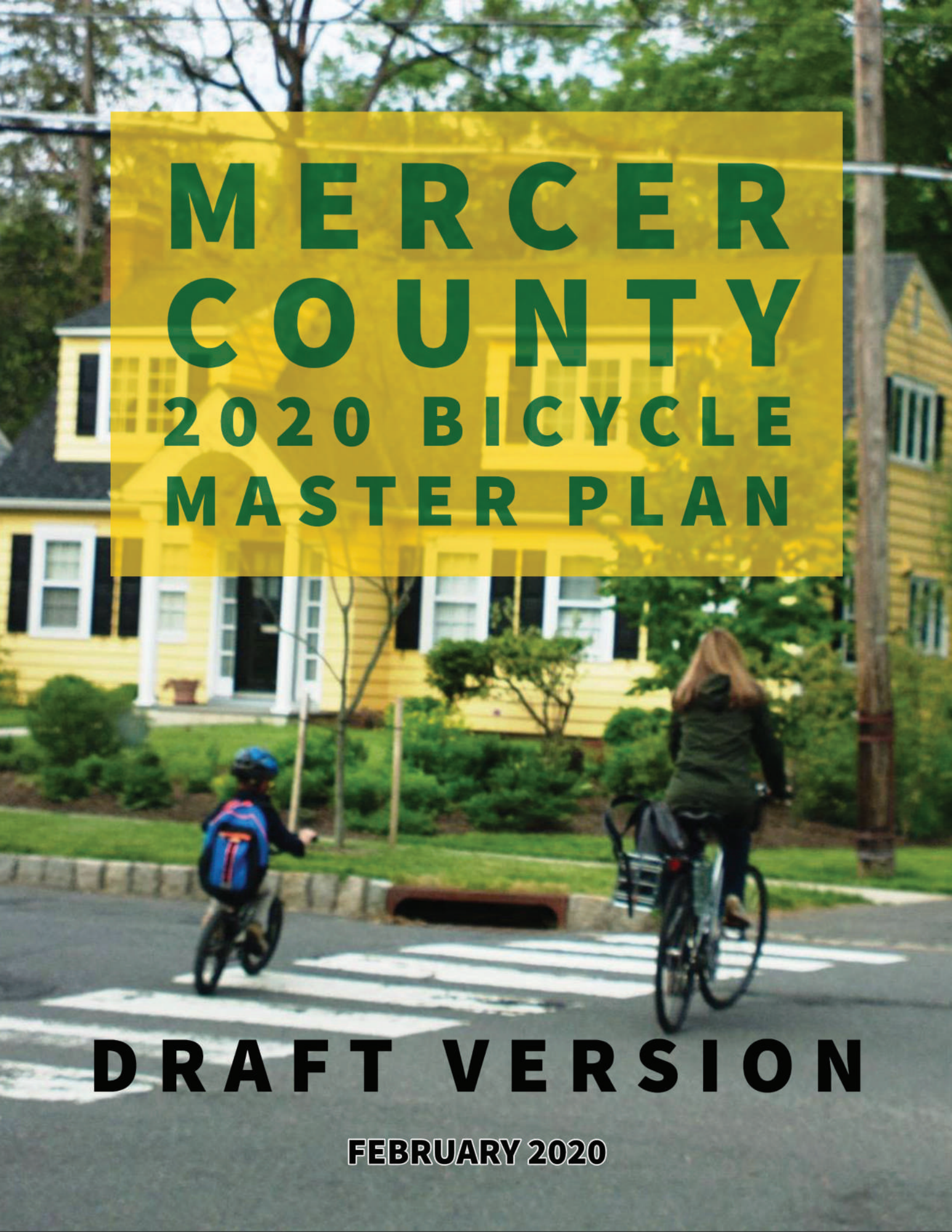

MERCER COUNTY
2020 BICYCLE MASTER PLAN

DRAFT VERSION

FEBRUARY 2020

Mercer County Bicycle Master Plan

Adopted February __ , 2020

Brian M. Hughes, County Executive

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Additional copies of this report can be found on the Official Mercer County Website at **http://www.mercercounty.org**

Cover Photo Courtesy of West Windsor Bicycle and Pedestrian Alliance

Mercer County Bicycle Master Plan

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The original of this plan has been signed and sealed in accordance with the New Jersey Professional Planners Licensing Act.

Adopted by the Mercer County Planning Board, February __, 2020.

Leslie R. Floyd, AICP, PP #5681
Planning Director

Richard J. Smith
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Mercer County Bicycle Master Plan Acknowledgements

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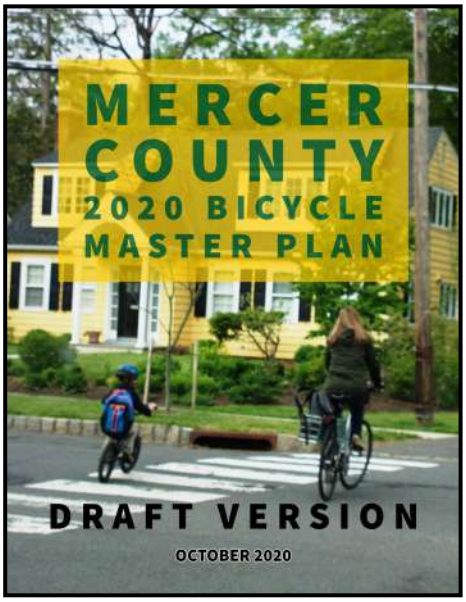
2020 Mercer County Bicycle Master Plan Table of Contents

BICYCLE MASTER PLAN EXECUTIVE SUMMARY

This plan is a sub-element of the Mercer County Master Plan Mobility Element and serves to enhance the County road network, as directed in the Mercer County Complete Streets Resolution (Resolution No. 2012-249) adopted April 26, 2012. With this Resolution, the Mercer County Board of Chosen Freeholders expressed support for the County Executive's "Complete Streets" policy for the planning, design, construction, maintenance, and operation of new and retrofitted transportation facilities to enable safe access and mobility, not only for motorists, but also for pedestrians, bicyclists, and transit users of all ages and abilities. This Plan offers guidance to project development in the County's capital program. Its goal is to enhance the safety and convenience of bicycle travel on the County's road network and thereby improve the quality of life for everyone who lives and works in Mercer County.



GENERAL PROJECT INFORMATION

Mercer County's strategy for improving the cycling network focuses on improvements for safety and accommodation along approximately 180 centerline miles of roadway under County jurisdiction These roads serve as critical corridors for intra-county (600 routes) and inter-county (500 routes) mobility. By addressing bicycle mobility on these routes, the County hopes to provide strategies that complement municipal plans and forge new connections. The plan builds upon roughly 15 years of work of the County Planning Department, the Mercer County Bicycle and Pedestrian Task Force (MCBPTF), and careful review of municipal plans and studies.

The Mercer County Bicycle Master Plan provides recommendations for bicycle facilities to be considered for every County route segment. Based on a wide-ranging review of best practices nationwide, and on facility standards developing within the State of New Jersey, particular recommendations for specific segments were deemed most practical given cartway and right-of-way limits, posted speeds, traffic volumes, truck and bus routes, adjacent land use, and more. Recommended facilities are not proposed projects nor are they final recommendations. County Planning and Engineering staff will study locations in greater detail and consider location-specific design alternatives as scheduled capital projects advance, and may propose new projects to close critical gaps or create longer corridors. Final facility designs and implementation schedules will be determined case by case, at the final discretion of the County Engineer.

PLAN GOALS AND OBJECTIVES

Goals

In order to achieve this vision, the County of Mercer has outlined a C5 strategy, similar to that in NJDOTs *Complete Streets Design Guide*, for developing and integrating bike facilities throughout the County. These 5 goals will guide the County's efforts:

Continuous: Create a network of continuous facilities that do not require bicyclists to walk their bikes or weave in and out of vehicular traffic.

Complete: Create a complete and thorough network of on and off-road bike facilities.

Connected: Provide bicycle access to destinations such as schools, employment centers, neighborhoods, shopping centers, trails, parks and other major attractors.

Comfortable: Create a safe ride where people do not have to fear riding on our facilities.

Convenient: Create facilities that are easy to use by all age groups.

Bicycle Master Plan Objectives

In order to advance these goals, this study has achieved four objectives:

Consider roadway conditions of all County Routes, including: Posted Speeds, Traffic Volumes, Existing Cartway Widths, Adjacent Land Use, Environmental Conditions, Constraints and Pinch Points, Truck Routes, Bus Routes, and Street Activity.

Demonstrate conceptual designs and identify opportunities, constraints and costs associated with implementation.

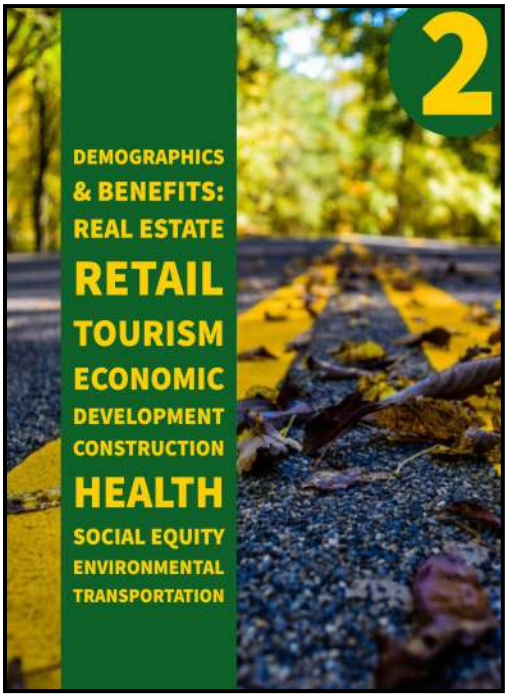
Identify and separate road segments into **short term, medium term and long term project horizons** based on necessary infrastructure, right-of-way considerations, and fiscal constraints.

Specific Goal Targets

- Build at least 30 miles of bike facilities by end of 2025.
- Double the bicycle commuting mode share in Mercer County by 2030.
- Improve safety for pedestrians and bicyclists by reducing bicycle & pedestrian crashes on County roads by 50% by 2030.
- Encourage biking and walking events to promote healthy, active living and to enjoy the associated economic and environmental benefits.
- Enhance the connectivity of adjacent off-road and on-road bikeways and walking trails.
- Achieve a minimum of Level of Traffic Stress 3 rating on improvement projects, targeting LTS 1 & 2.
- Establish a working relationship with local planners, engineers and officials as well as with NJDOT staff for efficient project advancement and coordination.

BICYCLE MASTER PLAN PURPOSE AND NEED

The main purpose of this project is to assist in the implementation of our Complete Streets Policy, which aims to accommodate all modes of transportation and users of all ages, abilities and incomes. At this time, every municipality in the County, as well as the State of New Jersey has adopted similar Complete Street Policies.

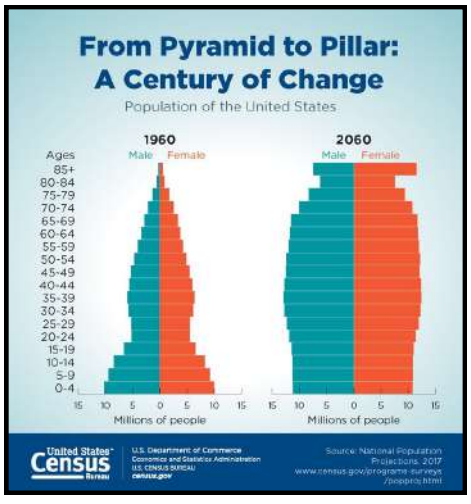


Cycling is an important mode for County residents. For many, cycling is an enjoyable recreational activity, For others it is a primary travel mode for commuting and errands. The Princeton area in particular has a high concentration of commuters who exclusively ride their bicycles to work and school. In other parts of the County, cycling is less a choice than a necessity. For households living below the poverty line or households with only a single vehicle, the option of cycling may be critical. And walking or cycling may be the only way for young people with working parents to get to extracurricular activities.

To support the case for implementing bicycle facilities, Chapter 2 of the Bicycle Master Plan cites numerous positive impacts on real estate, retail, tourism, and economic development activity. That chapter also describes benefits to public health, social equity, environmental justice, the environment, and how cycling may contribute to pavement preservation, crash reduction, and congestion reduction.

BICYCLE MASTER PLAN ANALYSIS

Anticipating an aging population, this Plan takes an '8 to 80 design' approach, which is based on the premise that if a community is accommodating for eight year olds and 80 year olds, then that community is accommodating to everyone. To do so, Planning staff adopted a facility selection method similar to that in the NJDOT *2017 Complete Streets Design Guide*. This method is primarily driven by traffic speeds and volumes, as are most best practices today in the United States. The premise is that, as volumes and speeds increase, the level of "traffic stress" for cyclists increases. More than just a feeling, crashes at higher speeds result in exponentially higher fatality rates for cyclists. This means that high speed and high volume roads need greater separation from traffic, with wider bike lanes and buffers, or physical separation on a side path.



Chapter 3 applies this method to every segment of roadway under the jurisdiction of the County to assign a facility type, and assigns codes to indicate planning-level estimates of design and construction costs. Types and costs are indicated in maps and tables.

BICYCLE FACILITY RECOMMENDATIONS

While Chapter 3 provides a facility recommendation based on the County Bicycle Facility Selection Table and road characteristics, Chapter 4 recommends design considerations for the various facility types. The designs and recommendations to be considered are derived from design and policy manuals from both local agencies and national organizations, including the Federal Highway Administration. These manuals offer guidance on standards, best practices, and strategies for design and construction of bicycle facilities.

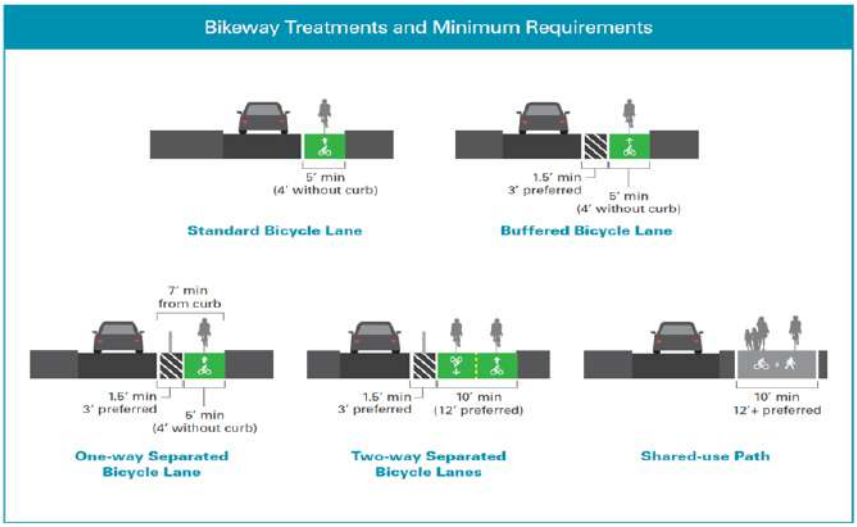
Mercer County Bicycle Facility Selection Table

	USLIMITS2 Recommended Speed						
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	A B C D E F	A B C D E F	C D E F	C D E F	C D E F	D* E F	F
2,500–5,000	B C D E F	B C D E F	C D E F	C D E F	D* E F	D* E F	F
5,000–10,000	B C D E F	B C D E F	C D E F	C* D E F	D* E F	D* E F	F
10,000–15,000	C* D E F	C* D E F	C* D E F	C * D* E F	D* E F	D* E F	F
15,000-30,000	C* D E F	C* D E F	C* D E F	D* E F	E F	E* F	F
≥30,000	F	F	F	F	F	F	F

A: Shared Street/Bicycle Boulevard
B: Shared-lane Markings
C: Bicycle Lane
C*: Bicycle Lane (After careful consideration)
D: Buffered Bicycle Lane
D*: Buffered Bicycle Lane (After careful consideration)
E: Separated Bicycle Lane
E*: Separated Bicycle Lane (After careful consideration)
F: Shared-use Path

1. If USLIMITS2 data not available, use posted speed
2. Bicycle boulevards are preferred at speeds ≤25 mph
3. Shared-lane markings are not a preferred treatment with truck percentages greater than 10%
4. Buffered Bike Lanes may include Rumble Strips if designed to Mercer County Bike Friendly Standards.

Source: Mercer County Department of Planning, Trenton, New Jersey



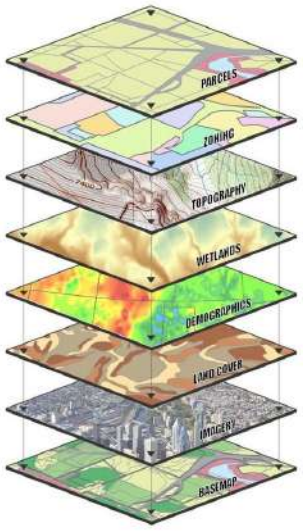
Above: Mercer County selection table as well as NJDOT graphic showing most common types of bicycle facilities available.

It is important to note that there is significant room for flexibility in highway and roadway design. In particular, the often used AASHTO *Policy on Geometric Design of Highways and Streets* (the 'Green Book') is not a detailed design manual but a guidance document to be used to make better-informed decisions. There is a significant range of roadway conditions within Mercer County so a "one size fits all" approach will not work. Context sensitive solutions must be used to reflect the location and community. As a result, a range of design reference and guidance documents will be used to design and implement bicycle facilities throughout the County.

Despite flexibility in geometric design, the County must comply with the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD is adopted by reference in accordance with Title 23, United States Code, Section 109(d) and Title 23, Code of Federal Regulations, Part 655.603, and is approved as the national standard for designing, applying, and planning traffic control devices, including roadway striping and signage. As the MUTCD and other federal guidance changes, design recommendations may vary during the life of this plan.

GIS ANALYSIS

Mercer County's bicycle facility selections in Chapter 3 were based on a careful analysis of the roadway conditions and surrounding land use in order to provide context sensitive recommendations. To support this analysis, 21 different environmental, land use, and transportation data sets, and three aerial imagery sources were compiled within a geographic information system (GIS), which is a framework for gathering, managing, and analyzing spatial data. With frequent reference to Google Steetview imagery, these data allowed staff to visualize each segment of road and nearby infrastructure, as well as nearby environmental assets and constraints. Measurements in GIS were compared to field samples and found to be within six inches, plus or minus. With these data, staff was able to make a good faith determination of what facility to recommend for each segment and to estimate implementation costs. In total, approximately 931,957 feet or 176.5 miles of roadway were analyzed, in 50'-250' segments.



Above: Simplified visualization of overlapping GIS data.

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed _Parking	Length(ft)	CONcost	DEScost	TOTcost	LFcost	Truck_or_BusRo ute
Sullivan Way / [illegible] Creek Road / Trenton-Harbourton Road / Harbourton-Rocktown Road																	
00000579_	0.000	0.070	1	35	30	12,500	2	2	28'-36'	Sharrow to underpass	No Parking	370	739	739	1,478	4.00	Bus and Truck Route
00000579_	[illegible]	[illegible]	5	35	30	12,500	110	20	22'	D&R Underpass... Build	No Parking	116	12,778	2,323	15,101	130.00	Bus and Truck Route
00000579_	0.092	[illegible]	3	35	30	10,000	55	20	28-32'	Need to widen out to 38'	No Parking	544	29,911	10,877	40,788	75.00	Bus and Truck Route
00000579_	0.195	[illegible]	3	25	25	8,000	55	20	32'-34'	Need to widen out to 38'	No Parking	924	50,820	18,480	69,300	75.00	Bus and Truck Route
00000579_	0.370	0.80	3	40	35	8,500	85	20	26'-30'	Need to widen out to 38'	No Parking	2,270	192,984	45,408	238,392	105.00	Bus and Truck Route
00000579_	0.800	0.908	3	40	35	8,500	55	20	32'-34'	Need to widen out to 38'	No Parking	570	31,363	11,405	42,768	75.00	Bus and Truck Route
00000579_	0.908	0.943		40	35	10,000	85	50	40'-42'	Need to widen out to 50'	No Parking	185	15,708	9,240	24,948	135.00	Bus and Truck Route
00000579_	0.943	0.990		40	35	10,000	55	20	46'-48'	Need to widen out to 50'	No Parking	248	13,649	4,963	18,612	75.00	Bus and Truck Route
00000579_	0.990	1.090	3	40	35	9,000	3.4	2	36'-40'	Diet Lanes to 11'-11.5'	No Parking	528	1,795	1,056	2,851	5.40	Bus and Truck Route
00000579_	1.090	1.160	3	[illegible]	35	9,000	85	20	36'-38'	Need to widen out to 50' for 3 12' lanes, 5' bike	No Parking	370	31,416	7,392	38,808	105.00	Bus and Truck Route
00000579_	1.160	1.350	3	[illegible]	35	9,000	4	2	38'-40'	Diet Lanes to 12' and put	No Parking	1,003	4,013	2,006	6,019	6.00	Bus and Truck Route
00000579_	1.350	1.416	3	40	35	9,000	4	2	40'-45'	Diet Lanes to 12' and put	No Parking	348	1,394	697	2,091	6.00	Bus and Truck Route
00000579_	1.416	1.635	4	40	35	9,000	20	8	40'-43'	Redirect all bike traffic to [illegible]	No Parking	1,156	23,126	9,251	32,377	28.00	Bus and Truck Route

Above: Within our geographic information system (GIS), we utilized NJDOT 2014 centerline information to break up each route into segments based on identified AADT, speeds, pavement cartway, pinch points, and other relevant information. The entire Mercer County Bikability network is as a result based on the 2014 Standard Route Identifier (SRI) and Linear Referencing Systems (LRS). Each segment as a result can be looked at individually, which is much more helpful when determining costs and improvements. In addition to the improvement and design codes provided for each segment, a field for additional comments was included to provide more detail.

IMPLEMENTATION AND MAINTENANCE

The final Chapter of the Bicycle Master Plan focuses on implementation and maintenance. This chapter outlines how the County can incorporate bicycle facilities that do not require changes to geometry or motor vehicle operations into our resurfacing projects. Initially a bicycle facility may appear simply as a wider shoulder. The County will consider formally designating bicycle routes when practical extents are achieved, such as when longer continuous segments and connections are possible. For larger projects on longer timeframes, which may require traffic signal alterations, right-of-way, or geometric changes, the County may either design facilities in-house or work with outside contractors to develop design plans for construction.

Long-term maintenance must also be considered. Just like regular vehicle lanes, bike lanes must be kept clear of debris, free of hanging vegetation, free of standing water, free of parked vehicles and free of snow and ice in winter. The County will also need to work with towns to educate residents and pass parking and debris ordinances, where necessary to keep bicycle lanes clear. When adding bicycle facilities, it is important to understand that, as the network is built out, maintenance may require additional machinery and manpower to keep lanes in a good state of repair.

PLANNING BOARD & LAND DEVELOPMENT

Chapter 5 also discusses how Complete Streets, and bicycle facilities in particular, should be incorporated into the County's Land Development process. The New Jersey County Planning Act (N.J.S.A 47:20-1, et seq.) authorizes counties to balance the desires of private developers with the general welfare and safety of the traveling public. Through the County Land Development process, the Planning Board may require the installation of bicycle and pedestrian facilities on County highways or require that accommodations to be made for future projects. Where municipal streets provide potentially desirable bicycle access to the County network, the Planning Board may recommend consideration of bicycle improvements on those streets.

The parent document of this element, the Mobility Element of the County Master Plan, identifies five roadway types or 'access levels' for Mercer County highways, with desirable typical sections (DTS) that define right of way requirements to accommodate travel by motor vehicle, bicycle, foot, and wheelchair, with elements that include shoulders or on-street parking, bicycle lanes, sidewalks, roadside buffers, as well as vehicular travel lanes and medians or center left two way turn lanes. These DTS assignments define right-of-way dedications required for approval of subdivision and site plans. In most cases, the Master Plan DTS will accommodate bicycle facilities as recommended in this sub-element. However, where high-speed, high-volume roads result in the recommendation of a side path or shared use path, the Planning Board may require its inclusion in a subdivision or site plan. While this plan provides specific, data-driven facility-type recommendations for every County Highway, based on current best practices and standards, final design decisions and implementation schedules are at the discretion of the County Engineer.

PROJECT CONTEXT & BACKGROUND

1

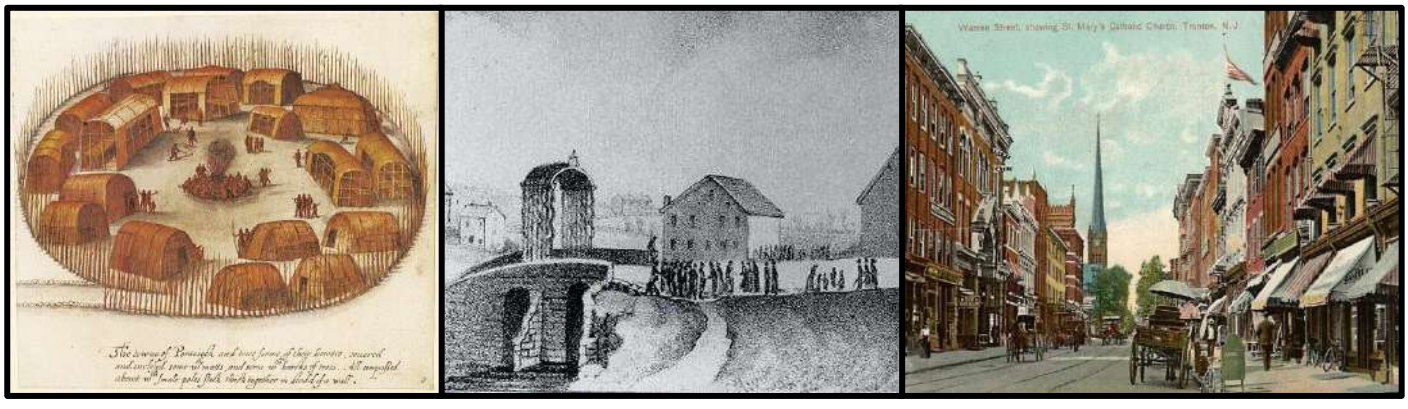
Introduction

Mercer County, prides itself as a center of commerce, education, healthcare and culture. Located in central New Jersey, roughly equidistant between New York City and Philadelphia, the County is home to nearly 400,000 residents within 226 square miles. Our County sits within one of the most densely developed regions in the nation with approximately 10% of the US population living within 75 miles.

The County is home to the State Capital and many state offices as well as numerous fortune 500 corporations and prestigious medical and educational institutions. Along with its many assets, it is also blessed with a rich cultural history that dates back to Native American inhabitation and encompasses sites of original European settlements, vital Revolutionary War locations, industrial revolution factories, and more. The County is also home to a vast amount of preserved farmland and open space, home to numerous parks and a growing trail network.

As Mercer County evolved from a rural agricultural community to a mixed-economy with vast manufacturing in the City of Trenton, the County continued to grow organically. Starting in the post WWII era, we witnessed the first large scale suburban developments, which now form the backbone of our many communities and neighborhoods. During this time, our region witnessed a massive expansion of our highway networks. This network has been evolving to meet our community's needs and to make the County a strong, economically successful and socially vibrant area. Today, our transportation infrastructure is the skeleton on which our modern society is built upon. Without it, our modern society would grind to a halt. Moving forward, the County will continue to improve our highways to accommodate all users and community needs.

With nearly 400,000 residents and thousands of local businesses located within the County, it is crucial to work together to promote a more economically viable, environmentally sustainable and livable area. Transportation planning at the regional scale is critical to our economic vitality, environmental health and community cohesion. To meaningfully influence economic and environmental impacts associated with development, land use, and transportation, officials must act at a level where central cities and suburbs can be considered together. At the County level, our transportation system connects towns to each other and to connect towns to other surrounding counties.



This plan in a sub-element of the Mercer County Mobility Element and serves to enhance our County road network as directed per the Mercer County Complete Streets Resolution (Resolution No. 2012-249), adopted on April 26, 2012. Under this resolution, the Mercer County Board of Chosen Freeholders wish to support the County Executive's "Complete Streets" policy through the planning, design, construction, maintenance and operation of new and retrofitted transportation facilities, enabling safe access and mobility of pedestrians, bicyclists, and transit users of all ages and abilities. This Mercer County Bike Plan serves as a guidance document for the County in developing bicycle facilities along County roadways and, to enhance travel for pedestrians and bicyclists of all abilities. It also serves to improve the quality of our transportation network as well as the quality of life for everyone who lives and works in the County.

Project Context and Background

Through adoption of Complete Streets policies at the State, County, and Municipal levels, Mercer County is committed to accommodating and encouraging transportation by all modes on our public roadways. An important element of this complete streets initiative in turn is the pursuit of a safe and comprehensive network for cyclists. Over the past decade, bicycling has become increasingly recognized as a key element of everything from reducing traffic congestion to improving air quality to reducing obesity and is a critical factor in creating healthy and vibrant communities. Within the county, existing and proposed investments for bicycling are seen in dedicated on-street facilities as well as several off-road multi-use trails, such as the Lawrence-Hopewell Trail, Delaware and Raritan (D&R) Canal Trail and others.

Individually, these projects reflect improved safety for cyclists, but their sum is a network that lacks connectivity - both between bicycle facilities and between key destinations. Obstacles such as highways and large intersections pose additional challenges to improving the connectivity of the network.

Mercer County's strategy for improving the network begins by focusing on improvements for safety and accommodation along our jurisdiction of approximately 180 centerline miles of County Routes. These roadways are owned and maintained by the County, and serve as critical intra-county and inter-county corridors for all users. By addressing bicycle access on these routes, the County hopes to provide strategies that bridge disparate municipal plans and resolve existing obstacles.

The Mercer County Master Bike Plan provides a comprehensive analysis and bicycle facility design recommendations for all County routes. As part of the Mercer County Master Plan, this sub-element of the Mercer County Mobility Element, complements local initiatives and programs; and builds upon the work of the County Planning Department, the Mercer County Bicycle and Pedestrian Task Force (MCBPTF), and local municipalities' plans and studies. This analysis can be used for future planning efforts by County staff as well as by the County Engineer and Planning Board during the Land Development review process, especially when determining DTS, ROW dedications, and conditions of approval such as sidepaths.

Staff from the Delaware Valley Regional Planning Commission (DVRPC), our regional Metropolitan Planning Organization, assisted with this study to assess opportunities, constraints, and strategies towards enhancing bicycle facilities and connections on County Routes within Mercer County, with emphasis on improving safety and mobility for all users.

In addition to the recommendations included in the report, this study provides a replicable framework for identifying, assessing, and designing facilities to be used in future phases of MCPD's bicycle network development. The following pages discuss our County Vision, Goals and Objectives which served as the guide to developing our plan and facility recommendations as well as to help guide future conceptual designs and implementation.

Vision, Goals and Objectives

Bicycling and walking are integral components of an efficient transportation network. Appropriate bicycle and pedestrian accommodations provide the public, including the disabled community, with access to the transportation network, connectivity with other modes of transportation, and independent mobility regardless of age, physical constraint, or income. It is the objective of Mercer County to create a bicycle facility network that encompasses the entire County of Mercer and connects neighborhoods to parks, schools, open space, retail, employment centers, public facilities and anywhere else people may need to go. Our vision is to create the most bike friendly community in the State of New Jersey.

Goals

In order to achieve this vision, the County of Mercer has outlined a C5 strategy, similar to that in NJDOTs *Complete Streets Design Guide*, towards developing and integrating bike facilities throughout the County. These 5 goals will guide the County's efforts of establishing

Continuous: Create a network of continuous facilities that do not require bicyclists to walk their bikes or ride in and out of vehicular traffic.

Complete: Create a complete and thorough network of on and off-road bike facilities.

Connected: Provide bicycle access to destinations such as schools, employment centers, neighborhoods, shopping centers, trails, parks and other major attractors.

Comfortable: Create a safe ride that is comfortable where people do not have to fear riding on our facilities.

Convenient: Create facilities that are easy to use by all age groups.

Objectives

In order to achieve these goals, this study accomplishes 4 objectives:

1. Consider roadway conditions of all County Routes including the following:
   Posted Speeds, AADT, Existing Cartway Widths, Land Use, Environmental Conditions, Constraints and Pinch Points, Truck Routes, Bus Routes, and Street Activity.
2. Demonstrate conceptual designs and identify opportunities, constraints and costs associated with implementation.
3. Identify and separate road segments into short term, medium term and long term project horizons based on necessary infrastructure needed, right-of-way considerations and fiscal constraints.
4. Prioritize bicycle capital program improvements (maintenance, operational or major capital projects), especially for resurfacing projects.

Project Background and Development

The steering committee assembled for this project included staff from the Mercer County Planning Department and the Mercer County Engineering Division. The steering committee also included the Greater Mercer Transportation Management Association (GMTMA) which includes advocates and staff from the Mercer County Bicycle and Pedestrian Task Force (MCBPTF), the Greater Philadelphia Bicycle Coalition, as well as and municipal representatives. The steering committee met during this County Bicycle Master Plan process and the GMTMA Trail Plan process. Committee members and the general public were involved during 5 public meetings and 2 pop-up events held in May, June and July. Photos from those meetings are on the following pages.

Mercer County Planning Department staff also worked closely with the Engineering Division to discuss implications and overall feasibility of bicycle infrastructure. With the help of the Engineering Division, a variety of issues were discussed. Items such as setting speed limits and utilizing USLIMITS2, reducing cartway widths, road diets, intersection improvements, crosswalk types and locations, curb radii, incorporating bike infrastructure during resurfacing projects and more were discussed. The County Highway Division was also consulted with to determine feasibility of improvements at a series of locations. Moving forward the Department of Planning with Engineering and Highway Divisions will work to implement these facilities where feasible.

Steering Committee Meetings

The project team and steering committee first convened at a MCPBTF meeting in September 2016. After introducing the project scope and goals, the committee participated in a map based workshop of prioritizing routes in order to establish a study area for the project. This exercise helped to reduce the number of potential routes from forty to thirteen. An overview of these prioritized routes was provided in January 2017, during the second steering committee meeting. The project team briefly presented the existing conditions of the study area, and outlined the process of collecting, assessing, and mapping street characteristic data.

Feedback from the first two steering committee meetings informed the process by which the project team assembled additional data and conducted analyses. Next, a series of design proposals for each of the priority routes were developed and provided to the steering committee for review at the third meeting in April 2017. The committee shared their priorities and feedback related to the proposed designs, and discussed the potential outcomes of each proposal.

Five Public Meeting & Two Pop-Up Events

2019 Princeton Communiversity Day Celebration with GMTMA

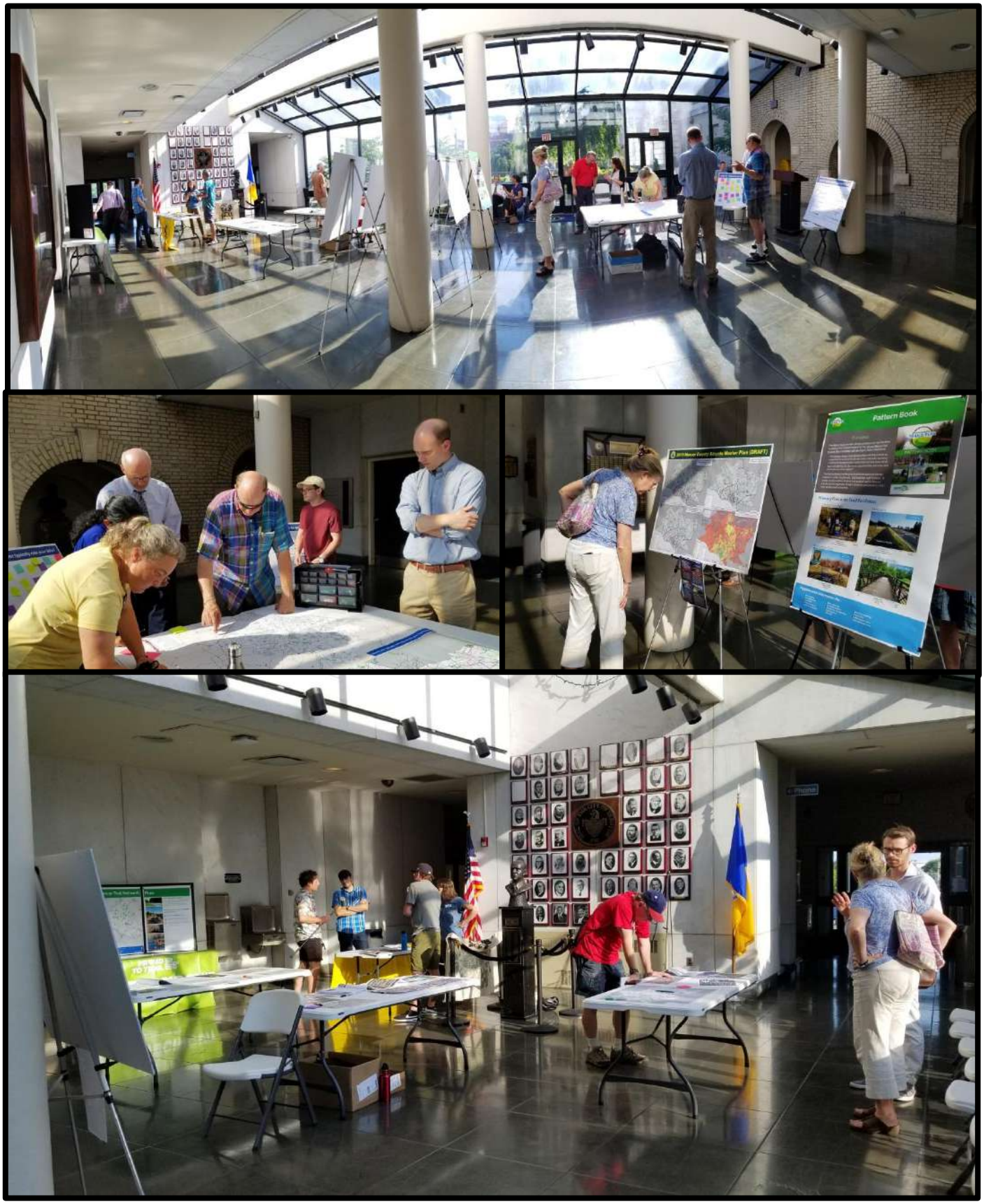
2019 Cultural Heritage Festival at Mercer County Park

Above: Public Bike Plan meeting at the Hightstown Public Library

Above: Public Bike Plan meeting at the Ewing Senior Center across from NJDOT HQ.

Above: Public Bike Plan meeting at the Princeton Country Club in West Windsor.

Above: Public Bike Plan meeting at the Princeton University Carl Fields Center

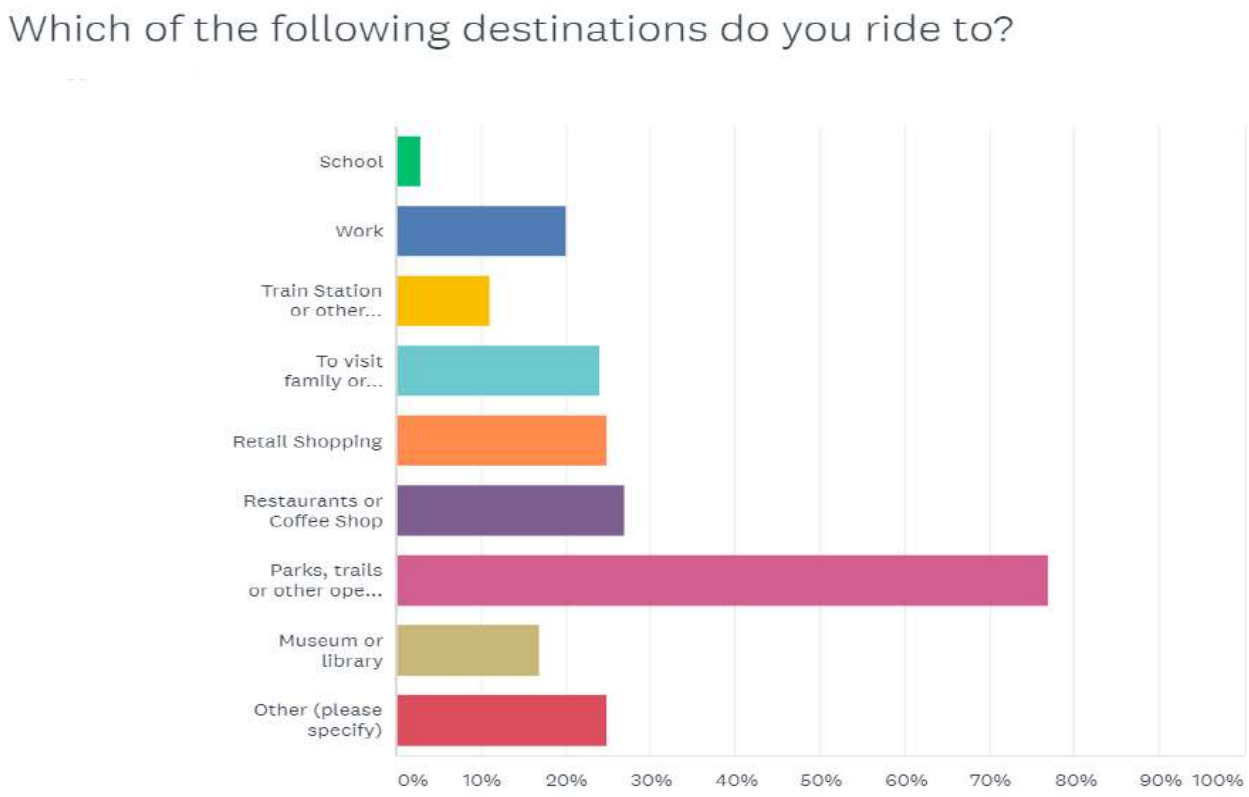


Above: Final Public Bike Plan meeting at Trenton City Hall coordinated with the GMTMA Trail Plan and Trenton Cycling Revolution, a local Trenton area bicycle advocacy group.

Public Meeting Findings & Summary

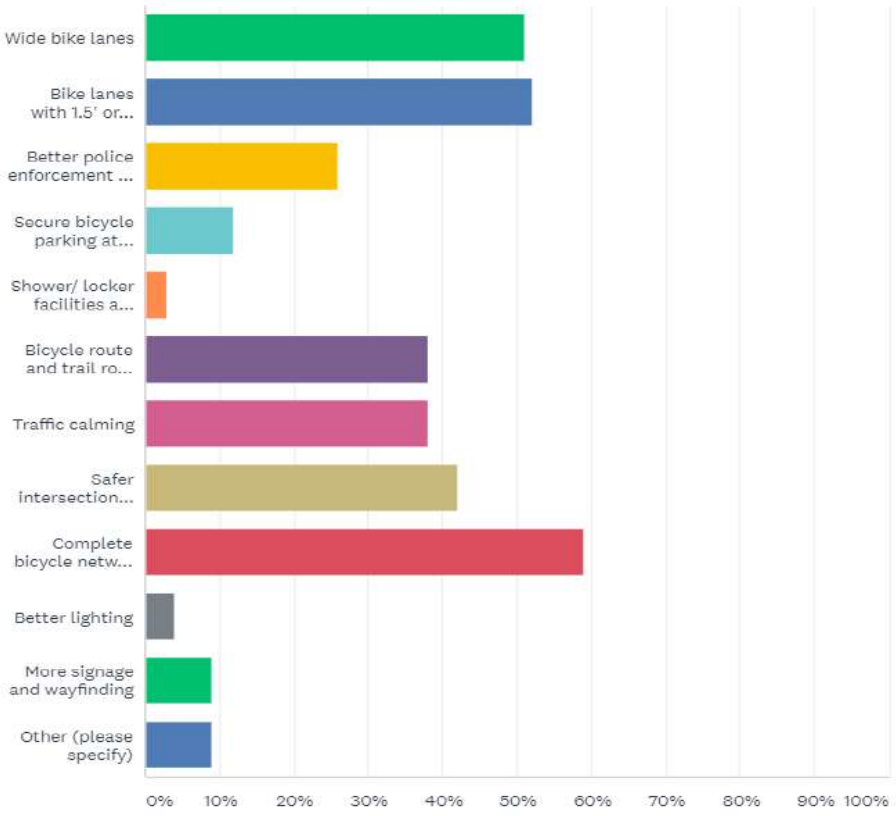
Through the months of May, June and July, a total of 5 public "open-house" style meetings were held throughout the County. These meetings were advertised on County and town websites and social media pages as well as through social media pages of various nonprofits and bicycle advocacy groups. In addition to these public meetings, Mercer County staff ran stands at the Princeton Communiversity Day Festival and the Mercer County Cultural Heritage Festival to reach out to bypass residents who do not or cannot typically attend public meetings. Over these 7 public outreach events, staff interacted with hundreds of residents. During these meetings, staff asked residents to provide feedback on the County Bicycle Master Plan Element and cycling in general around the County.

Three major forms of public participation were utilized. The County began its efforts with an online survey which the County website and social media linked to. Physical paper links with scannable QR codes were also handed out in person during live meetings. The link led to a short 5 minute survey (average response time 4.2 minutes) with 10 questions. The survey saw 144 individual respondents answer the survey. When asked how often they ride their bike, a majority of our respondents (41%) rode a few times a week, followed by 17% who said they rode a few times a year and 12% who rode a few times a year. Approximately 10% of our respondents ride their bikes every single day.



Above: A majority (77%) respondents ride their bike to get to parks, trails or other open space opportunities in and around Mercer County. Due to lack of school reach out, school age children may have been underrepresented.

What would you MOST like to see to make your biking experience better? (Pick up to 4 options)



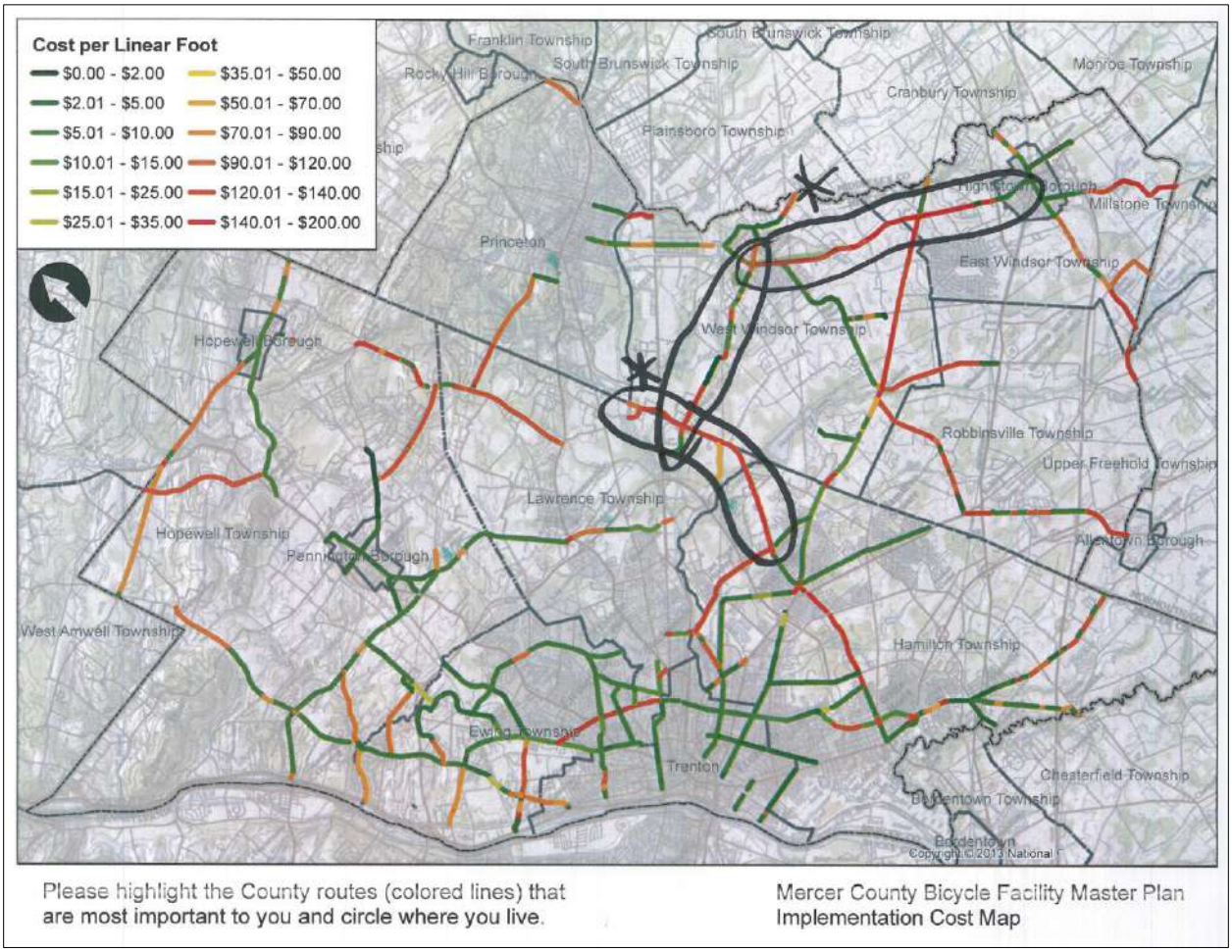
When asked about what impediments riders faced and factors that made it difficult to ride, 58% of respondents cited high speed traffic, 55% said there was too much traffic, and 57% cited that the road was too narrow. Other major problems facing riders include difficult intersections (37% of respondents) as well as unpredictable drivers (34% of respondents) and uneven roads (33% of respondents). When asked what they would like to see most to make their biking experience better, 59% said that a complete bicycle network connecting Local, County and State bike facilities was important. Respondents also wanted wide bike lanes (51% of respondents), bike lanes with 1.5' or 3' buffers (52% of respondents), and safer intersections, interchanges or bridge crossings (42% of respondents).

Approximately 75% of respondents, indicated that the primary reason that they bike was for health or exercise. Most also ride for recreation or for fun (69% of respondents). Only some 20% of respondents indicated that they ride primarily for commuting to school or work reasons. Of our respondents, approximately 65% of people indicated that their average bicycle trip is one hour or less with 35% indicating that their average trip is 30 minutes or less. Of the respondents, approximately 45% of respondents rode their bikes from 1.5 hours to 2 hours in a single trip. Two enthusiastic respondents indicated that they typically ride 4-5 hours in one trip.

STATEMENT	STRONGLY DIAGREE	DISAGREE	NEITHER	AGREE	STRONGLY AGREE	WEIGHED AVERAGE
I feel comfortable riding a bike around my neighborhood.	6%	10%	17%	41%	26%	3.71
I want to live in a community where people can bike to many destinations.	1%	3%	6%	23%	67%	4.52
I would ride my bicycle more often if the bikeway network was improved.	1%	0%	14%	29%	56%	4.39
Improving bicycling will have a positive benefit on Mercer County's attractiveness as a community.	1%	1%	9%	17%	72%	4.58
Better bicycle infrastructure is critical to attract and retain a talented workforce in Mercer County.	2%	4%	29%	35%	30%	3.87
More bicycle parking should be offered around destinations in the County.	0%	1%	20%	57%	22%	4
Providing safe bicycling alternatives for people who can't or don't drive is critical.	1%	2%	11%	46%	40%	4.22
Improving bicycling routes should be just as important as vehicle routes.	3%	4%	7%	31%	55%	4.31

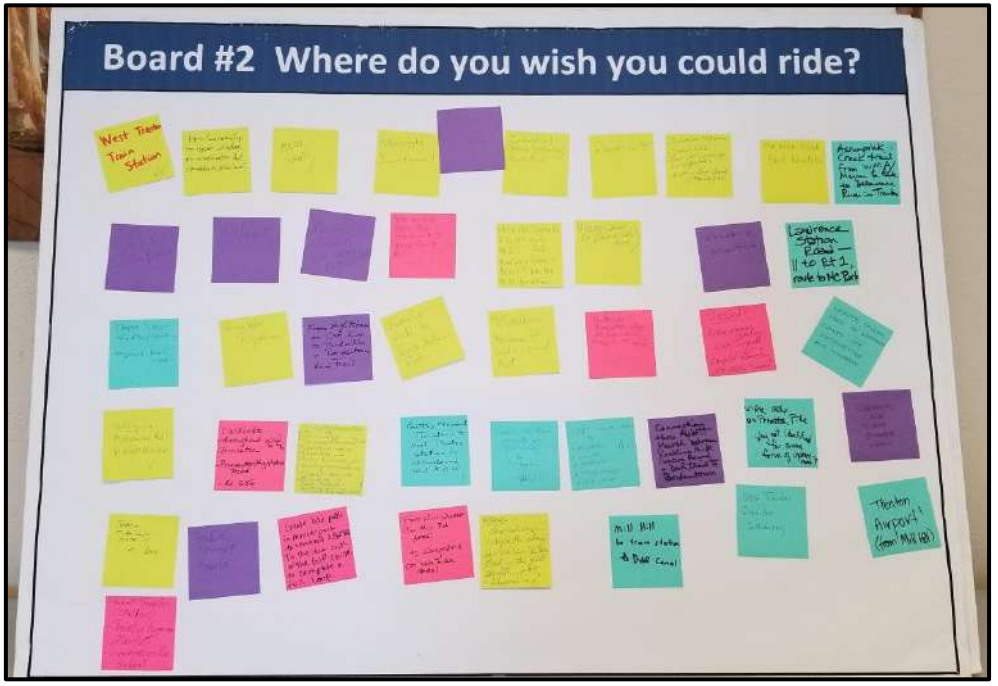
Above: Table showing agreement with a variety of statements. A higher percentage and weighed average indicates more agreement with statement.

The survey also asked the public to agree or disagree with a variety of statements. Respondents answered that they strongly agreed, agreed, had no opinion, disagreed, or strongly disagreed with the statements shown above. Most people would like to live in a community in which they can bike to many destinations and that they would ride their bike more if the bicycle network was improved. Some 89% of respondents agreed or strongly agreed that improving bicycling will have a positive benefit on Mercer County's attractiveness as a community.

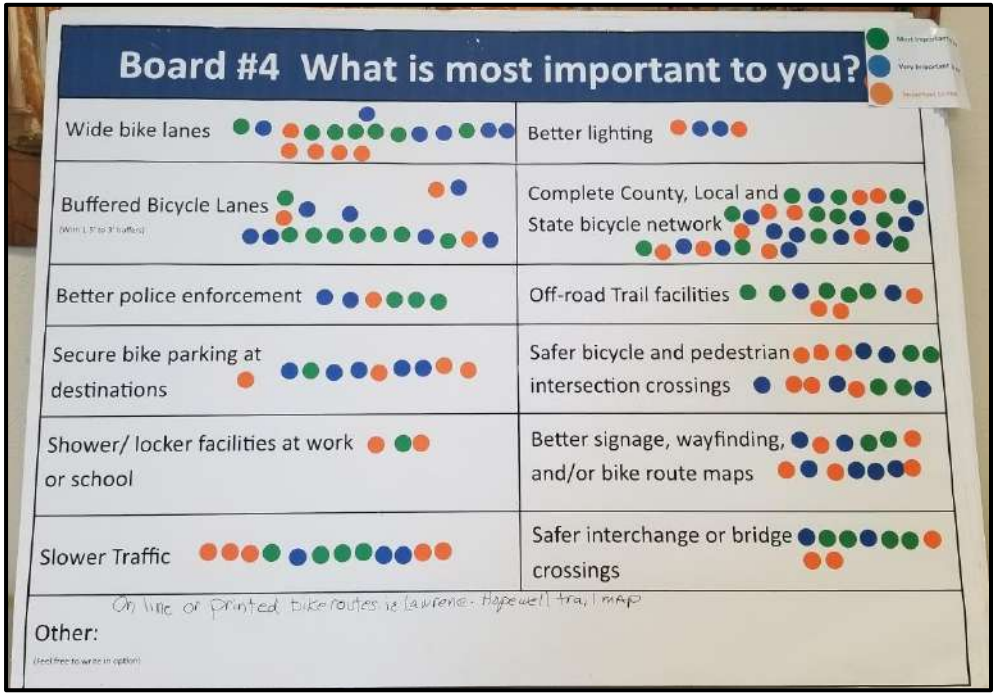


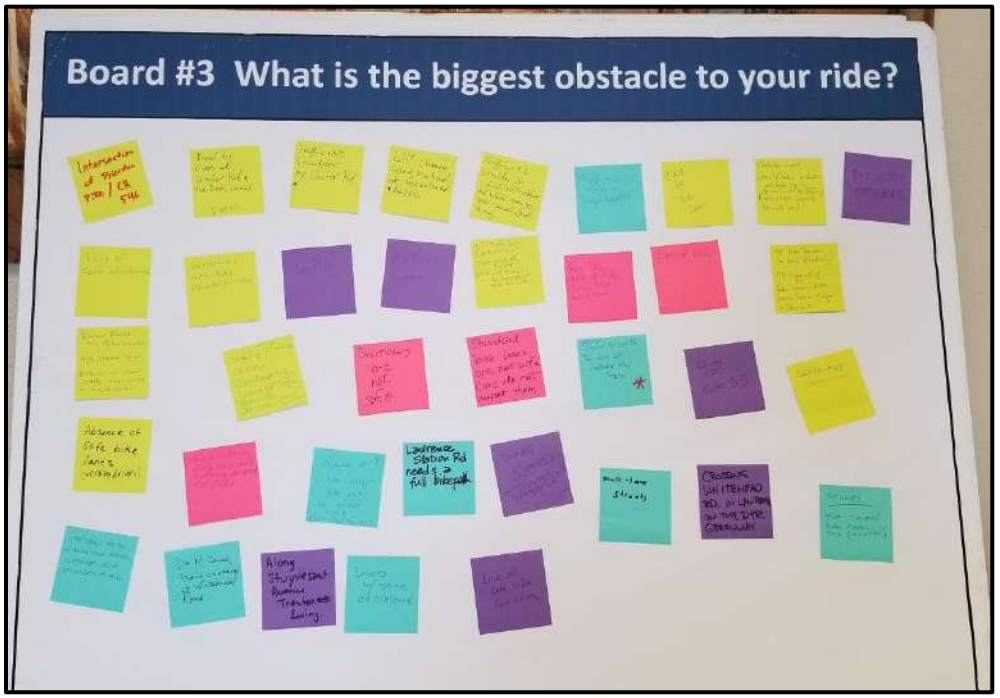
The second form of public participation included paper handouts of the County map with County routes emphasized by cost of improvement by linear foot. Participants at the 7 public meetings were asked to circle, highlight or point out locations where they currently ride, wish they could ride and specific things that obstruct their ride or prevent their ride. Respondents mostly selected out local routes near their homes but a significant portion of responses indicated a desire for improved bicycle facilities along County Route 571 between Hightstown Borough and downtown Princeton. There were also several participants who wanted to see more facilities improved in the inner I-295 ring of Mercer County, specifically the inner ring areas of Ewing-Trenton-Lawrence-Hamilton. Those sheets can be found in the appendix.

The third form of public participation includes 4 36” x 24” boards asking the public various questions. During this process, participants were asked questions very similar to our survey questions such as what was the biggest obstacle to their ride and what is the most important to their ride. This was done to get responses from visitors who would not take the time to do the survey. The following page shows the four boards while a high resolution photo of the responses can be found in the appendix.



These four boards were used to gather public input on bicycle facilities asking basic questions such as where do people ride and where they wishes they could ride. During this process, participants were asked what was the biggest obstacle to their ride and what is the most important to their ride.





Evolution of Mercer County Bicycle Planning

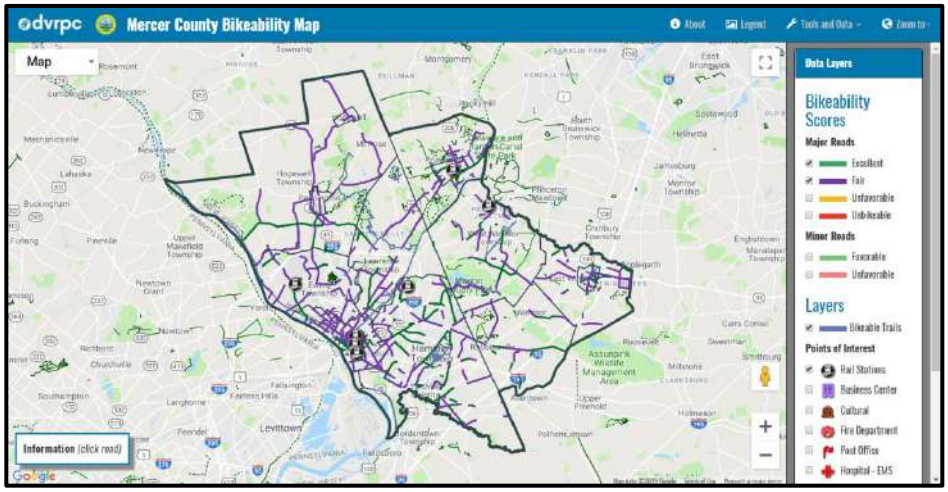
The 2019 Mercer County Bike Plan builds upon years of various planning objectives and initiatives to develop cycling facilities throughout the County. Over the past decade, there has been an increasing amount of effort to reincorporate bicycle traffic within our right-of-way. The following efforts show previous initiatives and projects that have paved the way and influenced our Mercer County Bike Plan.

2007 Mercer County Bike-Ped Task Force Created

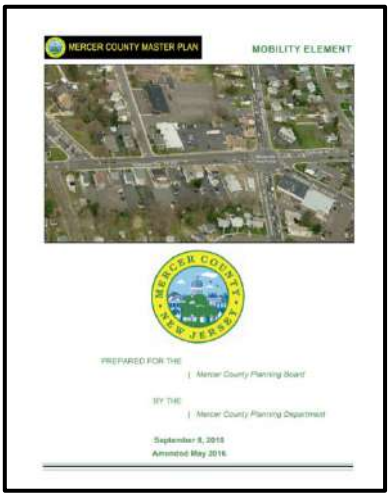
In 2009, the Mercer County Bike-Pedestrian Task Force (MCBPTF) was created with the support of Mercer County Executive, Brian M. Hughes, and hosted by the Greater Mercer Transportation Management Association (GMTMA). The MCBPTF consists of municipal representatives designated by town mayors as well as various advocates and residents. The primary purpose of the organization is to help advocate for non-motorized infrastructure throughout Mercer County, including sidewalk improvements, bicycle improvements, intersection improvements, trail improvements, and many others. The group also acts as a forum to coordinate municipal efforts and keep each other informed of activities happening around the County.

2009 Mercer County Bicycle Level of Service Online Tool

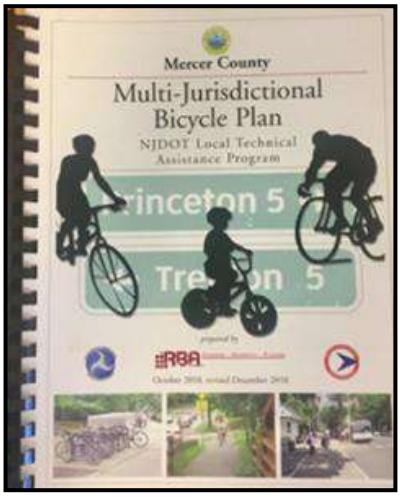
The Mercer County Bicycle Level of Service Project was the first project to attempt to identify the bikability (on-road) of Mercer County Highways. Bikability is an estimate of how comfortable it is to bike along a roadway, and considers many factors, including traffic volumes, traffic speeds, pavement widths, and whether there is a usable shoulder. This online tool derived bikability using the Bicycle Level of Service (BLOS) model, which references physical characteristics such as shoulders and widths as well as functional characteristics including traffic volumes to determine a letter grade (A-F) for each segment. The study incorporated an interactive map to facilitate data sharing and solicit feedback stakeholder from agencies and with the community. This site was and currently is also intended to be a resource for Mercer County residents and bicyclists to help them plan bicycle-friendly routes to ride and to help planners identify priority bicycle corridors and facilities to be considered in the future.



2010 Mercer County Mobility Master Plan (Amended 2016)



In September of 2010, the County adopted a new Master Plan, replacing the traditional highway element with a Mobility Element that addressed all modes at a policy level. This was our complete streets policy, among other more general policies. This mobility plan presented a vision for the future of mobility in Mercer County that was conservative about recommending new roads and increased vehicular capacity. Instead the plan looked at existing conditions and making realistic improvements to our existing network. It also addressed for the first time the need to consider all modes, including transit, bicycle infrastructure and pedestrian scale walkability improvements.

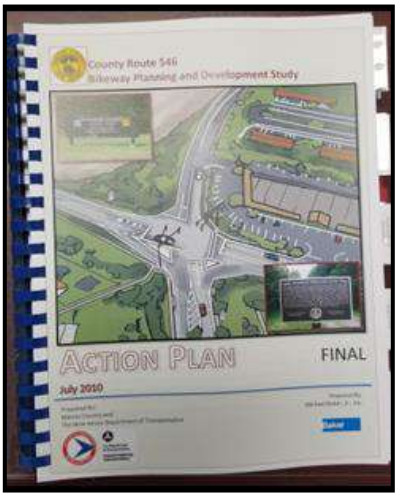


2010 Mercer County Multi-Jurisdictional Bike Plan

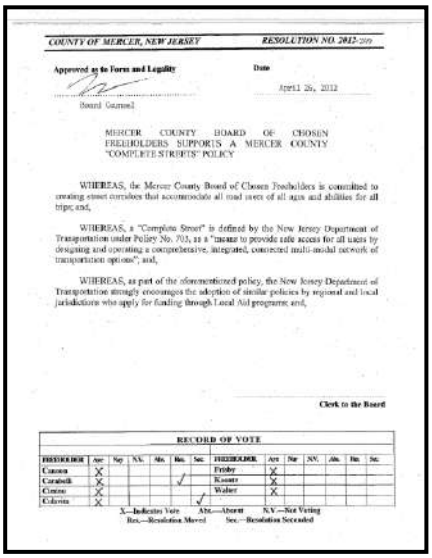
A predecessor of the current study, the Multi-Jurisdictional Bicycle Plan, was intended to create a database of roadway conditions from which the County could select segments or intersections for improvements. This plan was not adopted into the County Master Plan due to its focus on all jurisdictions. The County does not have jurisdiction over municipal or state facilities and as such cannot adopt a Master Plan stating where those improvements should take place. Instead, the MCBPTF decided to informally adopt this plan as their guide in advocating for improvements. Prior to this document, the last Countywide bicycle plan effort County staff could track down was a 1975 Mercer County Bikeway Map, 35 years prior.

2010 County Route 546 Bikeway Study

The County Route 546 Bikeway Planning and Development Study was prepared in July of 2010 by Michael Baker, Jr., Inc. The primary purpose of the plan was to develop a concept for bikeway infrastructure between Washington Crossing State Park in Hopewell and the Johnson Trolley Line in Lawrence Township. The proposed bikeway would also include a possible connection to the Borough of Pennington via CR 631, CR 640 and CR 632. This study analyzed existing conditions and compiled data on the roadway and proposed improvement alternatives including a preferred alternative.



2012 Mercer County Complete Streets Policy



COUNTY OF MERCER, NEW JERSEY — RESOLUTION NO. 2012-209

Approved as to Form and Legality — Date: April 26, 2012

Board Counsel

MERCER COUNTY BOARD OF CHOSEN FREEHOLDERS SUPPORTS A MERCER COUNTY "COMPLETE STREETS" POLICY

WHEREAS, the Mercer County Board of Chosen Freeholders is committed to creating street corridors that accommodate all road users of all ages and abilities for all trips; and,

WHEREAS, a "Complete Street" is defined by the New Jersey Department of Transportation under Policy No. 703, as a "means to provide safe access for all users by designing and operating a comprehensive, integrated, connected multi-modal network of transportation options"; and,

WHEREAS, as part of the aforementioned policy, the New Jersey Department of Transportation strongly encourages the adoption of similar policies by regional and local jurisdictions who apply for funding through Local Aid programs; and,

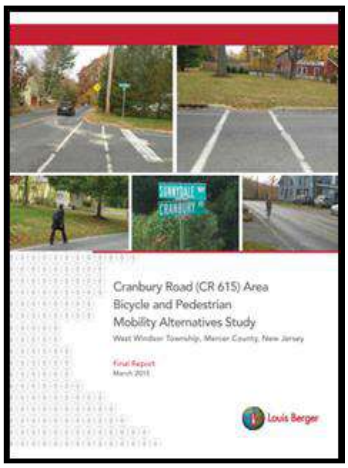
Clerk to the Board

RECORD OF VOTE

FREEHOLDER	Aye	Nay	N.V.	Abs.	Res.	Sec.	FREEHOLDER	Aye	Nay	N.V.	Abs.	Res.	Sec.
Cannon	X						Friday	X					
Crandell	X				✓		Kasner	X					
Cimino	X						Walker	X					
Oliveira	X					✓							

X—Indicates Vote Abs.—Absent N.V.—Not Voting
Res.—Resolution Moved Sec.—Resolution Seconded

The Mercer County Freeholders adopted a Complete Streets Policy and became the first County in New Jersey in which every single jurisdiction had adopted a Complete Streets Policy. Twelve Borough, Township and City policies now complement Complete Streets policies at the County and State levels. Adopting these Complete Street Policies orients roadway owners to improve transportation options, access to opportunities, safety, physical health, environmental quality, and community and economic vitality. Implementation of Complete Streets policies ensures that all users of the roadway are routinely considered in transportation projects and provided with safe, convenient, affordable, and equitable transportation options. With the adoption of the Complete Streets Policy, Mercer intends to incorporate complete streets facilities on all new roadways and during resurfacing projects when time and budgets allow.

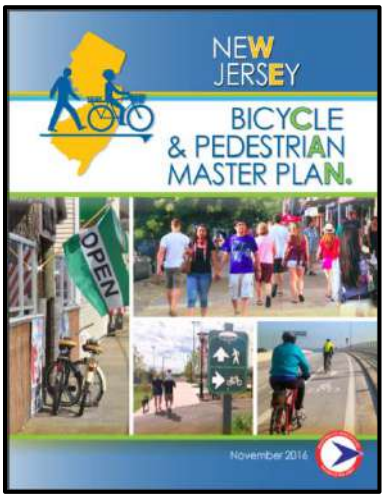


2016 Cranbury Road Area Bicycle and Pedestrian Study

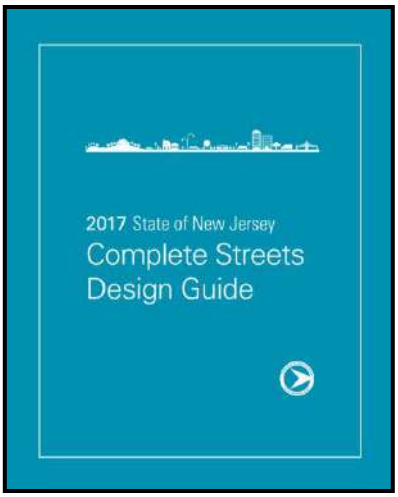
The Cranbury Road Area Bicycle and Pedestrian Alternatives Study was released in 2016. Prompted by a lack of pedestrian and bicycle connections, West Windsor Township commissioned a study of five alternatives for a two-mile stretch of Cranbury Road (Route 615), from Route 571 to the County line. Proposed Alternatives include options for bicycle lanes and sidewalks and options centered on off-road facilities. The study ultimately recommends a hybrid alternative: a four-foot sidewalk along the north side of the road before transitioning to the south side of the road to avoid relocation of utility poles.

2016 New Jersey Bicycle & Pedestrian Master Plan

An update to the New Jersey Bicycle and Pedestrian Master Plan was released in December of 2016, renewing NJ's commitment to creating a bicycle and pedestrian-friendly state. This document at the State level lays out a series of goals and proposes measurable actions to reach them. The plan also aims to integrate the NJDOT Complete Streets Policy and design frameworks into a long-term vision for New Jersey.



2017 NJDOT Complete Street Design Guide



In 2017, The State of New Jersey Complete Street Design Guide was released and serves as a reference for strategies and designs to achieve the goals of each municipality's adopted policy. Our 12 municipal complete streets policies as well as the County and State policies vary in their implementation approach and intensity, but each references and promotes the NJDOT vision of providing "safe access for all users by designing and operating a comprehensive, integrated, connected, multi-modal network of transportation options" (NJDOT Complete Streets Policy). The design guide helps move municipalities as well as the State from policy to action with design recommendations.

2018-2019 Mercer County Priority Route Process Memo

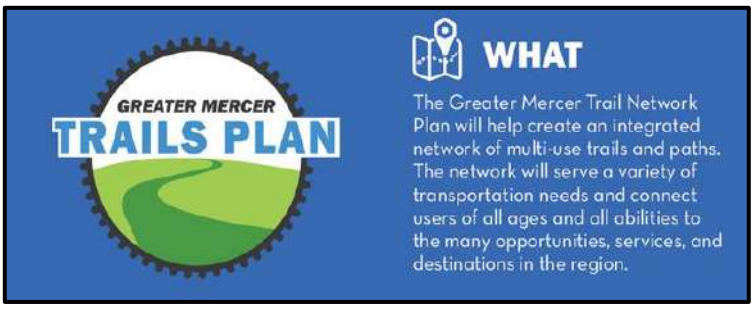

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Memorandum

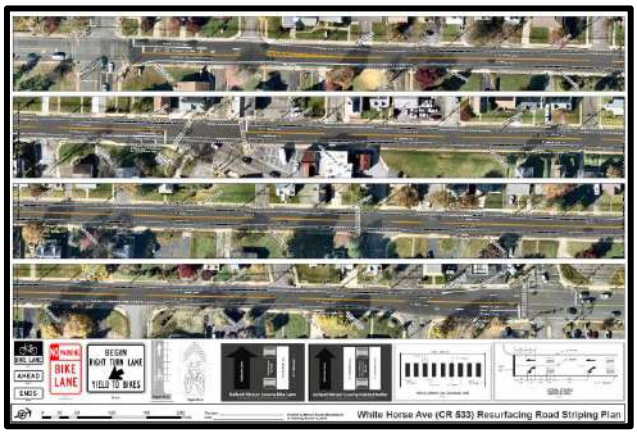
Mercer County most recently worked with DVRPC to prepare a technical memorandum to regarding the process and methodology for analyzing our County roadways and execute that process for thirteen routes. These routes were selected with input of the Mercer County Bike and Pedestrian Task Force (MCBPTF) and determined to be of the highest priority. During this process, the County Planning Department and Engineering Division worked very closely to establish a methodology which would produce recommendations to be considered which could actually work out in the field in accordance with MUTCD, AASHTO and local regulations.

2019 Greater Mercer Trails Plan

During the creation of the 2018 Mercer County Bike Plan, Mercer County transportation staff was also involved with the Greater Mercer Transportation Management Association's (GMTMA) 2019 Mercer County Trail Plan. The GMTMA is preparing a trail network plan which will serve as a guide to further developing a trail network that will connect users of all ages and abilities to the many opportunities, services, and destinations in the region. This plan is due to be released in 2019 and compliments this plan by looking at trail and multi-use paths outside of Mercer County right-of-way. As some on-road facilities may be too expensive or difficult to construct throughout Mercer County, these networks will serve as secondary or "Plan B" routes to connect the rest of our network. See more on page ___.

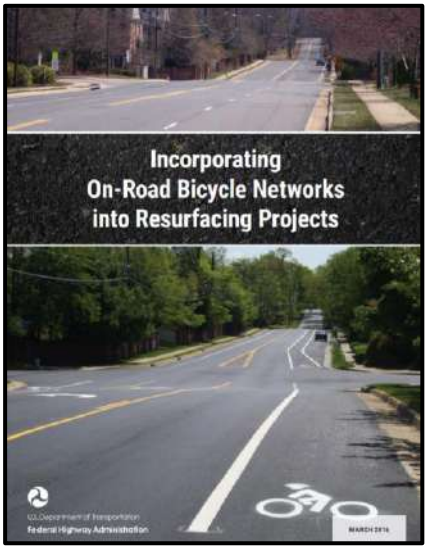


2019 Repaving Program & Bike Facility Implementation Coordination



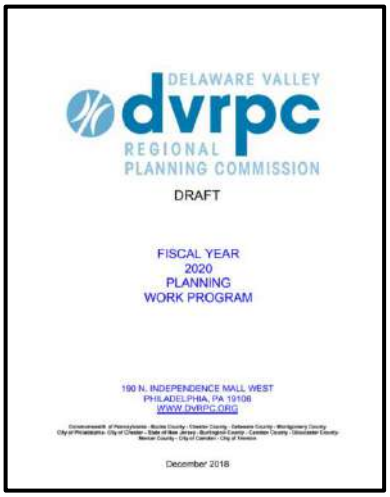
Prior to the 2019 repaving program, several roadways were identified in need of milling and resurfacing throughout the County. During this process, the roadway is typically restriped to the existing traffic conditions.

Following a FHWA's 2016 report titled, "Incorporating On-Road Bicycle Networks into Resurfacing Projects", conversations within the County Engineering and Highway Divisions took place about feasibility. Staff identified several roads within the scheduled 2019 paving program which could accommodate bicycle lanes with simple restriping. These projects include no geometric changes and only make improvements to the existing cartway with epoxy paint/ thermoplastic and signage. Moving forward, Planning Department staff will work on a Bicycle Implementation Repaving program alongside the County Engineering Department and Highway Division. This will be the County's primary method of increasing the number of bicycle facilities around the County.



2020 DVRPC UPWP Assistance

In fiscal year 2020, DVRPC has scheduled to set aside staff time and resources to assist Mercer County with a pilot project on selected Mercer County roadways scheduled to be re-paved with bicycle lanes. This project will determine feasibility of bicycle improvements in circumstances where travel lanes would need to be moved, eliminated or added. DVRPC staff will work with the County in identifying specific locations and will conduct technical work to assist with planning-level design concepts. Concept refinement may require capacity analysis to assess the impacts of lane configuration changes on traffic movements and if bicycle facilities are feasible in those select locations.



