	Short-Term Tasks	Mid-Term Tasks	Long-Term Tasks
Establish a Bicycle and Pedestrian Coordinator position that is supported by permanent Citizens Advisory Council	• Allocate funding for coordinator position salary • Create job posting for position	• Hire bicycle and pedestrian coordinator	• Bicycle and pedestrian coordinator is responsible for guiding implementation of the network and leading programming activities. • Coordinator expands upon the Athens in Motion network and programming
Become a platinum-level Bicycle Friendly Community by 2050*	• Conduct inventory of bicycle-friendly laws and ordinances. • Consider outreach campaign to encourage biking throughout Athens-Clarke County. • Host annual Bike Month Activities	• Host annual adult bicycle skills class • Ensure that over 50% of schools in the Clarke County School District offer bicycle education • Expand planned network and programming by updating Athens in Motion • Hire additional bicycle and pedestrian planning/engineering staff	• Implement entire Athens in Motion network and additional connections to expand the network • Apply for platinum-level designation

**Note that tasks included in this row of the Success Measure Plan are not exhaustive of qualifications to become a platinum-level Bicycle Friendly Community; instead, this row contains only the qualifications that were not included in other parts of the Success Measure Plan. For more information, please visit https://bikeleague.org/community*

Athens IN MOTION

EXISTING CONDITIONS

EXISTING PLAN REVIEW

FACILITY INVENTORY

DEMAND ANALYSIS FACTORS

LEVEL OF COMFORT METHODOLOGY

APPENDIX A

EXISTING PLAN REVIEW

ATHENS-CLARKE COUNTY BICYCLE ACCESS IMPROVEMENT PROJECT EVALUATION MANUAL

The Athens Clarke County Bicycle Access Improvement Program provides a framework for a systematic approach to bicycle infrastructure projects. This manual's purpose is to help city and county staff, officials, and citizens understand how projects are evaluated. The manual contains a comprehensive list of projects completed under the Bike Athens Master Plan and relevant experiences/ practices used by other governments. The AASHTO guidelines, bicycle level of service, and the NACTO guidelines are also used as criterion measures.

Based on these guidelines and case studies, this manual identifies seven evaluation criteria for prioritizing bicycle infrastructure projects: safety, cost, connectivity, level of stress, accessibility, topography, and route attractiveness. Safety, costs, connectivity, and level of traffic stress are weighted more heavily than the other factors. The manual assess safety based on many factors, including but not limited to grade, lighting, pavement factors, and roadway geometry. Level of stress for cyclists is also measured by several criteria, including average daily traffic, posted speed limit, paved shoulders, and outside land width. Connectivity evaluation is based on connection to two types of infrastructure: number of existing bicycle facilities and arterials connected to a proposed project. And the cost evaluation considers two main factors: existing right of way and type of reconstruction (major and minor).

ATHENS-CLARKE COUNTY BICYCLE MASTER PLAN

The primary purpose of the Athens-Clarke County Bicycle Master Plan is to identify existing bicycle routes and propose a connected network of bicycle paths. The plan's focus is within a three-mile radius around College Avenue. The focus area has a gridded street system that is well-suited for bicycle infrastructure. Eight existing facilities totaling to 8.5 miles of bicycle lanes are already in place; these include both on and off-street facilities.

The University of Georgia's bicycle infrastructure should also be connected to the network. Based on the existing facilities, bicycle level of service, public engagement, corridor studies, and existing bus routes, sixteen new projects were proposed. Each is evaluated based on the Athens-Clarke County Bicycle Access Improvement Project Evaluation Manual. The proposed projects connect existing facilities to one another and allow access to downtown Athens.

COMPLETED BICYCLES FACILITIES REPORT

This report summarizes the bicycle infrastructure projects that have been completed between 2001 and 2017. Nearly 30 different bicycle lane projects have been completed, and more than 50 sharrows have been added.

PROPOSED BICYCLE FACILITIES SCORE SHEET

Athens-Clarke County's Bicycle Access Improvement Project Evaluation Manual has been used to score and prioritize proposed bicycle projects based on its seven criteria. The highest scoring projects are categorized as "share the road signage" projects, which include sharrows and road signs, as cost is considered one of the most important factor in prioritization.

ATHENS TRANSIT FEASIBILITY STUDY & APPENDICES 2016

This study provides an overview of the study area and its transit services to explore the feasibility of coordinated transit services in Athens-Clarke County and the University of Georgia (UGA). There are two major providers of transit within the area: Athens Transit and UGA transit. There are other forms of transit within the city, including intercity buses like Greyhound and Max Bus, taxis and ride share networks, apartment shuttles, and human services transport. This report is the first step in analyzing existing conditions to determine if the existing land use, zoning, development densities, census data, and existing infrastructure are supportive of an interconnected system.

After considering multiple transit structures and connectivity options, recommendations were proposed for branding and marketing, user enhancements, multimodal enhancements, and financial strategies. The plan recommends an updated branding strategy for Athens Transit and to hire specific marketing staff. It also recommends incorporating on-board Wi-Fi. This would benefit both users and operators; integration of Wi-Fi would also allow opportunities for integrating intelligent transportation system (ITS) elements like real-time information sent to operations. In terms of multimodal enhancements, the report also suggests that bicycle and pedestrian facilities within a one-mile radius of the proposed route changes provide connectivity to the bus stop. As nearly 60% of transit users walk to and from transit, it is recommended that a thorough study of bicycle and pedestrian accessibility be conducted to assess the conditions of existing facilities and provide an implementation plan for future facilities.

The appendices of the Athens Transit Feasibility Study contain the results from an extensive public engagement process. It includes results from public meetings and stakeholder interviews, as well as transit rider on-board surveys.

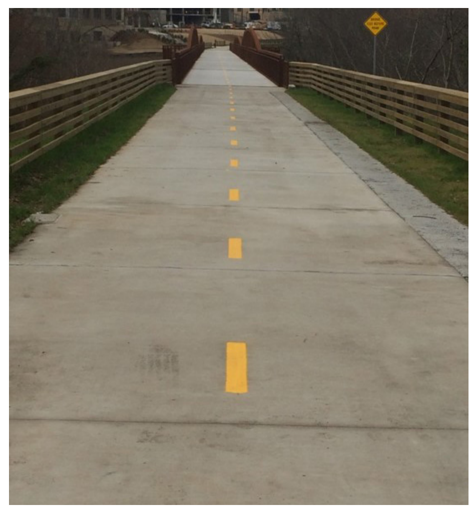
FACILITY INVENTORY

CROSSWALK TREATMENTS






BIKE PAVEMENT MARKINGS

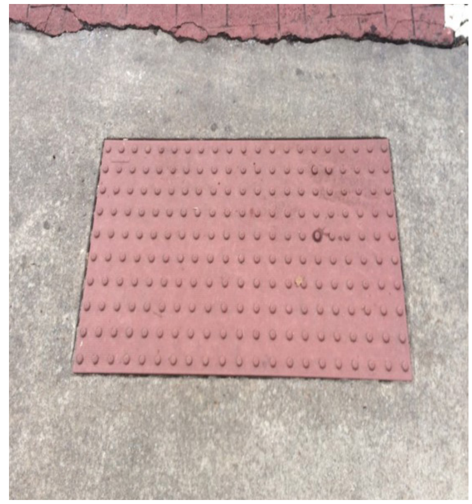


PEDESTRIAN PUSH BUTTONS

BICYCLE AND PEDESTRIAN SIGNAGE

CURB RAMPS AND TACTILES






MID-BLOCK CROSSINGS

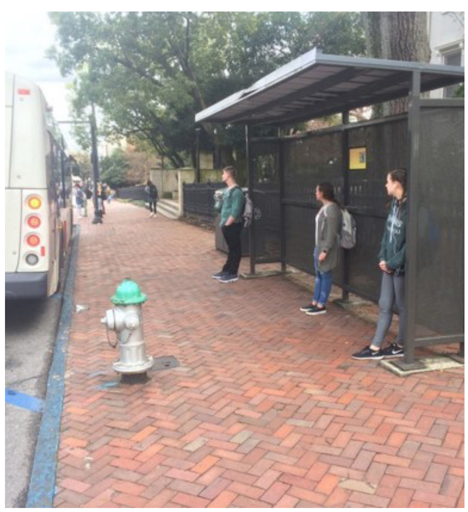
STREET FURNITURE

STREET FURNITURE (CONTINUED)










DEMAND ANALYSIS FACTORS

The demand analysis created for the Athens-Clarke County study area identifies existing and potential demand for bicycle and pedestrian activity. The demand analysis map, or heatmap, illustrates these locations by considering multiple factors with differing weights, including but not limited to existing active transportation infrastructure and the location of key destinations with Athens-Clarke County. Together, these inputs provide a picture of locations where bike and pedestrian infrastructure will most likely be successful. This analysis, along with public input, will shape the network recommendations for Athens-Clarke County.

Each factor and its weight was chosen based on its likelihood to generate biking and/or walking trips. Bus stops, for example, are places that have higher levels of pedestrian activity and therefore require safe "first and last mile" connections. Also, certain land uses, such as "residential mixed use" and "community center," are more attractive to bike and pedestrian trips and have been included as inputs within the demand analysis. An exhaustive list of factors used in the analysis and their weights, as shown in table below and illustrated by the demand analysis map in **Figure 2-6**.

Input	Weight	Rationale
EXISTING GREENWAY TRAIL	15	Existing greenway trails attract users of all ages and abilities
PLANNED GREENWAY TRAIL	10	Future greenway trail linkages will generate future trips
EXISTING BIKE FACILITIES	15	Existing infrastructure indicates a certain level of bike and pedestrian activity currently exists
SHARROWS	3	Identified for bike routing (Google)
UNIVERSITY/COLLEGE	7	UGA and Athens Tech serve as hubs of activity, and the campus environment offers comfortable bicycling and walking opportunities
BUS STOPS	7	Bus stops are centers for bicycling and pedestrian activity, and they need connected active transportation networks
BUS ROUTES	3	Transit ridership generates demand for bike and pedestrian facilities
SCHOOLS	12	Students may be frequent users of active transportation to commute to school if safe facilities are provided
SIDEWALKS	8	Sidewalks provide connectivity for pedestrians
PARKS/OPEN SPACE	10	Parks are existing locations of pedestrian activity and destinations for bicyclists and pedestrians
RELEVANT FUTURE LAND USES • Community Center Mixed Use • Corridor Business • Corridor Residential • Downtown • Main Street Business • Neighborhood Mixed Use • Residential Mixed Use • Community/Institutional • Health Care Facilities • Libraries	10	Certain land uses are more likely to generate and attract walking and biking trips. Some uses may also provide more comfortable and safer bicycling trips.
TOTAL	100	

LEVEL OF COMFORT METHODOLOGY

For the Athens-Clarke County analysis, factors that affect Level of Comfort (LOC) include speed, the road's classification, the level of separation of the bicycle facilities from traffic, and the presence of bicycle infrastructure such as "sharrows" or a bicycle lane. Five classifications were used to describe the existing LOC, with LOC 1 indicating the most comfortable riding environments, and LOC 5 indicating riding environments not suitable for bicycle traffic. LOC was determined based on datasets provided by Athens-Clarke County. These data sets included speed limits, functional classification, and existing bicycle facilities.

Score	Qualitative Assessment	Quantitative Assessment
LOC 1	Level of stress tolerable by most children, requiring minimal attention of cyclists	• Multiuse paths and greenway trails • Roads classified as "alleys" • Local roads with speed limits 25 mph or less • Major collectors with speed limits 30 mph or less with bike lanes
LOC 2	Appropriate riding conditions for the mainstream adult population	• Local roads with 30 mph speed limits, or local roads with higher speed limits and bike lanes • Arterials with speed limits 30 mph or less, or with speed limits 35 mph or less on streets with bike lanes • Minor arterials with speed limits of 30 mph and bike lanes • Collectors with speed limits of 30 miles per hour or less, or with speed limits of 40 mph or less on streets with bike lanes
LOC 3	Well-suited for the enthusiastic rider that is confident in his/her riding abilities, but still prefers separated facilities	• Local roads with speed limits between 30 and 40 mph • Arterials and collectors with speed limits between 30 and 45 mph, or speed limits between 35 and 45 mph on streets with bike lanes
LOC 4	Only tolerated by riders who may be classified as "strong and fearless"	• Local roads with speed limits greater than or equal to 45 mph • Arterials with speed limits greater than 45 mph, or with speed limits greater than 50 on streets with a bike lane • Minor arterials with speed limits greater than 30, or with speed limits greater than 40 on streets with bike lanes • Collectors with speed limits greater than 40 mph, or with speed limits greater than 45 on streets with bike lanes
LOC 5	Not appropriate conditions for bicycle traffic	• Inner/Outer Loop 10 and its ramps (restricted bike access) • Arterials with speed limits greater than 45 mph

CONTEXT CROSS SECTIONS

URBAN CORE MENU

URBAN MENU

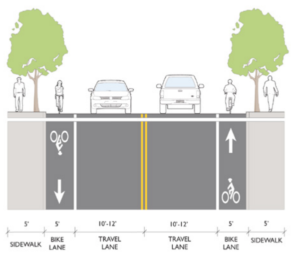
SUBURBAN MENU

RURAL MENU

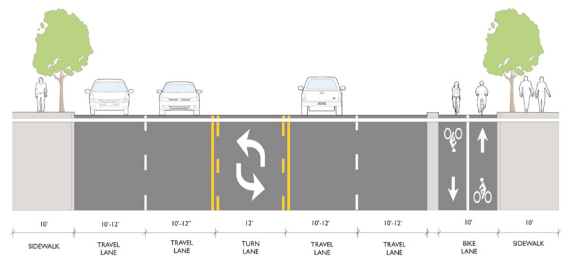
RURAL TOWN MENU

APPENDIX B

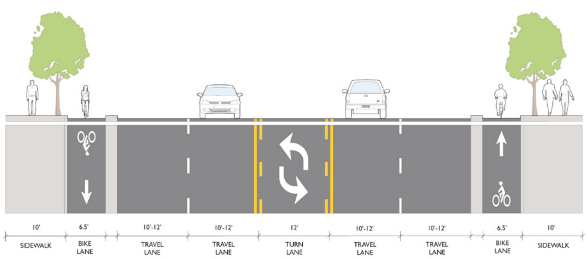
URBAN CORE MENU



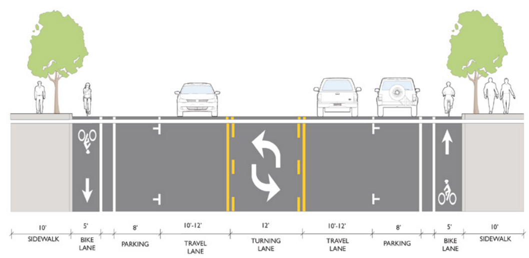
BIKE LANE + SIDEWALK



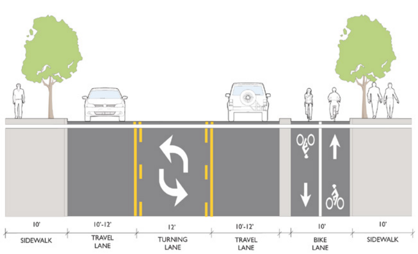
TWO-WAY SEPARATED BIKE LANE
3+ TRAVEL LANES



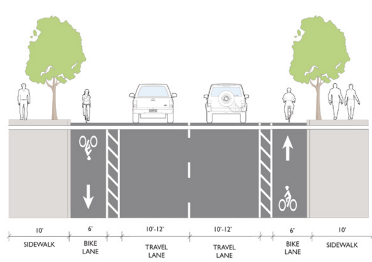
SEPARATED BIKE LANE
3+ TRAVEL LANES



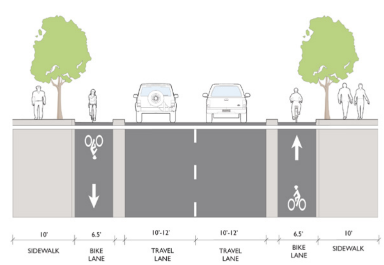
PARKING PROTECTED BIKE LANE



TWO-WAY SEPARATED BIKE LANE



BUFFERED BIKE LANE
ONE-WAY STREET



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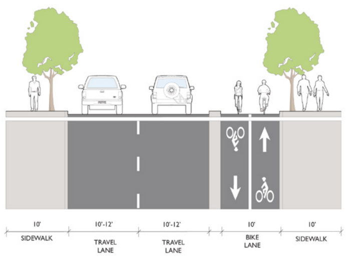
ONE-WAY STREET



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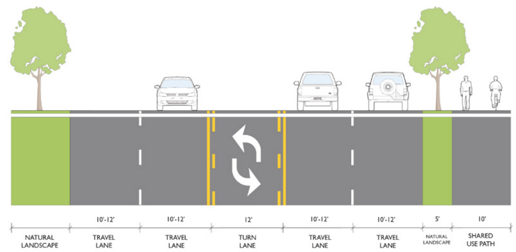
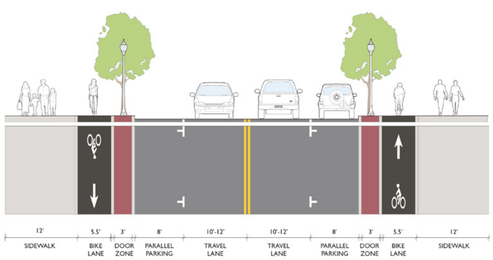
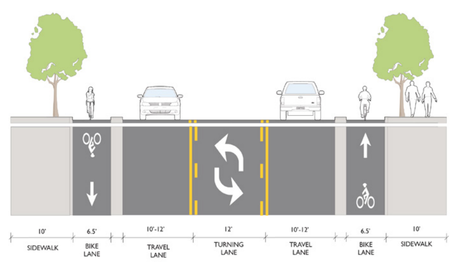
ONE-WAY STREET



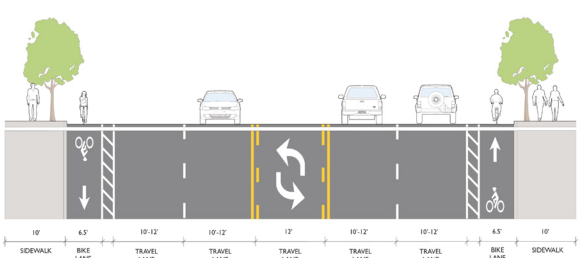
SHARED USE PATH
3+ TRAVEL LANES



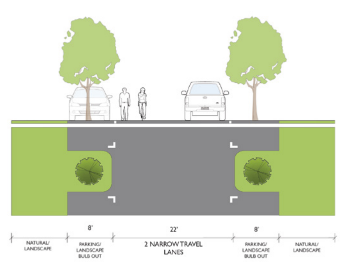
SIDEWALK LEVEL BIKE LANE



SEPARATED BIKE LANE

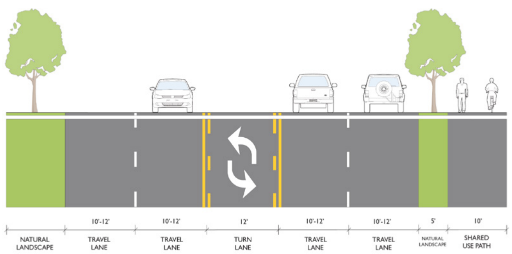


BUFFERED BIKE LANE
3+ TRAVEL LANES

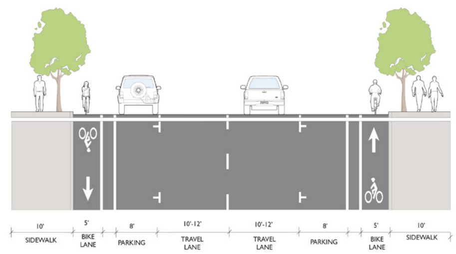


YEILD ROADWAY

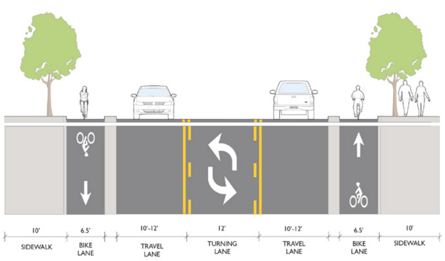
URBAN MENU



SHARED USE PATH
3+ TRAVEL LANES



PARKING PROTECTED BIKE LANE
ONE-WAY STREET



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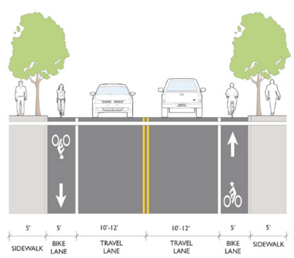
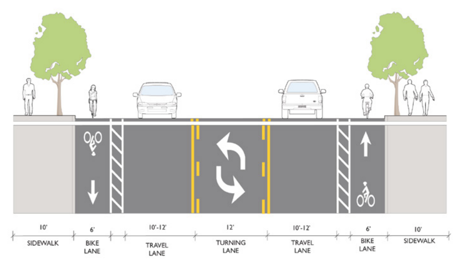


BIKE LANE + SIDEWALK



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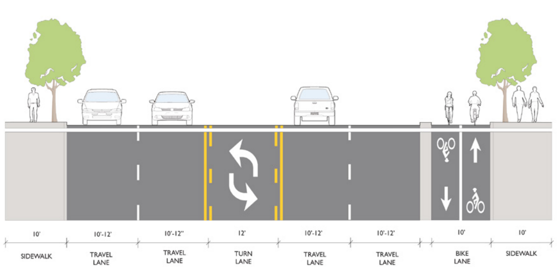
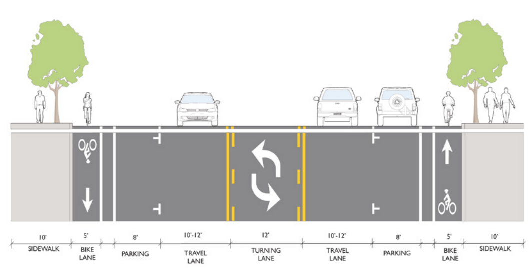
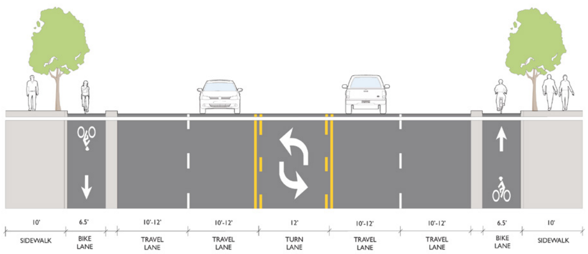


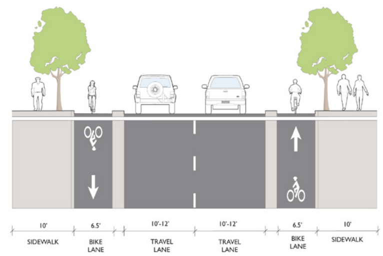
TWO-WAY SEPARATED BIKE LANE
3+ TRAVEL LANES



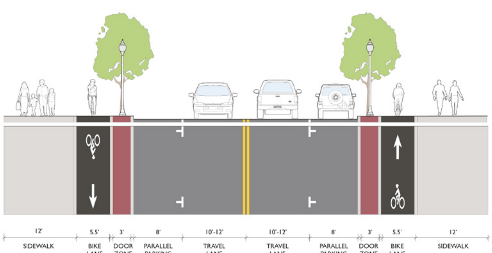
PARKING PROTECTED BIKE LANE



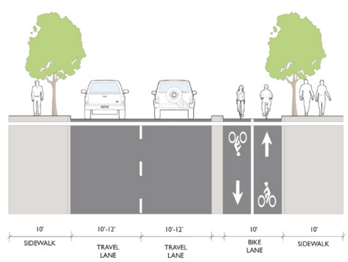
SEPARATED BIKE LANE
3+ TRAVEL LANES



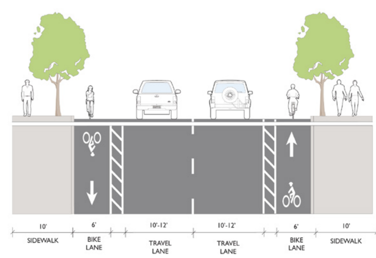
SEPARATED BIKE LANE
ONE-WAY STREET



SIDEWALK LEVEL BIKE LANE



TWO-WAY SEPARATED BIKE LANE
ONE-WAY STREET



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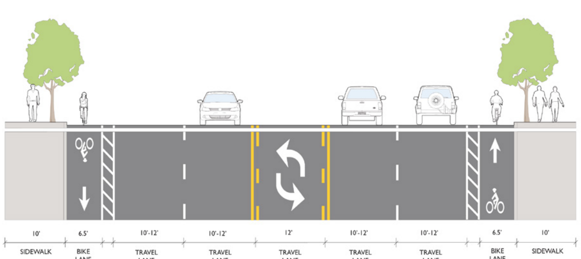
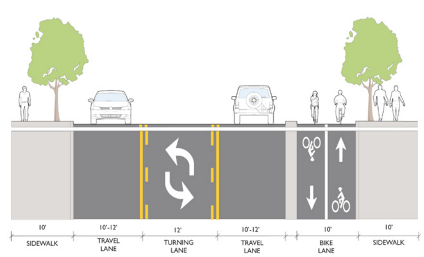
ONE-WAY STREET

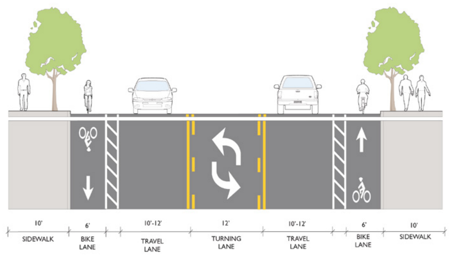


BUFFERED BIKE LANE
3+ TRAVEL LANES



TWO-WAY SEPARATED BIKE LANE

SUBURBAN MENU



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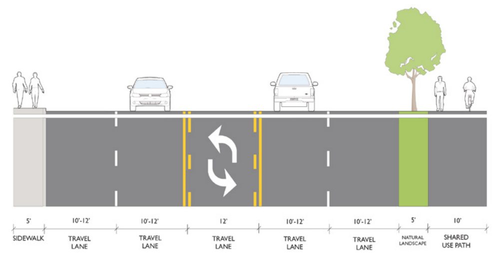
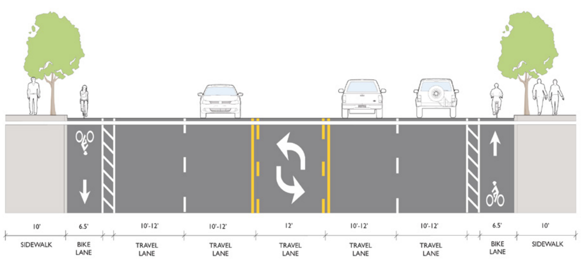


SHARED USE PATH + SIDEWALK
3+ TRAVEL LANES



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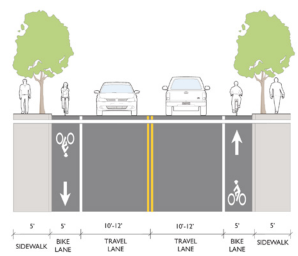
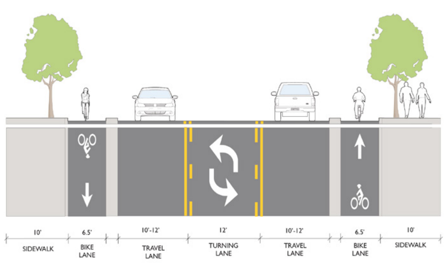
3+ TRAVEL LANES



BIKE LANE + SIDEWALK



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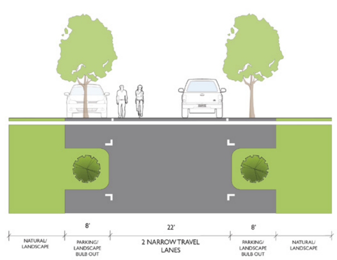
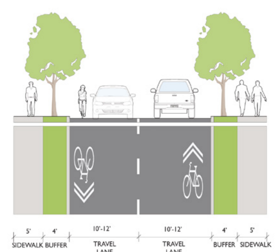
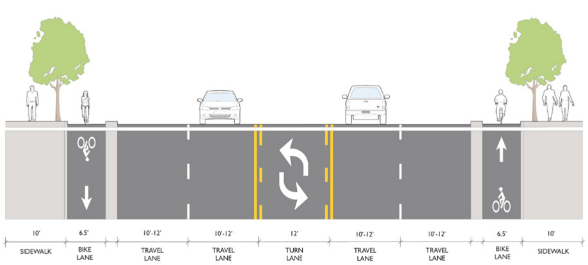


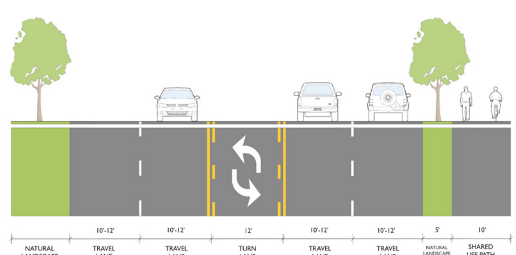
YEILD ROADWAY



BIKE BOULEVARD
NEIGHBORHOOD STREET

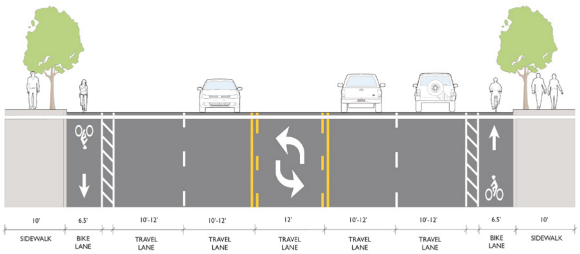


SEPARATED BIKE LANE
3+ TRAVEL LANES



SHARED USE PATH
3+ TRAVEL LANES

RURAL MENU



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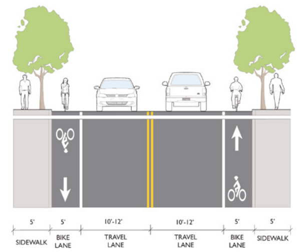
3+ TRAVEL LANES



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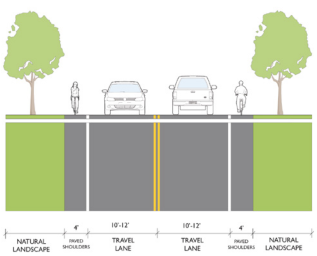
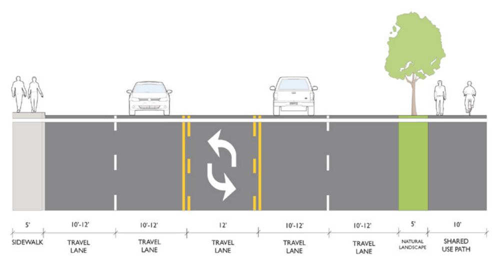
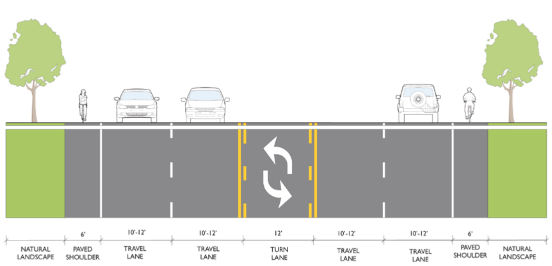


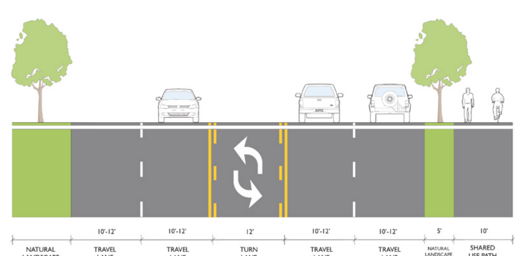
PAVED SHOULDERS



SHARED USE PATH + SIDEWALK
3+ TRAVEL LANES

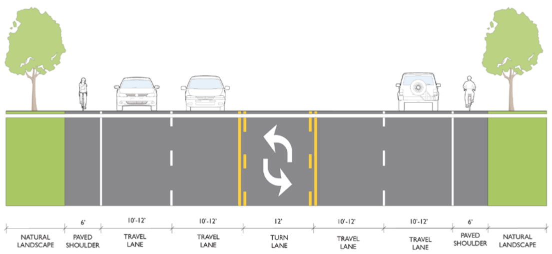


PAVED + STRIPED SHOULDER
3+ TRAVEL LANES

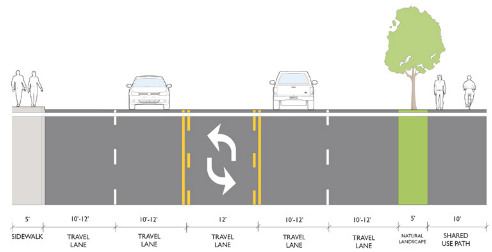


SHARED USE PATH
3+ TRAVEL LANES

RURAL TOWN MENU



PAVED + STRIPED SHOULDER
3+ TRAVEL LANES



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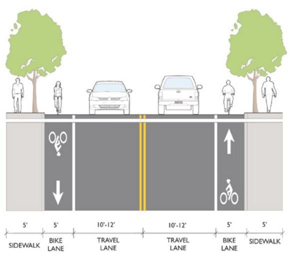

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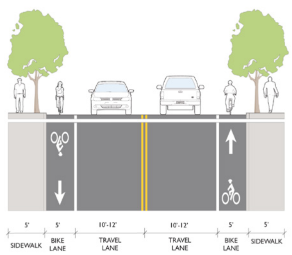
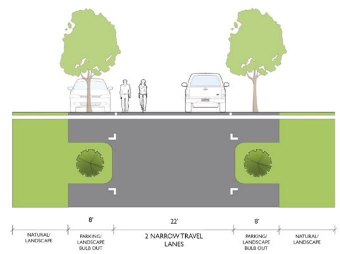
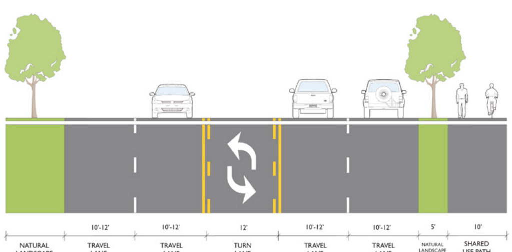


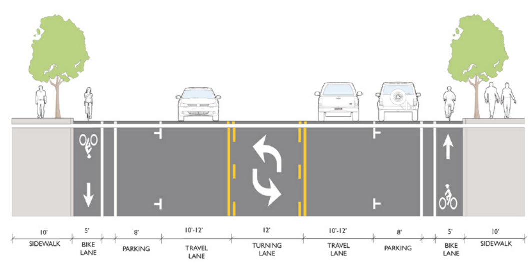
BIKE LANE + SIDEWALK



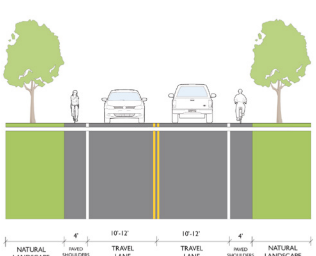
YEILD ROADWAY



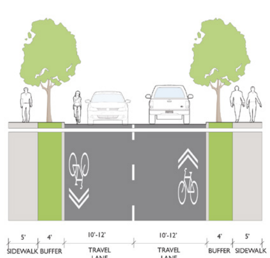
SHARED USE PATH
3+ TRAVEL LANES



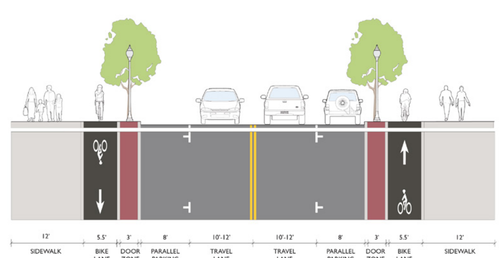
PARKING PROTECTED BIKE LANE



PAVED SHOULDERS



BIKE BOULEVARD
NEIGHBORHOOD STREET



SIDEWALK LEVEL BIKE LANE

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PROJECTS AND COST ESTIMATES

PROJECTS BY PEDESTRIAN TIER

PROJECTS BY BICYCLE TIER

DETAILED COST ESTIMATES

APPENDIX C

PROJECTS BY PEDESTRIAN TIER

The following table represents all of the projects proposed by the Athens in Motion Plan. Projects are listed by Pedestrian tier, a group scoring based upon the pedestrian prioritization score described in the Implementation chapter of this plan. The Low Cost is estimated for sidewalk alone while the High Cost is estimated based upon the addition of curb and gutter.

