County Council of Howard County, Maryland

2016 Legislative Session Legislative Day No. **3**

Resolution No. 35 -2016

Introduced by: Chairperson at the request of the County Executive

A RESOLUTION approving a Bicycle Master Plan and a Complete Streets policy for Howard County.

Introduced and read first time _____, 2016.

By order _____
Jessica Feldmark, Administrator

Read for a second time at a public hearing on _____, 2016.

By order _____
Jessica Feldmark, Administrator

This Resolution was read the third time and was Adopted__, Adopted with amendments__, Failed__, Withdrawn__, by the County Council on _____, 2016.

Certified By _____
Jessica Feldmark, Administrator

NOTE: [[text in brackets]] indicates deletions from existing law; TEXT IN SMALL CAPITALS indicates additions to existing law; ~~Strike-out~~ indicates material deleted by amendment; Underlining indicates material added by amendment

WHEREAS, the Bicycle Master Plan, attached as Exhibit A, creates the vision and path forward for Howard County to become a bicycle friendly community by making it easy for people of all ages and abilities to get around by bicycle; and

WHEREAS, the Bicycle Master Plan was developed with extensive public input and with oversight from the Office of Transportation, a multi-disciplinary Technical Advisory group, and a consultant with extensive experience in drafting similar plans around the country; and

WHEREAS, the Bicycle Master Plan provides guidance and recommendations in the categories of policy updates, programs for education, encouragement, and enforcement, as well as suggested infrastructure improvements to create a connected bike network; and

WHEREAS, the Bicycle Master Plan is identified in PlanHoward 2030, the County's General Plan, as Policy and Implementing Action 7.6a to be completed; and

WHEREAS, the County Executive believes that streets should be safe and accommodating for everyone, whether they are driving, walking, biking, or taking public transit; and

WHEREAS, the County Executive has proposed a Complete Streets policy statement within his letter of support that will be included in the Bicycle Master Plan that states, *"To ensure that Howard County is a place for individuals of all backgrounds to live and travel freely, safely, and comfortably, public and private roadways in Howard County shall be safe and convenient for residents of all ages and abilities who travel by foot, bicycle, public transportation or automobile, ensuring sustainable communities Countywide."*; and

WHEREAS, the County Executive is organizing a working group, the Complete Streets Implementation Team, that will first evaluate the Howard County Design Manual, *Volume III, Roads and Bridges*, (the "Design Manual") in order to recommend changes to incorporate the Complete Streets policy; and

WHEREAS, upon completion of the Complete Streets Implementation Team's review, the County Executive will submit to the County Council recommended changes to the Design Manual consistent with the Complete Streets policy; and

WHEREAS, the League of American Bicyclists is a 501(c)(3) organization that works to create a Bicycle Friendly America through education programs, creating better biking environments, and promoting bicycling as a transportation option of choice; and

WHEREAS, a bicycle-friendly community designation from the League of American Bicyclists is a highly coveted award that identifies the community as one that is improving public health, reducing traffic congestion, improving air quality, and improving the quality of life; and

WHEREAS, a bicycle-friendly community designation marks the community as a vibrant destination for residents and visitors, which holds positive economic benefits for the entire community; and

WHEREAS, the approval of this Resolution will greatly aid the County in its pursuit of receiving a bicycle-friendly community designation from the League of American Bicyclists, and to be the first county to do so in the State of Maryland; and

WHEREAS, the Bicycle Master Plan was reviewed and recommended approval unanimously by the Planning Board on January 7, 2016, with the note that the projects are preliminary and to include the development of a public input process as a step in the implementation matrix.

NOW, THEREFORE, BE IT RESOLVED by the County Council of Howard County, Maryland, this _____ day of _____, 2016, that it hereby approves the Bicycle Master Plan of Howard County, attached as Exhibit A.

AND BE IT FURTHER RESOLVED by the County Council of Howard County, Maryland, that the Council is approving the Bicycle Master Plan with the understanding that specific routes identified in the Plan are suggested at a very high planning level, and may be altered following additional detailed design planning and public comment.

AND BE IT FURTHER RESOLVED by the County Council of Howard County, Maryland, this _____ day of _____, 2016, that it hereby approves a Complete Streets policy for Howard County.

January 5, 2016

To the Residents of Howard County,

Today I present to you Howard County's first Bicycle Master Plan. As Howard County continues to evolve and develop, this plan will serve to provide proactive guidance on how to accommodate the growing demand for transportation options in a cost-effective and comprehensive manner. Bicycling is more than just a healthy hobby. It also provides a functional form of travel for many individuals, and developing a stronger infrastructure for people biking provides numerous benefits for the entire county. These benefits include creating an environment for all citizens to lead healthier lifestyles, building opportunities for economic development, and improving our air quality through the reduction of emissions. This plan will serve as another avenue for Howard County to become a more sustainable community.

The key proposals of this plan focus on creating a more bikeable Howard County by recommending a review of certain policies, developing a bicycle network that connects people and places, and promoting awareness and education on living in a bicycle-friendly community.

One of the recommendations of this plan, as well as PlanHoward 2030, is the adoption of a complete streets policy. A complete streets policy outlines a community's vision for how their streets should be designed, operated and maintained so that all users feel secure walking, biking or driving. Based on these recommendations, I therefore propose that the County hold the following policy and vision to guide future development, re-development and County road projects:

"To ensure that Howard County is a place for individuals of all backgrounds to live and travel freely, safely, and comfortably, public and private roadways in Howard County shall be safe and convenient for residents of all ages and abilities who travel by foot, bicycle, public transportation or automobile, ensuring sustainable communities Countywide."

In fulfilling another recommendation of this plan, I am organizing an implementation team to evaluate and execute the key components of this plan to the maximum extent feasible, and I have asked Christopher Eatough, the County's Bicycle and Pedestrian Coordinator, to chair this working group. Members of this team will include individuals from the Department of Public Works, the Department of Planning and Zoning, the Department of Recreation and Parks, Columbia Association, and the Howard County Public School System. The first task that I am directing this team to complete is an evaluation of the Howard County Design Manual, *Volume III, Roads and Bridges*, in order to provide recommendations on updating this document to integrate with the aforementioned complete streets policy.

This plan was developed with strong community engagement in order to better understand the direction the citizens of Howard County wish to move towards. This plan presents a strong framework for the future of Howard County and while we have already started to implement a few of the recommendations in this plan, I look forward to our continued progress in developing a bicycle-friendly community. With the adoption of this plan, Howard County reaffirms a commitment to its citizens to provide a healthy and sustainable environment to live in, and therefore I encourage the support of this plan from the entire Howard County community.

Sincerely,

Allan H. Kittleman
Howard County Executive

BIKE HOWARD

Howard County Bicycle Master Plan

2015

Table of Contents

List of Tables and Figures

Section 1:

Introduction

Introduction

Purpose

BikeHoward is the Howard County Bicycle Master Plan. The primary purpose of BikeHoward is to provide a framework to guide the county's future actions to improve conditions for bicyclists and promote bicycling as a safe and convenient travel option. In other words:

Making it easy for people of all ages and abilities to get around by bike in Howard County.

BikeHoward provides recommendations and guidance in the following general categories:

- Policy updates
- Programs for education, encouragement and enforcement
- Infrastructure improvements to create a connected bike network

It is important to note that details on committed funding sources for the infrastructure improvements are not identified or confirmed in this plan. The network is aspirational and provides a vision to work towards over time. Funding will require creativity in acquiring grants, coordinating with the County resurfacing schedule, working with developers and exploring various funding sources at the local, state and federal level. Providing the details of the desired bike network will be valuable for maximizing these funding opportunities, however, BikeHoward does not commit Howard County to funding all of the structured projects in the plan.

The Vision of BikeHoward

"Howard County, Maryland seeks to be a bicycle-friendly County where residents and visitors, schoolchildren and seniors, men and women feel comfortable and safe bicycling on our roads and paths as a means of daily transportation and healthy recreation."

Vision and Goals

The vision and goals of BikeHoward flow directly from PlanHoward 2030, the County's general plan. PlanHoward 2030 is organized around the concepts of environmental, economic and community sustainability.

Bicycling has the potential to make a significant contribution toward achieving the County's sustainability goals in each of these areas:

- Environmental sustainability by reducing air and water pollution
- Economic sustainability by contributing to tourism and reducing household transportation expenditures
- Community sustainability by contributing to public health and helping neighborhoods remain safe and functional for all generations

PlanHoward 2030 calls for the promotion of complete streets design practices, and establishment of an interdepartmental team to implement both a countywide Bicycle Master Plan and a countywide Pedestrian Master Plan. BikeHoward is an important step in achieving these objectives.

By improving conditions for cyclists on roadways, by connecting and extending paths, and by linking residential areas to shopping centers, public facilities and jobs, bicycling can take its place in an effective multi-modal transportation system that provides residents sustainable transportation options for daily life.

The Goals of BikeHoward

Create a Safe and Seamless Network: For bicycling to grow, cyclists must have a safe, intuitive, easy and seamless network of bikeways that connects them to where they want to go: schools, shops, parks and work, with facilities that will serve cyclists of all skill and comfort levels.

Increase Participation and Safety through bicycle educational programs for school-aged children and youth, and awareness campaigns for motor vehicle users, to make bicycling normal, popular and an accepted transportation option.

Update County Policies to ensure that the County's infrastructure and land development policies fully accommodate and encourage bicycling.

Coordinate with Maryland state legislators and agency officials to accommodate bicycle travel through:

- State highways and public transit services
- Regulation of utility rights-of-way
- Administration of storm water treatment and water quality regulations

Promote Active Living by including bicycling as an active component of a livable community that is physically healthy, economically sound and environmentally sustainable.

How BikeHoward is Organized

Following this introductory chapter, Chapter 2 of BikeHoward provides a brief discussion of existing bicycling conditions that focuses on the physical conditions for bicycling for transportation.

Chapter 3 describes the roles of county agencies and partners in relation to bicycle planning and facility development, current planning practices and development policies that affect bicycling and the development of bicycle transportation infrastructure. This discussion of existing conditions is followed by recommendations for updating planning and development policies to provide a firmer foundation for creating a bicycle-friendly county.

Chapter 4 discusses the public outreach activities undertaken as a part of the planning process to develop BikeHoward. It also describes the work done to assess the existing roadways, pathways and path corridors, evaluate the potential for creation of a Countywide Bikeway Network and it describes the process used to develop the networks.

Chapter 5 discusses the Countywide Bikeway Network and explains how it has been subdivided into Short-Term and Mid-Term and Long-Term Networks. This Chapter also describes the types of bicycle facilities that are recommended to create a bikeway network that serves a broad range of cyclists.

Chapter 6 presents recommendations for specific components of the bikeway network including way finding sign systems, use of experimental and new facility types, state roads in BikeHoward and provides highlights of the shared use path recommendations.

Chapter 7 addresses bicycle parking and integration of bicycling with public transit services.

Chapter 8 discusses a set of recommended programs in the areas of bicycle safety education, encouragement and enforcement.

Chapter 9 summarizes the implementation strategies for the plan, presents the Short-Term network organized into specific projects and recommends specific institutional processes that are key for effective build out of the Bikeway Network.

Chapter 10 presents an implementation matrix that serves as a guide to all of the recommendations in the plan.

Chapter 11 provides the conclusion for BikeHoward.

Why Bicycling in Howard County?

Investing and improving conditions for bicycling is a fast growing trend throughout the country. There is a growing and strong body of evidence showing that when communities invest in bicycling, there are many short and long-term benefits to public health, household budgets, the local economy, environmental sustainability and overall quality of life.

Howard County's economic competitiveness has been driven in large part by its image and location as a great place to live, do business and raise children. Howard County has long depended on its location between Baltimore and Washington DC and its proximity to major transportation hubs and corridors to assure its economic success. However, in today's changing economy the ability to attract and retain successful companies, and attract highly skilled employees that can compete in the broader global marketplace is critical to ensuring the county's sustained success. Communities that are prospering and attracting top tier talent and companies are investing in building cycling infrastructure.

In a report by People for Bikes, Fred Schmidt, a founder of two tech companies in Austin TX stated "Tech companies, especially in the game industry, like to be where there's a lot of buzz, where there's entertainment and energy. In order to attract those type of companies, we need to continue to provide buildings and workspaces and infrastructure that supports the culture that thrives on that type of urban environment."

The Urban Land Institute, in its report "*Shifting Suburbs: Reinventing Infrastructure for Compact Development*", stated that "… market preferences have been shifting. Signs point to an increasing appetite—especially among generation Y—for higher-density living patterns and for transportation options that include transit, walking, and biking."

Affordability

In a period of high-variability in the cost of fuel, bicycling offers a lower cost transportation option. Bicycling has an annual operating cost less than 4% of the average ownership and use cost of a car. In Howard County, few households report having no access to a motor vehicle (less than 4 percent) and 70 percent report having 2, 3 or more vehicles per family unit.[1] The annual cost of owning and maintaining a car can range from $9,000 to $11,000 a year, even more if the car is older and requires more repairs.[2] For a family, the bicycle is the most economic second or third car, providing independence and freedom for members of the household when the family car is already in use.

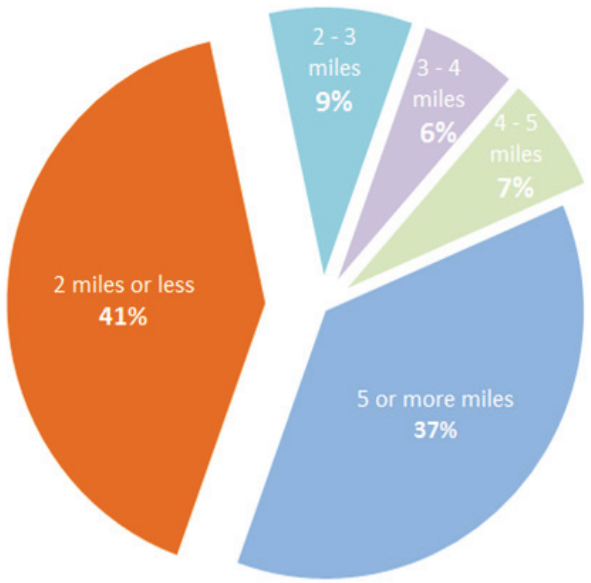
Traffic Congestion

In time, bicycling will have an impact on local traffic congestion. In Howard County, around one-third of all daily trips are less than three miles in length, nationwide 50% of all trips are three miles or less, a distance covered by bicycle in fifteen to twenty minutes. Today, most of these trips are made by automobile, in part due to a lack of safe walking and bicycling facilities. Improved bicycling conditions will reduce congestion by providing residents the option to travel by bicycle for shopping, running errands and visiting friends. At certain times of day, there may be little difference in the time it takes to make a short trip by bicycle or by car, and bicycling may be a preferred choice to save time and money.

Health

All our citizens need opportunities for regular exercise and active transportation in order to maintain and improve their physical health. The Centers for Disease Control and Prevention recommends thirty minutes of moderate physical activity almost every day and adults who are physically active are healthier and less likely to develop many chronic diseases than adults who are inactive. Today, there are nearly twice as many overweight children and almost three times as many overweight adolescents in the U.S. as there were in 1980. Expanded and improved bi-

National Average of Personal Trip Lengths



[1] American Community Survey, US Census, 2010

[2] The American Automobile Association reports the average annual cost of owning a sedan to be $9,000 per year in 2012; an SUV is over $11,000. http://newsroom.aaa.com/2012/04/cost-of-owning-and-operating-vehicle-in-u-s-increased-1-9-percent-according-to-aaa%E2%80%99s-2012-%E2%80%98your-driving-costs%E2%80%99-study/

cycle facilities along with policies and programs that support active transportation will provide easy opportunities for our citizens to easily incorporate exercise into their daily transportation routines.

Local Spending

Economic benefits are also generated by the spending of local and visiting cyclists, especially by those that come to participate in large bicycling events like charity rides or triathlons. A 2004 economic impact study prepared for the Virginia Department of Conservation found that the estimated 1.7 million adult W&OD trail users in Northern Virginia suburbs spent about $12 million annually related to their recreational use of the trail.[3] Other studies have documented similar impacts. Whether the bicycling draw is in a suburban, urban or rural context, it generates surprising levels of local spending.

Traffic Safety

Interestingly, more people bicycling will actually increase traffic safety for cyclists and safe, clear and consistent accommodations for cyclists enhance safety for all road users. For example, bicycle lanes not only give cyclists clear guidance and more confidence about riding in the road, they give motorists information about where to expect bikes. When entering a street with bike lanes from a side street or driveway, bike lanes provide better sight distance for motorists watching for oncoming traffic. Research undertaken by the Alliance for Biking and Walking shows that areas with more bicycling trips per capita have a lower frequency of bicycle/motor vehicle crashes. When bicyclists are encountered more frequently on roadways, motorists become more accustomed to sharing the road with them.[4] Also, when more people ride bikes, it's more common that a driver is also an occasional cyclist themself, so they have more awareness, understanding and patience for people on bikes.

Recreation

Creating a countywide network of bikeways will increase the opportunities for close-to-home and affordable recreation for people of all ages. It will enhance access to the County's many public parks and other recreational venues. On County and Columbia Association trails, bicycling for recreation offers a way to de-stress, exercise and enjoy nature. On County roadways, particularly in western Howard County, bicycling offers a serious cardiovascular workout and a chance to appreciate a working agricultural landscape.

Environmental

Bicycling is not the sole answer to environmental issues such as air pollution and climate change, but it can make a meaningful contribution. Increased levels of bicycling reduce fossil fuel consumption and the resulting air pollution and carbon emissions. Every bike trip that replaces a car trip reduces pollution. Based upon research conducted by the U.S. Environmental Protection Agency, it is estimated that sixty percent (60%) of the pollution created by automobile emissions is emitted in the first few minutes of operation, before pollution control devices begin to work effectively. So even short trips make a difference.

Equity and Transportation Choices

Improving bicycle conditions will expand transportation choices for the entire community. People with low incomes more often depend on car-free options such as public transit, walking and biking. Access to public transit is much easier when biking is possible. Four percent of Howard County households do not have access to a motor vehicle.[5] Many people cannot drive due to being under age, having a physical disability or other reasons. Some of these people can get around by bike if safety and conditions are improved. Bicycling may also be a solution for older residents who reach an age where driving is no longer an option by providing the ability to get to the grocery store, to medical appointments and to access recreational opportunities. Improvements to the bikeway network will make it easier for County residents to age in place, while also lowering transportation costs.

[3] http://www.americantrails.org/resources/adjacent/WODstudy04.html

[4] *Bicycling and Walking in the United Sates: 2012 Benchmarking Report*, Alliance for Biking and Walking, 2012.

[5] American Community Survey, 2010 U.S. Census.

Section 2:

Existing Facilities

Existing Facilities

As of 2015, bicycle conditions in Howard County are highly varied. Rural two lane roads in the Western part of the County are narrow and largely without shoulders, many have low traffic volumes and remain popular with increasing numbers of recreational cyclists but increased traffic levels and development is impacting cyclists using these roads. Most of the large arterial roadways in the central and eastern part of the county have poor cycling conditions due to large traffic volumes, high traffic speeds and/or lack of space available for cycling. However, many collector roads and neighborhood streets have good cycling conditions due to low traffic volumes, low speeds, the presence of traffic calming and/or the availability of extra space for cycling.

The state highways in the county are also variable, for instance, MD 108, has high volumes of high speed traffic and no consistent bicycling facilities. However, recently upgraded highways like MD 32 have consistent and wide shoulders that have been designated by the state to provide bicycle access even as the roadway in general has been upgraded to highway design.

One of the county's major bicycling issues are the barriers to connectivity, including major highways with few bicycle-friendly crossings, railroad lines, large natural areas and stream valleys with steep topography such as the Patapsco River.

The county has an extensive shared use path system that is centered on Columbia and extends south to Savage along the Little Patuxent River. The County is just beginning to install on-road bikeways such as bike lanes. Additional details describing the status of off-road and on-road facility development follows:

Off Road

Off-road facilities include Columbia Association's pathway system, paths in residential developments, the Patuxent Branch Trail that connects Savage with Columbia, and other trail systems in parks like Centennial Park. While the pathway system is extensive in the Columbia and greater Columbia area, much of it is fairly narrow and quite steep in places.

On Road

The on-road bikeway network consists of a very few bicycle lanes, but a fair number of roadways with paved and striped shoulders that are sufficiently wide for cyclists to use. A number of residential streets have striped parking lanes that are minimally used, creating de facto bicycle lanes. Some roadways have wide outside lanes (13-15 feet) that provide cyclists a place to ride away from passing motor vehicles.

BikeHoward has classified paved and striped shoulders (of 4 feet or greater) as existing facilities; these shoulders are wide enough to accommodate cyclists. However, some roads with existing paved and striped shoulders may not be comfortable for all cyclists.

See Table 1 for an estimate of linear miles of existing on-road and off-road bikeways in the County.

Improvements for bicycling are already being made within the path networks and on the roadway system.

A few examples of recent activities related to bikeway network development follow:

- "pocket" bike lanes have been installed on Route 99 near Mt. Hebron High School and on MD 103 at Snowden River Parkway
- A trail is being designed to link the Howard General Hospital, Downtown Columbia and Blandair Park
- New bicycle lanes were installed on Great Star Drive in 2012 and extended on Stevens Forest Drive
- Some roads commonly used by cyclists, have received SHARE THE ROAD signs
- Columbia Association completed a pathway around Lake Kittamaqundi

In addition to on-the-ground conditions for bicycling, BikeHoward reviewed the existing planning and policy environment. The next chapter discusses these conditions and presents a comprehensive set of recommendations for County policies and planning practices.

Please see Map 1 on the following page for summary of existing bicycle facilities in the county as identified in the planning process.

Table 1: Summary of Existing Facilities

Bikeway Facility Type	Estimated Linear Miles or Count of Locations
Paved Pathways (Owned by Columbia Association)	~95 Miles
Paved Pathways (Owned by DRP, HCPSS, or other HOA's)	~54 Miles
Bicycle Lanes	3 Miles
Paved & Striped Shoulders (No parking)	~42 Miles
Tunnels under roadways	10 Locations
Bicycle/pedestrian bridges over roadways	5 Locations

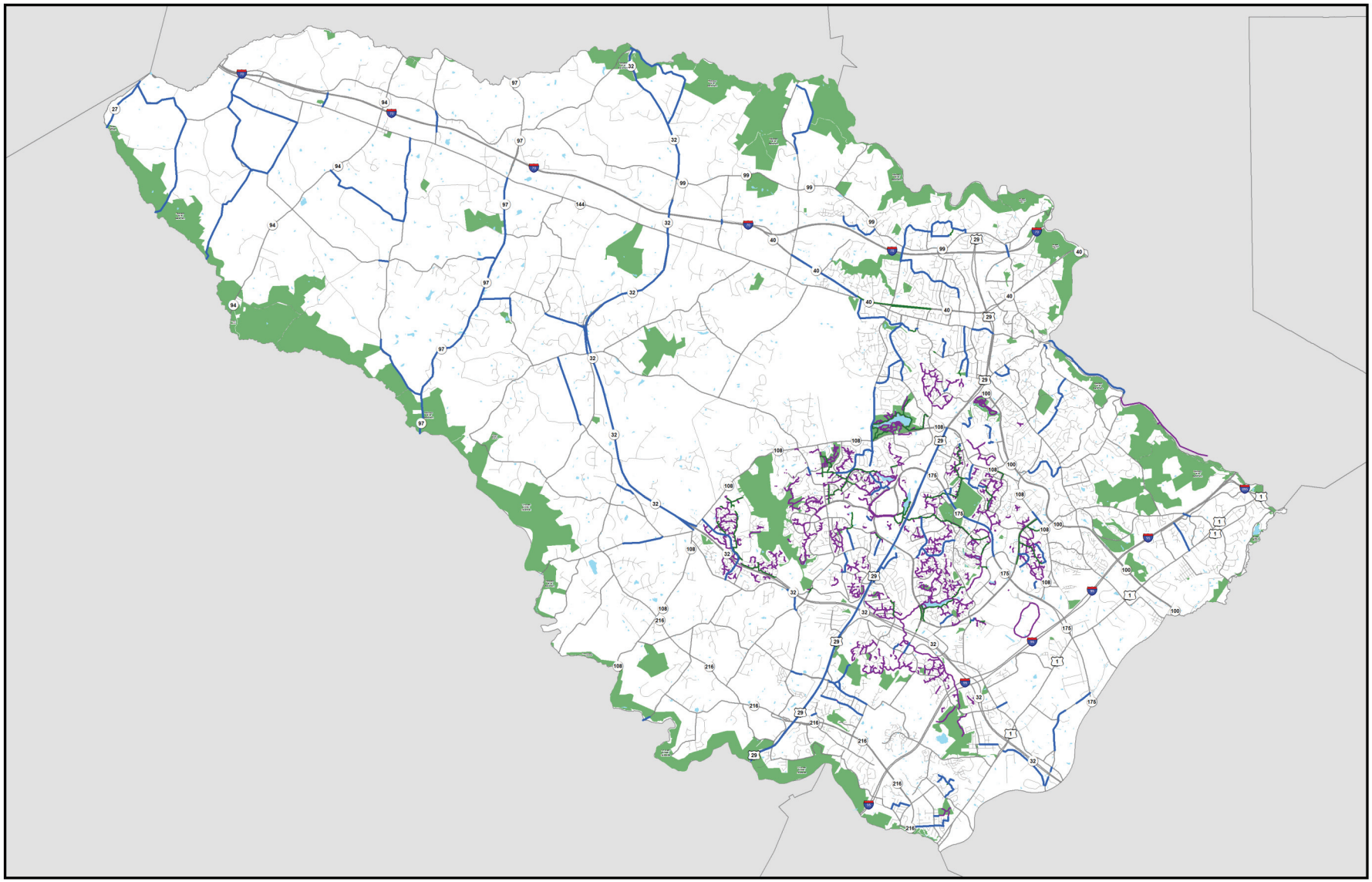
BIKE HOWARD

Existing Facilities
Map No. 1

On Road (Bike Lanes, Shared Roadways, Paved and Striped Shoulders)

Off Road (Shared Use Path-CA Pathways, HC Trails and Other)

N



Section 3:

Policy and Planning Recommendations

Planning and Policy Conditions and Recommendations

There are number of County agencies and non-county organizations that are involved in the planning, development and management of cycling infrastructure and cycling related programs. Each and every agency and organization has an important role to play in advancing cycling in the county, their roles are outlined in this section.

Additionally, the County has existing policies and infrastructure design standards that govern private and public development. BikeHoward reviewed these documents and developed policy recommendations and guidance to direct further actions.

Bicycling Related Roles and Responsibilities of County Agencies and Organizations

Office of Transportation

The Office of Transportation (OOT) performs the following roles related to transportation in the county:

The Office develops and oversees the implementation of the plans that guide transportation investments in the county; these plans include the county-wide bike and pedestrian master plans, and regional transportation plans. In addition, the Office develops and manages the grant and capital programs that fund the development of cycling facilities.

The Office oversees the provision of public transportation services, including route development, financial oversight and procurement.

The Office also directs transportation policy by working with the Department of Public Works, the Department of Planning and Zoning as part of the development the County's master plan (PlanHoward 2030) and the region's long range transportation plan.

Department of Planning and Zoning

The Department of Planning and Zoning's (DPZ) Development Engineering Division reviews private property and road development plans to identify opportunities for cycling and pedestrian infrastructure and compliance with subdivision regulations.

Department of Public Works

The following bureaus within the Department of Public Works (DPW) perform key roles:

- The Bureau of Engineering develops and implements major capital projects, including the development of new roads, road widening, sidewalks and intersections
- The Bureau of Highways oversees the maintenance and repair of the county's sidewalks, roads and intersections, including repaving and restriping roads, street cleaning, and developing traffic-calming measures
- The Bureau of Facilities is responsible for the maintenance and upgrading of county buildings, including parking and grounds
- The Real Estate Services Division plays an important role by developing and managing developer agreements, sidewalk maintenance agreements and securing land for capital projects

Department of Recreation and Parks

The Department of Recreation and Parks (DRP) develops and manages Howard County's recreational facilities and programs, including parks, community centers, and trails. The key bureaus within the department are:

- The Bureau of Capital Projects, Park Planning and Construction conducts long range planning efforts that guide park and recreational facility development, and constructs new parks, trails and park buildings
- The Bureau of Recreation Services manages and develops the recreational programs for the public, such as walking and hiking events, and educational classes
- The Operations Bureau maintains the County's Parks and path systems

Columbia Association

Columbia Association (CA) plans, develops, constructs and maintains the pathway network within the organization's boundaries. CA also manages a broad range of programs and events that use the pathway system, including the Columbia BikeAbout. CA also works closely with the County to coordinate planning and maintenance efforts.

Howard County Public School System

The primary role the Howard County Public School System (HCPSS) plays in relation to cycling is:

- Planning, development and construction of school buildings and grounds
- Installation and maintenance of bicycle parking on school grounds

- Building and maintaining paths into and through school grounds, including paths that connect to County and CA paths

Bicycle Advisory Group

The Bicycle Advisory Group (BAG) is a cooperative effort between Howard County and advocates addressing their mutual interest in promoting safe and effective bicycle transportation systems. The Howard County Executive and County Council formed BAG in response to a request by advocates for regular meetings with departments which include bicycling and other active transportation modes as a part of their missions. Participating members of the BAG include advocates and representatives of the County Executive, County Council, Departments of Planning and Zoning, Public Works, Recreation and Parks and Office of Transportation. BAG also includes representatives from Columbia Association, State Highway Administration and the Maryland Department of Transportation. The BAG meets quarterly to review issues of concern to the bicycling community and the ways advocates and government can work together to address those issues.

Existing Policies & Practices

The development of cycling facilities in the county is closely linked to laws, regulations and practices that guide the development of land, housing and transportation. These formal laws and policies are outlined in the Zoning Ordinance, Subdivision Development Regulations and the Howard County Design Manual. During the planning process, these manuals, codes and practices were reviewed to identify sections and areas that impact conditions for cycling and the implementation of the Plan.

Practices

The County has informal county policies in effect that impact the development of cycling infrastructure.

- Executive policy that all newly paved road and newly constructed roads will accommodate bicycles where possible
- The Department of Public Works has a draft internal design manual to provide guidance on the design of bicycle facilities on all new and resurfaced roads

The Zoning Ordinance

The Zoning Ordinance regulates the use of land within zoning districts in the county and is the primary tool used by the County to implement the County's general plan. The zoning ordinance guides the supply and density of housing and commercial development, types of uses allowed in different areas, setbacks and the amount of parking required.

Subdivision and Land Development Regulations

Along with the Zoning Ordinance, the subdivision regulations guide the subdivision of land and new development in the county. The regulations are divided into a number of subtitles. BikeHoward identifies relevant sections that impact the development of cycling facilities in the county.

Subtitle 1 is the primary section that guides and controls the subdivision of land, provides design guidance and requirements for development projects, and the steps and processes for approving and implementing development projects. Subtitle 1 is a comprehensive document, but also references other county documents for specific guidance. Subtitle 1 provides direction and guidance on when public improvements are required during the subdivision and land development process. However, this document does not include language related to cycling and cycling facilities.

Subtitle 11, the *Adequate Public Facilities Ordinance* (APFO) controls the rate of development in the county by ensuring that schools and roads are adequate to accommodate the impact of new development. The APFO requires development projects to pass certain tests as a condition for approval. The APFO has language specifically related to downtown Columbia and the county as a whole.

The countywide portion includes three tests: housing allocations test, schools test and a roads test. The tests are designed to assure; that a proposed development does not exceed the number of houses allocated to an area by the general plan's growth targets; that the number of new residents associated with a new development will not exceed the capacity of public schools. The roads test, also known as a traffic study, measures the impact from car traffic from a proposed development. The roads test

Planning and Policy Conditions and Recommendations

There are number of County agencies and non-county organizations that are involved in the planning, development and management of cycling infrastructure and cycling related programs. Each and every agency and organization has an important role to play in advancing cycling in the county, their roles are outlined in this section.

Additionally, the County has existing policies and infrastructure design standards that govern private and public development. BikeHoward reviewed these documents and developed policy recommendations and guidance to direct further actions.

Bicycling Related Roles and Responsibilities of County Agencies and Organizations

Office of Transportation

The Office of Transportation (OOT) performs the following roles related to transportation in the county:

The Office develops and oversees the implementation of the plans that guide transportation investments in the county; these plans include the county-wide bike and pedestrian master plans, and regional transportation plans. In addition, the Office develops and manages the grant and capital programs that fund the development of cycling facilities.

The Office oversees the provision of public transportation services, including route development, financial oversight and procurement.

The Office also directs transportation policy by working with the Department of Public Works, the Department of Planning and Zoning as part of the development the County's master plan (PlanHoward 2030) and the region's long range transportation plan.

Department of Planning and Zoning

The Department of Planning and Zoning's (DPZ) Development Engineering Division reviews private property and road development plans to identify opportunities for cycling and pedestrian infrastructure and compliance with subdivision regulations.

Department of Public Works

The following bureaus within the Department of Public Works (DPW) perform key roles:

- The Bureau of Engineering develops and implements major capital projects, including the development of new roads, road widening, sidewalks and intersections
- The Bureau of Highways oversees the maintenance and repair of the county's sidewalks, roads and intersections, including repaving and restriping roads, street cleaning, and developing traffic-calming measures
- The Bureau of Facilities is responsible for the maintenance and upgrading of county buildings, including parking and grounds
- The Real Estate Services Division plays an important role by developing and managing developer agreements, sidewalk maintenance agreements and securing land for capital projects

Department of Recreation and Parks

The Department of Recreation and Parks (DRP) develops and manages Howard County's recreational facilities and programs, including parks, community centers, and trails. The key bureaus within the department are:

- The Bureau of Capital Projects, Park Planning and Construction conducts long range planning efforts that guide park and recreational facility development, and constructs new parks, trails and park buildings
- The Bureau of Recreation Services manages and develops the recreational programs for the public, such as walking and hiking events, and educational classes
- The Operations Bureau maintains the County's Parks and path systems

Columbia Association

Columbia Association (CA) plans, develops, constructs and maintains the pathway network within the organization's boundaries. CA also manages a broad range of programs and events that use the pathway system, including the Columbia BikeAbout. CA also works closely with the County to coordinate planning and maintenance efforts.

Howard County Public School System

The primary role the Howard County Public School System (HCPSS) plays in relation to cycling is:

- Planning, development and construction of school buildings and grounds
- Installation and maintenance of bicycle parking on school grounds

- Building and maintaining paths into and through school grounds, including paths that connect to County and CA paths

Bicycle Advisory Group

The Bicycle Advisory Group (BAG) is a cooperative effort between Howard County and advocates addressing their mutual interest in promoting safe and effective bicycle transportation systems. The Howard County Executive and County Council formed BAG in response to a request by advocates for regular meetings with departments which include bicycling and other active transportation modes as a part of their missions. Participating members of the BAG include advocates and representatives of the County Executive, County Council, Departments of Planning and Zoning, Public Works, Recreation and Parks and Office of Transportation. BAG also includes representatives from Columbia Association, State Highway Administration and the Maryland Department of Transportation. The BAG meets quarterly to review issues of concern to the bicycling community and the ways advocates and government can work together to address those issues.

Existing Policies & Practices

The development of cycling facilities in the county is closely linked to laws, regulations and practices that guide the development of land, housing and transportation. These formal laws and policies are outlined in the Zoning Ordinance, Subdivision Development Regulations and the Howard County Design Manual. During the planning process, these manuals, codes and practices were reviewed to identify sections and areas that impact conditions for cycling and the implementation of the Plan.

Practices

The County has informal county policies in effect that impact the development of cycling infrastructure.

- Executive policy that all newly paved road and newly constructed roads will accommodate bicycles where possible
- The Department of Public Works has a draft internal design manual to provide guidance on the design of bicycle facilities on all new and resurfaced roads

The Zoning Ordinance

The Zoning Ordinance regulates the use of land within zoning districts in the county and is the primary tool used by the County to implement the County's general plan. The zoning ordinance guides the supply and density of housing and commercial development, types of uses allowed in different areas, setbacks and the amount of parking required.

Subdivision and Land Development Regulations

Along with the Zoning Ordinance, the subdivision regulations guide the subdivision of land and new development in the county. The regulations are divided into a number of subtitles. BikeHoward identifies relevant sections that impact the development of cycling facilities in the county.

Subtitle 1 is the primary section that guides and controls the subdivision of land, provides design guidance and requirements for development projects, and the steps and processes for approving and implementing development projects. Subtitle 1 is a comprehensive document, but also references other county documents for specific guidance. Subtitle 1 provides direction and guidance on when public improvements are required during the subdivision and land development process. However, this document does not include language related to cycling and cycling facilities.

Subtitle 11, the *Adequate Public Facilities Ordinance* (APFO) controls the rate of development in the county by ensuring that schools and roads are adequate to accommodate the impact of new development. The APFO requires development projects to pass certain tests as a condition for approval. The APFO has language specifically related to downtown Columbia and the county as a whole.

The countywide portion includes three tests: housing allocations test, schools test and a roads test. The tests are designed to assure; that a proposed development does not exceed the number of houses allocated to an area by the general plan's growth targets; that the number of new residents associated with a new development will not exceed the capacity of public schools. The roads test, also known as a traffic study, measures the impact from car traffic from a proposed development. The roads test

measures the impact on the automobile "levels of service" at certain types of intersections within a certain distance from the proposed development site. Generally, if a project fails the roads test, mitigation is required as a condition for plan approval. Mitigation measures can include adding car travel and turning lanes or paying a fee in lieu to the County for future road improvements.

The traffic study methodology and test thresholds do not include factors for the development's generation of bicycle trips. Moreover, the tests called for by the county wide APFO do not require measuring the impact on pedestrian and cyclist traffic, the impact on conditions for cyclists and pedestrians from the proposed development or the impact on bicycling or walking from the proposed road mitigation measures. This is left to the discretion of the Director of Public Works.

The Downtown Columbia portions of the APFO do require that cycling and walking be addressed specifically in the traffic study and does allow for the use of mitigation measures if the test is not passed.

The scenic roads section protects the character of roads that meet certain characteristics and have been added to the scenic roads inventory. Some of the key scenic road characteristics include: a) they go through an area of outstanding environmental features and b) have outstanding views or follow historic alignments. The ordinance allows changes to these roads if the changes are designed to preserve the character of the road and improve safety. The Howard County design manual includes design standards for scenic roads.

Subtitle 15 of the Subdivision regulations provides for the development of a Design Advisory Panel. The design advisory panel provides expert guidance to the Director of the Department of Planning and Zoning on new development plans in parts of the county that have design manuals, such as the US 1 Corridor, Downtown Columbia and areas for age restricted housing.

The Howard County Design Manual

The Design Manual details the County's technical engineering standards, approved by resolution of the County Council, for design, construction and inspection of bridges, roads, storm drain structures, storm water management systems, sidewalks, walkways, pathways, trails, parking areas, traffic-control devices, water and sewer facilities, and other improvements. *Volume III, Roads and Bridges* details criteria and standards for roads in the county. Volume III presents extensive and detailed information and guidance on the design of roads and intersections.

The Design Manual references cycling in a number of sections but does not provide detailed road section drawings that are specifically related to cycling infrastructure. However, the manual does provide guidance related to bikeways in general; and specific guidance for roads classified as major collectors or greater-- "Outside lanes on curbed roadways on major collectors or above shall be a minimum of 14' wide to facilitate bicycle use" (2.4 Typical Sections).

The Design Manual, in 2.24 (section j), also states the following:

"Pathways shall be constructed in subdivisions where directed by the Department of Planning and Zoning or under capital project implementation by the Department of Public Works or the Department of Education. Residential areas, school and open space areas and short routes connecting residential and employment centers typically warrant provisions for pedestrians and/or bicyclists. Bikeways may be separated from the roadway but within the road right -of-way such as through open areas. Cul-de-Sac roads and local roads will not normally have designated bikeways because of the low traffic volumes and speeds. The location of all bikeway systems should be compatible with the General Plan for Howard County. Bikeways may be incorporated as part of a combined bikeway/pedestrian pathway system where they can be accommodated with adequate safety. When planning a bikeway, the Department of Planning and Zoning shall be consulted to provide coordination between the planned bikeway and those in surrounding areas. The Department of Public Works shall be consulted when planning a bikeway within or adjacent to a road right-of-way. The design of bikeways shall be in conformance with the AASHTO Criteria for Bikeways."

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Policy Recommendations for Bicycle Infrastructure Planning, Implementation and Management

To ensure the most efficient development of a bicycle-friendly Howard County, policies affecting bicycling in the Zoning Ordinance, the Subdivision and Land Development Regulations, and the Howard County Design Manual should be reviewed and modified as necessary. This section of BikeHoward identifies key issues addressed by these documents and recommends the policy outcomes that should be achieved in initiatives to update and revise them.

Additionally, there may be other policies, practices and design guidelines that need to be revised to achieve the objectives in this section of the plan. The following recommendations are organized by general topic and may need to be addressed by more than one agency or within more than one policy document.

Transportation Planning

Changes to transportation planning practices are recommended in the areas of staffing, transit planning and traffic projections.

Staffing

Recommendation: *Develop a Bicycle and Pedestrian Coordinator Position.*

To address the increased level of work necessary to implement BikeHoward and the specialized skills needed to effectively address bicycling issues, at least one person should be hired to provide focused leadership in this area.

Public Transit Planning Activities

Recommendation: *Ensure that the practice of scoping transportation studies always includes elements related to bicycling and other relevant intermodal and multi-modal topics.*

Future planning and feasibility studies related to existing or new public transit services or systems should address bicycling in a variety of ways, i.e. bikes on transit vehicles, bike parking at transit stations and stops, bicycle access to transit stations and stops.

Future Traffic Projections

Recommendation: *In coordination with the Baltimore Regional Transportation Board develop long-range transportation forecasting methods and models for bicycle and pedestrian trips.*

Current traffic models do not typically account for bicycle trips, and existing bicycling levels are admittedly low.

Recommendation: *Consider the establishment of a bicycle counting program that would allow the County to measure annual changes in bicycle ridership and traffic counts to better understand the impacts of enhanced bicycle facilities.*

At least 10 locations, including both road and trail settings, can be identified for use of automated bicycle counting technology. Counts can be performed on a continuous basis. The County can model its program after a similar program evolving in Arlington , VA and promote the activity with the Baltimore Metropolitan Council and its member jurisdictions. Baltimore City has recently initiated a manual counting program using trained local cyclists and transportation professionals.

Road System Design

Roadway and bikeway design policy and guidelines should be thoroughly reviewed and updated. In general, bikeway design practices should conform to the current edition of the American Association of State Highway and Transportation Officials (AASHTO) Guide to the Development of Bicycle Facilities. In addition to this, County guidelines should be informed by SHA's currently adopted Bicycle Policy & Design Guidelines, the Urban Bikeway Design Guidelines from National Association of City Transportation Officials (NACTO) and the Maryland and Federal Manuals on Uniform Traffic Control Devices (MUTCD). County standards should be based upon the most current national and state standards and guidelines.

While these guidance documents are useful resources, the County also needs specific guidelines tailored directly to developing the bicycle network; and its relationship to other users and environmental considerations.

The following recommendations will enable DPW and the Maryland State Highway Administration (SHA) and other relevant entities to design and build many of the bicycle facilities and treatments that make up the bikeway network to be described in the following chapters of BikeHoward.

Complete Streets

Recommendation: *Develop a "complete streets" policy to ensure that Howard County streets are designed, built, and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of diverse ages and abilities. This could include requiring the development of site and location specific bicycle and pedestrian circulation plans.*

General Roadway and Bikeway Facility Design Guidelines

Recommendation: *Consider the adoption of the specific roadway and bikeway design guidelines related to the facilities proposed in this Plan as outlined in Appendix A.*

Appendix A provides specific guidance regarding lane diets and minimum travel lane widths, shoulder widths, bicycle lane widths, shared use path widths, shared use sidewalk widths and other features and is intended to serve as guidelines for the county and inform the county's actions with SHA in relation to state roads in Howard County.

By-pass lanes

Recommendation: *Monitor DPW and SHA roadway resurfacing and design projects.*

In rural areas, where by-pass lanes are provided on two lane roads, if the roadway section approaching the by-pass lane has a shoulder it is essential that the shoulders are continued through the widened roadway section.

Slip Lane Design and Warrants

Recommendation: *Consider revising traffic volume warrants for slip lanes, including the review of design standards to include: a) pocket bike lanes and dashed bike lanes showing the cyclist's left merging movement, b) the radii of slip lanes should be designed to reduce entry and exit speeds, and c) high quality bicycle and pedestrian crossing accommodations should be provided for those traveling on the crossing roadway.*

Right turn slip lanes at intersections can create a dangerous situation for cyclists.

Bicycle Design for Roundabouts

Recommendation: *Consider retrofitting existing roundabouts and traffic circles with appropriate signs and striping to provide bicycle accommodations and appropriate directives and warnings for bicyclists and motorists. Update design guidance that will be used to design future roundabouts.*

Most roundabouts in the county are appropriately small and one lane. Bicyclists should be encouraged to take the lane upon approach to roundabouts and they should be provided sufficient advance directive to do so. Motorists should be alerted to expect this movement from cyclists and be directed to yield respectfully. This can be done by providing signage for motorists and cyclists as per the MUTCD.

Bicycle Friendly Traffic Calming

Recommendation: *Consider designing all traffic calming treatments, such as speed humps, curb extensions, chicanes, etc. to allow easy passage for cyclists. When travel lanes are narrowed at intersections or mid-block crossings to reduce crossing distances for pedestrians, slots should be provided so that bicyclists traveling on the right do not have to merge into the travel lane to pass through the narrowed section of roadway.*

Bicycle-friendly traffic calming designs can be found in a number of traffic calming design resources, including The AASHTO *Guide for the Development of Bicycle Facilities*; *Traffic Calming: State of the Practice*, ITE/FHWA, 1999; and the Institute of Transportation Engineers' (ITE) website and fact sheets (http://www.ite.org/traffic/tcdevices.as).

Compliance with State Stormwater Regulations

Increasingly, compliance with state stormwater management regulations are affecting shared use path projects and on road bicycle facilities. Shared use path projects are being scrutinized closely because they add impervious surface and are reviewed in the same manner as parking lots and roads. This can cause paths to be reduced in width, reducing their effectiveness. In addition, these regulations can also lead to road improvement projects that minimize shoulder width or eliminate paved shoulders in efforts to meet stormwater regulations.

Recommendation: *Given their low impact on stormwater runoff and water quality, the county should consider advocating for and work with state officials to identify and encourage alternate best practices for stormwater management appropriate for non-motorized pathways.*

Recommendation: *Trail projects should consider utilizing Low Impact Development (LID) and other design treatments as a part of trail and path projects to ensure that trail designs do not promote erosion and appropriately direct runoff to pervious areas that can filter and absorb water.*

Low Impact Development is a design and engineering approach to manage storm water runoff which uses conservation and on-site natural features close to a project to mitigate the impact of stormwater.

Recommendation: *Roadway improvement projects should consider utilizing pavement reduction strategies, where appropriate that support bicycling, such as:*

- *Reducing the width of wide motor vehicle lanes (greater than 12 feet)*
- *Reducing curb radii at intersections*
- *Reducing the use of slip lanes for right turn movements*
- *Minimizing the foot print of intersections, and including LID treatments in place of asphalt where it is not needed for vehicular movements*
- *Minimizing the length of turn lanes and stacking lanes*
- *Minimizing the use of acceleration lanes*
- *Using planted buffer spaces to separate bicycle traffic from high speed motor vehicle traffic*

Howard County Scenic Roads

The County has a policy designed to help preserve the integrity of view sheds and environmental features of certain roads.

Recommendation: *Consider amending Howard County Scenic Roads legislation to accomplish the following: a) clarify that road improvements allowed on designated scenic roads to provide safe conditions for traffic includes improvements for the safety of bicycle traffic, b) that improvements listed in BikeHoward as components of the "facility type" Shared Roadway with Safety Treatments are in keeping with the county's definition of allowable roadway improvements for designated scenic roads, c) that designation of scenic roads as recreational bikeways, and signing them as such, complements the County's scenic roads policy and program goals, and that d) increased levels of bicycling on scenic roads strengthens the County's efforts to sustain the scenic and historic quality of these roads while at the same time increase the public's opportunity to enjoy them on a regular basis.*

County policy governing improvements to designated scenic roads states, "Improvement to scenic roads must protect the features that contribute to the road's scenic character, such as width, alignment, and vegetation or slopes within the right-of-way… road design standards require that improvements within the right-of-way of scenic roads be designed to preserve the character of the road while providing safe conditions for traffic." Current recommendations to update scenic roads policy suggest that improvements should be restricted to carefully designed spot improvements which retain the scenic qualities of the road. Many of the bicycle safety treatments referred to in BikeHoward for potential application on roads mapped as Shared Roadways with Safety Treatments, are in keeping with this policy recommendation.

Land Development Policies that Govern Private Development and Site Plan Review

Recommendation: *County zoning, subdivision policy, and the County Design Manual, all of which regulate new development, redevelopment and site design should be, where feasible, updated to achieve the following objectives related to implementing BikeHoward and improving conditions for bicycling:*

1. *Ensuring that all new development or redevelopment plans do not reduce or degrade the amount of space available for bicycling on public roads along the property frontage or on access roads. This shall apply to existing travel lanes of 11 feet or greater, paved shoulders, parking lanes and other road elements not marked or shown as a legal bike facility.*
2. *Ensuring that appropriate types and quantities of bicycle parking are provided in commercial, retail, institutional, multi-family residential and public facility developments.*
3. *Ensuring that bicycle and pedestrian connectivity from residential developments is provided to surrounding developments as well as to roadway, utility, school and park rights-of way adjacent to the property.*
4. *Ensuring that commercial development provides bicycle and pedestrian connectivity to adjoining properties.*
5. *Ensuring that large tract multi-family residential developments provide public access ways through the development that are designed for bicyclists and pedestrians.*
6. *Increasing the traffic generation thresholds that trigger provision of right and left turn lanes into the development from arterial and collector roads. Emphasis should be placed on reducing delays from left turns. A higher threshold of traffic generation should be provided before right turn receiving lanes are required.*
7. *Determine the provisions that could require offsite road improvements related to traffic impacts include provision of shoulders or bike lanes for up to 0.1-0.2 of a mile in each direction from the development property boundary on entrance frontage.*
8. *Intersection improvements required of developers as a result of traffic impacts should include upgraded bicycle and pedestrian*

accommodations at and approaching the intersection.

Howard County Public School Policy Governing Site and Road Design for Public Schools

Recommendation: *The following recommendations are provided for guidance and direction on how public school property can contribute to a bicycle-friendly Howard County. The Howard County Public Schools and School Board should consider adopting the following policies:*

1. *Replace existing substandard bicycle parking equipment with racks that meet standards described in this plan and begin a process of providing covered bicycle parking where bicycle access is highest.*

2. *Manage bicycle parking supply in response to use and need, to ensure that all schools have sufficient supply to meet the needs of students, teachers, staff, visitors and school and non-school events that use school facilities.*

3. *At middle and high schools especially, provide appropriate bicycle facilities on and/or adjacent to school entry roads, drive ways, parking lots and circulation roadways.*

4. *Provide pathways through school grounds and around athletic fields as identified in* BikeHoward, *and as may be identified in future updates of* BikeHoward to *ensure that school properties can contribute to a continuous and connected bikeway network. Funding may be provided through HCPSS capital improvement funds, county transportation funds, and other funding sources, including state and federal grants.*

5. *Provide direct bicycle and pedestrian access paths to existing and new schools from adjacent neighborhoods. Where ever possible these paths shall be provided by residential property developers.*

6. *Consider siting new schools in locations that will: a) maximize access by walking, bicycling and use of public transit; b) ensure that school site design minimizes conflicts between motorized and non-motorized access modes and c) favors student and other arrivals by walking, bicycling, public transit and school bus, not motor vehicle drop-off.*

County Policy Governing Park Design and Development

Recommendations: *The following recommendations are provided for guidance and direction on how parks can contribute fully to a bicycle-friendly Howard County. The Howard County Department of Recreation and Parks (DRP) should consider adopting the following policies:*

1. *Replace existing substandard bicycle parking equipment with racks that meet standards described in this plan and begin a process of providing covered bicycle parking where bicycle access is highest.*

2. *Manage bicycle parking supply in response to use and need, to ensure that all parks have sufficient supply to meet the needs of park visitors.*

3. *Provide temporary bicycle parking for special events as it may be requested by event sponsors.*

4. *Promote bicycle access to parks as an alternative to motor vehicle access and as a way to: a) reduce the need for asphalt surface parking lots, b) reduce car trips and resulting air pollution, and c) promote healthy and active living.*

5. *Provide appropriate bicycle facilities on and/or adjacent to park entry road drive ways, parking lots and park circulation roadways.*

6. *Develop pathways through park lands as identified in the BikeHoward, and as may be identified in future updates of the Plan. Funding may be provided through DRP capital improvement funds, County transportation funds, or other sources.*

7. *Design and build Transportation Trails (as so designated in this Plan) to width and surface standards detailed in Appendix A.*

8. *Update the Blandair Park Development Plan based upon consideration of proposed adjustments to a small number of proposed trail alignments. These alignments will improve directness and user experience in the bikeway network and better enable park trails to contribute to a continuous and connected county-wide system of bikeways.*

9. *Implement the on-road, off-road and spot recommendations in this plan that are on or directly related to Howard County park lands. These may be in Centennial Lake Park, Meadowbrook Park, Rockburn Branch Park, Cedar Lane Park, and on the Patuxent Branch Trail.*

10. *Provide direct bicycle and pedestrian access paths to existing and new parks from adjacent neighborhoods.*

11. *In regional parks with large pathway systems, DRP should consider creation of a hierarchy of paved paths, providing sufficient width for high volumes of mixed use, and through bicycle movements on select paths, and providing narrower, varied-surface paths for pedestrian strolling, hiking, nature observation, etc.*

Bikeway Management & Maintenance

Due to the extensive pathway system managed by Columbia Association and the Department of Recreation and Parks, the County is well acquainted with the maintenance and management of shared use paths. None the less, these practices will need to be upgraded to appropriately manage shared use paths for transportation use. Moreover, as the inventory of on-road bicycle facilities increases, management and maintenance of this system will require greater attention. The following list of maintenance and management practices for path and on-road bikeways are recommended.

On-Road Bikeway Maintenance and Management

Recommendations:

1. *Use the County's mobile app. (Tell HoCo) and/or online reporting systems system to identify road hazards that pose a safety risk for cyclists.*

   Encourage bicycle clubs and advocacy groups to use this service. As hazards are addressed, the County should provide feedback to the citizens that report problems as well as to the community at large, to describe what citizens and government can do together in an ongoing partnership.

2. *Develop a bike lane and shoulder sweeping program that focuses on the roads with the worst debris build up and those with the highest user levels.*

3. *Restripe bicycle lanes and reapply shared lanes markings as needed.*

4. *Develop an asset management database for maintenance of wayfinding and other signs used in the bikeway system.*

5. *Develop a coordination protocol between County roadway maintenance officials and State Highway Administration roadway maintenance offices.*

Trail Maintenance and Management

Recommendations:

1. *Expand the geo-coded emergency response location system to include CA and other pathway tunnels and other regularly spaced markers to ensure that the trail systems are fully covered.*

2. *Develop a program that involves volunteers in trail maintenance, especially youth on County paths and trails.*

Volunteer cyclists may also be useful to conduct periodic visual inspection of bicycle related signs and markings.

The following Chapter discusses how the network was developed.

Section 4:

How the Network Was Developed

How the Network was Developed

Creating a network of comfortable and useful bikeways is a primary goal of this plan. This chapter describes the planning and study process that led to development of the network. The chapter is divided into three sections, as follows:

- ***Learning about the County:*** which describes the processes used to assess the county's road and trail corridors and gather input from the bicycling public about existing conditions
- ***Themes:*** which discusses the common types of bicyclists a network should serve and how cyclists' variable need for protection from traffic is addressed by various facilities that make up a network
- ***Prioritization Criteria:*** the criteria used to organize a comprehensive countywide network into smaller sub-networks that can be developed over short, medium and long term timeframes

Learning about the County

BikeHoward approached learning and studying cycling conditions in the county through the following methods:

- Gathering input and knowledge from county residents and stakeholders through a series of public meetings, interactive online maps and interviews
- Conducting extensive field analysis of the roadway system, existing trails and potential future trail corridors
- Reviewing relevant local and state planning documents and initiatives
- Reviewing Columbia Association's Active Transportation Action Agenda

Public Input

Public involvement was facilitated through 6 public workshops, an online survey and an online interactive map. More than 750 people were engaged in the process and provided comments and ideas on every aspect of bicycling in the county. Please see Appendix B for additional detail on the public outreach activities.

Field Analysis

Field analysis was conducted on approximately one-third of the county's roads (including state highways in the county). Additional review was conducted on county trails and potential trail corridors. The trail assessment looked first at the potential for the existing trail or potential trail to provide an important transportation connection. Additional factors reviewed were related to engineering feasibility and property ownership. Please see Appendix B for additional detail on the roadway and trail assessment process.

What is a Bikeway Network?

A Bikeway Network is concept used in transportation planning to identify a set of roadways, shared use paths and other bicycling infrastructure (such as bridges and tunnels) that will function effectively for bicycle transportation.

It is comprised of existing shared use paths and roadways that are good for bicycling, as well as the roads and paths that need improvement to better accommodate bicycle travel. It also includes proposed new pathways, new bridges and tunnels and even new roads that may be called for in existing development plans.

The goal of a Bikeway Network is to establish effective connectivity between trip origins and destinations so that bicycling can be a viable option for greater numbers of people. As a whole, a proposed Bikeway Network establishes both a vision and a "road map" for making a community safe and attractive for bicycling.

It is important to note that many existing roads, chiefly neighborhood streets, are already bicycle-friendly, but may not be included in a Bikeway Network because they do not need special bicycling facilities or are not critical for system-wide transportation connectivity. Likewise, many trails may not be included because they serve primarily as capillaries that supplement the network, or because they are recreational in nature and do not need to be upgraded for transportation use.

Planning Context

More than twenty existing or ongoing project plans, general planning and study documents were reviewed. The review looked for nexus points, i.e. factors and issues which may have some important relationship to bicycling and thus the potential to inform the Plan. See Appendix C for additional detail on the plans reviewed.

Themes

Comfort for All

For a network to work for all types of cyclists, it must be comprised of facilities that increase the physical safety of cyclists (as well as cyclists' perception of safety). Concern for safety in traffic is the primary reason Americans give for not bicycling for transportation, and the survey of Howard County residents conducted during this planning process revealed the same.

A goal of BikeHoward is to create a seamless network of roadways, trails, public transit services and parking facilities that serves cyclists of all skill and comfort levels and bicycle trips for all purposes. To do this, BikeHoward focuses on developing facilities for a broad range of people, from expert cyclists comfortable riding in all conditions to families that want to run local errands by bicycle and youth that want to bike to school.

The classification of bicyclists is informed by research conducted by the City of Portland, Oregon.[1] Through surveys of both existing cyclists and those toward whom promotional efforts were directed, Portland found that its overall population could be divided into four different groups based upon their attitude toward bicycling for Transportation (see Figure 1):

- *Strong and Fearless* riders (less than 1%); this group is willing to bicycle under almost any traffic conditions
- *Enthused and Confident* cyclists (7%); this group is generally willing to ride in urban areas but prefers low volume streets and dedicated bicycle facilities
- *Interested but Concerned* cyclists (60%); this group is hesitant to ride in urban traffic and tends to stick to very low volume, low speed neighborhood streets or shared use paths and greenway trails
- *No Way No How* (33%); people who would not cycle under any circumstances

Moreover, Portland found that cyclists' attitudes toward utilitarian bicycling were essentially a reflection of their skill and confidence levels. From this work Portland has concluded that making improvements to the physical bicycling network is essential to:

a) Get the *enthused and confident* to ride even more often and to more varied destinations; and

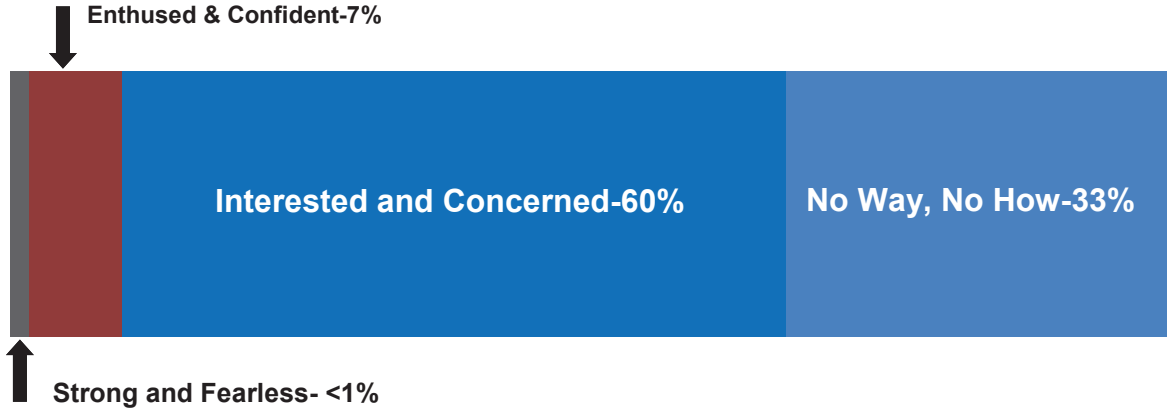
b) Increase the numbers of people in the *interested but concerned* group to get engaged in bicycling for transportation.

Portland's work has been built upon by research published by the Mineta Transportation Institute that looked at bicycling stress levels and "low-stress" bikeways.[2] This study defined a range of stress levels cyclists experience while bicycling in various settings. Stress is primarily determined by three factors:

- The cyclist's skill level
- The traffic conditions on the road or trail (speed, volume and mix)
- The degree of protection from traffic provided by the bicycling facility and/or overall roadway design

Low stress bikeways can now be defined as those that provide a high level of comfort for even the lowest skilled, in low to moderate traffic conditions.

Figure 1: Classifications of Utilitarian Cyclists



[1] http://www.portlandoregon.gov/transportation/article/158497

[2] Low Stress Bicycling and Network Connectivity, May 2012, Mekuria, Furth & Nixon.

However, it is important to note that cyclists of the highest skill level require less protection from motor vehicle traffic and have greater tolerance for high stress traffic conditions, and thus may consider a 4-5 foot shoulder on a low volume road with 45 mph car traffic a “low stress” condition, whereas less skilled cyclists and children may not consider a 10 foot shoulder on such a road sufficient to make it low stress.

Because traffic conditions on a roadway are a major contributor to the stress factor, the same facility may be a low stress bikeway to some in certain settings, a medium stress bikeway to others in certain settings, and a high stress bikeway to still others in a certain setting.

As a result, bikeway types (i.e. facilities) are classified as “low stress” bikeways, and “variable stress” bikeways. Moreover, the design quality of the bikeway, as well, will play a role in its ability to reduce stress for cyclists.

In most suburban settings, shared use paths of 10 feet in width, sidewalks with bikes permitted, and residential streets are low stress for most cyclists. Protected Bike Lanes, also known as Cycletracks, a European bicycle facility now being used in the U.S., are also low stress bikeways. A bicycle lane is a “variable stress” bikeway. (See Figure 2, Traffic Stress Matrix, for further illustration of this concept.)

Figure 2: Traffic Stress Matrix

Connections

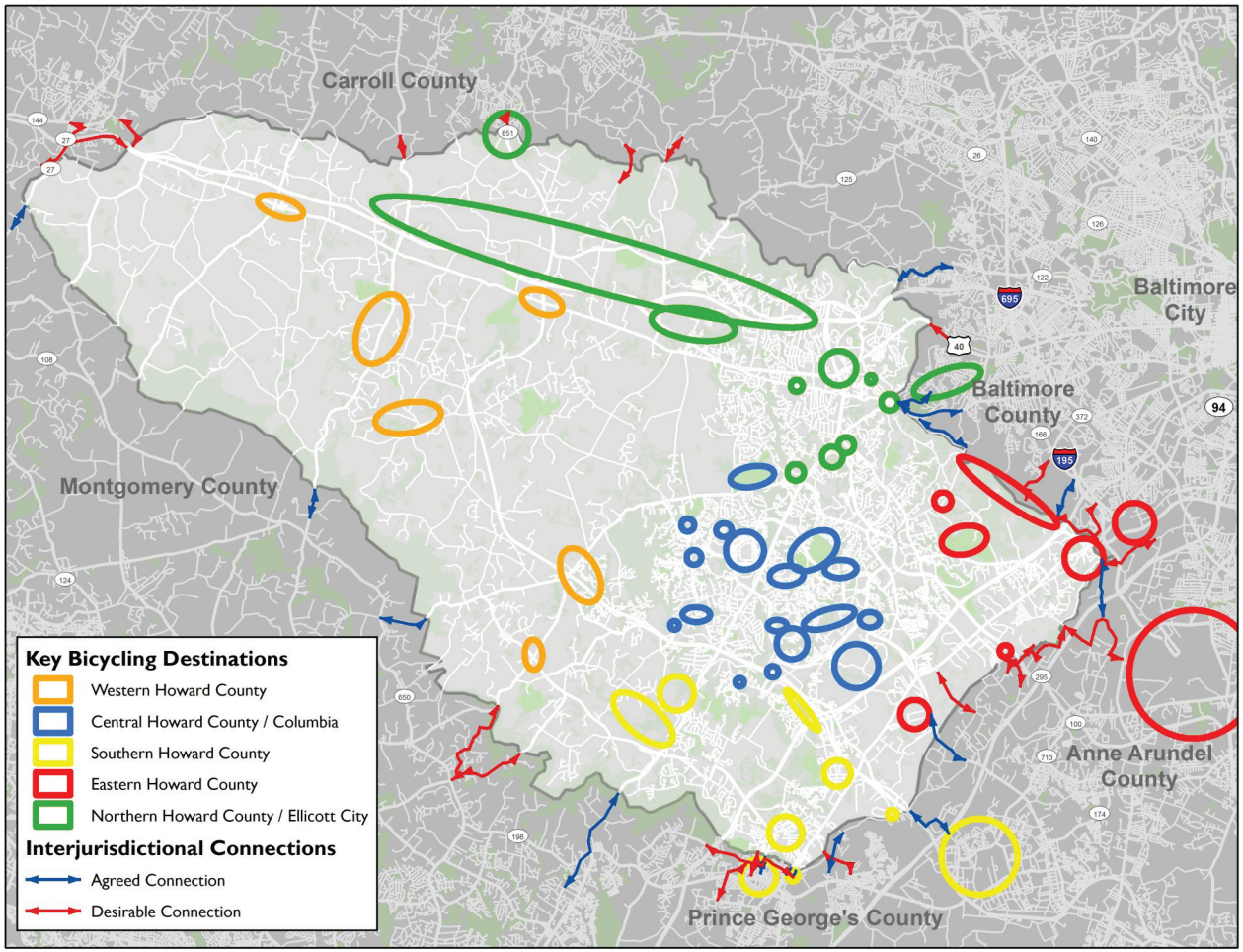
For a bicycle network to be useful, it needs to connect people to places they want to go, be continuous, direct and efficient, and be easy to navigate. BikeHoward addresses connections in four ways: 1) connecting people and places, 2) connecting Howard County to surrounding jurisdictions, 3) addressing barriers to bicycle travel and 4) closing gaps in and extending the existing pathway networks.

Connecting People and Places

Based upon public input and mapping of neighborhoods, rural villages, employment centers, recreational destinations, schools and libraries, transit hubs, major trails and commercial areas, a set of 51 key geographic destinations within and just outside the county were identified and confirmed by the Technical Advisory Group as key places that need improved bicycle access. In the selection process, emphasis was placed on the most heavily populated and developed core of the county, which can be best understood as the area within the planned water and sewer service boundary.

Map 2 provides a schematic map of these locations. For a list of Key Destinations please see Appendix D.

Map 2: Map of Key Bicycling Destinations Needing Bikeway Connectivity



Connecting Howard County to Surrounding Jurisdictions

A second planning exercise included review of bicycle plans by the state and surrounding counties, and included public input to identify key border locations where on-road bikeways or trail links are needed for bicycle access to and from surrounding jurisdictions. Recreational as well as transportation routes were considered.

Addressing Barriers to Connections

Like all of central Maryland, Howard County has many barriers to bicycling such as major highways, railroad corridors and stream valleys. There are also large natural areas such as the protected lands along the Patuxent and Patapsco rivers. The following strategies are recommended for addressing these types of barriers.

- Improve the transportation utility of trails that have existing grade separated crossings (bridges, tunnels or underpasses) of major highways, railroads, rivers and streams.
- Use and improve trail and road routes that cross limited access highways at locations where there are no interchanges.
- Provide improvements to routes that use the most convenient and direct alternatives around barriers that cannot be directly addressed in the near term.

- Provide a priority list of key grade separations that can be pursued as major funding opportunities become available.

Throughout the planning process the public continued to stress that intersections along arterial roadways are also key barriers to bicycling. Due to the large crossing distances and multiple turn lanes at typical intersections, cyclists can easily go unnoticed to motorists, or be hidden behind other vehicles. It can also be difficult to make left turn movements at such intersections. As a result BikeHoward has identified a number of locations where intersections should be improved.

Closing Gaps in and Extending the Existing Pathway Networks

Columbia has one of the most extensive pathway networks of any suburban community in the U.S. A plan to build on that existing CA pathway network, and a plan for improving that network has already been articulated by the Connecting Columbia Active Transportation Action Agenda. This plan, completed in 2012 by Columbia Association identifies and highlights key trail segments that will contribute significantly to use of both CA pathways and Howard County Recreation and Parks Department's trail systems.

BikeHoward will build upon and improve the pathway system by:

- Closing gaps in existing systems
- Improving connectivity to adjacent land uses such as employment centers, retail shopping areas, residential neighborhoods and key roadways
- Widening and upgrading key trail segments so that they can safely support bicycle transportation usage
- Extending pathway networks where feasible along stream valley, road corridors and utility corridors

Bicycle Trip Types and Purposes Served by the Bikeway Network

Trips of 3 miles or less

- Casual riders
- Commuting to work
- Shopping, errands, seeing friends
- Children and youth biking to school
- Close to home recreation

Trips of 3 miles or more

- Biking to transit or park & rides
- Commuting to work
- Long distance recreation
- Fitness and training

Prioritization of Recommendations

BikeHoward developed over 500 miles of roadway and pathway improvements throughout the county. The full set of recommendations is referred to as the *Countywide Bikeway Network* and represents the long term vision for the county's bikeway network, a bikeway network that provides a high level of connectivity for the county.

To make implementation practical, these facility recommendations were prioritized and divided into networks referred to as the *Short-Term Network*, *Mid-Term Network*, and the *Long-Term Network.*

In general, the Short-Term Network is comprised primarily of lower cost improvements and includes a very small number of "non-standard" facility types. The Mid-Term Network is more balanced between lower cost and high cost activities. The balance of the network includes primarily higher cost activities and supplemental routes that provide additional linkages to destinations, or connections to destinations of lesser importance.

In addition to proposed improvements, each network also includes existing roads and trails that are important because of the connectivity they provide, even though further improvements are not necessary.

Prioritization Criteria

BikeHoward approached prioritizing the countywide network into the mid-term and Short-Term networks using the following baseline criteria for all recommendations:

That all recommendations must connect with each other, to existing facilities, or to Key Destinations as identified in BikeHoward. There can be no gaps; and each network, while limited in scope, should be fully functional if completed as planned.

Three specific types of criteria were identified and used in the screening process to develop the Short, Mid and Long-Term Networks. The basic framework used in the screening process is shown in Figure 3

- Overarching Criteria
- Geographic Criteria
- Feasibility Criteria

Overarching Criteria

Overarching criteria address values that are represented in most recommendations in the Mid-Term Network and many recommendations in the Short-Term Network, including:

- Leveraging existing facilities
- Safety Improvements
- Better serving riders in "*enthused and confident*" and "*interested but concerned*" groups as described in BikeHoward

Geographic Criteria

Geographic criteria ensure that the network provides connectivity and continuity to as many key destinations as possible. The Mid-Term Network connects to 95 percent of the Key Destinations in the county and the Long Term network represents the balance of the key destinations in the county as shown in Map 2. The Short-Term Network provides a small set of core routes that serve north-south and east-west movements within the core of the county and key corridors for access to popular recreational routes.

The public input gathered throughout the planning process is primarily integrated into the geographic criteria. The Key Destinations list was developed based upon the destinations identified in public meetings and workshops as well as on the interactive map. As routes were selected to link these destinations, input from cyclists was considered heavily. Moreover, public input was used to determine which recreational routes were most important to include in the Short-Term Network.

Some key criteria are:

- Creating connectivity between important destinations such as trails, schools, parks and employment clusters
- Develop select scenic/recreational routes
- Align with Columbia Association's Active Transportation Action Agenda

Feasibility Criteria

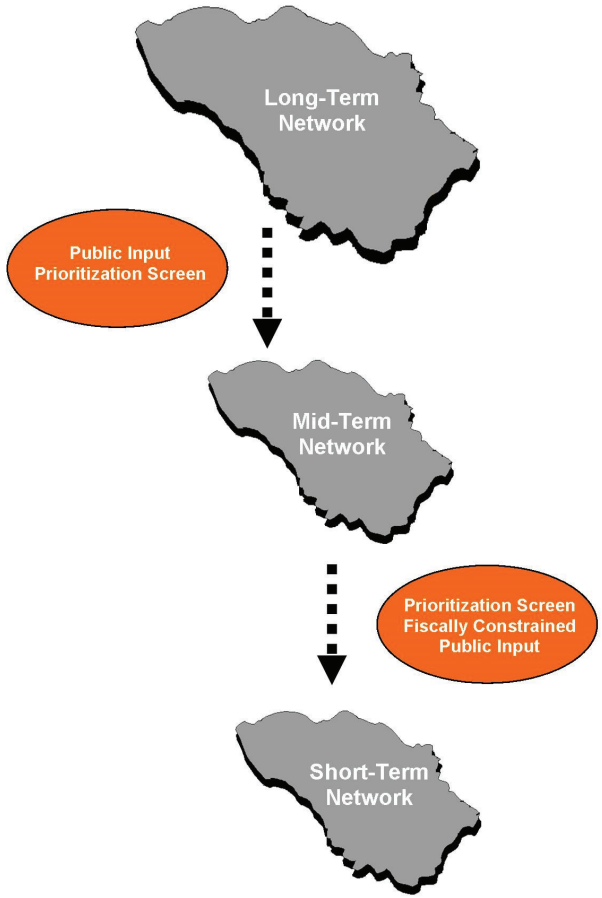
Feasibility criteria are factors related to the physical nature of each recommendation, including the proposed facility type, and other logistical issues related to implementation, including the level of effort required and the estimated cost.

Some key criteria are:

- Facility type
- Level of effort needed to implement the facility
- Right of way availability
- Cost

For a full discussion of the screening process, please see Appendix E.

Figure 3: Network Prioritization Process



Section 5:

The Bikeway Network

The Countywide Bikeway Network

This chapter describes the Long-Term, Mid-Term and Short-Term networks and the recommendations that comprise the Countywide Bikeway Network and describes the bikeway facility types that make up the networks.

Short-Term Network

The Short-Term Network utilizes the core of the existing pathway system and provides a basic level of connectivity in the more heavily populated and developed core of the county. The Short-Term Network is projected to take 10 years to fully develop from the adoption of BikeHoward. Outside of the existing pathway system, it also leverages committed projects being planned and built by as part of the redevelopment of Downtown Columbia and by Columbia Association.

This network mostly includes variable stress facility improvements on low and medium volume roads. It includes 72 miles of on-road bikeway improvements, 23 miles of new and upgraded pathways and 47 spot improvements at intersections and pathway crossings.

A few north-south routes are included, linking Historic Ellicott City and the Howard County government center to downtown Columbia, Oakland Mills, Savage and Laurel. East-West routes link the Howard County General Hospital (HCGH) to Rockburn Regional Park, and River Hill to the Savage MARC station.

Mid-Term Network

The Mid-Term Network is oriented to ensure that most of the Key Destinations identified by the long term vision for the county are connected. It includes 160 miles of upgrades and improvements on roads, 34 miles of new and upgraded paths and recommends 97 spot improvements at intersections, trail crossings, bridges and tunnels.

In addition to recommendations for trail and pathway upgrades, the Mid-Term Network includes much of the existing CA trail system. A major goal of this network is to create a bikeway system that will attract more people from the *interested but concerned* group of cyclists. It relies more heavily on development of low and medium stress bikeways in high stress corridors. Build out of this network is projected to take 20 years from plan adoption. It aims to create both transportation routes and recreational routes, linking more of the scenic and historic corridors in both the western and eastern portions of the county.

Long-Term Network

The Long-Term network is the long term vision for the whole county and is comprised of the recommendations that are not included in the Mid-Term and Short-Term Networks.

Many of the facility improvements designated in this network will likely happen in conjunction with major roadway reconstructions and expansions and is projected to take place 20 to 30 years following the adoption of BikeHoward. Other types of projects in the countywide network include the following:

- New bicycle overpasses of major highways
- Many of the more costly cycle tracks; and many of the more costly new trails
- Development of lower stress routes to destinations already served by variable stress routes
- Upgrades of variable stress facilities implemented in the Short-Term or Mid-Term to low stress facilities

Table 2: Summary of Recommendations

Bikeway Facility Type	Network (Miles)			Total (Miles or Locations)
	Short-Term	Mid Term	Long Term	
On-Road Bikeway Improvements				394 mi.
Minor Upgrades to Existing Facilities	2	12	15	29
Recommendations for New Facilities	70	148	147	365
New and Upgraded Path/Cycletrack or Protected Bike Lanes				160 mi.
Upgrade Existing Pathways	13	14	10	37
Construct New Shared Use Paths & Protected Bike Lanes	10	21	91	122
Spot Improvements				191 Locations
Trail Access and Bike Linkage Improvements	12	17	5	34 Locations
Bridge and Tunnel Improvements (new and upgrades)	1	7	18	26 Locations
Intersection Improvements	33	74	24	131 Locations

Facilities in the Bikeway Network

The County's Bikeway Network is made up of a variety of bikeway facility types and spot improvements, each of which has been assigned to specific road and trail segments based upon need and applicability. The visual glossary presents the various bikeway types proposed in BikeHoward.

Linear Improvements

The networks include a range of standard and non-standard bikeways. They also include the use of low volume neighborhood streets and other streets where cyclists can share the roadway with low speed traffic. The Networks include other facilities such as shared use paths, neighborhood greenways and shared lane markings (sharrows). New treatments such as colored bike lanes are also included.

Spot Improvements

In addition to linear facilities, spot location recommendations are included, such as intersections that need to be upgraded, trail crossings that should be made safe and functional, and small path connections, such as curb ramps, barrier removal locations, stairway retrofits, etc. Locations where new or upgraded bicycle/pedestrian bridges or tunnels are needed are also included. A table with detail on the spot locations is presented in Appendix F.

Network Mapping

Accompanying the main body of the document are two large scale maps.

A map titled "Countywide Network by Phase" presents the network by the three phases.

Click here to open the map.

A map titled "Short-Term Network Bike Facility Type" presents the Short-Term network by the types of facilities recommended.

Click here to open the map.