Relevant Municipal Documents

As this study area comprises all of Mercer County's municipalities, the plan aims to synthesize disparate municipal plans and local studies related to bicycle facilities and policy. The resources reviewed include local complete street policies, which serve as the foundation for the current project, as well as municipal master plans and elements. In determining appropriate bicycle improvement on County facilities, it was imperative to look at municipal proposals and priorities in determining how best to link the different jurisdictional networks. Below is a list of municipal documents reviewed for this purpose.


NJDOT Bicycle/Pedestrian Planning Assistance

WEST WINDSOR TOWNSHIP
BICYCLE/PEDESTRIAN PLAN

West Windsor Township, Mercer County, NJ

FINAL PLAN

October 12, 2004

2004 West Windsor Bicycle/ Pedestrian Plan

NJDOT provided technical assistance to West Windsor Township by assessing 28 miles of roads and 14 miles of trails. The study finds over 60 percent of segments as 'not optimal' for accommodating bicyclists and pedestrians. For more feasible areas, the plan provides short- and long term recommendations for increasing the network; a few of the assessed routes are included in the current study as well. West Windsor is also home to a few corridor improvement projects such as the CR 571 Princeton Junction Project and others.

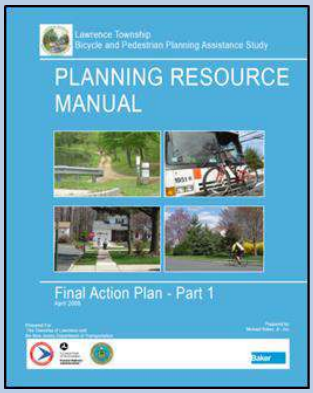
2006 Hopewell Circulation Plan Element

Hopewell Township has identified the bicycle as a low-cost and effective means of transportation that is quiet, nonpolluting, extremely energy-efficient, versatile, healthy and fun. Bicycles also provide low-cost mobility to the non-driving public, including the young. In addition, pedestrian and bicycle routes can be designed to accommodate both forms of transportation. The intent in recommending both pedestrian and bikeway plans are to ensure that the dual function is accommodated.


Circulation Plan Element

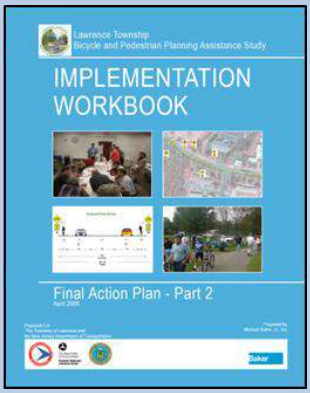
Township of Hopewell
Mercer County, New Jersey

February 2006


Lawrence Township
Bicycle and Pedestrian Planning Assistance Study

PLANNING RESOURCE MANUAL

Final Action Plan - Part 1


Lawrence Township
Bicycle and Pedestrian Planning Assistance Study

IMPLEMENTATION WORKBOOK

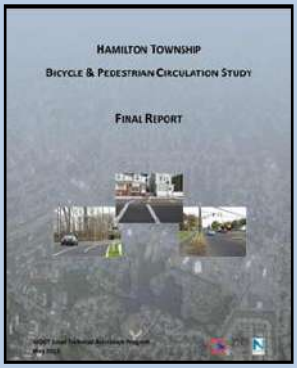
Final Action Plan - Part 2

2011 Lawrence Township Study

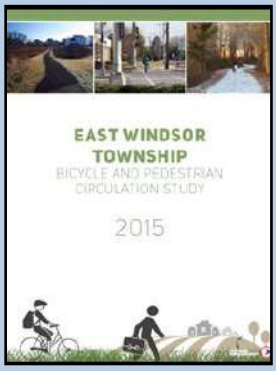
The stated goal of the Lawrence Township Bike and Ped Planning Assistance Study was to develop and implement a comprehensive bicycle and pedestrian plan that includes improvements in the three (3) E's (Engineering, Education and Enforcement), to enhance safety and mobility. The outcome of this planning study is a two-part Action Plan, The Planning Resource Manual as well as an Implementation Workbook.

Relevant Municipal Documents

2011 Hamilton Bicycle and Pedestrian Circulation Study



The Hamilton Bicycle and Pedestrian Circulation Study is envisioned as a component of the overall circulation element and will serve to support planning and implementation of bicycle and pedestrian improvements across the Township. This study was undertaken as part of the NJDOT's Local Bicycle/Pedestrian Planning Assistance Program, which seeks to foster the development of non-motorized transportation modes in accordance with statewide goals and local needs.



2015 East Windsor Bicycle and Pedestrian Circulation Study

East Windsor Township sought to develop a plan for bicycle and pedestrian circulation that accommodates access and provides connections to key generators of non-motorized traffic. The plan is anticipated as a framework plan to guide the development of improvement concepts and policies, and to support planning and implementation of bicycle and pedestrian improvements for the township. East Windsor has indicated their commitment to improving conditions for non-motorized traffic through their Complete Streets Policy, passed in May 2014.

2016 Downtown Trenton Bicycle and Pedestrian Plan

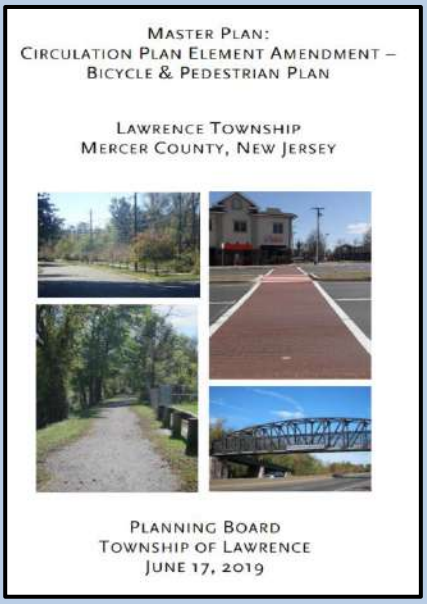
This plan was prepared by DVRPC in 2016. This plan suggests that Trenton the capital city and major city of Mercer County, can become a more walkable, bikable and safer city through a robust cycling and walking network and through dedicated infrastructure. The plan compiles existing conditions and provides strategies and designs ranging from standard bicycle lanes to Bicycle Boulevards, and also addresses off-road trails and pedestrian infrastructure.

2017 Princeton Bicycle Master Plan

This is the most recent municipal bike plan finished in 2017. Princeton earned recognition as Bronze Level Bicycle Friendly Community in 2013, and hopes to achieve silver status through implementation of its 2017 Bicycle Master Plan. The data for the plan incorporates a crowd-sourced webmap, an analysis of Level of Traffic Stress (LTS), and a Bicycle Penalty Metric which calculates the percentage of the street network that is fully-accessible to vehicles but falls above LTS 2 for bicyclists. The plan concludes with guidance and proposals to improve Princeton's bicycling infrastructure and facilities.

New and Upcoming Municipal Documents

2019 Lawrence Township Master Plan Element Effort



This plan serves as Lawrence Township's guiding document for guiding bicycle and pedestrian improvements. With approximately one-third of the town's population unable to drive for reasons such as age, disability, or income, it is important that this significant segment of the population be able to safely access destinations. The town also recently updated their Complete Streets Policy, Complete Streets, Implementation Policy and Complete Streets Checklist.

This document is intended to further advance the Township's vision for complete streets and related open space and recreation goals by providing goals and objectives, recommendations and implementation strategies specifically intended to enhance bicycle and pedestrian safety, access, and mobility throughout Lawrence Township.

2020 Ewing Township Rec and Open Space Master Plan

Ewing Township's Open Space and Recreation Plan will serve as a "blueprint" for the future of its parks and recreation system. As an element of the Township Master Plan, the document will communicate the Township's vision for current and future park facilities and make recommendations to guide Township policies, capital expenditures, and decisions by the Planning Board and Zoning Board. Through the plan, Ewing will continue to form an integrated system of open space that is sufficiently diverse and comprehensive to protect natural areas and provide sources of recreation for all residents. The ultimate goal is to deliver an adequate supply of park and recreation facilities that is connected to schools, public transit, bicycle and pedestrian routes, surrounding neighborhoods, and economic activity.

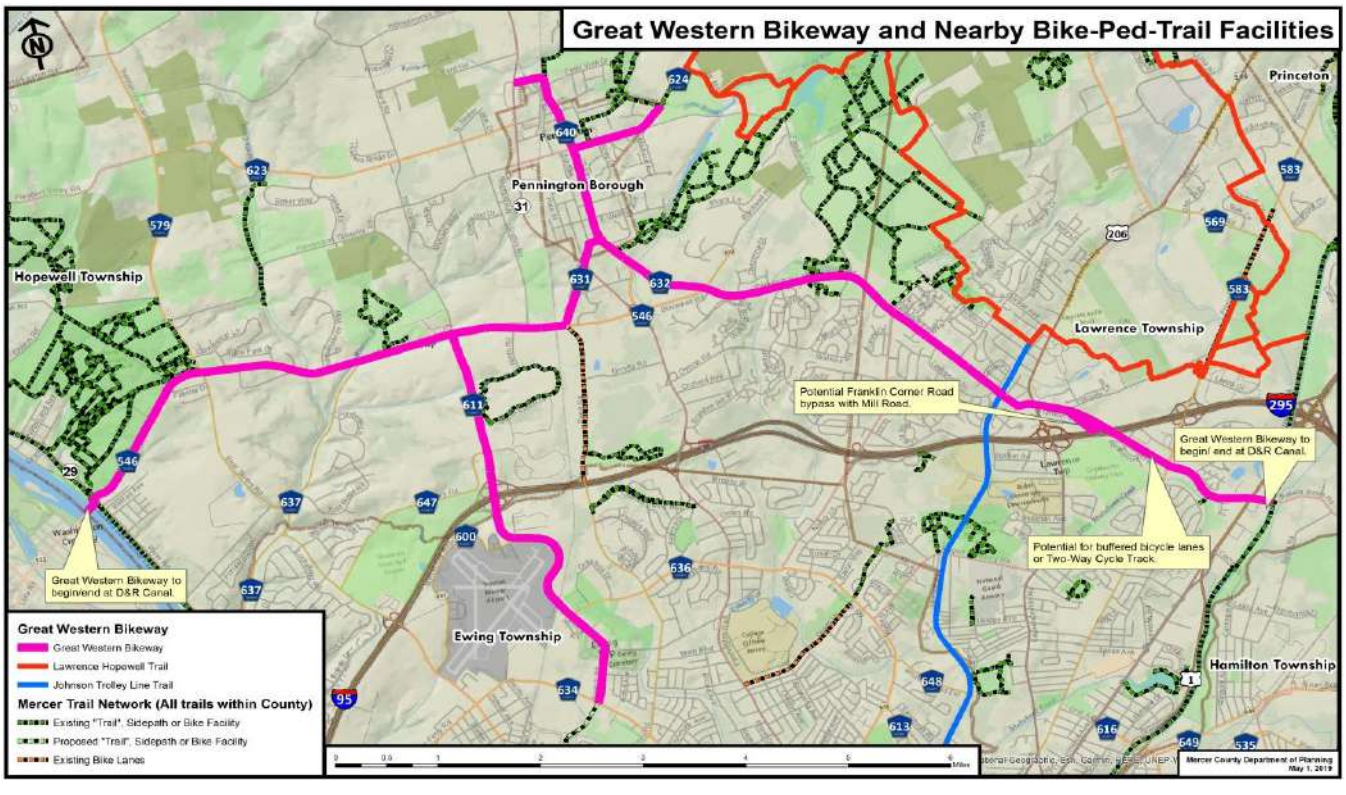
2020 Hightstown Borough Mobility Plan

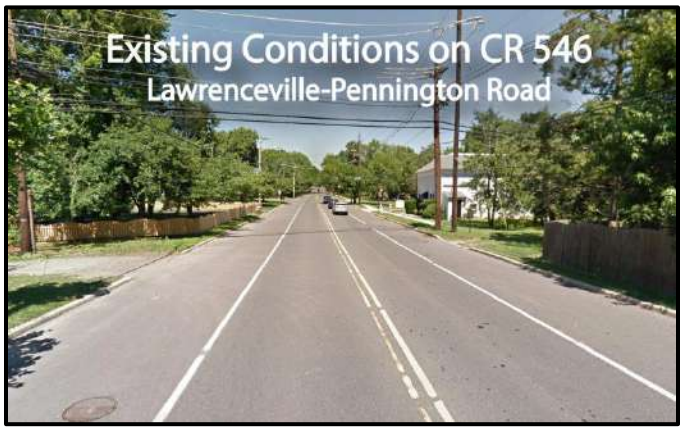
The Hightstown Borough Mobility plan, funded through NJDOT, will aim to establish a long-term plan to improve the bicycling and walking environment for residents and visitors to Hightstown. The Borough has been proactive in incorporating new sidewalks and crosswalks in new public works projects and would like for this plan to build upon those efforts with private owners as well as County and State agencies.

Great Western Bikeway

One of Mercer County's signature projects currently underway is a major long distance bicycle corridor along County Route 546. This County Route essentially runs from the D&R Canal next to the Delaware River in Hopewell Township through to the D&R Canal and Route 1 in Lawrence Township and covers a massive western section of Mercer County. Once completed, the Great Western Bikeway will establish 17.5 miles of bikable shoulders, bike lanes and signed bikeways on CR 546 and Scotch Road. In 2009, Mercer County requested local planning assistance from NJDOT for the project's CR 546 segment, resulting in a plan and conceptual alignment.

With this alignment, we can create a "bicycle spine" that will allow us to connect future bike facilities and trails from Ewing, Pennington, Hopewell and Lawrence. Building off this spine will allow us to create a safe, comprehensive, connected and continuous network for residents and visitors to Mercer County. Much of this route was originally intended to be a 4-lane highway, though only ever striped to carry one lane in each direction. With such wide pavement extents, most of this road can be converted to bicycle lanes relatively easily, converting existing 8 foot shoulders to 5 foot bike lanes with 3 foot rumble and painted buffers. There are however certain segments which will require minor widening to accommodate a safe and continuous facility from the Delaware River to Route 1 and from Upper Ferry Road to CR 546. Though no ROW acquisition is anticipated, items such as utility poles, landscaping and mailboxes may need to be moved in certain cases for road widening. In 2017, Mercer County submitted a Regional Transportation Alternatives application which was awarded in 2019 in the sum of $2,365,900.




Existing Conditions on CR 546
Lawrenceville-Pennington Road


Conceptual Alternative 1
Great Western Bikeway

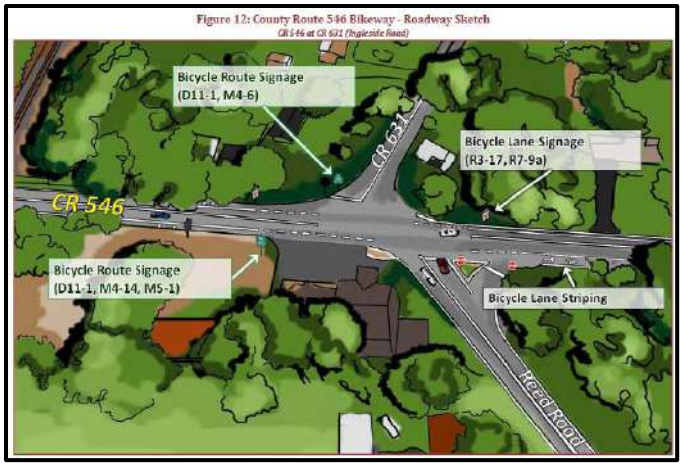


Figure 12: County Route 546 Bikeway - Roadway Sketch
CR 546 at CR 631 (Ingleside Road)
Bicycle Route Signage (D11-1, M4-6)
CR 631
Bicycle Lane Signage (R3-17, R7-9a)
CR 546
Bicycle Route Signage (D11-1, M4-14, M5-1)
Bicycle Lane Striping
Kefer Road

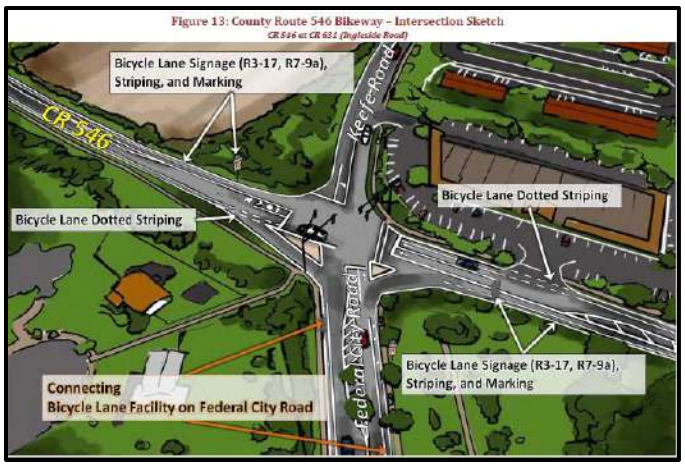
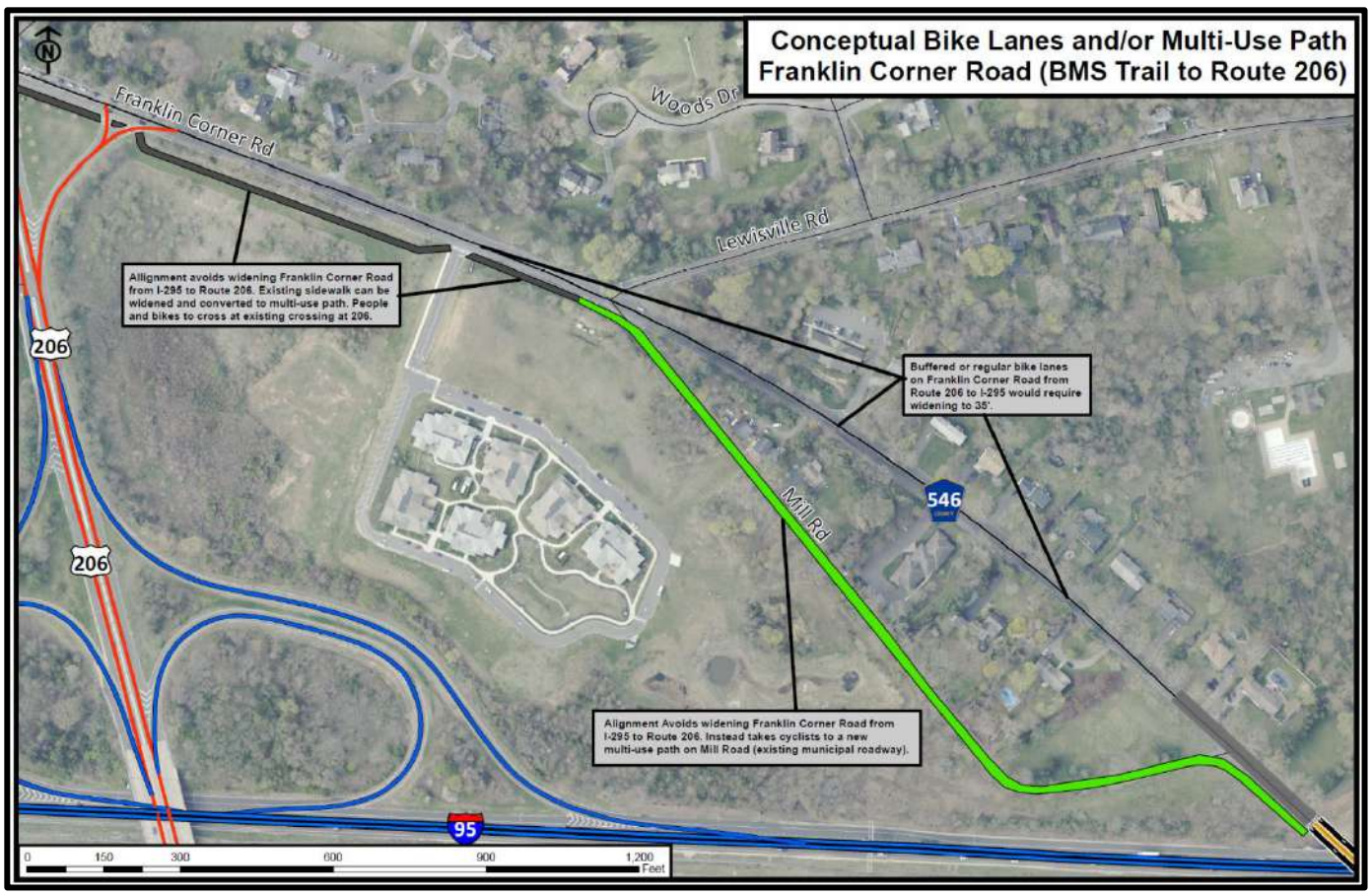
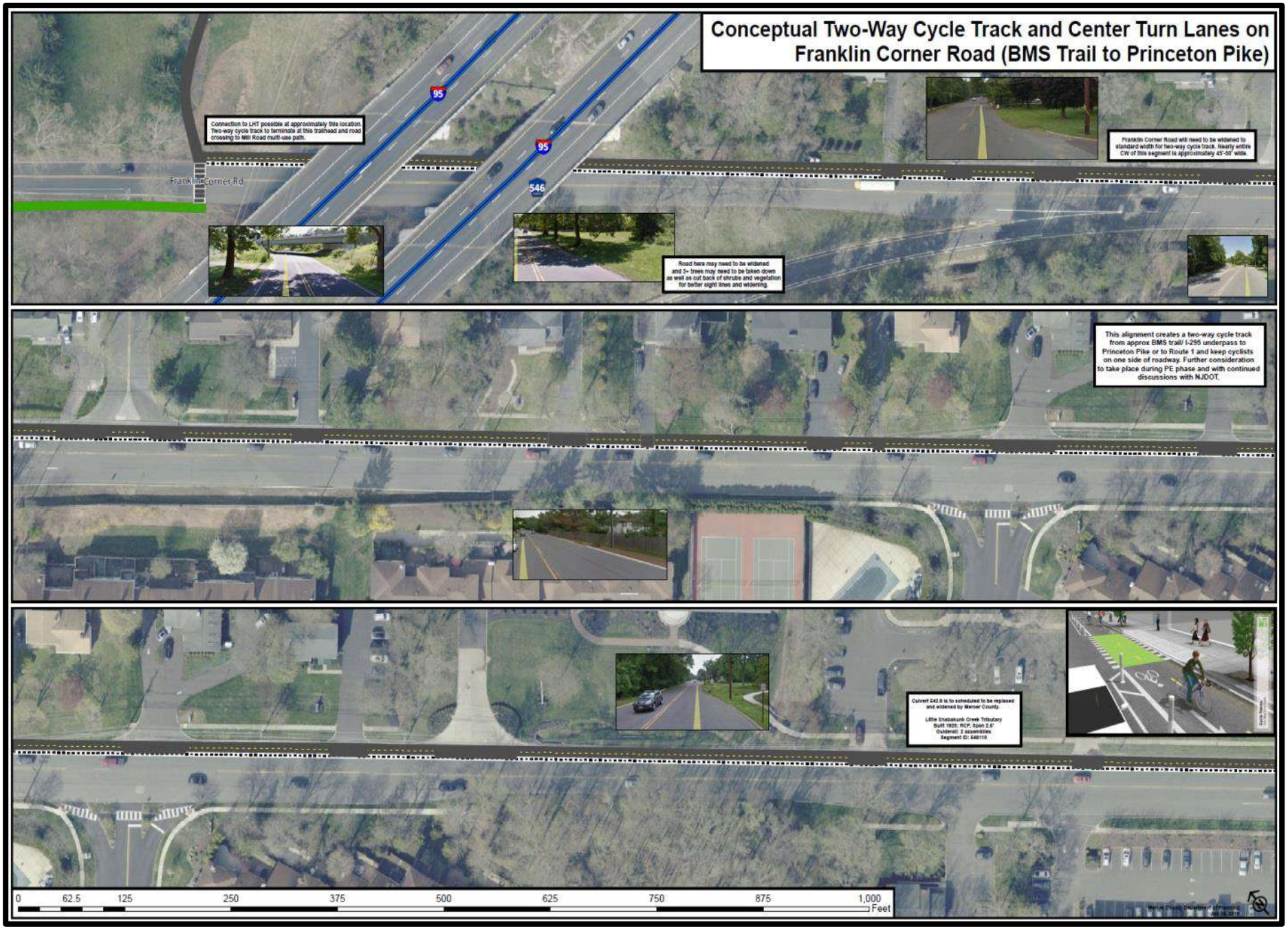


Figure 13: County Route 546 Bikeway – Intersection Sketch
CR 546 at CR 631 (Ingleside Road)
Bicycle Lane Signage (R3-17, R7-9a), Striping, and Marking
CR 546
Kefer Road
Bicycle Lane Dotted Striping
Bicycle Lane Dotted Striping
Federal City Road
Bicycle Lane Signage (R3-17, R7-9a), Striping, and Marking
Connecting Bicycle Lane Facility on Federal City Road


Conceptual Bike Lanes and/or Multi-Use Path
Franklin Corner Road (BMS Trail to Route 206)
Franklin Corner Rd
Woods Dr
Lewisville Rd
Allignment avoids widening Franklin Corner Road from I-295 to Route 206. Existing sidewalk can be widened and converted to multi-use path. People and bikes to cross at existing crossing at 206.
206
206
Buffered or regular bike lanes on Franklin Corner Road from Route 206 to I-295 would require widening to 35'.
546
Mill Rd
Alignment Avoids widening Franklin Corner Road from I-295 to Route 206. Instead takes cyclists to a new multi-use path on Mill Road (existing municipal roadway).
95
0
150
300
600
900
1,200
Feet

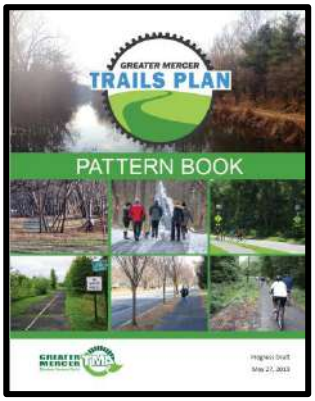

Conceptual Two-Way Cycle Track and Center Turn Lanes on Franklin Corner Road (BMS Trail to Princeton Pike)
Connection to LHT possible at approximately this location. Two-way cycle track to terminate at this trailhead and road crossing to Mill Road multi-use path.
Franklin Corner Rd
95
95
546
Franklin Corner Road will need to be widened to standard width for two-way cycle track. Nearly entire CW of this segment is approximately 45'-50' wide.
Road here may need to be widened and 3+ trees may need to be taken down as well as cut back of shrubs and vegetation for better sight lines and widening.
This alignment creates a two-way cycle track from approx BMS trail/ I-295 underpass to Princeton Pike or to Route 1 and keep cyclists on one side of roadway. Further consideration to take place during PE phase and with continued discussions with NJDOT.
Culvert 642.9 is to scheduled to be replaced and widened by Mercer County.
Little Shabakunk Creek Tributary
Built 1920, RCP, Span 2.6'
Culdesac: 2 assemblies
Segment ID: 648119
0
62.5
125
250
375
500
625
750
875
1,000
Feet

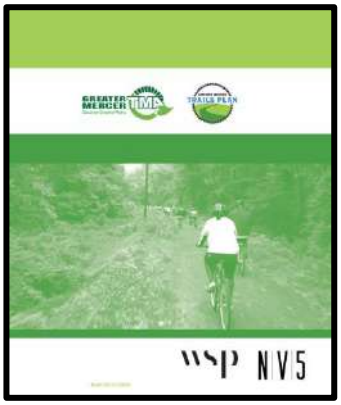
2020 Greater Mercer Trail Plan

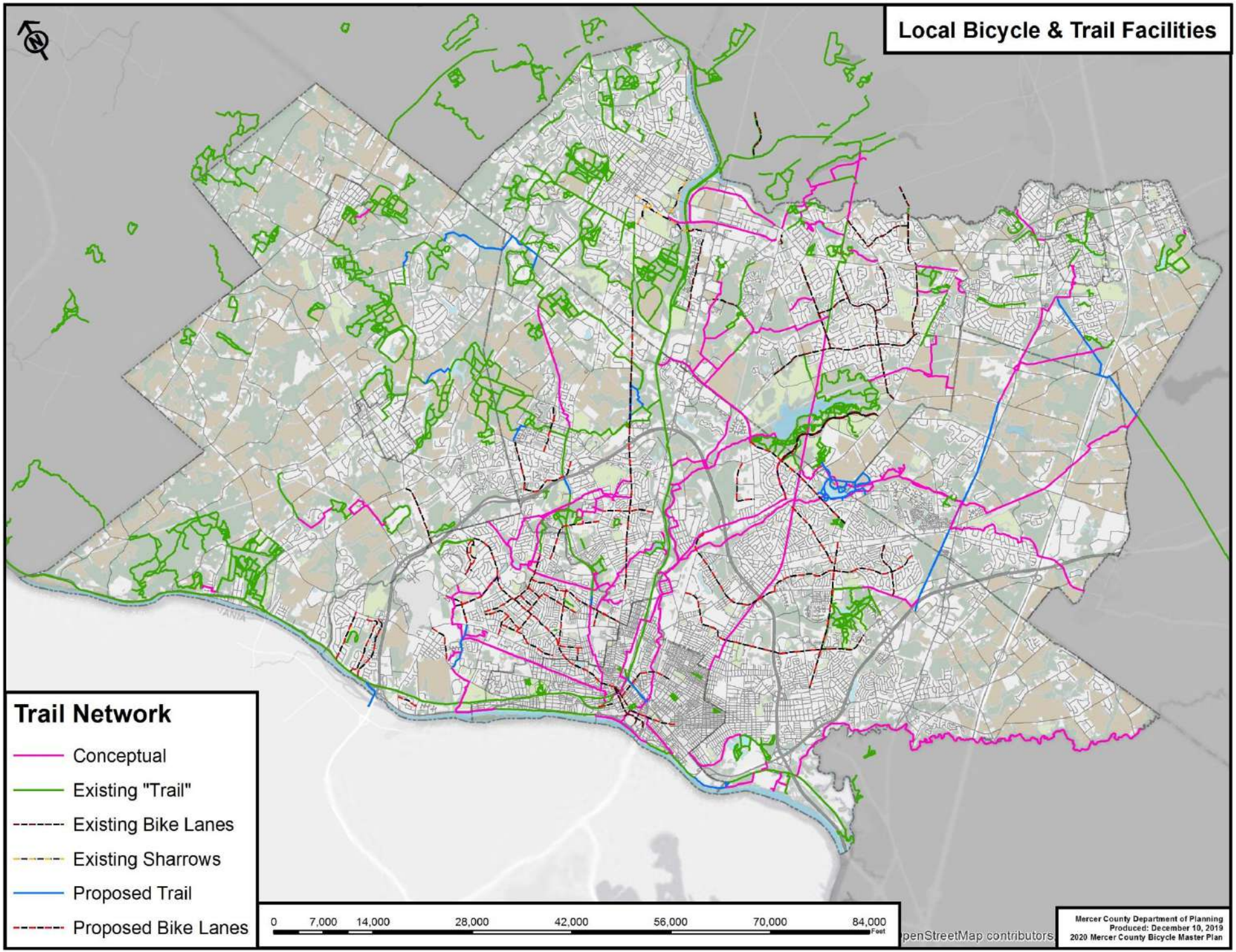
Concurrently, as the Mercer County Department of Planning has been developing our Bicycle Plan, the Greater Mercer Transportation Management Association (GMTMA) has been working with their consultant, WSP, on a Greater Mercer Trail Plan. This trail plan aims to create an integrated network of multi-use trails and paths throughout the Greater Mercer region and is directly tied to the County's on-road Bike Plan network. The combined on-road and off-road network will provide a variety of transportation needs and will connect users of all ages and all abilities to the many opportunities, services, and destinations in the region.

The effort involved inventorying existing and planned trails and paths for all jurisdictions in the Planning Area, and gained input from all relevant stakeholders. WSP is currently creating a plan for an interconnected network of multi-use paths that enable access to transit stations, education, retail and other employment locations and recreation. The vision is for the Planning Area to be home to a multiuse trail network that transforms public life by linking communities and the amenities within those communities with a safe, low stress option to motorized travel.

This plan alongside our Mercer County Bike Plan can be transformative for Mercer County in creating wholesome connections. Trails, bikeways and greenways are often seen narrowly when it comes to their benefits. People tend to focus on the recreational or environmental aspects of bikeways, trails and greenways, failing to see the big picture—the total package of benefits that a bikeway, trail or greenway can provide to communities, including public health, economic and transportation benefits, and even the effect on community pride and identity. See the benefits section for more information.






Local Bicycle & Trail Facilities
Trail Network
Conceptual
Existing "Trail"
Existing Bike Lanes
Existing Sharrows
Proposed Trail
Proposed Bike Lanes
0 7,000 14,000 28,000 42,000 56,000 70,000 84,000
Feet
penStreetMap contributors
Mercer County Department of Planning
Produced: December 10, 2019
2020 Mercer County Bicycle Master Plan

Vital Local Connections

Mercer County is lucky to be home to hundreds of recreational facilities (including parks, ball fields, trails, nature preserves, nature centers, etc.) that are dispersed throughout the County. In addition, the County has done an excellent job preserving farmland and open space. Today, approximately 28,000 acres of land in Mercer County is protected and preserved, accounting for over 20% of all developable land in Mercer County. The County also has a wealth of existing and planned trails. Among all of these recreational facilities, open space, trails, schools, neighborhoods, local businesses and other areas of interest, there are few connections for non-motorized traffic. Under current conditions, it is difficult for a pedestrian or cyclist to get from the Delaware and Raritan Canal State Park to Mercer County Park.

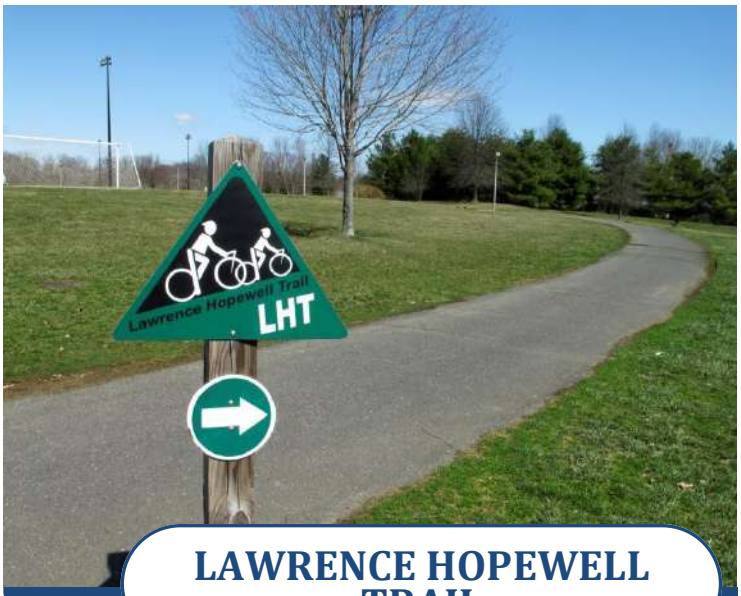
At the same time, it is difficult for workers and students to get from their homes to employment centers or schools. Where a short bike ride should be possible to get to school, current road conditions make it difficult and oftentimes dangerous to ride to school with on-road traffic. Though State Law in New Jersey grants bicycles the same rights and subjects them to the same duties as a motor vehicle driver, it is oftentimes impractical for the average rider to utilize existing right-of-way.

The Mercer County Bike Plan strives to utilize the County Road System to create as many connections as possible so our residents can travel without a motor vehicle. With some of the best natural and institutional assets in New Jersey, Mercer County will strive to connect these for the general public. The following pages illustrate a few of the many incredible assets within the County that could ultimately be connected with a full bicycle network.

Over 28,000 acres of land in Mercer County are protected and preserved, accounting for over 20% of all developable land in the County. Of the land preserved for recreation and public use, most land isn't interconnected in a way that residents can access without an automobile.

DELAWARE & RARITAN CANAL TRAIL

The 70-mile trail is one of central New Jersey's most popular recreational corridors for canoeing, jogging, hiking, bicycling, fishing and horseback riding. The canal and the park are part of the National Recreation Trail System, Circuit Trails and East Coast Greenway. This linear park is also a valuable wildlife corridor connecting fields and forests.

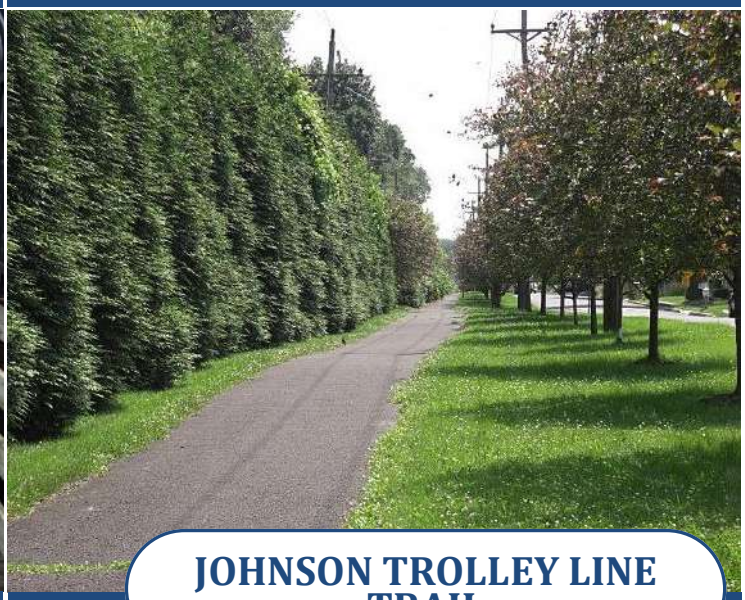


LAWRENCE HOPEWELL TRAIL

The LHT is a 18.7 mile trail that is traverses public and private lands in Lawrence and Hopewell Townships including Mercer Meadows, the Stony Brook Millstone Watershed Association, Mt. Rose Preserve, Maidenhead Meadows Park and more. The trail is complete and open to the public for all but 3.3 miles which planned. The trail offers safe, off-road access for all who want to enjoy the great outdoors.

DELAWARE RIVER HERITAGE TRAIL

The Delaware River Heritage Trail's goal is to ultimately link 24 towns in the hopes of highlighting the cultural and natural resources along the river. The Delaware River Heritage Trail will follow the east bank of the Delaware River from D&R Canal in downtown Trenton to the Ben Franklin Bridge in Camden and will loop to Pennsylvania to connect from Morrisville to Philadelphia's Tacony neighborhood in Pennsylvania.



JOHNSON TROLLEY LINE TRAIL

Following the corridor of the former Johnson Trolley Line in Lawrence Township, the Johnson Trolley Line trail is a 1.9 mile route that is divided by Interstate 95. The Johnson Trolley Line South is also a linear park that runs from the Shabakunk Creek in the south to Rider University in the north. At just under one mile in length, the southern route connects the future Heritage Park, the Loveless Nature Preserve, Central Park, and Rider University's nature trail.

MERCER MEADOWS

Mercer Meadows consists of more than 1,600 acres, divided among five separate districts (Rosedale Park, Mercer County Equestrian Center, Mercer County Park Northwest and Curlis Woods). Miles of mowed and gravel trails provide visitors and their families with scenic walking and biking routes through the meadows and woodland. Fishing and kayaking is also popular activity at the park's four water bodies.

BALDPATE MOUNTAIN

Baldpate Mountain is located adjacent to the Delaware River, on the border of Mercer and Hunterdon Counties, just south of Lambertville. The woods at Baldpate Mountain have over 12 miles of marked trails for hiking, horseback riding, mountain biking, and trail running. A walk to the grassy summit of Baldpate, the highest point in Mercer County, offers a spectacular view of the Delaware River and the City of Trenton.

MERCER COUNTY PARK

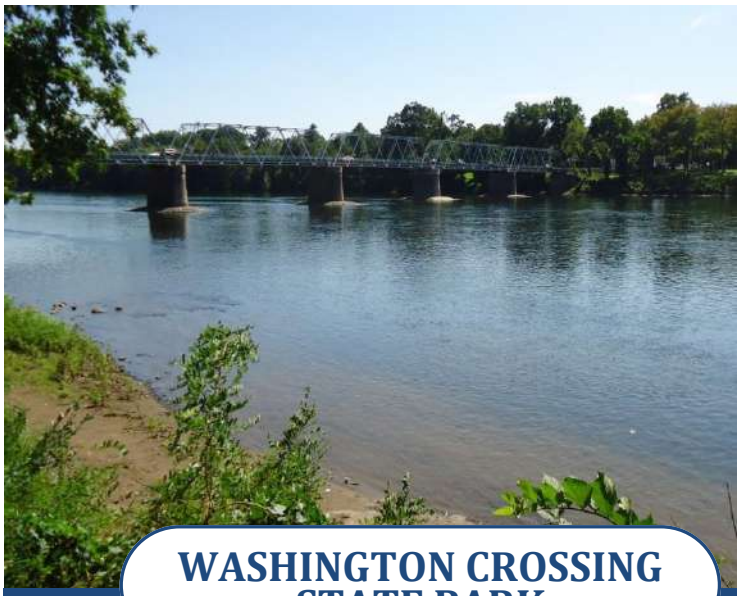
Mercer County Park is 2,500 acre park primarily within West Windsor Township and includes a tennis center with indoor and outdoor courts, an ice skating center, a boat marina, a lake used for rowing with local and national events, picnic and playground areas, soccer, baseball, and cricket playing fields, basketball, bocce and volley ball courts, dog parks, paved paths and nature/bike dirt trails. Mercer County Community College is on the southern border.

ABBOTT MARSHLANDS

The Abbott Marshlands contain a number of different habitats, including tidal and non-tidal freshwater marsh, streams, upland forest, and forested swamps. These habitats support a huge array of plant and animal life, making the Marshlands an excellent destination for nature enthusiasts. The marshland also has 4 trails for hikers and cyclists that allow visitors to explore the park.

VETERAN'S PARK

Veteran's Park is a large park in Hamilton Township that has walking and bike paths, as well as many other facilities. The recreation facilities include a playground, picnic areas, formal gardens, a shallow lake, and numerous memorials, baseball fields, tennis, bocce, croquet, badminton, and shuffleboard courts as well as two dog parks. The historic area near the entrance includes a Civil War and Native American Museum.

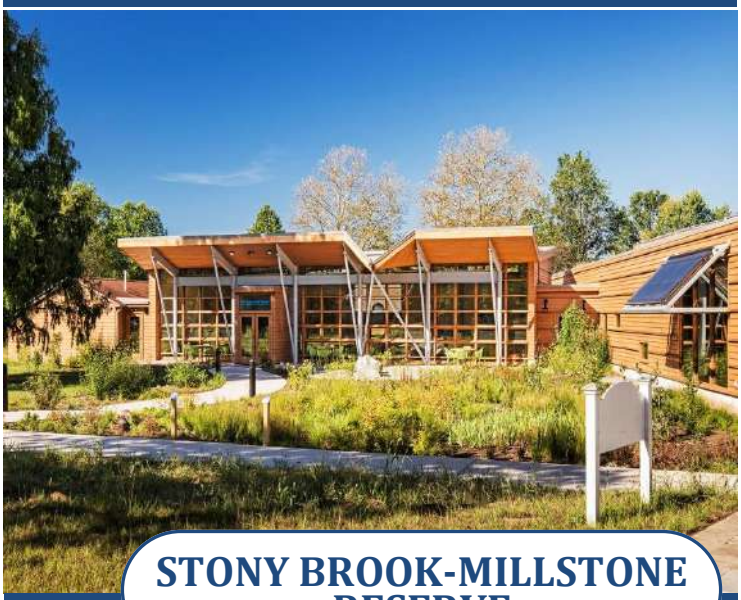


WASHINGTON CROSSING STATE PARK

Washington Crossing State Park is a 3,575-acre park in Hopewell Township and is the location of General George Washington's Delaware River crossing on December 25, 1776 prior to the attack on Trenton, NJ. The park offers miles of hiking and cycling trails , numerous historic artifacts, a nature center, observatory, overlook, and contains a variety of wildlife and plant species.

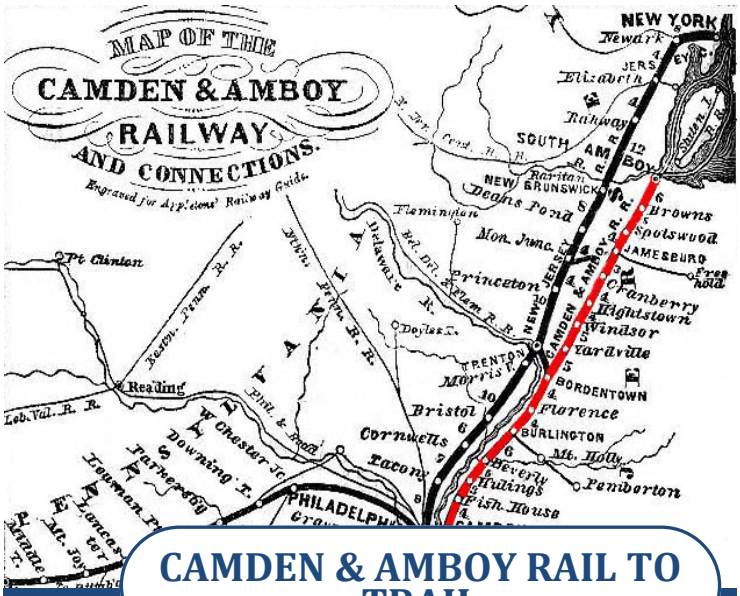
SOUTH RIVERWALK PARK

The South Riverwalk Park sits above the Route 29 tunnel in the City of Trenton and hosts many festivals throughout the year. It also hosts weddings, walk-a-thons, community events and offers picturesque views of the river and waterfront. Within the park sits, bicycle and pedestrian walkways, lawn areas, pavilions, a children's playground, an historic interpretive area and an urban streetscape along Lamberton Street.



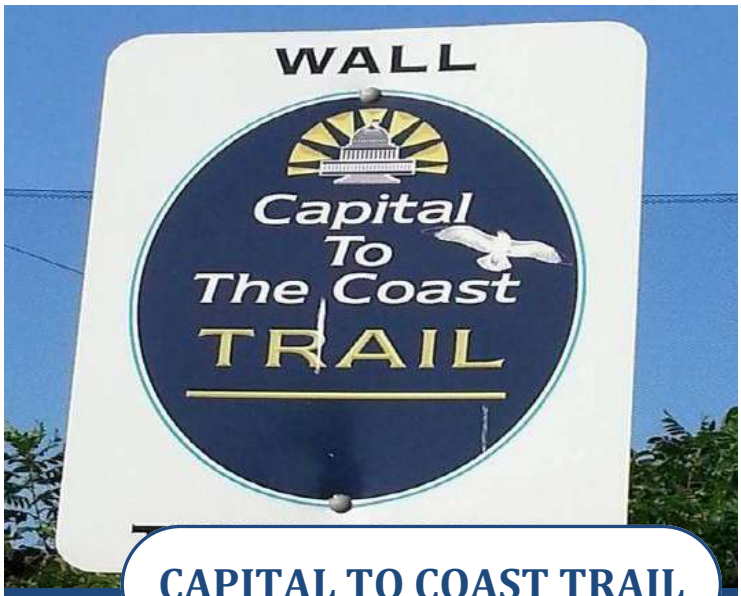
STONY BROOK-MILLSTONE RESERVE

The Stony Brook-Millstone Watershed Reserve in Hopewell Township was created with an initial gift of 400 acres from Dr. Muriel Gardiner Buttinger in 1969, the Reserve now spans nearly 1,000 acres of forest, wetlands, meadows and farmland. More than 10 miles of hiking trails wind through these habitats and pass by two historic farmsteads that date back to the 18th and 19th centuries.



CAMDEN & AMBOY RAIL TO TRAIL

Located between two of the nation's most important cities, in an important corridor for the Mid Atlantic region, the Camden & Amboy Railway was the third railroad to be constructed in the nation. Today the line is no longer used but right-of-way is retained by Conrail. In the future, this could be a great location for a Rails to Trails project, creating walking, cycling, and commuting connections for residents and visitors alike.



CAPITAL TO COAST TRAIL

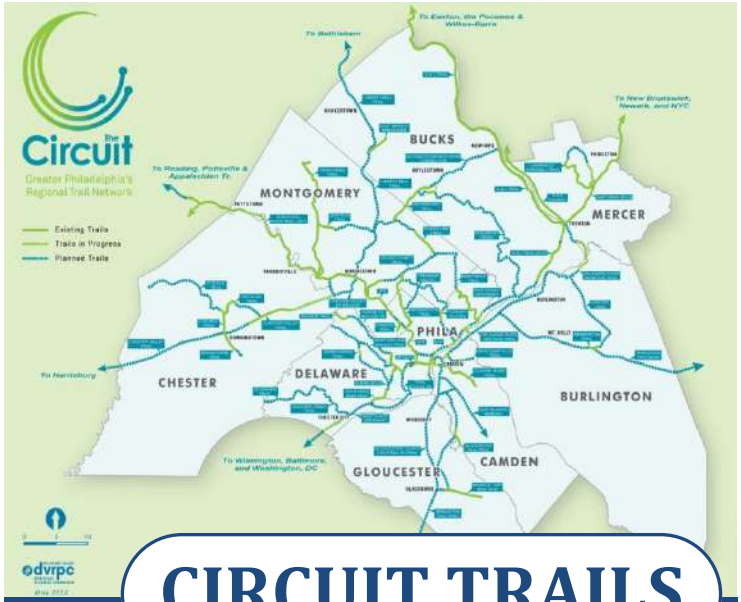
The Capital to Coast Trail is a 55-mile (89 km) cross-state multi-use trail network that is designed to span the state of New Jersey (west to east) from the Delaware River in Trenton through much of Eastern Mercer County, including Miry Run Ponds (Dam Site 21), to the beach front town of Manasquan on the Atlantic Ocean. When finished the trail will be the third longest in the state, behind the Delaware and Raritan Canal Trail and the Appalachian Trail.

UNION TRANSPORTATION TRAIL

The Union Transportation Trail is a 9 mile rail trail on the former Pemberton & Hightstown Railroad in Monmouth County. The trail now accommodates equestrians, hikers, walkers, joggers and bicyclists and will ultimately be extended into Mercer County from Old York Road in East Windsor Township to downtown Hightstown. The new extension will continue to follow the Jersey Central Power and Light right-of-way.

EAST COAST GREENWAY

The East Coast Greenway is the nation’s longest connected biking and walking route and will ultimately connect 15 states as well as 450 cities and towns. The approximately 3,000-mile protected biking and walking routes will allow bicyclists, walkers, runners, inline skaters, horseback riders, wheelchair users, cross-country skiers and more — of all ages and abilities — feel safe, for commuting and recreation.



CIRCUIT TRAILS

Greater Philadelphia is the proud home of the Circuit Trails, a vast regional network of hundreds of miles of multi-use trails that is growing in size each year. The Circuit connects Greater Philadelphia communities, and provides endless opportunities for recreating and commuting. Governments, non-profits, and foundations have collaborated to complete over 300 miles of the envisioned 750-mile regional network.

9/11 MEMORIAL TRAIL

The September 11th National Memorial Trail is a 1,300 mile system of trails and roadways that are a symbol of resiliency and character that links the World Trade Center in New York, the Pentagon in Washington D.C and the Flight 93 Memorial in Shanksville, Pennsylvania. It serves as a tribute to the fallen men and women who perished on September 11, 2001.

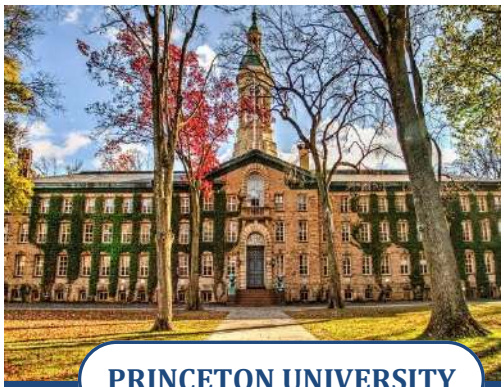
TRENTON WELLNESS LOOP

The Wellness Loop has been designed to provide connectivity between Battle Monument and the Assunpink Creek using Broad and Warren Streets. This loop operates on a pair of one-way streets. The wellness loop provides bike compatible roadways between the Battle Monument and the heart of downtown, with additional connections to the Assunpink Creek at Mill Hill Park.

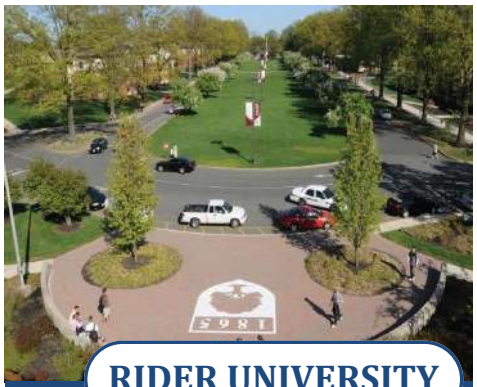
MUNICIPAL TRAILS

In addition to many regional, state-wide and national trail systems running through Mercer County, we have hundreds of miles of smaller local trails. These trails are the capillaries to main arterial trail systems, oftentimes more remote and secluded. They are great places to walk, run and enjoy within each town in Mercer County.

Educational Institutions



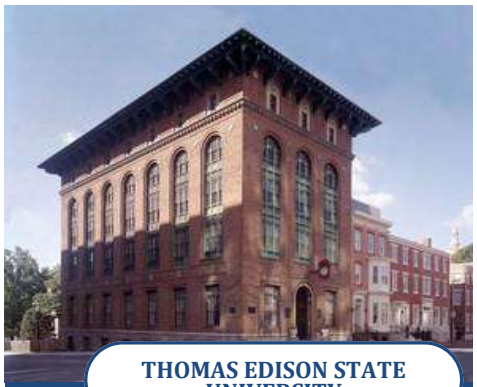
PRINCETON UNIVERSITY



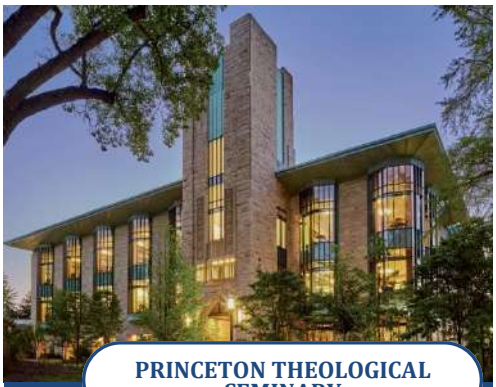
RIDER UNIVERSITY

THE COLLEGE OF NEW JERSEY

MERCER COUNTY COMMUNITY COLLEGE



THOMAS EDISON STATE UNIVERSITY



PRINCETON THEOLOGICAL SEMINARY

INSTITUTE FOR ADVANCED STUDY

107 PUBLIC AND 65 PRIVATESCHOOLS

OLD BARRACKS MUSEUM

GROUNDS FOR SCULPTURE

NJ STATE MUSEUM AND PLANETARIUM

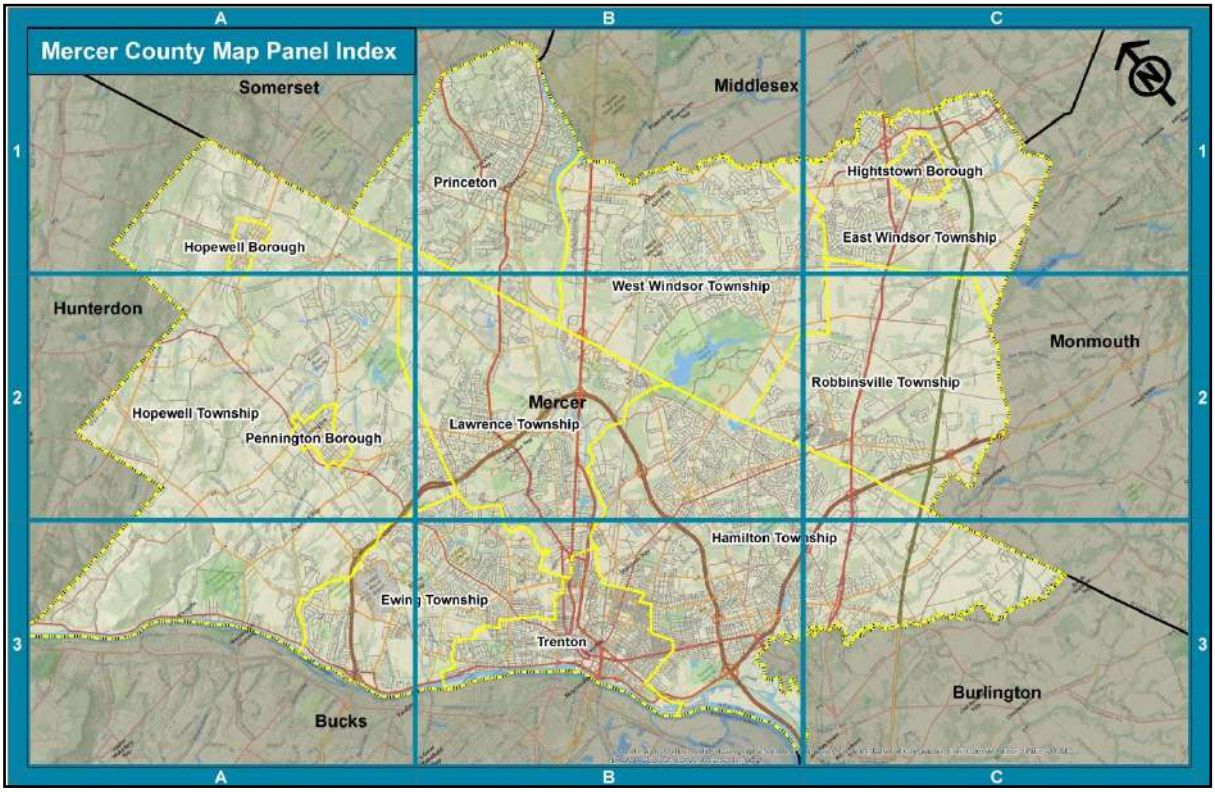
MORVEN MUSEUM & GARDEN

Study Area

This study considers the context of county-wide networks and amenities. Under this study every single County Roadway (approximately 180 miles) was analyzed for existing conditions and has a recommendation for future consideration. Only those routes under direct ownership and jurisdiction of Mercer County were observed unlike the 2010 Multi-Jurisdictional Bike Plan which examined both Municipal and County roadways.

It was determined that every County Route should be examined for a variety of reasons. Foremost, it was determined that choosing a select number of routes would limit the County in building out a network based on a Complete Streets Policy. By analyzing all routes at once, we can utilize a data-driven methodology to rank each route, or route sub-segments, by improvement cost and effort. In doing so, Mercer County can prioritize the low cost "low hanging fruit" for capital improvements while beginning work to design larger, more costly and more problematic routes. In doing so, we have also identified pinch points and determined future road conditions to be considered. This means that whenever Mercer County reconstructs a bridge or culvert, reconstructs a roadway or works on a County facility, projects can be programmed with design recommendations for future bicycle facilities.

Another benefit to analyzing the entire road network is that it provides an equitable way of reviewing our County network for improvements. By reviewing the entire County, underrepresented and overrepresented neighborhoods and corridors are treated equally. Below is a quadrant map of the County Road network, divided into 9 quadrants to make for legibility:



Mercer County Roadways Analyzed & Reference Map

CR #	Name(s)	Length	Maps
518	Lambertville-Hopewell Road/ Louellen Street/ Hopewell-Rocky Hill Road/ Georgetown Franklin Turnpike	7.35 miles	A1, A2
524	Broad Street	5.79 miles	B3, C3
526	Edinburg Road/ South Mill Road	3.84 miles	B1, B2
533	Quaker Road/ Quaker Bridge Road/ Mercerville-Quakerbridge Rd / White Horse Ave / Whitehorse-Mercerville Rd	8.65 miles	B1, B2, B3
535	East State Street/ East State Street Extension/Nottingham Way / Edinburg Rd./ Mercerville Edinburg Rd./Old Trenton Rd.	11.70 miles	B1, B2, B3
539	North Main Street / South Main Street / Old York Road	5.60 miles	C1, C2
546	Washington Crossing-Pennington Road/ Lawrence-Pennington Road/ Franklin Corner Road	9.90 miles	A2, A3, B2
569	Hopewell Princeton Road/ Carter Road	6.45 miles	A1, A2, B2
571	Washington Road/ Princeton Hightstown Road/ Etra Road	11.58 miles	B1, C1
579	Sullivan Way / Grand Ave / Bear Tavern Road / Trenton Harbourton Road	8.95 miles	A2, A3, B3
600	Sam Weinroth Road	1.69 miles	A3
602	S Post Road	0.73 miles	B2
604	Rosedale Road / Elm Road	3.04 miles	B1, B2
605	River Road	0.76 miles	B1
606	Hamilton Avenue	3.31 miles	B2, B3
608	Station Road	0.77 miles	B2
609	Groveville-Yardville Road	0.68 miles	C3
611	Scotch Road	3.55 miles	A3, B3
612	Marshalls Corner-Woodsville Road	2.45 miles	A2
613	Spruce Street	1.28 miles	B3
614	Nottingham Way	0.97 miles	B2
615	Cranbury Road	1.85 miles	B1
616	Whitehead Road	1.35 miles	B2
618	Nottingham Way	2.79 miles	B2
619	Kuser Road	1.75 miles	B3
620	Arena Drive	2.34 miles	B3, C3
622	Olden Ave	6.33 miles	B3
623	Pennington-Harbourton Road	2.62 miles	A2
624	Pennington-Rocky Hill Road	2.62 miles	A2
625	Elm Ridge Road	2.21 miles	A2
626	Chambers Street	2.06 miles	B3
627	Prospect Street	1.35 miles	B3
629	S Harrison Street	1.12 miles	B1
630	Imlaystown Road / Windsor-Perrineville Road	1.10 miles	A1
631	Ingleside Ave	0.77 miles	A2
632	Lawrenceville-Pennington Road	0.63 miles	A2
633	Monmouth Street	1.00 miles	A1
634	Parkway Ave	4.92 miles	A3, B3
635	East State Street	1.13 miles	B3
636	Parkside Ave/ Ewingville Road/ Upper Ferry Road	5.87 miles	A3, B3
637	Jacobs Creek Road	2.74 miles	A3
638	Clarksville Road / Grovers Mill Road	5.05 miles	A1, A2
639	Arctic Parkway	0.33 miles	B3
640	Main Street/ Pennington Road	2.26 miles	A2
641	Edinburg-Windsor Road	2.37 miles	C2
643	Lower Ferry Road	4.10 miles	A3, B3
644	Village Road East / Southfield Road	0.80 miles	B1
645	Brunswick Circle Extension	0.21 miles	B3
647	Nursery Road	1.73 miles	A3
648	Whitehead Road Extension	0.62 miles	B3
649	Sloan Ave/ Sweet Briar Ave/ Flock Road	3.23 miles	B2
650	Lalor Street	1.18 miles	B3
653	Calhoun Street	1.53 miles	B3
654	Pennington-Hopewell Road / W Broad Street	3.05 miles	A2
672	Broad Street	2.17 miles	B3

Mercer County Map Panel Index

A B C

1 2 3

Somerset
Middlesex
Hightstown Borough
East Windsor Township
Princeton
Hunterdon
West Windsor Township
Monmouth
Hopewell Township
Pennington Borough
Mercer
Lawrence Township
Robbinsville Township
Ewing Township
Hamilton Township
Trenton
Bucks
Burlington

Mercer County Bicycle Plan Map Legend & Symbology Key

Sharrows

These are the simplest proposed facilities and require the least amount of infrastructure and improvements. They are also ranked as the least comfortable and safe as cyclists and drivers must share the roadway. As a result, these facilities are only recommended for roads posted for 25 mph or slower and with an AADT less than 10,000.

Standard Bicycle Lanes

A standard bicycle lane offers a basic travel way, separated by a solid white line, for bicyclists adjacent to vehicle travel lanes. These are separated facilities that are safer than a mixed travel way and offer a more comfortable ride. These are recommended for locations where cartway is wide enough for these lanes but too narrow for buffered bicycle lanes.

Existing "Trails"

These are "trails" known and verified to exist. "Trails" include sidepaths, multi-use paths, or minimally improved hiking paths. They may include hard paths such as asphalt and concrete, or be of soft materials such as stone dust, turf or dirt. These may include bikable and non-bikable trails.

Buffered Bicycle Lanes

A buffered bicycle lane offers more separation between vehicle lanes and bicycle lanes. Buffers also help create a much more comfortable riding environment for younger and older riders. A standard Mercer County double white line buffer will range from 1.5' to 4', and may include raised pavement markers to help alert drivers of cyclists at night or under adverse weather conditions. In rural areas away from significant residential development, rumble strips may be considered to provide drivers with an additional auditory and sensory notification.

Off-Road Facilities

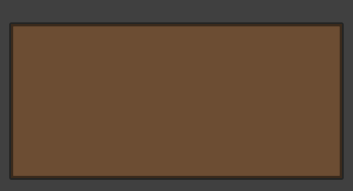
This grouping includes facilities such as physically protected bicycle lanes, sidepaths, and multi-use paths, all of which are located outside of the road travel lanes, road cartway or outside of the County right-of-way. These facilities offer the most protection and comfort for bicycles but are the most difficult and expensive to construct and maintain. Careful design and engineering is required as well as geometric changes to the roadway. In many cases, the County would need to work with towns and property owners to secure the necessary travel way.

Existing Bike Lanes

These are existing on-street bicycle facilities that were built and are maintained by either the municipality, County or State. Bike lanes may encompass either regular bicycle lanes or buffered bicycle lanes. They vary in size and design as per jurisdiction and year constructed.

Proposed Bicycle Lanes

These are bicycle lanes that are located on either a municipal or State plan or are proposed by a municipality or State. These facilities may at some point be contracted for the general public to use and show where additional connections can and should be made. Proposed bike lanes may encompass either regular bicycle lanes or buffered bicycle lanes.



Agricultural Land Use (DVRPC 2015)

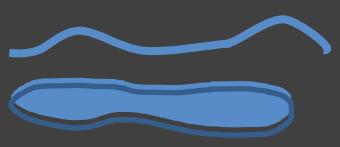
This layer provided by Mercer County shows all preserved farmland. This farmland has been preserved by the municipality, County, State or non-profit organization.

Wooded Land (Nov 2018)

This layer was obtained from DVRPC and shows lands that wooded throughout the County. These are lands with dense tree cover and no large or permanent structures.

Recreational Land Use (DVRPC 2015)

This layer was obtained from DVRPC and shows recreational land use which can include everything from parks and recreational sports fields to golf courses, school fields and others.



Stream, River or Water Body (Nov 2018)

These are bodies of water throughout Mercer County that encompass everything from small streams to major rivers as well as ponds, lakes, canals, and so forth.

Building Footprint (2010-2019)

These are outlines and footprints of existing buildings and structures. This file has been periodically updated between 2010-2019 to reflect changes to our built environment.

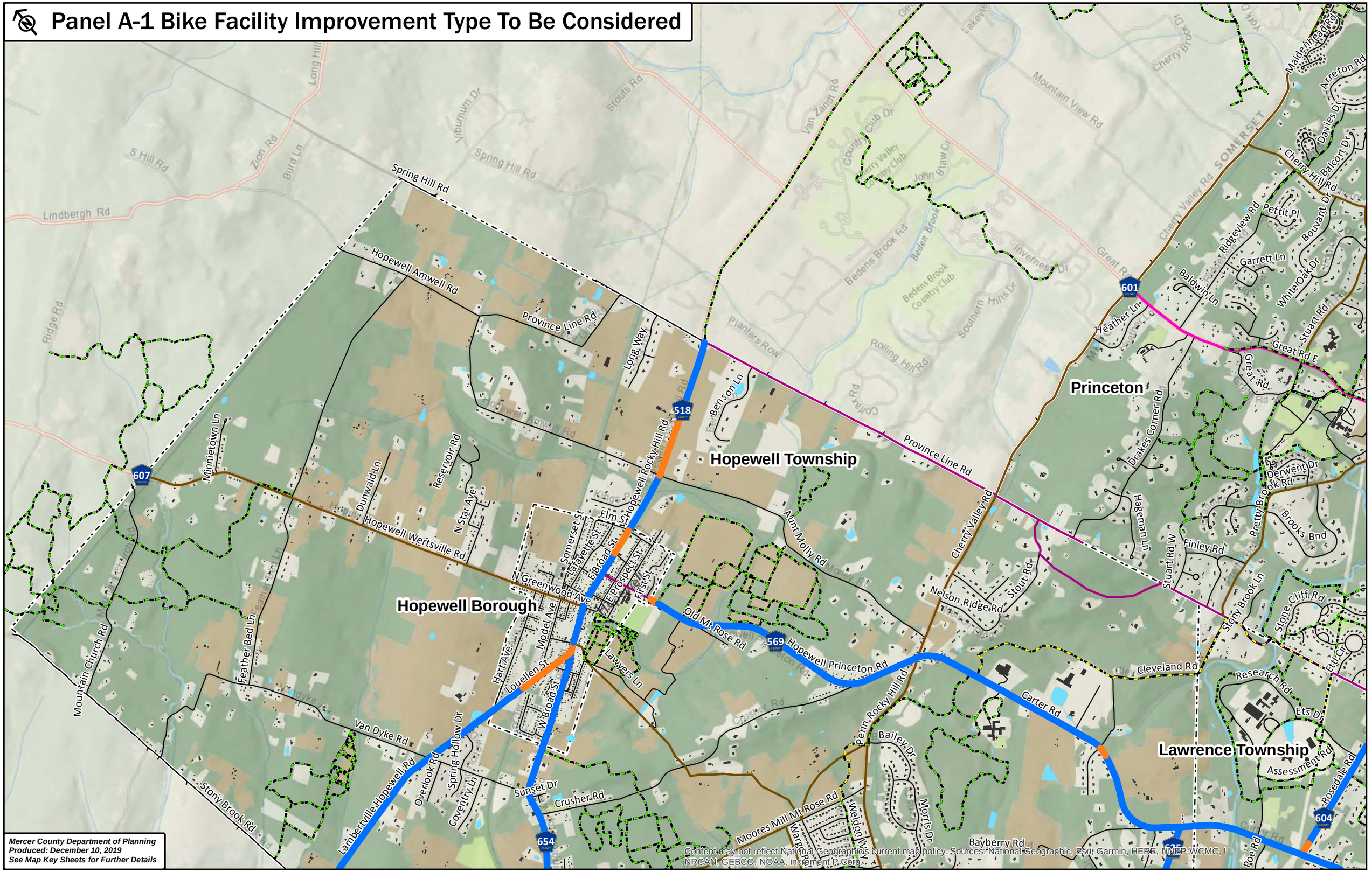
Existing Sharrows

These are shared use roadways known and verified to exist. They include either signage, on-street sharrow markings or both. They show where existing connections exist and where additional connections can be made.

Municipal Boundary (1891)

These are municipal boundary lines separating different municipalities.