Tier	Project ID	Project Name	To	From	Low Cost	High Cost	Funding	Project Length (mi)	Sidewalk Length (mi)
1	6	Barber St	N Chase St	Boulevard	$589,787	$735,881		1	1
1	7	Willow St/ Cleveland Ave	Barber St	Elizabeth St	$215,761	$269,206		0.6	0.6
1	12	Oneta St	Normaltown Connector Greenway	Barber St	$275,281	$343,470		0.5	0.5
1	25	Normal Ave/ Belvoir Hts	Oglethorpe Ave	Brooklyn Creek Middle Greenway	$291,054	$363,150		0.5	0.5
1	33	Old Jefferson Rd	Whitehead Rd	Buena Vista Ave/ Nantahala Ext	$1,387,880	$1,731,667		2.4	2.4
1	38	Jefferson River Rd	Old Jefferson Rd/Greenway	Vincent Dr	$455,528	$568,366		0.8	0.8
1	39	Vincent Dr	Jefferson River Rd	Newton Bridge Rd	$826,397	$1,031,101		1.4	1.4
1	41	Newton Bridge Rd	Vincent Dr	N Chase St	$825,485	$1,029,962		1.4	1.4
1	43	Old Hull Rd	North Ave	Athena Dr	$443,983	$553,961		1.3	0.8
1	44	Old Hull Rd	Athena Dr	Hull Rd	$659,747	$823,171		1.1	1.1
1	45	Athena Dr	Collins Industrial Blvd	Olympic Dr	$730,762	$911,776		1.3	1.3
1	51	Vine St	Oakridge Ave	Nellie B Ave	$296,348	$369,755		0.6	0.5
1	53	N Peter St/ Olympic Dr	Vine St	Indian Hills Rd	$552,503	$689,362		1	1

Tier	Project ID	Project Name	To	From	Low Cost	High Cost	Funding	Project Length (mi)	Sidewalk Length (mi)
1	57	Athens Rd	N Main St	N Church St	$53,077	$66,225	Winterville	0.3	0.1
1	58	N Church St	Athens Rd	Marigold Ln	$57,919	$72,266	Winterville	0.5	0.1
1	59	Marigold Ln/ Parkview Dr	N Church St	Marigold Ln/ Parkview Dr	$107,013	$133,520	Winterville	0.2	0.2
1	60	Cherokee Rd	Hickory Dr	Athens Rd	$121,953	$152,162	Winterville	1	0.2
1	62	Cherokee Rd	Beaverdam Rd	Lexington Rd	$313,444	$391,086		0.9	0.5
1	63	Lexington Rd	Barnett Shoals Rd	Gaines School Rd/ Cherokee Rd	$1,003,112	$1,251,589	Lexington Road	1.9	1.7
1	64	Winterville Rd	Winterville Rd	Lexington Rd	$95,537	$119,202		0.2	0.2
1	72	Lexington Rd	Whit Davis Rd	Morton Rd/ Robert Hardeman Rd	$837,106	$1,044,463	Lexington Road	1.9	1.8
1	75	Robert Hardeman Rd	S Main St	Martin Meadow Way	$544,741	$679,677	Winterville	0.9	0.9
1	81	Macon Hwy/ Timothy Rd	Timothy Rd	S Milledge Ave	$890,024	$1,110,489		1.7	1.5
1	89	St James/ Devonshire/ Somerset	Timothy Rd	Brooklyn Creek South Greenway	$56,493	$70,486		0.1	0.1
1	94	W Hancock Ave	Glenhaven Ave	N Milledge Rd	$346,464	$432,286	West Broad Street	0.6	0.6
1	96	North Ave/E Dougherty St	College Ave	North Oconee River Greenway	$129,384	$161,434		0.4	0.2
1	97	E Campus Rd	Williams St Greenway	E Green St	$447,829	$558,760		0.8	0.8
1	106	Riverbend Rd	S Milledge Ave	College Station Rd	$797,397	$994,917		1.4	1.4

Tier	Project ID	Project Name	To	From	Low Cost	High Cost	Funding	Project Length (mi)	Sidewalk Length (mi)
1	108	Danielsville Rd/North Ave	Old Hull Rd	Freeman Dr	$378,581	$472,358		0.7	0.7
1	109	Henderson Ext/ Pedestrian Bridge	Evans St/ Hancock Ave/ Waddell Ext	Waddell/ Clarke Central/ Dearing	$271,288	$338,488	West Broad Street	0.5	0.5
1	110	Waddell/ Clarke Central/ Dearing	Henderson Ext/ Pedestrian Bridge	N Milledge Rd	$111,943	$139,672	West Broad Street	0.5	0.2
1	111	Evans St/ Hancock Av/ Waddell Ext	Rose St/ Magnolia St	Henderson Ext/ Pedestrian Bridge	$111,488	$139,104	West Broad Street	0.2	0.2
1	112	Rose St/ Magnolia St	Baxter St	Evans St/ Hancock Ave/ Waddell Ext	$74,759	$93,277	West Broad Street	0.3	0.3
1	114	Atlanta Hwy/W Broad St	Mitchell Bridge Rd	Hawthorne Ave/Alps Rd	$1,333,888	$1,664,301	Atlanta Highway	2.7	2.7
1	117	King Ave	Sunset Dr	Old West Broad St	$56,493	$70,486		0.1	0.1
1	122	Pulaski St	Prince Ave	Cleveland Ave	$304,655	$380,120		0.5	0.5
1	125	Oak St	Poplar St	Grove St	$19,620	$24,480		0.1	0.1
1	126	King Ave	Hill St	Mathews Ave	$103,659	$129,336		0.2	0.2
2	11	N Chase St	Prince Ave	Newton Bridge Rd/ Barber St	$283,761	$354,051		1.1	0.7
2	13	Normaltown Connector Greenway	Old Jefferson Rd/Greenway (33)	Oneta St	$191,282	$238,664		0.3	0.3
2	14	Buena Vista Ave/ Nantahala Ext	Old Jefferson Rd/Greenway	Boulevard	$184,590	$230,314		0.3	0.3

Tier	Project ID	Project Name	To	From	Low Cost	High Cost	Funding	Project Length (mi)	Sidewalk Length (mi)
2	28	Mitchell Bridge Rd	Mitchell Bridge Rd	W Broad St/ Atlanta Hwy	$722,982	$902,070		1.6	1.3
2	31	Tallassee Rd	Turkey Creek Rd	Mitchell Bridge Rd	$884,776	$1,103,941		1.9	1.5
2	32	Tallassee Rd Greenway South	Three Oaks Dr	Turkey Creek Rd	$1,479,686	$1,846,214		2.6	2.6
2	34	Old Jefferson Rd	Archer Grove Rd	Whitehead Rd	$972,923	$1,213,922		1.7	1.7
2	40	Newton Bridge Rd	Vincent Dr	Saxon Woods Dr	$578,673	$722,014		1	1
2	46	Collins Industrial Blvd	N Ave Brdg/ Danielsville Rd	Athena Dr	$573,193	$715,177		1	1
2	48	Monty Dr/ Kenwood Dr	Mercer Ct	Freeman Dr	$282,001	$351,855		0.5	0.5
2	49	Cabernet/ Nowhere/ Pine/ Sayemore	Freeman Dr	Danielsville Rd	$461,900	$576,315		1.1	0.8
2	50	Danielsville Rd	Cabernet/ Pine/ Nowhere/ Sayemore	Forest Acres Cir	$614,778	$767,063		1.4	1.1
2	52	Nellie B Ave	Vine St	Spring Valley Rd	$340,918	$425,365		0.7	0.6
2	54	Olympic Dr	Indian Hills Rd	Athena Dr	$634,862	$792,121		1.1	1.1
2	55	Athena Dr	Olympic Dr	Spring Valley Rd	$576,091	$718,792		1	1
2	56	Old Elberton Rd/Spring Valley Rd	Taylor Ln	Chandler Ray Rd	$1,620,748	$2,022,218		2.8	2.8
2	68	Barnett Shoals Rd	Red Fox Run	Whit Davis Rd	$633,428	$790,332		1.1	1.1

Tier	Project ID	Project Name	To	From	Low Cost	High Cost	Funding	Project Length (mi)	Sidewalk Length (mi)
2	69	Old Lexington Rd	Barnett Shoals Rd	Whit Davis Rd	$814,360	$1,016,082		1.5	1.4
2	76	Robert Hardeman Rd	Martin Meadow Way	Lexington Rd	$1,141,117	$1,423,780		2	2
2	77	Morton Rd	Lexington Rd	Old Lexington Rd	$949,324	$1,184,477		1.6	1.6
2	78	Morton Rd	Old Lexington Rd	Belmont Rd	$1,327,903	$1,656,834		2.3	2.3
2	79	Barnett Shoals Rd	Whit Davis Rd	Bob Godfrey Rd	$1,458,209	$1,819,416		2.5	2.5
2	80	Belmont Rd	Barnett Shoals Rd	Morton Rd	$785,187	$979,683		1.4	1.4
2	82	Timothy Rd	Epps Bridge Pkwy	Timothy Rd/ Macon Hwy	$987,637	$1,232,281		2.4	1.7
2	84	Atlanta Hwy	Commerce Blvd	Mitchell Bridge Rd	$737,778	$920,530	Atlanta Highway	1.3	1.3
2	85	Commerce Blvd	Jennings Mill Pkwy	Atlanta Hwy	$171,616	$214,126		0.3	0.3
2	86	Marilyn Farmer Way/ Cleveland Rd	Atlanta Hwy	Chesterfield Rd/W Huntington Rd	$625,843	$780,868		1.1	1.1
2	87	Cleveland Rd	Big Bear Rd	Chesterfield Rd/W Huntington Rd	$1,313,930	$1,639,399		2.3	2.3
2	88	Ruth St	Dr. MLK Jr. Pkwy	North Ave	$197,648	$246,607		0.8	0.3
2	90	Oglethorpe Ave	Hawthorne Ave	Prince Ave	$260,841	$325,453		0.7	0.5
2	98	Williams St/ Baldwin St	E Campus Rd	Oconee St	$88,612	$110,562		0.2	0.2
2	118	MLK Parkway	Strickland Ave	Ruth Dr	$32,700	$40,800		0.1	0.1

Tier	Project ID	Project Name	To	From	Low Cost	High Cost	Funding	Project Length (mi)	Sidewalk Length (mi)
2	119	Bray St	Fourth St	North Ave	$72,267	$90,168		0.1	0.1
2	120	University Dr	Pincrest Dr	Scott Dr	$124,260	$155,040		0.2	0.2
2	121	Hawthorne Ave	Hawthorne Park	Driveway	$15,805	$19,720		0.1	0.1
2	123	Agriculture Dr	University Dr	Southview Dr	$65,400	$81,600		0.1	0.1
2	124	Moores Grove Rd	Gordon Cir	Oakmont Ct	$223,668	$279,072		0.4	0.4
2	127	Fourth St	Bray St	Strickland Ave	$33,136	$41,344		0.1	0.1
3	2	E/W Hancock Ave	N Milledge Ave	College Ave	$45,863	$57,223		0.8	0.1
3	8	College Ave	Elizabeth St	E Dougherty St/North Ave	$152,928	$190,810		0.6	0.3
3	10	Boulevard	Buena Vista Ave/ Nantahala Ext	N Finley St/ Barber St	$154,791	$193,133		0.9	0.3
3	19	S Milledge Ave	S Lumpkin St	Riverbend Rd	$94,194	$117,526		1.3	0.2
3	20	S Lumpkin St	S Milledge Ave	Timothy Rd/ Macon Hwy	$197,450	$246,360		1.7	0.3
3	22	Brooklyn Creek Middle Greenway	Baxter St	Normal Ave/ Belvoir Hts	$12,924	$16,125		0.8	0.1
3	23	West Lake Dr/Alps Rd	Baxter St	S Lumpkin St	$654,752	$816,938		1.5	1.1
3	26	Oglethorpe/ Satula/ Tallassee	Mitchell Bridge Rd	Hawthorne Ave	$133,526	$166,601		1.2	0.2
3	27	Mitchell Bridge Rd	Oglethorpe/ Satula/ Tallassee	Mitchell Bridge Rd	$309,836	$386,585		0.9	0.5

Tier	Project ID	Project Name	To	From	Low Cost	High Cost	Funding	Project Length (mi)	Sidewalk Length (mi)
3	29	Greenway	Middle Oconee Greenway	Mitchell Bridge Rd	$1,331,389	$1,661,182		2.7	2.3
3	30	Chesterfield Rd/W Huntington Rd	Cleveland Rd	Greenway	$429,519	$535,913		0.7	0.7
3	35	Whitehead Rd	Old Jefferson Rd/Greenway	Tallassee Rd Greenway North	$67,523	$84,249		1.6	0.1
3	37	Lavender Rd	Roberts Rd	Tallassee Rd Greenway South	$799,422	$997,444		1.5	1.4
3	61	Cherokee Rd	Hickory Dr	Beaverdam Rd	$754,822	$941,796		1.5	1.3
3	66	Barnett Shoals Rd/ Whitehall Rd	Barnett Shoals Rd	Greencrest Dr	$98,611	$123,037		1	0.2
3	67	Barnett Shoals Rd	Whitehall Rd	Red Fox Run	$264,522	$330,046		1.5	0.5
3	71	Whit Davis Rd	Lexington Rd	Old Lexington Rd	$226,875	$283,073		1.9	0.6
3	73	Old Lexington Rd	Whit Davis Rd	Morton Rd	$409,515	$510,954		1.9	0.7
3	74	Whit Davis Rd	Old Lexington Rd	Barnett Shoals Rd	$201,111	$250,927		1.4	0.5
3	91	Hawthorne Ave	Oglethorpe Ave	W Broad St	$55,899	$69,745		0.9	0.1
3	103	Research Dr	College Station Rd	Barnett Shoals Rd	$254,939	$318,089		0.9	0.9
3	105	College Station Rd	Loop 10	Whitehall Rd/Barnett Shoals Rd	$259,280	$323,505		2.5	0.5
Grand Total					**$45,232,627**	**$56,437,039**		**104.8**	**81.3**

PROJECTS BY BICYCLE TIER

The following table represents all of the projects proposed by the Athens in Motion Plan. Projects are listed by Bicycle tier, a group scoring based upon the bicycle prioritization score described in the Implementation chapter of this plan. The Low Cost is estimated for the proposed bicycle category to be implemented through striping or construction on existing ashpahlt while the High Cost estimate assumes construction of a new facility outside of existing asphalt.

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
1	1	Pulaski St	Buffered Facility	Prince Ave	W Broad St	$256,970	$842,149		0.2
1	2	E/W Hancock Ave	Buffered Facility	N Milledge Ave	College Ave	$823,459	$2,698,662		0.8
1	4	W Broad St	Separated Facility	N Milledge Rd	S Lumpkin St	$748,447	$3,526,337		0.7
1	5	Barber St/N Finley St	Delineated Facility	Boulevard	E/W Hancock Ave	$254,144	$1,311,382		0.5
1	6	Barber St	Separated Facility	N Chase St	Boulevard	$1,358,133	$4,664,187		1
1	7	Willow St/ Cleveland Ave	Buffered Facility	Barber St	Elizabeth St	$592,702	$1,942,420		0.6
1	8	College Ave	Shared Facility	Elizabeth St	E Dougherty St/North Ave	$158,939	$221,339		0.6
1	9	College Ave	Delineated Facility	E Dougherty St/North Ave	E Broad St	$125,575	$647,968		0.2
1	15	Prince Ave	Separated Facility	Oglethorpe Ave	Pulaski St	$1,346,802	$6,345,508	Prince Avenue	1.2
1	17	S/N Milledge Ave	Separated Facility	Prince Ave	Baxter St	$963,471	$4,539,432		0.9
1	18	S Milledge Ave	Separated Facility	Baxter St	S Lumpkin St	$773,651	$3,645,087		0.7
1	19	S Milledge Ave	Separated Facility	S Lumpkin St	Riverbend Rd	$1,714,267	$5,887,245		1.3

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
1	42	North Ave	Separated Facility	North Oconee River Greenway	Old Hull Rd	$1,140,936	$3,918,273		0.9
1	51	Vine St	Delineated Facility	Oakridge Ave	Nellie B Ave	$306,100	$1,579,477		0.6
1	57	Athens Rd	Separated Facility	N Main St	N Church St	$306,658	$1,444,830	Winterville	0.3
1	58	N Church St	Delineated Facility	Athens Rd	Marigold Ln	$263,545	$1,359,893	Winterville	0.5
1	59	Marigold Ln/ Parkview Dr	Shared Facility	N Church St	Marigold Ln/ Parkview Dr	$59,792	$106,592	Winterville	0.2
1	60	Cherokee Rd	Buffered Facility	Hickory Dr	Athens Rd	$1,037,828	$3,401,197	Winterville	1
1	63	Lexington Rd	Separated Facility	Barnett Shoals Rd	Gaines School Rd/ Cherokee Rd	$2,555,689	$8,776,906	Lexington Road	1.9
1	64	Winterville Rd	Separated Facility	Winterville Rd	Lexington Rd	$219,997	$755,528		0.2
1	65	Gaines School Rd	Separated Facility	Barnett Shoals Rd	Lexington Rd	$1,479,013	$6,968,429		1.3
1	70	Lexington Rd	Separated Facility	Gaines School Rd/Cherokee Rd	Whit Davis Rd	$1,064,698	$3,656,453	Lexington Road	0.8
1	72	Lexington Rd	Buffered Facility	Whit Davis Rd	Morton Rd/Robert Hardeman Rd	$2,008,820	$6,583,361	Lexington Road	1.9
1	75	Robert Hardeman Rd	Buffered Facility	S Main St	Martin Meadow Way	$1,009,520	$3,308,426	Winterville	0.9
1	91	Hawthorne Ave	Buffered Facility	Oglethorpe Ave	W Broad St	$953,629	$3,125,258		0.9
1	92	Alps Rd	Buffered Facility	W Broad St	Baxter St	$321,216	$1,052,697	West Broad Street	0.3

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
1	93	Baxter St	Buffered Facility	Alps Rd/West Lake Rd	N/S Milledge Ave	$1,356,511	$4,445,596	West Broad Street	1.3
1	94	W Hancock Ave	Separated Facility	Glenhaven Ave	N Milledge Rd	$797,821	$2,739,928	West Broad Street	0.6
1	95	Baxter St	Delineated Facility	N/S Milledge Rd	S Lumpkin St	$328,672	$1,695,945		0.6
1	98	Williams St/ Baldwin St	Buffered Facility	E Campus Rd	Oconee St	$264,073	$865,427		0.2
1	99	Cedar Shoals Dr	Delineated Facility	Gaines School Rd	Whit Davis Rd	$952,323	$4,913,986		1.8
1	109	Henderson Ext/ Pedestrian Bridge	Shared Facility	Evans St/ Hancock Ave/ Waddell Ext	Waddell/ Clarke Central/ Dearing	$124,444	$150,244	West Broad Street	0.5
1	110	Waddell/ Clarke Central/ Dearing	Shared Facility	Henderson Ext/Pedestrian Bridge	N Milledge Rd	$126,360	$177,960	West Broad Street	0.5
1	111	Evans St/ Hancock Av/ Waddell Ext	Shared Facility	Rose St/ Magnolia St	Henderson Ext/ Pedestrian Bridge	$51,141	$51,141	West Broad Street	0.2
1	112	Rose St/ Magnolia St	Shared Facility	Baxter St	Evans St/ Hancock Ave/Waddell Ext	$73,232	$73,232	West Broad Street	0.3
1	113	W Broad St	Separated Facility	Hawthorne Ave/Alps Rd	N Milledge Rd	$1,690,884	$5,806,940	Atlanta Highway	1.3
1	114	Atlanta Hwy/W Broad St	Separated Facility	Mitchell Bridge Rd	Hawthorne Ave/Alps Rd	$3,581,723	$12,300,577	Atlanta Highway	2.7
2	3	E Broad St	Separated Facility	S Lumpkin St	Wilkerson St	$588,879	$2,774,527		0.5
2	10	Boulevard	Delineated Facility	Buena Vista Ave/Nantahala Ext	N Finley St/ Barber St	$490,918	$2,533,138		0.9

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
2	11	N Chase St	Shared Facility	Prince Ave	Newton Bridge Rd/ Barber St	$290,410	$384,010		1.1
2	14	Buena Vista Ave/ Nantahala Ext	Greenway	Old Jefferson Rd/Greenway	Boulevard	$396,276	$396,276		0.3
2	16	Wilkerson Greenway	Greenway	E Broad St	Williams St Greenway	$599,592	$599,592		0.5
2	20	S Lumpkin St	Buffered Facility	S Milledge Ave	Timothy Rd/ Macon Hwy	$1,770,244	$5,801,492		1.7
2	21	College Station Rd/ Southview Dr	Shared Facility	S Milledge Rd	E Campus Rd	$147,029	$240,629		0.6
2	23	West Lake Dr/ Alps Rd	Separated Facility	Baxter St	S Lumpkin St	$1,927,512	$6,619,584		1.5
2	24	Brooklyn Creek Middle Greenway	Greenway	Alps Rd/West Lake Rd	Baxter St	$977,469	$977,469		0.8
2	26	Oglethorpe/ Satula/ Tallassee	Separated Facility	Mitchell Bridge Rd	Hawthorne Ave	$1,652,169	$5,673,984		1.2
2	27	Mitchell Bridge Rd	Separated Facility	Oglethorpe/ Satula/ Tallassee	Mitchell Bridge Rd	$1,160,536	$3,985,585		0.9
2	28	Mitchell Bridge Rd	Separated Facility	Mitchell Bridge Rd	W Broad St/ Atlanta Hwy	$2,073,975	$7,122,576		1.6
2	39	Vincent Dr	Buffered Facility	Jefferson River Rd	Newton Bridge Rd	$1,531,488	$5,019,035		1.4
2	40	Newton Bridge Rd	Separated Facility	Vincent Dr	Saxon Woods Dr	$1,332,541	$4,576,297		1
2	41	Newton Bridge Rd	Separated Facility	Vincent Dr	N Chase St	$1,900,887	$6,528,144		1.4
2	43	Old Hull Rd	Buffered Facility	North Ave	Athena Dr	$1,426,889	$4,676,241		1.3

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
2	47	Freeman Dr	Separated Facility	Cabernet/ Pine/Nowhere/ Sayemore	North Ave Bridge/ Danielsville Rd	$1,115,016	$3,829,259		0.8
2	52	Nellie B Ave	Delineated Facility	Vine St	Spring Valley Rd	$366,474	$1,891,004		0.7
2	62	Cherokee Rd	Separated Facility	Beaverdam Rd	Lexington Rd	$987,569	$4,652,969		0.9
2	66	Barnett Shoals Rd/ Whitehall Rd	Separated Facility	Barnett Shoals Rd	Greencrest Dr	$1,096,733	$5,167,298		1
2	71	Whit Davis Rd	Separated Facility	Lexington Rd	Old Lexington Rd	$2,137,474	$10,070,791		1.9
2	81	Macon Hwy/ Timothy Rd	Separated Facility	Timothy Rd	S Milledge Ave	$2,290,418	$7,865,897		1.7
2	83	Timothy Rd	Buffered Facility	W Broad St/ Atlanta Hwy	Epps Bridge Pkwy	$1,150,936	$3,771,879		1.1
2	84	Atlanta Hwy	Separated Facility	Commerce Blvd	Mitchell Bridge Rd	$1,698,919	$5,834,535	Atlanta Highway	1.3
2	89	St James / Devonshire/ Somerset	Shared facility	Timothy Rd	Brooklyn Creek South Greenway	$25,914.01	$25,914.01		0.1
2	90	Oglethorpe Ave	Buffered Facility	Hawthorne Ave	Prince Ave	$764,678	$2,506,025		0.7
2	96	North Ave/E Dougherty St	Separated Facility	College Ave	North Oconee River Greenway	$543,784	$1,867,499		0.4
2	97	E Campus Rd	Buffered Facility	Williams St Greenway	E Green St	$829,922	$2,719,845		0.8
2	100	Barnett Shoals Rd	Separated Facility	Lexington Rd	Gaines School Rd	$1,934,798	$9,115,876		1.8
2	101	S Lumpkin St	Buffered Facility	Baxter St	S Milledge Ave	$1,141,989	$3,742,558		1.1

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
2	102	S Lumpkin St	Buffered Facility	W Broad St	Baxter St	$449,679	$1,473,700		0.4
2	103	Research Dr	Buffered Facility	College Station Rd	Barnett Shoals Rd	$907,207	$2,973,123		0.9
2	104	College Station Rd	Buffered Facility	E Campus Rd	Loop 10	$842,717	$2,761,775		0.8
2	105	College Station Rd	Buffered Facility	Loop 10	Whitehall Rd/Barnett Shoals Rd	$2,710,151	$8,881,783		2.5
2	106	Riverbend Rd	Delineated Facility	S Milledge Ave	College Station Rd	$731,557	$3,774,833		1.4
2	108	Danielsville Rd/North Ave	Shared Facility	Old Hull Rd	Freeman Dr	$173,661	$173,661		0.7
3	12	Oneta St	Shared Facility	Normaltown Connector Greenway	Barber St	$126,276	$126,276		0.5
3	13	Normaltown Connector Greenway	Greenway	Old Jefferson Rd/Greenway (33)	Oneta St	$410,643	$410,643		0.3
3	22	Brooklyn Creek Middle Greenway	Shared Facility	Baxter St	Normal Ave/ Belvoir Hts	$944,491	$944,491		0.8
3	25	Normal Ave/ Belvoir Hts	Shared Facility	Oglethorpe Ave	Brooklyn Creek Middle Greenway	$133,511	$227,111		0.5
3	29	Greenway	Greenway	Middle Oconee Greenway	Mitchell Bridge Rd	$3,391,463	$3,391,463		2.7
3	30	Chesterfield Rd/W Huntington Rd	Shared Facility	Cleveland Rd	Greenway	$197,027	$306,227		0.7
3	31	Tallassee Rd	Greenway	Turkey Creek Rd	Mitchell Bridge Rd	$2,363,972	$2,363,972		1.9

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
3	32	Tallassee Rd Greenway South	Greenway	Three Oaks Dr	Turkey Creek Rd	$3,176,573	$3,176,573		2.6
3	33	Old Jefferson Rd	Buffered Facility	Whitehead Rd	Buena Vista Ave/ Nantahala Ext	$2,572,035	$8,429,145		2.4
3	34	Old Jefferson Rd	Buffered Facility	Archer Grove Rd	Whitehead Rd	$1,803,031	$5,908,943		1.7
3	35	Whitehead Rd	Buffered Facility	Old Jefferson Rd/Greenway	Tallassee Rd Greenway North	$1,694,080	$5,551,885		1.6
3	36	Lavender Rd	Buffered Facility	Roberts Rd	Old Jefferson Rd	$826,078	$2,707,245		0.8
3	37	Lavender Rd	Buffered Facility	Roberts Rd	Tallassee Rd Greenway South	$1,588,783	$5,206,803		1.5
3	38	Jefferson River Rd	Buffered Facility	Old Jefferson Rd/Greenway	Vincent Dr	$844,190	$2,766,603		0.8
3	44	Old Hull Rd	Buffered Facility	Athena Dr	Hull Rd	$1,222,651	$4,006,906		1.1
3	45	Athena Dr	Buffered Facility	Collins Industrial Blvd	Olympic Dr	$1,354,256	$4,438,205		1.3
3	46	Collins Industrial Blvd	Shared Facility	N Ave Brdg/ Danielsville Rd	Athena Dr	$262,933	$262,933		1
3	48	Monty Dr/ Kenwood Dr	Shared Facility	Mercer Ct	Freeman Dr	$129,358	$207,358		0.5
3	49	Cabernet/ Nowhere/ Pine/ Sayemore	Shared Facility	Freeman Dr	Danielsville Rd	$281,240	$343,640		1.1
3	50	Danielsville Rd	Separated Facility	Cabernet/ Pine/Nowhere/ Sayemore	Forest Acres Cir	$1,802,914	$6,191,681		1.4

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
3	53	N Peter St/ Olympic Dr	Delineated Facility	Vine St	Indian Hills Rd	$531,653	$2,743,327		1
3	54	Olympic Dr	Separated Facility	Indian Hills Rd	Athena Dr	$1,461,929	$5,020,650		1.1
3	55	Athena Dr	Separated Facility	Olympic Dr	Spring Valley Rd	$1,326,594	$4,555,873		1
3	56	Old Elberton Rd/Spring Valley Rd	Buffered Facility	Taylor Ln	Chandler Ray Rd	$3,003,588	$9,843,442		2.8
3	61	Cherokee Rd	Buffered Facility	Hickory Dr	Beaverdam Rd	$1,649,228	$5,404,894		1.5
3	67	Barnett Shoals Rd	Separated Facility	Whitehall Rd	Red Fox Run	$1,922,162	$6,601,211		1.5
3	68	Barnett Shoals Rd	Separated Facility	Red Fox Run	Whit Davis Rd	$1,458,627	$5,009,310		1.1
3	69	Old Lexington Rd	Buffered Facility	Barnett Shoals Rd	Whit Davis Rd	$1,628,391	$5,336,609		1.5
3	73	Old Lexington Rd	Buffered Facility	Whit Davis Rd	Morton Rd	$2,024,661	$6,635,276		1.9
3	74	Whit Davis Rd	Buffered Facility	Old Lexington Rd	Barnett Shoals Rd	$1,461,310	$4,789,046		1.4
3	76	Robert Hardeman Rd	Buffered Facility	Martin Meadow Way	Lexington Rd	$2,114,731	$6,930,456		2
3	77	Morton Rd	Buffered Facility	Lexington Rd	Old Lexington Rd	$1,759,297	$5,765,617		1.6
3	78	Morton Rd	Buffered Facility	Old Lexington Rd	Belmont Rd	$2,460,885	$8,064,881		2.3
3	79	Barnett Shoals Rd	Buffered Facility	Whit Davis Rd	Bob Godfrey Rd	$2,702,368	$8,856,277		2.5
3	80	Belmont Rd	Buffered Facility	Barnett Shoals Rd	Morton Rd	$1,455,117	$4,768,751		1.4
3	82	Timothy Rd	Buffered Facility	Epps Bridge Pkwy	Timothy Rd/ Macon Hwy	$2,525,260	$8,275,851		2.4

Tier	Project ID	Project Name	Bike Category	To	From	Low Cost	High Cost	Funding	Project Length (mi)
3	85	Commerce Blvd	Shared Facility	Jennings Mill Pkwy	Atlanta Hwy	$78,723	$125,523		0.3
3	86	Marilyn Farmer Way/ Cleveland Rd	Shared Facility	Atlanta Hwy	Chesterfield Rd/W Huntington Rd	$287,084	$349,484		1.1
3	87	Cleveland Rd	Shared Facility	Big Bear Rd	Chesterfield Rd/W Huntington Rd	$602,720	$696,320		2.3
3	88	Ruth St	Shared Facility	Dr. MLK Jr. Pkwy	North Ave	$214,567	$339,367		0.8
3	107	Jennings Mill Pkwy	Shared Facility	New Jimmie Daniel Rd	Commerce Blvd	$309,564	$371,964		1.2
3	115	Middle Oconee Greenway	Greenway	Mitchell Bridge Rd	W Broad St/ Atlanta Hwy	$1,984,323	$1,984,323		1.6
3	116	Brooklyn Creek South	Greenway	St James/ Devonshire/ Somerset	Alps Rd/West Lake Rd	$1,239,255	$1,239,255		1
Grand Total						**$130,685,139**	**$417,214,627**		**29.4**

DETAILED COST ESTIMATES

FACILITY COST WITHOUT WIDENING

Bike Lanes, Paved and Striped Shoulder without Curb (4’-6’ paved shoulder)				
Includes: bicycle lane markings in one direction with bicycle lane signs. No road widening. Requires 5’ of existing asphalt on one side. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
Thermoplastic Pavement Marking Lines (4” to 6”)	LF	100	$1.27	$127
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$7,937
			20% Contingency	$1,587
			Total Estimated Cost	$9,600
			$96.00 Per Foot	

Buffered Bike Lane with Existing Curb and Gutter (Min. 1.5' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs.No road widening. Requires 6.5' of existing asphalt on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
Thermoplastic Pavement Marking Lines (1.5' wide)	LF	100	$5.50	$550
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$8,372
			20% Contingency	$1,674
			Total Estimated Cost	$10,100
			$101.00 Per Foot	

Buffered Bike Lane with Existing Curb and Gutter (3' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. No road widening. Requires 8' of existing asphalt on one side. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
Thermoplastic Pavement Marking Lines (3' wide)	LF	100	$11.00	$1,100
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$8,922
			20% Contingency	$1,784
			Total Estimated Cost	$10,800
			$108.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter (2’ painted buffer with flex posts, 5’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. No road widening. Requires 8’ of existing asphalt on one side. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$17,778
			20% Contingency	$3,556
			Total Estimated Cost	$21,400
			$214.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter (2’ beveled curb seperation, 6’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. No road widening. Requires up to 8’ of existing asphalt on one side. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
2’ Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$20,779
			20% Contingency	$4,156
			Total Estimated Cost	$25,000
			$250.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter (2’ painted buffer with flex posts, 10’ bike lane)

Includes: bicycle lane markings in one direction with bicycle lane signs. No road widening. Requires up to 12’ existing asphalt on one side. Bicycle facility not required on other side of the road. Priced based on 100LF section.

Item	Unit	Quantity	Unit Cost	Total Cost
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$17,278
			20% Contingency	$3,456
			Total Estimated Cost	$20,800
			$208.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter (2’ painted buffer with flex posts, 10’ bike lane)

Includes: bicycle lane markings in one direction with bicycle lane signs. No road widening. Requires up to 12’ existing asphalt on one side. Bicycle facility not required on other side of the road. Priced based on 100LF section.

Item	Unit	Quantity	Unit Cost	Total Cost
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$17,278
			20% Contingency	$3,456
			Total Estimated Cost	$20,800
			$208.00 Per Foot	

SINGLE FACILITY COST

4" Striping				
Assumes restriping of exsiting roadway. Prices based on 100' long section on one side.				
Item	Unit	Quantity	Unit Cost	Total Cost
4" Thermoplastic Striping, White	LF	100	$1.27	$127
Remove Existing White Stripe, Paint	LF	100	$1.08	$108
Pavement Marking, Bike Shared Lane Symbol	EA	4	$391.17	$391
Pavement Marking, Bike Lane Symbol	EA	0	$538.08	$0
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$4,126
			20% Contingency	$825
			Total Estimated Cost	$5,000
			$50 Per Foot	

5' Sidewalk With No Curb and Gutter				
Includes: removal of existing earth, minimal grading to avoid property acquistion, sawcut and removal of asphalt road edge and soil for new grade. Prices based on 100' long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	4	$19.00	$76
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
New Signs (assume 1 per 500')	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$500.00	$500
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$9,031
			20% Contingency	$1,806
			Total Estimated Cost	$10,900
			$109.00 Per Foot	

5’ Sidewalk With Existing Curb and Gutter Attached				
Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	4	$19.00	$76
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk (4” Thickness)	SY	56	$73.56	$4,119
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$500.00	$500
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$9,031
			20% Contingency	$1,806
			Total Estimated Cost	$10,900
			$109.00 Per Foot	

5’ Sidewalk with Existing Curb and Gutter Detached				
Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	4	$19.00	$76
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk (4” Thickness)	SY	56	$73.56	$4,119
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$500.00	$500
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$9,031
			20% Contingency	$1,806
			Total Estimated Cost	$10,900
			$109.00 Per Foot	

10’ Sidewalk With Existing Curb and Gutter				
Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	8	$19.00	$152
Aggregate Base Course	CY	4	$18.19	$73
10’ Concrete Sidewalk (4” Thickness)	SY	112	$85.93	$9,624
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$500.00	$500
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$14,648
			20% Contingency	$2,930
			Total Estimated Cost	$17,600
			$176.00 Per Foot	

Bike Lanes, Paved and Striped Shoulder without Curb (4’-6’ paved shoulder)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening of 5’ on one side. Major grading required with no curb and gutter. Natural ditch drainage provided. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	9	$19.00	$171
Milling & Overlay	SY	123	$32.00	$3,936
Asphalt Surface Paving	SY	56	$124.77	$6,987
Thermoplastic Pavement Marking Lines (4” to 6”)	LF	100	$1.27	$127
Pavement Marking, Bike Shared Lane Symbol	EA	0	$391.17	$0
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$21,423
			20% Contingency	$4,285
			Total Estimated Cost	$25,800
			$258.00 Per Foot	

Buffered Bike Lane with Existing Curb and Gutter (Min. 1.5’ painted buffer, 5’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 6.5’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
Thermoplastic Pavement Marking Lines (1.5’ wide)	LF	100	$5.50	$550
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$23,646
			20% Contingency	$4,729
			Total Estimated Cost	$28,400
			$284.00 Per Foot	

Buffered Bike Lane with Existing Curb and Gutter (3' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (3' wide)	LF	100	$11.00	$1,100
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$27,552
			20% Contingency	$5,510
			Total Estimated Cost	$33,100
			$331.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter (2’ painted buffer with flex posts, 5’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$36,408
			20% Contingency	$7,282
			Total Estimated Cost	$43,700
			$437.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter (2' beveled curb seperation, 6' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
2' Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$39,409
			20% Contingency	$7,882
			Total Estimated Cost	$47,300
			$473.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter (4’ landscape buffer, 6’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 10’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
2’ Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$40,779
			20% Contingency	$8,156
			Total Estimated Cost	$49,000
			$490.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter (2' painted buffer with flex posts, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
Thermoplastic Pavement Marking Lines (2' wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$41,808
			20% Contingency	$8,362
			Total Estimated Cost	$50,200
			$502.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter (2' beveled curb seperation, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
2' Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$44,809
			20% Contingency	$8,962
			Total Estimated Cost	$53,800
			$538.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter (4' landscape buffer, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 14' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	17	$19.00	$323
Milling & Overlay	SY	240	$32.00	$7,680
Asphalt Surface Paving	SY	144	$124.77	$17,967
2' Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$53,867
			20% Contingency	$10,773
			Total Estimated Cost	$64,700
			$647.00 Per Foot	

Shared Use Path 10’ wide - Asphalt (No Curb and Gutter)				
Includes: removal of existing earth, minimal grading to avoid property acquistion. Four foot buffer. Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	8	$19.00	$152
Aggregate Base Course	CY	4	$18.19	$73
Asphalt Surface Paving	SY	115	$124.77	$14,349
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$20,873
			20% Contingency	$4,175
			Total Estimated Cost	$25,100
			$251.00 Per Foot	

Shared Use Path 12’ wide - Asphalt (No Curb and Gutter)				
Includes: removal of existing earth, minimal grading to avoid property acquistion. Four foot buffer. Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	10	$19.00	$190
Aggregate Base Course	CY	5	$18.19	$91
Asphalt Surface Paving	SY	138	$124.77	$17,218
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$23,798
			20% Contingency	$4,760
			Total Estimated Cost	$28,600
			$286.00 Per Foot	

Shared Use Path 10’ wide - Asphalt (Existing Curb and Gutter)				
Includes: removal of existing earth, minimal grading to avoid property acquistion. Four foot buffer. Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	8	$19.00	$152
Aggregate Base Course	CY	4	$18.19	$73
Asphalt Surface Paving	SY	115	$124.77	$14,349
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$20,873
			20% Contingency	$4,175
			Total Estimated Cost	$25,100
			$251.00 Per Foot	