5 smaller network maps are also presented in this chapter

Maps 3-7 shows the full extent of all three networks, including segments with recommended improvements and those with existing facilities. One map is provided for each of the five planning areas:

- Map 3 presents the whole county, along with the Rural West Planning Area
- Map 4 presents the Ellicott City Planning Area
- Map 5 presents the Columbia Planning Area
- Map 6 presents the Elkridge Planning Area
- Map 7 presents the Southeast Planning Area

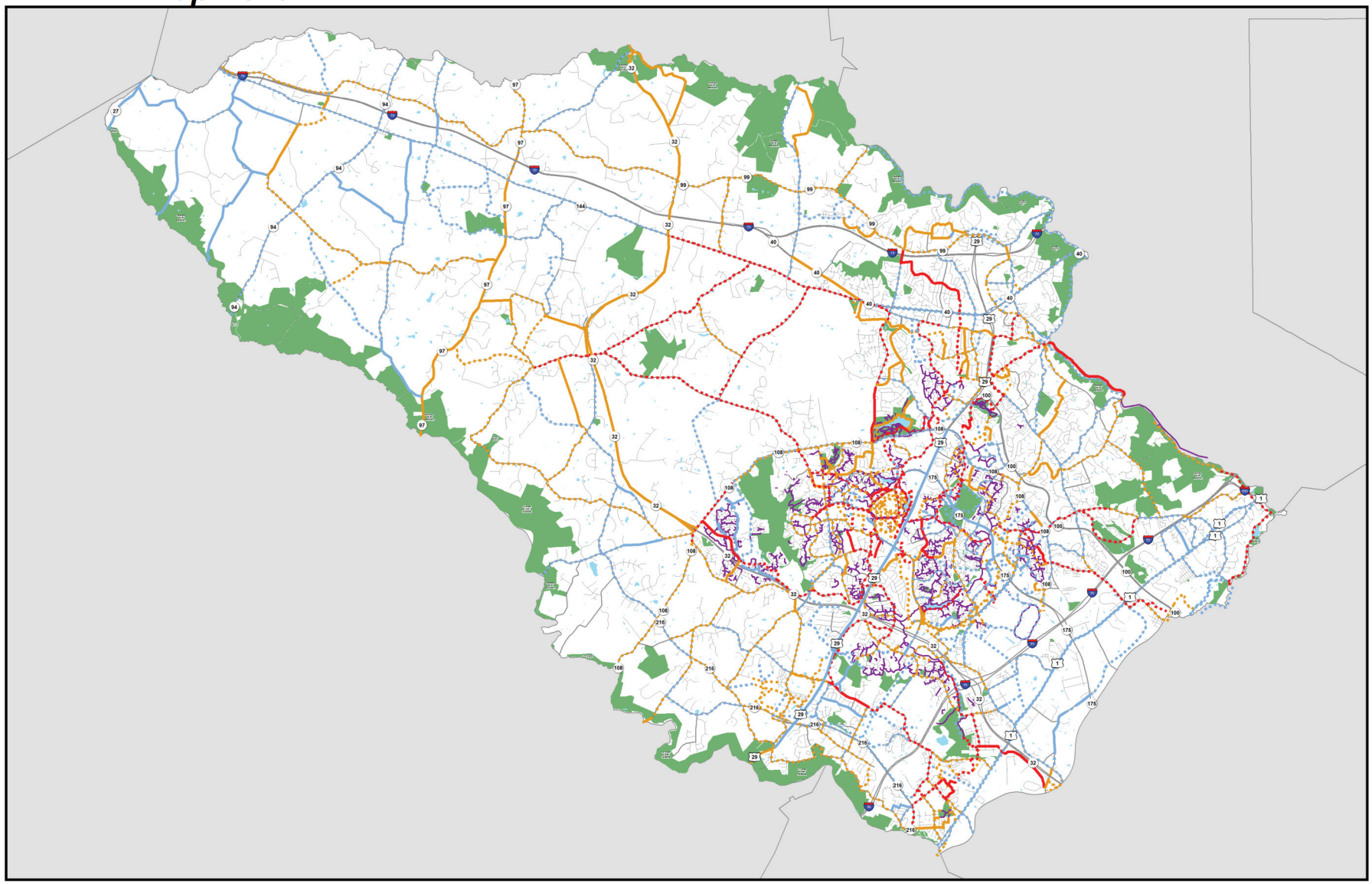
BIKE HOWARD

Rural West/Countywide Bikeway Networks Map No. 3

Bike Facility Recommendations

Short Term	Mid Term	Long Term	
Existing	Existing	Existing	Further Study
Improvements	Improvements	Improvements	Existing Pathways and Trails (HC, CA, and Others)

N



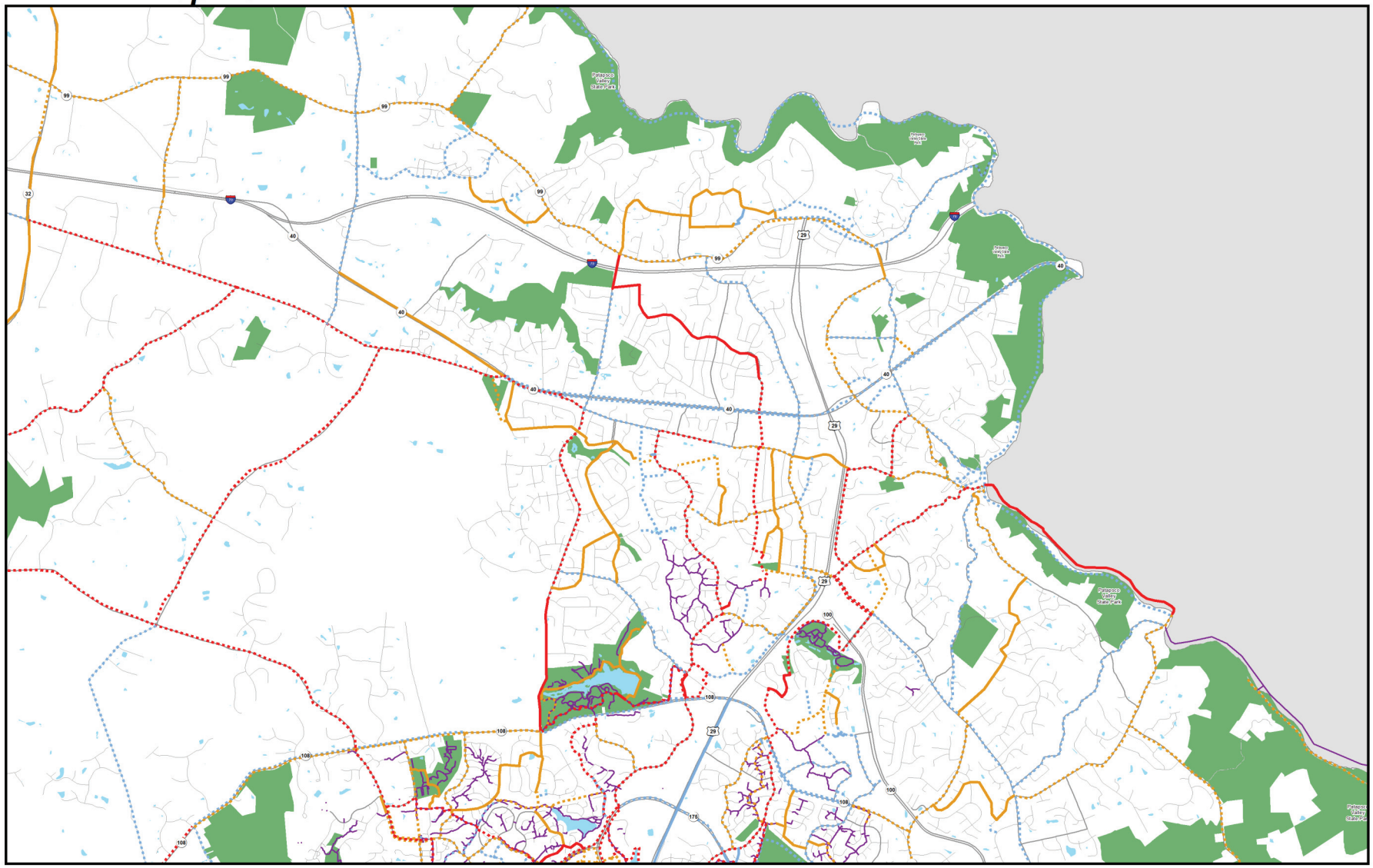
BIKE HOWARD

Ellicott City Bikeway Networks Map No. 4

Bike Facility Recommendations

Short Term	Mid Term	Long Term	
Existing	Existing	Existing	Further Study
Improvements	Improvements	Improvements	Existing Pathways and Trails (HC, CA, and Others)

N



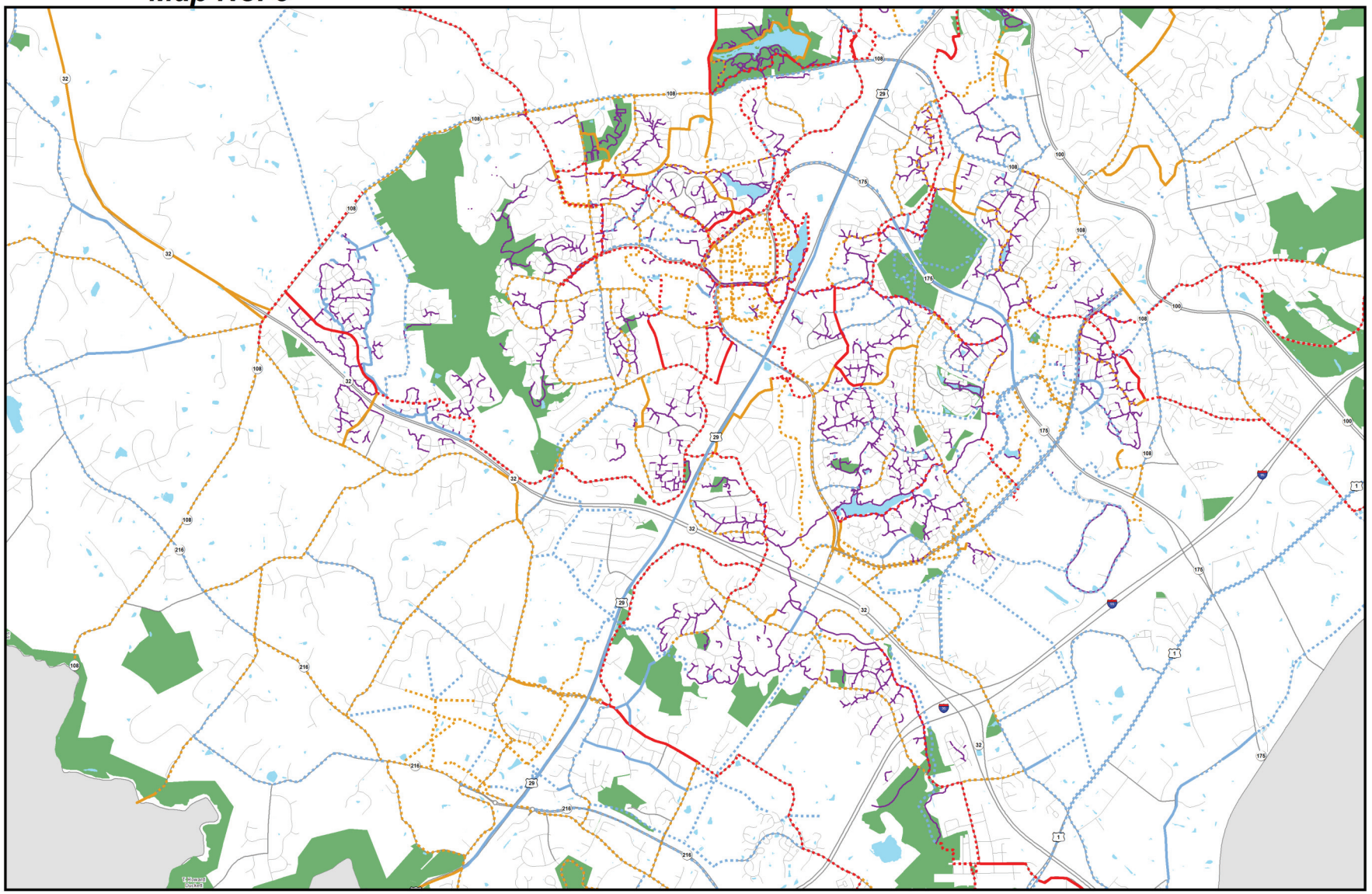
BIKE HOWARD

Columbia Bikeway Networks Map No. 5

Bike Facility Recommendations

Short Term	Mid Term	Long Term	
Existing	Existing	Existing	Further Study
Improvements	Improvements	Improvements	Existing Pathways and Trails (HC, CA, and Others)

N



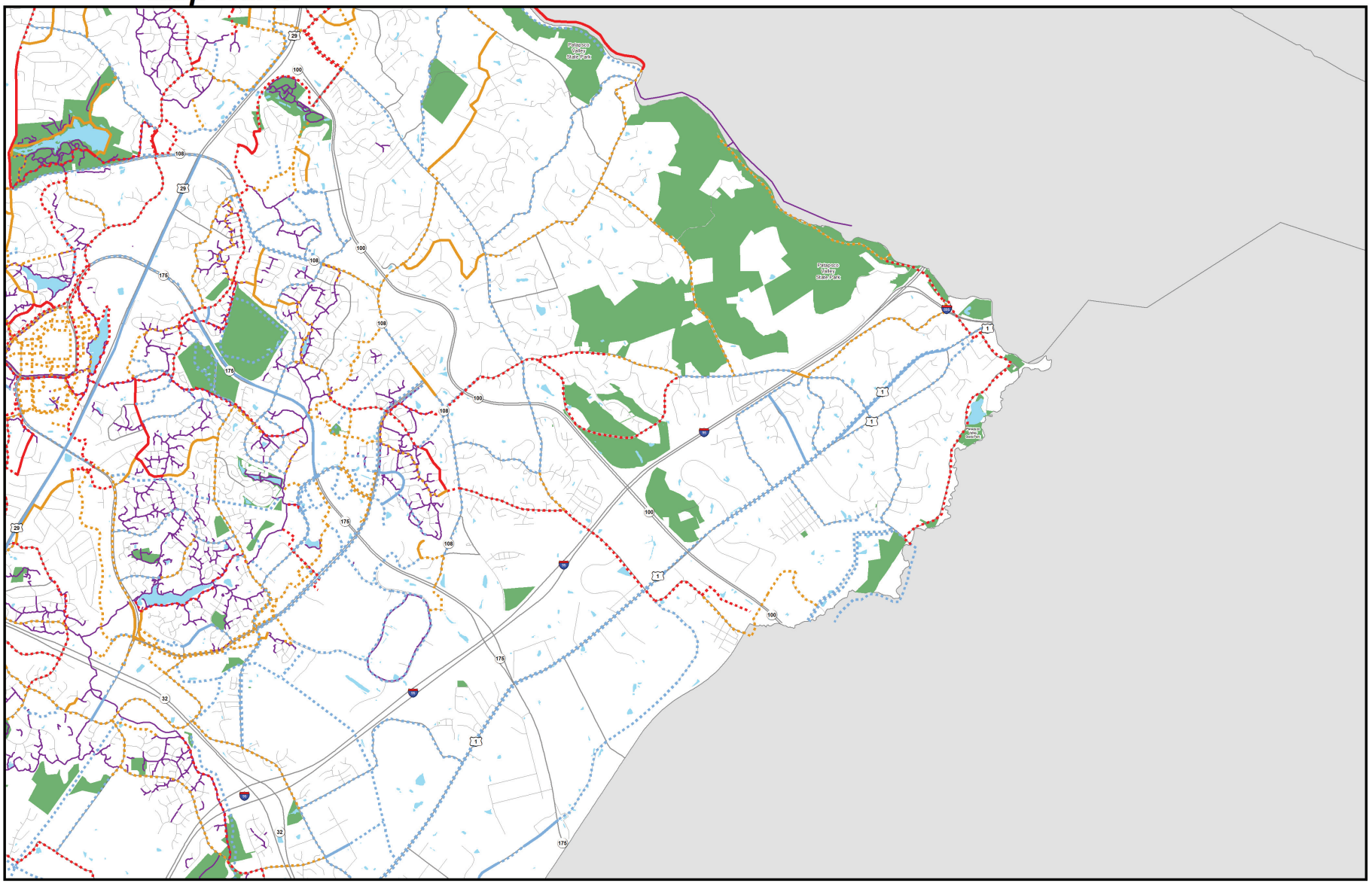
BIKE HOWARD

Elkridge Bikeway Networks Map No. 6

Bike Facility Recommendations

Short Term	Mid Term	Long Term	
Existing	Existing	Existing	Further Study
Improvements	Improvements	Improvements	Existing Pathways and Trails (HC, CA, and Others)

N



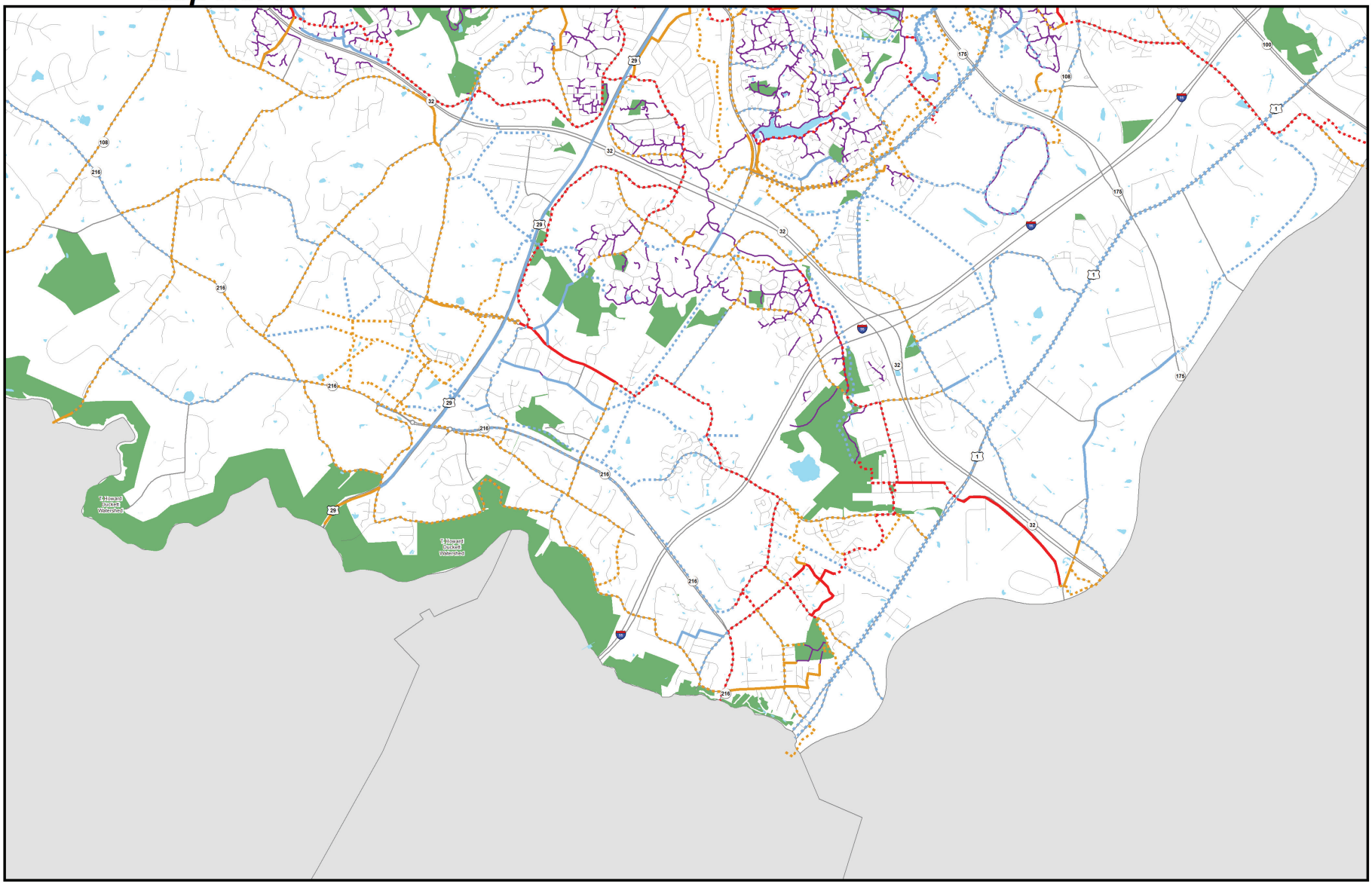
BIKE HOWARD

Southeast Bikeway Networks Map No. 7

Bike Facility Recommendations

Short Term	Mid Term	Long Term	
Existing	Existing	Existing	Further Study
Improvements	Improvements	Improvements	Existing Pathways and Trails (HC, CA, and Others)

N



Connections to Surrounding Jurisdictions

Table 3 on the next page identifies a set of key locations where Howard County desires bicycle-friendly roadway connections to its neighboring jurisdictions. These locations listed as confirmed are those that are identified in the bikeway plans of the neighboring jurisdiction and those that are listed as unconfirmed are only identified by Howard County. In general, the County hopes that neighbor jurisdictions, or the state (in the case of a state roadway) will provide bicycle facilities or accommodations commensurate with those shown by this plan on the Howard County side of the border.

Regarding state roadways that become limited access highways, i.e. US 29, MD 100, and portions of MD 32 and MD 216, Howard County generally prefers development of parallel routes on each side of such highways, rather than shared use path, cycletrack or wide shoulder accommodations within the road ROW. In some cases, where major road and/or interchange upgrades take place these project may create opportunities for high quality bikeways with grade separated ramp crossings along portions of such roads. Howard County seeks to preserve bicycle access to the shoulders of US 29 especially between Old Columbia Road in Howard County and Old Columbia Road in Montgomery County, as this is the only crossing of the Rocky Gorge Reservoir.

Small Area Plans

During the planning process, it was determined that additional study would be needed in parts of the county that are undergoing or expected to undergo significant change.

In response to this need, BikeHoward developed a detailed circulation bicycle plan for Downtown Columbia that is harmonized with the countywide plan. The Downtown Columbia circulation plan is presented in Maps 8 and 9 and additional detail on Downtown Columbia is presented in Appendix G. The Downtown Columbia map represents two scenarios for Downtown, with and without the new north-south collector road.

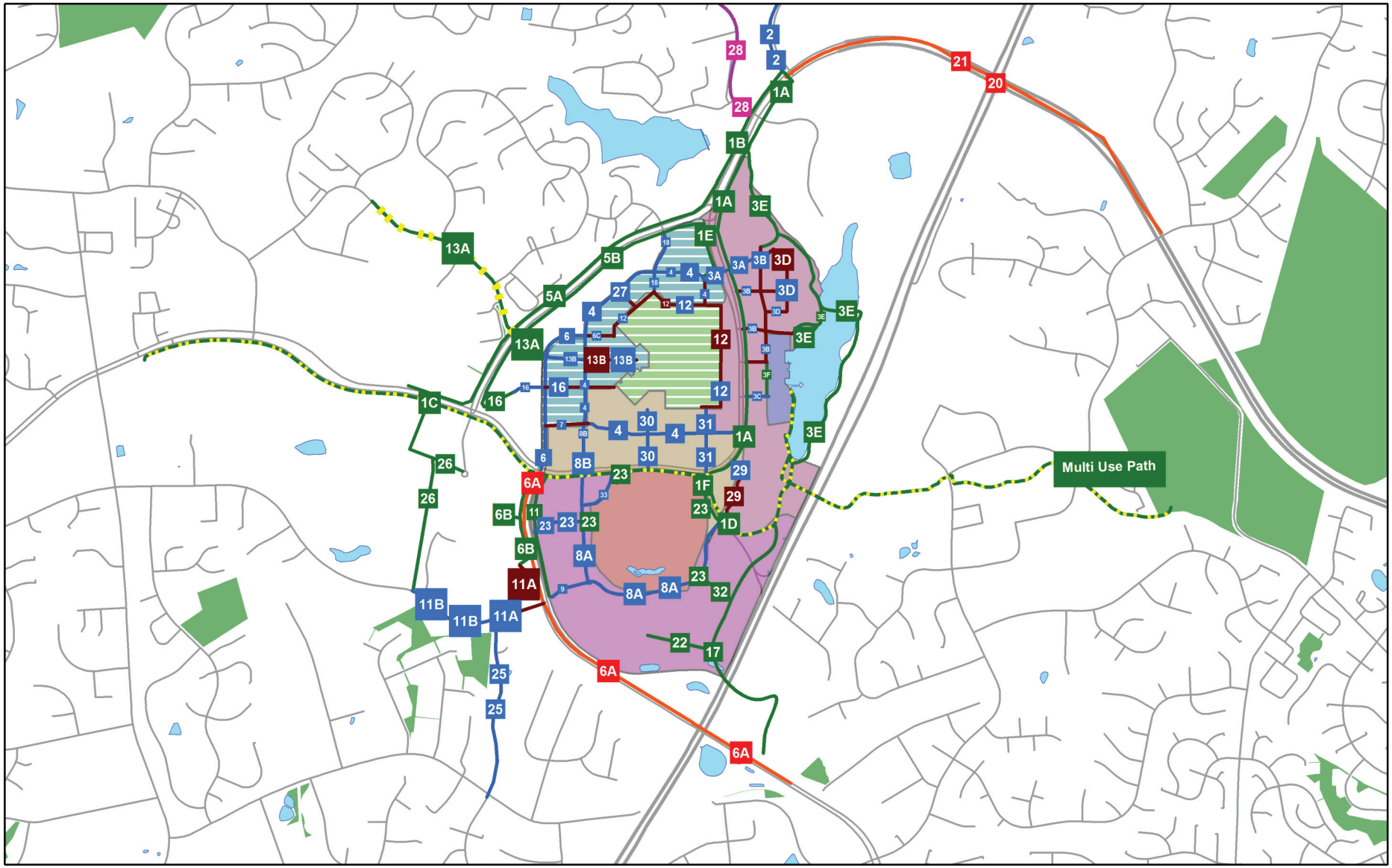
In addition, BikeHoward recommends the following areas for Future Small Area Planning:

- Dobbin Road Commercial Area
- Gateway Commerce Center
- Route 40 Corridor in Ellicott City
- MD 216 Corridor
- Maple Lawn
- Various segments of the Route 1 Corridor
- Clarksville (River Hill)
- Historic Ellicott City

Table 3: Recommended Bikeway Connections to Surrounding Jurisdictions	
Desirable Connections (Confirmed by neighboring jurisdiction)	**Connections Howard County Desires (unconfirmed by neighboring jurisdiction)**
To Baltimore County Via Old Frederick Road	To BWI Trail Via Hanover Road
To Baltimore County Via Frederick Road	To Anne Arundel County Via Dorsey Road
To Baltimore County Via Gun Road	To Anne Arundel County Via Race Road
To Anne Arundel County Via Ridge Road	To Anne Arundel County Via Coca Cola Drive
To Anne Arundel County Via Waterloo Road	To Carroll County & Frederick County Via Penn Shop Road
To Anne Arundel County Via Savage Guilford Road	To Carroll County Via MD 97
To Prince George's County Via N 2nd Street	To Anne Arundel County Via Whiskey Bottom Road
To Prince George's County Via MD 216	To Anne Arundel County Via Montevideo Road
To Montgomery County Via US 29 & Old Columbia Road	To Anne Arundel County, Baltimore County & Baltimore City via River Road
To Montgomery County Via Brighton Dam Road	To Baltimore County Via Street Denis MARC Sta. River Road
To Montgomery County Via Georgia Ave	To Baltimore County Via Tunnel, Trail and Foxhall Farm Road
To Montgomery County Via Ridge Road	To Baltimore County Via US 40, Baltimore National Pike
To Prince George's and Anne Arundel County via Brock Br. Road	To Carroll County Via Marriotsville Road
To Baltimore County Via Trolley Line #9 Trail	To Carroll County Via Old Henryton Road-restore bridge
To Baltimore County Via River Road	To Sykesville and Carroll County via Main Street
To Prince George's and Laurel MARC via Bike Lane on new road bridge	To Mt. Airy and Carroll County Via Twin Arch Road
	To Mt. Airy, Frederick County and Carroll County Via Ridge Road
	To Montgomery County Via Tucker Lane & Ednor Road
	To Montgomery County Via Ednor Road
	To Laurel and Prince George's County Via restored bridge
	Through City of Laurel

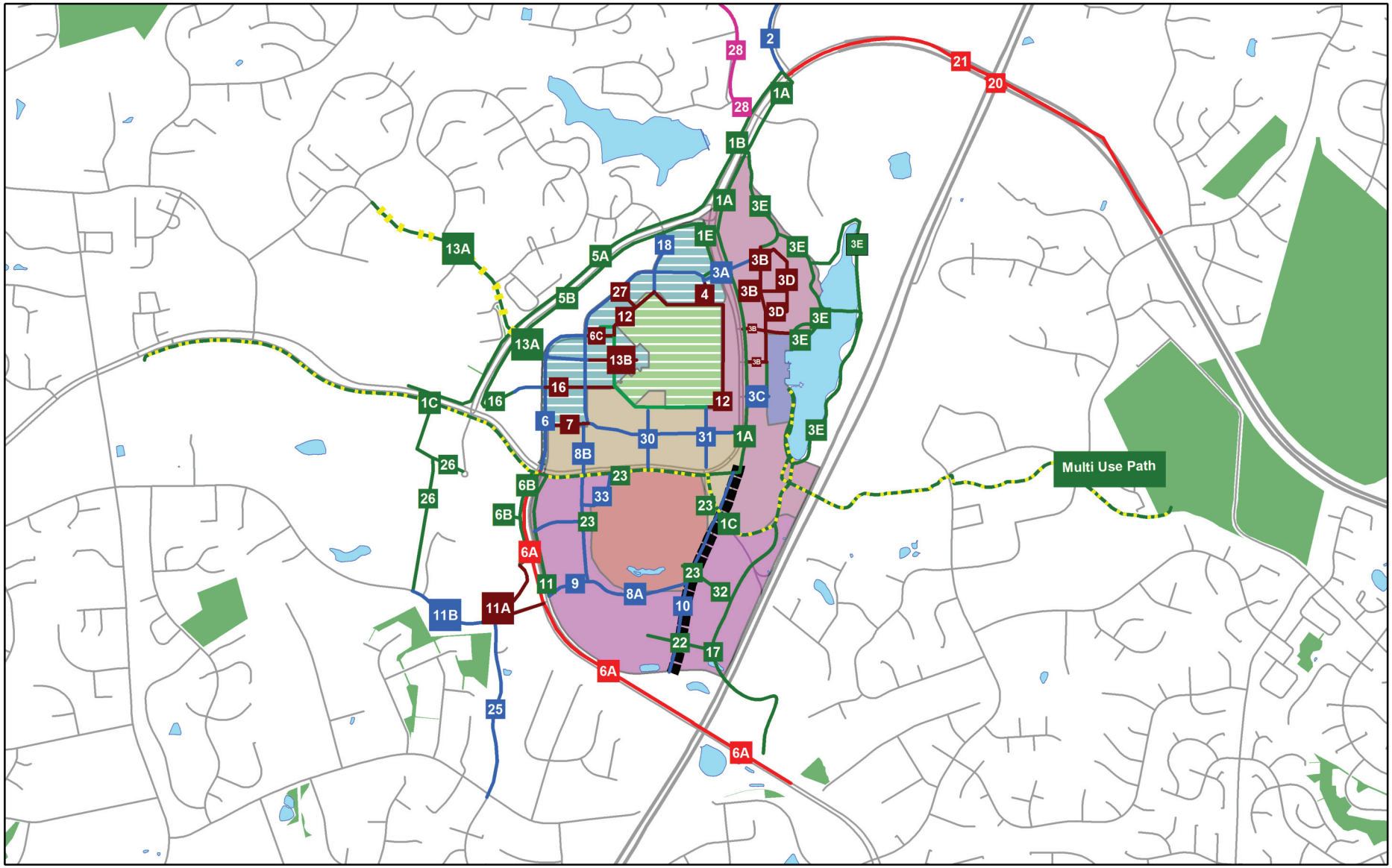
BIKE HOWARD

Downtown Columbia
Without North South Collector
Bicycle Facilities and Circulation Plan
Map No. 8



BIKE HOWARD

Downtown Columbia With North South Collector Bicycle Facilities and Circulation Plan Map No. 9



Bicycle Facilities Visual Glossary

The visual glossary presents a series of typical treatments and facility types that are included in the proposed Howard County Bikeway Network. The glossary is organized into three types of facilities.

Bikeways that primarily use facilities separated from the road with vertical barriers or landscape buffers

Shared Use Paths

Off-street bicycle and pedestrian facility, physically separated from the road and motor vehicle traffic creates a lower stress bikeway

Sidewalk with Cycling Permitted

An off-street facility which is used where pedestrian and bike volumes are expected to remain low to create a lower stress bikeway

One-Way Protected Bike Lanes

One-way bicycle facility physically separated from moving traffic and pedestrians to create a lower stress bikeway

Two-Way Protected Bike Lanes

Two-way bicycle facility physically separated from both the roadway and sidewalk

Neighborhood Greenways

Low traffic street with bicycle friendly traffic calming to create a low stress bikeway. Used where all traffic volumes are expected to remain low

Bicycle Facilities Visual Glossary

Bikeways that primarily use on-road bike lanes and facilities

Climbing Lanes

Used where existing road width will support addition of only one bike lane. Bike lane provided in uphill and shared lane marking on the downhill portion of the road

Bike Lanes

Pavement marking designating a portion of roadway for preferential use of bicycles

Colored Bike Lanes

Type of bike lane that uses color to create additional awareness of right-of-way for bicyclists

Buffered Bike Lanes

A type of bike lane with additional striped buffer zones to provide increased separation from faster moving traffic

Advisory Bike Lanes

Type of facility where the center line has been removed from the road in order to have room to stripe “advisory” bike lanes. The dashed lines (as opposed to solid) allow motor vehicles to occupy that space when a bicyclist is not using it

Bicycle Facilities Visual Glossary

Bikeways that primarily use existing roads and streets with treatments to guide car and bicycle placement and behavior.

Shared Roadway w/ Safety Treatment

Used on two-lane rural roads where there are no continuous shoulders. Uses safety signs and short shoulder sections to allow cars to pass bikes on hills

Paved and Striped Shoulder

Most often used on rural roadways and can accommodate bicycle travel. Usually no less than four (4) feet wide

Shared Roadway

Used on rural roads, neighborhood streets where there is good sight distance and low traffic volumes

Shared Lane Markings (Sharrows)

Used where speed limit is 35 mph or lower. Indicates cyclists' safest path of travel and reminds motorists of requirements to share the road

Section 6:

Components of the Network

Components of the Network

This section advances the discussion related to certain bicycle facility types and treatments that make up the network and how people will navigate the network. It provides detail and specific guidance related to intersections, path crossings, bike links, connector paths, bridges and tunnels, path systems, State roadways, special safety treatments for rural roads, sidewalk bikeways, and new facility types. It also provides recommendations on a signage and way finding system.

Standard Bikeways

The *AASHTO Guidelines for the Development of Bicycle Facilities*, 2012 and Manual on Uniform Traffic Control Devices, provides a basis for the application of most of the bicycle facilities and treatments recommended by BikeHoward. For additional guidance to clarify application of facilities such as shoulder bikeways, bicycle lanes, buffered bicycle lanes, climbing lanes, shared use paths and other features included in BikeHoward, please see Appendix A.

Difficult Intersections and Network Gaps

Howard County has a large number of major highways that act as barriers to bicycle travel; among them are U.S. 29, MD 100, Route 40, MD 108, MD 32, Broken Land Parkway and Snowden River Parkway. After significant analysis and feedback from a variety of stakeholders, the following priority list is provided to direct County and State attention in the near term and illustrate potential least-cost solutions.

Recommendation: *Review the following areas to determine which solutions should be pursued in the near term and which can be delayed or should be coordinated with expected future road improvements or development:*

- *MD 103 and Long Gate Area*
- *Columbia Road and MD 108*
- *MD 108: Homewood Road to Centennial Lane*
- *North-South Link through Downtown Columbia*
- *North-South Link from HCGH/Howard County Community College/Symphony Woods to southern Howard County*
- *Access to the JHU-Applied Physics Lab across U.S. 29 at Johns Hopkins-Gorman Road*
- *Cedar Lane Corridor*
- *Dobbin Road/Gateway Commerce Center*

For each of these areas, the solutions are not as simple as fixing one intersection. Often there are space constraints and the needs of pedestrians must be taken into consideration. The challenges for cyclists, pedestrians and those using electric personal assistive devices, usually include passage through multiple intersections and along short segments of roadway with poor conditions. Roadway configurations tend to be complex and often involve interchanges with limited access highways. It may take multiple phases of infrastructure upgrades to make these areas safe and inviting to the *enthused and confident* and *interested but concerned* cyclists.

However, creating a connected network is dependent on addressing these areas.

Recommendation: *The County's Traffic Engineering Division should initiate a review of all traffic signals in the County to ensure that bicycles will be detected on the minor road approaches which may be given a green cycle only when cross traffic is present. Various treatments are available to remedy any location where bicycles are not currently detected.*

Shared Use Paths

As a part of this plan, a number of existing and potential pathway corridors were explored. Existing and planned regional parks were also reviewed. The Connecting Columbia Active Transportation Action Agenda adopted by Columbia Association was studied in detail. As a result an extensive list of recommended shared use path improvements was developed. See Table 4 for a summary of the number of new and upgraded shared use paths.

BikeHoward supports the *Connecting Columbia Active Transportation Action Agenda* approved by Columbia Association in 2012. Specifically, it supports the flexible pathway width recommendations for the

Primary, Secondary and Tertiary system, and identifies which CA path segments will be most important to be upgraded to accommodate both recreational and transportation usage. It supports the curb ramp and crossing improvements, and again identifies which of these will be most important to facilitate safe transportation usage and it specifically identified recommendations for on-road and/or off-road facilities in the Columbia area where the CA plan identified pathway connection needs along County-owned or state highways.

In some cases, BikeHoward recommends only on-road bikeways and assumes standard sidewalks for expected small numbers of *interested but concerned* cyclists.

Key Path Recommendations:

- *Key path trail improvements are identified in regional County parks including Blandair, Centennial Lake, Cedar Lane, Meadowbrook, Troy and Savage. Bicycle Lanes or shared lane markings are also recommended for a number of park access roads and/or parking lot aisles to improve bicyclists' safety passing through these parks.*
- *The Patuxent Branch Trail south of the Guilford Road trailhead should be paved to provide all-weather, three-season transportation use of this trail.*
- *The Maple Lawn area and the MD 216- Hammonds Branch corridor between Maple Lawn and North Laurel represent a significant opportunity for major new transportation trail development.*
- *Utility corridors and rights-of -way present important opportunities to make key connections throughout the County. BikeHoward recommends that the county conduct additional research and develop strategies, including working with key federal, state and local stakeholders to develop clear technical, design and policy guidance on the development of linear shared use trails on utility rights-of-way.*
- *BikeHoward did not fully explore further trail potential in the Patapsco Heritage Greenway Corridor (primarily state DNR lands), nor the protected lands along the main branch of the Patuxent River. BikeHoward recommends exploring trail potential and road linkages in these areas, including the concept of a loop trail to link Ellicott City, Mt Airy and Laurel.*

Table 4: Shared Use Path Recommendations

Facility Recommendations	Miles or Locations
New Shared Use Paths	86 Miles
Upgraded Shared Use Paths	37 Miles
Mid Block and intersection path crossings	44 Locations
New Bicycle/Pedestrian Bridges	21 Locations
New Tunnels	3 Locations
Spot Trail Access	12 Locations

Special Facility Types and Treatments

A number of special facility types and treatments are included in BikeHoward, including some that are considered "Experimental" in nature. The Federal Highway Administration manages a formal approval process for state and local governments who wish to install experimental facilities and treatments.

These special facility type treatments include: 1) safety treatments for a certain class of shared roadways, 2) sidewalk bikeways, 3) colored bicycle lanes, and 4) cycletracks/protected bike lanes and median pathways.

Shared Roadway with Safety Treatments

This plan recommends development of a safety treatment for 106 miles of roadways that generally have the following characteristics.

- Two 10-12 foot paved travel lanes
- No or minimal shoulder, unpaved
- Speed limit of 35 mph or greater; advisory speed limits of 30 or less on sharp curves
- Traversing hilly terrain and crossing numerous stream drainages
- Drainage ditches, farm fields and mature trees on the edge of the roadway
- Periodic curves with poor sight distances
- Forested and/or rural residential landscape

During the planning process, many cyclists identified these roads as uncomfortable and potentially dangerous. Moreover, many motorists would concur that they seem dangerous for bicycling. Due to the hills, which slow cyclists down and the periodic curves and poor sight distances, it is easy for a motorist to come upon a bicyclist from behind with little or no warning. The lack of a paved shoulder requires bicyclists to use the travel lane, and thus motorists must decelerate quickly and determine when it may be safe to pass.

Many of these roads are in western Howard County and are popular for recreational cycling, especially on weekends. However, others are in the older, less developed section of the county along the Patapsco River, around Elkridge, in the MD 216 corridor and around Savage and North Laurel. Howard County has a tremendous economic interest in maintaining and expanding the recreation and tourism potential of these bikeways.

However, universally widening these roads to provide full shoulders on each side will be both cost prohibitive and would violate the rural, scenic, cultural and historic character of the road. Preserving these values is not only essential for their success as recreational bikeways, but is important for a host of other reasons to which the County is already committed.

Recommendation: *Consider the development of new approaches to increase both safety and mutual respect for bicyclists and motorists who share these roads including but not limited to the following treatments.*

- *Utilize existing signs, such as the BIKES MAY USE FULL LANE sign.*
- *Use available flexibility in the MUTCD to develop auxiliary word plaques to more directly address situations and appropriate driver and cyclists' response, such as PASS WITH CARE, ALLOW 3 FEET, EXPECT CYCLISTS, etc.*
- *Ensure that sign messages are unambiguous and have separate messages directed to motorists and cyclists, explaining why and how all users must share the road.*
- *On hills, in the uphill direction, add bike pullout lanes, i.e. short segments of shoulder where a cyclist can pull to the side and let a line of cars following them to safely pass.*
- *Use new technologies to detect cyclists in potentially hidden locations and inform approaching motorists of their presence; use similar technologies to inform motorists traveling at unsafe speeds.*
- *Establish a unique logo and graphic identity to use on signage for a system of On Road Recreational Routes*.

These routes will be primarily in western Howard County, but also include routes in the southwest around Fulton, in and around Historic Ellicott City, the Patapsco River area and Elkridge. By having a unique brand for rural recreational routes, the county can coordinate effective safety messaging campaigns using a variety of media. Information that is provided on the web, at events, during road safety awareness weeks, on printed materials, etc. can all be associated with the route system where these safe bicycle and motorist road sharing practices are most applicable.

Sidewalk Bicycling

In general, sidewalk bicycling is discouraged, except for children and those just learning to ride a bicycle. However, in Howard County many casual and recreational cyclists ride on sidewalks for short sections of their ride or even long distances, because conditions on the roadway are too uncomfortable. Sidewalk cycling is permitted by county code.

Recommendation: *In 16 locations (6.6 miles), where sidewalks exist and where no bicycle facilities exist, this plan recommends designation of Sidewalks w/ Bikes Permitted, as a formal Bikeway.*

These facilities should be a minimum of 6 feet wide, and may be up to 8 feet wide depending on space available. If a 4-5 foot sidewalk already exists, where feasible it should be expanded to 6 or more feet wide. The location should be posted as Sidewalks with Bikes Permitted and BICYCLISTS YIELD TO PEDESTRIAN signs. In the locations identified in BikeHoward pedestrian volumes are expected to be low, as are bicycle volumes. These facilities may be needed to provide low cost connectivity in areas where retrofitting roadways will likely have a low cost/benefit ratio. These facilities may also be recommended in areas where some cyclists will be served on the roadway and low-skilled cyclists will be best served on the sidewalk.

Note: BikeHoward also identifies 20 locations (4.8 miles) where existing sidewalks are present, but upgrades to Shared Use Path facilities are recommended. Sidewalk upgrades to path standards will require a minimum of 8-foot treadways (asphalt or concrete), and a minimum 5-foot lateral buffer from the adjacent roadway, or vertical barrier.

[3] http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/mutcd_bike.cfm

Colored Bicycle Lanes & Advisory Bicycle Lanes

Colored bicycle lanes are currently sanctioned by a formal *Interim Approval for Optional Use of Green* Colored *Pavement for* Bike Lanes *(IA-14)*, (April 15, 2011)[3] A Federal Highway Administration process to encourage communities to apply and evaluate new approaches to address traffic control and safety issues. Advisory Bike Lanes are approved for experimentation.

Recommendation*: As a demonstration project, consider conducting an experimental application of colored bicycle lanes in one location: west bound Johns Hopkins Road from Montpelier Road to the Applied Physics Lab entrance and on east bound Johns Hopkins Road from Montpelier Road through the entrance ramp to US 29 south. Coordination with SHA may be required due to the project's relationship with US 29 traffic.*

Recommendation: *Consider conducting an experimental application of advisory bicycle lanes on the Little Patuxent Parkway loop in Clary's Forest.*

Cycletracks, Protected Bike Lanes and Median Paths

Guidelines for cycletracks, also known as protected bike lanes, are not provided in AASHTO or the MUTCD, however, NACTO provides a guidance document based on the experience of leading cities in the U.S. that have installed these facilities as well as European designs.[4] Median paths are also not specifically addressed in AASHTO. Howard County is not prohibited from installing these facilities by their omission from these national guidance documents. Moreover the specific guidance that is provided for shared use path and bicycle lane design can and should be applied to these less common bicycle facility types.

[4] Cycletracks have been used extensively, and for many years, in northern European countries such as Germany, Denmark and the Netherlands contributing to urban bicycle mode shares of 10-30 percent of all trips.

Recommendation: *Consider installing pilot protected bike lanes in three locations: 1) along Columbia Road between Annapolis Road and MD 108, 2) along Robert Fulton Drive between Snowden River Parkway and Commerce Center Drive, and 3) along MD 103 between Long Gate Parkway and Old Columbia Road. The later segment will need to be conducted in coordination with the MD State Highway Administration.*

State Roadways

The state roadways in Howard County are critical for bicycling for a number of reasons:

- State roads open to bicycling need to have bicycle facilities and treatments where appropriate and feasible, including bicycle improvements through large arterial intersections with high volumes of traffic and many turning movements
- Existing bicycle access on state roads cannot be forfeited when they are upgraded to divided or limited access highway design
- State roadways that prohibit bicycling need parallel routes on minor streets and roads
- Limited Access State and Interstate highways need to have bicycle-friendly and safe crossings that do not require cyclists to make major detours, or travel through unimproved interchanges with multiple, high speed, free flow, entrance and exit ramps

This plan studied a large portion of the state roadway network in the county and includes facility and

treatment recommendations for these roadways. In many cases the accommodations recommended are well within the design guidelines currently used by SHA to address routine accommodations. Howard County will be seeking cooperation, coordination and partnership to implement a variety of both standard and non-standard facilities in the coming years. For a list of state roadways and recommended facilities and intersections please see Appendix H.

Recommendation: *Howard County requests that major bicycle facilities be included in the SHA maintained Highway Needs Inventory, which includes lists of priority projects consisting of new and upgraded highway and transit facilities and requests BikeHoward's recommendations be included into SHA fund 76.*

Howard County will annually identify the following bicycle facility needs that are directly related to roadways and state transportation infrastructure on the Highway Needs Inventory:

- *Facilities needed on the state primary system*
- *Parallel facilities needed that serve bicyclists in limited access highway corridors*
- *Accommodations through Interchanges*
- *Grade-separated over/under passes of limited access highways*
- *Accommodations needed on state-owned bridges that serve County or state roads that cross limited access highways at non-interchange locations*

Recommendation: *Howard County request that bicycle facilities proposed in BikeHoward be included into the Baltimore Regional Transportation Board (BRTB) long range transportation plan and Transportation Improvement Program (TIP), including bridge resurfacing projects.*

State Scenic Byway Designations

Recommendation: *Consider engaging the SHA Scenic Byway office regarding any plans to implement the paved striped shoulders recommended for MD 144 which is part of the National Road Scenic Byway. It is state policy to consider proposals to widen designated scenic byways on a case by case basis, because the presence of scenic and historic resources that need protection varies considerably along the length of the National Road Scenic Byway, and it is state policy to provide a minimum 4-foot shoulder along open section state roads where needed for bicycle safety, is feasible, fundable and in keeping with the goals of scenic byway designations.*

In the planning document for this byway, *Context Sensitive Solutions for the Maryland Historic National Road Scenic Byway, 2006,* published by the MD State Highway Administration, it states, "Decisions regarding requirements for bicycle accommodations should be made carefully taking into consideration the importance of maintaining the character-defining features of the Historic National Road."

Wayfinding & Signage Systems

Public comment during this and other recent planning processes clearly identified the need for improved wayfinding geared toward cyclists. Three distinct but related signage needs were identified:

- Wayfinding on the CA pathway system and other County and school owned paths
- On-road bike route signage
- On-road signage related to recreational routes, especially in western Howard County and historic sites

County stakeholders use a number existing of signage and wayfinding systems. Descriptions of these systems follow.

CA Pathways Wayfinding Signs

In 2013, Columbia Association conducted a pilot program that included design and installation of wayfinding signs on a small portion of the CA pathway system. It will use primarily blue fingerboards as shown in Figure 4.

County Parks Trail Wayfinding Signs

The Howard County Department of Recreation and Parks currently uses brown wayfinding signs for trails, but does not install signs on all of its trails.

State Signed Routes

Currently, the only signed bicycle routes in the county are along State roadways. Additionally, the MD State Highway Administration is developing a plan to sign a bicycle route in the MD 32 corridor that will act as a bicycling alternative to the portions of the highway upon which bicycle use is prohibited. This route would extend from MD 108 at MD 32 to the National Security Administration campus adjacent to Fort Meade, in Anne Arundel County. The state is considering two options provided in the MUTCD.

Installation of an attractive and coordinated sign system will broaden public awareness of bicycling, and in combination with web-based information and traditional maps, help users identify low-stress routes, recreation routes and standard routes for people of all ages and skill levels.

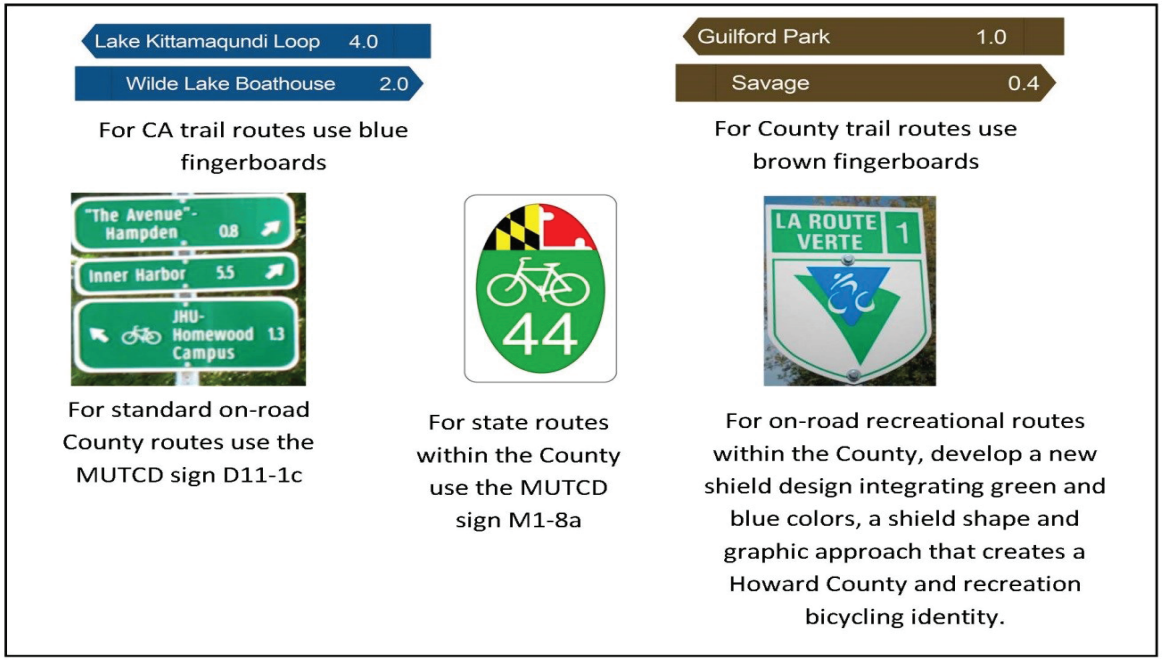
Please see Appendix I for a full discussion of issues that need to be coordinated among key stakeholders with an interest in and responsibility for bicycle wayfinding signs.

Recommendation: *Develop an integrated bikeway sign protocol and manual using the system of shields and branding graphics provided in Figure 4.*

Initial sign installation efforts should focus on providing signs along the Short-Term network, Columbia Association and the County's pathway systems and routes that may be developed and designated by the State Highway Administration. As safety on rural roads is improved and other facilities are installed, the recreational route system and additional County routes in the Mid-Term Network can be signed.

Recommendation: *The County should develop and advance, in coordination with state and local stakeholders, paper and electronic directional applications and devices to enable navigation, including expanding CA's existing directional app outside its current limits.*

Figure 4: Concept for Sign Shield System for Signed Bicycle Routes

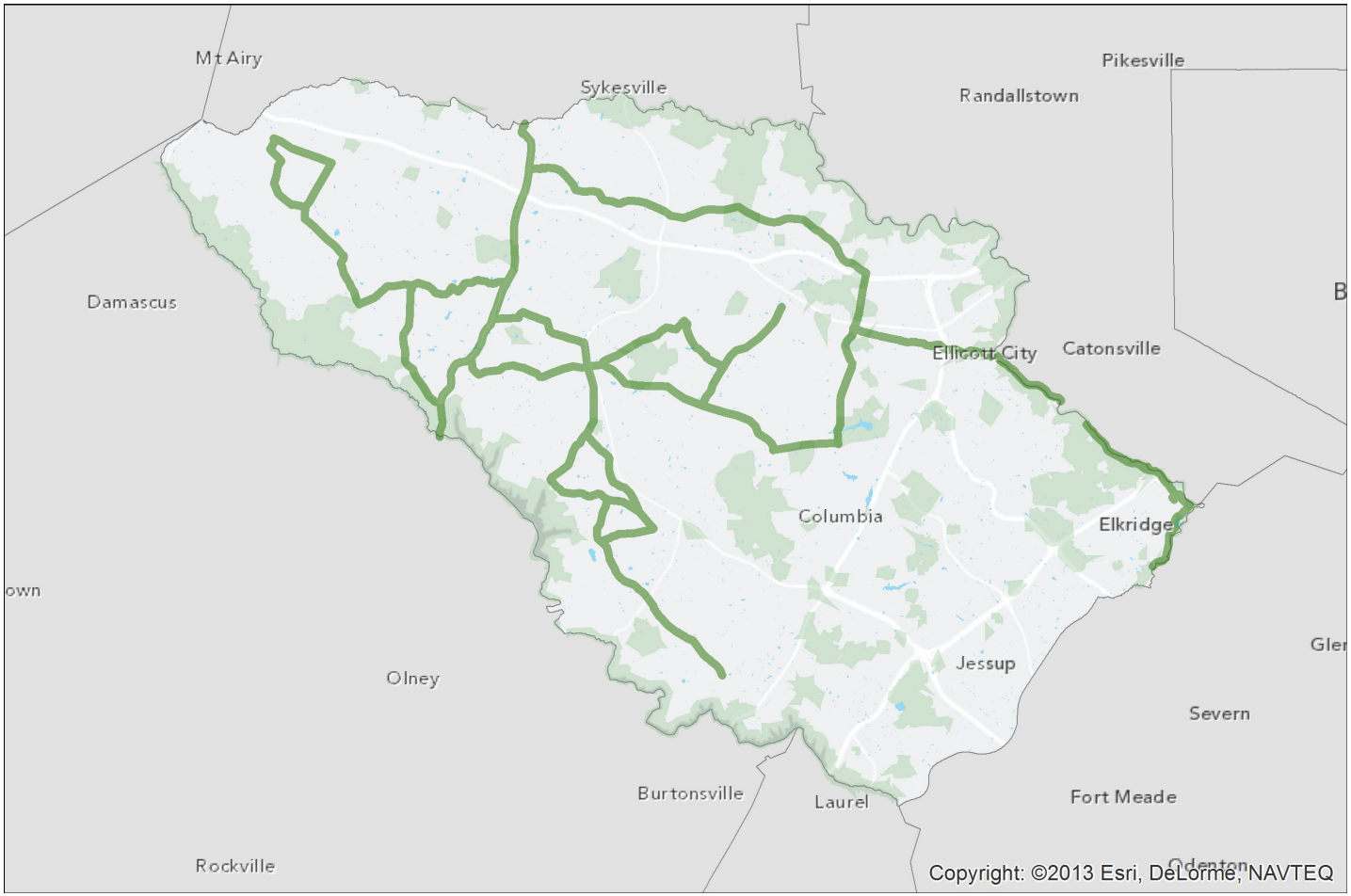


Recommendation: *The County should consider developing an On-Road County Recreational Route System in western Howard County, the southwest area around Fulton, in and around Historic Ellicott City and Savage, as well as in the Patapsco Heritage Greenway and the Elkridge Area (See Figure 5).*

The recreational route system should be coordinated with local stakeholders to maximize the economic impact of the recreational routes.

Creating unique brands for a distinct set of recreational routes will help cyclists easily find their way around an area they may not be familiar with. In addition, since these recreational routes will be on roads in more rural and older areas, roads which tend to be narrower and steeper, allow the county to coordinate its efforts to ensure safety for cyclists and motorists.

Figure 5: Draft Recreational Route System



Section 7:

End of Trip Facilities

End of Trip Facilities

For bicycling to be attractive for transportation, providing places for cyclists to store their bikes is essential. Bicycle parking equipment provides a community an opportunity to integrate public art into streetscapes, brand their bike program and engage the business community in bicycling.

The opportunity to leverage a bike trip into a longer trip by using public transit is also central for those seeking to reduce motor vehicle use. This chapter details how bicycle end of trip facilities should be will be integrated into the plan.

Cyclists who commute by bike often need showers and changing rooms and is an important tool in encouraging utilitarian cycling.

Bicycle Parking Types and Applications

Bicycle parking needs vary based upon land use and intensity of activity levels. Covered or uncovered racks are appropriate for Short-Term parking needs such as at retail stores, restaurants, recreation centers, parks, libraries and similar locations. While students, teachers and staff at schools stay for longer periods of time, covered bicycle racks are recommended at elementary, middle, high schools, colleges and technical schools, both public and private. At all of these locations it is important to plan for both employee parking as well as visitor parking.

On-demand lockers, standard rental lockers or bike-lids are recommended at locations where all day parking in lightly supervised locations such as park & ride lots, commuter rail stations, office complexes, industrial parks, etc. Bike lids are covered racks that provide protection from the weather, but are easier to install and move if needed.

Secure indoor parking is needed in apartment buildings and other multi-family, residential housing types, including senior housing and retirement centers. Garden apartments and campus-style complexes who have limited public access can meet residents' needs by providing covered medium security bike parking in convenient locations for regular use, and indoor storage areas for winter or long term storage.

The challenge for communities with little existing bicycle parking is developing an approach that addresses, 1) retrofit of existing commercial employment sites and 2) provision of appropriate types, locations and capacity as an integrated component of new developments. To do this Howard County should implement a publicly supported retrofit program and update zoning and subdivision codes to address new development and public facilities.

Another important bicycle parking principle is that needed capacity is not a static factor. When the goal is to increase levels of bicycle it is critical that as progress is made, increased levels of bicycle parking are also provided. Provision of bicycle parking is a management activity not a capital program.

Recommendation: *Howard County should initiate a publically supported Bicycle Parking retrofit program, see box for details.*

Recommendation: *Howard County should consider initiating an interagency program to evaluate, replace and add bike parking at all County owned public facilities.*

- *Assess needs and current bike parking equipment. Replace sub-standard equipment, seek covered and convenient locations, assess needs, and ensure that the program is responsive to the need for added capacity as usage increases*
- *Coordinate the efforts of the Howard County Public Schools, the Recreation and Parks Department, the library system, and Department of Public Works, Facilities Division*

Generally, racks that do not provide two points of contact to lock the bike are substandard. The current edition of AASHTO's Guide for the Development of Bicycle Facilities provides guidance and direction on bike parking.

Bicycle Parking in New Commercial Developments

Recommendation: *Consider amending zoning and subdivision codes to require new development to provide appropriate types, quantities and locations of bicycle parking as a part of development approval.*

Appendix J provides examples and help to guide the County in developing the revisions.

Bicycle Parking Retrofit Program Components:

- A contest for architects and small business fabricators to design and develop a covered bicycle parking shelter that could be "mass" produced and used in a variety of settings throughout the County
- A property tax credit incentive for retail and customer–oriented commercial businesses that provide covered bicycle parking for customers.
- A commitment to support employee bike parking needs for businesses with fewer than 50 employees, if property managers, the benefiting business, and employees partner to assess and meet employee needs. Up to $1,000 per site depending on number of employees committed to participate in biking to work. Up to $20,000 per year
- A mechanism for bicycle customers to request bike parking racks with an application that includes a request to the business, property owner/manager, and Howard County Bike Parking program; with the program to install the racks at a shared cost

Bike Sharing Programs

Bike share programs provide access to bikes at multiple locations throughout a community for short point-to-point trips. In just a few years, bike sharing has become an extremely popular mobility option in communities across North America, with one of the most successful systems being Capital Bikeshare in

Washington D.C, Arlington, Alexandria and Montgomery County.

The bikes are designed specifically for continuous outdoor use and are sturdy, theft proof and easy to ride. The stations where the bikes are docked are easy to use, unstaffed, and often solar powered. Some systems now include the locking and technology aspects on the bikes themselves, which can provide more flexibility and lower cost than systems that use docking stations.

Recommendation: *Study and based on findings, consider implementing a pilot bicycle sharing program.*

Full-Service Bicycle Stations

Recommendation: *In the future, as bicycle usage increases countywide, and the bicycle network is built, consider public support for a full-service bicycle station at an appropriate location such as downtown Columbia, in the Dobbin Road/Gateway Commercial Area, or in relation to a transit hub that may be created to serve a new, higher-volume transit system.*

Integrating Bicycling with Public Transit Services

Bicycle integration with public transit can take a number of forms. The Regional Transportation Agency of Central Maryland (RTA) provides scheduled fixed route transit services in Howard County, Anne Arundel County and Prince Georges County. RTA fixed route buses are equipped with front mounted bicycle racks that hold two bikes each.

The Maryland Transit Administration also serves Howard County with commuter buses running to Washington DC, Baltimore, Gaithersburg and Fort Meade. MTA also services Ellicott City and downtown Columbia with an express bus from Baltimore. MTA commuter rail service is also provided at the St. Denis, Dorsey Road, Jessup and Savage MARC stations. None of these locations provide covered bike parking or lockers. Some do not have racks. In addition, MTA Commuter buses do not include bike racks.

Through public input and dialogue with Office of Transportation Services a number of additional bike/transit integration needs and opportunities were identified. Bicycle access to commuter bus and rail hubs was identified as a key need.

Bike Parking at Transit Hubs

Recommendations: *Consider upgrading bicycle parking at MARC stations and Park & Ride (P&R) lots. In the near term, a minimum of two bike lids (i.e. individual, on-demand, covered racks) should be placed at each of the following transit hubs:*

- *Broken Land Parkway P&R*
- *Clarksville P&R*
- *Long Gate P&R*
- *Oakland Ridge P&R*
- *Scaggsville P&R*
- *Snowden River Parkway P&R*
- *Dorsey MARC Station*
- *Savage MARC Station*

Market these services to the public, bicycling community and existing users of these hubs. Remove substandard racks. As usage occurs additional bike lids should be added to ensure that anyone considering biking to a transit hub will see that high security covered racks are available.

Bicycle Access to/from Transit Hubs

Recommendations:

- *Prioritize and implement access improvements to the following transit hubs (as identified on the plan map) Broken Land East and West, Long Gate, Oakland Ridge, Snowden River Parkway, Dorsey MARC and Savage MARC, access. Improvements at Broken Land Parkway East and West should be completed before bike parking at these locations is upgraded. Coordination with MTA and/or SHA may be required.*

- *Explore the potential to provide bicycle storage in the under carriage on commuter bus services. Survey customers regarding likelihood to use such a service. Coordinate with the state to implement such services. Market services to the public.*

- *Request state leadership in providing a system of higher quality on-demand bike storage lockers throughout the MTA and Park & Ride systems in Maryland. Across the country, private vendors are providing this service on contract with local governments for a small hourly fee to the user. The system does not have to be limited to transit hubs; it could also be used to serve colleges, hospitals or other institutions.*

Integration with RTA

Currently bike-on-bus rack usage is low due to the significant headways between buses on RTA lines (30 or 60 minutes). Many people may be able to ride some distance in the time that they would spend waiting for a bus. However, as service levels are increased in the future, or as routes may be changed, bike-on-bus services may become a more important component of the network.

During the planning process three new ideas for bus/bike integration emerged for consideration in the near term.

Recommendations:

- *Consider purchasing a bus shelter that includes covered bicycle parking as a part of the structure's design*

- *Consider offering a special weekend service (periodically) to take recreational cyclists to a location in Western Howard County for a day of recreational riding. This may be attractive to entry level recreational riders*

- *Market transit routes and bike-on-bus services that cross or travel along major barriers for bicyclists, such as I-95, US 29, US 40, MD 32, MD 100, MD 175, the CSX railroad and US 1*

Section 8:

Programs for Safety Education, Encouragement and Enforcement

Programs for Safety Education, Encouragement & Enforcement

Existing Programs, Activities and Organizations

Howard County has a wide range of programs, organizations and activities that involve cycling. The following narrative provides highlights of those that address safety education, encouragement and enforcement.

Safety Education

A few Howard County public schools participate in Safe Routes to School programs including Walk to School Day and Bicycle to School Day events. These events are run and developed out of individual schools with parent leadership and participation. The Howard County Police Department participates in these and many other events contributing a multimodal safety message.

Encouragement

The Howard County Department of Recreation and Parks regularly offers classes and camps focused on mountain biking, trail conservation skills, bike repair, and triathlon training, as well as classes that help children with disabilities learn to bicycle. Encouragement efforts include participation in annual region-wide Bike to Work Day events, as well as a long list of triathlons, charity bike rides and road races. The JHU-Applied Physics Laboratory is a bicycle friendly business and supports many of its bicycle commuting employees by providing showers and changing facilities and secure bicycle parking on its campus. The CA BikeAbout is an annual event sponsored by CA in which cyclists explore historical and cultural sites using the CA pathway system.

In 2013, the Howard County Office on Aging started a bicycling encouragement program, Cycle2Health, focused on older cyclists, both men and women. Local cyclists from the Howard County Bicycle Advocates and various cycling clubs volunteered as ride planners and leaders. Throughout the summer and fall, as weather permitted, weekly rides were offered on routes throughout the County. Cyclists seeking to increase their strength, skill levels and endurance were able to venture into a variety of contexts with confidence, due to the support of riding with a group.

Enforcement

Currently, police programs that support bicycle safety are primarily educational. The HC police have bicycle mounted officers and International Police Mountain Bike Association instructors that train additional officers as necessary. The department is involved in a wide range of education and prevention programs oriented to traffic safety including; a *You Are Responsible* program for teen driver training, regular training of officers regarding traffic laws and enforcement practices, a ticket diversion program for young offenders who commit serious traffic violations, and participation in the bi-annual Street Smart campaign oriented to bicycle and pedestrian traffic safety. The primary enforcement activities are automated red light camera and a School Zone Photo Speed enforcement program begun in 2011.

Organizations

The Bicycling Advocates of Howard County is the lead bicycling advocacy organization in Howard County. A number of bicycle clubs and bike stores, regularly offer group rides, including the Glenelg Gang, the Baltimore Bicycling Club, and Howard County Cyclists. Howard County residents' participation in the Mid-Atlantic Off-Road Enthusiasts and the International Mountain Bike Association is also strong as they partnered with the Department of Recreation and Parks to create a top flight mountain bicycling skills park at Rockburn Regional Park.

The Transportation Advocates organization promotes and supports transportation issues both in Howard County and regionally. The group's primary focus areas are public transit, bicycling and walking.

Recommendations for Partnerships, Programs and Activities

An extensive set of programmatic recommendations are described below. Communities that combine infrastructure development and safety education and encouragement programs are the most successful at increasing levels of participation in bicycling. Howard County is already ahead of many communities in terms of public interest in bicycling. Education and encouragement programs will help ensure that many of the *interested but concerned* cyclists will transition to the *enthused and confident* group.

Education and encouragement programs are the best opportunity for partnerships between government agencies, community groups and the non-profit sector. Leadership from local elected officials is key as well; their support can ensure that activities are seen and understood by the wider public as for the common good of the community as a whole.

Programs that combine safety education and encouragement are discussed first, followed by award programs, other encouragement programs and enforcement recommendations. For a full discussion of program recommendations please see Appendix K.

Recommendation: *Seek a bronze level Bicycle-Friendly Community Designation from the League of American Bicyclists*

BAHC submitted an application for initial designation and the County was awarded a Honorable Mention in the Spring of 2013. It will take a focused partnership including CA, key county agencies, any Bicycle Friendly businesses within the county and the BAHC to make the progress necessary for a bronze level designation.

Recommendation: *Provide cycling education and encouragement materials at Howard County Public Libraries.*

Because libraries are a well used and supported component of community life, develop a multi-dimensional bicycling education and encouragement program; using all of the media resources available to the library system. Key partners could include the Bicycling Advocates of Howard County (BAHC), the Department of Public Works, Department of Planning and Zoning and Columbia Association.

Recommendation: *Consider establishing a County-wide Safe Routes to School Program (SRTS). Adopt a goal to have 50% of elementary and middle schools participating in SRTS.*

To reach this goal and guide school activities the Howard County Public Schools (including the school board) should lead a joint effort that would also include the Howard County Police and Department of Public Works. Federal funding for activities in this program are available through the Maryland Department of Transportation.

Recommendation: *Establish a Share-the-Path and Road Safety and Respect program*

This program would be designed to accomplish three main goals: 1) reduce user conflicts on CA and County paths, many of which are narrow and winding 2) foster unity and social cohesion among path users and supporters, 3) use that unity to continue to advocate for path widening, safer road crossings, wayfinding signs and a host of other needed upgrades to make the path system safe and functional for transportation and recreation. This initiative would be led by a partnership including CA, the County Department of Recreation and Parks, and representatives from a variety of path users groups, village councils, and HOAs.

Recommendation: *Establish a Youth Ambassadors Program, similar to efforts in other communities, that trains teenagers to be ambassadors of bicycling at public events, educators about bike safety, and promoters of bicycling.*

Recommendation: *Expand existing off-road biking maintenance and youth training programs*

These programs can be part of efforts to engage at risk youth in constructive civic activity, or offer young people exposure to future careers in the bicycling field. Due to the extensive pathway and trail system in Columbia and the county, youth ambassadors could be used to support the path safety and respect program described above.

Recommendation: *Continue the Cycle2Health program and refine it to offer a wide variety of challenge levels. Plan routes and conduct rides in such a way that participants can be educated about bicycling improvements proposed in the BikeHoward plan.*

In 2013 the Howard County Office on Aging started a bicycling encouragement program focused on older cyclists. Volunteers from the BAHC and various cycling clubs participated as ride planners and leaders. Throughout the summer and fall weekly rides are offered on routes throughout the County.

Other Encouragement Recommendations

Recommendation: *Establish an active living partnership.*

This initiative would target those agencies, businesses and institutions already involved in promoting health and wellness including the Howard County Department of Public Health, Hospital, health practitioner associations, Johns Hopkins University, the Horizon Foundation, private gyms, CA and County recreation centers and programs, etc. These organizations could implement various programs promoting bicycling for heath, including prescriptions for outdoor activity and sponsoring a special event in each of the four seasons of the year, targeted to specific at-risk populations.

Recommendation: *Expand the bicycling-related elements of the County's existing Transportation Demand Management program.*

The County should expand its existing Commuter Solutions program and multimodal commuting reimbursement program, through which local employers receive an incentive to promote the use of transit, walking and bicycling for commuting purposes.

Recommendation: *Consider establishing a Howard County "Bike-About"*

Following the example of the Columbia Association and tied to the county's economic development plans, the "bike-about" program would designate certain days of the year to have a "celebration" on wheels which would help Howard County residents, rediscover where they live. The initiative would be based on County Council districts and would help increase awareness of bicycling throughout Howard County.

Enforcement

Over the past ten years the state of Maryland has regularly updated its bicycle related laws. And while the driver's license study book has been updated to include good language about how drivers are to operate motor vehicles safely around cyclists, those who already have licenses have no occasion to revisit the study manual or retake the test. For this reason County Police should be actively engaged in leading or supporting efforts to educate the driving public about new laws, such as the 3-foot passing law.

Recommendation: *Analyze Bicycle Crashes*

Track, analyze and report on bicycle crashes in Howard County. This will require coordination with the Maryland Office of Highway Safety, Maryland State Police, as well as with the Howard County Department of Public Works, Department of Planning and Zoning, Police Department, and local Bicycle Advocacy Groups.

Recommendation: *Consider expanding the Bicycle-Mounted Police Program and Park Ranger Program.*

As Downtown Columbia and other more compact locations like Ellicott City and Laurel continue their transformation into more walkable and bikeable communities, and County parks increase in popularity the county should consider expanding its bicycle-mounted police and ranger patrols which will increase the presence of bicyclists and create greater awareness of bicycle safety issues.

Recommendation: *Continue active enforcement of the Maryland Three Feet law.*

Section 9:

Implementation

Implementation

As BikeHoward was being developed in 2012-2015, the implementation of bicycle facilities was underway. This chapter presents a framework to enable the County to keep the process going and intensify its efforts. The framework is based on a set of key components needed to ensure a well-integrated approach to implementing projects, programs and policies. These components play complementary roles in achieving plan goals.

- Network Implementation
- Building Institutional Capacity
- Capital Project Prioritization
- Funding Strategies
- Inter-Agency Coordination

A discussion of each of these topics is provided, followed by recommendations where appropriate.

Network Implementation

BikeHoward recommends implementing the bikeway network by focusing the County's efforts on developing structured projects and leveraging opportunities.

Structured Projects in the Short-Term Network

BikeHoward developed 49 structured projects comprised of a series of facility improvements along a specific route that are bundled together to create seamless, intuitive, safe and useful connections. Structured projects are expected to be implemented over a 10 year period through the county's capital improvement program and/or coordination with SHA and CA, as appropriate. Funding support is expected to come from a variety of sources, including County, State, Federal and developer funds.

Structured projects will develop useful travel corridors to connect the core of the county. The cost estimates for structured projects use planning level construction cost estimates, design and engineering cost factors, but do not include any land acquisition costs or permitting fees. Final project costs will be dependent on more detailed analysis during facility design. For additional detail on the costs, please see Appendix L.

The structured projects also include cost estimates for wayfinding, however design and installation of wayfinding is undertaken on a route by route basis. The costs presented are based on a per mile cost and only serve as guidance.

The facilities within a structured project may be comprised of an off-road recommendation, such as a shared use path, an on-road recommendation, such as a bike lane, and/or a spot improvement. A Structured Project may combine construction of new facilities as well as upgrading existing facilities.

A summary of the structured projects is presented in Table 5 along with Map No. 10 outlining the scope of the 49 structured projects. Detail on each structured project is then presented in a series of detail sheets.

Recommendation: *Complete the structured projects in the Short-Term Network in the 10 years following adoption.*

Opportunities

Opportunities to implement BikeHoward projects will typically arise in four ways.

1. The annual scheduling of County Road resurfacing projects. While resurfacing schedules are generally based on pavement quality and typical pavement life, specific segments of road are typically identified for resurfacing on an annual basis about 4-6 months prior to the beginning of the paving season.

It is important that this process begin to take into account the implementation needs of the Short-Term Network as well as the BikeHoward Plan overall.

Recommendation: *Annually, the County shall conduct a detailed review of the on-road bikeways in the Bikeway Network and implement recommended projects. The projects selected should be based upon continuity with existing facilities and consideration of the required actions and estimated level of effort as identified in the BikeHoward GIS data. As with all public works projects, field verification of projects identified in a master plan process is necessary prior to implementation.*

2. The opportunity for the County to implement recommendations through the development process—sometimes through a requirement, or through a request.

Recommendation: *When development applications are filed, staff within DPZ should be assigned the task of identifying BikeHoward plan recommendations that may be related to the development.*

3. Through routine County work to address neighborhood traffic calming applications, traffic signal management, and other traffic management and safety needs at intersections, including crosswalk installation and maintenance, curb ramp retrofits, and installation of curb extensions.

Recommendation: *Ensure that bicycle accommodations and safety features, especially those identified in BikeHoward, are incorporated into traffic calming, intersection, crosswalk, curb extension and traffic signal projects as a routine part of evaluation and design.*

4. The opportunity to relate to activities undertaken in response to the first three opportunities. Improvements undertaken through an opportunity such as 1-3, while contributing to the Network, can end up being disconnected from it due to the limits which must be set for project boundaries. To extend an improvement with some type of action that gives the bicyclist a sense of continuity will have tremendous safety, practicality and public relations benefits, however this also may require additional funding beyond that set aside for the work that is within project boundaries.

Recommendation: *Allocate 15 percent of BikeHoward's implementation funding to an opportunity project fund to ensure the short-term utility of the investments realized by repaving, intersection upgrade and private redevelopment projects.*

Building Institutional Capacity

To begin implementation of BikeHoward two special initiatives are needed to create a solid foundation for development of the network.

Bicycle Route Sign Protocol and Manual

The proposed signage system discussed in Chapter 6 needs to be fully developed and agreed to by stakeholders. Graphic designs, color schemes, and implementation strategies need to be discussed and agreed upon, then documented in a Sign Protocol and Manual.

Recommendation: *Consider developing a sign Protocol and Manual that is agreed to by all stakeholders, including CA, DRP, DPW, DPZ, and SHA.*

Bikeway Design Training

Because Howard County has not developed a significant number of on-road bikeways, traffic engineering and roadway design staff do not have extensive experience integrating bicycle facilities into the various roadway types that the County builds and maintains.

Recommendation: *Prior to developing County-specific Bikeway Design Guidelines, thoroughly train existing traffic engineering and design staff (as well as consulting engineers) using existing curriculum related to the AASHTO Guide for the Development of Bicycle Facilities, and other national and state engineering guidance documents. Conduct four training courses in the year following plan adoption and continue with an annual training program as needed.*

Recommendation: *Ensure the County has adequate engineering and design capacity through the use of on call design firms.*

Recommendation: *Participate in study tours to visit with officials of other jurisdictions to learn about bicycling facility design and implementation best practices.*

Annual Capital Project Prioritization

Prioritizing capital projects is an activity that County agencies undertake annually. Related to the bikeway projects in the Plan, there are a number of tasks in this process for which the County should develop routine practices, including the following:

- Setting a dollar amount, or level of effort description, to determine which bikeway projects should be implemented as major capital expenditures
- Determining which bikeway projects should be integrated into roadway projects that are on the capital project list, or likely to be added to the list
- Determining which bikeway projects should be in the capital budgets of other County agencies, such as Recreation and Parks, Schools, Transit, Public Works, Libraries, etc
- Determining which bikeway projects should be recommended to the State for inclusion in the Consolidated Transportation Program.

To manage implementation of small and medium sized bikeway projects, many jurisdictions establish an on-going Bicycle Infrastructure Funding Program, for which a lump sum is budgeted each year. Selection of the specific projects to fund annually can be done through an inter-agency coordination group that is managing implementation of the BikeHoward Plan. This method keeps funding flexible and thus can be used to respond to new opportunities, critical needs that were not foreseen in the planning process, and the opportunity projects that are implemented as a part of routine work by County agencies.

Recommendation: *Annually, determine and develop projects for inclusion in the County's capital budget. Continue to ensure that the capital budget line item for BikeHoward projects maintains a fund balance of at least $750,000 per year.*

Funding

Determining how to fund various bikeway improvements is a key strategic issue that communities face when implementing bikeway master plans. While there are many funding options, each source may have limitations making it more appropriate for certain types of bikeway improvement projects.

Some funding sources are targeted to infrastructure, some to safety, education and encouragement efforts. Some sources are not directly bicycle-related but can be applicable to a bikeway project due to its nexus with another public priority such as historic preservation or public health. Some sources may support grants of hundreds of thousands or millions of dollars, other may be targeted to smaller amounts and require citizen volunteers or community involvement.

A wide range of funding options are available to Howard County, (see Table 6 for highlights). For a full discussion and additional details about funding a bikeway project or program please see Appendix M.