Panel A-1 Bike Facility Improvement Type To Be Considered



Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details

Panel A-2 Bike Facility Improvement Type To Be Considered

Hopewell Township

Pennington Borough

Lawrence Township

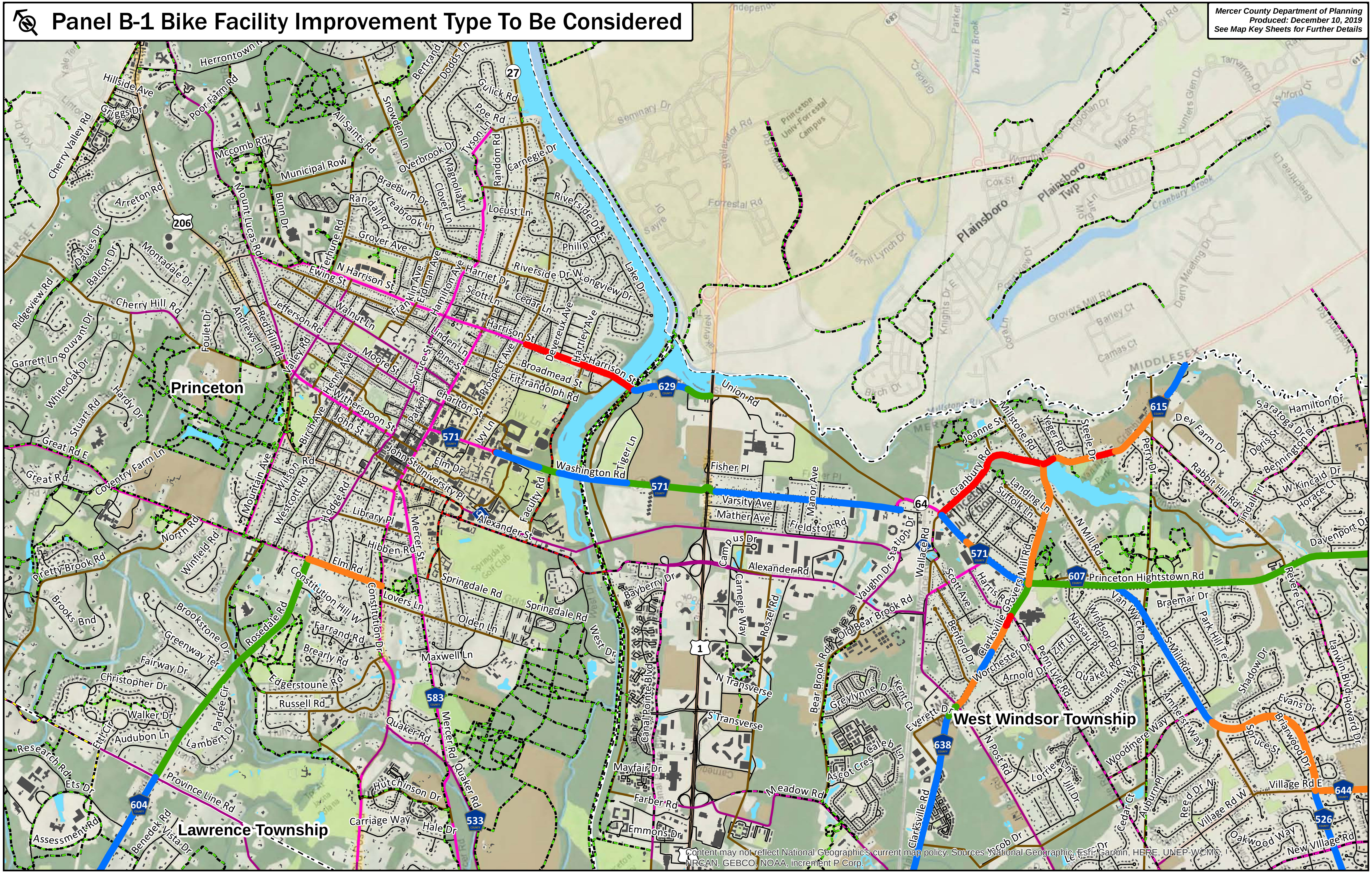
Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details

Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details

Panel A-3 Bike Facility Improvement Type To Be Considered

Panel B-1 Bike Facility Improvement Type To Be Considered

Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details



Panel B-2 Bike Facility Improvement Type To Be Considered

Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details

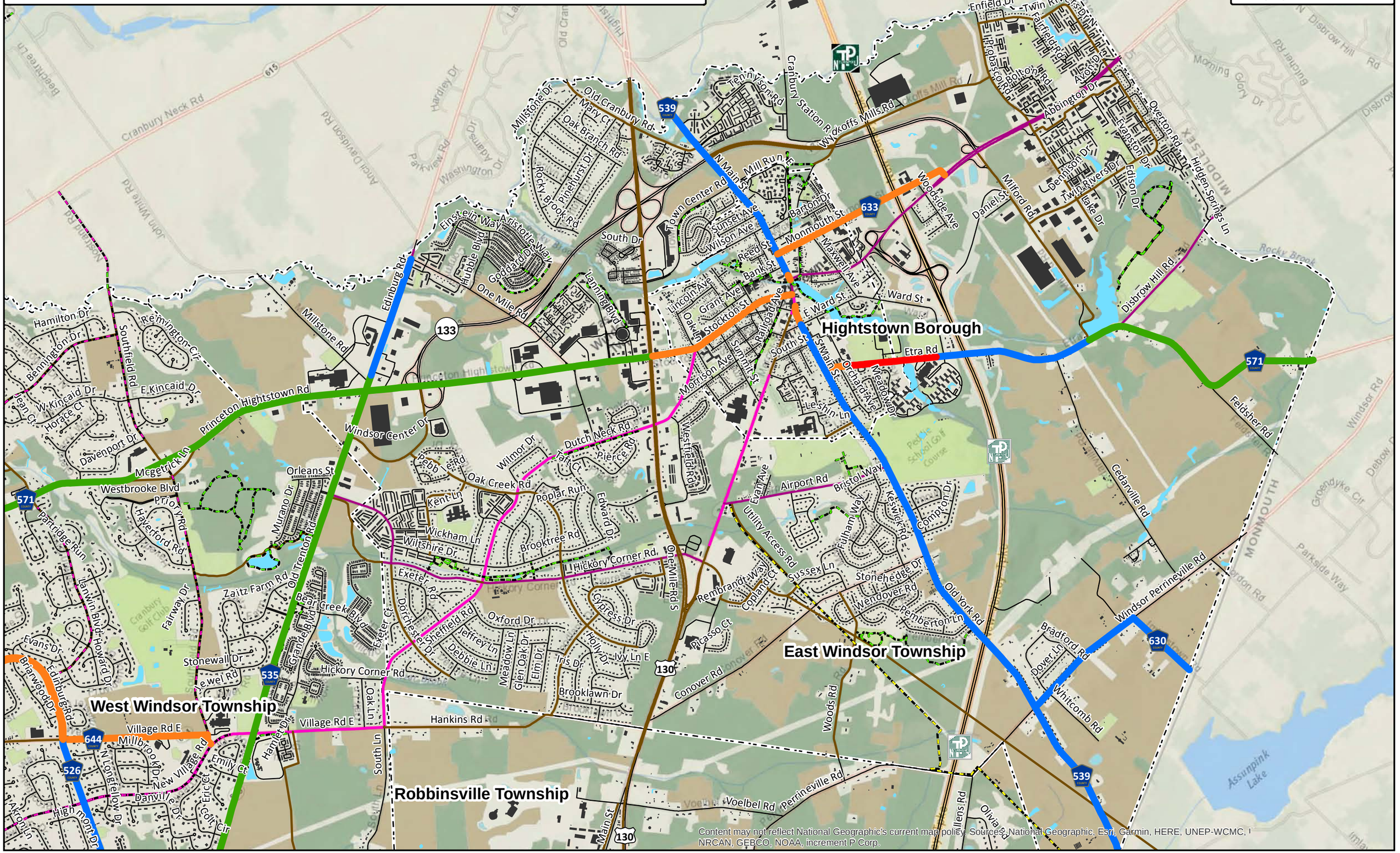
Lawrence Township
Hopewell Township
West Windsor Township
Hamilton Township

Panel B-3 Bike Facility Improvement Type To Be Considered

Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details

Panel C-1 Bike Facility Improvement Type To Be Considered

Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details



Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details

West Windsor Township

East Windsor Township

Robbinsville Township

Hamilton Township

Allentown

Panel C-2 Bike Facility Improvement Type To Be Considered

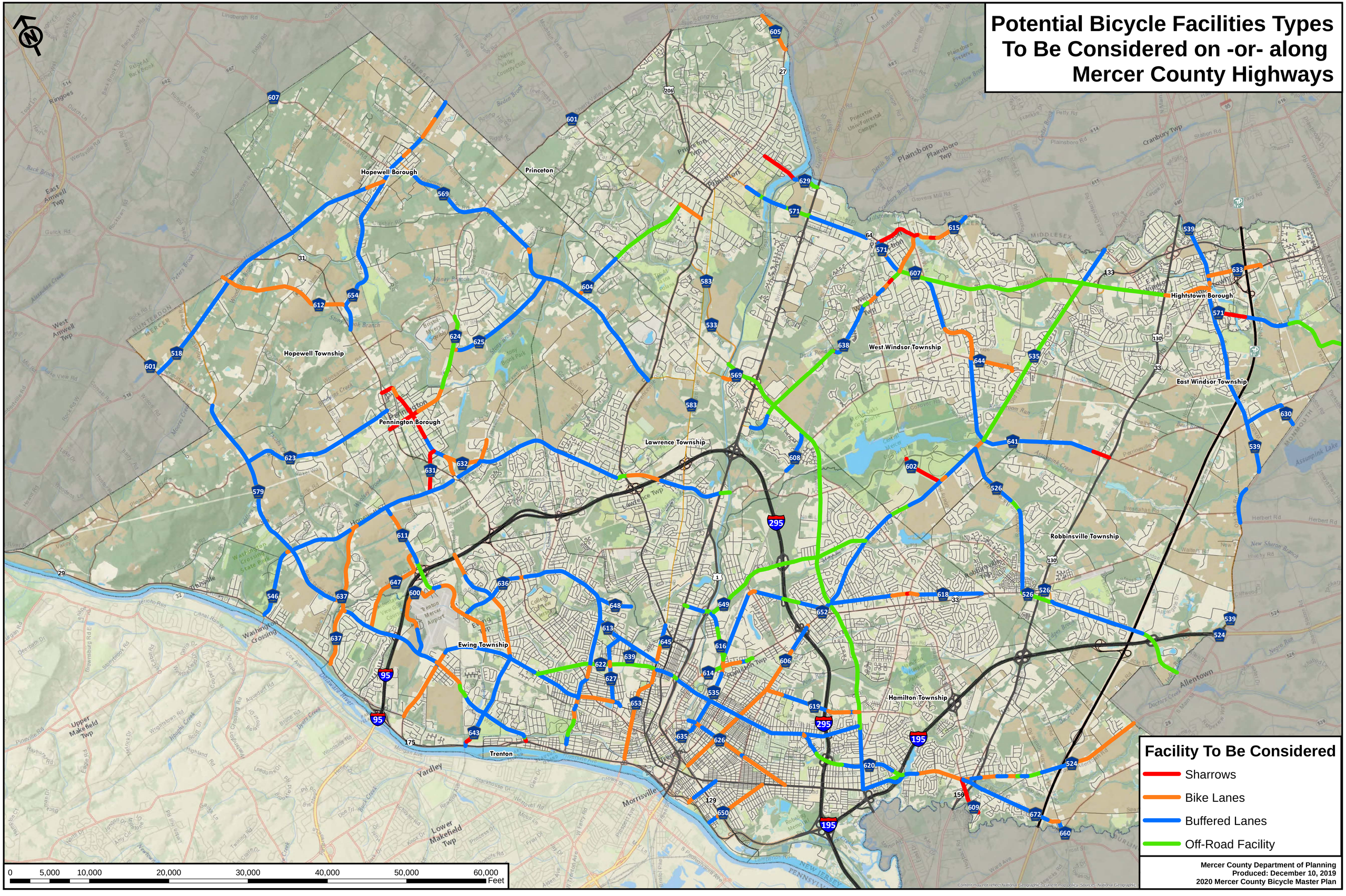
Mercer County Department of Planning
Produced: December 10, 2019
See Map Key Sheets for Further Details

Robbinsville Township

Hamilton Township

Panel C-3 Bike Facility Improvement Type To Be Considered

Potential Bicycle Facilities Types To Be Considered on -or- along Mercer County Highways

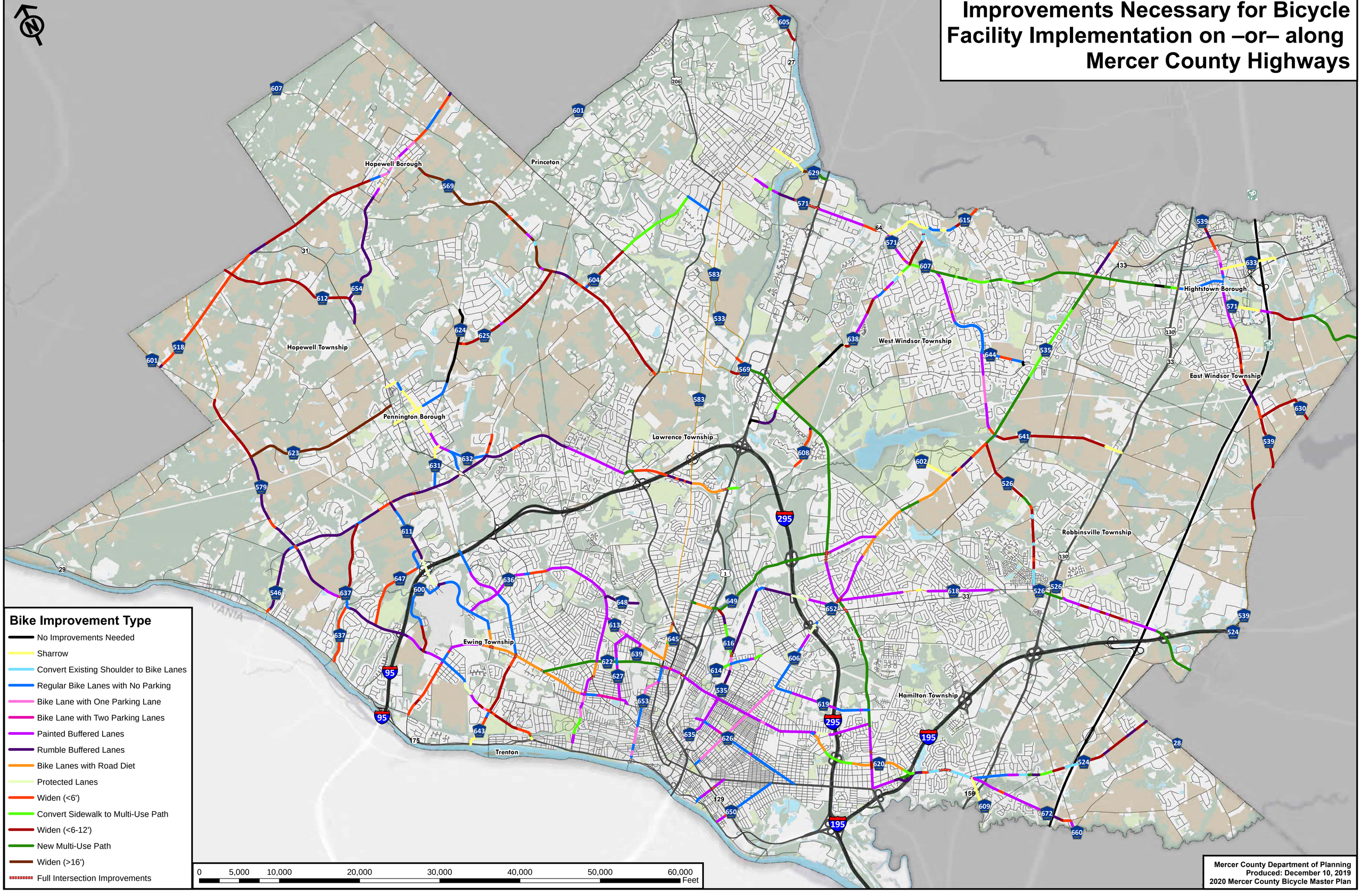


Facility To Be Considered

- Sharrows
- Bike Lanes
- Buffered Lanes
- Off-Road Facility

Mercer County Department of Planning
Produced: December 10, 2019
2020 Mercer County Bicycle Master Plan

Improvements Necessary for Bicycle Facility Implementation on –or– along Mercer County Highways



Bike Improvement Type

- No Improvements Needed
- Sharrow
- Convert Existing Shoulder to Bike Lanes
- Regular Bike Lanes with No Parking
- Bike Lane with One Parking Lane
- Bike Lane with Two Parking Lanes
- Painted Buffered Lanes
- Rumble Buffered Lanes
- Bike Lanes with Road Diet
- Protected Lanes
- Widen (<6')
- Convert Sidewalk to Multi-Use Path
- Widen (<6-12')
- New Multi-Use Path
- Widen (>16')
- Full Intersection Improvements

Mercer County Department of Planning
Produced: December 10, 2019
2020 Mercer County Bicycle Master Plan

Mercer County Bicycle Demand vs. Improvement Cost Based on LF Cost and WSP Bicycle Demand Model

Factor	Weight
Pop Density	18%
Job Density	17%
Key Destinations	
School Access	4%
University Access	8%
Park Access	4%
Commercial Access	8%
Bus Access	3%
Train Access	8%
Equity Factors	
Under 18 Density	6%
Over 64 Density	1%
Zero Car HH Density	8%
IP Ratio < 1.25 Density	5%
Bike to Work Density	6%
Walk or Transit to Work Density	4%

The WSP "Demand Score" in this map shows a combination of elements that look at a variety of factors that influence demand for bicycle travel ranging from socio-economic factors to environmental factors to demographic and population geography factors.

Demographic factors such as population density under 18 and over 64, zero car household density, bike/ walk/ transit to work density as well as an income-poverty ratio density were used. In addition, geographic factors such as population density, job density, school/ university access, park access, commercial access, and bus/ train access were used. [SEE CHART ABOVE FOR WEIGHTS]

Somerset County

Middlesex County

Mercer County

PENNSYLVANIA

NEW JERSEY

Trenton Mercer Airport

Legend

- 1.57 - 2.08
- 2.09 - 2.58
- 2.59 - 3.08
- 3.09 - 3.58
- 3.59 - 4.08
- 4.09 - 4.58
- 4.59 - 5.09
- 5.10 - 5.59
- 5.60 - 6.09
- 6.10 - 6.59
- 6.60 - 7.09
- 7.10 - 7.59
- 7.60 - 8.10
- 8.11 - 8.60
- 8.61 - 9.10

Improvement Linear Foot Cost

- $0.00 - $2.00
- $2.01 - $5.00
- $5.01 - $10.00
- $10.01 - $15.00
- $15.01 - $25.00
- $25.01 - $35.00
- $35.01 - $50.00
- $50.01 - $70.00
- $70.01 - $90.00
- $90.01 - $120.00
- $120.01 - $140.00
- $140.01 - $200.00

0 5,000 10,000 20,000 30,000 40,000 50,000 60,000 Feet

Mercer County Department of Planning
Demand Score Analysis Data from WSP
& The Greater Mercer Trail Plan (2019)
DRAFT CONCEPT MAP: April 17, 2019

2

DEMOGRAPHICS & BENEFITS:

REAL ESTATE

RETAIL

TOURISM

ECONOMIC DEVELOPMENT

CONSTRUCTION

HEALTH

SOCIAL EQUITY

ENVIRONMENTAL

TRANSPORTATION

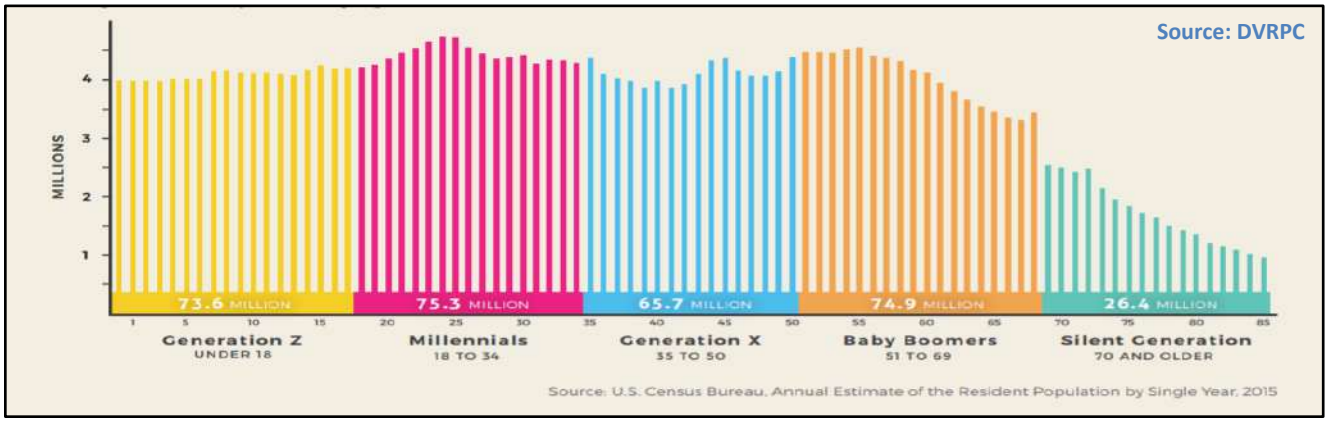
Purpose and Benefits of Bicycle Facilities

Since Mercer County's Complete Streets Policy adoption in 2012, the County has been striving to promote a multi-modal approach to transportation. The policy calls for County officials to promote walkability, pedestrian safety, increased bicycle use and alternative modes of transportation throughout the County in order to increase public safety, sustainability, efficiency, mobility and air quality, while decreasing overall traffic congestion. This policy initiative is driven by significant demographic changes as well as significant research quantifying the many economic, environmental, mobility and social benefits of complete streets.

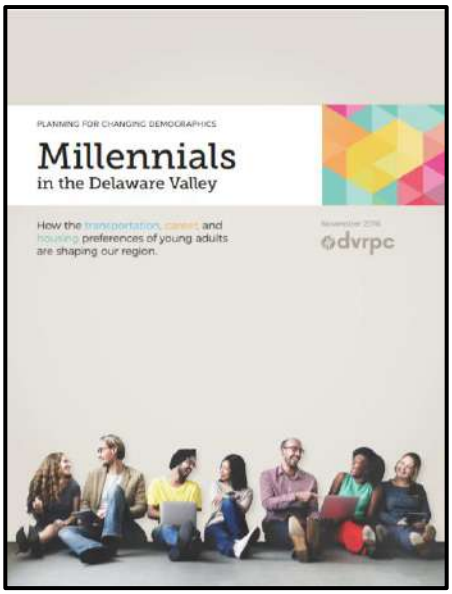
Demographic Changes

According to Census Bureau population projections for the US, in 2015 individuals between the ages of 18 and 34 numbered 75.3 million, surpassing baby boomers (74.9 million) as the largest generational cohort in the United States. This generation is now entering a period in which their purchasing power is growing at an exponential rate and will soon take over the previous generation to become our nation's dominant consumer base. Everyday decisions like housing and transportation choices that millennials will make will translate into hundreds of billions of dollars in economic activity.

According to DVRPC, approximately one-third of young adults (32.1%) currently live at home with their parents or other relatives[1]. Many of these factors are a result of a sluggish economy during the recession, low starting wages out of college, student debt, high cost of housing and the fact that young adults are marrying and having children later. Despite these factors, the millennial generation represents the largest share of recent homebuyers according to a 2015 study conducted by the National Association of Realtors (NAR)[2]. That means that over 24 million millennials will likely move out on their own over the next several years as they enter the work force, marry, or save enough to purchase a home. According to the 2015 NAR study, the millennial generation already represents the largest share of recent homebuyers and will only grow larger over the next few years.



[1] Delaware Valley Regional Planning Commission, "Millennials in the Delaware Valley," November 2016. https://www.dvrpc.org/Reports/16035.pdf
[2] National Association of Realtors and Portland State University, "2015 Community Preference Survey," July 28, 2015, www.realtor.org/reports/nar-2015-community-preference-survey.



In Mercer County, millennials make up a significant portion of certain municipalities' populations. Ewing Township and Princeton rank #10 and #11 respectively out of 352 municipalities in the Greater Philadelphia DVRPC region (9 County Region) for millennials as a proportion of their total population. Lawrence Township, Hightstown and the City of Trenton also have significant population proportions of millennials.

Where they choose to live will have momentous implications for communities not only in Mercer County but the region and state. Even a small percentage of this generation exhibiting any preference or behavior can translate into large investments. Clearly, this generation will shape our economy and drive our land use and transportation investments for decades to come. Communities unprepared or unwilling to accommodate this new generation will lose a large market segment and consumer class. Doing so will also impact existing residents and may have a cascading effect on the success of existing and future economic development as well as municipal budgets.

Existing Demographics

In addition to preparing for significant demographic changes, we must look at our current demographic profile in order to understand how to best serve our public. With an estimated population of 373,362 persons calling Mercer County home as of 2017, there are varying needs for different demographic segments of the County[3]. Demographics subgroups will all have different priorities and as such, finding common ground in determining facility choices and improvements is critical.

Bicycle demand is influenced by a variety of factors, including the locations of population centers, jobs, key destinations, and demographic factors. In terms of bicycle planning, there are several key demographic indicators called out in this plan due to their interconnected role in determining demand and need. Factors such as percent of households living below poverty level, number of households with no vehicles, populations of persons over 62 and under 18, as well as commuting mode choice all play a significant role in determining need and demand for bicycle improvements. Though all County roads are considered for improvements, these demographics will help influence which roads require prioritization over others when funding is limited. Populations living in poverty and with no vehicles have a greater need for bicycle facilities over wealthy residents or those with multiple vehicles. Younger or older residents who cannot drive also have a greater need, as do people who commute via bicycles to work or school.

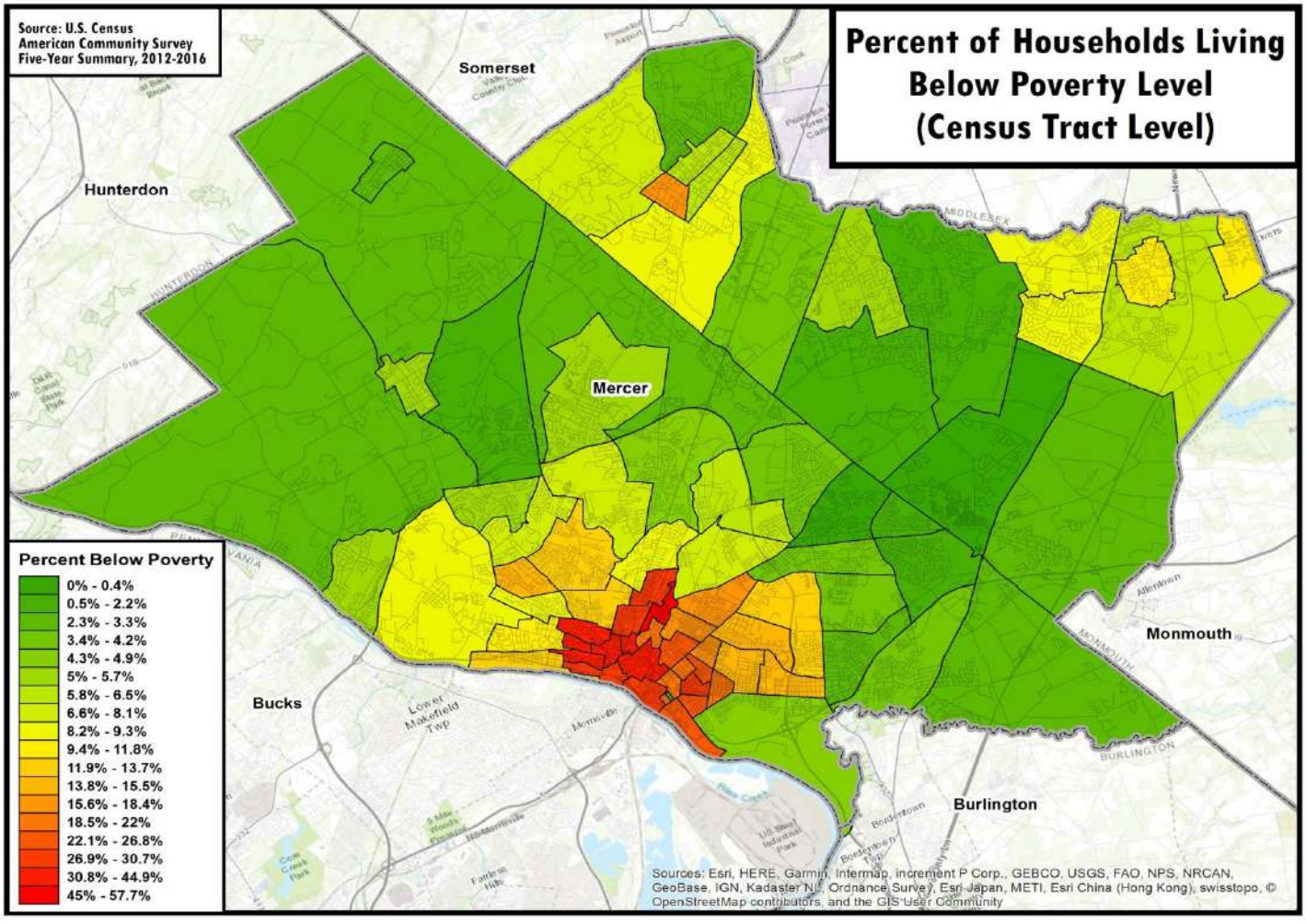
The following pages discuss demographics as well as the various benefits of bicycle improvements on the County.

[3] AMERICAN COMMUNITY SURVEY 2013-2017 5-YEAR ESTIMATES

Households Living Below Poverty Line

Cycling is an important alternative transportation choice for many low income households. Unlike high income households who typically choose to commute by bike for health or environmental reasons, low-income households often have no choice. Low income populations may often not be able to afford the costs associated with car ownership, and may rely more frequently on walking, bicycling, and transit options. Those that do own a vehicle may only have one, which is shared among many family members and not always available or may have broken down, and the costs of repair must compete with things like rent, mortgages, groceries or the electric bill. As a result, a majority of people walking and bicycling to work are of low-income backgrounds (with the second highest majority those of very high-income who do so out of choice).

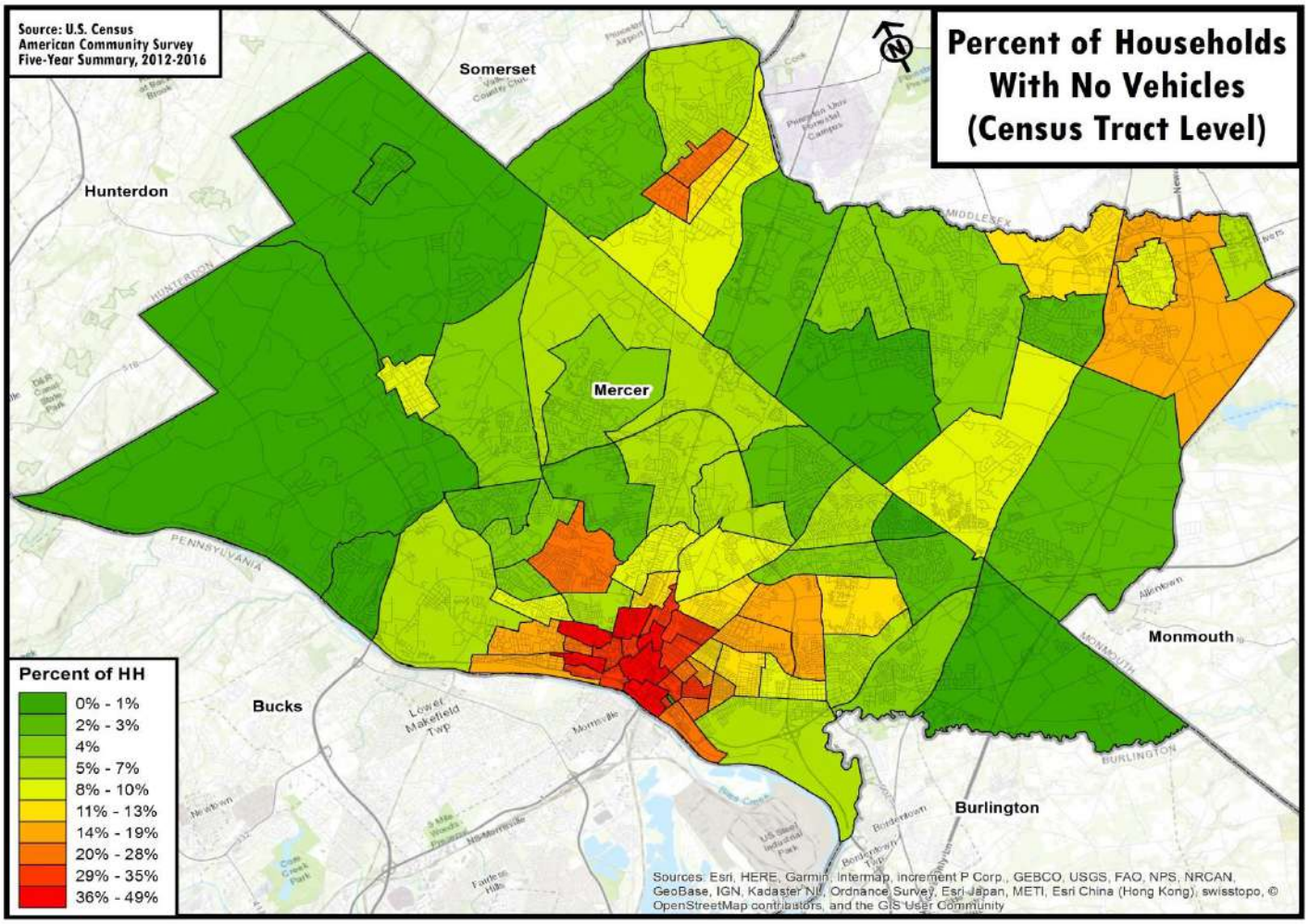
While the median household income in Mercer County was approximately $77,650 in 2016, approximately 11.4% of people live below the poverty line. Much of the County's poverty is concentrated in the City of Trenton but high percentages also exist in Princeton, Hightstown, Ewing, and Hamilton. With a little over 1 in 10 people living in poverty in Mercer County, having alternative travel modes is essential for prosperity and equity of all Mercer County residents.



Households with No Vehicles

Zero car households are becoming more common in the United States as we continue to urbanize and technology keeps advancing alternative options. According to the 2017 American Community Survey, approximately 5.2% of people in Mercer County had no vehicle available and nearly 22% had only one vehicle in their household. These are people who oftentimes either cannot afford to own and operate a vehicle or simply choose to live a car free lifestyle. Concentrations of zero car households can be found in the Trenton-Ewing-Hamilton area as well as parts of East Windsor, Princeton, and Hightstown. Many of these areas are of greater density and oftentimes can offer simple amenities such as sidewalk, bike lanes or sidepaths to allow people to walk or bike around.

In the City of Trenton, there are census tracts and neighborhoods where nearly half of all households own no car. These are households that contribute to municipal and County taxes, yet use a much smaller portion of the transportation network. It is important to ensure all constituents are given equitable access to safe and efficient mobility, whether it be walking, biking, using transit, or driving.



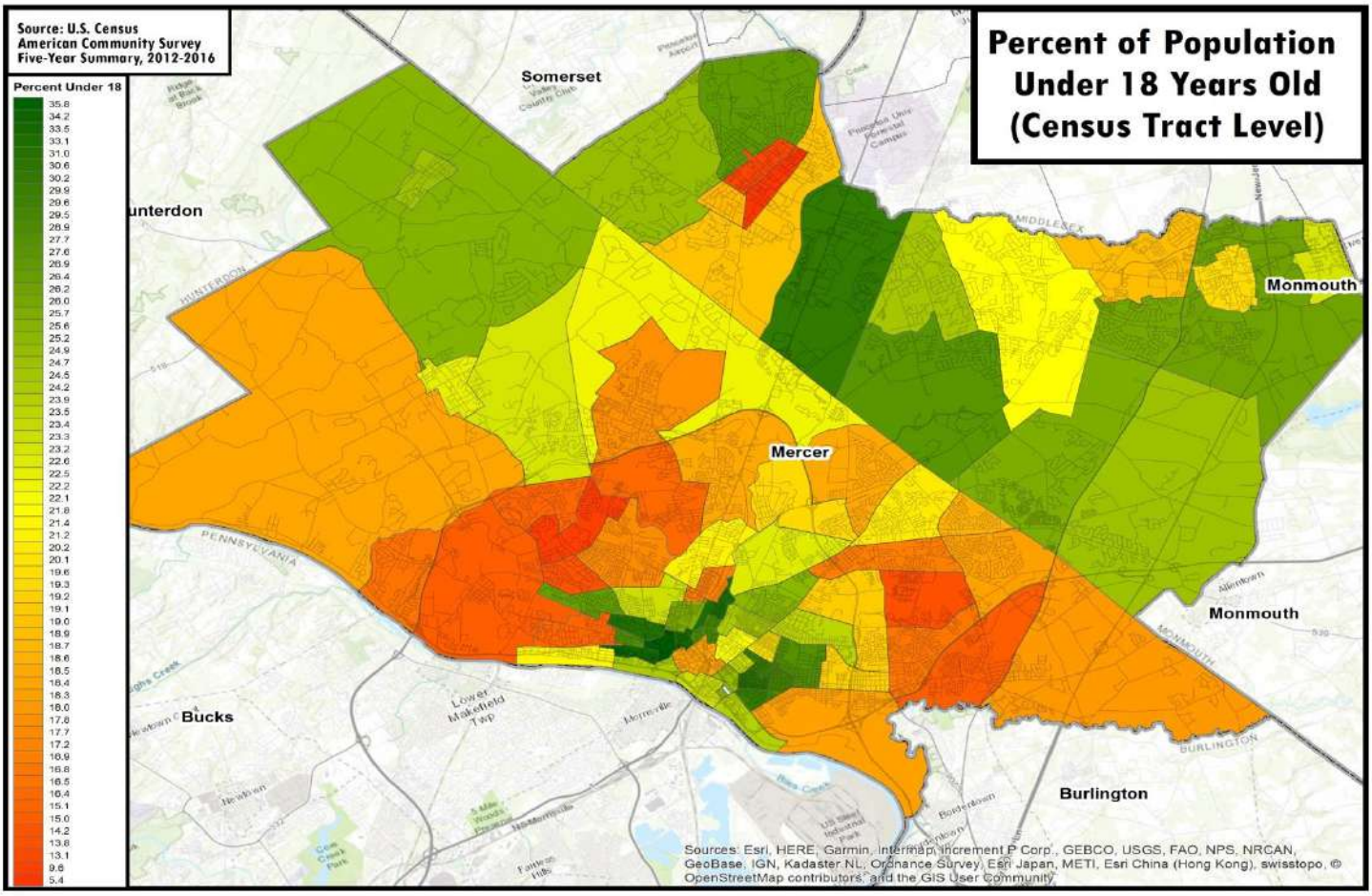
Population Under-18 and Over-62

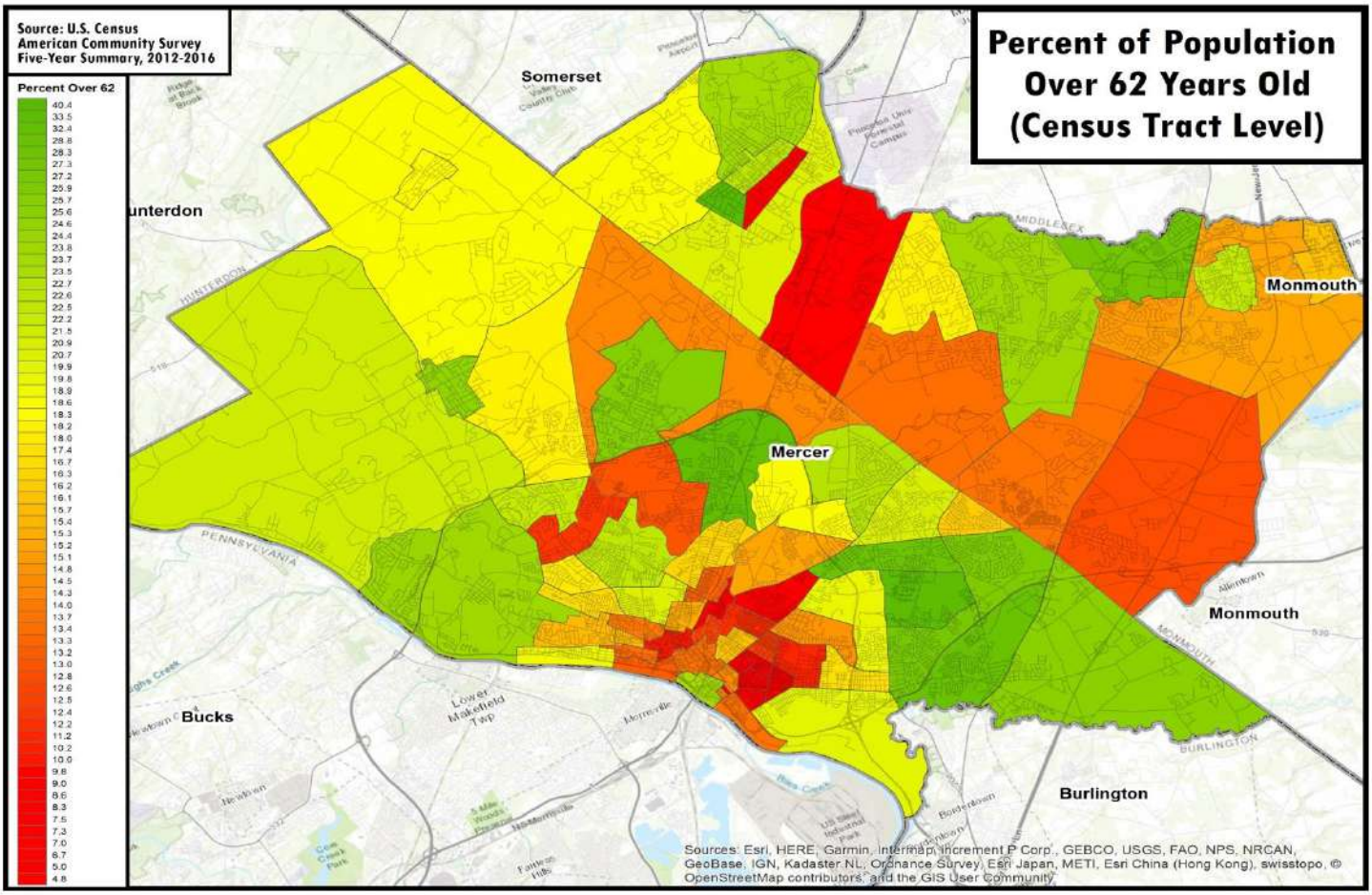
Mercer County residents have a median age of 38.6 years. Mercer County has approximately 80,409 persons under the age of 18 out of a total 373,362 persons or approximately 21.5% of our population. The County also has approximately 65,952 persons over the age of 62 which is approximately 17.7% of the population. These two groups represent a significant population of individuals who are significant users in need of safe bicycle and pedestrian facilities.

Young children and the elderly who need special assistance need safe crossings, ADA compliant wheelchair ramps, and dedicated facilities such as sidewalks, bike lanes or multi-use paths. Different subgroups of children also have different needs. Very young children and their parents need special facilities because they need a separation from vehicular traffic and dangerous and unpredictable conditions. Older children, though more aware of their surrounds, also need safer facilities and separations. As children enter adolescence and become young adults searching for freedom, walking or bicycling is oftentimes their only means of transportation. To these kids, who are too young to have a driver's permit or license but old enough to travel by themselves, these continuous, connected and safe facilities are critical to their growth and independence.

Multimodal facilities are just as critical for seniors entering retirement. In order to have a vibrant multi-generational society where our elderly can age in place, they need safe facilities to get them from place to place. As some seniors begin to abandon vehicles, out of choice or health necessities, alternative transportation such as walking, biking or taking public transit is the only method to move around. Additionally, some seniors may want to remain in their current neighborhoods and communities but would also like to engage in a more active lifestyle now that they have time. Simple things like walking to the store, senior center, friend or family member's house is oftentimes impossible due to the lack of connections and facilities.

The maps on the following page show census tracts within Mercer County with the percentage of seniors and persons under 18 out of the total population. Within Mercer County, we have places of high senior concentrations in parts of Princeton, Lawrence and Hamilton. One census tract in Princeton has seniors consisting of 40.4% of the population and one in Hamilton has nearly 33.5% of its population consisting of seniors. We also have areas with very significant concentrations of young children under 18 in certain census tracts within Trenton where children under 18 comprise 35.8% and 34.2% of the population. Overall there are 20 tracts in Mercer County where children under 18 represent 25% of the population.

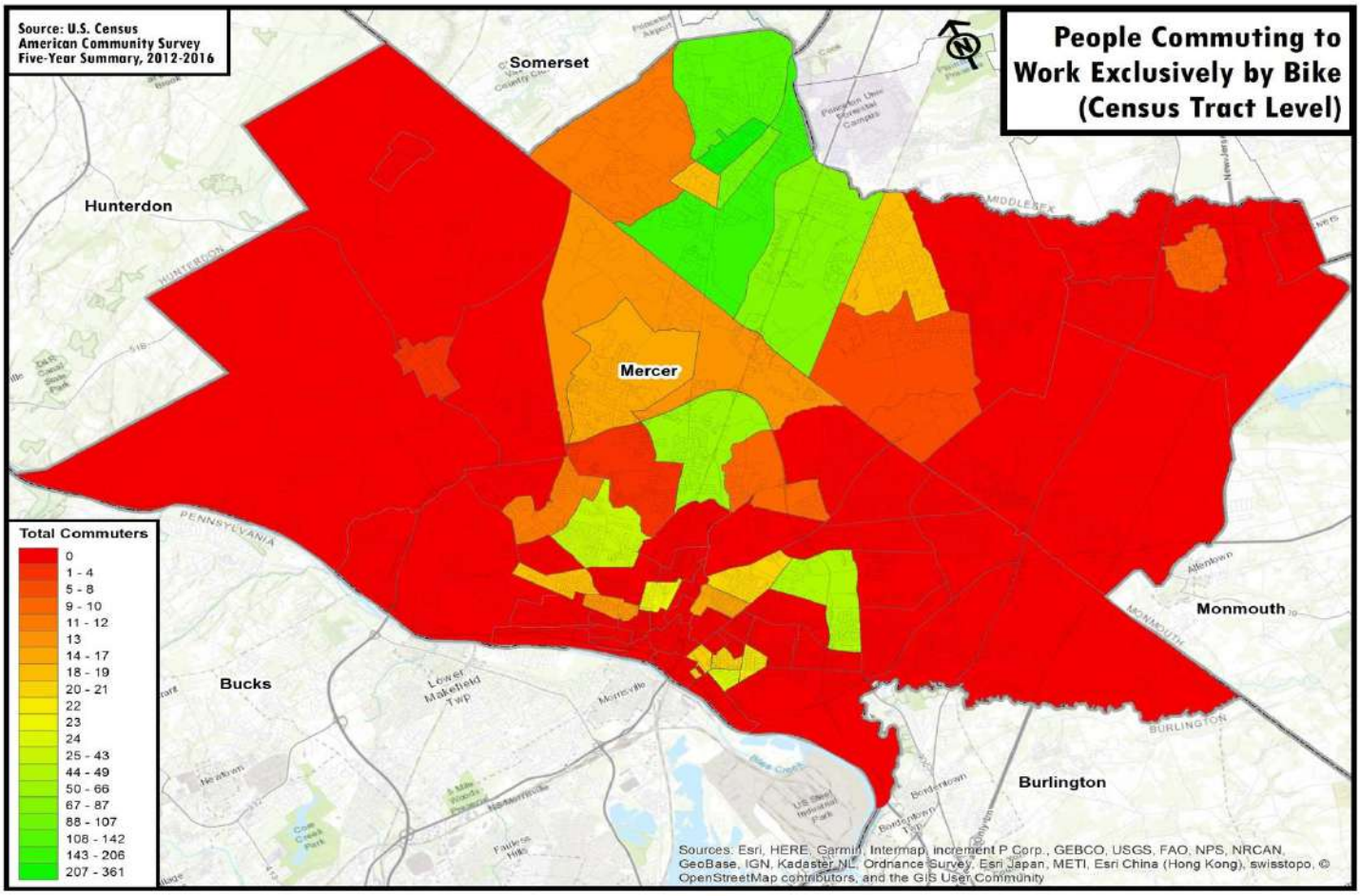

Source: U.S. Census
American Community Survey
Five-Year Summary, 2012-2016
Percent Under 18
35.8
34.2
33.5
33.1
31.0
30.6
30.2
29.9
29.6
29.5
28.9
27.7
27.6
26.9
26.4
26.2
26.0
25.7
25.6
25.2
24.9
24.7
24.5
24.2
23.9
23.5
23.4
23.3
23.2
22.6
22.5
22.2
22.1
21.8
21.4
21.2
20.2
20.1
19.6
19.3
19.2
19.1
19.0
18.9
18.7
18.6
18.5
18.4
18.3
18.0
17.8
17.7
17.2
16.9
16.8
16.5
16.4
15.1
15.0
14.2
13.6
13.1
9.6
5.4
Percent of Population
Under 18 Years Old
(Census Tract Level)
Somerset
Monmouth
Mercer
Monmouth
Bucks
Burlington
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community


Source: U.S. Census
American Community Survey
Five-Year Summary, 2012-2016
Percent Over 62
40.4
33.5
32.4
28.8
28.3
27.3
27.2
25.9
25.7
25.6
24.6
24.4
23.8
23.7
23.5
22.7
22.6
22.5
22.2
21.5
20.9
20.7
19.9
19.8
18.9
18.6
18.3
18.2
18.0
17.4
16.7
16.3
16.2
16.1
15.7
15.4
15.3
15.2
15.1
14.8
14.5
14.3
14.0
13.7
13.4
13.3
13.2
13.0
12.8
12.6
12.5
12.4
12.2
11.2
10.2
10.0
9.8
9.0
8.6
8.3
7.5
7.3
7.0
6.7
5.0
4.8
Percent of Population
Over 62 Years Old
(Census Tract Level)
Somerset
Monmouth
Mercer
Monmouth
Bucks
Burlington
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Bicycle and Walking Commuters

Within Mercer County, even though most people drive alone due to the nature of our built environment, there are several places within the County where people do commute via bicycle to work. In the Princeton and West Windsor area, there is a significant bicycle commuter population with a smaller commuter group in parts of Trenton, Ewing, Lawrence and Hamilton. Even though these numbers are small in relation to the entire population, they are not insignificant. These commuters are die hard cyclists who are often not riding in dedicated bike lanes but instead riding in travel lanes along with fast moving vehicles, trucks and busses. They represent a small percentage of the population who will ride regardless of facilities being available.

The rest of the population is more careful and will only ride if a bike lane or sidepath is present, regardless of how close they may be to their destination. Though not represented in this dataset and map, schoolchildren who live within a quarter mile of a school oftentimes cannot walk or bike to school because of a lack of sidewalk, bike lanes or crossings. The same issue exists for commuters who live near their job or nearest transit station but have to drive because no alternative exists.



Real Estate Impacts

Photo courtesy of flickr: Dimitry B.

With the construction of bike and trail facilities, real estate values oftentimes see positive gains. While the valuation of real estate is based on a multitude of factors, research shows that people positively value things such as parks, trails, bicycle facilities, farmland, walkable communities, wilderness areas, beaches, lakes and preserved open space. Neighborhoods that offer these amenities become more desirable and in turn increase the selling point of homes and the land they sit on.

A 2017 survey by the National Association of Realtors found that millennials and Gen Xers are more likely to live in at least somewhat walkable neighborhoods, and are more likely to have sidewalks, public transit, and parks nearby. Those characteristics were noted as being VERY important in determining where millennials and Gen Xers prefer to live. Of those surveyed, approximately 80% responded that they liked walking and about half like to ride their bikes. The number of people who responded that bike lanes or paths are very important or somewhat important in deciding where to live is nearby has been slightly increasing over the years. In the short time from the last 2015 survey to the 2017 survey, the number rose from 52% to 54% of respondents. Of all respondents who were asked what keeps them from walking, they mentioned that there are too few sidewalks or trails available to them.[4]

This preference for complete street communities translates indirectly to demand and real estate valuations. In our region, there are several examples of direct impact. In nearby Radnor Township, PA, a study found that properties within a quarter-mile (0.4 km) of the Radnor Trail, a 2.4-mile (3.9 km) trail which sees an estimated 200 to 600 users per day, were valued on average $69,000 higher than other area properties further away. Real estate listings in Radnor frequently mention trail access in their advertisements, and for-sale signs often appear on the trail side of properties. [5]

Another 2009 nationwide study by CEOs for Cities, a cross-sector organization that develops ideas to make U.S. cities more economically successful, found that “houses located in areas with above-average walkability or bikability are worth up to $34,000 more than similar houses in areas with average walkability levels.”[6] Nationally, residential developers have increasingly built properties with features that support use of trails with facilities such as bike parking, trail connections, bike repair stations and more. Overall, homes near walkable, and often bikable, trails enjoy premiums of between 5% to 10%, according to an analysis by

[4] National Association of Realtors, “National Community and Transportation Preferences Survey” September 2017. https://www.nar.realtor/sites/default/files/documents/2017%20Analysis%20and%20slides.pdf

[5] DVRPC & GreenSpace Alliance, “Return on Environment: The Economic Value of Open Space in Southeastern Pennsylvania” January 2011 https://www.dvrpc.org/reports/11033A.pdf

[6] CEOs For Cities, “Walking the Walk: How Walkability Raises Home Values in US Cities” August 2009, http://blog.walkscore.com/wp-content/uploads/2009/08/WalkingTheWalk_CEOsforCities.pdf

Headwaters Economics, a research group focused on community development and land management issues.[7] Other surveys have put that percentage even higher.

Within the region, residential developers have built properties with features that support use of trails with facilities such as bike parking, trail connections, bike repair stations and more. These facilities not only serve to promote good community relations but have a direct benefit to developers as their sites become more desirable to homebuyers and tenants. Just as community rooms, pools and gyms are amenities that multi-family developers can often include for residents, bicycle lanes and trails are oftentimes just as appealing if not more so.

In Philadelphia, Brandywine Realty Trust is developing trailside properties, including the FMC Tower, a 49-story, 730 foot tall mixed-use skyscraper recently completed. Access to the Schuylkill River Trail is touted in advertisements for the tower. Gerard H. Sweeney, Brandywine's president and chief executive officer, expressed his company's support for connecting regional trails in a 2013 letter to the city of Philadelphia, stating, "When fully complete, the Circuit Trails network will help connect people to jobs, recreational opportunities, public transportation, and other neighborhoods, and will serve as a gateway to open green space."[8]

New research from Portland State University finds that proximity to a network of high-quality bike facilities such as protected bike lanes, buffered bike lanes, and bike boulevards, is associated with an increase in property values. Through the separate estimation of ordinary least squares hedonic pricing models and spatial autoregressive hedonic models of single and multifamily properties, it was found that proximity to advanced bike facilities (measured by distance) had significant and positive effects on all property values, which highlighted household preferences for high-quality bike infrastructure. Furthermore, the study showed that the extensiveness of the bike network (measured by density) was a positive and statistically significant contributor to the prices for all property types, even after proximity was controlled for with respect to bike facilities and other property, neighborhood, and transaction characteristics. Finally, estimated coefficients were applied to assess the property value impacts of the Green Loop (i.e., the proposed Portland, Oregon, signature bike infrastructure concept), which illustrated the importance of considering the accessibility and the extensiveness of bike facility networks.[9]

In 2013, REMAX Realty in Atlanta explained that homes near the BeltLine— a transit and trail loop around the city that will include a planned total of 33 miles (53 km) of pedestrian and bicycle trails—were selling within 24 hours. Before the Atlanta BeltLine project began, homes along the corridor had typically stayed on the market for 60 to 90 days. Furthermore, real estate listings near trails and bike facilities frequently mention trail access in their advertisements and for-sale signs often appear on the trail side of properties.

[7] Headwater Economics, "Measuring Trail Benefits: Property Value" Spring 2016. http://headwaterseconomics.org/wp-content/uploads/trails-library-property-value-overview.pdf

[8] Urban Land Institute, "Active Transportation and Real Estate: The Next Frontier" March 2016. http://uli.org/wp-content/uploads/ULI-Documents/Active-Transportation-and-Real-Estate-The-Next-Frontier.pdf

[9] *Liu, Jenny & Shi, Wei., 2016 - Impact of Bike Facilities on Residential Property Prices*

Retail, Tourism and Economic Development Impacts

Bicycle infrastructure is playing an increasing role in local economic development and has the potential to promote and strengthen a local community's tourism sector. According to a 2009 report by the League of American Bicyclists, the national bicycle industry contributes approximately $133 billion annually to the U.S. economy by supporting over 1 million jobs, generating nearly $18 billion in federal, state, and local taxes, and providing nearly $47 billion for meals, transportation, and lodging purchases during bike trips and tours. Economic development impacts range from higher value rents and property prices, more retail sales, more aesthetically pleasing neighborhoods and commercial corridors, better tourist and recreational transportation options, and more. Jobs relating to bike infrastructure range from sale and maintenance of bikes and bike facilities to ancillary jobs such as those that are tied to increased tourism.[10]

Local stores particularly benefit more than others. Local bike and service shops keep money in their communities on a much larger scale than multi-national firms that often send money overseas or to national firms which send money to investors and shareholders across the nation. Numerous studies of businesses across the nation show that cyclists are competitive consumers, spending similar amounts or more, on average, than their counterparts using automobiles. On average, though cyclists spent less per trip, they made more trips and more trips to local stores rather than to national chain big box stores.

A study by the Salt Lake City DOT found that "replacing parking with protected bike lanes increased retail sales." A general street upgrade on Broadway Avenue removed 30% of on-street parking from nine blocks of the major commercial street, but improved crosswalks and sidewalks and added protected bike lanes. In the first six months of the next year, retail sales were up 8.8% over the first six months of the previous year, compared with a citywide increase of only 7%. After the changes, 59% of business owners said they supported the street improvements, 23% were neutral and only 18% opposed them.[11]

"Business is up 20% since last year. I'm excited about the changes to the neighborhood. The bike lanes and lower speed limits help to calm car traffic and increase pedestrian traffic – all positives for my business." - Paradise Palm. John Mueller, Owner

[10] League of American Bicyclists, "The Economic Benefits of Bicycle Infrastructure Investments" June 2009. https://bikeleague.org/sites/default/files/Bicycling_and_the_Economy-Econ_Impact_Studies_web.pdf

[11] Salt Lake City DOT, "300 South Progress Report" Sept. 2015,

A study of the Pinellas Trail in Florida found that the downtown area of Dunedin, Florida was suffering a 35 percent storefront vacancy rate in the early 1990's until the Pinellas Trail came into town. Now, storefront occupancy is 100 percent and business is booming. New businesses included several restaurants, a bike shop, an outdoor equipment supplier, a bed-and-breakfast operation, and a coffee shop.[12]

The Rails-to-Trails Conservancy found that the Schuylkill River Trail, a popular Circuit route, generated $7.3 million in direct economic impact along its route in 2009, and the Delaware & Lehigh Trail, a 165-mile (265 km) rail-trail through eastern Pennsylvania, was found to have generated an annual economic impact exceeding $19 million in 2012. As part of the study, a survey was conducted and found that 77% of respondents indicated they had purchased some hard-durable goods during the past year because of their use of the trail, with the average expenditure amounting to more than $400 per user on top of an average of $9.07 per visit. [13]

Tourism in Mercer County and New Jersey

Tourism and recreation plays a significant role in the Mercer County economy. According to a recent New Jersey Tourism study, expenditures in Mercer County were $1.311 billion in 2016, a 5.5% increase from 2015 and accounts for nearly 12,833 positions or 4.5% of all employment. State and local tourism-related tax receipts for Mercer County increased by 4.1% to $166.0 million. In 2016, total tourism demand in the State of New Jersey grew to $44.1 billion, a 2.9% increase from 2015. In 2016, the tourism industry directly supported 321,231 jobs in New Jersey and sustained 517,559 jobs including indirect and induced jobs. These jobs represent 9.8% of total employment or 1-in-10 jobs in New Jersey. Without the tourism industry, New Jersey households would need pay an additional $1,525 each in order to maintain the current level of state and local government services.[14]

Though domestic visitor (NJ residents) markets comprise the majority (88.4%) of tourism sales in New Jersey, there are some national and international visitors to NJ that come to enjoy our rich education, arts and history assets. Unlocking Mercer County to more of the national and international community would vastly help our tourism industry. Mercer County has well developed local and regional trail network of existing trails as well as trails under construction or in the planning stages. Trails such as the Lawrence Hopewell Trail, Delaware and Raritan Canal State Park Trails, not to mention many other smaller trail networks provide the backbone to our system. The County highway network provides a significant opportunity to connect these networks and their missing segments. As County highways connect our

[12] WMTH Corporation, "Economic Impact of Biking" 2009
[13] Rails to Trails Conservancy, "Schuylkill River Trail 2009 User Survey and Economic Impact Analysis" Nov. 2009
[14] Tourism Economics, An Oxford Economics Company, "The Economic Impact of Tourism in New Jersey" 2016
https://www.visitnj.org/sites/default/master/files/2016-nj-economic-impact.pdf

municipalities, they provide the long connections required for a continuous and connected bicycle network that other trails or bike lanes can connect into.

More specifically within the tourism industry, active transportation is a growing industry in the region and state. According to a Rutgers report on "The Economic Impacts of Active Transportation in New Jersey, in total, active transportation-related infrastructure, businesses, and events were estimated to have contributed $497.46 million to the NJ economy in 2011 or $565.15 million in 2019 dollars and supported 4,018 jobs. Active transportation also added $153.17 million in compensation ($174.01 million in 2019 dollars), added $278.12 million to state GDP ($315.97 million in 2019 dollars), and generated an estimated $49 million in total tax revenue ($55.67 million in 2019 dollars).[15]

Above: Rutgers model and report estimated that participation of persons in NJ run and walk events totaled 197,930 and bicycling events 44,408, for a total of 242,338 participants in 2011. The map above shows where these participants traveled from to attend events.

Other Key VTC Study Results

- In 2011, it was estimated through surveys on revenues from bicycling, running, or walking related equipment and services that 317 independent businesses received $267.5 million in annual revenue. This provided 2,253 full and part-time jobs, paying out $37 million in salaries and wages.
- Participation in run and walk events was estimated to total 197,930 in 2011, with 44,408 participating in bicycling events for an overall total of 242,338. Some 19% of participants were estimated to have traveled from outside of New Jersey to attend, with 6.7% of respondents indicating that their trip required an overnight stay. Participants were estimated to spend over $35 million annually in the state as part of their trips to events, with over $10 million of that spending deriving from visitors traveling from outside NJ.
- The model output estimated that these active transportation-related events generated $57.82 million in economic activity in 2011. This resulted in an estimated 369 jobs at New Jersey businesses, with compensation amounting to $17.79 million. The total estimated tax contribution in 2011 as a result of event participant spending was $6.45 million, with a contribution of $31.2 million to the state's GDP.

[15] Brown and Hawkins, Alan M. Voorhees Transportation Center, Rutgers University, "The Economic Impacts of Active Transportation in New Jersey" May 2013, http://vtc.rutgers.edu/the-economic-impacts-of-active-transportation-in-nj-2013/

Bicycle, Pedestrian & Trail Facility Employment Impacts

Though not a factor for making improvements, bicycle facility construction helps stimulate and support local employment. Construction of facilities benefits the local economy as it requires local labor to go out and physically construct improvements. Once constructed, businesses often benefit from these facilities and employ workers to service the facility patrons. In 2011, The Political Economy Research Institute released a study of 58 separate bicycle and pedestrian projects across the United States. Impacts studied in the report are specific to the design and construction of roads, bicycle, and pedestrian facilities. They do not consider the ongoing maintenance and use of these facilities nor do they account for additional economic development or potential ancillary effects in regards to job creation.

In the table below, it can be seen that on average, every $1 million spent on the design and construction of bicycle and pedestrian specific projects results in approximately 8.42 jobs (4.2 direct, 2.2 indirect, 2.02 induced). The greatest job generation is produced for infrastructure projects specific to bicycling (11.41 jobs created for every $1 million spent) while the lowest job creation is for road-only projects such as repaving or widening (7.75 jobs per $1 million spent).

Sample Calculation of Job Creation within Mercer County:

- 149 miles of on-road bike facilities @ $37.1 Million Construction Cost x 11.41 jobs = 423 total jobs
- 25 miles of off-road bike facilities @ $23.7 Million Construction Cost x 9.57 jobs= 227 total jobs

For a total of 650 total jobs (direct, indirect and induced) with a full network buildout

*The above total is a rough estimate for planning purposes, as exact costs cannot be quantified at this time.

Project Type	Road	Bicycle	Pedestrian	Off Street Multi-Use Trail	Direct Jobs per $1 Million	Indirect Jobs per $1 Million	Induced Jobs per $1 Million	Total Jobs per $1 Million
Bicycle Infrastructure Only		✓			6	2.4	3.01	11.41
Pedestrian Infrastructure Only			✓		5.18	2.33	2.4	9.91
Off Street Multi-Use Trails				✓	5.09	2.21	2.27	9.57
Road Infrastructure with Bicycle and Ped Facilities	✓	✓	✓		4.32	2.21	2	8.53
On-Street Bicycle and Ped Facilities (without road construction)		✓	✓		4.2	2.2	2.02	8.42
Road Infrastructure with Pedestrian Facilities	✓		✓		4.58	1.82	2.01	8.42
Road Infrastructure Only (No Bike or Ped Components)	✓				4.06	1.86	1.83	7.75
AVERAGE (All Projects)					**4.78**	**2.15**	**2.22**	**9.14**

Original Data Source: Garrett-Peltier, Bicycle and Bicycle Infrastructure: A National Study of Employment Impacts, Political Economy Research Institute, 2011

Public Health Benefits

Regular exercise, such as cycling and walking is important to good health. Health professionals recommend at least 30 minutes of moderate-intensity physical activity each day. This is enough to maintain good health, even if the exercise is broken up into short 10 minute bursts. Riding a bike to work, school, college, or taking neighborhood trips is a convenient and practical way to incorporate regular exercise into your busy day.

New Jersey's adult obesity rate is approximately 27.4%, up from 17% in 2000 and from 12.3% in 1995.[16] By comparison, in 2016 approximately 33.7% of Mercer residents reported a BMI ≥30. According to a Greater Mercer Public Health Partnership study of Mercer County residents, the percent of Mercer County residents reporting diabetes increased from 8.3% in 2011 to 12.2% in 2016. Also in 2016, Mercer County had the second highest percentage of patients reporting diabetes among comparison counties in the State. In addition to obesity and diabetes, it was found that in 2012, the leading causes of mortality in Mercer County were heart disease (159.9 per 100,000 persons) and cancer (156.5 per 100,000 persons).[17]

A 2008 national study found that obesity-related employment absenteeism annual cost is between $79 and $132, per obese individual, in productivity costs.[18] With 94,335 considered obese in Mercer County, this translates into between $7.45 million and $12.45 million in annual obesity-related absenteeism costs or $8.84 and $14.78 million in 2019 dollars.

According to 2014 County Health Rankings data (based on the CDC's, The National Diabetes Surveillance System), 22% of adults over 20 years of age or some 60,987 persons, in Mercer County had not participated in a leisure-time physical activity. This inactivity is not only hurting our health but is also impacting us financially. A 2004 national study found that the annual individual medical cost of inactivity is approximately $622 or with 60,987 physically inactive adults currently living in Mercer County, this translates to approximately $51,351,054 in medical costs per year in 2019 dollars (equivalent to $842 per person). That same report found that this cost of inactivity is more than 2 ½ times the annual cost per user of bike and pedestrian trails ($318 in 2019 dollars).[19]

For individuals with heart disease, the savings are even greater. According to an analysis of 26,239 men and women published in the Journal of the American Heart Association, patients with heart disease who met weekly guidelines for moderate to vigorous exercise saved on average more than $2,500 in annual

[16] Robert Wood Johnson Foundation, "The State of Obesity: Better Policies for a Healthier America," 2017. Reproduced with permission of the Robert Wood Johnson Foundation, Princeton, N.J. https://www.stateofobesity.org/states/nj/

[17] Greater Mercer Public Health Partnership, "Mercer County 2015 Community Health Assessment" 2015. & "Mercer County 2018 Community Health Assessment" 2018. https://health.montgomery.nj.us/wp-content/uploads/2018/10/GMPHP-CHA-DRAFT_092118.pdf

[18] Trogdon JG, Finkelstein EA, Hylands T, Dellea PS, Kamal-Bahl., "Indirect costs of obesity: a review of the current literature." 2008. https://www.cdc.gov/obesity/adult/causes.html

[19] *Wang, G., et al., "Cost Analysis of the Built Environment: The Case of Bike and Pedestrian Trials in Lincoln, Neb" 2004.* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448293/

healthcare costs. Healthy patients, and those with cardiovascular risk factors, who exercised as recommended also had lower average medical costs.[20]

The new study examined data from a 2012 national survey sample of more than 26,000 Americans age 18 or older, excluding people who were underweight, pregnant, or unable to walk up to 10 steps. People in the study who already had cardiovascular disease — specifically coronary artery disease, stroke, heart attack, arrhythmias or peripheral artery disease — had higher healthcare costs. But those patients who regularly exercised at recommended levels logged average healthcare costs more than $2,500 lower than those who didn't meet exercise guidelines. The research suggests that even if just 20 percent of patients with cardiovascular disease who are not getting enough physical activity would meet exercise goals, the nation could save several billion dollars in healthcare costs annually.

Residents of Mercer County would benefit from additional exercise and providing a space for them to do so may allow more people to live more health conscious lifestyles. For those with busy schedules, incorporating exercise into their daily work/ school commute may be an attractive alternative. In a research study by the University of Glasgow in which 263,450 people and their travel to work was tracked for five years, commuters who cycled to work had a 41% lower risk of dying from all causes than people who drove or took public transport. They also had a 46% lower risk of developing and a 52% lower risk of dying from cardiovascular disease, and a 45% lower risk of developing and a 40% lower risk of dying from cancer.

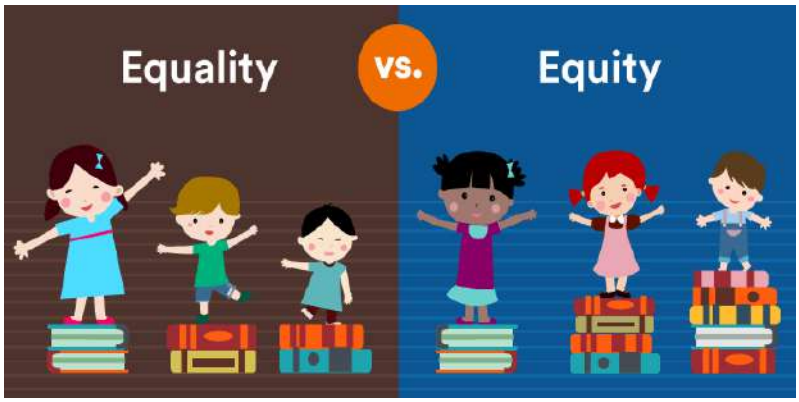
There are many factors that affect cancer and cardiovascular disease in addition to how a person travels to work and researchers went to great lengths to control many of these factors. The analyses were carried out controlling for sex, age, ethnicity, deprivation (measured as a combination of household unemployment and overcrowding, and non-ownership of a car or home), other illnesses such as diabetes, hypertension and depression, body mass index, smoking, diet (alcohol, fruits and vegetables, red meat, oily fish, poultry, and processed meat), time spent walking for pleasure or engaged in strenuous sport, level of occupational physical activity, and sedentary behavior.[21]

Locally, the trails of "The Circuit" (which the Lawrence-Hopewell Trail, Johnson Trolley Line, Delaware & Raritan Canal State Park Trail, and many others are a part) also contribute to the health of Mercer County and Greater Philadelphia. A 2011 study by the GreenSpace Alliance and the Delaware Valley Regional Planning Commission found that residents' use of southeastern Pennsylvania's parks and trails, including the Circuit, avoids $199 million per year in direct medical costs and $596 million in indirect costs.

[20] Javier Valero-Elizondo, et al., "Economic Impact of Moderate-Vigorous Physical Activity Among Those With and Without Established Cardiovascular Disease" 2016 https://www.ahajournals.org/doi/10.1161/JAHA.116.003614

[21] University of Glasgow, Association Between Active Commuting and Incident Cardiovascular Disease, Cancer, and Mortality: Prospective Cohort Study" 2017, https://www.bmj.com/content/357/bmj.j1456

Transportation & Social Equity



Mercer County is committed to promoting equality and equity within all of our planning endeavors and initiatives. We aim to this high standard by convening the widest array of partners to inform and facilitate data-driven decision-making. In doing an analysis of potential facility choice in the following chapter, Mercer County used a data driven method that looks at AADT, posted speeds, cartway widths, bus routes, truck routes and overall road geometry. By doing an analysis of the entire Mercer County owned highway network, Mercer County is providing equal resources to all of our towns and neighborhoods and allows us to move forward to provide for greater equity.

To understand the County's road network, one must understand that the Mercer County Road system is one of the oldest in the nation, with some routes predating the United States itself, having originated with Native American trails and roads. As a result, we do not have the wide cartways and organized grid patterns that many newer cities and states enjoy. In the City of Trenton, Princeton, Hightstown and other older communities, roads were oftentimes built to accommodate livestock and took winding turns based on ownership and natural geography. Homes and especially businesses were often built up close to the edge of roadways, leaving little room for any further widening. Much of our older urban fabric illustrates this and as a result, many older urban roadways have limited cartways to this day.

In the post WWII period, Mercer County as well as countless other communities throughout the USA, evolved rapidly in an auto centric fashion where automobile traffic dominated over all other modes. No direct democratic vote, referendum or debate was given to this transition of public ROW and as a result, the network evolved at the discretion business and developer interests under the guise of economic development. Today, though we cannot correct decades of auto-centric market design, we can strive to have an accessible road network for all and to distribute County right-of-way in such a way that accommodates "Complete Streets" and all modes of travel.

Communities designed exclusively for motor vehicles impose a major financial penalty on those who are compelled to take on the expense of driving. Less affluent household and especially those living below the poverty line are most affected by the auto-centric market design of our urban fabric. From 2016-2017, The New Jersey-New York Metro Area saw households spent 11.7% of their budgets on transportation while the Philadelphia Metro Area spent 14.5%. This is in comparison to the 15.9% national average.[22] According to AAA's "Your Driving Cost" Study in 2018, owning and operating a new vehicle in 2018 will cost a driver an average of $8,849 annually and roughly $10,215 for a pickup truck, based on 15,000 miles

[22] Bureau of Labor Statistics, US Department of Labor, "Consumer Expenditure Surveys" https://www.bls.gov/cex/

driven annually.[23] According to another recent study by the personal finance website Bankrate, just the average annual cost of repairs, insurance and gasoline in 2014 for New Jersey was approximately $2,421.[24] This makes NJ the 5th most expensive state to own a car in the United States. This financial burden is imposed on many residents of auto centric communities and furthers economic inequality.

Being able to thrive without a car is essential to many African-Americans, 22% of who have no access to a car, and Latinos, 14% of who are carless, according to a report by the Leadership Conference Education Fund.[25] For individuals who don't own a car or have access to one, alternative transportation such as bicycling represents important pathways to opportunity. For a 3 car family switching to 2 cars or 2 car family switching to 1 would save them on average $7,500 - $13,000 per vehicle dropped. According to estimates by Transportation Alternatives, an advocacy organization devoted to environmentally-friendly transportation, bicycle riding costs the frequent cyclist only one-quarter as much as driving, assuming cyclists replace their bicycles every three years. Additionally, safe bicycling conditions provide low-income Americans with an opportunity to get to jobs, education, stores and transit so they don't have to spend their limited capital or go into debt to buy a vehicle.

Cycling also provides economic and independent travel for those who might otherwise have their travel options restricted. Over one-third of Americans do not drive, a figure increasing with our aging population, and transportation choice and accessibility are critical issues of social equity. Cycling offers increased mobility to many groups of the population with low rates of car ownership, such as low income earners, minorities, unemployed persons, the elderly and those under 18 years of age as well as urban residents. These populations are disproportionately affected to have limited transportation choices, especially when the affordable transportation options of biking, walking and transit are not sufficiently safe, effective or available. This in turn leads to significant social and economic isolation and decline, with frequent poor health outcomes.

Mercer County, as many Central New Jersey communities has recently seen a significant influx of warehouse and light manufacturing employment along the NJ Turnpike. These jobs often do not require higher education and many of the employees working at these facilities rely on hourly wages. As these warehouses and manufacturers are located far from urban areas or older and smaller housing stock that low income earners can afford, they must travel considerable distances to the nearest affordable housing. Living such a considerable distance away from these employment centers disproportionally affects these residents and has a direct effect on social equity for our residents and labor productivity for our businesses. This disconnect between employment centers, housing and limited transportation choices hiders our ability for economic development and promotion of social equity.

[23] AAA's "Your Driving Cost" 2018. https://newsroom.aaa.com/auto/your-driving-costs/
[24] Bankrate "Best and Worst States for Drivers" https://www.bankrate.com/auto/best-and-worst-states-for-drivers-ranked/
[25] Leadership Conference Education Fund http://civilrightsdocs.info/pdf/testimony/Statement-for-House-Ways-and-Means-Hearing-6-17-2015.pdf

Equity and Cost of On-Street Parking

> "Suppose cities required all fast-food restaurants to include french fries with every hamburger. The fries would appear free, but they would have a high cost in money and health. Those who don't eat the fries pay higher prices for their hamburgers but receive no benefit. Those who eat the fries they wouldn't have ordered separately are also worse off, because they eat unhealthy food they wouldn't otherwise buy. Even those who would order the fries if they weren't included free are no better off, because the price of a hamburger would increase to cover the cost of the fries. How are minimum parking requirements different?"
> Shoup- The Cost of Free Parking

Free parking serves as a powerful market and government subsidy to cars and car trips in which legally mandated parking, via zoning requirements, lowers the market price of parking spaces, often to zero. A generalized system of zoning and development restrictions often require a large number of parking spaces attached to a store or a smaller number of spaces attached to a house or apartment block, many of which are only used a few times a year during peak holiday shopping demand. This requirement not only takes up valuable urban land and destroys the concept of a "Main Street" type streetscape but also adds a financial burden on developers, residents and tenants. If developers were allowed to face directly the high land costs of providing so much parking, the number of spaces would be a result of a careful economic calculation rather than a matter of satisfying a legal requirement. Money saved could be then used for other amenities such as sidewalk, bicycle facilitates, lighting, landscaping, façades or other treatments.

Today, many suburbanites take free parking for granted. Whether it's in the lot of a big-box store or at home in the driveway, people expect free parking wherever they go. Over the past century, we've come to regard parking as a basic public good that should be freely shared but in reality, free parking isn't a public good and isn't used by everyone. While roadways are used by and benefit all in one form or another, whether it is for travel, commerce, or goods movements, parking is not used by all. The cost of land, pavement, street cleaning, and other services related to free on-street parking spots come directly out of tax dollars (usually municipal or state funding sources). Each on-street parking space is estimated to cost around $1,750 to build and $400 to maintain annually.[26] Residents who do not own or use a car are in turn subsidizing car owner's parking spaces. As a third of the nation does not drive, that one third in turn theoretically helps subsidizes the other 2/3 of the population who do not use these services and provide no social benefits like other necessary services (transportation, fire, police, education, healthcare) provide.

In urban areas such as Trenton, Princeton, Hightstown, Pennington and Hopewell, carless residents must not only subsidize parking but also give up valuable public right-of-way to allow for street parking. Mercer County holds that to promote economic equality and equity, parking shall be held as a secondary benefit of a roadway, second to bicycle and pedestrian facilities which promote safety and mobility for residents. This is especially true for disenfranchised and low-income residents who may not be able to afford and maintain a vehicle but have the same right as all other residents to travel in a safe marked lane. Free parking is a luxury that comes second to providing a safe way for our residents to get to their jobs, homes, schools, doctors, and other destinations.

[26] Metropolitan Area Planning Council, "Financing Public Parking" https://www.mapc.org/resources/parking-toolkit/parking-issues-questions/financing-public-parking

Pavement Management and Maintenance

This current generation of young adults has the most to gain and lose from the transportation investments that we make today because they and their children will be impacted by our investments for decades to come. According to DVRPC, the millennial generation is driving less, getting driver's licenses later (if at all), and are less interested in car ownership compared to previous generations. Almost half of more than 1,000 consumers surveyed do not enjoy most of the time they spend driving, said a study by Arity, a Chicago-based transportation technology and data company created by Allstate. The numbers are starkest for millennials. More than half of adults between the ages of 22 and 37 say a car is not worth the money spent on maintenance, and that they would rather be doing something other than driving.[27]

The daily wear and tear of vehicles on our road system has significant maintenance implications and requires the County to repave every single County Road every few years depending on use and other variables. This requires a vast expenditure of County funds to maintain our roads in a state of good repair. A study by the U.S. General Accounting Office (GAO) determined that the road damage caused by a single 18-wheeler was equivalent to the damage caused by 9,600 cars.[28] The study found that road damage was exponentially worse with more weight. If one vehicle carries a load of 1,500 pounds per axle and another carries a load of 3,000 pounds on each axle, the road damage caused by the heavier vehicle is then not twice as much, but 2 to the 4th power as much (2x2x2x2 = 16 times as much road damage as the lighter vehicle). Looking at this from alternative travel modes, bicycles do nearly no damage to our road surface. Comparing a passenger car and a bicycle, say a bike and its rider weigh in at 200 pounds, and the car at 4,000 pounds. The weight of the car is also 20 times greater than the bike and rider, and the road damage caused would be 160,000 times greater. It would take 700 trips by a bicycle to equal the damage caused by one Smart Car. It would take 17,059 trips by bike to equal the damage caused by an average car. And it would take 364,520 bike trips to equal the damage caused by just one Hummer H2.

In a hypothetical scenario, if every 1,000 miles traveled in an average sized car equals $1 worth of damage to the road that will have to come out of County budget for repair work, a bicyclist would have to travel over 17 million miles to cause the same $1's worth of damage. Or another way to look at that, for the $1's worth of damage that a car does to a road, a bicycle, traveling the same distance on the same road, would perpetrate $0.0005862 worth of damage. A Hummer on the other hand would cause $21.37 worth of damage for the same distance as a bicycle. Since car weight is an unpriced external cost within the transportation sector for all but freight trucks and toll roads, we do not price these additional costs into our County tax structure. By increasing bike lanes (as well as multi-modal travel and carpooling), we can extend pavement life and in turn save taxpayer money that otherwise would need to go towards more frequent resurfacing and repaving.

[27] Arity, LLC. November 2018 https://www.arity.com/

[28] U.S. General Accounting Office "Excessive Truck Weight: An Expensive Burden We Can No Longer Afford" https://www.gao.gov/products/CED-79-94

Facility Design and Crash Safety

Bike facilities also provide for many transportation safety improvements, not just for bicyclists but also to drivers. Foremost, the most cited safety benefit of dedicated facilities such as bike lanes, buffered lanes, protected lanes and multi-use paths is the fact that bikes have a reduced need to travel in a vehicle lane. Marked facilities send a message to drivers that bicyclists can and should be expected and the physical lane markings separate their expected travel behavior from expected rider behavior.