Shared Use Path 12’ wide - Asphalt (Existing Curb and Gutter)				
Includes: removal of existing earth, minimal grading to avoid property acquistion. Four foot buffer. Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	10	$19.00	$190
Aggregate Base Course	CY	5	$18.19	$91
Asphalt Surface Paving	SY	138	$124.77	$17,218
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$23,798
			20% Contingency	$4,760
			Total Estimated Cost	$28,600
			$286.00 Per Foot	

Sidewalk Level Bike Lane with Existing Curb and Gutter (10' Sidewalk)				
Requires road widening of 18' on one side. 5' Bike Lane, 10' Sidewalk, and 3' Buffer. Prices based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	9	$19.00	$171
Milling & Overlay	SY	123	$32.00	$3,936
Asphalt Surface Paving	SY	56	$124.77	$6,987
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10' Concrete Sidewalk (4" Thickness)	SY	112	$85.93	$9,624
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$2,000.00	$2,000
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$2,000.00	$2,000
Maintenance of Traffic	LS	1.00	$2,000.00	$2,000
Utility Adjustments	LS	1.00	$2,000.00	$2,000
			Subtotal	$33,993
			20% Contingency	$6,799
			Total Estimated Cost	$40,800
			$408.00 Per Foot	

Sidewalk Level Bike Lane with Existing Curb and Gutter (12’ Sidewalk)				
Requires road widening of 18’ on one side. 5’ Bike Lane, 12’ Sidewalk, and 3’ Buffer. Prices based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	9	$19.00	$171
Milling & Overlay	SY	123	$32.00	$3,936
Asphalt Surface Paving	SY	56	$124.77	$6,987
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	5	$18.19	$91
10’ Concrete Sidewalk (4” Thickness)	SY	134	$85.93	$11,515
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$2,000.00	$2,000
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$2,000.00	$2,000
Maintenance of Traffic	LS	1.00	$2,000.00	$2,000
Utility Adjustments	LS	1.00	$2,000.00	$2,000
			Subtotal	$35,901
			20% Contingency	$7,180
			Total Estimated Cost	$43,100
			$431.00 Per Foot	

Shared Use Path 12’ wide - Concrete (No Curb and Gutter)				
Includes: removal of existing earth, minimal grading to avoid property acquistion. Four foot buffer if necessary. Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	10	$19.00	$190
Aggregate Base Course	CY	5	$18.19	$91
Concrete Surface Paving	SY	138	$93.56	$12,911
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			20% Contingency	$3,898
			Total Estimated Cost	$23,400
			$234.00 Per Foot	

FACILITY PLUS CURB AND GUTTER

5’ Sidewalk With Curb and Gutter (Attached Sidewalk)				
Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	4	$19.00	$76
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$500.00	$500
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$11,320
			20% Contingency	$2,264
			Total Estimated Cost	$13,600
			$136.00 Per Foot	

5’ Sidewalk With Curb and Gutter (2’ Detached)				
Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	4	$19.00	$76
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$500.00	$500
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$11,320
			20% Contingency	$2,264
			Total Estimated Cost	$13,600
			$136.00 Per Foot	

10’ Sidewalk With Existing Curb and Gutter				
Includes: removal of existing earth, minimal grading to avoid property acquistion, sawcut and removal of asphalt road edge and soil for new grade. Prices based on 100’ long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	8	$19.00	$152
Aggregate Base Course	CY	4	$18.19	$73
10’ Concrete Sidewalk (4” Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
New Signs (assume 1 per 500’)	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$500.00	$500
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$16,937
			20% Contingency	$3,387
			Total Estimated Cost	$20,400
			$204.00 Per Foot	

Buffered Bike Lane with Curb and Gutter (Min. 1.5’ painted buffer, 5’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 6.5’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
Thermoplastic Pavement Marking Lines (1.5’ wide)	LF	100	$5.50	$550
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$25,935
			20% Contingency	$5,187
			Total Estimated Cost	$31,200
			$312.00 Per Foot	

Buffered Bike Lane with Curb and Gutter (3' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (3' wide)	LF	100	$11.00	$1,100
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$29,841
			20% Contingency	$5,968
			Total Estimated Cost	$35,900
			$359.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter (2’ painted buffer with flex posts, 5’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$38,697
			20% Contingency	$7,739
			Total Estimated Cost	$46,500
			$465.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter (2’ beveled curb seperation, 6’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
2’ Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$41,698
			20% Contingency	$8,340
			Total Estimated Cost	$50,100
			$501.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter (4' landscape buffer, 6' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 10' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
2' Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$43,068
			20% Contingency	$8,614
			Total Estimated Cost	$51,700
			$517.00 Per Foot	

Separated Bike Lane (Two-Way) with Curb and Gutter (2’ painted buffer with flex posts, 10’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$44,097
			20% Contingency	$8,819
			Total Estimated Cost	$53,000
			$530.00 Per Foot	

Separated Bike Lane (Two-Way) with Curb and Gutter (2' beveled curb seperation, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
2' Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$47,098
			20% Contingency	$9,420
			Total Estimated Cost	$56,600
			$566.00 Per Foot	

Separated Bike Lane (Two-Way) with Curb and Gutter (4' landscape buffer, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 14' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	17	$19.00	$323
Milling & Overlay	SY	240	$32.00	$7,680
Asphalt Surface Paving	SY	144	$124.77	$17,967
2' Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$56,156
			20% Contingency	$11,231
			Total Estimated Cost	$67,400
			$674.00 Per Foot	

Shared Use Path 10' wide - Asphalt (Curb and Gutter)				
Includes: removal of existing earth, minimal grading to avoid property acquistion. Four foot buffer. Prices based on 100' long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	8	$19.00	$152
Aggregate Base Course	CY	4	$18.19	$73
Asphalt Surface Paving	SY	115	$124.77	$14,349
Conc. Curb and Gutter	LF	100	$22.89	$2,289
New Signs (assume 1 per 500')	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$23,162
			20% Contingency	$4,632
			Total Estimated Cost	$27,800
			$278.00 Per Foot	

Shared Use Path 12' wide - Asphalt (Curb and Gutter)				
Includes: removal of existing earth, minimal grading to avoid property acquistion. Four foot buffer. Prices based on 100' long section on one side of roadway.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Fill, Excavation, Grading	CY	10	$19.00	$190
Aggregate Base Course	CY	5	$18.19	$91
Asphalt Surface Paving	SY	138	$124.77	$17,218
Conc. Curb and Gutter	LF	100	$22.89	$2,289
New Signs (assume 1 per 500')	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$500.00	$500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Misc. Move mailbox/ signage	LS	1.00	$250.00	$250
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$26,087
			20% Contingency	$5,217
			Total Estimated Cost	$31,400
			$314.00 Per Foot	

FACILITY PLUS 5-FOOT SIDEWALK

Bike Lanes, Paved and Striped Shoulder with 5' Sidewalk (4'-6' paved shoulder)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening of 5' on one side. Major grading required with no curb and gutter. Natural ditch drainage provided. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	9	$19.00	$171
Milling & Overlay	SY	123	$32.00	$3,936
Asphalt Surface Paving	SY	56	$124.77	$6,987
Thermoplastic Pavement Marking Lines (4" to 6")	LF	100	$1.27	$127
Pavement Marking, Bike Shared Lane Symbol	EA	0	$391.17	$0
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$2,000.00	$2,000
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$2,000.00	$2,000
Maintenance of Traffic	LS	1.00	$2,000.00	$2,000
Utility Adjustments	LS	1.00	$2,000.00	$2,000
			Subtotal	$27,578
			20% Contingency	$5,516
			Total Estimated Cost	$33,100
			$331.00 Per Foot	

Buffered Bike Lane with Existing Curb and Gutter and 5' Sidewalk (Min. 1.5' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 6.5' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
Thermoplastic Pavement Marking Lines (1.5' wide)	LF	100	$5.50	$550
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$27,802
			20% Contingency	$5,560
			Total Estimated Cost	$33,400
			$334.00 Per Foot	

Buffered Bike Lane with Existing Curb and Gutter with 5' Sidewalk (3' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (3' wide)	LF	100	$11.00	$1,100
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$31,708
			20% Contingency	$6,342
			Total Estimated Cost	$38,100
			$381.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter with 5’ Sidewalk (2’ painted buffer with flex posts, 5’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$40,564
			20% Contingency	$8,113
			Total Estimated Cost	$48,700
			$487.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter with 5' Sidewalk (2' beveled curb seperation, 6' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
2' Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$43,565
			20% Contingency	$8,713
			Total Estimated Cost	$52,300
			$523.00 Per Foot	

Separated Bike Lane (One-Way) with Existing Curb and Gutter with 5' Sidewalk (4' landscape buffer, 6' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 10' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
2' Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$44,935
			20% Contingency	$8,987
			Total Estimated Cost	$54,000
			$540.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter with 5’ Sidewalk (2’ painted buffer with flex posts, 10’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$45,964
			20% Contingency	$9,193
			Total Estimated Cost	$55,200
			$552.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter (2' beveled curb seperation, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
2' Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$48,965
			20% Contingency	$9,793
			Total Estimated Cost	$58,800
			$588.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter (4’ landscape buffer, 10’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 14’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	17	$19.00	$323
Milling & Overlay	SY	240	$32.00	$7,680
Asphalt Surface Paving	SY	144	$124.77	$17,967
2’ Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$58,022
			20% Contingency	$11,604
			Total Estimated Cost	$69,700
			$697.00 Per Foot	

FACILITY PLUS 5-FOOT SIDEWALK AND CURB AND GUTTER

Bike Lanes, Paved and Striped Shoulder with 5' Sidewalk and Curb and Gutter (4'-6' paved shoulder)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening of 5' on one side. Major grading required with no curb and gutter. Natural ditch drainage provided. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	9	$19.00	$171
Milling & Overlay	SY	123	$32.00	$3,936
Asphalt Surface Paving	SY	56	$124.77	$6,987
Thermoplastic Pavement Marking Lines (4" to 6")	LF	100	$1.27	$127
Pavement Marking, Bike Shared Lane Symbol	EA	0	$391.17	$0
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$2,000.00	$2,000
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$2,000.00	$2,000
Maintenance of Traffic	LS	1.00	$2,000.00	$2,000
Utility Adjustments	LS	1.00	$2,000.00	$2,000
			Subtotal	$29,867
			20% Contingency	$5,973
			Total Estimated Cost	$35,900
			$359.00 Per Foot	

Buffered Bike Lane with Curb and Gutter and 5' Sidewalk (Min. 1.5' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 6.5' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
Thermoplastic Pavement Marking Lines (1.5' wide)	LF	100	$5.50	$550
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$30,091
			20% Contingency	$6,018
			Total Estimated Cost	$36,200
			$362.00 Per Foot	

Buffered Bike Lane with Curb and Gutter with 5' Sidewalk (3' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (3' wide)	LF	100	$11.00	$1,100
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$33,997
			20% Contingency	$6,799
			Total Estimated Cost	$40,800
			$408.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter with 5' Sidewalk (2' painted buffer with flex posts, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (2' wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$42,853
			20% Contingency	$8,571
			Total Estimated Cost	$51,500
			$515.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter with 5’ Sidewalk (2’ beveled curb seperation, 6’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
2’ Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$45,854
			20% Contingency	$9,171
			Total Estimated Cost	$55,100
			$551.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter with 5' Sidewalk (4' landscape buffer, 6' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 10' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
2' Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$47,224
			20% Contingency	$9,445
			Total Estimated Cost	$56,700
			$567.00 Per Foot	

Separated Bike Lane (Two-Way) with Curb and Gutter with 5’ Sidewalk (2’ painted buffer with flex posts, 10’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$48,253
			20% Contingency	$9,651
			Total Estimated Cost	$58,000
			$580.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter with 5’ Sidewalk (2’ beveled curb seperation, 10’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
2’ Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5’ Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$51,254
			20% Contingency	$10,251
			Total Estimated Cost	$61,600
			$616.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter with 5' Sidewalk (4' landscape buffer, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 14' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	17	$19.00	$323
Milling & Overlay	SY	240	$32.00	$7,680
Asphalt Surface Paving	SY	144	$124.77	$17,967
2' Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	2	$18.19	$36
5' Concrete Sidewalk	SY	56	$73.56	$4,119
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$60,311
			20% Contingency	$12,062
			Total Estimated Cost	$72,400
			$724.00 Per Foot	

FACILITY PLUS 10-FOOT SIDEWALK AND CURB AND GUTTER

Bike Lanes, Paved and Striped Shoulder with 10' Sidewalk and Curb and Gutter (4'-6' paved shoulder)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening of 5' on one side. Major grading required with no curb and gutter. Natural ditch drainage provided. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	9	$19.00	$171
Milling & Overlay	SY	123	$32.00	$3,936
Asphalt Surface Paving	SY	56	$124.77	$6,987
Thermoplastic Pavement Marking Lines (4" to 6")	LF	100	$1.27	$127
Pavement Marking, Bike Shared Lane Symbol	EA	0	$391.17	$0
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10' Concrete Sidewalk (4" Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$49
Lump Sum Items				
Mobilization	LS	1.00	$2,000.00	$2,000
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$2,000.00	$2,000
Maintenance of Traffic	LS	1.00	$2,000.00	$2,000
Utility Adjustments	LS	1.00	$2,000.00	$2,000
			Subtotal	$35,409
			20% Contingency	$7,082
			Total Estimated Cost	$42,500
			$425.00 Per Foot	

Buffered Bike Lane with Curb and Gutter and 10' Sidewalk (Min. 1.5' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 6.5' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
Thermoplastic Pavement Marking Lines (1.5' wide)	LF	100	$5.50	$550
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10' Concrete Sidewalk (4" Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$35,632
			20% Contingency	$7,126
			Total Estimated Cost	$42,800
			$428.00 Per Foot	

Buffered Bike Lane with Curb and Gutter with 10' Sidewalk (3' painted buffer, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (3' wide)	LF	100	$11.00	$1,100
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10' Concrete Sidewalk (4" Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$39,538
			20% Contingency	$7,908
			Total Estimated Cost	$47,500
			$475.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter with 10' Sidewalk (2' painted buffer with flex posts, 5' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
Thermoplastic Pavement Marking Lines (2' wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10' Concrete Sidewalk (4" Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$48,394
			20% Contingency	$9,679
			Total Estimated Cost	$58,100
			$581.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter with 10' Sidewalk (2' beveled curb seperation, 6' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 8' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	11	$19.00	$209
Milling & Overlay	SY	150	$32.00	$4,800
Asphalt Surface Paving	SY	90	$124.77	$11,229
2' Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10' Concrete Sidewalk (4" Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$51,395
			20% Contingency	$10,279
			Total Estimated Cost	$61,700
			$617.00 Per Foot	

Separated Bike Lane (One-Way) with Curb and Gutter with 10’ Sidewalk (4’ landscape buffer, 6’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 10’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	10	$19.00	$190
Milling & Overlay	SY	112	$32.00	$3,584
Asphalt Surface Paving	SY	73	$124.77	$9,108
2’ Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10’ Concrete Sidewalk (4” Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$52,765
			20% Contingency	$10,553
			Total Estimated Cost	$63,400
			$634.00 Per Foot	

Separated Bike Lane (Two-Way) with Curb and Gutter with 10’ Sidewalk (2’ painted buffer with flex posts, 10’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
Thermoplastic Pavement Marking Lines (2’ wide)	LF	100	$7.25	$725
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10’ Concrete Sidewalk (4” Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$53,794
			20% Contingency	$10,759
			Total Estimated Cost	$64,600
			$646.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter with 10’ Sidewalk (2’ beveled curb seperation, 10’ bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 12’ on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	14	$19.00	$266
Milling & Overlay	SY	200	$32.00	$6,400
Asphalt Surface Paving	SY	120	$124.77	$14,972
2’ Curb	LF	100	$37.26	$3,726
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10’ Concrete Sidewalk (4” Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100’ cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500’)	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$1,000.00	$1,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$56,795
			20% Contingency	$11,359
			Total Estimated Cost	$68,200
			$617.00 Per Foot	

Separated Bike Lane (Two-Way) with Existing Curb and Gutter with 10' Sidewalk (4' landscape buffer, 10' bike lane)				
Includes: bicycle lane markings in one direction with bicycle lane signs. Requires road widening up to 14' on one side. Major grading required and relocation of curb and gutter. Priced based on 100LF section.				
Item	Unit	Quantity	Unit Cost	Total Cost
Earthwork, Excavation, Grading	CY	17	$19.00	$323
Milling & Overlay	SY	240	$32.00	$7,680
Asphalt Surface Paving	SY	144	$124.77	$17,967
2' Curb	LF	200	$37.26	$7,452
Flex Posts	EA	100	$92.31	$9,231
Pavement Marking, Bike Lane Symbol	EA	4	$538.08	$2,152
Aggregate Base Course	CY	4	$18.19	$73
10' Concrete Sidewalk (4" Thickness)	SY	112	$85.93	$9,624
Conc. Curb and Gutter	LF	100	$22.89	$2,289
Crosswalk (4 per mile, 2 units for 100' cost)	EA	2	$500.00	$1,000
New Signs (assume 1 per 500')	EA	0	$246.00	$62
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Landscaping	LS	1.00	$2,000.00	$2,000
Drainage and E&S	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,500.00	$1,500
Utility Adjustments	LS	1.00	$1,500.00	$1,500
			Subtotal	$65,853
			20% Contingency	$13,171
			Total Estimated Cost	$79,100
			$791.00 Per Foot	

TRAFFIC CALMING ELEMENTS

Bulb-Out (Curb Extension)				
Assumes 50’ in length including taper. Prices based on 50’ long section on one side.				
Item	Unit	Quantity	Unit Cost	Total Cost
Bulb-Out	EA	1	$13,000.00	$13,000
			Subtotal	$13,000
			20% Contingency	$2,600
			Total Estimated Cost	$15,600

Pedestrian Signals (All 4 legs, no cabinet upgrades)				
All 4 legs no cabinet upgrades required (8 signals and corresponding buttons)				
Item	Unit	Quantity	Unit Cost	Total Cost
Pedestrian Pushbuttons w/ Buttons and Signs	EA	8	$182.00	$1,456
LED Countdown Pedestrian Signal Head	EA	8	$324.00	$2,592
Signal Cable (14AWG); 4 Conductor, Per 1000 FT.	EA	2	$302.00	$604
Signal Cable (14AWG); 7 Conductor, Per 1000 FT.	EA	2	$402.00	$804
Labor				
Labor Hours	LS	1	$3,679.00	$3,679
Lump Sum Items				
Miscellanous Materials	LS	1.00	$424.00	$424
Mobilization (5%)	LS	1.00	$477.95	$478
Travel Expense (5%)	LS	1.00	$477.95	$478
Contractor Profit (5%)	LS	1.00	$477.95	$478
Sub-Contractor Profit (5%)	LS	1.00	$477.95	$478
			Subtotal	$11,471
			20% Contingency	$2,294
			Total Estimated Cost	$13,800

Pedestrian Signals (All 4 legs, cabinet upgrades)				
All 4 legs (8 signals and corresponding buttons) + cabinet upgrades required				
Item	Unit	Quantity	Unit Cost	Total Cost
Pedestrian Pushbuttons w/ Buttons and Signs	EA	8	$182.00	$1,456
LED Countdown Pedestrian Signal Head	EA	8	$324.00	$2,592
Signal Cable (14AWG); 4 Conductor, Per 1000 FT.	EA	2	$302.00	$604
Signal Cable (14AWG); 7 Conductor, Per 1000 FT.	EA	2	$402.00	$804
Cabinet Upgrades				
Controller Unit Model 2070 LX (Preferred)	EA	1	$2,230.00	$2,230
Cabinet Assembly, Model 336S	EA	1	$4,470.00	$4,470
Switch Pack (Load Switch)	EA	12	$19.00	$228
DC Isolator	EA	3	$33.00	$99
2010 Signal Monitor, Type B (Ethernet)	EA	1	$505.00	$505
Pull Box, PB-3	EA	1	$271.00	$271
Labor				
Labor Hours	LS	1	$5,218.00	$5,218
Lump Sum Items				
Miscellanous Materials	LS	1.00	$1,069.00	$1,069
Mobilization (5%)	LS	1.00	$977.30	$977
Travel Expense (5%)	LS	1.00	$977.30	$977
Sub-Contractor Profit (5%)	LS	1.00	$977.30	$977
Contractor Profit (5%)	LS	1.00	$977.30	$977
			Subtotal	$23,455
			20% Contingency	$4,691
			Total Estimated Cost	$28,200

Pedestrian Signals (One approach, cabinet upgrades)				
A single approach (2 signals and corresponding buttons) and cabinet upgrades needed				
Item	Unit	Quantity	Unit Cost	Total Cost
Pedestrian Pushbuttons w/ Buttons and Signs	EA	2	$182.00	$364
LED Countdown Pedestrian Signal Head	EA	2	$324.00	$648
Signal Cable (14AWG); 4 Conductor, Per 1000 FT.	EA	1	$302.00	$302
Signal Cable (14AWG); 7 Conductor, Per 1000 FT.	EA	1	$402.00	$402
Cabinet Upgrades				
Controller Unit Model 2070 LX (Preferred)	EA	1	$2,230.00	$2,230
Cabinet Assembly, Model 336S	EA	1	$4,470.00	$4,470
Switch Pack (Load Switch)	EA	12	$19.00	$228
DC Isolator	EA	3	$33.00	$99
2010 Signal Monitor, Type B (Ethernet)	EA	1	$505.00	$505
Pull Box, PB-3	EA	1	$271.00	$271
Labor Hours				
Labor Hours	LS	1	$4,473.00	$4,473
Lump Sum Items				
Miscellanous Materials	LS	1.00	$759.00	$759
Mobilization (5%)	LS	1.00	$699.60	$700
Travel Expense (5%)	LS	1.00	$699.60	$700
Sub-Contractor Profit (5%)	LS	1.00	$699.60	$700
Contractor Profit (5%)	LS	1.00	$699.60	$700
			Subtotal	$17,549
			20% Contingency	$3,510
			Total Estimated Cost	$21,100

Pedestrian Signals (One approach, no cabinet upgrades)				
A single approach no cabinet upgrades required (2 signals and corresponding buttons)				
Item	Unit	Quantity	Unit Cost	Total Cost
Pedestrian Pushbuttons w/ Buttons and Signs	EA	2	$182.00	$364
LED Countdown Pedestrian Signal Head	EA	2	$324.00	$648
Signal Cable (14AWG); 4 Conductor, Per 1000 FT.	EA	1	$302.00	$302
Signal Cable (14AWG); 7 Conductor, Per 1000 FT.	EA	1	$402.00	$402
Labor				
Labor Hours	LS	1	$1,813.00	$1,813
Lump Sum Items				
Miscellanous Materials	LS	1.00	$138.00	$138
Mobilization (5%)	LS	1.00	$183.35	$183
Travel Expense (5%)	LS	1.00	$183.35	$183
Sub-Contractor Profit (5%)	LS	1.00	$183.35	$183
Contractor Profit (5%)	LS	1.00	$183.35	$183
			Subtotal	$4,400
			20% Contingency	$880
			Total Estimated Cost	$5,300

Striped Crosswalk (High-Visibility)				
40’ length and Continental or Ladder Style (High Visibility)				
Item	Unit	Quantity	Unit Cost	Total Cost
Striped Crosswalk	EA	1	$2,540.00	$2,540
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
			Subtotal	$5,040
			20% Contingency	$1,008
			Total Estimated Cost	$6,100

Raised Crosswalk				
40’ length, concrete crossing, approaches are assumed 6’ on either side				
Item	Unit	Quantity	Unit Cost	Total Cost
Raised Crosswalk	EA	1	$8,170.00	$8,170
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000

			Subtotal	$10,670
			20% Contingency	$2,134
			Total Estimated Cost	$12,900

Median Refuge Island				
40' length, 8' in width, raised curb, with detectable warning				
Item	Unit	Quantity	Unit Cost	Total Cost
Median Refuge Island	SF	320	$10.00	$3,200
Detectable Warning Surface	SF	4	$47.91	$192
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
			Subtotal	$5,892
			20% Contingency	$1,178
			Total Estimated Cost	$7,100

ADA Ramp				
Complete installation with detectable warning				
Item	Unit	Quantity	Unit Cost	Total Cost
Wheelchair Ramp	EA	1	$810.00	$810
Detectable Warning Surface	SF	2	$47.91	$96
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$4,406
			20% Contingency	$881
			Total Estimated Cost	$5,300

Rectangular Rapid Flashing Beacon (RRFB)				
2 RRFs at one crossing; solar powered				
Item	Unit	Quantity	Unit Cost	Total Cost
Rectangular Rapid Flashing Beacon (RRFB)	EA	2	$22,250.00	$44,500
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000

Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$48,000
			20% Contingency	$9,600
			Total Estimated Cost	$57,600

High Intensity Activated Crosswalk (HAWK Signal)				
Assumes electric connection exists				
Item	Unit	Quantity	Unit Cost	Total Cost
High Intensity Activated Crosswalk (HAWK Signal)	EA	1	$57,680.00	$57,680
Lump Sum Items				
Mobilization	LS	1.00	$1,500.00	$1,500
Maintenance of Traffic	LS	1.00	$1,000.00	$1,000
Utility Adjustments	LS	1.00	$1,000.00	$1,000
			Subtotal	$61,180
			20% Contingency	$12,236
			Total Estimated Cost	$73,500

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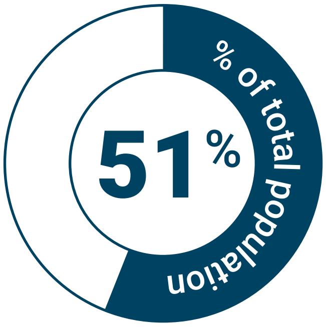
DESIGN GUIDANCE

APPENDIX D

POTENTIAL BICYCLE USERS

Interested but Concerned



Types of Cyclists

The figure below illustrates a typical range of cyclists. Estimates show the greatest percentage of the population—upwards of 60-70%—fall into the “Interested but Concerned” category. The “Interested but Concerned” are most comfortable cycling separated from motorized vehicles. On the other end of the spectrum, only roughly 1% of the population is “Experienced and Confident”, comfortable sharing the road with motorized vehicles. In the middle, approximately 7% are “Casual and Confident”, comfortable cycling for short distances with motorized vehicles. See Page 22-23, Bikeway Facilities Selection Chart to determine which facility types best serve the different types of cyclists.

Who are they?

A mother and daughter who enjoy Saturday rides to the library along the shared-use path that runs near their house. Concern over crossing a busy road prevents them from riding together to elementary school during the week.

Who are they?

A 45-year-old father of two who was just diagnosed with pre-diabetes. His doctor encouraged him to be more active. He doesn’t think he has time to go to the gym, so he’s been thinking about commuting to work by bike.

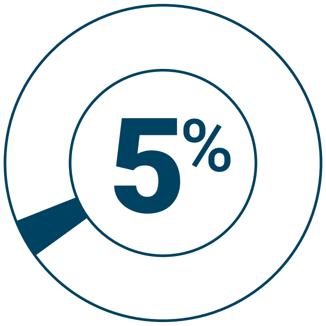
As a motorist he feels uncomfortable passing bicyclists, so he isn’t sure he’d feel comfortable as a bicyclist sharing the road with cars.

Who are they?

A resident who just moved to the US. He’s used bike share a few times to ride home from the train station. He enjoys riding as long as he stays on quiet streets or the sidewalk. He’d like to be able to ride to the grocery store, but he’s uncomfortable crossing busy roads and intersections along the way.

POTENTIAL BICYCLE USERS

Casual and Somewhat Confident

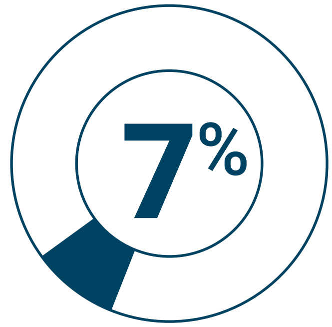


Who are they?

A woman who rides her bike downtown every morning to her job at the hospital. She prefers to ride on neighborhood streets, but doesn't mind riding the last few blocks on a busy street since there's a bike lane.

Who are they?

A lower-income resident who rides a bicycle to save money for other household expenses. He's comfortable riding on Main Street without a conventional bike lane because it's a two-lane road and motorists usually don't pass him.

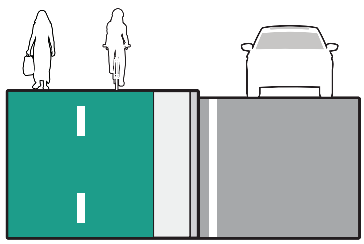


Who are they?

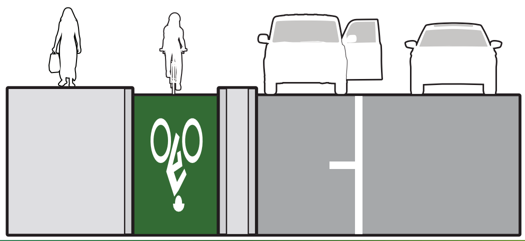
A recent college grad who can't wait to hit the road this weekend for a 100-mile ride on his brand new road bike. He helped pay his way through college as a bike messenger, and loves the rush that he gets from racing.

BICYCLE FACILITY OVERVIEW

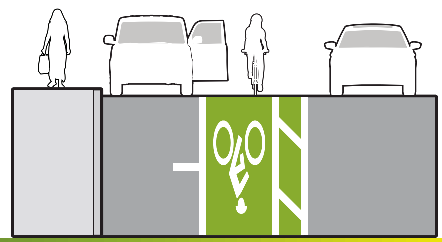
Shared Use Path SUP



Separated Bike Lane SBL



Buffered Bike Lane BBL



MOST SEPARATED

TYPICAL APPLICATION

Shared Use Path

Shared use paths will generally be considered on any road with one or more of the following characteristics:

- Total traffic lanes: 3 lanes or greater
- Posted speed limit: 30 mph or greater
- Average Daily Traffic: 9,000 vehicles or greater
- Parking turnover: frequent
- Bike lane obstruction: likely to be frequent
- Streets that are designated as truck or bus routes

Shared use paths may be preferable to separated bike lanes in low density areas where pedestrian volumes are anticipated to be fewer than 200 people per hour on the path.

Separated Bike Lane

Separated bike lanes will generally be considered on any road with one or more of the following characteristics:

- Total traffic lanes: 3 lanes or greater
- Posted speed limit: 30 mph or more
- Average Daily Traffic: 9,000 vehicles or greater
- Parking turnover: frequent
- Bike lane obstruction: likely to be frequent
- Streets that are designated as truck or bus routes

Preferred in higher density areas, adjacent to commercial and mixed-use development, and near major transit stations or locations where observed or anticipated pedestrian volumes will be higher.

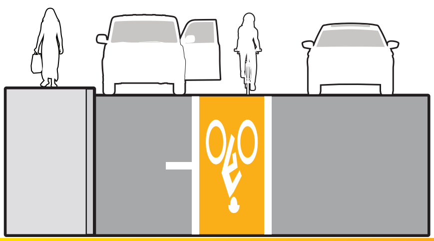
Buffered Bike Lane

Buffered bike lanes will generally be considered on any road with one or more of the following characteristics:

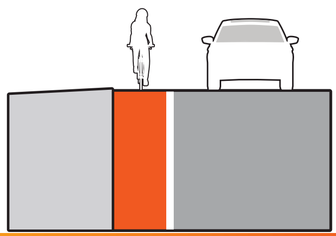
- Total traffic lanes: 3 lanes or fewer
- Posted speed limit: 30 mph or lower
- Average Daily Traffic: 9,000 vehicles or fewer
- Parking turnover: infrequent.
- Bike lane obstruction: likely to be infrequent
- Where a separated bike lane or sidepath is infeasible or not desirable

BICYCLE FACILITY OVERVIEW

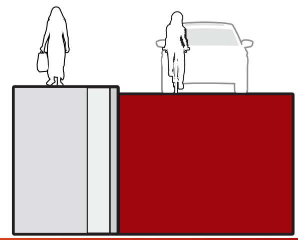
Bike Lane BL



Shoulder Bikeway SB



Shared Roadway SR



LEAST SEPARATED

TYPICAL APPLICATION

Conventional bike lanes will generally be considered on any road with one or more of the following characteristics:

+ Total traffic lanes: 3 lanes or fewer
+ Posted speed limit: 30 mph or lower
+ Average Daily Traffic: 9,000 vehicles or fewer
+ Parking turnover: infrequent
+ Bike lane obstruction: likely to be infrequent
+ Where a separated bike lane or sidepath is infeasible or not desirable

Shoulder bike lanes can generally be considered on any road without on-street parking and one or more of the following characteristics:

+ Total traffic lanes: 3 lanes or fewer
+ Average Daily Traffic: Up to 8,000 vehicles
+ Shoulder obstruction: likely to be infrequent
+ Where a separated bike lane or sidepath is infeasible or not desirable

The minimum width of a shoulder bikeway is 4' (exclusive of the gutter if one

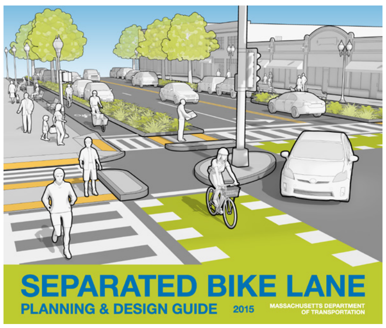
exists). Wider shoulders should be provided on streets or roads with average daily traffic higher than 3,500 vehicles.

Shared roadways can be considered on any road with one or more of the following characteristics:

+ Total traffic lanes: 3 lanes or fewer
+ Posted speed limit: 25 mph or lower
+ Average Daily Traffic: Up to 3,000 vehicles
+ Where a separated bike lane or sidepath is infeasible or not desirable

NATIONAL STANDARDS AND RESOURCES

The publications listed here are excellent resources for planning and design guidance in implementing safe, comfortable accommodations for pedestrians and bicyclists in a variety of environments. Many of these resources are available online at no cost.



Massachusetts Department of Transportation (MassDOT)

Separated Bike Lane Planning & Design Guide, 2016

Federal Highway Administration (FHWA)

Separated Bike Lane Planning and Design Guide, 2015

Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts (2016)

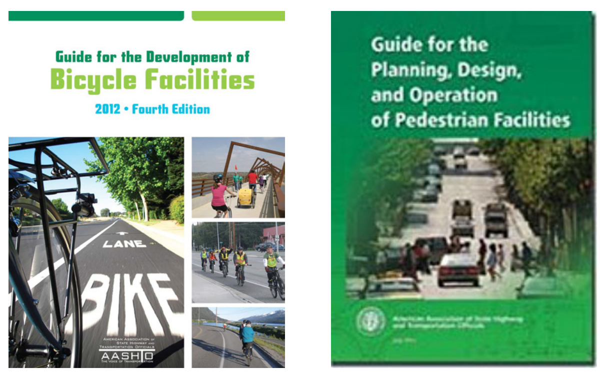
Incorporating On-Road Bicycle Networks into Resurfacing Projects (2016)

National Association of City Transportation Officials (NACTO)

Urban Street Design Guide

Transit Street Design Guide

Urban Bikeway Design Guide



American Association of State Highway and Transportation Officials (AASHTO)

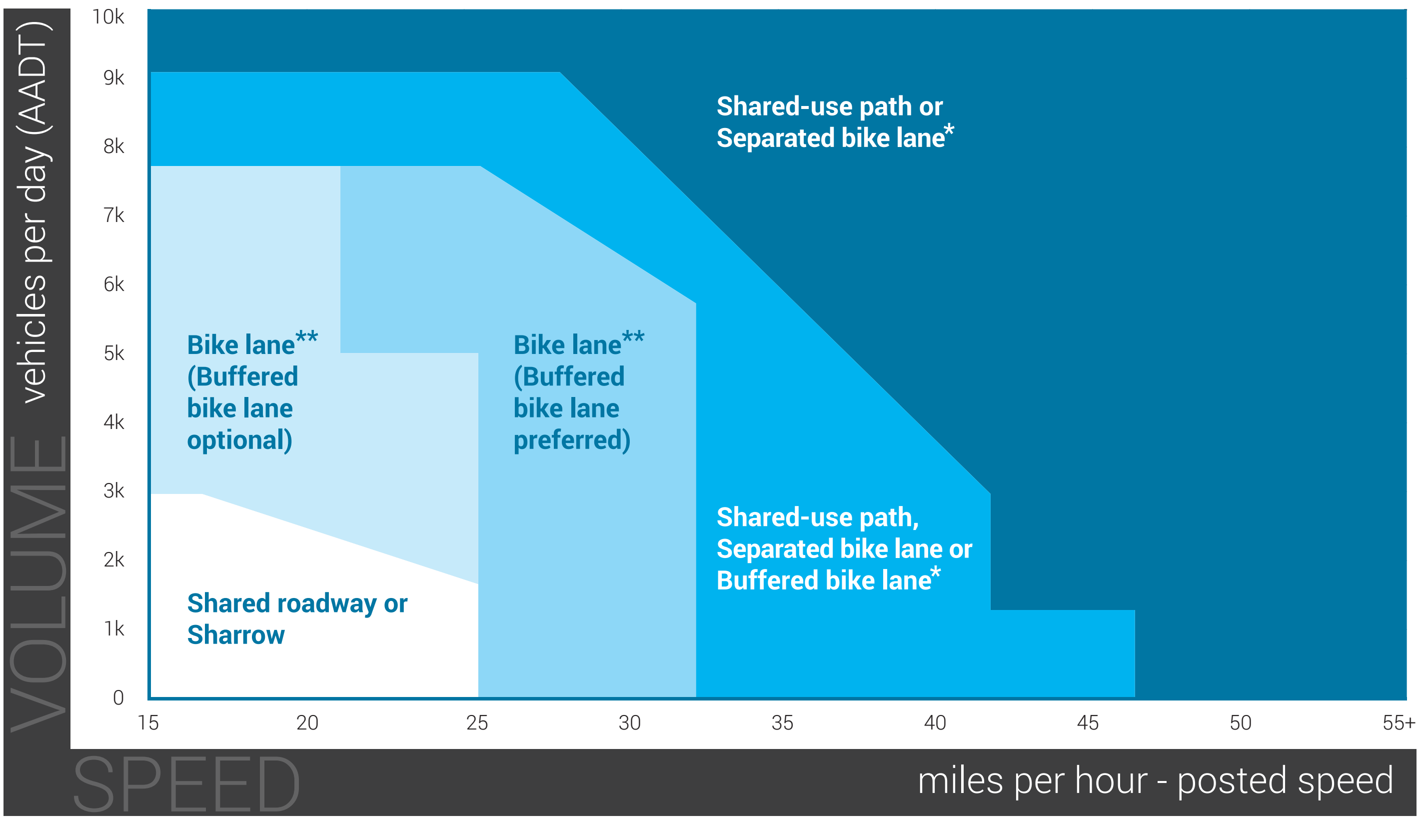
Guide for the Development of Bicycle Facilities, 2012

Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004

BICYCLE FACILITY SELECTION

Designing for Interested but Concerned and Casual and Somewhat Confident Bicyclists

“Interested but concerned” bicyclists prefer physical separation as traffic volumes and speeds increase. The bikeway facility selection chart below identifies bikeway facilities that improve operating environment for this bicyslist type at different roadway speeds and traffic volumes. The “casual” and “somewhat confident” bicyclist will also prefer bikeway treatments noted in this chart. If a community’s goal is to increase bicycling, it is appropriate to select facility types based on this chart.