Recommendation:

- *Identify dedicated annual funding in the Department of Recreation and Parks and HC Public Schools for implementation of the BikeHoward Plan*
- *Identify dedicated annual funding for County Agencies to use as matching funds for grant applications including to match state and federal transportation funds and other grant programs*
- *Identify dedicated funding for ongoing maintenance of pavement markings and signage, bike parking facilities and County trails*
- *Ensure that the County is a regular applicant for key funding programs such as Transportation Alternatives, Safe Routes to School, Maryland Bikeways Program, Congestion Mitigation and Air Quality Improvement Program (CMAQ), and Recreational Trails*

Interagency and Inter-Jurisdictional Coordination

Effective implementation of BikeHoward will require ongoing coordination among a significant number of county agencies and other entities.

Recommendation: *Consider establishing a BikeHoward Implementation Team (BMP), chaired by a senior staffer from the county administration, that meets regularly (monthly or bi-monthly) to which each individual agency can report its progress.*

This group should be comprised of DPW, DPR, HCPSS, CA, DPZ, and OOT staff directly tasked with developing bicycle infrastructure in the county. This group will stay apprised of funding opportunities and monitor grant application deadlines and can also be used to resolve any conflicts that may arise.

Recommendation: *Consider establishing protocols for coordination with neighboring counties; private railroads (CSX) and utilities (BGE and others); state agencies such as State Highway Administration, Maryland Transit Administration, Maryland Department of Transportation, and the Maryland Department of Natural Resources; and Federal agencies such as the National Security Administration and other Defense Department agencies that are located in or near the county.*

How Projects Can Cost Less Than Forecast

The project cost estimates in BikeHoward are based on known and unknown factors that influence the estimates. Some factors can be clearly identified and incorporated into the cost estimates, while others cannot be. Therefore BikeHoward sometimes has to assume the worst case cost scenarios when developing estimates. Some examples of these unknown factors are the relationships between the project and the county repaving schedule, road improvements, and utility work. For BikeHoward, the most critical relationship is the repaving schedule. Since BikeHoward cannot forecast the repaving schedule, Bikehoward's estimates have to assume that a bike lane will have to be developed as a standalone project, the most costly scenario. However, when part of a project can be incorporated into a repaving project, costs can be significantly lower.

One example of this relationship to lower costs is Structured Project No. 63. This project calls for a shared use pathway connection from South Entrance Road following a corridor along the Little Patuxent River up to Stevens Forest Road, then transitioning to a bike lane on Stevens Forest Road to connect with Broken Land Parkway. The Stevens Forest Road bike lanes were estimated at $40,000, however because a portion was able to completed when the road was repaved, the new bike lanes were installed for $3,880.

Bike Howard

Structured Projects
Map No. 10

Structured Projects-Line colors are used to show each structured project)

Existing Pathways and Trails (HC, CA and Others)

N

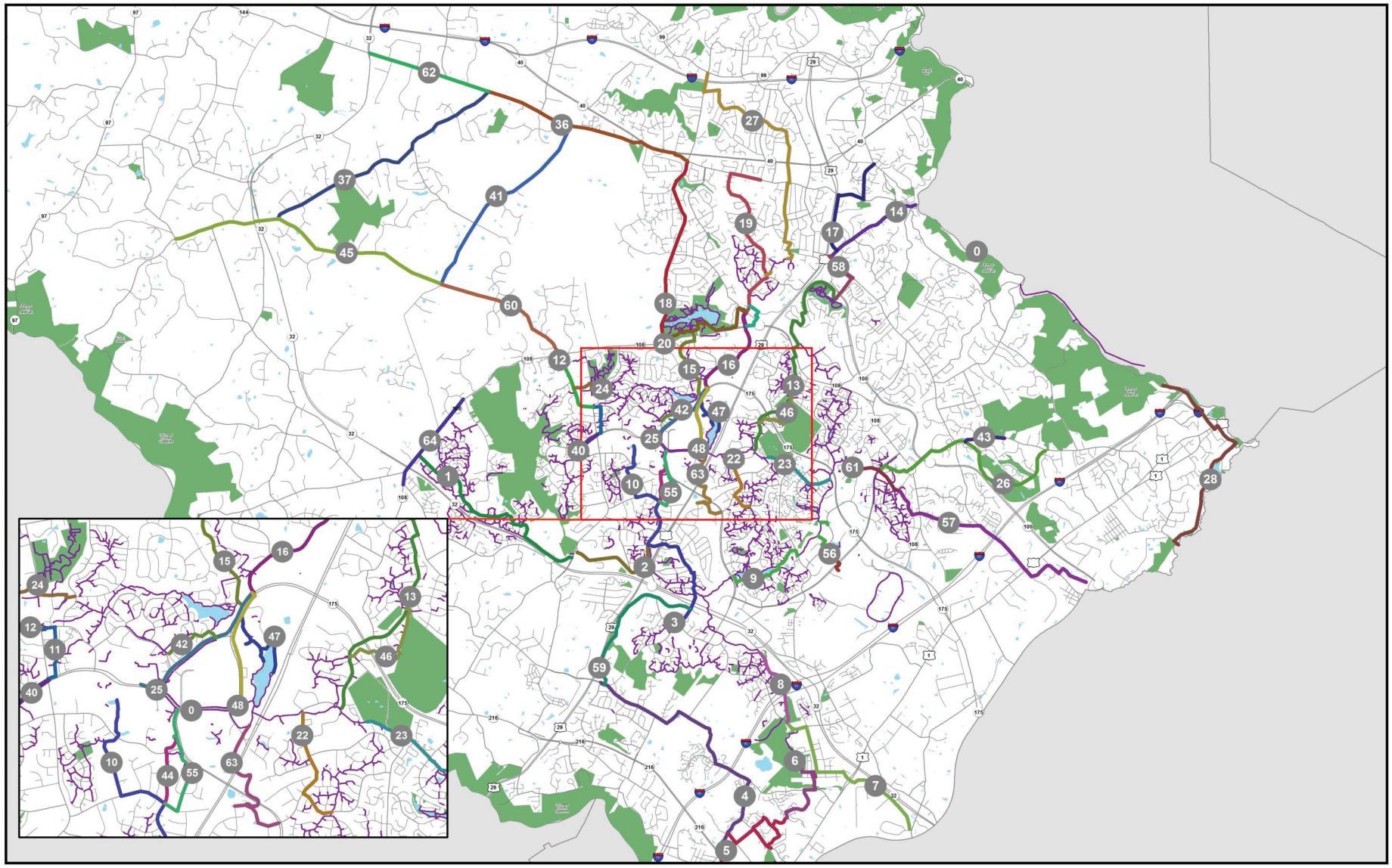


Table 5: Structured Projects Note: Costs listed in these tables are planning level estimates and include high contingency factors. Actual costs for most projects are expected to be lower, particularly when bike lane projects can be aligned with ongoing road resurfacing.

Project No.	Primary Locations	From	To	Description	Construction Estimate	Design and Engineering	Signage Cost	Total	Length (Miles)
1	Grace Drive (Bike Lanes), Summer Sunrise Drive (Sharrows)	River Hill	Cedar Lane	The project will develop bike lanes to extend the existing bike lanes on Great Star Drive in River Hill to provide connections to the east. This project leverages a connection that will be built as part of the Simpson Mill housing development. This project is also coordinated with SHA's Fort Meade/NSA signed bike route.	$ 158,568	$ 47,570	$ 34,000	$ 240,138	3.4
2	Harriett Tubman Lane (Bike Lanes, Climbing Lanes), Martin Road (Bike Lane)	Cedar Lane	Seneca Drive	The project proposes a series of bike lanes to develop an east/west connection, it is aligned with SHA's Fort Meade Signed Route.	$ 324,546	$ 97,364	$ 17,000	$ 438,910	1.7
3	Seneca Drive (Bike Lane) Shaker Drive (Sharrows) Eden Brook Drive (Bike Lane from S. Carlinda to KC VC), Path upgrades on path section from Wesleigh Drive to S. Carlinda, spot improvements at Wesleigh Drive/Seneca Drive and trail crossing at Cape Anne Drive, signal improvement at Old Columbia Road and Eden Brook Drive	Martin Road	Guilford Road/ Kings Contriv-ance Village Center	The project will develop a series of trail access improvements, bike lanes, upgrades to shared use paths to provide a north/south connection across MD 32 and better connect the village center and the Patuxent Branch Trail.	$ 479,691	$ 143,907	$ 20,000	$ 643,598	2
4	Gorman Road (Paved and Striped Shoulder, Shared Roadway w/ ST, sharrows, Bike Lanes), Stephens Road (Bike Lanes)	Johns Hopkins Road	North Laurel	The project will develop a series of bike lanes, sharrows and roads with safety treatments to provide a connection from Johns Hopkins Road to Laurel to improve north/south passage.	$ 450,987	$ 135,296	$ 44,000	$ 630,283	4.4
5	All Saints Road (Bike Lanes), North Laurel Road from Stephens Road to All Saints Road (Bike Lanes), Whis-key Bottom Road from All Saints Road to access road to N. Laurel Community Center (Sharrows), Manor-wood Road from Whiskey Bottom Road to Kings Grant Road (Shared Roadway-exists), Kings Grant Road, Chaton Road, Woodsong Court, Royal Path Cove (Shared Roadway-Existing), New Shared Use path connection between Whiskey Bottom Road/All Saints Road junction north across to Chaton Road, New Shared Use path on informal trail between end of Royal Path Cove to Ridings Way with a spot improve-ment at transition to Ridings Way. Intersection improvement at All Saints Road at Scaggsville Road and Baltimore Avenue/Pilgrim Avenue/Scaggsville Road)	Savage	North Laurel/ Prince Georges County	This project will develop a series of on road and off road connections to connect North Laurel to Savage and establish connections to existing destinations and Prince Georges County.	$ 461,107	$ 138,332	$ 32,000	$ 631,439	3.2
6	Ridings Way at proposed junction with Project No. 5 to Knights Bridge Road (Sharrows), Knights Bridge Road (Bike Lane), Gorman Road between intersection at Gorman Road and Foundry Street (Bike Lanes), Foundry Street (Sharrows),Washington Street be-tween Foundry Street and William Street (Sharrows), Baltimore Street between Williams Street and Savage Guilford Road (Sharrows)	Maxwell Court	Baltimore Street	This project will develop connections to the Savage Historic Mill Trail and through Savage to connect to the Patuxent Branch Trail, including sharrows to indicate path of travel for cars and cyclists the parking area at trailhead in park.	$ 154,409	$ 46,323	$ 19,000	$ 219,732	1.9
7	Vollmerhausen Road (Buffered Bike Lane), Savage Guilford Road (Sharrows), Baltimore Street (Shared Roadway-Existing), Corridor Road (Paved And Striped Shoulders (Existing), Howard Street (Sharrows), Junction Drive between Corridor Road and Dorsey Road (Bike Lanes, includes access to MARC station access roads), intersection improvement at Junction Drive/Dorsey Run Road and Rt. 1 and Corridor Road	Terminus of Patuxent Branch Trail/ Vollmerhau-sen Road	Savage TOD/ MARC Station	The project will develop a series of bike lanes, sharrows, and paved striped shoulders to allow continuous passage via the Patuxent Branch Trail to the Savage TOD / MARC station and establish connections to the southside of Laurel.	$ 283,749	$ 85,125	$ 30,000	$ 398,874	3

Table 5: Structured Projects Note: Costs listed in these tables are planning level estimates and include high contingency factors. Actual costs for most projects are expected to be lower, particularly when bike lane projects can be aligned with ongoing road resurfacing.

Project No.	Primary Locations	From	To	Description	Construction Estimate	Design and Engineering	Signage Cost	Total	Length (Miles)
8	Patuxent Branch Trail (unpaved portion between existing trailhead at Guilford Road to trailhead at Vollmerhausen Road)	Trailhead at Guilford Road	Vollmerhausen Road	The project proposes to pave the existing unpaved portion of the Patuxent Branch Trail to improve conditions for travel and three season use. The project also calls for improvements at the trailhead at Guilford Road to more clearly indicate to users the direction of travel and passage across and through the parking area.	$ 525,143	$ 157,543	$ 13,000	$ 695,686	1.3
9	CA Pathway from parking area at Lake Elkhorn, path on southside of lake then on to trail crossing over Dasher Court to Oakland Mills Road (Shared Use Path -Upgrade), Oakland Mill Road from Dasher Court to Tunnel (Share Use Path-Upgrade)	Broken Land Parkway/Lake Elkhorn	Dobbin Road Commercial Area	Upgrades to existing trails and new trail connections. Path crossings will provide high quality east/west passage. Project also calls for new trail connections to Dobbin Road and McGaw Road. The project includes the tunnel under Oakland Mills Road, but does not propose any improvements. The project proposes building a new shared use path to connect the existing pathway to connect with Dobbin Road at McGaw Court, and upgrade an existing shared use path to improve connections to Dobbin Road.	$ 683,360	$ 205,008	$ 18,000	$ 906,368	1.8
10	Martin Road, Owen Brown Road, Jerrys Drive	Hickory Ridge Road, Howard County Community College	Seneca Drive	Series of bike lanes, sharrows, and shared use paths to connect Howard County Community College and provide north/south passage.	$ 671,537	$ 201,461	$ 21,000	$ 893,998	2.1
11	Columbia Association Pathway and Harpers Farm Road	Little Patuxent Parkway	Harpers Farm Road	The project calls for improvements to a shared use trail and a bike lane that will allow a more direct and effective connection for riders to use the multiuse trail to connect the College, Hospital and Harpers Choice Village Center.	$ 240,957	$ 72,287	$ 6,000	$ 319,244	0.6
12	Harpers Farm Road	Cedar Lane	MD 108	The project calls for a series of bike lanes and sharrows to provide north/south passage and allow cyclists to connect to Project No.11.	$ 101,074	$ 30,322	$ 11,000	$ 142,396	1.1
13	Thunder Hill Road, Old Annapolis Road, Bendix Road, Edgar Road, Meadowbrook Road	Multiuse Trail	Meadowbrook Road/MD 100	The project proposes a series of bike lanes and multiuse path to develop a high quality north/south connection between Downtown Columbia and Long Gate.	$ 582,610	$ 174,783	$ 39,000	$ 796,393	3.9
14	Old Columbia Pike, Main Street	MD 108	Historic Ellicott City	The project calls for a series of bike lanes, sharrows, and climbing lanes to establish a connection to historic Ellicott City. The project calls for improved connections to the trolley trail to allow continuous passage.	$ 300,678	$ 90,203	$ 16,000	$ 406,881	1.6
15	W. Running Brook Road	Little Patuxent Parkway	MD 108	The project calls for the development of a neighborhood greenway, climbing lanes and an improvement to a road crossing to provide north/south passage from Downtown Columbia to Centennial Park.	$ 645,729	$ 193,719	$ 12,000	$ 851,448	1.2
16	Columbia Road	Little Patuxent Parkway	MD 108	The project will develop a series of bike lanes, cycle tracks and intersection improvements to provide for north/southbound travel to connect to Downtown Columbia. Included in this project are improvements at 108 and Columbia Road.	$ 730,974	$ 219,292	$ 18,000	$ 968,266	1.8

Table 5: Structured Projects Note: Costs listed in these tables are planning level estimates and include high contingency factors. Actual costs for most projects are expected to be lower, particularly when bike lane projects can be aligned with ongoing road resurfacing.

Project No.	Primary Locations	From	To	Description	Construction Estimate	Design and Engineering	Signage Cost	Total	Length (Miles)
17	Toll House Road, Rogers Avenue	Old Columbia Pike	Government Center	The project calls for a series of bike lanes to continue north/south connections and route from Long Gate area to connect to the Government Center and Rogers Avenue northbound to US 40.	$ 149,625	$ 44,888	$ 19,000	$ 213,513	1.9
18	Centennial Lane (Bike Lanes, Sharrows, Paved and Striped Shoulders)	MD 108	Frederick Road	The project will develop a connection from MD 108 northbound to Frederick Road to provide a north/south connection to Centennial Park and Columbia using a series of bike lanes, sharrows and existing paved and striped shoulders.	$ 240,568	$ 72,170	$ 31,000	$ 343,738	3.1
19	Gray Rock Drive, Columbia Road, Frederick Road	Old Annapolis Road	Frederick Road	The project will develop a connection from Old Annapolis Road northbound to the Frederick Road, Miller Library. The route proposes a series of bike lanes and climbing lanes.	$ 363,080	$ 108,924	$ 31,000	$ 503,004	3.1
20	Centennial Park, Dorsey's Search Area	Centennial Lane	Wood Yard Road, Old Annapolis Road	The project will develop a series of pathway improvements, sharrows and intersection improvements to provide passage using Centennial Park to connect Centennial Lane, Columbia Road and Dorsey's Search Area, allowing passage parallel to MD 108.	$ 778,893	$ 233,668	$ 19,000	$ 1,031,561	1.9
21	Old Columbia Road	Old Annapolis Road	Old Annapolis Road/Dorsey Hall Road	The project calls for intersection and linkages at MD 108/Old Columbia Road and Columbia Road/Old Annapolis Road. These improvements will provide connections to Project No. 19 and No. 20. The project will also develop improvements on Old Columbia Road to connect to the Dorsey's Search Village Center.	$ 241,812	$ 72,544	$ 5,000	$ 319,356	0.5
22	Stevens Forest Road	Whiteacre Road	Farewell Road/ Trail	Leverage completed bike lanes on Stevens Forest Road with additional signage.	$ 25,000	$ 7,500	$ 11,000	$ 43,500	1.1
23	Existing Pathways, Montgomery Road	Blandair Park	Tamar Drive	Improve existing shared use path and develop bike link to provide east/ west travel.	$ 368,397	$ 110,519	$ 11,000	$ 489,916	1.1
24	Rivendell Lane, Cedar Lane Park, Longfellow Elementary School	Harpers Farm Road	Existing Trails	Upgrade existing paths and develop bike lanes to provide east/west route to connect to proposed Twin Rivers Trail to Downtown Columbia.	$ 149,858	$ 44,957	$ 7,000	$ 201,815	0.7
25	Governor Warfield Parkway-from interchange at Governor Warfield and LPP on the Northside of the mall to intersection of LPP at Governor Warfield Parkway (Shared use path), LPP-west side of roadway to intersection at Columbia Road (shared use path upgrade)	Columbia Road	Little Patuxent Parkway / Governor Warfield Parkway /Banneker Road	Build new shared use pathway along Gov. Warfield Pkwy and continue along the west side of Little Patuxent Pkwy to Columbia Rd, enhancing existing sidewalks where they exist along this route. Connects to Hospital to Blandair Park pathway and Columbia Rd improvements (Project No. 16)	$ 663,323	$ 198,997	$ 13,000	$ 875,320	1.3
26	Brightfield Road, Old Montgomery Road, Montgomery Road, Marshalee Drive	Snowden River Parkway	Montgomery Road/Marshalee	Develops a series of bike lanes, upgrades to existing shared use paths, add new shared use path to provide for east/west passage from Snowden River Parkway and Tamar Drive.	$ 519,370	$ 155,811	$ 35,000	$ 710,181	3.5
27	Chatham Road, North Chatham Road	Columbia Road	MD 99	Develop a series of bike lanes and sharrows for a north/south connection, spot improvements, address existing traffic calming to better accommodate cycling	$ 590,547	$ 177,164	$ 43,000	$ 810,711	4.3
28	River Road, Furnace Road, Levering Avenue, Race Road	Gun Road	Hanover Road	Develop a series of bike lanes, avenue and striped shoulders, and sharrows to provide for passage in this popular cycling area. Provides access to the BWI trail and Grist Mill Trail.	$ 309,936	$ 92,981	$ 36,000	$ 438,917	3.6

Table 5: Structured Projects Note: Costs listed in these tables are planning level estimates and include high contingency factors. Actual costs for most projects are expected to be lower, particularly when bike lane projects can be aligned with ongoing road resurfacing.

Project No.	Primary Locations	From	To	Description	Construction Estimate	Design and Engineering	Signage Cost	Total	Length (Miles)
36	Frederick Road, Route 40	Frederick Road/ Bethany Lane	Triadelphia Road	Develop bike lanes and sharrows to provide for east/west passage, the balance of Fredrick road to the west would bring shoulder improvements and reconfiguration striping.	$ 1,516,670	$ 455,001	$ 2,000	$ 1,973,671	3.3
37	Triadelphia Road	Frederick Road	Folly Quarter	Develop shared roadways and safety treatment along this road popular with recreational cyclists.	$ 601,567	$ 180,470	$ 40,000	$ 822,037	4
40	Little Patuxent Loop at Clary's Forest	Little Patuxent Parkway/Cedar Lane	Little Patux-ent Parkway/ Clary's Forest Loop	Develop an advisory bike lane to provide passage for riders to connect to multiuse trail that will terminate at the Howard County General Hospital.	$ 9,557	$ 2,867	$ 8,000	$ 20,424	0.83
41	Folly Quarter Road	Homewood Road	Frederick Road	The project proposes signed and spot widening that will improve shoulders in some areas. The project will develop a higher quality north/south connection already popular with recreational cyclists.	$ 491,173	$ 147,352	$ 33,000	$ 671,525	3.3
42	Windstream Drive, Green Mountain Circle	Governor Warfield Parkway	Twins Rivers Road	Improve signal at Green Mountain and Windstream Drive to improve connection and access to alternative route out of the mall entrance at Windstream Drive, would also require adjusting signal at Windstream Drive and Governor Warfield Parkway.	$ 125,000	$ 37,500	$ 5,000	$ 167,500	0.49
43	Montgomery Road	Marshalee Drive	Rockburn Park Entrance	Develop a bike lane along road to provide access to Rockburn Branch Park, a busy bike related park.	$ 343,311	$ 102,993	$ 6,000	$ 452,304	0.62
44	Martin Road	Owen Brown Road	Hickory Ridge and Neighbor-hood roads	This project calls for sharrows and bike lanes to provide an alternative connection using an access road to connect to Project No. 55 to establish a connection to Downtown Columbia.	$ 92,126	$ 27,638	$ 6,000	$ 125,764	0.64
45	Triadelphia Road, Folly Quarter Road	Sharp Road/Shady Lane	Homewood Road	Develop shared roadways and safety treatment along road popular for triathlon events.	$ 672,946	$ 201,884	$ 67,000	$ 941,830	6.7
46	Thunder Hill Rd at MD 175	Thunder Hill Road	Trail intersec-tion at Thunder Hill Road just north of Soaring Hill Road	Upgrade existing shared use path to develop high quality connections under MD 175, using existing tunnel and improve lighting and aesthetic experience.	$ 465,193	$ 139,558	$ 9,000	$ 613,751	0.93
47	Lake Kittamaqundi /Vantage Point Road	Kennedy Gardens at Lake Kittamaqundi	Little Patux-ent Parkway/ Vantage Point Road inter-section	Complete loop around Lake Kittamaqundi (this CA project is anticipated to be completed in 2014) and widen existing pathway between the north end of the lake and Vantage Point Road; enhance intersection at Vantage Point Road/Little Patux-ent Parkway/W. Running Brook, as needed. Connects to Project No. 25 the west side of Little Patuxent Parkway to Columbia Rd as well as to Gov. Warfield Pkwy and Project No. 48 along the east side of Little Patuxent Pkwy.	$ 153,194	$ 45,958	$ 10,000	$ 209,152	1
48	Little Patuxent Parkway	Columbia Road	Multiuse Trail at South Entrance Road	Shared use path to provide north/south travel and connect to DTC Trail.	$ 442,971	$ 132,891	$ 11,000	$ 586,862	1.13

Table 5: Structured Projects Note: Costs listed in these tables are planning level estimates and include high contingency factors. Actual costs for most projects are expected to be lower, particularly when bike lane projects can be aligned with ongoing road resurfacing.

Project No.	Primary Locations	From	To	Description	Construction Estimate	Design and Engineering	Signage Cost	Total	Length (Miles)
55	Broken Land Parkway, Sebring Drive	Multiuse Trail	Martin Road	The project proposes a series of shared roadways, improved shared use paths, new shared use paths, and bike lanes to develop a north/south connection to connect to Martin Road from Down-town Columbia.	$ 399,819	$ 119,946	$ 11,000	$ 530,765	1.11
56	McGaw Road	Dobbin Road	Snowden River Parkway and into Snowden Square access roads	The project proposes a series of bike lanes, sharrows and a trail connection to provide access to the Snowden Square Shopping center area.	$ 435,948	$ 130,784	$ 5,000	$ 571,732	0.5
57	Old Montgomery Road , Mayfield Avenue, Mead-owridge Road	Old Montgomery Road	Dorsey MARC Station	The project calls for a series of bike lanes, improved paths, shar-rows and an intersection improvement to develop an east/west connection to the Dorsey MARC Station.	$ 959,998	$ 287,999	$ 37,000	$ 1,284,997	3.7
58	Longate Parkway, MD 103	Meadowbrook Road/MD 100	MD 103/Old Columbia Road	The project proposes a series of sharrows, bike lanes and cycle tracks to allow cyclists to transition through this very busy area to continue a quality north/south connection between Downtown Columbia through the Long Gate area and onto Historic Ellicott City.	$ 1,758,232	$ 527,470	$ 14,000	$ 2,299,702	1.4
59	Old Columbia Road	Eden Brook Drive	Johns Hopkins Road	The project will develop a series of bike lanes, sharrows and roads with safety treatments to provide a connection from Kings Contriv-ance Village Center to Johns Hopkins Road to allow north/south passage.	$ 393,907	$ 118,172	$ 25,000	$ 537,079	2.5
60	Homewood Road	MD 108	Folly Quarter Road	Develop shared roadways and safety treatment along road popular for triathlon events.	$ 1,123,716	$ 337,115	$ 22,000	$ 1,482,830	2.2
61	Tamar Drive	Tamar Drive/ Hayshed Lane	Old Montgomery Road	The project calls for a series of bike lanes to develop an east/west connection and connect with Project No. 57.	$ 111,153	$ 33,346	$ 10,000	$ 154,499	1
62	Frederick Road (MD 144)	Triadelphia Road	MD 32	The plan calls for improving this segment of road by improving shoulders to provide a paved and striped shoulder, would entail working with SHA, would improve access to MD 32 and western portion of county.	$ 1,066,884	$ 320,065	$ 19,000	$ 1,405,949	1.9
63	Downtown Columbia	South Entrance Road/US 29	Broken Land Parkway/Stevens Forest Road	The plan calls for developing a shared use path from the multi use pathway that would follow the Little Patuxent River to allow passage under US 29 and Broken Land Parkway, develop bike lanes on Stevens Forest Road south of Broken Land Parkway and connect to existing bicycle facilities on Stevens Forest Road north of Broken Land Parkway. (Cost based on results of Downtown Columbia Patuxent Branch Trail Extension Feasibility Study plus a wayfinding factor)			$ 13,000	$ 802,000	1.3
64	Clarksville Pike/MD 108	Guilford Road	Trotter Road	The plan calls for developing a shared use path from Guilford Road to Trotter Road on the west side of Clarksville Pike/MD 108, including pedestrian related improvements, including signal and crosswalk improvements. (Costs are based on preliminary results of Clarksville Streetscape Design Guidelines Study and includes estimated construction, design and engineering , utility and right of way costs).			$ 17,000	$ 1,617,000	1.7
							TTL	$ 32,436,561	

Bike Howard
Structured Projects

Estimated Cost: $240,138
Length (Miles): 3.4

Project Description:

The project will develop bike lanes to extend the existing bike lanes on Great Star Drive in River Hill to provide connections to the east. This project leverages a connection that will be built as part of the Simpson Mill housing development. This project is also coordinated with SHA's Fort Meade/NSA signed bike route.

Primary Location/Streets:

Grace Drive (Bike Lanes), Summer Sunrise Drive (Sharrows)

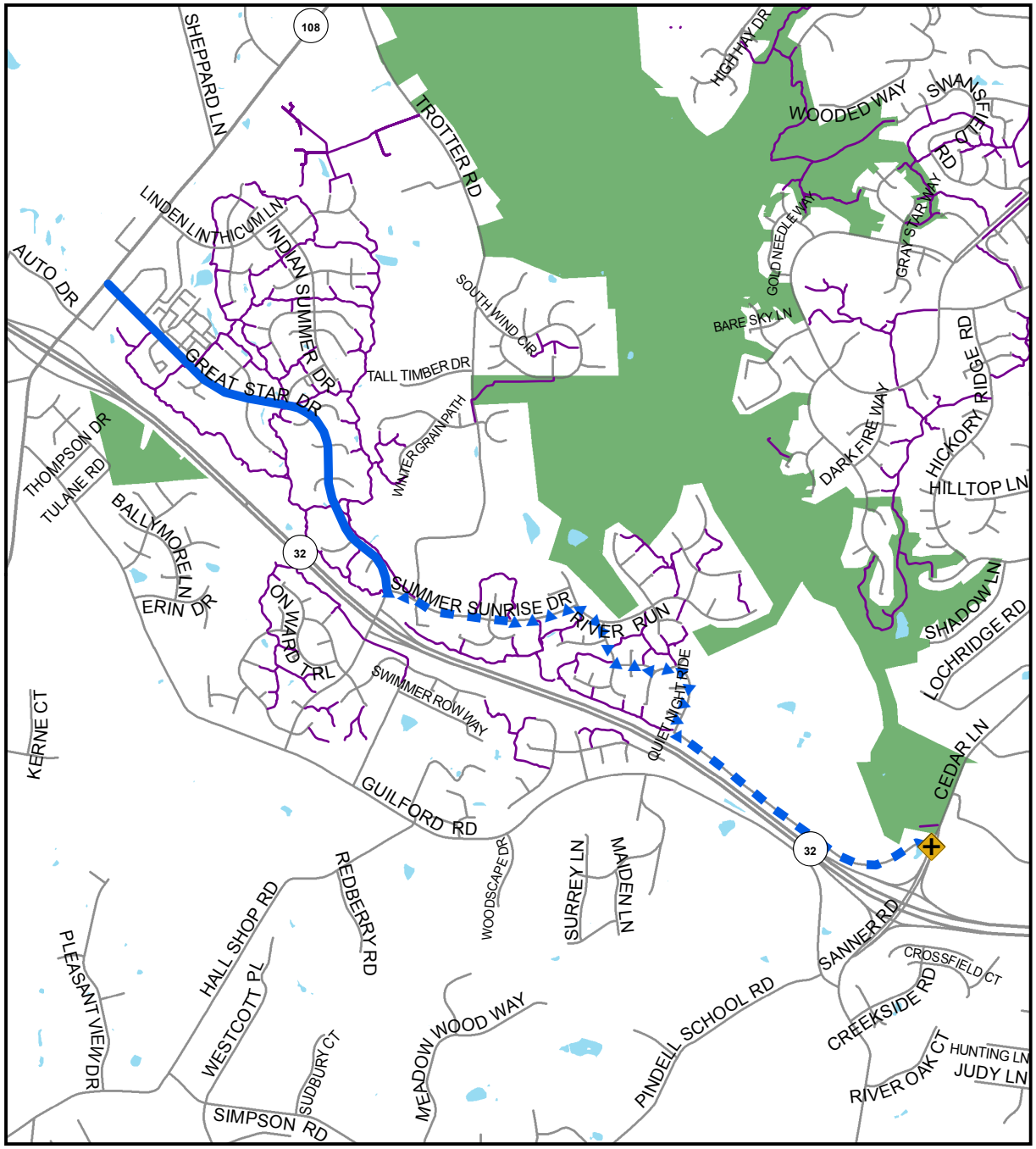
Start: River Hill
End: Cedar Lane

Linear Recommendations
- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations
- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities
- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Proposed/Preliminary
Structured Project Number: 1



Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 2

Estimated Cost: $438,910

Length (Miles): 1.7

Project Description:

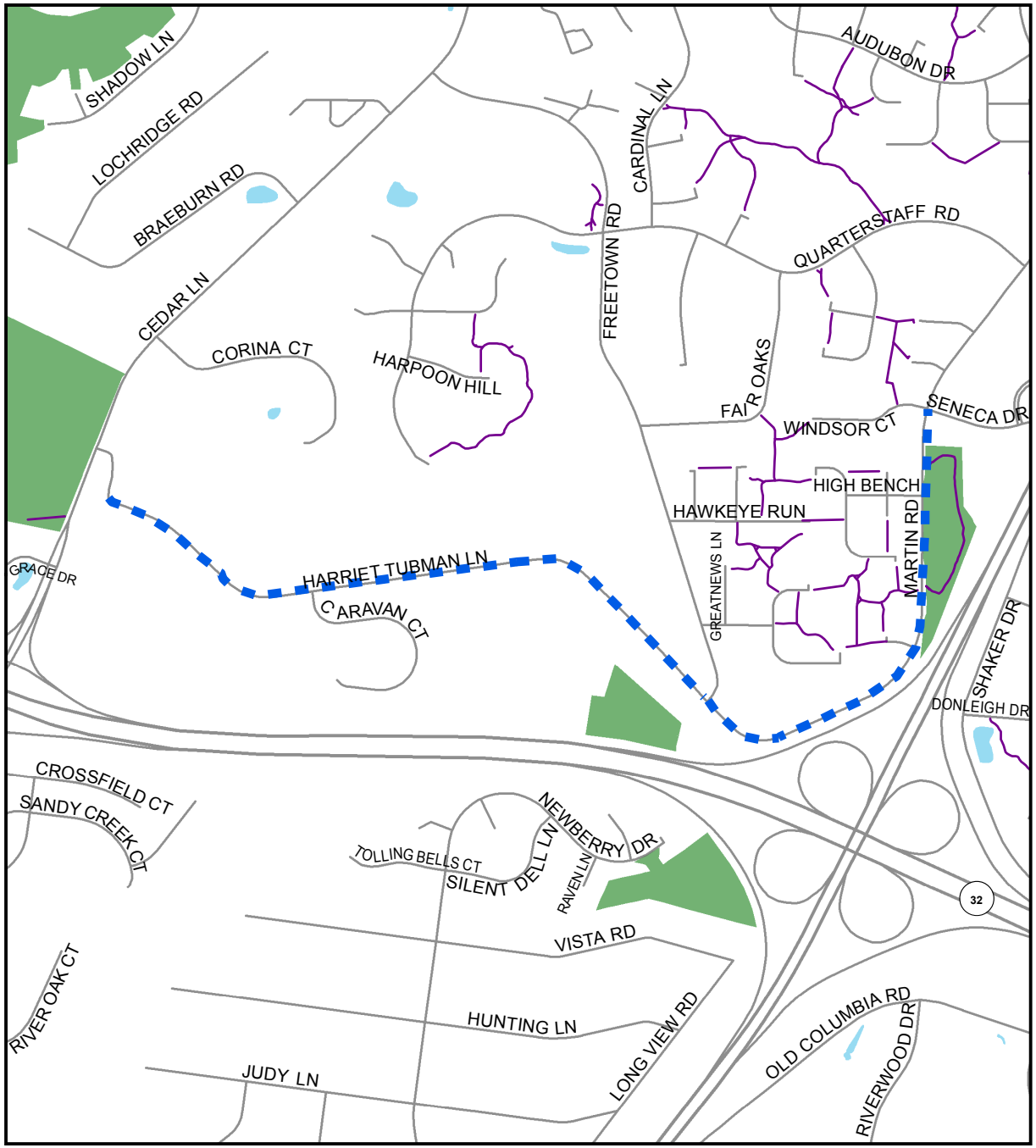
The project proposes a series of bike lanes to develop an east/west connection, it is aligned with SHA's Fort Meade Signed Route.

Primary Location/Streets:

Harriett Tubman Lane (Bike Lanes, Climbing Lanes), Martin Road (Bike Lane)

Start: Cedar Lane

End: Seneca Drive



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 3

Estimated Cost: $643,598

Length (Miles): 2

Project Description:

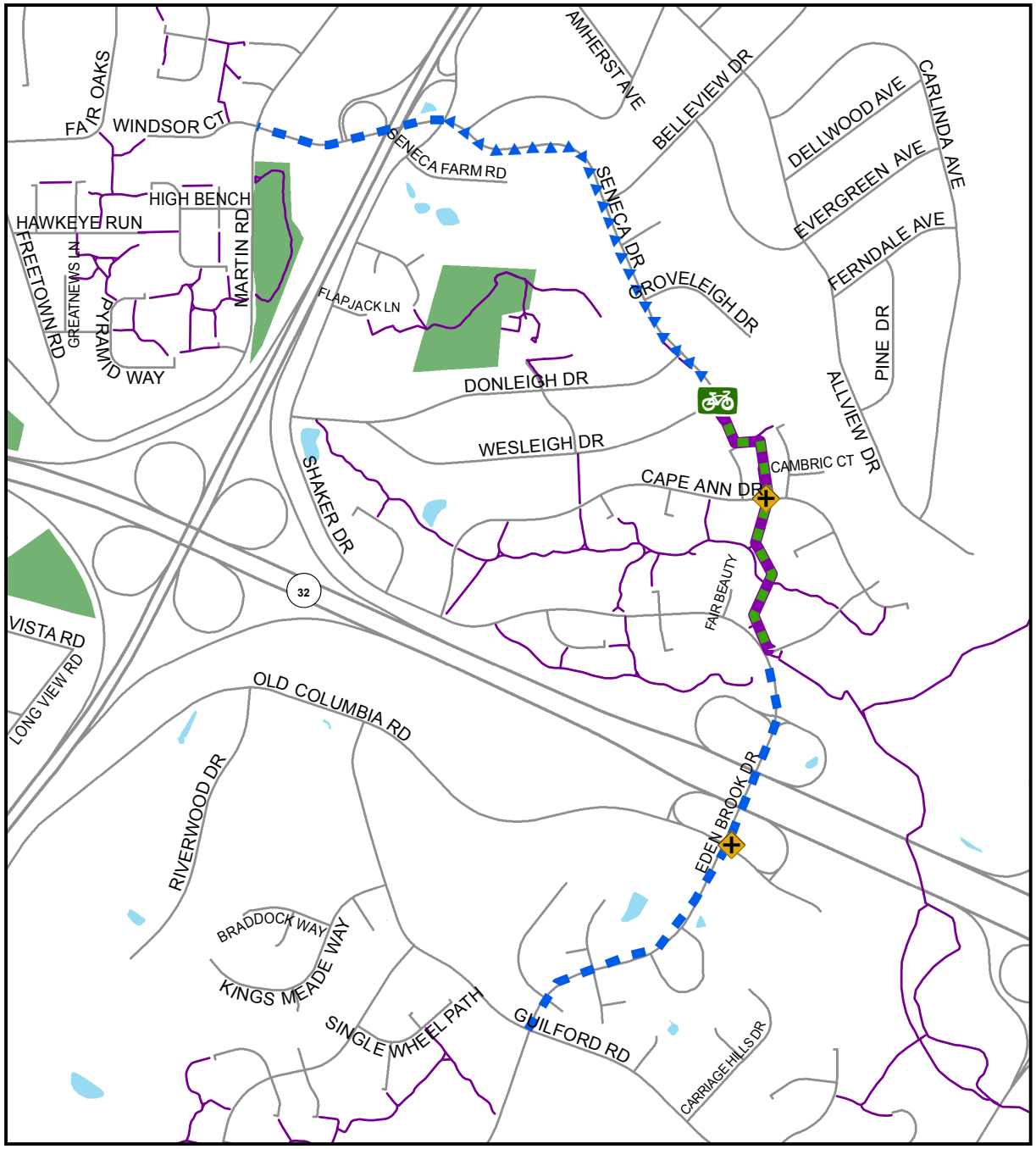
The project will develop a series of trail access improvements, bike lanes, upgrades to shared use paths to provide a north/south connection across MD 32 and better connect the village center and the Patuxent Branch Trail.

Primary Location/Streets:

Seneca Drive (Bike Lane) Shaker Drive (Sharrows) Eden Brook Drive (Bike Lane from S. Carlinda to KC VC), Path upgrades on path section from Wesleigh Drive to S. Carlinda, spot improvements at Wesleigh Drive/ Seneca Drive and trail crossing at Cape Anne Drive, signal improvement at Old Columbia Road and Eden Brook Drive

Start: Martin Road

End: Guilford Road/Kings Contrivance Village Center



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 4

Estimated Cost: $630,283

Length (Miles): 4.4

Project Description:

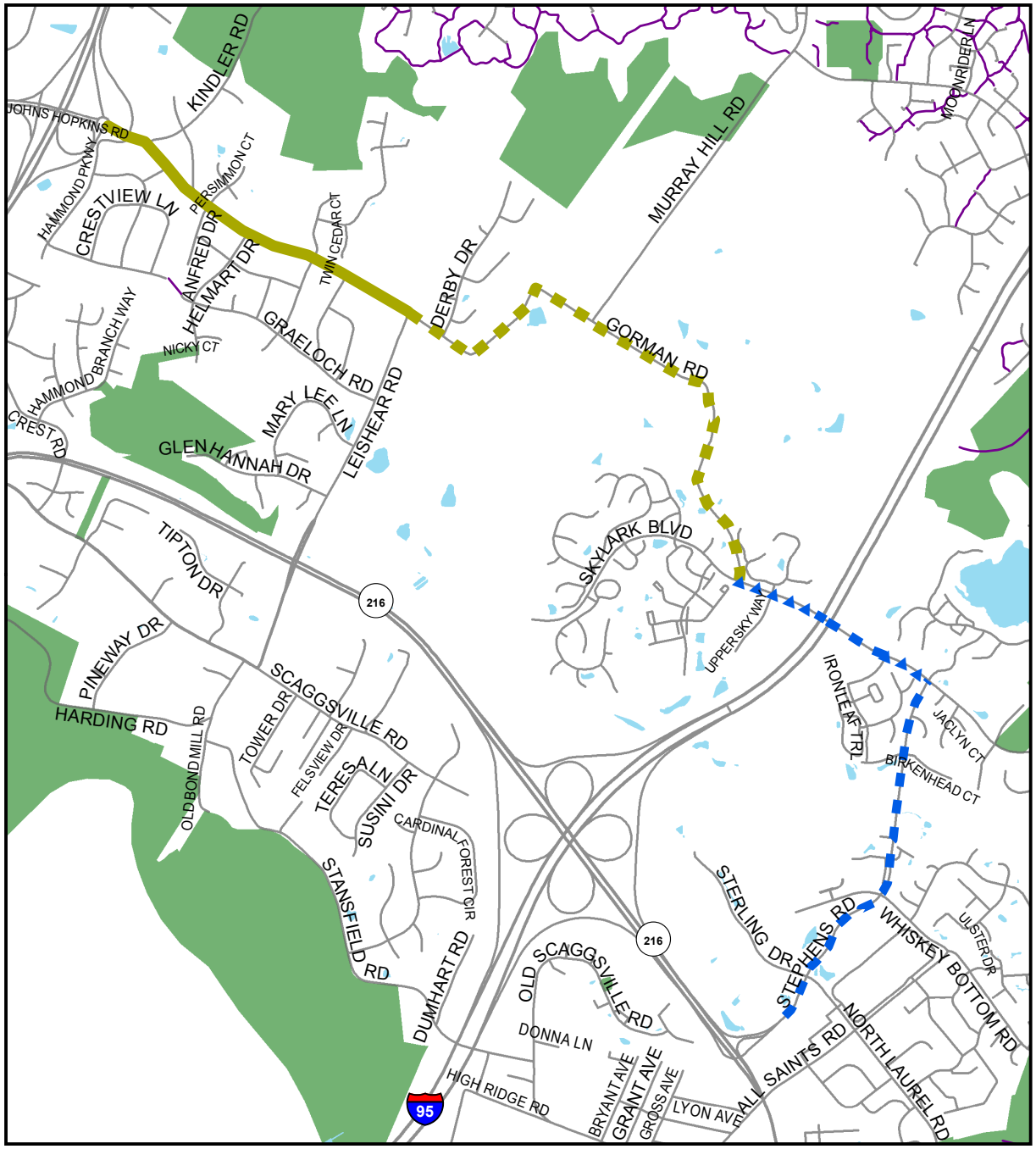
The project will develop a series of bike lanes, sharrows and roads with safety treatments to provide a connection from Johns Hopkins Road to Laurel to improve north/south passage.

Primary Location/Streets:

Gorman Road (Paved and Striped Shoulder, Shared Roadway w/ ST, sharrows, Bike Lanes), Stephens Road (Bike Lanes)

Start: Johns Hopkins Road

End: North Laurel



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 5

Estimated Cost: $631,439

Length (Miles): 3.2

Project Description:

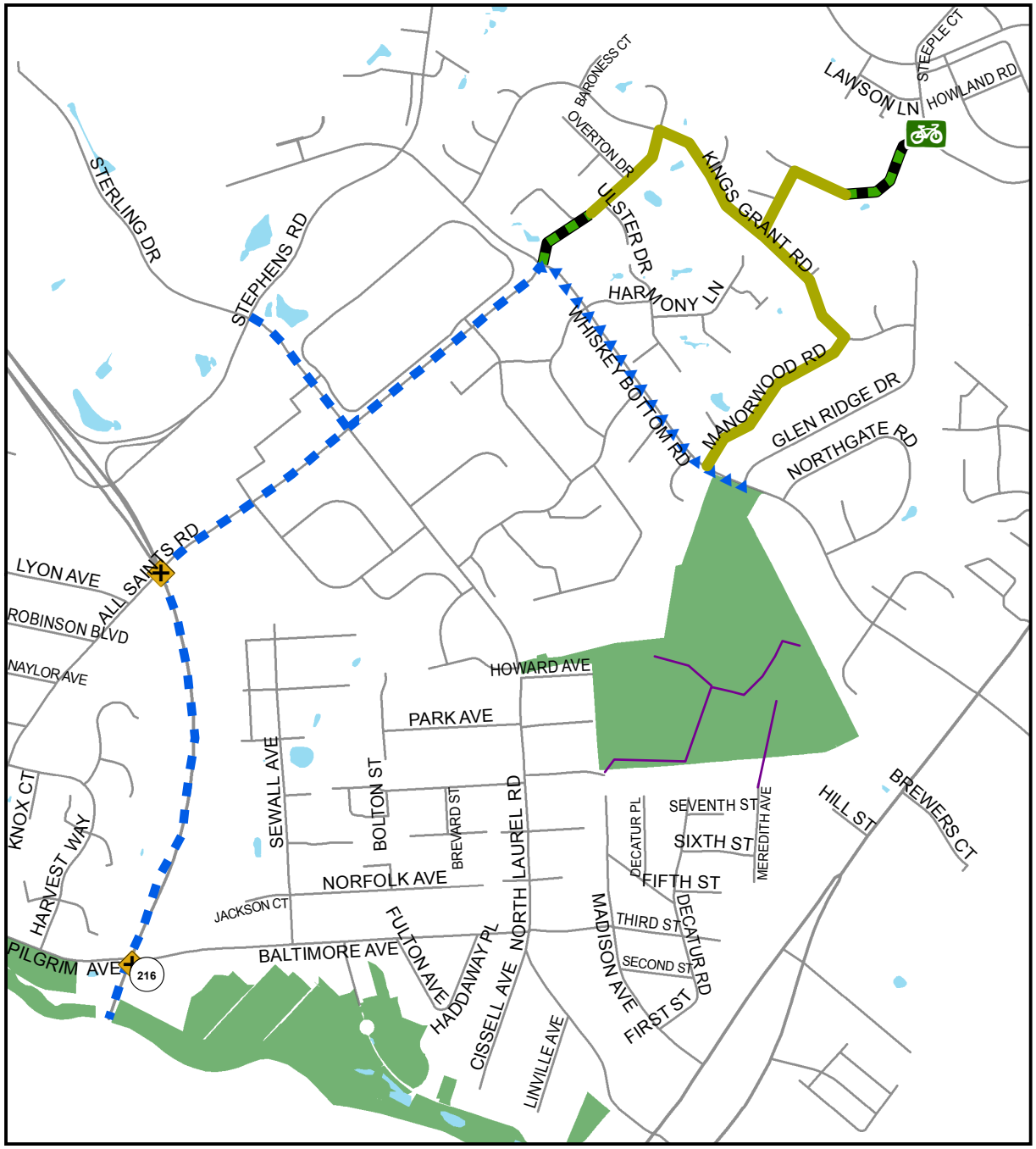
This project will develop a series of on road and off road connections to connect North Laurel to Savage and establish connections to existing destinations and Prince Georges County.

Primary Location/Streets:

All Saints Road (Bike Lanes), North Laurel Road from Stephens Road to All Saints Road (Bike Lanes), Whiskey Bottom Road from All Saints Road to access road to N. Laurel Community Center (Sharrows), Manorwood Road from Whiskey Bottom Road to Kings Grant Road (Shared Roadway-exists),Kings Grant Road, Chaton Road, Woodsong Court, Royal Path Cove (Shared Roadway-Existing), New Shared Use path connection between Whiskey Bottom Road/All Saints Road junction north across to Chaton Road, New Shared Use Path on informal trail between end of Royal Path Cove to Ridings Way with a spot improvement at transition to Ridings Way. Intersection improvement at All Saints Road at Scaggsville Road and Baltimore

Start: Savage

End: North Laurel/Prince Georges County



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 6

Estimated Cost: $219,732

Length (Miles): 1.9

Project Description:

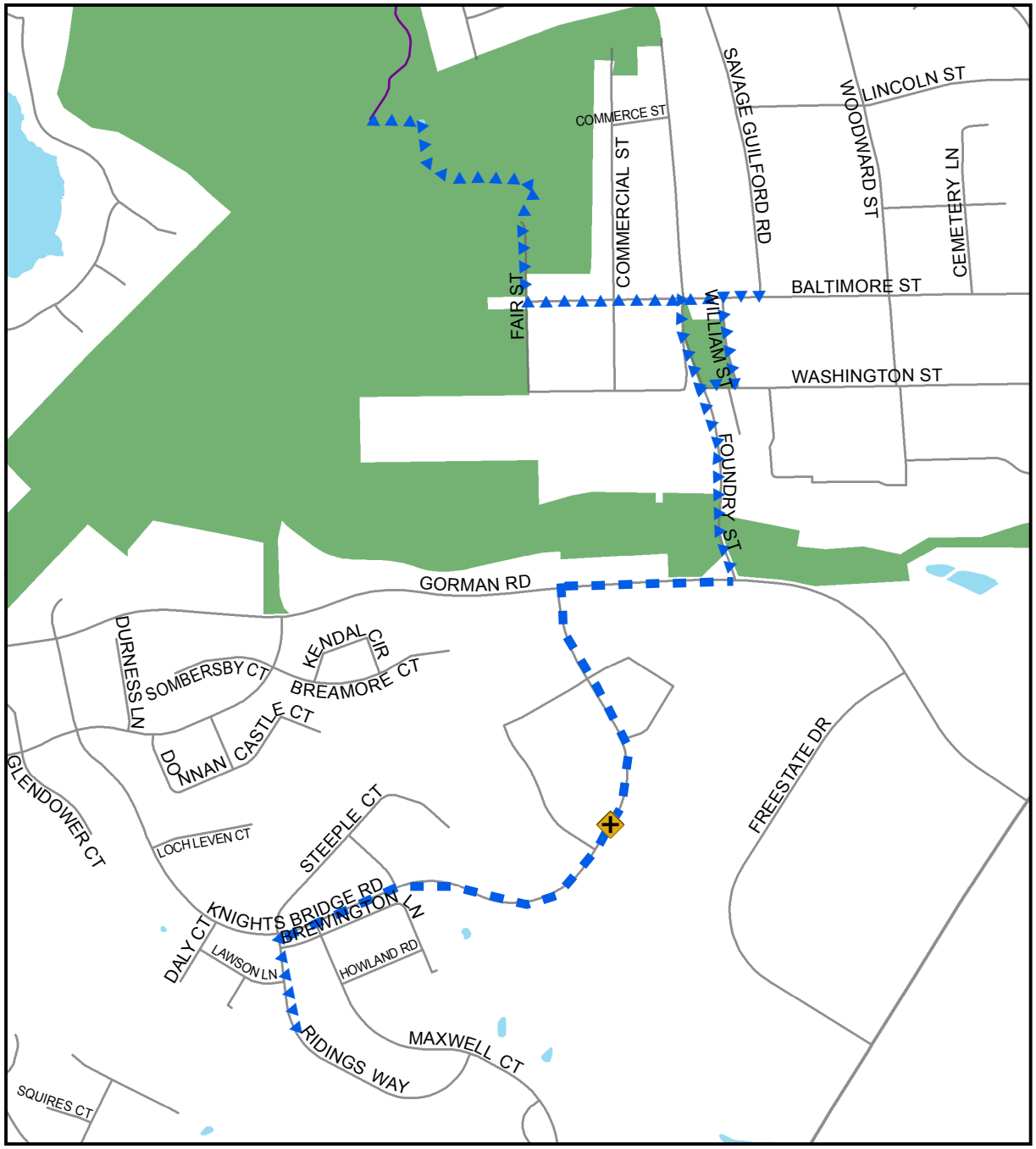
This project will develop connections to the Savage Historic Mill Trail and through Savage to connect to the Patuxent Branch Trail, including sharrows to indicate path of travel for cars and cyclists the parking area at trailhead in park.

Primary Location/Streets:

Ridings Way at proposed junction with Project No. 5 to Knights Bridge Road (Sharrows), Knights Bridge Road (Bike Lane), Gorman Road between intersection at Gorman Road and Foundry Street (Bike Lanes), Foundry Street (Sharrows),Washington Street between Foundry Street and William Street (Sharrows), Baltimore Street between Williams Street and Savage Guilford Road (Sharrows)

Start: Maxwell Court

End: Baltimore Street/Savage Park



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 7

Estimated Cost: **$398,874**

Length (Miles): **3**

Project Description:

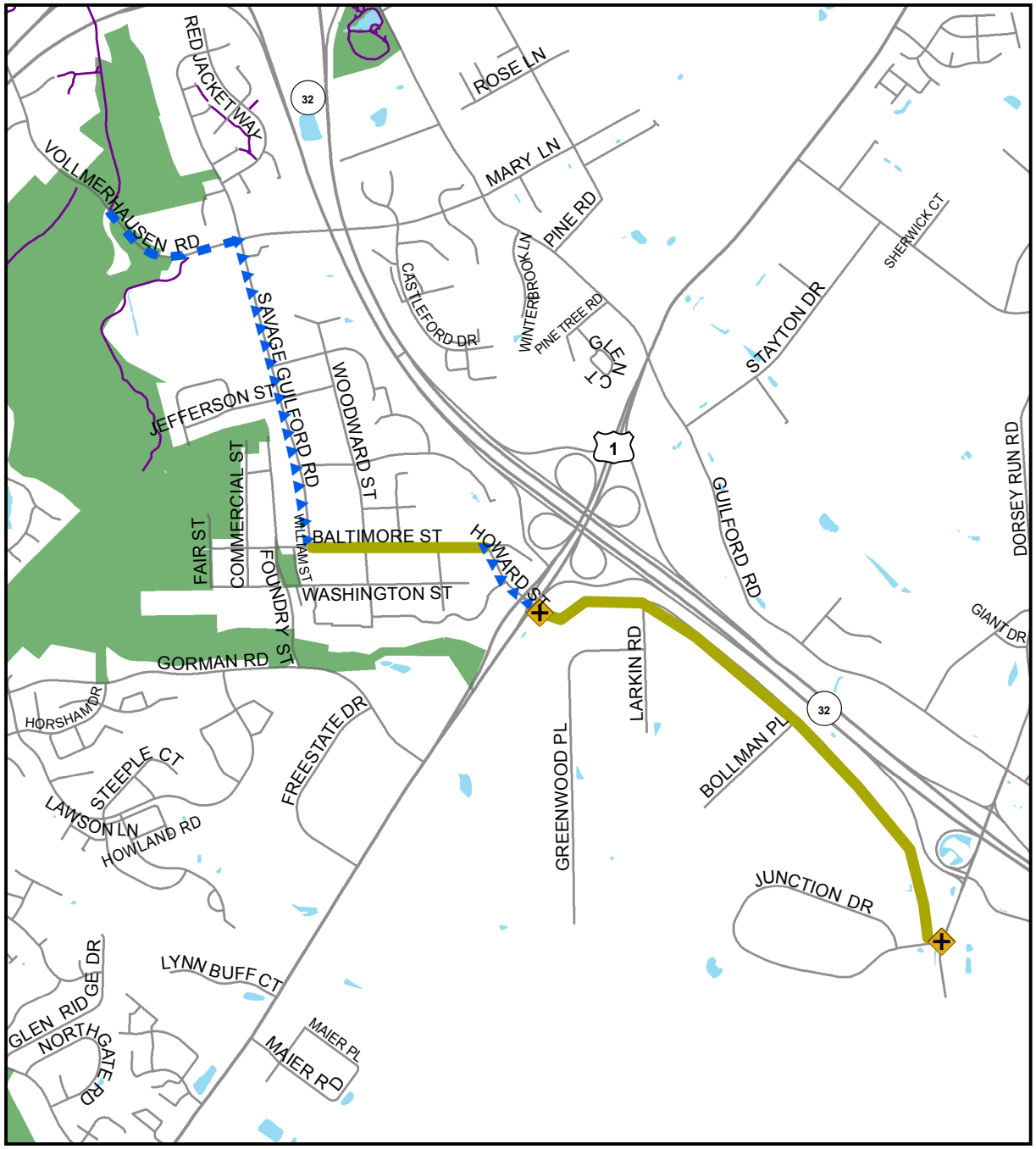
The project will develop a series of bike lanes, sharrows, and paved striped shoulders to allow continuous passage via the Patuxent Branch Trail to the Savage TOD / MARC station and establish connections to the southside of Laurel.

Primary Location/Streets:

Vollmerhausen Road (Buffered Bike Lane), Savage Guilford Road (Sharrows), Baltimore Street (Shared Roadway-Existing), Corridor Road (Paved And Striped Shoulders (Existing), Howard Street (Sharrows), Junction Drive between Corridor Road and Dorsey Road (Bike Lanes, includes access to MARC station access roads),intersection improvement at Junction Drive/Dorsey Run Road and Rt. 1 and Corridor Road.

Start: Terminus of Patuxent Branch Trail/ Vollmerhausen Road

End: Savage TOD/MARC Station



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 8

Estimated Cost: $695,686

Length (Miles): 1.3

Project Description:

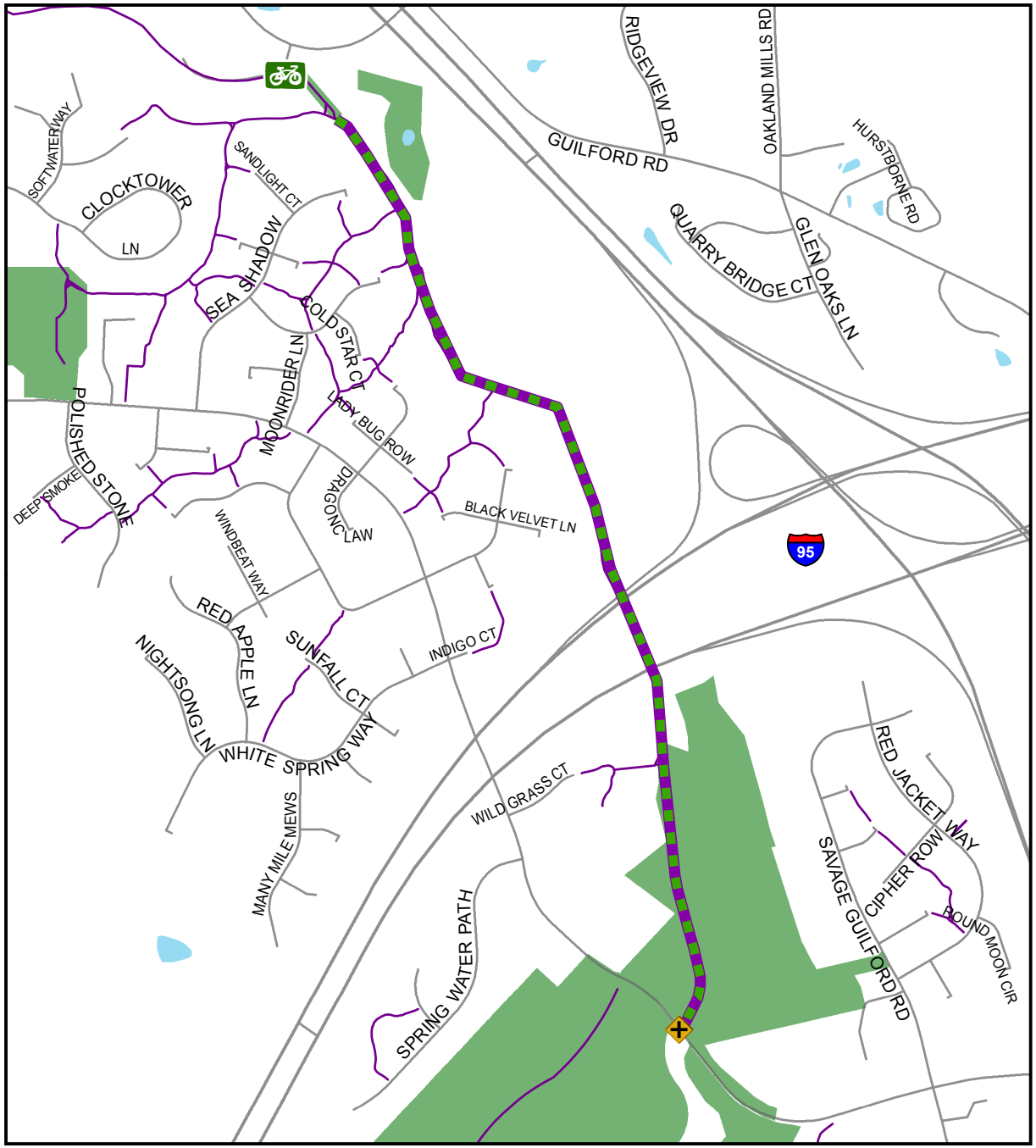
The project proposes to pave the existing unpaved portion of the Patuxent Branch Trail to improve conditions for travel and three season use. The project also calls for improvements at the trailhead at Guilford Road to more clearly indicate to users the direction of travel and passage across and through the parking area.

Primary Location/Streets:

Patuxent Branch Trail (unpaved portion between existing trailhead at Guilford Road to trailhead at Vollmerhausen Road)

Start: Trailhead at Guilford Road

End: Vollmerhausen Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 9

Estimated Cost: $906,368

Length (Miles): 1.8

Project Description:

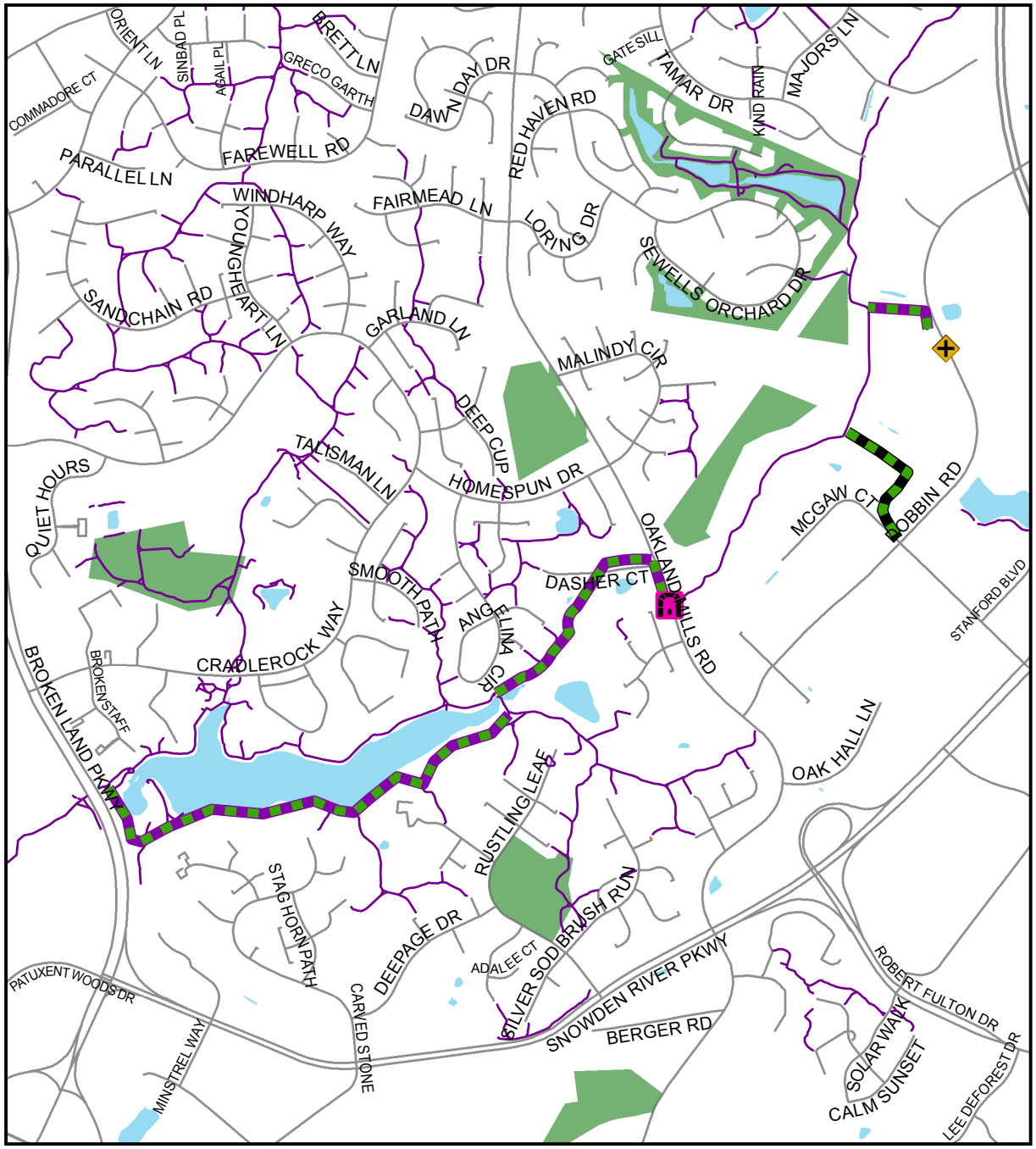
Upgrades to existing trails and new trail connections. Path crossings will provide high quality east/west passage. Project also calls for new trail connections to Dobbin Road and McGaw Road. The project includes the tunnel under Oakland Mills Road, but does not propose any improvements. The project proposes building a new shared use path to connect the existing pathway to connect with Dobbin Road at McGaw Court, and upgrade an existing shared use path to improve connections to Dobbin Road.

Primary Location/Streets:

CA Pathway from parking area at Lake Elkhorn, path on southside of lake then on to trail crossing over Dasher Court to Oakland Mills Road (Shared Use Path-Upgrade), Oakland Mill Road from Dasher Court to Tunnel (Share Use Path-Upgrade)

Start: Broken Land Parkway/Lake Elkhorn

End: Dobbin Road Commercial Area



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 10

Estimated Cost: $893,998

Length (Miles): 2.1

Project Description:

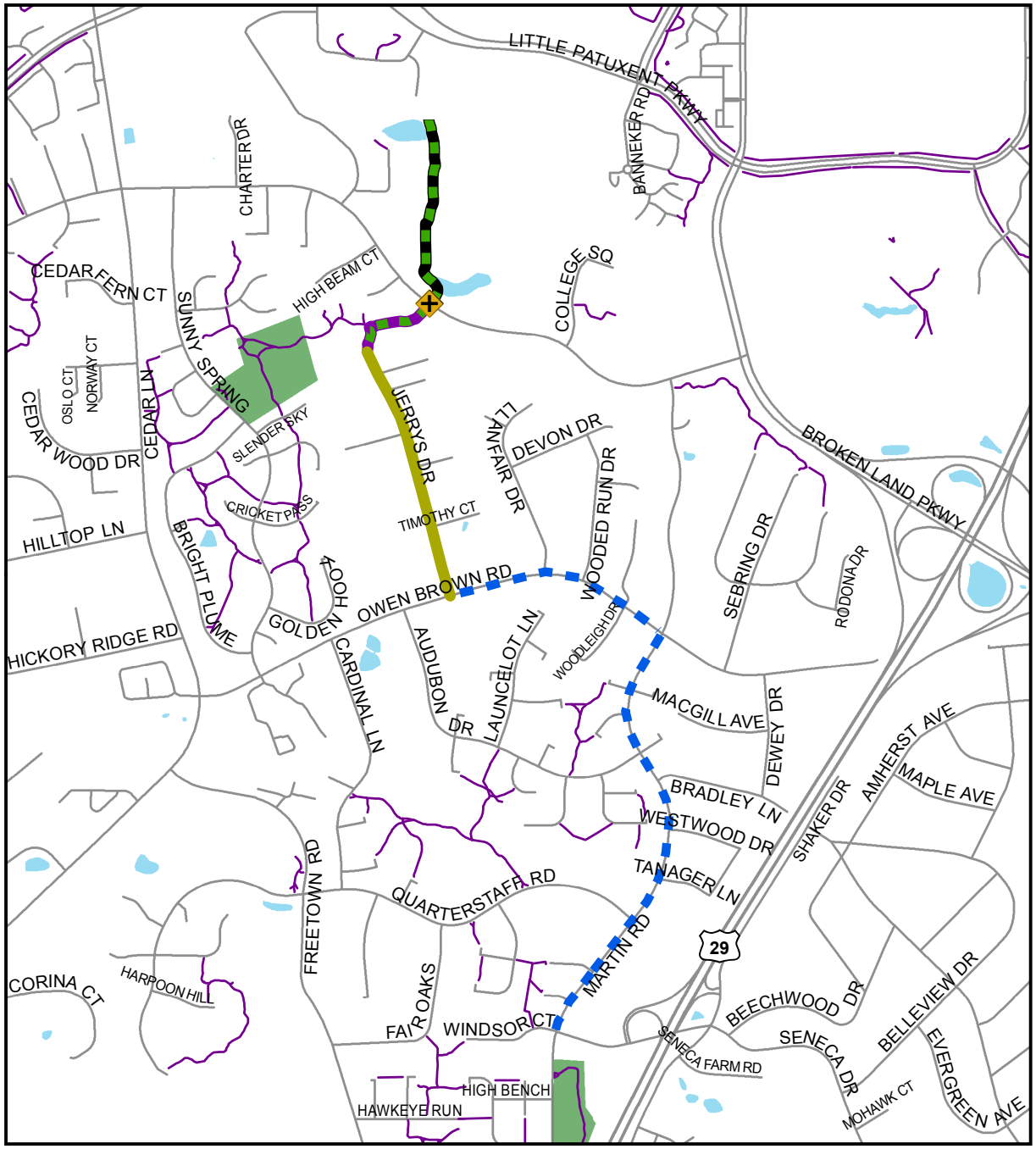
Series of bike lanes, sharrows, and shared use paths to connect Howard County Community College and provide north/south passage.

Primary Location/Streets:

Martin Road, Owen Brown Road, Jerrys Drive

Start: Hickory Ridge Road, Howard County Community College

End: Seneca Drive



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 11

Estimated Cost: **$319,244**

Length (Miles): **0.6**

Project Description:

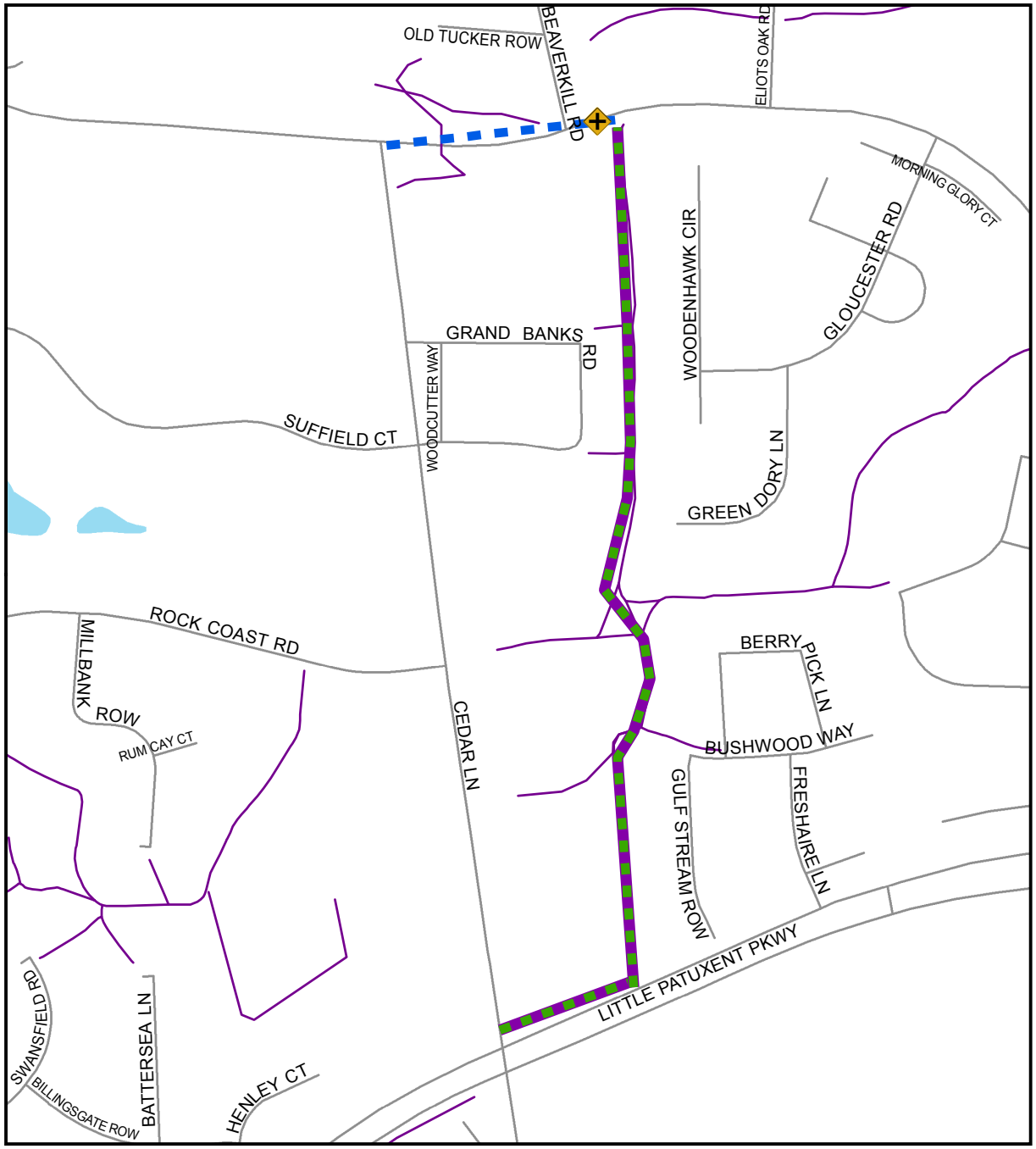
The project calls for improvements to a shared use trail and a bike lane that will allow a more direct and effective connection for riders to use the multiuse trail to connect the College, Hospital and Harpers Choice Village Center.

Primary Location/Streets:

Columbia Association Pathway and Harpers Farm Road

Start: Little Patuxent Parkway

End: Harpers Farm Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 12

Estimated Cost: $142,396

Length (Miles): 1.1

Project Description:

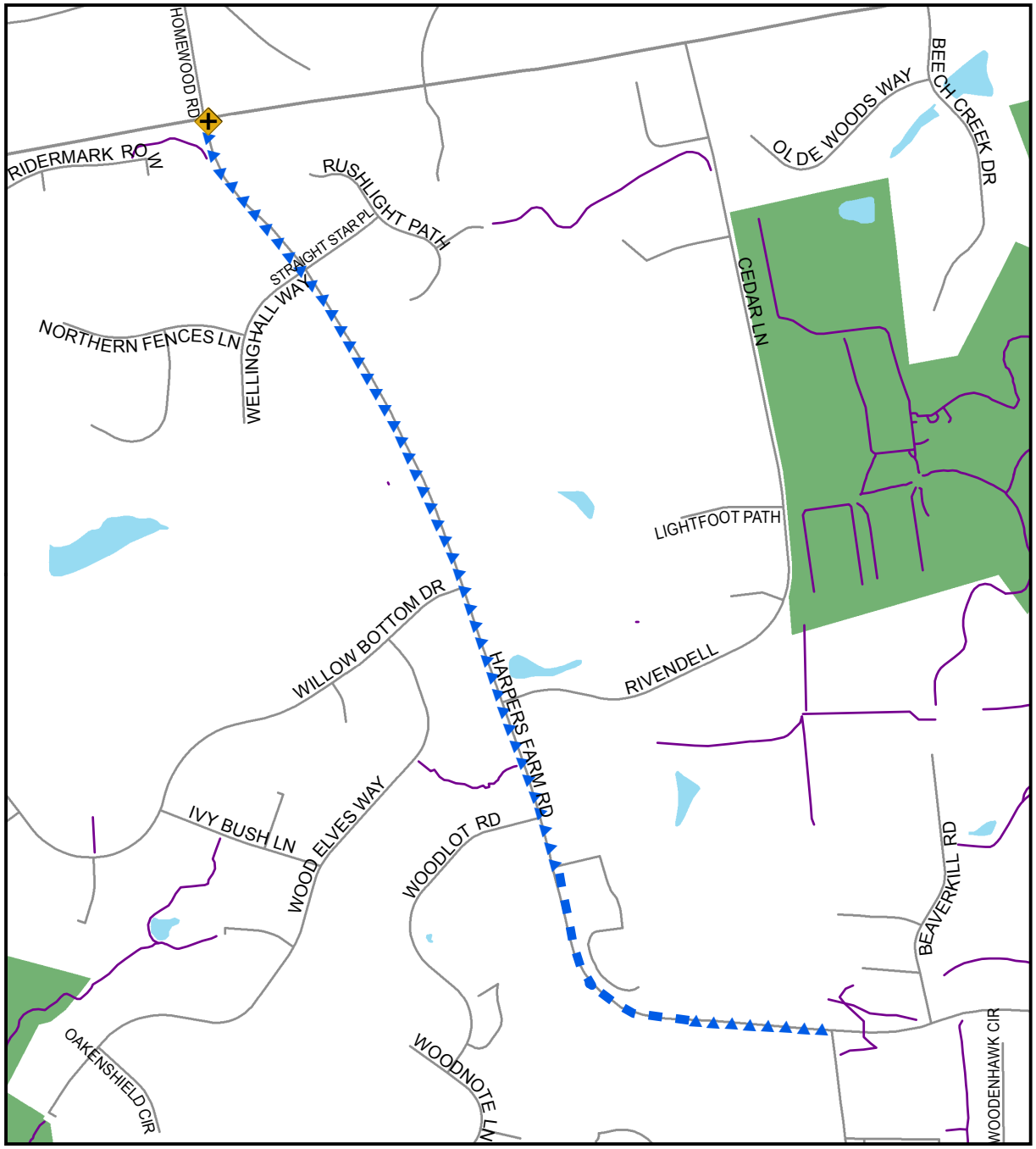
The project calls for a series of bike lanes and sharrows to provide north/south passage and allow cyclists to connect to project number 11.

