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 endorsing a Complete Streets policy as the road use approach for Howard County; and requesting the County Executive to take certain actions.

Introduced and read first time March 7, 2016.

By order Jessica Feldmark
Jessica Feldmark, Administrator

Read for a second time at a public hearing on March 21, 2016.

By order Jessica Feldmark
Jessica Feldmark, Administrator

This Resolution was read the third time and was Adopted___, Adopted with amendments ✓, Failed___, Withdrawn___, by the County Council on April 4, 2016.

Certified By Jessica Feldmark
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 County Executive is organizing a working group, the Complete Streets Implementation Team, that is expected to (1) draft a comprehensive Complete Streets Policy consistent with best practices; and (2) develop a Complete Streets Design Manual (the "Design Manual") that implements the Complete Streets Policy and incorporates necessary elements from the current Howard County Design Manual, *Volume III, Roads and Bridges*; and

WHEREAS, upon completion of the Complete Streets Implementation Team's work, the County Executive is expected to submit to the County Council both the comprehensive Complete Streets Policy and Design Manual for final approval; 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

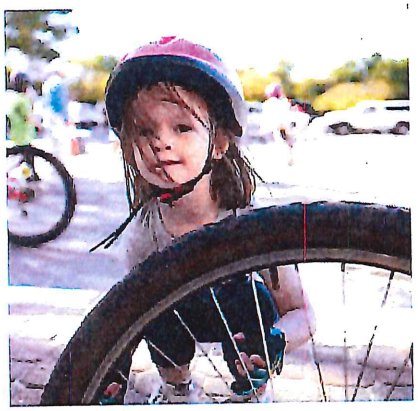
WHEREAS, the Bicycle Master Plan was reviewed and recommended approval unanimously by the Planning Board on January 7, 2016, with the note that the projects are preliminary and to include the development of a public input process as a step in the implementation matrix.

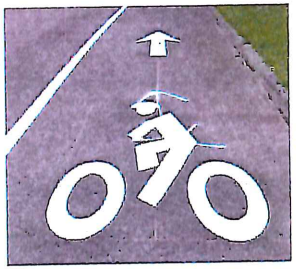
NOW, THEREFORE, BE IT RESOLVED by the County Council of Howard County, Maryland, this 4th day of April, 2016, that it hereby approves the Bicycle Master Plan of Howard County, attached as Exhibit A.

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.

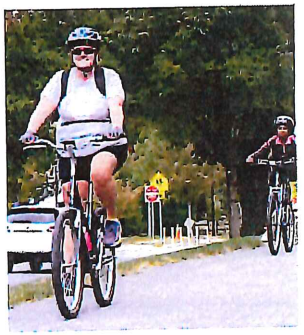
AND BE IT FURTHER RESOLVED by the County Council of Howard County, Maryland, that the County Council requests that the County Executive direct the Complete Streets Implementation Team to draft a comprehensive Complete Streets Policy and develop a Complete Streets Design Manual that implements the Complete Streets Policy for submission to the Council for approval.

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





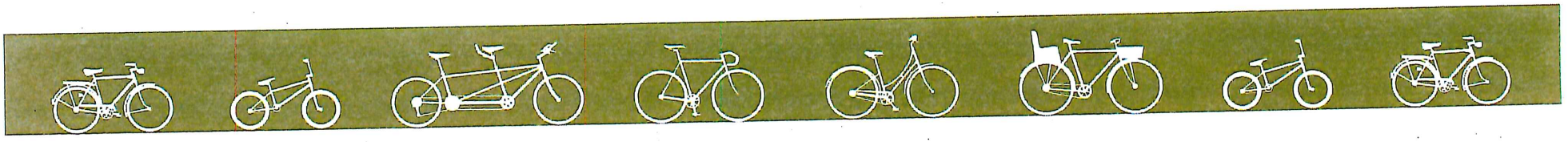
Howard County, Maryland
Allan H. Kittleman, County Executive



BIKE HOWARD

Howard County Bicycle Master Plan 2015

Exhibit A



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

Executive Summary

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."

Purpose

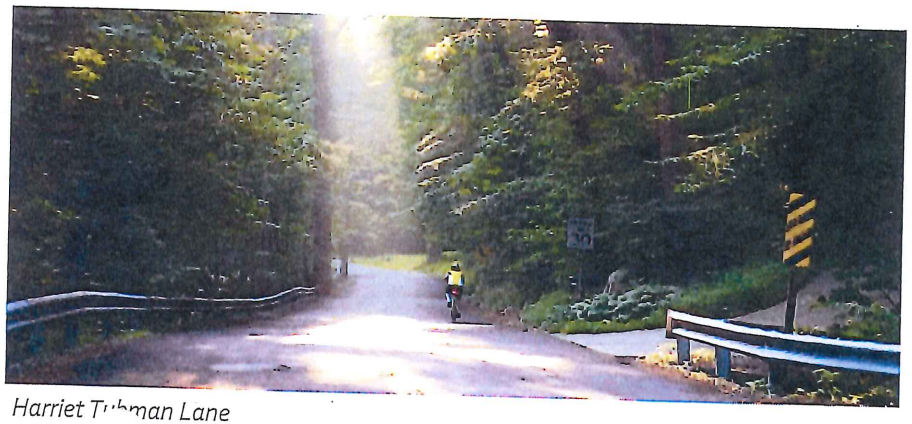
BikeHoward is the Howard County Bicycle Master Plan. The primary purpose of BikeHoward is to provide a framework to guide the county's future actions to improve conditions for bicyclists and promote bicycling as a safe and convenient travel option. In other words:

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 providing 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. 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.



Harriet Tubman Lane

Goals

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 accepted transportation option.

Update County Policies to ensure that 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.

Recommendations for Policy

BikeHoward provides several recommendations for updating County policy that would significantly improve bicycle accommodation. Most significantly:

- Develop a county wide "complete streets" policy. This would ensure that all streets are designed, built, operated and maintained to enable safe access for pedestrians, bicyclists, motorists and transit users of all ages and abilities.
- Update Howard County roadway and bikeway design guidelines. A proposal for these updates is provided in Appendix A.
- Update development policies and regulations that govern private development and site plan review to include measures that accommodate people on bikes.

CA Bikeabout

Bicycle Parking at Northfield Elementary

Recommendations for Programs

A comprehensive approach to becoming a bike friendly community includes programming efforts to provide education, encouragement and enforcement. These efforts need to be ongoing and far reaching. They are generally low cost and can be incorporated into existing programs and organizations.

- Education is critical to ensure that all road users understand their rights and responsibilities on the road and to provide the necessary skills and awareness for people to coexist, whether they are riding a bicycle, walking, or driving a motor vehicle.
- Encouragement is important to boost participation and help more people enjoy the benefits of getting around by bike. In particular, the large "interested but concerned" category includes many people that would like to ride more, but may need the assistance of a group ride, a mentor, a goal or a challenge to make the change and integrate biking into their lives. The "interested but concerned" group is estimated to include 60% of the general population.
- Enforcement is an important element to safety on the roads for everyone, including the most vulnerable road users, i.e. cyclists and pedestrians. This can be done through coordination with County Police to improve compliance with existing laws. Especially important is the bicycle mounted police program and park ranger program. Maintaining or expanding these programs provides increased knowledge, understanding and enforcement of laws and behaviors that affect the safety of people on bikes.

Recommendations for Infrastructure Improvements

A connected network is critical to accommodating bike trips in Howard County. To ensure the network is easy to use for people of all ages and abilities, the focus is on high quality, separated facilities such as off street pathways and protected bike lanes. These facilities need to be continuous rather than disjointed, and need to connect places that people want to go to.

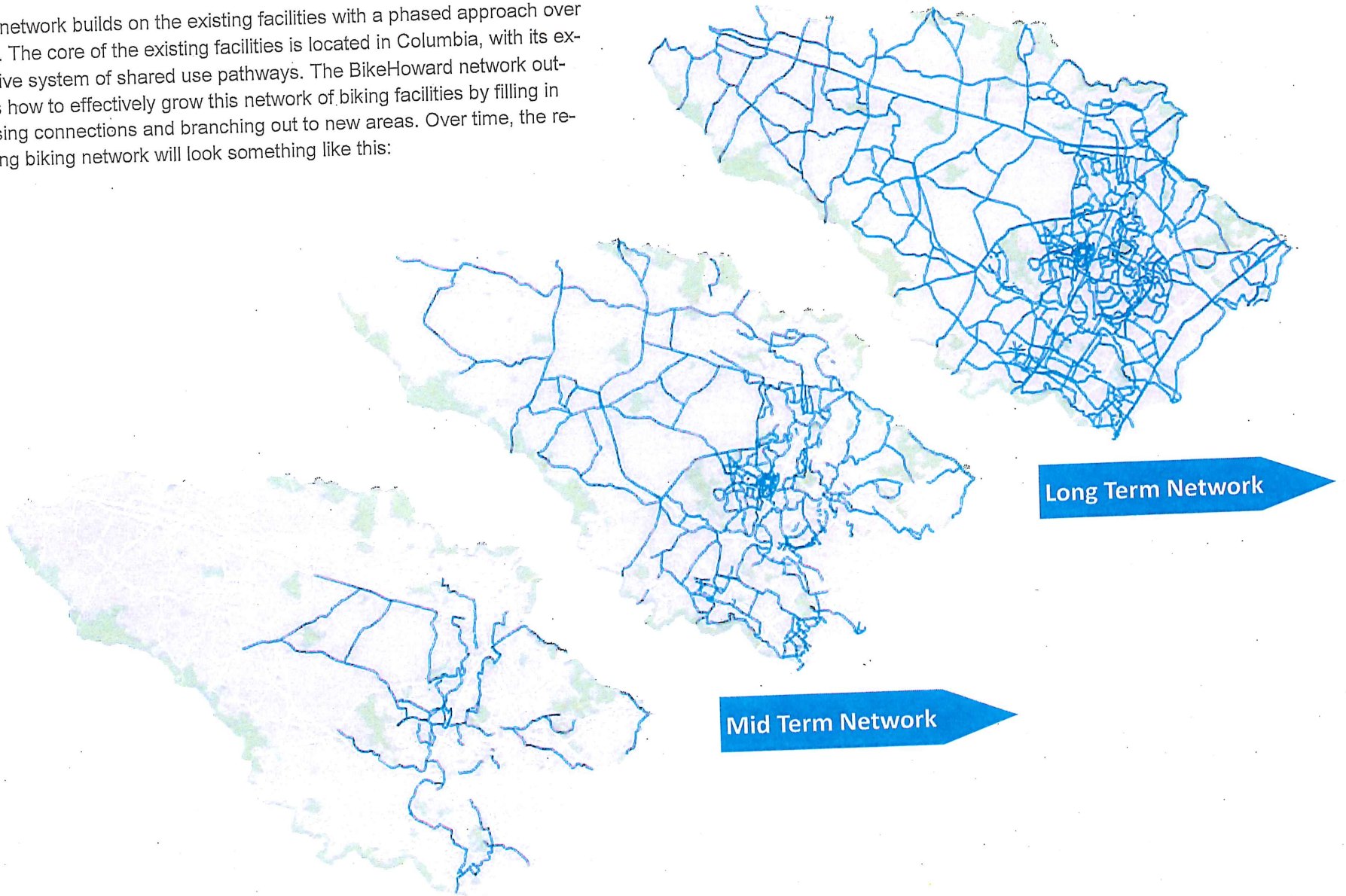
The proposed BikeHoward network was developed with extensive community input, consultant expertise and staff guidance from many departments. It is organized into short-term (10 years), mid-term (10 to 20 years) and long-term (20 to 30 years) improvements.