* To determine whether to provide a shared-use path, separated bike lane, or buffered bike lane, consider pedestrian and bicycle volumes or, in the absence of volume, consider land use.

** Can use a shoulder bikeway as necessary

FACILITY DETAILS:

- **Physically separated facility:**
  - Separated bike lane or shared-use path, separated from traffic by parking, posts, curb, etc.
  - For two-way facility: 10 to 12 ft preferred, 8 ft minimum
- **Bike lane:** 5 to 7 ft
- **Buffered bike lane:** 8 to 9 ft total
- **Shoulder bikeway:** 4 to 10 ft paved

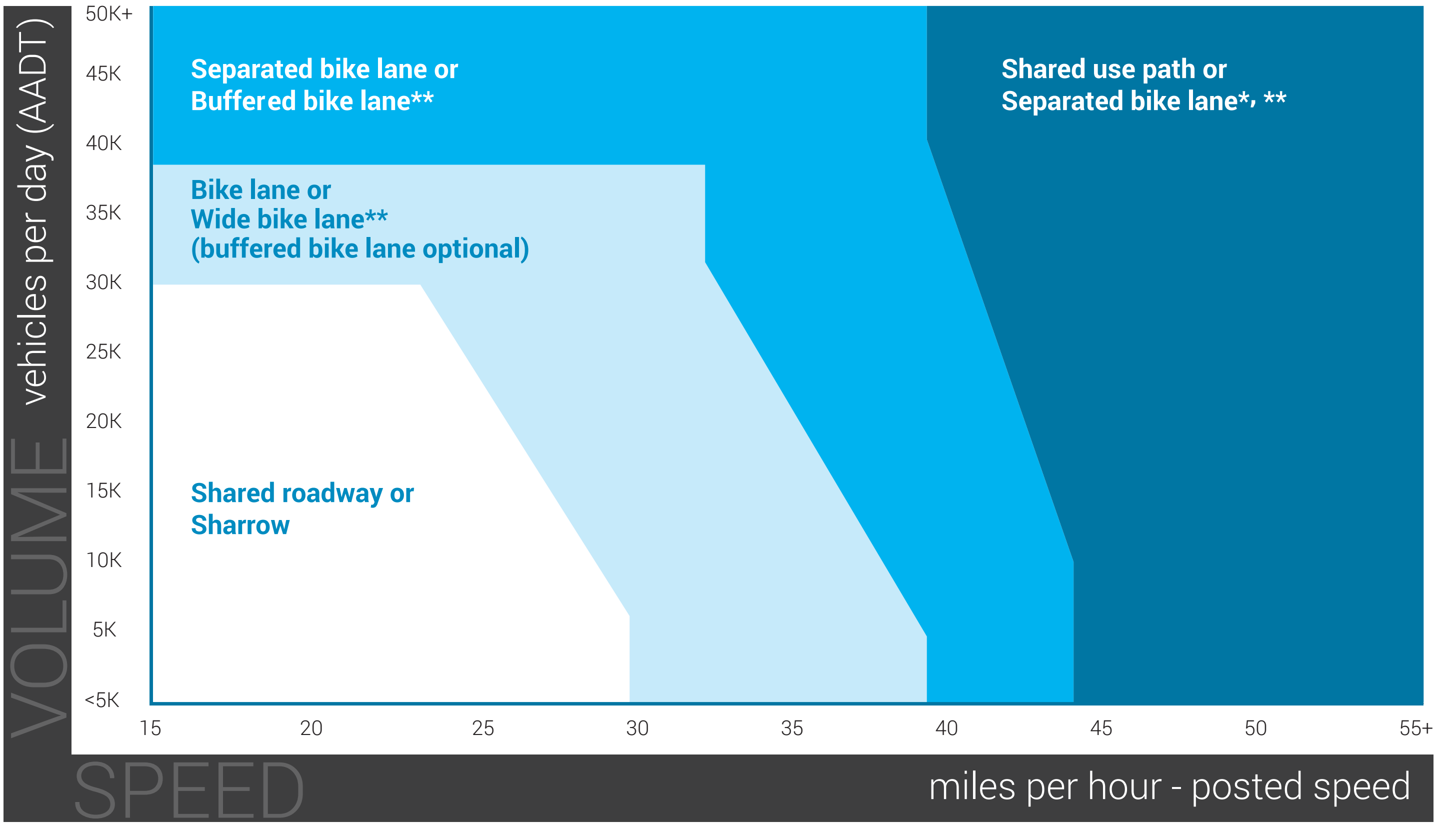
CHART REFERENCES

- Transitions are based on a shift in the Highway Capacity Manual (HCM) bike Level of Service (LOS) from A to B (assuming no parking, 12 ft outside travel lane, 6 ft bike lane, 8 ft buffered bike lane). This roughly translates to a C to D transition with on-street parking (8 ft parking lane).
- Speed thresholds based on Level of Traffic Stress. “Interested but Concerned” riders are sensitive to increases in volume or speed, based on Dill’s research, *Categorizing Cyclists: What Do We Know? Insights from Portland, OR* on the four types of cyclists.

BICYCLE FACILITY SELECTION

Designing for Experienced and Confident Bicyclists

"Experienced and confident" bicyclists have a greater tolerance and willingness to operate with higher motor vehicle traffic volumes and speeds. The bikeway facility selection chart below identifies bikeway facilities that improve the operating environment for this bicyclist type at different roadway speeds and traffic volumes. The "casual and somewhat confident" bicyclist may tolerate bikeway treatments based on this chart for limited distances, while "interested but concerned" bicyclists may not.



* To determine whether to provide a shared-use path, separated bike lane, or buffered bike lane, consider pedestrian and bicycle volumes or, in the absence of volume, consider land use.

** Can use a shoulder bikeway as necessary

FACILITY DETAILS:

- **Physically separated facility:**
  - Separated bike lane or shared-use path, separated from traffic by parking, posts, curb, etc.
  - For two-way facility: 10 to 12 ft preferred, 8 ft minimum
- **Bike lane:** 5 to 7 ft
- **Buffered bike lane:** 8 to 9 ft total
- **Shoulder bikeway:** 4 to 10 ft paved

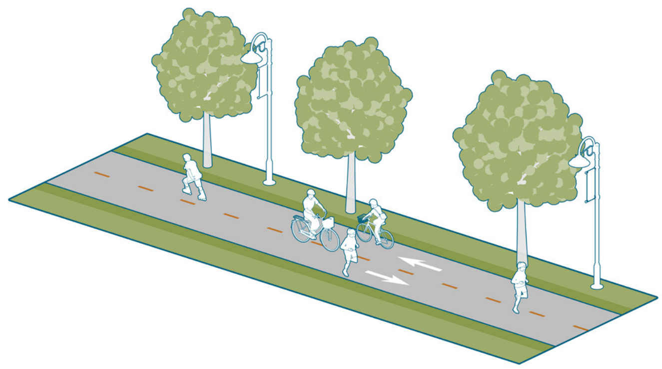
CHART REFERENCES

- Transitions are based on a shift in the Highway Capacity Manual (HCM) bike Level of Service (LOS) from A to B (assuming no parking, 12 ft outside travel lane, 6 ft bike lane, 8 ft buffered bike lane). This roughly translates to a C to D transition with on-street parking (8 ft parking lane).
- "Enthusiastic and Confident" bicyclists are more concerned with speed than volume; therefore the volume scale on the chart is significantly higher than in the bikeway facility selection chart (up to 50,000) and the thresholds are more sensitive to increases in speed than to increases in volume.

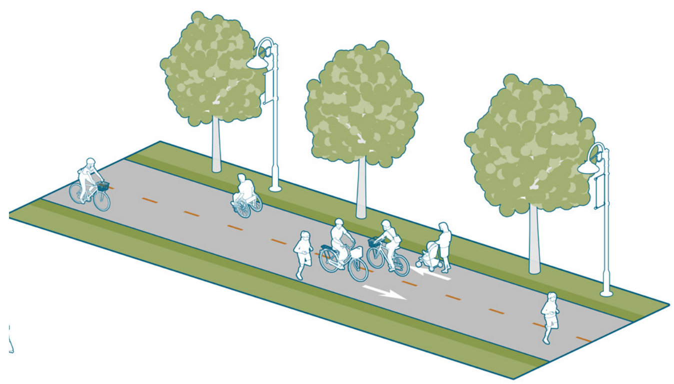
SHARED USE PATHS AND SIDEPATHS

A shared use path is a two-way facility physically separated from motor vehicle traffic and used by bicyclists, pedestrians, and other non-motorized users. Shared use paths, also referred to as trails, are often located in an independent alignment, such as a greenbelt or abandoned railroad. However, they are also regularly constructed along roadways; often bicyclists and pedestrians will have increased interactions with motor vehicles at driveways and intersections on these "sidepaths."

+ According to the AASHTO, "Shared use paths should not be used to preclude on-road bicycle facilities, but rather to supplement a network of on-road bike lanes, shared roadways, bicycle boulevards, and paved shoulders." In other words, in some situations it may be appropriate to provide an on-road bikeway in addition to a sidepath along the same roadway.
+ Many people express a strong preference for the separation between bicycle and motor vehicle traffic provided by paths when compared to on-street bikeways. Sidepaths may be desirable along high-volume or high-speed roadways, where accommodating the targeted type of bicyclist within the roadway in a safe and comfortable way is impractical. However, sidepaths may present increased conflicts between path users and motor vehicles at intersections and driveway crossings. Conflicts can be reduced by minimizing the number of driveway and street crossings present along a path and otherwise providing high-visibility crossing treatments.
+ Paths typically have a lower design speed for bicyclists than on-street facilities and may not provide appropriate accommodation for more confident bicyclists who desire to travel at greater speeds. In addition, greater numbers of driveways or intersections along a sidepath corridor can decrease bicycle travel speeds and traffic signals can increase delay for bicyclists on off-street paths compared to cyclists using in-street bicycle facilities such as bike lanes. Therefore, paths should not be considered a substitute to accommodating more confident bicyclists within the roadway.



Path Width for One-way Passing



Path Width for Two-way Passing

REFERENCES

AASHTO Guide for the Development of Bicycle Facilities (2012)

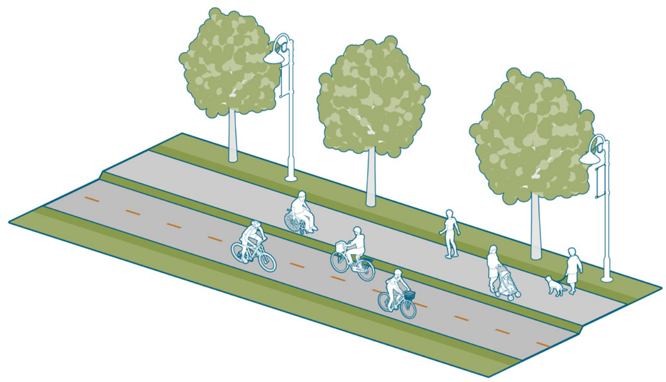
FHWA Shared-Use Path Level of Service Calculator (2006)

Manual on Uniform Traffic Control Devices (2009)

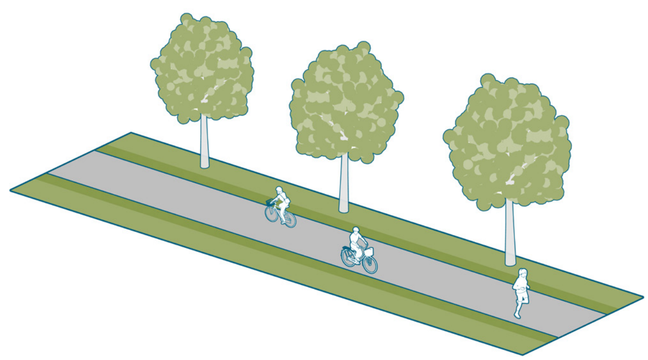
PATH WIDTH CONSIDERATIONS

Path width should be determined based on three main characteristics: the number of users, the types of users, and the differences in their speeds. For example, a path that is used by higher-speed bicyclists and children walking to school may experience conflicts due to their difference in speeds. By widening the path to provide space to accommodate passing movements, conflicts can be reduced.

- Widths as narrow as 8 feet are acceptable for short distances under physical constraint. Warning signs should be considered at these locations.
- In locations with heavy volumes or a high proportion of pedestrians, widths exceeding 10 feet are recommended. A minimum of 11 feet is required for users to pass with a user traveling in the other direction. It may be beneficial to separate bicyclists from pedestrians by constructing parallel paths for each mode.
- Paths must be designed according to state and national standards. This includes establishing a design speed (typically 18 mph) and designing path geometry accordingly. Consult the AASHTO Guide for the Development of Bicycle Facilities for guidance on geometry, clearances, traffic control, railings, drainage, and pavement design.
- On hard surfaces it can be useful to include soft surface parallel paths which are preferred by some users, such as runners.
- Path clearances are an important element in path design and reducing user conflicts. Vertical objects close to the path edge can endanger users and reduce the comfortable usable width of the path. Along the path, vertical objects should be set back at least two feet from the edge of the path. Path shoulders may also reduce conflicts by providing space for users who step off the path to rest, allowing users to pass one another, or providing space for viewpoints.



Shared Use Path Physical Separation



Minimum Path Width Limits Passing

REFERENCES

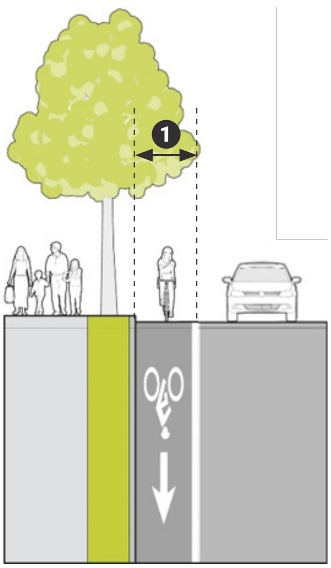
AASHTO Guide for the Development of Bicycle Facilities (2012)

FHWA Shared-Use Path Level of Service Calculator (2006)

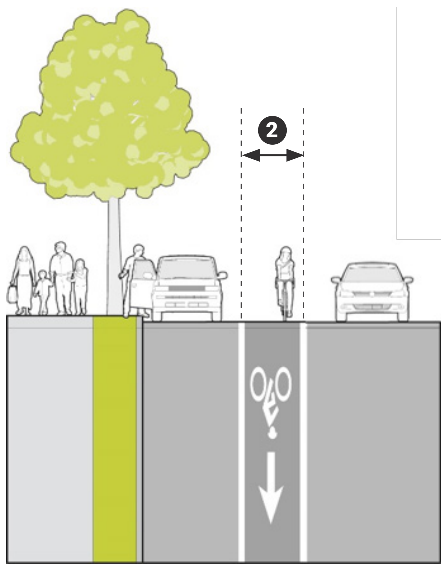
Manual on Uniform Traffic Control Devices (2009)

BIKE LANES

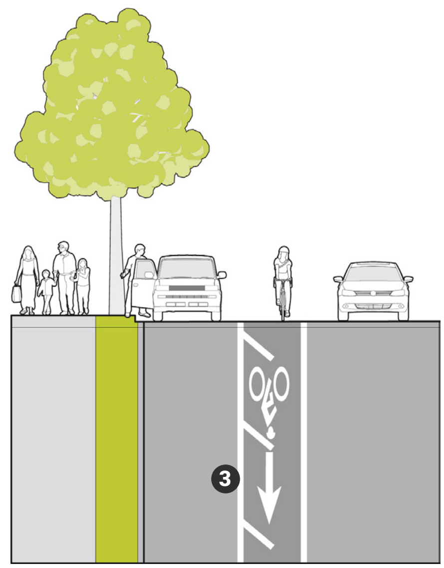
Bicycle lanes provide an exclusive space for bicyclists in the roadway. Bicycle lanes are established through the use of lines and symbols on the roadway surface. Bicycle lanes are for one-way travel and are normally provided in both directions on two-way streets and/or on one side of a one-way street. Bicyclists are not required to remain in a bicycle lane when traveling on a street and may leave the bicycle lane as necessary to make turns, pass other bicyclists, or to properly position themselves for other necessary movements. Bicycle lanes may only be used temporarily by vehicles accessing parking spaces and entering and exiting driveways and alleys. Stopping, standing and parking in bike lanes is prohibited.



Bike Lane Adjacent to Parking



Bike Lane Adjacent to a Curb



Bike Lane with Door Zone Marking

- Typically installed by reallocating existing street space.
- Can be used on one-way or two-way streets.
- Contra-flow bicycle lanes may be used to allow two-way bicycle travel on streets designated for one-way travel for motorists to improve bicycle network connectivity.
- Stopping, standing and parking in bike lanes may be problematic in areas of high parking demand and deliveries, especially in commercial areas.
- Wider bike lanes or buffered bike lanes are preferable at locations with high parking turnover.

1. The minimum width of a bike lane adjacent to a curb is 5 feet exclusive of a gutter, a desirable width is 6 feet.
2. The minimum width of a bike lane adjacent to parking is 5 feet, a desirable width is 6 feet.
3. Parking T's or hatch marks can highlight the door zone on constrained corridors with high parking turnover to guide bicyclists away from doors.

REFERENCES

AASHTO. Guide for the Development of Bicycle Facilities. 2012.

NACTO. Urban Bikeway Design Guide. 2nd Edition.

LEFT SIDE BIKE LANE

In some locations, bicycle lanes placed on the left-side of the roadway can result in fewer conflicts between bicyclists and motor vehicles, particularly on streets with heavy right-turn volumes or frequent bus service and stops where buses operate in the right-side curb lane. Other occasions may be where parking is provided only on the right side of the street or where loading predominantly occurs on the right. Left-side bike lanes can increase visibility between motorists and bicyclists at intersections due to the location of the rider on the left-side of the vehicle. However, left-side bike lanes are often an unfamiliar orientation for both bicyclists and drivers and may be less intuitive.

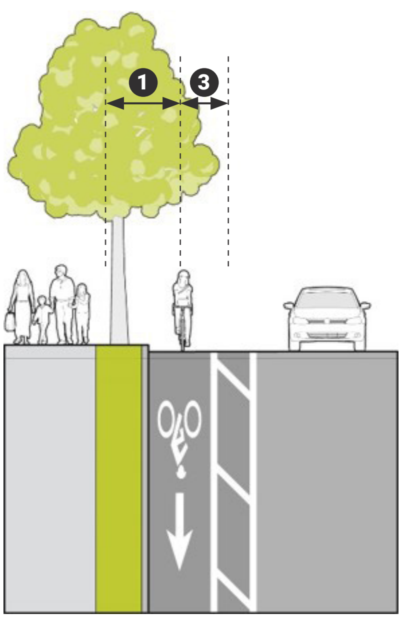
+ On one-way streets with parking on both sides, bicyclists will typically encounter fewer conflicts with car doors opening on the passenger side.
+ Colored pavement should be considered in curbside locations to increase awareness of the restriction against parking or stopping in the bicycle lane.
+ Left-side placement may not be appropriate in locations where the street switches from one-way to two-way operation.
+ Left-side bicycle lanes may not be appropriate near the center or left-side of free flow ramps or along medians with streetcar operations, unless appropriate physical separation and signal protection can be provided.
+ Consider dominant bicycle routes. Where a large proportion of bicyclists make right hand turns, conventional bike lanes may be preferable.
+ Left-side bicycle lanes generally may only be used on one-way streets or on median divided streets.
+ Left-side bicycle lanes have the same design requirements as right-side bicycle lanes.

REFERENCES

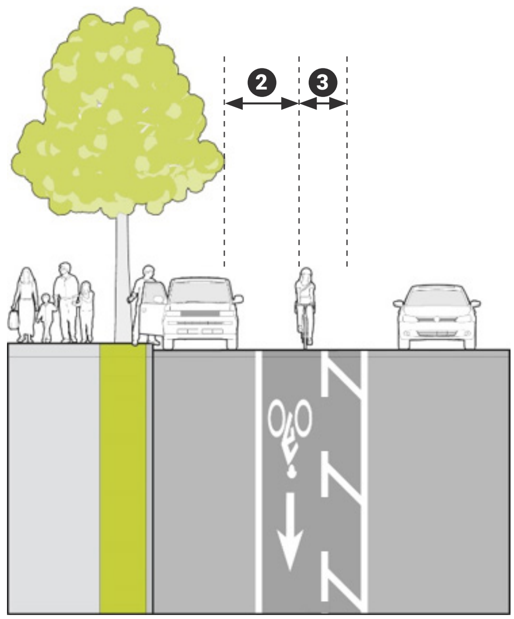
AASHTO. Guide for the Development of Bicycle Facilities. 2012..

BUFFERED BIKE LANES

Buffered bicycle lanes are created by painting or otherwise creating a flush buffer zone between a bicycle lane and the adjacent travel lane. While buffers are typically used between bicycle lanes and motor vehicle travel lanes to increase bicyclists' comfort, they can also be provided between bicycle lanes and parking lanes in locations with high parking turnover to discourage bicyclists from riding too close to parked vehicles.



Buffered Bike Lane Adjacent to a Curb



Buffered Bike Lane Adjacent to Parking

- Preferable to a conventional bicycle lanes when used as a contra-flow bike lane on one-way streets.
- Typically installed by reallocating existing street space.
- Can be used on one-way or two-way streets.
- Consider placing buffer next to parking lane where there is commercial or metered parking.
- Consider placing buffer next to travel lane where speeds are 30 mph or greater or when traffic volume exceeds 6,000 vehicles per day.
- Where there is 7 feet of roadway width available for a bicycle lane, a buffered bike lane should be installed instead of a conventional bike lane
- Buffered bike lanes allow bicyclists to ride side by side or to pass slower moving bicyclists.
- Research has documented buffered bicycle lanes increase the perception of safety.

1. The minimum width of a buffered bike lane adjacent to parking is 4 feet, a desirable width is 6 feet.
2. Buffers are to be broken where curbside parking is present to allow cars to cross the bike lane.
3. The minimum buffer width is 18 inches. There is no maximum. Diagonal cross hatching should be used for buffers <3 feet in width. Chevron cross hatching should be used for buffers >3 feet in width.

REFERENCES

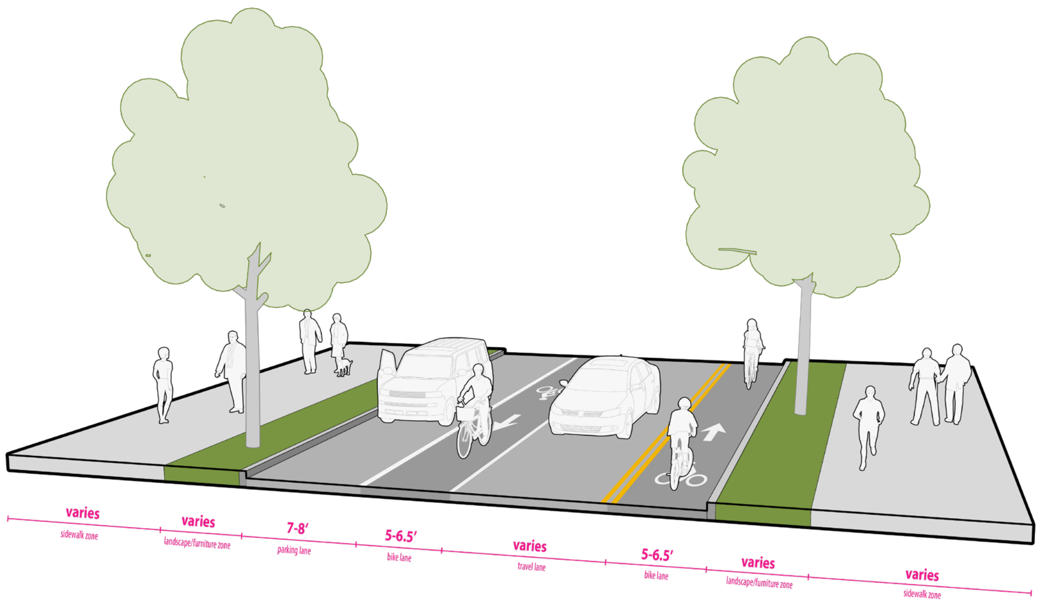
AASHTO. Guide for the Development of Bicycle Facilities. 2012.

NACTO. *Urban Bikeway Design Guide.* 2nd Edition.

Portland State University, Center for Transportation Studies. *Evaluation of Innovative Bicycle Facilities: SW Broadway Cycle Track & SW Stark/Oak Street Buffered Bike Lanes FINAL REPORT.* 2011.

CONTRA-FLOW BIKE LANE

One-way streets and irregular street grids can make bicycling to specific destrinatinos within short distances difficult. Contra-flow bicycle lanes can help to solve this problem by enabling only bicyclists to operate in two directions on one-way streets. Contra-flow lanes are useful to reduce distances bicyclists must travel and can make bicycling safer by creating facilities that help other roadway users understand where to expect bicyclists.



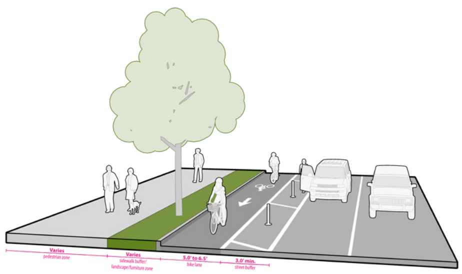
- Contra-flow lanes follow the same design parameters as conventional bicycle lanes: however, the left side marking is a double yellow line. The line should be dashed if parking is provided on both sides of the street. Contra-flow lanes may also be separated by a buffer or vertical separation such as a curb.
- Contra-flow lanes must be placed to the motorist's left.
- A bicycle lane or other marked bicycle facility should be provided for bicyclists traveling in the same direction as motor vehicle traffic on the street to discourage wrong way riding in the contra-flow lane.
- Parking is discouraged against the contra-flow lane as drivers' view of oncoming bicyclists would be blocked by other vehicles. If parking is provided, a buffer is recommended to increase the visibility of bicyclists. On-street parking should be restricted at corners.
- Contra-flow lanes are less desirable on-streets with frequent and/or high-volume driveways or alley entrances on the side with the proposed contraflow lane. Drivers may neglect to look for opposing direction bicyclists on a one-way street.
- Contra-flow bicycle lanes are used on one-way streets that provide more convenient or direct connections for bicyclists where other alternative routes are less desirable or inconvenient.
- Contra-flow lanes should be used where there is a clear and observed need for the connection as evidenced by a number of "wrong way riding" bicyclists or bicyclists riding on sidewalks in the opposing direction.
- Contra-flow lanes are often short, connecting segments. They are not typically used along extended corridors.
- Contra-flow lanes may only be established where there is adequate roadway width for an exclusive lane.
- Care should be taken in the design of contra-flow lane termini. Bicyclists should be directed to the proper location on the receiving roadway.

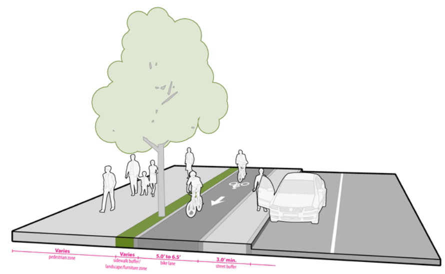
REFERENCES

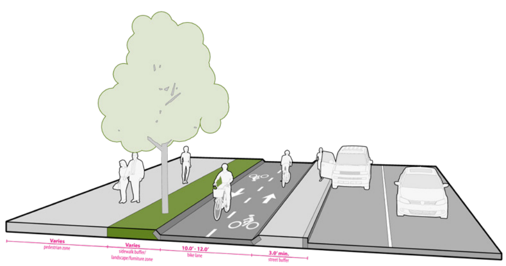
AASHTO. Guide for the Development of Bicycle Facilities. 2012..

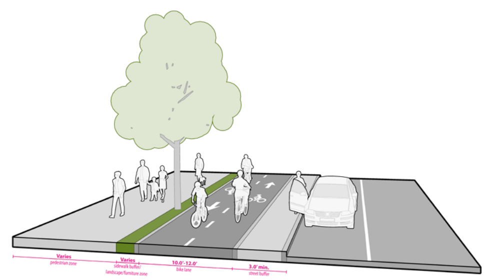
SEPARATED BIKE LANES

Separated Bike Lanes are an exclusive bikeway facility type that combines the user experience of a sidepath with the on-street infrastructure of a conventional bike lane. They are physically separated from motor vehicle traffic and distinct from the sidewalk.









Separated bike lanes are more attractive to a wider range of bicyclists than striped bikeways on higher volume and higher speed roads. They eliminate the risk of a bicyclist being hit by an opening car door and prevent motor vehicles from driving, stopping or waiting in the bikeway. They also provide greater comfort to pedestrians by separating them from bicyclists operating at higher speeds.

Separated bike lanes can provide different levels of separation:

+ Separated bike lanes with flexible delineator posts ("flex posts") alone offer the least separation from traffic and are appropriate as interim solution.
+ Separated bike lanes that are raised with a wider buffer from traffic provide the greatest level of separation from traffic, but will often require road reconstruction.
+ Separated bike lanes that are protected from traffic by a row of on-street parking offer a high-degree of separation.

Separated bike lanes can generally be considered on any road with one or more of the following characteristics:

+ Traffic lanes: 3 lanes or more.
+ Posted speed limit: 30 mph or more.
+ Traffic: 9,000 vehicles per day or more.
+ On-Street parking turnover: frequent.
+ Bike lane obstruction: likely to be frequent.
+ Streets that are designated as truck or bus routes.

Separated bike lanes are preferred over sidepaths in higher density areas, commercial and mixed-use development, and near major transit stations or locations where pedestrian volumes are anticipated to exceed 200 people per hour on a shared use path.

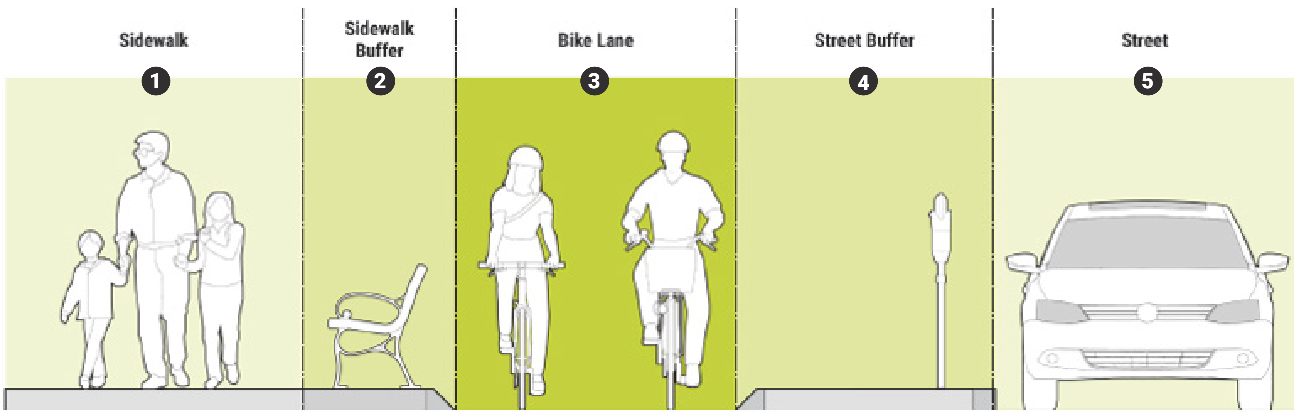
REFERENCES

NACTO. Urban Bikeway Design Guide. 2nd Edition.

MassDOT. Separated Bike Lane Planning and Design Guide. 2015

SEPARATED BIKE LANE ZONES

The cross section of a separated bike lane is composed of three separate zones:
Bike lane: the bicyclist operating space between the street buffer and the sidewalk buffer.
Street buffer: the street buffer separates the bike lane from motor vehicle traffic.
Sidewalk buffer: the sidewalk buffer separates the bike lane from the sidewalk.



The width of the bike lane zone is impacted by the elevation of the bike lane and the volume of users. Separated bike lanes generally attract a wider spectrum of bicyclists, some of whom operate at slower speeds, such as children or seniors. Because of the elements used to separate the bike lane from the adjacent motor vehicle lane, bicyclists usually do not have the option to pass each other by moving out of the separated bike lane. The bike lane zone should therefore be sufficiently wide to enable passing maneuvers between bicyclists.

The goal of the street buffer is to maximize the safety and comfort of people bicycling and driving by physically separating these roadway users with a vertical object or a raised median. The width of the street buffer also influences intersection operations and bicyclists safety, particularly at locations where motorists may turn across the bike lane. The street buffer can consist of parked cars, vertical objects, raised medians, landscape medians, and a variety of other elements.

The sidewalk buffer zone separates the bike lane from the sidewalk, communicating each as distinct spaces. By separating people walking and bicycling, encroachment into these spaces is minimized and the safety and comfort is enhanced for both users.

1. The sidewalk width should be determined by the anticipated peak hour pedestrian volume.
2. The sidewalk buffer is desirable, but not required.
3. The bike lane is required and may be at street level, intermediate level, or sidewalk level. (See pages x-x).
    - Bike lane width should be determined by the anticipated peak hour bicycle volume. (See pages x-x).
    - A minimum shy distance of 1 foot should be provided between any vertical objects in the sidewalk or street buffer to the bike lane.
4. The street buffer is required and should be separated from the street by vertical objects or a median.
5. Travel lanes and parking should be narrowed to the minimum widths in constrained corridors.

REFERENCES

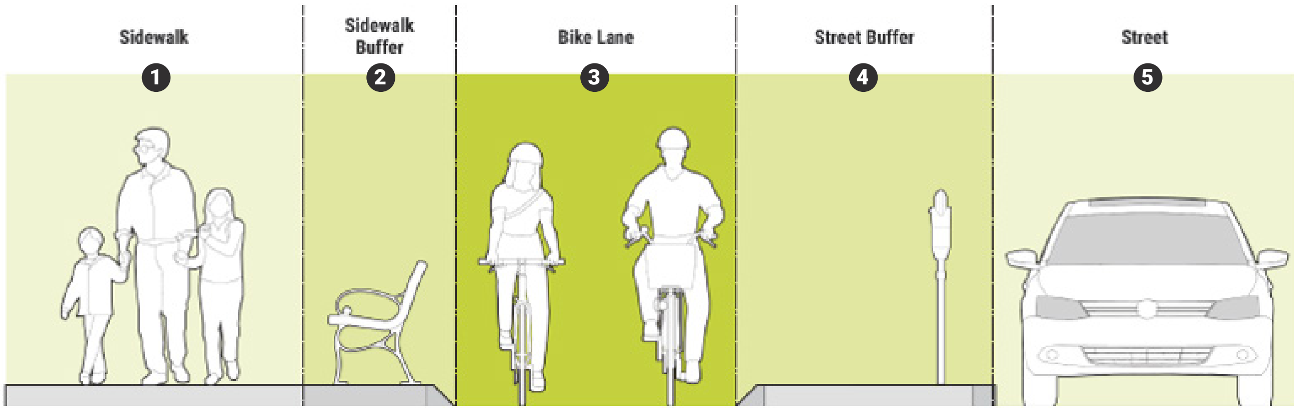
AASHTO. Guide for the Development of Bicycle Facilities. 2012..

NACTO. Urban Bikeway Design Guide. 2nd Edition.

MassDOT. Separated Bike Lane Planning and Design Guide. 2015

DETERMINING ZONE WIDTHS IN CONSTRAINED CORRIDORS

When designing separated bike lanes in constrained corridors, designers may need to minimize some portions of the cross section, including separated bike lane zones, to achieve a context-sensitive design that safely and comfortably accommodates all users.



CONSIDERATIONS

- The allocation of space can vary from midblock locations to intersection approaches. It may be beneficial to narrow midblock street buffers to provide sidewalk buffers or a wider bike lane. At approaches to intersections the mid-block sidewalk buffer can be eliminated to provide a wider street buffer to improve intersection safety.
- The street buffer is critical to the safety of separated bike lanes. Narrowing or eliminating it should be avoided wherever possible, especially at intersections. Providing a larger street buffer at intersections can be achieved by tapering the bike lane toward the sidewalk as it approaches the intersection, or by narrowing or eliminating the sidewalk buffer.
- In constrained locations where physical separation is desirable because of higher pedestrian demand, such as commercial areas, raised separation between the sidewalk buffer and bike lane is preferable to ensure pedestrians do not walk in the bike lane, and bicyclists do not ride on the sidewalk. Where it is not feasible to provide raised separation, it will be necessary to distinguish the bike lane from the sidewalk through the use of stained surfaces or applied surface colorization materials that provide a high degree of visual contrast between the two.