A comprehensive study looking at 13 years of crash and street design data from 12 cities found that roads with protected bike lanes make both cycling and driving safer. The authors amassed a huge data set: 17,000 fatalities and 77,000 severe injuries between 2000-2012 in cities like Minneapolis, Seattle, Denver, Portland, Dallas, Houston, Austin, Kansas City, and Chicago. All these cities have experienced a rise in cycling's popularity, have added bike amenities at various levels of investment, and have seen a range of safety outcomes. The study found that where cycle tracks were most abundant on a citywide basis, fatal crash rates dropped by 44% compared to the average city, and injury rates were halved.[29]

Design of bicycle facilities can also incorporate features that improve both driver and cyclist safety. According to the FHWA, run-off-the-road crashes account for approximately one-third of the deaths and serious injuries each year on the Nation's highways. Drift-off crashes, caused by drowsy, distracted, or otherwise inattentive driving, are a subset of run-off-road crashes. As part of the County's typical buffered bicycle lane design, items such as rumble strips and raised reflective pavement markers (RPMs) will be considered. FHWA states that studies of milled freeway shoulder rumble strips in Michigan and New York documented drift-off-road crash reductions of 38 and 79% while NCHRP Report 641 documents milled shoulder and edge rumble strips to provide statistically significant reductions in single-vehicle run-off-road injury crashes: 10- 24% on rural freeways, and 26- 46% on two-lane rural roads.[30] [31]

Shoulder and edge line rumble strips may also serve as an effective means of locating the travel lane during inclement weather such as fog, snow, or rain as these conditions often obscure pavement markings. The vibration provided by rumble strips can assist drivers from unintentionally leaving the roadway in these conditions or if the driver is inattentive. There are also potential visibility benefits as even a light rain can seriously reduce the retroreflective capacity of pavement markings. When the edge line marking is placed within the rumble strip, the vertical component will often still be visible under these adverse conditions. Bike facilities intrinsically provide for an additional 4'-10' of cartway outside of travel lanes and can be designed with rumble strips as well as RPMs that have a dual purpose of keeping cyclists safe and motorists in their lanes.

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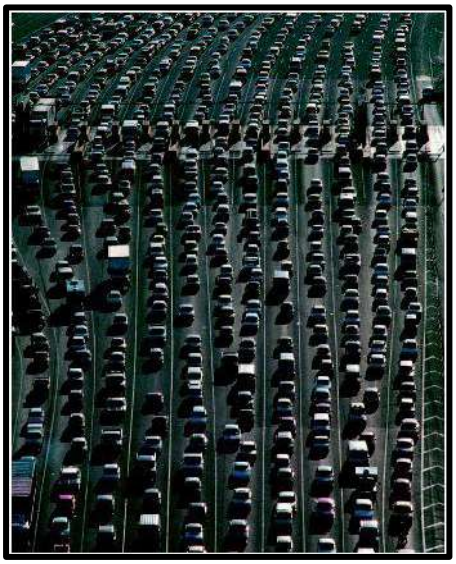
[29] Wesley E. Marshall & Nicholas N. Ferenchak, "Why cities with high bicycling rates are safer for all road users" June 2019. https://www.sciencedirect.com/science/article/pii/S2214140518301488?via%3Dihub

[30] FHWA "Shoulder and Edge Line Rumble Strips: T 5040.39, REVISION 1" November 2011. https://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504039/

[31] NCHRP "Report 641: Guidance for the Design and Application of Shoulder and Centerline Rumble Strips" 2009. http://www.cmfclearinghouse.org/studydocs/nchrp_rpt_641-GuidanceRumbleStrips.pdf

Though not a primary function of bicycle facilities, this additional space can be used in extreme emergencies by motorists to stop in the event of a mechanical difficulty, health emergency, or to escape or reduce their severity of a potential crashes. Emergency vehicles also have the ability to use this space to maneuver in the roadways if they temporarily need to utilize the bike lane to bypass debris or motorists. Since bike lanes are supposed to be free of debris, parked cars and other large items, they provide the added benefit of greater sight distances for motorists.

Congestion



A common reason for opposition to bike lanes is that, according to the rules of traffic engineering, they lead to congestion. Evidence and studies however prove counter to this argument. In a 2014 study by New York City DOT of roadways with new bicycle facilities, congestion went down on those roads. Rather than increase delay for cars, the protected bike lanes on Columbus Avenue actually improved travel times in the corridor. According to city figures, the average car took about four-and-a-half minutes to go from 96th to 77th before the bike lanes were installed, and three minutes afterward—a 35 percent decrease in travel time. This was true even as total vehicle volume on the road remained fairly consistent. Over on Eighth Avenue, where bike lanes were installed in 2008 and 2009, DOT figures show a 14 percent overall decline in daytime travel times in the corridor from 23rd to 34th streets once the protected bike lanes were installed. That quicker ride was consistent throughout the day: travel time decreased during morning peak (13 percent), midday (21 percent), and evening peak (13 percent) alike.[32] To repeat: a street that became safer for bikes saw a reduction in travel time for motorists.

County highways by their nature are designed to be inter-municipal and inter-county routes of travel. They often provide the most direct and common ways of travel and in conjunction with State and US routes and act as the arteries for our County. Designing them to accommodate all modes of travel, especially bike facilities can help reduce the number of single-occupancy cars on our roadways which benefits all users.

A major form of congestion known to many residents is school traffic during morning peak hours. Parents and residents driving past schools know all too well that our society has increasingly been relying on dropping students off in single-occupancy vehicles and that walking to school or riding a bike is becoming a relic of the past in many communities. In 1969, half of American schoolchildren walked or rode their bikes to school but by 2009; just 13 percent of kids walked or biked to school. Despite many schools being constructed further from where people live, the majority of car trips to school are still within walking distance, though direct and safe routes are often unavailable in auto-centric communities. Developing bike

[32] NYCDOT "Protected Bike Lane Analysis" September 2014. http://www.nyc.gov/html/dot/downloads/pdf/2014-09-03-bicycle-path-data-analysis.pdf

facilities for students would allow them to walk or bike to school and reduce the number of vehicles arriving at schools, thus reducing congestion.

The community of Lakewood, Ohio can prove that alternative transportation is possible as the city does not and never has bused its students. The city of 52,000 only runs a small transportation program for students with special needs — about 100 students use it, out of 5,800. To this day, nearly every student walks to school. Not only does this help reduce peak hour congestion, but as an added benefit, it helps kids stay focused and be generally healthier. According to a Danish "Mass Experiment 2012" project study, 20,000 participating kids who walked or biked to school had performed better on tasks requiring concentration than those who were driven to school or took public transit.[33] Researchers found that the lift in concentration lasts for about four hours into the school day. Other benefits of biking to school include a stronger connection to the community, a taste of independence, numerous health benefits, family bonding time and of course – exercise.

Overall, in order to reduce congestion, we need to take a multi-modal approach to see real progress. This applies to not only long distance trips but especially to last mile connections. Mercer County is one of the most densely populated places in the United States with approximately 1,615 persons per square mile. In order to provide for an efficient transportation system, we need to work together with municipal and State partners to provide a complete network of sidewalk, bicycle facilities and transit routes as reduce single occupancy vehicle trips. In order to do so, our citizens need facilities to make that happen. In the image below, we can see the space requirements for 70 people walking, taking transit, riding their bikes or driving solo (regardless of vehicle type).

Left to Right: Space required to transport 70 people walking, taking public transit, biking and driving (regardless if car is autonomous, electric, hydrogen, or other alt-fuel)

[33] Niels Egelund; Aarhus University. http://sciencenordic.com/children-who-walk-school-concentrate-better

Environmental Considerations

The transportation sector is a significant source of our nation's pollution and the effects of automobile pollution are especially widespread, affecting air, soil and water quality. Air pollutants such as that of Nitrous Oxide, contributes to the depletion of the ozone layer, which shields the Earth from harmful ultraviolet radiation from the sun. Sulfur dioxide and nitrogen dioxide mix with rainwater to create acid rain, which damages crops, forests and other vegetation and buildings (especially historic buildings and monuments of marble and sandstone). Carbon monoxide, another exhaust gas, is particularly dangerous to infants and people suffering from heart disease because it interferes with the blood's ability to transport oxygen.[34] [35]

Above: Vehicle soot has significant health implications for humans, especially developing young children, the elderly and those with respiratory impairments.

Other car pollutants that harm human health include Benzene, Formaldehyde and many more volatile organic compounds and particulate matter. Some 24,000 vulnerable people die prematurely each year and similar numbers are admitted to hospital because of exposure to air pollution from particulates, ozone, and sulfur dioxide, much of which is related to road traffic. Air quality is often worse in more deprived areas and affects vulnerable populations more, exacerbating the symptoms of people with asthma, for example.[36] Particulate matter, hydrocarbons, carbon monoxide and other car pollutants harm human health. Diesel engines emit high levels of particulate matter, which are airborne particles of soot and metal. These cause skin and eye irritation and allergies, and very fine particles lodge deep in lungs, where they cause respiratory problems. Hydrocarbons react with nitrogen dioxide and sunlight and form ozone, which is beneficial in the upper atmosphere but harmful at ground level. Ozone inflames lungs, causing chest pains and coughing and making it difficult to breathe.

Vehicles also significantly contribute to the poor nature of our nation's water quality. Vehicles leave oil, antifreeze, grease, nitrogen and phosphorous from washing detergents, metals and various chemicals on streets and driveways. Water pollution in the form of oil and fuel spills from cars and trucks oftentimes seeps into the soil near highways, and discarded fuel and particulates from vehicle emissions contaminates lakes, rivers and wetlands. Americans dump enough oil to contaminate about 1.5 trillion

[34] Union of Concerned Scientists "Cars, Trucks, Buses and Air Pollution" https://www.ucsusa.org/clean-vehicles/vehicles-air-pollution-and-human-health/cars-trucks-air-pollution

[35] EPA "Transportation, Air Pollution, and Climate Change" https://www.epa.gov/transportation-air-pollution-and-climate-change

[36] World Health Organization "How Air Pollution is Destroying our Health" https://www.who.int/air-pollution/news-and-events/how-air-pollution-is-destroying-our-health

gallons of water every year. Nearly all of our storm sewers drain directly to creeks, rivers, lakes or our oceans with no water-quality treatment.[37]

These toxins then settle in our waters and kill fish, plants, aquatic life and even people. One quart of oil will contaminate thousands of gallons of water because it cannot dissolve and break down. These toxins as well as trace metals and degreasing agents used on automobiles can also contaminate drinking water and can cause major illness. Some of these toxins and metals are absorbed in various aquatic life and cause medical problems to people when eaten. Phosphorus and nitrogen cause explosive growth of algae, which depletes water of oxygen, killing fish and aquatic life. This has a direct impact on our recreational and commercial fishing viability within our region.[38]

There is also the issues of noise pollution as vehicles in rush hour traffic can reach noise levels of 70 decibels or higher in intensity, where prolonged exposure to noises above 85 decibels can damage hearing. Exposure to prolonged exposure can cause annoyance, stress, sleep disturbance, psychological conditions, and cardiovascular diseases.[39] This in turn exerts a higher burden on the cost of health care. It results in lost productivity and leads to a diminished quality of life.

Cycling on the other hand uses minimal fossil fuels, is nearly silent and is a pollution-free mode of transport. Bicycles reduce the need to build, service and dispose of cars (regardless of fuel type) and the need for vast lithium, cobalt, oil, gas or hydrogen operations to fuel them. The carbon footprint of making a car is immensely complex and though bicycles also must be manufactured, they require much less complex input. Ores have to be dug out of the ground and the metals extracted. These have to be turned into components that then have to be brought together: rubber tires, plastic dashboards, paint, and so on. All of this involves transporting components around the world where environmental regulations are often much more lax. The whole automobile then has to be assembled, and every stage in the process requires energy. The companies that make cars have offices and other infrastructure with their own carbon footprints, which we need to somehow allocate proportionately to the cars that are made. For a given journey, the energy consumed by a driver is at least 42 times more than by a cyclist, a bus passenger uses 34 times as much, and a train passenger 27 times as much. The cyclist requires less space than all but the train passenger and pedestrian.[40]

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[37] Hilary Nixon and Jean-Daniel Saphores, UC Irvine "Impacts of Motor Vehicle Operation on Water Quality: Clean-up Costs and Policies" 2007. https://escholarship.org/uc/item/8tn1w17s

[38] EPA, "Polluted Runoff: Nonpoint Source (NPS) Pollution" https://www.epa.gov/nps

[39] National Institute on Deafness and Other Communication Disorders "Noise-Induced Hearing Loss" https://www.nidcd.nih.gov/health/noise-induced-hearing-loss

[40] Max Glaskin, "Cycling Science: How Rider and Machine Work Together" 2012. Print.

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3

METHODOLOGY & ANALYSIS

Creating the Bike Plan

Mercer County's Bicycle Master Plan is intended to serve as the guiding document for the development of an integrated network of bicycle facilities and supporting programs, linking neighborhoods, activity centers, employment centers, parks and open space and more in throughout our twelve towns. The network will not only make cycling a more viable mode of transportation but will contribute to enhanced quality of life for residents and visitors.

This plan includes an inventory of all existing County roads and County maintained roads, a network of existing bicycle facilities, a proposed bike route system segmented by route and appropriate facility type, cost estimate and an implementation plan. The plan identifies optimal bicycling routes, preferred roadway treatments, design guidelines, and current best practices.

It serves as a critical reference document and direct follow up to the County's Complete Streets Policy adoption. This document will ensure that bicycle facilities are considered during routine road maintenance, repaving, reconstruction, construction, and land development reviews/ approvals. This plan also contains recommendations for programs and policies that will support bicycling, which will enable Mercer County to be recognized as one of the most bicycle-friendly counties in New Jersey.

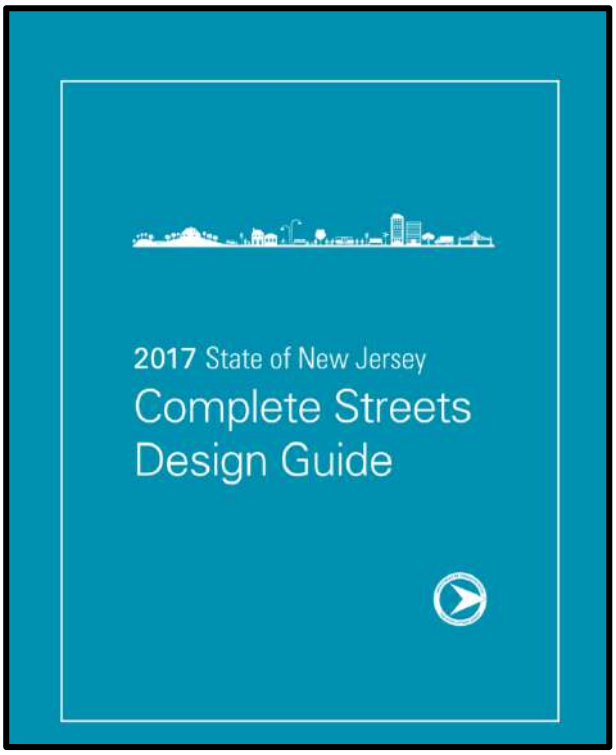
Implementation of the County's bike plan will be broken down into an immediate and short term improvements plan that can be incorporated relatively quickly, efficiently and economically as well as long term improvement plan that will require significant capital investment, right-of-way, and road reconstruction. The ultimate focus of the plan is a series of routes and facility improvements for cyclists more comfortable riding on the street. A level of traffic stress (LTS) of 2 (discussed in the following chapters), is preferred but may ultimately not be possible due to many constraints. Regardless, Mercer County is dedicated to implementing complete streets and bicycle facilities and understands that phasing in projects is essential to the safety of our riders. With this vision in mind, the plan is intentionally bicycle-focused and gives reduced consideration to other modes of transportation.

Goal Targets

1. Build out at least 30 miles of bike facilities by end of 2025.
2. Double the bicycle commuting mode share in Mercer County by 2030.
3. Improve safety for pedestrians and bicyclists by reducing bicycle & pedestrian crashes on County roads by 50% by 2030.
4. Encourage biking and walking events to promote healthy, active living and to enjoy the associated economic and environmental benefits.
5. Continue the connectivity of adjacent off-road and on-road bikeways and walking trails.
6. Achieve a minimum of LTS 3 rating on Mercer County Highways but aim for LTS 1 & 2.
7. Establish a working relationship with local planners, engineers and officials as well as with NJDOT staff for efficient project advancement and coordination.

Complete Streets Policy

Bicyclists have a legal right to use public roads in New Jersey, unless noted, though it may not always be safe to do so. Mercer County's long term vision is to provide all of our residents with the ability to utilize any County roadway to ride their bicycles in a safe and stress free manner. This plan builds upon Mercer's dedication to implementing our Complete Streets Policy and with respect to the State and 12 Municipal Complete Street Policies. Complete Streets essentially balance the needs of drivers, pedestrians, bicyclists, transit vehicles, emergency responders, and goods movement and are designed to benefit entire communities by addressing the needs of all road users regardless of age, ability, or mode of transportation. Among other benefits, Complete Streets address issues related to mobility and accessibility, community and economic development, safety, physical and environmental health, transportation cost, and equity.



At this time, Mercer County is the only county in New Jersey where every single municipality has committed to a complete streets policy. In addition to the County and municipalities, the State has adopted a complete streets policy which means the complete streets policy applies to all levels of government in Mercer County. For the purpose of this project and plan, though only Bicycle facilities were considered during a particular project, all aspects of complete streets can be considered under the draft complete streets checklist which can be found in *Appendix B*.

There is no singular design prescription for Complete Streets; each one is unique and responds to its community context. A complete street may include: sidewalks, bike lanes (or wide paved shoulders), special bus lanes, comfortable and accessible public transportation stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, and more. These facilities and improvements serve to increase the safety and availability for alternative modes of transportation. For the purpose of this plan, the County examined bicycle facilities which is an integral part of Complete Streets and will help advance our Complete Streets Policy from resolution to action.

Bicycle Crashes

Safety is of paramount importance for Mercer County and one of the primary drivers of this long range bike plan. Since bicycles today do not have dedicated facilities on a majority of roadways, they are faced with traversing public roads with drivers. Many of these drivers follow speed limits and pay attention to the road but a significant amount drive the speed they feel safe driving at, which may be much higher than the posted limit. Increasingly, drivers are also becoming more distracted as mobile devices have become a part of daily life. With that said, it is important to analyze existing crashes and their cause so we can move forward with a planned course of action.

As expected, when a crash occurs between motor vehicle and a bike, it is the cyclist who is most likely to be injured or killed. Nationally, approximately 840 cyclists were killed in motor vehicle crashes in 2016 and bicyclists accounted for 2.2 percent of all traffic deaths according to the National Highway Traffic Safety Administration. Mercer County is no different and unfortunately, in the 5 year period from 2012-2016, there were 4 cyclist fatalities in Mercer County, two of which occurred on County Roads. During this time there were also 4 incapacitating injury crashes, 97 moderate injury crashes and 138 complaints of pain following a crash. With 53 property damage crashes this brings the total number of cyclist crashes to 296 of which 107 occurred on County Roads. This is a high number which on paper may seem like just another statistic but that number represents our community. Each victim is a brother, sister, mother, father, son, daughter, grandparent, coworker or friend.

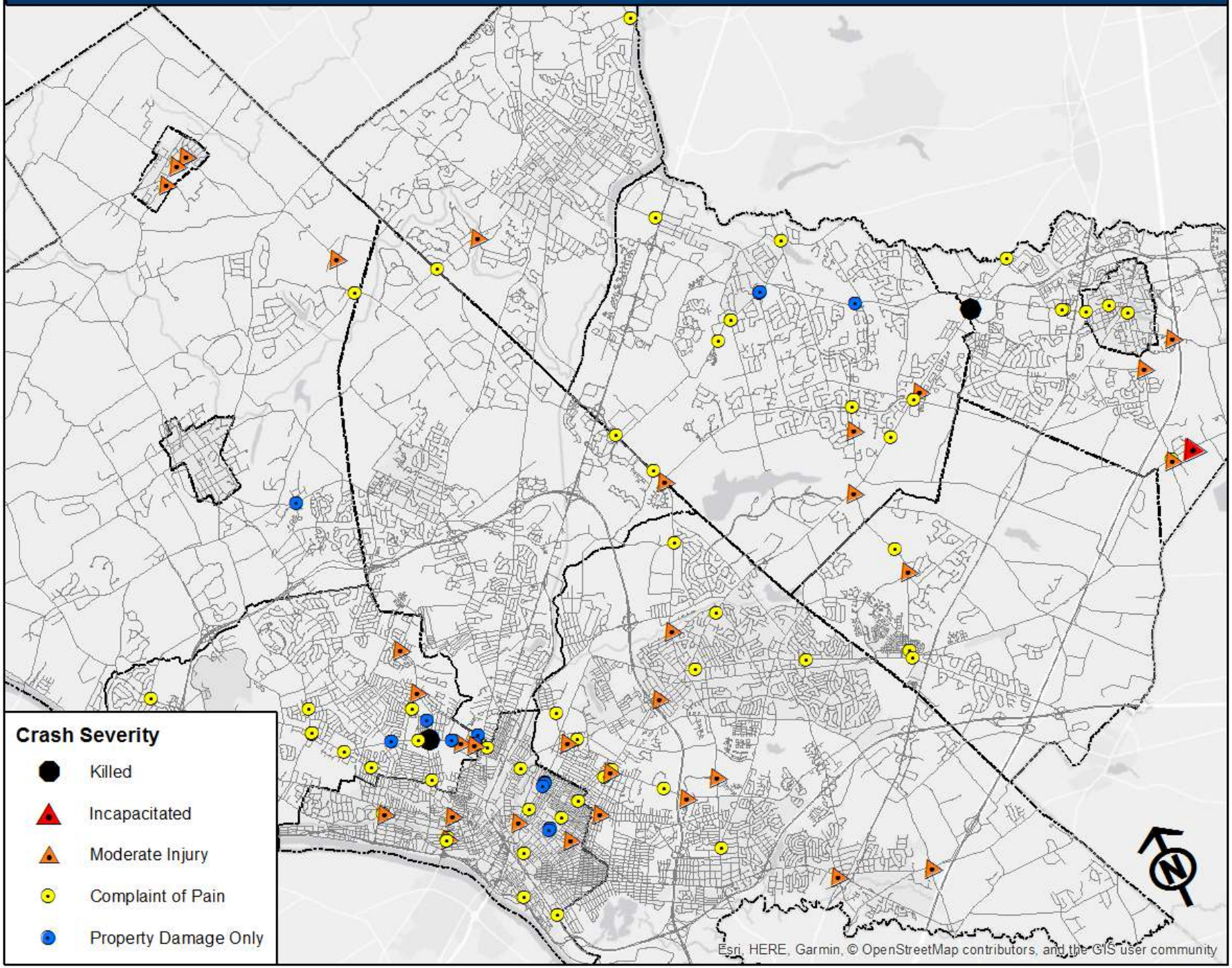
In this 5 year period, approximately 92% of crashes occurred in dry conditions and roughly 74% occurred during daylight hours. In addition only 2 out of 296 involved cell phone usage and only 9 involved alcohol as variables. This data shows us that a majority of crashes occur in normal conditions with limited externalities influencing crashes. Surprisingly, some 36% of crashes occurred in locations where the posted speed limit was 25 mph. This indicates that drivers may not see bicyclists (visual noise of roadway), do not pay attention or cannot stop in time due to speed. It is likely that road conditions such as speeding or inattentive drivers, narrow cartways, high volumes and others are the predominant factor influencing the crash rate. As a result, it would be beneficial to have dedicated facilities for bicyclists. A study by the University of British Columbia found that bicycle lanes can reduce injury rates by approximately 50% while protected bike lanes can reduce injuries by up to 90%.[1] Essentially the larger the separation, whether a stripped/rumbled buffer or protected lane, the larger the increase in safety.

Row Labels	Count of Severity
Fatality	**4**
Killed	4
Injury	**239**
Complaint of Pain	138
Incapacitated	4
Moderate Injury	97
Property Damage Only	**53**
Property Damage Only	53
Grand Total	**296**

Source: NJDOT Safety Voyager

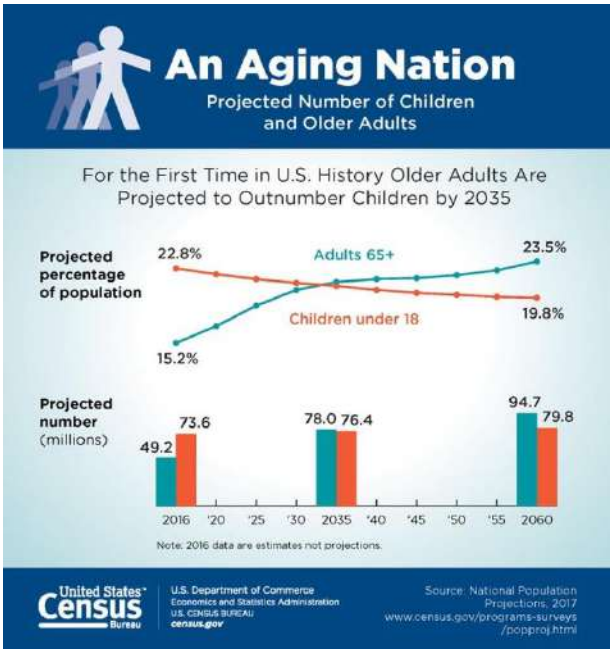
[1] University of British Columbia, "Route Infrastructure and the Risk of Injuries to Bicyclists: A Case-Crossover Study," November 2012, https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2012.300762?journalCode=ajph

Bicycle Crashes from 2012-2016 on County Roadways



Network Connectivity, LTS and 8-80 Design

As we move forward into the new millennia, our population is aging at a significant rate. The year 2030 will mark an important demographic turning point in U.S. history according to the U.S. Census Bureau's 2017 National Population Projections. By 2030, all baby boomers will be older than age 65 which means that 1 in every 5 residents will be of retirement age. With the aging of baby boomers, in just a couple decades, older people are projected to outnumber children for the first time in U.S. history. By 2035, there will be 78.0 million people 65 years and older compared to 76.4 million under the age of 18. Mercer County is home to many families with young children and will continue to be a family friendly community but will have to adapt to these future demographics.



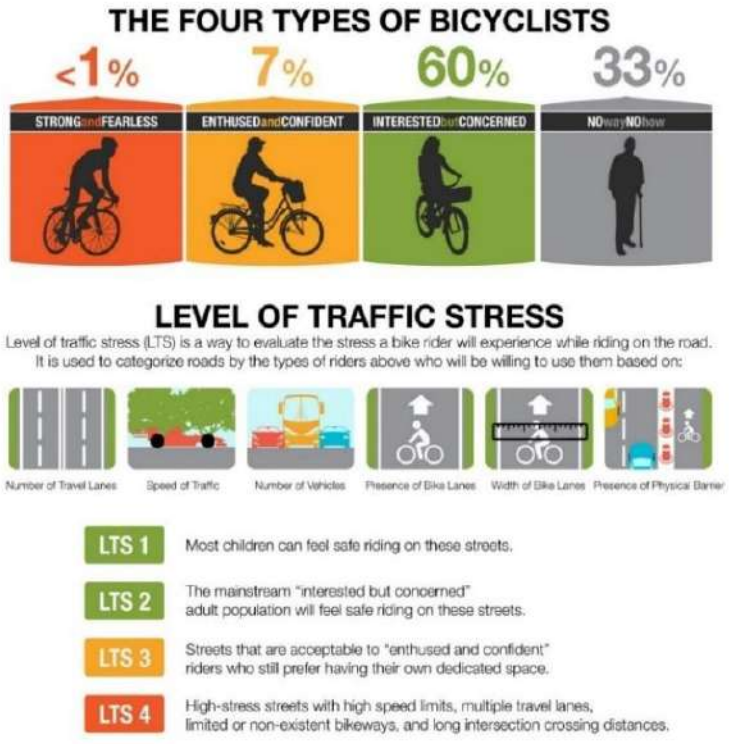
Source: US Census Bureau

As a result, moving forward, the County hopes to follow an 8 to 80 form of design and planning when implementing complete streets. The 8 to 80 form of planning is based on the premise that if we build a community that is accommodating for an eight year old and an 80 year old, than we will build a successful community for everyone. Think of a child who is around eight years old and an older adult you know who is approximately 80 years young. Once you have that child and that older adult in your mind, ask yourself: Would I send them out together for a walk to school or the park; or perhaps to the store in my town? If you would, the public realm is safe and accommodating to them. If you wouldn't, public improvements are needed. We need to rethink the construction of auto-centric communities as if everyone was 30 years old and athletic, wealthy enough to afford a vehicle or young/old enough to drive themselves.

In addition to having a safe network, Mercer County aims to have a connected network. A connected bike network provides a safe and comfortable transportation experience, enabling people of all ages and abilities to get where they want to go and offers multiple ways to get there. Connected bike networks increase ridership and improve safety. In 2007, the City of Seville, Spain focused on connecting a bike network across the entire city, fully separating network facilities from auto traffic to make it safe and comfortable for people of all ages and abilities to ride. Between 2006 and 2013, the network grew from just 12 km of protected bike lanes to 152 km spanning the entire city. With these improvements (and other bike friendly policies and programs), the city observed a 435% increase in the number of bike trips and a 61 percent drop in bike-motor vehicle crash rate.[2]

[2] Marqués & Hernández-Herrador, "On the effect of networks of cycle-tracks on the risk of cycling. The case of Seville," March 2017, https://www.ncbi.nlm.nih.gov/pubmed/28319756

In order to analyze the current state of facilities and be able to quantify our network for this 8 to 80 design standard, we have utilized a Level of Traffic Stress (LTS) methodology for the purpose of planning future facilities. This allows us to set benchmarks for measuring performance and plan improvements based on the existing benchmark. Currently the Mercer County road network has predominantely LTS 4 facilities which means that there are no dedicated bicycle facilities on a majority of our roads. This means that riders must ride with existing vehicular traffic with no dedicated facilities to separate them. This means that only the most fearless cyclists feel safe enough to ride their bicycles while the rest of the general public is forced to drive their bikes to their destination, ride on discontinious sidewalk or forgo biking altogether.



Above Graphic Courtesy of Alta Planning + Design

In moving forward with our analysis, Mercer County strives to make every County roadway an LTS 3 facility or better. This would not only allow much more of the general public to feel safe riding their bikes and increase ridership numbers but as mentioned before, reduce the crash rate for cyclists. Ultimately while an LTS 1 is preffered and most accomedating, the cost of constructing these facilies and implications of private land ownership often make it difficult and lengthy if not impossible to construct. With careful analysis of existing cartway, posted speeds and Average Annual Daily Traffic (AADT) we have created a list of potential facility recommendations for each County roadway at the lowest cost. Once we have a significant amount of LTS 3 facilities across the County, we will be able to proceed with building more accomedating facilities prioritized by demand. Priority however will be to get to LTS 3 at the minimum.

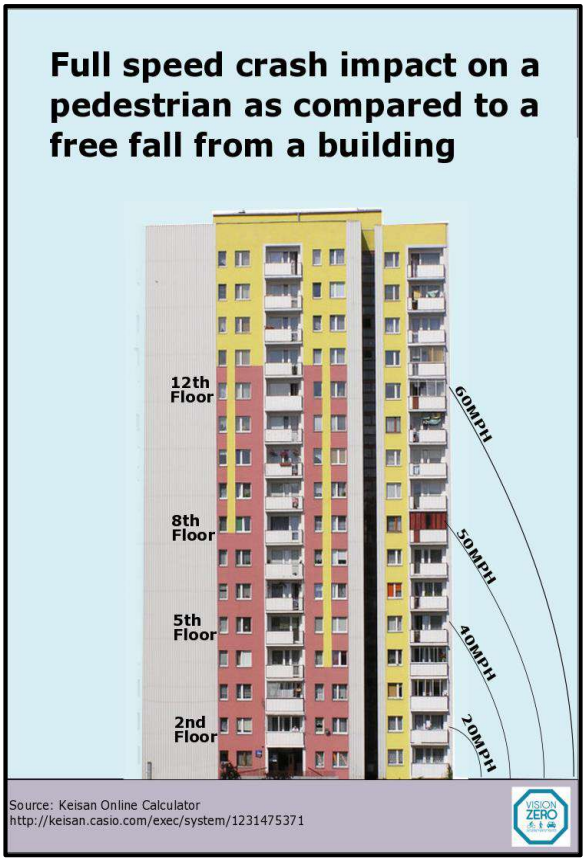
Above Graphic Courtesy of Alta Planning + Design

AADT and Posted Speed Relationship

There has been an increasingly significant of research pointing to a strong death correlation between auto speeds and survival rates for pedestrians as well as cyclists hit by vehicles. Without the protection of an automobile, the human body has a limited tolerance for speeds higher than 20 miles per hour. Speed is especially lethal for people walking and biking. Young persons and the elderly are even more likely to die if struck by a vehicle. Work by Northeastern University's Peter Furth also gives a strong correlation between auto speeds interaction with bikeway design and peoples willingness to bike. People are generally unwilling to risk riding a bike with high speed traffic buzzing past them (as mentioned in the previous LTS section). For high speed roads, separated facilities or buffers are highly recommended to provide a larger space between bikes and vehicular traffic. This not only provides a more comfortable ride and higher LTS but also increases cyclist safety.

Source: Philadelphia Vision Three-Year Zero Action Plan

In order to accommodate bicycle facilities, in certain situations, the case can be made to reduce speed limits. Currently, rather than arbitrarily setting a speed limit, Mercer County uses MUTCD recommended 85th percentile speed studies to determine the posted speed limit which provides us with an accurate representation of what speeds drivers are actually driving. This method while accurate, fails to account for additional factors critical to pedestrian and cyclist safety such as land use, crash history and other users other than automobiles. In 2017, the National Transportation Safety Board (NTSB) released a new Safety Study titled "*Reducing Speeding-Related Crashes Involving Passenger Vehicles*" which found that raising speed limits to match the 85th percentile speed can result in unintended consequences. It may lead to higher operating speeds, and thus a higher 85th percentile speed. In general, the 85th percentile speed within a given traffic flow doesn't always equate to the speed with the lowest crash involvement rate for all road types and the safest operating speed is influenced by many environmental factors.

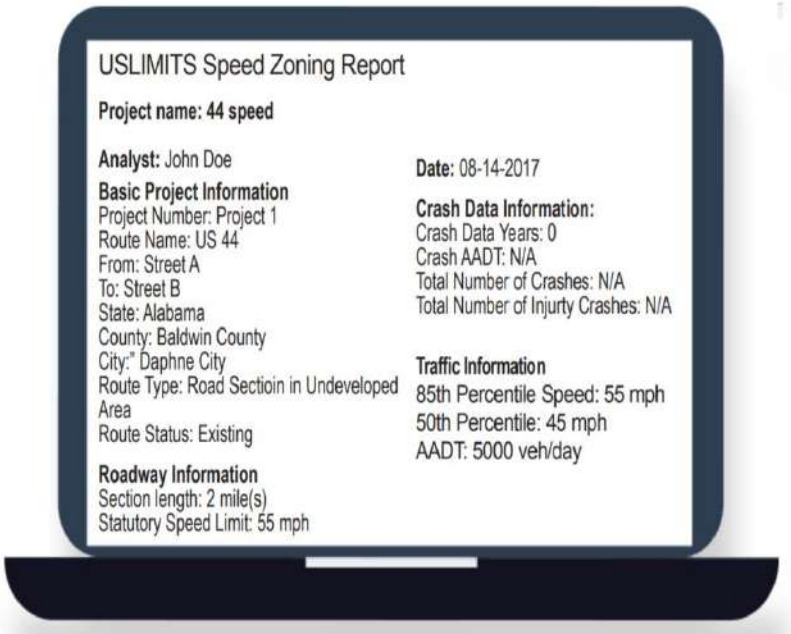


NTSB identified dangerous speeds as an under-appreciated problem despite the fact that it is poses one of the greatest threats to public safety. More than 112,000 people died in speeding-related crashes in the U.S. from 2005 to 2014, averaging more than 10,000 deaths each year. This is on par with the number of drunk driving fatalities during the same time period, NTSB reported, yet receives far less attention. Alternative approaches and expert systems for setting speed limits are available, which incorporate factors such as crash history and the presence of vulnerable road users such as pedestrians.

Moving forward with this bike plan, road segments were also analyzed to determine whether existing posted speeds should be lowered to increase pedestrian and cyclist safety. The NTSB report recommends use of FHWA's online USLIMITS2 tool to determine speeds with external factors. This AASHTO approved tool can improve the setting of speed limits by allowing traffic engineers to systematically incorporate crash statistics and other factors in addition to the 85th percentile speed, and to validate their engineering studies. USLIMITS2 is also one of the proven safety countermeasures offered by the FHWA and has been proven to produce an unbiased and objective suggested speed limit value based on the 50th and 85th percentile speeds, volumes, road characteristics, cyclist and pedestrian activity and crash data.

When using this tool, data is input into an online interface and ends up with a report for the recommended speed limit. Based on a series of trials of Mercer County roads and the USLIMITS2 tool, we found that speeds can change on average 0-10 mph with a 5 mph reduction the most common change. This reduction recommendation is common in areas where over the years, certain parts of Mercer County gradually have transitioned from a low density rural-residential development to more dense residential-commercial. As a result, the 2020 Bike Plan data includes a field for existing speed as well as a proposed speed limit that shows a typical reduction of 5 mph and in extreme conditions, a reduction of 10 mph.

Though this may be unpopular with some people, at the end of the day, the County's priority is the safety and wellbeing of the general public. We must ask ourselves as neighbors, how much are we willing to slow down to save another person's life? The County's responsibility is to provide for the general welfare, safety and preservation of life of the general public even if it adds an extra minute to motorist's trips.



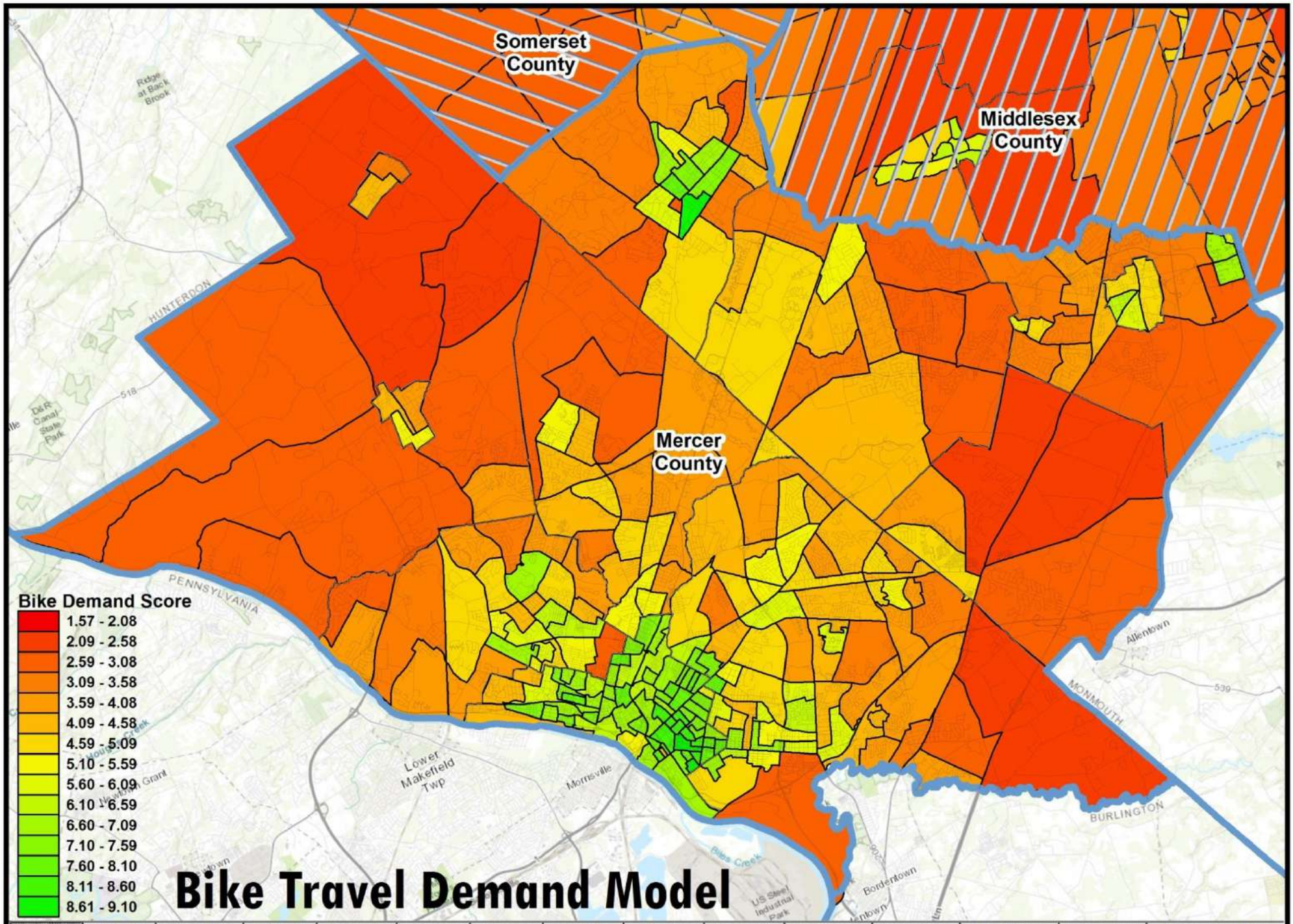
Bicycle Travel Demand Modeling

As part of the GMTMA Trail Plan effort, their consultant WSP Global Inc. (WSP), has created a travel demand model that analyzes a variety of demographic and geographic factors. Quantitative modeling of the demand for bicycles is an essential part of any coherent attempt to establish the bicycle's role in an urban transportation system and is a more efficient way of looking at where bicycle capital improvement would be best prioritized for the greatest impact. Demographic factors such as population density under 18 and over 64, zero car household density, bike/ walk/ transit to work density as well as an income-poverty ratio density were used. In addition, geographic factors such as population density, job density, school/ university access, park access, commercial access, and bus/ train access were used.

This combination of elements looks at a variety of factors that influence demand for bicycle travel ranging from socio-economic factors to environmental factors to demographic and population geography factors. While a higher population and job density pull in more riders due to higher concentrations of people, places like parks, schools, universities and commercial retail centers pull in people due to their daily operations. Populations without car access, persons of low-income, persons under 18 and over 65 are also much more likely to ride out of necessity. This combination of elements ultimately produces a final quantifiable “score” of demand.

These individual factors were then given a different weight based on their respective importance to a bikable trail. The different factors of the bicycle demand analysis were aggregated at the U.S. Census block group level, and demographic factors were normalized to the block group area to account for differences in block group size. Each factor was assigned a weight to give greater heft to different factors and balance factors representing or associated with trip generators (origins) and those that represent trip attractors (destinations). In the end, a score of 1-10 was created for each block group. The table below shows the different weights given to each factor within the travel demand model.

Factor	Weight
Pop Density	18%
Job Density	17%
Key Destinations	
School Access	4%
University Access	8%
Park Access	4%
Commercial Access	8%
Bus Access	3%
Train Access	8%
Equity Factors	
Under 18 Density	6%
Over 64 Density	1%
Zero Car HH Density	8%
IP Ratio < 1.25 Density	5%
Bike to Work Density	6%
Walk or Transit to Work Density	4%



PopDenSc	JobDenSc	SchoolAcce	UniAccSc	ParkAccSc	ComAccSc	BusAccSc	RailAccSc	Un18DenSc	Ov64DenSc	ZeroCarHHD	IPLess1_25	BikeModeSc	WlkTranMod	Bike Demand Score
1.44	1.08	0	0	0.4	0.8	0.3	0	0.54	0	0	0.4	0	0.2	5.301667
0.18	0.18	0	0	0.4	0.8	0.3	0	0.06	0	0	0.15	0	0.08	2.429167
1.62	1.44	0	0	0.4	0.8	0.3	0	0.54	0	0.72	0.45	0	0.36	6.6925

NJDOT & Mercer County Facility Selection Table

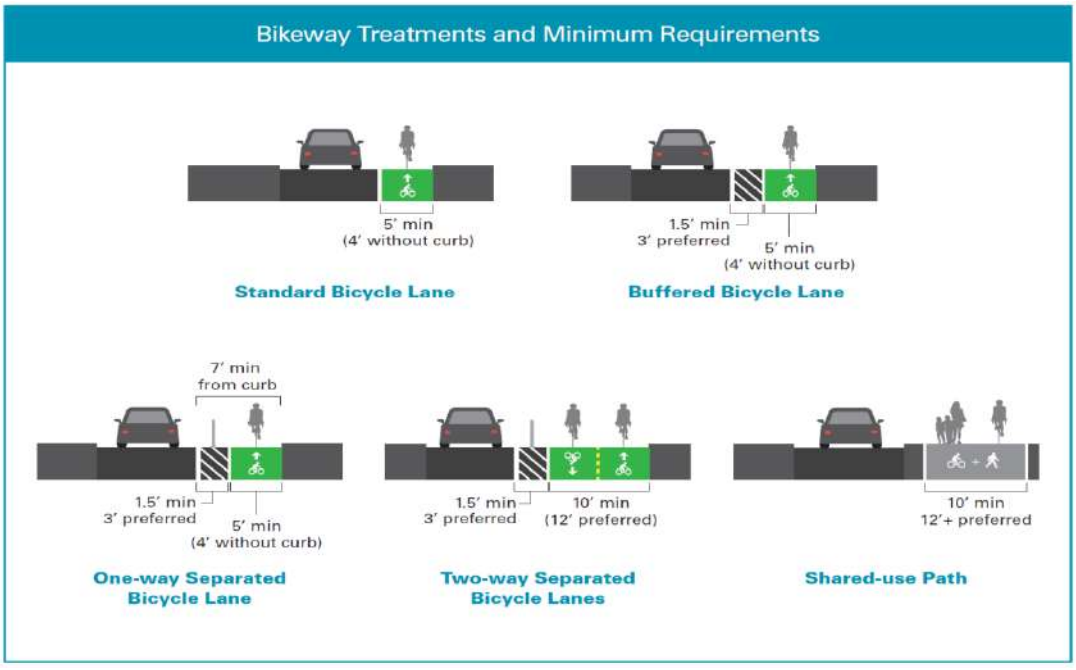
Published in 2017, the NJDOT Complete Streets Guide provided the County with a reliable methodology of looking at the relationship between ADT and posted speeds. Based on methodology from other states and with the same concept of reaching the highest possible LTS with limited resources and limited cartway, NJDOT prepared a "Bicycle Facility Table" for a simplified analysis. This table however offers a conservative selection for maximum comfort and while fitting the goals of NJDOT, it doen't allow for the flexibility of incorporating the maximum amount of facilities and while providing for a better LTS, will limit the amount of facilities NJDOT ultimately constructs.

A Bicycle Facility Table

	85TH PERCENTILE SPEED[1]						
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	ABCDEF	A[2]BCDEF	CDEF	CDEF	CDEF	DEF	F
2,500–5,000	BCDEF	BCDEF	CDEF	CDEF	DEF	DEF	F
5,000–10,000	B[3]CDEF	B[3]CDEF	CDEF	DEF	DEF	EF	F
10,000–15,000	DEF	DEF	DEF	DEF	EF	EF	F
≥15,000	DEF	DEF	DEF	EF	EF	F	F

A: Shared Street/Bicycle Boulevard **B:** Shared-lane Markings **C:** Bicycle Lane **D:** Buffered Bicycle Lane
E: Separated Bicycle Lane **F:** Shared-use Path

[1] If data not available, use posted speed
[2] Bicycle boulevards are preferred at speeds ≤25 mph
[3] Shared-lane markings are not a preferred treatment with truck percentages greater than 10%



Source: NJDOT Complete Streets Design Guide

Mercer County has created a facility selection table that builds off the NJDOT Bicycle Facility Table. In the County vision, ADT and Speed limits for facilities are increased. For example, while NJDOT may recommend bicycle lanes up to an ADT of 10,000, the County will allow them for ADTs of 30,000 when speeds are 30 mph or less. While the NJDOT table creates a less stressful experience for cyclists, it would essentially prevent inclusion of facilities on much of the County road network as many County Highways are limited on ROW and cartway widths and speeds are difficult to realistically reduce. Taking cyclists out vehicle lanes with high speed traffic into dedicated facilities is preferable over creating a low stress experience. Where possible, maximum LTS facilities will be sought, and over time as funding is available, high stress facilities can be upgraded to create less stressful rides.

Below is a custom facility selection table based off the one in NJDOT's Complete Street Guide that was used by Mercer County staff in determening an appropriate facility type for each County Roadway and road under County jurisdiction. Following a USLIMITS2 traffic engineering study, staff can determine which facility will fit the existing cartway and be appropriate for the new posted speed limit and road ADT.

Mercer County Bicycle Facility Selection Table

	USLIMITS2 Recommended Speed						
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	A B C D E F	A B C D E F	C D E F	C D E F	C D E F	D* E F	F
2,500–5,000	B C D E F	B C D E F	C D E F	C D E F	D* E F	D* E F	F
5,000–10,000	B C D E F	B C D E F	C D E F	C* D E F	D* E F	D* E F	F
10,000–15,000	C* D E F	C* D E F	C* D E F	C * D* E F	D* E F	D* E F	F
15,000-30,000	C* D E F	C* D E F	C* D E F	D* E F	E F	E* F	F
≥30,000	F	F	F	F	F	F	F

A: Shared Street/Bicycle Boulevard
B: Shared-lane Markings
C: Bicycle Lane
C*: Bicycle Lane (After careful consideration)
D: Buffered Bicycle Lane
D*: Buffered Bicycle Lane (After careful consideration)
E: Separated Bicycle Lane
E*: Separated Bicycle Lane (After careful consideration)
F: Shared-use Path

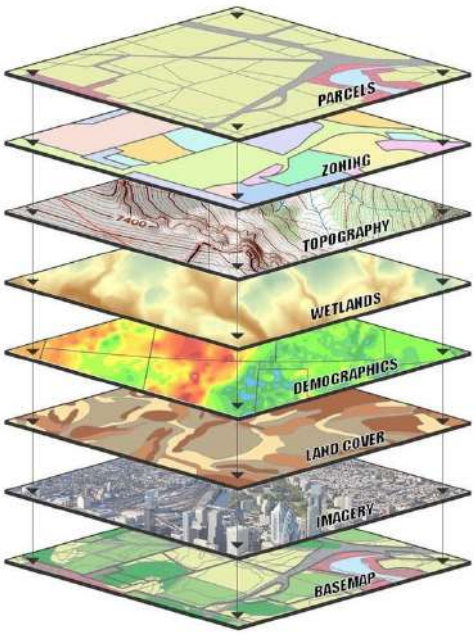
1. If USLIMITS2 data not available, use posted speed
2. Bicycle boulevards are preferred at speeds ≤25 mph
3. Shared-lane markings are not a preferred treatment with truck percentages greater than 10%
4. Buffered Bike Lanes may include Rumble Strips if designed to Mercer County Bike Friendly Standards.

Source: Mercer County Department of Planning, Trenton, New Jersey

Geographic Information System Analysis

Mercer County's bicycle facility selections were based on a careful analysis of the roadway conditions and surrounding land use in order to provide context sensitive recommendations for each road segment. In order to do this analysis, a vast amount of data sources were compiled within a geographic information system (GIS), which is a framework for gathering, managing, and analyzing data.

This data allowed staff to visualize each segment of road and nearby infrastructure as well as nearby environmental assets and constraints. With this data, staff was able to look closely at each road segment to make a good faith determination on what facility to recommend to our Planning and Engineering staff. Though site conditions may change, these recommendations are based on a significant amount of data that is relatively current and can serve to give staff a good overview on what should be improved on a per case basis.



Above: Simplified visualization of overlapping GIS data.

The most critical element of this method, which serves as our control point for each route, is the linear referencing system for the network, which is located within the Mercer County Road Centerline shapefile. That file is based on milepostings developed by State of New Jersey and covers the entire network of public roads in the State. It gives us the ability to cut each segment into any length we need based on those milepostings or call out specific locations based on an exact milepost location. In addition to this data, there are 18 other data sources and 3 aerial imagery sources we used to determine our facility selection. In order to verify many of these locations, Google Street View was utilized to confirm assets and constraints. Below is a list of all data sources utilized in the County's analysis.

GIS DATA USED IN ANALYSIS

Transportation Data

- Mercer County Road Centerlines (2014)
- DVRPC and NJDOT Annual Average Daily Traffic (AADT) Counts (2010-2019)
- NJ DOT Truck Routes (2018)
- NJ Transit Bus Routes (2018)
- NJ Rail Line and Station Data (2018)
- Mercer County Multi-Use Trails (2018)
- Mercer County On-Street Bicycle Facility Data (2018)
- Mercer County Guard Rail Data (2016)
- Mercer County Pavement Extents (2014)
- Mercer County Airport Layer Data (2017)
- Mercer County Traffic Signal Data (2012)
- Mercer County Bridge and Culvert Data (2016)

Land Use and Environmental Data

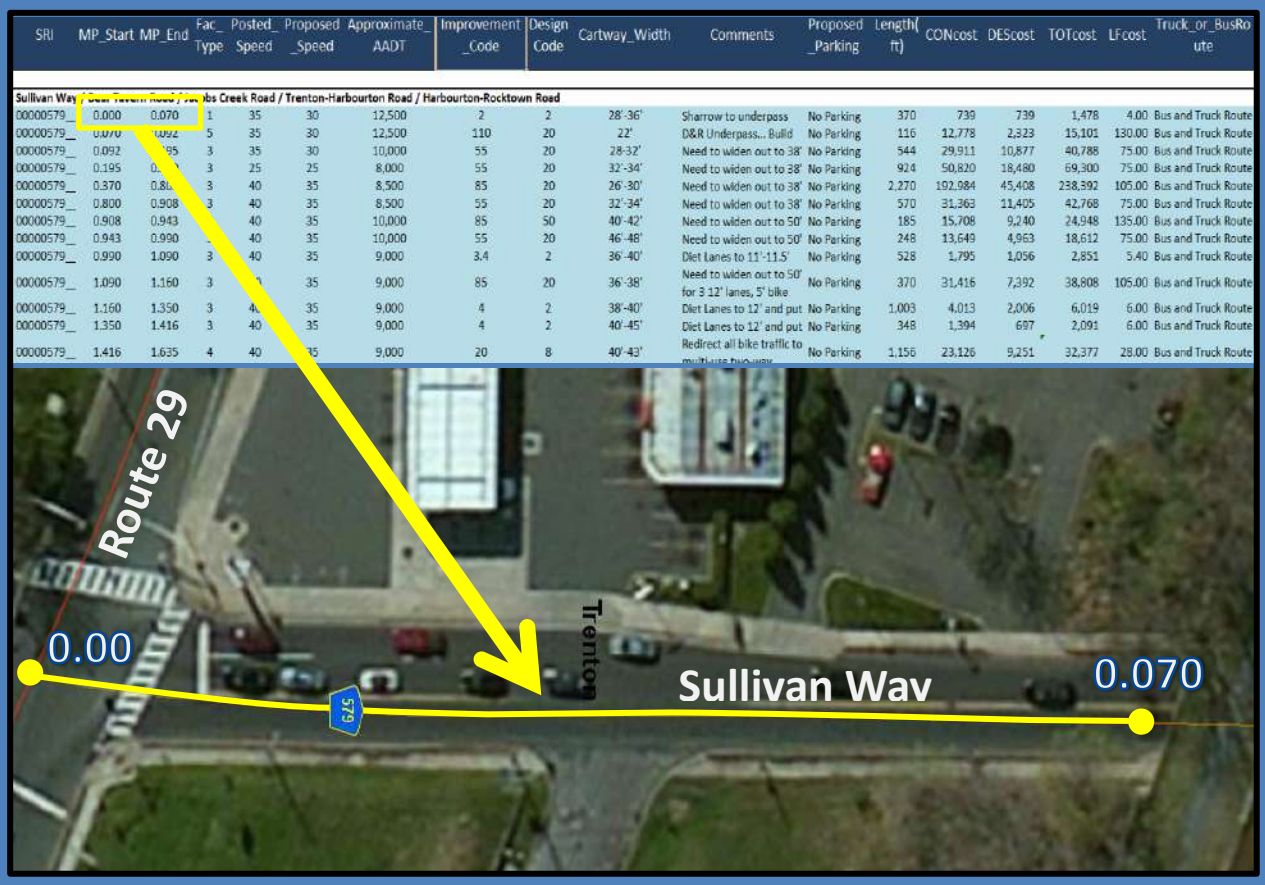
- DVRPC Land Use Data (2015)
- Mercer County Mod4 Parcel Data (2018)
- Mercer County Digital Elevation Model Data (2005 & 2009)
- Mercer County Schools and Educational Site Data (2014)
- Mercer County Wetlands, Streams and Water Bodies (2018)
- Preserved Farmland -Local, County and State (2018)
- Preserved Open Space -Local, County and State (2018)

Aerial & Street Imagery

- Nearmap Aerial Imagery (2018-2019)
- Google Earth/ Street View (2014-2019)
- DVRPC Aerial Imagery (2015)
- Pictometry Aerial Imagery (2009)

In performing this analysis, staff created an excel table for data entry and within our GIS platform, took the following steps to identify current conditions and potential recommendations:

Step1: Open and load GIS platform and insert all relevant data shapefiles and aerial imagery. Layer these in proper order to perform your analysis and turn off/on layers as needed. Find the starting point of a County Route Segment (Milepost 0.000) and zoom to that location on the map. In an excel table, create a new line item for this road and input the road's name as well as Standard Route Identifier (SRI), which is a number associated with each County Route that helps to geolocate the segment. The SRI can be found by clicking on the road line using the *Identify tool* and then can be copied/pasted from GIS to excel. In the following steps, you will break each roadway segment into appropriate sizes based on the location's AADT, roadway speeds, cartway, environmental factors and constraints. This segmentation will then allow for automatic length calculations which can then be used with multipliers to give a magnitude of scale and rough cost estimates. It also allows for different symbology designs based on desired map outcome.



SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed _Parking	Length(ft)	CONcost	DEScost	TOTcost	LFcost	Truck_or_BusRo ute
Sullivan Way / [illegible] Creek Road / Trenton-Harbourton Road / Harbourton-Rocktown Road																	
00000579_	0.000	0.070	1	35	30	12,500	2	2	28'-36'	Sharrow to underpass	No Parking	370	739	739	1,478	4.00	Bus and Truck Route
00000579_	0.070	0.092	5	35	30	12,500	110	20	22'	D&R Underpass... Build	No Parking	116	12,778	2,323	15,101	130.00	Bus and Truck Route
00000579_	0.092	0.195	3	35	30	10,000	55	20	28-32'	Need to widen out to 38'	No Parking	544	29,911	10,877	40,788	75.00	Bus and Truck Route
00000579_	0.195	0.[illegible]	3	25	25	8,000	55	20	32'-34'	Need to widen out to 38'	No Parking	924	50,820	18,480	69,300	75.00	Bus and Truck Route
00000579_	0.370	0.8[illegible]	3	40	35	8,500	85	20	26'-30'	Need to widen out to 38'	No Parking	2,270	192,984	45,408	238,392	105.00	Bus and Truck Route
00000579_	0.800	0.908	3	40	35	8,500	55	20	32'-34'	Need to widen out to 38'	No Parking	570	31,363	11,405	42,768	75.00	Bus and Truck Route
00000579_	0.908	0.943		40	35	10,000	85	50	40'-42'	Need to widen out to 50'	No Parking	185	15,708	9,240	24,948	135.00	Bus and Truck Route
00000579_	0.943	0.990		40	35	10,000	55	20	46'-48'	Need to widen out to 50'	No Parking	248	13,649	4,963	18,612	75.00	Bus and Truck Route
00000579_	0.990	1.090	3	40	35	9,000	3.4	2	36'-40'	Diet Lanes to 11'-11.5'	No Parking	528	1,795	1,056	2,851	5.40	Bus and Truck Route
00000579_	1.090	1.160	3	[illegible]	35	9,000	85	20	36'-38'	Need to widen out to 50' for 3 12' lanes, 5' bike	No Parking	370	31,416	7,392	38,808	105.00	Bus and Truck Route
00000579_	1.160	1.350	3	[illegible]	35	9,000	4	2	38'-40'	Diet Lanes to 12' and put	No Parking	1,003	4,013	2,006	6,019	6.00	Bus and Truck Route
00000579_	1.350	1.416	3	40	35	9,000	4	2	40'-45'	Diet Lanes to 12' and put	No Parking	348	1,394	697	2,091	6.00	Bus and Truck Route
00000579_	1.416	1.635	4	40	35	9,000	20	8	40'-43'	Redirect all bike traffic to [illegible]	No Parking	1,156	23,126	9,251	32,377	28.00	Bus and Truck Route

Above: Within our geographic information system (GIS), we utilized NJDOT 2014 centerline information to break up each route into segments based on identified AADT, speeds, pavement cartway, pinch points, and other relevant information. The entire Mercer County Bikability network is as a result based on the 2014 Standard Route Identifier (SRI) and Linear Referencing Systems (LRS). Each segment as a result can be looked at individually, which is much more helpful when determining costs and improvements. In addition to the improvement and design codes provided for each segment, a field for additional comments was included to provide more detail.

Step 2: Once the SRI and the beginning milepost location information is entered, look at the roadway volumes (AADT) as well as posted speeds. Posted speeds may need to be obtained from Google Street view or via GIS if data is available. For AADT, if the road segment if located between two count locations, do an average of the two numbers and if count is closer to one location, apply a heavier pull towards that count. Then round the number up to the nearest 100. Input that data into the excel table.

Step 3: Now look at the aerial imagery to measure the road cartway. This important step determines what facilities can physically fit in each space and should be carefully measured and remeasured. Nearmap imagery was Mercer County's preferred imagery due to its high accuracy but in cases where there were obstructions (trees, solar panels, vehicles, etc.), other imagery was used, such as our 2015 DVPRC aerials or 2009 Pictometry imagery. Most often, measurements were made with two sources for improved accuracy. Since roads may vary in size, we tried to break up road segments to keep similar widths. In many cases, where the cartway dropped below 32', a new segment would be created due to the fact that it couldn't accommodate bicycle lanes (Two 11' lanes and two 5' bicycle lanes). Similarly, if a road increased in size from 34' to 35', it may become a new segment due to the fact that it could now hold two 11' vehicle lanes and two 5' bike lanes with 1.5' buffers. Wherever possible within existing cartway, we aim for the higher LTS facility so buffered lanes would beat out regular lanes. Segmentation was based on multiple factors but relied heavily on this step of measuring out cartways.

Step 4: Once cartway, speeds and AADTs are measured, a proper segment can be determined. Use the *Identify Route Location* tool in GIS to find the Mile Posting ending point. In the example on the previous page, we look at breaking up Sullivan Way from Route 29 (0.000) to the D&R Canal (0.070) due to the constraints posed because of the canal support piers and cartway reduction. Now input the ending milepost into the excel table.

Step 5: Now look for additional roadway information such as if the road is a truck route or bus route for any bus services. If there are bus or truck routes, Mercer County aimed to keep lanes at 12' for increased comfort and safety of cyclists. In some cases 11' was required due to space constraints but where possible, aim to keep 12' or even 13' where truck or bus traffic is extremely heavy. Also look for on-street parking and mark it in the excel table. If parking needs to be removed, this table will indicate which segments will require parking reconfiguration.

Step 6: Now look at any other environmental factors that may be required to make an informed decision. Are there are stream, rivers, wetlands, large trees or wildlife crossings? Make note of guiderail, rail lines, traffic signs, elevation changes, preserved open space, preserved farmland, school locations, and any other relevant elements. In some cases, the speeds may be high for the selected segment and may be proposed for a 5mph reduction. As bicycle lanes will narrow vehicle lanes and create a better defined barrier to drivers, we can anticipate the 85th percentile speeds to be reduced when plugged into the USLIMITS2 interface as mentioned in the previous sections. Only in very limited and severe cases will the posted speed be allowed to be reduced by 10mph. Most reductions of 10 mph and all reductions of 15mph and more will likely require geometric changes

to the roadway as the road was most likely designed for much higher speeds and arbitrarily lowering speed limits may actually decrease safety. This is to keep drivers and cyclists safe as contrary to popular belief, reducing speed limits arbitrarily may actually increase crashes and be more dangerous. Once the table is filled with information from Steps 1-6 and you have information regarding the segment in question, reference the *Mercer County Bicycle Facility Selection Table* to determine the appropriate facility choices based on AADT and speeds and determine which ones can fit within the existing cartway.

Now look at your choices and determine what improvements will be required to incorporate each facility. Make note of what type of improvement is required to make your facility a reality. In some cases, the road may need to be widened or sidewalk may need to be converted into a multi-use path. In other cases, full intersection improvements may be required. Look at the *Improvement Code Table* below and enter the "Facility Type", "Improvement", and "Design" codes into the excel table.

Category	GIS Code	Description	Epoxy Cost/mi	Bike Plan Notes
Facility Type	1	Sharrow		ADT/SPEED LIMIT: 10,000/0-25; or obstructing structure
	2	Bicycle Lane		ADT/SPEED LIMIT: 30,000/0-30; 15,000/35; 2,500/40
	3	Buffered Bicycle Lane		ADT/SPEED LIMIT: 30,000/0-35; 15,000/40-45
	4	Separated Bike Lane		ADT/ SPEED LIMIT: 30,000/0-45
	5	Multi-Use Path		ADT/SPEED LIMIT: No Limit
Posted Speed	##	This is the posted speed on this road		
Proposed Speed	##	Speed needed for proposed facility		Desired speed to accommodate facility type. Typical reduction of 5 mph and never more than 10 mph reduction. Use 10 mph only in limited cases.
Approximate AADT	#,###	Rounded approximate number in segment		
Cartway Width	##'	Approximate width range of cartway		Try to keep this as small as possible by segmentation. Base segmentation on cartway widths (approximately)
Improvement	0	No Improvements		N/A
	0.648	Edge Stripe	$ 3,421	4" White Line (x2)
	4.057	Sharrow	$ 21,421	Pavement Markings & Signs
	4.389	Convert Existing Shoulders to Bike Lanes	$ 23,174	Pavement Markings, Signs & RPMs
	5.242	Regular Bike Lane	$ 27,678	6" White Line (x2), Pavement Markings, Signs & RPMs
	7.36	Bike Lane with One Parking Lane	$ 38,861	6" White Line (x2), 4" White Line, Pavement Markings, Signs & RPMs
	7.686	Bike Lane with Two Parking Lanes	$ 40,582	6" White Line (x2), 4" White Line (x2), Pavement Markings, Signs & RPMs
	6.14	Painted Buffered Lane	$ 32,419	6" White Line (x2), Pavement Markings, Signs & RPMs
	7.965	Rumble Buffered Lane	$ 42,055	6" White Line (x2), Rumble Strips (x2), Pavement Markings, Signs & RPMs
	10.14	Bike Lanes with Road Diet	$ 53,539	Mill 4 Lines, 6" White Line (x2), 4" Yellow Lines (x4), Pavement Markings, Signs & RPMs
	13.843	Protected Lane	$ 73,091	Mill 4 Lines, 6" White Line (x2), 4" Yellow Lines (x5), Pavement Markings, Signs & Flexible Posts
	55	Widen (<6')	$ 290,400	Mill, subase, 8" HMA, edge line
	85	Widen (6-12')	$ 448,800	Mill, subase, 8" HMA, edge line
	160	Widen (16')	$ 844,800	Mill, subase, 8" HMA, edge line
	80	Convert Sidewalk to Multi-Use Path	$ 422,400	Widen (4'-6') + Clearing 4' (2' either side)
	110	New Multi-Use Path	$ 580,800	Widen (7-12') + Clearing 18'
	1000	Full Intersection Improvement/ Redesign	$ -	New signals & stripes, 200' segment ($200k total)
Design	1	Paint		Simple
	2	Paint & Signs		More complex
	4	Paint & Signs & Rumble Strips/ RPMs		Much more complex
	8	Protected Lane		Extremely complex engineering design
	20	Widen		Consider drainage, etc.
	50	ROW		DES only, ROW cost not included
	60	ROW & NEPA		DES & permitting, ROW cost not included

*Improvement and design codes are temporary, will need further calibration for more accurate cost estimates. Can do this later on, after road analysis.

This table specifies coded values ('code') to be entered into attributes ('category') for each road segment to create a bicycle facility with a reasonable level of traffic stress. When the 'improvement' and 'design' values are multiplied by the segment length, an order of magnitude cost for implementation results. Only the 'intersection' improvement type has a pre-defined segment length (100' either side of an intersection node) to generate an appropriate improvement cost. Note that 'costs' are for planning purposes only; they are not estimates of actual project costs.

As a result of this input, cost estimates can be then be provided in the future when determining facility improvement costs. These draft cost estimates were based on data from 2019 County construction bids and contracts. Minor differences in cost distinguish facility types. These codes can then be factored into a multiplier within the excel table that will multiply the segment length by the improvement code to give a cost estimate of each segment improvement. These estimates can be changed at future point when better data is available at the state or local level. As Mercer County produces more bicycle improvements, we will be able to analyze those costs to create better estimates tailored specifically to our Metropolitan Region and County.

Step 8: In the comments section, enter a brief description of improvements in as little words as possible. If this attribute field is to be input into GIS at a later time, it will need to meet the character limit for whatever GIS platform you are using or will not populate properly, if at all. For additional notes, keep a separate comments section for *Additional Comments* and enter those comments there. Before converting the excel table into a GIS shapefile, you may need to delete that field due to character limits.

Step 9: Now to convert the excel table and routes into shapefiles, which display your collected data, follow the following steps:

I. Place all the data in one spreadsheet tab and save the file as a .csv
II. In Arc Catalog, create a new geodatabase by navigating to the desired folder, right click on the folder > new > File Geodatabase
III. In Arc-gis, navigate to your geodatabase in the catalog window on the right. Right click on the geodatabase > import > table (single). The table should now be displayed in your Table of Contents on the left.
IV. Right click on the table > display route events
V. Once your lines draw, right click on the layer file > data > export data
VI. Your table data should now be in shapefile form.