Protected Bike Lane

Recommended Network Improvements

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 Pathways and 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

The network builds on the existing facilities with a phased approach over time. The core of the existing facilities is located in Columbia, with its extensive system of shared use pathways. The BikeHoward network outlines how to effectively grow this network of biking facilities by filling in missing connections and branching out to new areas. Over time, the resulting biking network will look something like this:



BIKE HOWARD

Howard County Bicycle Master Plan

2015

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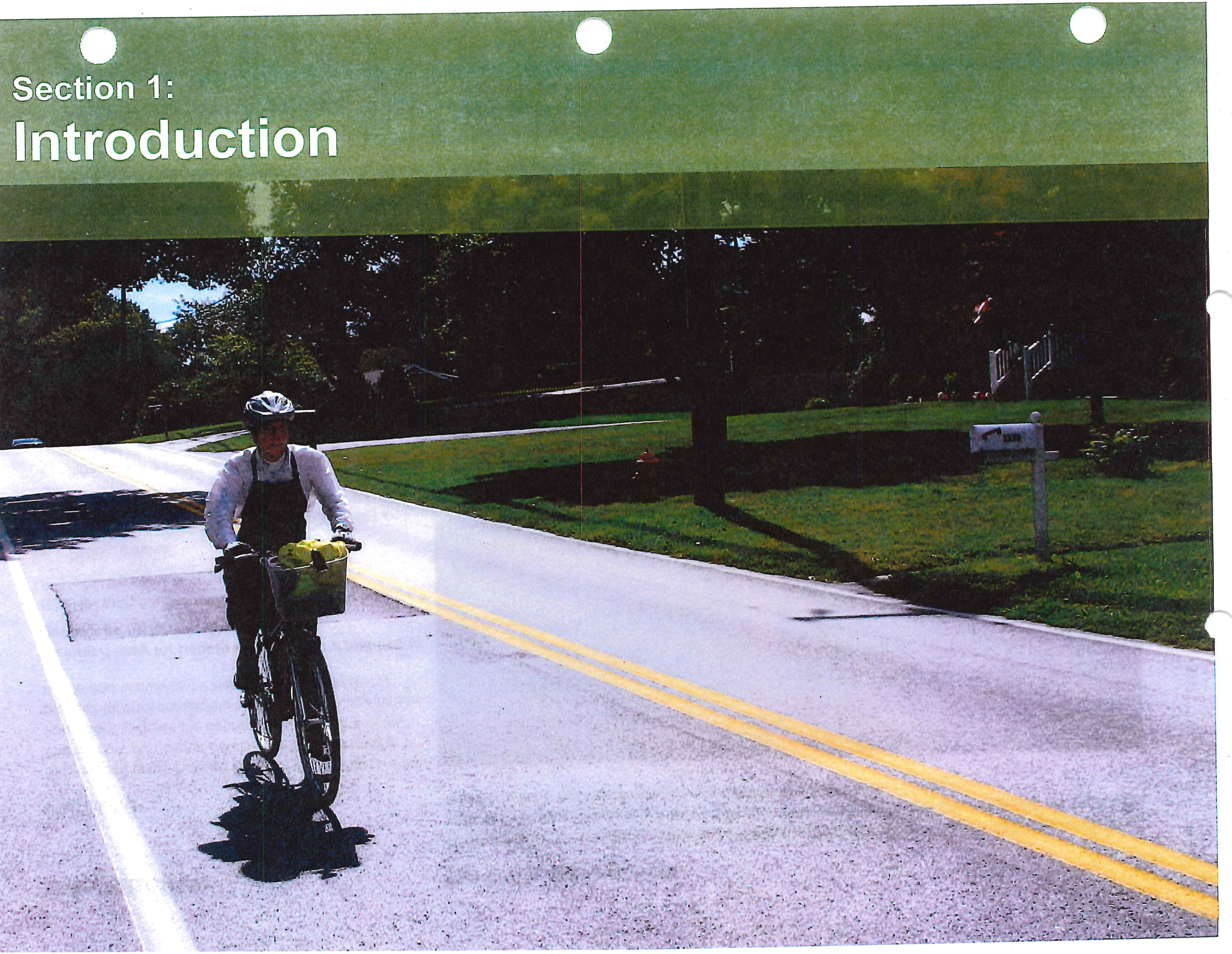
Introduction



Introduction

Purpose

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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.

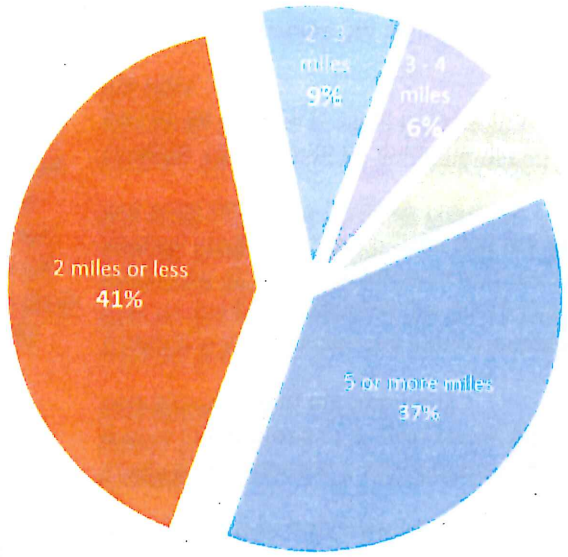
Traffic Congestion

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

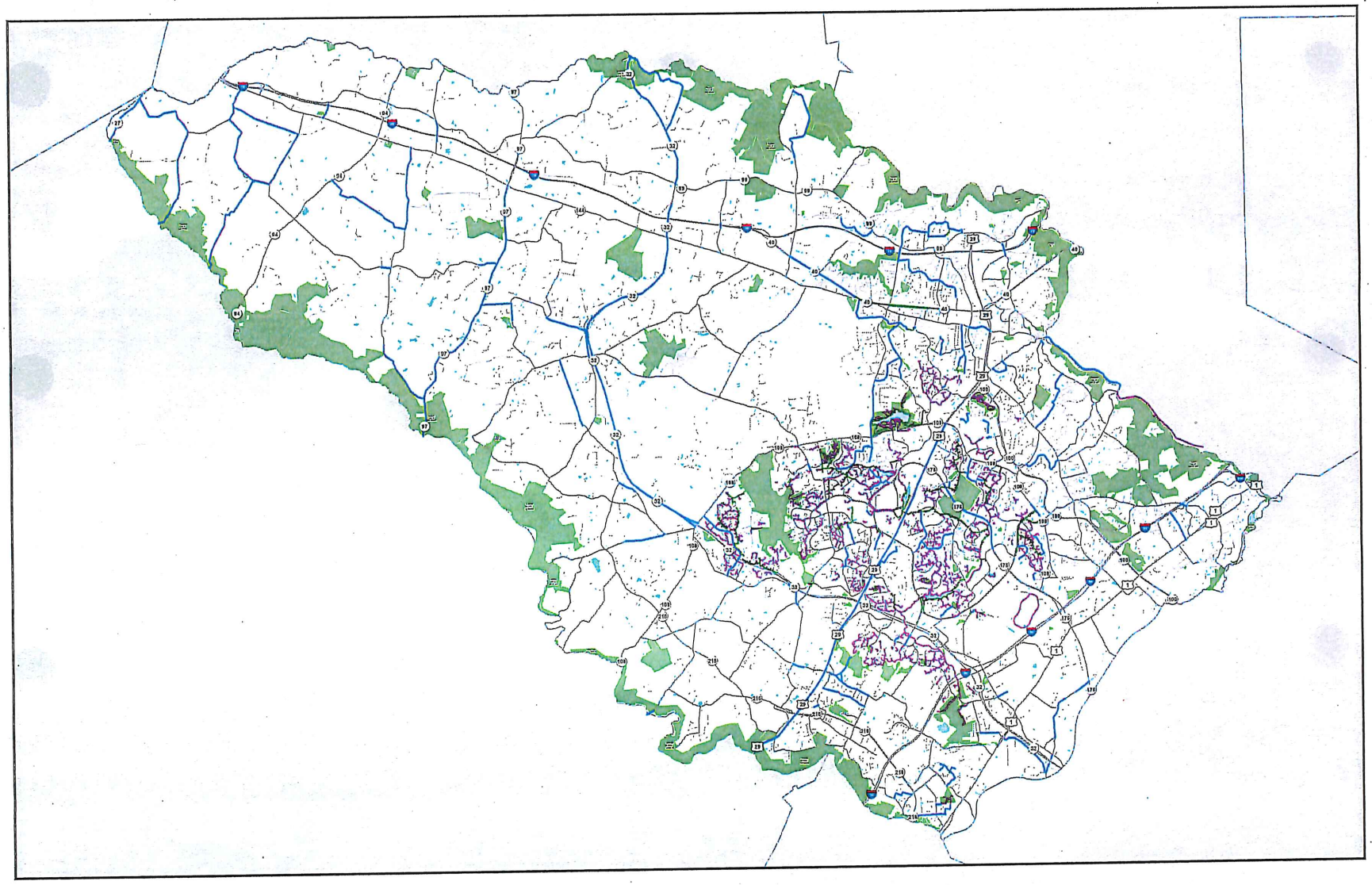
BIKE HOWARD

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

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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 inter-modal 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 and a Complete Streets Design Manual to ensure that Howard County streets are de-signed, 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.

Recommendation: A representative of the Office of Transportation should be added as a member of the Subdivision Review Committee to ensure achievement of the objectives enumerated above and to maintain an ongoing focus on compliance with the Bicycle Master Plan and the Pedestrian Master Plan throughout the subdivision and site development plan review process.

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 of County Parks and Facilities

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.*

Recommendation: *County Government facilities should be developed in accordance with the Bicycle Master Plan and Pedestrian Master Plan and should model best practices for bicycle and pedestrian connectivity and bicycle parking.*

1. *Ensuring safe and convenient bike and pedestrian access should be considered in siting facilities prior to land acquisition.*

2. *Ensuring safe and convenient bike and pedestrian access should be considered in developing new facilities.*

3. *Promote and implement strategies to enhance safe and convenient bike and pedestrian access to existing government facilities.*

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.*

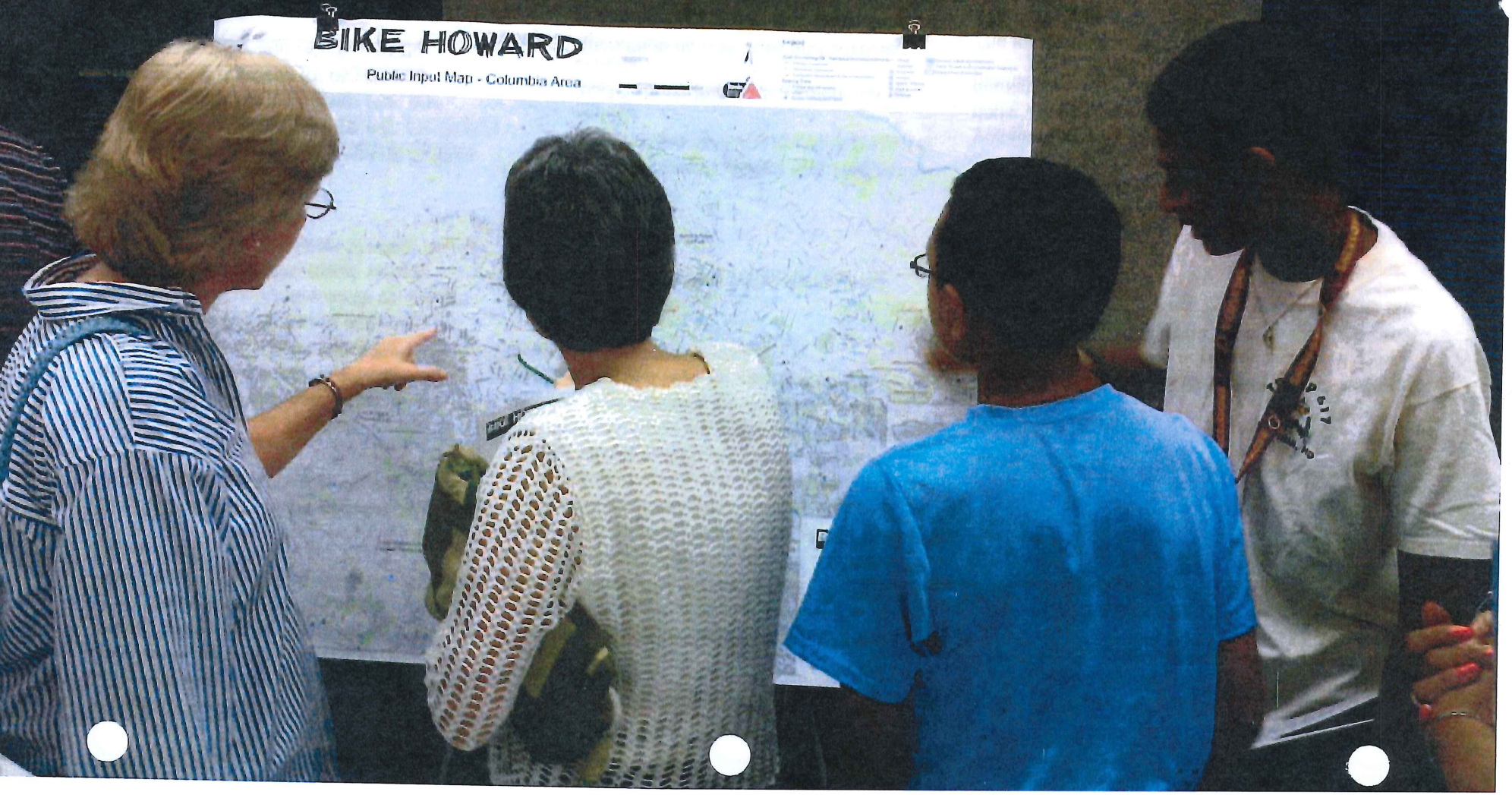
2. *Develop a program that involves volunteers in trail maintenance, especially youth on County paths and trails.*

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.