GUIDANCE

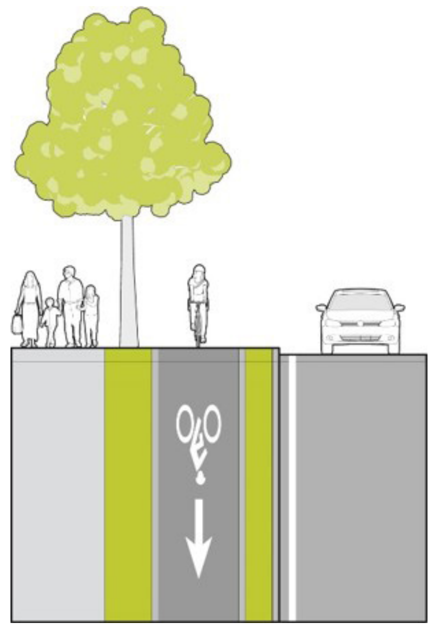
Zone spatial tradeoff prioritization (1 is lowest-priority use, 5 is highest-priority use):

1. Designers should prioritize reduction of the space allocated to the street before narrowing other spaces. This reduction can include decreasing the number of travel lanes, narrowing existing lanes or adjusting on-street parking.
2. The sidewalk should not be narrowed beyond the minimum necessary to accommodate pedestrian demand.
3. The sidewalk buffer may be eliminated at locations with low pedestrian volume. At locations with increased pedestrian volume, it is desirable to provide vertical separation and/or clear delineation between the bicycle lane and the sidewalk.
4. The street buffer is critical to the safety of separated bike lanes; narrowing or eliminating it should be avoided wherever possible. The buffer should not be reduced below 2 feet at midblock locations and should be between 6 feet and 20 feet at intersections to provide maximum safety benefits. Where the buffer is reduced below 6 feet, a raised bicycle crossing or signal phase separation should be considered.

+ 5. The bike lane width should not be reduced below 6.5 feet for one-way bike lanes and 8 feet for two-way bikeways, to ensure bicyclists can safely pass other bicyclists.

SEPARATED BIKE LANE - ONE-WAY SIDEWALK LEVEL

This treatment provides an exclusive, uni-directional operating space for bicyclists between the street and sidewalk that is at the same elevation as the sidewalk. It is physically separated from motor vehicles and pedestrians by vertical and horizontal elements.



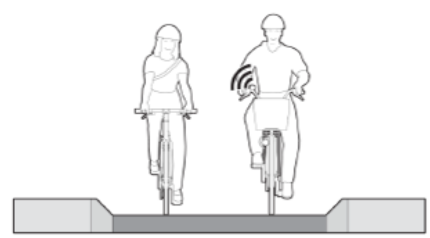
Sidewalk-level bike lanes:

+ May encourage pedestrian and bicyclist encroachment unless a continuous sidewalk buffer is provided.
+ Allow separation from motor vehicles in locations with limited right-of-way.
+ Maximize usable bike lane width.
+ Require no transition for raised bicycle crossings at driveways, alleys or cross streets.
+ May provide level landing areas for parking, loading or bus stops along the street buffer.
+ May reduce maintenance needs by prohibiting debris build up from roadway runoff.
+ May simplify plowing operations.
+ Allow bicyclists to use a portion of the sidewalk or street buffer to pass other bicyclists in constrained corridors where sidewalk buffers are eliminated.

One-way separated bike lanes in the direction of motorized travel provide intuitive and simplified transitions to existing bike lanes and shared travel lanes.

GUIDANCE

+ The recommended minimum width of the bicycle lane is:



Same Direction Bicyclists/ Peak Hour	Bike Lane Width (ft.)	
	Rec.	Min.*
<150	6.5	5.0
150-750	8.0	6.5
>750	10.0	8.0

+ A constrained bicycle lane width of 4 feet may be used for short distances to navigate around transit stops or accessible parking spaces.

REFERENCES

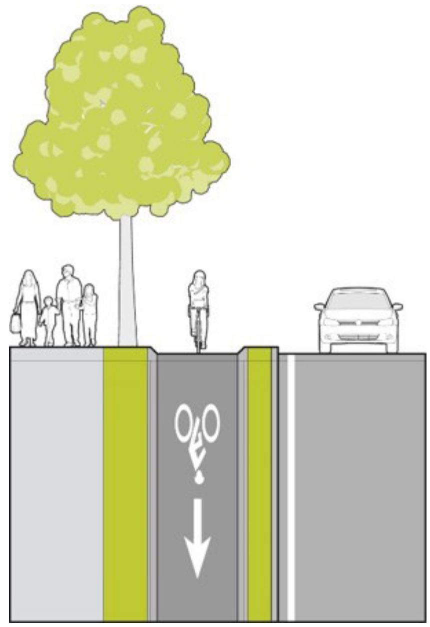
NACTO. *Urban Bikeway Design Guide. 2nd Edition.*

MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

SEPARATED BIKE LANE - ONE-WAY STREET LEVEL

This treatment provides an exclusive, uni-directional operating space for bicyclists between the street and sidewalk that is located at the same elevation as the street. It is physically separated from motor vehicles and pedestrians by vertical and horizontal elements.



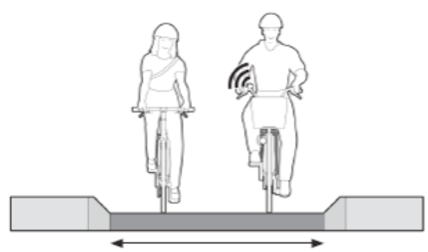
Street-level bike lanes:

+ Preserve separation between bicyclists and pedestrians where sidewalk buffers are eliminated.
+ Ensures a detectable edge is provided for people with vision disabilities.
+ May increase maintenance needs to remove debris from roadway runoff unless street buffer is raised.
+ May complicate snow plowing operations.
+ May require careful consideration of drainage design and in some cases may require catch basins to manage bike lane runoff.

One-way separated bike lanes in the direction of motorized travel are provide intuitive and simplified transitions to existing bike lanes and shared travel lanes.

GUIDANCE

+ The recommended minimum width of the bicycle lane is:



Same Direction Bicyclists/ Peak Hour	Bike Lane Width (ft.)	
	Rec.	Min.*
<150	6.5	5.0
150-750	8.0	6.5
>750	10.0	8.0

+ A constrained bicycle lane width of 4 feet may be used for short distances to navigate around transit stops or accessible parking spaces.

REFERENCES

NACTO. Urban Bikeway Design Guide. 2nd Edition.

MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

SEPARATED BIKE LANE - TWO-WAY SIDEWALK LEVEL

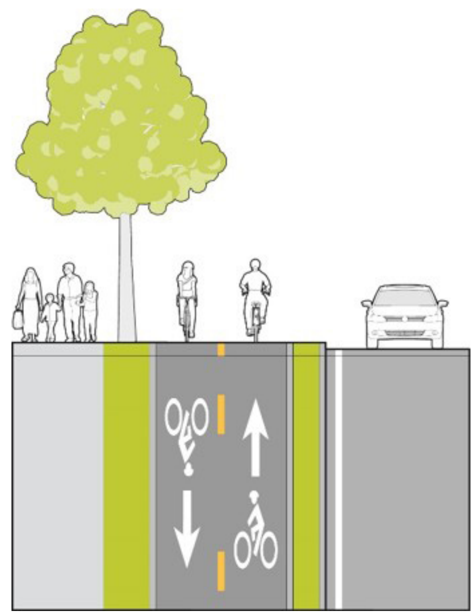
This treatment provides an exclusive, bi-directional operating space for bicyclists between the street and sidewalk that is at the same elevation as the sidewalk. It is physically separated from motor vehicles and pedestrians by vertical and horizontal elements.

Sidewalk-level bike lanes:

+ May encourage pedestrian and bicyclist encroachment unless discouraged with a continuous sidewalk buffer.
+ Requires no transition for raised bicycle crossings at driveways, alleys or streets.
+ May provide level landing areas for parking, loading or bus stops along the street buffer.
+ May reduce maintenance needs by prohibiting debris build up from roadway runoff.
+ May simplify snow plowing operations.
+ Allow bicyclists to use a portion of the sidewalk or street buffer to pass other bicyclists in constrained corridors where sidewalk buffers are eliminated.

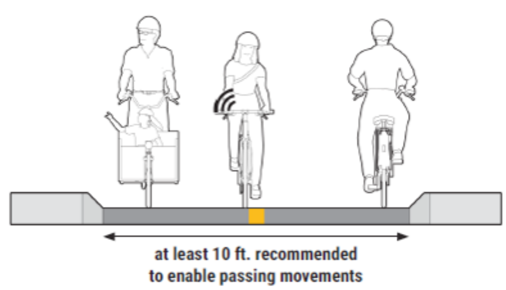
Two-way separated bike lanes will require special attention to transition the contra-flow bicyclist into existing bike lanes and shared travel lanes.

Depending on context, motorists may not expect bicyclists to approach crossings from both directions. For this reason, two-way separated bike lanes may require detailed treatments at alley, driveway, and cross street crossings to enhance the safety of these crossings



GUIDANCE

+ The recommended minimum width of the bicycle lane is:



Bidirectional Bicyclists/ Peak Hour	Bike Lane Width (ft.)	
	Rec.	Min.*
<150	10.0	8.0
150-400	11.0	10.0
>400	14.0	11.0

REFERENCES

NACTO. Urban Bikeway Design Guide. 2nd Edition.

MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

SEPARATED BIKE LANE - TWO-WAY STREET LEVEL

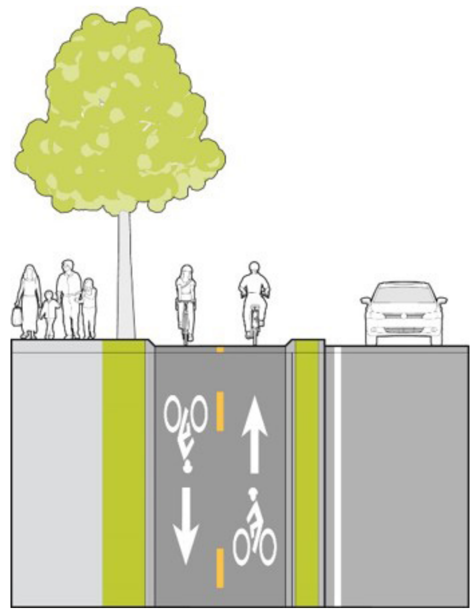
This treatment provides an exclusive, bi-directional operating space for bicyclists between the street and sidewalk that is located at the same elevation as the street. It is physically separated from motor vehicles and pedestrians by vertical and horizontal elements.

Street-level bike lanes:

+ Preserve separation between bicyclists and pedestrians where sidewalk buffers are eliminated.
+ Ensures a detectable edge is provided for people with vision disabilities.
+ May increase maintenance needs to remove debris from roadway runoff unless street buffer is raised.
+ May complicate snow plowing operations.
+ May require careful consideration of drainage design and in some cases may require catch basins to manage bike lane runoff.

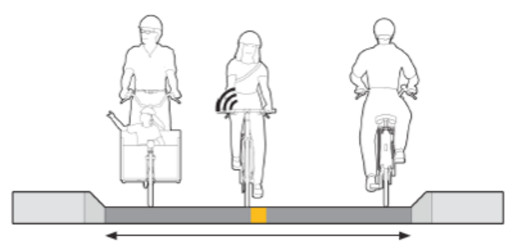
Two-way separated bike lanes will require special attention to transition the contra-flow bicyclist into existing bike lanes and shared travel lanes.

Depending on context, motorists may not expect bicyclists to approach crossings from both directions. For this reason, two-way separated bike lanes may require detailed treatments at alley, driveway, and cross street crossings to enhance the safety of these crossings.



GUIDANCE

+ The recommended minimum width of the bicycle lane is:



Bidirectional Bicyclists/ Peak Hour	Bike Lane Width (ft.)	
	Rec.	Min.*
<150	10.0	8.0
150-400	11.0	10.0
>400	14.0	11.0

REFERENCES

NACTO. Urban Bikeway Design Guide. 2nd Edition.

MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

BICYCLE BOULEVARD TREATMENTS

Bicycle boulevard treatments are applied on quiet streets, often through residential neighborhoods. These treatments are designed to prioritize bicycle through-travel, while discouraging motor vehicle traffic and maintaining relatively low motor vehicle speeds. Treatments vary depending on context, but often include elements of traffic calming, including traffic diverters, speed attenuators such as speed humps or chicanes, pavement markings, and signs. Bicycle boulevards are also known as neighborhood greenways, and neighborhood bikeways, among other locally-preferred terms.

Many cities already have signed bike routes along neighborhood streets that provide an alternative to traveling on high-volume, high-speed arterials. Applying bicycle boulevard treatments to these routes makes them more suitable for bicyclists of all abilities and can reduce crashes as well.

Stop signs or traffic signals should be placed along the bicycle boulevard in a way that prioritizes the bicycle movement, minimizing stops for bicyclists whenever possible.

Bicycle boulevard treatments include traffic calming measures such as street trees, traffic circles, chicanes, and speed humps. Traffic management devices such as diverters or semi-diverters can redirect cut-through vehicle traffic and reduce traffic volume while still enabling local access to the street.

Communities should begin by implementing bicycle boulevard treatments on one pilot corridor to measure the impacts and gain community support. The pilot program should include before-and-after crash studies, motor vehicle counts, and bicyclist counts on both the bicycle boulevard and parallel streets. Findings from the pilot program can be used to justify bicycle boulevard treatments on other neighborhood streets.

Additional treatments for major street crossings may be needed, such as median refuge islands, rapid flash beacons, bicycle signals, and HAWK or half signals.

+ Maximum Average Daily Traffic (ADT): 3,000
+ Preferred ADT: up to 1,000
+ Target speeds for motor vehicle traffic are typically around 20 mph; there should be a maximum < 15 mph speed differential between bicyclists and vehicles.

REFERENCES

AASHTO Guide for the Development of Bicycle Facilities (2012)

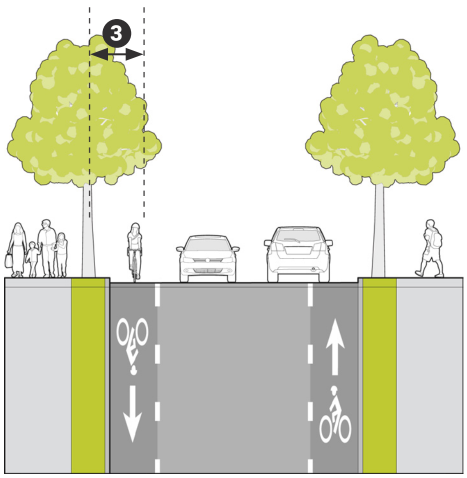
NACTO Urban Bikeway Design Guide (2012)

Manual on Uniform Traffic Control Devices (2009)

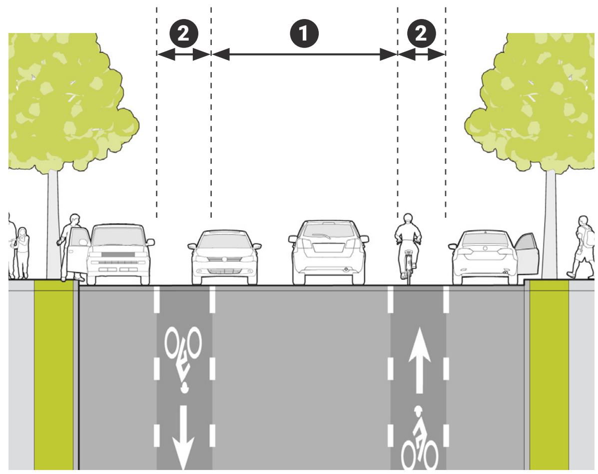
Fundamentals of Bicycle Boulevard Planning & Design (2009)

ADVISORY BIKE LANES

Advisory bicycle lanes (ABLs) are used to create narrow streets where bicyclists are provided priority movement and motorists are compelled to yield to bicyclists as well as drivers approaching in the opposing direction. ABLs use dotted lane lines, allowing motorists to enter them to yield, and are designed using dimensions based on conventional bicycle lanes. ABLs are reserved for use on low-volume, low-speed streets.



Advisory Bike Lane without Parking



Advisory Bike Lane with Parking

CONSIDERATIONS

- **Treatment requires FHWA permission to experiment**
- For use on streets too narrow for bike lanes and normal-width travel lanes.
- Provide two separate minimum-width bicycle lanes, on either side of a single shared (unlaned) two-way "yielding" motorist travel space.
- Motorists must yield to on-coming motor vehicles by pulling into the bicycle lane.
- To reduce motorist speeds, and to encourage yielding, the unmarked space between the two advisory bike lanes should be no wider than 18 feet.
- This treatment should only be used on streets with >60% continuous daytime parking occupancy.
- Where parking occupancy is continuously <50%, it is preferable to consolidate it to one side of the street or remove it.
- A Two-Way Traffic warning sign (W6-3) may increase motorists understanding of the intended two-way operation of the street.

GUIDANCE

1. The minimum width of the unlaned motorist space should be 12 feet between the bicycle lanes. The maximum width should be no more than 18 feet.
2. The minimum width of an advisory bike lane adjacent to parking is 5 feet; a desirable width is 6 feet.
3. The minimum width of an advisory bike lane adjacent to a curb is 4 feet exclusive of a gutter; a desirable width is 6 feet.

Advisory bikeways can generally be considered on any road with one or more of the following characteristics:

- Traffic lanes: 2 lanes or less.
- Posted speed limit: 25 mph or less.
- Traffic: 6,000 vehicles per day or less or 300 vehicles or less during the peak hour
- On-Street parking turnover: infrequent.
- Street is not a designated truck or bus route.

REFERENCES

AASHTO. Guide for the Development of Bicycle Facilities. 2012..

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/mutcd/dashed_bike_lanes.cfm

PAVED SHOULDERS

Paved shoulders provide a range of benefits: they reduce motor vehicle crashes, reduce long-term roadway maintenance, ease short-term maintenance such as snow plowing, and provide space for bicyclists and pedestrians (although paved shoulders typically do not meet accessibility requirements for pedestrians). Paved shoulders are typically reserved for rural road cross-sections.

Where 4-foot or wider paved shoulders exist already, it is acceptable or even desirable to mark them as bike lanes in various circumstances, such as to provide continuity between other bikeways. If paved shoulders are marked as bike lanes, they need to also be designed as bike lanes at intersections. Where a roadway does not have paved shoulders already, paved shoulders can be retrofitted to the existing shoulder when the road is resurfaced or reconstructed. In some instances, adequate shoulder width can be provided by narrowing travel lanes to 11 feet.

Reducing travel lane width on existing roads—also known as a "lane diet"—is one way to increase paved shoulder width.

There are several situations in which additional shoulder width should be provided, including motor vehicle speeds exceeding 50 mph, moderate to heavy volumes of traffic, and above-average bicycle or pedestrian use.

The placement of rumble strips may significantly degrade the functionality of paved shoulders for bicyclists. Rumble strips should be placed as close to the edge line as practicable and four feet of usable space should be provided for bicyclists. Where rumble strips are present, gaps of at least 12' should be provided every 40-60'.

GUIDANCE

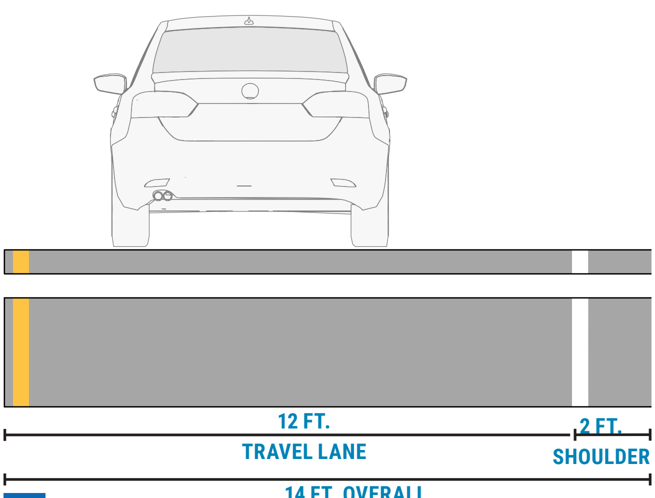
Sufficiently wide shoulders can greatly improve bicyclist safety and comfort, particularly on higher-speed, higher-volume roadways. Shoulders are most often found on rural roadways and less often on urban roadways.

To accommodate bicyclists, provide a minimum 4-foot paved shoulder width, continuous along the length of the roadway and through intersections.

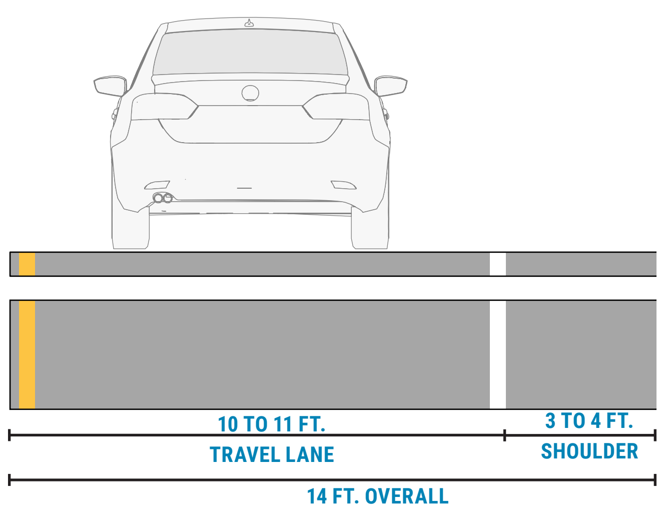
Use at least 5 feet where guardrails, curbs, or other roadside barriers are present.

Designers should consider wider shoulders if vehicle speeds are greater than 50 mph (AASHTO Bike Guide). Designers may use the Bicycle Level of Service model, which includes factors for vehicle speeds, traffic volumes, and lane widths to determine the appropriate shoulder width (AASHTO Bike Guide).

EXISTING CONFIGURATION



BICYCLE-FRIENDLY CONFIGURATION



Graphic: FHWA Multimodal Networks

REFERENCES

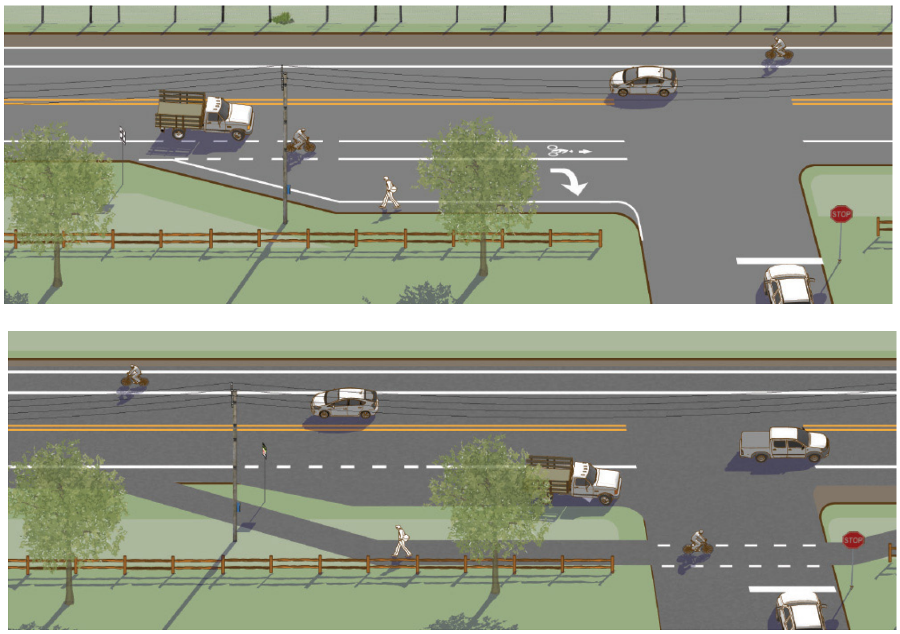
FHWA Achieving Multimodal Networks

AASHTO Guide for the Development of Bicycle Facilities (2012)

AASHTO Policy on Geometric Design of Highways and Streets (2013)

PAVED SHOULDERS AT INTERSECTIONS

Shoulders are often narrowed or removed entirely through intersections, so it is important to carefully design rural intersections to allow for safe bicycle travel.



Transitions from paved shoulder to bike lanes or separated bike lane/shared use path (FHWA Rural Design Guide).

At auxiliary bypass lanes, it is important to consider the needs of bicyclists and continue the shoulder area outside the bypass lane (See 2012 AASHTO Bike Guide).

There are several options to reconfigure paved shoulders through intersections (as the curb lane often accommodates a right-turn lane):

+ On-street bike lanes
+ Separated bike lanes or shared use paths

At auxiliary bypass lanes or center turn lanes, preserve 6 ft of the shoulder for bicyclist travel, a minimum shoulder witdth of 4 feet.

As rural roadways accommodate right-turn lanes, reconfigure the paved shoulder as a bike lane or separated bike lane/path:

+ For a bike lane, add a right turn lane to the right of the bike lane. Use dotted line extensions to define the tapered entrance into the right-turn lane. For more information, refer to the guidance on bike lanes and FHWA MUTCD Figure 9C-4.
+ For a one-way separated bike lane or shared use path, transition the paved shoulder in advance of the intersection and continue through the intersection (see figure above and guidance on separated bike lanes).

REFERENCES

FHWA Rural Design Guide (2016)

AASHTO Guide for the Development of Bicycle Facilities (2012)

MUTCD (2009)

RUMBLE STRIP DESIGN

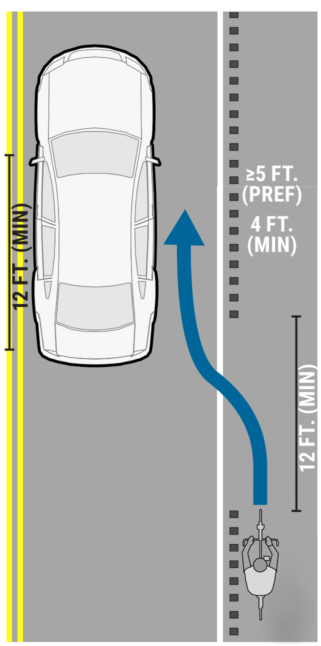
Rumble strips are an important safety feature on rural roadways due to their effectiveness in reducing run-off-road crashes. However, it is important to design rumble strips carefully to ensure the safety and comfort of bicyclists.

Rumble strips are a Proven Safety Countermeasure. Designers have flexibility on the placement and configuration of roadway rumble strips. Therefore, it is important that rumble strips are designed with bicyclist safety in mind. The AASHTO Bike Guide recommends providing a 4-foot clear space from the rumble strip to the outside edge of a paved shoulder, or 5 feet to an adjacent curb, guardrail, or other obstacle. A reduced rumble strip length (measured perpendicular to the roadway) or edge line rumble strips, sometimes referred to as a rumble stripes , can be considered to provide additional shoulder width for bicyclists. The AASHTO Bike Guide recommends providing 12-foot minimum gaps in rumble strips spaced every 40–60 feet to allow bicyclists to enter or exit the shoulder as needed (2012, p. 4-9). Designers should consider longer gaps in locations where bicyclists are traveling at relatively high speeds.

Designers may also consider bicycle-tolerable rumble strips. Even though the strips can be made more tolerable, they are not considered to be rideable by bicyclists. Additional information on rumble strip design can be found in the AASHTO Bike Guide 2012 and the FHWA Rumble Strips and Rumble Stripes Website (http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/).

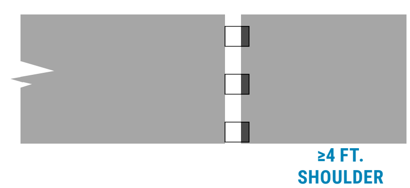
In constrained locations with a paved shoulder width less than 4 feet, designers should consider placing rumble strips at the far right edge of the pavement to give bicyclists additional space near the edge of the lane. Results from NCHRP Report 641: Guidance for the Design and Application of Shoulder and Centerline Rumble Strips 2009 indicate that there may not be a practical difference in the effectiveness of rumble strips placed on the edge line or 2 feet or more beyond the edge line on two-lane rural roads.

DESIRABLE (FOR BICYCLISTS) CROSS SECTION



UNDESIRABLE (FOR BICYCLISTS) CROSS SECTION

ADEQUATE CROSS SECTION



CONSTRAINED CROSS SECTION

Graphics: FHWA Multimodal Networks

REFERENCES

FHWA Achieving Multimodal Networks

AASHTO Guide for the Development of Bicycle Facilities (2012)

FHWA Rumble Strips and Rumble Stripes Website

Pedestrian Facility Types

SIDEWALKS

Sidewalks play a critical role in the character, function, enjoyment, and accessibility of neighborhoods, main streets, and other community destinations. Sidewalks are the place typically reserved for pedestrians within the public right-of-way, adjacent to property lines or the building face. In addition to providing vertical and/or horizontal separation between vehicles and pedestrians, the spaces between sidewalks and roadways also accommodate street trees and other plantings, stormwater infrastructure, street lights, and bicycle racks.

Frontage Zone:

the Frontage Zone is the area of sidewalk that immediately abuts buildings along the street. In residential areas, the Frontage Zone may be occupied by front porches, stoops, lawns, or other landscape elements that extend from the front door to the sidewalk edge. The Frontage Zone of commercial properties may include architectural features or projections, outdoor retailing displays, café seating, awnings, signage, and other intrusions into or use of the public right-of-way. Frontage Zones may vary widely in width from just a few feet to several yards.

Pedestrian Zone:

Also known as the "walking zone," the Pedestrian Zone is the portion of the sidewalk space used for active travel. For it to function, it must be kept clear of any obstacles and be wide enough to comfortably accommodate expected pedestrian volumes includeing those using mobility assistance devices, pushing strollers, or pulling carts. To maintain the social quality of the street, the width should accommodate pedestrians passing singly, in pairs, or in small groups as anticipated by density and adjacent land use.

Amenity Zone:

The Amenity Zone, or "landscape zone," lies between the curb and the Pedestrian Zone. This area is occupied by a number of street fixtures such as street lights, street trees, bicycle racks, parking meters, signposts, signal boxes, benches, trash and recycling receptacles, and other amenities. In commercial areas, it is typical for this zone to be hardscape pavement, pavers, or tree grates. In residential, or lower intensity areas, it is commonly a planted strip.

The Amenity Zone can provide an emergency reposi- tory for snow cleared from streets and sidewalks, although snow storage should not impede access to or use of important mobility fixtures such as parking meters, bus stops, and curb ramps. Stormwater Best Management Practices (BMPs) are commonly located in the Amenity Zone.

The Curb:

Although not a zone per se, the curb is a unique and vital element of the street. It is the demarcation line between the pedestrian domain and the vehicular domain. The curb is typically a physical barrier providing vertical separation between the street and sidewalk. The curb coupled with adjacent gutter and stormwater inlets also plays a specific role in the drainage of the sidewalk and roadway and even of the adjacent property at times.

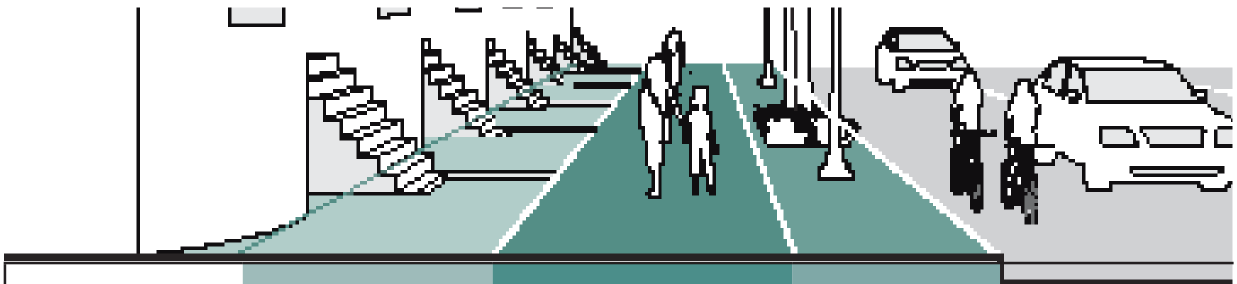
REFERENCES

NACTO Urban Street Design Guide (2013)

Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG; 2011)

PREFERRED WIDTHS FOR SIDEWALK ZONES

The width of the various sidewalk zones will vary given the street type, the available right-of-way, scale of the adjoining buildings and the intensity and type of uses expected along a particular street segment. A balanced approach for determining the sidewalk width should consider the character of the surrounding area and the anticipated pedestrian activities. For example, is the street lined with retail that encourages window shopping or does it connect a residential neighborhood to a commercial area where pedestrians frequently need to pass one another? Does the scale of the buildings and the character of the street indicate a need for a wider sidewalk?



Street Type	Frontage Zone[1] Door swings, Awnings, Café seating, Retail signage and displays, Building projections	Pedestrian Zone[2] Zone should be clear of any and all fixed obstacles. Clear space for pedestrian travel only.	Amenity Zone[3] Street lights and utility poles, Street trees, Bicycle racks, Parking meters, Transit stops, BMPs, Street furniture and signage	Total Width
Commercial Connector	2'-5'	6'-15'	6'-10'	14'-30'
Main Street	2'- 6'	6'-10'	6'-10'	14'-22'
Mixed Use Boulevard	2'- 6'	6'-18'	6'-10'	14'-30'
Neighborhood Connector	2'	6'-8'	6'-7'	14'-17'
Neighborhood Residential	2'	6'	5'-7'	11'-13'
Parkway	N/A	6'-10'	5'-10'	11'-20'
Industrial	2’ or N/A	6’	5’-7’	11’-15’
Shared Streets	2'	N/A	N/A	N/A

NOTES SPECIFIC TO ZONES:

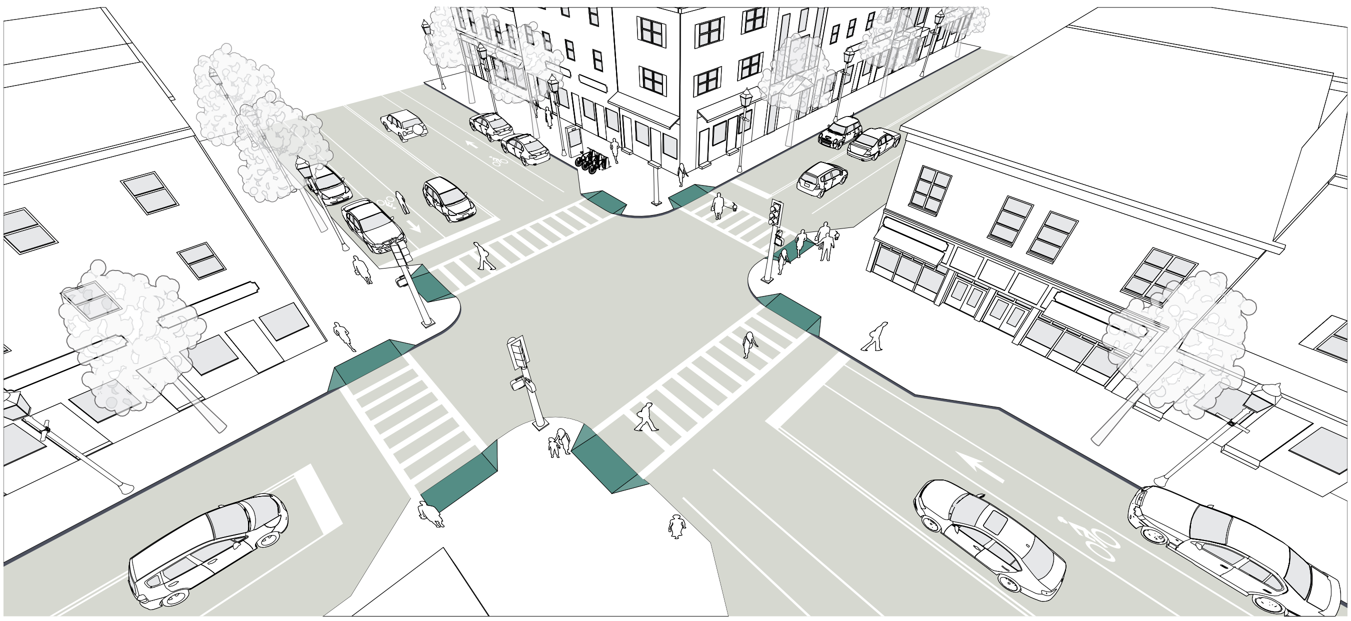
+ Frontage Zones used for sidewalk cafés are a special condition and should generally be no less than 6’ in width.
+ In locations with severely constrained rights-of-way, it is possible to provide a narrower Frontage Zone and Pedestrian Zone. Sidewalk width is based on the context, therefore in retrofit locations where development is not occurring and where existing building are antici- pated to remain, 5’ wide sidewalks may be adequate.
+ Sidewalk BMPs require a minimum of 7’ of width for the Amenity Zone. The final dimensions will be established based on the context of each landscape area. Where BMPs are not provided in the Amenity Zone, this area may be at the lower end of the range.

GENERAL NOTES:

+ Where on-street parking is not present, the wider dimensions should be provided.
+ The provision of tree well or landscape strip within the Amenity Zone will be based on the existing or planned character of the neighborhood.

CURB RAMPS

The transition for pedestrians from the sidewalk to the street is provided by a curb ramp. The designs of curb ramps are critical for all pedestrians, but particularly for people with disabilities. The ADA Standards require all pedestrian crossings be accessible to people with disabilities by providing curb ramps at intersections and midblock crossings as well as other locations where pedestrians can be expected to enter the street. Curb ramps also benefit people pushing strollers, grocery carts, suitcases, or bicycles.



Furnishing zones or terraces (the space between the curb and sidewalk) of 7' of width provide just enough space at intersections for curb ramps to gain sufficient elevation to a sidewalk.

Separate curb ramps should be provided for each crosswalk at an intersection rather than a single ramp at a corner for both crosswalks. The separate curb ramps improve orientation for visually impaired pedestrians by directing them toward the correct crosswalk.

Curb ramps are required to have landings. Landings provide a level area with a cross slope of 2% or less in any direction for wheelchair users to wait, maneuver into or out of a ramp, or bypass the ramp altogether. Landings should be 5' by 5' and shall, at a minimum, be 4' by 4'.

Consider providing wider curb ramps in areas of high pedestrian volumes and crossing activities.

Flares are required when the surface adjacent to the ramp's sides is walkable, however, they are unnecessary when this space is occupied by a landscaped buffer. Excluding flares can also increase the overall capacity of a ramp in high-pedestrian areas.