The following pages are the Mercer County Bicycle Facility Analysis Sheets:

Final Countywide Totals:

931,957 feet analyzed or 176.5 miles

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
Lambertville-Hopewell Road / Louellen Street / Broad Street / Hopewell-Rocky Hill Road													
00000518__	4.541	4.570	3	50	40	3,500	7.965	4	45'-46'	Start buffered lanes from intersection, 12' travel lanes, 7'-8' bike lanes and 3' rumble buffers	No Parking	153	None
00000518__	4.570	5.453	3	50	40	3,500	55	20	28'-30'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	4,662	None
00000518__	5.453	5.512	3	50	40	3,500	55	20	32'	Widen out intersection to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	312	None
00000518__	5.512	7.122	3	45	40	3,500	55	20	28'-30'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	8,501	None
00000518__	7.122	7.340	3	40	35	7,500	7.965	4	40'-52'	Increasing CW at Intersection with 31 (3 lanes + aux), buffered bike lanes through this intersection	No Parking	1,151	None
00000518__	7.340	7.461	3	40	35	6,000	7.965	4	34'-38'	Lane diet down to 11' lanes with 5' bike lanes and 1.5'-2' rumble buffers	No Parking	639	None
00000518__	7.461	9.721	3	40	35	6,000	85	20	24'-28'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	11,933	None
00000518__	9.721	9.918	2	30	30	6,700	5.242	2	28'-30'	Diet to 10' lanes and 5' bike lanes. Long term should widen to 32' through here for 11' lanes and 5' bike lanes.	No Parking	1,040	None
00000518__	9.918	10.040	2	30	30	7,500	7.36	2	38'-40'	Diet two lanes to 10.5'-11' and put in 7' EB Parking Lane with 5' bike lanes and one 1.5' parking buffer	One Parking	644	None
00000518__	10.040	10.102	2	25	25	12,000	5.242	2	36'-38'	Diet two lanes to 11' and put in 5' bike lanes, No Parking up to Mercer in this segment	No Parking	327	None
00000518__	10.102	10.175	3	25	25	12,000	7.36	2	40'-44'	Diet two lanes to 11' and put in 7'-8' WB parking lane, 5' bike lane and 2' parking buffer	One Parking Lane	385	None
00000518__	10.175	10.253	3	25	25	12,000	7.36	2	45'-50'	Diet two lanes to 11' and put in 8' WB parking lane, 5'-6' bike lane and 2'-3' buffers	One Parking Lane	412	None
00000518__	10.253	10.290	3	25	25	12,000	7.686	2	50'-53'	Diet two lanes to 11' and put in two 7.5' parking lanes, 5' bike lane and 1.5'-3' buffers	Two Parking Lanes	195	None
00000518__	10.290	10.315	3	25	25	12,000	6.14	2	48'-53'	Diet lanes to 11' and add decicated left or right turn lane as well as 5'-6' bike lanes and 2'-4' buffers	No Parking	132	None
00000518__	10.315	10.385	3	25	25	12,000	7.36	2	41'-50'	Diet lanes to 11' and put in 7'-8' EB parking lane with 5' bike lanes and 1.5' parking buffer	One Parking Lane	370	None
00000518__	10.385	10.642	3	25	25	12,000	6.14	2	36'-37'	Diet lanes to 11' with 5' bike lanes and 2'-3' buffers	No Parking	1,357	None
00000518__	10.642	10.785	2	25	25	12,000	7.36	2	41'	Diet lanes to 11' and put in 7' WB parking lane with 5' bike lanes and 2' parking buffer	One Parking Lane	755	None
00000518__	10.785	11.000	3	40	30	12,000	55	20	26'-28'	Widen to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers. Major aging/crumbling bridge to widen and replace.	No Parking	1,135	None
00000518__	11.000	11.020	3	40	30	10,000	55	20	26'-28'	Widen small culvert to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	106	None
00000518__	11.020	11.129	3	40	30	10,000	55	20	26'-28'	Widen to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	576	None
00000518__	11.129	11.525	2	40	35	10,000	5.242	4	34'	Diet lanes to 11' and put in 6' bike lanes	No Parking	2,091	None
00000518__	11.525	11.852	3	40	35	10,000	55	20	26'-28'	Widen to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	1,727	None
00000518__	11.852	11.890	3	40	35	10,000	7.965	4	34'-38'	34'-38' CW, move centerline and diet lanes to 11' with 5' bike lanes and 1.5'-3' rumble buffers	No Parking	201	None
											Totals	**38,803**	
Broad Street / Yardville-Allentown Road / Old York Road													
00000524__	0.050	0.423	3	25	25	15,000	6.14	2	42'-44'	Diet lanes to 12' and put in 6' bike lanes with 3' striped buffers	No Parking	1,969	Bus and Truck Route
00000524__	0.423	0.865	3	40	35	15,000	7.965	4	22'-34'	Existing shoulder is 8'-10' so convert to 6' bike lane with 3'-4' rumble buffer. At end where this meets with I-195 off ramp, will need to have carefull crossing (cyclists yield to traffic) and continue buffered bike lanes.	No Parking	2,334	Bus and Truck Route
00000524_W	39.040	39.430	5	40	35	15,000	110	20	25'-40'	Go to off road trail here for safety and crossings.	No Parking	2,059	Bus and Truck Route
00000524__	0.865	0.898	3	35	35	18,800	7.965	4	46'	Merge off ramp and road lanes before bridge. Once on bridge, diet 3 lanes to 11' and put in 5' bike lanes with 1.5' rumble buffers	No Parking	174	Bus and Truck Route
00000524__	0.898	0.988	3	25	25	18,800	7.965	4	40'-42'	Diet lanes to 12' and put in 6' bike lanes with 2'-3' rumble buffers	No Parking	475	Bus and Truck Route
00000524__	0.988	1.070	3	25	25	18,800	55	20	40'	Widen CW to 46' on school side to get continious buffered bike lane. Move centerline to fit in 3 11' lanes with 5' bike lanes and 1.5' rumble buffers.	No Parking	433	Bus and Truck Route
00000524__	1.070	1.264	2	35	30	18,800	4.389	50	44'	Paint bike legends in existing shoulders.	No Parking	1,024	Bus and Truck Route
00000524__	1.264	1.524	2	35	30	18,800	1000		66'	Intesection redesign at Sunnybrae- stripe curblane as bike lane create a right turn mixing lane with cyclists in advance of light.	No Parking	1,373	Bus and Truck Route
00000524__	1.524	1.854	2	35	30	24,500	4.389	2	40'-42'	Convert shoulders to buffered bike lanes	No Parking	1,742	Bus and Truck Route
00000524__	1.854	1.947	2	35	30	24,500	1000		47'	Intersection ReStriping (will provide striping plan).	No Parking	491	Bus and Truck Route
00000524__	1.947	2.090	2	35	30	24,500	5.242	2	32'-34'	Diet lanes to 11' and put in 5' bike lanes	No Parking	755	Bus and Truck Route
00000524__	2.090	2.252	3	35	30	11,500	5.242	2	36'-40'	Diet lanes to 11'-12' and put in 5'-6' bike lanes with 2' buffers	No Parking	855	Bus and Truck Route
00000524__	2.252	2.558	2	35	30	11,500	5.242	2	30'-32'	Narrow lanes to 10.5' and put in 4.5' bike lanes. Drop speeds to 30 on either side of school zone). If widening is possible it should absolutely be considered.	No Parking	1,616	Truck Route
00000524__	2.558	2.725	3	35	35	5,500	6.14	2	44'	Diet two lanes to 12' and put in 6' bike lanes with 3' buffers	No Parking	882	Truck Route
00000524__	2.725	2.926	2	35	30	5,500	4.389	2	34'	Paint bike legends in existing shoulders.	No Parking	1,061	Truck Route
00000524__	2.926	3.002	5	40	30	5,500	110	60	28'	Need to either go to off road trail (boardwalk) or widen when reconstructing culvert/bridge	No Parking	401	Truck Route
00000524__	3.002	3.111	3	40	35	5,500	7.965	2	36'	Diet lanes to 11' and put in 5' bike lanes with 2' buffers	No Parking	576	Truck Route
00000524__	3.111	3.385	5	40	40	4,800	80	50	26'	Convert sidewalk to multi-use path between Cullen Way and Crosswicks Hamilton Square Road. Construct section that doesn't exist.	No Parking	1,447	Truck Route
00000524__	3.385	3.575	3	40	30	7,000	85	20	28'	Widen out to 36' for 11' lanes with 5' bike lanes and 2' buffers	No Parking	1,003	Truck Route
00000524__	3.587	3.924	3	40	35	7,000	4.389	2	40'	Convert shoulders to buffered bike lanes.	No Parking	1,779	Truck Route
00000524__	3.920	3.969	2	40	35	7,000	85	20	28'	Widen to 36' for 11' lanes with 5' bike lanes and 2' buffers	No Parking	259	Truck Route
00000524__	3.969	4.021	2	40	35	7,000	5.242	2	36'	Stripe 5' bicycle lanes	No Parking	275	Truck Route
00000524__	4.021	4.363	2	45	40	7,000	85	50	28'	Widen to 36' for 11' lanes with 5' bike lanes and 2' buffers	No Parking	1,806	Truck Route
00000524__	4.363	4.455	2	45	40	7,000	7.965	4	36'	Diet lanes to 11' and put in 5' bike lanes with 2' buffers	No Parking	486	Truck Route
00000524__	4.455	4.874	2	45	40	5,000	85	50	26'	Widen to 36' for 11' lanes with 5' bike lanes and 2' buffers	No Parking	2,212	Truck Route
00000524__	4.874	5.098	2	45	40	5,600	7.965	4	36'	Diet lanes to 11' and put in 5' bike lanes with 2' buffers	No Parking	1,183	Truck Route
00000524__	5.098	5.231	2	45	40	5,600	85	50	28'	Widen to 36' for 11' lanes with 5' bike lanes and 2' buffers	No Parking	702	Truck Route
00000524__	5.098	5.320	2	50	40	5,600	7.965	4	38'	Diet lanes to 11' and put in 6' bike lanes with 2' buffers	No Parking	1,172	Truck Route
											Totals	**30,545**	
South Mill Road / Edinburg Road / Old Trenton Road / Robbinsville-Allentown Road													
00000526__	0.000	0.090	3	35	35	6,000	6.14	2	50'-52'	Diet 3 intersection lanes to 12' and put in 5' bike lanes with 2' buffers	No Parking	475	Truck Route
00000526__	0.090	0.172	3	35	35	6,000	7.36	2	50'	Diet lanes to 12' and put in 6' bike lanes with 3' buffers and one 8' parking lane	One Parking Lane	433	Truck Route
00000526__	0.172	0.605	3	35	35	6,000	6.14	2	40'-42'	Diet lanes to 12' and put in 6' bike lanes with 2'-3' buffers	No Parking	2,286	Truck Route
00000526__	0.605	0.742	3	35	35	6,000	6.14	2	54'-56'	Diet lanes to 12' and mark acceleration/deceleration lane; put in 6' bike lanes with 2'-3' buffers	No Parking	723	Truck Route
00000526__	0.742	0.815	3	35	35	6,000	55	20	43'-46'	Widen for consistancy and then diet 3 lanes to 12' and put in 6' bike lanes with 2'-3' buffers	No Parking	385	Truck Route
00000526__	0.815	0.909	3	35	35	6,000	6.14	2	60'-64'	Diet lanes to 12' and mark acceleration/deceleration lane; put in 6' bike lanes with 2'-3' buffers	No Parking	496	Truck Route
00000526__	0.909	0.986	3	35	35	6,000	6.14	2	50'	Diet lanes to 12' and put in 6' bike lanes with 3' buffers...gore area remainder space	No Parking	407	Truck Route
00000526__	0.986	1.899	2	35	35	6,000	5.242	2	16'-26'	Diet lane(s) to 11' and put in 5' bike lane	No Parking	4,821	Truck Route
00000526_W	33.684	34.590	2	35	35	6,000	5.242	2	16'-26'	Diet lane(s) to 11' and put in 5' bike lane	No Parking	4,784	Truck Route
00000526__	1.899	1.953	3	35	35	6,000	6.14	2	50'-54'	Diet lanes to 11' and put in 6' bike lanes with 3' buffers...gore area remainder space	No Parking	285	None
00000526__	1.953	2.254	3	35	35	6,000	6.14	2	50'-58'	Diet lanes to 11' and put in 6' bike lanes with 3' buffers...gore area remainder space	No Parking	1,589	None
00000526__	2.254	2.295	3	35	35	6,000	6.14	2	62'	Diet 4 intersection lanes to 11' and put in 6' bike lanes with 2'-3' buffers	No Parking	216	None
00000526__	2.295	2.835	3	35	35	6,000	7.36	2	50'-54'	Diet lanes to 12' and put in 6' bike lanes with 3' buffers and one 8' parking lane	One Parking Lane	2,851	None
00000526__	2.835	3.260	3	35	35	6,000	6.14	2	38'-42'	Diet lanes to 11' and put in 6' bike lanes with 2'-3' buffers	No Parking	2,244	None
00000526__	3.260	3.428	3	35	35	6,000	55	20	30'-32'	Need to widen out to 36' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	887	None
00000526__	3.652	4.830	3	45	40	7,050	85	50	27'	Widen road by at 8'-10' and stripe rumble buffered bicycle lanes	No Parking	6,220	Truck Route
00000526__	4.830	5.071	5	30	30	6,508	110	50	50'	Build a sidepath along the west side of the road from the school entrance at buckley Lane to the end of the school zone. Create crossing at Intersection for NB cyclists to cross back to other side of road	No Parking	1,272	Truck Route
00000526__	5.071	5.114	3	30	30	6,508	55	50	45'	Widen road by 6' and stripe 5' bicycle lanes in each direction	No Parking	227	Truck Route
00000526__	5.114	5.242	3	30	30	6,508	85	50	32-42'	Widen road by 8' and stripe 5' bicycle lanes in each direction	No Parking	676	Truck Route
00000526__	5.242	5.290	3	45	35	6,508	4.389	2	34'	Place legends in existing shoulders- lower speeds to 35 in advance of school zone	No Parking	253	Truck Route
00000526__	5.290	5.752	3	45	40	4,712	85	50	30'	Widen road to 38' and stripe buffered lanes. Beechwood to beechwood	No Parking	2,439	Truck Route
00000526__	5.752	5.812	3	45	40	4,712	4.389	2	44'	Paint buffered bike lanes in the existing shoulders	No Parking	317	Truck Route
00000526__	5.812	5.887	3	45	40	4,712	85	50	30'	Widen road to 38' and stripe buffered lanes	No Parking	396	Truck Route
00000526__	5.887	5.913	3	45	40	5,200	55	50	36'	Widen SB shoulder by 4 feet and stripe buffered bike lanes in existing shoulder	No Parking	137	Truck Route
00000526__	5.913	6.025	3	45	40	5,200	85	50	30'	Widen road to 38' and stripe buffered lanes	No Parking	591	Truck Route
00000526__	6.025	6.059	3	45	40	5,200	55	50	36'	Widen SB shoulder by 4 feet and stripe buffered bike lanes in existing shoulder	No Parking	180	Truck Route
00000526__	6.059	6.233	3	45	40	5,200	85	50	30'	Widen road to 38' and stripe buffered lanes	No Parking	919	Truck Route

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
00000526__	6.233	6.486	3	35	30	5,200	4.389	2	64'	Place legends in existing striped lanes	Parking on both sides of street	1,336	Bus and Truck Route
00000526__	6.486	6.570	3	35	30	5,200	6.14	2	54'	converrt sb curb lane into buffered bicycle lane to intersection- NB bicycle lane striped all the way to intersection.	No Parking	444	Bus and Truck Route
00000526__	6.570	6.634	5	35	30	12,568	1000	50	N/A	Intersection redesign needed.	No Parking	338	Bus and Truck Route
00000526__	6.634	6.879	5	35	35	12,568	110	50	28'	Build sidepath along the North side of Main Street between Robbinsville Edinburg Rd and robbinsville rd.	No Parking	1,294	Truck Route
11121762__	0.000	0.253	5	35	35	10,576	110	50	28'	Construct/ widen convert existing sidewalk on South side of road	No Parking	1,336	Truck Route
00000526__	7.363	7.667	3	45	40	10,674	6.14	2	38'	Bufferred Bike Lanes	No Parking	1,605	Truck Route
00000526__	7.667	7.869	3	45	40	11,080	85	50	26'	Widen road by 12' and install buffered bike lanes	No Parking	1,067	Truck Route
00000526__	7.869	8.080	3	45	40	11,080	6.14	2	42'	Stripe buffered bike lanes	No Parking	1,114	Truck Route
00000526__	8.080	8.152	3	45	40	11,080	85	50	22'	Widen road by 14'. Will Require guardrail to be moved. Buffered bike lanes	No Parking	380	Truck Route
00000526__	8.152	8.258	3	45	40	11,080	6.14	2	38'	Stripe buffered bike lanes	No Parking	560	Truck Route
00000526__	8.258	8.438	3	45	40	8,178	85	50	26'	Widen road by 12' and install buffered bike lanes	No Parking	950	Truck Route
00000526__	8.438	8.470	3	45	40	8,178	6.14	2	38'	Stripe buffered bike lanes	No Parking	169	Truck Route
00000526__	8.470	8.526	3	45	40	8,178	85	50	22'	Widen road by 14' and stripe buffered bike lanes	No Parking	296	Truck Route
00000526__	8.526	8.575	3	45	40	8,178	6.14	2	38'	Stripe buffered bike lanes	No Parking	259	Truck Route
00000526__	8.575	8.651	3	45	40	8,178	55	50	32'	Widen to 38' and stripe buffered bicycle lanes	No Parking	401	Truck Route
00000526__	8.651	9.120	3	45	40	8,178	6.14	2	42'	Stripe buffered bike lanes from Hunt Drive eb approach to W Manor way intersection	No Parking	2,476	Truck Route
00000526__	9.120	10.132	5	40	40	8,278	110	50	30-55	Build Sidepath along east side of the road from W. Manor Way to County Line	No Parking	5,343	Truck Route
												20,286	
White Horse Ave / Whitehorse-Mercerville Road / Mercerville-Quakerbridge Road / Quaker Bridge Road / Quaker Road / Province Line Road													
00000533__	0.000	0.040	3	35	35	12,000	6.14	2	48'	Diet lanes to 12' and put in 6' bike lanes and 3' painted buffers with gore area in middle	No Parking	211	Bus and Truck Route
00000533__	0.040	0.092	3	35	35	12,000	6.14	2	38'	Diet lanes to 12' and put in 5' bike lanes and 2' painted buffers	No Parking	275	Bus and Truck Route
00000533__	0.092	0.125	3	35	30	12,000	85	50	38'	CW not enough for 2 through lanes and left turn lane, will need to widen to 44'-48'	No Parking	174	Bus and Truck Route
00000533__	0.125	0.367	3	35	30	16,000	6.14	2	38'	Diet lanes to 12' and put in 5' bike lanes and 2' painted buffers	No Parking	1,278	Bus and Truck Route
00000533__	0.367	0.470	3	35	30	16,000	85	50	40'	This 3 lane intersection not enough for even 4' bike lanes, need to widen out to 44'-48'	No Parking	544	Bus and Truck Route
00000533__	0.470	0.615	3	35	30	20,000	6.14	2	38'	Diet lanes to 12' lanes and put in 5' bike lanes and 2' painted buffers	No Parking	766	Bus and Truck Route
00000533__	0.615	0.680	3	35	30	20,000	1000		40'	Need some larger intersection improvements here to put in bike facilities.	No Parking	343	Bus and Truck Route
00000533__	0.680	1.116	3	35	30	13,000	6.14	2	38'	Diet lanes to 12' lanes and put in 5' bike lanes and 2' painted buffers	No Parking	2,302	Bus and Truck Route
00000533__	1.116	1.376	5	35	30	20,000	110	50	40'-80'	CW opens up at Kuser Intersection with 4 lanes (plus gore area after Olden intersection), should go off road due to speed, driveways and volumes.	No Parking	1,373	Bus and Truck Route
00000533__	1.376	1.450	5	45	40	20,000	1000		80'	Large CW at intersection, need to make improvements for bike/ ped safety. One of most dangerous intersections in MC here.	No Parking	391	Bus and Truck Route
00000533__	1.450	2.650	5	45	40	20,000	110	50	50'-70'	50'-70' CW, should go off road due to speed, driveways and volumes.	No Parking	6,336	Bus and Truck Route
00000533__	2.650	2.760	5	45	40	20,000	1000		60'-70'	60'-70' CW at intersection, need to make improvements for bike/ ped safety.	No Parking	581	Bus and Truck Route
00000533__	2.760	3.240	5	45	40	17,000	110	50	50'-70'	50'-70' CW, should go off road due to speed, driveways and volumes.	No Parking	2,534	Bus and Truck Route
00000533__	3.240	3.358	5	45	40	18,000	1000		48'	48' CW at intersection with 33, need to make improvements for bike/ ped safety.	No Parking	623	Bus and Truck Route
00000533__	3.358	3.475	5	45	40	16,000	110	50	45'-50'	45'-50' CW, should go off road due to speed, driveways and volumes.	No Parking	618	Bus and Truck Route
00000533__	3.475	3.555	5	45	40	17,000	1000		48'-52'	48'-52' CW across intersection of 5 points, need improvements on large scale for safety.	No Parking	422	Bus and Truck Route
00000533__	3.555	4.220	4	35	35	20,000	6.14	2	36'-39'	36'-39' CW, diet lanes to 12' and put in 4'-5' bike lanes and 2' buffers	No Parking	3,511	Bus and Truck Route
00000533__	4.220	4.480	5	45	40	25,000	1000		40'-80'	40'-80' CW, from bridge and through intersection with Sloan (one of most dangerous in MC) Need massive bike/ ped improvements.	No Parking	1,373	Bus and Truck Route
00000533__	4.480	7.800	5	45	45	25,000	110	50	60'-100'	60'-100' CW, Need to go off road from Sloan to Quakerbridge Mall	No Parking	17,530	Bus and Truck Route
00000533__	7.800	8.420	5	45	40	32,000	110	50	60'-100'	60'-100' CW, Need to go off road at Route 1 Interchange..possible dedicated ped bridge? If new overpass ever built, should include bike/ ped improvements.	No Parking	3,274	Bus and Truck Route
00000533__	8.420	8.655	4	25	25	8,000	55	60	28'-30'	28'-30' CW, Widen to 36' or continue multi-use path from intersection to canal	No Parking	1,241	None
											Totals	**45,698**	
East State Street Extension / Nottingham Way / Edinburg Road / Mercerville-Edinburg Road / Old Trenton Road													
00000535__	0.000	0.351	3	35	35	4,500	7.965	4	40'	Diet to 12' lanes and put in 5' bike lanes with 3' rumble buffers	No Parking	1,853	Bus and Truck Route
00000535__	0.351	0.605	2	35	30	6,500	7.36	2	38'-40'	Diet to 11' lanes and put in 5' bike lanes with one 7' parking lane	One Parking Lane	1,341	Bus and Truck Route
00000535__	0.605	0.700	4	35	30	6,500	1000	50	40'-55'	Very complicated intersection…needs massive safety improvements to accomedate bikes..seperated bike lanes possible here?	No Parking	502	Truck Route
00000535__	0.700	1.081	3	35	30	6,500	7.965	4	53'	Diet lanes to 12' and put in two 7' parking lanes with 5' bike lane and 2' rumble buffers	Two Parking Lanes	2,012	Truck Route
00000535__	1.081	1.900	3	45	35	6,800	7.965	4	53'	Diet lanes to 12' and put in two 7' parking lanes with 5' bike lane and 2' rumble buffers	Two Parking Lanes	4,324	Bus and Truck Route
00000535__	1.895	2.011	2	45	35	6,500	5.242	2	48'-50'	Diet 3 lanes intersection to 11.5' lanes and put in 5' bike lanes with 1.5' buffers	No Parking	612	Bus and Truck Route
00000535__	2.011	2.540	3	45	40	4,500	7.965	4	53'-55'	Diet lanes to 12' and put in two 7' parking lanes with 5' bike lane and 2.5' rumble buffers	Two Parking Lanes	2,793	Bus and Truck Route
00000535__	2.540	2.825	4	45	40	4,500	13.843	4	55'-75'	I-295 lanes as well as Norcross Circle …need to make massive safety improvements here with protected lanes	No Parking	1,505	Bus and Truck Route
00000535__	2.825	3.260	3	40	35	18,000	6.14	2	53'-54'	Diet lanes to 12' and put in two 7' parking lanes with 5' bike lane and 2.5' rumble buffers	Two Parking Lanes	2,297	Bus and Truck Route
00000535__	3.260	3.290	2	40	35	19,500	5.242	2	54'	Diet lanes to 11' and put in 5' bike lanes	No Parking	158	Bus and Truck Route
00000535__	3.290	3.520	3	35	35	21,500	1000		Variable	Intersection with 535/ 533 / 652 / 618 and all side roads needs separate study and concept plan	No Parking	1,214	Bus and Truck Route
00000535__	3.520	4.385	3	40	35	16,500	6.14	2	52'	Stripe buffered bike lanes in existing shoulder	No Parking	4,567	Bus and Truck Route
00000535__	4.385	5.405	3	40	35	16,500	10.14	2	52-54'	Road Diet from Dube Rd. to just past Rose Everett Court,	No Parking	5,386	Bus and Truck Route
00000535__	5.405	5.806	5	45	45	16,500	110	50	70'	Build 10' multi-use path on each side of the road to until cartway returns to 4 lane configuration without medians	No Parking	2,117	Bus and Truck Route
00000535__	5.806	6.560	3	40	35	17,800	10.14	2	52'	Road Diet until just after S Post Road	No Parking	3,981	Truck Route
00000535__	6.560	6.638	2	45	40	17,800	7.965	4	37'	Rumble buffered bike lane- lower speeds if possible.	No Parking	412	Truck Route
00000535__	6.638	6.785	3	45	40	17,800	55	4	28'	Widen road by 6 feet and install rumble buffers	No Parking	776	Truck Route
00000535__	6.785	7.053	3	45	40	17,800	7.965	4	38'	Move center line and install rumble buffers	No Parking	1,415	Truck Route
00000535__	7.053	7.371	3	45	40	17,800	55	4	28-40'	Widen south side of road by 6 feet and install rumble buffers	No Parking	1,679	Truck Route
00000526__	3.428	3.644	2	35	30	15,000	110	60	30'-45'	Put multi-use path on south side where major intersections have crosswalks and canteliever trail off existing bridge.	No Parking	1,140	Truck Route
00000535__	7.620	8.814	5	40	35	15,000	110	60	28'-40'	Construct multi-use path on southern side of 535 and connect to existing sidewalk/ path across Emily Court.	No Parking	6,304	Truck Route
00000535__	8.814	10.300	5	50	50	11,500	80	50	40'	Widen existing sidewalk into multi-use sidepath	No Parking	7,846	Truck Route
00000535__	10.300	10.405	5	40	40	14,000	110	50	40'	Construct multi-use path on southern side of 535 and connect to existing sidewalk/ path at Dorchester	No Parking	554	Truck Route
00000535__	10.405	10.981	5	40	40	15,800	110	50	40'	Build multi-use sidepath along WB (south) side of the road until Princeton Hightown Rd.	No Parking	3,041	Truck Route
00000535__	10.981	11.080	5	40	40	9,200	1000		62-72	Redesign intersection of Princeton Hightown Road and Edinburg Road and Millstone to include pedestrian crossings.	No Parking	523	Truck Route
00000535__	11.080	11.394	3	40	40	8,900	7.965	4	50'-55'	Restripe 2 lanes into 3 with CTL and dedicated left turn lanes with 5'-6' bike lanes and 2'-3' buffers. Crossing at new signalized Millstone intersection	No Parking	1,658	Truck Route
00000535__	11.394	11.417	3	40	40	8,900	85	20	38'	Widen out 12' to 50' for consistancy and do as above/below.	No Parking	121	Truck Route

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
00000535__	11.417	11.520	3	40	40	12,800	7.965	4	50'	Restripe 2 lanes into 3 with CTL and dedicated left turn lanes with 5'-6' bike lanes and 2'-3' buffers	No Parking	544	Truck Route
00000535__	11.520	11.730	3	40	40	12,800	55	20	28'-40'	Widen to 36' for two 11' lanes with 5' bike lanes and 2' buffers	No Parking	1,109	Truck Route
											Totals	**61,787**	
Old York Road / Main Street													
00000539__	47.441	49.412	3	45	40	6,000	85	60	24'-27'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	10,407	None
00000539__	49.412	49.618	3	45	40	6,500	55	20	32'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	1,088	Truck Route
00000539__	49.618	50.060	3	45	40	6,500	7.965	4	40'-44'	Diet lanes to 12' and put in 5'-6' bike lanes with 3' rumble buffers	No Parking	2,334	Truck Route
00000539__	50.060	50.219	3	45	40	7,000	85	20	30'-32'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	840	Truck Route
00000539__	50.219	50.379	3	45	40	7,500	85	20	24'-30'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	845	Truck Route
00000539__	50.379	50.468	3	45	40	7,500	55	20	32'-34'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	470	Truck Route
00000539__	50.468	50.636	3	40	40	7,500	85	20	28'-30'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	887	Truck Route
00000539__	50.636	50.767	3	40	40	8,000	55	20	37'-45'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	692	Truck Route
00000539__	50.767	51.140	3	40	40	8,000	85	20	26'-30'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	1,969	Truck Route
00000539__	51.140	51.803	3	25	25	8,000	6.14	2	37'-38'	Diet lanes to 12' and put in 5' bike lanes with 2' rumble buffers	No Parking	3,501	Truck Route
00000539__	51.803	51.907	2	25	25	8,500	5.242	2	30'-34'	Diet lanes to 11'' and put in 5' bike lanes	No Parking	549	Truck Route
00000539__	52.080	52.107	2	25	25	9,000	5.242	2	42'	Diet intersection lanes to 11' and put in 4.5' bike lanes	No Parking	143	Truck Route
00000539__	52.107	52.369	3	25	25	10,000	6.14	2	36'-38'	Diet lanes to 12' lanes and put in 5' bike lanes and 1.5'-2' painted buffers	No Parking	1,383	Truck Route
00000539__	52.369	52.615	3	25	25	10,500	7.36	2	40'-42'	Diet lanes to 11' lanes and put 7' SB parking lane with 5' bike lanes and 1.5' buffer	One Parking Lane	1,299	Truck Route
00000539__	52.615	52.716	3	25	25	10,500	55	20	40'-54'	Widen out intersection to get bike lanes in	No Parking	533	Truck Route
00000539__	52.716	52.834	3	25	25	10,000	55	20	34'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	623	Truck Route
00000539__	52.834	52.884	3	40	35	10,000	7.965	4	46'	Wide CW under Route 133, Diet lanes to 12' and put in 6' bike lanes with 3' rumble buffers	No Parking	264	Truck Route
00000539__	52.884	52.969	3	40	35	10,000	7.965	4	38'	Diet lanes to 12' and put in 5' bike lanes and 2' rumble buffers	No Parking	449	Truck Route
00000539__	52.969	53.061	3	40	35	10,000	85	20	30'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	486	Truck Route
00000539__	53.061	53.106	3	40	35	10,000	85	20	25'-28'	Widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	238	Truck Route
00000539__	53.106	53.209	3	40	35	10,000	7.965	4	50'	50' CW at bridge, diet lanes to 12' and put in 5' bike lanes and 2' rumble buffers	No Parking	544	Truck Route
											Totals	**29,542**	
Washington Crossing-Pennington Road/ Lawrence-Pennington Road/ Franklin Corner Road													
00000546__	0.000	0.052	3	45	40	7,500	55	60	34'-46'	Route 29/ CR 546 Intersection; Widen intersection for bike lanes 200' back from stop bar	No Parking	275	Truck Route
00000546__	0.052	1.239	3	45	40	7,500	7.965	4	38'-40'	Diet lanes to 12' and put in 5' bike lane with 2'-3 rumble buffer	No Parking	6,267	Truck Route
00000546__	1.239	1.380	2	45	40	8,000	5.242	2	41'-50'	Diet 3 Intersection Lanes to 12' and put in 4'-5' bike lanes	No Parking	744	Truck Route
00000546__	1.380	2.469	3	45	40	8,800	7.965	4	40'	Diet lanes to 12' and put in 5' bike lane with 3' rumble buffer	No Parking	5,750	Truck Route
00000546__	2.469	2.518	3	45	40	8,800	7.965	4	35'	35'' CW on bridge approach, Diet lanes to 11' and put in 5' bike lanes with 1.5' rumble buffer	No Parking	259	Truck Route
00000546__	2.518	2.625	2	45	40	10,800	5.242	2	28' on bridge	Tight intersection, Diet lanes to 10' and put in 4' bike lanes	No Parking	565	Truck Route
00000546__	2.625	3.035	3	45	40	10,800	7.965	4	38'-40'	Diet lanes to 12' and put in 5' bike lane with 2'-3' rumble buffer	No Parking	2,165	Truck Route
00000546__	3.035	3.325	3	45	40	10,800	55	20	50'	4 lanes to intersection/ 2 driveways. Need to widen for buffered lanes or go off to multi-use path	No Parking	1,531	Truck Route
00000546__	3.325	3.670	3	45	40	7,600	7.965	4	40'	Diet lanes to 12' and put in 5' bike lane with 3' rumble buffer	No Parking	1,822	Truck Route
00000546__	3.670	3.734	3	45	40	7,600	7.965	4	48'-50'	Diet thru lanes to 12' and turn lane to 11' and put in 4'-5' bike lane with 2' rumble buffer	No Parking	338	Truck Route
00000546__	3.734	3.778	3	45	40	7,600	85	20	38'	Tight CW with left turn lane, will need to widen to 50' to accommodate 3 12' lanes and 5' bike lanes with 2' buffer.	No Parking	232	Truck Route
00000546__	3.778	4.100	3	45	40	7,600	7.965	4	40'	Diet lanes to 12' and put in 5' bike lane with 3' rumble buffer	No Parking	1,700	Truck Route
00000546__	4.100	4.170	3	40	35	7,700	7.965	4	38'-44'	Diet lanes to 12' and put in 4'-5' bike lane with 2' rumble buffer	No Parking	370	Truck Route
00000546__	4.170	4.600	3	40	35	7,800	7.965	4	40'	Diet lanes to 12' and put in 5' bike lanes with 3' rumble buffer	No Parking	2,270	Truck Route
00000546__	4.790	5.214	3	40	35	5,000	7.965	4	40'	Diet lanes to 12' and put in 5' bike lanes with 3' rumble buffer	No Parking	2,239	Truck Route
00000546__	5.214	5.260	3	40	35	5,600	7.965	4	36'-60'	Diet intersection lanes to 12' and put in 5' bike lanes with 2'-3' rumble buffer	No Parking	243	Truck Route
00000546__	5.260	5.335	3	40	35	6,000	7.965	4	45'-50'	Diet 3 intersection lanes to 11'-12' and put in 5' bike lanes with 1.5' buffers	No Parking	396	Truck Route
00000546__	5.335	5.792	3	40	35	8,200	7.965	4	40'-42'	Diet lanes to 12' and put in 5' bike lanes with 3' rumble buffer	No Parking	2,413	Truck Route
00000546__	5.792	5.910	3	40	35	8,200	55	20	40'	Widen out to 46' for 12' thru lanes, 11' left turn lane, 5' bike lanes and 1.5' painted buffers	No Parking	623	Truck Route
00000546__	5.910	6.010	3	40	35	8,200	7.965	4	40'-44'	Diet lanes to 12' and put in 5'-6' bike lanes with 3' rumble buffer	No Parking	528	Truck Route
00000546__	6.010	6.105	3	40	35	8,500	7.965	4	45'-48'	Diet lanes to 12' thru lanes, 11' left turn lane, 4'-5' bike lanes and 1.5' rumble buffers	No Parking	502	Truck Route
00000546__	6.105	6.300	3	40	35	8,800	7.965	4	45'-48'	Diet lanes to 12' thru lanes, 6' bike lanes and 4' rumble buffers	No Parking	1,030	Truck Route
00000546__	6.300	6.430	3	40	35	9,000	7.965	4	44'-52'	Diet intersection lanes to 12' and put in 5' bike lanes with 2' rumble buffer	No Parking	686	Truck Route
00000546__	6.430	6.635	3	40	35	9,200	7.965	4	42'-46'	Diet lanes to 12'-13' and put in 6' bike lanes with 3' rumble buffer	No Parking	1,082	Truck Route
00000546__	6.635	6.895	3	40	35	9,200	7.965	4	50'	50' CW through intersection (not including ramps), Lane diet to 12' and put in 5' bike lanes with 2' rumble. Approximately 17' CW at ramps, diet to 12' and put in 5' bike lanes to Federal City.	No Parking	1,373	Truck Route
00000546__	6.895	7.700	3	40	35	7,800	6.14	2	42'-48'	Diet lanes to 12' and put in 5'-6' bike lanes with 3' rumble buffer	No Parking	4,250	Truck Route
00000546__	7.700	7.980	3	35	35	8,000	6.14	2	42'	Lane diet thru Denow intersection, 12' lanes with 5' bike lanes and painted or rumble 2' buffer	No Parking	1,478	Truck Route
00000546__	7.980	8.212	5	35	35	16,000	110	50	Variable	Variable CW from Denow to 206 Ramp, widen to 50' (6'-14' extra) for 3 12' lanes, 5' bike lanes and 2' buffers or construct a multi-use path with some intersection improvements	No Parking	1,225	Truck Route
00000546__	8.212	8.815	2	45	40	8,500	55	50	30'-32'	Widen out to 38' for 12' lanes and 5' bike lanes with 2' buffers	No Parking	3,184	Truck Route
00000546__	8.815	8.936	3	45	40	8,500	7.965	4	45'-50'	Diet Lanes to 12' and work out crossing at I-295 off ramp to include 5' bike lanes with 2' buffer	No Parking	639	Truck Route
00000546__	8.936	9.045	3	45	40	8,500	55	50	30'-32'	Widen out to 38' for 12' lanes and 5' bike lanes with 2' buffers	No Parking	576	Truck Route
00000546__	9.045	9.108	3	45	40	8,500	7.965	4	48'-50'	Diet Lanes to 12' and put in 5' bike lanes with 2' buffer	No Parking	333	Truck Route
00000546__	9.108	9.184	3	45	40	8,500	55	50	30'-32'	Widen out to 38' for 12' lanes and 5' bike lanes with 2' buffers	No Parking	401	Truck Route
00000546__	9.187	9.280	3	45	40	11,000	7.965	4	50'	Diet 3 Intersection Lanes to 12' and put in 5' bike lanes with 2' buffers	No Parking	491	Truck Route
00000546__	9.315	9.864	3	45	40	11,000	10.14	2	50'-64'	Road diet with 12' lanes, 13' center turn lane, 5'-6' bike lanes and 2'-3' buffers	No Parking	2,899	Bus and Truck Route
00000546__	9.864	9.974	3	45	40	11,000	1000		56'	Need significant improvements to make safe for bikes and peds	No Parking	581	Bus and Truck Route
11072002__	0.005	0.160	5	45	40	15,000	80	20	56'	Widen sidewalks from US1 to Canal to convert into multi-use path on WAWA side of road.	No Parking	818	None
											Totals	**52,277**	
Province Line Road / Fackler Road / Carter Road / Hopewell-Princeton Road / Princeton Ave													
00000569__	8.231	8.183	2	25	25	4,803	5.242	2	30'	Narrow to 11' lanes and stripe 4' bike lanes in each direction	No Parking	253	Truck Route
00000569__	8.183	7.971	3	45	40	4,803	160	50	24'	Widen road by 15' and stripe buffered bicycle lanes in each direction.	No Parking	1,119	Truck Route
00000569__	7.971	7.940	3	45	40	4,803	85	50	35'	Widen east side of the road by 7' and stripe buffered bicycle lanes	No Parking	164	Truck Route
00000569__	7.940	6.640	3	45	35	5,875	160	50	25'	Widen road by 14' and stripe buffered bicycle lanes in each direction	No Parking	6,864	Truck Route
00000569__	6.640	6.191	3	40	35	6,483	160	20	24-28'	Widen Road by up to 14' and stripe buffered bicycle lanes in each direction	No Parking	2,371	Truck Route
00000569__	6.191	6.163	3	40	35	6,483	55	20	37'	Widen east side of the road by 5' and stripe buffered bicycle lanes in both directions	No Parking	148	Truck Route
00000569__	6.163	6.129	3	40	35	6,483	55	20	48'	Stripe buffered bike lanes	No Parking	180	Truck Route
00000569__	6.129	6.097	3	40	35	6,483	55	20	37'	Widen west side of the road by 5' and stripe buffered bicycle lanes in both directions	No Parking	169	Truck Route
00000569__	6.097	5.704	3	40	35	6,483	160	20	24'	Widen Road by up to 14' and stripe buffered bicycle lanes in each direction	No Parking	2,075	Truck Route
00000569__	5.704	5.625	3	40	35	6,483	6.14	2	42'	Stripe buffered bike lanes	No Parking	417	Truck Route
00000569__	5.625	5.506	3	40	35	6,483	160	20	24-28'	Widen Road by up to 14' and stripe buffered bicycle lanes in each direction	No Parking	628	Truck Route
00000569__	5.506	5.455	2	40	35	6,483	4.389	2	36'	Place bike legends in existing shoulders- lower speeds to 30 if possible.	No Parking	269	Truck Route
00000569__	5.455	5.000	3	40	35	6,483	160	20	24'	Widen Road by up to 14' and stripe buffered bicycle lanes in each direction	No Parking	2,402	Truck Route
00000569__	5.000	4.972	3	40	35	6,483	6.14	2	50'	Stripe buffered bike lanes and neckdown Bayberry road intersection	No Parking	148	Truck Route
00000569__	4.972	4.724	3	40	35	6,483	160	50	24'	Widen Road by up to 14' and stripe buffered bicycle lanes in each direction	No Parking	1,309	Truck Route
00000569__	4.724	4.432	3	45	40	6,483	7.965	4	42'	Rumble buffers in existing shoulders	No Parking	1,542	Truck Route
00000569__	4.432	4.307	3	45	40	8,000	85	50	40'-48'	Widen out to 47' for 3 lanes, 5' bike lanes and 2' buffers	No Parking	660	Bus and Truck Route
00000569__	4.307	4.164	3	45	40	8,000	55	50	32'-33'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	755	Bus and Truck Route
00000569__	4.164	4.076	3	45	40	8,500	85	50	34'-42'	Widen out to 47' for 3 lanes, 5' bike lanes and 2' buffers	No Parking	465	Bus and Truck Route
00000569__	4.076	3.785	3	45	40	9,000	85	50	25'-30'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	1,536	Bus and Truck Route
00000569__	3.785	3.700	3	45	40	9,000	85	50	36'-42'	Widen out to 47' for 3 lanes, 5' bike lanes and 2' buffers	No Parking	449	Bus and Truck Route
00000569__	3.700	3.040	3	45	40	9,000	85	50	25'-30'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	3,485	Bus and Truck Route
00000569__	3.040	2.865	3	45	40	9,000	85	50	35'-40'	Widen out to 47' for 3 lanes, 5' bike lanes and 2' buffers	No Parking	924	Bus and Truck Route
00000569__	2.865	2.198	3	45	40	9,000	85	50	25'-30'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	3,522	Bus and Truck Route
00000569__	2.198	2.106	3	45	40	9,000	55	50	32'-34'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	486	Bus and Truck Route
00000569__	0.328	0.113	2	35	30	15,000	85	50	26'-40'	Widen out to 34' for 11' lanes with 6' bike lanes	No Parking	1,135	None
00000569__	0.113	0.000	2	35	30	15,000	85	50	23'-37'	Approaching intersection, widen and diet lanes and put in regular bike lanes	No Parking	597	None
												34,072	

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
Washington Road / Etra Road / Stockton Street / Princeton-Hightstown Road / Washington Road													
00000571__	34.085	33.955	2	25	25	3,292	4.389	2	32'	Place bike legends in existing shoulders	No Parking	686	Truck Route
00000571__	33.955	33.491	1	40	25	3,292	4.057	2	24'	Massively reduce speed limit next to school to 25 and put in sharrows	No Parking	2,450	Truck Route
00000571__	33.491	33.245	3	35	35	3,292	6.14	2	34+	Paint buffered bike lanes in existing shoulders	No Parking	1,299	Truck Route
00000571__	33.245	32.645	3	40	40	4,063	85	50	28'-33'	Widen to 36' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	3,168	Truck Route
00000571__	32.645	31.285	5	45	40	3,927	110	60	25'	Build sidepath along the north side of the road. Opportunity to build upon existing path extending south from Etra Lake Parking lot on Disbrow Hill Road.	No Parking	7,181	Truck Route
00000571__	43.653	43.645	1	25	25	12,200	4.057	2	24'-25'	Continue existing sharrows here	No Parking	42	Truck Route
00000571__	43.645	43.383	3	40	30	13,500	6.14	2	38'	Diet lanes to 11' and put in 6' bike lanes and 2' buffers	No Parking	1,383	Truck Route
00000571__	43.383	43.262	5	40	35	15,000	80	20	38'	Continue buffered lanes on SB side and expand sidewalk to multi-use path on NB side	No Parking	639	Truck Route
00000571__	43.262	43.135	3	40	35	15,000	6.14	2	38'	Diet lanes to 11' and stripe 6' bicycle lanes in the existing shoulders with 2' buffers	No Parking	671	Truck Route
00000571__	43.135	42.860	3	50	40	15,000	7.965	4	38'	Diet lanes to 11' and put in 5' bike lanes and 3' buffers (long term have off-road multi-use and on road)	No Parking	1,452	Truck Route
00000571__	42.860	42.330	5	50	40	15,000	1000	50	38'	Need major safety improvements for this intersection to get bikes and peds across	No Parking	2,798	Truck Route
00000571__	42.330	41.566	3	40	35	15,000	6.14	2	38'	Stripe buffered bike lanes in existing shoulders	No Parking	4,034	Truck Route
00000571__	41.566	41.310	3	40	35	14,800	55	20	30'-32'	Widen out to 36' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	1,352	Truck Route
00000571__	40.961	40.753	3	40	35	15,400	6.14	4	40-65	Stripe buffered bike lanes	No Parking	1,098	Truck Route
00000571__	40.753	40.710	2	40	35	15,400	5.242	2	43'-52'	SB:Diet through lanes and create dashed bicycle lane connecting curbside buffered lane across right turn lane to 5' lane between through and right turn lane. NB Continue buffered lane throught intersection	No Parking	227	Truck Route
00000571__	40.710	40.471	3	40	35	15,400	6.14	2	68'	Diet road and stripe buffered bike lanes in both directions	No Parking	1,262	Truck Route
00000571__	40.471	40.452	3	40	35	15,400	55	50	34'	Widen Road from 34 -40 feet- may require moving telephone poll- could also make a short sidepath here.	No Parking	100	Truck Route
00000571__	40.452	40.331	3	40	35	15,400	6.14	2	43'	Diet road to a single through lane and a right turn lane, stripe buffered bicycle lanes.	No Parking	639	Truck Route
00000571__	40.331	40.084	5	40	40	22,000	80	50	52'	Create sidepath along south side of Princeton Hightstown Rd. From Clarksville rd to Windsor Drive.	No Parking	1,304	Truck Route
00000571__	40.084	39.469	5	40	40	25,000	110	50	45'-60'	Continue Multi-Use Path for this segment. May be difficult with homes but no alternative.	No Parking	3,247	Truck Route
00000571__	39.469	39.386	5	40	40	28,500	80	50	53'	Turn existing sidewalk on South side of Princeton Hightstown Rd into mutli use path	No Parking	438	Truck Route
00000571__	39.386	39.244	5	40	40	28,500	110	50	53'	Build sidepath- will need to work with homeowners	No Parking	750	Truck Route
00000571__	39.244	38.800	5	40	40	28,500	80	50	53'	Turn existing sidewalk on South side of Princeton Hightstown Rd into mutli use path	No Parking	2,344	Truck Route
00000571__	38.800	38.686	5	40	40	28,500	110	50	53'	Build sidepath- will need to work with homeowners	No Parking	602	Truck Route
00000571__	38.686	38.627	5	40	40	28,500	110	60	53'	Create cantileaver sidepath off of bridge over Bear Brook	No Parking	312	Truck Route
00000571__	38.627	38.571	5	40	40	24,000	110	50	53'	Build sidepath	No Parking	296	Truck Route
00000571__	38.571	38.426	5	40	40	24,000	80	50	53'	Turn existing sidewalk on South side of Princeton Hightstown Rd into mutli use path	No Parking	766	Truck Route
00000571__	38.426	38.167	5	40	40	24,000	110	50	53'	Build sidepath	No Parking	1,368	Truck Route
00000571__	38.167	38.117	5	40	40	24,000	80	50	53'	Turn existing sidewalk on South side of Princeton Hightstown Rd into mutli use path	No Parking	264	Truck Route
00000571__	38.117	38.066	5	40	40	24,000	110	50	53'	Build sidepath	No Parking	269	Truck Route
00000571__	38.066	37.989	5	40	40	24,000	80	50	53'	Turn existing sidewalk on South side of Princeton Hightstown Rd into mutli use path	No Parking	407	Truck Route
00000571__	37.989	35.812	5	40	40	14,423	110	50	53'	Build sidepath	No Parking	11,495	Truck Route
00000571__	35.812	35.594	5	40	40	16,000	0	0	52'	Cross Princeton Hightstown Road at 1 mile Road and Use existing sidepathon north side of road	No Parking	1,151	Truck Route
00000571__	35.594	35.516	5	40	40	16,000	110	50	53'	Build sidepath	No Parking	412	Truck Route
00000571__	35.516	35.358	5	40	40	24,000	80	50	53'	Turn existing sidewalk into mutli use path	No Parking	834	Truck Route
00000571__	35.358	35.326	2	25	25	10,683	55	50	34'	Widen slightly to 40' to accomedate 3 travel lanes and continue 5' bike lanes to intersection	No Parking	169	Truck Route
00000571__	35.326	34.526	2	25	25	10,603	5.242	2	28'-30'	Diet travel lanes to 10' and put in 4'-5' bicycle lanes	No Parking	4,224	Truck Route
												61,132	
Sullivan Way / Bear Tavern Road / Jacobs Creek Road / Trenton-Harbourton Road / Harbourton-Rocktown Road													
00000579__	0.000	0.070	1	35	30	12,500	4.057	2	28'-36'	Sharrow to underpass	No Parking	370	Bus and Truck Route
00000579__	0.070	0.092	5	35	30	12,500	110	20	22'	D&R Underpass... Build ramp onto Sidewalk to get through this section	No Parking	116	Bus and Truck Route
00000579__	0.092	0.195	3	35	30	10,000	55	20	28-32'	Need to widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	544	Bus and Truck Route
00000579__	0.195	0.370	3	25	25	8,000	55	20	32'-34'	Need to widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	924	Bus and Truck Route
00000579__	0.370	0.800	3	40	35	8,500	85	20	26'-30'	Need to widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	2,270	Bus and Truck Route
00000579__	0.800	0.908	3	40	35	8,500	55	20	32'-34'	Need to widen out to 38' for 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	570	Bus and Truck Route
00000579__	0.908	0.943	3	40	35	10,000	85	50	40'-42'	Need to widen out to 50' for 3 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	185	Bus and Truck Route
00000579__	0.943	0.990	3	40	35	10,000	55	20	46'-48'	Need to widen out to 50' for 3 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	248	Bus and Truck Route
00000579__	0.990	1.090	3	40	35	9,000	7.36	2	36'-40'	Diet Lanes to 11'-11.5' and put in 5' bike lanes with 1.5'-2' buffer	No Parking	528	Bus and Truck Route
00000579__	1.090	1.160	3	40	35	9,000	85	20	36'-38'	Need to widen out to 50' for 3 12' lanes, 5' bike lanes and 2' rumble buffers	No Parking	370	Bus and Truck Route
00000579__	1.160	1.350	3	40	35	9,000	6.14	2	38'-40'	Diet Lanes to 12' and put in 4'-5' bike lanes with 2' buffer	No Parking	1,003	Bus and Truck Route
00000579__	1.350	1.416	3	40	35	9,000	6.14	2	40'-45'	Diet Lanes to 12' and put in 5'-6' bike lanes with 2' buffer	No Parking	348	Bus and Truck Route
00000579__	1.416	1.635	4	40	35	9,000	13.843	8	40'-43'	Redirect all bike traffic to multi-use two-way protected bike lane on NB side. Crossings at Silvia Street and Railroad Ave	No Parking	1,156	Bus and Truck Route
00000579__	1.635	2.180	2	35	30	9,000	5.242	2	30'	Narrow to 10.5' lanes and put in regular 4' bike lanes	No Parking	2,878	Bus and Truck Route
00000579__	2.180	2.245	2	35	30	13,000	5.242	2	35'-40'	Diet intersection lanes to 12'-13' and put in 5' bike lanes	No Parking	343	Bus and Truck
00000579__	2.210	2.250	2	35	35	13,500	6.14	2	45'-48'	Diet intersection lanes to 12' and put in 5' bike lanes	No Parking	211	Bus and Truck Route
00000579__	2.250	2.570	3	35	35	13,500	6.14	2	40'-42'	Diet Lanes to 12' and put in 5' bike lanes with 2' buffer	No Parking	1,690	Bus and Truck Route
00000579__	2.570	2.665	3	45	40	14,000	7.965	4	44'-50'	Diet 3 lanes to 10'-11' and put in 5' bike lanes with 1'.5 buffer	No Parking	502	Bus and Truck Route
00000579__	2.665	3.010	3	45	40	14,000	6.14	2	40'-42'	Diet Lanes to 12' and put in 5' bike lanes with 2' buffer	No Parking	1,822	Bus and Truck Route
00000579__	3.010	3.260	3	45	40	14,000	7.965	4	44'	44' CW across most of I-295 interchange, diet lanes down to 12' and put in 4'-5' bike lanes and 2' rumbled buffer	No Parking	1,320	Bus and Truck Route
00000579__	3.260	3.337	3	45	40	8,500	7.965	4	48'	Diet lanes down to 12' and put in 5' bike lanes with 2' buffer	No Parking	407	Truck Route
00000579__	3.337	4.210	3	40	35	8,500	7.965	4	38'-40'	Diet lanes down to 12' and put in 5' bike lanes with 2' buffer	No Parking	4,609	Truck Route
00000579__	4.210	4.433	2	35	35	8,500	5.242	2	32'-41'	41' CW at curve to 32' at bridge to 34'-40' at split. Diet lanes to 10', with 4' bike lanes	No Parking	1,177	Truck Route
00000579__	4.433	4.492	2	35	30	8,500	5.242	2	38'	Diet 3 lanes to 10', with 4' bike lanes or bikable shoulder	No Parking	312	Truck Route
00000579__	4.492	4.577	2	35	30	8,500	55	2	28'	Diet lanes to 10', with 4' bike lanes or bikable shoulder	No Parking	449	Truck Route
00000579__	4.577	4.830	3	50	40	8,500	6.14	2	32'-36'	Diet lanes to 11' with 4' bike lanes and 1.5' buffers	No Parking	1,336	Truck Route
00000579__	4.830	4.925	3	50	40	8,000	7.965	4	48'-50'	Diet intersection lanes to 12' and put in 5' bike lanes with 1.5'-2' buffers	No Parking	502	Truck Route
00000579__	4.925	5.363	3	50	40	8,000	7.965	4	36'-37'	Diet lanes to 12' and put in 4'-5' bike lanes with 1.5'-2' buffer	No Parking	2,313	Truck Route
00000579__	5.363	5.550	3	50	35	8,000	7.965	4	36'-38'	Diet lanes to 12' and put in 4'-5' bike lanes with 2' buffer	No Parking	987	Truck Route
00000579__	5.550	5.760	3	50	40	8,000	7.965	4	38'-40'	Diet Lanes to 12' and put in 5' bike lanes with 2' buffer	No Parking	1,109	Truck Route
00000579__	5.750	5.800	3	45	40	10,000	55	20	40'-50'	Need to widen to 50' for 3 12' lanes and 5' bike lanes with 2' buffers	No Parking	264	Truck Route
00000579__	5.800	5.850	3	45	40	10,000	85	20	49'-51'	Need to widen to 57' for 4 11' lanes and 5' bike lanes with 1.5' buffers	No Parking	264	Truck Route
00000579__	5.850	6.300	3	45	40	10,000	7.965	4	34'-40'	Diet Lanes to 11'-12' and put in 5' bike lanes with 1.5'-2' buffer	No Parking	2,376	Truck Route
00000579__	6.300	6.455	3	45	40	10,000	55	20	30'	Need to widen to 38' for 12' lanes, 5' bike lanes and 2' buffers	No Parking	818	Truck Route
00000579__	6.455	7.660	3	45	40	10,000	7.965	4	38'-40'	Diet lanes to 11' and put in 5' bike lanes with 2' rumble buffer	No Parking	6,362	Truck Route
00000579__	7.660	8.906	3	45	40	8,000	85	20	20'-26'	Need to widen to 38' for 12' lanes, 5' bike lanes and 2' buffers	No Parking	6,579	Truck Route
											Totals	**47,261**	
Sam Weinroth Road / Ridge Road													
11000600__	0.000	0.058	3	40	35	800	7.965	4	55'-57'	Diet 3 intersection lanes to 12' and put in 6' bike lanes with 3' rumble buffer	No Parking	306	None
11000600__	0.058	1.238	2	40	35	800	5.242	2	32'	Diet lanes to 11' and put in regular 5' bike lanes	No Parking	6,230	None
11000600__	1.238	1.690	3	35	35	1,000	85	20	22'-28'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	2,387	None
											Totals	**8,923**	
S Post Road													
11000602__	0.000	0.727	1	25	25	N/A	4.057	2	22'-40'	Sharrow this low volume and low speed park road	No Parking	3,839	None
											Totals	**3,839**	
Rosedale Road / Elm Road													

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
11000604__	0.000	0.070	2	45	40	8,200	5.242	2	39'-42'	Diet turn lanes to 10' and 11' inbound lane and put in 4'-5' bike lanes. Best to widen to 50'.	No Parking	370	None
11000604__	0.070	0.565	3	45	40	8,200	85	55	25'-28'	Widen to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	2,614	None
11000604__	0.480	0.606	3	45	40	8,200	85	55	24'-33'	Widen to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	665	None
11000604__	0.606	0.662	3	45	40	8,200	85	55	38'	Widen to 47' for 3 11' lanes, 5' bike lanes and 2' buffers	No Parking	296	None
11000604__	0.662	0.920	3	45	40	8,200	85	55	26'-27'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	1,362	None
11000604__	0.920	0.946	3	45	40	8,500	85	55	30'-32'	Widen intersection to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	137	None
11000604__	0.946	2.502	5	45	40	8,500	80	20	24'-26'	Princeton already has a 6'-7' path here...widen by a few feet to get to 8' multi-use path. Might need to reduce road CW in some cases to get a few extra feet in...like on the Stony Brook Bridge	No Parking	8,216	None
11000604__	2.502	2.950	2	25	25	16,000	5.242	2	30'-32'	Diet lanes to 11' and put in 4'-5' bike lanes	No Parking	2,365	None
											Totals	**16,025**	
River Road													
11000605__	0.000	0.760	2	35	30	6,000	85	20	22'-26'	Widen out to 32' for 11' lanes and 5' bike lanes	No Parking	4,013	None
											Totals	**4,013**	
Hamilton Ave													
11000606__	0.169	0.189	2	25	25	13,000	5.242	2	38'	Stripe 5' EB Bikelane from 129 to Canal Street & WB Sharrow from E Canal to 129 (bike box in thru lane only)	No Parking	106	Bus and Truck Route
11000606__	0.189	0.253	2	25	25	13,000	5.242	2	38'	5' bikelanes from Canal to Clark Street. Do not block box at Clark Ave for left turns.	No Parking	338	Bus and Truck Route
11000606__	0.253	0.275	2	25	25	13,000	7.36	2	38'	Remove Parking WB from Clark to Clinton and stripe 5' bikelanes (wb through lane becomes shared at intersection)	No Parking	116	Bus and Truck Route
11000606__	0.275	0.306	2	25	25	13,000	5.242	2	42'	Diet 3 intersection lanes to 11' each and put in 4.5' bike lanes	No Parking	164	Bus and Truck Route
11000606__	0.306	0.844	2	25	25	13,000	7.36	2	38'	Diet 2 lanes to 11' and put in 7' EB Parking lane with 4' bike lanes and 1' buffer on parking side	One Parking Lane	2,841	Bus and Truck Route
11000606__	0.844	0.945	2	25	25	14,200	5.242	2	38'	Diet lanes to 10' and put in 4' bikelanes	No Parking	533	Bus and Truck Route
11000606__	0.945	1.333	2	25	25	14,400	7.36	2	38'	Diet 2 lanes to 11' and put in 7' EB Parking lane with 4' bike lanes and 1' buffer on parking side	One Parking Lane	2,049	Bus and Truck Route
11000606__	1.333	2.122	2	25	25	14,400	7.36	2	38'	Diet 2 lanes to 11' and put in 7' WB Parking lane with 4' bike lanes and 1' buffer on parking side	One Parking Lane	4,166	Bus and Truck Route
11000606__	2.122	2.160	2	25	25	12,500	4.057	2	38'-40	Sharrows between Liberty and Kuser in both directions, with a bike boxe in both directions at the intersection of Kuster and Hamilton	No Parking	201	Bus and Truck Route
11000606__	2.172	2.224	2	35	30	19,000	5.242	2	38	Stripe 5' bicycle lane EB' & Sharrow wb with Bike Box at intersection	No Parking	275	Bus and Truck Route
11000606__	2.224	2.603	2	35	30	19,000	5.242	2	38'	5' bike lanes in both directions Speed limit changes to 25 in approach to school	No Parking	2,001	Bus and Truck Route
11000606__	2.603	2.641	2	25	25	19,000	5.242	2	38'	5' bikelane wb & Sharrow eb with Bike Box at intersection	No Parking	201	Bus and Truck Route
11000606__	2.667	2.687	2	25	25	19,000	5.242	2	40'	5' Bike Lane EB & Sharrow wb with Bike Box at intersection	No Parking	106	Bus and Truck Route
11000606__	2.687	2.899	3	25	25	16,200	6.14	2	40'	5' Bike Lane with 2-3' buffer in both directions	No Parking	1,119	Bus and Truck Route
11000606__	2.899	2.949	2	25	25	16,200	5.242	2	40'	EB Bike Lane become a dashed through lane, the two existing turn lanes at the intesection narrow to 10' to make room for a bicycle lane. Paint bike box at intersection. Stripe 5' bike lane wb	No Parking	264	Bus and Truck Route
11000606__	2.964	2.983	2	25	25	16,200	5.242	2	38'	5' EB Bike Lane & WB sharrow on through lane with bike box at intersection	No Parking	100	Bus and Truck Route
11000606__	2.983	3.304	3	35	30	12,500	6.14	2	38'	Diet 2 travel lanes to 12' and put in 5' bicycle lanes with 2' buffers	No Parking	1,695	Bus and Truck Route
11000606__	3.304	3.482	3	35	30	12,500	13.843	8	45'-46'	Diet lanes to 13.5' and put in 6' bike lanes with 3' buffers. Stripe dashed bicycle lane across on ramp with yield to cyclists signage. Eventually turn into protected lanes?	No Parking	940	Bus and Truck Route
11000606__	3.482	3.534	2	35	30	12,500	5.242	2	40'	Diet lanes to 10' each and put in regular 5' bike lanes	No Parking	275	Bus and Truck Route
											Totals	**17,487**	
Station Road													
11000608__	0.000	0.080	3	40	35	5,000	7.965	4	21'-24' per lane	Diet lanes to 12' and put in 5' bike lane with 2' buffer	No Parking	422	Bus Route
11000608__	0.080	0.77	3	40	35	5,000	55	2	28'-32'	Widen to 38' for 12' lanes, 5' bike lanes and 2' buffers	No Parking	3,643	Bus Route
											Totals	**4,066**	
Groveville-Yardville Road													
11000609__	0.000	0.680	1	25	25	3,200	4.057	2	28'-30'	Sharrow this entire route and post more 25 mph speed limit signs	One Parking Lane	3,590	None
											Totals	**3,590**	
Scotch Road													
11000611__	0.000	0.300	2	40	35	9,200	10.14	2	50'	Road diet 4 lanes to 3 12' lanes with 5' bike lanes and 2' buffers	No Parking	1,584	None
11000611__	0.300	0.428	2	40	35	9,200	5.242	2	34'	Diet lanes to 11' and put in 5' bike lanes	No Parking	676	None
11000611__	0.428	0.493	2	40	30	9,000	5.242	2	28'	Diet lanes to 10' lanes (Carlton thru curve) and put in 4' bike lanes	No Parking	343	None
11000611__	0.493	0.800	2	45	35	8,600	5.242	2	36'	Diet lanes to 11' and put in 5' bike lanes	No Parking	1,621	None
11000611__	0.800	0.880	2	45	35	8,600	5.242	2	44'	Diet intersection to put in 11' lanes and put in 5' bike lanes	No Parking	422	None
11000611__	0.880	0.928	2	45	35	8,000	5.242	2	40'	Diet lanes to 11' and put in 5' bike lanes	No Parking	253	None
11000611__	0.928	0.972	2	45	35	8,000	5.242	2	32'	Diet lanes under tracks to 10'-11' and put in 5' bike lanes	No Parking	232	None
11000611__	0.972	1.700	2	45	35	8,000	5.242	2	32'-34'	Diet lanes around curve to 11' and put in 5' bike lanes	No Parking	3,844	None
11000611__	1.700	1.800	3	45	45	9,500	7.965	4	50'-54'	Diet intersection lanes to 11' and put in 6' bike lanes with 3' buffers	No Parking	528	None
11000611__	1.800	1.980	4	45	45	9,500	13.843	8	70'-90'	70'-90' CW, diet lanes to 11' and put in seperated 6' bike lanes with 3' buffer	No Parking	950	None
11000611__	1.980	2.403	4	45	45	10,000	13.843	8	70'-90'	I-95 section...a seperated bike facility safest here	No Parking	2,233	None
11000611__	2.403	3.045	3	45	45	12,000	7.965	4	34'-40'	40' CW (3-lane) NB go off road or buffer lanes; 34' CW (2-lane) SB to have buffered lanes	No Parking	3,390	None
11000611__	3.045	3.400	2	45	40	12,000	5.242	2	25'-28'	28' CW NB & SB, diet lanes to 11' and put in 5' bike lanes. (NB Woolsey Brook CW only 25')	No Parking	1,874	None
11000611__	3.400	3.550	3	45	40	12,000	7.965	4	28'-40'	40' CW NB road diet to 11' lanes and stripe 5' lane with 2' buffer; 28' CW SB lane with 5' bike lanes	No Parking	792	None
											Totals	**18,744**	
Marshalls Corner-Woodsville Road													
11000612__	0.000	0.130	2	35	30	308	85	50	24'-30'	Widen out to 32' to accomedate 5' bike lanes	No Parking	686	None
11000612__	0.130	2.450	2	35	35	1,300	85	50	24'-28'	Widen to 32' to accommodate 5' bike lanes	No Parking	12,250	None
											Totals	**12,936**	
Spruce Street													
11000613__	0.000	0.036	3	40	35	10,000	10.14	2	50'	50' CW through intersection, need full intersection improvement with Princeton Ave	No Parking	190	None
11000613__	0.036	0.500	3	40	35	10,000	10.14	2	50'	Do a full 4-3 road diet to Artic Parkway (CR 639), 3-12' lanes, 5' bike lanes and 2' buffers	No Parking	2,450	None
11000613__	0.500	0.546	3	40	35	10,000	6.14	2	40'	Diet lanes to 12' with 6' bike lanes and 2' buffers	No Parking	243	None
11000613__	0.546	0.792	3	40	35	10,000	6.14	2	36'-37'	36'-37' CW from bridge to Romeco, 11' lanes with 5' bike lanes and 2'-3' buffers (Eliminate detour left turn lane from 2016 bridge project)	No Parking	1,299	None
11000613__	0.792	0.851	3	40	35	10,000	6.14	2	42'	Diet lanes to 12' with 6' bike lanes and 3' buffers	No Parking	312	None
11000613__	0.851	1.005	3	40	35	9,700	7.36	2	42'	Diet lanes to 11' and put in one 7' NB parking lane with 5' bike lanes and 1.5' buffers	One Parking Lane	813	None
11000613__	1.005	1.173	3	40	35	9,700	7.36	2	44'	Diet lanes to 11' and put in one 8' NB parking lane with 5' bike lanes and 2' buffers	One Parking Lane	887	None
11000613__	1.173	1.280	3	40	35	9,700	6.14	2	24'	24' CW on interior lanes and 20' CW on auxiliary lanes allows for 6' bike lanes with 3' buffers	No Parking	565	None
											Totals	**6,758**	
Nottingham Way													
11000614__	0.000	0.030	2	30	30	13,500	5.242	2	32'-35'	35' CW at bridge narrows to 32'; Diet lanes to 11' and put in 5' lanes	No Parking	158	None
11000614__	0.030	0.146	2	30	30	12,000	5.242	2	30'-32'	Diet lanes to 11' and put in 4'-5' lanes	No Parking	612	None
11000614__	0.146	0.252	5	25	25	12,000	80	20	22'-25	Widen and convert existing sidewalk to multi-use path and get bikes off road	No Parking	560	None
11000614__	0.252	0.398	5	25	25	12,000	80	20	34'-35'	Widen and convert existing sidewalk to multi-use path (WB) and get bikes off road. ON EB side put 7' parking lane with 10' lanes and 5' bike lane with 1.5'-2'	One Parking Lane	771	None
11000614__	0.398	0.729	2	25	25	12,000	5.242	2	30'-32'	Diet lanes to 11' and put in 5' lanes	No Parking	1,748	Bus Route
11000614__	0.729	0.850	3	25	25	12,000	6.14	2	34'-50'	Diet lanes to 10.5'-11' and put in 5' lanes with 1.5'-2' buffers	No Parking	639	Bus Route
11000614__	0.850	0.970	5	25	25	8,500	80	20	42'-45'	Go off road with complicated geometry here and connection to high volume/speed Route 33	No Parking	634	Bus Route
											Totals	**5,122**	

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
Cranbury Road													
11000615__	0.000	0.062	1	25	25	8,000	4.057	2	42'	Sharrow...cartway too small and little to no options for widening	No Parking	327	None
11000615__	0.062	0.412	1	25	25	8,000	4.057	2	21'-23'	Sharrow...cartway too small and little to no options for widening	No Parking	1,848	None
11000615__	0.412	0.449	1	25	25	8,000	4.057	2	26'	Sharrow...cartway too small and little to no options for widening	No Parking	195	None
11000615__	0.449	0.760	1	25	25	8,000	4.057	2	25'-30'	Sharrow...cartway too small and little to no options for widening	No Parking	1,642	None
11000615__	0.76	0.823	1	25	25	5,000	4.057	2	24'	Sharrow this road segment	No Parking	333	None
11000615__	0.823	1.078	2	25	25	5,000	5.242	2	34'	Diet 2 travel lanes to 11' and stripe 6' bicycle lanes in both directions	No Parking	1,346	None
11000615__	1.078	1.197	1	30	25	5,000	4.057	2	24'	Sharrow	No Parking	628	None
11000615__	1.197	1.339	2	30	30	5,000	5.242	2	32-36'	Stripe 5' bicycle lanes in both directions	No Parking	750	None
11000615__	1.339	1.647	2	40	30	7,000	85	50	22'	Widen road to 32' for 11' lanes and 5' bike lanes (preferably to 36' for 2' buffers as well, drop speed to 30	No Parking	1,626	None
11000615__	1.647	1.850	3	40	35	7,000	55	50	32'	Widen road by 5' and Stripe buffered lanes in both directions	No Parking	1,072	None
											Totals	**9,768**	
Whitehead Road / Whitehead Road Extension													
11000616__	0.000	0.056	5	35	35	7,500	80	50	25'-29'	This intersection is tight and tough, may need full geometric improvements or better to convert existing sidewalk to multi-use path	No Parking	296	None
11000616__	0.056	0.265	5	35	35	7,500	80	50	28'-31'	28'-31' CW across bridge and roadway segment, with amount of truck traffic best to convert sidewalk to multi-use path here.	No Parking	1,104	None
11000616__	0.265	0.545	5	35	35	7,500	80	50	25'-30'	Need to widen or go off road. Off road safer and can convert sidewalk to multi-use path. Truck traffic very high to be on road.	No Parking	1,478	None
11000616__	0.545	0.750	3	35	35	8,800	7.965	4	40'	Diet lanes to 12' with 5' bike lanes and 3' rumble buffers	No Parking	1,082	None
11000616__	0.750	0.833	3	35	35	8,800	85	20	32'	32' CW too small for amount of truck traffic and no buffer. Widen to 40' for 12' lanes, 5' bike lanes and 3' buffers	No Parking	438	None
11000616__	0.833	1.000	5	35	35	26,500	110	60	50'-52'	With amount of traffic, accidents, sight angles, and more concerns, need to go off road here	No Parking	882	None
11000616__	1.000	1.295	3	35	35	14,000	10.14	2	50'	Road diet from 4 to 3 12' lanes, 5' bike lanes and 2' buffers	No Parking	1,558	None
11000616__	1.295	1.350	5	35	35	17,000	110	50	22'-28'	With FHWA/ other design guidelines, bike lanes cannot be inside a roundabout. Must go off road.	No Parking	290	None
											Totals	**7,128**	
Nottingham Way													
11000618__	0.000	0.057	3	40	35	11,700	6.14	2	44'-47'	44'-47' CW at Intersection, diet lanes to 12' and put in 5' bike lanes with buffers	No Parking	301	Bus Route
11000618__	0.057	0.858	3	40	35	11,700	6.14	2	39'	Diet lanes to 12' and put in 5' bike lanes and 2' buffers	No Parking	4,229	Bus Route
11000618__	0.858	0.918	3	40	35	11,500	6.14	2	35'-37'	Diet lanes to 11'-12' and put in 5' bike lanes and 1.5' buffers	No Parking	317	Bus Route
11000618__	0.918	1.154	3	40	35	11,500	6.14	2	36'	Diet lanes to 11' and put in 5' bike lanes and 2' buffers	No Parking	1,246	Bus Route
11000618__	1.154	1.297	2	40	35	11,500	3.2	2	32'-33'	Diet lanes to 11.5'-12' and put in 4.5' bike lanes	No Parking	755	Bus Route
11000618__	1.297	1.426	2	30	30	11,000	3.2	2	28'-29'	Diet lanes to 11.5' and sharrow WB lanes (slower traffic out of intersection), 5' bike lane EB (high speed traffic coming into town)	No Parking	681	Bus Route
11000618__	1.426	1.493	1	30	25	12,000	4.057	2	30'-32'	Sharrow through this segment after reducing speed to 25	No Parking	354	Bus Route
11000618__	1.493	1.620	2	30	30	12,000	3.2	2	27'-32'	Diet lanes to 11.5' and sharrow EB lanes (slower traffic out of intersection), 5' bike lane WB (high speed traffic coming into town)	No Parking	671	Bus Route
11000618__	1.620	2.787	3	40	35	12,000	6.14	2	38'-40'	Diet lanes to 12' travel lanes with 5'-6' bike lanes and 2' buffers	No Parking	6,162	Bus Route
											Totals	**14,715**	
Kuser Road													
11000619__	0.000	0.095	2	35	35	11,500	5.242	2	20'-27'	27' CW thru lanes and 20' at aux lanes then 62' with 4 lanes...diet lanes to 11' and put in 5' bike lanes. Put in buffers where 4 lanes and transition EB/WB lanes with aux lanes	No Parking	502	None
11000619__	0.095	0.185	3	35	35	11,500	6.14	2	40'-50'	Transition to smaller CW, diet lanes to 12' and put in 6' bike lanes with 2'-4' buffers	No Parking	475	None
11000619__	0.185	0.445	2	35	35	11,500	5.242	2	30'-32'	Diet lanes to 10-11' and put in 5' bike lanes	No Parking	1,373	None
11000619__	0.445	0.570	2	35	35	11,500	5.242	2	40'	Diet 3 intersection lanes to 10.5' and mark 4.25' bike lanes	No Parking	660	None
11000619__	0.570	0.760	3	35	35	11,500	6.14	2	40'	Diet lanes to 11' and put in 6' bike lanes and 3' buffers	No Parking	1,003	None
11000619__	0.760	0.810	3	40	35	11,500	6.14	2	42'-48'	Diet 3 intersection lanes to 11' and mark 5' bike lanes with 1.5'-3' buffers	No Parking	264	None
11000619__	0.810	1.070	3	40	35	11,500	6.14	2	45'-48'	Diet lanes to 12' and put in 6' bike lanes and 3' buffers	No Parking	1,373	None
11000619__	1.070	1.263	3	40	35	11,500	6.14	2	38'-40'	Diet lanes to 11' and put in 5'-6' bike lanes and 3' buffers	No Parking	1,019	None
11000619__	1.263	1.456	3	40	35	11,500	6.14	2	48'	Diet lanes to 12' and put in 6' bike lanes and 3' buffers	No Parking	1,019	None
11000619__	1.456	1.695	2	35	35	11,500	5.242	2	30'	Diet lanes to 10' and put in 5' bike lanes	No Parking	1,262	None
11000619__	1.695	1.750	2	35	35	11,500	5.242	2	32'	Diet intersection lanes to 11' and put in 5' bike lanes	No Parking	290	None
											Totals	**9,240**	
Arena Drive													
00000524__X	0.000	0.124	5	40	40	7,300	80	50	26'	NB Beneath 195: Turn existing sidewalk on north side of Broad/ east side of Arena into multi-use path	No Parking	655	Bus Route
00000524__X	0.124	0.140	5	40	40	7,300	80	50	55'	Construct sidepath in sidewalk network gap on north side of road	No Parking	84	Bus Route
11000620__	0.000	0.185	5	40	40	7,300	80	50	26'	Turn existing sidewalks into multi-use paths in both directions	No Parking	977	Bus Route
11000620__	0.185	1.152	3	40	40	10,200	10.14	2	42'	Road diet with buffered lanes. Remove center median from .750-.813 and from 1.065 to 1.138	No Parking	5,106	Bus Route
11000620__	1.152	1.684	5	40	40	3,500	80	50	50-75	Turn sidewalks into sidepaths between Woodside Avenue and Reeves Avenue	No Parking	2,809	Bus Route
11000620__	1.684	2.082	3	40	40	8,800	10.14	2	54'	Road diet with buffered lanes. Southbound intersection at Central Ave (1.903) will need to be redesigned)	No Parking	2,101	Bus Route
11000620__	2.082	2.119	2	40	40	8,800	5.242	2	28'	Diet lanes to 10'-11' with 5' bike lane at intersection and bike box at intersection. Stripe dashed across RHT Channelized lane	No Parking	195	Bus Route
11000620__Y	0.000	0.076	3	35	30	8,800	5.242	2	20'	Put in buffered bike lane next to travel lane	No Parking	401	Bus Route
												12,329	
Olden Avenue													
11000622__	0.000	0.040	3	35	30	10,000	85	50	37'	With 3 lanes, not enough space for bike lanes. Widen out to 47' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	211	None
11000622__	0.040	0.563	3	35	30	10,000	6.14	2	37'	Diet lanes to 11' and put in 5'-6' bike lanes with 2' buffers	No Parking	2,761	None
11000622__	0.563	0.685	3	35	35	10,000	6.14	2	40'-44'	40'-44' CW at I-296 on ramp, diet lanes to 11'-12' and put in 4'-5' bike lanes with 1.5'-2' buffers	No Parking	644	None
11000622__	0.685	0.750	3	35	35	10,000	6.14	2	37'	Diet lanes to 11' and put in 5'-6' bike lanes with 2' buffers	No Parking	343	None
11000622__	0.750	1.016	3	35	35	10,000	13.843	8	44'-46'	Consider protected bike lanes though this intersection due to traffic/ turning movements?	No Parking	1,404	None
11000622__	1.016	1.122	3	35	30	12,500	6.14	2	50'-35'	50' CW down to 35' CW, diet to 11' lanes, 5' bike lanes and 1.5' buffers	No Parking	560	None
11000622__	1.122	1.600	3	35	30	12,500	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	2,524	None
11000622__	1.600	1.641	3	35	30	12,500	85	50	35'	35' CW to intersection, widen to 47' to accommodate 3 11' lanes and 2 5' bike lanes with 2' buffers	No Parking	216	None
11000622__	1.641	1.969	3	30	30	13,500	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	1,732	None
11000622__	1.969	2.022	3	30	30	13,500	7.36	2	41'	Diet lanes to 11' and put in 7' NB parking lane with 4.5' bike lanes and 1.5' buffers	One Parking Lane	280	None
11000622__	2.022	2.267	3	25	25	14,000	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	1,294	None
11000622__	2.267	2.310	3	25	25	14,000	6.14	2	40'	Diet intersection lanes to 12' and put in 6' bike lanes with 2' buffers	No Parking	227	None
11000622__	2.310	2.342	3	25	25	14,000	6.14	2	38'-40'	Diet intersection lanes to 12' and put in 5' bike lanes with 2' buffers	No Parking	169	None
11000622__	2.342	2.654	3	25	25	15,000	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	1,647	None
11000622__	2.654	2.726	3	25	25	15,000	6.14	2	40'	Diet intersection lanes to 12' and put in 6' bike lanes with 2' buffers	No Parking	380	None
11000622__	2.726	2.883	3	25	25	15,500	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	829	None
11000622__	2.883	2.951	3	25	25	15,500	6.14	2	40'	Diet intersection lanes to 12' lanes and put in 6' bike lanes with 2' buffers	No Parking	359	None
11000622__	2.951	3.054	3	25	25	16,000	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	544	None
11000622__	3.054	3.085	3	25	25	16,000	6.14	2	31'	31' CW across bridge, diet to 12' lanes with NB bike lane to go off road, SB to have 5' lane with 2' buffer (LONG TERM REPLACE BRIDGE)	No Parking	164	None
11000622__	3.085	3.312	3	25	25	16,000	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	1,199	None
11000622__	3.312	3.400	3	25	25	16,000	6.14	2	40'	Diet intersection lanes to 12' lanes and put in 6' bike lanes with 2' buffers	No Parking	465	None
11000622__	3.400	3.540	3	25	25	19,000	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	739	None
11000622__	3.540	3.670	3	25	25	19,000	6.14	2	40'	40' CW across bridge, diet lanes to 12' lanes and put in 6' bike lanes with 2' buffers	No Parking	686	None
11000622__	3.670	3.781	5	25	25	22,000	1000	8	40'-55'	Variable CW through this segment, Need total geometric intersection improvements at New York Ave/ Olden/ Route 1 on-ramp. NEED MAJOR BIKE/ PED IMPROVEMENTS	No Parking	586	None
11000622__	3.781	3.923	3	25	25	23,800	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	750	None
11000622__	3.923	4.008	3	25	25	23,800	55	50	40'	40' CW approaching Route 206, NEED TO WIDEN SLIGHTLY ON CHURCH/ BANK SIDE. Widen to 48' for 12' lanes, 4' BL and 2' bike buffers	No Parking	449	None
11000622__	4.008	4.080	3	25	25	22,000	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	380	None
11000622__	4.080	4.180	5	35	35	28,300	1000	50	40'-65'	40'-65' CW, Intersection needs full study and geometric redesign along with vehicular/ truck/ pedestrian circulation improvements	No Parking	528	None
11000622__	4.180	6.330	5	35	35	38,000	110	50	60'-65'	60'-65' CW, Need to go off road with the amount of vehicles and speeds (AADT almost nearly 40k!!)	No Parking	11,352	None
											Totals	**33,422**	
Pennington-Harbourton Road													
11000623__	0.000	1.287	3	45	35	2,600	160	50	22'-25'	Need to widen roadway to 36' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	6,795	None
11000623__	1.287	2.870	3	45	35	2,700	160	50	24'-27'	Need to widen roadway to 36' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	8,358	None
											Totals	**15,154**	