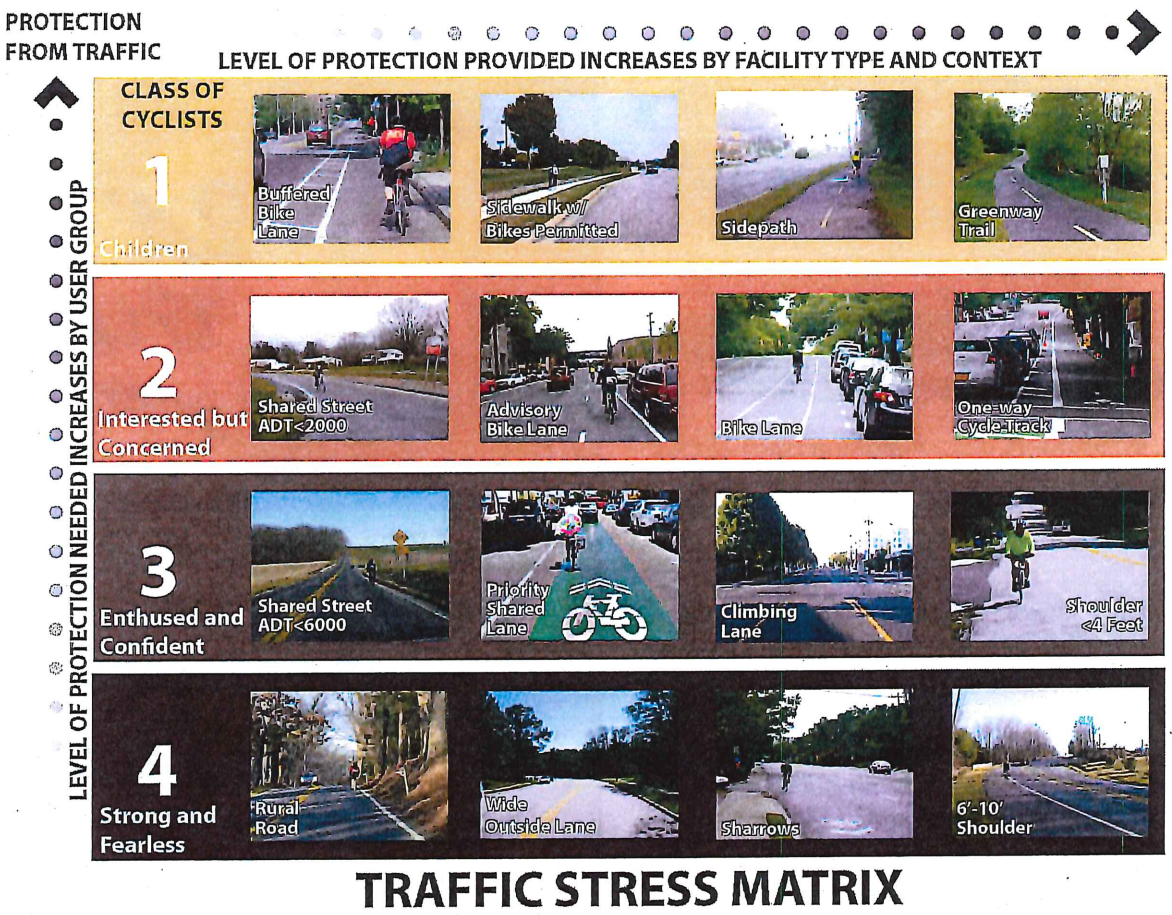
However, it is important to note that cyclists of the highest skill level require less protection from motor vehicle traffic and have greater tolerance for high stress traffic conditions, and thus may consider a 4-5 foot shoulder on a low volume road with 45 mph car traffic a "low stress" condition, 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

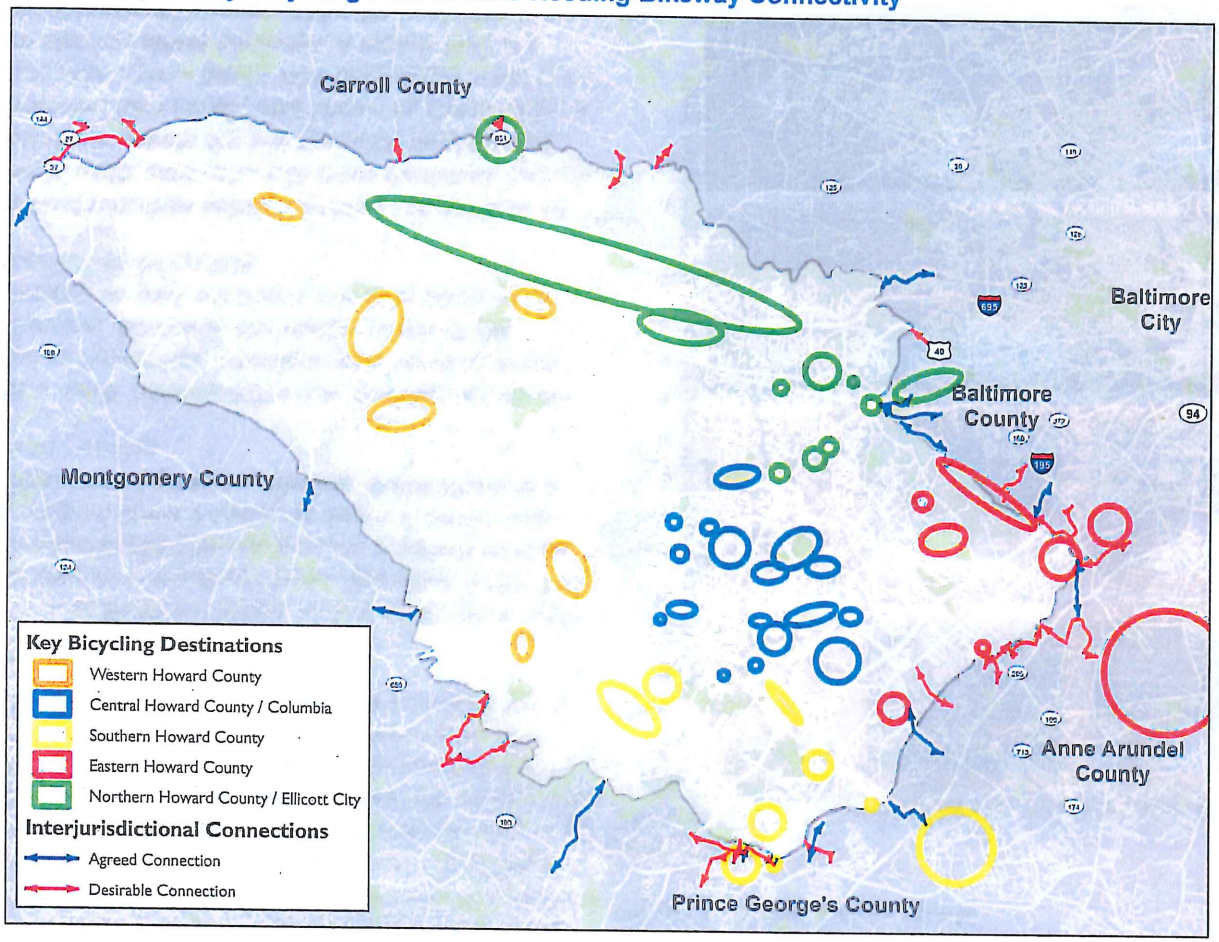
For a bicycle network to be useful, it needs to connect people to places they want to go, be continuous, direct and efficient, and be easy to navigate. BikeHoward addresses connections in four ways: 1) connecting people and places, 2) connecting Howard County to surrounding jurisdictions, 3) addressing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

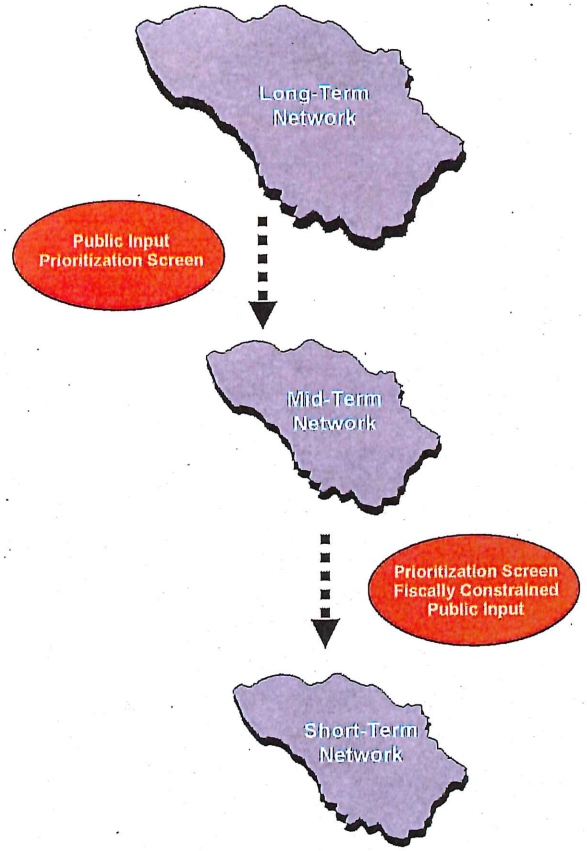
Feasibility criteria are factors related to the physical nature of each recommendation, including the proposed facility type, and other logistical issues related to implementation, including the level of effort required and the estimated cost.

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

*In addition, the existing bicycle and pedestrian bridge over Route 29 between Downtown Columbia and Oakland Mills was the topic of the 2015 "Downtown Columbia Bridge Feasibility Study". www.howardcountymd.gov/Departments/County-Administration/Transportation/Transportation-Projects. The study evaluated several options to modify the existing bridge or build a new bridge to accommodate transit in addition to improving bicycle and pedestrian traffic. The potential change to this bridge has been incorporated in Appendix F and Appendix G of this plan.