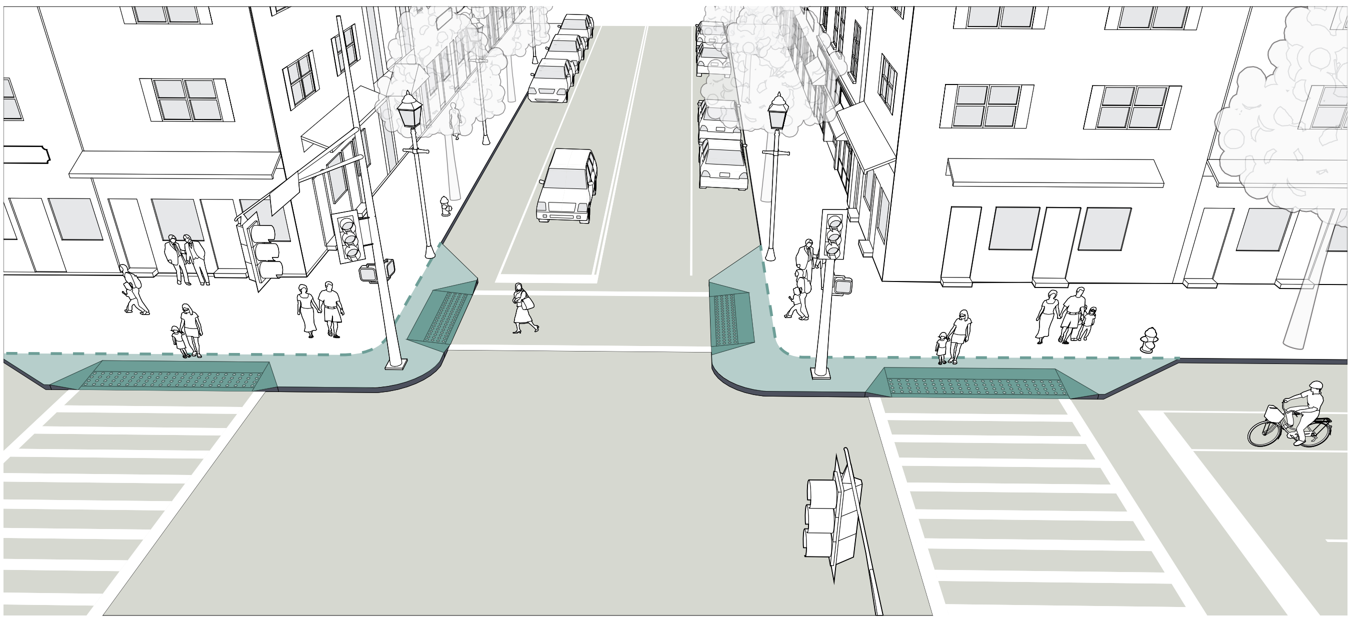
+ Maximum slope: 1:12 (8.33%).
+ Maximum slope of side flares: 1:10 (10%).
+ Maximum cross-slope: 2% (1–2% with tight tolerances recommended).
+ Should direct pedestrians into the crosswalk. The bottom of the ramp should lie within the area of the crosswalk.
+ Truncated domes (the only permitted detectable warning device) must be installed on all new curb ramps to alert pedestrians to the sidewalk and street edge.
+ Type II ramps, which provide one ramp leading to each crosswalk at an intersection, are strongly preferred over Type I ramps that only provide a single ramp for multiple crosswalks.

REFERENCES

Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG; 2011)

CURB EXTENSIONS

Curb extensions, also known as neckdowns, bulb-outs, or bump-outs, are created by extending the sidewalk at corners or mid-block. Curb extensions are intended to increase safety, calm traffic, and provide extra space along sidewalks for users and amenities.



- The turning needs of emergency and larger vehicles should be considered in curb extension design.
- Care should be taken to maintain direct routes across intersections aligning pedestrian desire lines on either side of the sidewalk. Curb extensions often make this possible as they provide extra space for grade transitions.
- Consider providing a 20' long curb extension to restrict parking within 20' of an intersection.
- When curb extensions conflict with turning movements, the reduction of width and/or length should be prioritized over elimination.
- Emergency access is often improved through the use of curb extensions as intersections are kept clear of parked cars.
- Curb extensions should be considered only where parking is present or where motor vehicle traffic deflection is provided through other curbside uses such as bicycle share stations or parklets.
- Curb extensions are particularly valuable in locations with high volumes of pedestrian traffic, near schools, at unsignalized pedestrian crossings, or where there are demonstrated pedestrian safety issues.
- A typical curb extension extends the approximate width of a parked car (or about 6' from the curb).
- The minimum length of a curb extension is the width of the crosswalk, allowing the curvature of the curb extension to start after the crosswalk, which should deter parking; NO STOPPING signs should also be used to discourage parking. The length of a curb extension can vary depending on the intended use (i.e., stormwater management, transit stop waiting areas, restrict parking).
- Curb extensions should not reduce a travel lane or a bicycle lane to an unsafe width.

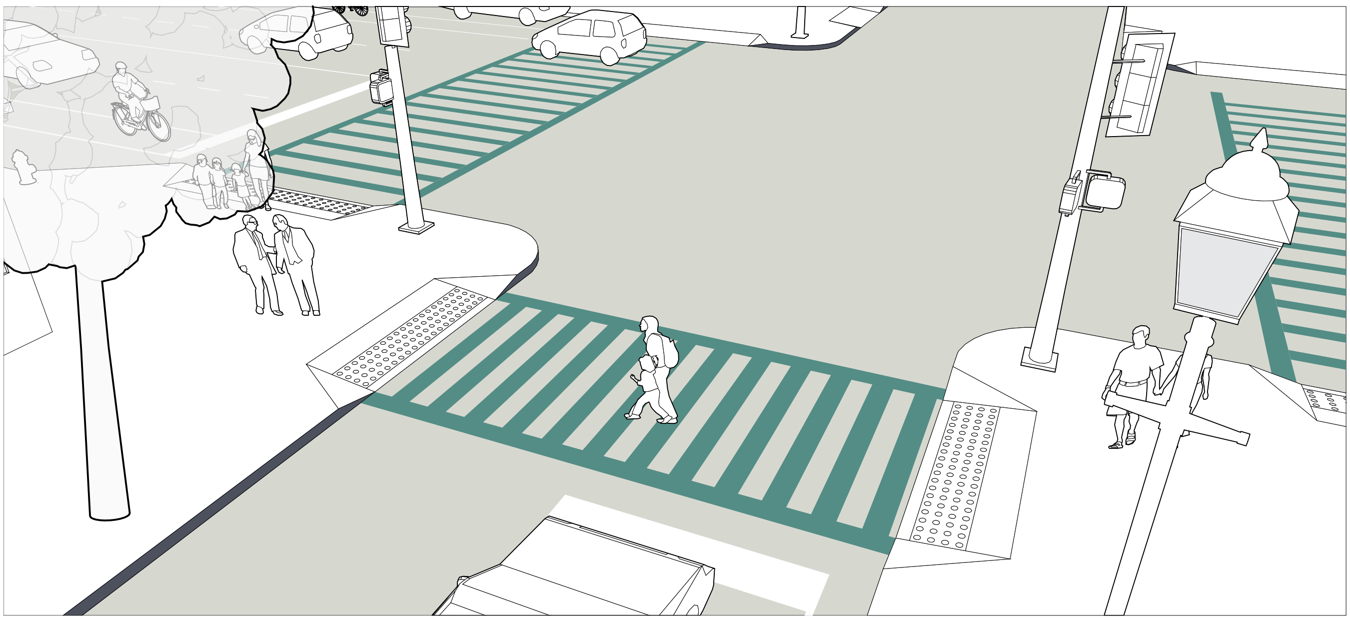
REFERENCES

AASHTO Guide for the Development of Bicycle Facilities (2012)

NACTO Urban Streets Design Guide (2012) - Curb Extensions

MARKED CROSSWALKS

Legal crosswalks exist at all locations where sidewalks meet the roadway, regardless of whether pavement markings are present. Drivers are legally required to yield to pedestrians at intersections, even when there are no pavement markings. Providing marked crosswalks communicates to drivers that pedestrians may be present, and helps guide pedestrians to locations where they should cross the street. In addition to pavement markings, crosswalks may include signals/beacons, warning signs, and raised platforms.



There are many different styles of crosswalk striping and some are more effective than others. Ladder and continental striping patterns are more visible to drivers.

Signal phasing is very important. Pedestrian signal phases must be timed based on the length of the crossing. If pedestrians are forced to wait longer than 40 seconds, non-compliance is more likely.

Raised crossings calm traffic and increase the visibility of pedestrians.

Curb extensions, also known as bulb-outs and bump-outs, reduce the distance pedestrians have to cross and calm traffic.

REFERENCES

NACTO Urban Street Design Guide (2013)

Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines (2005)

Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG; 2011)

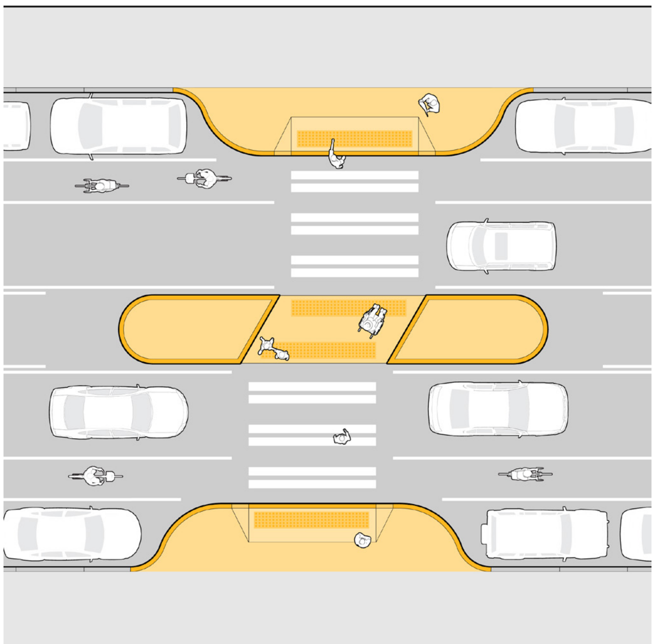
ADA Accessibility Guidelines (2004)

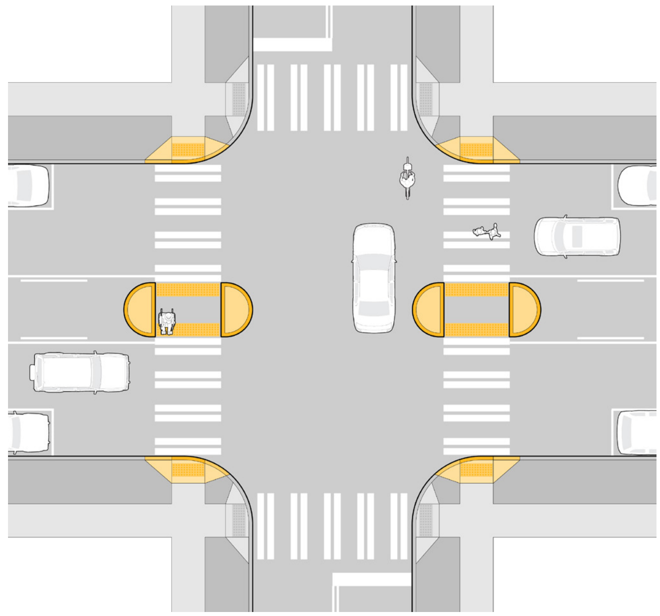
Manual on Uniform Traffic Control Devices (2009)

+ Place on all legs of signalized intersections, in school zones, and across streets with more than minor levels of traffic.
+ Crosswalks should be at least 10 feet wide or the width of the approaching sidewalk if it is greater. In areas of heavy pedestrian volumes, crosswalks can be up to 25 feet wide.
+ Stop lines at stop-controlled and signalized intersections should be striped no less than 4 feet and no more than 30 feet from the approach of crosswalks.
+ Add rapid-flash beacons, signals, crossing islands, curb extensions, and/or other traffic-calming measures when ADT exceeds 12,000 on 4-lane roads or speeds exceed 40 mph on any road.
+ Designs should balance the need to reflect the desired pedestrian walking path with orienting the crosswalk perpendicular to the curb; perpendicular crosswalks minimize crossing distances and therefore limit the time that pedestrians are exposed.

CROSSING/REFUGE ISLAND

Crossing islands are raised islands that provide a pedestrian refuge and allow multi-stage crossings of wide streets. They can be located along the centerline of a street, as roundabout splitter islands, or as “pork chop” islands where right-turn slip lanes are present.





There are two primary types of crossing islands. The first provides a cut-through of the island, keeping pedestrians at street-grade. The second ramps pedestrians up above street grade and may present challenges to constructing accessible curb ramps unless they are more than 17’ wide.

Crossing islands should be considered where crossing distances are greater than 50 feet to allow multi-stage crossings, which in turn allow shorter signal phases.

Cut-through widths should equal the width of the crosswalk. Cut-throughs may be wider in order to allow the clearing of debris and snow, but should not encourage motor vehicles to use the space for U-turns.

Crossing islands can be coupled with other traffic-calming features, such as partial diverters.

At mid-block crossings where width is available, islands should be designed with a stagger, or in a “Z” pattern, encouraging pedestrians to face oncoming traffic before crossing the other side of the street.

+ Minimum width: 6 feet
+ Preferred Width: 8 feet (to accommodate bicyclists and wheelchair users)
+ Curb ramps with truncated dome detectable warnings and 5’ by 5’ landing areas are required.
+ A “nose” that extends past the crosswalk is not required, but is recommended to protect people waiting on the crossing island and to slow turning drivers.
+ Vegetation and other aesthetic treatments may be incorporated, but must not obscure visibility.

REFERENCES

NACTO Urban Street Design Guide (2013)

Manual on Uniform Traffic Control Devices (2009)

SIGNAL TIMING FOR PEDESTRIANS

Signal timing for pedestrians is provided through the use of pedestrian signal heads. Pedestrian signal heads display the three intervals of the pedestrian phase: The Walk Interval, signified by the WALK indication— the walking person symbol—alerts pedestrians to begin crossing the street. The Pedestrian Change Interval, signified by the flashing DON'T WALK indication—the flashing hand symbol accompanied by a countdown display—alerts pedestrians approaching the crosswalk that they should not begin crossing the street. The Don't Walk Interval, signified by a steady DON'T WALK indication—the steady upraised hand symbol–alerts pedestrians that they should not cross the street.

One of primary challenges for traffic signal design is to balance the goals of minimizing conflicts between turning vehicles with the goal of minimizing the time required to wait at the curb for a WALK indication.

Intersection geometry and traffic controls should encourage turning vehicles to yield the right-of-way to pedestrians.

Requiring pedestrians to wait for extended periods can encourage crossing against the signal. The 2010 Highway Capacity Manual states that pedestrians have an increased likelihood of risk-taking behavior (e.g., jay-walking) after waiting longer than 30 seconds at signalized intersections.

Opportunities to provide a WALK indication should be maximized whenever possible. Vehicular movements should be analyzed at every intersection in order to utilize non-conflicting phases to implement Walk Intervals. For example, pedestrians can always cross the approach where vehicles cannot turn at a four-leg intersection with the major road intersecting a one-way street when the major road has the green indication.

Intersection geometry and traffic controls should encourage turning vehicles to yield the right-of-way to pedestrians. Traffic movements should be analyzed at intersections in order to utilize non-conflicting phases to implement one or more WALK intervals per cycle.

Signal design should also minimize the time that pedestrians must wait. Requiring pedestrians to wait for extended periods can encourage crossing against the signal. The 2010 Highway Capacity Manual states that pedestrians have an increased likelihood of risk-taking behavior (crossing against the signal) after waiting longer than 30 seconds.

Free-flowing right-turn lanes are discouraged at signalized intersections. Where they are present and unsignalized, the pedestrian signal and pushbutton should be located on the channelization ("pork chop") island. A yield or crosswalk warning sign should then be placed in advance of the crosswalk.

GUIDANCE

+ Pedestrian signals should allocate enough time for pedestrians of all abilities to safely cross the` roadway. The MUTCD specifies a pedestrian walking speed of 3.5 feet per second to account for an aging population. The minimum pedestrian clearance time, which is the total time for the pedestrian change interval plus the buffer interval, is calculated using the pedestrian walking speed and the distance a pedestrian has to cross the street. To the extent feasible, pedestrian clearance time should be maximized.
+ Countdown pedestrian displays inform pedestrians the amount of time in seconds available to safely cross during the flashing DON'T WALK (or upraised hand) interval. All pedestrian signal heads should contain a countdown display provided with the DON'T WALK indication.
+ In areas with higher pedestrian activity, such as near transit stations, and main streets, push button actuators may not be appropriate. People should expect to get a pedestrian cycle at every signal phase, rather than having to push a button to call for a pedestrian phase.

LEADING PEDESTRIAN INTERVAL

The Leading Pedestrian Interval initiates the pedestrian WALK indication three to seven seconds before motor vehicles traveling in the same direction are given the green indication. This signal timing technique allows pedestrians to enter the intersection prior to turning vehicles, increasing visibility between all modes.

+ The LPI should be used at intersections with high volumes of pedestrians and conflicting turning vehicles and at locations with a large population of older adults or school children who tend to walk slower.
+ A lagging protected left arrow for vehicles should be provided to accommodate the LPI.

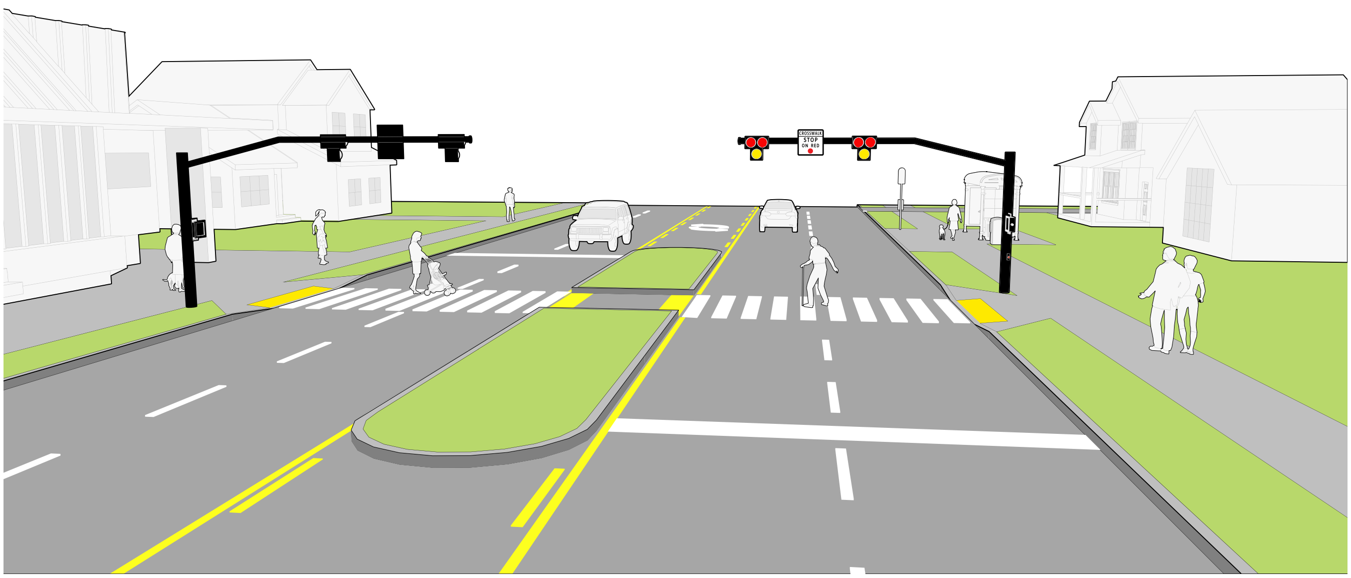
REFERENCES

NACTO Urban Streets Design Guide (2013)

MUTCD (2009)

HIGH-INTENSITY ACTIVATED CROSSWALK BEACON

Pedestrian-activated beacons, including the High-intensity Activated Crosswalk Beacon (HAWK), are a type of hybrid signal intended to allow pedestrians and bicyclists to stop traffic to cross high-volume arterial streets. This type of signal may be used in lieu of a full signal that meets any of the traffic signal control warrants in the MUTCD. It may also be used at locations which do not meet traffic signal warrants but where assistance is needed for pedestrians or bicyclists to cross a high-volume arterial street.



While this type of device is intended for pedestrians, it would be beneficial to retrofit it for bicyclists as the City of Portland, Oregon has, using bicycle detection and bicycle signal heads on major cycling networks. Depending upon the detection design, the agency implementing these devices may have the option to provide different clearance intervals for bicyclists and pedestrians. The provision of bicycle signal heads would require permission to experiment from FHWA.

- The MUTCD recommends minimum volumes of 20 pedestrians or bicyclists an hour for major arterial crossings (volumes exceeding 2,000 vehicles/hour).
- This type of device should be considered for all arterial crossings in a bicycle network and for path crossings if other engineering measures are found inadequate to create safe crossings.
- Pushbutton actuators should be “hot” (respond immediately when pressed), be placed in convenient locations for all users, and abide by other ADA standards. Passive signal activation, such as video or infrared detection, may also be considered.
- See FHWA’s Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations publication and theManual of Uniform Traffic Control Devices to determine warrants for traffic control at midblock crossings. from FHWA.

REFERENCES

NACTO Urban Street Design Guide (2013)

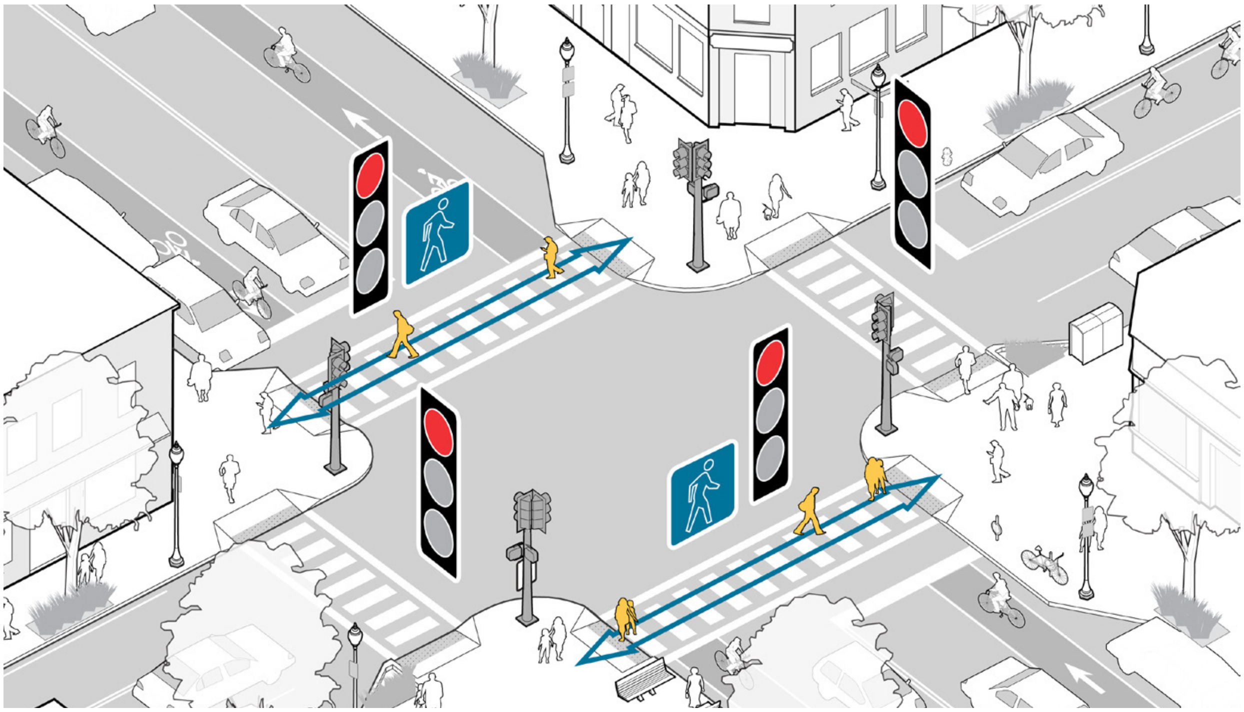
Manual on Uniform Traffic Control Devices (2009)

CDOT Roadway Design Guide, Chapter 14 (2015)

Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations (2005)

PEDESTRIAN "SCRAMBLE" AT INTERSECTIONS

Pedestrian crossings in all directions, including diagonally across the intersection, is often called a pedestrian scramble. These facilities include painted crosswalks at all four legs of the intersection and diagonally, and they are usually supplemented with pedestrian-only phasing



+ "Pedestrian scrambles" should be considered at intersections where there are high volumes of pedestrians in all directions. Intersections near schools, senior housing, recreation areas, medical facilities, or other major vulnerable pedestrian attractors are potential locations for scramble designs and signaling.
+ Removing permissive turning movements can have added safety benefits during a pedestrian-only phase.
+ Typically, these designs increase wait-times for all users—including pedestrians—so scrambles should be considered in places where there is necessity for pedestrian only movements.

GUIDANCE

+ These designs are suitable at intersections with significant pedestrian use and high conflicting vehicular movements (greater than 250 per hour or meeting other local/state requirements).
+ Use 3.5 feet per second as a measure of pedestrian travel time to determine timing for pedestrians crossing intersections diagonally.
+ All bicycle movements must yield to pedestrian movements at these intersections.
+ Designated crossing areas in all directions should be striped (as specified in this guide) and equipped ADA ramps.

REFERENCES

http://streetsillustrated.seattle.gov/design-standards/intersections/its/

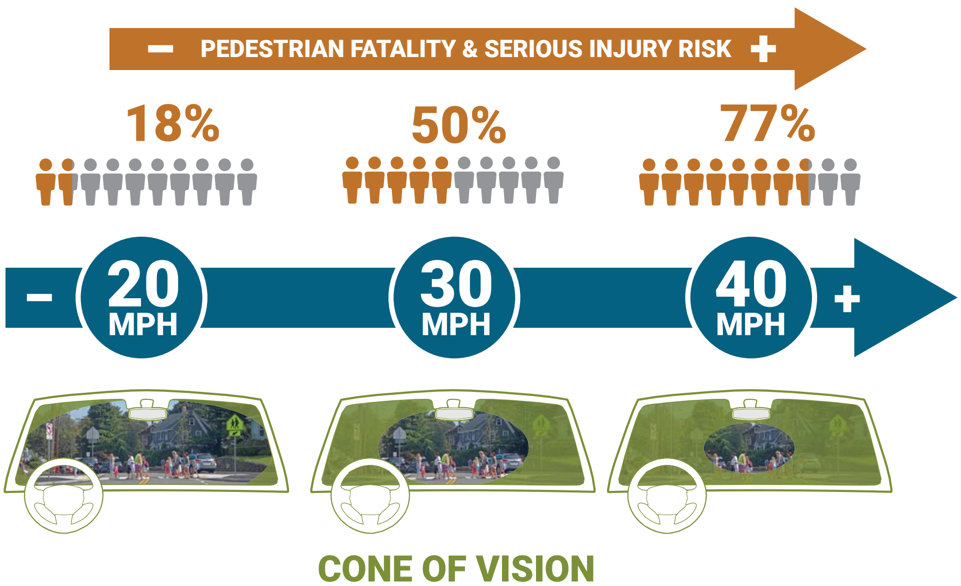
http://streetsillustrated.seattle.gov/design-standards/bicycle/bike-intersection-design/

Exclusive Pedestrian Phase Design Element, LADOT Complete Streets Committee, Jan 2017.

Supporting Elements for Bicycle Facilities

TRAFFIC CALMING

Traffic calming aims to slow the speeds of motorists to a "desired speed" (usually 20 mph or less for residential streets and 25 to 35 mph for collectors and minor arterials). The greatest benefit of traffic calming is increased safety and comfort for all users on and crossing the street. Compared with conventionally-designed streets, traffic calmed streets typically have fewer collisions and far fewer injuries and fatalities. These safety benefits are the result of slower speeds for motorists that result in greater driver awareness, shorter stopping distances, and less kinetic energy during a collision.



Prior to permanently implementing a traffic calming measure, it may be useful to introduce a temporary measure using paint, cones, or street furniture, as changes can easily be made to the design.

A formal policy or procedure can help a community objectively determine whether traffic calming measures should be installed on a street or in a neighborhood. Such a procedure should include traffic and speed studies and a way to gather input and approval from neighborhood residents.

- Vertical deflections such as speed humps and speed cushions should have a smooth leading edge, a parabolic rise, and be engineered for a speed of 25 to 30 mph. Speed humps should be clearly marked with reflective markings and signs.
- Typically speed humps are 22 feet in length, with a rise of 6 inches above the roadway. They should extend the full width of the roadway and should be tapered to the gutter to accommodate drainage. Speed humps are not typically used on roads with rural cross-sections; however, if they are used on such roads, they should match the full pavement width (including paved shoulders).
- Speed humps or speed cushions are not typically used on collector or arterial streets.
- The size of chicanes will vary based on the targeted design speed and roadway width, but must be 20 feet wide curb-to-curb at a minimum to accommodate emergency vehicles.
- A typical curb radius of 20 feet should be used wherever possible, including where there are higher pedestrian volumes and fewer larger vehicles.

REFERENCES

Huang and Cynecki (2001). The Effects of Traffic Calming Measures on Pedestrian and Motorist Behavior. FHWA

ITE Traffic Calming Web site

NACTO Urban Street Design Guide (2013)

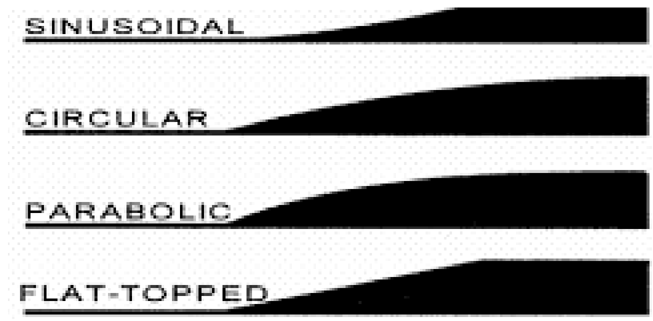
TRAFFIC CALMING - VERTICAL DEFLECTION TREATMENTS

Vertical traffic calming treatments compel motorists to slow speeds. By lowering the speed differential between bicyclists and motorists, safety and bicyclist comfort is increased. These treatments are typically used where other types of traffic controls are less frequent, for instance along a segment where stop signs may have been removed to ease bicyclist travel.


Speed cushion


Speed hump


Raised crosswalk



Curve profile options

- Speed humps and raised crosswalks impact bicyclist comfort. The approach profile should preferably be sinusoidal or flat.
- Where traffic calming must not slow an emergency vehicle, speed cushions or raised tables (crosswalks) should be considered. Speed cushions provide gaps spaced for an emergency vehicle's wheelbase to pass through without slowing.
- Consider using raised crosswalks at intersections to slow traffic turning onto the neighborhood greenway from a major street.

Vertical traffic calming will not be necessary on all neighborhood greenways but should be considered on any road with the following characteristic:

- Locations with measured or observed speeding issues, with 50th percentile of traffic exceeding 25mph.

Continuous devices, such as speed humps and raised crosswalks, are more effective to achieve slower speeds than speed cushions.

REFERENCES

NACTO. Urban Bikeway Design Guide. 2nd Edition.

Portland Bureau of Transportation. Neighborhood Greenway Assessment Report. 2015.

TRAFFIC CALMING - HORIZONTAL TREATMENTS

Horizontal traffic calming reduces speeds by narrowing lanes, which creates a sense of enclosure and additional friction between passing vehicles. Narrower conditions require more careful maneuvering around fixed objects and when passing bicyclists or oncoming automobile traffic. Some treatments may slow traffic by creating a yield situation where one driver must wait to pass.

Chicane

Neckdown

Curb extension

Neighborhood traffic circle

- Horizontal traffic calming treatments must be designed to deflect motor vehicle traffic without forcing the bicycle path of travel to be directed into a merging motorist.
- Neighborhood traffic circles should be considered at local street intersections to prioritize the through movement of bicyclists (by removing stop control or converting to yield control) without enabling an increase in motorist's speeds.
- Infrastructure costs will range dependent upon the complexity and permanence of design. Simple, interim treatments such as striping and flexposts are low-cost. Curbed, permanent treatments that integrate plantings or green infrastructure are higher-cost.

Horizontal traffic calming treatments can be appropriate along street segments or at intersections where width contributes to higher motor vehicle speeds. It can be particularly effective at locations where:

- On-street parking is low-occupancy during most times of day.
- There is desire to remove or decrease stop control at a minor intersection.

Horizontal treatments are most effective if they deflect motorists midblock (with chicanes) or within intersections (with neighborhood traffic circles).

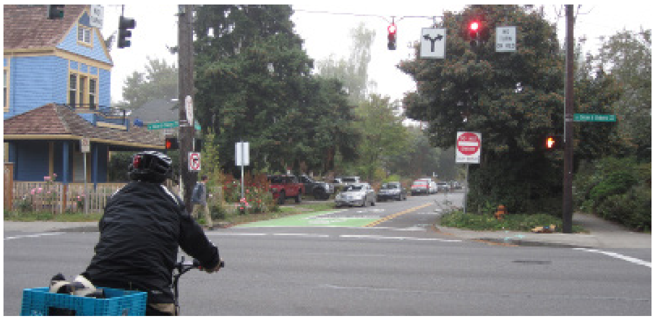
REFERENCES

NACTO. Urban Bikeway Design Guide. 2nd Edition.

Portland Bureau of Transportation. Neighborhood Greenway Assessment Report. 2015.

TRAFFIC DIVERSION

Traffic diversion strategies are used to reroute traffic from a neighborhood greenway onto other adjacent streets by installing design treatments that restrict motorized traffic from passing through.



Partial closure - permanent, signalized

Diagonal diverter

Partial closure - interim, stop-control

Full closure

- Diversion necessarily moves trips from the neighborhood greenway onto adjacent streets. This change in traffic volume on other local streets must be identified and addressed during the planning, design and evaluation process.
- Other traffic calming tools should be explored for their effectiveness before implementing traffic diversion measures. In communities where the street network is not a traditional grid, the impacts of diversion to the larger street network will be greater, due to the inability of traffic to easily disperse and find alternate routes.
- Temporary materials may be used to test diversion impacts before permanent, curbed diverters are installed.
- Consultation with emergency services will be necessary to understand their routing needs.
- Preferred motor vehicle volumes are in the range of 1,000 to 1,500 per day, while up to 3,000 automobiles is acceptable.
- Diversion devices must be designed to provide a minimum clear width of 6 feet for a bicyclist to pass through.
- Some treatments may require a separate pedestrian accommodation.

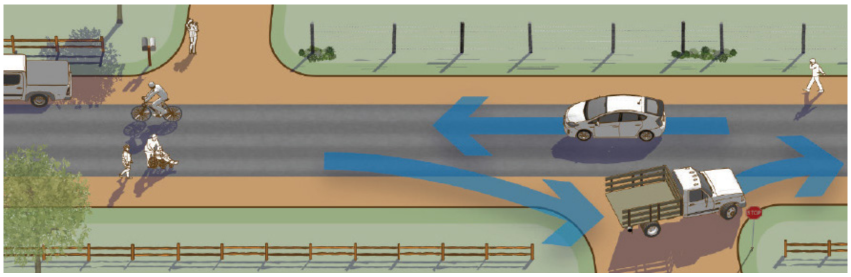
REFERENCES

NACTO. Urban Bikeway Design Guide. 2nd Edition.

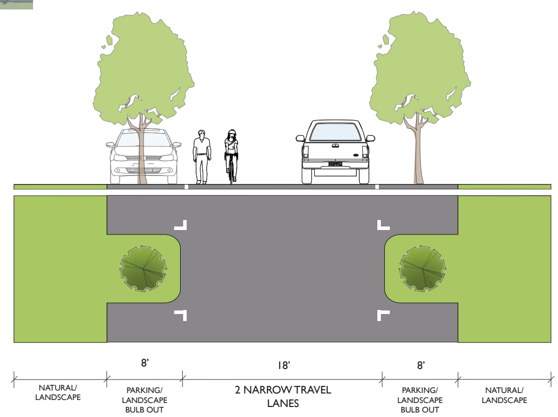
Portland Bureau of Transportation. Neighborhood Greenway Assessment Report. 2015.

"YIELD" STREET

A "yield" street is a non-arterial street that allows for one-way vehicle movement due to traffic calming and/or the presence of on-street parking.



Yield Street as shown in FHWA's Small Town and Rural Multimodal Networks.



YIELD ROADWAY

"Yield" streets typically allow for single-direction vehicle movement due to the presence of on-street parking and/or traffic calming devices. Yield streets often have sidewalks buffered by planting strips that support a wide range of treatments including gardening, green stormwater infrastructure and large canopy street trees. Yield streets also are conducive for bicycle boulevards.

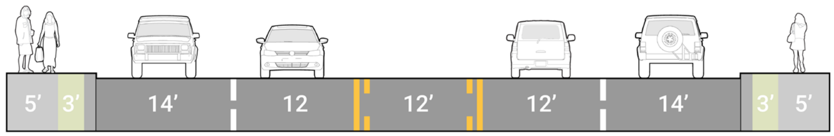
When implementing yield streets, consider emergency vehicle, pedestrian, and bicyclist access and safety.

+ Yield streets should be non-arterial streets at at least 40 feet in width. These streets are not appropriate for transit routes or freight routes, but should accommodate local deliveries by SU-30.
+ Yield streets should have a traveled way narrower than 20 feet. Total traveled way width varies between 12 feet and 20 feet. According to the AASHTO Low Volume Roads guidelines, streets 15 feet or narrower function as a two-way roadway and should provide pull-out areas every 200-300 feet.
+ Yield streets may consist of one 11-foot travel lane with 7-foot flexible zones on each side (typically occupied by on-street parking, but may be programmed with other uses.
+ According to the FHWA Small Town and Rural Multimodal Networks guide, parking lanes on yield streets should be constructed with a contrasting material when possible.
+ The MUTCD does not recommend centerline markings on two-way streets narrower than 16 feet wide or below 3,000 ADT.