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
Pennington-Rocky Hill Road / Delaware Ave													
11000624__	0.000	0.637	2	25	25	8,000	5.242	2	30'	Diet lanes to 10' and put in 5' bike lanes; At King George Street, cross to LHT access	No Parking	3,363	None
11000624__	0.637	1.980	5	25	25	6,500	0	0	N/A	Jump to existing LHT Multi-Use Path	No Parking	7,091	None
11081029__	0.000	0.640	1	25	25	9,000	4.057	2	30'-34'	Sharrow this low speed segment. Too little CW for anything else. Extra care at intersection with 31.	No Parking	3,379	None
											Totals	**13,834**	
Elm Ridge Road													
11000625__	0.000	0.060	2	50	45	4,500	85	2	41'	Widen out to 47' and diet 3 intersection lanes to 11' and put in 5' bike lanes with 2' buffers	No Parking	317	None
11000625__	0.060	0.158	3	50	45	4,500	55	50	26'-38'	38' CW transitions down to 26', need to widen to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	517	None
11000625__	0.158	0.836	3	50	45	4,500	85	50	24'-27'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers	No Parking	3,580	None
11000625__	0.836	0.959	3	50	45	4,500	6.14	2	38'	Diet lanes to 11' and put in 6' bike lanes with 2' buffers	No Parking	649	None
11000625__	0.959	2.210	3	50	45	4,500	85	50	24'-28'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' buffers (30' CW across bridge? This would allow for 4' bike lanes and no buffers)	No Parking	6,605	None
											Totals	**11,669**	
Chambers Street													
11000626__	0.000	0.116	3	25	25	12,000	6.14	2	38'-40'	Design new bridge to have minimum 36' CW for 11' lanes and 5' bike lanes with 2' buffer	No Parking	612	None
11000626__	0.116	0.147	2	25	25	12,000	160	2	35'	Widen out intersection to 43' to allow for 11' lanes and 5' bike lanes	No Parking	164	None
11000626__	0.147	0.273	2	25	25	12,800	5.242	2	30'-32'	Eliminate left turn lane, diet lanes to 11' and put in 4'-5' bike lanes	No Parking	665	None
11000626__	0.273	0.330	3	25	25	12,800	6.14	2	35'	Diet lanes to 11' and put in 5' bike lanes with 1.5' buffer	No Parking	301	None
11000626__	0.330	0.370	3	25	25	12,800	6.14	2	35'-46'	Combine right turn lane and thru lane into one and diet 3 intersection lanes to 11' and put in 5' bike lanes with 1.5' buffers	No Parking	211	None
11000626__	0.370	0.402	3	25	25	15,500	6.14	2	50'	Combine right turn lane and thru lane into one and diet 3 intersection lanes to 12' and put in 5' bike lanes with 2' buffer	No Parking	169	Bus Route
11000626__	0.402	0.569	3	25	25	15,500	7.686	2	50'	Diet lanes to 11.5' and put in 2 7' parking lanes with 5' bike lanes and 1.5' buffers	Two Parking Lanes	882	Bus Route
11000626__	0.569	0.592	3	25	25	15,500	6.14	2	50'-55'	Diet 3 intersection lanes to 12' and put in 5' bike lanes with 2'-3' buffers	No Parking	121	Bus Route
11000626__	0.592	0.627	2	25	25	13,500	5.242	2	40'-42'	Diet lanes to 11' and put in 5' bike lanes	No Parking	185	Bus Route
11000626__	0.627	0.731	3	25	25	12,000	7.36	2	40'-42'	Diet lanes to 11' and put in 7.5' SB parking lane with 5' bike lanes and 1.5' buffer next to parking lane	One Parking Lane	549	Bus Route
11000626__	0.731	1.009	2	25	25	12,000	5.242	2	34'	Diet lanes to 12' and put in 5' bike lanes	No Parking	1,468	Bus Route
11000626__	1.009	1.128	2	25	25	10,000	5.242	2	36'	Combine right turn lane and thru lanes, diet intersection lanes to 11.5' and put in 5' bike lanes with 1.5' buffers	No Parking	628	Bus Route
11000626__	1.128	1.194	3	25	25	9,000	6.14	2	40'	Combine right turn lane and thru lanes, diet intersection lanes to 12' and put in 6' bike lanes with 2' buffers	No Parking	348	Bus Route
11000626__	1.194	2.056	2	25	25	8,000	5.242	2	34'-36'	Diet lanes to 12' and put in 5'-6' bike lanes	No Parking	4,551	Bus Route
											Totals	**10,856**	
Prospect Street													
11000627__	0.000	0.640	3	25	30	12,000	6.14	2	37'-38'	Diet lanes to 12' and put in 4.5'-5' bike lanes with 2' buffers	No Parking	3,379	Bus Route
11000627__	0.640	0.720	2	25	30	12,000	5.242	2	44'-47'	Diet NB lanes to 11', combine 2 SB lanes to one 12' lane and put in 5' bike lanes with buffer if possible	No Parking	422	Bus Route
11000627__	0.720	0.970	3	25	25	4,500	6.14	2	37'-38'	Diet lanes to 11' lanes and put in 5'-6' bike lanes with 2' buffers. Make left lane turn only lane.	No Parking	1,320	None
11000627__	0.870	1.004	3	25	25	4,500	6.14	2	37'-38'	Diet lanes to 11' lanes and put in 5'-6' bike lanes with 2' buffers	No Parking	708	None
11000627__	1.004	1.250	3	25	25	4,500	6.14	2	37'-38'	Diet lanes to 11' lanes and put in 5'-6' bike lanes with 2' buffers	No Parking	1,299	None
											Totals	**7,128**	
Harrison Street													
11000629__	0.000	0.672	1	25	25	12,800	4.057	2	30'	Sharrow already exist in town segment, make this entire segment to canal a sharrow	No Parking	3,548	None
11000629__	0.672	0.984	3	25	25	12,000	160	4	22'	Widen to 36' for 11' lanes and 5' bike lanes with 2' rumble buffers	No Parking	1,647	None
11000629__	0.984	1.120	5	35	30	11,000	110	50	38'-42'	New multi-use path to connect to path across Route 1	No Parking	718	None
											Totals	**5,914**	
Windsor-Perrineville Road / Imlaystown Road													
11000630__	0.000	0.678	3	40	35	3,200	85	20	22'-25'	Widen to 36' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	3,580	None
11000630__	0.678	1.100	3	40	25	3,200	85	20	22'	Widen to 36' for 11' lanes and 5' bike lanes with 2' buffers	No Parking	2,228	None
											Totals	**5,808**	
Ingleside Ave													
11000631__	0.000	0.485	1	25	25	1,500	5.242	2	28'-30'	Sharrow this low volume and low speed segment	No Parking	2,561	None
11000631__	0.485	0.520	2	25	25	1,500	5.242	2	30'	Stripe across Route 31, install bike/ped crossing and upgrade signal, HAWK signal?	No Parking	185	None
11000631__	0.520	0.770	1	25	25	1,500	4.057	2	26'-30'	Sharrow this low volume and low speed segment	No Parking	1,320	None
											Totals	**4,066**	
Lawrenceville-Pennington Road Blackwell Road													
11000632__	0.000	0.626	2	30	30	3,500	5.242	2	31'-34'	Diet lanes to 11' and put in 5' bike lanes	No Parking	3,305	None
11000632__	0.626	0.690	2	40	35	2,500	5.242	20	32'-50'	Diet 3 intersection lanes to 11' and put regular 5' bike lanes. Need to break up center median to readjust	No Parking	338	None
11000632__	0.690	0.800	2	40	35	2,500	55	20	27'-30'	Widen out to 32' for 11' travel lanes and 5' bike lanes	No Parking	581	None
11000632__	0.800	0.885	2	40	35	2,500	85	20	21'-26'	Widen out to 32' for 11' travel lanes and 5' bike lanes	No Parking	449	None
11000632__	0.885	0.900	2	40	35	2,500	55	20	25'-30'	Widen out to 32' for 11' travel lanes and 5' bike lanes	No Parking	79	None
11000632__	0.900	1.000	2	40	35	2,500	55	20	26'-30	Widen out to 32' for 11' travel lanes and 5' bike lanes		528	None
											Totals	**5,280**	
Monmouth Street													
11000633__	0.000	1.000	2	25	25	3,500	4.057	2	28'-30'	Sharrow this low volume and low speed section	No Parking	5,280	None
											Totals	**5,280**	
Parkway Ave / West Upper Ferry Road													
11000634__	0.000	0.200	2	40	35	4,000	55	20	25'-26'	Widen out to 34' for 12' travel lanes and 5' bike lanes	No Parking	1,056	Bus Route
11000634__	0.200	0.358	2	40	35	4,000	85	20	30'-32'	Widen out to 34' for 12' travel lanes and 5' bike lanes	No Parking	834	Bus Route
11000634__	0.358	1.08	2	40	35	5,000	55	20	24'-28'	Widen out to 34' for 12' travel lanes and 5' bike lanes	No Parking	3,812	Bus Route
11000634__	1.08	1.138	3	35	30	6,000	6.14	2	38'	Diet to 12' travel lanes with 5' bike lanes and 2' buffers	No Parking	306	Bus Route
11000634__	1.138	1.206	3	35	30	6,000	1000		34'-48'	Intersection improvements needed here for buffered lanes (West Trenton Bypass Improvements)	No Parking	359	Bus Route
11000634__	1.206	1.319	2	35	30	13,000	5.242	2	34'-35'	Diet lanes to 12' and put in 5' bike lanes. Buffered lanes long term if West Trenton Bypass comes in.	No Parking	597	Bus Route
11000634__	1.319	1.400	2	35	30	13,000	55	20	31'-32'	11' travel lanes temporary but widen out to 34' with hot pave for 12' travel lanes and 5' bike lanes	No Parking	428	Bus Route
11000634__	1.400	1.500	3	35	35	13,000	6.14	2	48'-60'	Diet lanes to 12' and put in 5' bike lanes. Buffered lanes long term if West Trenton Bypass comes in.	No Parking	528	Bus Route
11000634__	1.500	2.054	3	40	35	13,000	6.14	2	54'-57'	Paint 5' bike lanes in existing shoulders with 2' buffers, restripe where need to move edgeline	No Parking	2,925	Bus Route
11000634__	2.054	2.146	3	40	35	13,000	10.14	2	54'-55'	Road diet to 3 lanes with buffered lanes or 4 10' lanes with 5' bike lanes	No Parking	486	Bus Route
11000634__	2.146	2.232	3	40	35	14,500	1000		50'-120'	Need massive improvements at Scotch and Parkway	No Parking	454	Bus Route
11000634__	2.232	2.663	3	40	35	16,000	10.14	2	50'	Diet 4 lanes to 3 12' lanes with 5' bike lanes and 2' buffers	No Parking	2,276	Bus Route
11000634__	2.663	3.176	3	40	35	18,000	10.14	2	50'	Diet 4 lanes to 3 12' lanes with 5' bike lanes and 2' buffers	No Parking	2,709	Bus Route
11000634__	3.176	3.290	4	40	35	20,000	1000		60'-70'	Massive Intersection improvements at Olden and Parkway needed	No Parking	602	Bus Route
11000634__	3.290	4.050	3	40	35	12,000	10.14	2	45'-48'	Diet 4 lanes to 3 11.5' lanes with 5' bike lanes and 2' buffers	No Parking	4,013	Bus Route
11000634__	4.050	4.106	3	40	35	12,000	6.14	2	55'-60'	Diet 4 intersection lanes to 11' and put in 5' bike lanes with 2' buffers (RTL currently 18' and inbound 14')	No Parking	296	Bus Route
11000634__	4.106	4.180	2	35	30	7,500	5.242	2	45'	Diet 3 intersection lanes to 11' and put in five foot bicycle lanes with 1.5' buffers	No Parking	391	None
11000634__	4.180	4.350	2	35	30	7,500	5.242	2	30'	Stripe four foot bicycle lanes in both directions, expand to 5' at intersection wb' at Pennington Intesection.	No Parking	898	None
11000634__	4.350	4.749	2	35	30	5,500	7.686	2	48'	Diet lanes to 10.5' and put in 5' bike lanes with two 7' parking lanes and 1.5' buffers.	No Parking	2,107	None
11000634__	4.749	4.923	3	30	30	7,000	6.14	2	40'-42'	Diet lanes to 12' and put in 6' bike lanes with 2' buffers	No Parking	919	None
												25,993	
East State Street													
11000635__	0.000	0.118	3	25	25	6,000	6.14	2	38'	Diet lanes to 12' with 5' bike lanes and put in 2' buffers	No Parking	623	Bus Route
11000635__	0.118	0.195	3	25	25	6,000	1000		46'-50'	Need massive intersection improvements here	No Parking	407	Bus Route
11000635__	0.195	0.318	3	25	25	7,000	6.14	2	42'-60'	Here to Monmouth will be reconstructed with new bridge? Widen out to minimum of 38' for 2 12' lanes with 5' bike lanes and 2' buffers.	No Parking	649	Bus Route
11000635__	0.318	0.943	3	25	25	8,000	6.14	2	38'-39'	Diet lanes to 12' with 5' bike lanes and 2' buffers	No Parking	3,300	Bus Route
11000635__	0.943	1.130	3	25	25	8,000	6.14	2	40'	Diet lanes to 12' with 5' bike lanes and 2' buffers	No Parking	987	Bus Route
											Totals	**5,966**	
Parkside Ave/ Ewingville Road/ Upper Ferry Road													
11000636__	0.000	0.170	3	25	25	9,500	6.14	2	24'	24' CW North, road diet to one 12' lane with 3' painted buffer and 6' bike lane	No Parking	898	None
11000636_S	5.665	5.702	3	30	30	9,000	6.14	2	30'	30' CW South, diet to two lanes with 2' painted buffer and 6' bike lanes	No Parking	195	None

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
11000636_S	5.540	5.665	3	30	30	9,000	6.14	2	24'	24' CW South, road diet to one 12' lane with 3' painted buffer and 6' bike lane	No Parking	660	None
11000636__	0.170	0.205	5	30	30	15,000	80	8	34'-60'	Ramp bikes off roadway and onto sidewalk for multi-use path. Convert sidewalk to multi-use path	No Parking	185	None
11000636__	0.205	0.274	5	30	30	17,000	80	50	40'	Diet lanes to 11' and put in 5' bike lanes with 3' painted buffer...best to continue off road to intersection. Convert sidewalk to multi-use path.	No Parking	364	None
11000636__	0.274	0.464	5	30	30	17,000	80	50	40'	40' CW thru most of intersection...diet to 10' won't work with high AADT. Cheapest option to convert sidewalk to multi-use path	No Parking	1,003	None
11000636__	0.464	0.495	2	30	30	17,000	5.242	2	40'	Diet lanes down to 10' and put in 5' bike lanes	No Parking	164	None
11000636__	0.495	0.671	2	30	30	17,000	7.36	2	40'	Remove EB parking and move CL, diet to 11' lanes with 7' WB parking lane and 4.5' bike lanes with 2' buffer	One Parking Lane	929	None
11000636__	0.671	0.749	3	30	30	17,000	6.14	2	36'	No Parking Area, diet to 11' lanes with 5' bike lanes and 2' painted buffers	No Parking	412	None
11000636__	0.749	0.890	2	25	25	17,000	7.36	2	40'	Remove EB parking and move CL, diet to 12' lanes with 7' parking lane and 4.5' bike lanes	One Parking Lane	744	Bus Route
11000636__	0.890	0.970	3	30	30	17,000	1000	50	37'-40'	37'-40' CW x3 lanes...need to widen, go off road or redesign intersection.	No Parking	422	Bus Route
11000636__	0.970	1.225	3	30	25	12,500	6.14	2	38'	Diet lanes to 12' and put in 5' bike lanes with 2' painted buffers	No Parking	1,346	None
11000636__	1.225	1.325	3	30	30	12,500	1000	50		Widen on Co ROW, modify Route 31/ CR 636 Intersection	No Parking	528	None
11000636__	1.325	1.507	2	35	30	10,500	10.14	2	43'	Diet 4 lane road segment to 2 11' lanes and 11' CTL, put in 5' bike lanes	No Parking	961	None
11000636__	1.507	1.570	2	35	30	10,500	10.14	2	43'	Eliminate EB L turn lane (T-L 7 R), move CL, diet lanes to 11' and put in 5' bike lanes	No Parking	333	None
11000636__	1.570	1.628	3	35	35	10,500	6.14	2	50'	Diet 3 lanes to 12' and put in 5' bike lanes and 2' buffers	No Parking	306	Bus Route
11000636__	1.628	2.009	3	35	35	10,500	6.14	2	46'-48'	Diet lanes to 11' and put in 12' CTR, 4'-5' bike lanes and 1.5' buffers	No Parking	2,012	Bus Route
11000636__	2.009	2.124	3	35	35	10,500	6.14	2	50'-60'	Diet 4 lanes to 12' and put in 4'-5' bike lanes and 2' buffers	No Parking	607	Bus Route
11000636__	2.124	2.358	3	35	35	10,500	6.14	2	42'-44'	Diet lanes to 12', Eliminate CTL, Put in 7' parking lane SB (except bus area), 4'-6' bike lanes and 2' buffers	One Parking Lane	1,236	Bus Route
11000636__	2.358	2.467	3	40	35	12,500	6.14	2	50'	Diet intersection lanes/ gore area to include a 5' bike lane with 2' buffers	No Parking	576	Bus Route
11000636__	2.467	3.130	3	40	35	12,500	6.14	2	44'	Diet lanes to 11' and put in 6' bike lanes with 2' buffers except where left turn into Sherbrooke. Eliminate lane?	No Parking	3,501	Bus Route
11000636__	3.130	3.200	3	40	35	12,500	6.14	2	50'	Diet 3 intersection lanes to 12' and paint 5' bike lane with 2' buffers	No Parking	370	Bus Route
11000636__	3.200	3.355	3	40	35	12,500	6.14	2	50'	Diet 3 intersection lanes to 12' and paint 5' bike lane with 2' buffers	No Parking	818	Bus Route
11000636__	3.355	3.425	3	40	35	12,500	6.14	2	50'	Diet travel and left turn lanes to 12', put in 5' bike lanes with 2' buffer	No Parking	370	Bus Route
11000636__	3.425	3.600	3	35	30	12,500	6.14	2	50'	Diet lanes to 12', put in 5' bike lanes with 2' buffer	No Parking	924	None
11000636__	3.600	3.700	3	35	30	12,500	6.14	2	57'	Diet travel lanes to 12' and right turn lane to 14', put in 6' bike lanes with 3' buffer	No Parking	528	None
11000636__	3.700	3.986	3	35	35	12,500	6.14	2	48'-50'	Diet lanes to 12', put in 4'-6' bike lanes with 2' buffer and only one 7' parking lane...alternate side?	One Parking Lane	1,510	None
11000636__	3.986	4.070	3	35	35	12,500	6.14	2	50'	Diet lanes down to 12' and put in 5' bike lanes with 2' buffer	No Parking	444	None
11000636__	4.070	4.350	3	35	35	12,500	55	50	30'-34'	Need to widen out to have a 38' CW to accommodate 2' buffers and 5' bike lanes with 12' lanes.	No Parking	1,478	None
11000636__	4.350	4.490	2	35	35	8,500	5.242	2	55'	Diet 4 intersection lanes (Route 31) to 11' and put in 5' bike lanes	No Parking	739	Bus Route
11000636__	4.490	5.650	3	35	35	8,500	6.14	2	40'	Diet lanes to 12' and put in 6' bike lanes and 2' buffers	No Parking	6,125	Bus Route
11000636__	5.650	5.710	3	35	35	8,500	6.14	2	42'-50'	Diet lanes down to 12' and put in 4'-6' bike lanes with 2'-3' buffer	No Parking	317	Bus Route
											Totals	**31,004**	
Jacobs Creek Road													
11000637__	0.000	1.400	2	35	30	1,600	55	20	24'	24' CW, Need to widen out to 32' for regular bike lane or put in multi-use path	No Parking	7,392	None
11000637__	1.251	2.590	2	35	30	1,200	85	20	20'	20' CW, Need to widen out to 32' for regular bike lane or put in multi-use path	No Parking	7,070	None
											Totals	**14,462**	
Clarksville Road / Grovers Mill Road													
11000638__	0.000	0.214	N/A	40	40	14,000	0	0	32'	Road to Route 1...no need for facilities here	No Parking	1,130	Bus Route
11000638__	0.214	0.360	3	40	35	14,000	7.965	4	40'-42'	Diet lanes to 12' and put in 6' bike lanes with 2' rumble buffers	No Parking	771	Bus Route
11000638__	0.360	0.648	3	40	35	14,000	7.965	4	46'-48'	Diet lanes to 12' and put in 6' bike lanes with 3'-4' rumble buffers	No Parking	1,521	Bus Route
11000638__	0.648	0.870	5	40	35	14,000	80	50	24'	Convert sidewalk to multi-use path all the way to Quakerbridge	No Parking	1,172	Bus Route
11000638__	0.870	1.770	5	45	45	15,000	110	60	28'-30'	Build multi-use path from Quaker Bridge Rd. to existing sidepath just west of Blue Jay Way	No Parking	4,752	Bus Route
11000638__	1.770	2.342	5	45	45	14,800	0	0	38-53	Use existing multi-use trail along south side of road from Blue Jay Way to Clarksville Grovers Mill Rd.	No Parking	3,020	Bus Route
11000638__	2.342	2.434	1	45	45	15,500	4.057	2	20'	Build new Cantileavered multiuse paths on each side of bridge minimum 8' each (near term, lower speeds and sharrow over bridge)	No Parking	486	Bus Route
11000638__	2.403	2.620	3	45	40	15,500	85	60	26'	Widen Road by 11-12 feet and stripe buffered bicycle lanes- this will require moving guardrail and possibly replacing a culvert at Duck pond Rd which is already in poor condition.	No Parking	1,146	Bus Route
11000638__	2.620	3.112	3	45	40	15,500	6.14	2	50+	Stripe buffered bicycle lanes in existing striped shoulders.	No Parking	2,598	Bus Route
11000638__	3.112	3.425	3	45	40	15,500	85	50	26'	Widen Road by 12 feet and use rumble buffers	No Parking	1,653	Bus Route
11000638__	3.425	3.493	4	45	40	15,500	6.14	8	50'	Stripe buffered bicycle lanes.	No Parking	359	Bus Route
11000638__	3.493	3.683	2	35	30	13,500	5.242	2	52- 34'	Stripe bicycle lanes in the shoulders-	No Parking	1,003	Bus Route
11000638__	3.683	3.738	2	35	30	13,500	55	20	29'	Widen road by 6' and stripe bicycle lanes	No Parking	290	None
11000638__	3.738	3.871	3	25	25	13,500	6.14	2	48'	Stripe buffered bicycle lanes in the shoulders	No Parking	702	None
11000638__	3.871	4.045	2	35	35	13,500	4.389	2	32'	Stripe 5' bicycle lanes in shoulders	No Parking	919	None
11000638__	4.045	4.105	1	35	30	13,500	4.057	2	48'	Narrow lanes at intersection to 11' each and stripe 4' bicycle lane going wb, mark eb with sharrows	No Parking	317	None
11000638__	4.105	4.316	5	35	30	15,500	80	20	50'	Convert existing sidewalk on south side of Clarksville into Multi-use path that connects to existing path at Ronald Rogers Arboretum (Princeton Hightstown Rd.)	No Parking	1,114	None
11000638__	4.316	4.814	2	35	30	6,200	85	20	28-30	Widen road by 6-8 feet and stripe bicycle lanes in both directions	No Parking	2,629	None
11000638__	4.814	4.891	2	35	30	6,200	4.389	2	42'+	Stripe 4 foot bicycle lanes.	No Parking	407	None
11000638__	4.891	4.950	2	35	30	6,200	85	50	26'	Widen road by 8 feet and Stripe bicycle lanes	No Parking	312	None
11000638__	4.950	5.022	2	35	30	6,200	4.389	2	33'-40'	Place bike legends in existing shoulders, might need to shift edge stripe on north side of road near Cranbury Rd.	No Parking	380	None
												26,680	
Arctic Parkway													
11000639__	0.000	0.050	3	35	35	7,800	6.14	2	21'-45'	21' NB Aux, 30' SB Aux, 45' Center lanes; diet all lanes and put in 4-6' Bike lanes with 2' buffers	No Parking	264	None
11000639__	0.050	0.286	3	35	35	7,800	10.14	4	50'	Full 4-3 road diet with Center Turn Lane, 3-12' lanes, 5' bike lanes and 2' buffers	No Parking	1,246	None
11000639__	0.286	0.330	3	35	35	7,800	6.14	2	16'-50'	50' regular CR with 16' aux lane. full 4-3 road diet with Center Turn Lane, 3-12' lanes, 5' bike lanes and 2' buffers; aux lane to go to 11' with 5' bike lane	No Parking	232	None
											Totals	**1,742**	
Main Street/ Pennington Road													
11000640__	0.065	0.367	2	35	30	6,900	5.242	2	32'-34'	Diet lanes down to 12' and put in 4'-5' bike lanes. (pave out to 34' minimum if possible with hot pave for 12')	No Parking	1,595	Bus Route
11000640__	0.367	0.416	2	35	30	6,900	5.242	2	40'	40' CW through intersection, diet travel lanes to 11' and left turn to 11', put in 4.5' bike lanes	No Parking	259	Bus Route
11000640__	0.416	0.528	3	35	30	10,000	6.14	2	36'-38'	Diet lanes down to 11'-12' and put in 4'-5' bike lanes with 1.5' buffer	No Parking	591	Bus Route
11000640__	0.528	0.946	3	25	25	10,000	6.14	2	40'-46'	Diet lanes down to 12' and put in 5' bike lanes with 2'-3' buffer	No Parking	2,207	Bus Route
11000640__	0.946	1.235	1	25	25	8,000	4.057	2	28'-32'	Sharrow this entire segment	No Parking	1,526	Bus Route
11000640__	1.135	1.446	1	25	25	7,000	4.057	2	38'	Sharrow this entire segment	No Parking	1,642	Bus Route
11000640__	1.446	1.864	1	25	25	4,000	4.057	2	30'-34'	Sharrow this entire segment	No Parking	2,207	None
11000640__	1.864	1.993	2	25	25	3,000	5.242	2	34'	Diet lanes to 11' and put in 5' bike lanes	No Parking	681	None
11000640__	1.993	2.225	1	25	25	3,000	4.057	2	28'-30'	Low volume and low speed once in town and can sharrow this entire segment	No Parking	1,225	None
											Totals	**11,933**	
Edinburg-Windsor Road / Chruch Street													
11000641__	0.000	0.025	3	40	35	5,000	5.242	2	18'-34'	34' main CW with 18' aux lane, diet lanes to 11' and put in 5' bike lanes	No Parking	132	None
11000641__	0.025	0.175	3	40	35	5,000	85	50	22'-24'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	792	None
11000641__	0.175	0.248	3	40	35	5,000	85	50	30'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	385	None
11000641__	0.248	1.641	3	50	40	3,800	85	50	23'-25'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	7,355	None
11000641__	1.641	2.060	3	40	35	3,800	85	50	24'-26'	Widen out to 36' for 11' lanes, 5' bike lanes and 2' rumble buffers	No Parking	2,212	None
11000641__	2.060	2.200	1	40	25	3,800	4.057	2	25'	Low volume once in town and can sharrow once speed is reduced. Incorporate traffic calming.	No Parking	739	None
11121039__	0.000	0.171	1	25	25	5,000	4.057	2	30'	Low volume and speeds make sharrows ok here.	No Parking	903	None
											Totals	**12,519**	
Lower Ferry Road													
11000643__	0.000	0.086	3	25	25	4,200	4.057	2	40'-48'	Buffered lanes. Need this connection to home and neighborhoods off River Road (not Route 29)	No Parking	454	None
11000643__	0.086	0.225	1	25	25	4,200	4.057	2	24'-25'	Sharrow. Need this connection to home and neighborhoods off River Road (not Route 29)	No Parking	734	None
11000643__	0.225	0.435	3	40	35	4,200	85	60	24'-26'	Widen road to 36'; diet lanes to 11' and put in 5' bike lanes with 2' buffer	No Parking	1,109	None
11000643__	0.435	0.550	3	40	35	4,200	55	20	40'	Widen road to 46'; diet 3 lanes to 11' and put in 5' bike lanes with 1.5' buffer	No Parking	607	None
11000643__	0.550	0.600	3	40	35	4,200	7.965	4	55'	Diet thru lanes to 11' with 10' right turn lane and 9'+/- gore area with 5' bike lanes with 1.5' buffers	No Parking	264	None
11000643__	0.600	0.745	3	40	35	4,200	5.242	2	45'-46'	Diet 3 lanes to 11' and put in 5' bike lanes with 1'-2' buffers	No Parking	766	None

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
11000643__	0.745	1.581	3	40	35	8,500	85	50	28'-30'	Need to widen to 38' for two 12' lanes, two 5' bike lanes, and 2' buffers	No Parking	4,414	Bus Route
11000643__	1.581	1.775	3	40	35	8,500	55	20	38'-54'	Widen to 50' and diet 3 lanes to 12' and put in 5' bike lanes with 2' buffers	No Parking	1,024	Bus Route
11000643__	1.775	1.864	3	40	35	16,000	1000	50	30'-56'	56' CW and 4 lanes on southern leg with 30' CW and 2 lanes on northern leg, Need full intersection improvement...highly dangerous intersection with multiple bike crashes and many vehicle crashes	No Parking	470	Bus Route
11000643__	1.864	3.028	2	35	30	7,500	5.242	2	28'-30'	Diet lanes to 10' and put in 4'-5' bike lanes	No Parking	6,146	None
11000643__	3.028	3.065	2	35	30	7,000	5.242	2	43'	Diet intersection lanes to 11' and put in 5' bike lanes	No Parking	195	Bus Route
11000643__	3.065	3.667	3	35	35	6,000	6.14	2	43'-45'	Diet lanes to 12' and put in 7' parking lane with 5' bike lane and 1.5' buffers	One Parking Lane	3,179	Bus Route
11000643__	3.667	3.971	2	35	35	3,500	5.242	2	42'-44'	Diet 3 lanes to 11' and put in 5' bike lanes	No Parking	1,605	Bus Route
11000643__	3.971	4.104	2	35	35	3,500	5.242	2	37'-40'	Convert existing shoulder striping to bike lane. Work with Lawrence/Hopewell to continue this the entire way	No Parking	702	Bus Route
											Totals	**21,669**	
Village Road East / Southfield Road													
11000644__	0.000	0.190	2	35	35	2,200	5.242	2	34'	Diet lanes to 11' and put in 6' bike lanes	No Parking	1,003	None
11000644__	0.190	0.228	2	35	35	2,200	55	20	28'-30'	Widen out to 32' for 11' lanes and 5' bike lanes	No Parking	201	None
11000644__	0.228	0.308	2	45	35	2,200	5.242	2	33'-50'	Diet 2 thru lanes and right turn lane to 11' and put in 5'-6' bike lanes	No Parking	422	None
11000644__	0.308	0.342	2	45	35	2,200	5.242	2	44'	Diet 2 thru lanes and acceleration lane to 11' and put in 5' bike lanes	No Parking	180	None
11000644__	0.342	0.526	2	45	35	2,200	55	20	30'	Widen out to 32' for 11' lanes and 5' bike lanes	No Parking	972	None
11000644__	0.526	0.750	2	45	35	2,200	5.242	2	34'	Diet lanes to 11' and put in 6' bike lanes	No Parking	1,183	None
11000644__	0.750	0.802	2	25	25	2,200	0	0	40'	Bike lanes already exist, repaint and freshen up	No Parking	275	None
											Totals	**4,235**	
Brunswick Circle Extension													
11000645__	0.000	0.210	5	25	25	15,000	80	50	40'-50'	New roundabout under design for Brunswick Circle Ext., best to expand sidewalk to multi-use path between 2 roundabouts	No Parking	1,109	None
											Totals	**1,109**	
Nursery Road													
11000647__	0.000	1.390	2	35	35	1,000	55	50	23'-28'	Widen out to 36' for 11' lanes and 5' bike lanes with 2' buffer	No Parking	7,339	None
11000647__	1.390	1.729	2	40	35	1,000	5.242	2	40'	Convert existing shoulder striping to bike lane, make buffered lane at next repaving, diet to 11' lanes at intersection	No Parking	1,790	None
											Totals	**9,129**	
Whitehead Road Extension													
11000648__	0.000	0.614	3	35	30	None	7.965	4	50'-55'	Diet lanes to 12' and put in 8' parking lanes, 4'-5' bike lanes and 2' rumble buffers	One Parking Lane	3,242	None
											Totals	**3,242**	
Sloan Ave/ Sweet Briar Ave/ Flock Road													
11000649__	0.000	0.055	5	40	35	18,000	110	60	42'-52'	42'-52' CW across intersection...side path on southern side might be safest and easiest..especially if connecting to CR 616	No Parking	290	None
11000649__	0.055	0.774	5	40	35	18,000	110	60	30'-32'	30'-32' CW up to culvert needs to be widened or side path. Between CW, speed, volumes, bridge and wetlands...safest thing would be to do side path?	No Parking	3,796	None
11000649__	0.774	1.176	5	40	35	20,500	110	60	50'-55'	50'-55' across NEC overpass. Multi-use path on WB side (northern side of roadway),	No Parking	2,123	None
11000649__	1.176	1.640	5	40	40	32,000	110	60	55'-80'	55'-80 near train station, I-295, AMC Movie Theatre, shopping plaza. Multi-use path on one or perhaps both sides necessary.	No Parking	2,450	None
11031986__	0.000	0.858	5	35	35	17,000	6.14	2	50'	Diet two lanes to 11' and put in 2 7' parking lanes with 5' bike lanes and 2' buffers	Two Parking Lanes	4,530	None
11031986__	0.858	0.996	5	40	35	32,000	1000	60	60'-70'	Need massive improvements for Flock/Sloan and Quakerbridge intersection to be safe for bikes and peds. With volumes and speeds, this will be very hard.	No Parking	729	None
11031986__	0.996	1.590	5	40	35	32,000	110	60	55'-58'	Cannot do road diet as volumes are too high. Between that, CW, speeds the only option is to have off-road multi-use trail	No Parking	3,136	None
											Totals	**17,054**	
Lalor Street													
11000650__	0.000	0.189	3	25	25	10,000	6.14	2	38'-40'	Diet lanes to 12' and put in 5' bike lanes with 2' buffers	No Parking	998	Bus Route
11000650__	0.189	0.253	2	25	25	10,000	55	50	38'-40'	Remove one WB (inbound) lane and diet 3 remaining to 11'. Widen road by 5' on cemetary side to put in 5' bike lanes.	No Parking	338	Bus Route
11000650__	0.253	0.325	2	25	25	14,000	5.242	2	42'-43'	Remove one EB lane and turn one WB into right turn only; diet to 11' with 5' bike lanes	No Parking	380	Bus Route
11000650__	0.325	0.405	2	25	25	14,000	5.242	2	42'-43'	Diet 3 lanes to 11' and put in 5' bike lanes	No Parking	422	Bus Route
11000650__	0.405	1.178	2	25	25	14,000	5.242	2	28'-30'	Diet lanes to 11' and put in 4' bike lanes	No Parking	4,081	Bus Route
											Totals	**6,220**	
Calhoun Street													
11000653__	0.000	0.040	2	30	25	12,500	5.242	2	35'-50''	Intersection/Interchange needs geometric island improvements as 33' CW SB is tight and NB lane is 16'.	No Parking	211	Bus Route
11000653__	0.040	0.100	2	30	25	12,500	7.36	2	42'	42' CW from D&R past Hanover, diet to 11.5' lanes with 5' bike lanes and one 7' parking lane with one 2' parking lane buffer	One Parking Lane	317	Bus Route
11000653__	0.100	0.123	2	30	25	12,500	5.242	2	42'-32'	Need to remove parking and work with transition to put in regular 5' bike lanes.	No Parking	121	Bus Route
11000653__	0.123	0.256	2	25	25	12,500	5.242	2	32'	Diet lanes to 11' and put in 5' bike lanes.	No Parking	702	Bus Route
11000653__	0.256	0.288	2	25	25	12,500	7.36	2	42'	Diet lanes to 11.5' lanes with one NB 7.5' parking lane and one 1.5' parking lane buffer, 5' bike lanes	One Parking Lane	169	Bus Route
11000653__	0.288	0.308	2	25	25	12,500	55	50	34'-36'	Widen through this section for continuous path, only one property affected. Then diet lanes to 11.5' lanes with one NB 7.5' parking lane and one 1.5' parking lane buffer, 5' bike lanes	One Parking Lane	106	Bus Route
11000653__	0.308	0.564	2	25	25	12,500	7.36	2	42'	Diet lanes to 11.5' with one NB 7' parking lane and one 2' parking lane buffer and 5' bike lanes	One Parking Lane	1,352	Bus Route
11000653__	0.564	0.893	2	25	25	12,000	5.242	2	38'-32'	38' CW down to 32'-34', diet lanes to 11' and put in 5' bike lanes	No Parking	1,737	Bus Route
11000653__	0.893	0.938	2	25	25	12,000	5.242	2	38'-40'	Diet 3 lanes to 11' and put in 4'-5' bike lanes	No Parking	238	Bus Route
11000653__	0.938	1.460	2	25	25	12,000	7.36	2	40'	Diet lanes to 11' and put in 4.5' bike lanes and one NB 7' parking lane and one 2' parking lane buffer	One Parking Lane	2,756	Bus Route
11000653__	1.460	1.530	3	25	25	12,000	6.14	2	18'-22'	Tough intersection but can make bikes cross with peds to go NB on 206, SB would have buffered lane and NB to get to 206 would have space for buffered lane.	No Parking	370	Bus Route
											Totals	**8,078**	
Pennington-Hopewell Road / W Broad Street													
11000654__	0.000	0.320	3	40	35	7,500	7.965	4	42'	Diet lanes to 12' and put in 6' bike lanes and 3' rumble buffers	No Parking	1,690	None
11000654__	0.320	0.433	3	40	35	7,500	7.965	4	36-38'	Diet lanes to 11' and put in 5' bike lanes and 2'-3' rumble buffers	No Parking	597	None
11000654__	0.433	0.490	3	40	30	7,500	7.965	4	100'+	Diet lanes to 11' and put in 6' bike lanes with 3' rumblr buffer area. Gore area remainding CW.	No Parking	301	None
11000654__	0.490	1.136	3	40	35	7,500	7.965	4	38'	Diet lanes to 11' lanes with 5' bike lanes and 3' rumble buffers	No Parking	3,411	None
11000654__	1.136	2.212	3	45	40	7,500	7.965	4	40'	(45' CW at retaining wall), Diet to 12' lanes with 6' bike lanes and 2' rumble buffers	No Parking	5,681	None
11000654__	2.212	2.284	3	40	35	7,500	7.965	4	90'	Diet lanes to 11' and put in 6' bike lanes with 3' rumblr buffer area. Gore area remainding CW.	No Parking	380	None
11000654__	2.284	2.535	3	35	35	7,000	7.965	4	40'	Diet lanes to 12' and put in 5' bike lanes and 3' rumble buffers	No Parking	1,325	None
11000654__	2.535	2.720	3	40	35	6,500	6.14	2	38'	Diet lanes to 11' and put in 5' bike lanes and 3' painted buffers (entering urban residential area)	No Parking	977	None
11000654__	2.720	3.050	3	30	30	6,500	3.2	2	38'-32'	38' CW down to 32', transition to 11' lanes and 5' bike lanes	No Parking	1,742	None
											Totals	**16,104**	
Broad Street / Church Street													
11000672__	0.000	0.082	2	35	35	6,500	55	60	26'-30'	Widen out to 32' from bridge to Old York Road for 11' lanes and 5' bike lanes	No Parking	433	None
11000672__	0.082	0.235	3	35	35	5,000	6.14	2	37'-38'	Diet lanes to 11' and put in 6' bike lanes with 2' buffers	No Parking	808	None
11000672__	0.235	0.350	2	30	30	4,000	55	20	27'-28'	Widen road out to 32' for 11' lanes and 5' bike lanes	No Parking	607	None
11000672__	0.350	0.450	2	30	30	5,000	85	20	24'-30'	Widen road out to 32' for 11' lanes and 5' bike lanes	No Parking	528	None
11000672__	0.450	0.686	3	50	35	5,000	7.965	4	36'-42'	Diet lanes to 11' and out in 5'-6' bike lanes with 2'-4' rumble buffers	No Parking	1,246	None
11000672__	0.686	0.864	3	50	35	7,000	55	20	32'	Widen out to 36' for consistantcy and put in 11' lanes with 5' bike lanes and 2' buffers	No Parking	940	None
11000672__	0.864	1.575	3	50	35	8,000	6.14	2	38'-40'	Diet lanes to 11' and out in 5'-6' bike lanes with 3' buffers	No Parking	3,754	None
11000672__	1.575	1.647	3	50	35	9,000	55	20	34'-36'	Widen out to 36' for consistantcy and put in 11' lanes with 5' bike lanes and 2' buffers	No Parking	380	None
11000672__	1.647	1.902	3	50	35	9,000	6.14	2	40'-42'	Diet lanes to 11'-12' and out in 6' bike lanes with 3' buffers	No Parking	1,346	None
11000672__	1.902	1.980	3	50	35	5,000	6.14	2	42'-60'	Jug/Bridge need added safety protections. Diet lanes to 11' and put in 5' bike lanes with 2' buffers	No Parking	412	None
11000672__	1.980	2.170	3	50	35	5,000	6.14	2	40'-42'	Diet lanes to 11'-12' and out in 6' bike lanes with 3' buffers	No Parking	1,003	None
											Totals	**11,458**	

SRI	MP_Start	MP_End	Fac_ Type	Posted_ Speed	Proposed _Speed	Approximate_ AADT	Improvement _Code	Design Code	Cartway_Width	Comments	Proposed_ Parking	Length(ft)	Truck_or_Bus Route
Cass Street (not County Road but under County jurisdiction and MC_pave list)													
11111527__	0.000	0.117	2	25	25	8,500	5.242	2	34'-36'	Diet lanes to 12' and put in 5' bike lanes	No Parking	618	Bus Route
11111527__	0.117	0.281	3	25	25	8,500	6.14	2	38'	Diet lanes to 12' and put in 5' bike lanes with 2' buffers	No Parking	866	Bus Route
11111527__	0.281	0.413	3	25	25	8,500	1000		38'	Need intersection improvements to get bikes across Route 129 and this section of Cass	No Parking	697	Bus Route
11111527__	0.413	0.580	3	25	25	6,500	6.14	2	38'	Diet lanes to 12' and put in 5' bike lanes with 2' buffers	No Parking	882	Bus Route
											Totals	**3,062**	
Princeton Ave (MC pave list from Chadwick Street to 206)													
00000206Z	44.250	44.291	3	25	25	12,000	6.14	2	36'	Diet lanes to 11.5' and put in 1.5' buffers	No Parking	216	Bus Route
00000206Z_	44.291	44.500	2	25	25	12,000	5.242	2	36'	Diet lanes to 12' and put in 6' bike lanes	No Parking	1,104	Bus Route
00000206Z	44.500	44.571	4	25	25	15,000	1000		42'-50	This will be a major project that will require massive improvements and some widening to get trucks, buses and vehicles across. Preferably will have protected facilities here to take bikes out of travel way.	No Parking	375	Bus Route
00000206Z	44.571	44.640	4	35	30	15,000	13.843	8	42'	Protected lanes across this high volume corridor.	No Parking	364	Bus Route
00000206Z	44.640	44.721	4	35	30	15,000	1000		42'-60'	This will be a major project that will require massive improvements and some widening to get trucks, buses and vehicles across. Preferably will have protected facilities here to take bikes out of travel way.	No Parking	428	Bus Route
00000206Z_	44.721	44.935	2	30	30	22,000	10.14	2	42'-45'	Diet travel and CTL to 11' and put in 5' bike lanes	No Parking	1,130	Bus Route
00000206Z_	44.935	45.000	2	30	30	15,000	1000		42'-45'	Intersection with Brunswick Circle Extension needs significant bike/ped improvements	No Parking	343	Bus Route
00000206Z_	45.000	45.276	3	30	30	11,000	10.14	2	48'	Diet travel and CTL to 11' and put in 5' bike lanes with 2' buffers	No Parking	1,457	Bus Route
00000206Z_	45.276	45.349	3	30	30	11,000	1000		48'	Intersection with Route 206 needs significant bike/ped improvements	No Parking	385	Bus Route
											Totals	**5,803**	

County Wide Totals

931,957

BICYCLE FACILITY TYPES AND DESIGN RECOMMENDATIONS

4

Bicycle Facility Types and Design

This section serves as an introduction to the set of recommended facilities to be considered to enhance bicycle safety, connectivity, and accessibility in Mercer County. The types of facilities are both related to the existing conditions, strengths, and constraints discussed in chapter two, and reflective of established guidelines and design recommendations.

The designs and recommendations to be considered are derived from a series of design and policy manuals from both local and national contexts. These manuals aim to share standards, best practices, and strategies for design and construction of bicycle facilities. The following section outlines the guides referenced for development of these recommendations. It is important to note that many Mercer County Roads have limited right-of-way and without massive corridor improvement projects and takings, the County is mainly limited to existing road cartways & Right of Way. As such, staff will look at cost-effective benefits to the general public and utilize context-sensitive solutions for the roadway environment.

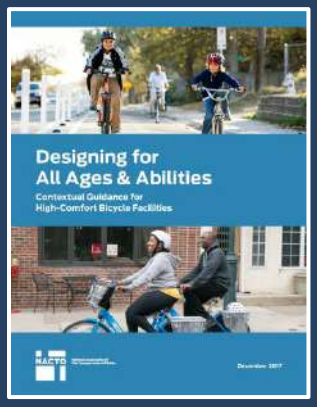
It is important to note that there is significant room for flexibility in highway and roadway design and the often used AASHTO Green Book is not a detailed design manual but a guidance document to be used by users to make better informed decisions. There is a significant range of roadway conditions within Mercer County so a “one size fits all” approach will not work. Context sensitive solutions must be used to reflect the location and community. As a result, a range of design reference and guidance documents will be used to design and implement bicycle facilities throughout the County. The following page refers to the most current and applicable reference documents for Mercer County staff.

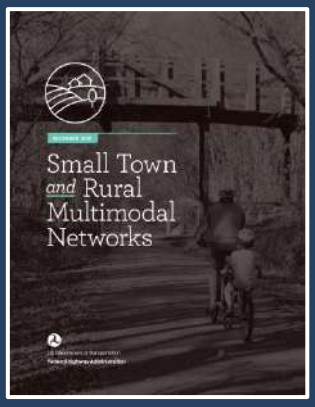
It is important to note that the County does however need to follow the Manual on Uniform Traffic Control Devices (MUTCD) to stay in standards conformance with FHWA and can only follow recommendations if in line with the MUTCD. The MUTCD is adopted by reference in accordance with Title 23, United States Code, Section 109(d) and Title 23, Code of Federal Regulations, Part 655.603, and is approved as the national standard for designing, applying, and planning traffic control devices. As the MUTCD and other federal guidance changes, these recommendations may change during the life of this plan.

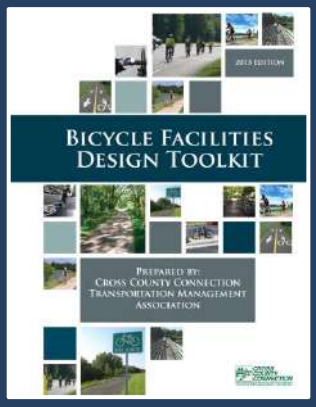
AASHTO GREEN BOOK NOTE:

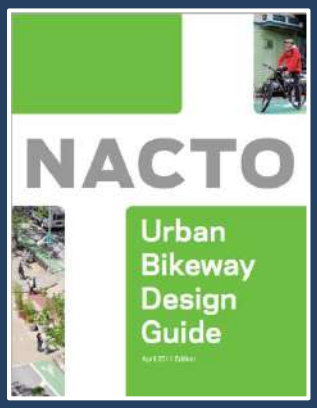
“The intent of this policy is to provide guidance to the designer by referencing a recommended range of values for critical dimensions. It is not intended to be a detailed design manual that could supersede the need for the application of sound principles by the knowledgeable design professional. Minimum values are either given or implied by the lower value in a given range of values. The larger values within the ranges will normally be used where the social, economic, and environmental (S.E.E.) impacts are not critical.”

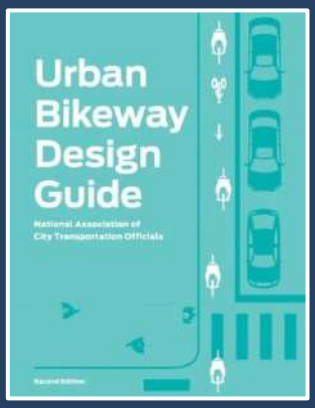
Reference and Guidance Documents

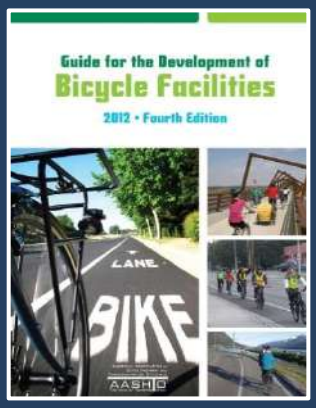


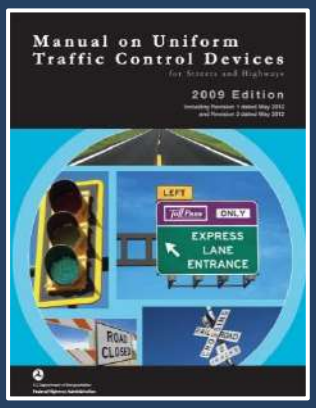


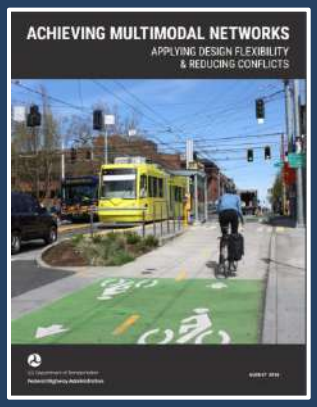


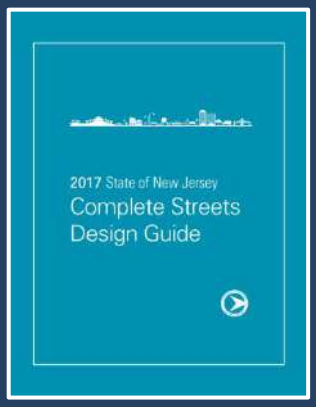


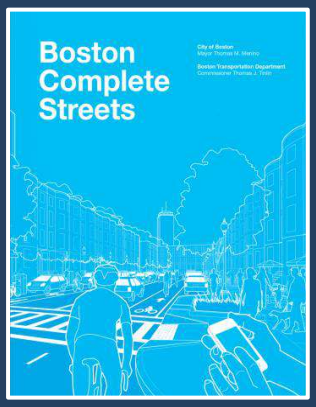


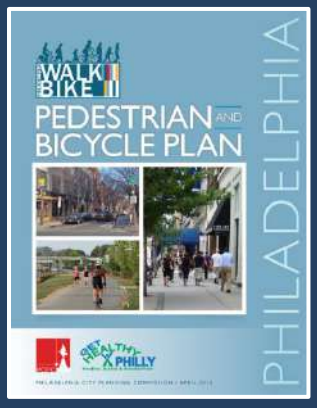


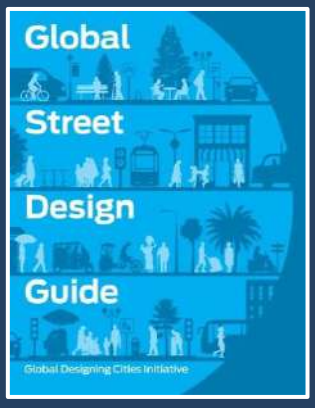












Bicycle Facilities To Be Considered

1. Sharrows and Shared Lane Markings
2. Bikable Paved Shoulders *(temporary or when cartway restricted)
3. Standard Bike Lanes
4. Buffered Bike Lanes (Painted and Rumble)
5. Two-Way Cycle Tracks & Hybrid Bike Lanes
6. Separated/ Protected Bike Lanes
7. Multi-Use Path and Shared-Use Paths
8. Through Lanes
9. Combines Bike Lane/ Turn Lanes
10. Intersection Crossings
    - Intersection Bike Box
    - Two-Stage Turn Queue Box
    - Protected Intersection
    - Signal Timing and Cycle Length
    - Leading Bike/ Pedestrian Interval
    - Signalized Turns
    - Bike Boxes and Two-Stage Bike Turn Boxes
11. Road Diet and Lane Diets
12. Driveway Design
13. Bikeway through Existing Bridge and Underpass/ Tunnel Considerations
14. Entrance/ Exit Ramp Designs
15. Midblock Crossings
16. Pavement Markings, Wayfinding, and Signage Standards (MUTCD)

Sharrow

A sharrow, or shared lane marking, is a street marking indicating that a lane should be used by both bicyclists and motor vehicles. The image, a bicycle below two wide directional arrows, identifies proper bicyclist positioning within the cartway. Sharrows can also be helpful tools for wayfinding and signaling directionality.

Benefits

> Does not require additional street space.

> Reduces bicyclists riding against motor vehicle traffic.

> Provide wayfinding and directionality guidance for bicyclists.

Considerations

> "May Use Full Lane" Signs encourage bicyclists to use the full lane to discourage unsafe within-lane passing

>Bike-and-chevron lane sharrow marking were approved for use within the US per the 2009 MUTCD.

> Frequency of sharrows should be increased when being used to fill gaps in other facilities, or in areas with high motor vehicle volume/speed.

> Placing sharrows in the center of a travel lane when possible will reduce marking wear from motor vehicle tires.

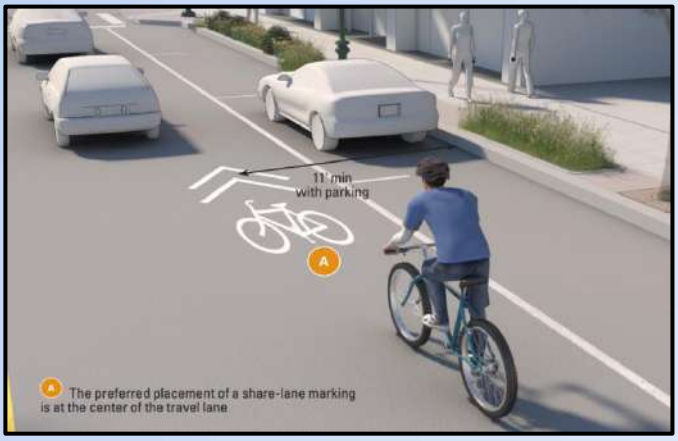
> The "door zone" should be avoided when determining lateral sharrow placement.

> In the absence of on-street parking, sharrows should be placed so as to avoid gutters, seams and other hazardous obstacles.

> The chevron orientation may be adjusted to serve wayfinding purposes.

> Color may be used to enhance the visibility of the sharrow.

Source: Town of Frisco, CO



Source: NJDOT Complete Streets Design Guide

Design Recommendations

-Sharrow spacing, high volume street: 50-100'

-Sharrow spacing, low volume street: 250' or more

-Minimum distance from curb: 4' (no parking)

-Shared Lane Marking (MUTCD 9C-9)

-MUTCD Sign Options: R4-11 > W11-1 & W16-1

Mercer County Bicycle Facility Selection Table

USLIMITS2 Recommended Speed							
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	ABCDEF	ABCDEF	CDEF	CDEF	CDEF	D*EF	F
2,500–5,000	BCDEF	BCDEF	CDEF	CDEF	D*EF	D*EF	F
5,000–10,000	BCDEF	BCDEF	CDEF	C*DEF	D*EF	D*EF	F
10,000–15,000	C*DEF	C*DEF	C*DEF	C*D*EF	D*EF	D*EF	F
15,000-30,000	C*DEF	C*DEF	C*DEF	D*EF	EF	E*F	F
≥30,000	F	F	F	F	F	F	F

A: Shared Street/Bicycle Boulevard
B: Shared-lane Markings
C: Bicycle Lane
D: Buffered Bicycle Lane
E: Separated Bicycle Lane
F: Shared-use Path
C*: Bicycle Lane (After careful consideration)
D*: Buffered Bicycle Lane (After careful consideration)
E*: Separated Bicycle Lane (After careful consideration)

Bikable Paved Shoulder

Paved shoulders may be used as space for bicyclists and pedestrians to travel adjacent to a motor vehicle lane and provide motorists with an area to pull over in emergencies. In cases of incomplete bicycle networks, paved shoulders can serve as an unofficial connection until such connection can be made.

Benefits

> May not require additional street space.

> Reduces bicyclists riding against motor vehicle traffic.

> Provides wayfinding and directionality guidance for bicyclists.

Considerations

> Physical separation, such as rumble strips in the buffer area, can be used to alert drivers that they are encroaching on the bike lane and increase bicyclist comfort/safety.

> Bicyclist signage is not required, but could be used to signify a bicycle route.

> The solid shoulder line should be discontinued at intersections and major driveways. Dotted white lines may be used to extend the shoulder and signify bicycle travel space through these areas.

> Provide more than the minimum 4' shoulder width when possible to increase bicyclist and pedestrian comfort.

> Contrasting colors may be used to distinguish the shoulder from the motor vehicle lanes.

> Paved shoulders should be considered during routine roadway maintenance, reconstruction, and in new constructions.

Above: Children riding bikes in shoulder of Pond Road in Robbinsville, NJ.
Source: Jerry Foster

Source: Alta Planning + Design (CC-BY-SA)

Design Recommendations

-Paved shoulders can be considered as a precursor to dedicated bicycle facilities and marked routes

-Minimum shoulder width: 4' (wider shoulders and rumble strips should be considered on roads with higher speeds AADTs)

-If rumble strips included, place rumble strips to overlap with the roadway edge line

>Rumble lines should provide a 12' gap every 40'-60' to allow for bicycle access into and out of the shoulder

- *12 inch spacing center to center*
- *6-8 inches long perpendicular to roadway*
- *6 inches wide, measured parallel to roadway*
- *3/8 inch deep*

Standard Bicycle Lane

Standard bicycle lanes are delineated by solidly striped lines and can be marked with a combination of bicycle symbols, directional arrows, and words. Lanes are located between a vehicular travel lane and parking or the curb, directing bicyclists to move with traffic.

Benefits

> Further separates sidewalks, if present, from motor vehicle travel lanes.

> Provides a space exclusively for bicyclist travel.

> Establishes a level of predictability for bicycle and vehicle placement and behavior.

Considerations

> Markings for bike lanes should not be dotted when passing through a driveway crossing, as driveways are not considered intersections (MUTCD 2009, AASHTO Bike Guide 2012).

> When determining the width of bike lanes, one should take into account the presence of curb faces, guardrails, on-street parking, and other features.

> Larger bike lanes (~7') may enable parking or driving within the lane. In this case, consider adding a buffer zone to clarify.

> When the bike lane is adjacent to a guard rail or physical barrier, add two feet to the bike lane width.

> A distance of four inches should be used to separate a bike lane from a parking lane.

> Obstacles in the bicycle lane such as gutters, drainage inlets, and utility covers should be designed so as not to interfere with bicycle tires. These features should be oriented appropriately and level with the ground.

Above: Standard bike lane in West Windsor, NJ *Source: Jerry Foster*

Source: Chicago Department of Transportation

Design Recommendations

-Lane width: 4'-6'

-Cartway width: 28' min.

-Line width: 6"-8"

>Green paint can be an appropriate tool in areas where motor vehicles need to cross bike lanes, such as merging. (MUTCD Interim Approval)

Mercer County Bicycle Facility Selection Table

USLIMITS2 Recommended Speed							
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	ABCDEF	ABCDEF	CDEF	CDEF	CDEF	D*EF	F
2,500–5,000	BCDEF	BCDEF	CDEF	CDEF	D*EF	D*EF	F
5,000–10,000	BCDEF	BCDEF	CDEF	C*DEF	D*EF	D*EF	F
10,000–15,000	C*DEF	C*DEF	C*DEF	C*D*EF	D*EF	D*EF	F
15,000-30,000	C*DEF	C*DEF	C*DEF	D*EF	EF	E*F	F
≥30,000	F	F	F	F	F	F	F

A: Shared Street/Bicycle Boulevard
B: Shared-lane Markings
C: Bicycle Lane
D: Buffered Bicycle Lane
E: Separated Bicycle Lane
F: Shared-use Path
C*: Bicycle Lane (After careful consideration)
D*: Buffered Bicycle Lane (After careful consideration)
E*: Separated Bicycle Lane (After careful consideration)

Mercer County Default Bike Lane

*Default will vary depending on most current version of MUTCD, engineering judgement as well as Road Geometry and Cartways and other factors.

Default Mercer County Bike Lane with Parking

*Default will vary depending on most current version of MUTCD, engineering judgement as well as Road Geometry and Cartways and other factors.

Buffered Bicycle Lane

To increase separation between bikers and motor vehicle traffic, bicycle lanes may be enhanced with a buffer. Buffers can include visual separation, such as a painted area marked with longitudinal stripes, or physical separation such as rumble strips to alert drivers when they are entering the bike lane. Buffer treatments improve safety and bicyclist comfort on roadways with high traffic volumes and speed, as well as those with trucks or oversized vehicles.

Benefits

> Expands the benefits of a conventional bike lane by providing greater distance between bicyclists and motor vehicles compared to conventional bike lanes.

> Allows space for bicyclists to pass each other without having to enter the vehicle travel lane.

>Distinguishes larger bike lanes from travel or parking lanes.

> Can create separation between bicyclists and 'door zone'.

Considerations

> Physical separation, such as rumble strips in the buffer area, can be used to alert drivers that they are encroaching on the bike lane and increase bicyclist comfort/safety.

> A bike lane should be transitioned to a through bike lane when a right turn only lane approaches, placed to the left of the turn lane. If space does not permit, a shared bike lane/turn lane should be used.

> At intersections without a right turn only lane, buffer markings should become a conventional dashed line. Bike boxes may also be helpful in these scenarios.

>A 6"-8" solid white line may be painted to mark the separation from a motor vehicle travel lane.

Above: Buffered bike lane on Warren Street in the City of Trenton, NJ. Source: Jerry Foster

Above: Double White Line Buffered Bike Lanes on Scotch Road, Ewing.

Design Recommendations

-Lane width: 4'-6'

-Cartway width: 35' min

-Buffer width: 12" White Line or other buffer ≥18"

>Optional rumble lines should provide a 12' gap every 40'-60' to allow for bicycle access into and out of their lane.

-A buffered bike lane is allowed as per MUTCD guidelines for buffered preferential lanes (section 3D-01).

-Buffer width: 3 ft. min. for hatching within buffer

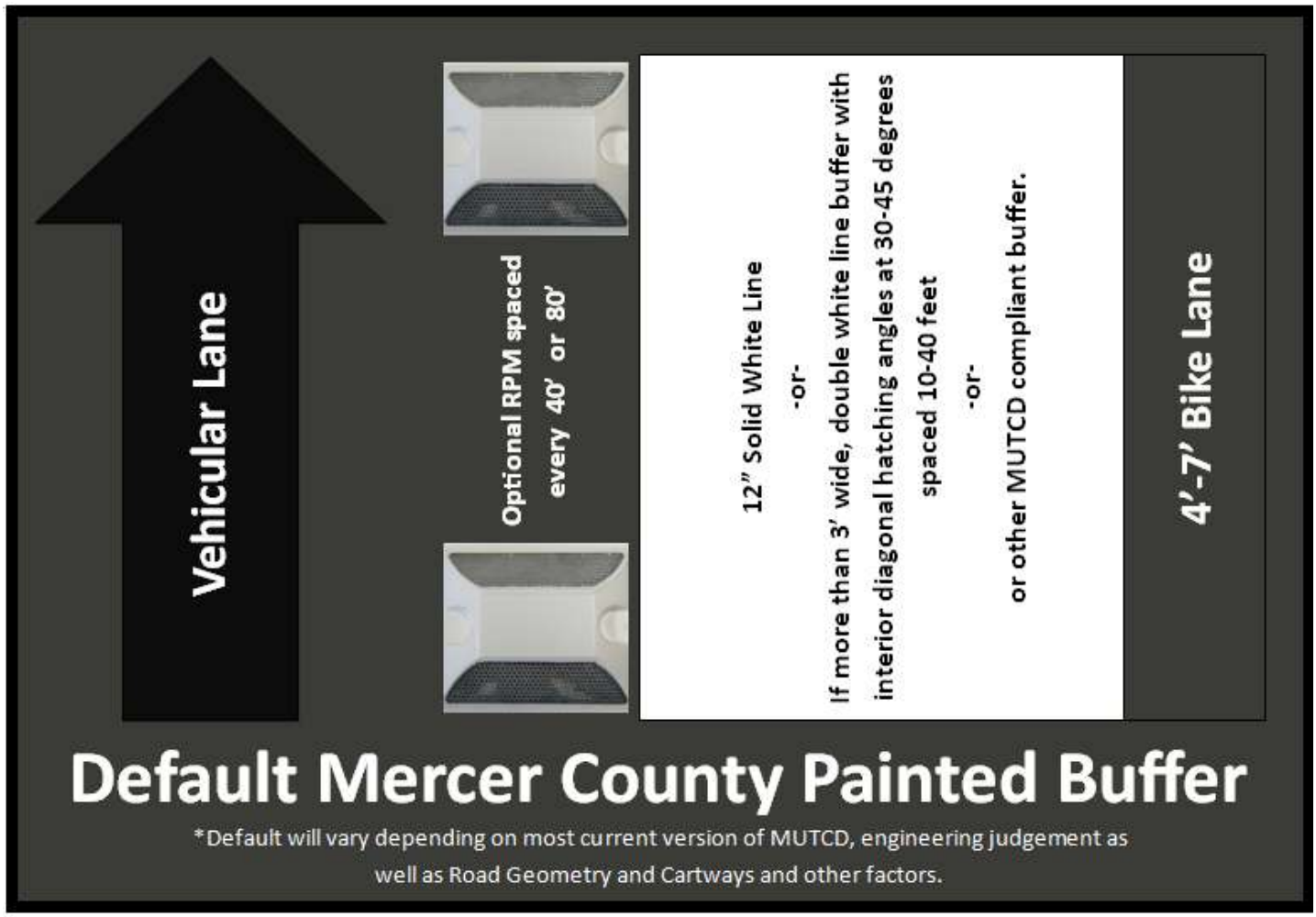
"When crosshatch markings are used in paved areas that separate traffic flows in the same general direction, they shall be white and they shall be shaped as chevron markings, with the point of each chevron facing toward approaching traffic…" (MUTCD section 3B.24)

Mercer County Bicycle Facility Selection Table

	USLIMITS2 Recommended Speed						
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	A B C D E F	A B C D E F	C D E F	C D E F	C D E F	D* E F	F
2,500–5,000	B C D E F	B C D E F	C D E F	C D E F	D* E F	D* E F	F
5,000–10,000	B C D E F	B C D E F	C D E F	C* D E F	D* E F	D* E F	F
10,000–15,000	C* D E F	C* D E F	C* D E F	C* D* E F	D* E F	D* E F	F
15,000-30,000	C* D E F	C* D E F	C* D E F	D* E F	E F	E* F	F
≥30,000	F	F	F	F	F	F	F

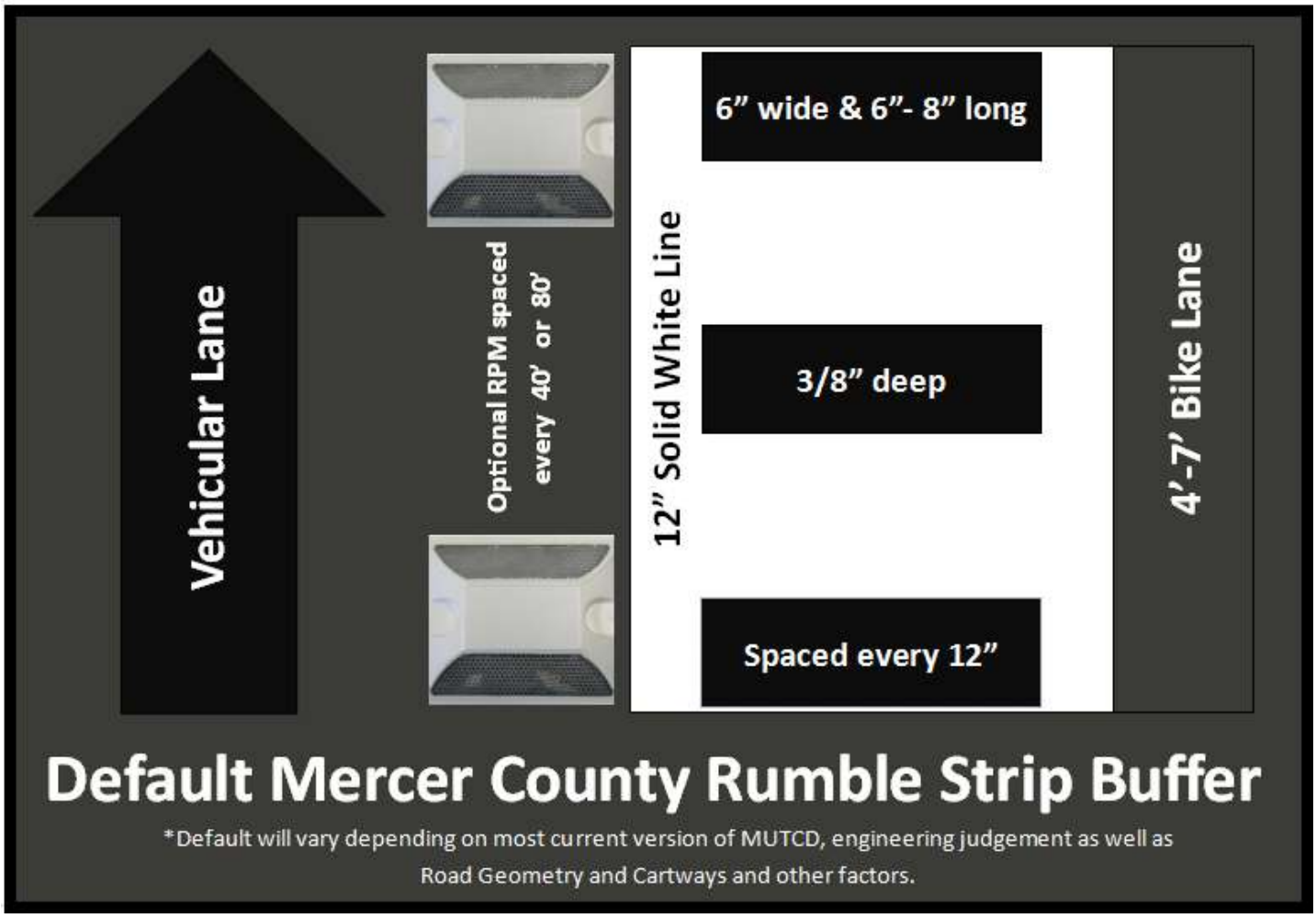
A: Shared Street/Bicycle Boulevard
B: Shared-lane Markings
C: Bicycle Lane
D: Buffered Bicycle Lane
E: Separated Bicycle Lane
F: Shared-use Path

C*: Bicycle Lane (After careful consideration)
D*: Buffered Bicycle Lane (After careful consideration)
E*: Separated Bicycle Lane (After careful consideration)



Default Mercer County Painted Buffer

*Default will vary depending on most current version of MUTCD, engineering judgement as well as Road Geometry and Cartways and other factors.



Default Mercer County Rumble Strip Buffer

*Default will vary depending on most current version of MUTCD, engineering judgement as well as Road Geometry and Cartways and other factors.

Separated Bicycle Lane

Separated bicycle lanes utilize a vertical buffer to distinguish the bicycle lane from motor vehicle traffic. Separated bicycle lanes differ from multi-use paths in that they are exclusively for bicyclists. They differ from conventional or buffered bike lanes in that they incorporate a vertical element as the buffer. Various treatments may be used as the vertical buffer, including: curbs, medians, on-street parking, landscaping, bollards, flexible delineators, and planters, depending on context and funding.

Benefits

> Provide a greater separation from motor vehicle traffic compared to buffered bike lanes.

> Appeals to more levels of bicyclists than conventional or visually buffered bike lanes.

> Bicyclist fear/risk of conflict with vehicles is eliminated, including crashes and “dooring”.

> Provide a more comfortable experience on high speed corridors than on-road shoulders.

Considerations

> Physically separated bicycle lanes can be one-way or two-way, as appropriate. Two-way separated bicycle lanes can be utilized to save space in the cartway.

> Solid white lines may be used to separate motor vehicle parking from the bicycle lane, diagonal crosshatching may be used to distinguish neutral areas.

> Increase the bicycle lane width when the gutter seam reaches more than 12 inches from the curb.

> Parking should not be allowed within 30 feet from an intersection to improve visibility when a lane is parking protected.

> To ease hazards at conflict areas, use color, yield lines and “Yield to Bikes” signage.

Source: Alta Planning + Design (CC-BY-SA)

Source: Dianne Yee, FHWA Separated Bike Lane Planning and Design Guide

Design Recommendations

-Lane width: 4’-6’

-Road width: 33’ min

-Buffer minimum: 1.5’ min; 3’ preferred

-Sight triangle from minor street crossings: 20’

-Sight triangle from driveway crossing: 10’

Mercer County Bicycle Facility Selection Table

	USLIMITS2 Recommended Speed						
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	ABCDEF	ABCDEF	CDEF	CDEF	CDEF	D*EF	F
2,500–5,000	BCDEF	BCDEF	CDEF	CDEF	D*EF	D*EF	F
5,000–10,000	BCDEF	BCDEF	CDEF	C*DEF	D*EF	D*EF	F
10,000–15,000	C*DEF	C*DEF	C*DEF	C*D*EF	D*EF	D*EF	F
15,000-30,000	C*DEF	C*DEF	C*DEF	D*EF	EF	E*F	F
≥30,000	F	F	F	F	F	F	F

A: Shared Street/Bicycle Boulevard
B: Shared-lane Markings
C: Bicycle Lane
D: Buffered Bicycle Lane
E: Separated Bicycle Lane
F: Shared-use Path

C*: Bicycle Lane (After careful consideration)
D*: Buffered Bicycle Lane (After careful consideration)
E*: Separated Bicycle Lane (After careful consideration)

Two-Way Cycle Track

Two-way cycle tracks are a physically separated set of bike lanes that allow bicycle movement in both directions on the same side of a street. Two-way cycle tracks tend to be good for bicyclists of all experience levels due to their physical separation from traffic, their ability to avoid the risk of being "doored" by a parked vehicle, and because they reduce indirect travel by allowing movement against the direction of one-way streets.

Benefits

>Provide dedicated and protected space to a cyclist, which improves their perceived feelings of safety.

> Reduces risk of dooring.

>Attractive to bicyclists with a range of ages and abilities.

Considerations

>Two way Cycle Tracks may be configured as:

- A protected cycle track at street level with a barrier such as a flexible delineator and/or with parking.
- Raised cycle tracks provide vertical separation from adjacent vehicular traffic.

>Function better on streets with fewer driveways and curb cuts and should be placed on the side of street with more desired destinations.

>Useful on streets with higher traffic volumes.

>Useful on higher stress streets with higher speeds and higher traffic volumes.

>Intersection controls should be oriented towards bicyclists going in both directions.

Above: Photo simulation of potential two-way cycle track on Lamberton Street in the City of Trenton. Source: NV5/ D&R Greenway Land Trust

Source: Dianne Yee, FHWA Separated Bike Lane Planning and Design Guide

Design Recommendations

-Minimum Track Width 8', Desired Width: 12'.

-When parking protected, 3' buffer is need between parked cars and cycle track.

-Dashed yellow centerline should be used to separate lanes.

-Approximately 10'-20' sight triangles are recommended at driveways and intersections. Parking should be prohibited near these driveways.

-Color, yield markings, and signage should be used to identify conflict zones.

-A "ONE WAY" sign (MUTCD R6-1, R6-2) should be provided if located on a one way street.

-A "DO NOT ENTER" with "EXCEPT BIKES" sign (MUTCD R5-1) sign should be provided.

Multi-Use Sidepath

A sidepath is a bidirectional shared use path located immediately adjacent and parallel to a roadway and provides a travel area separate from motorized traffic for bicyclists, pedestrians, skaters, wheelchair users, joggers, and other users. Sidepaths can offer a high-quality and low-stress experience for users of all ages and abilities using the network for transportation or recreation as compared to on-roadway facilities in heavy traffic environments

Benefits

>Encourages bicycling and walking in areas where high-volume and high-speed motor vehicle traffic would otherwise discourage it.

>Appropriate for walkers and bikers, as well as wheelchairs, roller blades, skateboards, etc.

> Provides a more appropriate facility for users of all ages and abilities than shoulders or mixed traffic facilities on roads with moderate or high traffic intensity.

>Very supportive of rural character when combined with vegetation.

Considerations

>Utilize medians and raised crossings at intersections to prioritize path travel and increase safety/comfort of path users.

>Widths and design details of sidepath elements may vary in response to the desire for increased user comfort and functionality, the available right-of-way, and the need to preserve natural resources.

>Landscaping can be used to further increase the separation between a path and the roadway, and add to the recreational appeal of the facility.

>When appropriate, sidepaths should transition to on-road facilities when the path ends.

Above: Penn Street Multi-Use Path in Philadelphia *Source: DRWC*

Above: Sidepath in Lawrence Township, NJ *Source: Jerry Foster*

Mercer County Bicycle Facility Selection Table

	USLIMITS2 Recommended Speed						
ADT	≤ 20	25	30	35	40	45	≥50
≤ 2,500	A B C D E F	A B C D E F	C D E F	C D E F	C D E F	D* E F	F
2,500–5,000	B C D E F	B C D E F	C D E F	C D E F	D* E F	D* E F	F
5,000–10,000	B C D E F	B C D E F	C D E F	C* D E F	D* E F	D* E F	F
10,000–15,000	C* D E F	C* D E F	C* D E F	C* D* E F	D* E F	D* E F	F
15,000-30,000	C* D E F	C* D E F	C* D E F	D* E F	E F	E* F	F
≥30,000	F	F	F	F	F	F	F

A: Shared Street/Bicycle Boulevard
B: Shared-lane Markings
C: Bicycle Lane
D: Buffered Bicycle Lane
E: Separated Bicycle Lane
F: Shared-use Path

C*: Bicycle Lane (After careful consideration)
D*: Buffered Bicycle Lane (After careful consideration)
E*: Separated Bicycle Lane (After careful consideration)

Multi-Use Sidepath

Design Recommendations

-Multi-Use sidepaths can be incorporated at any speed or volume of adjacent roadway.

-Intersections need to be carefully designed and other guides should be referenced for additional information.

-10' width is recommended in most situations and will be adequate for moderate to heavy use.