Primary Location/Streets:

Harpers Farm Road

Start: Cedar Lane

End: MD 108



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 13

Estimated Cost: $796,393

Length (Miles): 3.9

Project Description:

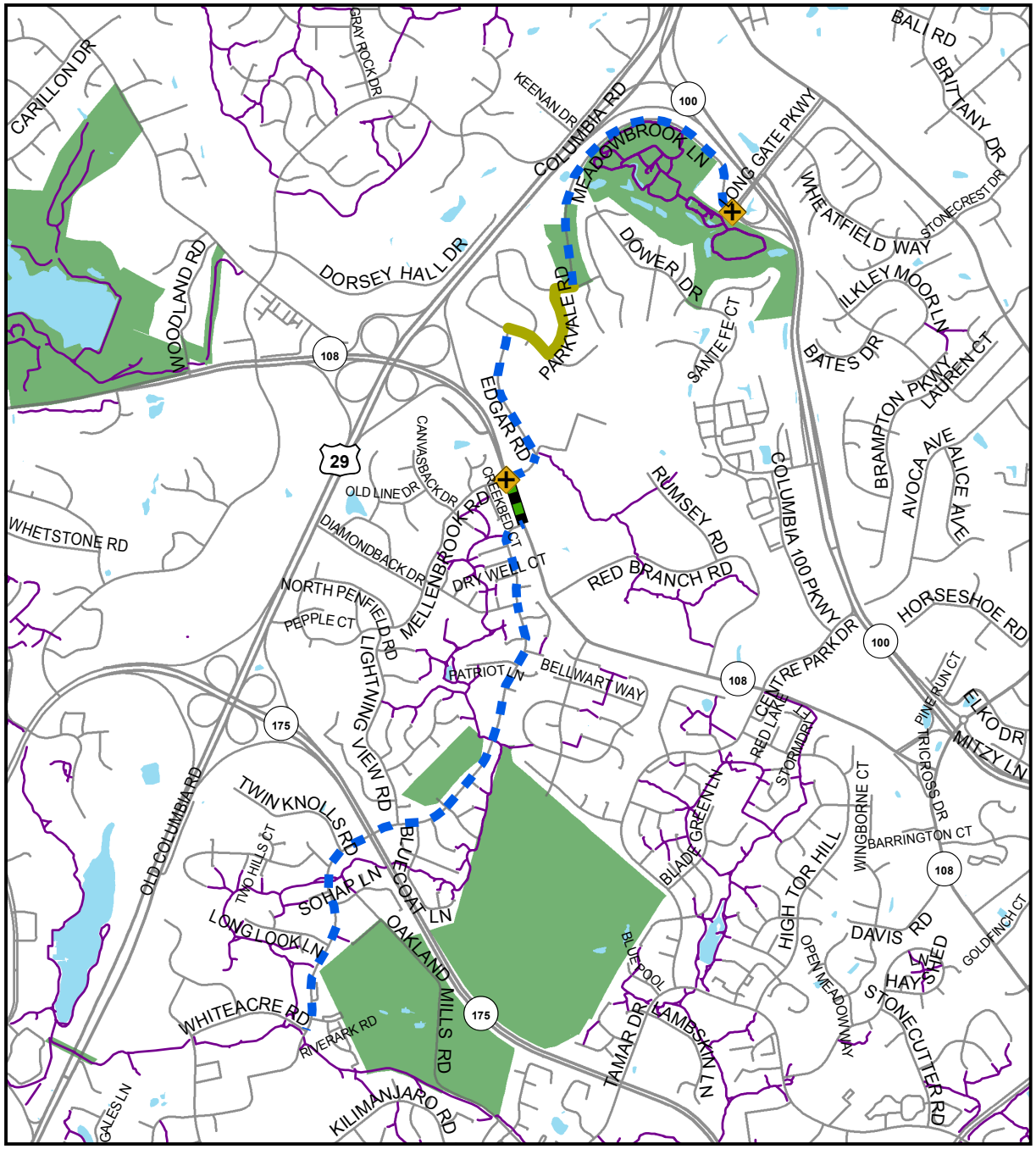
The project proposes a series of bike lanes and multiuse path to develop a high quality north/south connection between Downtown Columbia and Long Gate.

Primary Location/Streets:

Thunder Hill Road, Old Annapolis Road, Bendix Road, Edgar Road, Meadowbrook Road

Start: Multiuse Trail

End: Meadowbrook Road/MD 100



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 14

Estimated Cost: $406,881

Length (Miles): 1.6

Project Description:

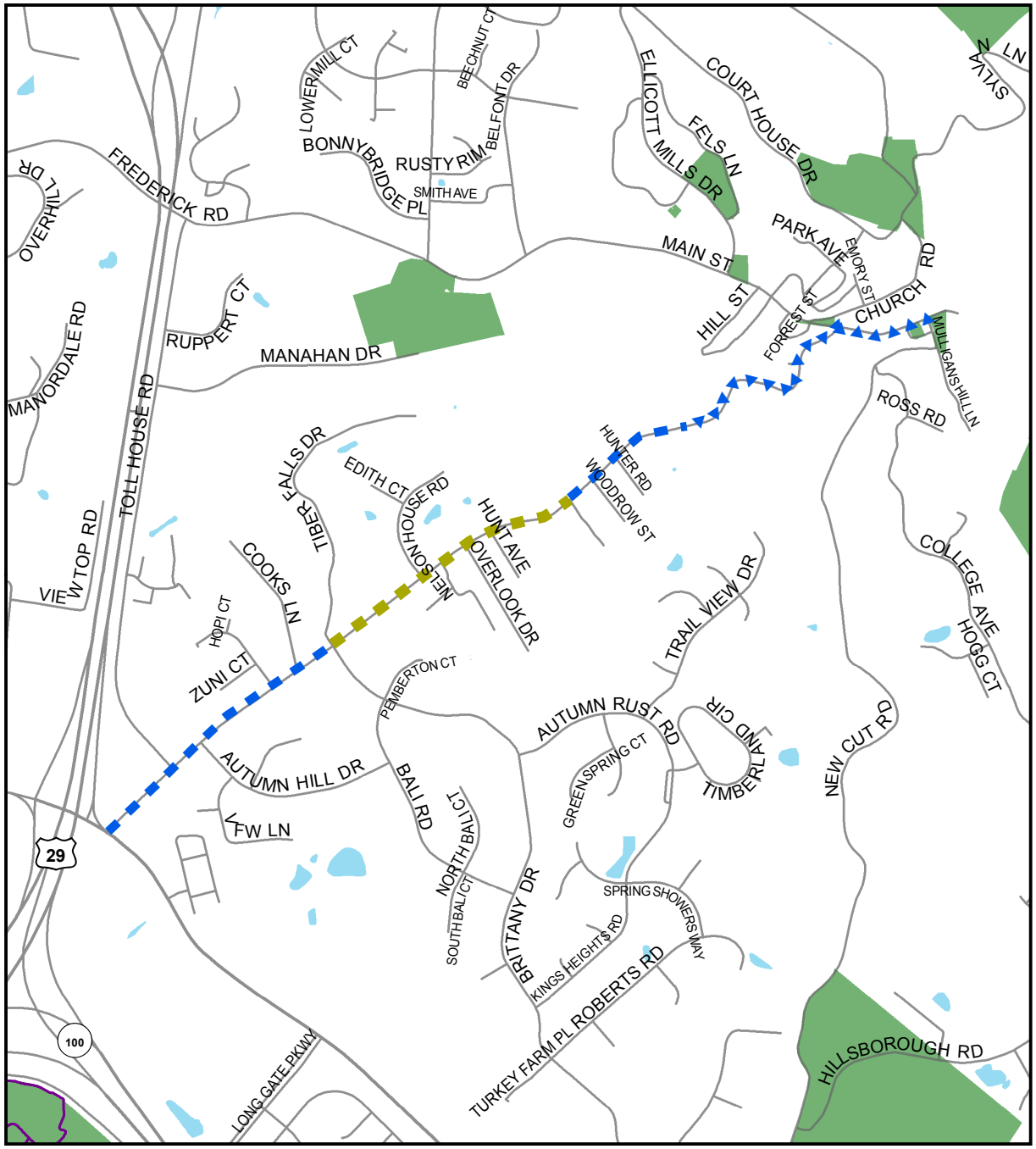
The project calls for a series of bike lanes, sharrows, and climbing lanes to establish a connection to historic Ellicott City. The project calls for improved connections to the trolley trail to allow continuous passage.

Primary Location/Streets:

Old Columbia Pike, Main Street

Start: MD 108

End: Historic Ellicott City



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 15

Estimated Cost: $851,448

Length (Miles): 1.2

Project Description:

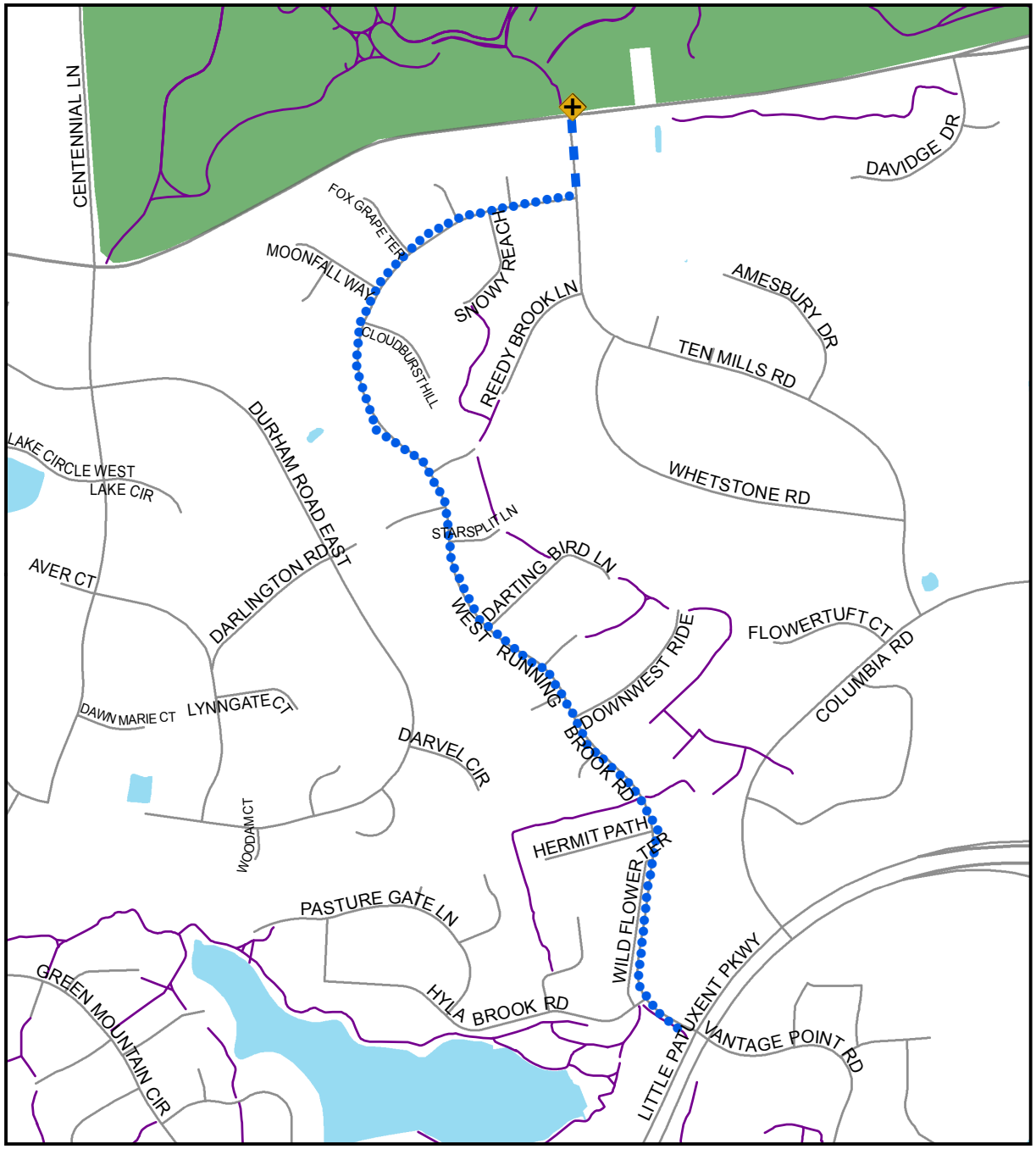
The project calls for the development of a neighborhood greenway, climbing lanes and an improvement to a road crossing to provide north/south passage from Downtown Columbia to Centennial Park.

Primary Location/Streets:

W. Running Brook Road

Start: Little Patuxent Parkway

End: MD 108



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 16

Estimated Cost: $968,266

Length (Miles): 1.8

Project Description:

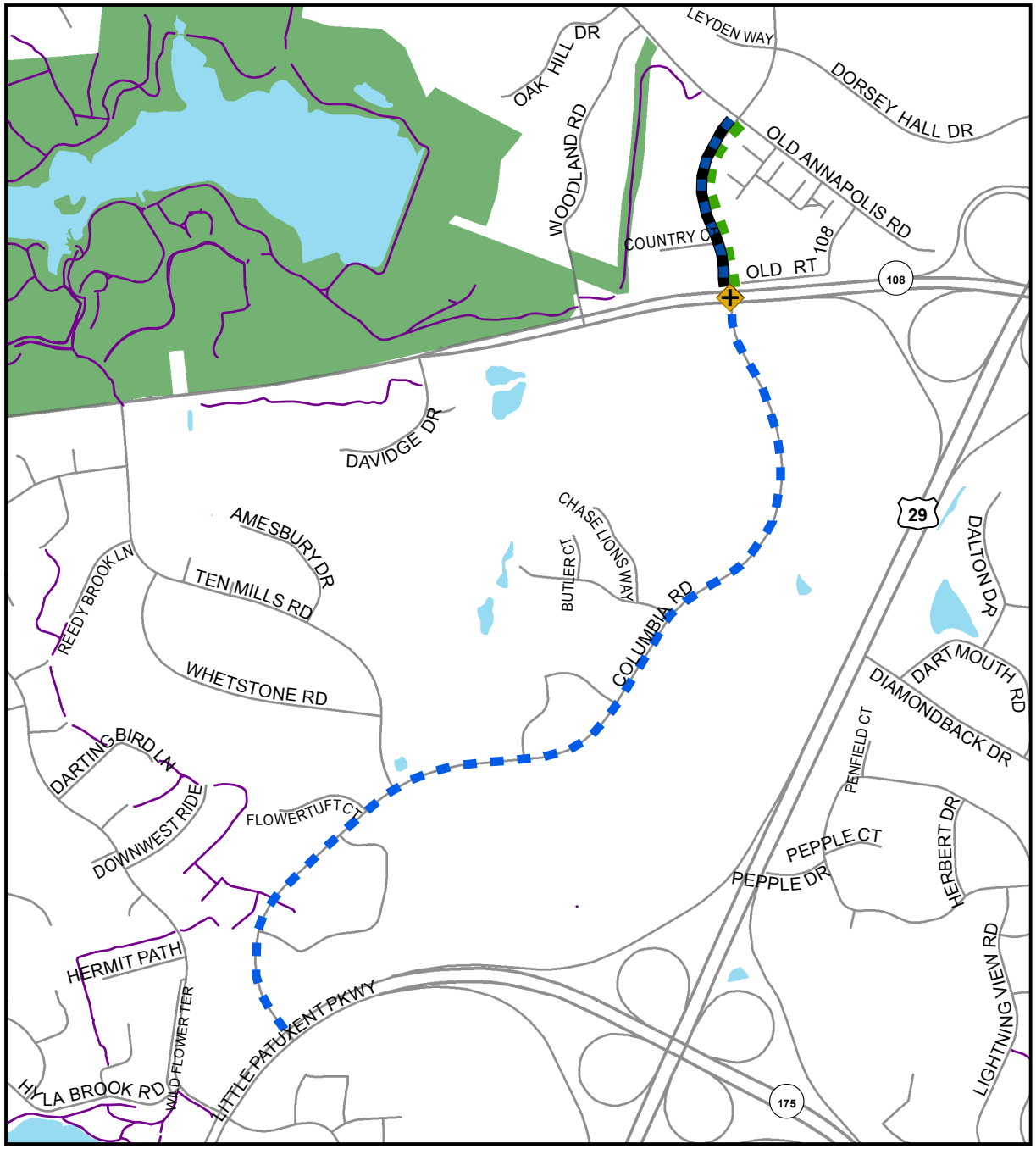
The project will develop a series of bike lanes, cycle tracks and intersection improvements to provide for north/southbound travel to connect to Downtown Columbia. Included in this project are improvements at 108 and Columbia Road.

Primary Location/Streets:

Columbia Road

Start: Little Patuxent Parkway

End: MD 108



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 17

Estimated Cost: $213,513

Length (Miles): 1.9

Project Description:

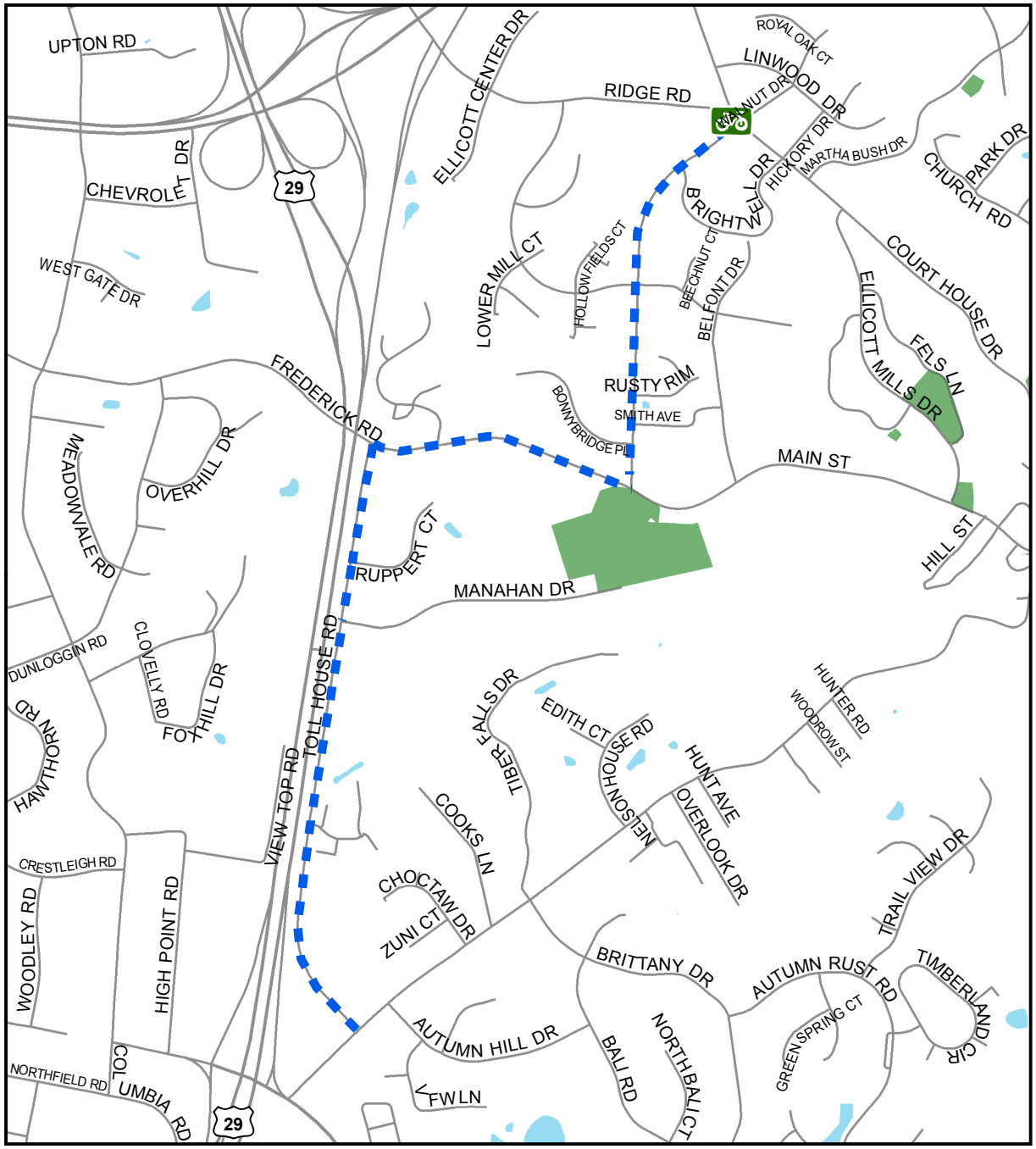
The project calls for a series of bike lanes to continue north/south connections and route from Long Gate area to connect to the Government Center and Rogers Avenue northbound to Route 40.

Primary Location/Streets:

Toll House Road, Rogers Avenue

Start: Old Columbia Pike

End: Government Center



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 18

Estimated Cost: $343,738

Length (Miles): 3.1

Project Description:

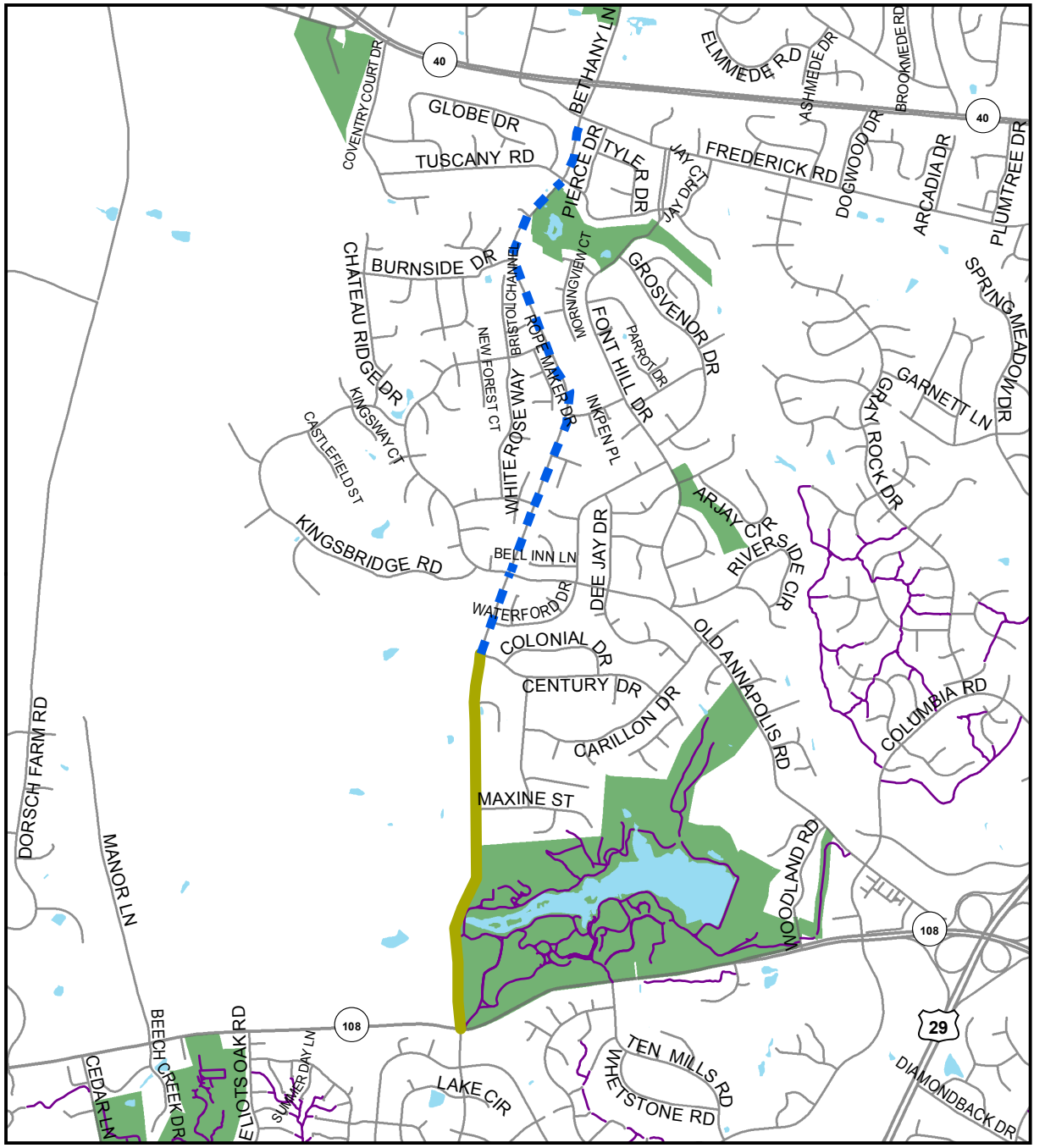
The project will develop a connection from MD 108 northbound to Frederick Road to provide a north/south connection to Centennial Park and Columbia using a series of bike lanes, sharrows and existing paved and striped shoulders.

Primary Location/Streets:

Centennial Lane (Bike Lanes, Sharrows, Paved and Striped Shoulders)

Start: MD 108

End: Frederick Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 19

Estimated Cost: $503,004

Length (Miles): 3.1

Project Description:

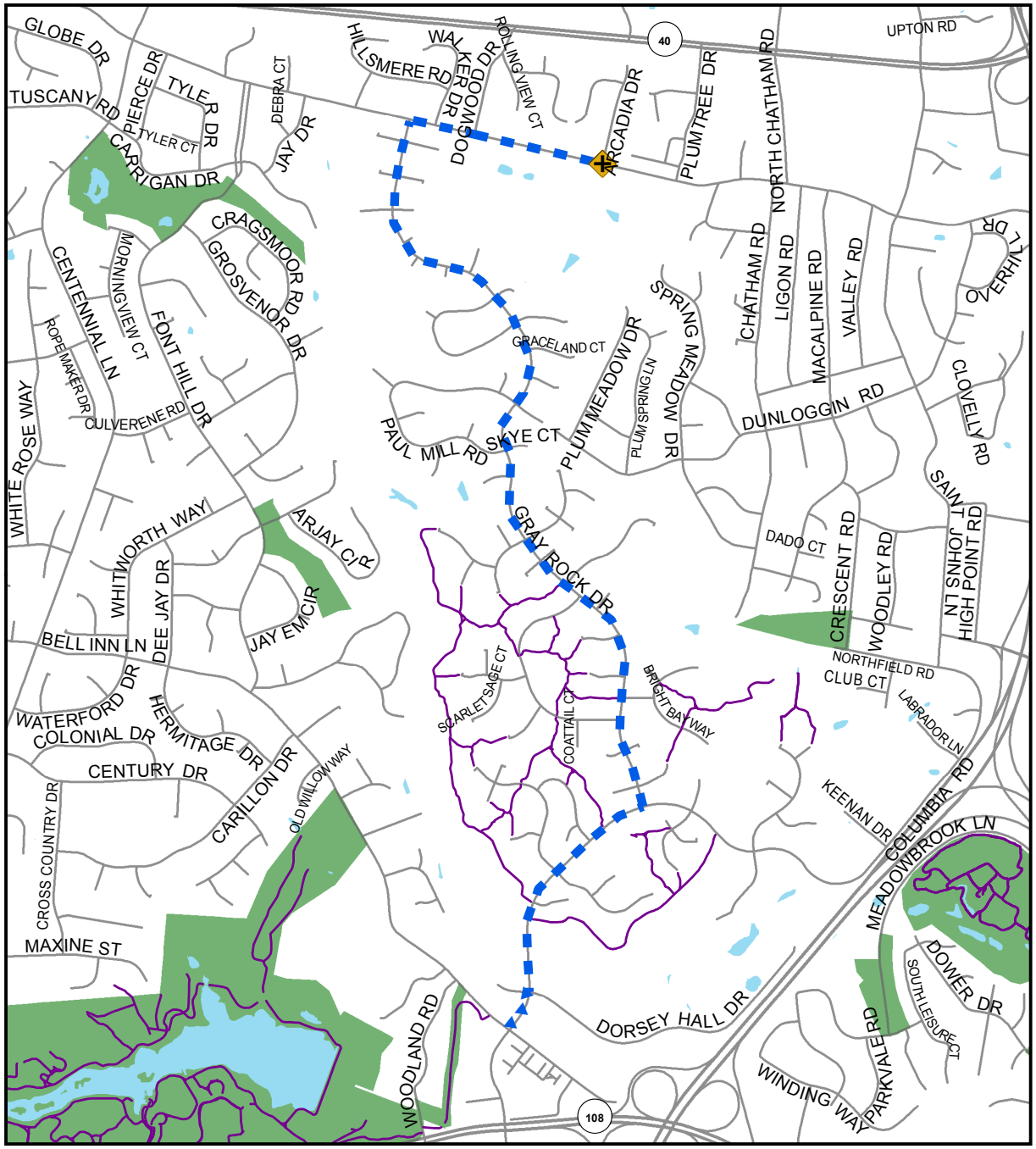
The project will develop a connection from Old Annapolis Road northbound to the Frederick Road, Miller Library. The route proposes a series of bike lanes and climbing lanes.

Primary Location/Streets:

Gray Rock Drive, Columbia Road, Frederick Road

Start: Old Annapolis Road

End: Frederick Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 20

Estimated Cost: $1,031,561

Length (Miles): 1.9

Project Description:

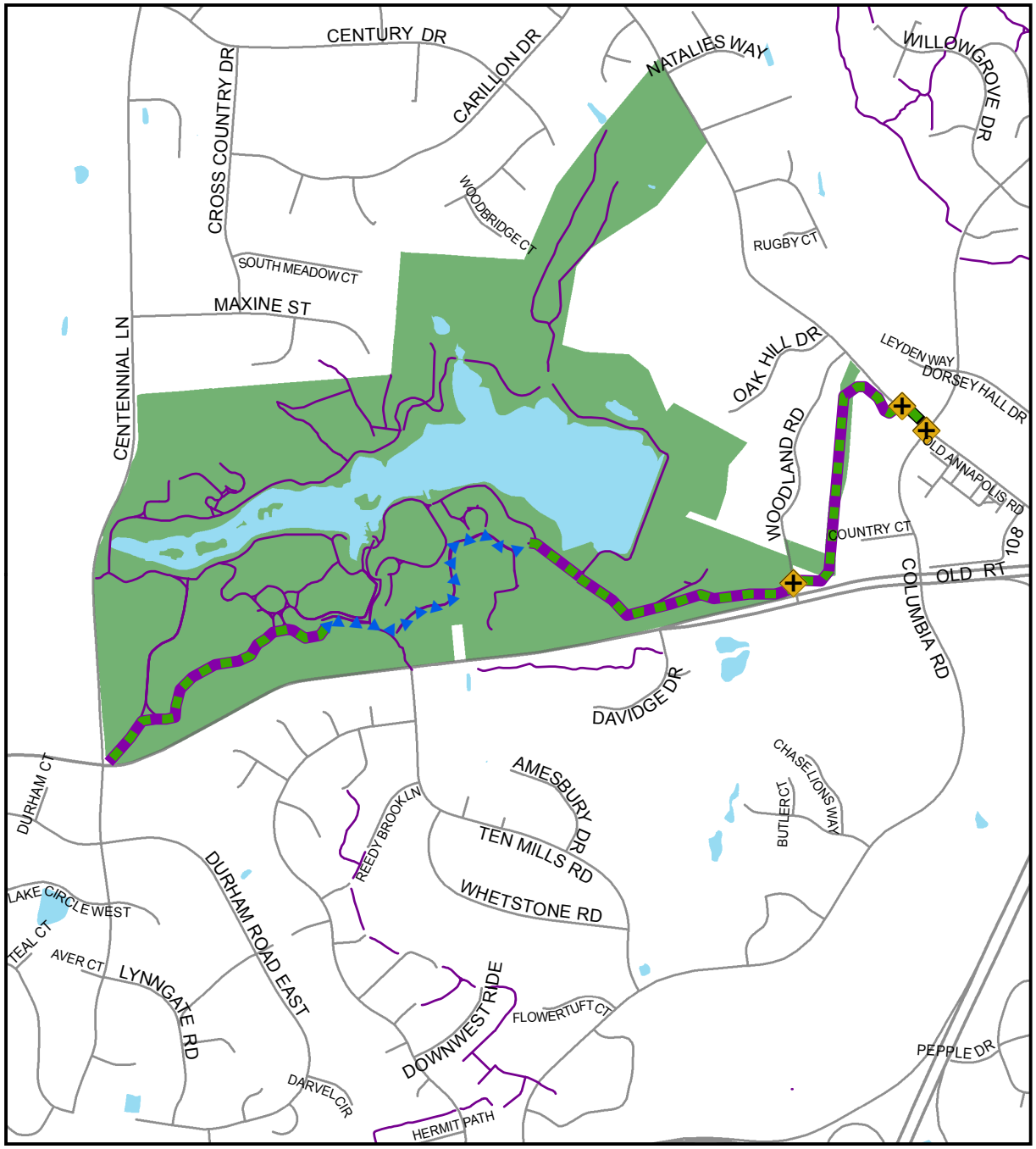
The project will develop a series of pathway improvements, sharrows and intersection improvements to provide passage using Centennial Park to connect Centennial Lane, Columbia Road and Dorsey's Search Area, allowing passage parallel to MD 108.

Primary Location/Streets:

Centennial Park, Dorsey's Search Area

Start: Centennial Lane

End: Wood Yard Road, Old Annapolis Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 21

Estimated Cost: $319,356

Length (Miles): 0.5

Project Description:

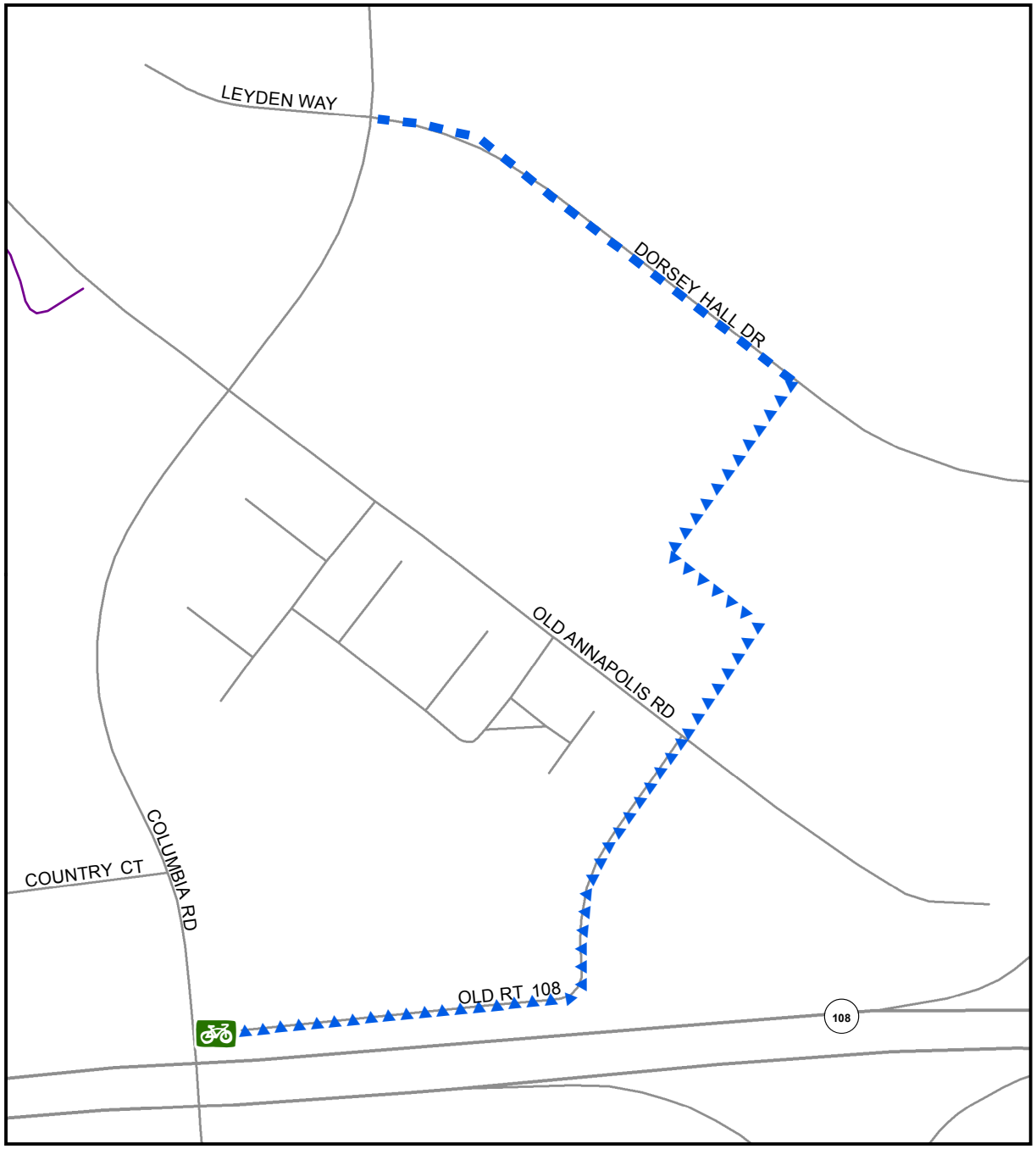
The project calls for intersection and linkages at MD 108/Old Columbia Road and Columbia Road/Old Annapolis Road. These improvements will provide connections to projects 19 and 20. The project will also develop improvements on Old Columbia Road to connect to the Dorsey's Search Village Center.

Primary Location/Streets:

Old Columbia Road

Start: Old Annapolis Road

End: Old Annapolis Road/Dorsey Hall Road



Linear Recommendations
- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities
- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations
- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 22

Estimated Cost: $43,500

Length (Miles): 1.1

Project Description:

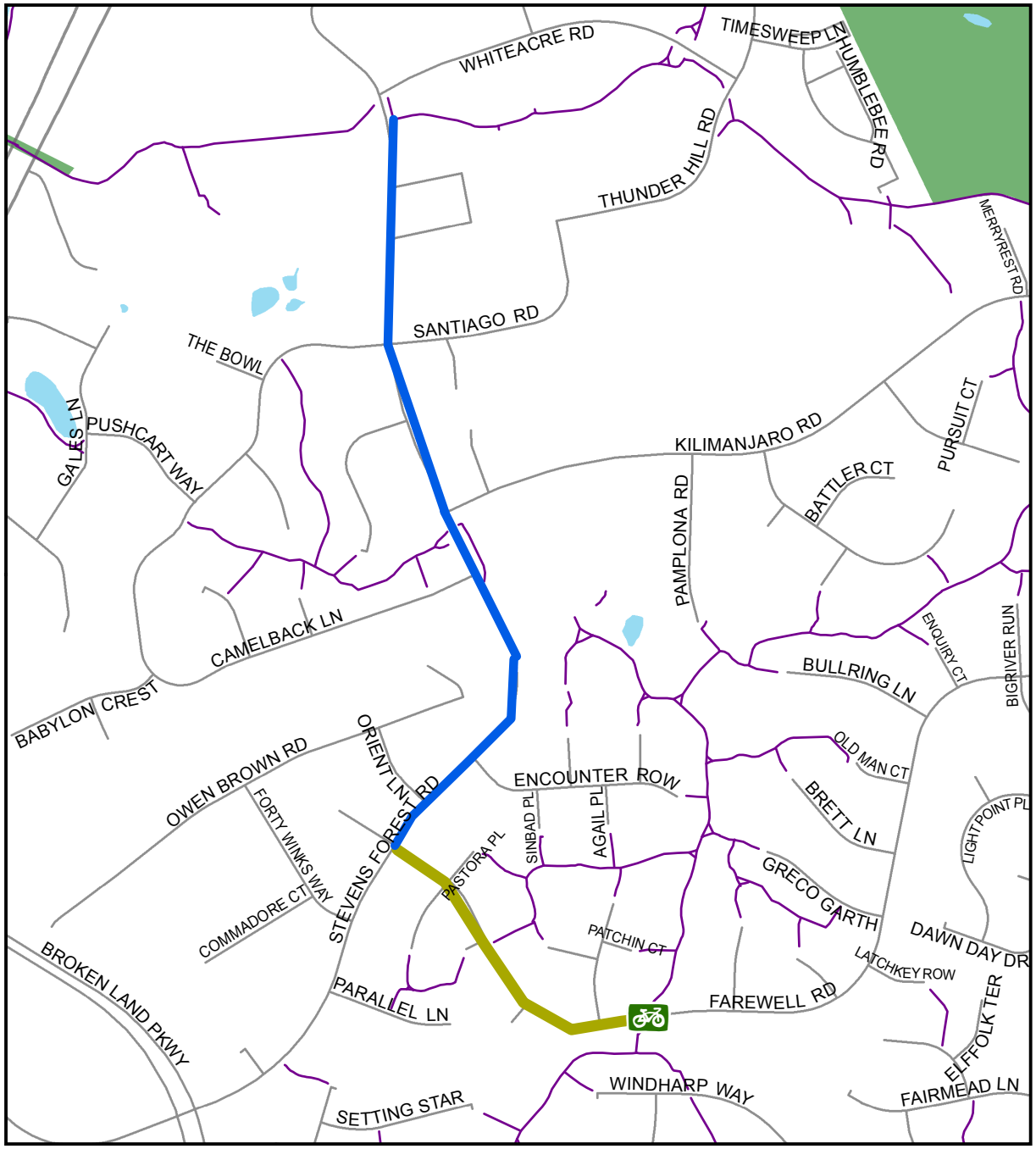
Leverage completed bike lanes on Stevens Forest Road with additional signage.

Primary Location/Streets:

Stevens Forest Road

Start: Whiteacre Road

End: Farewell Road/Trail



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 23

Estimated Cost: $489,916

Length (Miles): 1.1

Project Description:

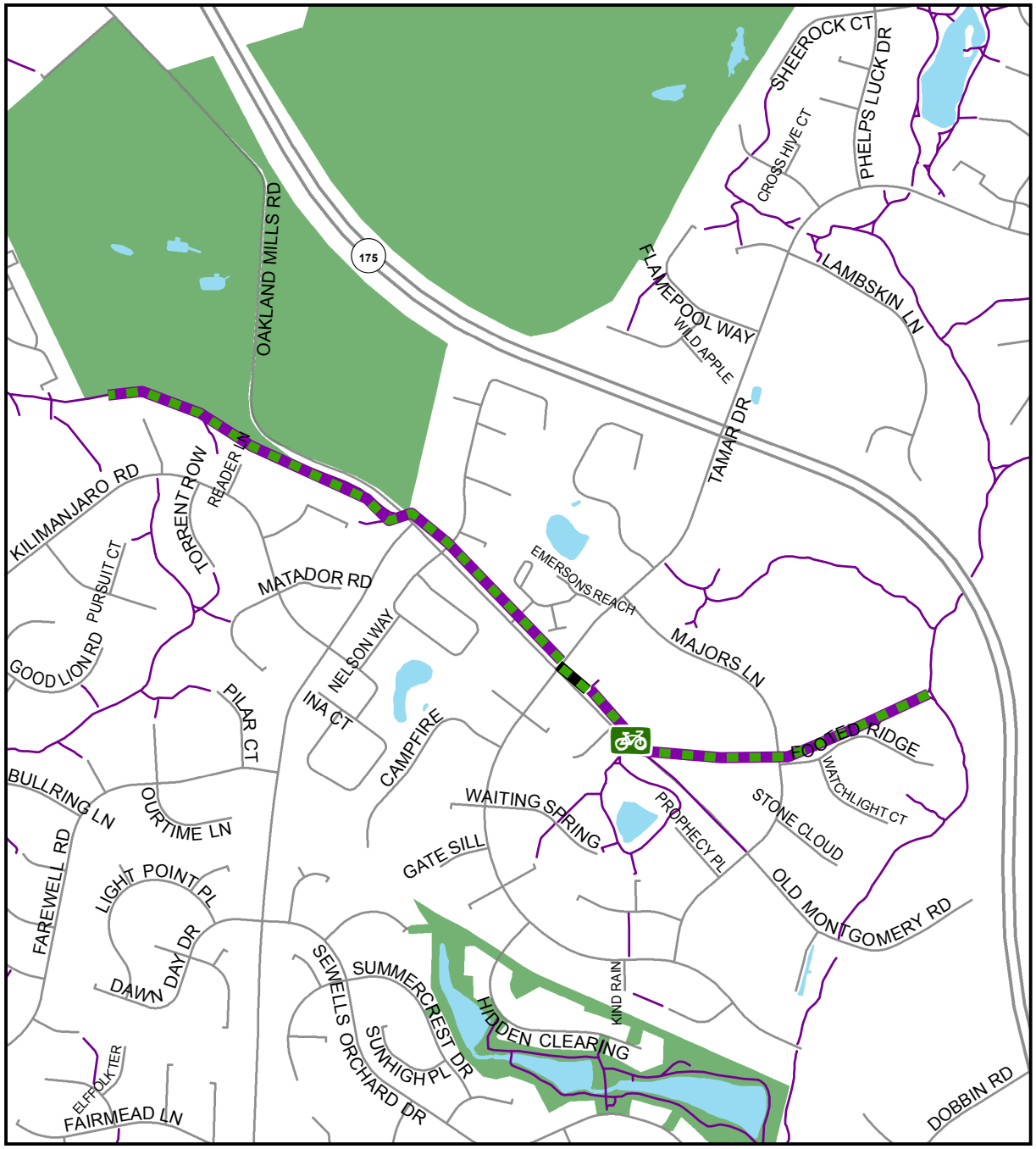
Improve existing shared use path and develop bike link to provide east/west travel.

Primary Location/Streets:

Existing Pathways, Montgomery Road

Start: Blandair Park

End: Tamar Drive



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 24

Estimated Cost: $201,815

Length (Miles): 0.7

Project Description:

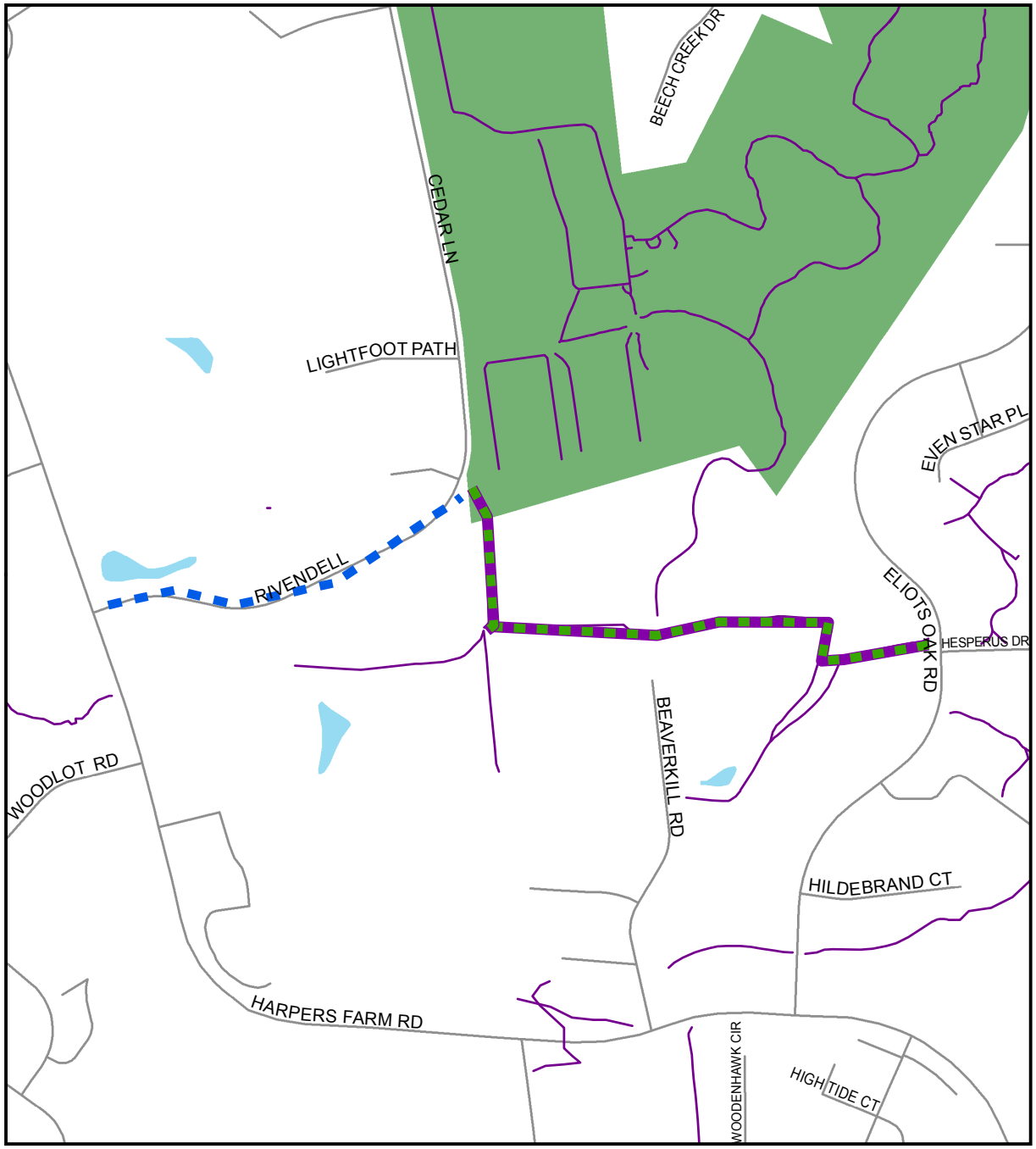
Upgrade existing paths and develop bike lanes to provide east/west route to connect to proposed Twin Rivers Trail to Downtown Columbia.

Primary Location/Streets:

Rivendell Lane, Cedar Lane Park, Longfellow Elementary School

Start: Harpers Farm Road

End: Existing Trails



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 25

Estimated Cost: $875,320

Length (Miles): 1.3

Project Description:

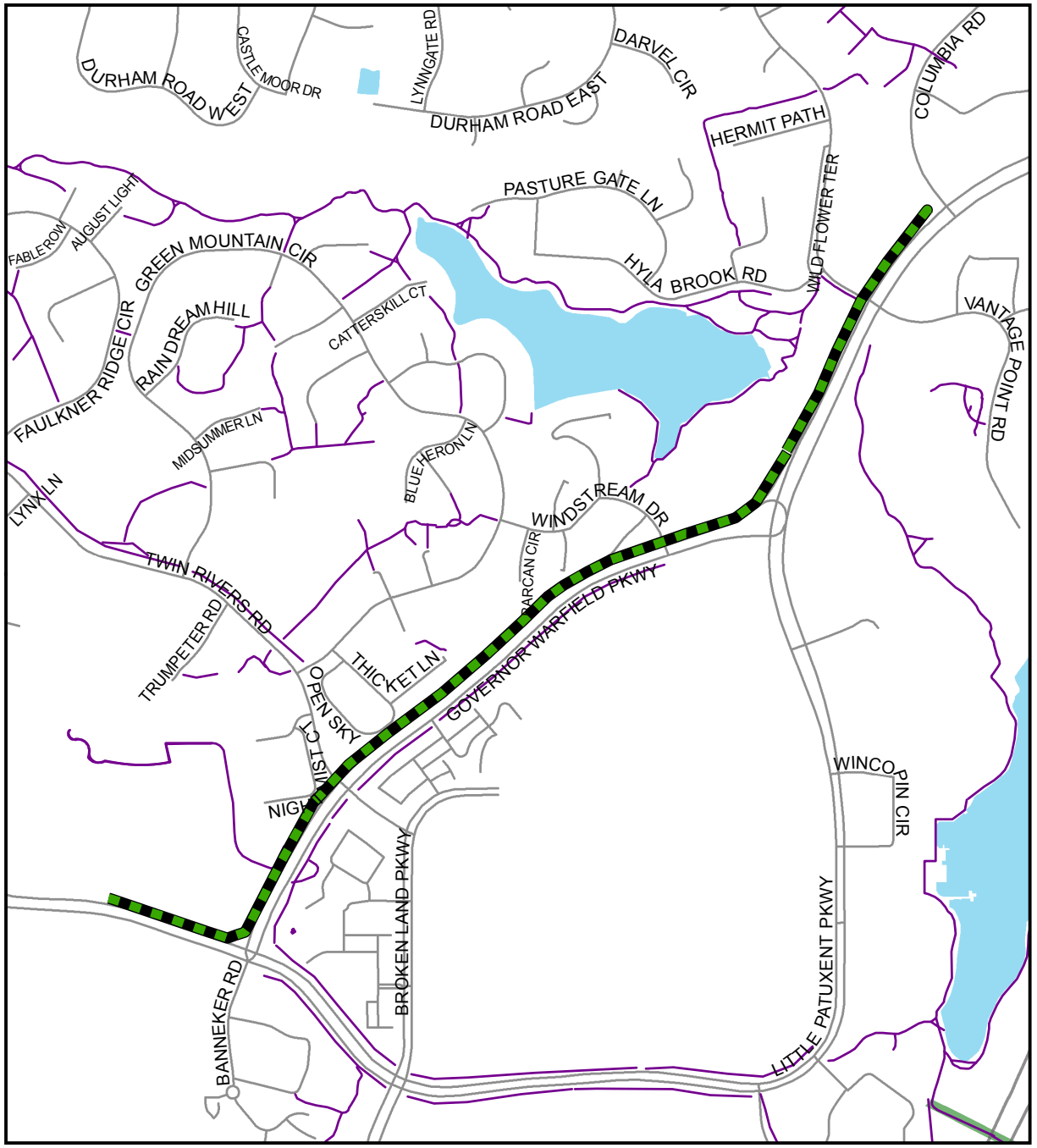
Description: Build new shared use pathway along Gov. Warfield Pkwy and continue along the west side of Little Patuxent Pkwy to Columbia Rd, enhancing existing sidewalks where they exist along this route. Connects to Hospital to Blandair Park pathway and Columbia Rd improvements (project #16)

Primary Location/Streets:

Governor Warfield Parkway-from interchange at Governor Warfield and LPP on the Northside of the mall to intersection of LPP at Governor Warfield Parkway (Shared use path), LPP-west side of roadway to intersection at Columbia Road (shared use path upgrade)

Start: Columbia Road

End: Little Patuxent Parkway /Governor Warfield



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 26

Estimated Cost: $710,181

Length (Miles): 3.5

Project Description:

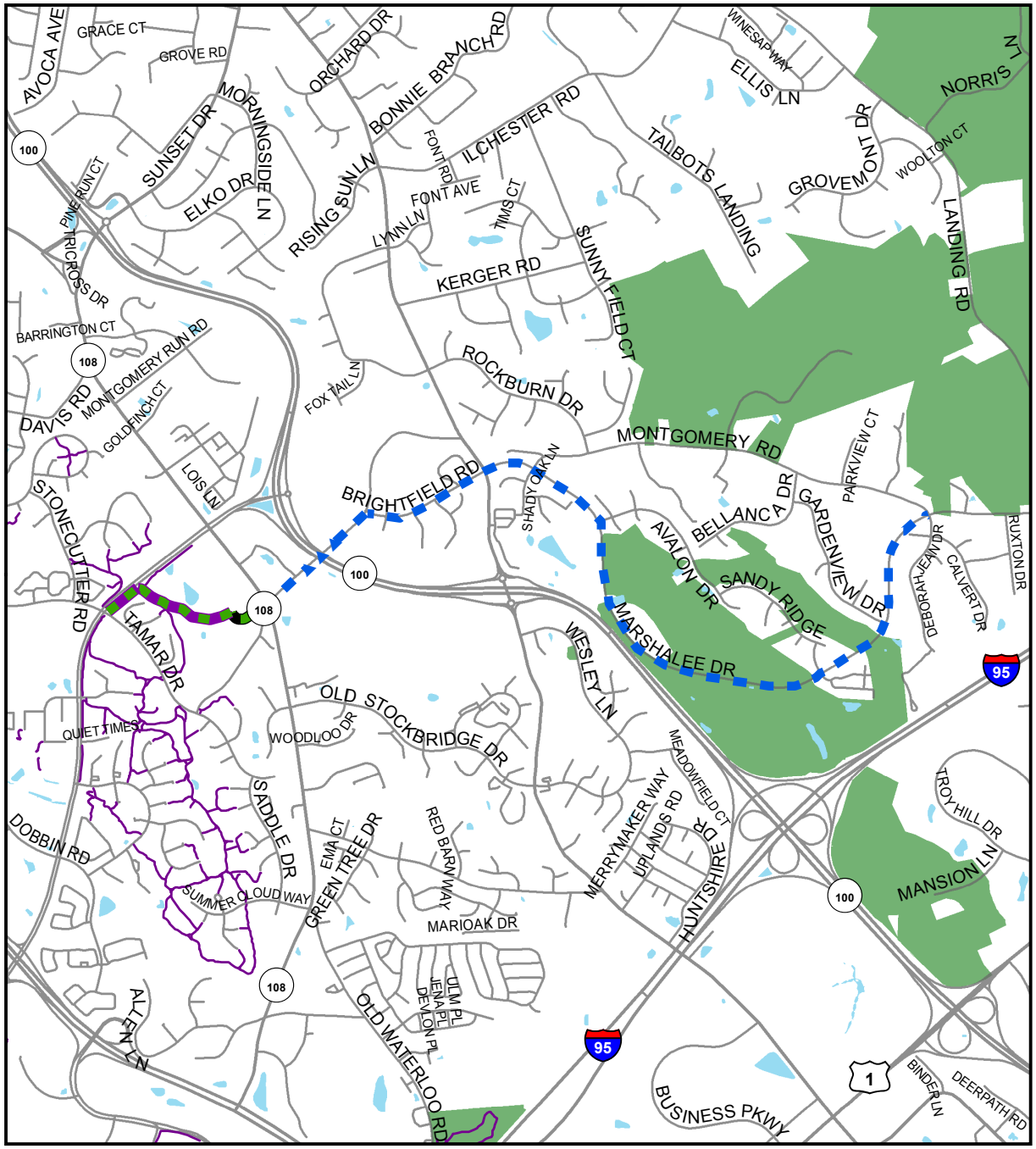
Develops a series of bike lanes, upgrades to existing shared use paths, add new shared use path to provide for east/west passage from Snowden River Parkway and Tamar Drive.

Primary Location/Streets:

Brightfield Road, Old Montgomery Road, Montgomery Road, Marshalee Drive

Start: Snowden River Parkway

End: Montgomery Road/Marshalee



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 27

Estimated Cost: $810,711

Length (Miles): 4.3

Project Description:

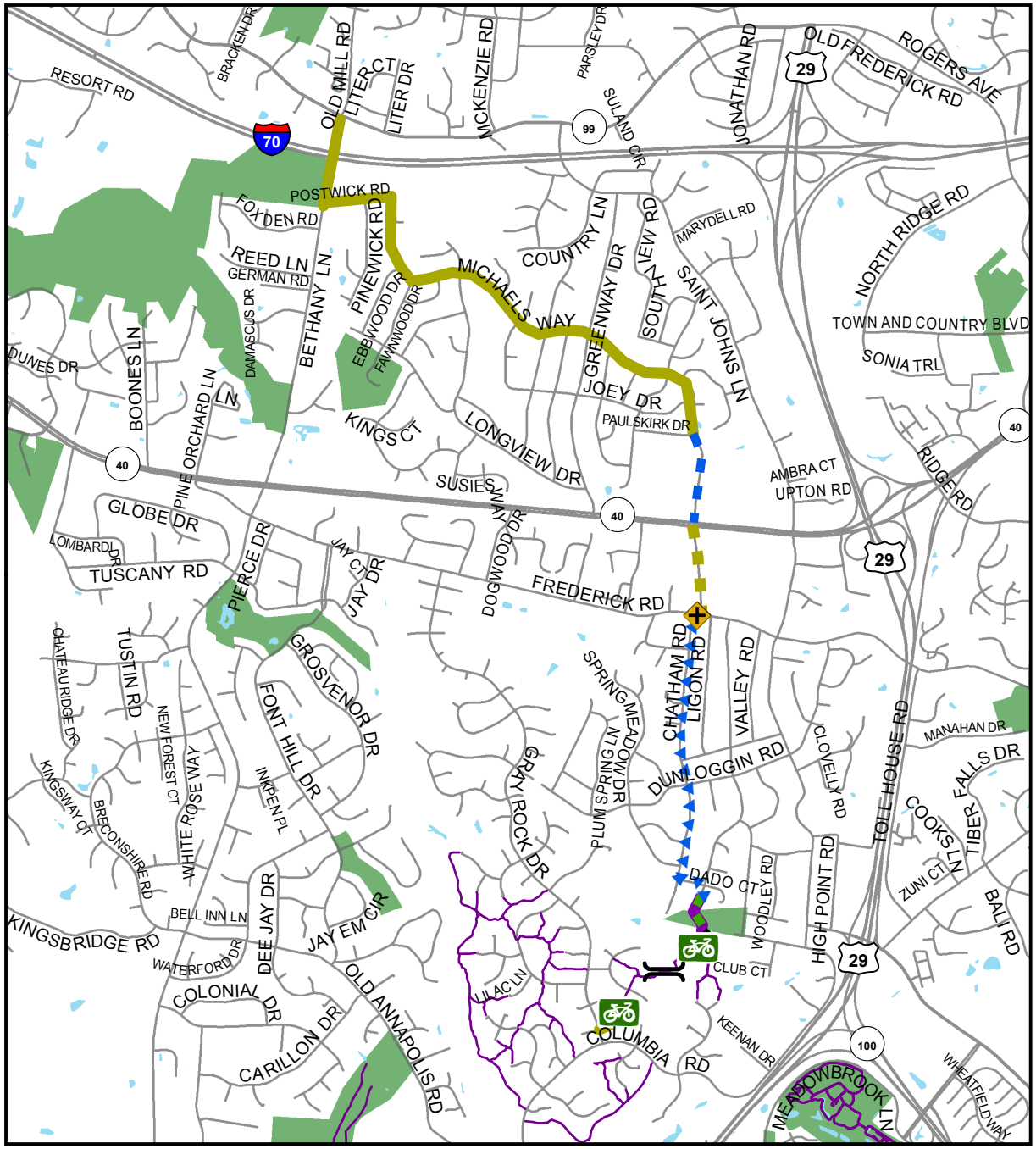
Develop a series of bike lanes and sharrows for a north/south connection, spot improvements, address existing traffic calming to better accommodate cycling

Primary Location/Streets:

Chatham Road, North Chatham Road

Start: Columbia Road

End: MD 99



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 28

Estimated Cost: $438,917

Length (Miles): 3.6

Project Description:

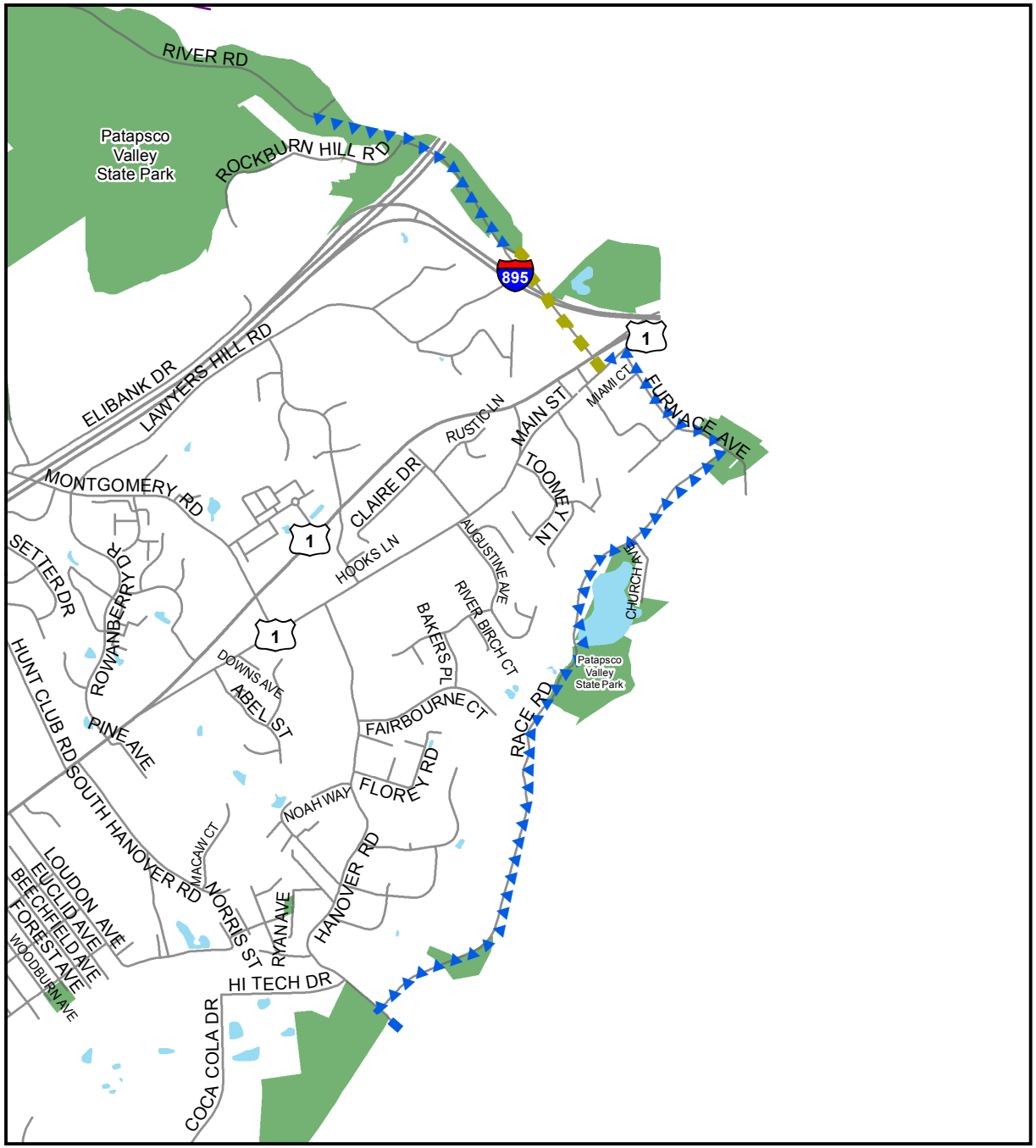
Develop a series of bike lanes, avenue and striped shoulders, and sharrows to provide for passage in this popular cycling area. Provides access to the BWI trail and Grist Mill Trail.

Primary Location/Streets:

River Road, Furnace Road, Levering Avenue, Race Road

Start: Gun Road

End: Hanover Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 36

Estimated Cost: $1,973,671

Length (Miles): 3.3

Project Description:

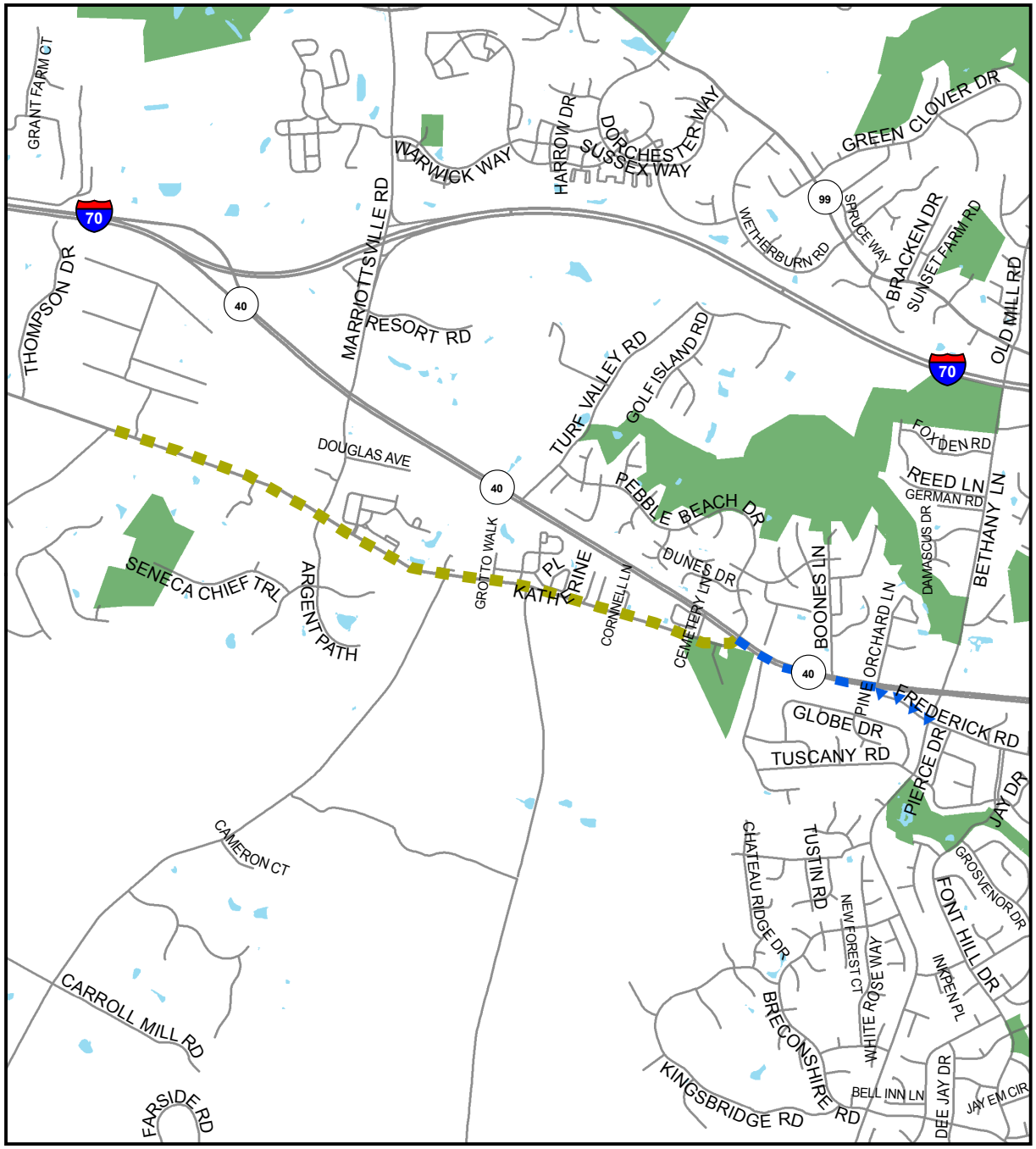
Develop bike lanes and sharrows to provide for east/west passage, the balance of Fredrick road to the west would bring shoulder improvements and reconfiguration striping.

Primary Location/Streets:

Frederick Road, Route 40

Start: Frederick Road/Bethany Lane

End: Triadelphia Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 37

Estimated Cost: $822,037

Length (Miles): 4

Project Description:

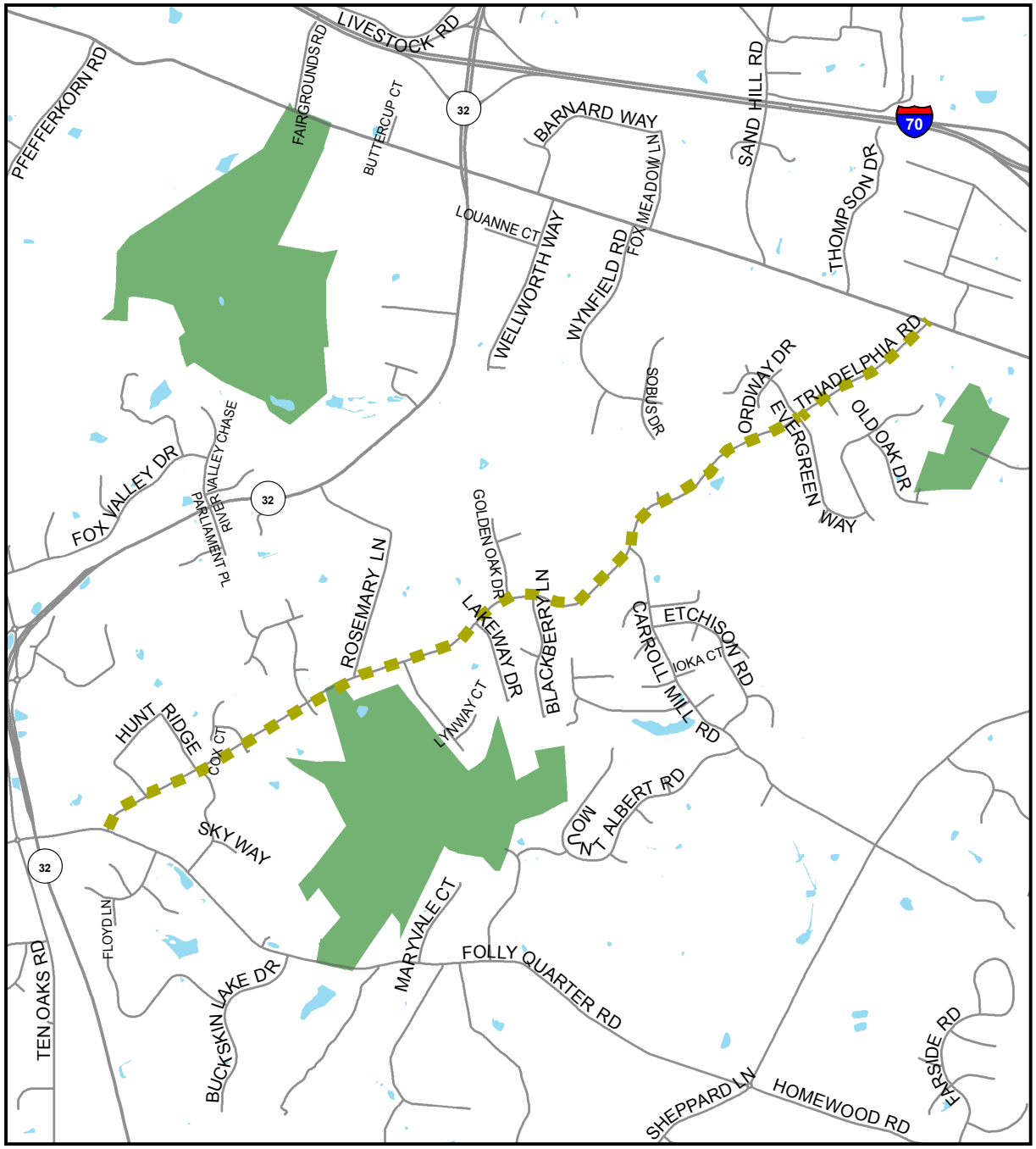
Develop shared roadways and safety treatment along this road popular with recreational cyclists.

Primary Location/Streets:

Triadelphia Road

Start: Frederick Road

End: Folly Quarter



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 40

Estimated Cost: $20,424

Length (Miles): 0.8

Project Description:

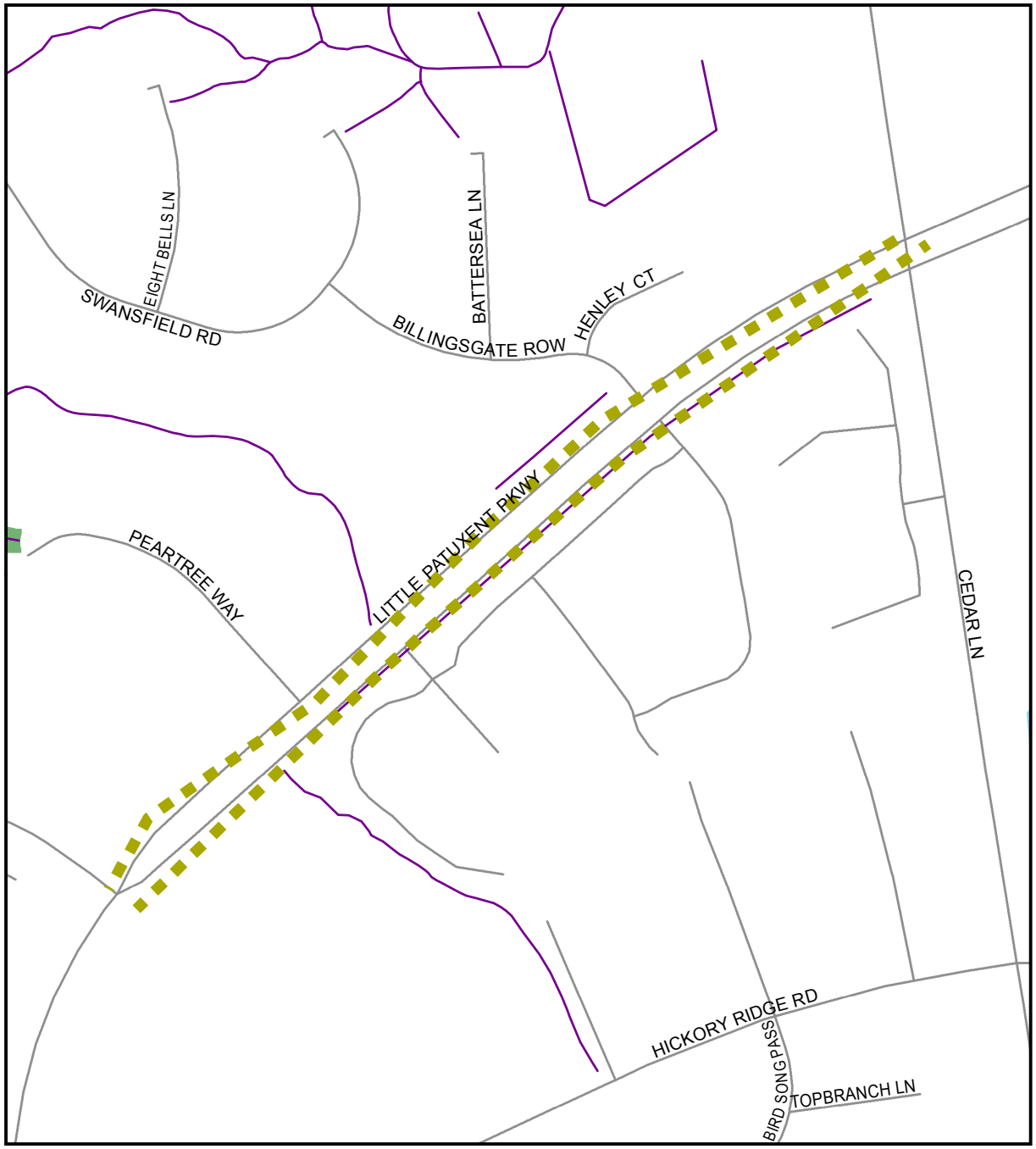
Develop an advisory bike lane to provide passage for riders to connect to multiuse trail that will terminate at the Howard County General Hospital.

Primary Location/Streets:

Little Patuxent Loop at Clary's Forest

Start: Little Patuxent Parkway/Cedar Lane

End: Little Patuxent Parkway/Clary's Forest Loop



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 41

Estimated Cost: $671,525

Length (Miles): 3.3

Project Description:

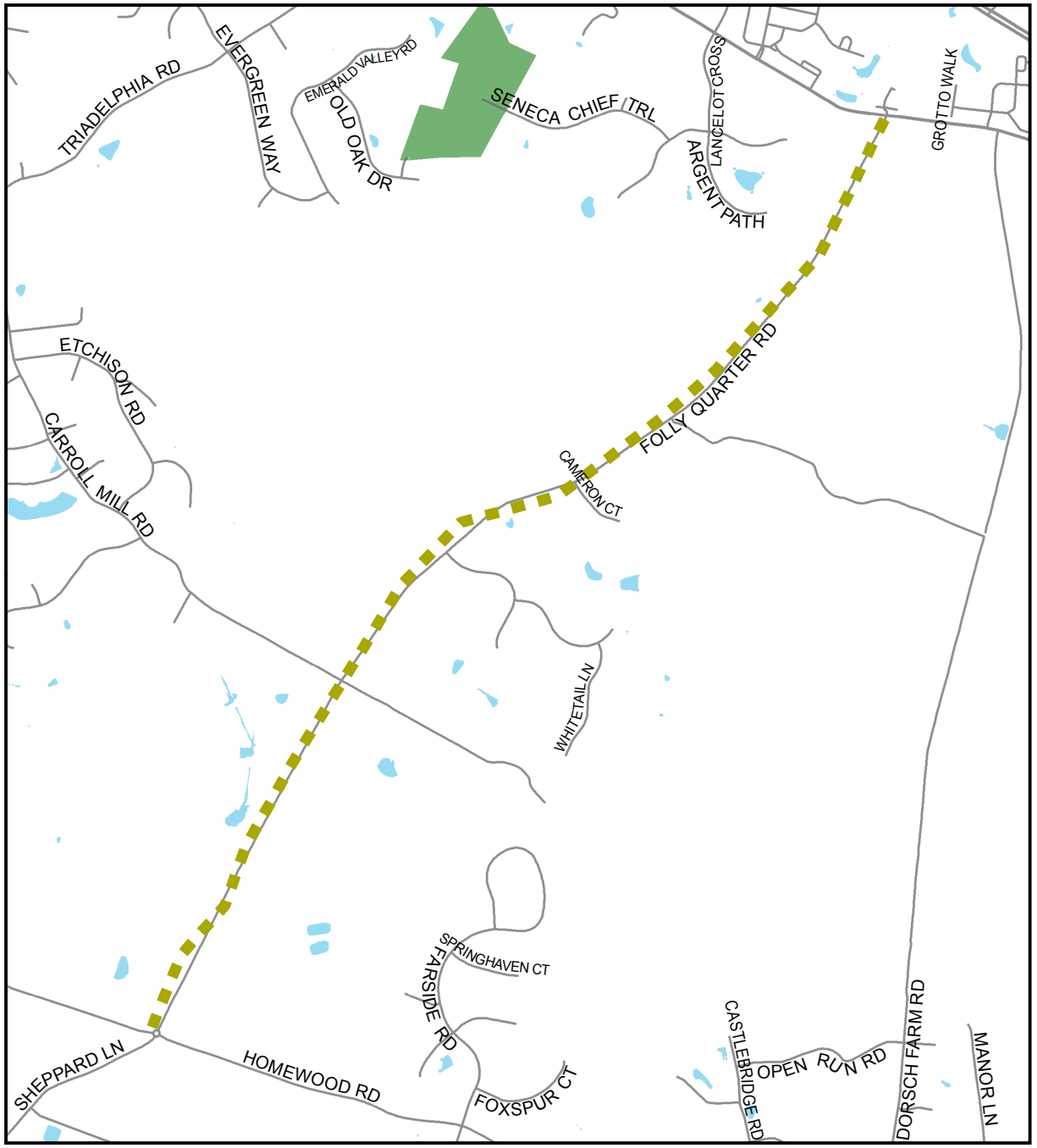
The project proposes signed and spot widening that will improve shoulders in some areas. The project will develop a higher quality north/south connection already popular with recreational cyclists.