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

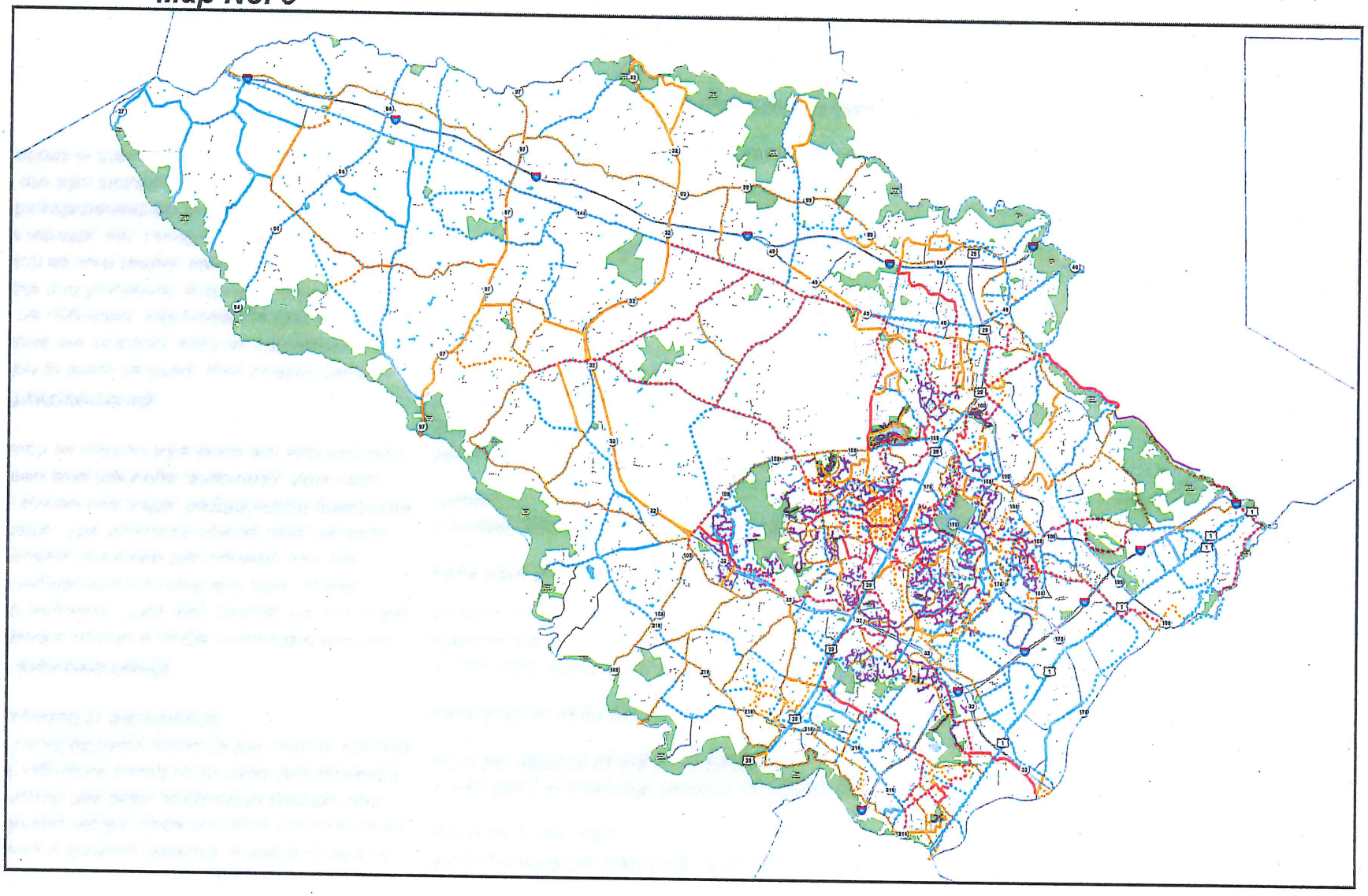
BIKE HOWARD

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



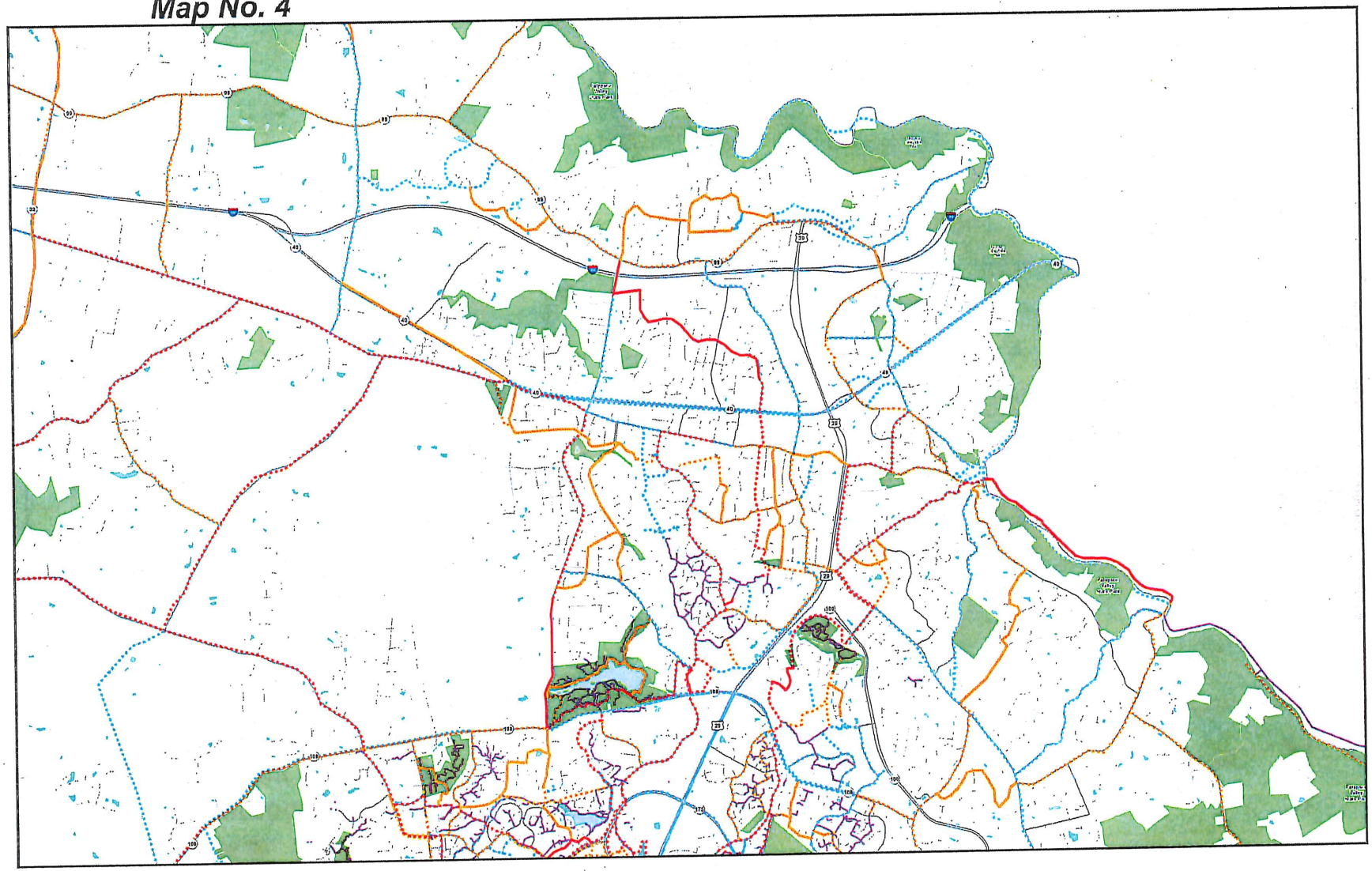
BIKE HOWARD

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



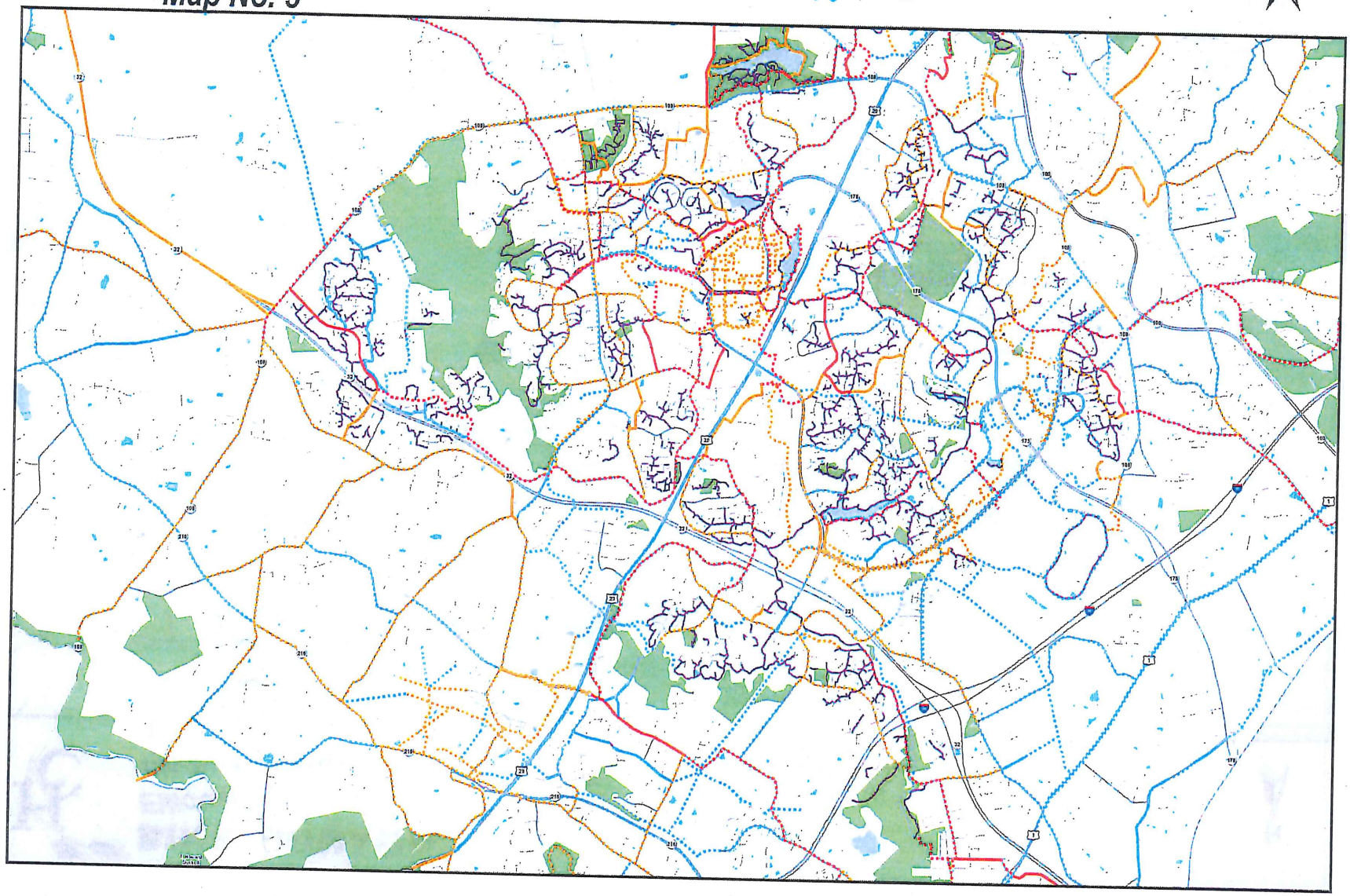
BIKE HOWARD

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