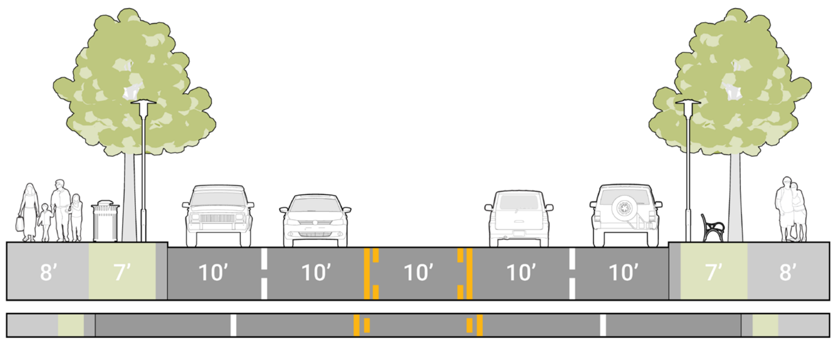
LANE NARROWING

Lane narrowing can improve comfort and safety for vulnerable road users. Narrowing lanes creates space that can be reallocated to other modes, in the form of wider sidewalks, bike lanes, and buffers between cyclists, pedestrians and motor vehicles. Space can also be dedicated to plantings and amenity zones, and reduces crossing distances at intersections.

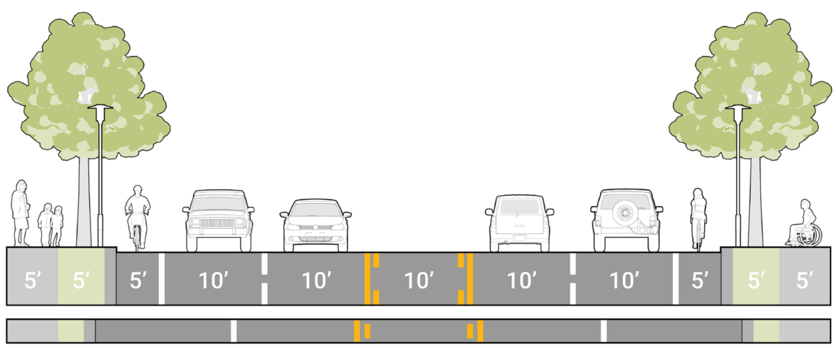
Roadway Before Narrowing



Narrowing Motor Vehicle Lanes to increase Sidewalk and Amenity Zones



Narrowing Motor Vehicle Lanes to increase Amenity Zone and add Bicycle Lanes



CONSIDERATIONS

Narrowing existing motor vehicle lanes may result in enough space to create separated bicycle lanes, widened sidewalks and buffers, or a combination of on-street bike lanes and enhancements to the pedestrian corridor.

Narrower lanes can contribute to lower operating speeds along the roadway, which may be appropriate in dense, walkable corridors.

GUIDANCE

+ Motor vehicle travel lanes as narrow as 10 feet are allowed in low-speed environments (45 mph or less) according to the AASHTO Green Book.
+ 10-foot travel lanes are not appropriate on 4-lane undivided arterial roadways.

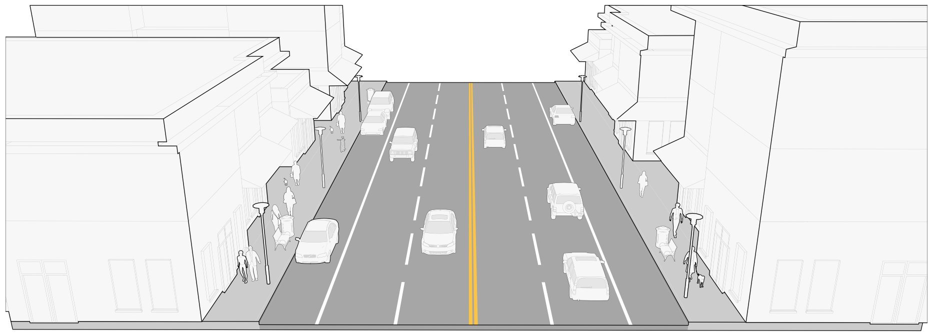
REFERENCES

FHWA Achieving Multimodal Networks

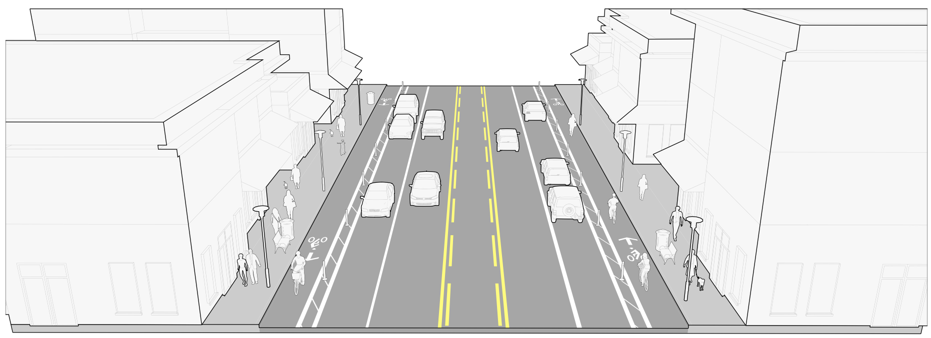
LANE RECONFIGURATION

Road Diets are the reconfiguration of one or more travel lanes to calm traffic and provide space for bicycle lanes, turn lanes, streetscapes, wider sidewalks, and other purposes. Four- to three-lane conversions are the most common Road Diet, but there are numerous types (e.g., three to two lanes, or five to three lanes).

Typical 4-lane Road with on-street parking



Three-lane Road Diet (with center two-way left-turn lane), with on-street parking and separated bicycle lane



The most common road diet configuration involves converting a four-lane road to three lanes: two travel lanes with a turn lane in the center of the roadway. The center turn lane at intersections often provides a great benefit to traffic congestion. A three-lane configuration with one lane in each direction and a center turn lane is often as productive (or more productive) than a four-lane configuration with two lanes in each direction and no dedicated turn lane.

The space gained for a center turn lane is often supplemented with painted, textured, or raised center islands. If considered during reconstruction, raised center islands may be incorporated in between intersections to provide improved pedestrian crossings, incorporate landscape elements and reduce travel speeds.

- Four-lane streets with volumes less than 15,000 vehicles per day are generally good candidates for four- to three-lane conversions.
- Four-lane streets with volumes between 15,000 to 20,000 vehicles per day may be good candidates for four- to three-lane conversions. A traffic analysis is needed to determine feasibility.
- Six-lane streets with volumes less than 35,000 vehicles per day may be good candidates for six- to five-lane (including two-way center turn lane) conversions. A traffic analysis is needed to determine feasibility.

REFERENCES

FHWA Road Diet Guide (2014)

NACTO Urban Street Design Guide (2013)

Manual on Uniform Traffic Control Devices (2009)

Bicycle Intersection Design & Spot Treatments

BIKE BOXES

A bicycle box provides dedicated space between the crosswalk and vehicle stop line where bicyclists can wait during the red light at signalized intersections. The bicycle box allows a bicyclist to take a position in front of motor vehicles at the intersection, which improves visibility and motorist awareness, and allows bicyclists to “claim the lane” if desired. Bike boxes aid bicyclists in making turning maneuvers at the intersection, and provide more queuing space for multiple bicyclists than that provided by a typical bicycle lane.

- Bicycle boxes are typically painted green and are a minimum of 10 feet in depth.
- Bicycle box design should be supplemented with appropriate signage according to latest version of the MUTCD.
- Bicycle box design should include appropriate adjustement in determining the minimum green time.
- Where right turn lanes for motor vehicles exist, bicycle lanes should be designed to the left of the turn lane. If right turns on red are permitted, consider ending the bicycle box at the edge of the bicycle lane to allow motor vehicles to make this turning movement.
- In locations with high volumes of turning movements by bicyclists, a bicycle box should be used to allow bicyclists to shift towards the desired side of the travel way. Depending on the position of the bicycle lane, bicyclists can shift sides of the street to align themselves with vehicles making the same movement through the intersection.
- In locations where motor vehicles can continue straight or cross through a right-side bicycle lane while turning right, the bicycle box allows bicyclists to move to the front of the traffic queue and make their movement first, minimizing conflicts with the turning. When a bicycle box is implemented in front of a vehicle lane that previously allowed right turns on red, the right turn on red movement must be restricted using signage and enforcement following installation of the bike box.

REFERENCES

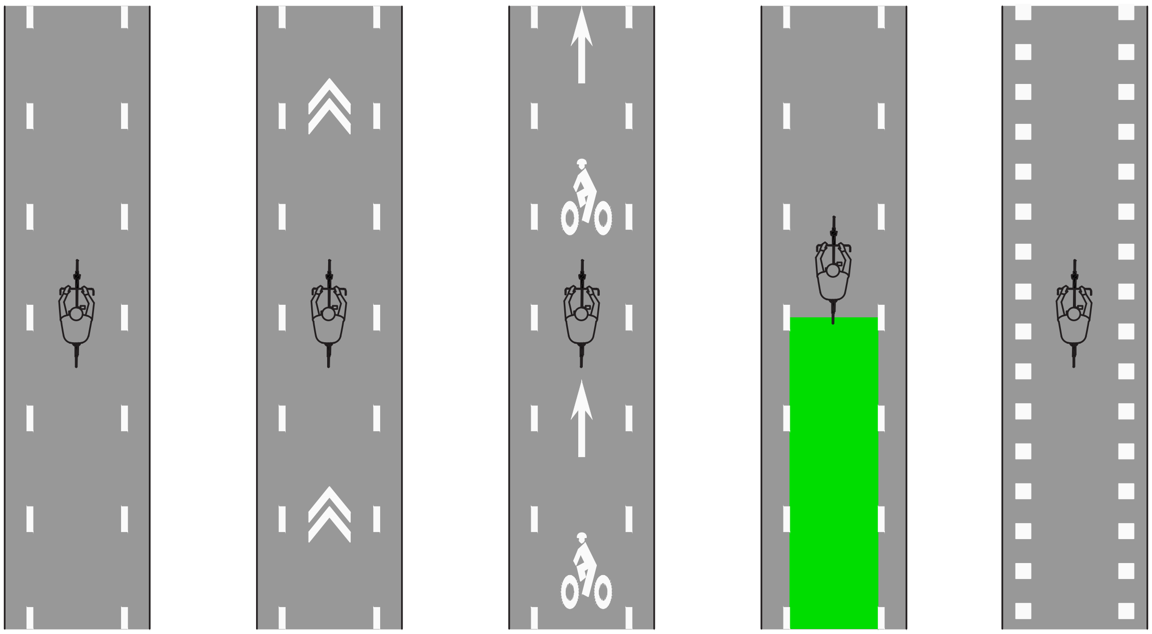
NACTO Urban Bikeway Design Guide - Bike Boxes

FHWA Separated Bike Lane Planning and Design Guide (2015)

MassDOT Separated Bike Lane Planning & Design Guide (2016)

CONFLICT AREA MARKING

Intersection pavement markings designed to improve visibility, alert all roadway users of expected behaviors, and to reduce conflicts with turning vehicles.



- The level of emphasis and visibility: dashed lane lines may be sufficient for guiding bicyclists through intersections; however, consider providing enhanced markings with green pavement and/or symbols at complex intersections or at intersections with documented conflicts and safety concerns.
- Symbol placement within intersections should consider vehicle wheel paths for maintenance.
- Driveways with higher volumes may require additional pavement markings and signage.
- Consideration should be given to using intersection pavement markings as spot treatments or standard intersection treatments. A corridor wide treatment can maintain consistency; however, spot treatments can be used to highlight conflict locations.
- Dashed white lane lanes should conform to the latest edition of the MUTCD. These can be used through different types of intersections based on engineering judgment.
- A variety of pavement marking symbols can enhance intersection treatments to guide bicyclists and warn of potential conflicts.
- Green pavement markings can be used along the length of a corridor or in select conflict locations.

REFERENCES

AASHTO Guide for the Development of Bicycle Facilities (2012)

NACTO Urban Bikeway Design Guide (2012)

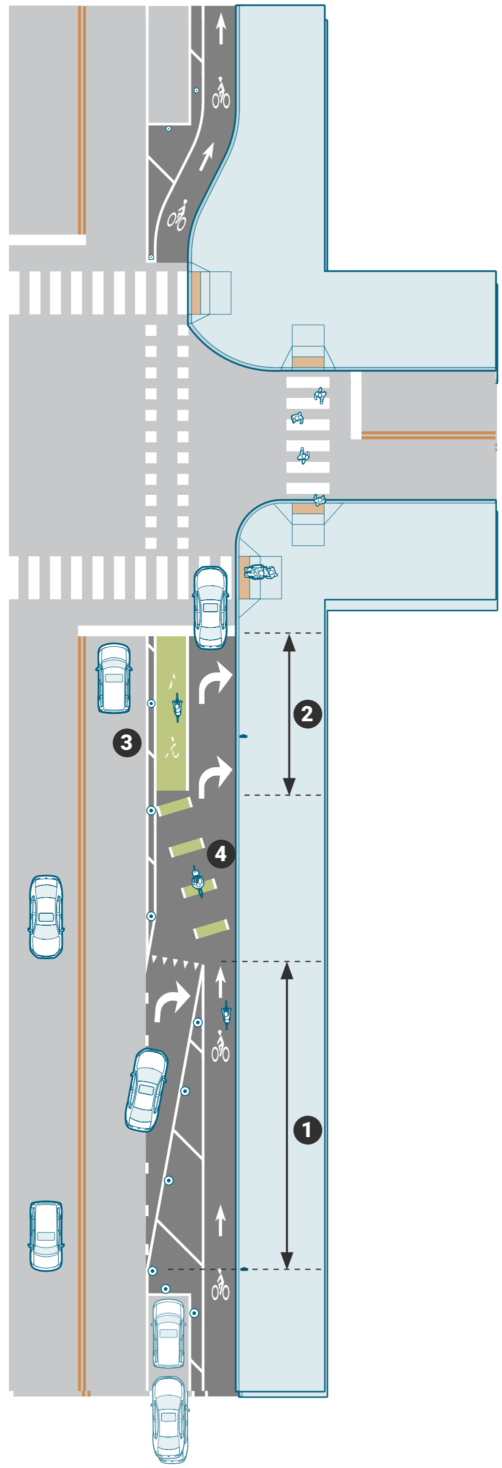
Manual on Uniform Traffic Control Devices (2009)

MIXING ZONES

A mixing zone requires turning motorists to merge across a separated bike lane at a defined location in advance of an intersection. Unlike a standard bike lane, where a motorist can merge across at any point, a mixing zone design limits bicyclists' exposure to motor vehicles by defining a limited merge area for the turning motorist. Mixing zones are compatible only with one-way separated bike lanes.

Protected intersections are preferable to mixing zones. Mixing zones are generally appropriate as an interim solution or in situations where severe right-of-way constraints make it infeasible to provide a protected intersection.

Mixing zones are only appropriate on street segments with one-way separated bike lanes. They are not appropriate for two-way separated bike lanes due to the contra-flow bicycle movement.



GUIDANCE

1. Locate merge points where the entering speeds of motor vehicles will be 20 mph or less by (a) minimizing the length of the merge area and (b) locating the merge point as close as practical to the intersection.
2. Minimize the lenth of the storage portion of the turn lane
3. Provide a buffer and physical separation (e.g. flexible delineator posts) from the adjacent through lane after the merge area, if feasible.
4. Highlight the conflict area with green surface coloring and dashed bike lane markings, as necessary, or shared lane markings placed on a green box.

+ Provide a BEGIN RIGHT (or LEFT) TURN LANE YIELD TO BIKES sign (R4-4) at the beginning of the merge area.
+ Restrict parking within the merge area
+ At locations where raised separated bike lanes approach the intersection, the bike lane should transition to street elevation at the point where parking terminates.
+ Where posted speeds are 35 mph or higher, or at locations where it is necessary to provide storage for queued vehicles, it may be necessary to provide a deceleration/storage lane in advance of the merge point.

REFERENCES

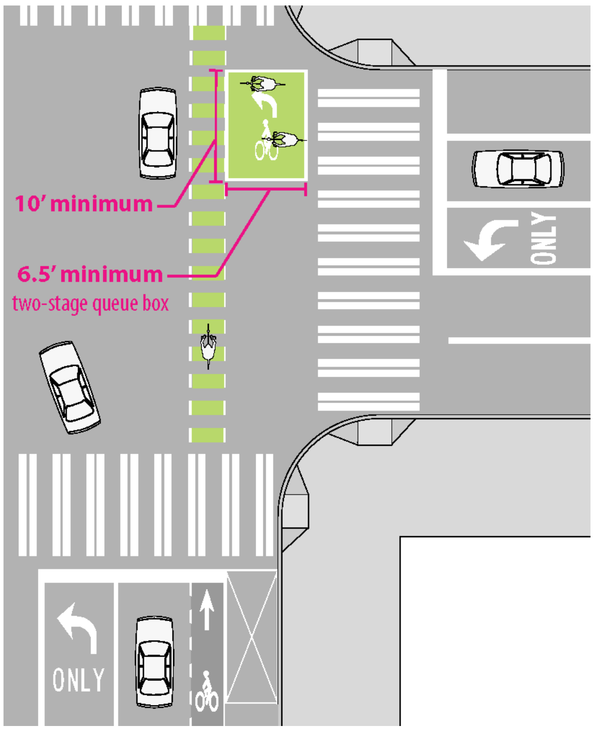
NACTO. *Urban Bikeway Design Guide. 2nd Edition.*

MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

TWO-STAGE TURN QUEUE BOX

A two-stage turn queue box should be considered where separated bike lanes are continued up to an intersection and a protected intersection is not provided. The two-stage turn queue box designates a space for bicyclists to wait while performing a two-stage turn across a street at a location outside the path of traffic.



The use of a two-stage turn queue box requires FHWA permission to experiment.

- Two-stage turn queue box dimensions will vary based on the street operating conditions, the presence or absence of a parking lane, traffic volumes and speeds, and available street space. The turn box may be placed in a variety of locations including in front of the pedestrian crossing (the crosswalk location may need to be adjusted), in a 'jug-handle' configuration within a sidewalk, or at the tail end of a parking lane or a median island.
- Dashed bike lane extension markings may be used to indicate the path of travel across the intersection.
- A minimum width of 10 feet is recommended.
- A minimum depth of 6.5 feet is recommended.
- NO TURN ON RED (R10-11) restrictions should be used to prevent vehicles from entering the queuing area.
- The use of a supplemental sign instructing bicyclists how to use the box is optional.
- The box should consist of a green box outlined with solid white lines supplemented with a bicycle symbol and a turn arrow to emphasize the crossing direction.

REFERENCES

NACTO. *Urban Bikeway Design Guide. 2nd Edition.*

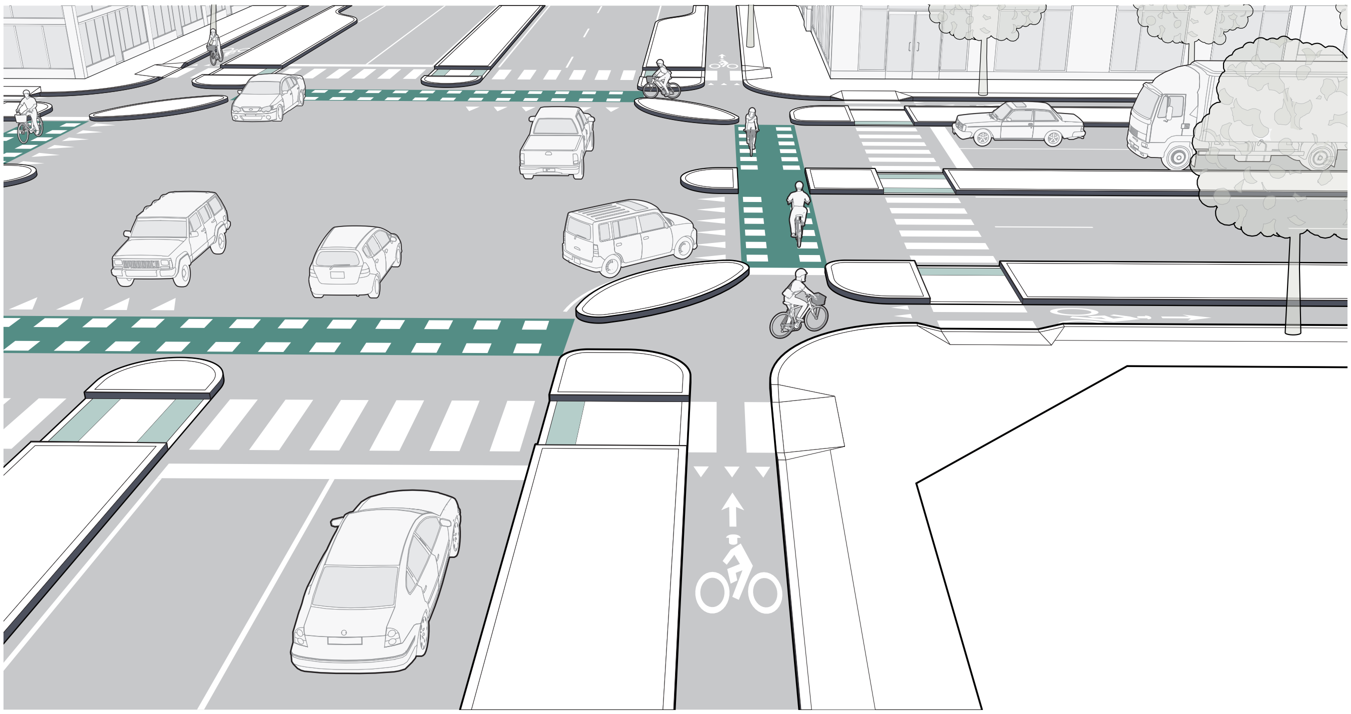
MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Bicycle Facilities and the Manual on Uniform Traffic Control Devices - Two-Stage Turn Box. 2015.

SEPARATED BIKE LANES AT INTERSECTIONS

Separated bicycle lanes provide an exclusive travel way for bicyclists alongside roadways that is separate from motor vehicle travel lanes, parking lanes, and sidewalks. Separated bike lane designs at intersections should manage conflicts with turning vehicles and increase visibility for all users.



Separated bicycle lane designs at intersections should give consideration to signal operation and phasing in order to manage conflicts between turning vehicles and bicyclists. Bicycle signal heads should be considered to separate conflicts.

Shared lane markings and/or colored pavement can supplement short dashed lines to demark the protected bike lane through intersections, where engineering judgment deems appropriate.

At non-signalized intersections, design treatments to increase visibility and safety include:

+ Warning signs
+ Raised intersections
+ Special pavement markings (including colored surface treatment)
+ Removal of parking prior to the intersection

REFERENCES

Bicycle Facilities and the Manual on Uniform Traffic Control Devices

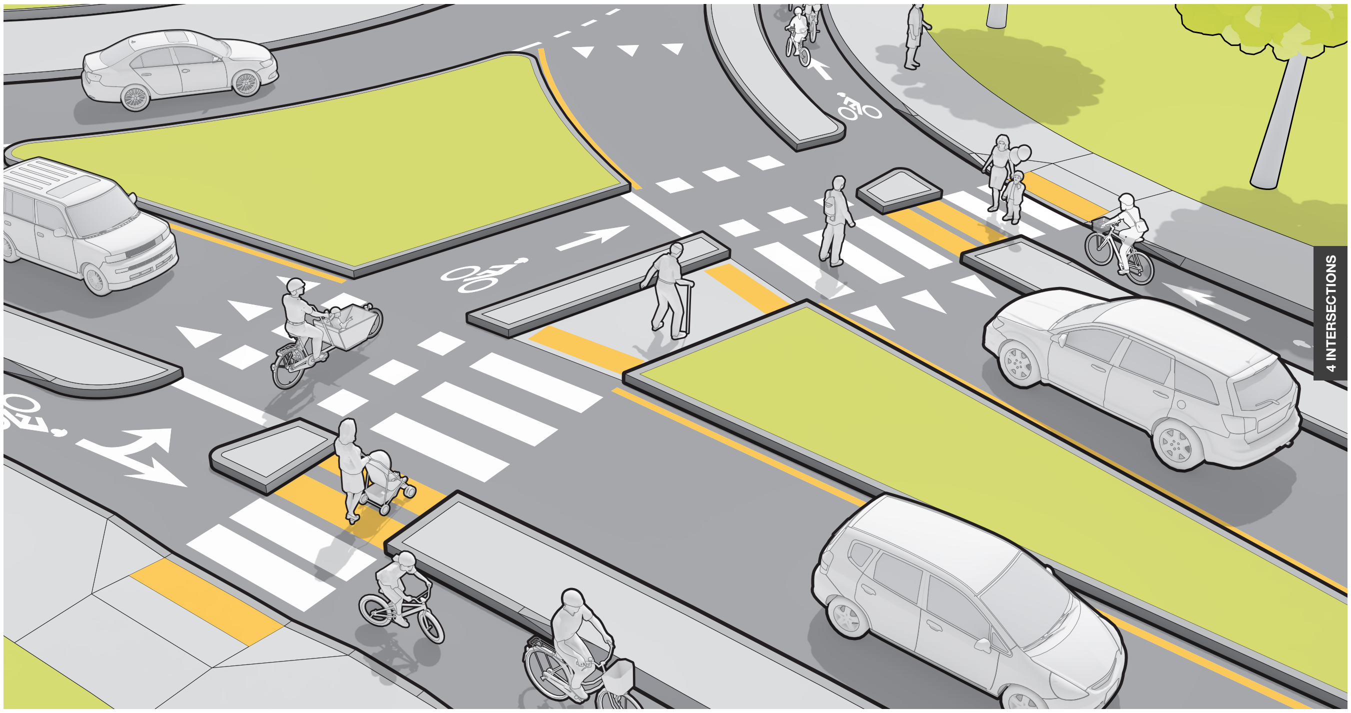
NACTO Urban Bikeway Design Guide

FHWA Separated Bike Lane Planning and Design Guide (2015)

+ It is preferable to maintain the separation of the bike lane through the intersection rather than introduce the bicyclist into the street with a merge lane. Where this is not possible, see guidance on Mixing Zones.
+ Increasing visibility and awareness are two key design goals for separated bike lanes at intersections. In some cases, parking restrictions between 20' to 40' are needed to ensure the visibility of bicyclists at intersections.
+ Separated bike lanes should typically be routed behind transit stops (i.e., the transit stop should be between the bike lane and motor vehicle travel lanes). If this is not feasible, the separated bike lane should be designed to include treatments such as signage and pavement markings to alert the bicyclist to stop for buses and pedestrians accessing transit stops.
+ Markings and signage should be used at intersections to give priority to separated bicycle lanes.

SEPARATED BIKE LANES AT ROUNDABOUTS

When separated bike lanes are provided at roundabouts, they should be continuous around the intersection, and parallel to the sidewalk. Separated bike lanes should generally follow the contour of the circular intersection.



At crossing locations of multi-lane roundabouts or roundabouts where the exit geometry will result in faster exiting speeds by motorists (thus reducing the likelihood that they will yield to bicyclists and pedestrians), additional measures should be considered to induce yielding such as providing an actuated device such as a Rapid Flashing Beacon or Pedestrian Hybrid Beacon.

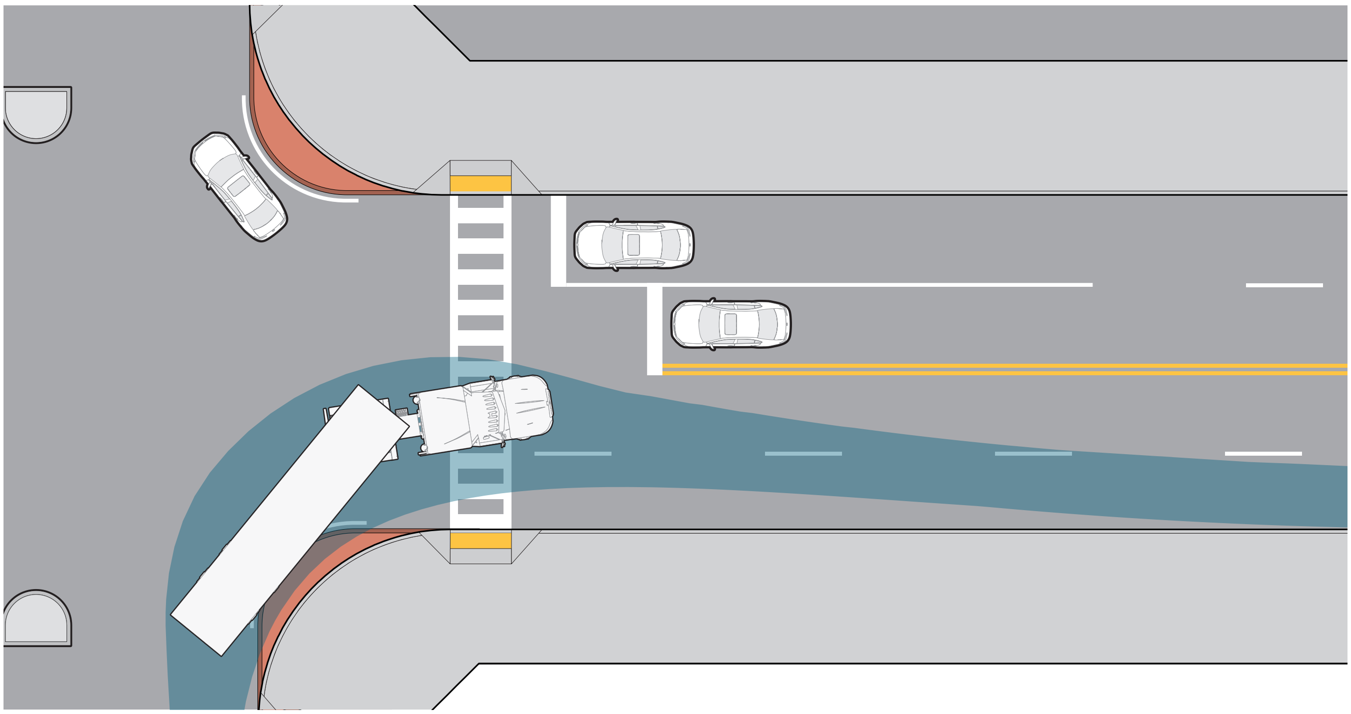
+ The bicycle crossing should be immediately adjacent to and parallel with the pedestrian crossing, and both should be at the same elevation.
+ Consider providing supplemental yield lines at roundabout exits to indicate priority at these crossings.
+ The decision of whether to use yield control or stop control at the bicycle crossing should be based on available sight distance.
+ The separated bike lane approach to the bicycle crossing should result in bicyclists arriving at the queuing area at a perpendicular angle to approaching motorists.
+ Curb radii should be a minimum of 5 ft. to enable bicyclists to turn into the queuing area.
+ Channelizing islands are preferred to maintain separation between bicyclists and pedestrians, but may be eliminated if different surface materials are used.

REFERENCES

MassDOT Separated Bike Lane Planning & Design Guide (2016)

TRUCK APRONS

In locations where large vehicles make occasional turns, designers can consider mountable truck aprons. Mountable truck aprons deter passenger vehicles from making higher-speed turns, but accommodate the occasional large vehicle without encroachment or off-tracking into pedestrian waiting areas. Mountable truck aprons should be visually distinct from the adjacent travel lane and sidewalk.



While bicyclist and pedestrian safety is negatively impacted by wide crossings, bicyclists and pedestrians are also at risk if the curb radius is too small. Curb radii that are too small for large vehicels to navigate can result in the rear wheels of a truck tracking over queuing areas at the corner. Maintenance problems are also caused when trucks must regularly drive over street corners to make turns.

Mountable truck aprons are a solution that can reduce turning speeds for passenger vehicles while accommodating the offtracking of larger vehicles where s larger corner radius is necessary.

+ Mountable truck aprons are part of the traveled way and as such should be designed to discourage pedestrian or bicycle refuge. Bicycle stop bars, detectable warning panels, traffic signal equipment and other intersection features must be located behind the mountable surface area. The mountable surface should be visually distinct from the adjacent travel lane, sidewalk and separated bike lane. The heights of mountable areas and curbs should be no more than 3 inches above the travel lane to accommodate lowboy trailers.

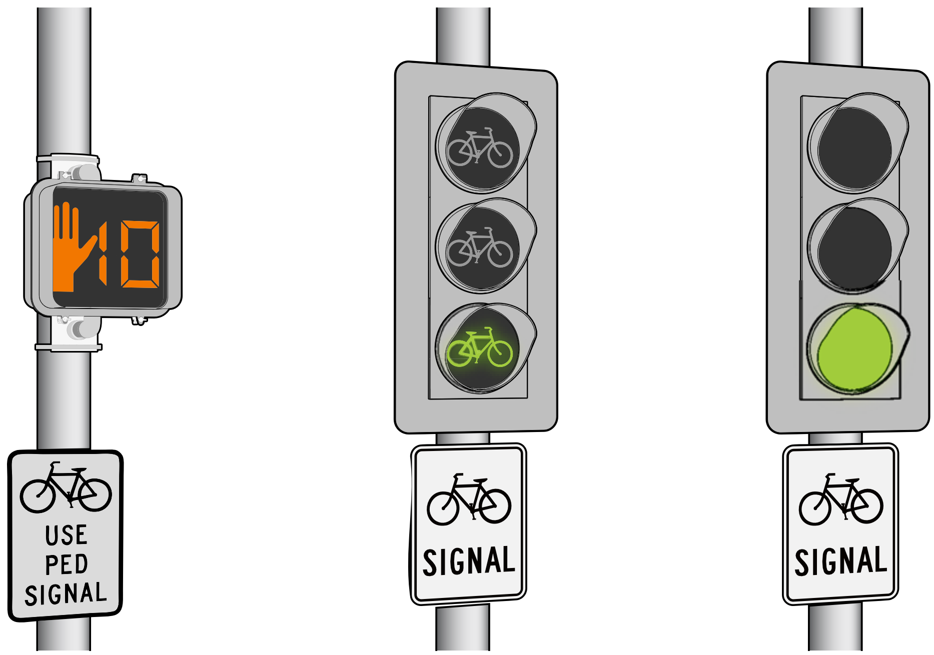
REFERENCES

MassDOT Separated Bike Lane Planning & Design Guide (2016)

FHWA Achieving Multimodal Networks

BICYCLE SIGNALS, DETECTION, ACTUATION

Bicyclists have unique needs at signalized intersections. Bicycle movements may be controlled by the same indications that control motor vehicle movements, by pedestrian signals, or by bicycle-specific traffic signals. The introduction of separated bike lanes creates situations that may require leading or protected phases for bicycle traffic, or place bicyclists outside the cone of vision of existing signal equipment. In these situations, provision of signals for bicycle traffic will be required.



+ Bicycle-specific signals may be appropriate to provide additional guidance or separate phasing for bicyclists per the 2012 AASHTO Guide for the Development of Bicycle Facilities.
+ It may be desirable to install advanced bicycle detection on the intersection approach to extend the phase, or to prompt the phase and allow for continuous bicycle through movements.
+ Video detection, microwave and infrared detection can be an alternate to loop detectors.
+ Another strategy in signal timing is coordinating signals to provide a "green wave", such that bicycles will receive a green indication and not be required to stop. Several cities including Portland, OR and San Francisco, CA have implemented "green waves" for bicycles.

REFERENCES

AASHTO Guide for the Development of Bicycle Facilities (2012)

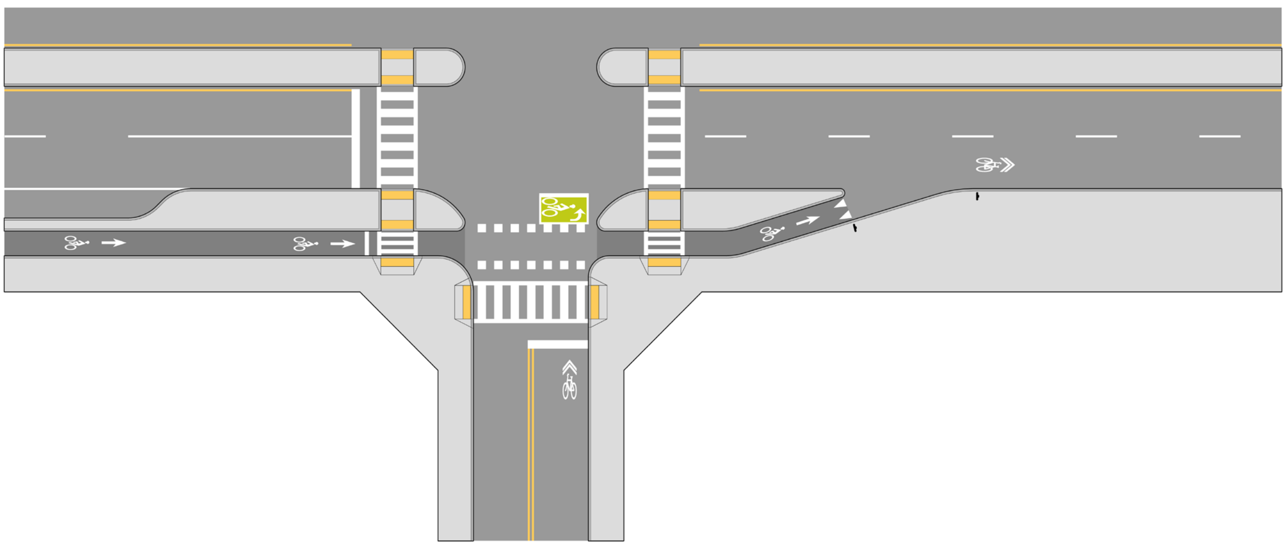
NACTO Urban Bikeway Design Guide (2012)

Manual on Uniform Traffic Control Devices (2009)

+ A stationary, or "standing", cyclist entering the intersection at the beginning of the green indication can typically be accommodated by increasing the minimum green time on an approach per the 2012 AASHTO Guide for the Development of Bicycle Facilities.
+ A moving, or "rolling", bicyclist approaching the intersection towards the end of the phase can typically be accommodated by increases to the red times (change and clearance intervals) per the 2012 AASHTO Guide for the Development of Bicycle Facilities.
+ Set loop detectors to the highest sensitivity level possible without detecting vehicles in adjacent lanes and field check. Type D and type Q loops are preferred for detecting bicyclists.
+ Install bicycle detector pavement markings and signs per the MUTCD, 2012 AASHTO Guide for the Development of Bicycle Facilities, and the NACTO Urban Bikeway Design Guide.