Primary Location/Streets:

Folly Quarter Road

Start: Homewood Road

End: Frederick Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 42

Estimated Cost: $167,500

Length (Miles): 0.5

Project Description:

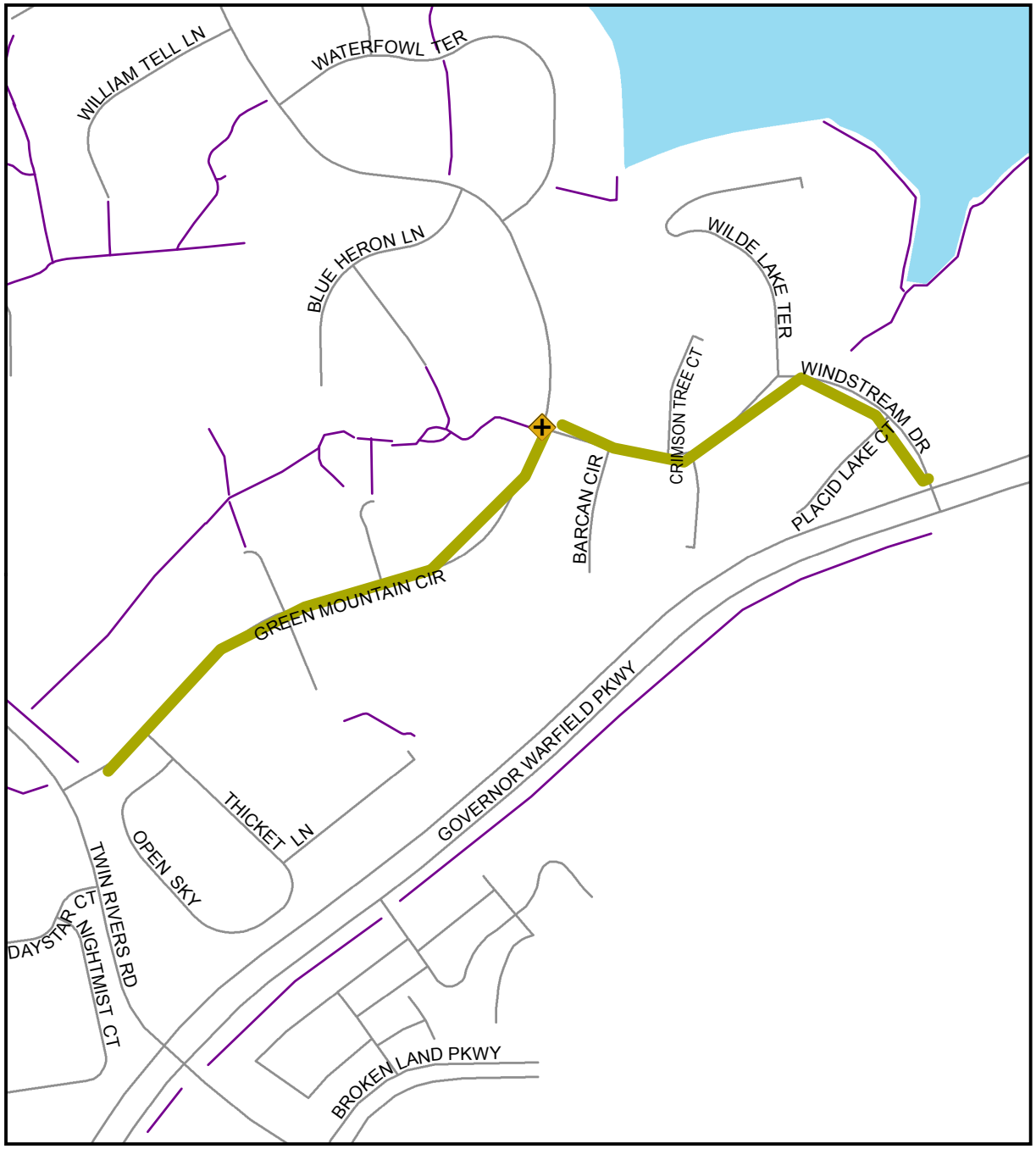
Improve signal at Green Mountain and Windstream Drive to improve connection and access to alternative route out of the mall entrance at Windstream Drive, would also require adjusting signal at Windstream Drive and Governor Warfield Parkway.

Primary Location/Streets:

Windstream Drive, Green Mountain Circle

Start: Governor Warfield Parkway

End: Twins Rivers Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 43

Estimated Cost: $452,304

Length (Miles): 0.6

Project Description:

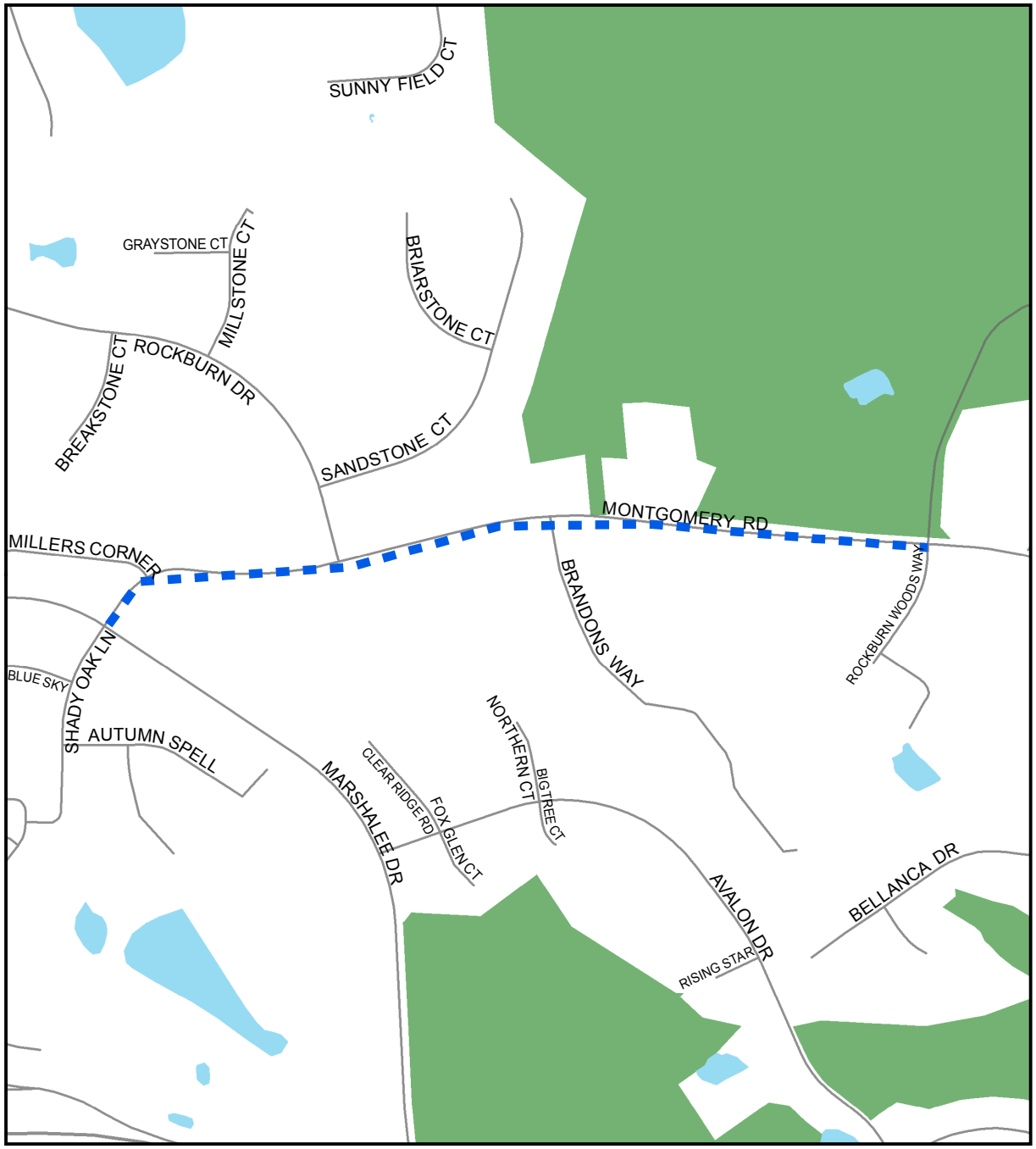
Develop a bike lane along road to provide access to Rockburn Branch Park, a busy bike related park.

Primary Location/Streets:

Montgomery Road

Start: Marshalee Drive

End: Rockburn Park Entrance



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 44

Estimated Cost: $125,764

Length (Miles): 0.6

Project Description:

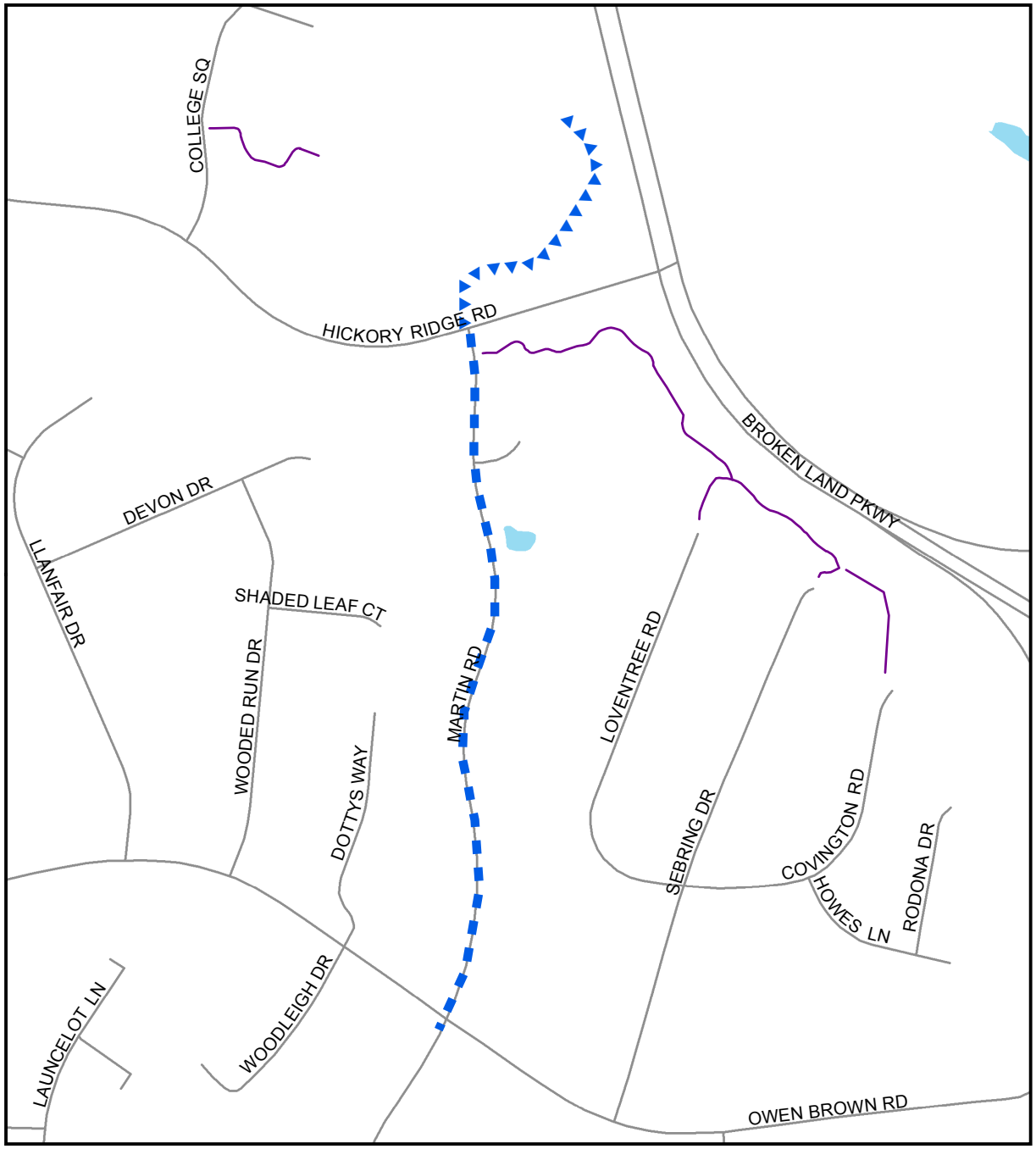
This project calls for sharrows and bike lanes to provide an alternative connection using an access road to connect to project no. 55 to establish a connection to Downtown Columbia.

Primary Location/Streets:

Martin Road

Start: Owen Brown Road

End: Hickory Ridge and Neighborhood roads



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 45

Estimated Cost: $941,830

Length (Miles): 6.7

Project Description:

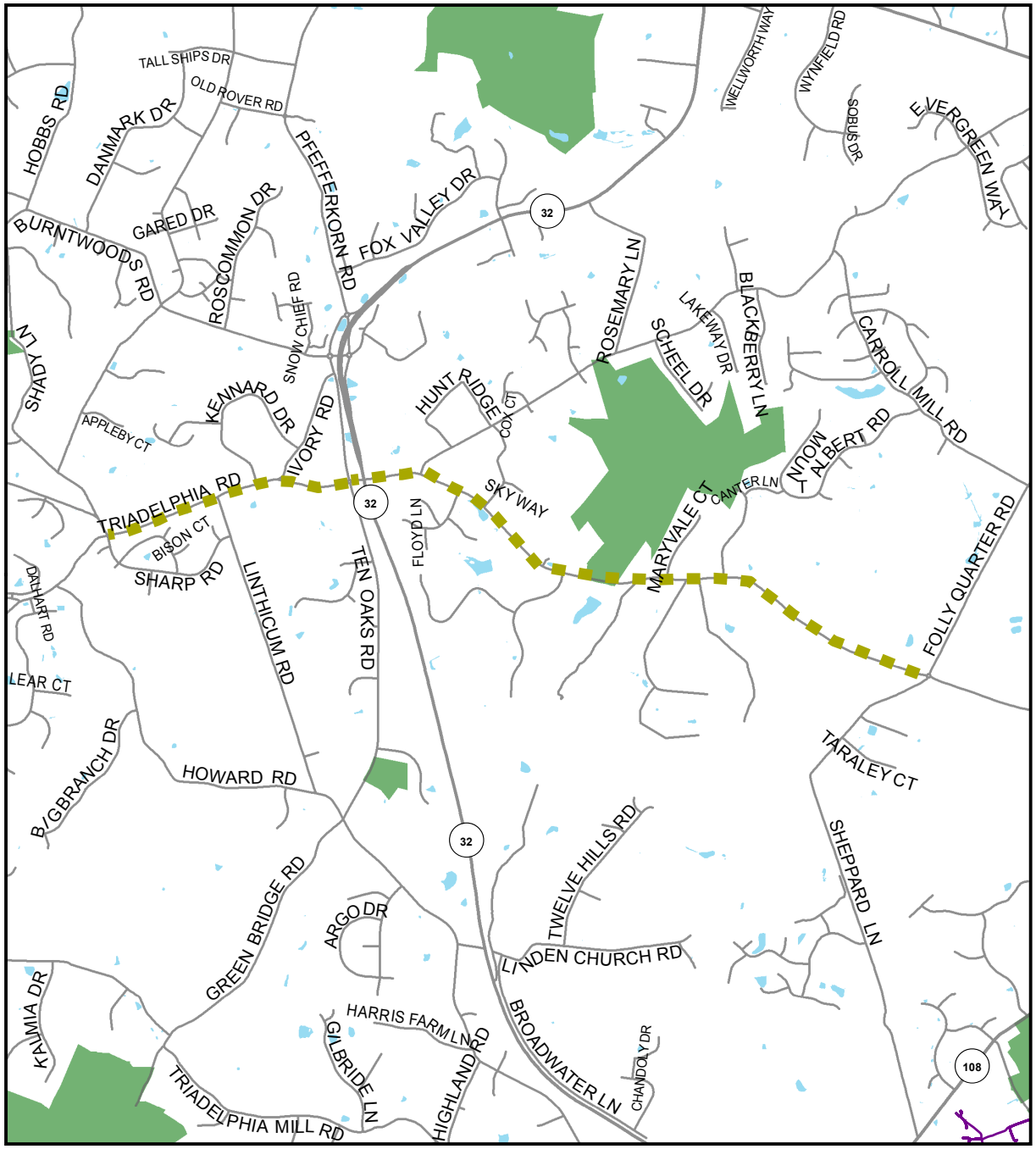
Develop shared roadways and safety treatment along road popular for triathlon events.

Primary Location/Streets:

Triadelphia Road, Folly Quarter Road

Start: Sharp Road/Shady Lane

End: Homewood Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 46

Estimated Cost: $613,751

Length (Miles): 0.9

Project Description:

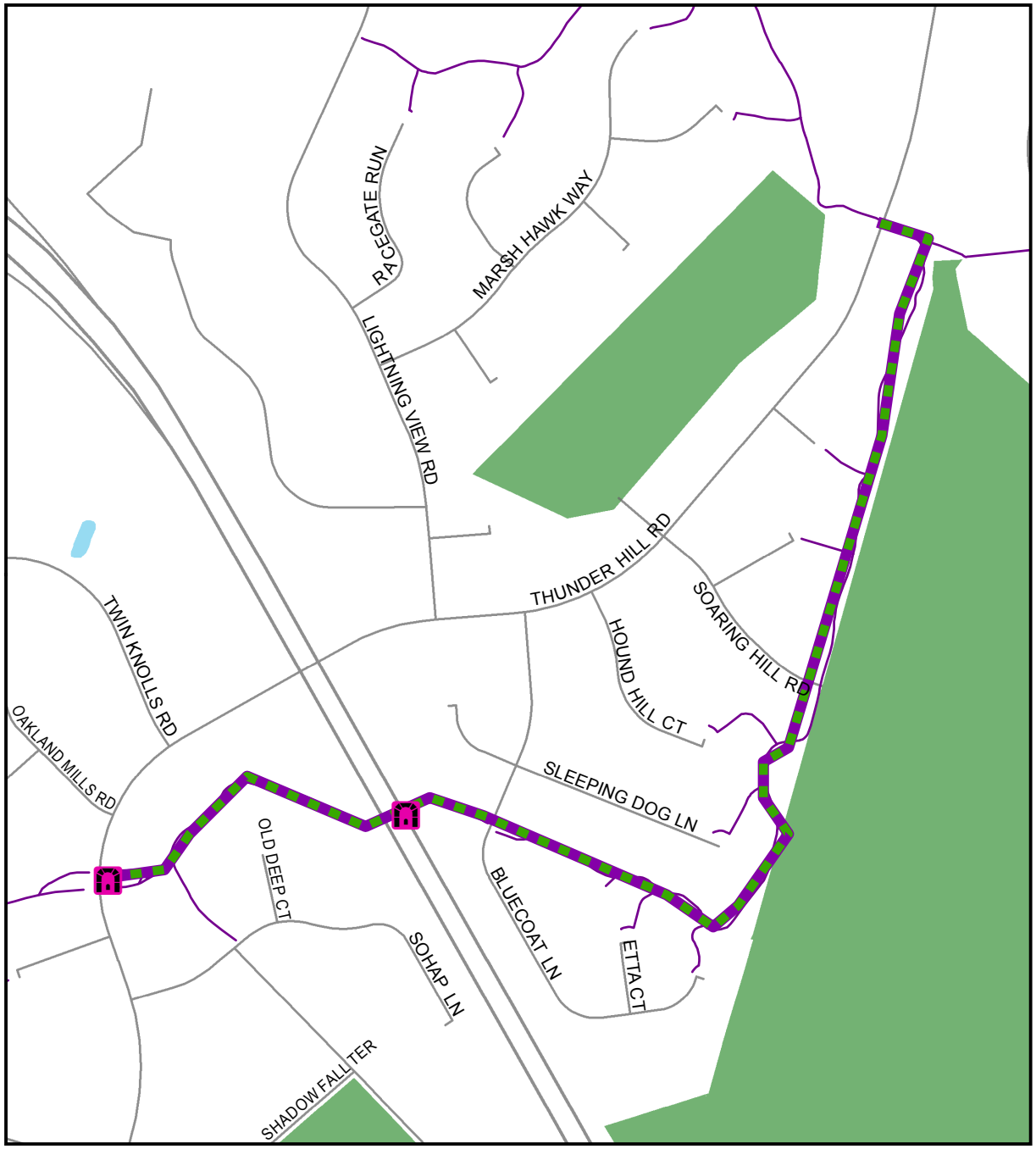
Upgrade existing shared use path to develop high quality connections under MD 175, using existing tunnel and improve lighting and aesthetic experience.

Primary Location/Streets:

Thunder Hill Rd at MD 175

Start: Thunder Hill Road

End: Trail intersection at Thunder Hill Road just north



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 47

Estimated Cost: $209,152

Length (Miles): 1

Project Description:

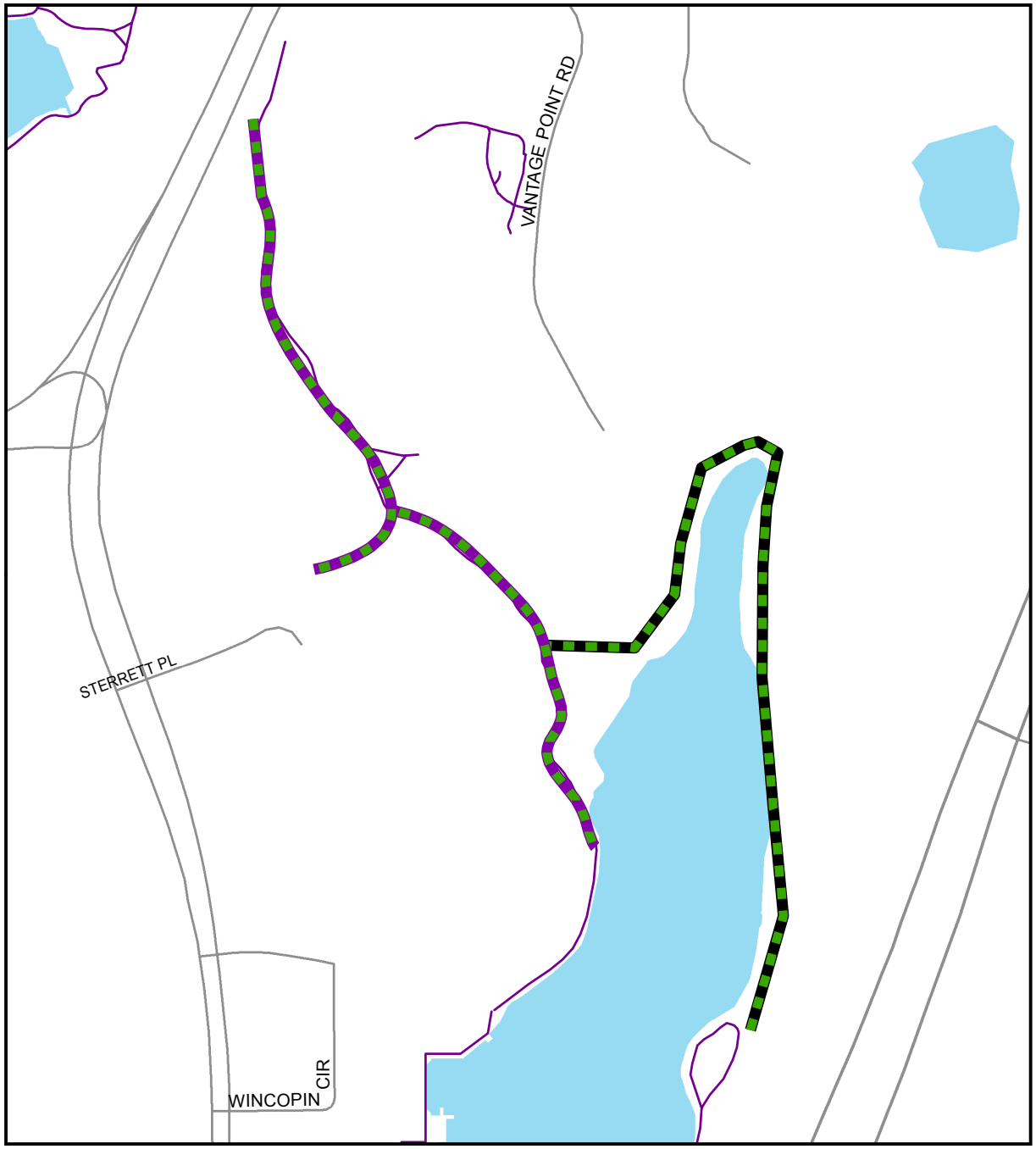
Complete loop around Lake Kittamaqundi (this CA project is anticipated to be completed in 2014) and widen existing pathway between the north end of the lake and Vantage Point Road; enhance intersection at Vantage Point Road/Little Patuxent Parkway/W. Running Brook, as needed. Connects to project no. 25 the west side of Little Patuxent Parkway to Columbia Rd as well as to Gov. Warfield Pkwy and project no. 48 along the east side of Little Patuxent Pkwy.

Primary Location/Streets:

Lake Kittamaqundi /Vantage Point Road

Start: Kennedy Gardens at Lake Kittamaqundi

End: Little Patuxent Parkway/Vantage Point Road



Linear Recommendations
- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations
- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities
- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 48

Estimated Cost: $586,862

Length (Miles): 1.1

Project Description:

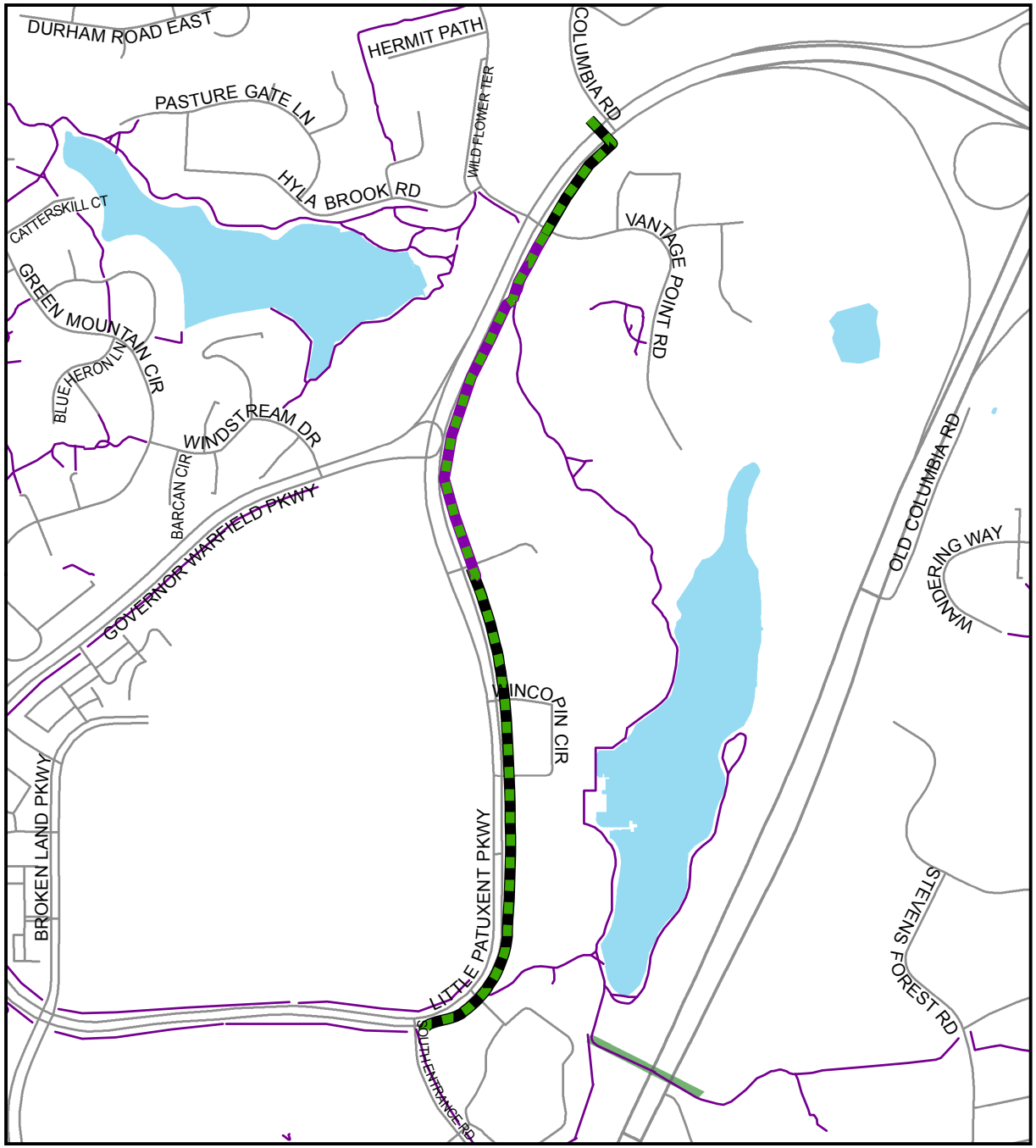
Shared use path to provide north/south travel and connect to DTC Trail.

Primary Location/Streets:

Little Patuxent Parkway

Start: Columbia Road

End: Multiuse Trail at South Entrance Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 55

Estimated Cost: $530,765

Length (Miles): 1.1

Project Description:

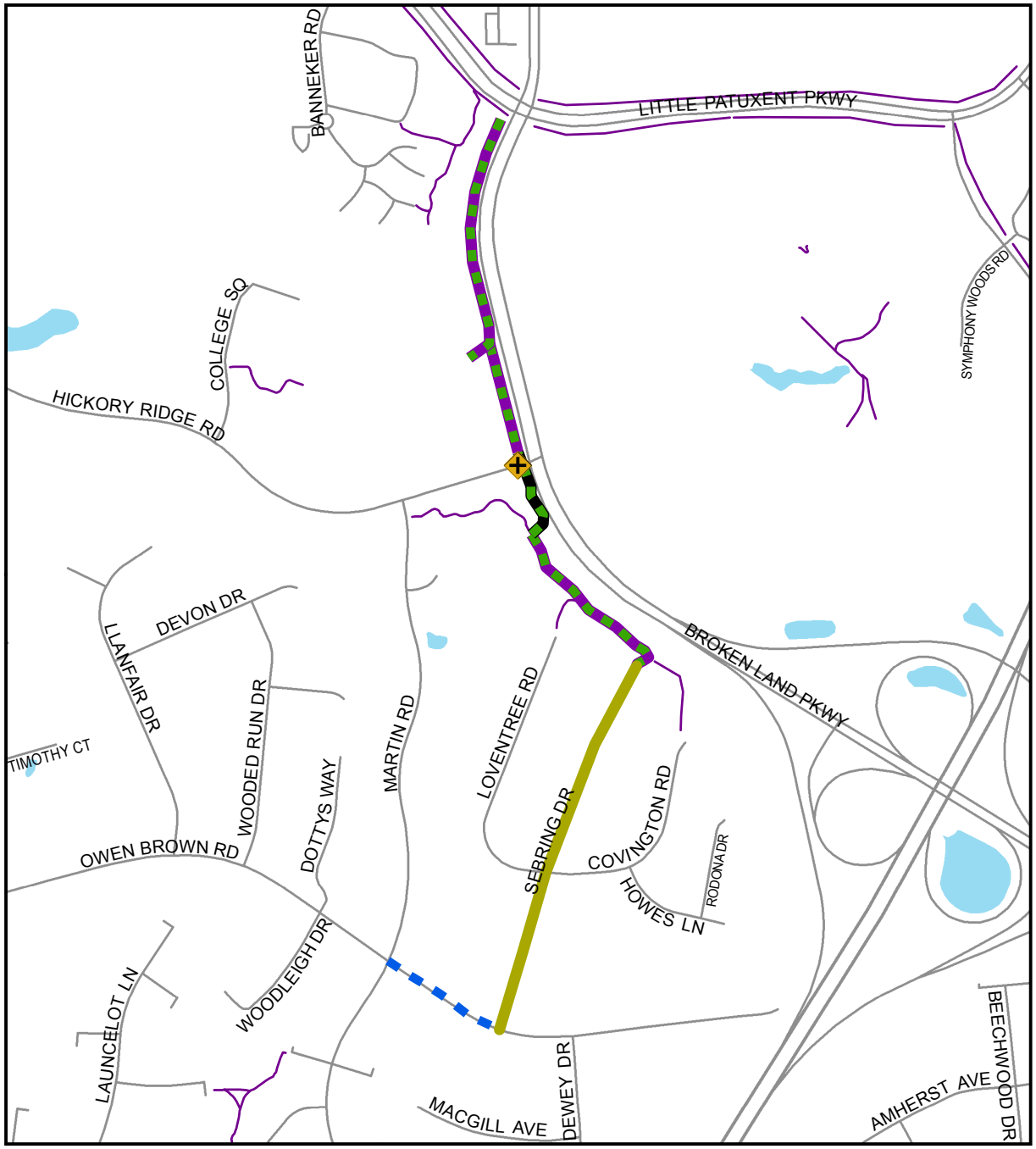
The project proposes a series of shared roadways, improved shared use paths, new shared use paths, and bike lanes to develop a north/south connection to connect to Martin Road from Downtown Columbia.

Primary Location/Streets:

Broken Land Parkway, Sebring Drive

Start: Multiuse Trail

End: Martin Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 56

Estimated Cost: $571,732

Length (Miles): 0.5

Project Description:

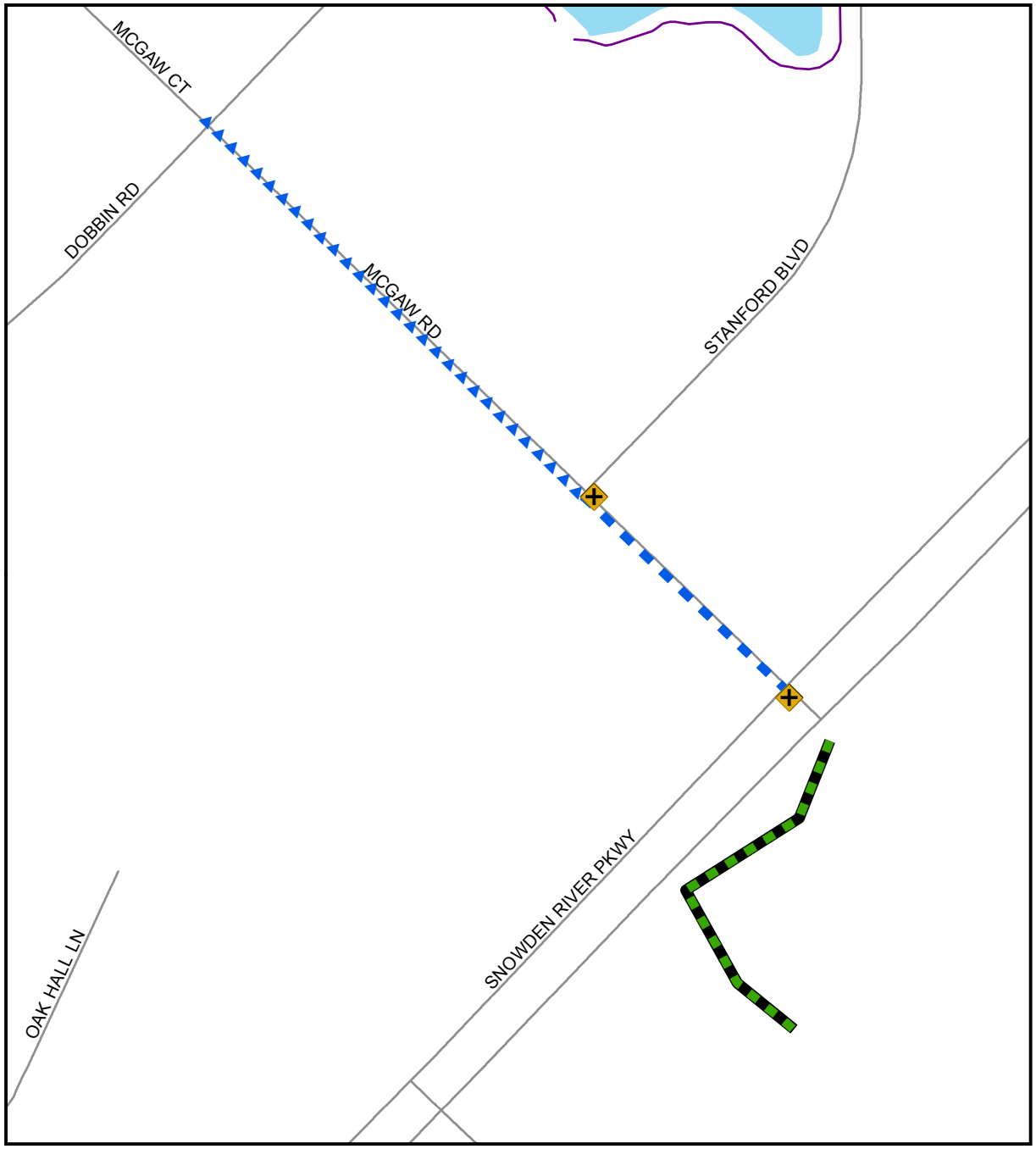
The project proposes a series of bike lanes, sharrows and a trail connection to provide access to the Snowden Square Shopping center area.

Primary Location/Streets:

McGaw Road

Start: Dobbin Road

End: Snowden River Parkway and into Snowden



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 57

Estimated Cost: $1,284,997

Length (Miles): 3.7

Project Description:

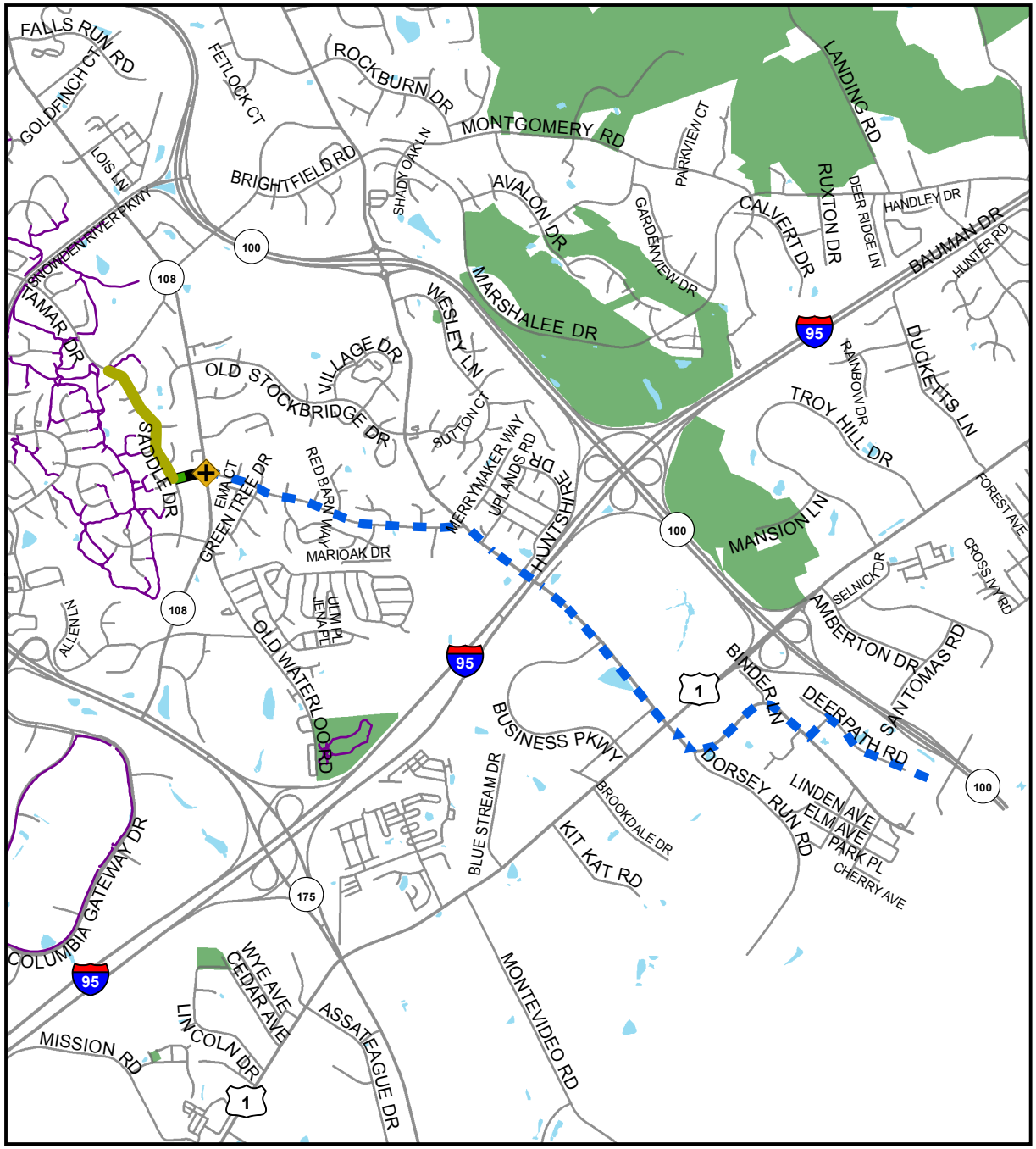
The project calls for a series of bike lanes, improved paths, sharrows and an intersection improvement to develop an east/west connection to the Dorsey MARC Station.

Primary Location/Streets:

Old Montgomery Road , Mayfield Avenue, Meadowridge Road

Start: Old Montgomery Road

End: Dorsey MARC Station



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 58

Estimated Cost: $2,299,702

Length (Miles): 1.4

Project Description:

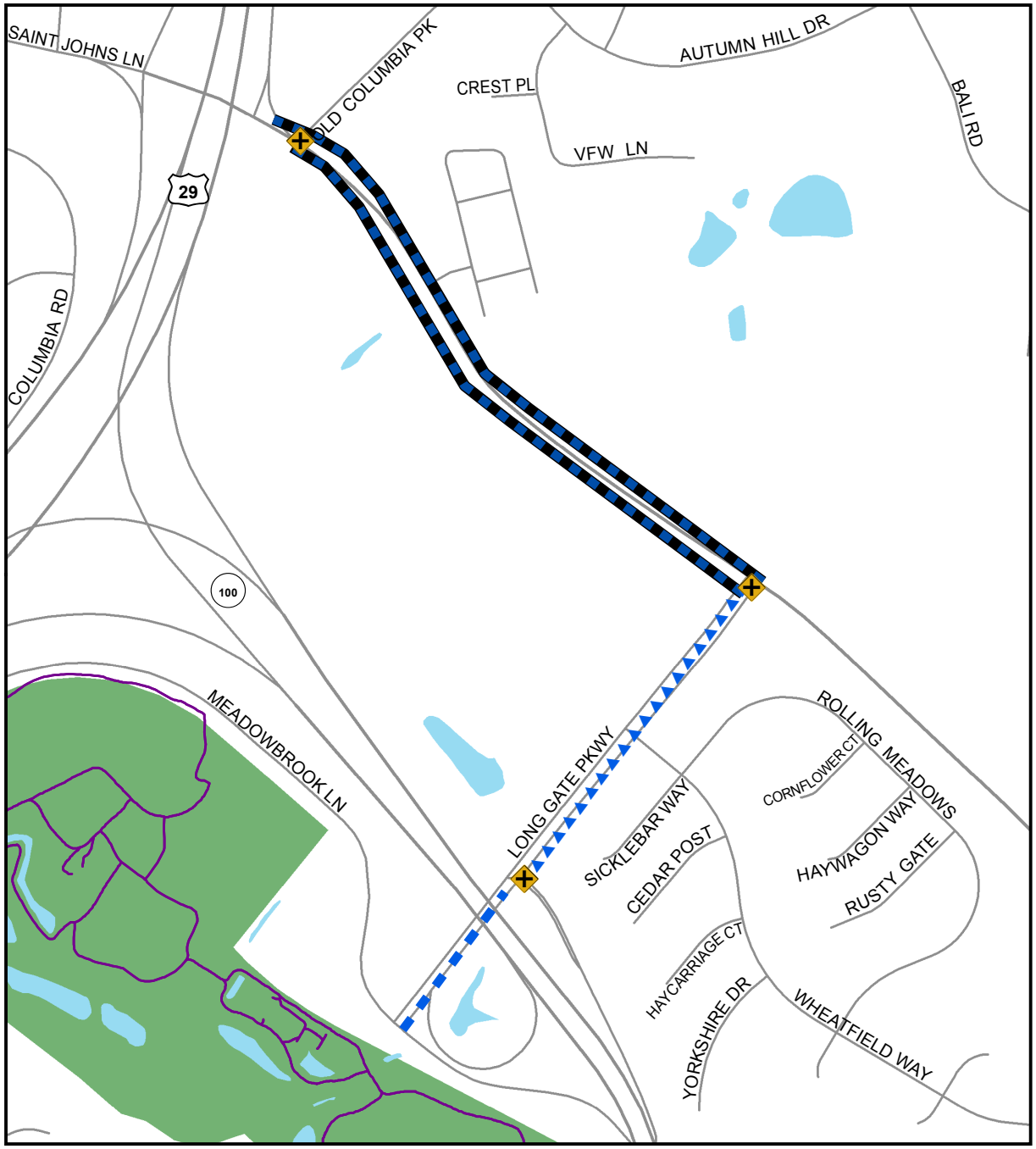
The project proposes a series of sharrows, bike lanes and cycle tracks to allow cyclists to transition through this very busy area to continue a quality north/south connection between Downtown Columbia through the Long Gate area and onto Historic Ellicott City.

Primary Location/Streets:

Longate Parkway, MD 103.

Start: Meadowbrook Road/MD 100

End: MD 103/Old Columbia Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 59

Estimated Cost: $537,079

Length (Miles): 2.5

Project Description:

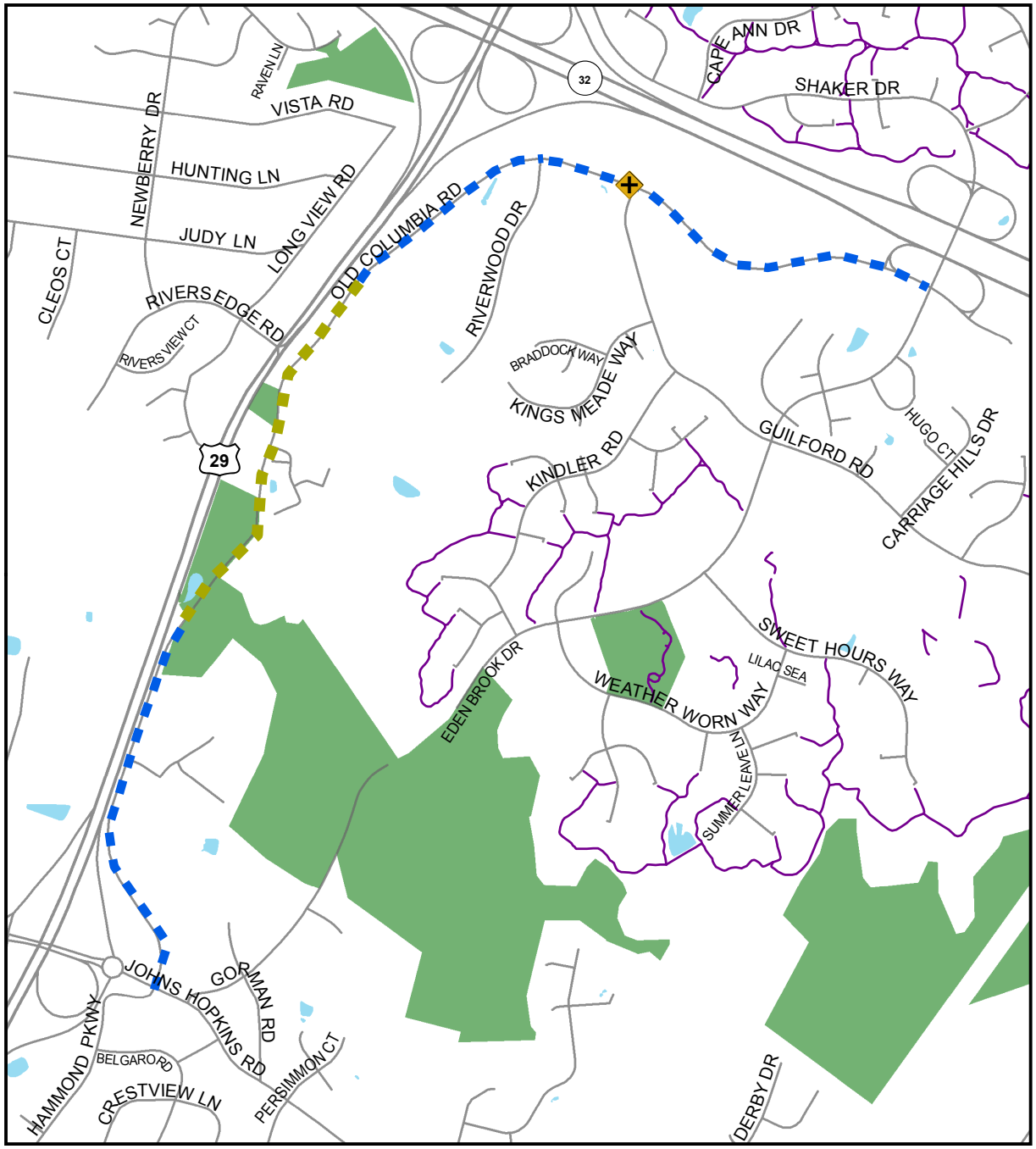
The project will develop a series of bike lanes, sharrows and roads with safety treatments to provide a connection from Kings Contrivance Village Center to Johns Hopkins Road to allow north/south passage.

Primary Location/Streets:

Old Columbia Road

Start: Eden Brook Drive

End: Johns Hopkins Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 60

Estimated Cost: $1,482,830

Length (Miles): 2.2

Project Description:

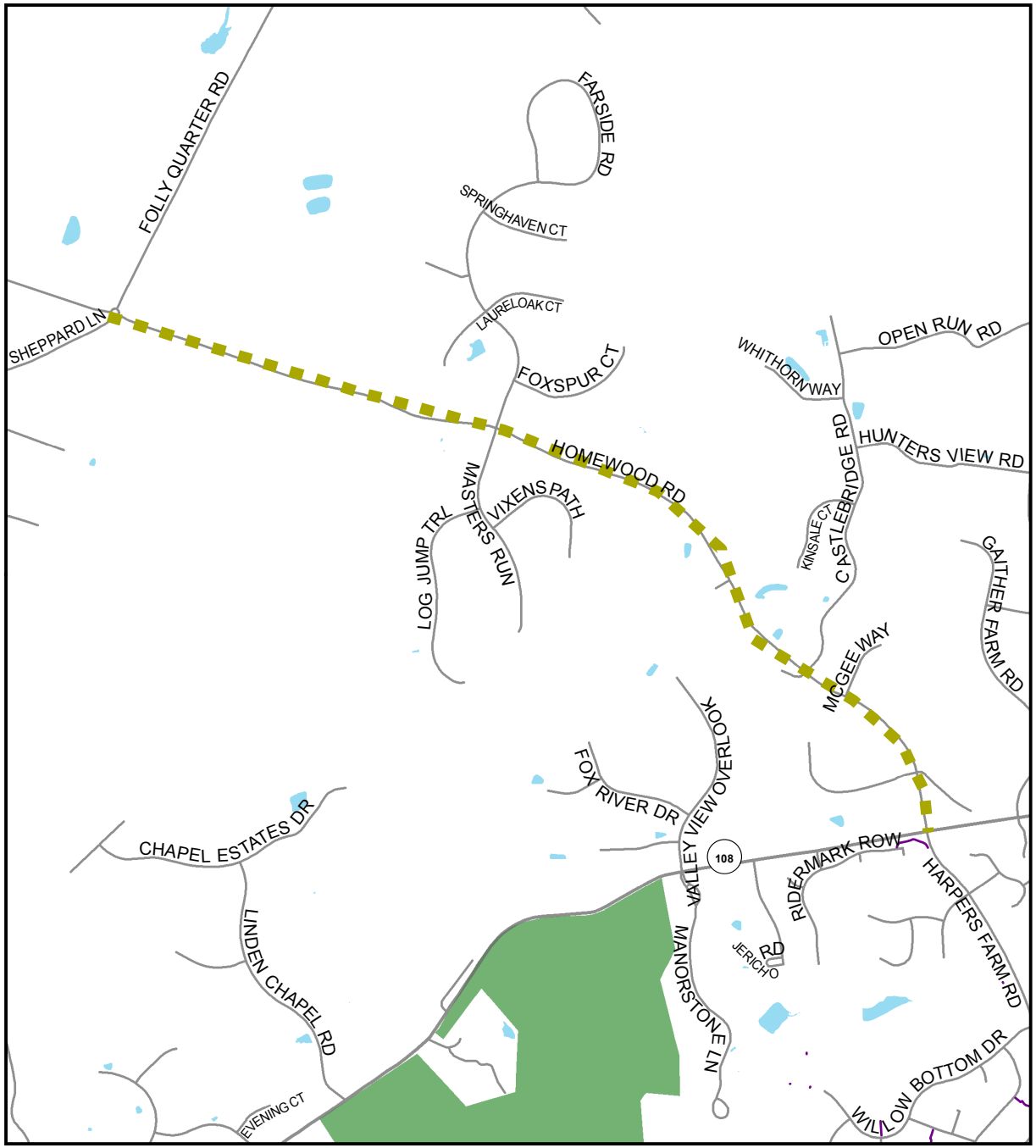
Develop shared roadways and safety treatment along road popular for triathlon events.

Primary Location/Streets:

Homewood Road

Start: MD 108

End: Folly Quarter Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
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- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 61

Estimated Cost: $154,499

Length (Miles): 1

Project Description:

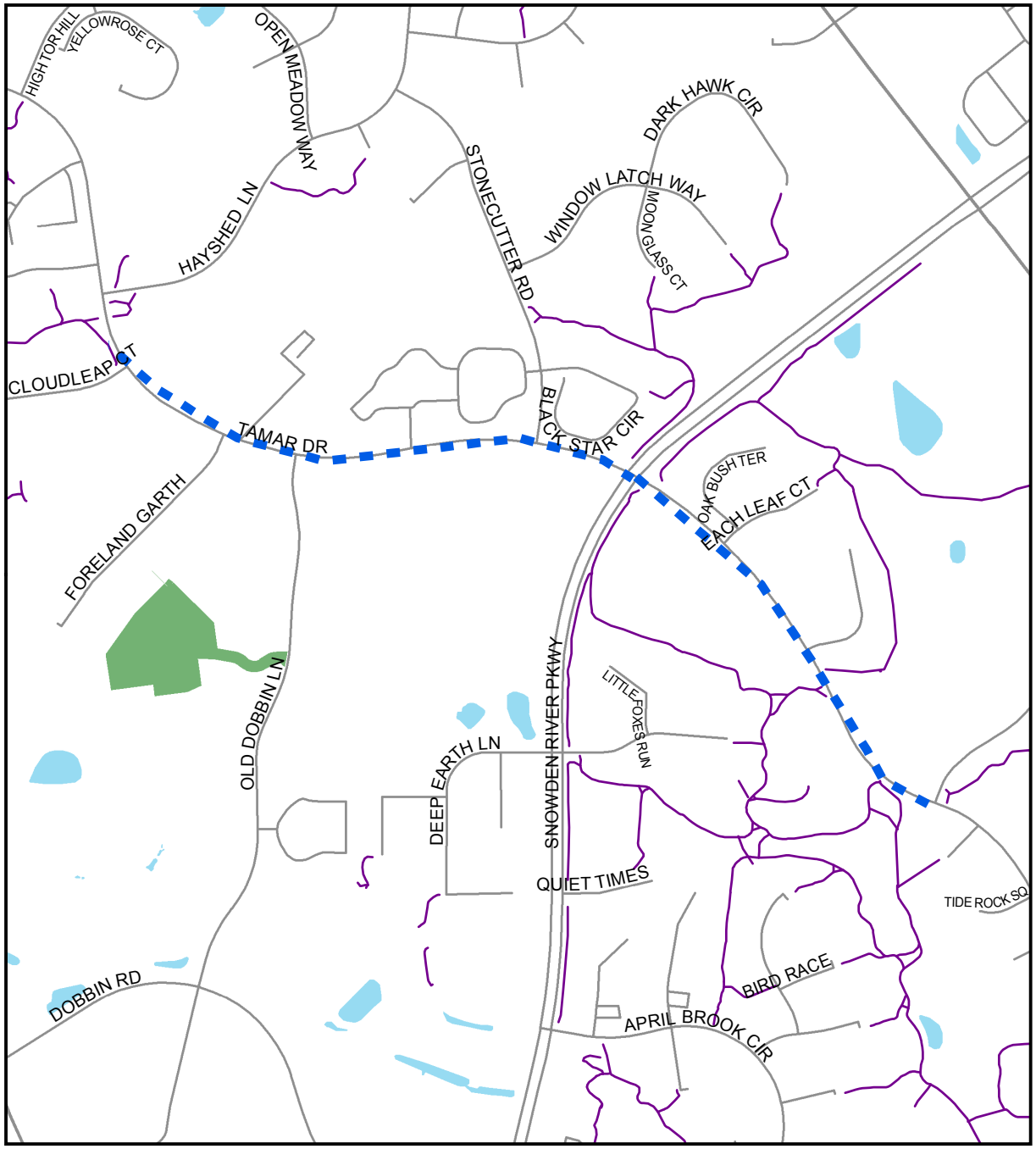
The project calls for a series of bike lanes to develop an east/west connection and connect with project number 57.

Primary Location/Streets:

Tamar Drive

Start: Tamar Drive/Hayshed Lane

End: Old Montgomery Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 62

Estimated Cost: $1,405,949

Length (Miles): 1.9

Project Description:

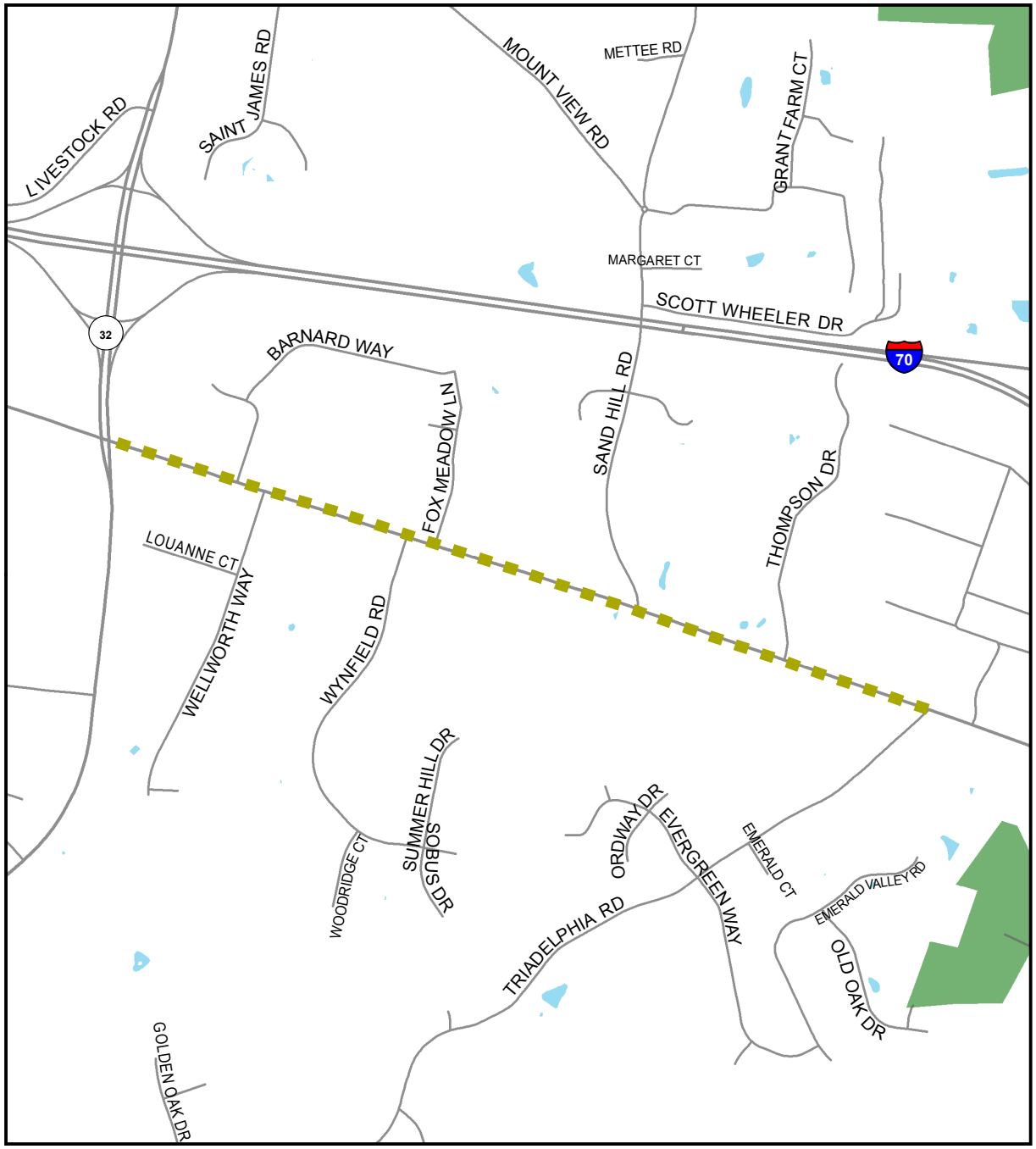
The plan calls for improving this segment of road by improving shoulders to provide a paved and striped shoulder, would entail working with SHA, would improve access to MD 32 and western portion of county.

Primary Location/Streets:

Frederick Road (MD 144)

Start: Triadelphia Road

End: MD 32



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
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Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 63

Estimated Cost: $802,000

Length (Miles): 1.3

Project Description:

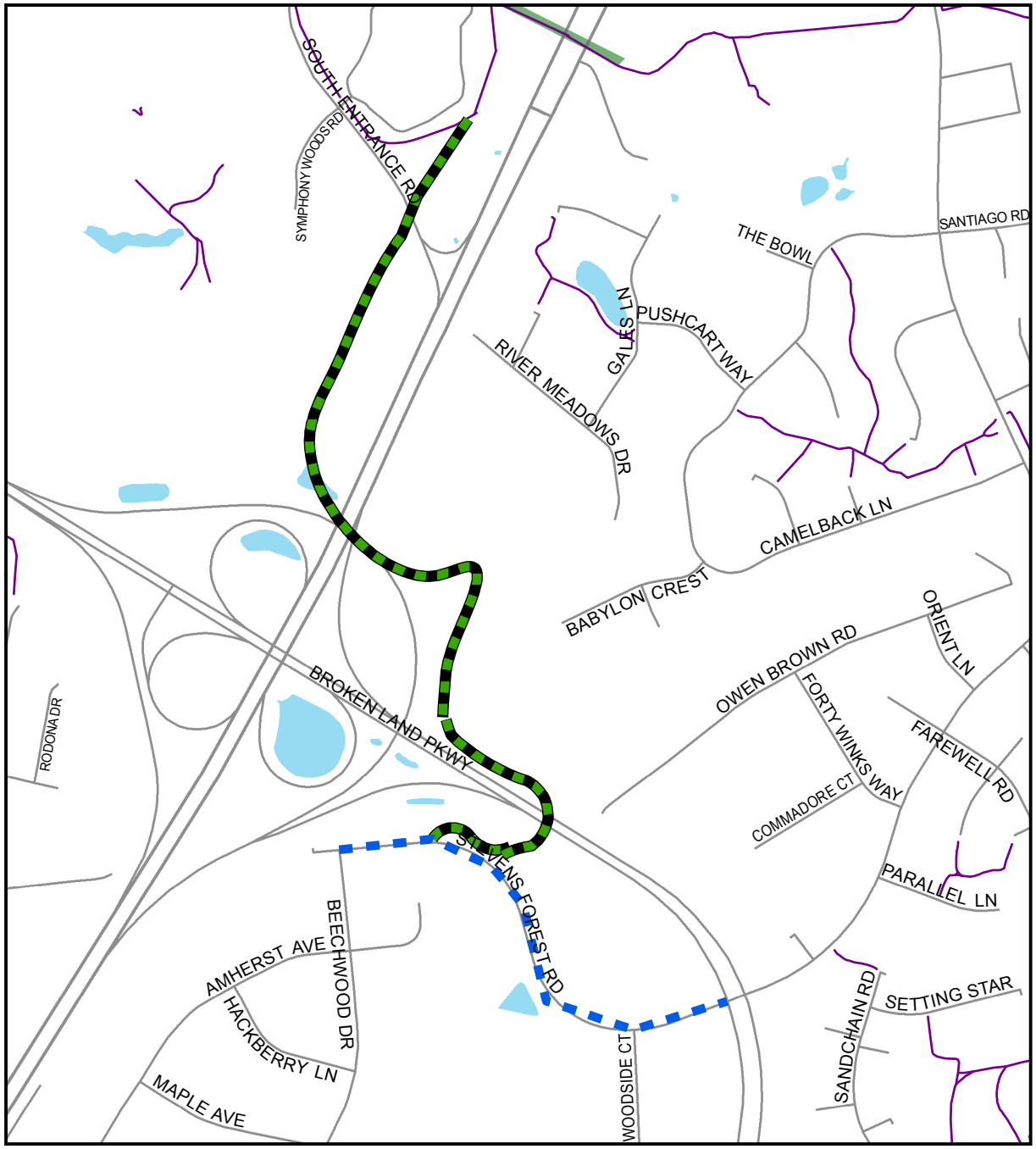
The plan calls for developing a shared use path from the multi use pathway that would follow the Little Patuxent River to allow passage under Rt. 29 and Broken Land Parkway, develop bike lanes on Stevens Forest Road south of Broken Land Parkway and connect to existing bicycle facilities on Stevens forest road north of Broken Lane Parkway. (Cost based on results of Downtown Columbia Patuxent Branch Trail Extension Feasibility Study plus wayfinding factor)

Primary Location/Streets:

Downtown Columbia

Start: South Entrance Road/Rt. 29

End: Broken Land Parkway/Stevens Forest Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
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- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Bike Howard
Structured Projects

Proposed/Preliminary

Structured Project Number: 64

Estimated Cost: $1,617,000

Length (Miles): 1.7

Project Description:

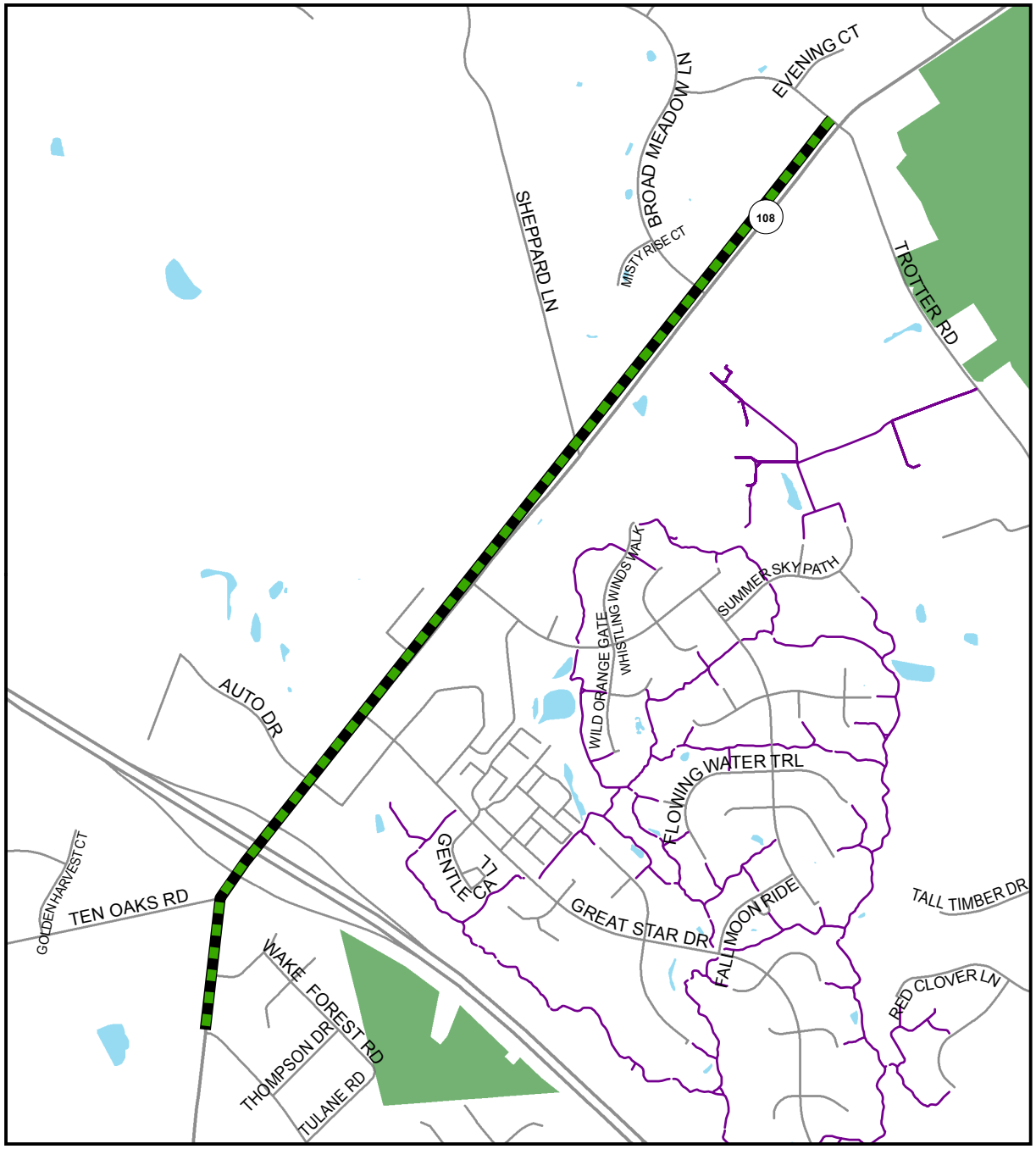
The plan calls for developing a shared use path from Guilford Road to Trotter Road on the west side of Clarksville Pike/MD 108, including pedestrian related improvements, including signal and crosswalk improvements. (Costs are based on preliminary results of Clarksville Streetscape Design Guidelines Study and includes estimated construction, design and engineering , utility and right of way costs).

Primary Location/Streets:

Clarksville Pike/MD 108

Start: Guilford Road

End: Trotter Road



Linear Recommendations

- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

Spot Recommendations

- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

- Bike Lane/Buffered Bike Lane
- Paved Shoulder/Shared Roadway
- Existing Pathways (CA, HC and Others)

Table 6: Summary of State and Federal Funding Programs

	Bicycle Facilities* (bike lanes, shared-use paths, etc.)	**Supplemental Infrastructure*** (Signs, crosswalks, etc.)	**Bicycle Parking Facilities*** (bike racks, secure bike stations, etc.)	**Safety, Education, Encouragement and Enforcement*** (education staff, maps, etc.)
Federal				
Transportation Alternatives Program	✓	✓	✓	✓
Congestion Mitigation and Air Quality Improvement	✓	✓	✓	✓
Surface Transportation Program	✓	✓	✓	✓
Non-Infrastructure: Highway Safety Funds 402				✓
Infrastructure: Highway Safety Improvement Program	✓	✓		
Federal Transit Administration	✓	✓	✓	✓
Associated Transit Improvements	✓	✓	✓	✓
State (Maryland)				
Recreational Trails Program	✓	✓	✓	✓
Highway User Revenues	✓	✓		
Maryland Bikeways Program	✓	✓	✓	
Bicycle Retrofit Program	✓	✓	✓	
Program Open Space (POS)	✓	✓		

* This funding stream may only be available for some types of projects in this category (e.g. bike lanes but not recreational trails). For more detailed information, see Appendix M

Section 10:

Implementation Matrix

Implementation Matrix

Throughout the document, BikeHoward has included a range of recommendations and actions. This chapter compiles all the policy recommendations into a summary table. This table includes the following elements:

- The recommendation or action
- The agencies or organizations responsible for implementing the recommendation
- The implementation timeframes for the recommendations

The implementation periods are below:

- On-going actions are activities that are occurring now and are expected to continue to occur
- “Short-Term” actions are recommendations that should be initiated within 1-2 years following plan adoption
- “Mid-Term” actions are recommendations that should be initiated within 2-5 years of plan adoption
- “Long-Term” actions include recommendations which may not be initiated until 5 or more years after plan adoption and may be dependent on the initiation and/or completion of mid and short term actions

IMPLEMENTATION MATRIX						
			Policy and Program Timeframes			
		Principal Organizations	Ongoing	Short-Term (1-2 Years)	Mid-Term (2-5 Years)	Long-Term (5+ Years)
Section 1: Introduction	No Recommendations					
Section 2: Existing Facilities	No Recommendations					
Section 3: Policy and Planning						
Transportation Planning	Develop a public participation process for implementation of structured projects	OOT, DPZ, DPW & DRP		✓		
	Develop a Bicycle and Pedestrian Coordinator Position	OOT		✓		
	Consider the establishment of a bicycle counting program that would allow the County to measure annual changes in bicycle ridership and traffic counts to better understand the impacts of enhanced bicycle facilities	DPW, DRP & OOT		✓		
	Ensure that the practice of scoping transportation studies always includes elements related to bicycling and other relevant intermodal and multi-modal topics	DPZ, DPW & OOT			✓	
	In coordination with the Baltimore Regional Transportation Board develop long-range transportation forecasting methods and models for bicycle and pedestrian trips.	DPZ, DPW & OOT			✓	
Road System Design	Develop a "complete streets" policy to ensure that Howard County streets are designed, built, and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of diverse ages and abilities. This could include requiring the development of site and location specific bicycle and pedestrian circulation plans.	DPZ, OOT			✓	
	Consider the adoption of the specific roadway and bikeway design guidelines related to the facilities proposed in this Plan as outlined in Appendix A	DPW, DRP,OOT			✓	
	Monitor DPW and SHA roadway resurfacing and design projects. In rural areas, where by-pass lanes are provided on two lane roads, if the roadway section approaching the by-pass lane has a shoulder it is essential that the shoulders are continued through the widened roadway section.	DPW, OOT		✓		
	Consider revising traffic volume warrants for slip lanes, including the review of design standards to include: a) a pocket bike lane and a dashed bike lane showing the cyclist's left merging movement, b) the radii of slip lanes should be designed to reduce entry and exit speeds, and c) high quality bicycle and pedestrian crossing accommodations should be provided for those traveling on the crossing roadway	DPW, SHA			✓	
	Consider retrofitting existing roundabouts and traffic circles with appropriate signs and striping to provide bicycle accommodations and appropriate directives and warnings for bicyclists and motorists. Update design guidance that will be used to design future roundabouts	DPW, SHA			✓	
	Review all traffic calming treatments, such as speed humps, curb extensions, chicanes, etc. to allow easy passage for cyclists. When travel lanes are narrowed at intersections or mid-block crossings to reduce crossing distances for pedestrians, slots should be provided so that bicyclists traveling on the right do not have to merge into the travel lane to pass through the narrowed section of roadway.	DPW,OOT		✓		
	Given their low impact on stormwater runoff and water quality, the county should consider advocating for and work with state officials to identify and encourage alternate best practices for stormwater management appropriate for non-motorized lanes and pathways.	DPW		✓		
	Trail projects should consider utilizing Low Impact Development (LID) and other design treatments as a part of trail and path projects to ensure that trail designs do not promote erosion and appropriately direct runoff to pervious areas that can filter and absorb water.	DPW		✓		
	Roadway improvement projects should consider utilizing pavement reduction strategies that support bicycling.	DPW		✓		
	Consider amending Howard County Scenic Roads legislation.	DPZ			✓	

IMPLEMENTATION MATRIX

			Policy and Program Timeframes			
		Principal Organizations	**Ongoing**	**Short-Term (1-2 Years)**	**Mid-Term (2-5 Years)**	**Long-Term (5+ Years)**
Land Development Policies that Govern Private Development and Site Plan Review	County zoning, subdivision policy, and the County Design Manual, all of which regulate new development, redevelopment and site design should be, where feasible, updated to achieve the objectives related to implementing BikeHoward and improving conditions for bicycling:	DPZ			✓	
Howard County Public School Policy Governing Site and Road Design for Public Schools	The following recommendations are provided for guidance and direction on how public school property can contribute to a bicycle-friendly Howard County. The Howard County Public Schools and School Board should consider adopting the following policies.	HCPSS			✓	
	Replace existing substandard bicycle parking equipment with racks that meet standards described in this plan and begin a process of providing covered bicycle parking where bicycle access is highest.					
	Manage bicycle parking supply in response to use and need, to ensure that all schools have sufficient supply to meet the needs of students, teachers, staff, visitors and school and non-school events that use school facilities.					
	At middle and high schools especially, provide appropriate bicycle facilities on and/or adjacent to school entry roads, drive ways, parking lots and circulation roadways.					
	Provide pathways through school grounds and around athletic fields as identified in the BikeHoward, and as may be identified in future updates of BikeHoward to ensure that school properties can contribute to a continuous and connected bikeway network. Funding may be provided through HCPSS capital improvement funds, county transportation funds, and other funding sources, including state and federal grants.					
	Provide direct bicycle and pedestrian access paths to existing and new schools from adjacent neighborhoods. Where ever possible these paths shall be provided by residential property developers.					
	Consider siting new schools in locations that will: a) maximize access by walking, bicycling and use of public transit; b) ensure that school site design minimizes conflicts between motorized and non-motorized access modes and c) favors student and other arrivals by walking, bicycling, public transit and school bus, not motor vehicle drop-off.					
County Policy Governing Park Design and Development	The following recommendations are provided for guidance and direction on how parks can contribute fully to a bicycle-friendly Howard County. The Howard County Department of Recreation and Parks (DRP) should consider adopting the following policies.	DRP			✓	
	Replace existing substandard bicycle parking equipment with racks that meet standards described in this plan and begin a process of providing covered bicycle parking where bicycle access is highest.					
	Manage bicycle parking supply in response to use and need, to ensure that all parks have sufficient supply to meet the needs of park visitors.					
	Provide temporary bicycle parking for special events as it may be requested by event sponsors.					
	Promote bicycle access to parks as an alternative to motor vehicle access and as a way to: a) reduce the need for asphalt surface parking lots, b) reduce car trips and resulting air pollution, and c) promote healthy and active living.					
	Provide appropriate bicycle facilities on and/or adjacent to park entry roads drive ways, parking lots and park circulation roadways.					
	Develop pathways through park lands as identified in the Bicycle Master Plan, and as may be identified in future updates of the Plan. Funding may be provided through DRP capital improvement funds, County transportation funds, or other sources.					
	Design and build Transportation Trails (as so designated in this Plan) to width and surface standards detailed in Appendix A.					
	Update the Blandair Park Development Plan based upon consideration of proposed adjustments to a small number of proposed path alignments. These alignments will improve directness and user experience in the bikeway network and better enable park paths to contribute to a continuous and connected county-wide system of bikeways.					
	Implement the on-road, off-road and spot recommendations in this plan that are on or directly related to Howard County park lands. These may be in Centennial Lake Park, Meadowbrook Park, Rockburn Branch Park, Cedar Lane Park, and on the Patuxent Branch Trail.					
	Provide direct bicycle and pedestrian access paths to existing and new parks from adjacent neighborhoods.					
	In regional parks with large pathway systems, DRP should consider creation of a hierarchy of paved paths, providing sufficient width for high volumes of mixed use, and through bicycle movements on select paths, and providing narrower, varied-surface paths for pedestrian strolling, hiking, nature observation, etc.					