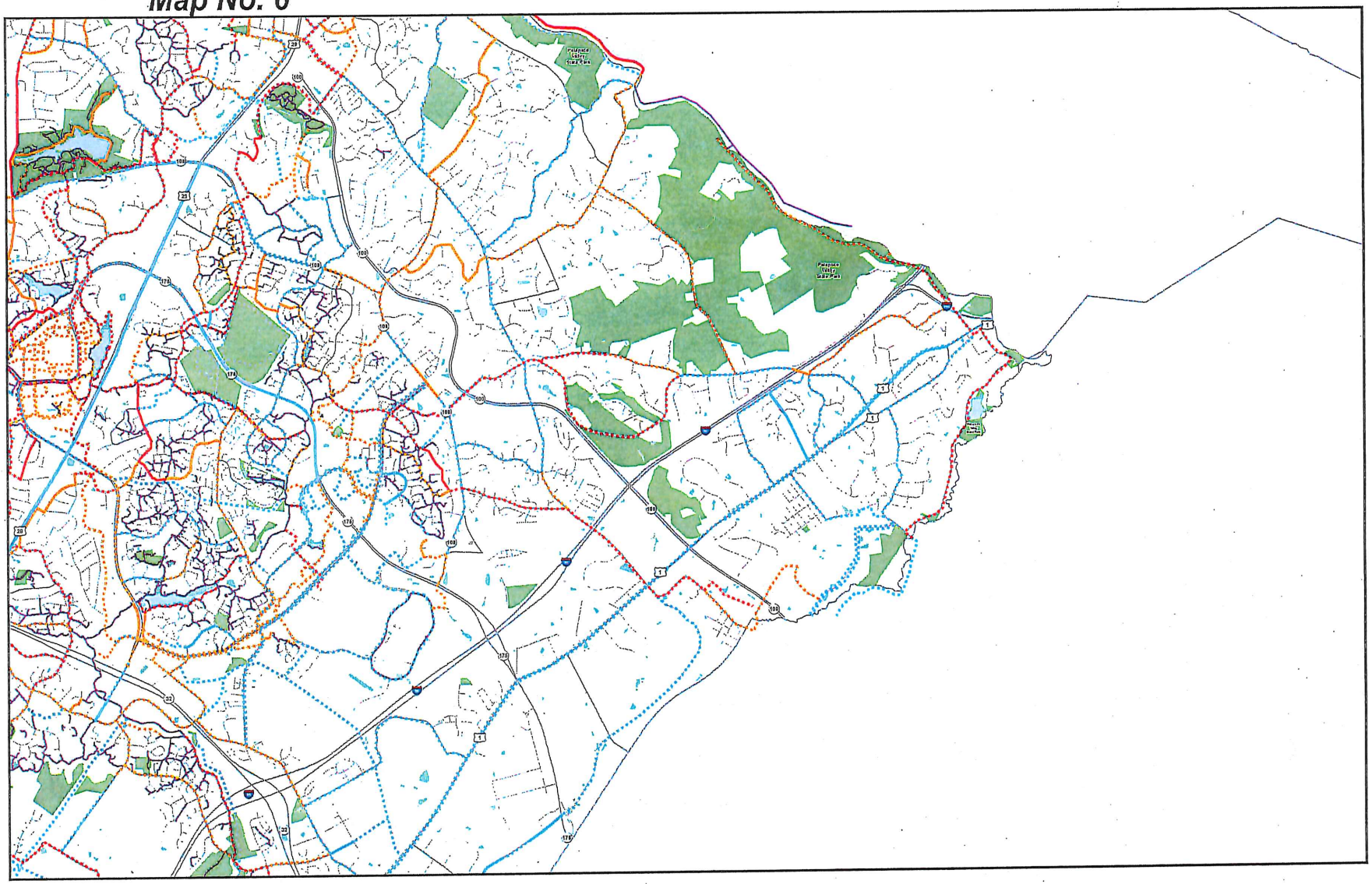
BIKE HOWARD

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



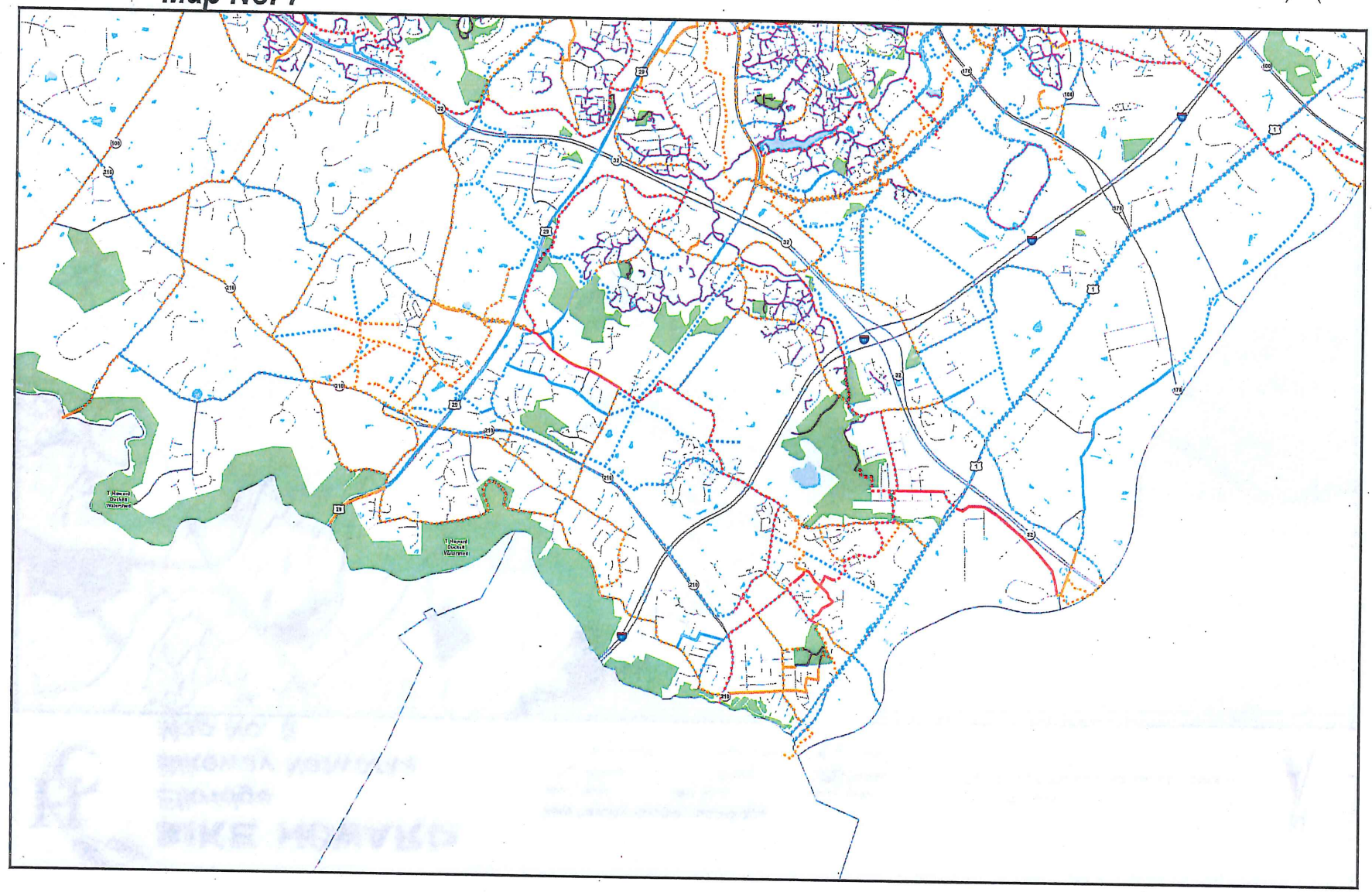
BIKE HOWARD

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.

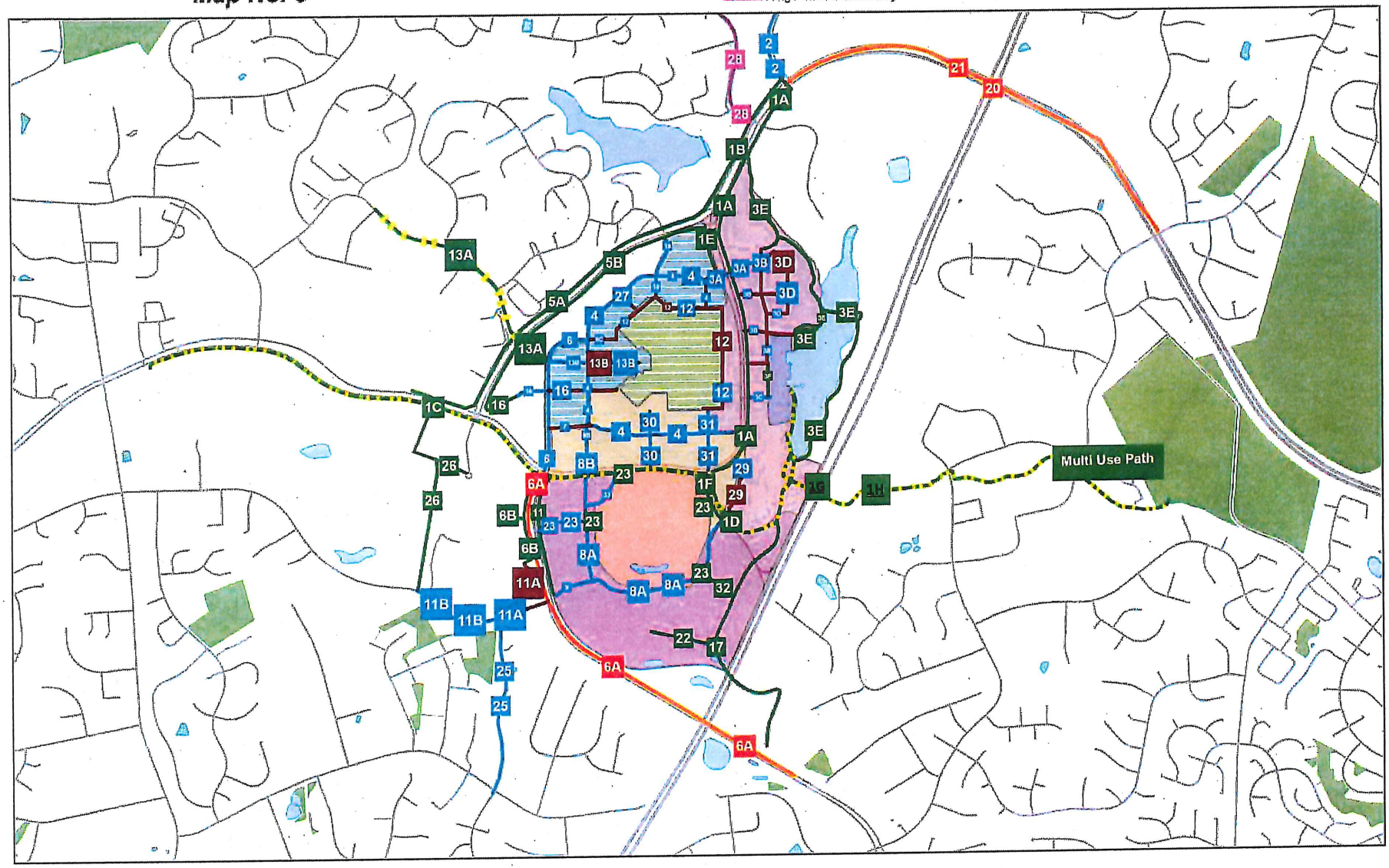
In addition, BikeHoward recommends the following areas for Future Small Area Planning:

- 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

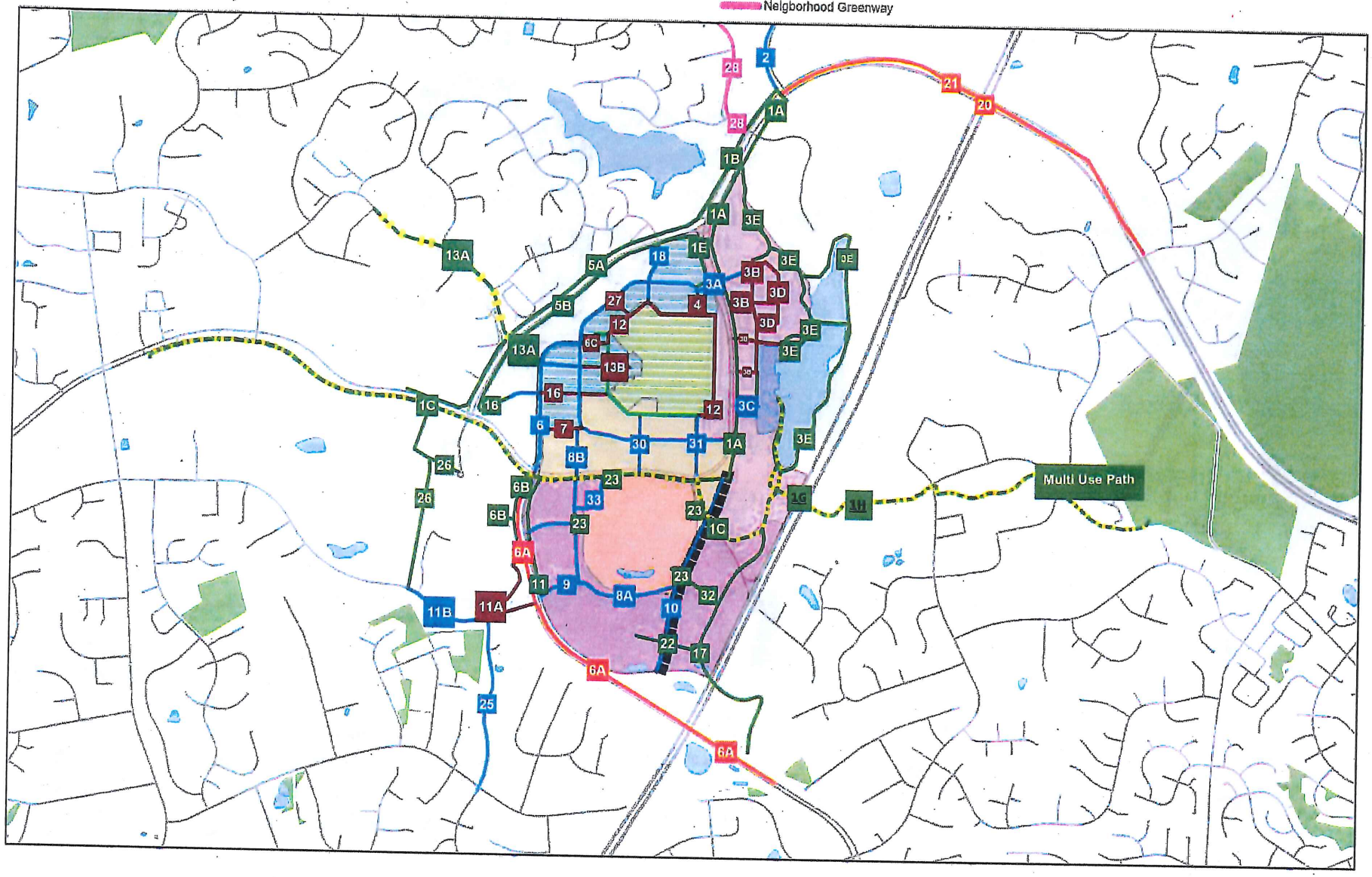
BIKE HOWARD

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



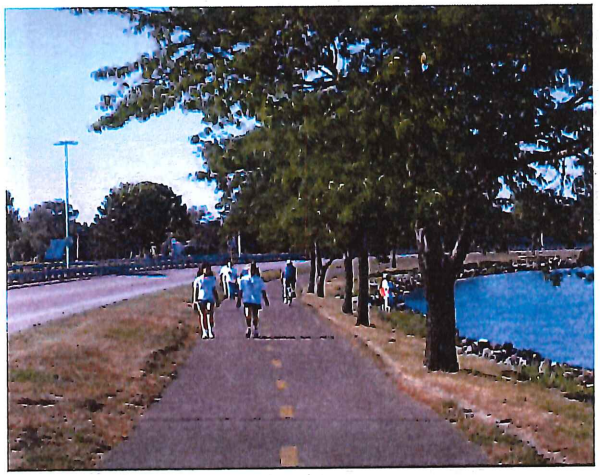
Bicycle Facilities Visual Glossary

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

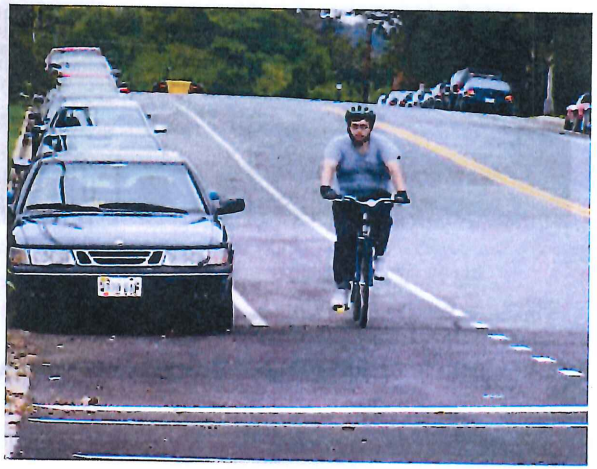
Bikeways that primarily use on-road bike lanes and facilities

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

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

Shared Roadway w/ Safety Treatment

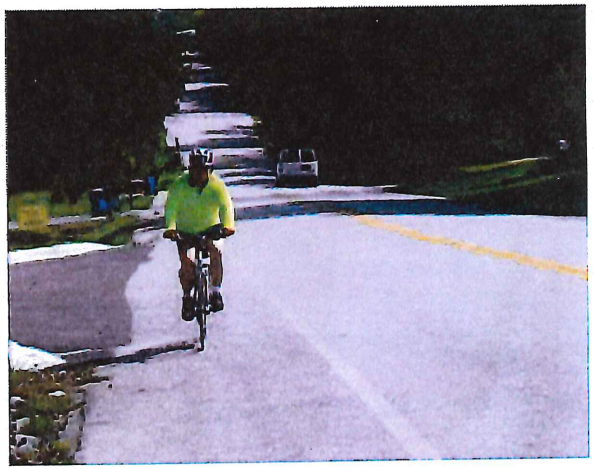
Used on two-lane rural roads where there are no continuous shoulders. Uses safety signs and short shoulder sections to allow cars to pass bikes on hills

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

Paved and Striped Shoulder

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



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.

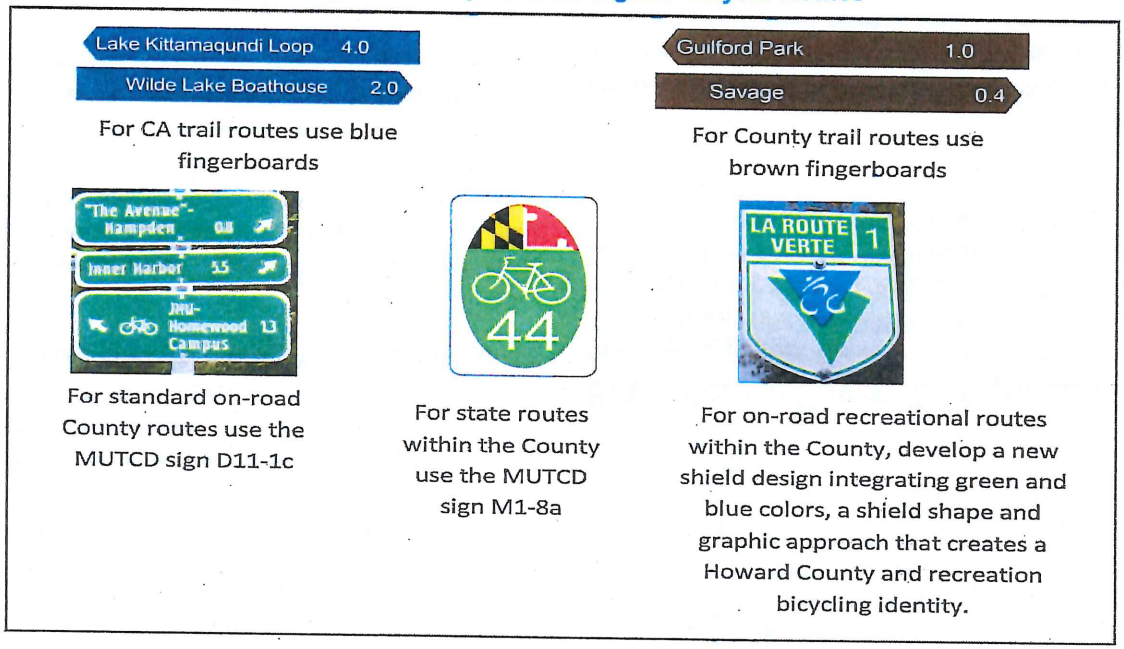
Please see Appendix I for a full discussion of issues that need to be coordinated among key stakeholders with an interest in and responsibility for bicycle wayfinding signs.

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

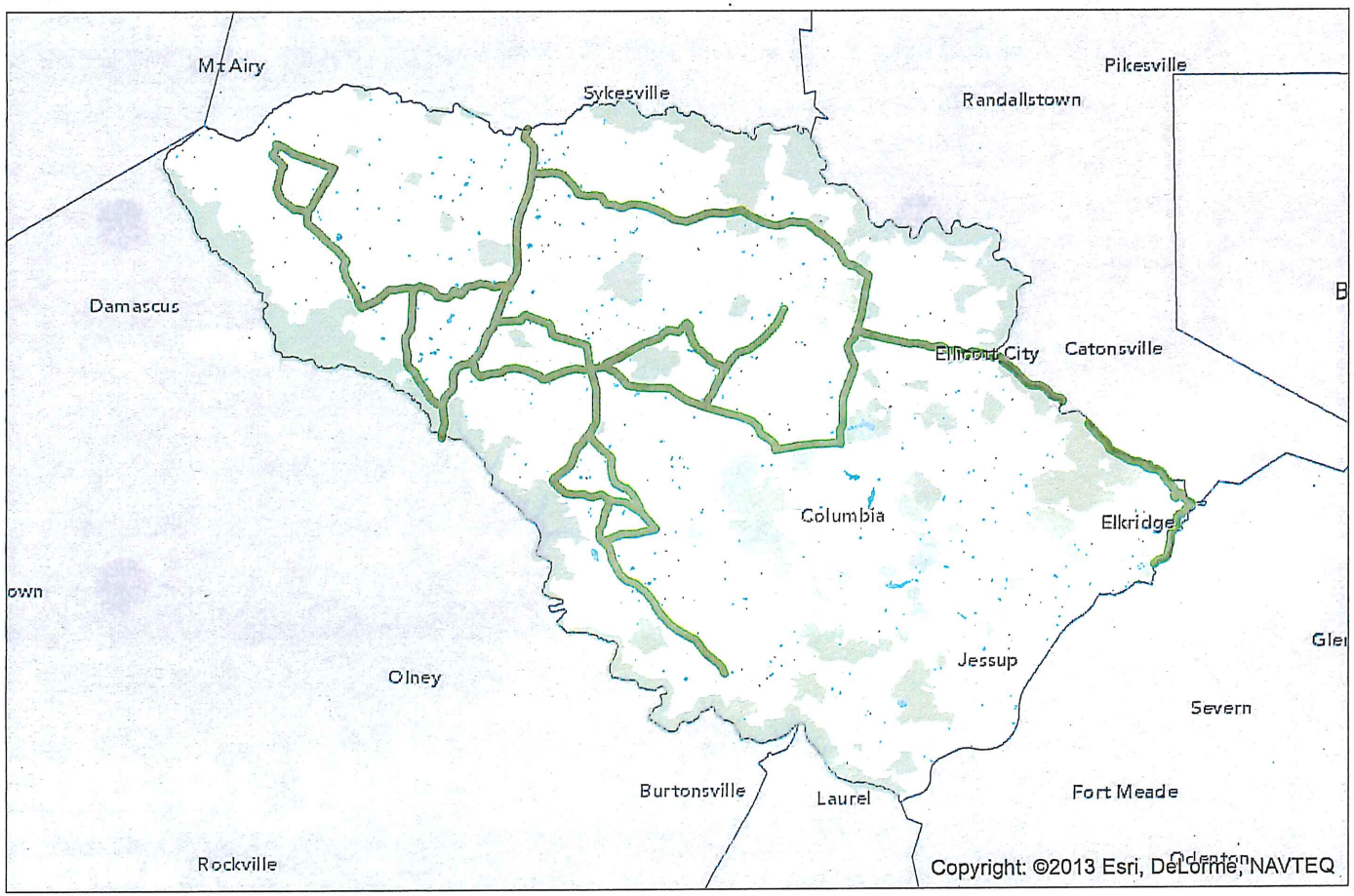


Recommendation: *The County should consider developing an On-Road County Recreational Route System in western Howard County, the southwest area around Fulton, in and around Historic Ellicott City and Savage, as well as in the Patapsco Heritage Greenway and the Elkridge Area (See Figure 5).*

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 multi-modal 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.*

Network Improvement Implementation Process

The structured projects in BikeHoward depict implementation projects at "planning level" detail that gives sufficient information to convey the route and type of project that is contemplated, but still allows for modifications, based on additional study, design and engineering and public input. Modifications that are generally consistent with the project as described in the Plan would not require a Plan amendment. Modifications that the Office of Transportation deems significant would require a County Council-approved Plan amendment, or approval through another public process such as the Capital Budget process that includes County Council approval.

At the request of the Planning Board. Section 10 of the Plan (Implementation Matrix) was amended to state that a public process for implementation of structured projects will be developed within two years. The following table recommends a framework for this public process:

Network Improvement Project Mechanism	Network Improvement Examples	Public Input Process	
Resurfacing project	Striping roadway with bicycle lanes, shared lane markings (sharrow)	Public meeting by DoT if on-street parking would be removed, or if vehicular travel lane patterns would change significantly.	
Development Process (e.g., rezoning, subdivision, special exception, site development plan)	Portion of BikeHoward structured project (bicycle lane, portion of off-road path, spot road widening) connection between neighborhoods.	Bicycle improvement discussed/addressed as part of Department of Planning and Zoning notice, review, and approval process. The DoT shall be included in the process.	
Capital Project			
Minor (for example, a curb ramp project, crosswalk, or traffic signal modifications).	Traffic signal detection for cyclists, shared lane markings, wider than standard curb ramp	Public meeting by DoT if on-street parking would be removed, or if vehicular travel lane patterns would change significantly.	
Major	Standalone BikeHoward structured project or structured project being implemented in association with, for example, a major road improvement, water and sewer project, park or public school.	1. Project will be reviewed with the Bicycle Advisory Group, as well as discussed at the annual BikeHoward Open House. 2. The BPAB shall review Project using a public process. 3. The DoT shall be included in process. 4. Project will be listed in the Capital Budget and follow the Capital Budget Public Input Process.	5. Project will have a page on bikehoward.com with all associated project documents, and a summary of public comments with responses. 6. The County web site shall include a prominent link to bikehoward.com. 7. Public meetings at 30% and 90% design stages before construction.

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 stake-holders. Graphic designs, color schemes, and imple-mentation strategies need to be discussed and agreed upon, then documented in a Sign Protocol and Manual.

Recommendation: *Consider developing a sign Pro-tocol and Manual that is agreed to by all stakehold-ers, including CA, DRP, DPW, DPZ, and SHA.*

Bikeway Design Training

Because Howard County has not developed a signif-icant number of on-road bikeways, traffic engineer-ing and roadway design staff do not have extensive experience integrating bicycle facilities into the vari-ous 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 bi-cycling facility design and implementation best prac-tices.*

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. Selec-tion 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 pro-cess, and the opportunity projects that are imple-mented as a part of routine work by County agencies.