TRANSITIONS BETWEEN BICYCLE FACILITIES

Facility types may vary along a roadway corridor based on land use, parking needs, right-of-way constraints and other characteristics. Additionally, a common or logical route for bicyclists may turn at an intersection. It is important to provide transitions between different types of facilities (e.g. wayfinding signage, pavement markings, turn-queue boxes).



Planning for appropriate connections and transitions between facility types should be conducted as a part of network planning. It is important that facilities have logical termini and a network is planned that serves a range of users.

Enhance visibility with green pavement markings and/or bicycle symbols at conflict locations.

Two-stage left turn movements can be accommodated using two-stage turn queue boxes (see page 60). These movements can be easier for some bicyclists to execute. Two-stage left turns may be more comfortable for many bicyclists because the maneuver does not require waiting for gaps in the adjacent same-direction traffic stream before merging laterally to reach a left-turn lane.

REFERENCES

NACTO. *Urban Bikeway Design Guide. 2nd Edition.*

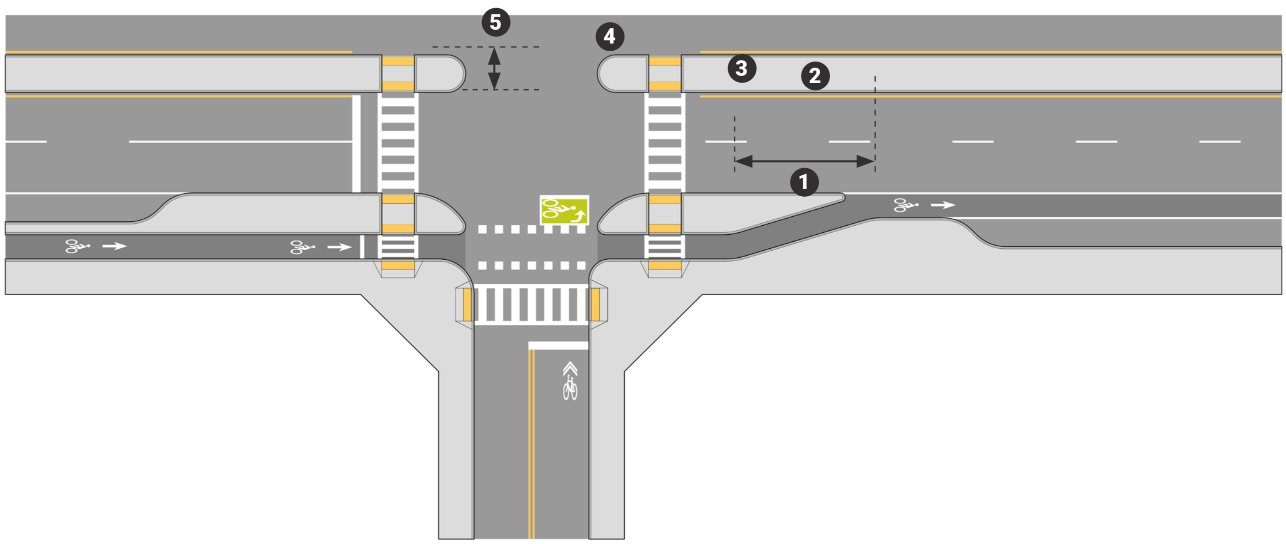
MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

+ Always carry bicycle facilities to a logical terminus. Specifically, designers should avoid abruptly ending facilities without considering transitions and interactions with vehicles.
+ At locations where bicycle lanes transition to shared lanes, it may be desirable to provide a transition to a short segment of shared lane markings, even if the shared lane markings will not continue.
+ Signage should be provided per recommendations in the latest edition of the MUTCD and AASHTO Bike Guide. Pavement markings should alert motorists of the change in facility and intended shared use of travel lanes.
+ Taper lengths for lane drops and transitions should follow the MUTCD and AASHTO Green Book recommendations.
+ Bicycle boxes and turn-queue boxes should be placed out of vehicle paths and be wide/long enough to support multiple bicyclists queuing at intersections. Bicycle boxes should only be used where a dedicated facility is provided prior to the intersection (bicycle lane); however, queue boxes may be used at a variety of locations with or without dedicated facilities.

TRANSITION FROM ONE-WAY SEPARATED BIKE LANE TO CONVENTIONAL BIKE LANE ON SAME STREET

This treatment provides an example of a preferred design of a separated bike lane transition to a conventional bicycle lane.



To convey which user has the right-of-way, intersections with separated bike lanes should be designed to minimize bicyclist exposure to motorized traffic and should minimize the speed differential at conflict points. The goal is to provide clear messages regarding right-of-way to all users moving through the intersection in conjunction with geometric features that result in higher compliance where users are expected to yield.

The transition should:

- Maintain separation through the intersection.
- Occur on the far side of intersections to reduce conflicts with turning vehicles within the intersection.
- Maintain a vertical or visual separation between bicyclists and pedestrians where sidewalk buffers are eliminated.
- Clearly communicate how bicyclists should enter and exit the separated bike lane minimizing conflicts with other users.

1. Maximum 3:1 lateral taper.
2. A bike lane width of 6.5 feet is required to allow passing.
3. A protecting island should be provided to shadow the bicycle lane on the far side and to create protection for queueing left turn bicyclists waiting in the turn box.
4. Provide a two-stage turn queue box at intersections with cross streets that have bicycle lanes or shared lanes.
5. Minimum offset is 6 feet, desirable 16.5 feet.

REFERENCES

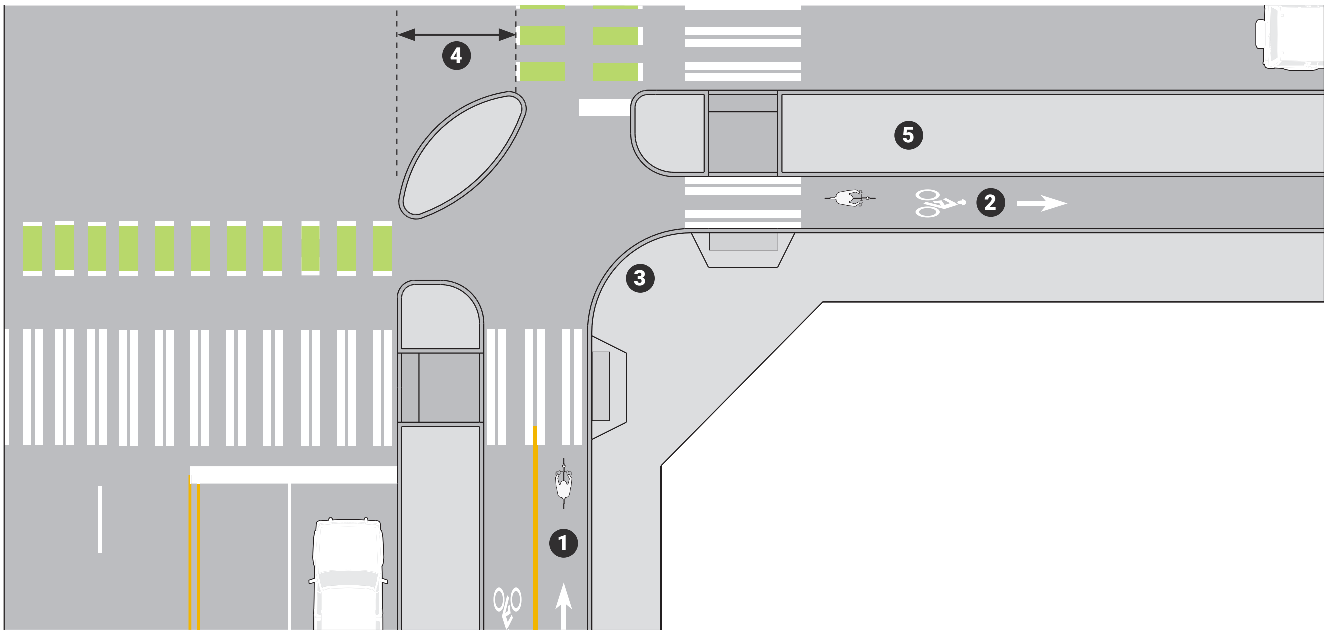
NACTO. *Urban Bikeway Design Guide. 2nd Edition.*

MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

TRANSITION FROM TWO-WAY SEPARATED BIKE LANE TO CONVENTIONAL BIKE LANE ON INTERSECTING STREET

This treatment provides an example of a typical design of a two-way separated bike lane transition to a one-way separated bicycle lane on a cross street.



Intersections with separated bike lanes should be designed to minimize bicyclist exposure to motorized traffic and should minimize the speed differential at the points where travel movements intersect. The goal is to provide clear messages regarding right-of-way to all users moving through the intersection in conjunction with geometric features that result in higher compliance where users are expected to yield.

The transition design should:

- Maintain separation through the intersection.
- Occur on the far side of intersections to reduce conflicts with turning vehicles within the intersection.
- Maintain a vertical or visual separation between bicyclists and pedestrians where sidewalk buffers are eliminated.
- Clearly communicate how bicyclists are intended to enter and exit the separated bike lane minimizing conflicts with other users.

1. A minimum two-way separated bike lane width of 10 feet is recommended.
2. A minimum one-way separated bike lane width of 6.5 feet is recommended.
3. A 15-foot corner radius is recommended for turns from the two-way bike lane onto the one-way bike lane.
4. Minimum offset is 6 feet, desirable 16.5 feet.
5. A minimum street buffer of 6 feet is recommended.

REFERENCES

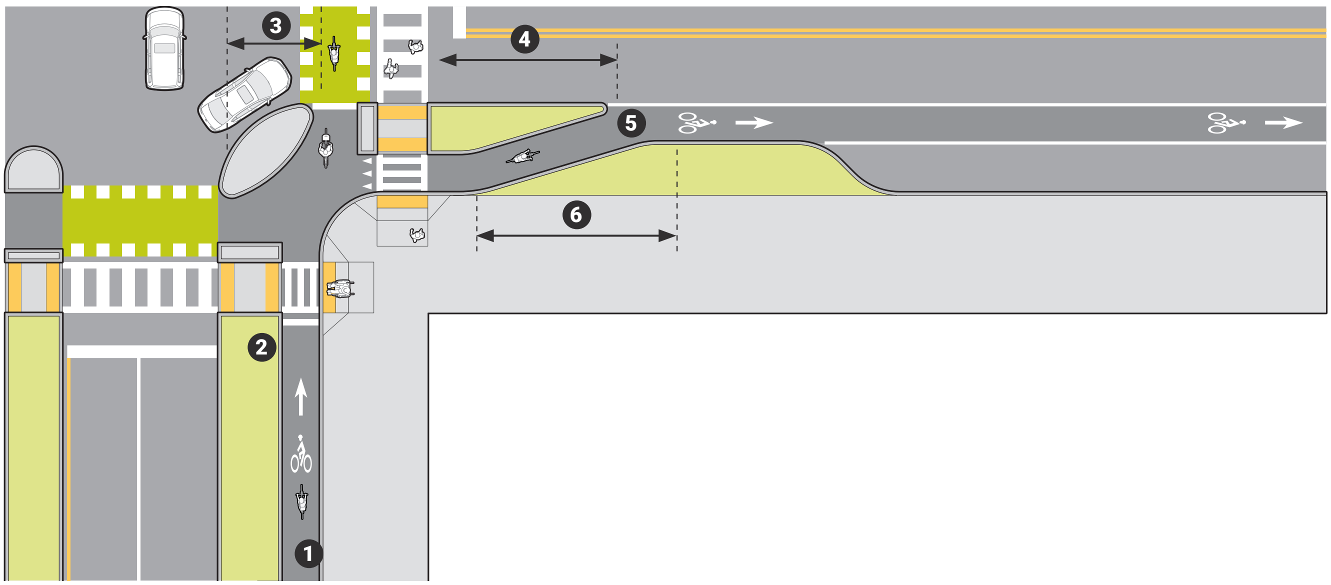
NACTO. *Urban Bikeway Design Guide. 2nd Edition.*

MassDOT. *Separated Bike Lane Planning and Design Guide. 2015.*

FHWA. *Separated Bike Lane Planning and Design Guide.* 2015.

TRANSITION FROM ONE-WAY SEPARATED BIKE LANE TO CONVENTIONAL BIKE LANE ON INTERSECTING STREET

This treatment provides an example of a typical design of a one-way separated bike lane transition to a one-way separated bicycle lane on a cross street.



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- Clearly communicate how bicyclists are intended to enter and exit the separated bike lane minimizing conflicts with other users.

1. A minimum one-way separated bike lane width of 6.5 feet is recommended.
2. A minimum street buffer of 6 feet is recommended.
3. Minimum offset is 6 feet, desirable 16.5 feet.
4. Recommended minimum transition is 25 feet to ensure a bicyclist has time to react to an approaching vehicle.
5. A one-way separated bike lane and conventional bike lane width of 6.5 feet is recommended.
6. Maximum 3:1 lateral taper.

REFERENCES

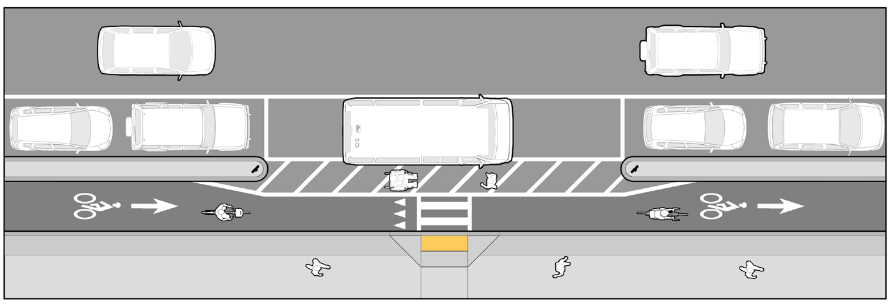
NACTO. *Urban Bikeway Design Guide. 2nd Edition.*

MassDOT. Separated Bike Lane Planning and Design Guide. 2015.

FHWA. Separated Bike Lane Planning and Design Guide. 2015.

LOADING ZONES

Truck loading operations typically involve pulling over to the side of the roadway. This action may result in blocking a bike lane or crossing through a bike lane to access a loading zone. Dedicated commercial loading zones can save trucking companies time and money and improve air quality. Commercial loading zones should be designated where they will provide convenient access to businesses, while causing minimal conflict with bicycle facilities. This should be balanced with providing convenient dedicated loading zones.



Consider consolidating commercial loading zones to a single location on each block to reduce potential conflicts.

Consider the length of typical loading vehicles that use the space when determining the length of the loading zone.

A curb ramp with a separated bike lane crosswalk can simplify loading and unloading activity.

Green-colored pavement can be used to notify freight operators of a potential conflict with a bicyclist.

Consider locating a commercial loading zone on an adjacent block or alley where a loading zone is desired but on-street parking is not present.

A lateral shift of the separated bike lane and the sidewalk should be considered as a last resort.

+ Streets with heavy freight usage, high parking demand, and bike lanes benefit from dedicated commercial loading zones after an intersection. Loading zones may help reduce obstruction of the bike lane and make deliveries easier for businesses. These zones can be striped and signed, or managed for off-peak deliveries.
+ Where on-street parking and separated bike lanes are provided, consider a 5-foot minimum access aisle between the commercial loading zone and the bike lane. Vertical objects used to delineate the bike lane should be discontinued where an access aisle is provided.
+ The loading zone should be 8–10 feet wide.

REFERENCES

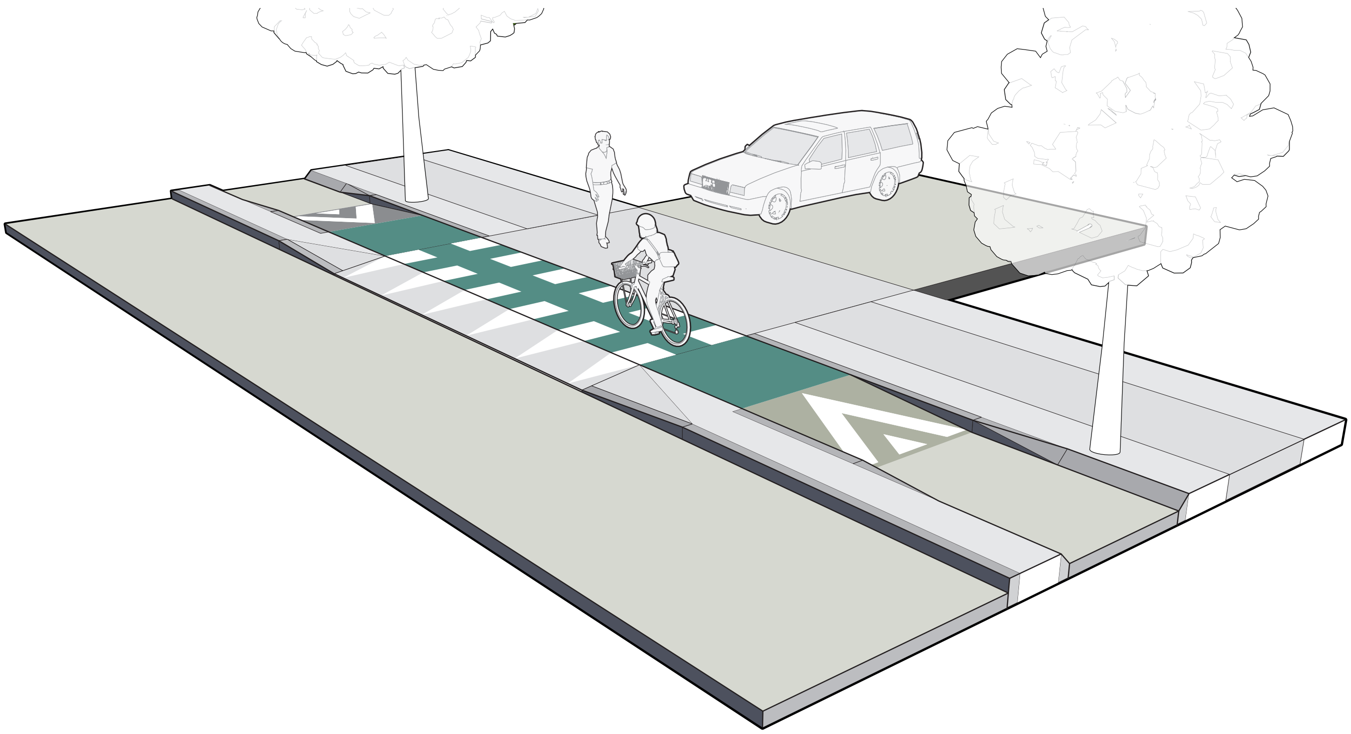
NACTO Urban Bikeway Design Guide (2012)

MassDOT Separated Bicycle Lane Planning & Design Guide (2016)

FHWA Separated Bicycle Lane Planning and Design Guide (2015)

DRIVEWAYS

Most bicycle facilities will need to cross streets, driveways, or alleys at multiple locations along a corridor. At these locations, the crossings should be designed to 1) delineate a preferred path for people bicycling through the intersection and 2) to encourage driver yielding behavior, where applicable. Bicycle crossings may be supplemented with green pavement, yield lines, and/or regulatory signs.



- Supplemental yield lines, otherwise known as shark's teeth, can be used to indicate priority for people bicycling and may be used in advance of unsignalized crossings at driveways, at signalized intersections where motorists may turn across a bicycle crossing during a concurrent phase, and in advance of bicycle crossings located within roundabouts.
- Raised bicycle crossings further promote driver yielding behavior by slowing their speed before the crossing and increasing visibility of people bicycling.
- The bicycle crossing may be bounded by 12" (perpendicular) by 24" (parallel) white pavement dashes, otherwise known as elephant's feet. Spacing for these markings should be coordinated with zebra, continental, or ladder striping of the adjacent crosswalk.
- The bicycle crossing should be a minimum of 6' wide for one-way travel and 10' wide for two-way travel, as measured from the outer edge of the elephant's feet. Bicycle lane symbol markings should be avoided in bicycle crossings. Directional arrows are preferred within two-way bicycle crossings.
- Dashed green colored pavement may be utilized within the bicycle crossing to increase the conspicuity of the crossing where permitted conflicts occur. Green color may be desirable at crossings where concurrent vehicle crossing movements are allowed and where sightlines are constrained, or where motor vehicle turning speeds exceed 10 mph.

REFERENCES

MassDOT Separated Bike Lane Planning & Design Guide (2016)

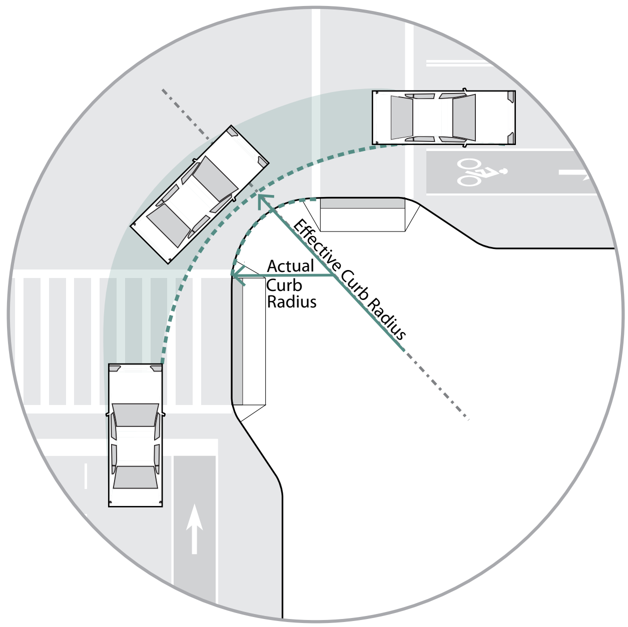
FHWA Separated Bike Lane Planning and Design Guide (2015)

CORNERS AND CURB RADII

Pedestrian safety and comfort is directly impacted by the width and configuration of street corners; however, streets must accommodate large turning vehicles, including school buses and transit vehicles. One of the most challenging aspects of intersection design is to determine methods of accommodating large vehicles while keeping intersections as compact as possible. This requires a great deal of design flexibility and engineering judgment, as each intersection is unique in terms of the angles of the approach and departure, the number of travel lanes, the presence of a median, and a number of other features that fundamentally impact corner design.

A variety of strategies can be employed to minimize curb radii:

+ On-street parking and bicycle lanes may provide the larger effective radii to accommodate the appropriate design vehicle.
+ On low volume (less than 4,000 vehicles per day), two-lane streets, corner design should assume that a large vehicle will use the entire width of the departing and receiving travel lanes, including the oncoming traffic lane.
+ At signalized intersections, corner design should assume the large vehicle will use the entire width of the receiving lanes on the intersecting street.
+ At signalized intersections where additional space is needed to accommodate turning vehicles, consideration can be given to recessing the stop bar on the receiving street to enable the vehicle to use the entire width of the receiving roadway (encroaching on the opposing travel lane).
+ In some cases, it may be possible to allow a large turning vehicle to encroach on the adjacent travel lane on the departure side (on multi-lane roads) to make the turn.
+ A compound curve can be used to vary the actual curb radius over the length of the turn so that the radius is smaller as vehicles approach a crosswalk and larger when making the turn.
+ In some cases where there are alternative access routes, it may be possible to restrict turning movements by large vehicles at certain intersections and driveways to enable tighter curb radii.
+ Turn restrictions and alternate access routes should be properly signed and must be approved by T&ES.

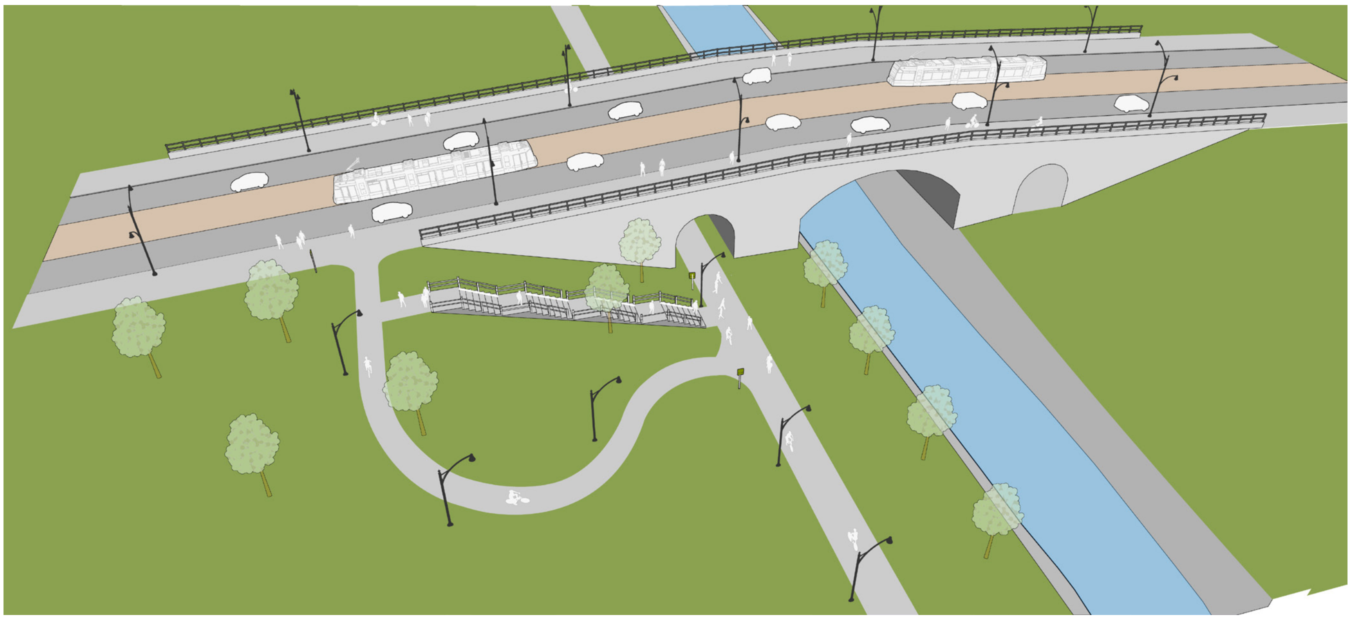


GUIDANCE

+ The design vehicle should be selected according to the types of vehicles using the intersection with considerations to relative volumes and frequencies. In most cases, the curb radii are based on a Single Unit vehicle with a 42' turning radius. If the City anticipates the need to accommodate a larger design vehicle, a radius evaluation based on this larger vehicle would be required. Examples of typical turning templates would include a SU, WB-40, WB-50, WB-60 and WB-62.
+ Intersection design should strive for an actual curb radii that is between 10' to 25'. The default curb radii for two intersecting Neighborhood Residential Streets is 10' (exceptions apply for angled streets). For all other street classifications, including streets that intersect with Neighborhood Residential Streets, corner design should strive for an actual curb radius that is no more than 15' (exceptions apply for angled streets). Methods to minimize curb radii are described below.

BRIDGE DESIGN

Bridge crossings are significant investments and therefore typically occur infrequently. However, bridges provide critical access linkages in a community and when they are designed, it is important that they accommodate pedestrians and bicyclists. A bridge without walking and bicycling access can result in a lengthy detour that discourges the trip, or requires the use of unsafe facilities.



Accommodations for pedestrian and bicycle travel should be provided on both sides of bridges. These facilities should be bi-directional where possible, in order to increase mobility and limit the need for vulnerable road users to cross the street. When planning for bicycle and pedestrian facilities on or beneath bridges, the facility design should account for existing and projected user volumes. The design should also consider whether to provide separate bicycle and pedestrian accommodations or combine these uses with a shared use path.

While an accessible route will be required to access a bridge, stairs may provide a more direct and shorter route, and should be considered to complement the accessible route. Stairs can accommodate bicycles by providing a bike channel. The handrail must be designed such that pedestrians are easily able to reach the railing without conflict with the bike channel.

Bridges may provide needed connectivity within a community, but opportunities to rebuild them are infrequent. Therefore, when such opportunities arise, the new design should account for all anticipated future uses and connectivity needs. Waterways, railroads and highways may provide a desirable corridor for future shared use paths.

+ The desirable clear width for a sidewalk on a bridge is 8 feet.
+ The minimum width for one-way bicycle travel is 4 feet.
+ Shy distances should be accounted for when providing the clear width. 1.5 feet is generally needed to provide shy distance from railings and other vertical objects.
+ On bridges that accommodate both vehicular and pedestrian/bicycle travel, only crash-tested railing should be installed.

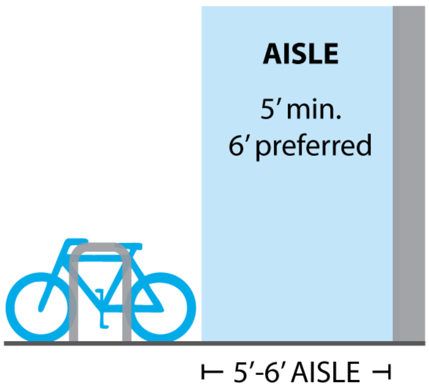
REFERENCES

NACTO Urban Street Design Guide (2012)

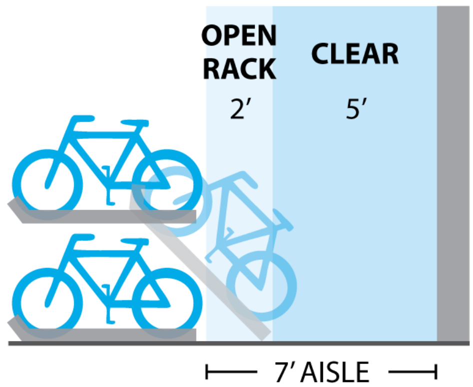
FHWA Achieving Multimodal Networks (2016)

BIKE PARKING

Bicycle parking enhances the usefulness of bicycle networks by providing locations for the secure storage of bicycles during a trip. Bicycle parking enables bicyclists to secure their bicycles while enjoying the offerings of a street or patronizing businesses and destinations in the city. Bicycle parking requires far less space than automobile parking-- in fact, 10 bicycles can typically park in the area needed for a single car.



Single Tier/Single Loaded



Two Tier/Single Loaded

Bicycle parking consists of a rack that supports the bicycle upright and provides a secure place for locking. Bicycle racks should be permanently affixed to a paved surface. Movable bicycle racks are only appropriate for temporary use, such as at major community gatherings.

On-street bicycle parking is intended for short term use. Bicyclists parking overnight should utilize offstreet bicycle parking facilities. Bicyclists typically find a variety of fixed objects in the street to which they lock their bicycles. These include parking meters, tree well fences, lawn fences or other objects. These objects may satisfy the need for bicycle parking, but if this is the intent, they should be designed and located with this use specifically in mind. Otherwise, the use of such objects for parking may indicate insufficient or inappropriately located bicycle parking facilities.

+ Bicycle racks should provide two points of support for bicycles to prevent locked bicycles from falling over.
+ Bicycle rack footings can be mounted in soil, concrete, or asphalt, or mounted to stable surfaces using anchors.

REFERENCES

NACTO Urban Street Design Guide (2013)

Manual on Uniform Traffic Control Devices (2009)

APBP Bicycle Parking Guidelines (2010)

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

SEPARATED BIKE LANE MAINTENANCE

Separated bike lanes require routine maintenance to ensure they provide safe bicycling conditions. Because of their location on the edge of the roadway, separated bike lanes are more likely to accumulate debris in all seasons. During the freeze/thaw cycles of the winter months, separated bike lanes are particularly susceptible to icing. As bicyclists are typically inhibited from exiting separated bike lanes, they may have no opportunity to avoid obstacles such as debris, obstructions, slippery surfaces, and pavement damage and defects.

An example of separated bike lane maintenance needs (Atlanta, GA)

CONSIDERATIONS

A separated bike lane should be maintained in a similar manner as the adjacent roadway, regardless of whether the separated bike lane is at street level or sidewalk level. Maintenance of separated bike lanes is therefore the responsibility of the public or private agency that is responsible for maintaining the adjacent roadway. This practice may contrast with responsibility for maintaining the adjacent sidewalk, which in some cases will be that of the abutting landowner.

Generally, separated bike lane widths of 8 feet or more are compatible with smaller sweepers and plows, but responsible parties may have larger and incompatible maintenance fleets. Narrower sweepers and plows (approximately 4 feet to 5 feet minimum operating width) may be required to clear one-way separated bike lanes.

Trash Collection

Where separated bike lanes are introduced, the general public, public works staff and contractors should be trained to place garbage bins in the street buffer zone to avoid obstructing the bike lane. Sidewalk buffers may be used to store bins where street buffers are too narrow. Special consideration may be required in separated bike lane design for access to large dumpsters which require the use of automated arms. This may require spot restrictions of on-street parking or curb cuts to dumpster storage in order to accommodate access.

Winter Maintenance

Snow and ice should be cleared from separated bike lanes to maintain safe and comfortable access by bicycle during winter weather events. A minimum 4 feet clearance per direction (i.e., 8 feet minimum for two-way facilities) should be provided in the bike lane zone as soon as practical after snow events. Snow from the separated bike lane should not be placed in the clear width of the sidewalk or vice versa.

Sweeping and Debris Removal

For street-level separated bike lanes without raised medians, debris can collect in the street buffer area between vertical objects and can migrate into the bike lane if not routinely collected. Landscaped areas, including green stormwater infrastructure, can also collect debris and require regular attention. Fine debris can settle into permeable pavement and inhibit surface infiltration unless vacuumed on a routine basis. At a minimum, permeable pavement should be vacuumed several times per year, depending on material type.

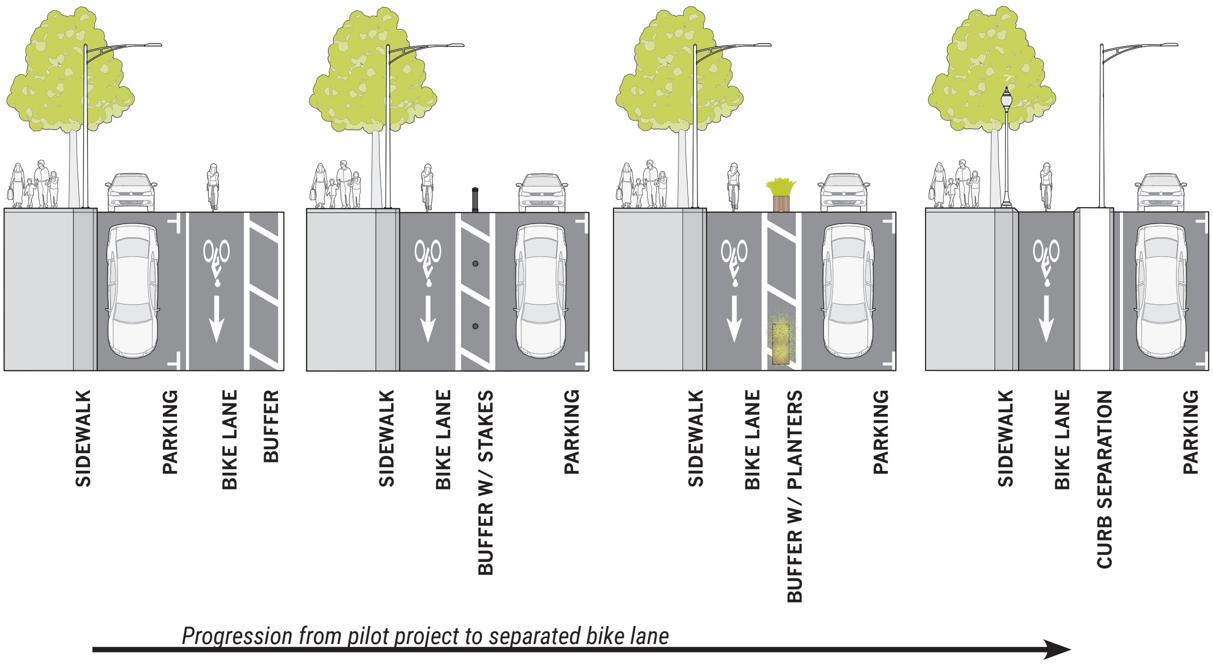
REFERENCES

NACTO Urban Streets Design Guide (2012)

MassDOT Separated Bicycle Lane Planning & Design (2016)

LIFE OF A BIKE LANE

Separated bike lanes have been implemented in many cases as low-cost retrofit projects (e.g. using flex posts and paint within the existing right-of-way). More permanent forms of separation, such as curb-protected bike lanes, cost more and are less flexible once implemented. A phased implementation approach, where “pilot” projects transition to permanent protected bike lanes may solve both of these problems, by implementing the facility slowly and troubleshooting before permanent materials and high costs are necessary.



Lower-cost retrofits or demonstration projects allow for quick implementation, responsiveness to public perception and ongoing evaluation. Separation types for short-term separated bike lane designs often include non-permanent separation, such as flexible delineator posts, planters or parking stops. Pilot projects allow the agency to:

+ Test the separated bike lane configuration for bicyclists and traffic operations
+ Evaluate public reaction, design performance, and safety effectiveness
+ Make changes if necessary
+ Transition to permanent design

+ Permanent separation designs provide a high level of protection and often have greater potential for placemaking, quality aesthetics, and integration with features such as green stormwater infrastructure. Agencies often implement permanent separation designs by leveraging private development (potentially through developer contribution), major capital construction, and including protected bike lanes in roadway reconstruction designs. Examples of permanent separation materials include rigid bollards, raised medians and grade-protected bike lanes at an intermediate or sidewalk level.

REFERENCES

NACTO Urban Street Design Guide (2013)

FHWA Protected Bike Lane Planning and Design Guide (2015)