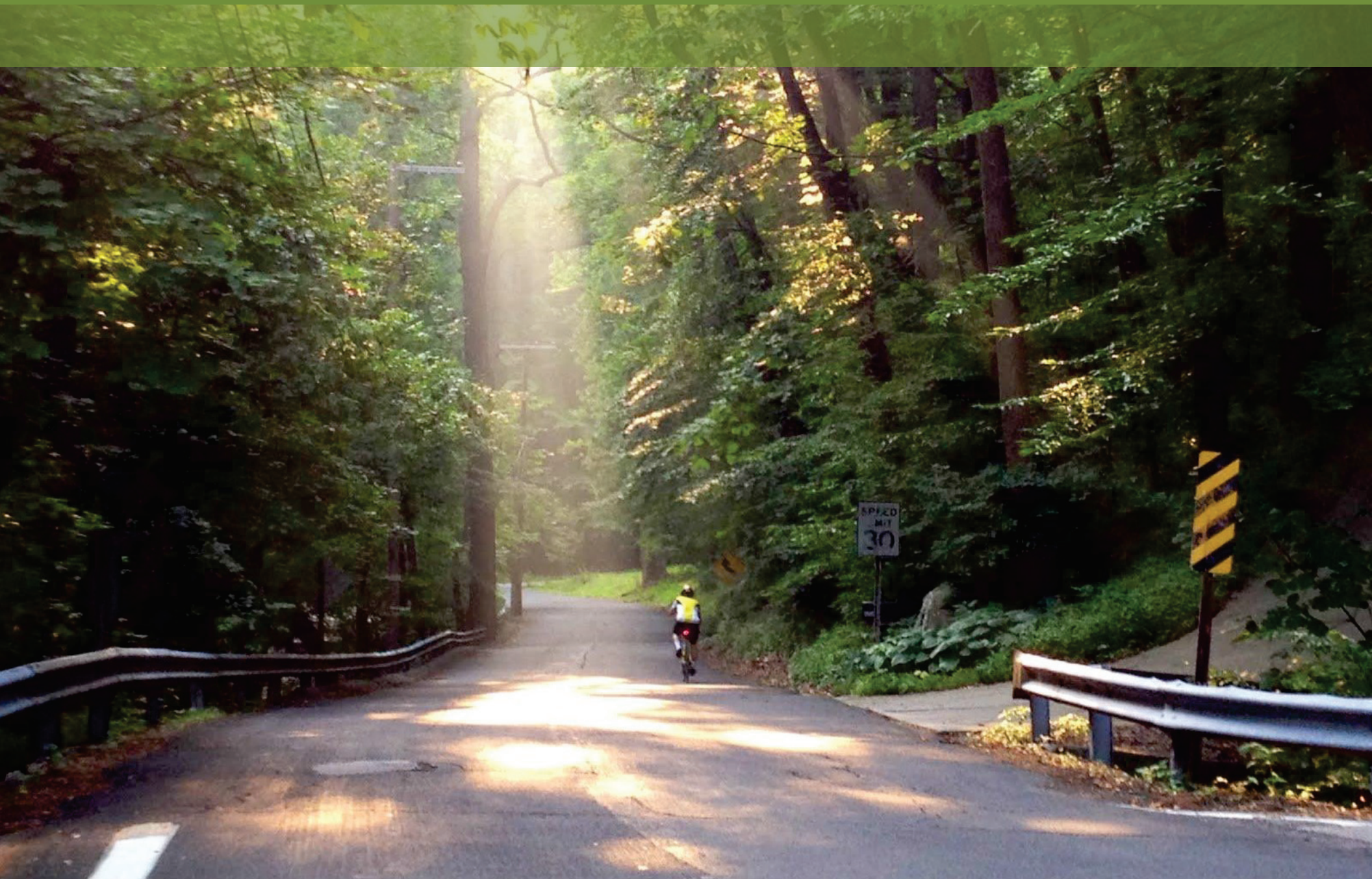
IMPLEMENTATION MATRIX						
			Policy and Program Timeframes			
		Principal Organizations	Ongoing	Short-Term (1-2 Years)	Mid-Term (2-5 Years)	Long-term (5+ Years)
Bikeway Management & Maintenance	Use the County's mobile app. (Tell HoCo) and/or online reporting systems system to identify road hazards that pose a safety risk for cyclists.	DPW, DRP	✓			
	Develop a bike lane and shoulder sweeping program that focuses on the roads with the worst debris build up and those with the highest user levels.	DPW, DRP		✓		
	Restripe bicycle lanes and reapply shared lanes markings as needed.	DPW, DRP		✓		
	Develop an asset management database for maintenance of wayfinding and other signs used in the bikeway system.	DPW, DRP	✓			
	Develop a coordination protocol between County roadway maintenance officials and State Highway Administration roadway maintenance offices.	DPW, DRP		✓		
	Expand the geo-coded emergency response location system to include CA and other pathway tunnels and other regularly spaced markers to ensure that the trail systems are fully covered	DPW, DRP	✓			
	Develop program that involves volunteers in trail maintenance, especially youth on County paths and trails.	DPW, DRP			✓	
Section 4: The Bikeway Network						
Small Area Plans	Review the following areas to determine which solutions should be pursued in the near term and which can be delayed or should be coordinated with expected future road improvements or development:	DPZ, OOT	✓	✓		
	Dobbin Road Commercial Area Gateway Commerce Center Route 40 Corridor in Ellicott City MD 216 Corridor Maple Lawn Various segments of the Route 1 Corridor Clarksville (River Hill) Historic Ellicott City Dobbin Road/Gateway Commerce Center					
Section 6: Components of the Network						
	The County's Traffic Engineering Division should consider initiating a review of all traffic signals in the County to ensure that bicycles will be detected on the minor road approaches which may be given a green cycle only when cross traffic is present. Various treatments are available to remedy any location where bicycles are not currently detected.	DPW			✓	
	Utility corridors and rights of way present important opportunities to make key connections throughout the County. The plan recommends that the county conduct additional research and develop strategies, including working with key federal, state and local stakeholders to develop clear technical and policy guidance on the development of linear shared use trails on utility rights of way.	OOT, DPW, DPZ				✓
	BikeHoward did not fully explore further trail potential in the Patapsco Heritage Greenway Corridor (primarily state DNR lands), nor the protected lands along the main branch of the Patuxent River. BikeHoward recommends exploring trail potential and road linkages in these areas, including the concept of a loop trail to link Ellicott City, Mt Airy and Laurel.	OOT, DRP		✓		
	Request that major bicycle facilities be included in the SHA maintained Highway Needs Inventory, which includes lists of priority projects consisting of new and upgraded highway and transit facilities and requests BikeHoward's recommendations be included into SHA Fund 76.	OOT	✓	✓		
	Request bicycle facilities proposed in BikeHoward be included into the BRTB long range transportation plan and TIP, including bridge resurfacing projects	OOT	✓			
	Consider engaging the SHA Scenic Byway office regarding any plans to implement the paved striped shoulders recommended for MD 144 which is part of the National Road Scenic Byway	OOT, DPZ			✓	
	Develop an integrated bikeway sign protocol and manual.	OOT, DPW, DRP		✓		
	Develop and advance, in coordination with state and local stakeholders, paper and electronic directional applications and devices to enable navigation, including expanding CA's existing directional app outside its current limits	OOT, CA	✓	✓		
	Consider developing an On-Road County Recreational Route System in western Howard County, the southwest area around Fulton, in and around Historic Ellicott City and Savage, as well as in the Patapsco Heritage Greenway and Elkridge Area	DRP, DPW, OOT			✓	

IMPLEMENTATION MATRIX						
			Policy and Program Timeframes			
		Principal Organizations	Ongoing	Short-Term (1-2 Years)	Mid-Term (2-5 Years)	Long-Term (5+ Years)
Section 7: End of Trip Facilities						
	Howard County should initiate a publically supported Bicycle Parking retrofit program	DPW, OOT			✓	
	Howard County should consider initiating an interagency program to evaluate, replace and add bike parking at all County owned public facilities.	DPW, OOT				✓
	Consider amending zoning and subdivision codes to require new development to provide appropriate types, quantities and locations of bicycle parking as a part of development approval.	DPZ, OOT		✓		
	Study and based on findings, consider implementing a pilot bicycle sharing program	OOT		✓		
	Consider upgrading bicycle parking at MARC stations and Park & Ride (P&R) lots. In the near term, a minimum of two bike lids (i.e. individual, on-demand, covered racks) should be placed at each of the following transit hubs.	MTA			✓	
	Prioritize and implement access improvements to the following transit hubs: Broken Land East and West, Long Gate, Oakland Ridge, Snowden River Parkway, Dorsey MARC and Savage MARC Access. improvements at Broken Land Parkway East and West should be completed before bike parking at these locations is upgraded. Coordination with MTA and/or SHA may be required.	MTA		✓		
	Explore the potential to provide bicycle storage in the under carriage on commuter bus services.	MTA				✓
	Request state leadership in providing a system of higher quality on-demand bike storage lockers throughout the MTA and Park & Ride systems in Maryland.	MTA		✓		
	Consider purchasing a bus shelter that includes covered bicycle parking as a part of the structure's design.	OOT			✓	
	Consider offering a special weekend service (periodically) to take recreational cyclists to a location in Western Howard County for a day of recreational riding. This may be attractive to entry level recreational riders.	OOT				✓
	Market transit routes and bike-on-bus services that cross or travel along major barriers for bicyclists, such as I-95, US 29, US 40, MD 32, MD 100, MD 175, the CSX railroad and US 1.	OOT, MTA			✓	

IMPLEMENTATION MATRIX						
			Policy and Program Timeframes			
		Principal Organizations	Ongoing	Short-Term (1-2 Years)	Mid-Term (2-5 Years)	Long-term (5+ Years)
Section 8: Programs for Safety Education, Encouragement & Enforcement						
	Seek a bronze level Bicycle-Friendly Community Designation from the League of American Bicyclists by 2018.	DPZ, DPW			✓	
	Provide BIKEHOWARD materials at Howard County Public Libraries-Because libraries are a well-used and supported component of community life, develop a multi-dimensional bicycling education and encouragement program; using all of the media resources available to the Library system.	OOT, HCPL			✓	
	Consider establishing a County-wide Safe Routes to School Program (SRTS). Adopt a goal, to have 50% of elementary and middle schools participating in SRTS activities.	OOT, HCPSS			✓	
	Establish a Share-the-Path and Road Safety and Respect program.	CA, DRP, DPW, HCPD		✓		
	Establish a Youth Ambassadors Program, similar to efforts in other communities, that trains teenagers to be ambassadors of bicycling at public events, educators about bike safety, and promoters of bicycling.	OOT, DPR, CA DRP				✓
	Expand on existing off road biking maintenance and youth training programs (DRP)	DRP			✓	
	Expand the bicycling-related elements of the County's existing TDM program.	OOT		✓		
	Track and analyze Bicycle Crashes.	HCPD		✓		
	Consider expanding the Bicycle-Mounted Police Program and Park Ranger Program.	HCPD, DRP			✓	
	Continue the Cycle2Health program and refine it to offer a wide variety of challenge levels. Plan routes and conduct rides in such a way that participants can be educated about bicycling improvements proposed in the BikeHoward plan.	Citizens Services	✓			
	Continue active enforcement of the Maryland Three Feet law.	HCPD	✓			
Section 9: Implementation						
	Conduct a detailed review of the on-road bikeways in the Bikeway Networks and implement recommended on-road facilities. Identifying BikeHoward plan recommendations that may be related to the development. Ensure that bicycle accommodations and safety features, especially those identified in the Plan, are incorporated into these projects as a routine part of evaluation and design.	DPZ, DPW		✓		
	Allocate 15 percent of BikeHoward's implementation funding to an opportunity project fund to ensure the Short -Term utility of the investments realized by repaving, intersection upgrade and private redevelopment projects.	OOT		✓		
	Consider developing a sign Protocol and Manual that is adopted by all stakeholders, including CA, DRP, DPW, DPZ, and SHA.	OOT, CA, DRP, DPW, SHA, DPZ		✓		
	Ensure the County has adequate engineering and design capacity through the use of on call design firms.	DPW		✓		
	Prior to developing County-specific Bikeway Design Guidelines, thoroughly train existing traffic engineering and design staff (as well as consulting engineers) using existing curriculum related to the AASHTO Guide for the Development of Bicycle Facilities, and other national and state engineering guidance documents. Conduct four training courses in the year following plan adoption and continue with an annual training program as needed.	DPW, OOT		✓		
	Participate in study tours to visit with officials of other jurisdictions to learn about bicycling facility design and implementation best practices.	DPW, OOT		✓		
	Determine and develop projects for inclusion in the County's capital budget. Continue to ensure that the capital budget line item for BikeHoward projects maintains a fund balance of at least $750,000 per year.	DPW, OOT		✓		
	Identify dedicated annual funding in the Department of Recreation and Parks and HC Public Schools for implementation of the BikeHoward Plan.	DRP, HCPSS		✓		
	Identify dedicated annual funding for County Agencies to use as matching funds for grant applications includ-ing to match state and federal transportation funds and other grant programs.	OOT		✓		
	Identify dedicated funding for ongoing maintenance of pavement markings and signage, bike parking facilities and County trails.	OOT, DPW		✓		
	Ensure that the County is a regular applicant for key funding programs such as Transportation Alternatives, Safe Routes to School, Maryland Bikeways Program, CMAQ, and Recreational Trails.	OOT, DPW	✓			
	Consider establishing a Bicycle Master Plan Implementation Team	OOT, DPZ, DPW, DRP		✓		

Section 11:

Conclusion



Conclusion

Howard County has become one of the most popular destinations for bicycling in the State of Maryland, due to our central location, health conscious and active citizenry, our stream valleys, pathways and our beautiful residential and agricultural landscapes.

Vision

BikeHoward sets forth a vision to make Howard County a more bicycle-friendly and inviting community where all members of the community, from children to seniors, men and women, feel comfortable and safe bicycling on our roads and pathways as a means of daily transportation and healthy recreation.

BikeHoward addresses bicycling primarily from a transportation perspective, but to the degree that recreational bicycling also takes place on the county's roads and pathways, it advocates development of bikeways that will serve both needs.

Goals

The plan establishes goals for County agencies and makes recommendations to achieve those goals, through policy actions, program implementation and development of a bikeway network.

To achieve the goal of promoting active living by including bicycling as an active component of a livable community that is physically healthy, economically sound and environmentally sustainable.

The plan proposes a series of progressive outreach and educational programs, the development of a safe and connected network and a path to stronger coordination, all of which will be needed to meet the goal.

To achieve the goal of updating County policies to ensure that the County's infrastructure and land development policies fully accommodate and encourage bicycling.

The plan provides policy recommendations for new actions and supporting policy information to guide and inform the update of the county's policies as they relate to cycling and land development.

To achieve the goal of accommodating bicycle travel across the county.

The plan provides an outline for coordinating with Maryland legislators and agency officials on bicycle travel through:

- State highways and public transit services
- Regulation of utility rights-of-way
- Administration of storm water treatment and water quality regulations

To achieve the goal of increasing participation and safety through bicycle educational programs for school-aged children and youth, and awareness campaigns for motor vehicle users, to make bicycling normal, popular and accepted transportation option.

The plan proposes a series of comprehensive programs and outreach that will develop cycling as a normal and popular option for all of the county's citizens**.**

To achieve the goal of creating a seamless cycling network that is safe, intuitive, and easily connects residents to where they want to go: schools, shops, parks and work, with facilities that will serve people of all skill and comfort levels.

The plan has developed a safe, connected, useful and seamless network of bicycle facilities for all ages and abilities.

Getting there, one bike ride at a time

This plan seeks to capitalize on these actions and resources to achieve its vision. Reaching this vision will not be simple and will not happen overnight; there will be setbacks, wins and lost opportunities. However, as James Rouse, the founder of Columbia said;

"Visions describe what best should be, could be - if and when mankind has the will to make them real"

This is a vision that can be achieved by Howard County.

For appendix, please go to www.BikeHoward.com

APPENDIX A

Bikeway and Roadway Design Guidance

The following general bikeway and road design parameters are recommended for roadways in the Bike Howard Bikeway Network. They are intended to provide guidance and direction during the implementation of a project in the plan. These recommendations may be applicable and effective on other roads as well.

This basic bikeway design guidance was drawn from a variety of sources; primarily the AASHTO Guide for the Development of Bicycle Facilities, 2012 Fourth Edition and the Manual on Uniform Traffic Control Devices, 2009. Additionally, the SHA Bicycle Policy & Design Guidelines (April 2013 draft) various other state and County documents were consulted. It also includes recommendations that based upon nationally recognized research in the field, best practices in bikeway and traffic safety design and the experience of Toole Design Group in assisting local and state governments in Maryland with bikeway design.

Motor Vehicle Travel Lane Widths

On two and four lane roadways of 35 mph or less, it should be County policy to consider reducing motor vehicle travel lane widths to 10 feet in order to gain sufficient space for the following facility types called for in Bike Howard. This is commonly referred to as a lane diet.

- Bike lanes (one in each direction)
- climbing lane (one in one direction)
- buffered bike lanes
- Protected bike lanes/Cycle tracks
- Shoulder widths of 3 feet or greater

Where space is needed to provide bicycle facilities or improve bicycling conditions on a Network route, consideration should be given to reducing turn lane widths to 9 feet; the primary consideration being the volume of vehicles making turns at that location, and the expected amount of truck traffic.

Road Diets

In select locations, the bikeway facilities called for in the Plan would require removing of one or more travel lanes along a section of a road with multiple automobile travel lanes. This action has only been indicated in locations where field observations suggest that this may be feasible with minimal disruption to motor vehicle traffic flow. A more detailed study and review would be needed as part of any facility design and feasibility assessment including traffic flow and level of service analysis.

Shoulder Width Minimums

In locations where bicycle traffic is expected to be and remain relatively low, and the landscape is largely rural, it may be desirable to provide paved striped shoulders as the bicycle accommodation rather than marked bike lanes. Shoulders can be used for a variety of purposes, emergency parking, breakdown lane, farm vehicle travel, postal delivery, and infrequent parking needs. Moreover, it is typically not cost effective to place the arrows and bicycle symbols on the shoulders of rural roads which can be miles in length.

The following guidance is recommended for Bikeway Network roads where the recommended bicycle facility is a Striped and Paved Shoulder:

- On two and four lane roads, where use of lane diets and shoulder widening cannot create enough space for striped shoulders of 3 feet or greater, it is best to place the edge line of the outside lane within 1-foot of the edge of pavement and provide 10-13-foot outside lanes. Strongly consider use of shared lane markings and BIKES MAY USE FULL LANE sign, or SHARE THE ROAD signs.

- On state and county roads with a speed limit of 35 mph, 5 foot wide shoulders are preferred; 4 feet is acceptable.

- Where speed limits are 40 or 45 mph, 8 foot wide shoulders are recommended.

- Where speed limits are 50 or 55 mph, 10 foot wide shoulders are recommended.

- 10 foot wide shoulders are required on 55 mph roadways because state law prohibits cyclists from riding in the travel lane on any road with a speed limit of 55 mph or greater.

- In general, for traffic safety reasons, on rural roads shoulders greater than 5 feet but less than 8 feet are not recommended.

Bike Lane Width Standards

- 5 feet of asphalt is the preferred bike lane width for a open or closed (curbed) section roadway.

- 4 feet of asphalt is acceptable for an open section roadway.

- On open section roadways, the outside bike lane stripe is optional; however it increases visibility for both the cyclists and motorists at night.

- 4 feet of asphalt is acceptable for a curbed roadway with a one-foot gutter pan and seam that is not a hazard. An outside lane stripe of the bike lane should not be used.

- 6 feet of asphalt is acceptable for both an open or curbed section (7 feet with gutter pan), however it is recommended that the left side bike lane stripe be increased from the standard 4 inch width to 6 inches or more.

- When designing lane diets on for roads with travel lanes with excessive width that is not needed for travel lanes, and the width allocated for bicycle accommodation is 7 or more feet, it is recommended that buffered bike lanes be installed.

Buffered Bike Lane Widths

- Buffered bike lanes may vary in width from 7 to 11 or 12 feet. Generally, the bike lane should be designed to be 5 or 6 feet wide, not counting the gutter pan, and the remainder of the space striped as buffer space between the bike lane and adjacent travel lane.

Shared Use Path Width

The Shared Use Path Bicycle Level of Service (SUBLOS) model should be used to determine path width for new paths and projects when existing paths are surfaced, resurfaced or widened.

- In general this will result in a minimum path width of 10-feet, and recommended path width of 11 feet for paths that will be primary transportation routes as well as carry significant volumes of recreational users of all modes. 12- to 14-foot shared use paths will be needed in areas where high volumes of bicyclists and pedestrians are expected and desired.

- Path widths of 9 and 8 feet are acceptable for short segments of path, to address design constraints, or in areas where paths are likely to receive a low volume of users. Where sidepaths are placed along arterial roadways, and no or minimal on-road bicycle facilities are provided, it is highly recommended that 8-foot paths be placed on both sides of the road to provide for bicyclists and pedestrians. Maintaining the 5 foot lateral buffer between the edge of the path and the curbed edge of the roadway is critical. In areas where a 5-foot lateral buffer is not feasible, a vertical barrier can be used, however it typically takes a minimum of 3 feet laterally to install a vertical barrier. If bike lanes or shoulders of 3-feet or greater are provided on the roadway, the buffer may be reduced 1 foot for every additional 2 feet of space created right of the motor vehicle travel lane.

- Adjacent to commercial or mixed use areas, where pedestrian traffic is expected to be higher, use the SUPBLOS to determine widths greater than 8 feet for the paths on one or both sides.

Shared Use Path Bridge and Boardwalk Widths

- In general, shared use paths should carry their pavement width and 2-foot shoulders (on each side) across bridge and boardwalk structures (see AASHTO). However, if the bridges or boardwalks are relatively short, 200 feet or less, carrying only 1-foot of shoulder (shy space adjacent to the railing) is acceptable.

- Bridges and boardwalks that provide views, or that cross natural areas and scenic areas that may attract trail users to stop and observe wildlife, should follow AASHTO, and may need to have even wider "bumpouts" created to allow trail users to safely stop on the structure and not block the main path of travel.

Sidewalk with Bikes Permitted Widths

- In locations, where Sidewalk with Bikes Permitted is the recommended facility and an existing sidewalk is present, if feasible and determined to be cost-effective it should be widened to at least 6 feet, and a sidewalk or other bikeway should be provided on each side of the roadway. Six feet is a minimum width that will allow a cyclist to pass another cyclist at a slow speed, or a cyclist to pass a pedestrian at slow speed.

- New construction of Sidewalks with Bikes Permitted (a rare occurrence) should be at least 6 feet in width, 7 feet is better, 8 feet will achieve the minimum shared use path width; if a barrier or 5-foot buffer is also feasible.

Maintaining Shoulder Widths on Bypass Lanes on Rural Roads

In rural areas, where bypass lanes are provided on two lane roads, if the roadway section approaching the bypass lane has a shoulder it is essential that the shoulders are continued through the widened roadway section.

Slip Lane Design and Warrants

Right turn slip lanes at intersections can create a dangerous situation for cyclists. Traffic volume warrants for slip lanes should be reviewed. Where they are provided, a pocket bike lane should also be provided and a dashed bike lane showing the cyclist's left merging movement. The radii of slip lanes should be designed to reduce entry and exit speeds. High quality bicycle and pedestrian crossing accommodations should be provided for those traveling on the crossing roadway.

Bike Design for Roundabouts

Existing roundabouts and traffic circles should be retrofitted to provide bicycle accommodations and appropriate warnings for bicyclists and motorists. Most roundabouts in the County are appropriately small and one lane. Bicyclists should be encouraged to take the lane upon approach to roundabouts and they should be provided sufficient advance warning. Motorists should be alerted to expect this movement from cyclists and directed to yield respectfully.

Bicycle Friendly Traffic Calming

Traffic calming measures such as speed humps, curb extensions, chicanes, etc. should be designed to allow easy passage for cyclists. When travel lanes are narrowed at intersections or mid-block crossings to reduce crossing distances for pedestrians, slots should be provided so that bicyclists traveling on the right do not have to merge into the travel lane to pass through the narrowed section of roadway. Other bicycle-friendly traffic calming designs can be found in the AASHTO bike guide.

Shared Roadway with Safety Treatments

This plan recommends development of a safety treatment for 106 miles of roadway that generally can be characterized as follows:

- Two 10-12' paved travel lanes
- No or minimal shoulder, unpaved
- Speed limit of 35 mph or greater; advisory speed limits of 30 or less on sharp curves
- Traversing hilly terrain and crossing numerous stream drainages
- Drainage ditches, farm fields and mature trees on the edge of the roadway
- Periodic curves with poor sight distances
- Forested and/or rural residential landscape

The following design treatments are recommended to increase cyclists' and motorists' safety.

- Utilize existing signs, such as the BIKES MAY USE FULL LANE sign.

- Use available flexibility in the MUTCD to develop auxiliary word plaques to more directly address situations and appropriate driver and cyclists' response, such as PASS WITH CARE, ALLOW 3 FEET, EXPECT CYCLISTS, etc.
- Ensure that sign messages are unambiguous and have separate messages directed to motorists and cyclists, explaining why and how all users must share the road.
- On hills, in the uphill direction, add bike pullout lanes, i.e. short segments of shoulder where a cyclist can pull to the side and let a line of cars following them to safely pass.
- Use new technologies to detect cyclists in potentially hidden locations and inform approaching motorists of their presence; use similar technologies to inform motorists traveling at unsafe speeds.

Howard County Scenic Roads

County policy governing improvements to designated scenic roads state, "Improvement to scenic roads must protect the features that contribute to the road's scenic character, such as width, alignment, and vegetation or slopes within the right-of-way…road design standards require that improvements within the right-of-way of scenic roads be designed to preserve the character of the road while providing safe conditions for traffic."

While it may need to be clarified in future amendments to this legislation or policy documents, safe conditions for traffic should be understood to include bicycle traffic, as cyclists are legal users of Howard

County scenic roads. Current recommendations to update scenic roads policy suggest that "road improvements should be restricted to carefully-designed spot improvements which retain the scenic qualities of the road. Many of the bicycle safety treatments referred to in the Bike Howard Plan for potential application on roads mapped as *Shared Roadways with Safety Treatments,* are in keeping with this policy recommendation; i.e. they are oriented to spot improvements and strategic signage that will enhance bicycle safety on these roads.

State Scenic Byways

MD 144 is the only state scenic byway in Howard County. This designation may have an impact on the types of bikeways that can be installed on this roadway. The following policy language is provided in Context Sensitive Solutions for the Maryland Historic National Road Scenic Byway, 2006, published by the MD State Highway Administration.

> *"Maryland State Highway Administration recently adopted a policy whereby SHA 'Shall make accommodations for bicycling and walking a routine and integral element of planning, design, construction, operations and maintenance activities as appropriate.' SHA's policy also states that a 'minimum four (4) foot wide outside shoulder is preferred on all roadways with open sections.' This policy may apply when doing resurfacing work. The policy will only be applied if it is reasonable to do so and pavement would not be widened just for bicycle use. Decisions regarding requirements for bicycle accommodations should be made carefully taking into consideration the importance of maintaining the character-defining features of the Historic National Road. The features of the Historic National Road's context that should be maintained include rural roads with a narrow scale, usually with a close proximity of trees and/or other landscape features. In this situation (*where historic and scenic resources must be protected*), a design waiver may be requested to minimize or eliminate the proposed bike lane in order to lessen the potential adverse effect. If widening is required to accommodate new development, then additional pavement width will be added for bicycles unless an exception to SHA policy is granted."*

APPENDIX B

Public Process and Assessments

Plan Howard developed an extensive public outreach and feedback process for the master plan. It included extensive public involvement, regular briefings of a Technical Advisory Group, stakeholder interviews, an on-line public survey and an interactive online public comment map.

The Technical Advisory Group

The Technical Advisory Group (TAG) included twelve representatives of key agencies and stakeholders in the County. The TAG met six times over the course of the plan development process and provided guidance in a number of areas, including public involvement strategies, agency coordination, specific network recommendations and policy review.

Two of the six TAG meetings were geared to a wider audience. Each of these meetings had about 35 people in attendance including representatives from key county institutions and major employers.

Technical Advisory Group Members	**Technical Advisory Group Meeting Dates & Locations**
Benjamin Pickar, Howard County Office of Planning and Zoning Captain John McKissick, Howard County Police Department Chris Tsien, Bicycle Advocates of Howard County Ian Kennedy, Howard County Administration and the Horizon Foundation Jane Dembner, Columbia Association Jen Terrasa, Howard County Council Jim Dooley and Shiva Shrestha, MD State Highway Administration Joel Gallihue, Howard County Public Schools John Powell, Howard County Office of Transportation Josh Russin, Howard County Administration Mark Deluca, Howard County Department of Public Works Paul Walsky, Howard County Department of Recreation and Parks	Meeting No. 1: Tuesday, June 12, 2012, Ellicott City, MD Meeting No. 2: Wednesday, August 29, 2012, Robinson Nature Center Meeting No. 3: Wednesday, October 24, 2012, Robinson Nature Center Meeting No. 4: Thursday, January 31, 2013, Ellicott City, MD Meeting No. 5: Friday, March 1, 2013, Robinson Nature Center Meeting No. 6: Thursday, October 17, 2013, Ellicott City, MD
Organizations Represented Among the Community Advisors **Representatives from these organizations attended one or both of TAG meetings 3 and 5)**	
Baltimore Metropolitan Council Bicycle Advocates of Howard County (*BAHC*) Columbia Association Denee Barr Photography Development Design Consultants FSH Associates Horizon Foundation Howard Community College Howard County Council Howard County Department of Public Works (*HCDPW)* Howard County Economic Development Authority (*HCEDA*) Howard County Government Howard County Parks and Recreation Howard County Police Department (*HCPD*) Howard County Public School System (*HCPSS*)	Howard County Executive's Office Howard County Tourism Howard County Traffic Maryland Department of Transportation (*MDOT*) Mount Airy Bicycles National Security Agency (*NSA*) Princeton Sports Public Transportation Board (*PTB*) Race Pace Bicycles ROMC State Highway Administration (*SHA*), District & Headquarters Office

Stakeholder Interviews and Meetings

Stakeholder interviews were conducted with an extensive range of agencies and policy makers. The purpose of these interviews was to explore coordination and nexus issues more thoroughly with staff who will be involved in ongoing efforts to implement Plan. Meeting summaries are available from the HC Department of Planning and Zoning:

• July 19, 2012	Bicycle Advocates for Howard County
• July 19, 2012 & February 13, 2013	HC Department of Public Works
• September 15, 2012	HC Department of Recreation and Parks
• September 28, 2012	Councilwoman Jen Terrasa, District 3
• October 11, 2012	State Highway Administration
• October 22, 2012	Columbia Association
• November 2, 2012	HC Department of Planning and Zoning
• November 29, 2012	HC Office of Transportation & HC Department of Planning and Zoning

Public Outreach

Public involvement was facilitated through public workshops, an online survey and an online interactive map. Overall, more than 750 people were engaged in the process and provided comments on every aspect of bicycling in the County.

Public Workshops

The core activity in the public engagement process included a series of six public workshops conducted in September, October and November of 2012. A total of 125 people attended at least one of these workshops which were located in various neighborhoods and locations around the County, including: Ellicott City, Columbia, Maple Lawn/Applied Physics Lab, North Laurel, Elkridge and Glenwood. At each of these meetings, participants received a slide presentation discussing bicycle transportation facilities and were engaged in discussions about safety education, encouragement and enforcement needs and opportunities. Maps were provided for recording comments and needs in specific locations; comment cards were provided as well. The meetings were well received and included a cross section of county residents

Additional public outreach efforts included the provision of information tables or presentations at other public events or meetings of various groups within the county, including the 2012 Columbia Bike About, Office on Aging's first Cycle2Health ride for Seniors, the Public Transportation Board, the Environmental Sustainability Board and Transportation Advocates.

- *Public Meeting #1*- Miller Branch Library, Ellicott City, MD. September 22, 2012
- *Public Meeting #2*- East Columbia Branch Library, Columbia, MD. October 3, 2012
- *Public Meeting #3*- Glenwood Branch Library. Cooksville, MD. November 7, 2012
- *Public Meeting #4*- JHU-Applied Physics Lab, Build.1, Parsons Auditorium, October 24, 2012.
- *Public Meeting #5*- North Laurel Community Center, Laurel, MD, November 14, 2012
- *Public Meeting #6*- Elkridge Landing Middle School, Elkridge, MD. November 2012.

Meetings with Community Groups

- Columbia Bike About (Information Table)
- Office on Aging's first Cycle2Health ride for Seniors
- Public Transportation Board
- Environmental Sustainability Board
- Transportation Advocates

Project Website

A project website was created early in the project and was maintained throughout the planning process. The website was used to raise awareness about the plan and inform citizens about the various opportunities they had to provide input. Meeting announcements and supporting documentation were posted to the site and direct comments were accepted via email. The site acted as a portal to the Interactive Online Maps and the Online Survey.

Interactive Online Map

The interactive online map was available for public use from mid September 2012 through the end of November 2012. More than 500 people provided more than 450 specific comments on the map showing where they would like to see bike lanes, and shared use paths, and where intersections are particularly difficult to cross. Key bicycling destinations, trail access points and a variety of other specific issues were mapped and described in text comments that discussed existing problems and/or desired improvements.

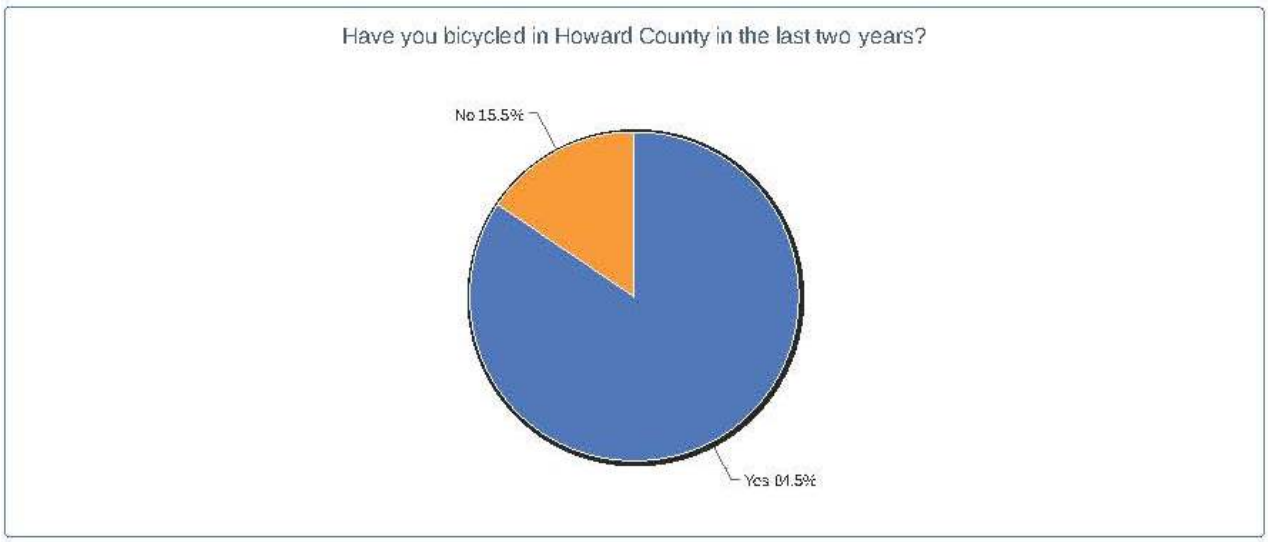
The Interactive Plan Review map was available for public review from September 1st through October 12, 2013. This interactive map provided the general public an opportunity to indicate which proposed improvements they agreed with, disagreed with, in addition to allowing them to suggest additional road or trail improvements not shown in the draft bikeway network. To provide various forms of public comment, PDF copies of the recommended bikeway network were also made available for download through the project website www.bikehoward.com. During the public comment process around 500 people provided over 450 comments on proposed route and intersection improvements.

Online Survey

The online survey asked 10 questions about bicycling in the County.

- More than 50% of respondents said that the paved paths and trails are what they like most about biking in Howard County.
- Helping the environment and enjoying well maintained road surfaces were selected by 20% of respondents.
- When asked about their trip purpose, 70% said they biked for fun; 55% for exercise and fitness. 50% bike to do shopping and run errands; 50% bicycle to visit family and friends. Only 20% regularly bicycle to work.
- In answer to questions about bicycle facilities, the majority of respondents prefer off-road paved trails and paths (60%) with 45% preferring paved shoulders and 38% striped bike lanes. Less than 10% prefer to bicycle on sidewalks.
- When asked what would influence you to bicycle more often, 70% of respondents said more bike lanes on major streets and 70% said paved shoulders on narrow roads. Only 25% said better road maintenance and 35% said more on road bike signage.

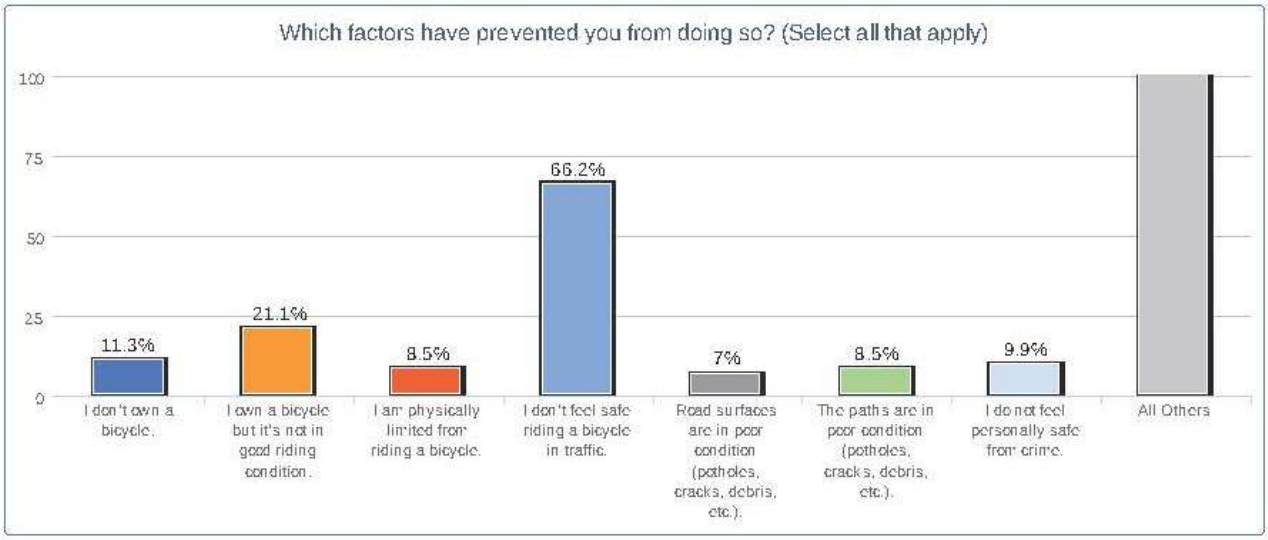
- The full results are presented below



1. Have you bicycled in Howard County in the last two years?

Value	Count	Percent %
Yes	386	84.5%
No	71	15.5%

Statistics	
Total Responses	457



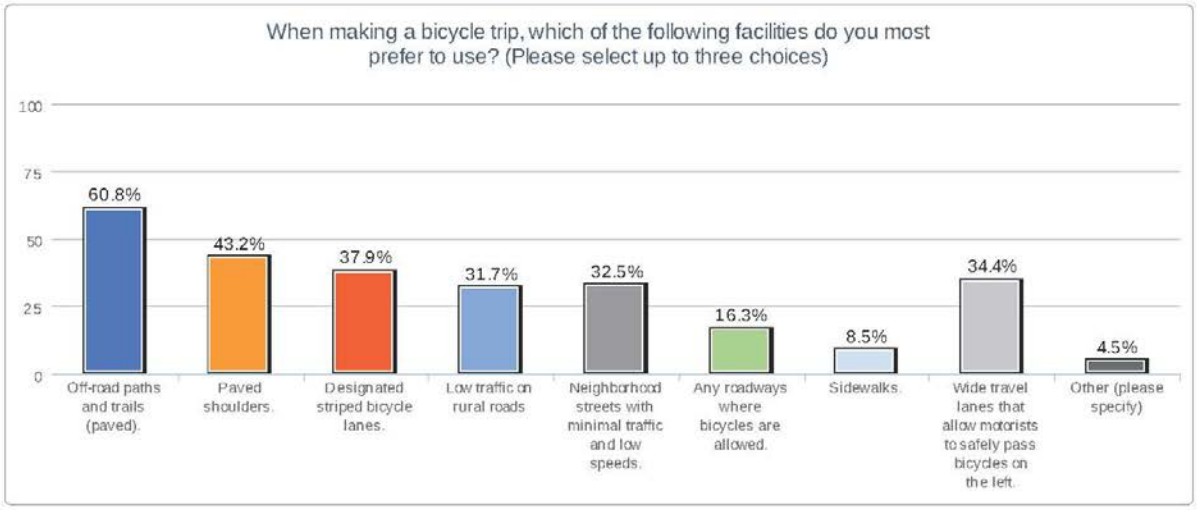
2. Which factors have prevented you from doing so? (Select all that apply)

Value	Count	Percent %
I don't own a bicycle.	8	11.3%
I own a bicycle but it's not in good riding condition.	15	21.1%
I am physically limited from riding a bicycle.	6	8.5%
I don't feel safe riding a bicycle in traffic.	47	66.2%
Road surfaces are in poor condition (potholes, cracks, debris, etc.).	5	7.0%
The paths are in poor condition (potholes, cracks, debris, etc.).	6	8.5%
I do not feel personally safe from crime.	7	9.9%

Statistics	
Total Responses	71

Value	Count	Percent %
The paved bicycle paths and trails (off-road)	212	56.7%
I am within bicycling distance of many important destinations	99	26.5%
Agreeable weather	81	21.7%
Motorists respect bicyclists on the roadways	31	8.3%
I feel like I am helping the environment	88	23.5%
Crossing roadways is safe and easy	7	1.9%
Road surfaces are well maintained	78	20.9%
It is a quick way to get around	28	7.5%
Mountain Biking	54	14.4%
The rural landscapes in Western Howard County	131	35.0%
It saves me money	41	11.0%
Other (please specify)	61	16.3%

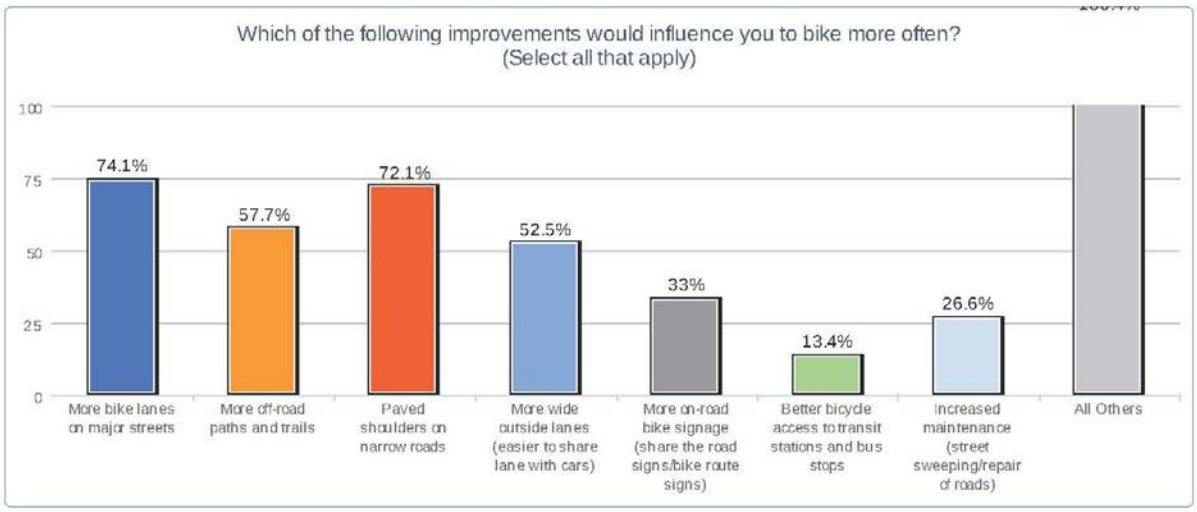
Statistics	
Total Responses	374



5. When making a bicycle trip, which of the following facilities do you most prefer to use? (Please select up to three choices)

Value	Count	Percent %
Off-road paths and trails (paved).	228	60.8%
Paved shoulders.	162	43.2%
Designated striped bicycle lanes.	142	37.9%
Low traffic on rural roads	119	31.7%
Neighborhood streets with minimal traffic and low speeds.	122	32.5%
Any roadways where bicycles are allowed.	61	16.3%
Sidewalks.	32	8.5%
Wide travel lanes that allow motorists to safely pass bicycles on the left.	129	34.4%
Other (please specify)	17	4.5%

Statistics	
Total Responses	375



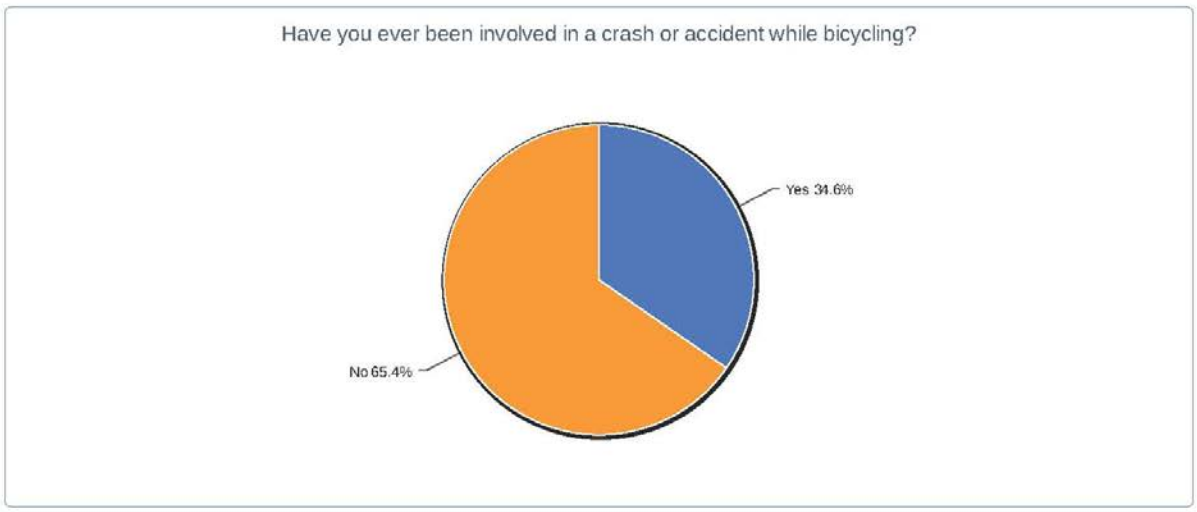
6. Which of the following improvements would influence you to bike more often? (Select all that apply)

Value	Count	Percent %
More bike lanes on major streets	326	74.1%
More off-road paths and trails	254	57.7%
Paved shoulders on narrow roads	317	72.1%
More wide outside lanes (easier to share lane with cars)	231	52.5%
More on-road bike signage (share the road signs/bike route signs)	145	33.0%
Better bicycle access to transit stations and bus stops	59	13.4%
Increased maintenance (street sweeping/repair of roads)	117	26.6%
Increased enforcement of traffic laws	98	22.3%
Education for yourself on how to ride with motor vehicle traffic	46	10.5%
Education for motorists on how to respectfully share the road	168	38.2%
Better bicycle parking/storage	108	24.6%
Showers and lockers at work	66	15.0%
A bike sharing program such as Capital Bikeshare in the DC Area	32	7.3%
Other (please specify)	55	12.5%

Statistics	
Total Responses	440

7. In the last year, did you take your bike on the following modes of public transportation?

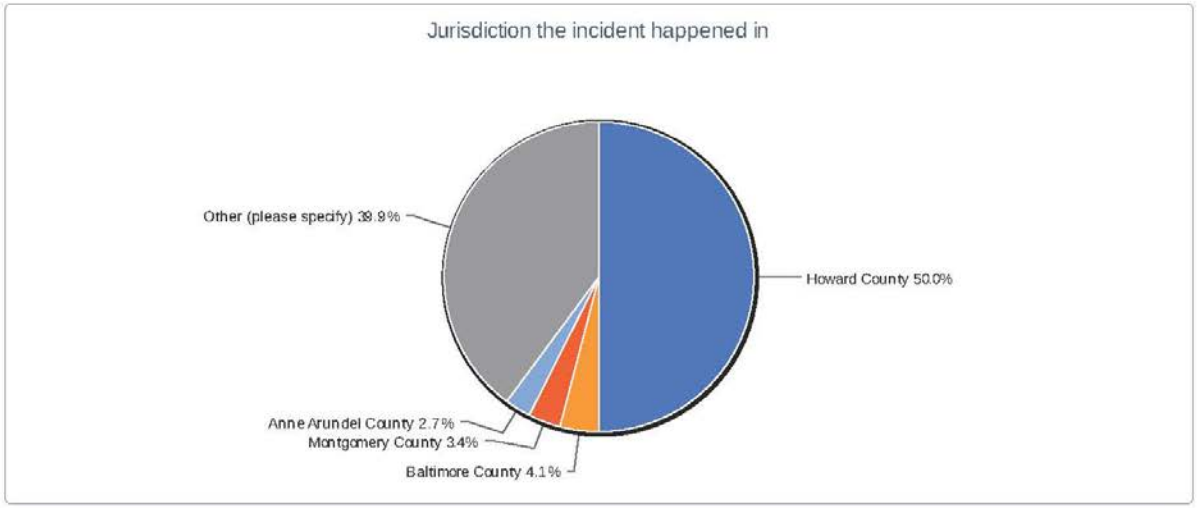
	Yes	No	Responses
Bus	**3.2%** 14	**96.8%** 419	433
Metrorail in DC Area	**6.5%** 28	**93.5%** 406	434
Folding bike on the MARC Train	**0.2%** 1	**99.8%** 430	431
Light Rail or subway in Baltimore	**3.0%** 13	**97.0%** 419	432



8. Have you ever been involved in a crash or accident while bicycling?

Value	Count	Percent %
Yes	152	34.6%
No	287	65.4%

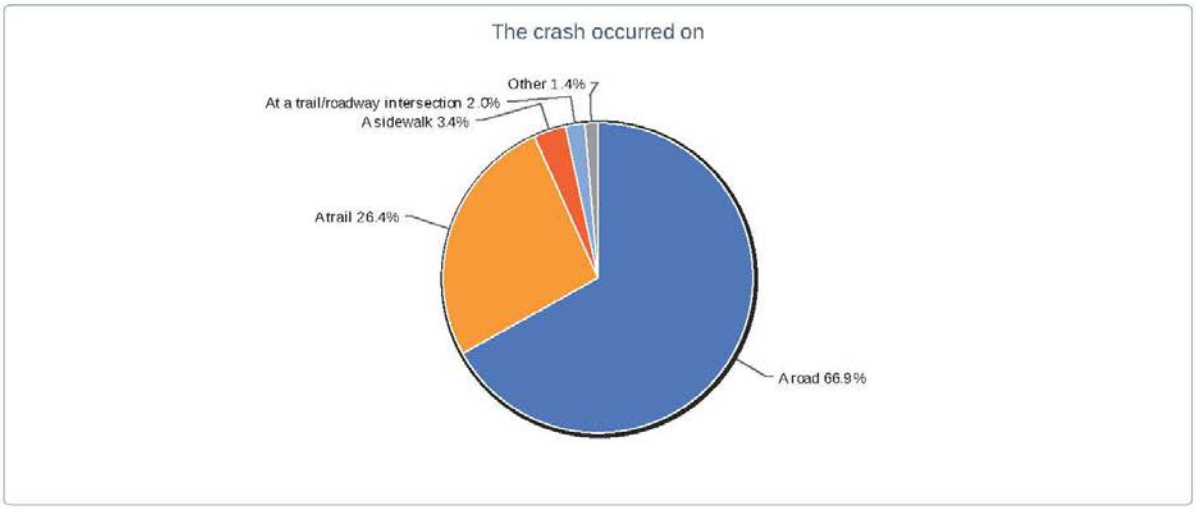
Statistics	
Total Responses	439



9. Jurisdiction the incident happened in

Value	Count	Percent %
Howard County	74	50.0%
Baltimore County	6	4.1%
Montgomery County	5	3.4%
Anne Arundel County	4	2.7%
Other (please specify)	59	39.9%
Don't Know	0	0.0%

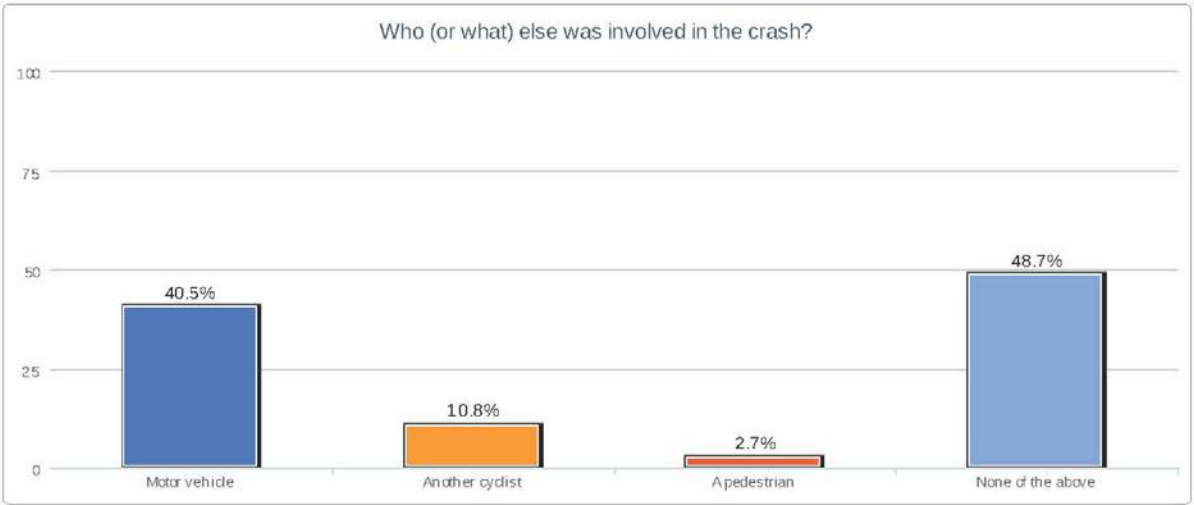
Statistics	
Total Responses	148



10. The crash occurred on

Value	Count	Percent %
A road	99	66.9%
A trail	39	26.4%
A sidewalk	5	3.4%
At a trail/roadway intersection	3	2.0%
Other	2	1.4%

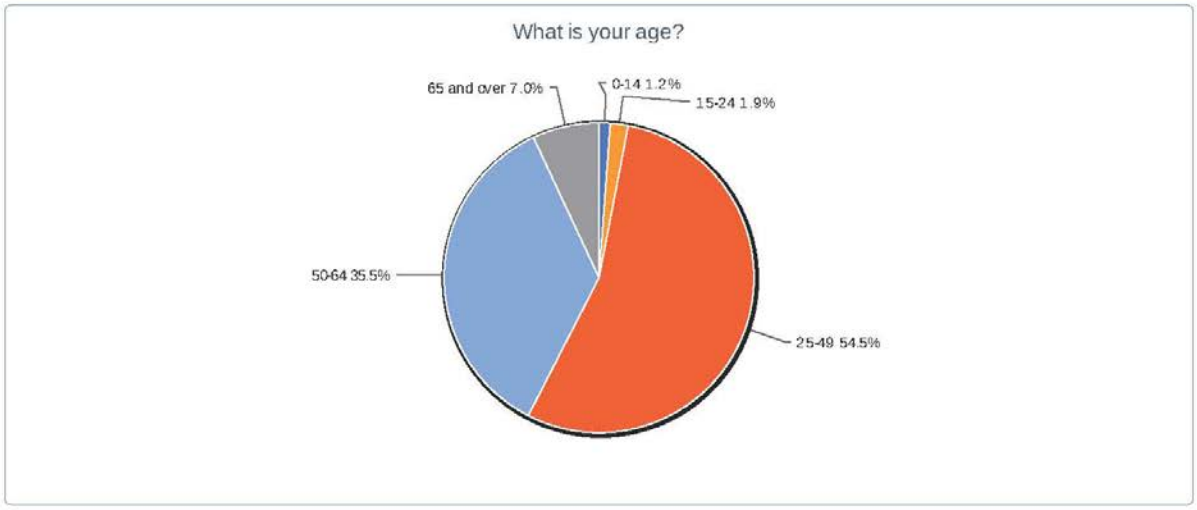
Statistics	
Total Responses	148



11. Who (or what) else was involved in the crash?

Value	Count	Percent %
Motor vehicle	60	40.5%
Another cyclist	16	10.8%
A pedestrian	4	2.7%
None of the above	72	48.7%

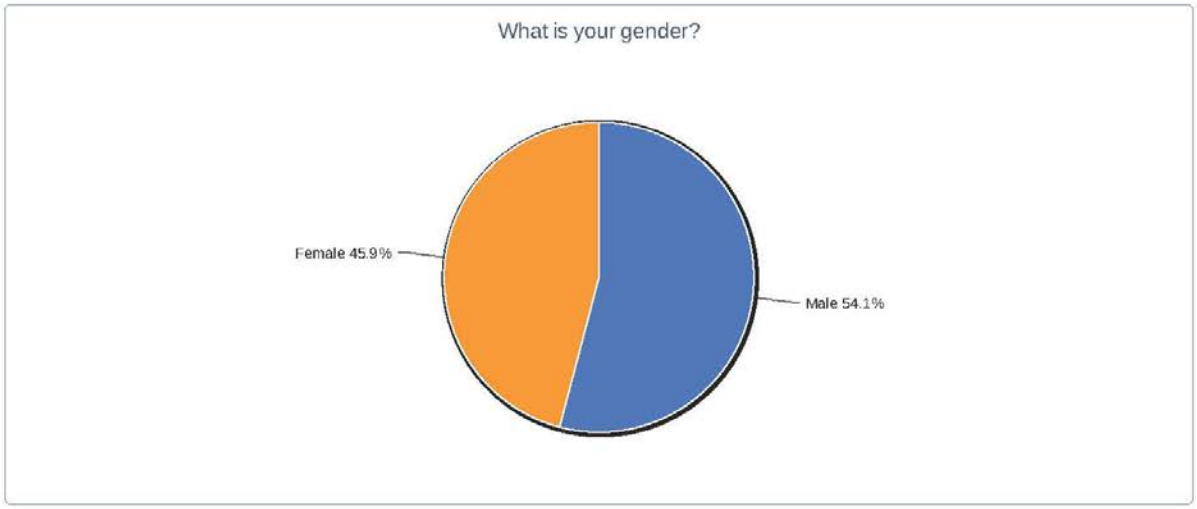
Statistics	
Total Responses	148



12. What is your age?

Value	Count	Percent %
0-14	5	1.2%
15-24	8	1.9%
25-49	235	54.5%
50-64	153	35.5%
65 and over	30	7.0%

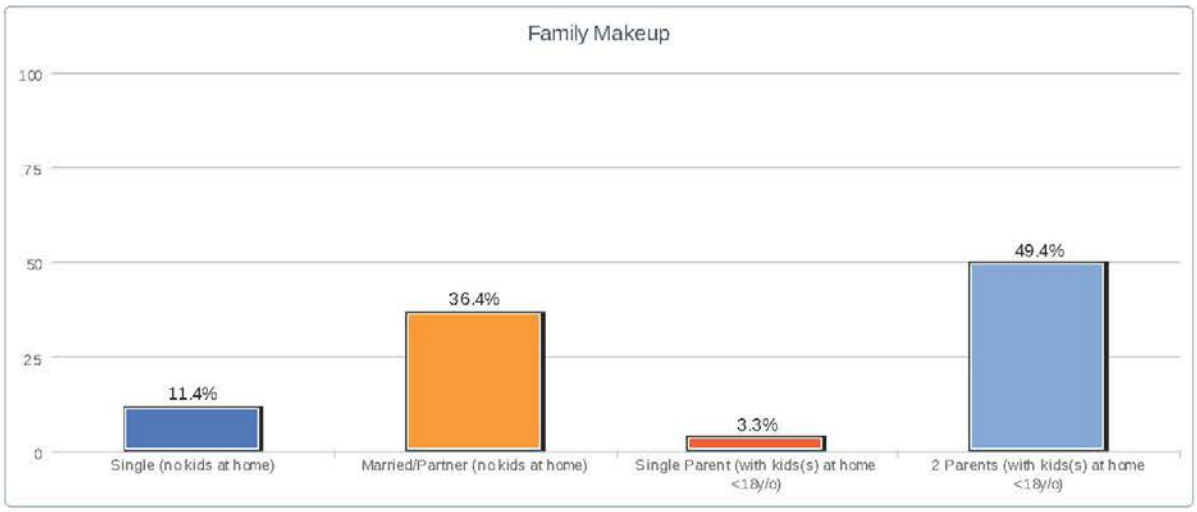
Statistics	
Total Responses	431
Sum	15,595.0
Avg.	36.6
StdDev	14.3
Max	65.0



13. What is your gender?

Value	Count	Percent %
Male	231	54.1%
Female	196	45.9%

Statistics	
Total Responses	427



14. Family Makeup

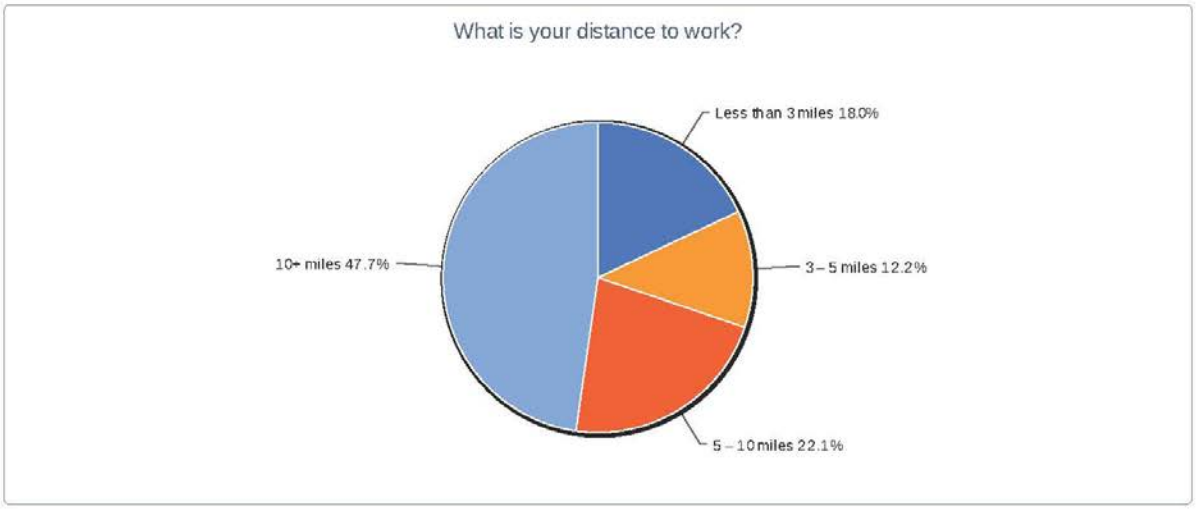
Value	Count	Percent %
Single (no kids at home)	49	11.4%
Married/Partner (no kids at home)	157	36.4%
Single Parent (with kids(s) at home <18y/o)	14	3.3%
2 Parents (with kids(s) at home <18y/o)	213	49.4%

Statistics	
Total Responses	431
Sum	426.0
Avg.	2.0
Max	2.0

15. How long have you lived in Howard County (in years)?

Count	Response
15	0
14	1
27	10
12	11
32	12
12	13
11	14
21	15
8	16
1	1625
7	17
12	18
7	19
17	2
21	20
8	21
13	22
10	23
7	24
19	25
2	26
2	27
5	28
5	29
19	3

9	30
2	31
3	32
6	33
3	34
7	35
3	36
5	37
1	38
13	4
6	40
1	41
2	42
1	43
1	44
3	45
1	47
1	49
8	5
3	50
1	51
1	52
1	54
8	6
1	60
5	7
15	8
7	9
1	Fairfax?
1	asdf



16. What is your distance to work?

Value	Count	Percent %
Less than 3 miles	71	18.0%
3 – 5 miles	48	12.2%
5 – 10 miles	87	22.1%
10+ miles	188	47.7%

Statistics	
Total Responses	394
Sum	2,459.0
Avg.	7.6
StdDev	2.9
Max	10.0

17. What is your zip code?

Count	Response
1	20143
1	2019
1	20722
26	20723
1	20749
9	20759
2	20763
7	20777
4	20794
1	20832
1	20902
2	20910
1	20912
23	21029
3	21036
65	21042
54	21043
53	21044
65	21045
23	21046
20	21075
3	21076
1	21090
5	21104
7	21163
1	21227
3	21228
1	21230
1	21244
2	21723
3	21737
7	21738
4	21771
2	21784
5	21794
15	21797

Field Survey

Roadways

Field analysis of county and state roadways and existing and potential rail corridors was conducted between September 2012 and February 2013. More than 300 miles of roadway were reviewed by the consultant team. The roadway assessment reviewed factors that are important for determining the need and potential for bicycle accommodations. In addition to the survey, 1-3 stops per roadway segment are made to take cross section measurements. Because the primary purpose of the survey was to make a bicycle facility, a complete inventory of these features was not documented for every roadway section reviewed. None-the-less, much of the data collected was logged electronically in a GIS database and additional data was logged manually on data collection sheets.

Below is a list of factors that were considered in the field review process:

- Street connectivity
- Topography
- Functional classification
- Types of land uses served
- Speed Limit
- Observed traffic speeds and volumes
- Traffic controls at intersections
- Presence of turn lanes at intersections
- Intersection design
- Presence of and design of highway interchanges
- Pavement quality
- Trail connectivity
- Presence of sidepaths
- Truck traffic volumes
- Presence of public bus routes
- Relationship to key destinations
- Connectivity to adjacent jurisdictions
- Presence of barriers and potential as a barrier avoidance route
- Potential sight distance or other safety issues (dangerous drainage grates)
- Potential for roadway hazards including vegetative overgrowth
- Observed cyclists,
- Observed need for parking
- Roadside conditions such as drainage structures, presence of sidewalks, buffers, forests, streams, wetlands etc.
- Roadway Measures:
  - Curbed or open section
  - Overall road width
  - Median width
  - Number and width of travel lanes
  - Shoulder width
  - Presence of parking and parking lane width

Trail Corridors

To complement the field analysis of roadways, the plan conducted a field assessment of potential trail corridors and off street connections. The assessment included evaluating field conditions to determine if the construction of shared use paths would be feasible. The field assessment report is presented below:

Bike Howard

Bicycle Master Plan
Howard County, Maryland

Field Assessments for Select Trail Corridors

Prepared by:

Vision Engineering and Planning

June, 2013

Table of Contents

I. INTRODUCTION

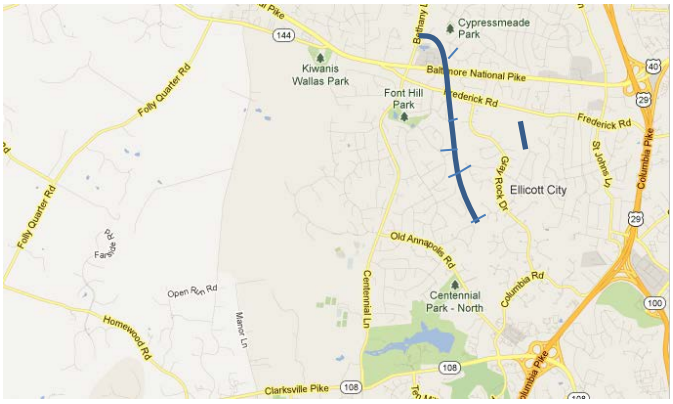
In support of the development of Bike Howard, the Howard County Bicycle Master Plan, Vision Engineering and Planning, LLC has been tasked with conducting field visits to trail corridors, potential trail corridors, and areas where off-street connections are needed as a component of the overall Plan. The locations and/or corridors investigated were among those that were not studied in the recent Columbia Association (CA) pathways plan, however they may be connected to or directly related to CA pathways or other proposed trails. The inventory consisted of evaluating field conditions to determine if the construction of shared-use paths might be feasible given the terrain, right-of-way, and environmental conditions. In consultation with County staff, Toole Design Group (TDG) selected the following locations for Vision Engineering and Planning to review:

- Ellicott City Area
- Dorsey's Search
- Long Reach Area
- Oakland Mills Area
- Lake Elkhorn/Snowden River Parkway Area
- Oakland Ridge Area
- Maple Lawn-North Laurel Area
- Potential route to APL
- Eden Brook Drive to APL
- Mayfield to Distant Rock Path
- Gateway Commerce to Columbia Pathway System
- Route MD 175 Underpass
- Connection to Disc Golf Course at Rockburn Branch
- Power Line Corridor Parallel to Montgomery Road
- Road Conditions on Long Gate Parkway
- Trail Through Waterloo Elementary School

- Short Cut Between Snowden River Parkway and Existing Pedestrian/Bicycle Tunnel Under MD 175
- Connection to Lowes Shopping Center

II. ELLICOTT CITY AREA

In the Ellicott City area, an extension of the Little Patuxent Trail from Larkspring Row, north to Bethany Lane was investigated.



Field review: The field review began near Cypressmede Park and continued to Larkspring Row. The terrain south of Frederick Road is level, and construction of a path adjacent to the stream bed is feasible. Directly north of Frederick Road, the terrain is steeper, and there is a small stream that would require a structure to cross.

Stream bed north of Frederick Road

Blue River Ct

Would require easement for access

The terrain on the west side of the stream bed is much steeper south of Frederick Road making it difficult to add proposed neighborhood connections on that side of the proposed path.

Consultation with staff at Howard County Department of Recreation and Parks: Consultation with Howard County Department of Recreation and Parks indicated that they had no plans for additional paths in this area.

Review Topography in GIS, property boundaries (parcels) and land cover/natural resource designation, including public ownership: The land cover along the corridor is forested with clear areas near the stream bed. No private lots traverse the corridor; however the stream bed passes through one private parcel associated with the Enchanted Forest shopping area. Given that the path is proposed on the north side of the stream bed, there would be no conflicts with this parcel.

Check the potential connecting points to the neighborhood as mapped by TDG: The access point to the proposed trail at Larkspring Row would require an easement at a private residence. This is also the case for connections at Blue River Court, Gray Rock Drive, and Horned Owl Court.

The grades on the west side of the stream bed preclude connections to Grosvenor Drive and Arjay Circle. Grades are also steep near the proposed connection to Plum Meadow Drive.

Would require easement for access to public library

The Plum Meadow Drive connections could be built if an easement is purchased near one of the private residences. This is an important connection between the neighborhood and the public library located on Frederick Road.

The connection to Elmmede Road would not require an easement and is feasible to construct with minimal grading.

Assess the prospects for crossing Route 40: A crossing over Route 40 would require the construction of a pedestrian/bicycle bridge. The Route 40 bridge over the stream is too narrow to construct a bike path under the bridge, adjacent

to the stream. Constructing a pedestrian bridge at this location would require significant amounts of fill on both sides of US 40 to provide the proper approach grades. An at-grade crossing is the most feasible option to cross Route 40. However, given the high speeds and traffic volumes along Route 40, and the fact that it would create a new mid-block crossing, special treatments would be needed to ensure the safety of bicyclists.

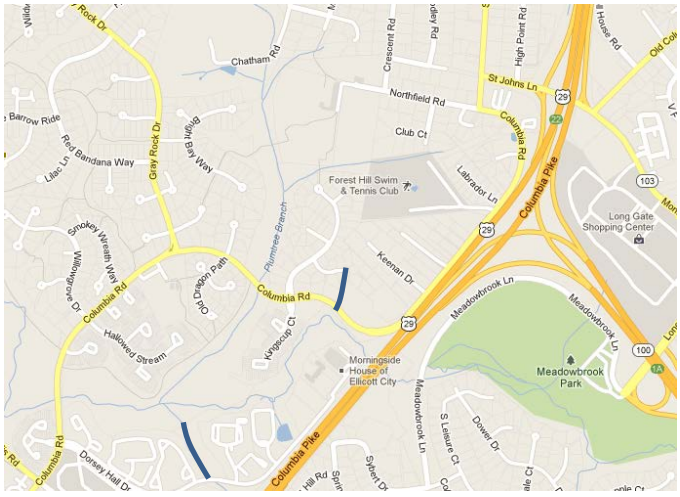
Determine if there are issues at Fredrick Road crossing point: The Frederick Road crossing has adequate sight distance for bicyclists, however, the bridge railing on Frederick Road reduces the visibility of motorists, particularly given the height of bicyclists, so this is another location where specialized treatment may be required for the crossing.

Summary of Recommendations:

- ❖ Construct connections on the east side of stream bed
- ❖ Evaluate signalized bicycle crossing at US 40
- ❖ Purchase easements as necessary to provide connections, particularly to key destinations such as the public library

III. DORSEY'S SEARCH

An extension of the Plumtree Branch trail from Columbia Road to the existing path leading to the Dunloggin MS and Northfield ES was investigated.



Field Review: This alignment is feasible and is located along an existing utility easement. The field review indicated that the proposed connections are feasible with relatively level terrain and no wetlands observed in the area. A review of

the existing paths crossing Brightbay Way and connecting to Wild Filly Court indicated that they do not have ramps for easy bicycle access.

Consultation with Howard County Recreation and Parks: Consultation with DRP staff indicated that there are plans for connections between the Village of Dorsey's Search and the east side of US 29 and south of MD 108.

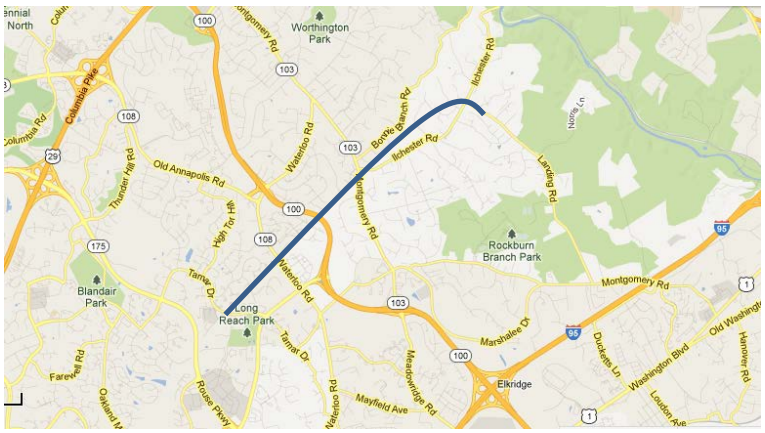
Review Topography in GIS, property boundaries (parcels) and land cover/natural resource designation, including public ownership: There are no private parcels located on the proposed alignments. The area is forested with some clearing near the stream bed.

Summary of Recommendations:

- Construct extension of the Plumtree Branch trail from Columbia Road to the existing path leading to the Dunloggin MS and Northfield ES

IV. LONG REACH AREA

The use of a major north-south powerline corridor in the county from Tamar Drive, north to Bonnie Branch Road, Ilchester Road, and Talbot's Landing was investigated for the potential use as bicycle trail.



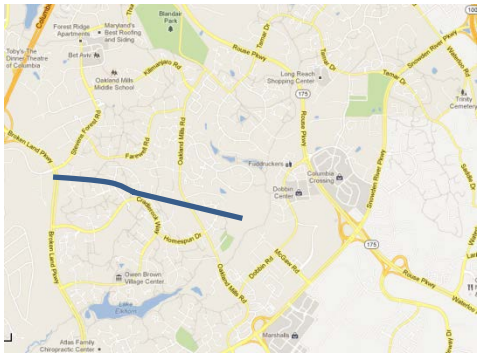
Field Review: The field review indicated that this corridor is suitable for a bicycle path, with existing gravel paths located along the corridor for service vehicles. The terrain is rolling throughout the corridor with no steep grades observed. Field evidence indicated that the power lines are owned by BGE.

Review Topography in GIS, property boundaries (parcels), streams and wetlands, and land cover: The power line corridor is completely cleared, and no public parcels are located on the corridor.

Check the potential connecting points to the neighborhood: Connections to existing neighborhoods would require coordination with BGE and private residences to obtain an easement.

Assess the prospects for crossing Route 100: Crossing over MD 100 would require the construction of a pedestrian/bicycle bridge over MD 100 which would require significant amounts of fill and the reconfiguration of sound walls along MD 100. There is no existing bridge/overpass on MD 100 at the power line crossing, which precludes crossing under MD 100, and crossing at-grade is not an option as MD 100 is a limited access facility. The field review indicated that the nearest crossing of MD 100 is located at Waterloo Road (MD 104), west of the proposed path. This would require deviating from the power line easement to Waterloo Road (MD 108) south of MD 100(northwest of the intersection of MD 108 at Brothers Partnership Court), using MD 108 and the MD 104 crossing at Route 100 to cross MD 100 before connecting back to the power easement north of Route 100 using a combination of residential streets including Elko Drive, E Glen Road, and Heatherland Court where an easement would be required to connect back to the power line corridor. This would require restriping all of these facilities which is feasible given the observed field conditions.

Summary of Recommendations:



- Construct path along power line corridor and use existing Waterloo Road overpass to cross MD 100

V. OAKLAND MILLS AREA

Vision also investigated the use of an existing

utility corridor for a trail to link east-west from the trail in the Sewell's Orchard area to the west to the proposed Little Patuxent Trail at Broken Land Parkway and Stevens Forest Road. This trail is proposed to go on the new sewer line, running north south from Kings Contrivance to Downtown Columbia.

Field review: The field review indicated some relatively steep grades in the Sewell Orchard area; however the existing bike paths in this area where constructed at an angle to reduce the uphill grade for bicyclists. This approach would be required to construct additional paths in this area. The remaining corridor is relatively level with an existing gravel path being used by access vehicles.

Review topography in GIS, and land cover/natural resource designation: A review of the topography and GIS land parcels indicated that the power lines are on reserved right of way and do not cross any private parcels. The land cover is grassy along the entire corridor.

Determine if it's a utility or public ROW: Field evidence indicated that the lines are owned by BGE. Discussion with County Engineering staff indicated that utility coordination for design projects, including bicycle paths is initiated by contacting Miss Utility at 1-800-257-7777. Miss Utility will then coordinate with the appropriate utilities to identify lines along a particular study corridor.

Check the potential connecting points to the neighborhood as mapped by TDG: A field review of the area indicated that connections to existing neighborhoods along the proposed path are feasible. In fact, several, de facto paths were observed between some of the neighborhoods and the proposed path, so there appears to be even greater opportunities to connect to neighborhoods along this alignment.

Review Topography in GIS, property boundaries (parcels) and land cover/natural resource designation, including public ownership: Field

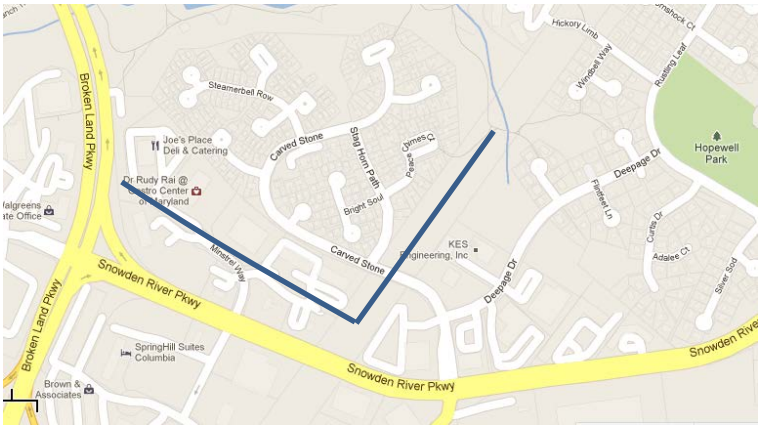
evidence indicated that the lines are owned by BGE. There are no private parcels located on the proposed line, [nor in immediate vicinity.]

Summary of Recommendations:

- ❖ Construct path between Sewell Orchard's area and Stevens Forest Road
- ❖ Construct path on angle in Sewell Orchard's area to overcome steep grades
- ❖ Construct all proposed neighborhood connections
- ❖ Explore additional neighborhood connections based on existing foot paths in area

VI. LAKE ELKHORN/SNOWDEN RIVER PARKWAY AREA

Vision investigated the potential to use parking lots, streets and a trail link across the powerline corridor to link Minstrel Way with Deepage Dr.