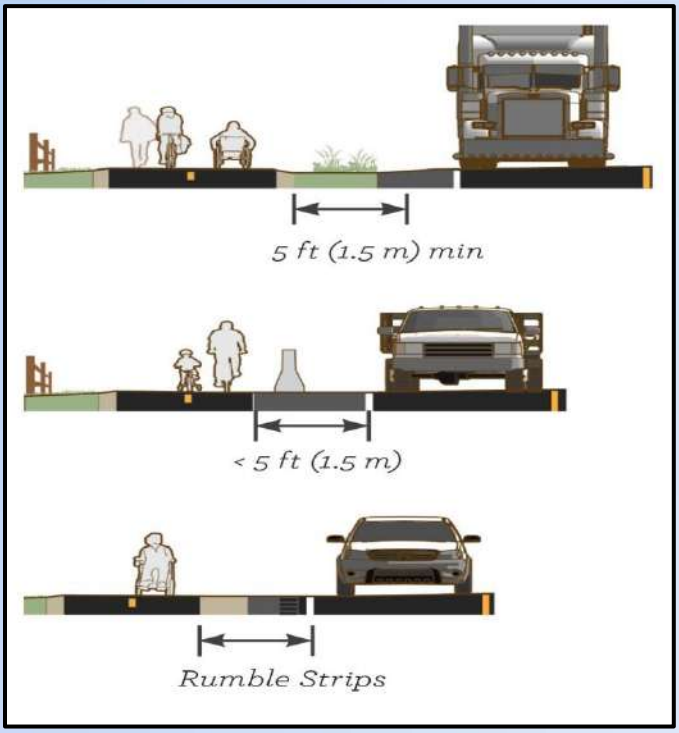
-A "BIKES YIELD TO PEDS" (R9-6) sign may be used at the entrances of path segments to remind bicyclists of the requirement to yield.

-A "RIGHT TURN YIELD TO PEDESTRIANS" sign (MUTCD R10-15) should be provided at road crossings with right turn intersections.

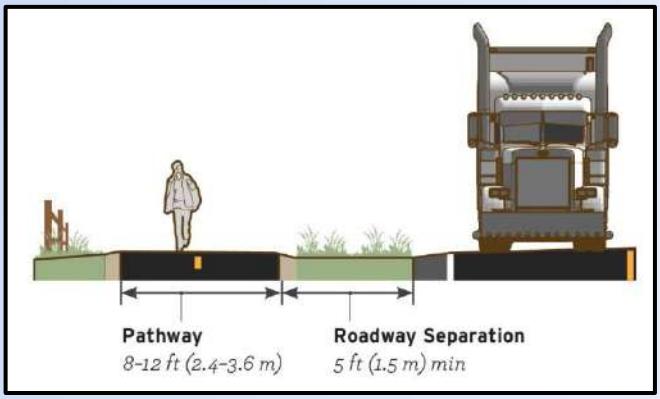
-Preferred minimum separation width is 6.5' and minimum separation distance is 5'

-Where a sidepath terminates, it may be necessary for path users to transition to a facility on the opposite side of the road.

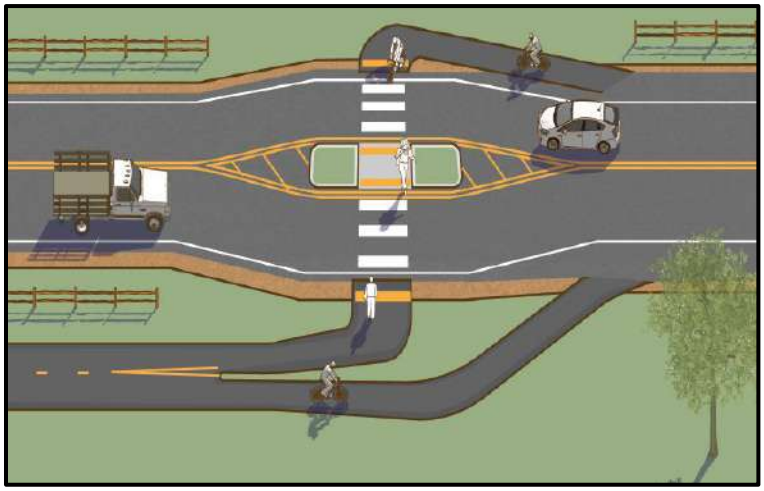
-Paths with a high volume of bidirectional traffic should include a centerline. When striping is required, use a 4 inch broken yellow center line stripe with 4 inch solid white edge lines. Solid center lines can be provided on tight or blind corners and on the approaches to roadway crossings.



Barriers can be used between the sidepath and the roadway where a 5' separation cannot be provided. In extremely constrained conditions for short distances, on-roadway rumble strips may be used as a form of separation. Source: FHWA Small Town and Rural Design Guide



Recommended Sidepath Dimensions To Be Considered (adjacent to roadway. Source: FHWA Small Town and Rural Design Guide)



Above: Sidepath Separation Distance at Road Crossings (left) and transition from a sidepath on one side to shoulders on each side of the road (right). Source: FHWA Small Town and Rural Design Guide

Multi-Use Sidepath Intersections and Crossings

Multi-Use Sidepaths require special attention at intersections and crossings, especially at mid-block crossings where motorists may be unaware of them. In the State of New Jersey, vehicles must yield the right of way to pedestrians at marked crosswalks and at intersections where stop signs or flashing red signals are in place. Pedestrians must yield the right-of-way to vehicles when crossing outside of a marked crosswalk or an unmarked crosswalk at an intersection with no stop sign. In many instances, multi-use paths will need to cross a County Highway away from a marked intersection.

Considerations

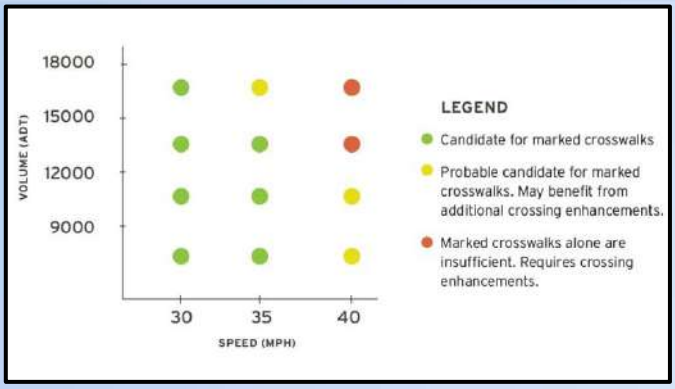
>Designs should consider the desire for natural directional flows, and the potential for conflicts with adjacent traffic. Use should be made of median islands and horizontal deflection of the roadway travel lanes to slow motor vehicle traffic and offer improved crossing conditions for path users.

>A basic marked shared use path crossing consists of a marked crosswalk, plus signs and other markings to slow or stop traffic.

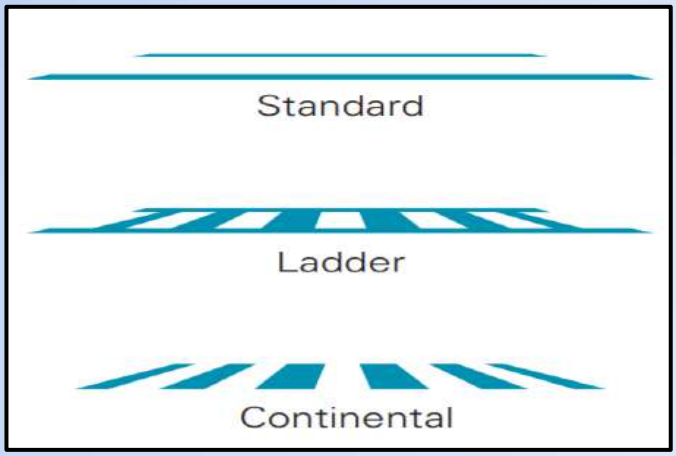
>High-visibility crosswalk markings are the preferred marking type at uncontrolled marked crossings. Transverse lines are “essentially not visible” when viewed from a standard approaching vehicle.

>At high-speed and high-volume intersections, it may be necessary to make full intersection improvements.

>Visual obstructions should be low to provide unobstructed sight of the crossing from the major street. Both motorists and path users should have a clear and unobstructed view of each other at intersections and driveways.



FHWA Safety Effects of Marked Crosswalks at Uncontrolled Locations 2005 recommends crossing enhancements on high-speed and high-volumes roadways where crosswalk markings alone are not a viable safety measure.
Source: FHWA

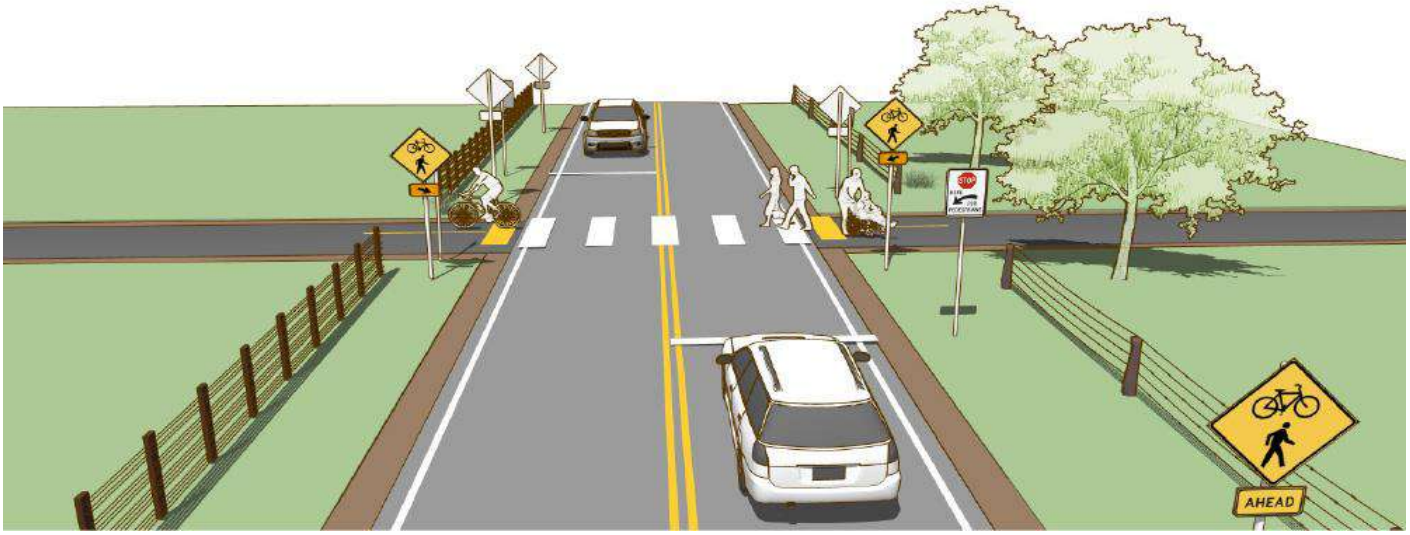


Standard crosswalk striping, shown at top, often has very poor visibility to motorists, particularly on higher speed roadways or where the striping has faded. Ladder or Continental striping is preferable in most situations because it significantly improves the visibility of the crossing to motorists and maintains this visibility better as it ages.
Source: NJDOT Complete Streets Design Guide

Source: Press of Atlantic City

Multi-Use Sidepath "Mid-Block" Crossings

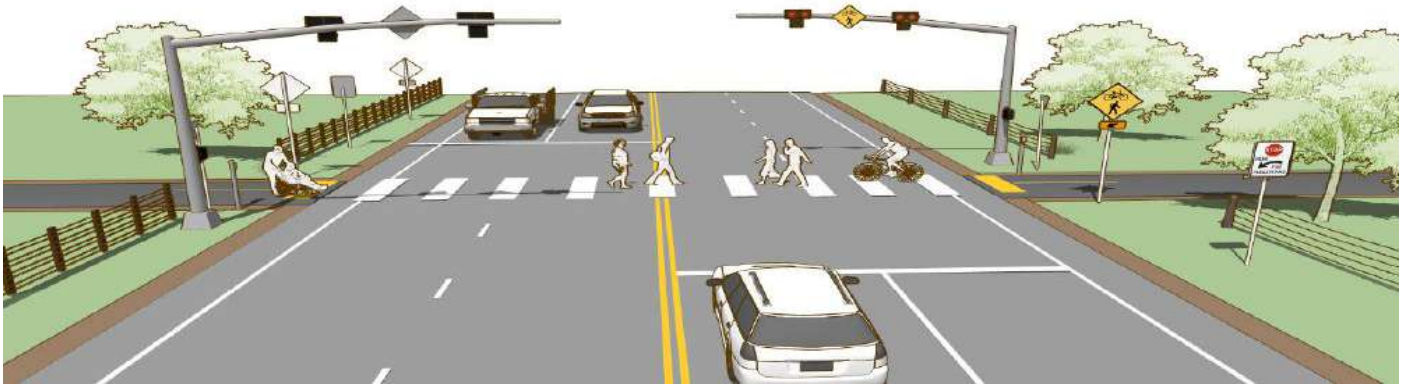
FHWA's report *Safety Effects of Marked Crosswalks at Uncontrolled Locations, 2005* recommends crossing enhancements on high-speed and high-volumes roadways where crosswalk markings alone are not a viable safety measure. There are several methods to create these safer crossings. For crossings on low-speed and low-volume roads, a simple marked crossing consisting of a marked crosswalk, signs and other marking to slow traffic, such as below. Crosswalk markings are necessary to establish a legal crosswalk at areas away from intersections. Crossing sign assemblies and advance crossing sign assemblies using W11-15 and W16-7P signs should be used to warn users of the crossing location and high-visibility crosswalk markings should be used.



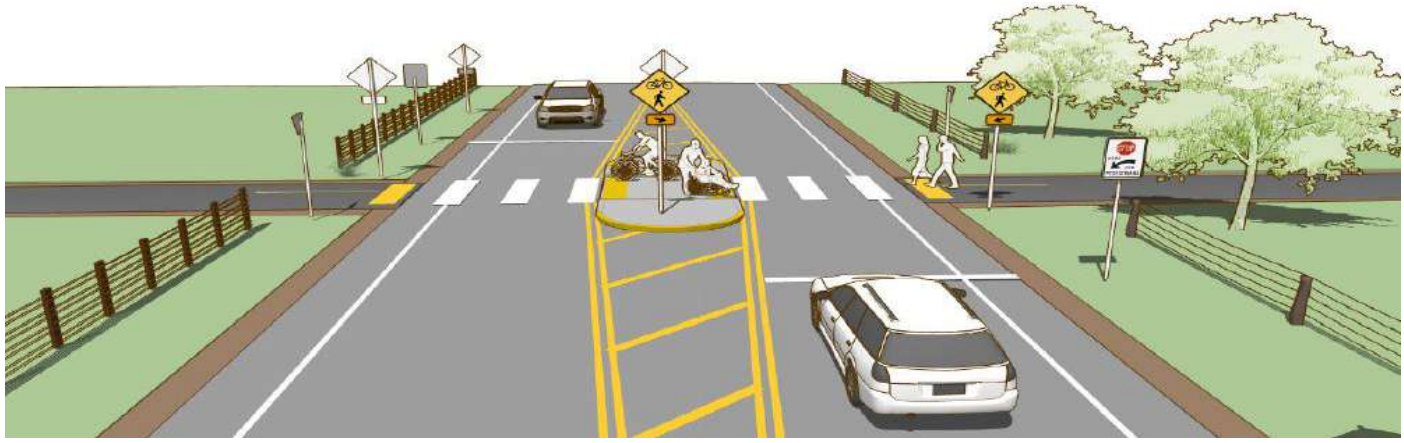
For higher-speed and higher-volume roads where greater visibility or traffic control is desired, a rectangular rapid flash beacon (RRFB) or pedestrian hybrid beacon (PHB) may be used. Where drivers fail to stop for pedestrians and compliance is low, RRFBs should also be incorporated. RRFBs are a yield enhancement device for use at uncontrolled crossings. They may be configured with solar power where it is the most cost-effective option. See an updated FHWA Interim Approval (March 2018) for guidance on the application of RRFBs. "State Law: Stop for Pedestrian" may also be placed to advise drivers of this requirement.

Multi-Use Sidepath “Mid-Block” Crossings

On treacherous and hard to cross multilane streets with high volumes and few gaps for crossing, a Pedestrian Hybrid Beacon (PHB) may be used to increase yielding rates. A pedestrian hybrid beacon, also known as a high intensity actuated crosswalk (HAWK), is a pedestrian actuated traffic control device for mid-block pedestrian crossing locations. They enable pedestrians to cross high-speed and high-volume roadways while traffic is stopped. As the name implies, it is essentially a hybrid between a RRFB and a full traffic signal. It provides planners and engineers with an intermediary option for locations that do not meet requirements for a traffic signal warrant, but where traffic conditions exceed the limitations of an RRFB. PHB’s provide a red signal indication to drivers, and create yielding rates similar to that of a conventional traffic signal. PHBs are particularly useful on undivided roadways with multiple lanes in any one direction. PHBs are an FHWA Proven Safety Countermeasure.



For many road segments, crossing islands or pedestrian refuge islands can be considered. These median islands are beneficial on roadways with high volumes and/or high speeds, and on roadways with three or more travel lanes. Median islands particularly benefit people who may travel slower, such as children, older adults, and people with disabilities. They enable pedestrians to make a crossing in two stages—crossing one direction of vehicular travel lanes, pausing at the island, and then completing the crossing. This reduces the exposure time of pedestrians to vehicular traffic. Crossing islands should be a minimum of 6 feet wide, with a preferred width of 8 to 10 feet, and a minimum of 6 feet long. They should also have a “nose” that extends beyond the crossing to protect pedestrians from turning vehicular traffic. Median islands are an FHWA Proven Safety Countermeasure which the FHWA identified as an effective, proven, tested and studied tool to promote safety.



Additional Design Considerations and Facilities

Through Lanes

A through bike lane uses dashed lines and/or colored lane to position bicyclists to the left of right turn lanes or to the right of left turn lanes and gets bicycles across dangerous or busy intersections.

Benefits

>Reduces conflict between turning motorists and cyclists going straight.

>Provides more predictable travel movements for all users.

>Alerts motorists to yield to merging traveling.

Design Recommendations

-Desired width of a through lane is 4'-6'.

-Dotted white line should be 6'' wide and 2 'long with 6' gap between dashes.

-Dashed lines should begin a minimum of 50' before an intersection, 100' if on a high volume corridor.

-The through bike lane shall be placed to the left of the right-turn only lane.

Source: NACTO, Boulder, CO

Source: NACTO, Portland, OR

Source: NACTO, Urban Street Design Guide

Combined Right Turn / Bike Sharrow

A combined bike sharrow lane / turn lane uses signage and bike sharrow markings within a turn lane to suggest a route to delineate space for cyclists and to guide them through the intersection. Sharrow markers also provide a visual warning to vehicles to watch for cyclists.

Source: SF Municipal Transportation Authority

Source: NACTO

Benefits

>Helps to position and guide cyclists through intersections by aligning them to the left of right-turning vehicles and encourages motorists to yield to cyclists.

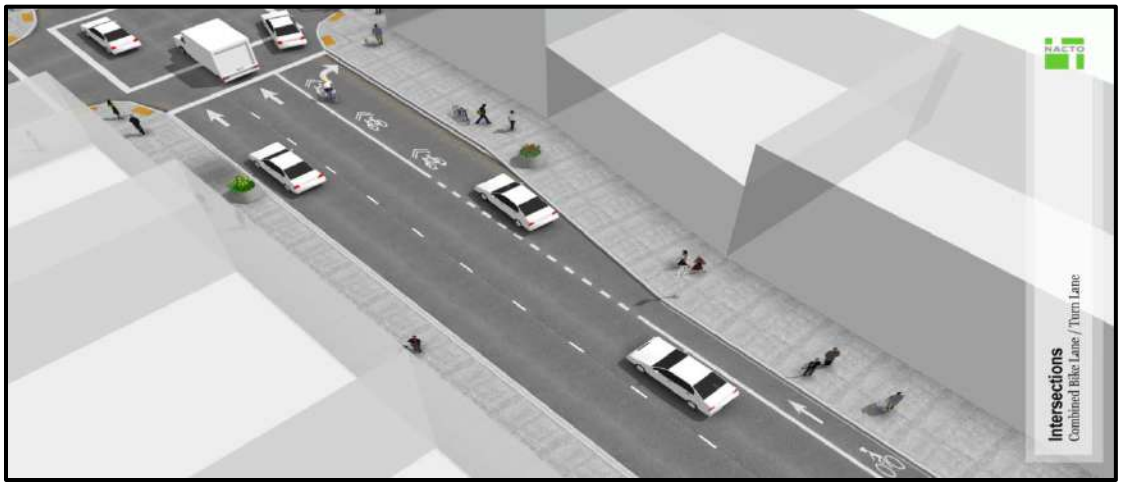
>Reduces risk of "right hook" collisions by keeping bikes left of vehicles making right turn. Cheapest alternative for streets with limited cartway.

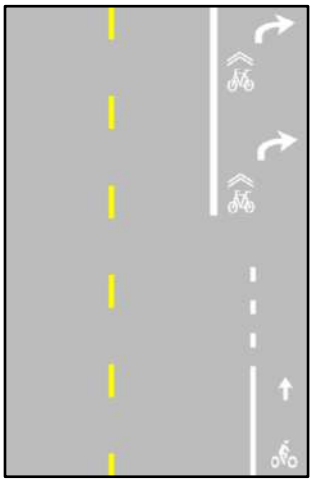
Design Recommendations

-Only MUTCD sharrow markings (with no alterations) shall be used to clarify bicyclist positioning within the combined lane. No bicycle lane markings or lines shall be used to attempt to create and establish a bike lane.

-Width of combined lane should be 9 feet minimum, 13 feet maximum. A full bicycle through lane can be accommodated if the vehicle right-turn only lane can be made 14 feet or wider.

-Chapter 5.3 of the NJDOT Roadway Design Manual: On land service highways states that where it is not practical to provide a shoulder adjacent to the outside lane (design exception required), the outside lane width shall be 15 feet to accommodate bicyclists. Where alternate bike access is provided, the outside lane width should be 1 foot wider than the adjacent through lane width. The designer should strive to accommodate the bicyclist and pedestrian on all projects.





Source: NACTO, Urban Street Design Guide (left); SF Municipal Transportation Agency (right)

Intersection Crossings

Intersection crossing markings help to guide bicyclists through intersections by providing clear and direct paths using arrows and dashes. These marking are also helpful in that they make bicyclists' paths more predictable for drivers, reinforcing that they have priority over turning vehicles and bringing attention to their presence.

Benefits

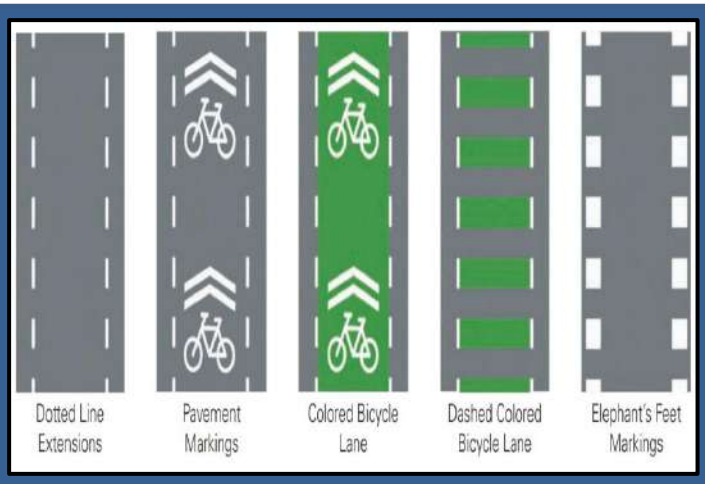
>Reduces conflict between turning motorists and cyclists going straight and Increases the visibility of bicyclists.

>Provides more predictable travel movements for all users.

>Guides bicyclists through the intersection in a straight and direct path.

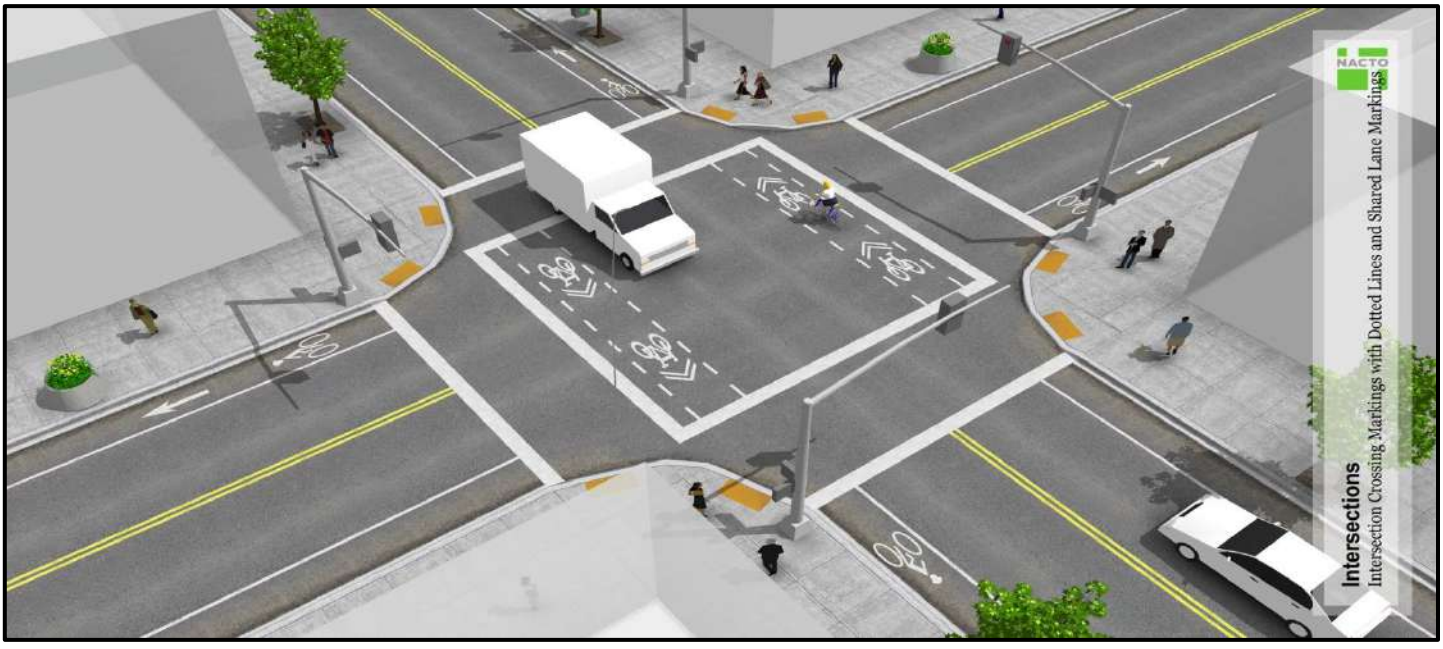
> Reinforces that through bicyclists have priority over turning vehicles or vehicles entering the roadway (from driveways or cross streets).

>Reduces bicyclist stress by delineating the bicycling zone.



Above: Types of possible markings *Source: NJDOT Complete Streets Guide*

Source: NACTO, Chicago, IL



Example of Intersection Markings *Source: NACTO, Urban Street Design*

Intersection Crossings

Design Recommendations

-Dotted lines shall bind the bicycle crossing space.

-Pavement markings extended into or continued through an intersection or interchange area shall be the same color and at least the same width as the line markings they extend.

-Striping width shall be a minimum of 6 inches adjacent to motor vehicle travel lanes and shall otherwise match the width and lateral positioning of leading bike lane striping, except when using elephant's feet markings.

-Dotted lines should be 2 foot lines with 2 to 6 foot spacing. Markings should be white, skid resistant and retro-reflective.

-Crossing lane width should match width and positioning of the leading bike lane.

-On crossings of two-way paths and cycle tracks, markings should indicate that there is two-way traffic either by marking the path center line through the intersection, or by marking bicycle silhouettes and / or chevrons in opposite directions in the two lanes. See Two-Way Cycle Tracks.

-Chevrons may be used for increased visibility within conflict areas or across entire intersections. Placement shall be in the middle of the moving lanes, and close to crosswalks.

-Shared lane markings (MUTCD Figure 9C-9) may be used for increased visibility within conflict areas or across entire intersections. Placement shall be in the middle of the moving lanes, and close to crosswalks.

Above: Crossing of side street in Trenton, NJ *Source: Jerry Foster*

Source: NACTO, Urban Street Design Guide; NYC, NY

Source: NACTO, Urban Street Design Guide; Missoula, MT

Intersection Bike Box

A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase.

Benefits

>Groups bicyclists together to clear an intersection quickly, minimizing impediment to transit or other traffic.

>Provides more predictable travel movements for all users.

>Helps prevent 'right-hook' conflicts with turning vehicles at the start of the green indication.

> Reduces signal delay for bicyclists.

>Facilitates bicyclist left turn positioning at intersections during red signal indication. This only applies to bike boxes that extend across the entire intersection.

>Facilitates the transition from a right-side bike lane to a left-side bike lane during red signal indication. This only applies to bike boxes that extend across the entire intersection.

Source: NJDOT Complete Streets Guide

Source: NACTO, Portland, OR

Source: NACTO, Urban Street Design Guide

Design Recommendations

-A box formed by transverse lines shall be used to hold queuing bicyclists, typically 10-16 feet deep. Deeper boxes show less encroachment by motor vehicles.

-Stop lines shall be used to indicate the point behind which motor vehicles are required to stop in compliance with a traffic control signal.

-Pavement markings shall be used and centered between the crosswalk line and the stop line to designate the space as a bike box. The marking may be a Bike Symbol (MUTCD 9C-3A) or Helmeted Bicyclist Symbol (MUTCD 9c-3B.)

-At intersections that currently permit right turns on red signal indications, a "No Turn on Red" sign shall be installed overhead to prevent vehicles from entering the Bike Box.

-A "Stop Here on Red" sign should be post-mounted at the stop line to reinforce observance of the stop line.

-Colored pavement should be used as a background color within the bike box to encourage compliance by motorists.

-An ingress lane should be used to define the bicycle space. Colored pavement may be used. When color is used, length shall be 25 to 50 feet to guarantee bicycle access to the box.

-An egress lane should be used to clearly define the potential area of conflict between motorists and bicyclists in the intersection when intersection is operating on a green signal indication.

-A "Yield to Bikes" sign should be post-mounted in advance of and in conjunction with an egress lane to reinforce that bicyclists have the right-of-way going through the intersection.

Source: NACTO, Madison, WI

Source: NACTO, Tucson, AZ

Source: NACTO, Austin, TX

Two-Stage Turn Queue Boxes

A two-stage bike turn box provides a more comfortable and safe way for bicyclists to cross multi-lane streets with high vehicle speeds or volumes. Similar to a jug-handle for motor vehicles, bicyclists complete a left turn by dividing it into two movements. Bicyclists first proceed through the intersection with traffic to a bike box on the far side of the intersection, where they position themselves in front of the traffic queue on the cross street. When the traffic signal turns green for the cross street, they cycle across the intersection with traffic, completing the left turn.

Source: City of Columbus, Ohio

Source: NJDOT Complete Streets Guide

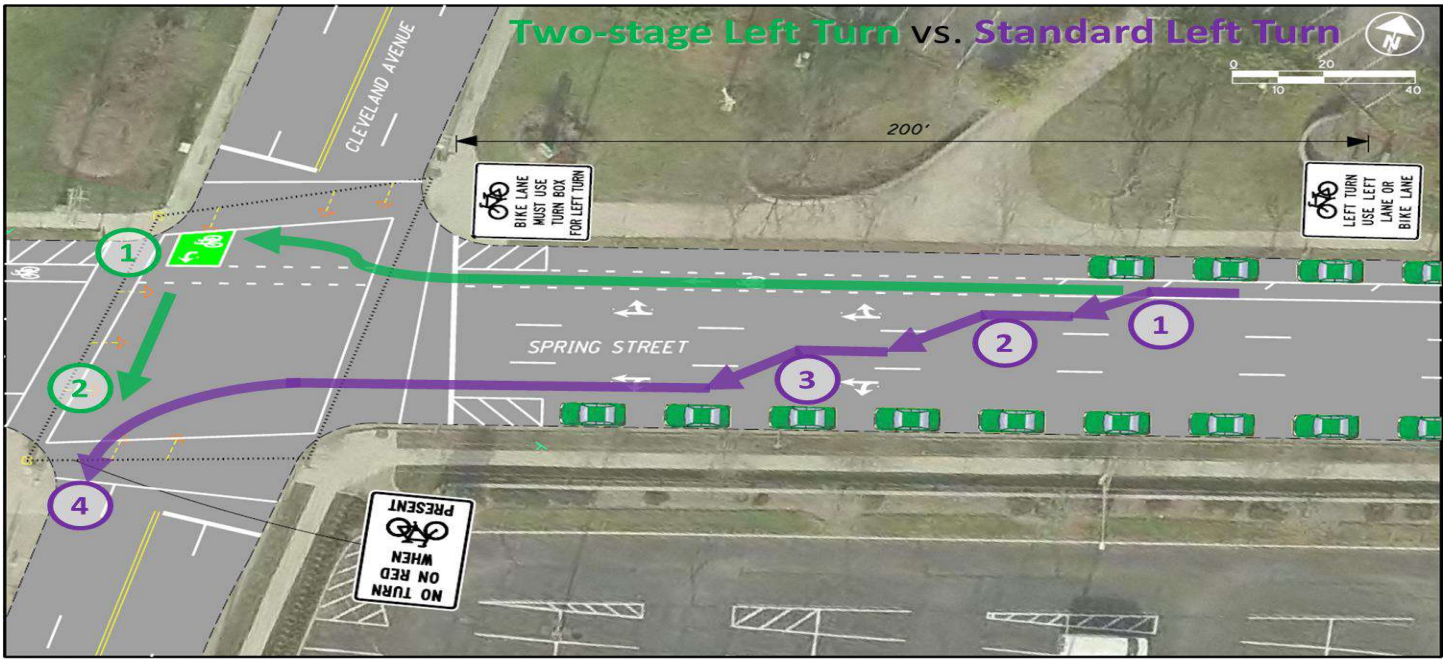
Benefits

>Improves bicyclist ability to safely and comfortably make left turns.

>Provides a formal queuing space for bicyclists making a two-stage turn.

>Reduces turning conflicts between bicyclists and motor vehicles.

>Prevents conflicts arising from bicyclists queuing in a bike lane or crosswalk.



Source: City of Columbus, Ohio

Protected Intersection

A protected intersection extends the physical barrier of the protected bike lane into the intersection, creating a clear and safe, continuous path of travel for all modes. Protected intersections have four main design elements: a corner refuge island, a forward stop bar for cyclists, a setback bicycle and pedestrian crossing, and bicycle-friendly signal phasing. The corner refuge island is a physical barrier that protects people on bikes from cars making turns. After yielding to pedestrians, cyclists can either turn right safely or continue into the intersection past the crosswalk to the forward stop bar, where they can wait at a red light buffered from vehicles by the refuge island.

Source: Chicago Department of Transportation

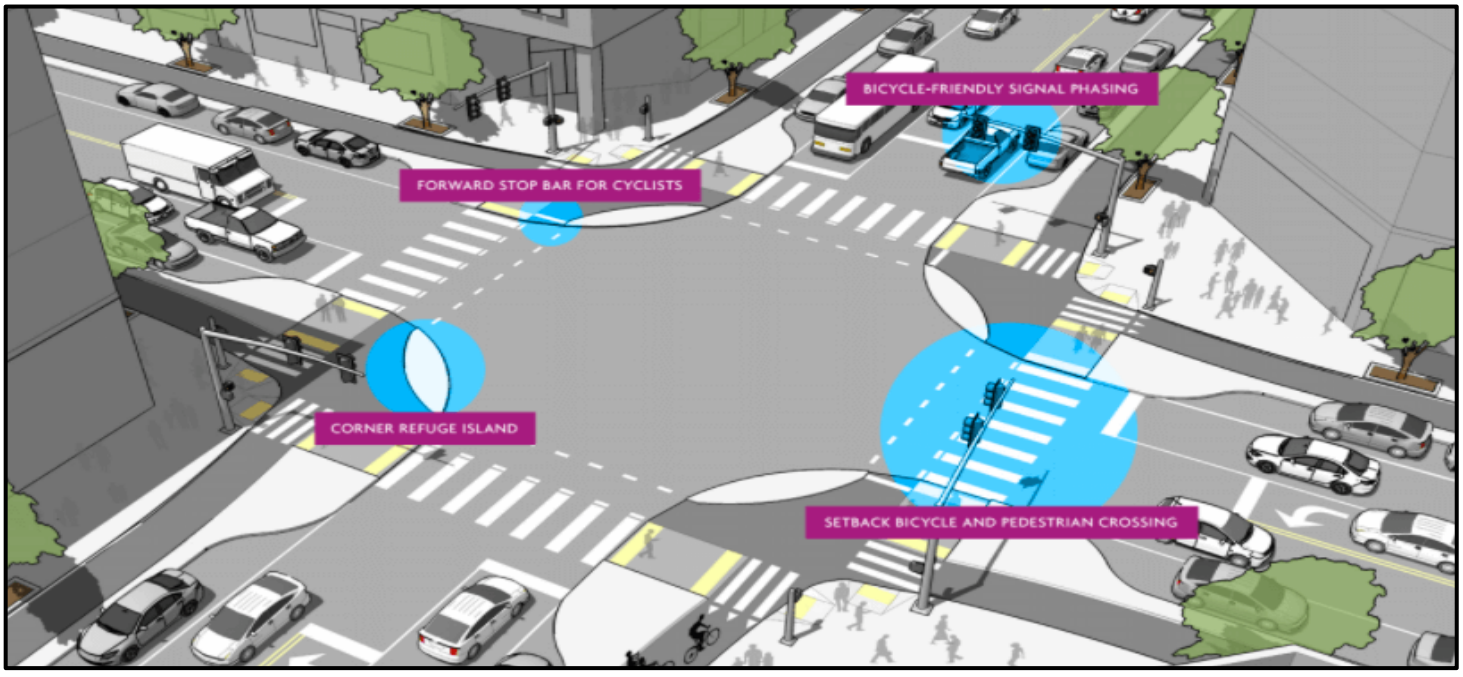
Source: Alta Planning, Salt Lake City

Benefits

>Improves bicyclist ability to safely and comfortably make left turns.

>Reduces turning conflicts between pedestrians, bicyclists and motor vehicles.

>Reduces crossing distances for bicyclists and pedestrians.



Source: Alta Planning

Lane Diets

A lane diet is a treatment that involves decreasing the size of lanes, rather than the number, to reduce vehicle speeds and encourage yielding. The size of the lane that is removed may be reallocated as a bicycle facility. According to the AASHTO Green Book, for rural and urban arterials, lane widths may vary from 10 to 12 feet. Ten feet is the recommended minimum width for travel lanes and turn lanes, while eleven feet is recommended for areas frequented by trucks and buses.

Benefits

>Narrower lanes typically result in lower speeds due to their effect on driver psychology, which can help to reduce the severity of crashes.

>Narrowed lanes help to create space for bicycle facilities.

>According to FHWA, there are "No significant safety or capacity differences between 10–foot and 12-foot wide travel lanes under most urban and suburban conditions."

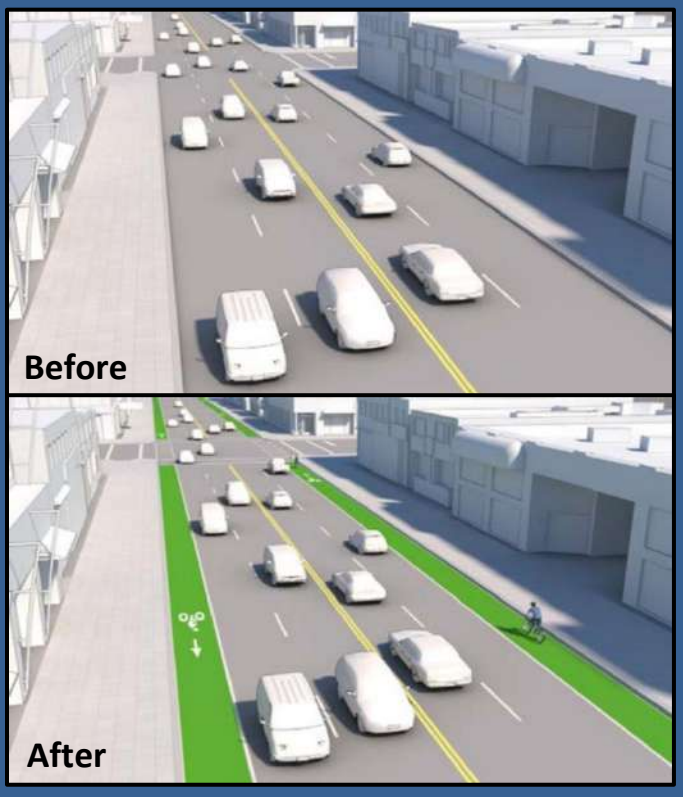
Design Recommendations

-Lanes greater than 11 feet should not be used as they may cause unintended speeding and assume valuable right of way at the expense of other modes.

-Parking lane widths of 7–9 feet are generally recommended. Cities are encouraged to demarcate the parking lane to indicate to drivers how close they are to parked cars.

-For multi-lane roadways where transit or freight vehicles are present and require a wider travel lane, the wider lane should be the outside lane (curbside or next to parking).

Source: John Keating, Overland Park, Kansas



Source: NJDOT Complete Streets Design Guide

Road Diet

Generally, road diets involve reallocating roadway space by removing vehicle travel lanes from a roadway and using that space for other modes or uses. One of the most common conversions is moving from a four-lane road to one with two through lanes and a center two-way left-turn lane, an example of which is shown to the right. By reducing lanes, other features such as bicycle lanes, widened sidewalks, or landscaped boulevards can be added to the right-of-way, resulting in fewer vehicle conflicts and improved safety outcomes.

Benefits

> The space provided by removing a travel lane can be used to create bicycle lanes on both sides of the cartway.

> Bike lanes provide greater separation between motor vehicles and the sidewalk, creating a more comfortable pedestrian environment.

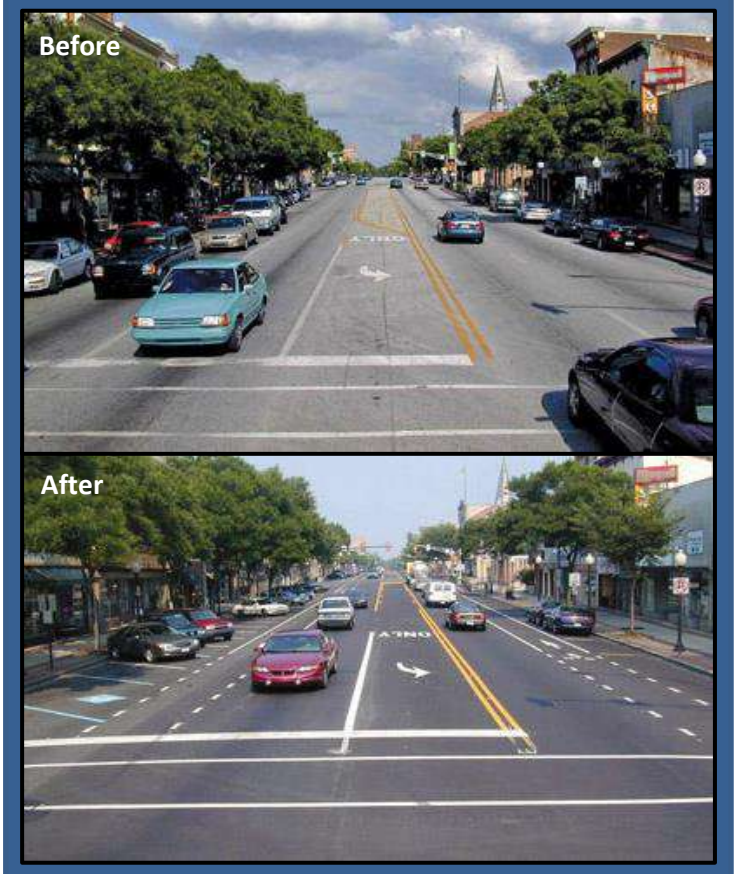
> Center turn lanes reduce crashes and conflicts with turning vehicles without reducing throughput. Center turn lanes have been shown to reduce crashes between 19% and 47%.

Design Recommendations

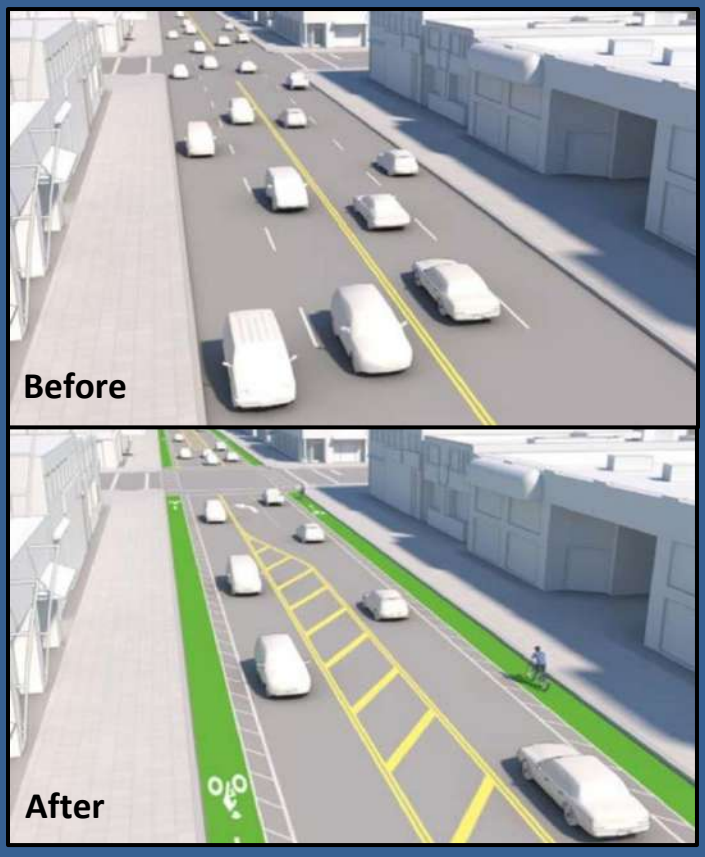
-Lane reductions on roadways with more than 20,000 AADT should be studied to assure that driveway access and signals are appropriate for higher volumes. Roadways with up to 25,000 AADT have successfully road dieted.

-Travel lane widths can be 10' to 12'.

-Width of center lane is 10' to 16' depending on types of vehicles using street.



Source: Michael Ronkin, Main Street, Pottstown, PA



Source: NJDOT Complete Streets Guide

Driveway Design

Driveways pose an often unforeseen danger to pedestrians and cyclists in that many are designed as intersections which promote high-speed turns and increase the likelihood that drivers will not stop for pedestrians or give cyclists the right of way.

Benefits

> Proper driveway design discourages high-speed turns and forces drivers to make slower turning movements. This allows drivers to better identify pedestrians and cyclists.

> Proper design is especially critical to safety for multi-use paths and facilities which include cyclists.

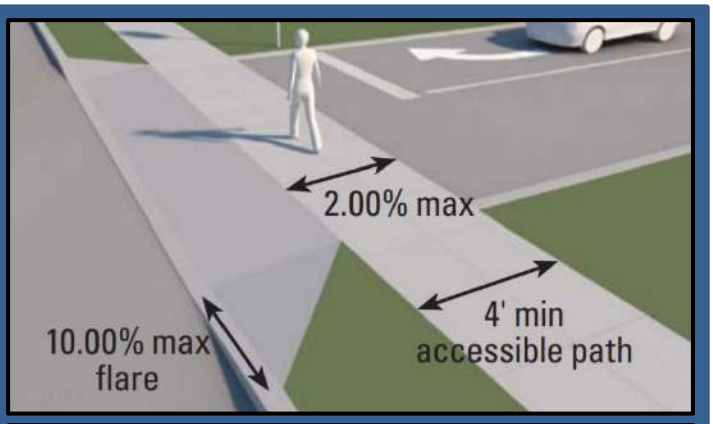
Design Recommendations

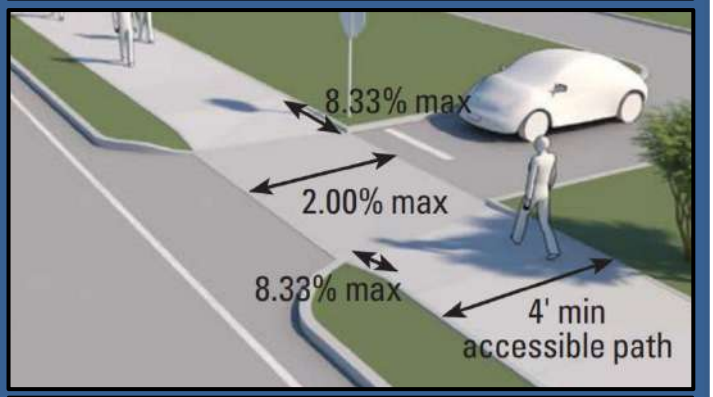
-According to ADAAG, driveways should be designed with the following guidance:

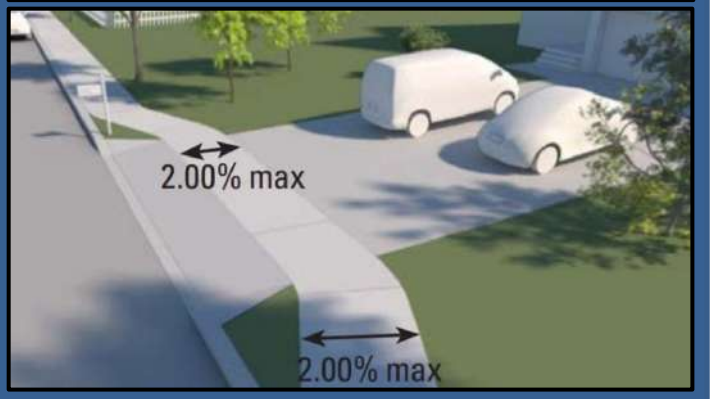
- *Cross slope should not exceed 2 percent.*
- *Changes in level or grade should be flush with a ¼-inch maximum gap in surface rise.*
- *The slope of the driveway apron flare should not exceed 10 percent.*
- *Sidewalk grade should not exceed 5 percent.*

-Max grade differential between driveway apron and street shall be no more than 8%.

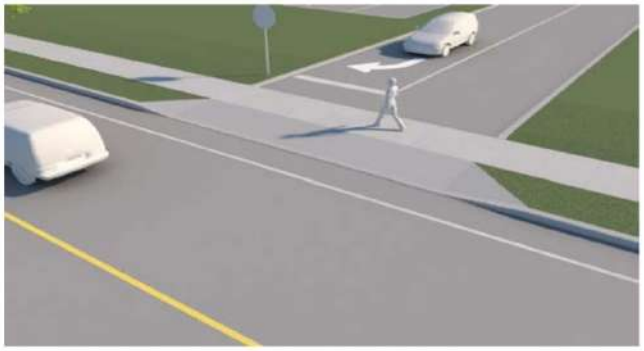
Where volumes are high, alternative B is preferred.

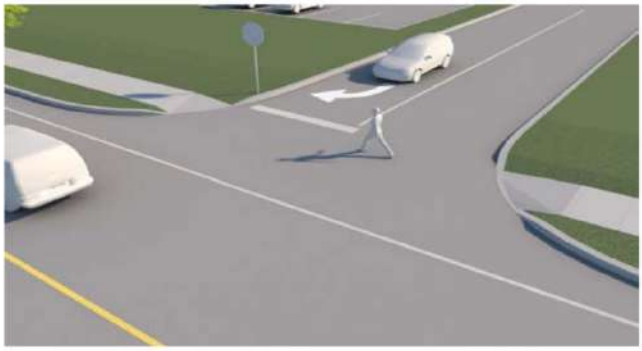






Source: NJDOT Complete Street Design Guide





Driveways should be designed for continuous and level pedestrian passage. Proper driveway design, such as in the above left, increases the visibility of pedestrians, encouraging drivers to stop. Driveways designed as intersections, such as in the above right, feature an interrupted crosswalk. This can reduce pedestrian visibility and increase the likelihood that drivers will not stop for pedestrians.

Source: NJDOT Complete Street Design Guide

Bikeways through an Existing Bridge

Bridges can be significant barriers to bicycle and pedestrian movement. Many bridges can be retrofitted to provide a bicycle/pedestrian crossing under the barrier by creating a crossing where there are no bicycle or pedestrian accommodations, or by upgrading the existing bicycle/pedestrian crossing.

Benefits

> Proper design allows for continuous bicycle facilities that are easy for cyclists or pedestrians to use.

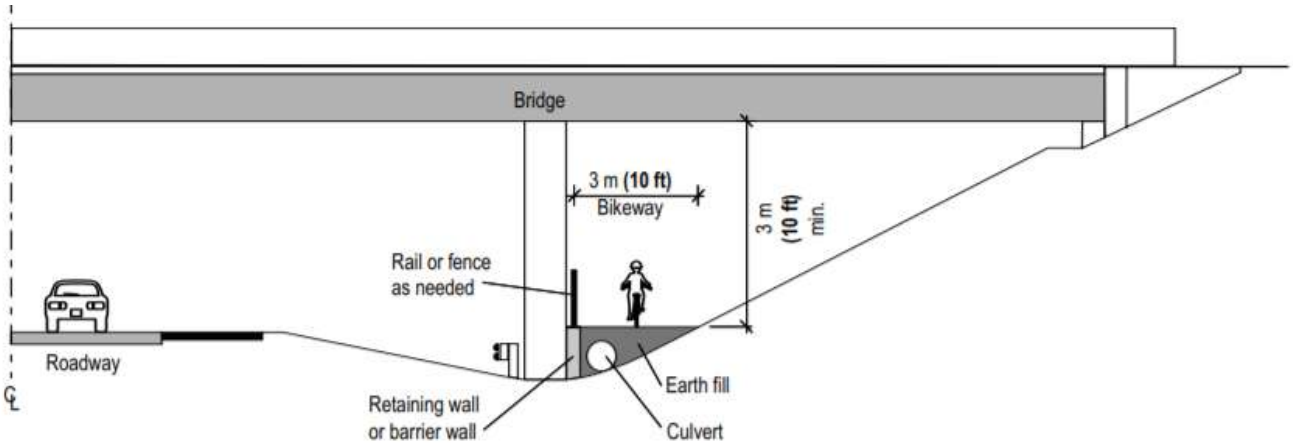
> Separating cyclists and pedestrians from vehicle traffic increases safety of all user groups.

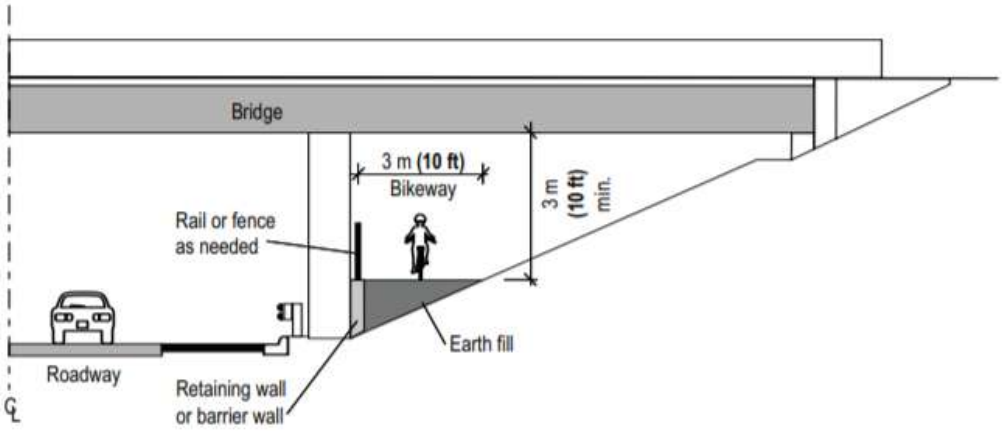
Design Recommendations

-It is preferred that bikeways have a width of 10 feet, but 8 feet may be allowable for short segments.

-Where access for emergency vehicles is necessary, vertical clearances shall be a minimum of 10 feet, otherwise vertical clearances over the bikeway shall be a minimum of 8 feet.

-Providing adequate drainage may also be a problem; providing a surface that does not become excessively slippery when wet is important. Proper drainage design is a key element to prevent wet silt deposits that are a common hazard for bicyclists using bridge underpasses.





Source: Minnesota Department of Transportation

Underpass and Tunnel Considerations

A bikeway underpass should be considered if there is no safe and direct on-street crossing, if the facility to be crossed is elevated, if an existing motor vehicle under-crossing is too narrow for a bicycle facility, and when the underpass would not require bicyclists to negotiate significant elevation changes. Underpass costs may be significantly lower than those for overpasses and encounter fewer constraints.

Benefits

>Underpasses are protected from weather and provide users from inclement weather. They also do not require snow removal or preventative application of deicing materials.

>Provides ability to reconnect divided neighborhoods and Provide critical connections within a municipality.

Design Recommendations

-Underpasses can be dark and intimidating to users and may pose safety concerns. Visibility through a tunnel and adequate lighting enhance users' perception of personal safety. For short underpasses or tunnels, modest lighting may all that is required. In many cases, lighting may be required on daily, 24-hour bases, especially for tunnels longer than 50 feet. All lighting should be recessed and vandal resistant.

-Underpasses are usually constructed of pre-cast concrete in a shape having the proper vertical/ horizontal clearances.

-Providing adequate drainage may also be a problem; providing a surface that does not become excessively slippery when wet is important. Proper drainage design is a key element to prevent wet silt deposits that are a common hazard for bicyclists using bridge underpasses.

-Underpasses need to be connected into Existing multi-use path networks with clear signage, adequate signage and ADA compatibility.

Above: Underpass in Northampton, Massachusetts
Below: Underpass in snowy winter of New Hampshire

Entrance Ramps/ Channelized Right-Turn Design

Some County arterials may contain high speed freeway-style channelized right-turn lane designs, which can create difficulties for bicyclists. The entrance lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles. Even with signage and striping improvements, free-flow ramps present significant challenges for pedestrians and bicyclists but getting bicycles across difficult to cross high-speed channelized turn lanes and entrance ramps is critical to the safety of cyclists.

Benefits

>Signage and striping provides a predictable environment to pedestrians, cyclists and vehicles.

Design Recommendations

-On low-speed entrance ramps (≤ 35 mph) the bike lane should travel straight through the merge area.

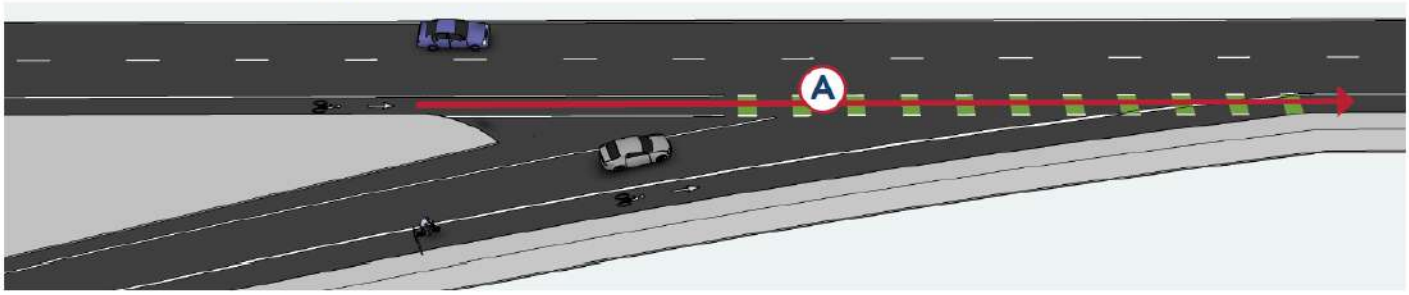
- Dashed lines, colored pavement and signs can be used to define bicyclist priority over merging traffic.

-At high-speed entrance ramps/ channelized right-turn lanes (≥ 40 mph), with dedicated receiving lanes, bicyclists should be encouraged to yield to merging traffic and cross when safe.

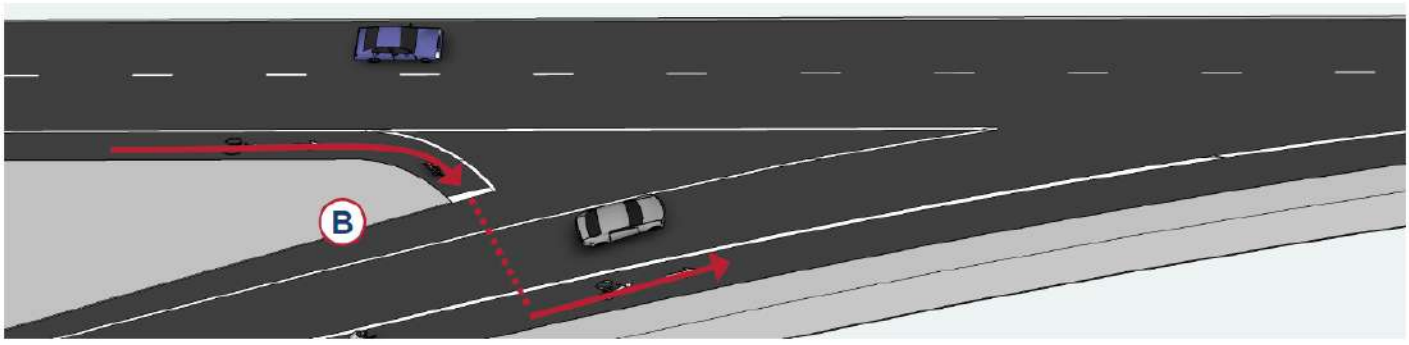
- Bike lane should be angled as close to a right angle as possible so as to increase the approach angle with entering traffic.

-The crossing should be positioned before the drivers' attention is focused on the upcoming merge.

Low Speed Entrance Ramp (Bicycle Priority)



High Speed Entrance Ramp (Motor Vehicle Priority)



Source: City of El Paso 2016 Bike Plan

Exit Ramps/ Channelized Right-Turn Design

Some County arterials may contain high speed freeway-style exit ramps and channelized right-turn lane designs, which can create difficulties for bicyclists. The entrance lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles. Even with signage and striping improvements, free-flow ramps present significant challenges for pedestrians and bicyclists but getting bicycles across difficult to cross high-speed channelized turn lanes and exit ramps is critical to the safety of cyclists.

Benefits

>Signage and striping provides a predictable environment to pedestrians, cyclists and vehicles.

Design Recommendations

-In constrained conditions, bicyclists may exit onto the sidewalk and complete the maneuver with pedestrians in the crosswalk.

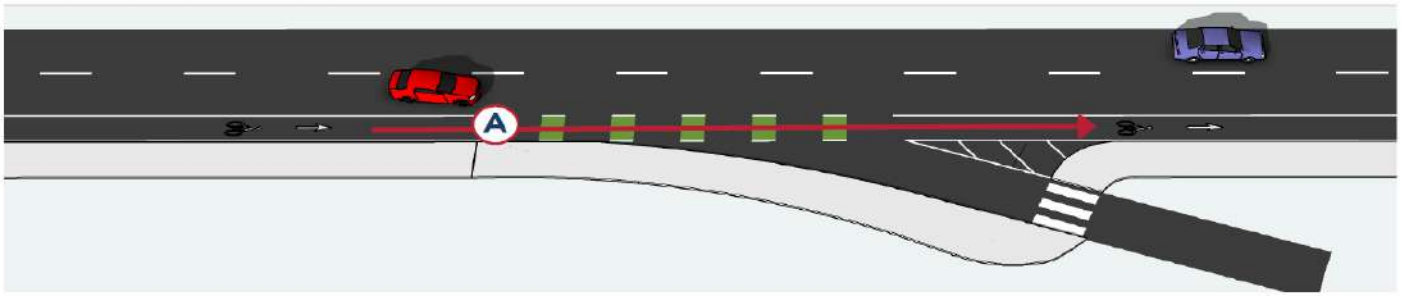
-On low-speed entrance ramps (≤ 40 mph) the bike lane should travel straight through the merge area.

- Dashed lines, colored pavement and signs can be used to define bicyclist priority over merging traffic.

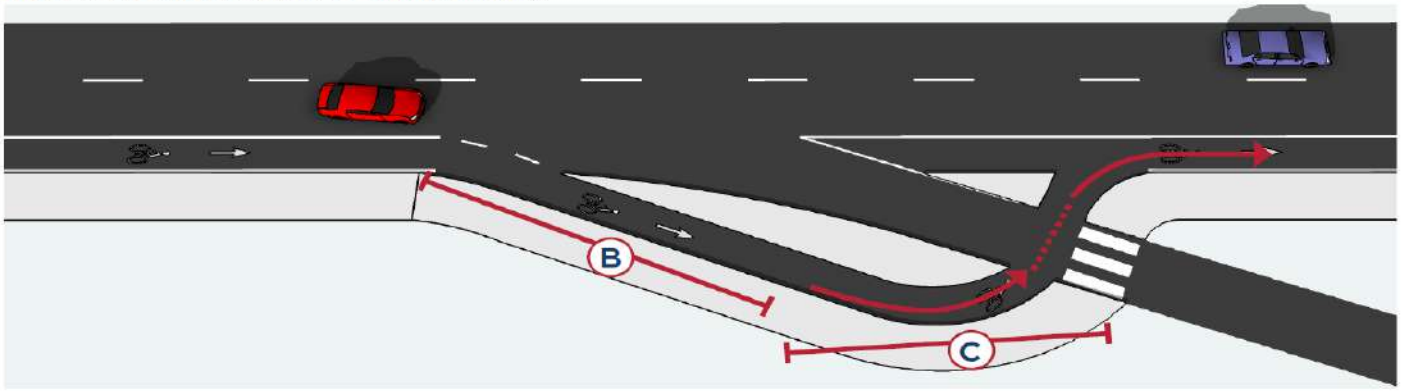
-On high-speed exit ramps (≥ 45 mph), use a jug handle turn to bring bicyclists to a visible location with exiting traffic.

- Design should include a *45 foot (35 foot minimum) taper from roadway.*
- Design should include a *45 foot (35 foot minimum) jughandle turn.*

Low Speed Exit Ramp (Bicycle Priority)



High Speed Exit Ramp (Motor Vehicle Priority)



Source: City of El Paso 2016 Bike Plan

Bicycle Facility Pavement Marking and Signage

Signs and pavement markings supplement good design, create a predictable environment for motorists/ cyclists and reinforce appropriate behavior for all roadway users. This section provides a summary of the most commonly used signs and pavement markings related to separated bike lane installation.

Figure 9B-2. Regulatory Signs and Plaques for Bicycle Facilities

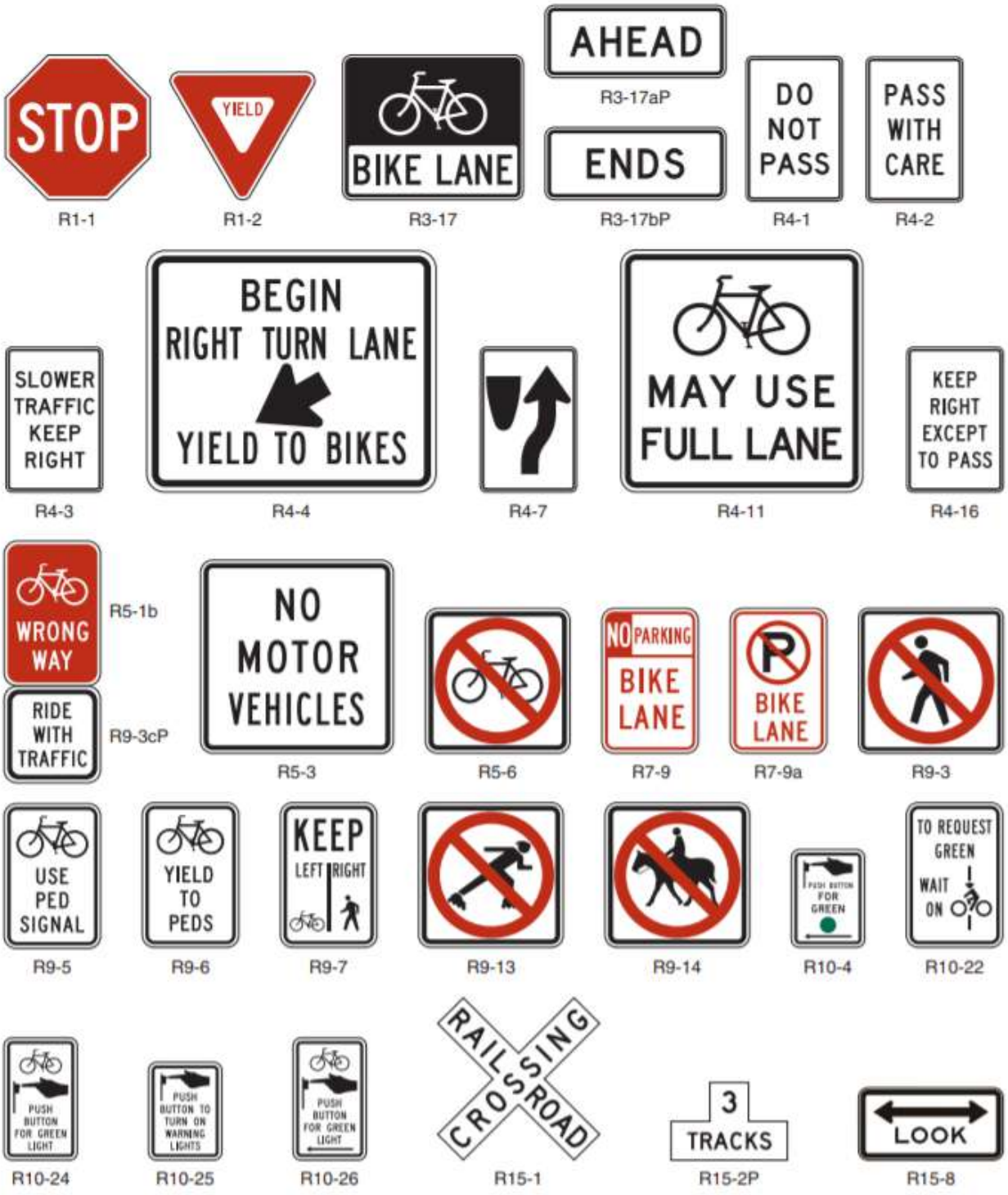
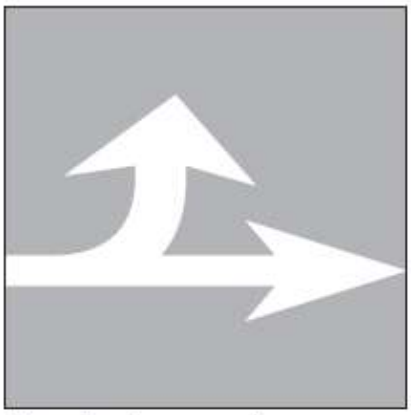


Figure 9B-3. Warning Signs and Plaques and Object Markers for Bicycle Facilities

★ A fluorescent yellow-green background color may be used for this sign or plaque. The background color of the plaque should match the color of the warning sign that it supplements.

MARKINGS GUIDANCE



Standard arrows for pavement markings (example shown)
MUTCD Fig. 3B-24

Bicycle pavement marking: bike symbol
MUTCD Fig. 9C-3

Bicycle pavement marking: helmeted bicyclist symbol
MUTCD Fig. 9C-3

Bicycle pavement marking: word legends
MUTCD Fig. 9C-3

Pavement marking
MUTCD Fig. 9C-5

Shared lane marking
MUTCD Fig. 9C-9

Bike detector pavement marking
MUTCD Fig. 9C-7

Recommended yield line pavement markings layout
MUTCD Fig. 3B-16

Figure 9C-3. Word, Symbol, and Arrow Pavement Markings for Bicycle Lanes

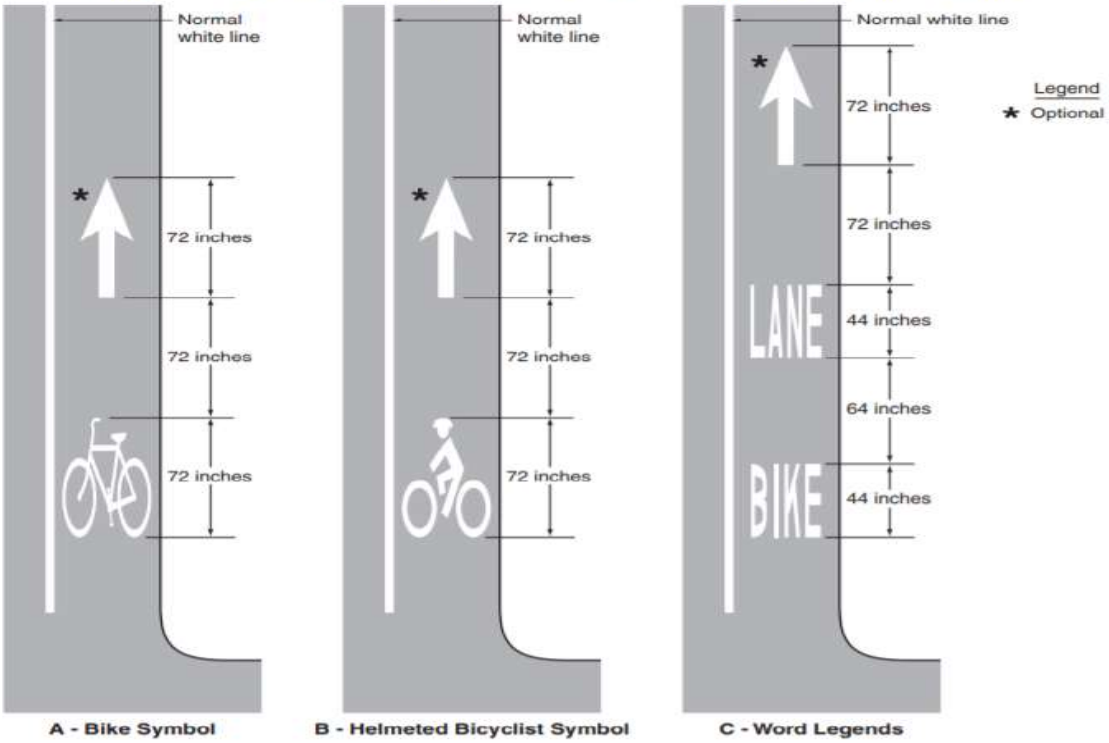


Figure 9C-4. Example of Bicycle Lane Treatment at a Right Turn Only Lane

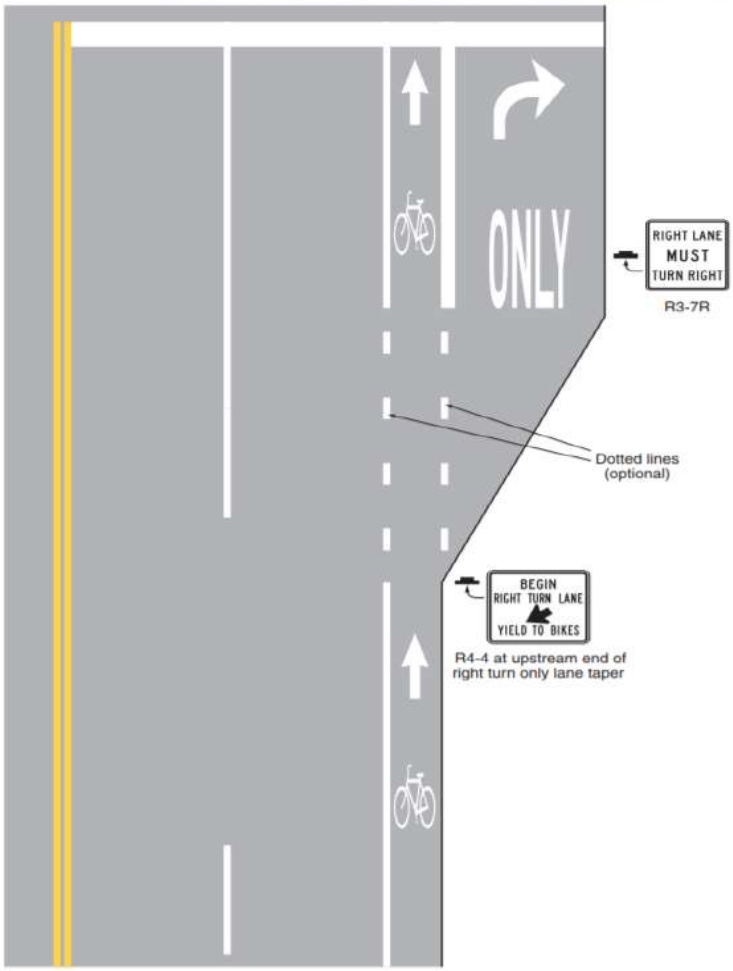


Figure 9C-1. Example of Intersection Pavement Markings—Designated Bicycle Lane with Left-Turn Area, Heavy Turn Volumes, Parking, One-Way Traffic, or Divided Highway

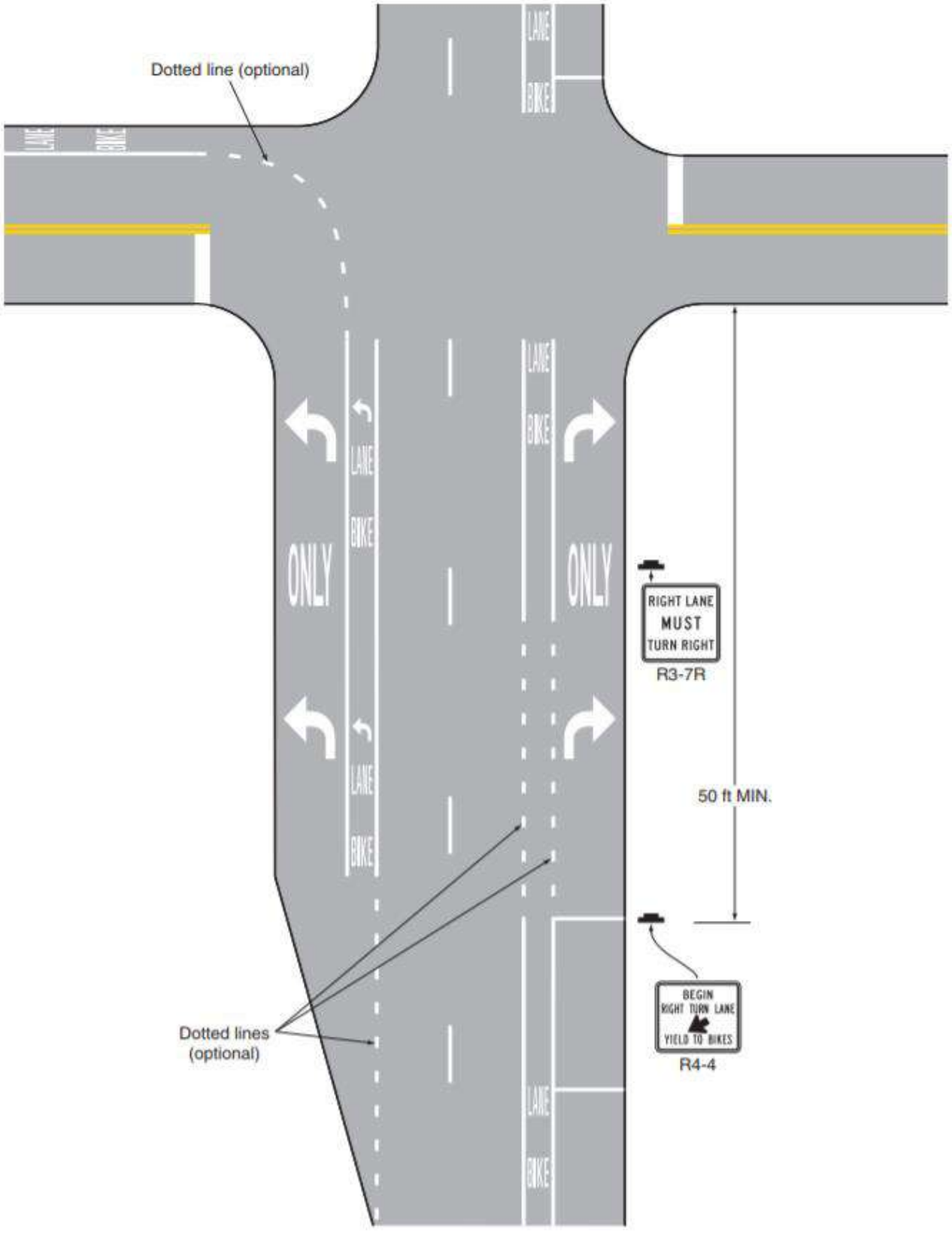
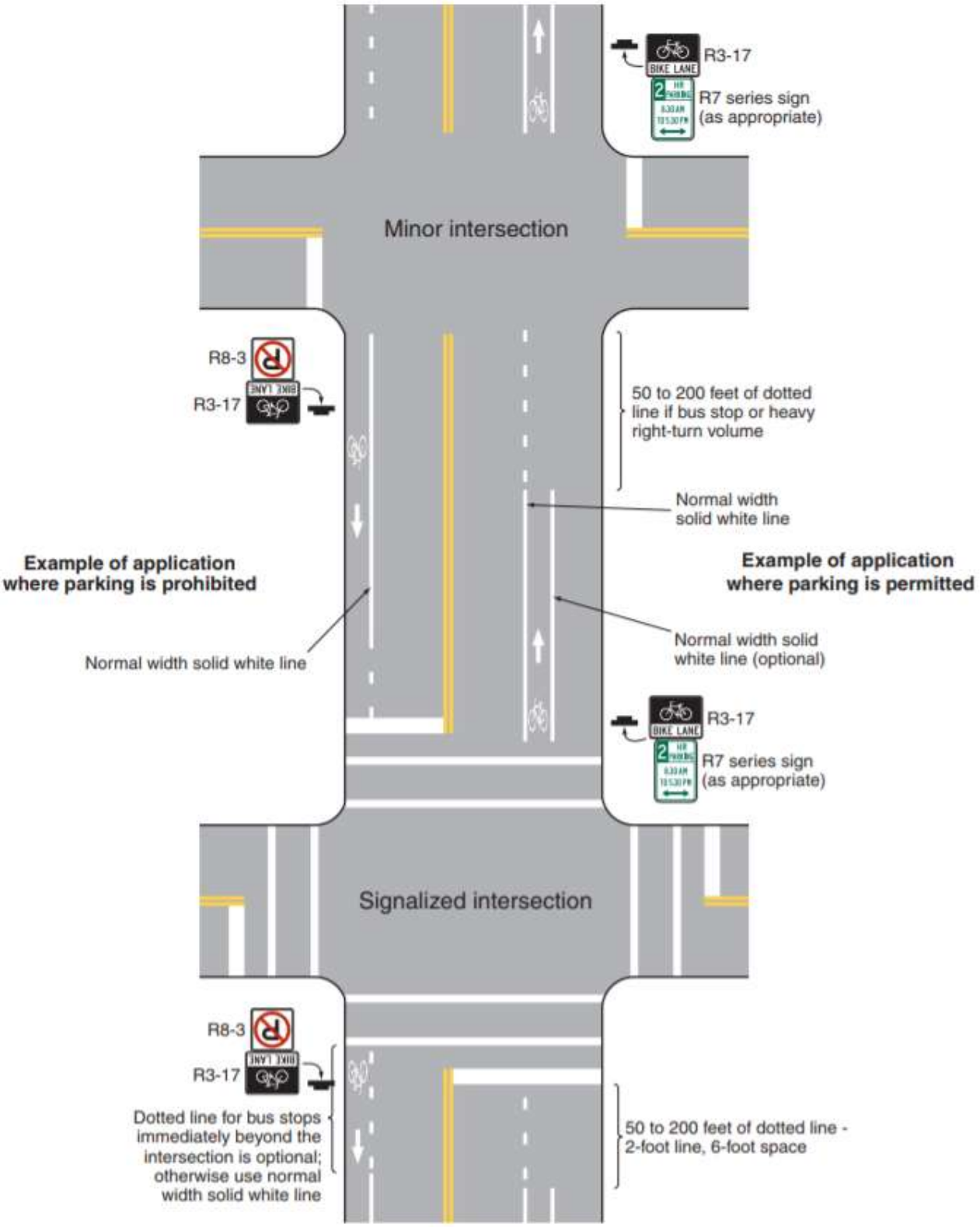


Figure 9C-6. Example of Pavement Markings for Bicycle Lanes on a Two-Way Street



IMPLEMENTATION

5

Implementing Bicycle Facilities

Implementing bicycle facilities on all Mercer County highways is a long term goal which may ultimately not be realized for every roadway. A series of recommended treatments are included in earlier chapters of this plan for consideration when and if implementation becomes feasible. These recommendations are based on the existing roadway conditions, traffic characteristics and realistic outcomes, as opposed to more idealistic targets which some residents may prefer. While these facilities are recommended at this time, future design phases may reveal preference for other facility types. As time passes and Mercer County becomes ever-denser and built out, roadway conditions as well as development patterns will change and this analysis may need to be updated.