Recommendation: *Annually, determine and devel-op 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: *A permanent Bicycle and Pedestrian Advisory Board (BPAB) should be established to provide technical assistance and the perspective of pedestrians and bicyclists.*

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 BPAB, 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 al-so 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.*

Tracking and Reporting

In order to encourage involvement by the entire community and continue to be transparent and open in implementing the recommendations of this Plan, a process should be outlined to track the progress of implementation, as well as continue to solicit public input.

Recommendation: *The Office of Transportation should host an annual, public BikeHoward Open House each winter. At these events, the Office of Transportation should provide updates on the progress of BikeHoward implementation and should solicit feedback on past implementation as well as solicit input regarding future projects and grant applications.*

Recommendation: *The Office of Transportation should produce and disseminate an annual BikeHoward Implementation Progress report to the County Executive and the County Council, as well as post it publicly on the BikeHoward website.*

Recommendation: *The Office of Transportation should comprehensively review the Bicycle Master Plan every five years and recommend changes for approval by the County Council.*

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 develop-ing estimates. Some examples of these unknown fac-tors 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 BikeHow-ard cannot forecast the repaving schedule, Bikehow-ard'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

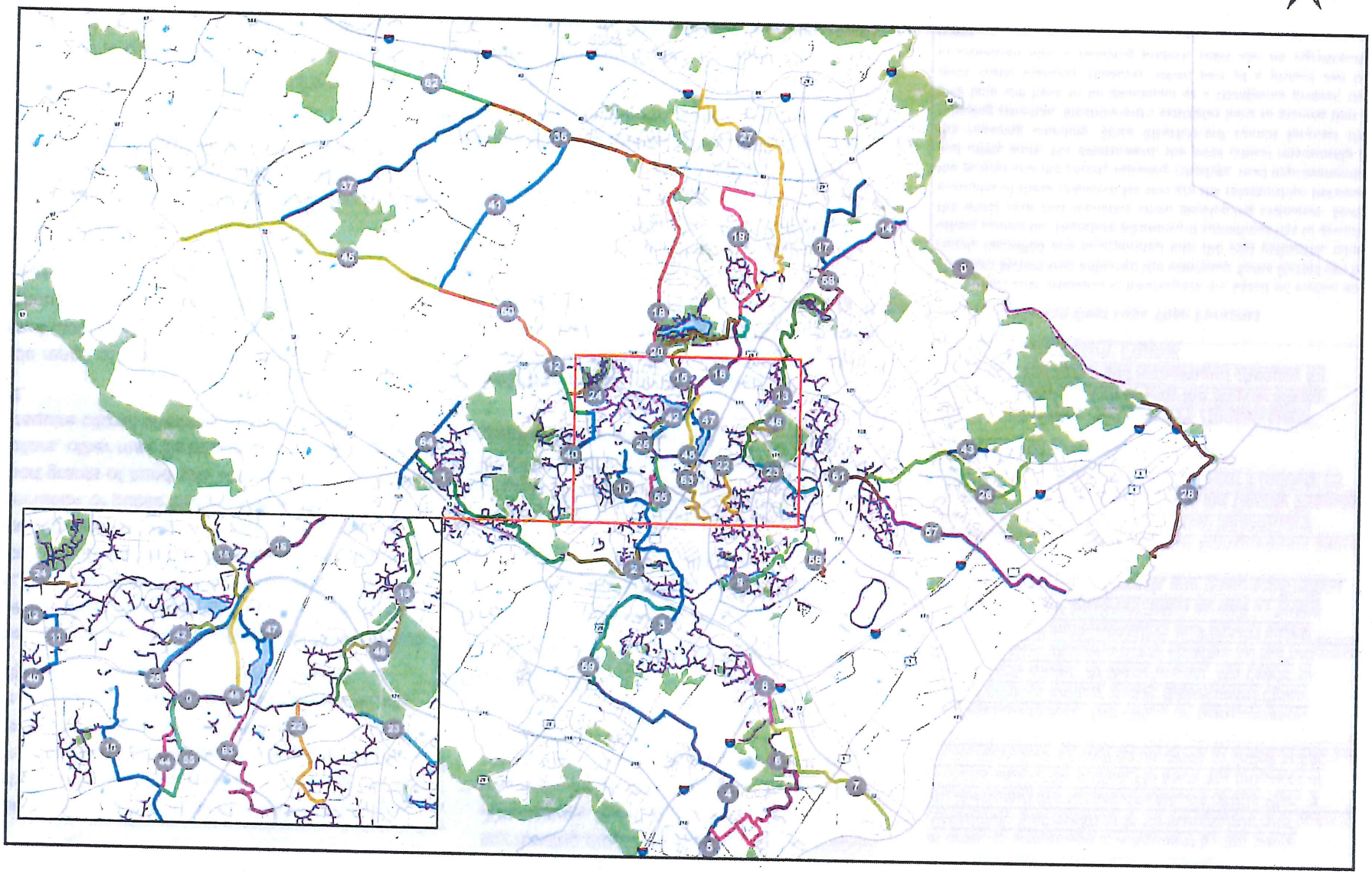


Table 5: Structured Projects Note: Costs listed in these tables are planning level estimates and include high contingency factors. Actual costs for most projects are expected to be lower, particularly when bike lane projects can be aligned with ongoing road resurfacing.

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 Downtown 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, Meadowridge Road	Old Montgomery Road	Dorsey MARC Station	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.	$ 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 Contrivance 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