Field review: The field review indicated that the utility easement is suitable in this location for a bicycle path. The crossing of Carved Stone should not be problematic, as traffic volumes were observed to be very low on this road with adequate sight distance in both directions. The portion of the proposed path connecting to Minstrel Way is located behind an existing gas station, and there is limited space to construct a path at this location (< 15').

Determine which utility owns the ROW: Field evidence indicated that the lines are owned by BGE.

Review Topography in GIS, property boundaries (parcels) and land cover: There are no private parcels located on the utility line, and the utility line has

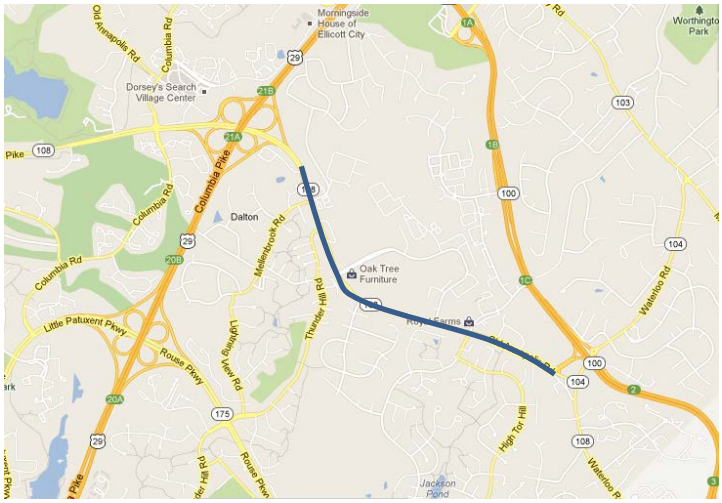
been completely cleared. Private parcels are located on the connection between the utility easement and Minstrel Way.

Summary of Recommendations:

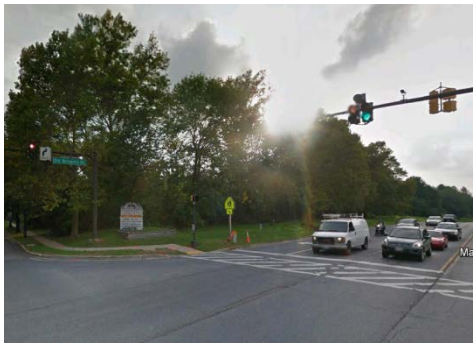
- ❖ Construct path between Minstrel Way and Deepage Drive
- ❖ Stripe bicycle lane on existing parking lot behind gas station

VII. OAKLAND RIDGE AREA

Vision researched the ownership of the Oil Pipeline Corridor on the south side of Route 108 (Annapolis Road) from Mellenbrook Road to Waterloo Road.



Field review: The field review indicated that there is potential right of way located adjacent to MD 108 for a bike path. There are currently no planned improvements to Route 108 in this section. As Built plans obtained from Colonial Gas Pipeline indicated that there is a gas pipeline easement on the north side of MD 108 that overlaps the existing MSHA Right-of-Way and CA property. The centerline of the easement is roughly 40' from the edge of pavement, but is closer at intersections where MD 108 has been widened. The easement is roughly 20' in width and crosses MD 108 west of Phelps Luck Drive and continues on the south side of MD 108 to US 29. On the south side of MD 108, the easement is much closer to the edge of the pavement (4-6'). However, the Right-of-Way in this area extends 85' from the centerline of MD 108, giving ample flexibility for the construction of bicycle paths in this corridor.

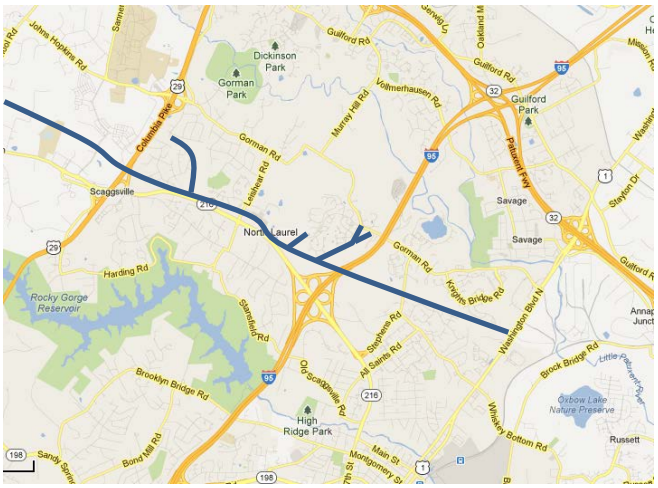


Summary of Recommendations:

- ❖ Construct path along MD 108 between Mellenbrook Road and Waterloo Road
- ❖ Contact Noah Dobbins at CenturyLink (703)-464-7529 to coordinate future bicycle path construction with Colonial Gas Pipeline

VIII. MAPLE LAWN-NORTH LAUREL AREA

The east-west powerline corridor from Pindell School Road to Route 1 was investigated for the possible construction of a bike path. This corridor roughly parallels MD 216.



Field review: The field review indicated the western and eastern portions of the corridor are suitable for a bicycle path, specifically from Route 1 to I-95 and from Scaggsville to US 29. The section of the proposed path east of Leishear Road currently has a no trespassing sign which precludes public access. There are also wetlands near Crest Road which pose another potential barrier along this proposed path.

Review Topography in GIS, property boundaries (parcels), streams and wetlands, and land cover: The utility easement has been completely cleared; the connection to Hammond Parkway is wooded. The utility easement crosses several private parcels near Leishear Road.

Check the potential connecting points to the neighborhood as mapped by TDG: The connections to Skylark Boulevard and Upper Sky Way would require traversing steep grades along the stream bed; however, the field review indicated that the paths could be constructed along an angle to the stream bed which would reduce the grades to an acceptable level.

Assess the prospects for crossing US 29, and I-95: The most significant barriers in this corridor are US 29 and I-95, neither of which have existing overpasses that could be utilized by the proposed path to cross under. As they are both limited access facilities, crossing US 29 and I-95 would require the construction of overpasses. Constructing an overpass at US 29 would require some fill (5-10') to develop the approach grades required for a bicycle bridge. The I-95 overpass would require significantly more fill to construct an overpass as the existing grades in the area of the proposed path are greater than 10' below I-95. There are no overhead utility conflicts to prevent the construction of a bridge, but given the amount of truck traffic on both facilities, a clearance of 25' is recommended for any bridge construction.

Hammond Branch stream corridor, from Hammond Park to Hammond Parkway: The connection to Hammond Parkway would be difficult and expensive to construct as there are steep grades located along the stream bed south of Hammond Parkway.

Assess the prospects for leaving the corridor to connect to Skylark Blvd. and surrounding neighborhood and using Gorman Road to Stevens Road and back to the corridor: Gorman Road has shoulders that could be utilized for bicycle lanes between Skylark Boulevard and Stephens Road. The County is also planning to improve Gorman Road which would offer an excellent opportunity to introduce bike lanes along this corridor.

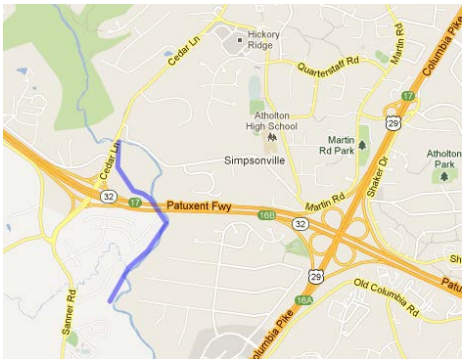
Assess neighborhood connectivity in the following areas; Maple Lawn, Hammond Park, Skylark area, North Laurel area: Connections to these areas are all feasible, though it would be difficult to provide a direct connection to Hammond Parkway and Hammond Drive because of the steep grades in this area.

Summary of Recommendations:

- Construct path between Pindell School Road and I-95
- Construct bicycle/pedestrian bridge at US 29
- Use existing Gorman Road overpass to cross I-95
- Construct connections to Skylark Boulevard and Upper Sky Way
- Construct connection to Stephens Road

IX. POTENTIAL ROUTE TO APL

This route would connect Cedar Lane north of MD 32 (near the Robinson Nature Center) to APL.



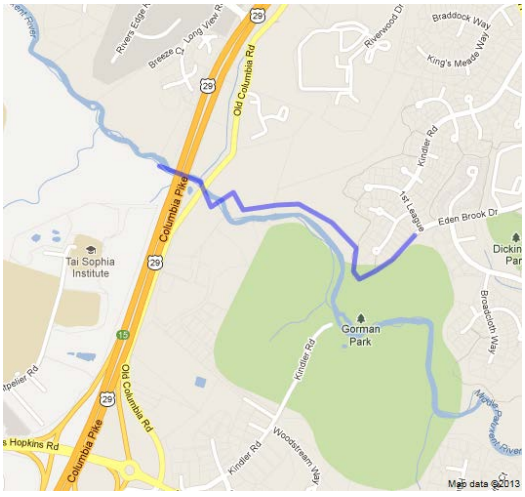
Field Review: The field review indicated that the MD 32 overpass over the Middle Patuxent River has sufficient vertical and horizontal clearance for a bike path to be constructed at this location. An alignment near the stream bed would be suitable as the terrain is relatively level with some clear areas near the stream bed.

Summary of Recommendations:

- ❖ Construct path between Cedar Lane and APL
- ❖ Use existing MD 32 overpass to cross MD 32

X. EDEN BROOK DRIVE TO APL

A connection between Eden Brook Drive and APL was investigated, particularly the crossing at US 29.



Field Review: The connection between Eden Brook Drive and APL would require using the existing US 29 overpass over the Middle Patuxent River. While the overpass on US 29 provides adequate vertical and horizontal clearance for a bicycle path, the Old Columbia Road overpass over the Middle Patuxent River has limited vertical and horizontal clearance which would preclude constructing a path under Old Columbia Road; however, the path could deviate from the stream bed at Old Columbia Road, and an at grade crossing could be constructed there. Old Columbia Road was observed to have low traffic volumes and sufficient sight distance which would make an at-grade crossing feasible.

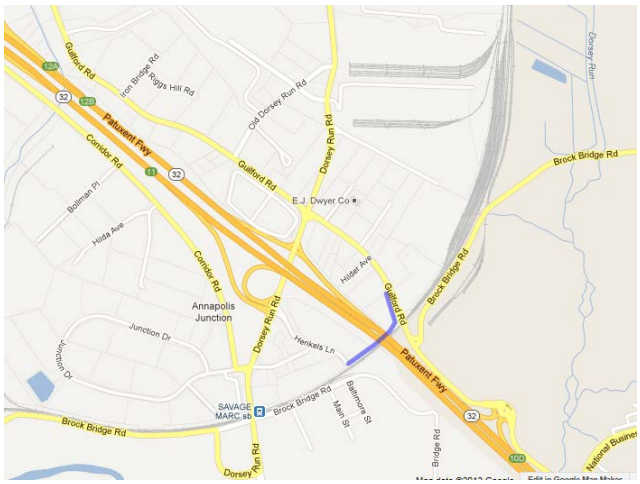
Old Columbia Rd Overpass

Summary of Recommendations:

- Construct path from Eden Brook Drive to APL
- Use existing US 29 overpass to cross US 29
- Sign/Stripe at-grade crossing at Old Columbia Road

XI. LINK GUILFORD ROAD TO HENKELS LANE

The link between Guilford Road and Henkels Lane would connect the Savage MARC station to the industrial parks north of MD 32. The proposed path would parallel the existing MARC commuter rail line under MD 32.



Field Review: The field investigation indicated that the bike path could be constructed under the existing MD 32 overpass as there is a buffer between the active rail lines and the location where the bike bath would be located.

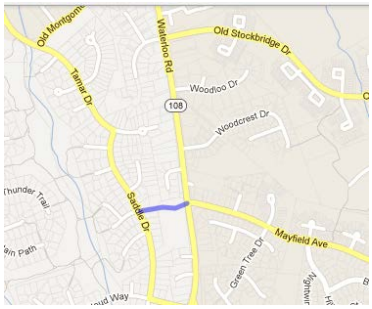
Locate bicycle path near bridge supports of MD 32 overpass

Summary of Recommendations:

- Construct path between Guilford Road and Henkels Lane

XII. MAYFIELD TO DISTANT ROCK PATH

Field Review: The field investigation indicated that this would be an ideal location to construct a bicycle path. It could not be determined from the field review if the Columbia Association owned this right of way.



Summary of Recommendations:

- Construct path between Mayfield Avenue and Distant Rock Path

XIII. GATEWAY COMMERCE TO COLUMBIA PATHWAY SYSTEM

This trail would parallel MD 108 and cross MD 175 before connecting to the existing Columbia Pathway System.

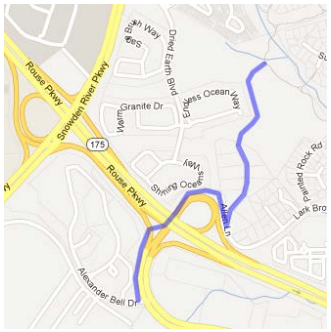
Field Review: The field investigation indicated that the area is clear and a bicycle path could be easily constructed between John McAdams Drive and MD 175. The key to this connection is providing a safe crossing across MD 175 which could be accomplished with improved markings and pedestrian/bicycle signal timing and phasing adjustments at the intersection of MD 175 and MD 108. Passive detection technologies (microwave, etc.) could be implemented which would improve the detection rates for bicycles and pedestrians at the intersection.

Summary of Recommendations:

- Construct path between Gateway Commerce and Columbia Pathway System
- Improve intersection of MD 175 at MD 108 to accommodate bicycles

XIV. ROUTE MD 175 UNDERPASS

Field Review: The existing underpass under MD 175 to Columbia Gateway Drive could be used for a bicycle path.



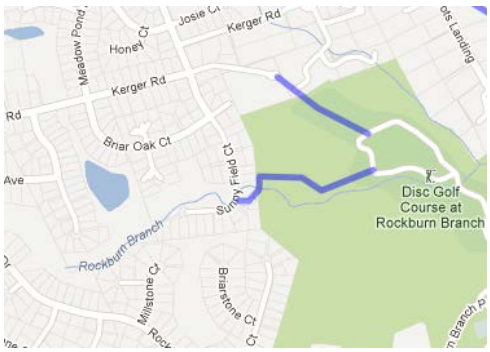
However it is recommended that the roadway be restriped to provide a larger buffer for bicyclists on the shoulder as vehicle speeds were observed to be over 40 mph at this location.

Summary of Recommendations:

- Construct path under MD 175 to Columbia Gateway Drive
- Restripe underpass to provide buffer for bicyclists

XV. CONNECTIONS TO DISC GOLF COURSE AT ROCKBURN BRANCH

Field Review: The connections to Disc Golf Course at Rockburn Branch would be difficult to implement in the field. There is a private fence separating the golf course from the subdivision and the northernmost connection would require the use of a private driveway which is not suitable for bicycle path.

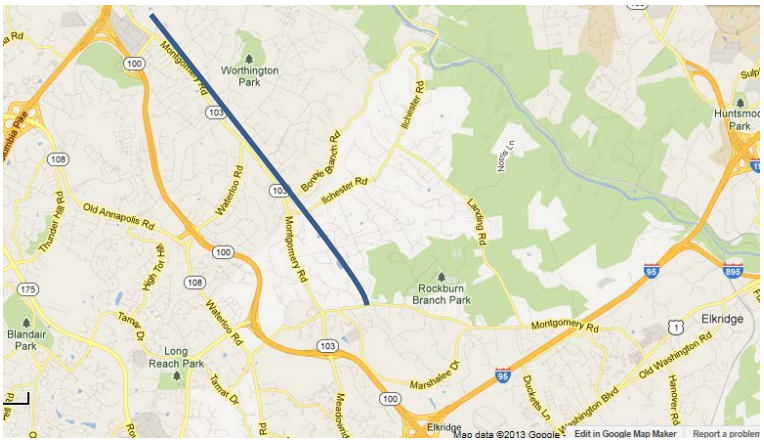


Summary of Recommendations:

- Do not construct connections to Disc Golf Course at Rockburn Branch

XVI. POWER LINE CORRIDOR PARALLEL TO MONTGOMERY ROAD

Field Review: The field investigation indicated that this would be an ideal location to construct a bicycle path. The terrain is generally rolling with reasonable grades observed along the

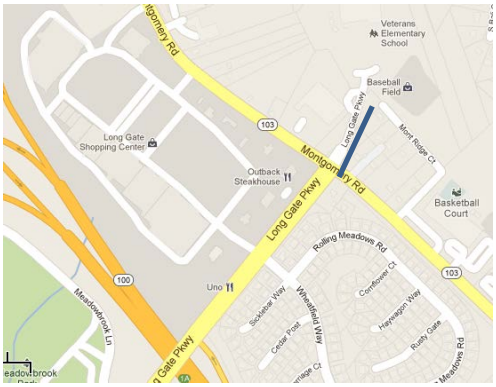


Summary of Recommendations:

- Construct path along power line corridor parallel to Montgomery Road

XVII. ROAD CONDITIONS ON LONG GATE PARKWAY

Field Review: The field investigation indicated that this location would be a suitable location to construct a bicycle path. There were reasonable grades observed along Long Gate Parkway, and bicycle lanes could be added with minimal striping.

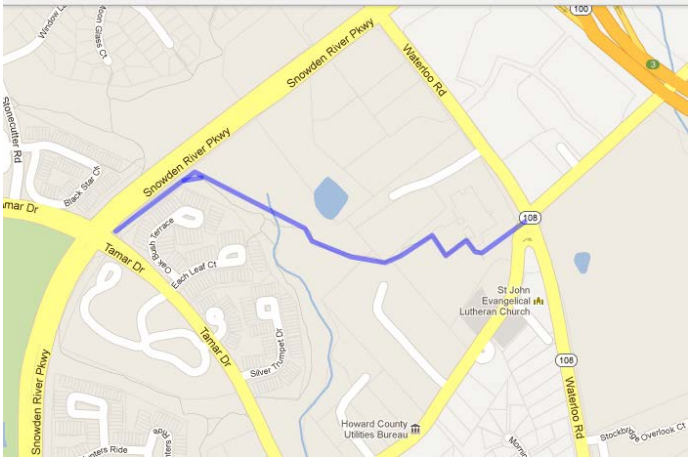


Summary of Recommendations:

- Stripe bicycle path along Long Gate Parkway

XVIII. TRAIL THROUGH WATERLOO ELEMENTARY SCHOOL

Field Review: The field investigation indicated that the existing paths are in reasonable condition for bicyclists and pedestrians. A review of the Waterloo Elementary School site indicated that the best way to route

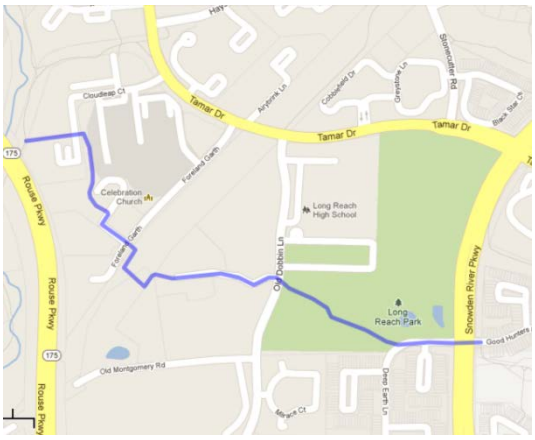


a bike path would be around the periphery of the school grounds as there is ample level ground to construct a path, and this would also help minimize any potential security issues the school may have with locating a bicycle path on the school grounds.

Summary of Recommendations:

- ❖ Construct path through Waterloo Elementary School

XIX. SHORT CUT BETWEEN SNOWDEN RIVER PARKWAY AND EXISTING PEDESTRIAN/BICYCLE TUNNEL UNDER MD 175



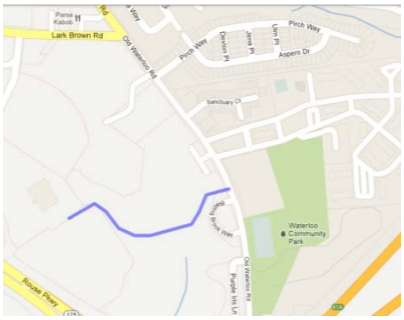
Field Review: The field investigation indicated that this connection is feasible and desirable as it would connect Long Reach Park with Long Reach High School and the Long Reach shopping center. The terrain is level and an informal footpath was observed between Long Reach Park and Long Reach High School indicating pedestrians are using this location already.

Summary of Recommendations:

- Construct path between Snowden River Parkway and existing bicycle/pedestrian tunnel under MD 175

XX. CONNECTION TO LOWES SHOPPING CENTER

Field Review: The field investigation indicated that this location would be difficult to construct a bicycle path. The shopping center site is elevated above the surrounding area, leading to significant grades which would make it difficult if not impossible for bicyclists to climb.



Summary of Recommendations:

- The grades are too steep at this location to construct a path

APPENDIX C

Plans Reviewed

Bicycle Policy & Design Guidelines: Maryland State Highway Administration, Draft. State Highway Administration. April 2013.

Bike Course. TriColumbia.

Chip Seal 2012 List. Howard County Department of Public Works. July 12, 2012.

Connecting Columbia: Active Transportation Action Agenda. Columbia Association. September 20, 2012.

Construction Plans. Annapolis Junction Town Center, LLC. January 2013.

The Mall Neighborhood: Downtown Columbia Neighborhood Concept Plan. Howard County. May 16, 2012.

Green Infrastructure Network, Draft. Howard County.

Highway Needs Inventory. Howard County-Primary. Revised 2011.

Highway Needs Inventory. Howard County-Secondary. Revised-2011.

Howard County: Pedestrian/Bicycles Element Comprehensive Transportation Plan. The Howard County Department of Planning and Zoning. July 1996.

Howard Transit System Map. Howard County. July 2010.

Letter from Howard County Internal Memorandum to Land Development Division, RE: Annapolis Junction Town Center (Savage TOD)-SDP 13-048. Date: March 4, 2013.

Letter from Howard County Office of Executive to Maryland Department of Transportation, RE: "Major Capital Projects". FY 2013-2018 Consolidated Transportation Program. Date: May 24, 2012.

Letter from State Highway Administration to HC Division of Land Development RE: Shipley's Grant Project. March 23, 2007

Map of Existing and Proposed Columbia Bikeways, Howard County Department of Public Works, provided by Mark DeLuca.

Maryland Historic National Road. Corridor Partnership Plan Update, Draft. January 2013.

Master Plan Draft. Blandair Park. October 10, 2008.

PlanHoward2030. Howard County

Queue Sheets of Recreational Bicycle Routes in Western Howard County, provided by Chris Tsien and other cyclists, 2012

Roadway Plan. Howard County Department of Public Works RE: Oakland Mills Road Improvements Capital Project J-4207. June 2011

Simpson Mill Development Proposal. Howard County Department of Planning and Zoning. 2013.

Snowden River Parkway Road Improvement Plans, i.e. engineering drawings (Broken Land Parkway to Oakland Mills Road), Howard County Department of Public Works, provided by the Department of Planning and Zoning, 2012.

Tentative Road Repair List-FY13. Howard County Department of Public Works. June 15, 2012.

Tentative Resurfacing List-FY13. Howard County Department of Public Works. June 15, 2012.

US 1 Corridor Improvement Strategy. Howard County. February 2008.

Warfield neighborhood Design Guidelines: Downtown Columbia. The Howard Hughes Corporation. January 2012.

APPENDIX D

Key Destinations for Network Development and Future Signed Route System

During the public involvement phases of the plan development process, important destinations were identified. The purpose of this task was to confirm where today's bicyclists and prospective bicyclists want to go by bike. Initially, a list of ~40 destinations was created, and in subsequent planning work with County staff and the Technical Advisory Group, the list grew to 51.

These Key Destinations were used in the prioritization and screening process to create the Short Term and Mid-Term Networks.

They can be used again at a future date when developing a network of signed bicycle routes. When developing a signed bicycle route system, an early task is to identify a logical set of destinations that the system will serve, and thus refer to on the sign panels. A standard approach is to develop three classes of destinations; primary, secondary and tertiary.

- Primary destinations will include those that serve as route endpoints and other destinations of major importance or of the greatest interest to existing and prospective bicyclists.
- Secondary destinations will include those of less importance and many that are along the various routes, but not at their endpoints.
- Tertiary destinations typically include important destinations that may be located a short distance away from a major route, or are of lowest level of importance.

Key Destinations

The destinations are organized by region. V.C. stands for Village Center.

Eastern Howard County (8)

- BWI Trail (AA County)
- Dorsey MARC Station
- Elkridge
- Grist Mill Trail
- Ilchester
- Rockburn Branch Park
- St. Denis MARC Station (Baltimore County)
- Wholesale Food Center

Southern Howard County (9)

- JHU-Applied Physics Lab
- Laurel (Prince George's County)
- Laurel MARC Station (Prince George's County)
- Maple Lawn
- North Laurel
- NSA/ Ft. Meade (Anne Arundel County)
- Patuxent Branch Trail
- Savage
- Savage MARC Station

Northern Howard County/Ellicott City (10)

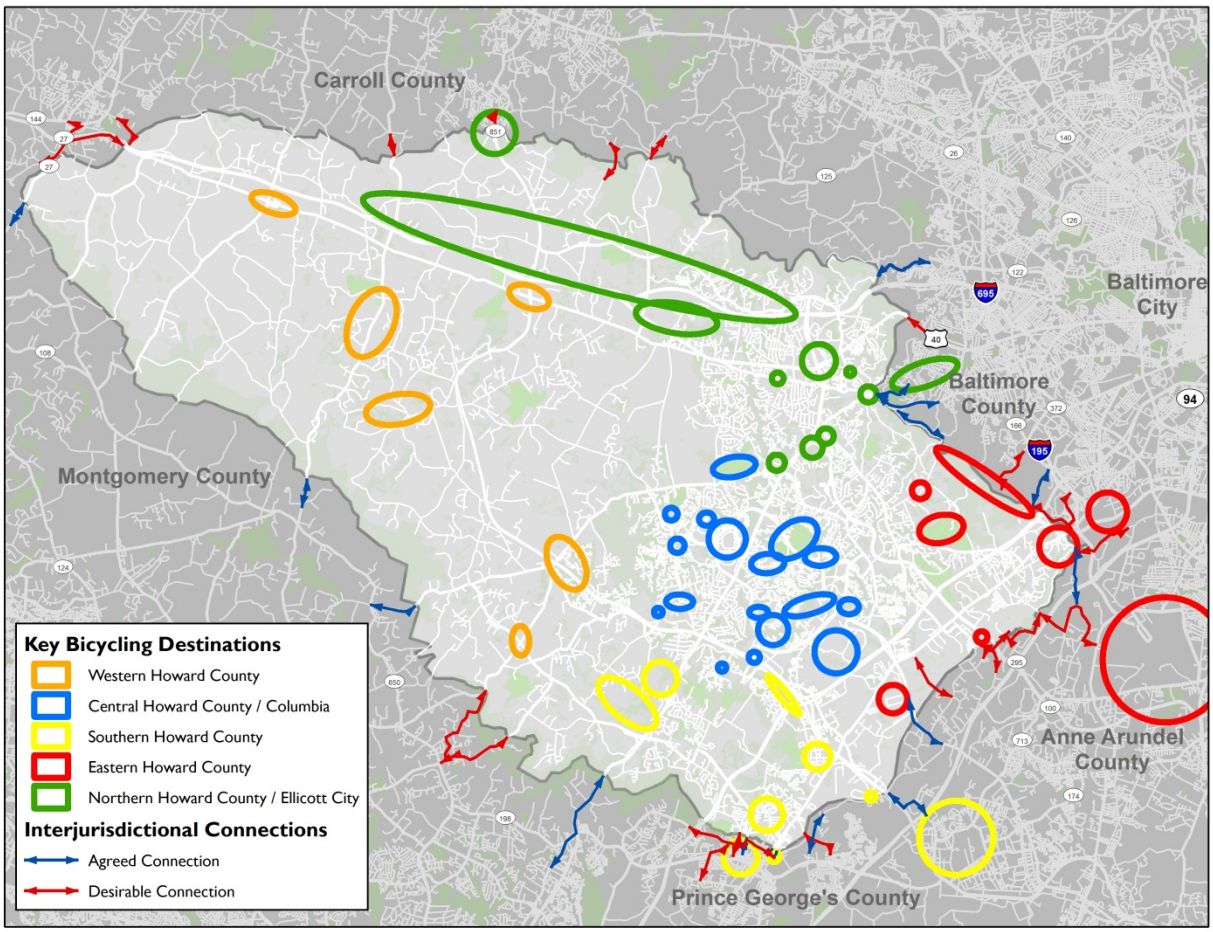
- Dorsey's Search V.C.
- Ellicott City North/Route 40 Commercial Areas
- HC Government Center
- Historic Ellicott City
- Long Gate
- Meadowbrook Park
- Miller Branch Library
- No. 9 Trolley Trail (Baltimore County)
- Old Frederick Road (Route 99)
- Turf Valley

Western Howard County (7)

- Clarksville/River Hill
- Glenelg
- Glenwood
- Highland
- Lisbon
- Syksville (Carroll County)
- West Friendship

Central Howard County/Columbia (17)

- Blandair Regional Park
- Centennial Park
- Dobbin Road/Columbia Crossing
- Downtown Columbia
- Gateway Commerce Center
- Harper's Choice V.C.
- Hickory Ridge V.C.
- Howard County General Hospital/HC Community College
- Kings Contrivance V.C.
- Lake Elkhorn
- Long Reach V.C.
- Oakland Mills V.C.
- Owen Brown V.C.
- Robinson Nature Center
- Route 175 Park & Ride
- Route 32 Park & Ride
- Wilde Lake V.C.



APPENDIX E

Prioritization and Screening the Bikeway Network

Bike Howard is a master plan which provides specific bikeway facility recommendations for 530 miles of roadway and trails based upon an assessment of existing conditions conducted in 2012-2013. Existing conditions assessment included a combination of windshield and "street-view" assessment of roads and field assessment of trails, as well as an assessment of planning and design documents at various levels of detail.

The purpose of dividing the comprehensive countywide set of recommendations into smaller subsets is to develop a phasing framework that can guide implementation. This process established Bike Howard priorities for funding and implementation actions in three timeframes:

- Short-Term (2014-2023; 10 years)
- Mid-Term (2024-2033; 10 years)
- Long Term (2034 and beyond)

The Short-Term Network is composed of key existing facilities, a number of projects that are already in design and/or funded, and a small set of recommended improvements to undertake by 2023.

The Mid-Term Network is composed of the Short-Term Network, an even larger set of existing facilities and a large set of recommended improvements to undertake prior to 2033.

The Long-Term Network is composed of all recommendations that are not in the Short-or Mid-Term Networks. This includes a large set of recommendations that are unlikely to be undertaken prior to 2033, due to their cost and the likelihood that they will not be needed until larger numbers of cyclists are using the roadway system.

To select routes and the corresponding improvement recommendations for the Mid- and Short-Term Networks, a set of criteria was established using factors identified by the public during public outreach efforts and the Technical Advisory Committee (TAG). The criteria were first used to identify the Mid-Term Network. A more refined use of the same criteria was used to identify the Short-Term Network.

The Prioritization Criteria

After identification of a variety of factors that might be relevant for prioritizing recommendations, the factors were grouped into three categories: overarching, geographic and process-oriented.

- Overarching criteria address values that should be represented in most recommendations for the Mid-Term Network, including: safety, serving less-skilled riders, and leveraging existing facilities.
- Geographic criteria relate to the location of the recommendation. The purpose in applying geographic criteria is to ensure that the Mid-Term Network provides connectivity and continuity to destinations identified by the public as important for bicycle access.
- Process/implementation criteria address factors related to the physical nature of the recommendation, including facility type, and other logistical issues related to implementation, including engineering feasibility, and the estimated cost. These criteria were utilized primarily to identify a smaller network that could be implemented in the near term; thus the concept of a Short-Term Network emerged.

Table 1 provides a more detailed outline of the criteria used for prioritization.

Table 1: Prioritization Criteria

Overarching Criteria	Process/Implementation Criteria	Geographic Criteria
1. Safety	1. Facility Type	1. Focus on the populated/developed core of the county (water/sewer service area)
2. Focus on Serving Less-Skilled Riders	2. Engineering Feasibility (i.e. level of effort)	2. Create Connectivity Between Important Destinations: • Community & Commercial Centers • Major Residential Neighborhoods • Employment Sites • Major Trails • Schools, Libraries • Parks, Recreation Centers, Entertainment Venues • Public Transit Hubs
3. Leverage Existing Facilities	3. Opportunity	3. Align with Columbia Association Priorities
	4. ROW Control	4. Develop Select Scenic/Recreational Routes
	5. Terms of Funding	5. Address Barriers
	6. Amount of Time to Implement	
	7. Cost	

The Mid-Term Network

The Mid-Term Network was identified primarily by using the overarching criteria and the geographic criteria to filter the Long-Term Network into a more manageable set of recommendations.

Overarching Criteria

Safety--By their very nature all of the recommendations embody the goal to make bicycling safer. To provide a more focused emphasis on safety, the intersections identified in the Mid-Network Network have been identified as the highest safety priorities.

Connectivity—A baseline assumption for all Mid-Term Network recommendations is that they must be connected to each other, to existing facilities or to Key Destinations. There can be no gaps; and each network while limited in scope, should be fully functional when build out is complete.

Focus on Less-Skilled Riders—To ensure that the Mid-Term Network will attract less skilled cyclists, it is has been designed to provide a balance between variable and low-stress bikeways and seeks to provide both on-road and off-road alternatives in key corridors.

Leveraging Existing Facilities—Because of the extensive existing pathway system in Columbia and recently approved Connecting Columbia plan, leveraging existing facilities emerged in the planning process as a key criterion. Each of the following categories of existing or already-planned bicycling facilities has contributed segments to the Mid-Term Network:

- the Columbia pathways, owned and managed by Columbia Association;
- existing County Trails, managed by the Department of Recreation and Parks;

- existing, bicycle-pedestrian bridges, tunnels and underpasses;
- low speed / low volume County roads and neighborhood streets;
- low speed / medium-low volume streets and roads for which improvement recommendations are made in the plan, but will serve cyclists well in the short term even before those improvements are implemented.
- State roadways with adequate shoulders; and
- trail facilities and road improvement efforts that are already planned and funded.

Geographic Criteria

Creating Connectivity Between Important Destinations

The geographic criteria in Table 1 were used to identify the Mid-Term Network in a number of ways. First, a set of 51 destinations throughout the county were identified and confirmed by the TAG as key destinations needing service. These locations included neighborhoods, institutions, public facilities, parks, recreational trails, and commercial centers drawn from among the categories in Table 1-- *Geographic Criteria item 2.*

Figure 1: Map of Key Bicycling Destinations and Inter-jurisdictional Connections

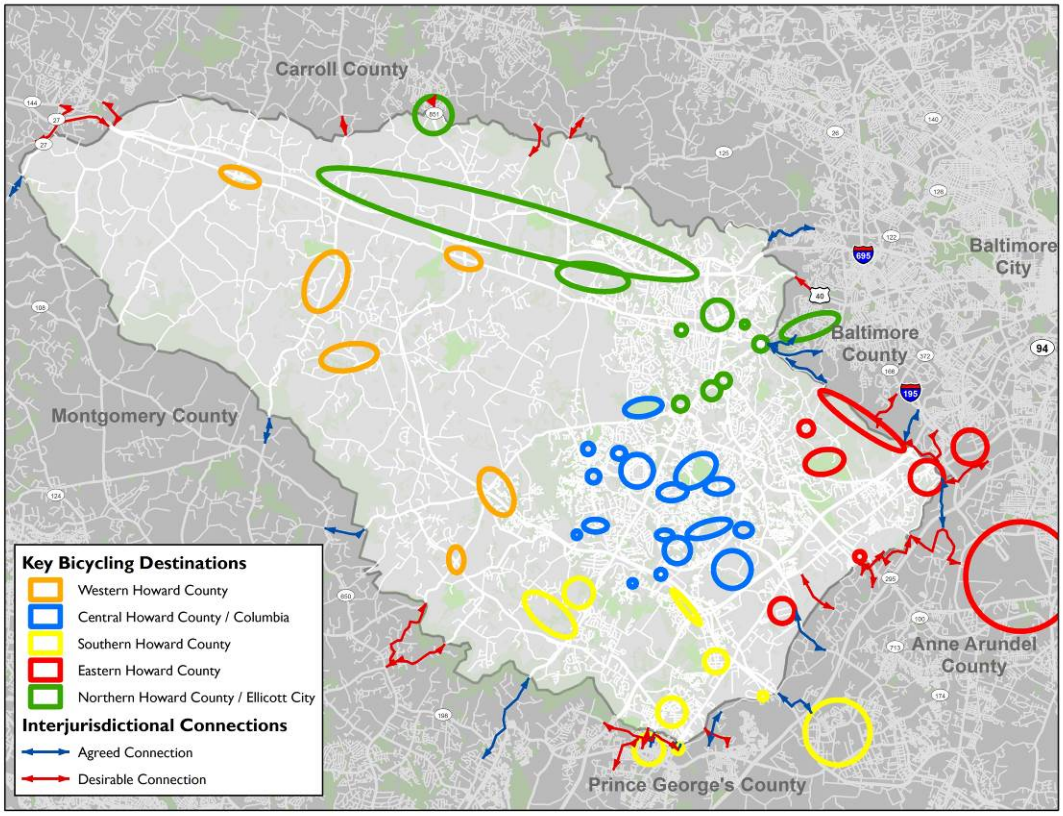


Figure 1 provides a schematic map of these locations, which are listed by name in Appendix D. Locations were selected throughout the County and in adjacent jurisdictions; however fewer locations were selected in rural and low density areas. In the selection process, emphasis was placed on the most heavily populated and developed core of the County, which can be best understood as the area within the planned water and sewer service boundary.

Connecting Columbia pathways plan: In general this plan accepts the recommendations of the Connecting Columbia Active Transportation Action Agenda. Particular recommendations from the CA plan were also selected for the Mid-Term Network if they also fulfilled other criteria, such as connectivity to key destinations, providing service to less-skilled riders, or because they contributed to key countywide routes.

Scenic and recreational routes: Recreational cycling is both popular and important to the County for health, quality of life and economic reasons and improving safety along the most heavily traveled recreational routes is a key goal of this plan. As a result the Mid-Term Network includes key recommendations along a basic set of routes that connect the historic communities of Elkridge, Savage, Ellicott City and popular scenic bicycling corridors in the Patapsco Valley, along highway 99 and in the closer-in portions of western Howard County.

Barriers: Addressing barriers is maybe the most challenging criteria to fulfill within a limited set of recommendations. Many barriers to bicycling are major highways, railroad corridors or rivers, which typically require high cost bridges or tunnels to solve. Large natural areas that are barriers may require costly trails with bridges and boardwalks to address sensitive environmental landscapes. For this reason the following approach was use to select routes for the Mid-Term Network:

1. Use and improve trail and road routes that cross limited access highways at locations where there are no interchanges.
2. Improve the transportation utility of trails that have existing grade separated crossings (bridges, tunnels or underpasses) of major highways, railroads, rivers and streams.
3. Provide improvements to routes that use the most convenient and direct alternatives around barriers that cannot be directly addressed in the near term.
4. Provide a priority list of key grade separations that can be pursued as major funding opportunities become available.

Based upon the Overarching and Geographic criteria described above, the Mid-Term Network. This network was able to provide connectivity to more than 90 percent of the key destinations.

The Short-Term Network

The Short-Term Network was identified by utilizing the following criteria to reduce the Mid-Term Network into a set of recommendations that could be implemented in approximately 10 years:

1. The concept of connectivity was more strictly defined as development of a few key north-south routes from the Government Center area in the north to North Laurel in the south. Also a few east-west routes linking the Howard County Hospital to Rockburn Regional Park and Dorsey MARC Station; and River Hill to the Savage MARC Station. Inclusion of Downtown Columbia and core neighborhood such as Oakland Mills was a priority.

2. The criterion of leveraging the existing pathway systems and path improvement projects such as the Downtown Columbia Trail were central.

3. The goal of improving recreational routes was included, but kept to a minimum, with a focus on some of the most critical roads in Western Howard County.

4. With this focus the final criteria applied included those from the process and implementation category which helps identify those projects that are lowest in cost and easiest to implement. Moreover, to keep costs reasonable, the total volume of recommended improvements had to be small, so duplication of routes was minimized.

Process-Oriented Criteria

Following are some of the factors that are included in this category of criteria:

1. Facility type—On-Road, Off-Road and Spot Improvements are among the elements of the Short-Term Network.
2. Engineering feasibility—Determined by engineering and design issues presented by the recommended facility type and its context.
3. Right-of-way control—Who owns the road, trail, open space corridor, or private property upon which the improvement is to be located?
4. Price/cost – Largely determined by items 1 and 2 above.
5. Opportunity – Due to proximity or other factors, can/should the recommendation be incorporated into other development or construction activity, whether public, private, road-related, park-related, trail-related, etc.
6. Amount of time it takes to plan, design, and construct the recommendation – Largely determined by items 1-5 above.

In general, for implementation of the Short-Term Network to be practical and realistic in a five year timeframe, it should consist primarily of recommendations that can best be described as ***"Low Hanging Fruit."*** However, it is not possible for 100 percent of projects in the Short-Term Network to be *Low Hanging Fruit.*

Projects that can be described as *low hanging fruit* include those that meet the following criteria:

a) Facility Type:
   - shared lane markings (sharrows),
   - bike lanes,
   - climbing lanes,
   - striping existing shoulders,
   - widening existing sidewalks,
   - widening or resurfacing existing trails,
   - making simple and small spot improvements, i.e. trail access, short trail extensions, modest intersection improvements, replacing small bridges over streams, improving signage, etc.

b) Level of Effort
   - Engineering feasibility—Simple; implementable within existing public right-of-way; no or minimal impact to existing road or trail uses and the surrounding context.
   - Right-of-Way control—County roadway, County or CA pathway, Howard County Public Schools, or likelihood of finding a willing private property partner.
   - Project types that take no more than 3 years to plan, design, and construct; many can be done in 1 to 2 years.

c) Minor Actions, i.e. can be done…
   - a) by simply adding striping/signs to existing pavement;
   - b) in conjunction with a County road resurfacing project, or minimum impact restriping project;
   - d) in conjunction with an already planned State road improvement or other project by a public agency, such as parks, schools, water and sewer authority, etc.
   - c) by a developer with an approved development;

d) Price/cost – Low, less than $300,000 per mile for linear improvements, or $300,000 per location for spot improvements.

APPENDIX F

Spot Improvements

Spot Improvements by Network

Bike Howard ID Number	Recommended Facility Improvements	Action	Network	Location
3	Bike Link	Upgrade Existing	Short Term	Patuxent Branch Trail @ Old Guilford Rd.
9	Bike Link	Construct New	Short Term	Columbia Rd. @ Clarksville Pike (going northbound)
13	Bike Link	Upgrade Existing	Short Term	On Ridge Rd. @ Rogers Ave. and Courthouse Dr.
59	Bike Link	Construct New	Short Term	Northfield Elementary School
110	Bike Link	Upgrade Existing	Short Term	Brunners Run Ct. @ Old Montgomery Rd.
195	Bridge	Construct New	Short Term	Bridge West of Northfield Elementary
191	Interior Pathway Crossing	Construct New	Short Term	Hickory Ridge Rd. @ Broken Land Pkwy.
2	Mid Block Crossing	Construct New	Short Term	Cape Ann Dr. between Cottonmill Ln. and Quantrell Row
102	Mid Block Crossing	Construct New	Short Term	Knights Bridge Rd. @ Stebbing Way
138	Mid Block Crossing	Upgrade Existing	Short Term	Centennial Park East Entrance @ Woodland Rd.
139	Mid Block Crossing	Construct New	Short Term	Old Annapolis Rd. (275 ft. West of Columbia Rd.)
150	Mid Block Crossing	Construct New	Short Term	375 ft. E of East Wind Way along Hickory Ridge Rd.
161	Mid Block Crossing	Construct New	Short Term	Mayfield Ave. @ Waterloo Rd.
200	Mid Block Crossing	Construct New	Short Term	Vollmerhausen Rd. (1900 ft. West of Savage Guilford Rd.)
17	On Road Crossing	Upgrade Existing	Short Term	Centennial Park South Entrance @ Clarksville Pike
35	On Road Crossing	Construct New	Short Term	Arcadia Dr. @ Frederick Rd.
54	On Road Crossing	Upgrade Existing	Short Term	Little Patuxent Pkwy. @ Broken Land Pkwy.
58	On Road Crossing	Upgrade Existing	Short Term	Long Gate Pkwy @ WB Rt. 100 to Long Gate Pkwy Ramp
70	On Road Crossing	Construct New	Short Term	Chatham Rd. @ Frederick Rd.
90	On Road Crossing	Construct New	Short Term	Long Gate Pkwy. @ Montgomery Rd.
91	On Road Crossing	Construct New	Short Term	Old Columbia Pike @ Montgomery Rd.
116	On Road Crossing	Upgrade Existing	Short Term	Mellenbrook Rd. @ Old Annapolis Rd.
124	On Road Crossing	Upgrade Existing	Short Term	Old Columbia Rd. @ Guilford Rd.
131	On Road Crossing	Upgrade Existing	Short Term	All Saints Rd. @ Rt. 216
132	On Road Crossing	Upgrade Existing	Short Term	Rt. 216 @ Baltimore Ave.
152	On Road Crossing	Construct New	Short Term	Twin Rivers Rd. @ Governor Warfield Pkwy.
154	On Road Crossing	Upgrade Existing	Short Term	Long Gate Pkwy. @ Rt. 100
162	On Road Crossing	Upgrade Existing	Short Term	Stanford Blvd. @ McGaw Rd.
165	On Road Crossing	Upgrade Existing	Short Term	Washington Blvd. @ Corridor Rd.
174	On Road Crossing	Construct New	Short Term	Junction Dr. @ Dorsey Run Rd.
178	On Road Crossing	Construct New	Short Term	Homewood Rd. @ Clarskville Pike
190	On Road Crossing	Upgrade Existing	Short Term	Grace Dr. @ Cedar Ln.
8	Pathway Crossing	Upgrade Existing	Short Term	Columbia Rd. @ Clarksville Pike
68	Pathway Crossing	Upgrade Existing	Short Term	Beaverkill Rd. @ Harpers Farm Rd.
69	Pathway Crossing	Construct New	Short Term	Columbia Rd. @ Old Annapolis Rd.
164	Pathway Crossing	Upgrade Existing	Short Term	1200 ft. North of Dobbin Center Way
41	Signal Improvement	Upgrade Existing	Short Term	Old Columbia Rd. @ Eden Brook Dr.
48	Signal Improvement	Upgrade Existing	Short Term	McGaw Rd. @ Snowden River Pkwy.
194	Signal Improvement	Upgrade Existing	Short Term	Windstream Dr. @ Green Mountain Circle
193	Signal Improvement	Construct New	Short Term	200 ft. West of EB Rt. 32 to Broken Land Pkwy. South Ramp

Spot Improvements by Network

Bike Howard ID Number	Recommended Facility Improvements	Action	Network	Location
199	Signal Improvement	Construct New	Short Term	Frederick Rd. (400 ft. East of Main St.)
1	Trail Access	Construct New	Short Term	Seneca Dr. @ Wesleigh Dr.
104	Trail Access	Construct New	Short Term	Ridings Way (260 ft. South of Lawson Ln.)
140	Trail Access	Construct New	Short Term	Trail Access at Wild Filly Ct.
202	Trail Access	Construct New	Short Term	Farewell Rd. (250 ft. East of Woodblock Rd.)
22	Tunnel	Existing	Short Term	Oakland Mills Rd. (350 ft. North of Downdale Pl.)
112	Tunnel	Existing	Short Term	Tunnel @ Rt. 175 near Cloudleap Ct.
113	Tunnel	Existing	Short Term	Whiteacre Rd. @ Thunder Hill Rd.
114	Tunnel	Existing	Short Term	Mirrorlight Pl. @ Thunder Hill Rd.
115	Tunnel	Existing	Short Term	Rt. 175 Tunnel between Old Deep Ct. and Bluecoat Ln
117	Tunnel	Existing	Short Term	Along Tamar Dr. (320 ft. East of Phelps Luck Dr.)
12	Bike Link	Upgrade Existing	Mid Term	Baltimore National Pike @ Governors Run
24	Bike Link	Construct New	Mid Term	On Old Columbia Rd. adjacent to Rivers Edge Rd.
63	Bike Link	Construct New	Mid Term	Wegmans on McGaw Rd.
73	Bike Link	Construct New	Mid Term	Medical Pavilion Parking Lot to Campus Dr. @ HCC
99	Bike Link	Construct New	Mid Term	100 ft. North of Rt. 216 and East of Maple Lawn Blvd.
100	Bike Link	Upgrade Existing	Mid Term	Bike link 270 ft. East of West Running Brook Rd.
180	Bike Link	Construct New	Mid Term	Along Rt. 97 by Misty Meadow Stables
72	Bridge	Construct New	Mid Term	North of Rivulet Row @ Green Mountain Circle
74	Bridge	Construct New	Mid Term	Rt. 175 between Tamar Dr. and Thunder Hill Rd.
106	Bridge	Construct New	Mid Term	Bridge access over Hammond Branch (1350 ft. East from Stephens Rd.)
134	Bridge	Construct New	Mid Term	Broken Land Pkwy. Bridge (1100 ft. South of Cradlerock Way)
135	Bridge	Construct New	Mid Term	Bridge that is 800 ft. North of Patuxent Woods Dr.
192	Bridge	Construct New	Mid Term	Bridge 425 ft. North of Grace Dr. on Cedar Ln.
198	Bridge	Construct New	Mid Term	Oella Ave. @ Frederick Rd.
18	Mid Block Crossing	Construct New	Mid Term	Columbia Rd. @ Plumtree Branch
57	Mid Block Crossing	Construct New	Mid Term	Cooks Ln. @ Old Columbia Pike
71	Mid Block Crossing	Construct New	Mid Term	Twin Rivers Rd. @ Harpers Farm Rd.
88	Mid Block Crossing	Construct New	Mid Term	EB Johns Hopkins Rd. To NB Rt. 29 Ramp
101	Mid Block Crossing	Construct New	Mid Term	West Running Brook Rd. (185 ft. North of Hermit Path)
105	Mid Block Crossing	Upgrade Existing	Mid Term	Jeanne Ct. @ Gorman Rd.
169	Mid Block Crossing	Upgrade Existing	Mid Term	Rt. 216 @ Rt. 29 Ramp (Roundabout)
14	On Road Crossing	Upgrade Existing	Mid Term	Washington Blvd @ Levering Ave.
19	On Road Crossing	Upgrade Existing	Mid Term	Ten Oaks Rd. @ Clarksville Pike
20	On Road Crossing	Upgrade Existing	Mid Term	Triadelphia Mill Rd. @ Ten Oaks Rd.
23	On Road Crossing	Construct New	Mid Term	Rivers Edge Rd. @ Rt. 29
26	On Road Crossing	Upgrade Existing	Mid Term	Cedar Ln. @ Harriet Tubman Ln.
27	On Road Crossing	Upgrade Existing	Mid Term	Rt. 97 divided highway towards Monticello Dr.
28	On Road Crossing	Upgrade Existing	Mid Term	Rt. 97 @ WB I-70 to Rt. 97 Ramp (Northside)
29	On Road Crossing	Upgrade Existing	Mid Term	Rt. 97 @ WB I-70 to Rt. 97 Ramp (Southside)

Spot Improvements by Network

Bike Howard ID Number	Recommended Facility Improvements	Action	Network	Location
30	On Road Crossing	Upgrade Existing	Mid Term	Rt. 97 @ EB I-70 to Rt. 97 Ramp (Southside)
31	On Road Crossing	Upgrade Existing	Mid Term	Rt. 97 @ EB I-70 to Rt. 97 Ramp (Northtside)
34	On Road Crossing	Construct New	Mid Term	Baltimore National Pike @ Rogers Ave.
36	On Road Crossing	Construct New	Mid Term	Pine Orchard Ln. @ Baltimore National Pike
37	On Road Crossing	Upgrade Existing	Mid Term	Frederick Rd. @ Baltimore National Pike
38	On Road Crossing	Construct New	Mid Term	Vollmerhausen Rd. @ Guilford Rd.
40	On Road Crossing	Construct New	Mid Term	Area between EB Rt. 32 and Guilford Rd along Sanner Rd.
45	On Road Crossing	Upgrade Existing	Mid Term	Centennial Ln. @ Clarksville Pike
47	On Road Crossing	Upgrade Existing	Mid Term	Dorsey Run Rd. to WB Rt. 32 Ramp @ Dorsey Run Rd.
53	On Road Crossing	Upgrade Existing	Mid Term	Oak Hall Ln. @ Oakland Mills Rd.
60	On Road Crossing	Upgrade Existing	Mid Term	Dobbin Rd. @ Rt. 175
76	On Road Crossing	Upgrade Existing	Mid Term	Little Patuxent Pkwy. @ Little Patuxent Pkwy.
79	On Road Crossing	Construct New	Mid Term	Gracious End Ct. @ Oakland Mills Rd.
86	On Road Crossing	Construct New	Mid Term	North Ridge Rd. @ WB Rt. 40 to SB Rt. 29 Ramp
87	On Road Crossing	Construct New	Mid Term	Montpelier Rd. @ Johns Hopkins Rd.
92	On Road Crossing	Construct New	Mid Term	Saint Johns Ln. @ SB Rt. 29 to Rt. 103 Saint Johns Ln. Ramp
95	On Road Crossing	Construct New	Mid Term	Crossover @ Old Columbia Rd. and 60 ft. North of Rt. 29
129	On Road Crossing	Upgrade Existing	Mid Term	Washington Blvd. @ Guilford Rd.
149	On Road Crossing	Upgrade Existing	Mid Term	300 ft. South of Burntwoods Rd. along Ten Oaks Rd.
151	On Road Crossing	Construct New	Mid Term	115 ft. South of Rt. 32 Ramp on Clarksville Pike
153	On Road Crossing	Construct New	Mid Term	Governor Warfield Pkwy. @ Windstream Dr.
155	On Road Crossing	Construct New	Mid Term	South Haven Dr. @ Montgomery Rd.
156	On Road Crossing	Construct New	Mid Term	Hale Haven Dr. @ Montgomery Rd.
157	On Road Crossing	Upgrade Existing	Mid Term	Waterloo Rd. @ WB Rt. 100 to Rt. 104 Ramp
158	On Road Crossing	Construct New	Mid Term	Waterloo Rd. @ Old Annapolis Rd.
159	On Road Crossing	Upgrade Existing	Mid Term	Meadowridge Rd. @ Rt. 103 to WB Rt. 100 Ramp
160	On Road Crossing	Upgrade Existing	Mid Term	Meadowridge Rd @ Rt. 103 to EB Rt. 100 Ramp
166	On Road Crossing	Upgrade Existing	Mid Term	Whiskey Bottom Rd. @ Washington Blvd.
167	On Road Crossing	Upgrade Existing	Mid Term	Gorman Rd. @ Washington Blvd.
168	On Road Crossing	Upgrade Existing	Mid Term	North Laurel Rd. @ Washington Blvd.
172	On Road Crossing	Construct New	Mid Term	Owen Brown Rd. @ Cedar Ln.
173	On Road Crossing	Construct New	Mid Term	Dorsey Run Rd. @ Rt. 32
175	On Road Crossing	Construct New	Mid Term	Guilford Rd. @ Dorsey Run Rd.
176	On Road Crossing	Construct New	Mid Term	Eliots Oak Rd. @ Clarksville Pike
177	On Road Crossing	Construct New	Mid Term	Clarksville Pike @ Cedar Ln.
179	On Road Crossing	Construct New	Mid Term	Rt. 97 @ Burntwoods Rd.
187	On Road Crossing	Construct New	Mid Term	Lime Kiln Rd. @ Scaggsville Rd.
196	On Road Crossing	Upgrade Existing	Mid Term	Baltimore National Pike @ Marriotsville Rd.
51	Pathway Crossing	Upgrade Existing	Mid Term	Roundabout on Rogers Ave. @ Old Frederick Rd.
67	Pathway Crossing	Upgrade Existing	Mid Term	Calico Ct. @ Little Patuxent Pkwy.

Spot Improvements by Network

Bike Howard ID Number	Recommended Facility Improvements	Action	Network	Location
77	Pathway Crossing	Construct New	Mid Term	Snowden River Pkwy. @ Rustling Leaf
80	Pathway Crossing	Construct New	Mid Term	Oakland Mills Rd. @ Snowden River Pkwy.
81	Pathway Crossing	Construct New	Mid Term	Solar Walk @ Robert Fulton Dr.
83	Pathway Crossing	Construct New	Mid Term	Dobbin Rd. @ Oakland Mills Rd.
103	Pathway Crossing	Construct New	Mid Term	Foundry St. @ Gorman Rd.
107	Pathway Crossing	Upgrade Existing	Mid Term	Oakland Mills Rd. @ Old Montgomery Rd.
108	Pathway Crossing	Upgrade Existing	Mid Term	Sealed Message Rd. @ Old Montgomery Rd.
109	Pathway Crossing	Upgrade Existing	Mid Term	Tamar Dr. @ Old Montgomery Rd.
111	Pathway Crossing	Upgrade Existing	Mid Term	Footed Ridge @ Majors Ln.
122	Pathway Crossing	Construct New	Mid Term	Xovr Deep Earth Ln. - Good Hunters Ride @ Snowden River Pkwy.
123	Pathway Crossing	Construct New	Mid Term	Rt. 175 @ Waterloo Rd.
163	Pathway Crossing	Upgrade Existing	Mid Term	Dobbin Center Way @ Dobbin Rd.
170	Pathway Crossing	Upgrade Existing	Mid Term	Maple Lawn Blvd. @ Scaggsville Rd. Roundabout
171	Pathway Crossing	Upgrade Existing	Mid Term	Westside Blvd. @ Scaggsville Rd. Roundabout
42	Signal Improvement	Upgrade Existing	Mid Term	Snowden River Pkwy. @ Broken Land Pkwy.
78	Signal Improvement	Construct New	Mid Term	Broken Land Pkwy. (North to WB Rt. 32 Ramp) @ Broken Land Pkwy.
126	Signal Improvement	Construct New	Mid Term	Stevens Forest Rd. @ Broken Land Pkwy.
127	Signal Improvement	Construct New	Mid Term	Cradlerock Way @ Broken Land Pkwy. (Northside)
128	Signal Improvement	Construct New	Mid Term	Cradlerock Way @ Broken Land Pkwy. (Southside)
15	Signal Improvement	Upgrade Existing	Mid Term	Florence Rd. @ Cabin Branch Ct.
16	Signal Improvement	Upgrade Existing	Mid Term	Watersville Rd. @ Frederick Rd
50	Signal Improvement	Construct New	Mid Term	Old Frederick Rd. @ Baltimore County Line
11	Trail Access	Upgrade Existing	Mid Term	Meadowbrook Park @ Long Gate Park and Ride
44	Trail Access	Construct New	Mid Term	End of Painted Rock Rd. near existing trails
65	Trail Access	Upgrade Existing	Mid Term	Trotter Rd. @ Trotter Crossing Ln.
75	Trail Access	Construct New	Mid Term	Summer Hollow Ln. @ Billow Row
137	Trail Access	Construct New	Mid Term	Broken Timber Way @ Five Fingers Way
141	Trail Access	Construct New	Mid Term	Trail Access at Larkspring Row
201	Trail Access	Upgrade Existing	Mid Term	Landing Rd. (2500 ft. North of Montgomery Rd.)
188	Bike Link	Existing	Long Term	Broken Land Pkwy. @ Rt. 32
66	Bridge	Existing	Long Term	Cedar Ln. @ Harpers Farm Rd.
4	Bike Link	Construct New	Long Term	Trail @ Rt. 32 and Brokenland Pkwy to WB Rt. 32 Ramp
49	Bike Link	Construct New	Long Term	Nearby Snowden Square Dr. @ Commerce Center Dr.
184	Bike Link	Construct New	Long Term	Bike Link 125 ft. North of Hanover Rd. near Hi Tech Dr.
185	Bike Link	Construct New	Long Term	Bike Link 190 ft. South of Fetlock Ct.
10	Bridge	Construct New	Long Term	Rt. 29 @ WB Rt. 100 to SB Rt. 29 Ramp
21	Bridge	Construct New	Long Term	Guilford Rd. @ Murray Hill Rd. along Little Patuxent River
25	Bridge	Upgrade Existing	Long Term	Near Carroll County Line and Henryton Center Rd. trail
33	Bridge	Construct New	Long Term	Old Scaggsville Rd. @ Pilgrim Ave.
39	Bridge	Construct New	Long Term	Trail near Gorman Park @ Middle Patuxent River

Spot Improvements by Network

Bike Howard ID Number	Recommended Facility Improvements	Action	Network	Location
61	Bridge	Construct New	Long Term	Dobbin Rd. by Maryland St. Dental Association
62	Bridge	Construct New	Long Term	Dobbin Center Way @ Dobbin Rd.
84	Bridge	Construct New	Long Term	South of WB Little Patuxent Pkwy. to Governor Warfield Pkwy. Ramp
85	Bridge	Construct New	Long Term	Bridge between Columbia Crossing and Dobbin Center
97	Bridge	Construct New	Long Term	Bridge that is 125 ft. South of Hammond Pkwy.
98	Bridge	Construct New	Long Term	Rt. 29 @ Rt. 216 to NB Rt. 29 Ramp
125	Bridge	Construct New	Long Term	650 ft. South of Snowden River Pkwy. to EB Rt. 175 Ramp
136	Bridge	Construct New	Long Term	80 ft. N of Broken Land Pkwy. (W of Owen Brown Rd.)
197	Bridge	Construct New	Long Term	450 ft. East of Santa Barbara Ct.
5	Mid Block Crossing	Construct New	Long Term	Snowden River Pkwy. @ Lincoln Technical Institute
82	Mid Block Crossing	Construct New	Long Term	Robert Fulton to SB Snowden River Pkwy. Ramp
89	Mid Block Crossing	Construct New	Long Term	350 ft. North of Simpson Mill Dr. along Cedar Ln.
143	Mid Block Crossing	Construct New	Long Term	Baltimore National Pike @ Executive Center Rd. (1100 ft from Rogers Ave.)
6	On Road Crossing	Construct New	Long Term	Dorsey's Search Village Center
32	On Road Crossing	Upgrade Existing	Long Term	Hunt Club Rd. @ Washington Blvd.
43	On Road Crossing	Upgrade Existing	Long Term	Merriweather Post Pavilion Driveway @ Broken Land Pkwy.
46	On Road Crossing	Construct New	Long Term	Ten Oaks Rd. @ Linden Church Rd.
55	On Road Crossing	Upgrade Existing	Long Term	Washington Blvd. @ Ducketts Ln.
56	On Road Crossing	Construct New	Long Term	Snowden River Pkwy. @ Rt. 175
93	On Road Crossing	Construct New	Long Term	Loudon Ave. @ Washington Blvd.
94	On Road Crossing	Construct New	Long Term	Montgomery Rd. @ Washington Blvd.
119	On Road Crossing	Upgrade Existing	Long Term	Farewell Rd. @ Oakland Mills Rd.
130	On Road Crossing	Upgrade Existing	Long Term	Jenmar Rd. @ Mission Rd.
145	On Road Crossing	Construct New	Long Term	WB I-70 to Marriottsville Rd. Ramp
146	On Road Crossing	Construct New	Long Term	Marriottsville Rd. (275 ft. South of I-70)
147	On Road Crossing	Construct New	Long Term	Marriottsville Rd. (650 ft. South of I-70)
7	Pathway Crossing	Upgrade Existing	Long Term	West Running Brook Rd. @ Little Patuxent Pkwy.
64	Pathway Crossing	Construct New	Long Term	Shadow Fall Terrace @ Oakland Mills Rd.
96	Pathway Crossing	Construct New	Long Term	Coca Cola Dr. @ Hi Tech Dr.
120	Pathway Crossing	Upgrade Existing	Long Term	Sewells Orchard Dr. @ Oakland Mills Rd.
121	Pathway Crossing	Upgrade Existing	Long Term	Fairmead Ln. @ Oakland Mills Rd.
142	Pathway Crossing	Construct New	Long Term	Saint Johns Ln. @ SB Rt. 29 to WB Rt. 40 Ramp
144	Pathway Crossing	Upgrade Existing	Long Term	Woodbine Rd. @ Frederick Rd.
148	Trail Access	Construct New	Long Term	Trail Access between Elibank Dr. and Montgomery Rd.
52	Tunnel	Construct New	Long Term	Centre Park Dr. @ Rt. 100
118	Tunnel	Existing	Long Term	Along Tamar Dr. (150 ft. North of Lamskin Ln.)
133	Tunnel	Construct New	Long Term	1000 ft. South of NB Rt. 29 to Johns Hopkins Rd. Ramp
181	Tunnel	Upgrade Existing	Long Term	Brumbaugh St. @ Main St.
182	Tunnel	Existing	Long Term	Tunnel by Baltimore County Line and 3600 ft. West of I-95
186	Tunnel	Construct New	Long Term	Northside of Rt. 29 at Rt. 40

APPENDIX G

Downtown Columbia Circulation Plan

Number	Road or Area Name	From	To	Facility Type Recommendation	Description of Recommendation
1A	Little Patuxent Parkway (eastside leg of north/south alignment)	Columbia Road	South Entrance Road	Shared Use Path	The 10 foot shared use path will follow the eastside of Little Patuxent Parkway from Columbia Road south to South Entrance Road.
1B	Little Patuxent Parkway (westside leg of north/south alignment)	Columbia Road	Governor Warfield Parkway	Shared Use Path	The 10 foot shared use path will follow the westside of Little Patuxent Parkway from Columbia Road south and continue to the intersection of Governor Warfield Parkway and Little Patuxent Parkway
1C	Little Patuxent Parkway (south side of east/west alignment)	South Entrance Road	Governor Warfield Parkway/Banneker Road	Shared Use Path	The 10 foot shared use path will follow the south side Little Patuxent Parkway from South Entrance Road to Governor Warfield Parkway/Banneker Road. This recommendation harmonizes with HHI's multi use path.
1D	South Entrance Road	Little Patuxent Parkway	Southwest Corner of Lakefront Neighborhood Building.	Shared Use Path	The shared use path will follow the east side of the South Entrance Road from Little Patuxent Parkway and transition around the southeast corner of the Lakefront Neighborhood Building. This recommendation harmonizes with the proposed multi use path.
1E	Little Patuxent Parkway (westside of Little Patuxent Parkway at Governor Warfield Parkway)	Governor Warfield Parkway	Sterret Place	Shared Use Path	The shared use path will follow the west side of Little Patuxent Parkway.
1F	South Entrance Road	Little Patuxent Parkway	Intersection of South Entrance Road and proposed extension of Symphony Wood Road.	Shared Use Path	The shared use path will follow the west side of South Entrance Road.
2	Columbia Road	Little Patuxent Parkway	Ten Mills Road	Bike Lanes	The bike lane will follow the north bound leg of Columbia Road to Ten Mills Road. A southbound bike lane could be accommodated with by shifting pavement markings.
3A	Sterret Place	Columbia Mall Circle	Wincopin Circle Extended	Bike Lanes	Bike lanes are proposed on Sterret Place from Columbia Mall Circle to proposed Wincopin Circle extended.
3B	Wincopin Circle	Little Patuxent Parkway	Existing terminus, with extension of facilities north	Sharrows	Sharrows are proposed for the existing road and on the proposed extension to the north.
3C	Access road to Whole Foods site	Little Patuxent Parkway	Shared Use Path from Wincopin.	Bike Lane	Bike lanes are proposed for the access road to Whole Foods.
3D	Existing private access roads	Area Wide		Sharrows	Sharrows are proposed for existing and proposed access roads within the neighborhood.

Number	Road or Area Name	From	To	Facility Type Recommendation	Description of Recommendation
3E	Existing paths	Vantage Point Road	To Lakefront Area	Shared Use Path	Expand existing and/or proposed paths to ultimate pavement width of 10 feet.
3F	Existing open area	Existing terminus at American City Building	Access road to Whole Foods site	Shared Use Path	A shared use path will allow access to Whole Foods from the north.
4	Columbia Mall Circle	Garage entrance near Sterret Place	Symphony Woods Road (See 8B)	Bike Lane/Sharrows	Bike lanes and sharrows are proposed to provide for a path around the mall.
5A	Governor Warfield Parkway	Little Patuxent Parkway/Governor Warfield Parkway	Little Patuxent Parkway/Banneker Road	Shared Use Path	The shared use path will follow the south bound leg of Governor Warfield Parkway.
5B	Governor Warfield Parkway	Little Patuxent Parkway/Governor Warfield Parkway	Little Patuxent Parkway/Banneker Road	Shared Use Path	The shared use path will follow the north bound leg of Governor Warfield Parkway.
6	Broken Land Parkway	Little Patuxent Parkway	Columbia Mall Circle	Bike Lanes	The recommendation for this section Broken Land Parkway is to install bike Lanes. This recommendation does not harmonize with the approved plan. The approved plan does not propose any treatment, however this is an important segment of the proposed network.
6A	Broken Land Parkway	Little Patuxent Parkway	Stevens Forest Road	Cycle Tracks	The proposed two way cycle track will follow the southbound leg of Broken Land Parkway, transitioning to a cycle track in the road median at Hickory Ridge Road and continue across MD 29 to Stevens Forest Road.
6B	Broken Land Parkway	Little Patuxent Parkway	1,200 feet south of the intersection of Broken Land Parkway and Little Patuxent Parkway	Shared Use Path	The shared use path will follow the southbound leg of Broken Land Parkway and will connect to an existing path and also transition to existing private road network in the Avalon Community. The first connection will be about 600 feet from the intersection of Broken Land Parkway and Little Patuxent Parkway, in which a spur would connect the two paths. The second transition would be a diversion into the Avalon community from the right of way into the property across a landscaped area at a point about 1,200 feet from the intersection of Broken Land Parkway and Little Patuxent Parkway. The transition would connect with proposed sharrow treatment within the Avalon Community.
6C	Broken Land Parkway Extended	Columbia Mall Circle	Terminus	Sharrows	Sharrows have been approved for use.
7	Gramercy Place (Extended)	Gramercy Place	Columbia Mall Circle	Sharrows	Sharrows are proposed to connect with bike lanes on Columbia Mall Circle.

Number	Road or Area Name	From	To	Facility Type Recommendation	Description of Recommendation
8A	Symphony Woods Road (existing and proposed extension to Little Patuxent Parkway) Avenue Type 3.	Little Patuxent Parkway	South Entrance Road	Bike Lanes	Bike lanes will follow the road in both travel directions.
8B	Symphony Woods Road-extended	Little Patuxent Parkway	Gramercy Place (Extended)	Bike Lanes	Bike lanes are proposed for both travel directions.
9	Hickory Ridge Road (Extended)	Current terminus of Hickory Ridge Road at Broken Land Parkway	Symphony Woods Road	Bike Lanes	Bike lanes are proposed for both travel directions.
10	North-South Collector (Proposed)	Where the North-South Collector overlaps the alignment of Symphony Woods Road.		Bike Lanes	Bike lanes are proposed for both travel directions.
11	Broken Land Parkway	Little Patuxent Parkway	Hickory Ridge Road Extended	Shared Use Path	A shared use path will follow the northbound leg of Broken Land Parkway.
11A	Hickory Ridge Road	Broken Land Parkway	Intersection of Martin Road and Avalon Community access road, then into private development via access road.	Bike Sharrows	The proposed sharrows will be placed on both east and west legs of Hickory Ridge Road from the intersection of Hickory Ridge Road and Broken Land Parkway to the intersection of Hickory Ridge Road and Martin Road. In addition, they will be placed on the access road into the development.
11B	Hickory Ridge Road	Martin Road	150 feet past college square.	Bike Lanes	The proposed bike lanes will be placed on both the east and west legs of Hickory Ridge Road.
12	Mall Neighborhood Street Type 3 Network	Area Wide		Sharrows	Sharrows are approved for use for use on the north and east sides of the mall building.
13A	Twin Rivers Road	Wilde Lake Village Center	Broken Land Parkway	Shared Use Path	The project aligns with the proposed shared use path being developed under CEPPA No. 18
13B	Twin Rivers Road and Twin Rivers Road Extended	Broken Land Parkway	To terminus in mall area.	Sharrows/Bike Lanes	The approved plan calls for sharrows and bike lanes.
15	Crescent Neighborhood local network (Street Type 2)				Bike lanes are included with the Street Type 2 typical section par the Downtown Columbia Design Guidance. It should be noted, however, that each developing Neighborhood to date has developed specific Design Guidance for their individual Neighborhood. Also the Road Type abdicated in the Downtown wide Design Guidance is also subject to change when that Neighborhood actually enters the development process.

Number	Road or Area Name	From	To	Facility Type Recommendation	Description of Recommendation
16	Town Center Avenue (Private Road)	Mall Access Road	Traffic circle within the development	Bike Lanes/Shared Use Path/Sharrows	The proposed bike lanes, sharrows and shared use path will be linked to enhance an existing connection to the intersection of Governor Warfield Parkway and Little Patuxent Parkway.
17	Downtown Columbia Trail/Patuxent Branch Trail Extension	Lake Kittamaqundi area and the multi use pathway	Existing Patuxent Branch Trail	Shared Use Path	This will study a new connection along the Little Patuxent River sewer alignment to Broken Land Parkway, connecting Downtown Columbia at Lake Kittamaqundi and extending south to the existing Patuxent Branch Trail.
18	Windstream Drive	Governor Warfield Parkway	Columbia Mall Circle and existing parking lots.	Bike Lanes	Bike lanes are proposed from the Governor Warfield Parkway intersection to the Mall entrances, transitioning across a parking lot.
19	Mall Alleys	Area Wide		No Recommendations	
20	MD 175/US 29 Bridge	Bridge Structure	Bridge Structure	Cycle Tracks	Cycle tracks are proposed on new bridge structures unless the existing deck structures can be reconstructed to accommodate cycle tracks. ALTERNATE: Cycle tracks are proposed for the existing but reconstructed bridge deck or a new bridge structure.
21	Little Patuxent Parkway	Columbia Road	Bridge Structure	Median cycle track	A 12 to 14 foot median cycle track is proposed from Columbia Road to the US 29 crossing. A bridge to cross a stream would be needed.
22	Crescent Neighborhood	Area Wide		Bike Lanes and Shared Use Paths	Bike Lanes are proposed for circulation on local private access roads. Grade separated Shared Use Paths are recommended to access the proposed Downtown Columbia Trail Patuxent Branch Trail Extension
23	Merriweather Wood Neighborhoods	Area Wide		Shared Use Path/Bike Lanes	Shared use paths are recommended to access the internal portions of the area without road access, bike lanes are recommended for the roads.
25	Martin Road	Hickory Ridge Road	Owen Brown Road	Bike Lanes	The proposed bike lanes would be on both the northbound and southbound sides of Martin Road.
26	New Utility Line ROW Connection	Hickory Ridge Road	HHI's multi use Path	Shared Use Path	The shared use path would use an existing utility ROW to provide a north/south connection from Hickory Ridge Road to HHI's multi use path and could also include a connection to Banneker Road.
27	Columbia Mall Circle Connection	Area Wide		Bike Sharrows	Bike sharrows are proposed to allow connections between the multi use path, Columbia Mall Circle and the Mall.

Number	Road or Area Name	From	To	Facility Type Recommendation	Description of Recommendation
27	Symphony Overlook Connections	Area Wide		Sharrows	Sharrows are proposed for access roads within the Symphony Overlook neighborhood
28	West Running Brook Road	Little Patuxent Parkway	Hyla Brook Road then north to Centennial Lane	Bike Lanes/Bike Sharrows	Bike lanes from Little Patuxent Parkway to Hyla Brook Road with a transition to sharrows as the road travels north.
29	Swift Stream Place	Little Patuxent Parkway	South Entrance Road	Bike Sharrows	Sharrows will provide for access to the multi use path for the community.
30	Connector Road	Little Patuxent Parkway/HHI multi use path	Columbia Mall Circle	Bike Lanes	Bike lanes are proposed to provide a high quality connection to the multi use path and symphony woods from the mall area.
31	Symphony Overlook Connections	Southeast corner of mall building	South to Little Patuxent Parkway and HHI's multi use path.	Bike Lanes	Bike lanes are proposed from the southeast corner of the mall south to connect to HHI's multi use path, providing a high quality connection.
32	Symphony Woods Connections	Symphony Woods Road	Little Patuxent Trail Extension	Shared Use Path	Shared use path proposed to connect to HHI's multi use path.
33	Merriweather Woods Proposed Road	Little Patuxent Parkway	Symphony Woods Road (existing and proposed extension to Little Patuxent Parkway) Avenue Type 3.	Bike Lanes	Bike lanes are called for on the proposed road.