Many County highways already have the capacity to incorporate bicycle facilities and only require a lane diet, or additional striping and signage. Other roadway segments however are less equipped and may require additional right-of-way, widening, drainage improvements, grading, vegetation removal, sign relocation, driveway or sidewalk relocation, or other significant design and construction improvements. As such, the County will initially target roadways that can easily accommodate bicycle facilities while simultaneously begin to advance more complicated segments as funding and project management capacity permit.

This chapter briefly reviews factors to be considered before, during, and after construction of on-road bicycle facilities. Long-term maintenance is a particular concern as is the Land Development process. In addition, motorist and cyclist education will become increasingly important as the network grows, and local police departments may need to step up enforcement of unsafe or uneducated motorists and cyclists.

Resurfacing, Reconstruction and Construction Project Cost Efficiencies

All levels of government operate with constrained budgets for building and maintaining roadways. Coupling a bicycle facility into another County project is more cost effective than undertaking a standalone project. When the County is looking at intersection improvement, corridor improvement, reconstruction, and resurfacing projects, significant savings can be achieved for implementing bike facilities. This is primarily due to reduced surveying, permitting, administrative, staging, mobilization, police enforcement and other costs that are built into any project. Regardless if bike facilities are included or not, these costs are observed within any project, so by incorporating bike facilities into a larger endeavor, significant saving can be grasped.

In 2016, FHWA published a report on Incorporating On-Road Bicycle Networks into Resurfacing Projects which explains the benefits and cost efficiencies of combining resurfacing projects with bicycle lane implementation. Mercer County has a pavement management system which takes into consideration various conditions to determine a resurfacing schedule for each work year. At some point, every County

roadway will need to be resurfaced and repaved and some may need full reconstruction. This provides the County with an opportunity to implement facilities at a relatively small added cost. For a majority of resurfacing projects, the only added costs for dedicated bicycle lanes would be that of paint and signage. In certain cases, new bicycle safe stormwater grates may need to be installed as well. As a result, the primary and cheapest method for bicycle facility implementation in Mercer County will be to implement projects within a resurfacing and reconstruction schedule.

Above: FHWA report on incorporating bicycle facilities into resurfacing projects.

The first step in incorporating bicycle facilities as part of resurfacing projects takes planning, which this report and its analysis serves (see reference table and maps). With a facility recommendation for every County highway, staff can quickly and easily identify road conditions (such as speeds, AADT, cartways, etc.) and determine how to best move forward. As our list of resurfacing projects is finalized, staff can begin to narrow down on feasible segments, begin to reach out to municipalities on coordination efforts, and begin to draft concepts. Feasible segments will have new striping plans prepared that will also oftentimes incorporate various complete street features in addition to bicycle facilities. Conceptual plans will be revised based on County Planning and Engineering staff comments and then circulated among municipal partners before being finalized. Once plans are accepted by all, they are sent over to County Traffic and Signal staff within the Mercer County Highway Division for implementation.

Add Bike Lanes (4-3 Road Diet, No Resurfacing)

Item	Unit	Quant.	2015 Est. Unit Cost	Total Cost per Mile	Comment
Eradication	LF	15,000	$1.50	$22,500	Assume 3 lines entire length
Bike Lane Lines: Thermoplastic (6")	LF	10,000	$1.50	$15,000	Assume 2 solid lines entire length
Travel Lane Lines: Thermoplastic (4")	LF	15,000	$1.00	$15,000	Assume two solid lines entire length and two striped lines at 50% coverage entire length
Bike Lane Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$12,000	Assume 1 Symbol every 250' each side of road (bike lane)
Bike Lane Sign	EA	20	$250.00	$5,000	Assume 1 Sign every 500'
Left-Turn Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$6,000	Assume 1 symbol every 250' (Left-Turn arrows)
Lump Sum Items					
Maintenance of Traffic (10%)	LS	1.00	$7,500	$7,500	
			Subtotal	**$83,000**	
			20% Contingency	$17,000	
			Total Estimated Cost	**$100,000**	

Add Bike Lanes (4-3 Road Diet, Full Resurfacing)

Item	Unit	Quant.	2015 Est. Unit Cost	Total Cost per Mile	Comment
Eradication	LF	15,000	$1.50	$0	Not necessary with resurfacing
Bike Lane Lines: Thermoplastic (6")	LF	10,000	$1.50	$15,000	Assume 2 solid lines entire length
Travel Lane Lines: Thermoplastic (4")	LF	15,000	$1.00	$0	Included with resurfacing project
Bike Lane Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$12,000	Assume 1 Symbol every 250' each side of road (bike lane)
Bike Lane Sign	EA	20	$250.00	$5,000	Assume 1 Sign every 500'
Left-Turn Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$0	Included with resurfacing project
Lump Sum Items					
Maintenance of Traffic (10%)	LS	1.00	$3,922	$0	Included with resurfacing project
			Subtotal	**$32,000**	
			20% Contingency	$6,400	
			Total Estimated Cost	**$38,400**	

Above: Chart showing cost difference of implementing a 1 mile Bike Lane & Road Diet as standalone project vs. when resurfacing.
Source: FHWA, Incorporating On-Road Bicycle Networks into Resurfacing Projects

Above: Shared-use path cantilevered off an existing bridge. Source: Small Town and Rural Design Guide

Following resurfacing, the County or County contractors will restripe the road and install signage as needed. During this time, Mercer County may narrow travel and turn lanes to 11' or 12' in width. This reduction oftentimes provides the space required for bicycle lanes and serves to act as a traffic calming measure. In certain cases, a road diet may be implemented which will reduce the number of travel lanes. This is most often a reduction of 4 travel lanes to 2 travel lanes with a center turn lane. This has not only the benefit of providing space for bicycle lanes but also has been proven to reduce crash rates for vehicles. Traffic congestion may also be reduced, as vehicles in the travel lane have free-flow movement while all left turning movements are moved outside of the travel lane. A reduction in the number of through lanes can calm traffic, reduce weaving, reduce the number of lanes for pedestrians to cross, and reduce left-turn conflicts as well as head-on & side swipe crashes from opposing traffic. Road diets going from 4 to 3 lanes will be considered on a case by case basis and only if AADT is below 25,000. These types of projects may need to undergo further evaluation and will be implemented at the discretion of the County Engineer.

Additional steps in the planning process include reaching out to our municipalities to coordinate efforts and work with municipal councils to enact potential no parking ordinances, debris ordinances and resolutions of support. This also allows municipalities to work with the County on their own complete street efforts and allows for a larger scale network projects that may complement County improvements. Given that the County only finalizes its annual paving program the year before the construction season, time for coordination may be short. Projects may need to be split into two phases which may require a bikable shoulder before a full bicycle facility is implemented. The County will however make every effort to provide municipalities with time to review and comment on facility improvements.

For larger project such as roadway, bridge and culvert reconstruction, bicycle and pedestrian facilities need to be considered early in the process. This is to provide enough time to identify the facility required, determine right-of-way, to calculate impact and added cost, to determine drainage, utility or permitting issues, and other considerations. In some case, especially those on high speed and high volume roadways, accommodating bikes and pedestrians may require an off road multi-use path or path that is built into or cantilevered off an existing bridge.

Improvements to Be Considered

At the time of this Master Plan Element effort, Mercer County has begun implementing pilot bicycle improvements along several routes to work out the implementation workflow and better understand conflicts and opportunities. This implementation is based primarily on our paving schedule and includes segments that can easily accommodate facilities within the existing cartway. As part of the 2019 Pilot Bicycle Paving Program, staff oversaw design and implementation of 6.78 miles of new bicycle lanes on: N Main Street (CR 539) in Hightstown, Ewingville Road (CR 634) and Scotch Road (CR 611) in Ewing, Elm Road (CR 604) in Princeton and East State Street (CR 535) in Hamilton, and oversaw implementation of bicycle sharrows on Ingleside Ave (CR 631) in Pennington.

As we move forward with future resurfacing seasons, the County will gain valuable experience and grow the bicycle facilities from individual segments to long distance interconnected network. In certain cases, bikable shoulders may need to be phased in first before designating an official bicycle route. Official designation will oftentimes take place when practical extents can be achieved, such as when longer continuous segments and connections can be created or two major nodes are connected. For larger projects on longer timeframes, which may need traffic signal alterations, right-of-way, or geometrical changes, the County may either design facilities in house or work with outside contractors to develop design plans for construction.

Above: Final concept plan for bike lanes on Elm Street in Princeton.

PROJECT: **Scotch Road (CR 611) Complete Street Improvements**
Road Diet, Bicycle Lanes, Pedestrian Crossings & ADA Ramps

DATE: **August - November 2019**

TOWN: **Ewing Township**

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Road Diet, Bicycle Lanes, Pedestrian Crossings & ADA Ramps

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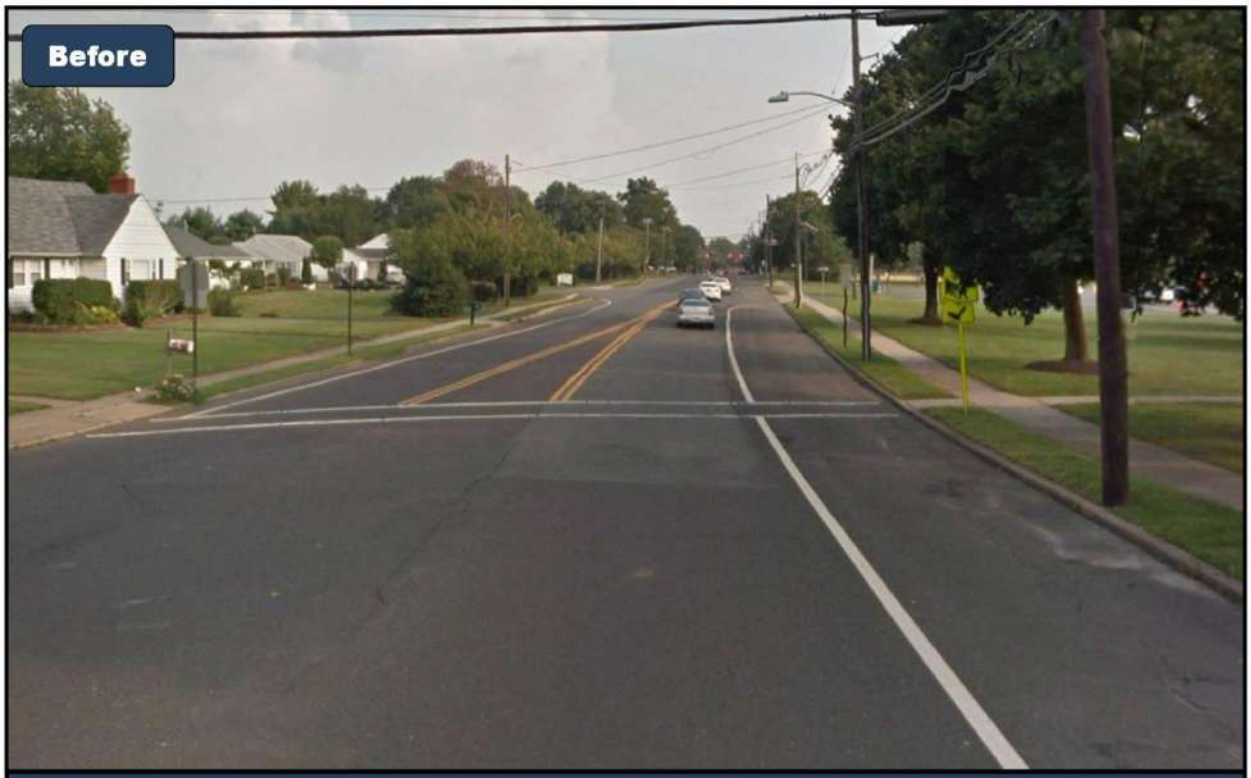


PROJECT: **Ewingville Road (CR 636) Complete Street Improvements**
Road Diet, Bicycle Lanes, Pedestrian Crossings & ADA Ramps

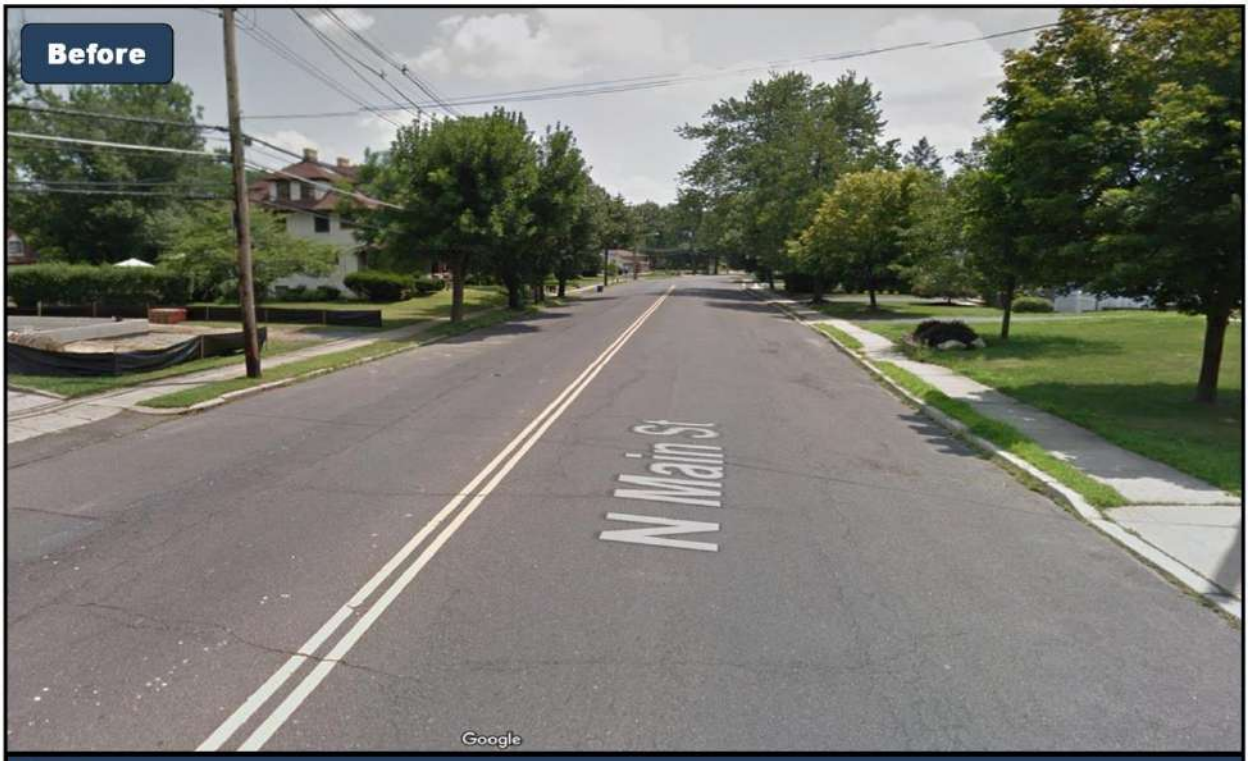
DATE: **August 2019**

TOWN: **Ewing Township**

PROJECT: **Ewingville Road (CR 636) Complete Street Improvements**
Road Diet, Bicycle Lanes, Pedestrian Crossings & ADA Ramps

DATE: **August 2019**

TOWN: **Ewing Township**



PROJECT: **N Main Street (CR 539) Complete Street Improvements**
Bicycle Lanes, Pedestrian Crossings & ADA Ramps

DATE: **September 2019**

TOWN: **Borough of Hightstown**

PROJECT: **N Main Street (CR 539) Complete Street Improvements**
Bicycle Lanes, Pedestrian Crossings & ADA Ramps

DATE: **September 2019**

TOWN: **Borough of Hightstown**

PROJECT: **Ingleside Ave (CR 631) Complete Street Improvements**
Mini-Roundabout, Bicycle Sharrows, Pedestrian Crossings & ADA Ramps

DATE: **July 2019**

TOWN: **Borough of Pennington**

PROJECT: **Ingleside Ave (CR 631) Complete Street Improvements**
Mini-Roundabout, Bicycle Sharrows, Pedestrian Crossings & ADA Ramps

DATE: **July 2019**

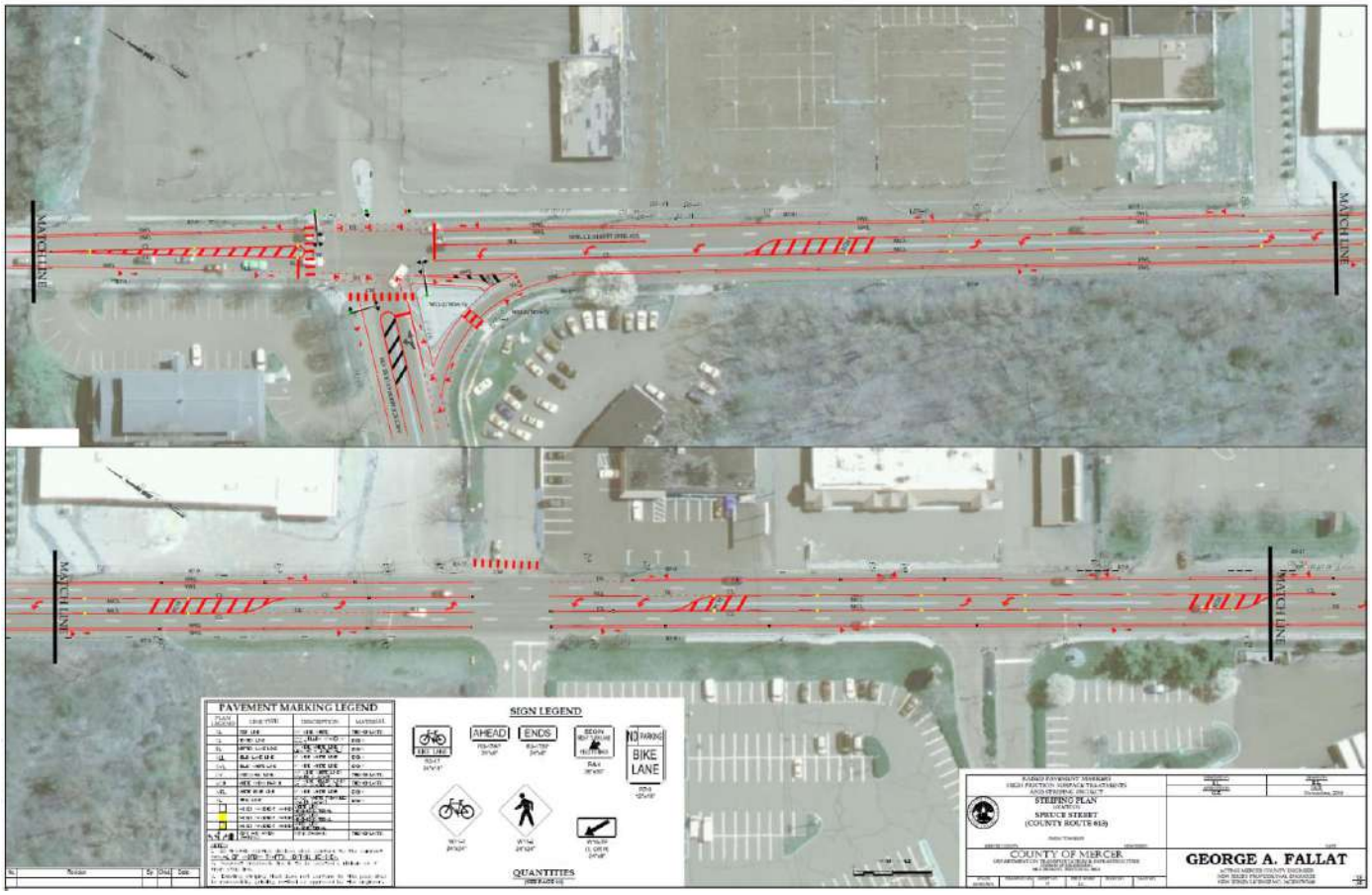
TOWN: **Borough of Pennington**

PROJECT: **East State Street (CR 535) Bicycle Lanes**

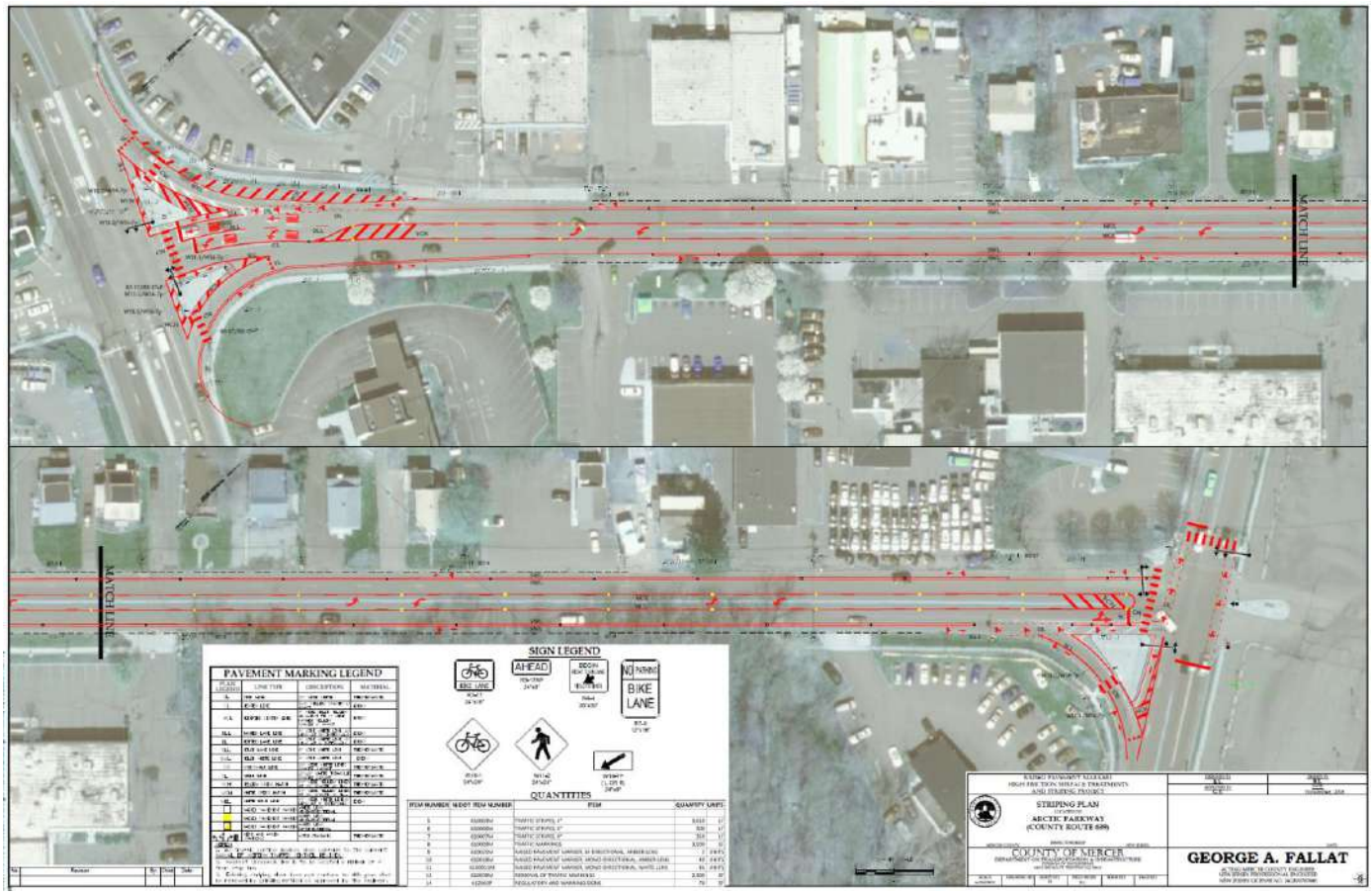
DATE: **December 2019** | TOWN: **Hamilton Township**

PROJECT: **East State Street (CR 535) Bicycle Lanes**

DATE: **December 2019** | TOWN: **Hamilton Township**



Above: Preliminary draft plans for a future road diet and bicycle lanes on Spruce Street (CR 613) at Mercer Crossings.



Above: Preliminary draft plans for a future road diet and bicycle lanes on Arctic Parkway (CR 639) at Mercer Crossings.

Programs and Policies

Once facilities are constructed, it will be essential for the community to utilize these facilities in a safe manner. Proper design and physical infrastructure can only go so far in creating a safe and comfortable environment. It is up to motorists and cyclists to follow state and local laws when using public facilities. Programs sponsored by nonprofits, non-government organizations and municipalities can educate the public of laws and etiquette to foster a mutual respect between cyclists and motorists. Supportive policies across jurisdictions also can ensure that the facilities are properly maintained. The following programs and policies may contribute.

Education

Educational programs provide roadways users with information about their rights, duties, responsibilities, and applicable laws that can promote a predictable, safe and comfortable ride for all. Educational programs can take many forms. Schools can teach students the proper rules of the road and their responsibilities as cyclists. Driver education programs for young adults and new drivers should include an emphasis of riding with multiple road users such as pedestrians and cyclists. Hands-on training for the community can also be incorporated.

Within Mercer County, organizations such as the Greater Mercer TMA have led the way in road user education. Some of their many programs include bike safety and pedestrian safety education, travel training, walking school bus, community fairs, walkability audits, safe routes to school projects, Bicycle Rodeos / Skills Clinics, and many more. Many municipalities and school districts also have their own programs. The County should continue to work with these organizations to promote public education. In addition, driver education and reeducation should be increased and the NJ DMV should be brought into the conversation regarding new laws and regulations as well as updated MUTCD signs and traffic control.

Source: https://gmtma.org/

Enforcement

Bicycling in New Jersey is regulated under Title 39 of the Motor Vehicles and Traffic Regulation laws and enforced by local jurisdictions. Enforcement by a ticketing agency such as the local police department ensures that laws and regulations are followed and that each person's road rights are provided. Aggressive, speeding, distracted and drunk drivers should be targeted as they pose the greatest threat to pedestrians and cyclists. The State of New Jersey is an FHWA 2019 designated "Pedestrian and Bicycle Focus State", which means that NJ has one of the highest fatalities and/or fatality rates in this category. Moving forward, it will be important for local jurisdictions, the County and the State to work together not only to improve facilities but to enforce the proper use. Police are important in ensuring that drivers and cyclists follow laws and regulations for their safety and other road user's safety. It is especially important that local police enforce bicycle design elements such as No Parking ordinances. These are specifically established so that cyclists have a clear and continuous travel lane. Parked cars, trucks, and or trailers create obstructions that require cyclists to swerve into vehicle lanes and hazardous situations. Keeping drivers from speeding is also important as higher speeds equate with higher fatality rates. Some current laws relevant to cycling are listed in the callout box below. For the full set of regulations and laws as well as updates, please check with the state:

IMPORTANT STATE BICYCLING LAWS UNDER TITLE 39

Title 39:4-14.5 Definition

"Bicycle" means any two wheeled vehicle having a rear drive which is solely human powered and having a seat height of 25 inches or greater when the seat is in the lowest adjustable position.

Title 39:4-10 Lights on Bicycles

When in use at nighttime every bicycle shall be equipped with: 1) A front headlamp emitting a white light visible from a distance of at least 500 feet to the front; 2) A rear lamp emitting a red light visible from a distance of at least 500 feet to the rear; 3) In addition to the red lamp a red reflector may be mounted on the rear.

Title 39:4-11 Audible Signal

A bicycle must be equipped with a bell or other audible device that can be heard at least 100 feet away, but not a siren or whistle.

Title 39:4-14.1 Rights and Duties of Persons on Bicycles

Every person riding a bicycle on a roadway is granted all the rights and subject to all of the duties of the motor vehicle driver.

Title 39:4-14.2, 39:4-10.11 Operating Regulations

Every person riding a bicycle on a roadway shall ride as near to the right roadside as practicable exercising due care when passing a standing vehicle or one proceeding in the same direction. A bicyclist may move left under any of the following conditions: 1) To make a left turn from a left turn lane or pocket; 2) To avoid debris, drains, or other hazardous conditions on the right; 3) To pass a slower moving vehicle; 4) To occupy any available lane when traveling at the same speed as other traffic; 5) To travel no more than two abreast when traffic is not impeded, but otherwise ride in single file. Every person riding a bicycle shall ride in the same direction as vehicular traffic. In New Jersey, the law states a bicyclist must obey all state and local automobile driving laws. A parent may be held responsible for the child's violation of any traffic law.

Title 39:4-10.1

In New Jersey, anyone under 17 years of age that rides a bicycle or is a passenger on a bicycle, or is towed as a passenger by a bicycle must wear a safety helmet.

Equity

The American Planning Association states that, “Mobility and access to opportunity are essential to move the needle toward equity. Groups disproportionately challenged by mobility needs, and those in traditionally underserved communities, include low-income people, people of color, people with disabilities, people with lower levels of education, and the old and the very young. Without access to jobs, schools, health care, healthy foods, recreation, goods, and services, it is difficult to envision a pathway to opportunity” (Planning for Equity, 2019)

Mercer County understands that improving transportation opportunities for all people is critical to providing our residents with connections that will allow them to meet basic needs, be engaged in their communities, thrive, and contribute to the economy. Having a data driven construction and maintenance program ensures that all communities are equally represented, regardless of political sway or wealth. Social equity also means that impoverished urban communities are just as much represented as affluent rural and suburban communities. Moving forward, all repaving jobs will be reviewed to determine is bicycle facilities are appropriate, feasible and can be efficiently implemented regardless of community wealth.

In cases where dedicated facilities cannot be implemented on County Routes, alternative routes may be feasible and recommended via local roads, private property or via trails. Certain urban County roads may have limited cartway and buildings located just feet from the curb which make widening all but impractical without massive community disruption. Other routes may have on-street parking that the community does not wish to remove. Certain rural roads may require massive slope adjustment and environmental impacts. At such time when facilities are not feasible, the County can work with community groups, non-profits and municipal representatives to find alternatives so every community can be represented.

Encouragement

Promoting a community that has a bike-friendly culture and appropriate facilities can increase the number of bicyclists. Businesses that provide shower and locker facilities for their employees and bike parking for customers go a long way to promote the culture. College campuses are especially ripe centers for cycling as students living on or near campus often do not bring personal vehicles to school or live close enough to ride to and from class. Princeton University has an especially proactive cycling policy and heavily promotes cycling as a transportation mode. The University even has 3,600 bicycle parking spaces scattered throughout its campus with plans for more as it develops its Lake Campus.

Recently, Princeton University and the County have both partnered with private bike-share companies to provide bicycles in select locations. Princeton welcomed Zagster bike-share to campus in early 2016 and charges members a one-time $20 fee, and through a smartphone app (iPhone/Android) members can rent a bike from any of its current 14 locations (with more planned). In 2019, The County of Mercer, the Mercer County Park Commission and Zagster have launched a bike-share program now available to the public in the County Parks system. Bikes are located at Mercer County Park near the 9/11 memorial and in Mercer Meadows, located both at Rosedale Lake and the Red Barn in Pole Farm section of the park. Ten bikes are at each location and can be rented by downloading the app.

County Executive Brian M. Hughes said that, “One of my goals is to make Mercer County more bike-friendly, whether it is on our county roadways or in our parks. The bike share provides our park users with a recreational activity that promotes both fun and fitness.” A future expansion is anticipated that will include more County locations. Companies are also looking into municipal projects and parks as well.

Implementing bicycle rentals as well as parking at public spaces, parks, historical sites and other destinations allows bicycle riders to feel like they are welcomed and open to ride their bicycles. It gives them a place to rent bike if they do not have one or lock up their private bike without worry of a ticket or police confiscation. This not only puts more bikes on the road but takes also takes vehicles off the road which reduces congestion, air/water pollution and reduces the wear and tear on our roadway. Having town policies (both official and unofficial) which make biking safer and more enjoyable makes residents feel more comfortable and more likely to cycle.

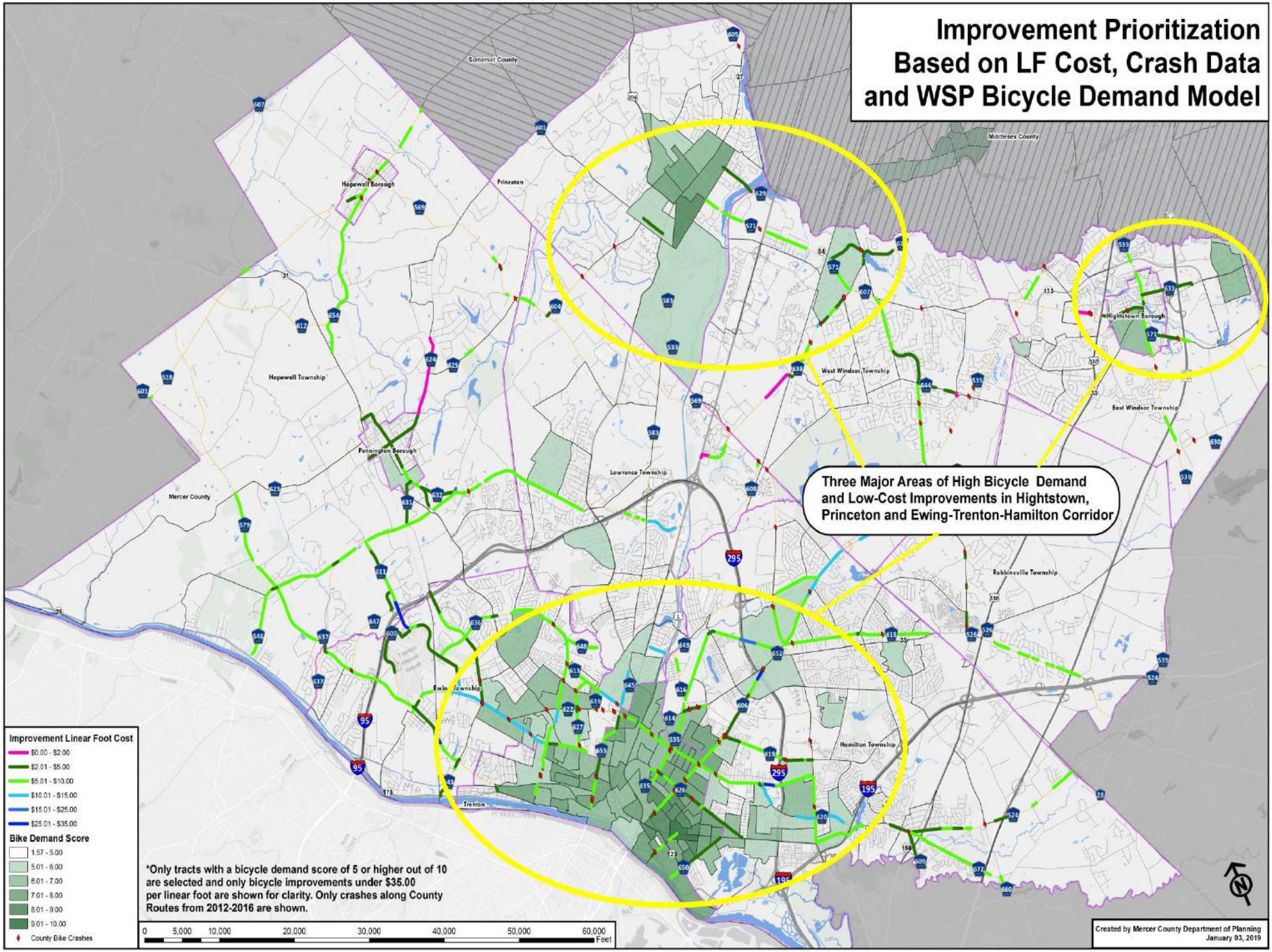
Prioritization Possibilities

With approximately 180 miles of County roads, it is important to prioritize improvements. Not only is funding limited but municipal cooperation and citizen support are required to widen roadways, improve intersections, and possibly remove parking. To make prioritization simpler, more efficient, and data drive, the County has overlaid a linear foot cost of improvements over the WSP Bicycle Demand Model to show where facilities can be improved at the lowest cost and where demand is highest.

The map on the following page shows route segments where total costs (both construction and design) come out to less than $35 per linear foot (LF). They are overlaid on census tracts that, according to the WSP Bicycle demand model, have the highest demand for bicycle facilities (further explanation can be found in the 2020 GMTMA Trail Plan). Only those tracts with a score of 5 or higher are included on the following map. In addition, bicycle crashes along county routes (2012-2016) are also shown. These three factors, safety need, cost, and demand, provide a data driven method for prioritizing facility improvements and upgrades.

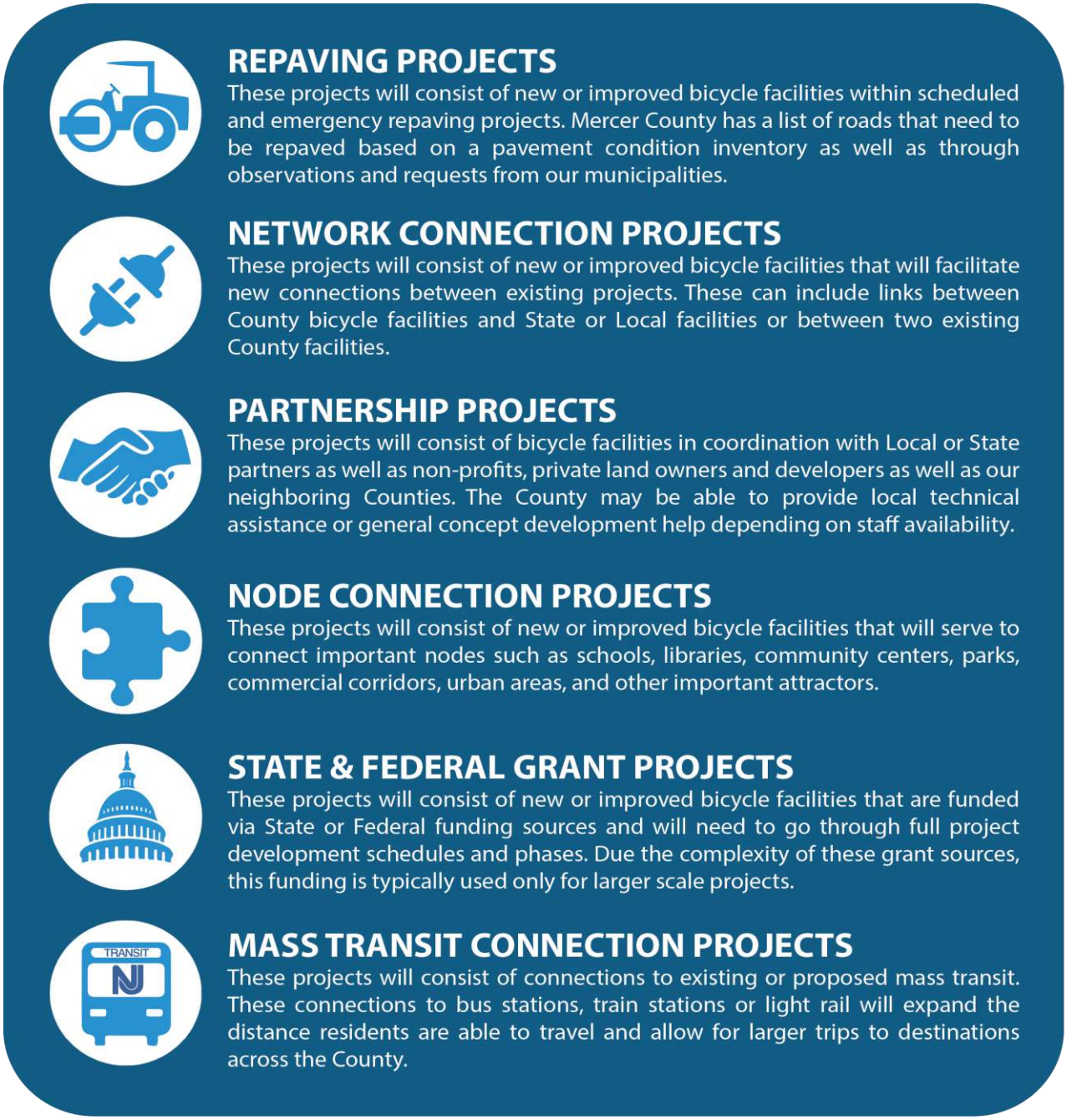
Of the three areas that most fit the three prioritization criteria, the Ewing-Trenton-Hamilton urbanized cluster stands out most clearly. This part of the County has high concentration of bicycle crashes, high bicycle demand, as well as facilities that can be upgraded at a cost under $35 per LF, with most routes coming in at under $10 per linear foot. This three town area (including a small section of Lawrence Township as well) is where the County can see the greatest impact for the lowest cost for our residents. The areas around Princeton, West Windsor, and Hightstown also meet the prioritization criteria, though these areas have fewer reported crashes. Several roads in those areas can be retrofitted at a nominal cost. Though facilities are needed across the entire county, efforts could be made to improve connections and conditions on routes in these areas in the near term to benefit the largest number of residents at an economical cost.

It is important to be realistic with prioritization and implementation. In many cases, alternative routes may be required for certain segments where implementation isn't feasible for physical or financial reasons. Projects that require massive widening or demolition of structures are unlikely to take place unless there is significant community support and funding available. As such, large scale projects will be undertaken on a case by case basis, which are oftentimes championed by municipal officials or local community groups.


Improvement Prioritization Based on LF Cost, Crash Data and WSP Bicycle Demand Model
Three Major Areas of High Bicycle Demand and Low-Cost Improvements in Hightstown, Princeton and Ewing-Trenton-Hamilton Corridor
Somerset County
Middlesex County
Mercer County
Hopewell Borough
Hopewell Township
Pennington Borough
Princeton
Lawrence Township
West Windsor Township
East Windsor Township
Hightstown Borough
Robbinsville Township
Ewing Township
Hamilton Township
Trenton
Improvement Linear Foot Cost
$0.00 - $2.00
$2.01 - $5.00
$5.01 - $10.00
$10.01 - $15.00
$15.01 - $25.00
$25.01 - $35.00
Bike Demand Score
1.57 - 5.00
5.01 - 6.00
6.01 - 7.00
7.01 - 8.00
8.01 - 9.00
9.01 - 10.00
County Bike Crashes
*Only tracts with a bicycle demand score of 5 or higher out of 10 are selected and only bicycle improvements under $35.00 per linear foot are shown for clarity. Only crashes along County Routes from 2012-2016 are shown.
0 5,000 10,000 20,000 30,000 40,000 50,000 60,000 Feet
Created by Mercer County Department of Planning
January 03, 2019

Project Implementation Categories

Over the next 10 years, the County will undertake a number of projects to create new bicycling infrastructure. As the County moves forward with implementation we will work with local and State partners as well as developers, non-profits and residents. Future short term and long term projects can be roughly broken into one or more of the categories below:



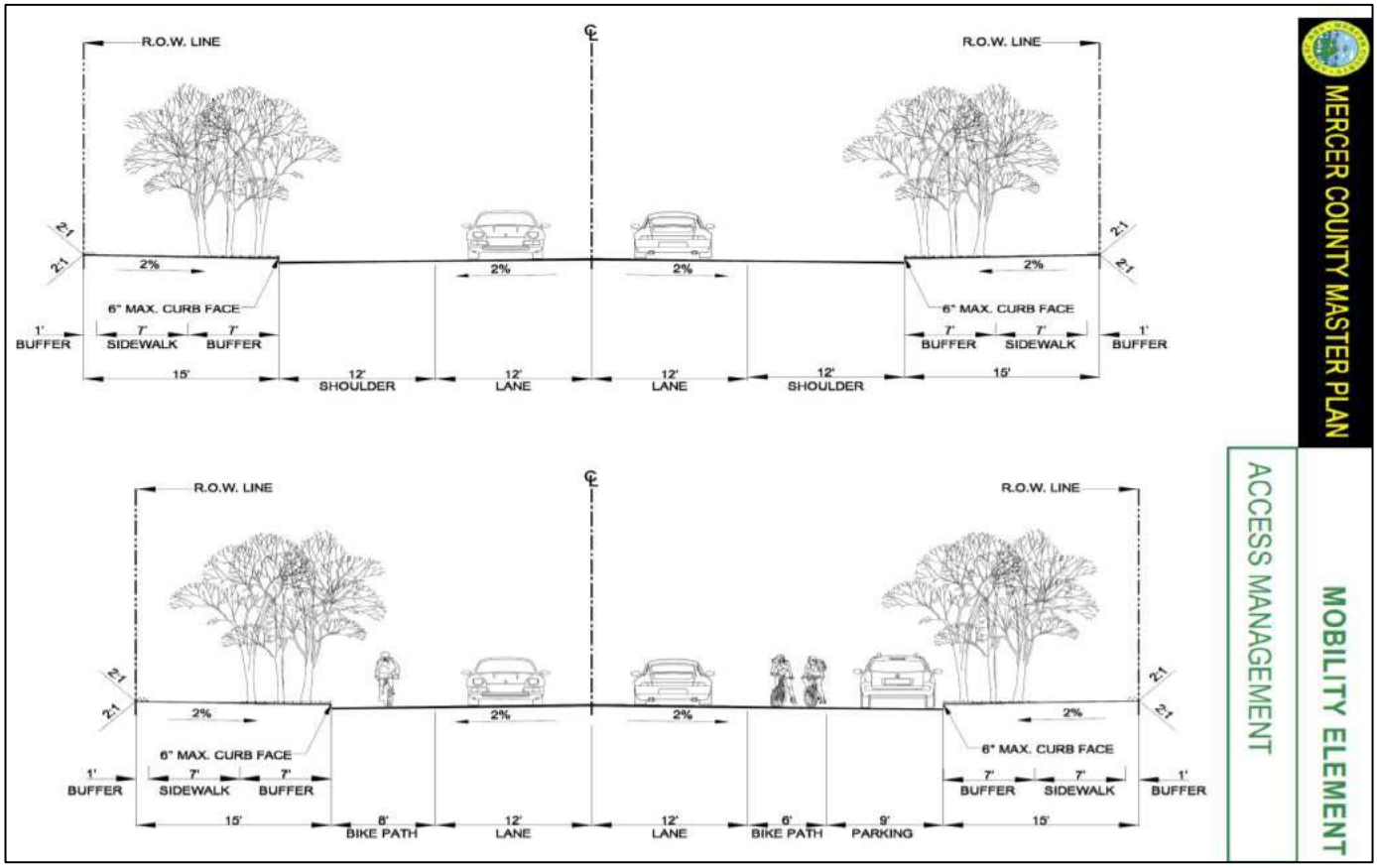
Planning Board & Land Development

New Jersey's Municipal Land Use Law (*N.J.S.A. 40:55D-1 et seq.)* gives towns and cities responsibility for managing land use, while the County Planning Act (*N.J.S.A. 40:27-1 et seq*.) reserves to Counties responsibility for maintaining the safety and capacity of the shared stormwater management system and the County highway network, which provides mobility between towns (600 routes) and between counties (500 routes). With representatives from the Freeholder Board and the County Administration, and through the Land Development Review process, the County Planning Board seeks to balance the desires of private developers with the general welfare and safety of the traveling public.

In compliance with the County's Complete Streets policy and this sub-element of the County Master Plan, the County Planning Board and staff should consider bicycle and pedestrian facilities during review of subdivision and site plans. Through the County Land Development process, the Planning Board may require the installation of bicycle and pedestrian facilities on County highways or require that accommodations to be made for future projects. Where municipal streets provide potentially desirable bicycle access to the County network, the Planning Board may recommend consideration of bicycle safety improvements on those streets. These actions by the planning board and staff are vital to implementing our Complete Streets Policy and to accommodate all abilities and modes of travel. While this plan provides specific data driven facility type recommendations for every County Highway, based on current best practices and standards, final design decisions and implementation schedules are at the discretion of the County Engineer.

While this Bicycle Facility Master Plan offers design standards and facility type recommendations for bicycle mobility, the Mercer County Master Plan Mobility Element does the same for all modes, with emphasis on motor vehicle traffic. The Mobility Element identifies five roadway types or 'access levels' for County highways, with desirable typical sections (DTS) that define right of way requirements and facilities for travel by motor vehicle, bicycle, foot, and wheelchair. (Future editions and updates of the Mobility Element and this Bicycle Plan may include consideration of electric bicycles and other micro-mobility devices.)

Maps within the Mobility Element display DTS assignments for each segment of County Highway, as well as comparable DTS assignments for State Highways, from the New Jersey Highway Access Code (*N.J.A.C. 16:47*). County access level and DTS assignments are displayed in tabular form in Appendix A of the Mobility Element, comparable to bicycle facility type recommendations in Chapter 3 of this plan. These DTS assignments define right-of-way dedications required for approval of subdivision and site plans. Within these DTS assignments, right of way is identified to include shoulders or on- street parking, bicycle lanes, sidewalks, buffers, as well as vehicular travel lanes and medians or center left two way turn lanes.



Above: Two implementation alternatives of Mercer County DTS 2A, the bottom of which shows bicycle facilities.

Examples of incorporating facilities into the land development process may include:

- On high speed and high volume roads, on-road bicycle facilities may be undesired or inappropriate. When multi-use paths are more feasible, or in many cases necessary, to accommodate bicycle and pedestrian users, an 8'-10' paved multi-use path should be requested rather than a 5' concrete sidewalk. As parcels redevelop over time and funding is available for dedicated projects, a continuous interconnected network will be created.
- For sidepath project, DTS assignments should be reviewed to determine required easements & dedications.
- At intersections where widening is necessary to accommodate continuous bicycle facilities, right of way and curb lines should be set to appropriately. Typically an additional +/-10' may be required to accommodate one bicycle lane in each direction.
- As parcels redevelop over time, some may need to replace deteriorating curb or construct new curb along the frontage. Where feasible, the County Engineer may request curb and sidewalk to be set to accommodate road widening.
- Though the County does not have jurisdiction over land use, the Planning Board may recommend bicycle accommodations to applicants, such as bicycle racks and or lockers. For major residential and commercial development projects, applicants should consider internal bicycle facilities, such as bike lanes or trails, that link to the County or Municipal network. The Planning Board may also recommend consideration of connections to adjacent existing or proposed trails.

Maintenance

Long term maintenance must be considered for proper functionality of bicycle facilities. Just like regular vehicle lanes, bike lanes should be kept clear of debris, free of hanging vegetation, free of standing water, free of parked vehicles and require removal of snow during the wintertime. In addition, a proactive and reactive de-icing program in conjunction with snow removal is necessary to help maintain good riding conditions along bikeways in the winter.

Mercer County already has the necessary programs, maintenance vehicles, and equipment to clear our roadways of debris, clear snow and to maintain our pavement. These vehicles are also available to clear bike lanes and shoulders in the same manner as vehicle lanes or shoulders, so long as there is no impediment for maintenance vehicles. Due to the cost of new trucks and machines, the County at this time can realistically only maintain roadways without impediments such as pylons, planters or other items that prevent our plows or sweeping trucks from navigating down these lanes.

As a result, Mercer County at this time does not use plastic pylons, rubber delineators or concrete/asphalt buffers in buffered and protected bicycle lanes. However, it may be possible to create physical barriers for on-road two-way cycle tracks, as those facilities can be designed wide enough for a County maintenance vehicle to clear. In the future, if County was to implement additional barriers, physical separations or separate bicycle facilities, new maintenance staff and equipment will be necessary to maintain these facilities.

Above: A typical plow will have a 8-12' front plow but can include an additional wing. Plowing 180 miles of County Highways for the general public requires trucks that do this quickly and effectively.

Bike lanes should also be free of debris and parked cars. Yard waste or trash and recycling should not be left in the path of travel as these lanes should be treated in the same manner as a vehicle travel lane. These types of impediments require cyclists to swerve out of their lane into traffic which can put them in danger. Residents should also make sure that their vegetation does not grow into the path of travel of a County Road. While the County can sweep up minor debris, it will be up to residents to keep their yard waste, trash bins, recycling and other items out of the roadway.

When necessary, the County will work with a municipality on implementing "No Debris" ordinances to keep County highways clear. Municipal staff will need to work with residents and businesses to ensure they understand this new requirement. In cases where vegetation or obstacles fall into the County ROW due to weather events (example: trees, power lines or tree branches after storm), residents should call in to report such issues.

Residents and businesses should also alert the County of unexpected and unforeseen items such as sinkholes, trash thrown from passing vehicles or trucks, debris from construction vehicles or trash collection, or other randomly uncontrollable items that the County may not be aware of without help from residents.

Above: Residents dumping yard waste into a bike lane after a storm
Source: Savannah Bicycle Campaign

Above: Blocked bike lane after storm
Source: WEAR-TV.

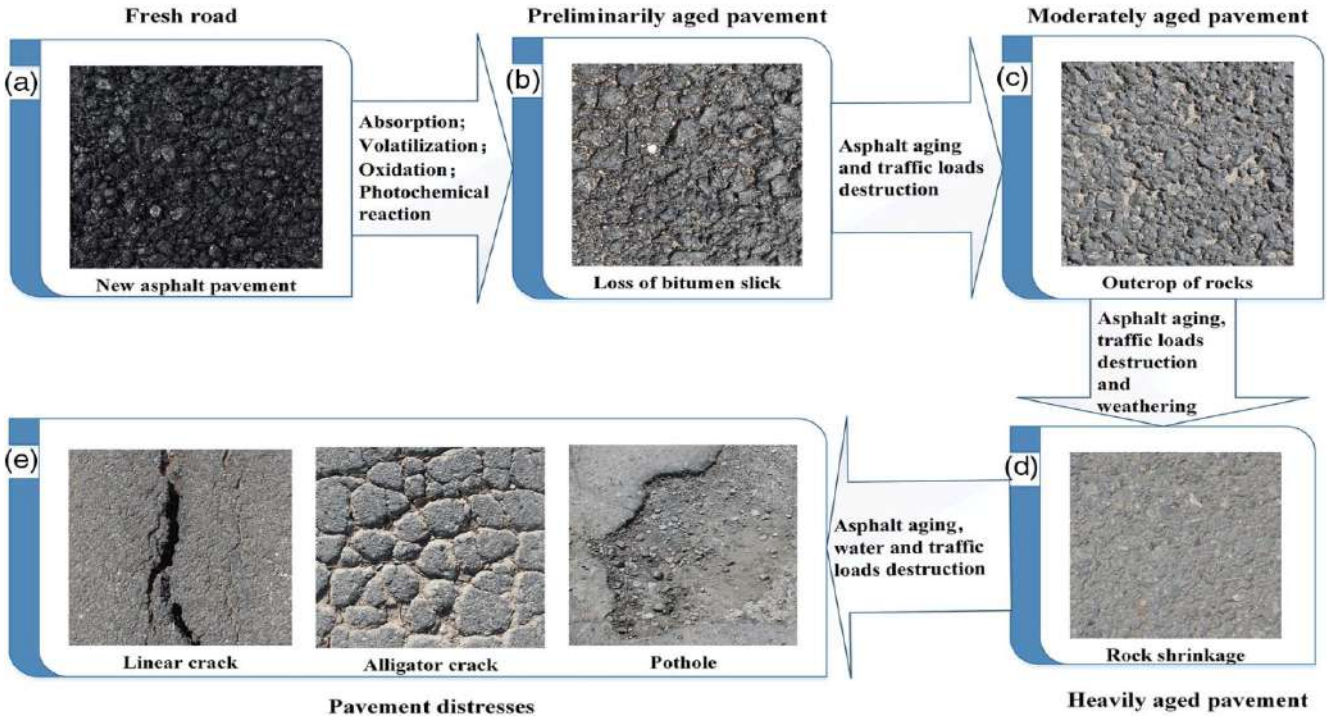
Above: Trash bins in bike lanes make lanes essentially useless.
Source: @adobeisnotsoftware via Twitter

Pavement Preservation

Pavement preservation is a topic of concern for the County and our cyclists. As for general maintenance work, bicycle lanes require just as much consideration as vehicle lanes. Since bicycles have much smaller wheel dimensions than vehicles, care must be given to filling cracks and patching potholes that may affect a cyclist. Moving forward, Mercer County should expand its pavement preservation system to incorporate bicycle facilities. Mercer County may need to perform emergency maintenance, preventative maintenance and resurfacing of our on-road bicycle facilities on a periodic basis in order to provide suitable riding surface. These tasks can be broken down into three major categories below:

Emergency/ Routine Maintenance

Cracks, potholes, depressions, raveling and rutting are unavoidable within an asphalt surface as pavement ages. The County can repair these as they are reported and the County becomes aware of them. This would be considered emergency or routine maintenance as needed. As it is impossible to be aware of every single problem along every foot of a 180 mile network, it will be important for residents, drivers and cyclists as well as our towns to report issues for the County to repair.



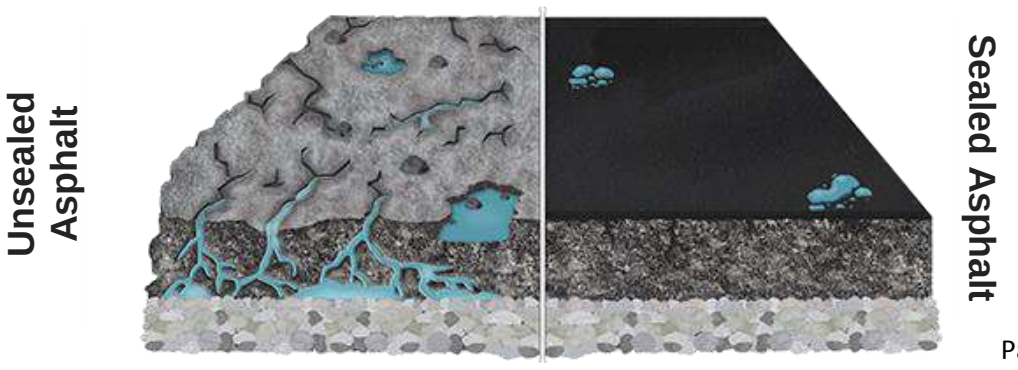
Preventative Maintenance

Preventive Maintenance is a type of maintenance that is the most effective to extend pavement life in a cost effective way. Preventative maintenance is a strategy of surface treatments when the asphalt is in relatively good condition. From crack filling small cracks to sealing the pavement, preventative maintenance addresses minor issues before they become serious issues. For preventative maintenance, the County has multiple options to keep a pavement surface in good condition. They include things like crack sealing, full depth patch repair, micro-surfacing, slurry seals, fog seals, top coats, chip seals, cape seals and other techniques. Sealcoating asphalt pavement protects the surface of asphalt from oxidation and damage from oil, gas and salt. It also minimizes the need for asphalt repairs by weatherizing the surface which helps prevent water from being able to seep into cracks. If not properly sealed, pavement starts to unravel and potholes form. Asphalt should be sealed approximately every 3 to 5 years depending on weather conditions, traffic patterns, and wear and tear.

For roadways which are significantly more uneven due to rutting, buckling, utility cuts or other items that cause an uneven surface, a thin hot-mix overlay may be the best option. Thin hot-mix overlays are able to be placed between a 5/8” to 1.5” thick and significantly improve pavement smoothness after treatment. They can extend the road lifespan between 8-15 years depending on weather conditions, traffic patterns, and wear and tear.

Resurfacing, Milling and Paving

At some point, every roadway will need to be milled and resurfaced. Partial milling removed will remove the top 1.5” to 3” of surface while full depth milling will remove the entire asphalt surface including both the binder and surface asphalt layers. During this time, roadways may be closed or detoured or include new traffic patterns. If a roadway has a new freshly milled surface, loose stones, grade changes and obstructions will be present for cyclists. Utility covers and panels will typically have a high grade change due to the loss in pavement height. In these cases cyclists should expect to walk their bicycles or take extra care when riding on such temporary surfaces. As this is unavoidable in the life cycle of a roadway, cyclists should be prepared for cases when roads are under construction.



County Roadway Sweeping

Roadway sweeping is important for keeping bicycle facilities clear for cyclists and preserve pavement condition. The County already sweeps all roads every 2 years and predominantly commercial and curbed roads with stormwater inlets once per month. Moving forward this will be need to be increased as 2020 NJDEP requirements come into effect.

Above: Example of typical street cleaning truck

The current 2009 NJDEP Storm Water Management rules require that County Highway Agencies establish a Street Sweeping Program for streets operated by the Highway Agency. County Highway Agencies are required to sweep curbed streets with storm drains that have a posted speed limit of 35 mph or less in predominately commercial areas a minimum of once per month, weather and street conditions permitting. All remaining streets (including roads or highways) that they own or operate shall be swept at a minimum of once every 2 years.

Updated 2019 DRAFT NJDEP permit requirements, when adopted, will constitute a significant overall increase in the road miles that will need to be swept on an annual basis. This is due to the fact that the number of road miles required to be swept monthly under the existing permit is more limited as those roads had to be in a predominantly commercial area and owned by the Highway Agency, have storm drain inlets, curbs, and a posted speed limit of 35 MPH or less. The vast majority of the road miles do not fit under these conditions, and therefore were only required to be swept once per two years. For the sections of the roads that do have storm drain inlets, or discharge directly to surface water, the frequency of sweeping is proposed to increase from once per 2 years to 3 or 4 times/year for non-Limited Access Roads or Limited Access Roads, respectively. For the sections of the roads that do not have storm drain inlets or discharge directly to surface water, the frequency of sweeping is proposed to increase from once per 2 years to once per year. These revised requirements also remove the exemption that allowed on and off ramps not to be swept.

Future Considerations and Expansion

As mentioned in the prior sections, with the addition of bicycle facilities on select County Routes, Mercer County will need to undertake greater care in maintenance of the County road system. With the addition of cyclists and dedicated bicycle lanes, there will be a need for increased sweeping, increased snow plowing, epoxy traffic line restriping, and an increase in pavement preservation projects. This increase in maintenance activities will be responsibility of the Mercer County Highway Division and it is important to note that additional resources may need to be provided, when needed, to provide for continued maintenance of these facilities. As bicycle facility lane miles increase, there may be a need for additional staff to maintain these facilities and operate machinery.

Facilities constructed at this time consist of sharrows, bicycle lanes and buffered lanes as Mercer County at this time can realistically only maintain roadways without major impediments that prevent plows or sweeping trucks from navigating down these lanes. If in the future the County was to implement additional improvements such as protected bicycle lanes or elevated bicycle lanes, the County may need to either work with towns on shared service agreements to maintain protected facilities or acquire machinery and staff to maintain these facilities ourselves.

Shared service agreements would put the maintenance responsibility on the municipality while distributing the cost between the County and municipality. This would essentially mean that while the County builds the facility and is responsible for structural elements, a municipality would be responsible for sweeping, cleaning and clearing the facility of impediments. Another alternative is for the County to maintain these protected facilities ourselves under an expanded public works program. If the County was to implement additional barriers, physical separations, elevated bicycle lanes or separate bicycle facilities, new smaller and specialized equipment would need to be purchased and new staff would need to be hired to run this equipment. At such point, budgetary considerations will need to be given to increasing the Highway Division's budget to accommodate new staff and machinery to maintain these new facilities for residents.

Above: Smaller snow plows such as the one above in Denver would need to be purchased and operated to clean and clear protected bicycle facilities of debris and snow.

Implementation Funding Opportunities

Pursuing local, regional, state, and federal funding will be one of the most critical steps for the success of this plan, especially for projects other than simple restriping jobs. For more complex complete streets or corridor projects, outside funding will be critical to implementing facilities. The following information highlights a number of common programs that Mercer County may pursue. The types of activities that are eligible under each funding program are identified in the following tables. Beyond those included here, there are a number of other programs and funding sources available that are not bicycle and pedestrian specific. These opportunities will also be tracked. Often partnering with our municipalities can be a successful strategy for securing funding and developing projects and efforts will be made to work with municipalities on future funding efforts.

Eligible Bicycle and Pedestrian Projects	TCDI	CMAQ	TAP	SRTS	RTP
Safety					
Safety education		■	■	■	
Police patrols			■	■	
Helmet promotion				■	
Safety brochures or books		■		■	■
Training		■		■	■
Safety campaigns		■	■	■	
Trails and Greenways					
Multi-use trails		■	■	■	■
Trail and highway intersections		■	■	■	■
Complete Streets					
On-road bicycle facilities		■	■	■	
Paved shoulders		■	■	■	
Signs and striping		■	■	■	
Bike racks on buses		■	■		
Bicycle parking facilities		■	■	■	
Bicycle storage or services		■	■	■	
Sidewalks: new or retrofit		■	■	■	
Crosswalks: new or retrofit		■	■	■	
Pedestrian signal improvements		■	■	■	
Curb cuts and ramps		■	■	■	
Traffic calming		■	■		
Maps and Plans					
Pedestrian and bicycle plans	■	■	■	■	
Maps	■	■	■	■	
Eligible Project Categories					
Construction		■	■	■	■
Planning	■				
Other			■		■

Source: DVRPC, Downtown Trenton Bicycle and Pedestrian Plan

Safe Routes to School (SRTS)

Program Administrator	Funding Type	Deadline
NJDOT	Federal	TBD

Summary	Types of Projects
This program provides funds to improve the ability of elementary and middle school students to safely walk and bike to school.	· Projects to educate and encourage school children on bicycle and pedestrian safety · Infrastructure projects that improve the built environment within a two-mile radius of K-8 schools

Application Process

Who can apply?	· Any state, county, municipal government, school district, or school · Non-profits cannot receive direct grants but may partner with public agencies to apply
Process	1. Contact a regional SRTS coordinator and visit the website for requirements 2. Form an SRTS team that might include a school administrator, school staff person, parent, police officer, community representative, and municipal representative 3. Obtain resolutions of support from both the municipality and the school or school district 4. Obtain letters of support from community organizations, elected officials, and interested parties

Amounts

Annual Total	$5.69 M (FY 2012)	Typical Allotments	Approximately $100,000 and up
Website	www.dvrpc.org/saferoutes		

Transportation Alternatives Program (TAP)

Program Administrator	Funding Type	Deadline
NJDOT	Federal	TBD

Summary	Types of Projects
Funds programs and projects that are defined as transportation alternatives, including design and construction of bicycle lanes and recreational trails.	· Off- and on-road trails and bicycle infrastructure · Conversion of abandoned railroad corridors to trails · Community improvement and environmental mitigation activities · Other non-motorized transportation infrastructure enhancements

Application Process

Who can apply?	· Local governments, regional transportation authorities, and transit agencies · Non-profits cannot receive direct grants, but may partner with public agencies to apply
Process	1. Visit website for more program information 2. Consult with DVRPC on how the proposed project relates to and supports the *DVRPC 2040 Plan* and the Transportation Improvement Program (TIP)

Amounts

Annual Total	$15.5 M (FY 2014)	Typical Allotments	$150,000 to $1,000,000
Website	www.dvrpc.org/TAP/NJ/		

Congestion Mitigation and Air Quality Program (CMAQ)

Program Administrator	Funding Type	Deadline
DVRPC	Federal	TBD

Summary	Types of Projects
Projects that demonstrably reduce air pollution emissions or reduce traffic congestion.	Bicycle and pedestrian projects, transit improvement programs, congestion reduction and traffic flow improvements, diesel retrofit and repower projects, freight projects, and funding of transportation demand management programs, among other eligible project types

Application Process

Who can apply?	Public agencies, non-profits, and public–private partnerships with a public agency sponsor
Process	1. Attend a mandatory information session held at DVRPC 2. Fill out the project application form on the DVRPC website

Amounts

Annual Total	$2.6 M	Typical Allotments	Up to $160,000–$1 M
Website	www.dvrpc.org/cmaq		

Bikeway Grant Program

Program Administrator	Funding Type	Deadline
NJDOT	State	TBD

Summary	Types of Projects
Funds projects that promote bicycling as an alternative mode of transportation. **20% match is required**	Priority is given to construction of new bike paths; however, the proposed construction or delineation of any new bicycle facility will be considered.

Application Process

Who can apply?	Federal, state, county, and local governments; non-profit organizations
Process	Apply to the program via New Jersey's System for Administering Grants Electronically website

Amounts

Annual Total	$1 M	Typical Allotments	$180,000–$330,000
Website	www.state.nj.us/transportation/business/localaid/bikewaysf.shtm		

Source: DVRPC, Downtown Trenton Bicycle and Pedestrian Plan

Recreational Trails Program (RTP)

Program Administrator	Funding Type	Deadline
New Jersey Department of Environmental Protection (NJDEP)	Federal	TBD

Summary

Funds to improve access to open space and provide additional biking and hiking opportunities.
20% match is required

Types of Projects

- Maintenance and restoration of existing recreational trails
- Development and rehabilitation of trailside and trailhead facilities and trail linkages for recreational trails
- Purchase and lease of recreational trail construction and maintenance equipment
- Construction of new recreational trails in existing parks or in new rights-of-way
- For motorized use only, acquisition of easement and fee simple title to property for recreational trails

Application Process

Who can apply?	Government agencies and non-profit organizations
Process	Obtain and submit the application from the NJDEP website

Amounts

Annual Total	$2.2 M	Typical Allotments	Up to $24,000
Website	www.state.nj.us/dep/parksandforests/natural/trail_grants.htm		

Transportation and Community Development Initiative (TCDI)

Program Administrator	Funding Type	Deadline
DVRPC	State	TBD

Summary

This effort is to ensure greater quality-of-life choices by providing and maintaining essential infrastructure, supporting local and regional economic development, and linking land use and transportation planning.
20% match is required

Types of Projects

Planning, analysis, or design initiatives for projects or programs that enhance development or redevelopment and improve the efficiency of the regional transportation system

Application Process

Who can apply?	Municipal and county governments
Process	Submit to DVRPC: · Grant application and budget form · Study area map · Description of the project · Description how the project will affect the area and population · Proposed approach to achieve public- and private-sector cooperation · Summary of how the project fits the TCDI goals, and other supporting materials

Amounts

Annual Total	$1 M	Typical Allotments	Up to $100,000
Website	www.dvrpc.org/TCDI		

Other Bicycle and Pedestrian Funding Programs

Program	Funding	Program Adminstrator	Deadline	Annual Total	Typical Allotments	Eligibility: Projects: Construction	Projects: Planning	Projects: Other	Entities: Municipalities	Entities: Counties	Entities: Other
Municipal Aid	State	NJDOT	Sep	$78.75 M	$150,000–$1 M	■			■		
County Aid	State	NJDOT	Feb	$78.75 M	$1.6 M–6.6 M	■				■	
Local Aid	State	NJDOT	Rolling	$5.3 M	$43,000–$450,000	■			■	■	
Local Bridges, Future Needs	State	NJDOT	Feb	$21 M	$250,000–$1 M	■				■	
Transit Village	State	NJDOT	Sep	$1 M	$45,000–$295,000	■			■		
Green Acres Program	State	NJDEP	Feb	$57 M	$300,000–$975,000	■			■	■	■
Muncipal Park Development	County	County	Jun	$5 M	$250,000	■			■		
Private Foundation Funding	Other	Varies	Varies	Varies	Varies	■	■	■	■	■	■

Source: DVRPC, Downtown Trenton Bicycle and Pedestrian Plan

Appendix

A. Complete Streets Resolutions

B. Potential Complete Streets Checklist

C. Public Outreach Materials