BIKE HOWARD

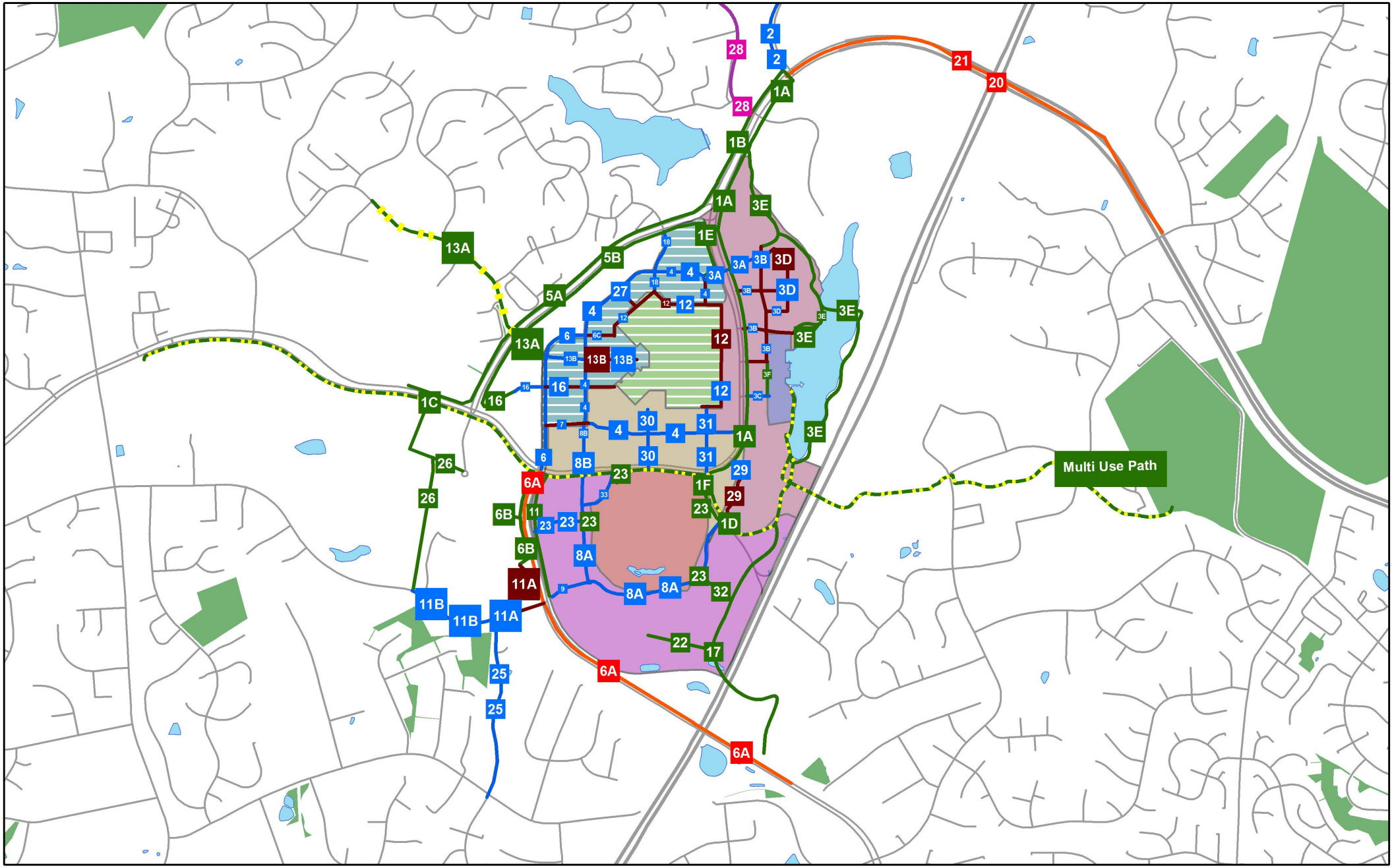
Downtown Columbia Without North South Collector Bicycle Facilities and Circulation Plan Map No. 8

Bike Facility Recommendations

- Shared Use Path
- Cycle Track
- Bike Lane
- Bike Sharrow
- Neigborhood Greenway
- Segment Number Label
- Required by Approved Downtown Columbia Master Plan

Neighborhoods

- Warfield-Approved
- Mall- Approved
- Crescent
- Lakefront
- Lakefront Core
- Merriweather
- Symphony Overlook



BIKE HOWARD

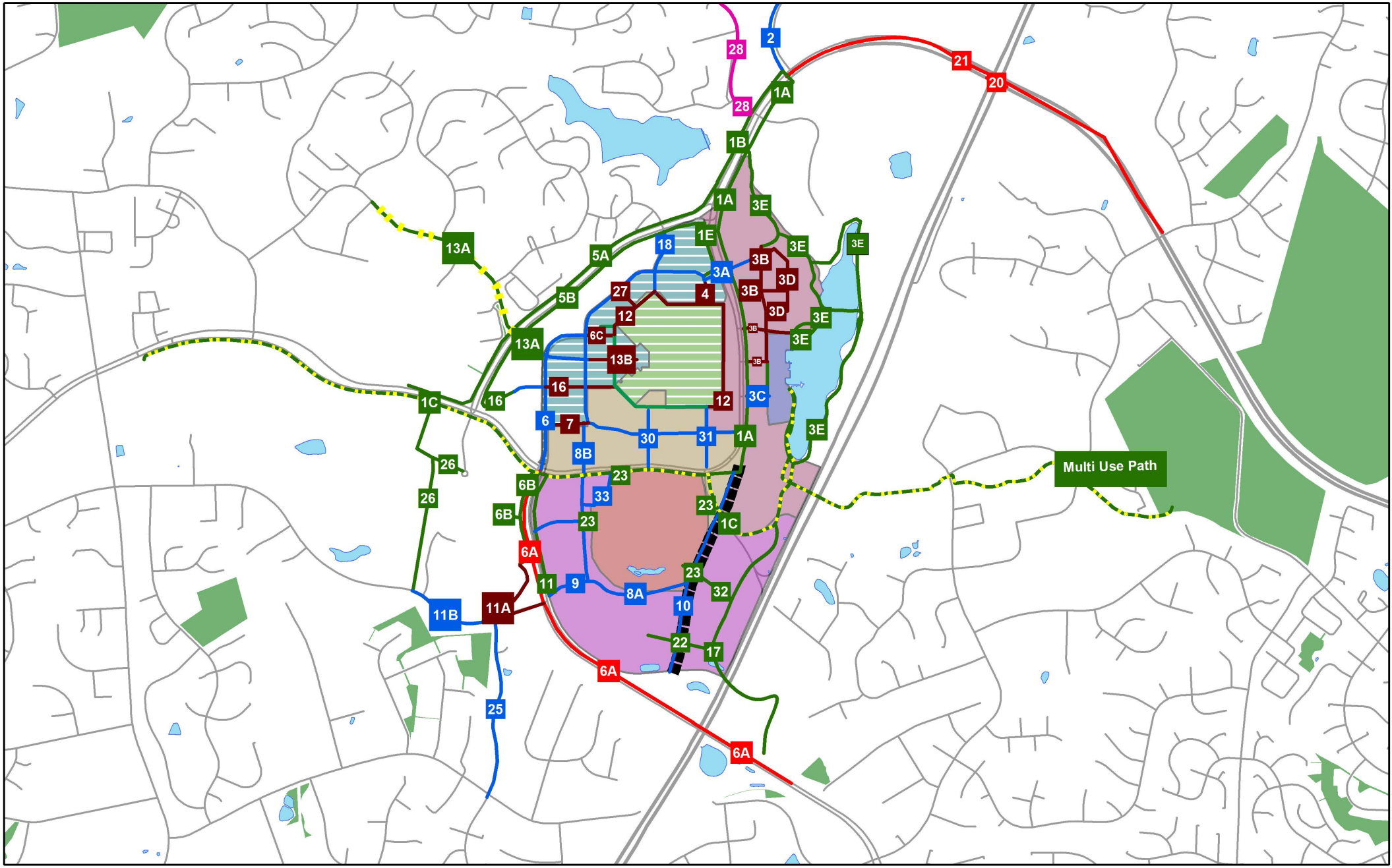
Downtown Columbia With North South Collector Bicycle Facilities and Circulation Plan Map No. 9

Bike Facility Recommendations

- Shared Use Path
- Cycle Track
- Bike Lane
- Bike Sharrow
- Neigborhood Greenway
- Segment Number Label
- Required by Approved Downtown Columbia Master Plan

Neighborhoods

- Warfield-Approved
- Mall- Approved
- Crescent
- Lakefront
- Lakefront Core
- Merriweather
- Symphony Overlook



APPENDIX H
Recommendations for State Highways in Howard County

Summary of Facility Recommendations for State Roadways in Howard County

Road Name	Route Number	Existing Conditions	General Facility Recommendations	Specific Facility Recommendations	Short Term	Long Term
Route 1	US 1	Very little space, variable lane widths, high traffic volumes and speeds.	Cycletracks	One way cycletracks each side, colored bike lanes thru interchanges	Bike Lanes and Buffered Bike Lanes based upon space available and truck traffic.	Cycletracks
	MD 32	Wide Shoulders, a few locations where shoulders disappear. Challenging interchanges.	Wide Shoulders	8-12 foot shoulders, safety treatments thru interchanges	Wide Shoulders	Median Path north of I-70
Columbia Pike	US 29	Wide Shoulders; challenging interchanges.	Wide Shoulders	8-12 foot shoulders, safety treatments thru interchanges	Wide Shoulders	Coordinate bicycle accommodations with BRT
Ridge Road	MD 27		Shared Roadway	Safety Treatments and 3-4' shoulders where feasible.	Same	Consistent 5' Shoulders
Baltimore Pike	US 40	Varies--wide but inconsistent shoulders east of Normandy Drive and west of Greenway Drive. No accommodations in the middle.	Combination	Cycletracks west of 29, median path through 29 interchange; cycletracks and buffered bike lanes east of 29	Same	Same
Woodbine Road	MD 94		Shoulders	4'-5' shoulders, spot safety treatments	Same	Same
Roxbury Woods Road	MD 97	Variable shoulder, 3-5' in most areas.	Shoulders	4'-6' shoulders		
Old Frederick Road	MD 99	Some shoulder west of Rodgers to St. John's way; short stretch of bike lanes	Bike Lanes and Shared Roadway w/ Safety Treatments	Consistent 5' Bike Lane or Shoulder; safety treatments west of Marriotsville Road	Same	Consistent 5' Bike Lane or Shoulder
Rouse Parkway/Savage Road	MD 175	Wide Shoulders in some areas, difficult interchanges.	Combination	Median Path; Wide Shoulders (10-12'); buffered bike lanes or cycletracks; some segments have no facility recommendations.	Same	May need a parallel, high speed bikeway with grade separations at interchanges.
Dorsey Road, Meadowridge Road, Montgomery Road	MD 103	Inconsistent shoulder width, 0-3 feet.	Bike Lanes and Cycletracks	Bike Lanes east of Long Gate Parkway; cycletracks from Long Gate Parkway to St. Johns Way/US 29 interchange.	Same	May need buffered bike lanes.
Waterloo Road	MD 104	Wide, but imbalanced shoulder	Sharrows & Bike Lane	Balance the shoulder space and provided bike lanes.	Sharrows	Buffered Bike Lanes
Clarksville Pike, Old Annapolis Road, Waterloo Road	MD 108	Varies tremendously--narrow shoulders in some areas, none in others, new substandard bike lanes near Snowden River Parkway.	Combination	Shoulders 4-6' south of Clarksville; sidepath and shoulders Clarksville to US29; colored bike lanes, shared use path, one way cycletrack, bike lanes, buffered bike lanes to 175.	Sharrows, Spot Safety Treatments, 4-6' Shoulders, Standard Bike Lanes.	Combined On-Road and Off-Road accommodations.

Priority Intersections Involving State Roads

	Approach Leg 1		Approach Leg 2		Approach Leg 3	
No.	**Street Name**	**Route #**	**Street Name**	**Route #**	**Street Name**	**Route #**
1	Washington Blvd	1	Levering Ave.			
2	Washington Blvd	1	Guilford Rd			
3	Washington Blvd	1	Howard St			
4	Washington Blvd	1	Whiskey Bottom Rd			
5	Washington Blvd	1	Meadowridge Rd	103	Meadowridge Rd	103
6	Columbia Pike	29	Old Annapolis	108		
7	Columbia Pike	29	John Hopkins Rd			
8	Patuxent Fwy	32	Dorsey Run Rd			
9	Patuxent Fwy	32	Clarksville Pike	108		
10	Patuxent Fwy	32	Cedar Lane			
11	Baltimore National Pike	40	Coventry Court Dr			
12	Baltimore National Pike	40	Bethany Lane		Centennial Lane	
13	Baltimore National Pike	40	N. Chatham Rd			
14	Baltimore National Pike	40	Ridge Rd			
15	Baltimore National Pike	40	Rogers Ave			
16	Roxbury Woods Rd	97	Burntwoods Rd			
17	Roxbury Woods Rd	97	Baltimore National Pike	I-70		
18	Route 100	100	Waterloo Rd	104		
19	Route 100	100	Meadowridge	103		
20	Montgomery Rd	103	Columbia Pike	US 29		
21	Montgomery Rd	103	Old Columbia Pike			
22	Montgomery Rd	103	Long Gate Pkwy			
23	Montgomery Rd	103	South Haven Drive			
24	Montgomery Rd	103	Brightfield Rd		Meadowridge Road	103
25	St Johns Lane	103	Columbia Road		St Johns Lane	
26	Clarksville Pike	108	Columbia Rd			
27	Clarksville Pike	108	Cedar Lane			
28	Clarksville Pike	108	Elliots Oak Rd			
29	Clarksville Pike	108	Centennial Lane		Beaverbrook Rd	
30	Clarksville Pike	108	Harpers Farm Rd			
31	Clarksville Pike	108	Trotter Rd		Meadow Vista Way	
32	Clarksville Pike	108	Linden Linthicum Ln			
33	Clarksville Pike	108	Clarksville Square Dr			
34	Clarksville Pike	108	Great Star Dr			
35	Clarksville Pike	108	Auto Dr			
36	Clarksville Pike	108	Ten Oaks Rd			
37	Clarksville Pike	108	Guilford Rd			
38	Old Annapolis	108	Mellenbrook Rd			
39	Old Annapolis	108	Waterloo Rd	108	Waterloo Rd	104
40	Waterloo Rd	108	Old Montgomery Rd			
41	Waterloo Rd	108	Mayfield Ave			
42	Waterloo Rd	108	Rouse Pkwy	175		
43	Scaggsville Rd	216	All Saints Rd			
44	Scaggsville Rd	216	Leishear Rd			
45	Scaggsville Rd	216	Ice Crystal Dr			
46	Scaggsville Rd	216	Columbia Pike	Route 29		
47	Scaggsville Rd	216	Maple Lawn Blvd			
48	Cedar Lane		Grace Dr	Near MD 32		
49	Cedar Lane		Guilford Rd	Near MD 32		
50	Johns Hopkins Rd		Montpelier Rd	Near US 29	Old Columbia Rd	
51	Johns Hopkins Rd		Old Columbia Rd	Near US 29	Hammond Pkwy	
52	Long Gate Pkwy		Route 100 Exit Ramp	MD 100		
53	Long Gate Pkwy		Meadowbrook Ln	MD 100		
54	Sanner Rd		Guilford Rd	Near MD 32	Cedar Lane	

APPENDIX I

Wayfinding and Signage Systems

Public comment during both the Bike Howard and the Columbia Association (CA) planning process clearly identified the need for improved wayfinding on both county roads and trails and Columbia association pathways.

Wayfinding refers to a system of signs, land markers, and related environmental elements/cues that guide individuals through an environment and to their destinations. Wayfinding is about effective communication and relies on a succession of word and graphic messages that enable the traveler to make decisions about routing. These decisions are based on inputs that may include destination options, relationships between destinations, mode of travel, type of travel way, direction and distance.

"Wayfinding is a consistent use and organization of definite sensory cues from the external environment" (Lynch, 1960 Image of the City)

Five distinct but related signage needs were identified for Howard County:

1. Wayfinding on the CA pathway system
2. Wayfinding on County Department of Recreation and Parks trails; and HCPS owned trails.
3. On-road bike route signs for Howard County designated routes.
4. On-road route and branding signs related to a specific group of recreational routes, especially in Western Howard County.
5. On-road bike route signs for State Highway Administration designated routes.

The following sketch plan will provide an outline for how to move forward in the development of a wayfinding sign system that achieves these goals:

- It will provide functional, seamless and color coordinated wayfinding guidance for cyclists on both roadway and trail networks.
- It will enable the separate but linked pathway systems of the County and Columbia Association to separately brand their path networks and address their own hierarchy of trails within each system.
- It will enable the State and County to both brand and sign on-road routes that can overlap and use roads belonging to either jurisdiction's network.

Installation of an attractive and coordinated sign system will broaden public awareness of bicycling and in combination with web-based information and traditional maps help users identify low-stress routes, recreation routes and standard routes for people of all ages and skill levels.

Background

Currently, the only signed bicycle routes in the County are along State roadways. Additionally, the MD State Highway Administration is developing a plan to sign a bicycle route on the MD 32 corridor from MD 32 and MD108 to the NSA campus. This route will act as a bicycle alternative to the portions of the highway upon which bicycle use is prohibited.

As of 2013, the Columbia Association is the process of developing a sign system for its pathways. This task was identified in CA's recent pathways plan Connecting Columbia, and is undergoing further study through implementation of signage in a few pilot locations.

Wayfinding Challenges in Howard County

Because it is a suburban county, and because Columbia is a planned community with very specific land use and landscape design standards, Howard County has some unique features that make wayfinding on the street, sidewalk and pathways system difficult. A list of some of these characteristics follows:

- Curvilinear nature of the streets in many residential developments
- Lack of street connectivity between residential pods
- Upon entering a residential pod, the inability to determine if a trail will or will not be provided to exit the pod, and if so, down which cul de sac it will be found.
- The typical landscaping, characterized by earthen berms, of many commercial areas in Columbia make it difficult to see what shopping or other commercial activities may be located within.
- The internal orientation of many commercial areas making it hard to know how to enter and exit them and whether or not internal navigation will be bicycle-friendly or not.
- The barriers created by a number of major highways, stream valleys, railroads, large conservation areas, and other large institutional properties characterized by few good crossings and no wayfinding guidance.

Positive Characteristics to Build Upon

Despite these challenges, one of the many bicycle-friendly pluses of Howard County is the extensive trail system at its core, which provides an amazing level of connectivity, as compared to other suburban counties in Maryland. Adding to this, is a spinal path system extending out from the core along some of the stream valleys, and the existence of a few grade separated crossings of major highways and other barriers. And finally, the presence of many low traffic streets that in combination with trails and future roadway improvements will offer more extensive bicycle access than previously thought possible.

As a result, it is realistic to think that a robust system of signed bicycle routes will encourage more widespread use of bicycles for transportation and also make a positive contribution to safer cycling in the County, even though safety is not the primary objective. Following, is a list of key benefits of a signed bicycle route network.

1. ***Comfort:*** Signed bike routes will provide a higher level of comfort for large numbers of existing and future cyclists:
    - for those who are new to bicycling for transportation purposes;
    - for those who are new in a community;
    - for those who are unfamiliar with a neighborhood where they want to travel;
    - visitors to the County from within the region, and
    - most tourists and business travelers from outside the region who are likely to be unfamiliar with the County.
2. Solutions to bicycling ***navigation*** needs:
    - Provides guidance along routes which are not intuitive or are different from those followed by motorists.
    - Provides critical navigational information, directions, distances, names of destinations, links to other transportation services.
3. Supports bicycle ***encouragement*** efforts by:
    - Providing a discrete element of bicycle infrastructure that can be promoted and marketed to new audiences;

- Creating a visual image of the bicycle in the roadway environment, and in turn, marketing bicycle transportation.

4. Supports bicycle ***safety*** by:
   - Helping cyclists find routes that are appropriate for their skill level;
   - Increasing the overall numbers of people bicycling, which has been shown to increase safety;
   - Providing a widespread indicator for motorists that bicyclists should be expected on most roadways throughout the County.

A framework for developing a signing protocol and route plans for both trails and on-road bicycle routes, and support seamless transitions between the two settings.

The Bicycle Route Framework

Recommendations for development of a system of Signed Bicycle Routes including the following:

In 2014, the County should develop an integrated bikeway sign protocol and manual using the following system of shields and branding graphics:

- ***For CA pathway routes use blue fingerboards.***
  In 2013, the Columbia Association conducted a pilot program that included design and installation of wayfinding signs on a small portion of the CA pathway system. It will use primarily blue fingerboards as exhibited in figure 1.

Figure 1: Example wayfinding signs from the Columbia Association.

- ***For County trail routes use brown fingerboards.***
  The Howard County Department of Recreation and Parks currently uses brown wayfinding signs for trails, but does not install signs on all of its trails.

- ***For standard on-road County routes use the MUTCD D11-1c as shown in Figure 2.***
  For bicycle wayfinding signs to be effective they must extend beyond CA pathways and state highways to include other trails and on street routes. As a result this plan recommends that County roads and trails be included in a coordinated signage effort.

Figure 2: Standard MUTCD signs.

- ***For state routes within the County use the MUTCD sign M1-8a as shown in Figure 3.***
  Currently, the only signed bicycle routes in the County are along State roadways. Additionally, the MD State Highway Administration is developing a plan to sign a bicycle route in the MD 32 corridor that will act as a bicycling alternative to the portions of the highway upon which bicycle use is prohibited. This route would extend from MD 144 in the north to the National Security Administration campus adjacent to Fort Meade, in

Figure 3: MUTCD sign M1-8a.

Anne Arundel County. The state is considering two options provided in the MUTCD.

- ***For on-road recreational routes within the County, develop a new shield design integrating green and blue colors, a shield shape and graphic approach that creates a Howard County and recreational bicycling identity (See Figure 4 for an example from Quebec's La Route Verte).***
  The On-Road Recreational Route System should be laid out primarily in western Howard County, but also include routes in the southwest around Fulton, in and around Historic Ellicott City and Savage, as well as in the Patapsco Heritage Greenway and Elkridge Area.

Figure 4: Example shield sign

  The purpose of providing a unique brand for a distinct set of recreational routes is twofold:

  1. It will assist cyclists with wayfinding and provide a welcoming environment for recreational riders attracted to the part of the County where these routes will be located.
  2. By having a unique brand for the more rural recreational routes, the county can coordinate effective safety messaging campaigns geared especially to the safety issues found along these typically narrow rural roads. Through use of a logo and graphic branding, information that is provided on the web, at events, during road safety awareness weeks, on printed materials, etc. can all be associated with the route system where these safe bicycle and motorist road sharing practices are most applicable.

  The graphic branding on this sign may include a traditional Howard County graphic brand such as the stalks of wheat. It should also include elements that communicate a friendly-attitude between cyclists and motorists, which is essential to help keep these popular routes safe in the future.

More about the On-Road Recreational Route System

The province of Quebec established a system of in-city and rural bicycle tourism routes with the brand *La Route Verte*. Many are off-road paths, others are on-road routes on low traffic roads. The routes are numbered and blazed as shown in figure 3.

Just like in Howard County, the facilities used for the various routes in Quebec are managed by a variety of agencies, including the provincial transportation department, national park agency, municipalities, etc. Figure 5 illustrates how users are informed of these partnerships. *Translation: Proud Partners of the Green Route: Transport Quebec.*

Figure 5: Proud Partners of the Green Route: Transport Quebec

Figure 6 illustrates how the route shield can also be used in relationship to typical destination guide signs. Destinations on the Route Verte can be distinguished from other destinations that are also accessible by bicycle.

Figure 6: Destination and distance signs

In Howard County, standard safety symbols and other warning and regulatory signs from the MUTCD can be used

to help drivers and cyclists more safely use the narrow two lane roads in the network. These signs would address issues such as poor sight distances, steep grades, potential conflicts at intersections, appropriate passing behavior and other respectful road sharing practices.

More about the Howard County General Route System

The general route system can be developed primarily in the eastern portion of the county, but will include some routes and destinations in the western part of the county that overlap with the Recreational Route System.

The signs for this system should have a different but coordinated graphic identity, so the system is ultimately seen as a whole network. This identity may be design to coordinate much more closely with one of the three design approaches offered by the MUTCD. The examples in Figures 7-9 illustrate how other communities have used the basic green MUTCD Bike Route signs and customized them to meet their own unique branding and system hierarchy needs. It will also need to be coordinated with the aesthetic approach taken by the Columbia Association.

This signage system will knit together trails and roads (including bicycle facility upgrades where recommended in the Plan) into a set of routes based upon their ultimate destination in the County. The routes will be designed to connect all of the major neighborhoods, employment centers, commercial centers and other key destinations. A draft list of these major destinations is provided in an appendix at the end of this document.

Figure 7: Baltimore, MD Phase 1

Figure 8: Baltimore, MD, Phase 2

Figure 9: Seattle, WA

Key to this system is determining how on-road and off-road route signing will be coordinated. On-road routes have very different signing issues than trail routes. There is also the need to coordinate with CA's work on developing a sign system for CA pathways. Other issues will include how to coordinate with surrounding jurisdictions.

A Bicycle Route Sign Manual and Protocol

A Bicycle Route Sign Manual and Protocol will provide a framework for a logical, legible, and an efficient guide sign system that is applied consistently throughout the County. For a wayfinding sign system to function effectively, it must be understood by users and based on a consistent pattern of sign design and usage. The Protocol will describe how to address on-road bicycle wayfinding and bicycle/pedestrian wayfinding for trails; however, it does not need to address pedestrian wayfinding issues outside of the trail system. These can be addressed in a separate manual.

The Protocol will fulfill the following objectives:

- Ensure consistency and cohesion in the final product, e.g. whether signs are installed along all of the routes at the same time, or over a series of years.
- Ensure that additional routes to be developed and signed in later years will be consistent with the overall system.
- Establish a consistent planning process for evaluating the readiness of routes and developing a sign installation plan, whether it is for a single route, or a set of routes in a particular area of the County.
- Describe how future expansion or contraction of the system should be addressed.
- Explain how to coordinate routing and sign information with the signed bicycle route sign systems of neighboring jurisdictions.
- Establish a standard graphic approach, symbology, lexicon and sign assembly pattern for bicycle route guide signs.
- Establish sign maintenance and replacement systems and practices.

The Protocol will also ensure that sign design adheres to key principals that address navigation needs that are unique to bicycle travel:

- When determining what information needs to be conveyed at any particular location the following must be taken into consideration a) what the cyclists have been told on the previous signs along the route and b) what they will be told on the next sign. All messaging must be considered in sequence.
- Cyclists should be provided less information at decision points (i.e. intersections) where greater attention to traffic (trail or roadway) is required to ensure the cyclists' safety, and more information provided at locations where traffic dynamics are simplified (i.e. along a straight stretch of street where turning movements are reduced and motorists can easily pass).
    - For example, at a location where a challenging left hand turn must be made, only the most basic route guidance should be given prior to and at the turn (main destinations and arrow; no mileage). The distance information can be included on a sign prior to or after the turn.
- Where it is helpful and contributes to safety, integrate operational guidance into wayfinding sign assemblies, such as:
    - USE CROSSWALK, USE SIDEWALK, USE SHOULDER.
    - Or, at a left turning location, a sign panel that reads "USE LEFT LANE" should be provided on a multi-lane arterial, and well in advance of the turn, to ensure that the cyclist has sufficient time to safely move left across through traffic.
- Providing mileage more often in areas where cyclists may be entering the route from any number of side streets and starting points; however, in other locations, if a set of destinations with mileage was just provided a few blocks back and the distances have not changed by more than 0.2 miles, signage at a turn in the route may not need to include mileages and only the destination legend(s) and arrow(s) are necessary.

Route Implementation

Initial sign installation efforts should focus on providing signs along the Spine Route system, the Columbia Association and County pathways systems, and routes that may be developed and designated by the State Highway Administration.

As safety on rural roads is improved and other facilities are installed, the recreational route system and additional County routes in the Primary Network can be signed.

To implement the route systems, subsequent to the adoption of the Master Plan, the County will need to carry out the following tasks:

- Develop a coordinated graphic identity (branding) for each system.
- Develop a Sign Manual and Protocol.
- Conduct a detailed feasibility study of the Spine Network routes identified in the Plan.
- Develop a sign design, fabrication and installation package for one or more routes that are deemed ready for signage.
- Install the signs.
- Coordination timing of sign installation with development of web-based information and traditional maps. The sign and map information systems will help users identify low-stress routes, recreation routes and standard routes for people of all ages and skill levels.

With a Sign Manual and Protocol, the County will be in a position to identify, plan and implement routes as they are made ready with new and upgraded facilities. The network should be signed in multiple phases over a period of years. The primary factors that will guide implementation include the following: the availability of funding for design and implementation, feasibility and route readiness, the time and funding needed to address minor but critical physical deficiencies, and the pace of implementation for both on-road facilities and future trail construction on signed routes.

Draft Destinations for Bicycle Route System

When developing a network of signed bicycle routes, an early task is to identify a logical set of destinations to be served by the signed routes. These destinations will be the main destinations used on the sign panels. A standard approach to this task is to develop three classes of destinations--primary, secondary and tertiary.

- Primary destinations will include those that serve as route endpoints and other destinations of major importance or of the greatest interest to existing and prospective bicyclists.
- Secondary destinations will include those of less importance and many that are along the various routes, but not at their endpoints.
- Tertiary destinations typically include important destinations that may be located a short distance away from a major route, or are of lowest level of importance.

Following is a preliminary set of destinations around which a countywide route system can be developed. They are organized by region.

Eastern Howard County (8)

- BWI Trail (AA County)
- Dorsey MARC Station
- Elkridge
- Grist Mill Trail
- Ilchester
- Rockburn Branch Park
- St. Denis MARC Station (Baltimore County)
- Wholesale Food Center

Southern Howard County (9)

- JHU-Applied Physics Lab
- Laurel (Prince George's County)
- Laurel MARC Station (Prince George's County)
- Maple Lawn
- North Laurel
- NSA/ Ft. Meade (Anne Arundel County)
- Patuxent Branch Trail
- Savage
- Savage MARC Station

Northern Howard County/Ellicott City (10)

- Dorsey's Search V.C.
- Ellicott City North/Route 40 Commercial Areas
- HC Government Center
- Historic Ellicott City
- Long Gate
- Meadowbrook Park
- Miller Branch Library
- No. 9 Trolley Trail (Baltimore County)
- Old Frederick Road (Route 99)
- Turf Valley

Western Howard County (7)

- Clarksville/River Hill
- Glenelg
- Glenwood
- Highland
- Lisbon
- Syksville (Carroll County)
- West Friendship

Central Howard County/Columbia (17)

- Blandair Regional Park
- Centennial Park
- Dobbin Road/Columbia Crossing
- Downtown Columbia
- Gateway Commerce Center
- Harper's Choice V.C.
- Hickory Ridge V.C.
- Howard County General Hospital/HC Community College
- Kings Contrivance V.C.
- Lake Elkhorn
- Long Reach V.C.
- Oakland Mills V.C.
- Owen Brown V.C.
- Robinson Nature Center
- Route 175 Park & Ride
- Route 32 Park & Ride
- Wilde Lake V.C.

APPENDIX J

Example Bicycle Parking Regulations

The following sample guidelines are provided in the plan to provide guidance and direction for new regulations in the County zoning and subdivision codes that govern new development.

Other guidelines that can be considered include those from Baltimore City, Maryland, Frederick County Maryland, and Arlington County, Virginia. See references to these at the end of this Appendix.

These sample guidelines are intended to facilitate adequate and secure short and long term bicycle parking for residents, workers in office and commercial buildings and students and staff in institutional buildings.

They can also serve as a template for those building owners who would like to retrofit existing residential or commercial properties with new or added bike parking facilities.

Draft Bike Parking Guidelines

The proposed presented below are provided as a model for Howard County. Sections include: Why Bike Parking, Definitions, Requirements, Equipment and Installation Design.

Why Bike Parking?

The provision of parking facilities directly encourages people to use their bicycles as a means of transportation. More people are likely to bicycle if they are confident that they will find convenient, secure, and weather protected parking areas at their destination. The following Bicycle Parking Requirements are applicable for accommodating bicycles in all buildings and development types in Howard County.

These requirements also set standards for bicycle parking at public facilities, bike-share stations and shower and changing facilities.

Definitions

Secure/Covered Facilities: Bicycle parking areas that protect the entire bicycle, its components and accessories against theft and against inclement weather, including wind-driven rain. Examples include but are not limited to: indoor bike room, indoor storage area, bike lockers, indoor or outdoor bike valet parking with weather protective cover and siding, areas with security camera linked to live viewers, and/or key access-covered cages with weather-protective siding.

Outdoor/Covered Facilities: Bicycle parking areas that provide some protection against inclement weather and may have added theft security. Covers include but are not limited to a building projection, an awning or tented roof. Siding is not required. Racks associated with covers will allow the user to lock the bicycle frame and one wheel while the bicycle is supported in a stable position.

Outdoor/Open facilities: Bicycle parking areas that permit the locking of the bicycle frame and one wheel to a bicycle rack and which supports the bicycle in a stable position without damage to wheels, frame or components. Cover and/or security enhancements are not provided.

Bicycle parking space: The number of bicycles that can be accommodated by the bicycle racks or facility, as defined by the user's manual for the rack or facility referenced. For the remainder of this document, guidelines refer to spaces, or number of bicycles for which the facility is designed to accommodate.

Requirements

The following are minimum requirements according to building type. Exceeding these minimum requirements is encouraged but not required.

Three-Five Unit Residential Buildings:

- One Secure/Covered bicycle parking space per unit located in an easily accessed basement storage area or adjacent / attached garage or shed.
- Shower / changing facilities as included in each residential unit.

Multi-Unit Residential (6 or more units) Buildings:

- One Secure/Covered bicycle parking space per unit located in an easily accessed dedicated storage area.
- One Outdoor/Covered or Outdoor/Open parking space per five units with a minimum of 2 Outdoor/Covered or Outdoor/Open spaces per building.
- Shower / changing facilities as included in each residential unit.

Office, Commercial & Industrial Buildings:

- One Secure/Covered parking space per worker for 10% of the planned part- and full-time worker occupancy (or 0.3 parking spaces per 1,000 square feet of development), but no fewer than 4 Secure/Covered parking spaces per building.

- One Outdoor/Covered or Outdoor/Open parking space for patrons and visitors for 2.5% of estimated daily building users but no fewer than 4 Outdoor/Covered or Outdoor/Open spaces per building.

- Provide at least one shower / changing facility for any building with 100 or more planned part- and full-time workers (or over 40,000 square feet of development) and one additional shower / changing facility per every 200 planned workers (or 80,000 square feet of development), thereafter. Shower / changing facility requirements may be met by providing the equivalent of free access to on-site health club shower facilities where health club can be accessed without going outside.

Retail Buildings:

- One Secure/Covered bike parking space per worker for 10% of the planned part- and full-time worker occupancy (or 0.3 spaces for 1,000 square feet of development) but no fewer than 2 Secure/Covered parking spaces per building.

- One Outdoor/Covered or Outdoor/Open parking space for patrons and visitors per 5,000 square feet, but no less than 2 Outdoor/Covered or Outdoor/Open spaces per building.

- Provide at least one shower / changing facility for any development with 100 or more planned part- and full-time workers (or over 40,000 square feet of development) and one additional shower / changing facility per every 200 planned workers (or 80,000 square feet of development), thereafter. Shower / changing facility requirements may be met by providing the

equivalent of free access to on-site health club shower facilities where health club can be accessed without going outside of buildings.

Institutional Building & Campus Dormitory Buildings:

- One Secure/Covered parking space
- per student and staff for 15% of the planned part- and full-time campus wide occupancy (or 0.5 parking spaces per 1,000 square feet of development), but no fewer than 4 Secure/Covered parking spaces per building.

- One Outdoor/Covered or Outdoor/Open parking space for patrons and visitors for 5.0% of estimated daily building users but no fewer than 4 Outdoor/Covered or Outdoor/Open spaces per building.

- Provide at least one shower / changing facility for any campus building with 100 or more planned part- and full-time students and staff (or over 40,000 square feet of development) and one additional shower / changing facility per every 200 planned students and staff (or 80,000 square feet of development), thereafter. Shower / changing facility requirements may be met by providing the equivalent of free access to on-site health club or gym shower facilities where health club or gym can be accessed without going outside.

- One Secure/Covered parking space per every two beds in a Dormitory building where such parking spaces may not be counted in the campus wide total.

Mixed- Use Buildings:

- Provide facilities proportional to the mix of uses using the above requirements.

- Shared facilities may be provided for non-residential uses mixed within a single building or for non-residential uses within a single development that is under 50,000 square feet. Specific requirements for unique uses such as senior or assisted living facilities, movie theaters, sports arena or conference venues will be determined on a case-by-case basis. Special provisions such as bicycle valet parking for single events such as concerts may be required.

Bike Parking Equipment and Installation Design

1. Acceptable bike rack designs must have a two point support system for easy access and locking of frame and wheels. The designs must present no sharp edges to pedestrians.

2. Developers are encouraged, but not required to use either a black-powder coated hitch style rack, or an artistic style rack to match Howard County preferred designs.

3. All racks and other fixtures must be securely affixed to the ground or a building.

4. Areas used for bicycle parking should be secure, well-maintained, well-lighted and easily accessible to bicycle riders.

5. No bicycle parking areas should impede sidewalk or pedestrian traffic. Designs that do not provide two-point supports for bicycles create unfit sidewalk conditions. Bicycles can fall over easily and become damaged, or hang out into the pedestrian right-of-way. Older “school” or

"dish" racks are not functional and do not provide full support. Single post designs with sharp edges can also be hazardous to pedestrians with visual disabilities. Racks with one point of contact, like hitch racks need to be in-ground mounted. Examples of recommended racks include: hitch rack, upside down U rack and multiple bike racks.

6. Retail establishments shall have Outdoor/Covered or Outdoor/Open facilities within 50 feet of the primary entrance(s). Racks must be 4-5ft away from hydrants & other street furniture. No bicycle parking shall be located farther from the entrance of a building than the closest automobile parking space (to include accessible parking spaces).Prominently placed signs should be within 50ft of parking & immediately visible. Signs must direct users to all secure/covered or outdoor/covered facilities that are not immediately visible from the street. All bicycle parking shall be separated by a physical barrier/parallel to curb or sufficient distance from car parking and vehicular traffic to protect parked bicycles from damage. Accessible, Indoor & Secure Accessible bike parking encourages daily use with well-maintained and well-lit easy access for riders. Converting on-street car parking to creative bike parking can accommodate up to eight bicycles, and encourage people to use their bikes for shopping and running errands-not just commuting.

Other Example Bike Parking Standards

A) Baltimore City Design Standards for All Bicycle Parking

(1) Required bicycle spaces must have a minimum dimension of two (2) feet in width by six (6) feet in length, with a minimum overhead vertical clearance of seven and six inches (7'-6") feet, except for approved bike lockers and other enclosures, which may be shorter.

(2) All bicycle parking spaces required by this Title must be used solely for the parking of bicycles.

(3) If required bicycle parking facilities are not visible from the street, signs must be posted indicating their location.

(4) Areas used for required bicycle parking must be paved and drained to be reasonably free of mud, dust, and standing water, and must be well-lighted.

(5) Bicycle parking must be designed so that bicycles may be securely locked without undue inconvenience and will be reasonably safeguarded from intentional or accidental damage.

(6) Bicycle parking must be provided at ground level unless an elevator is easily accessible to an approved bicycle storage area.

(7) Bicycle parking must be positioned so as to minimize interference with pedestrian movements and to provide for ADA compliance.

(8) Where required bicycle parking is provided in lockers, the lockers must meet the following standards:

(i) Lockable.

(ii) Capable of fully enclosing the bicycle.

(iii) Securely anchored

(iv) Constructed from a strong, weather-resistant and low-to-no maintenance material.

(v) Clearly labeled as bicycle parking.

(vi) Constructed with doors that open at least ninety (90) degrees to allow easy loading/unloading.

(vii) Posted with information about how to use bicycle lockers (user-provided locks, leasing or sign-up system, smart cards, etc.) on or near the lockers.

(viii) Include a wheel guide tray or other mechanism to assist the user with lifting the bicycle must be provided if lockers or racks are stacked on top of each other.

(9) Required bicycle parking may be provided in floor racks. Wall and ceiling rack designs may be approved by the Director of Planning as part of site plan review. Where required bicycle parking is provided in racks, the racks must meet the following standards:

(i) The bicycle frame and one (1) wheel can be locked to the rack with a high security, U-shaped shackle lock if both wheels are left on the bicycle.

(ii) A bicycle six (6) feet long can be securely held with its frame supported so that the bicycle cannot be pushed or fall in a manner that will damage the bicycle in any way.

(iii) Racks must support the bicycle in at least two (2) places, preventing it from falling over.

(iv) Racks must be anchored so that they cannot be easily removed, solidly constructed, resistant to rust and corrosion, and resistant to hammers and saws.

(10) Parking and maneuvering areas for bicycling parking must meet the following standards:

(i) Each required bicycle parking space must be accessible without moving another bicycle.

(ii) There must be an aisle at least five (5) feet wide behind all required bicycle parking to allow room for bicycle maneuvering. Where the bicycle parking is adjacent to a sidewalk, the maneuvering area may extend into the right-of-way.

(11) Covered bicycle parking can be provided inside buildings, under roof overhangs or awnings, in bicycle lockers, or within or under other structures. Where required covered bicycle parking is not within a building or locker, the cover must be:

(i) Permanent.

(ii) Designed to protect the bicycle from rainfall.

(iii) At least seven (7) feet and six (6) inches above the floor or ground.

(12) All required bicycle parking spaces must be made available to the public as follows:

(i) Required short-term bicycle parking spaces must be available for shoppers, customers, messengers and other visitors to the site.

(ii) Required long-term bicycle parking spaces must be available for employees, students, residents, commuters, and others who remain at the site for several hours.

(13) Alternate designs for bicycle parking may be approved by the Director of Planning as part of site plan review.

B) Arlington County, Virginia:
http://www.commuterpage.com/pages/special-programs/tdm-for-site-plans/bicycle-parking-specifications/

C) Frederick County,
Maryland http://frederickcountymd.gov/documents/7/150/BicycleParkingguidelines01192010.PDF

APPENDIX K
Bicycle Safety Education, Encouragement and Enforcement Programs Recommendations

Combined Safety Education & Encouragement Programs

- **BIKE HOWARD at Howard County Public Libraries** – In partnership with Bicycling Advocates of Howard County (BAHC), the Department of Public Works and the Department of Planning and Zoning, the Howard County Libraries would offer a multi-dimensional bicycling education and encouragement program. The program would include the use of posters, bicycle theme readings and book promotion, provision of covered bicycle parking, incentives for biking to the library, hosting bicycle repair classes, and use of parking lots for bicycle safety courses and youth rodeos. Additionally a joint online and physical library of local resources could be created including ride tip sheets, maps, brochures and indexes to other bicycle related information.

- **Receive a Bicycle-Friendly Community Designation from the League of American Bicyclists** – BAHC has prepared a draft application for this designation (January 2013). Upon receiving the initial LAB response to the first application, a public and private partnership should be formed to pursue a bronze level designation within five years (by 2018) the partnership should include CA, key county agencies, any Bicycle Friendly Businesses within the county and BAHC.

- **Establish a countywide Safe Routes to School Program (SRTS)** – The County should adopt a goal, such as to have 50% of elementary and middle schools participating in SRTS activities by 2018. To reach this goal and guide school activities the Howard County Public Schools (including the school board) would lead a joint effort that would also include the Howard County Police and Department of Public Works. The program would target schools with the greatest potential for biking and walking to school, i.e. they have the highest percentage of students living within a one-mile radius of the school. The program would promote and coordinate the following activities:
    - Participation in annual Walk and Bike to School Days.
    - Adoption of a school curriculum (many are already developed) which would educate students about safe walking and biking practices, including the importance of wearing reflective hear to be visible when its dark.
    - Education of bus drivers about the recently established Maryland 3 foot rule and other aspects of safe driving around cyclists.
    - Creation of incentive programs to encourage more students to bicycle to school;
    - Provision of high quality covered bicycle parking at schools in responds to demand as it increases.

- **Establish a *Share-the-Path Safety and Respect* program**—This program would be designed to accomplish three main goals: 1) reduce user conflicts on CA and County paths, many of which are quite narrow, 2) foster unity and social cohesion among path users and supporters, 3) use that unity to continue to advocate for path widening, safer road crossings, wayfinding signs and a host of other needed upgrades to make the path system safe and functional for transportation and recreation. This initiative would be lead by a partnership including Columbia Association the County Department of Recreation and Parks, and representatives from a variety of path users groups, village councils, and HOAs. The activities would include promoting safe practices and mutual respect among pedestrians and bicyclists using the trail system. For example, the program would educate pedestrians and bicyclists about the use of headphones and lights, keeping to the right, passing left, providing an audible warning when passing, yielding to pedestrians, and keeping dogs on a "short leash".

Other Encouragement Programs

- **Establish an active living partnership** – This initiative would target those agencies, businesses and institutions promoting health and wellness including the Howard County Dept. of Public Health, Hospitals, practitioner associations, Johns Hopkins, the Horizon Foundation, private gyms, CA and County recreation centers and programs, etc. These organizations could implement various programs promoting bicycling for heath, including prescriptions for outdoor activity and sponsoring a special event in each of the four seasons of the year, targeted to specific at-risk populations.

- **Expand the bicycling-related elements of the County's existing TDM program** – the County should expand its existing Commuter Solutions Howard program and multimodal commuting reimbursement program, through which local employers receive an incentive to promote the use of transit, walking and bicycling for commuting purposes. This program currently promotes bicycling as alternative transportation; promotes federal bicycling benefit of $20, facilitates bike to work events; and facilitates the bicycle friendly applications to the LAB. Additionally, the County should encourage bicycling by adding it to its list of employee benefits initiatives targeted through its TDM program.

- **Establish a Howard County "Bike-about"** – following the example of the Columbia Association and tied to the County's economic development plans, the "bike-about" program would designate certain days of the year to have a "celebration" on wheels which would help Howard County residents, rediscover where they live. The initiative would be based on County Council districts and would help increase awareness of bicycling throughout Howard County.

Enforcement

- **Analyze and publicize bicycling crash data** – through this program, the County Police would work with Public Works and DPZ to create an annual report about bicycle crashes. Hospital Emergency Rooms should also be asked to share their data regarding visits related to bicycling crashes. By regularly reporting this data other agencies and the public can be informed of the magnitude of this problem (currently very small) and track changes and trends over time. Analysis of the data may help in the design and implementation of bike safety programs involving both physical accommodations and education programs.

- **Establish a Bicycle-Mounted Police program** – as Downtown Columbia and other more compact locations like Ellicott City and Laurel continue their transformation into more walkable and bikeable communities, the County should consider expanding its bicycle-mounted police patrols which will help motorists learn how to safely maneuver around bicycles by increasing the presence of bicyclists in the area. Additionally, as the County begins to create awareness of bicycling issues, an increased enforcement of laws for motorists and bicyclists will be needed.

APPENDIX L

Cost Estimate Methodology

Planning level cost estimates have been developed for vast majority of recommendations included in this master plan; they are listed below. There are however, some types of improvements that are quite variable in cost, due to the range of design choices within the facility category and the site specific conditions. For these facilities only a range of potential costs can be provided at the master plan level.

Recommended On-Road Facilities and Accommodations

- Shared Roadways--sufficient for bicycling without further improvement.
- Paved and Striped Shoulders
- Shared Lane Markings (Sharrows)
- Bike Lanes-- including standard bike lanes, buffered bike lanes, advisory bike lanes, and colored bike lanes.
- Shared Road with Safety Treatments--should be understood as a variable set of treatments rather than a facility type, per se. Typically for rural roads; uses safety signs, shared lane markings and other treatments such as short shoulder sections to allow cars to pass bikes on hills.
- Neighborhood Greenway – Residential collector street with bicycle-friendly traffic calming to create a low stress bikeway on the roadway.

Recommended Off-Road Facilities and Accommodations

- Shared-Use Path-- sometimes referred to as a trail, sidepath or path.
- One-Way Cycletrack-- a one-way bicycle facility physically separated from moving traffic and pedestrians.
- Two-Way Cycletrack-- a two-way bicycle facility (in the median of the roadway, or on one side) physically separated from moving traffic and pedestrians.
- Sidewalk with Bikes Allowed—standard sidewalk made wide enough for two cyclists or a cyclist and pedestrian to safely pass at a low speed (6 feet).

Spot Improvements

- Bike Link —Includes a variety improvements to allow bicycle linkage between streets, including removal of gates or other barriers, providing curb cuts or ramps, providing access through a public or private parking lot, adding a short segment of sidewalk or asphalt path (< 500 feet) through an institutional property.
- Trail Access-- Includes a variety improvements to allow bicycle access to a trail system, such as a short segment of sidewalk or asphalt path (< 500 feet), a stairway with a bicycle channel, curb ramps, gate removal, etc.
- New Bridge – recommended new bridge over a major road, railroad or stream
- New Tunnel – recommended new tunnel or underpass under a major road
- Crossing Improvement—recommended safety improvement for bicyclists at road/road or road/trail intersections; i.e. curb ramps, crosswalks, special striping, pocket bike lanes, colored bike lanes, crossing islands, bike boxes, warning signs, signal modifications, bike signals, changes to existing curb radii, slip lane design, or vehicular travel lanes, etc.

Methodology

For most of the recommended improvements in the bicycle network, planning level cost estimates were developed in a two step process: first by identifying the relevant pay items needed for the facility, and second, by establishing rough quantities for each individual recommendation. The quantities were

determined by applying standard facility design requirements and calculating the length of recommended facility as drawn in GIS.

Unit costs for pay items[1] are based on 2011 dollars with an inflation adjustment of three percent per year (compounded) to provide 2013 costs. Unit costs for pay items were taken from three sources--construction cost estimates provided by the County , the Howard County Department of Public Works Project Development Cost Estimate Form (adjusted for inflation) provided by the County , and cost data from state departments of transportation and other sources. Engineering experience and knowledge of current practice in the field was used to determine which unit cost would be most accurate for today's Maryland market.

Rough costs were assigned to some general categories such as utility adjustments, drainage, and maintenance of traffic. It should be noted that these costs can vary widely depending on the nature of the work ultimately required for each individual project location.

The cost estimates provided are intended for general planning and county budgeting purposes. Construction costs for each project will vary based on the ultimate project scope at the time of implementation, conditions specific to each project, and the economic conditions at the time of construction. These costs are provided in 2013 dollars and additional inflation adjustments will be needed for projects undertaken in future years.

It is also important to note that in many cases, detailed design will be needed for many of the recommended facilities and treatments. The costs estimates provided do not include the cost of additional project planning, engineering analysis and design, Right-of-Way acquisition, or the cost for ongoing maintenance.

Assumptions

To provide planning cost estimates for the recommended facilities included in this Plan, certain baseline assumptions were made for each facility type. These are not provided as design criteria, but rather as assumptions used for cost estimating:

On-Road Facilities

- Bike Lane –5 ft wide.
- Buffered Bike Lanes –8 ft wide; a 5 ft wide bicycle lane and a 3 ft striped buffered zone.
- Shared Lane Marking (Sharrow) –standard dimension and spacing specified in the AASHTO Bicycle Facility Planning and Design Guide.
- Climbing Lane – 1 bike lane, width 5 ft wide and the shared lane marking in one lane.
- Paved and Striped Shoulder – 4 ft wide.
- Shared Roadway with Safety Treatment – Because these treatments are highly variable based upon each particular road segment and which treatments/improvements are selected, we are providing a ballpark cost estimate of $150,000 per mile.

Off-Road Facilities

- Sidewalk with Bikes Permitted – 6 ft wide; constructed of concrete.

[1] A pay item is a standard item of construction with an associated cost that is used in the engineering and design industry to make cost estimates and develop bid documents for construction of transportation or other facilities.

- One way Cycletrack – 7 ft. with curb & gutter on one side and a 3 foot median on the other. Includes standard striping and marking. Estimate does not include sidewalk for pedestrians or buffer enhancements on either sides, i.e. trees, planters, bollards, etc. Double the cost of a single one way cycletrack to provide one on each side of a two-way street.
- Two-way Cycle Track –10 ft. with curb & gutter on one side and a 3 foot median on the other with standard striping and marking.
- Shared Use Path –10 ft wide paved in asphalt.

Spot Improvements

Spot improvements vary greatly in context, nature, scope and magnitude. Some locations in the network represent a simple curb ramp, others may represent complete re-design of an intersection, still others may represent a bridge over a major highway such as Route 29 or I-95. For this reason, we are providing a range of costs for these activities/facilities. Using the project Level of Effort rating, we have provided range of costs for each of three Levels of Effort categories (LOE): Low, Medium and High.

- Low LOE, Bike Links and Trail Access Improvements $5,000 - $50,000
- Low LOE Crossing Improvements $50,000 - $100,000
- Medium LOE, All facility types $100,000 – $150,000
- High LOE, All facility types (not bridges) $150,000 - $300,000
- Medium or High LOE, Bridge over stream $300,000 - $500,000
- High LOE, Bridge over highway $3 - $10 million

Nineteen detailed cost estimate work sheets are provided to address a wide range of facility type and implementation action combinations.

Bike Howard

Howard County Bicycle Master Plan

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

1 **Signed Route (Add Signs)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet, each direction
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00		$233.00	$233	
				Subtotal	**$2,563**	
			25% Contingency		$641	
			Total Estimated Cost		**$3,300**	← **2 Lanes $0.63 Per Foot $3,300 Per Mile**

2 **Sharrows (No Major Action/Add Markings)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$318.00	$6,360	Assume 1 Symbol every 250 feet per side of the road
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$410.00	$435.00	$435	
				Subtotal	**$9,125**	
25% Contingency					$2,281	
Total Estimated Cost					**$11,500**	← **2 Lanes $2.18 Per Foot $11,500 Per Mile**

3 **Bike Lanes (No Major Action/Add Striping)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	20000	$1.50	$1.59	$31,800	Assume 4 lines entire length
Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$318.00	$12,720	Assume 1 Symbol every 250 feet each side of road
24" Thermoplastic Pavement Marking	LF	200	$6.00	$6.36	$1,272	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet each side of road
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$2,270.00	$2,406.00	$2,406	
				Subtotal	**$50,528**	
			25% Contingency		$12,632	
			Total Estimated Cost		**$63,200**	← **2 Lanes $11.97 Per Foot $63,200 Per Mile**

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

4 **Bike Lanes (Lane Diet)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	20000	$1.50	$1.59	$31,800	Assume 4 lines entire length (2 white edge)
Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$318.00	$6,360	Assume 1 Symbol every 250 feet each side of road
24" Thermoplastic Pavement Marking	LF	100	$6.00	$6.36	$636	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	5	$220.00	$233.00	$1,165	Assume 1 Sign every 500 feet
Eradication	LF	10000	$2.00	$1.50	$15,000	Assume 4 lines entire length (mixed edge and center lines)
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$2,885.00	$2,748.00	$2,748	
				Subtotal	**$57,709**	
			25% Contingency		$14,427	
			Total Estimated Cost		**$72,200**	← **2 Shoulders** **$13.67** **Per Foot** **$72,200** **Per Mile**

5 **Bike Lanes (Road Diet)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	20000	$1.50	$1.59	$31,800	Assume 4 lines entire length
Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$318.00	$12,720	Assume 1 Symbol every 250 feet each side of road (bike lane)
24" Thermoplastic Pavement Marking	LF	200	$6.00	$6.36	$1,272	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet
Eradication	LF	15000	$2.00	$1.50	$22,500	Assume 3 lines entire length (2 center yellow, 1 50% skip yellow)
Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$318.00	$6,360	Assume 1 symbol every 250 feet (Left-Turn arrows)
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$4,070.00	$3,849.00	$3,849	
				Subtotal	**$80,831**	
			25% Contingency		$20,208	
			Total Estimated Cost		**$101,100**	← **2 Lanes** **$19.15** **Per Foot** **$101,100** **Per Mile**

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

6 **Bike Lanes (Pave Existing Shoulders - 5' each side)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Milling	SY	5900	$6.00	$6.00	$35,400	Assume 10 feet width
Asphalt Surface Course	TON	500	$60.00	$64.00	$32,000	Assume 10 feet width and 0.125 feet depth, 13.3 CF in a TON
Eradication	LF	10000	$2.00	$2.12	$21,200	Assume 2 lines entire length (2 white edge lines)
Thermoplastic Pavement Marking (6")	LF	10000	$1.50	$1.59	$15,900	Assume 2 lines entire length
Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$318.00	$12,720	Assume 1 Symbol every 250 feet each side of road (bike lane)
24" Thermoplastic Pavement Marking	LF	200	$6.00	$6.36	$1,272	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet
Lump Sum Items						
Landscaping (5%)	LS	1.00	$3,250.00	$3,455.00	$3,455	
Drainage and E&S (10%)	LS	1.00	$6,500.00	$6,910.00	$6,910	
Maintenance of Traffic (5%)	LS	1.00	$3,250.00	$3,455.00	$3,455	
Utility Adjustments (10%)	LS	1.00	$6,500.00	$6,910.00	$6,910	
				Subtotal	**$141,552**	
25% Contingency					$35,388	
Total Estimated Cost					**$177,000**	← **2 Shoulders** **$33.52** **Per Foot** **$177,000** **Per Mile**

7 **Bike Lanes (Widen Road/Construct Shoulders - 5' each side)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	3750	$15.00	$25.00	$93,750	Assume 10 feet width and 2 feet depth
Aggregate Base Course for Pavement	CY	2000	$50.00	$60.00	$120,000	Assume 10 feet width and 1 feet depth
Milling	SY	5900	$6.00	$6.00	$35,400	Assume 10 feet width
Asphalt Surface Course	TON	500	$60.00	$64.00	$32,000	Assume 10 feet width and 0.125 feet depth, 13.3 CF in a TON
Eradication	LF	10000	$2.00	$2.12	$21,200	Assume 2 lines entire length (2 white edge lines)
Thermoplastic Pavement Marking (6")	LF	10000	$1.50	$1.59	$15,900	Assume 2 lines entire length
Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$318.00	$12,720	Assume 1 Symbol every 250 feet each side of road (bike lane)
24" Thermoplastic Pavement Marking	LF	200	$6.00	$6.36	$1,272	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet
Lump Sum Items						
Landscaping (5%)	LS	1.00	$3,250.00	$3,455.00	$3,455	
Drainage and E&S (10%)	LS	1.00	$6,500.00	$6,910.00	$6,910	
Maintenance of Traffic (5%)	LS	1.00	$3,250.00	$3,455.00	$3,455	
Utility Adjustments (10%)	LS	1.00	$6,500.00	$6,910.00	$6,910	
				Subtotal	**$355,302**	
25% Contingency					$88,826	
Total Estimated Cost					**$444,200**	← **2 Shoulders** **$84.13** **Per Foot** **$444,200** **Per Mile**

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

8 **Climbing Lane (Lane Diet)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	20000	$1.50	$1.59	$31,800	Assume 4 lines entire length (2 white edge, 2 center yellow)
Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$318.00	$12,720	Assume 1 Symbol every 250 feet each side of road
24" Thermoplastic Pavement Marking	LF	200	$6.00	$6.36	$1,272	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet
Eradication	LF	20000	$2.00	$1.50	$30,000	Assume 4 lines entire length (mixed edge and center lines)
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$4,270.00	$3,906.00	$3,906	
				Subtotal	**$82,028**	
			25% Contingency		$20,507	
			Total Estimated Cost		**$102,600**	

2 Shoulders
$19.43 Per Foot
$102,600 Per Mile

9 **Buffered Bike Lane - Lane Diet**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	30000	$1.50	$1.59	$47,700	Assume 6 lines entire length (4 white edge, 2 center yellow)
Thermoplastic Pavement Marking Symbol	EA	60	$300.00	$318.00	$19,080	Assume 1 Symbol every 250 feet each side of road
24" Thermoplastic Pavement Marking	LF	300	$6.00	$6.36	$1,908	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	15	$220.00	$233.00	$3,495	Assume 1 Sign every 500 feet
Eradication	LF	30000	$2.00	$1.50	$45,000	Assume 4 lines entire length (mixed edge and center lines)
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$6,405.00	$5,859.00	$5,859	
				Subtotal	**$123,042**	
			25% Contingency		$30,761	
			Total Estimated Cost		**$153,900**	

2 Shoulders
$29.15 Per Foot
$153,900 Per Mile

Howard County Bicycle Master Plan

Facility Base Costs (per mile)

Wednesday, April 10, 2013

Compounding inflation of assumes 3% per year

10 **Paved and Striped Shoulder (Add Striping)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	10000	$1.50	$1.59	$15,900	Assume 2 lines entire length
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet each side of road
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$860.00	$912.00	$912	
				Subtotal	**$19,142**	
			25% Contingency		$4,786	
			Total Estimated Cost		**$24,000**	← **2 Lanes** **$4.55** **Per Foot** **$24,000** **Per Mile**

11 **Paved and Striped Shoulder (Lane Diet)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	10000	$1.50	$1.59	$15,900	Assume 2 lines entire length (2 white edge)
Eradication	LF	20000	$2.00	$1.50	$30,000	Assume 4 lines entire length (mixed edge and center lines)
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$2,750.00	$2,295.00	$2,295	
				Subtotal	**$48,195**	
			25% Contingency		$12,049	
			Total Estimated Cost		**$60,300**	← **2 Shoulders** **$11.42** **Per Foot** **$60,300** **Per Mile**

12 **Paved and Striped Shoulders (Road Diet)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Thermoplastic Pavement Marking (6")	LF	20000	$1.50	$1.59	$31,800	Assume 4 lines entire length
Thermoplastic Pavement Marking Symbol	EA	40	$300.00	$318.00	$12,720	Assume 1 Symbol every 250 feet each side of road (bike lane)
24" Thermoplastic Pavement Marking	LF	200	$6.00	$6.36	$1,272	Assume 1 High Vis crossing every 2500 feet
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet
Eradication	LF	13300	$2.00	$1.50	$19,950	Assume 2.66 lines entire length (2 center yellow, 2x 0.33 skip dash white)
Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$318.00	$6,360	Assume 1 symbol every 250 feet (Left-Turn arrows)
Lump Sum Items						
Maintenance of Traffic (5%)	LS	1.00	$3,900.00	$3,722.00	$3,722	
				Subtotal	**$78,154**	
			25% Contingency		$19,539	
			Total Estimated Cost		**$97,700**	← **2 Shoulders** **$18.50** **Per Foot** **$97,700** **Per Mile**

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

13 **Paved and Striped Shoulders (Build Shoulders - 2' each side)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	1500	$15.00	$25.00	$37,500	Assume 4 feet width and 2 feet depth
Aggregate Base Course for Pavement	CY	800	$50.00	$60.00	$48,000	Assume 4 feet width and 1 feet depth
Asphalt Surface Course	TON	200	$60.00	$64.00	$12,800	Assume 4 feet width and 0.125 feet depth, 13.3 CF in a TON
Asphalt Base Course	TON	800	$60.00	$64.00	$51,200	Assume 4 feet width and 0.5 feet depth, 13.3 CF in a TON
Lump Sum Items						
Landscaping (5%)	LS	1.00	$6,125.00	$7,475.00	$7,475	
Drainage and E&S (10%)	LS	1.00	$12,250.00	$14,950.00	$14,950	
Maintenance of Traffic (5%)	LS	1.00	$6,125.00	$7,475.00	$7,475	
Utility Adjustments (10%)	LS	1.00	$12,250.00	$14,950.00	$14,950	
				Subtotal	**$194,350**	
			25% Contingency		$48,588	
			Total Estimated Cost		**$243,000**	← **2 Shoulders** **$46.02** **Per Foot** **$243,000** **Per Mile**

14 **Paved Shoulders (Build Shoulders - 4' each side)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	3000	$15.00	$25.00	$75,000	Assume 8 feet width and 2 feet depth
Aggregate Base Course for Pavement	CY	1600	$50.00	$60.00	$96,000	Assume 8 feet width and 1 feet depth
Asphalt Surface Course	TON	400	$60.00	$64.00	$25,600	Assume 8 feet width and 0.125 feet depth, 13.3 CF in a TON
Asphalt Base Course	TON	1600	$60.00	$64.00	$102,400	Assume 8 feet width and 0.5 feet depth, 13.3 CF in a TON
Thermoplastic Pavement Marking (6")	LF	10000	$1.50	$1.59	$15,900	Assume 2 lines entire length
Lump Sum Items						
Landscaping (5%)	LS	1.00	$13,000.00	$15,745.00	$15,745	
Drainage and E&S (10%)	LS	1.00	$26,000.00	$31,490.00	$31,490	
Maintenance of Traffic (5%)	LS	1.00	$13,000.00	$15,745.00	$15,745	
Utility Adjustments (10%)	LS	1.00	$26,000.00	$31,490.00	$31,490	
				Subtotal	**$409,370**	
			25% Contingency		$102,343	
			Total Estimated Cost		**$511,800**	← **2 Shoulders** **$96.93** **Per Foot** **$511,800** **Per Mile**

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

15 **Sidewalk with Bikes Permitted (Widen Existing - 2' concrete)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	750	$15.00	$25.00	$18,750	Assume 2 feet width and 2 feet depth
Aggregate Base Course for Pavement	CY	400	$50.00	$60.00	$24,000	Assume 2 feet width and 1 feet depth
Concrete Surface Course	TON	100	$60.00	$64.00	$6,400	Assume 2 feet width and 0.125 feet depth, 13.3 CF in a TON
Concrete Base Course	TON	400	$60.00	$64.00	$25,600	Assume 2 feet width and 0.5 feet depth, 13.3 CF in a TON
Lump Sum Items						
Landscaping (5%)	LS	1.00	$3,063.00	$3,738.00	$3,738	
Drainage and E&S (10%)	LS	1.00	$6,125.00	$7,475.00	$7,475	
Maintenance of Traffic (5%)	LS	1.00	$3,063.00	$3,738.00	$3,738	
Utility Adjustments (10%)	LS	1.00	$6,125.00	$7,475.00	$7,475	
				Subtotal	**$97,176**	
			25% Contingency		$24,294	
			Total Estimated Cost		**$121,500**	← **2 Lanes** **$23.01** **Per Foot** **$121,500** **Per Mile**

16 **Sidewalk w Bikes Permitted (Construct New- 6' concrete)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	4100	$15.00	$25.00	$102,500	Assume 6 feet width and 2 feet depth
Aggregate Base Course for Pavement	CY	1000	$50.00	$60.00	$60,000	Assume 6 feet width and 1 feet depth
Concrete Surface Course	TON	250	$60.00	$64.00	$16,000	Assume 6 feet width and 0.125 feet depth, 13.3 CF in a TON
Concrete Base Course	TON	1000	$60.00	$64.00	$64,000	Assume 6 feet width and 0.5 feet depth, 13.3 CF in a TON
Lump Sum Items						
Landscaping (5%)	LS	1.00	$9,325.00	$12,125.00	$12,125	
Drainage and E&S (10%)	LS	1.00	$18,650.00	$24,250.00	$24,250	Note: Does not include enhanced features such as: waysides, signals, crosswalks, signs, lighting, structures, etc.
Maintenance of Traffic (5%)	LS	1.00	$9,325.00	$12,125.00	$12,125	
Utility Adjustments (10%)	LS	1.00	$18,650.00	$24,250.00	$24,250	
				Subtotal	**$315,250**	
			25% Contingency		$78,813	
			Total Estimated Cost		**$394,100**	← **2 Lanes** **$74.64** **Per Foot** **$394,100** **Per Mile**

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

17 **Shared Use Path (Widen Existing- 4' asphalt)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	2600	$15.00	$25.00	$65,000	Assume 10 feet width and 2 feet depth
Aggregate Base Course for Pavement	CY	400	$50.00	$60.00	$24,000	Assume 4 feet width and 1 feet depth
Asphalt Surface Course	TON	100	$60.00	$64.00	$6,400	Assume 4 feet width and 0.125 feet depth, 13.3 CF in a TON
Asphalt Base Course	TON	400	$60.00	$64.00	$25,600	Assume 4 feet width and 0.5 feet depth, 13.3 CF in a TON
Lump Sum Items						
Landscaping (5%)	LS	1.00	$4,450.00	$6,050.00	$6,050	
Drainage and E&S (10%)	LS	1.00	$8,900.00	$12,100.00	$12,100	Note: Does not include enhanced features such as: waysides,
Maintenance of Traffic (5%)	LS	1.00	$4,450.00	$6,050.00	$6,050	signals, crosswalks, signs, lighting, structures, etc.
Utility Adjustments (10%)	LS	1.00	$8,900.00	$12,100.00	$12,100	
				Subtotal	**$157,300**	
			25% Contingency		$39,325	
			Total Estimated Cost		**$196,700**	← **$37.25 Per Foot**
						$196,700 Per Mile

18 **Shared Use Path (Construct New - 10' asphalt)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	6500	$15.00	$25.00	$162,500	Assume 16 feet width and 2 feet depth
Aggregate Base Course for Pavement	CY	1000	$50.00	$60.00	$60,000	Assume 10 feet width and 1 feet depth
Asphalt Surface Course	TON	250	$60.00	$64.00	$16,000	Assume 10 feet width and 0.125 feet depth, 13.3 CF in a TON
Asphalt Base Course	TON	1000	$60.00	$64.00	$64,000	Assume 10 feet width and 0.5 feet depth, 13.3 CF in a TON
Lump Sum Items						
Landscaping (5%)	LS	1.00	$11,125.00	$15,125.00	$15,125	
Drainage and E&S (10%)	LS	1.00	$22,250.00	$30,250.00	$30,250	Note: Does not include enhanced features such as: waysides,
Maintenance of Traffic (5%)	LS	1.00	$11,125.00	$15,125.00	$15,125	signals, crosswalks, signs, lighting, structures, etc.
Utility Adjustments (10%)	LS	1.00	$22,250.00	$30,250.00	$30,250	
				Subtotal	**$393,250**	
			25% Contingency		$98,313	
			Total Estimated Cost		**$491,600**	← **$93.11 Per Foot**
						$491,600 Per Mile

Facility Base Costs (per mile)

Wednesday, April 10, 2013 — Compounding inflation of assumes 3% per year

19 **One Way Cycletrack (Construct New - 7' asphalt w/ curb & gutter & median)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading	CY	5100	$15.00	$25.00	$127,500	Assume 13 feet (One 7 ft lane with 3 feet excavation each side) and 2 feet depth
Aggregate Base Course for Pavement & Median	CY	1000	$50.00	$60.00	$60,000	Assume 10 feet width and 1 feet depth
Asphalt Surface Course	TON	250	$60.00	$64.00	$16,000	Assume 10 feet width and 0.125 feet depth, 13.3 CF in a TON
Asphalt Base Course	TON	1000	$60.00	$64.00	$64,000	Assume 10 feet width and 0.5 feet depth, 13.3 CF in a TON
Curb & Gutter / Small Median (3')	LF	10000	$55.00	$58.00	$580,000	
Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$318.00	$6,360	Assume 1 symbol every 250 feet (bike lanes)
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet each side of Cycletrack
Lump Sum Items						
Landscaping (5%)	LS	1.00	$37,875.00	$42,693.00	$42,693	
Drainage and E&S (10%)	LS	1.00	$75,750.00	$85,386.00	$85,386	
Maintenance of Traffic (5%)	LS	1.00	$37,875.00	$42,693.00	$42,693	
Utility Adjustments (10%)	LS	1.00	$75,750.00	$85,386.00	$85,386	
				Subtotal	**$1,112,348**	
			25% Contingency		$278,087	
			Total Estimated Cost		**$1,390,500**	← **2 Lanes**
						$263.35 **Per Foot**
						$1,390,500 **Per Mile**

Note: $2,781,000 per mile, to provide a one way cycletrack on each side of a two way road.

20 **Two Way Cycletrack (Construct New - 10' asphalt w/ curb & gutter & median)**

Item	Unit	Quantity	2011 Unit Cost	2013 Compound Unit Cost	Total Cost 2013	Comment
Earthwork, Excavation, Grading (Item 12)	CY	6300	$15.00	$25.00	$157,500	Assume 16 feet width (two 5 ft lanes plus 3 ft excavation each side) and 2 feet depth
Aggregate Base Course for Pavement (Item 44)	CY	1200	$50.00	$60.00	$72,000	Assume 10 feet width and 1 feet depth
Asphalt Surface Course	TON	300	$60.00	$64.00	$19,200	Assume 10 feet width and 0.125 feet depth, 13.3 CF in a TON
Asphalt Base Course	TON	1200	$60.00	$64.00	$76,800	Assume 10 feet width and 0.5 feet depth, 13.3 CF in a TON
Curb & Gutter / Small Median (3')	LF	10000	$55.00	$58.00	$580,000	
Thermoplastic Pavement Marking (6")	LF	1300	$1.50	$1.59	$2,067	Assume 1 dashed center line, yellow)
Thermoplastic Pavement Marking (6")	LF	2500	$1.50	$2.00	$5,000	Assume 0.5 line entire length
Thermoplastic Pavement Marking Symbol	EA	20	$300.00	$318.00	$6,360	Assume 1 symbol every 250 feet (bike lanes)
New Sign	EA	10	$220.00	$233.00	$2,330	Assume 1 Sign every 500 feet each side of Cycletrack
Lump Sum Items						
Landscaping (5%)	LS	1.00	$40,310.00	$45,946.00	$45,946	
Drainage and E&S (10%)	LS	1.00	$80,620.00	$91,893.00	$91,893	
Maintenance of Traffic (5%)	LS	1.00	$40,310.00	$45,946.00	$45,946	
Utility Adjustments (10%)	LS	1.00	$80,620.00	$91,893.00	$91,893	
				Subtotal	**$1,196,935**	**$198.91**
			25% Contingency		$299,234	
			Total Estimated Cost		**$1,496,200**	← **2 Lanes**
						$283.37 **Per Foot**
						$1,496,200 **Per Mile**

APPENDIX M

Funding Sources

State

The State of Maryland has several funding programs that support the construction and maintenance of bicycle and walking facilities.

Highway User Revenues (HURs) are collected by the state and are distributed to localities. These revenues are usually spent on vehicular transportation projects such as roadways and bridges. They can used for the construction and maintenance of footpaths, bridle paths or horse paths, as well as bicycle trails (Article 66B Title 2 Department of Transportation Subtitle 4 Highway User Revenues 8-409).

Maryland Bikeways Program is a relatively new program operated out of the Maryland Department of Transportation Office of Planning and Capital Programming. The program funds three types of projects: Minor Retrofit projects of up to $100,000; Design and Feasibility Analysis projects focused on closing key gaps in local or state bikeway or trail networks, and Construction of on-road or off-road facilities. Project eligibility is described as follows:

- Minor Retrofit --including bicycle route signing, pavement markings, parking, drainage grate replacement and other minor retrofits to enhance bicycle routes.
- Feasibility Assessment and Design of proposed or potential bikeways --to assess issues, such as environmental impacts, right-of-way issues, ADA compatibility, local support, and cost estimates.
- Construction of bikeways-- generally leveraging other sources of funding, such as Transportation Enhancements, Maryland Heritage Areas, etc.

Only public agencies are eligible to apply for Bikeways Program funding. Program criteria and requirements are in place to target the Bikeways Program to priority areas. More detail on the targeted areas and other program criteria and requirements is provided in the funding application instructions.

Bicycle Retrofit Program was initiated by the State Highway Administration in 2000. The purpose of the program is to fund minimal on-road improvements on state highways that would benefit bicycling. Eligible improvements include projects that can be completed quickly and without the need for permits or right-of-way. One million dollars is allocated annually to the Bicycle Retrofit Program. Individuals and local jurisdictions can submit project requests to SHA's Bicycle and Pedestrian Coordinator on an on-going basis.

Program Open Space (POS) primary focus is to acquire outdoor recreation and open space areas for public use. POS is administered by Maryland's Department of Natural Resources (DNR) and is funded through the **state real estate transfer tax**. The money set aside for this program is divided equally between local and state projects. Half of the money is used by the state for direct land acquisitions, while the other half is granted to local governments. Using a population-based formula, every July 1, each county in the state and the City of Baltimore is apportioned a specific amount of the money for Program Open Space. In order to receive these funds, counties are required to create Land Preservation and Recreation Plan that outlines acquisition and development goals, of which bicycle and pedestrian facilities may be included. POS provides 100% funding for local land acquisition and will contribute 75% for development costs for county and city parks and recreation areas. As much as 90% of development costs can be funded if Land and Preservation and Recreation Plan goals are met.

Rural Legacy Program was enacted by the 1997 General Assembly as part of Governor Parris N. Glendenning's Smart Growth and Neighborhood Conservation Initiative. The program encourages local governments and private land trusts to identify Rural Legacy areas and to competitively apply for funds to protect the state's most valuable agricultural, forestry, natural, and cultural resources or create new ones.

A combination of Maryland Program Open Space dollars and general obligation bonds from the state's capital budget subsidize the Rural Legacy Program. During the first five years of the Rural Legacy Program between $110 and $128 million will be committed to preserving from 50,000 to 75,000 acres of Maryland's farms, forests, and open spaces. While the focus of this initiative is not specifically for bicycle and pedestrian facilities and programs, they can be proposed as an adjunct or compliment to eligible projects, and may be used to help acquire greenway lands. Applications may be made by local governments or organizations endorsed by local government to the Rural Legacy Board. The Rural Legacy Board, in turn, makes final recommendations to the Governor and the Board of Public Works. The Board of Public Works approves the grants for Rural Legacy funding.

The Sustainable Communities Act of 2010 (HB 475) strengthens reinvestment and revitalization in Maryland's older communities by reinventing an existing rehabilitation tax credit and extending the life of the credit through 2014, simplifying the framework for designated target areas in the Community Legacy (CL) and Neighborhood Business Works (NBW) program by creating "Sustainable Communities", establishing a new transportation focus on older communities, and enhancing the role of the Smart Growth Subcabinet (SGSC) in the revitalization of communities.

The Smart Growth Transit Program (SGTP) is an initiative to encourage community revitalization and to create incentives for development or redevelopment in areas close to MARC, metro, light rail, and bus stations and services. More specifically, these funds are used on behalf of transit-oriented developments that have an appropriate combination of commercial and residential land uses, sufficient density to support public transit usage, and that support community master planning in designated revitalization/growth areas. Improvements to improve bicycling and walking infrastructure are among the projects eligible for SGTP funds. SGTP includes four programs, the Transit Station Development Incentive Program, Neighborhood Conservation, Access 2000 Pedestrian Improvements and the Transit Enhancement Program. Funding is approximately $6 million per year.

Federal

The primary Federal Transportation funding programs for bicycling were consolidated under the MAP-21 legislation of 2012.[1] The Transportation Enhancements, Safe Routes to School and National Recreational Trails programs were combined into the Transportation Alternatives Program). The funding levels were reduced over the previous year's funding levels and some changes were made in project eligibility. Greater approval authority was transferred to Metropolitan Planning Organizations for project selection providing funding opportunities for MPO members that are prepared for grants. Table 1 provides a summary of the types of bikeway projects that would be eligible for the various the Federal Transportation funding programs.

Programs that remain unchanged by MAP-21 are described below:

The Surface Transportation Program (STP) provides flexible funding that may be used by states and localities for projects on any Federal-aid highway project, including bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities. These funds may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or non-construction projects such as maps, brochures, and public service announcements related to safe bicycle use and walking. Ten percent of each State's annual Surface Transportation Program funds is set aside for the

Hazard Elimination and Railway-Highway Crossing Programs, which addresses bicycle and pedestrian safety at hazardous locations

Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds may be used to construct bicycle facilities, pedestrian walkways, or non-construction projects such as maps, brochures, and public service announcements related to safe bicycle use.

The Recreational Trails Program (RTP) provides funds to States to develop and maintain recreational trails and trail-related facilities for both nonmotorized and motorized recreational trail uses. In addition, it is the only federal transportation funding source that can be used for maintenance activities. The RTP funds are distributed to the States by legislative formula: half of the funds are distributed equally among all States, and half are distributed in proportion to the estimated amount of non-highway recreational fuel use in each State.

Highway Safety Grant Program (Section 402) is administered by the Maryland Highway Safety Office (MHSO), a division of Motor Vehicle Administration. Federal 402 funds are used for pedestrian and bicycle public information and education programs. Funds are distributed to states annually from the National Highway Traffic Safety Administration (NHTSA) according to a formula based on population and road mileage. Maryland receives 402 funds each year. Local jurisdictions submit Expressions of Interest (EOI) to the MHSO in March and commitment letters announcing the approval of the proposed projects are distributed in June. Funds are generally awarded sometime after October 1st each year. Government agencies or government-sponsored entities are eligible to apply for 402 Grant funds. Every county in the state and the City of Baltimore is assigned a Community Traffic Safety Program Coordinator who organizes local Task Forces to identify and prioritize traffic safety issues and develop appropriate countermeasures. Agencies are encouraged to work with their local Task Force to determine the feasibility and eligibility of proposed projects prior to submitting a 402 Grant.

Outside of transportation funding there are a few other federal programs that local communities have used for bicycling improvements and programs, the most common being Community Development Block Grants through the Department of Housing and Urban Development (HUD). Examples of the types of projects include the following:

- Commercial district streetscape improvements
- Sidewalk improvements
- Safe routes to school
- Traffic calming

Table 1: Project Eligibility for Federal Transportation Funding Programs

	Core Federal Aid Programs Oriented to Bicycling					Safety Programs		Transit		Other	
	Transportation Alternatives Program					Non-Infrastructure	Infrastructure				
	Safe Routes to School	TEA	Recreational Trails Program	Congestion Mitigation and Air Quality Improvement	Surface Transportation Program	Highway Safety Funds-402	Highway Safety Improvement Program	FTA	ATI	FHWA-Office of Planning, Environment & Realty	National Highway Performance Program/ NHS
Bicycle Facilities											
Bicycle lanes on roadway	*	*		*	*		*	*	*		*
Paved Shoulders	*	*		*	*		*				*
Safety Signs and Signal improvements	*	*		*	*		*	*			*
Shared use path/	*	*	*	*	*		*	*			*
Trail/highway intersection	*	*	*	*	*		*				*
Trail Bridges		*	*	*	*		*				*
Tunnels and Undercrossings		*		*	*		*				*
Access Enhancements to Public		*		*	*			*	*		
Traffic calming	*	*			*		*	*			*
Recreational trail			*								
Supplemental Infrastructure											
Signed bike route	*	*		*	*			*			*
Sidewalks, new or retrofit	*	*		*	*		*	*	*		*
Crosswalks, new or retrofit	*	*		*	*		*	*	*		*
Curb cuts and ramps	*	*		*	*		*	*			*
Historic Preservation of Transportation		*						*	*		
Landscaping and Streetscaping		*						*	*		
Bus Shelters		*						*	*		
Bicycle parking facilities											
Bicycle parking facilities (racks and	*	*		*	*			*	*		
Bicycle Share (capital costs only,		*		*	*			*	*		*
Bicycle storage/service center	*	*		*	*			*	*		
Safety Education, Encouragement,											
Safety/education staff position	*				*	*					
Police Patrol	*					*					
Helmet Promotion	*	*			*	*					
Maps	*			*	*	*		*	*		
Safety brochure/book	*	*	*	*	*	*					
Training	*	*	*	*	*	*					

Other Funding Sources

Bikes Belong Community Partnership Grant Applications Bikes Belong award to municipalities, counties and grassroots groups for community bicycling projects. Bikes Belong accepts requests for funding of up to $10,000 for facility and advocacy projects and does not consider grant requests for more than 50% or more of the project budget.