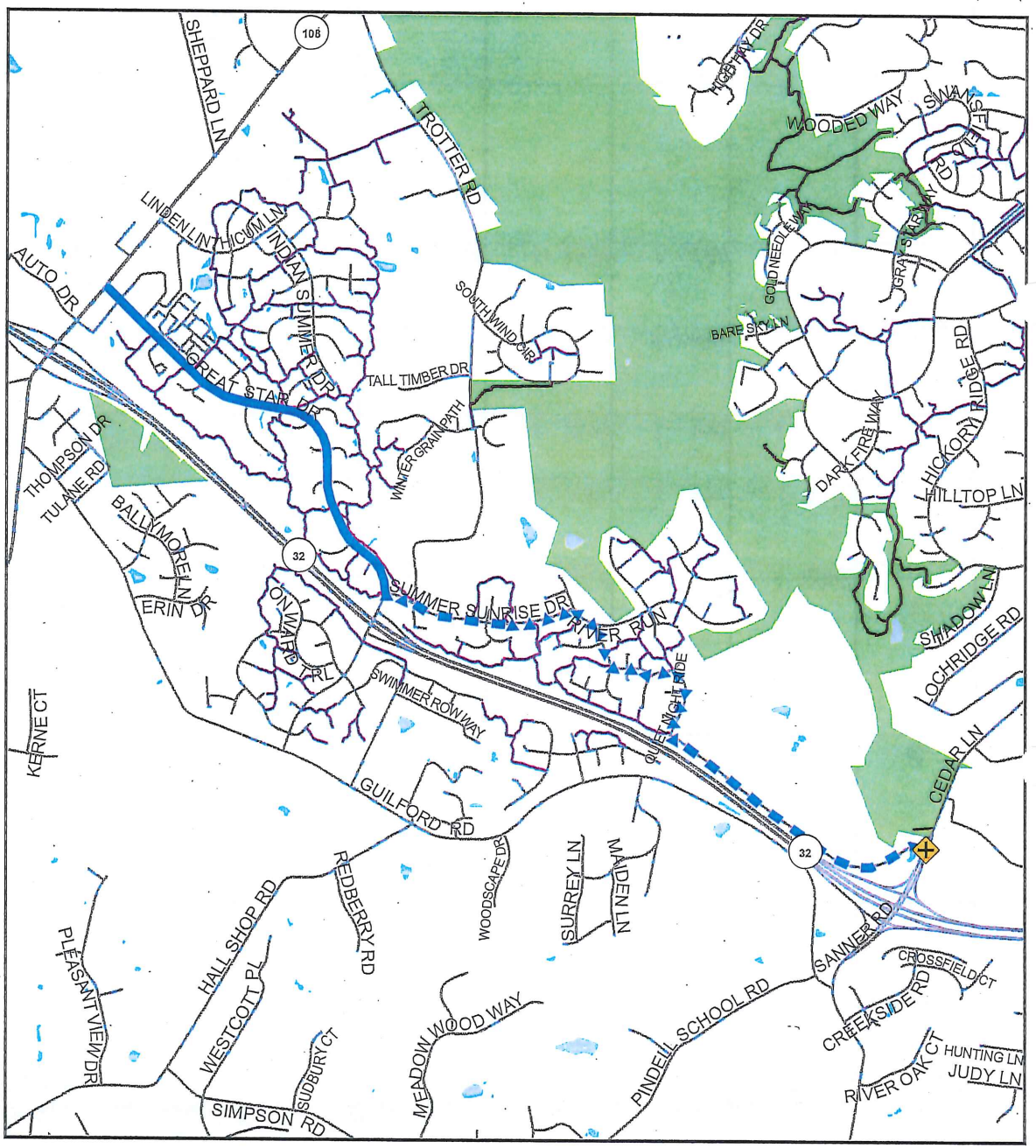
Spot Recommendations

- 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

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

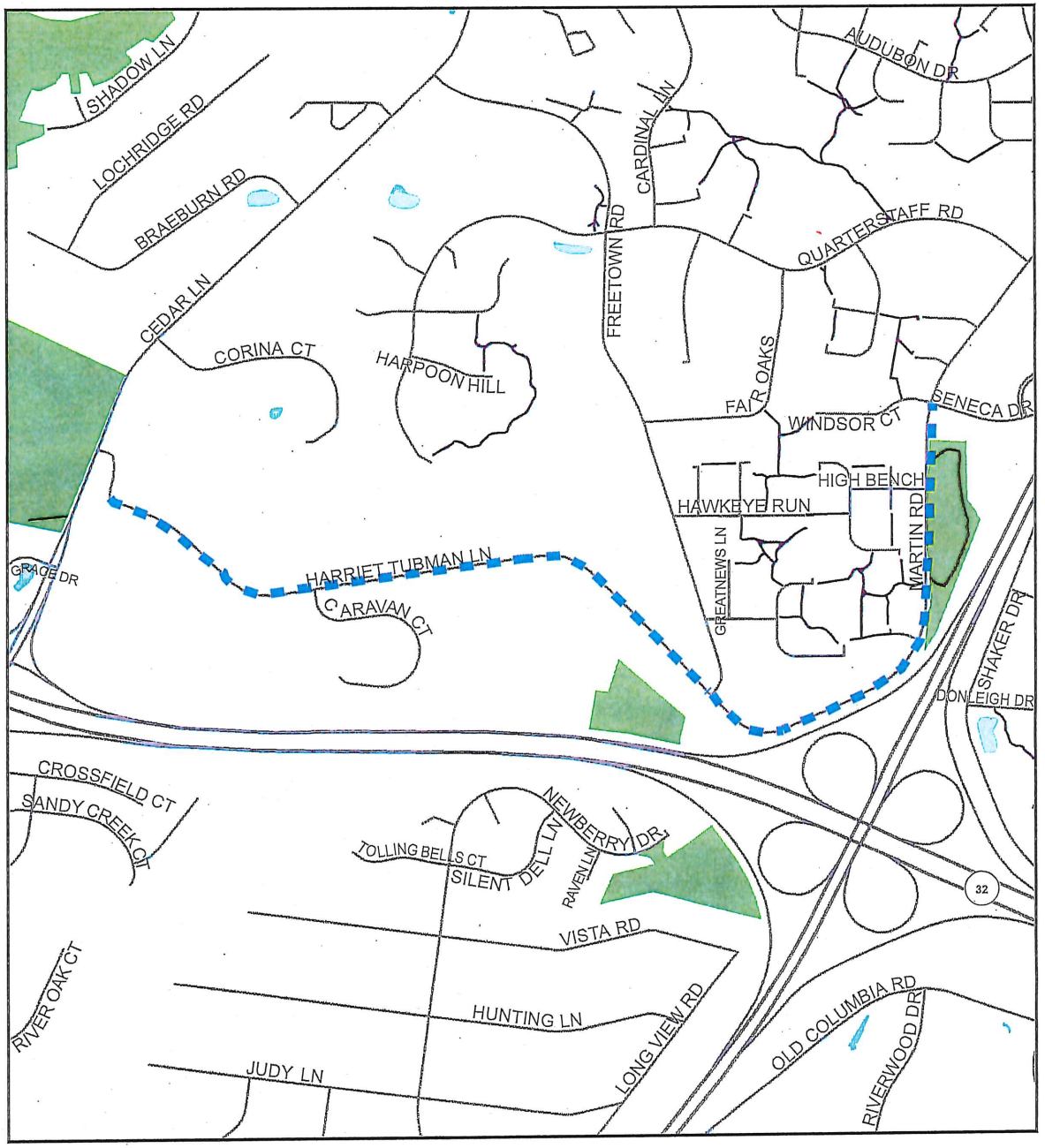
Spot Recommendations

- 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: 2



BIKE HOWARD
Structured Projects

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

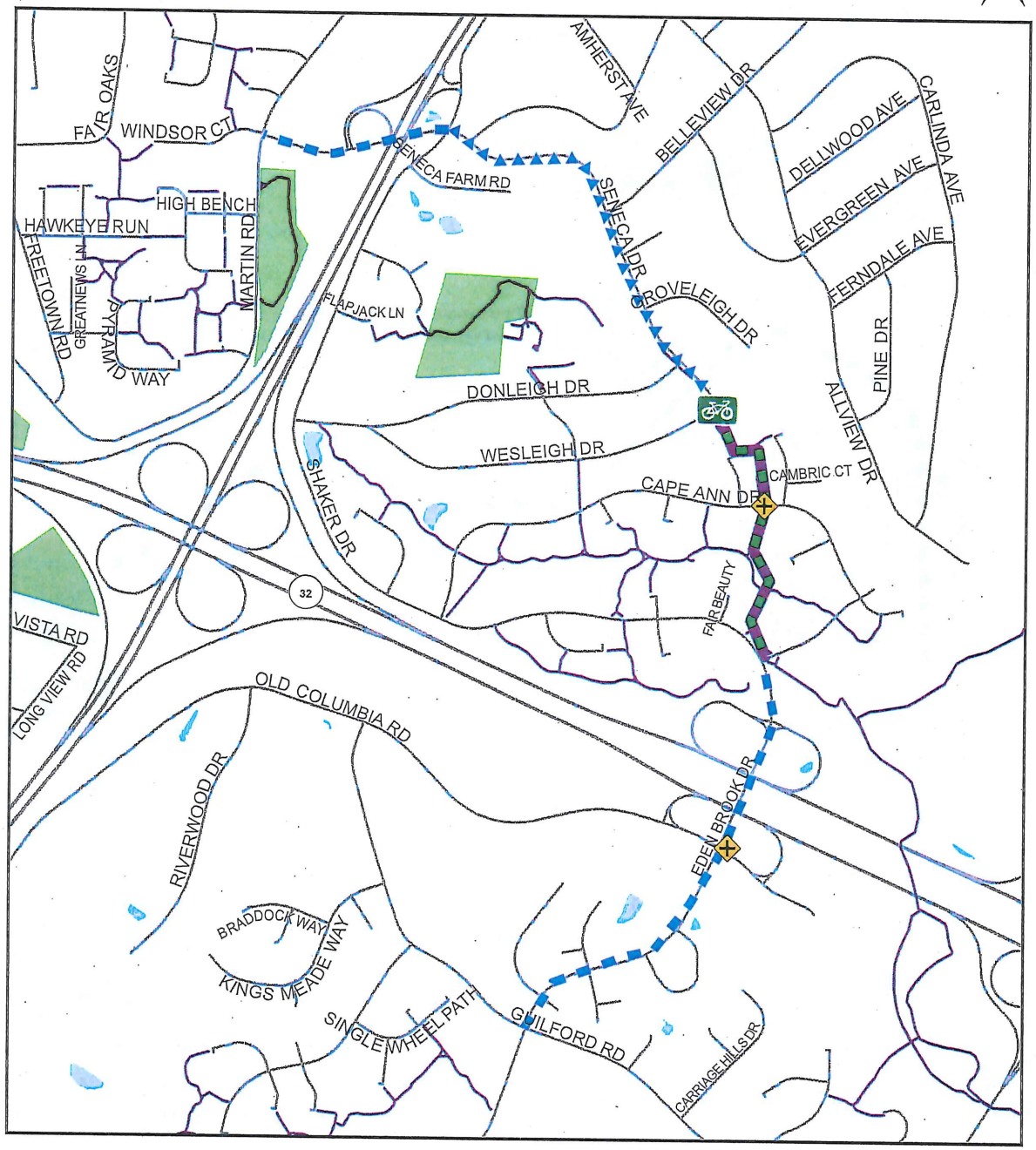
Start: Martin Road
End: Guilford Road/Kings Contrivance Village Center

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

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: 3



BIKE HOWARD
Structured Projects

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

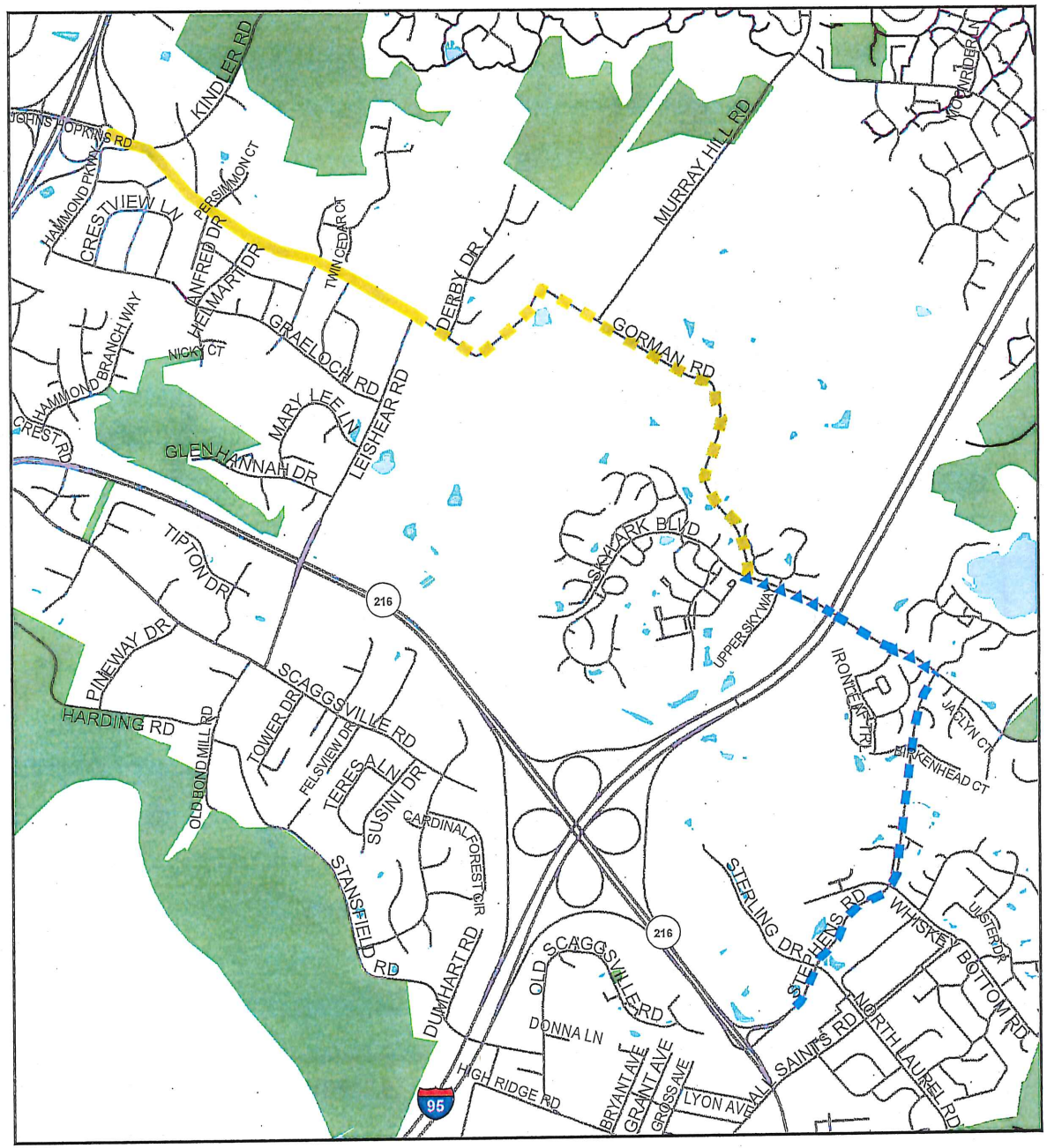
Spot Recommendations

- 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: 4



BIKE HOWARD
Structured Projects

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

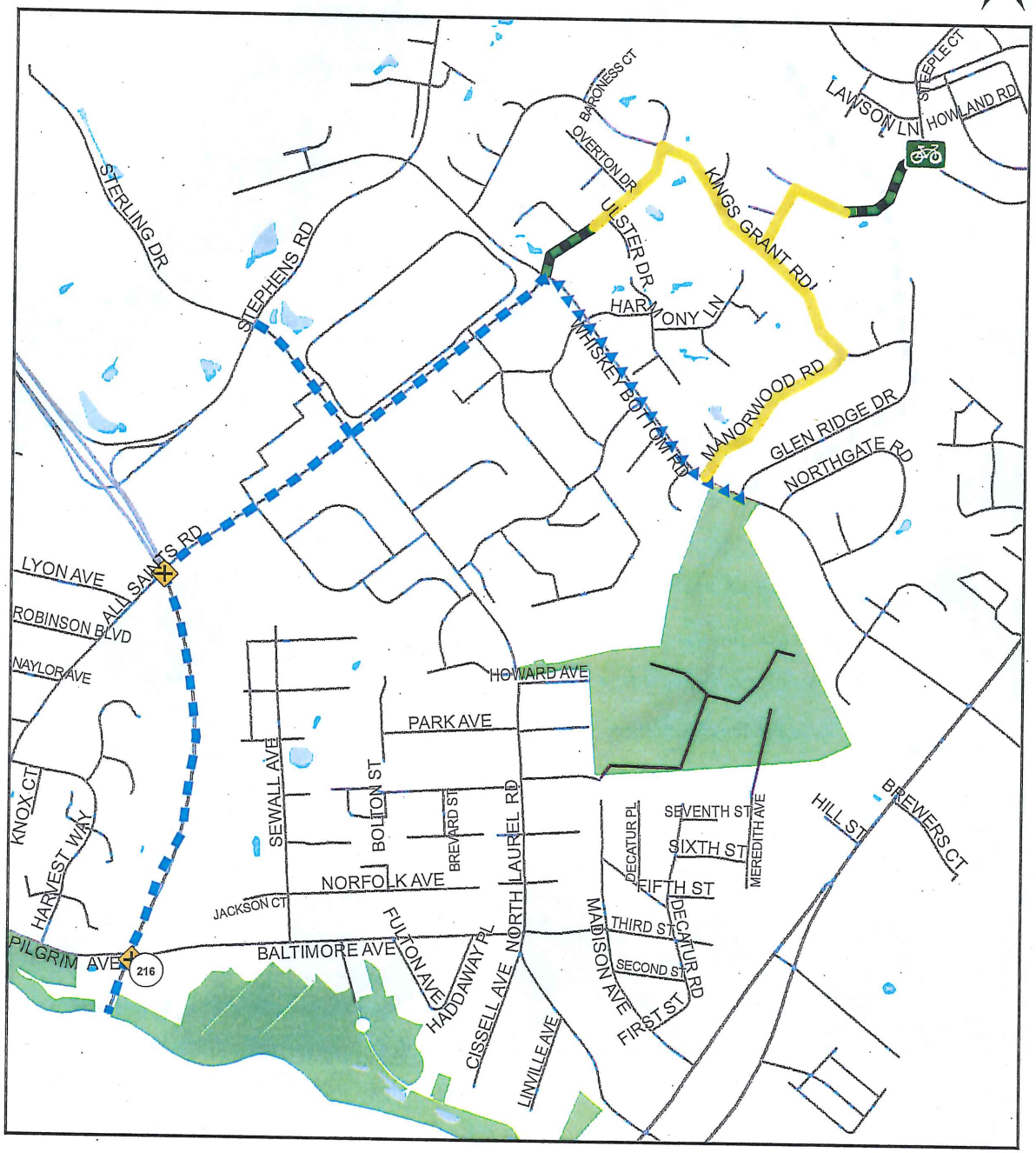
End: North Laurel/Prince Georges County

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

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: 5



BIKE HOWARD
Structured Projects

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

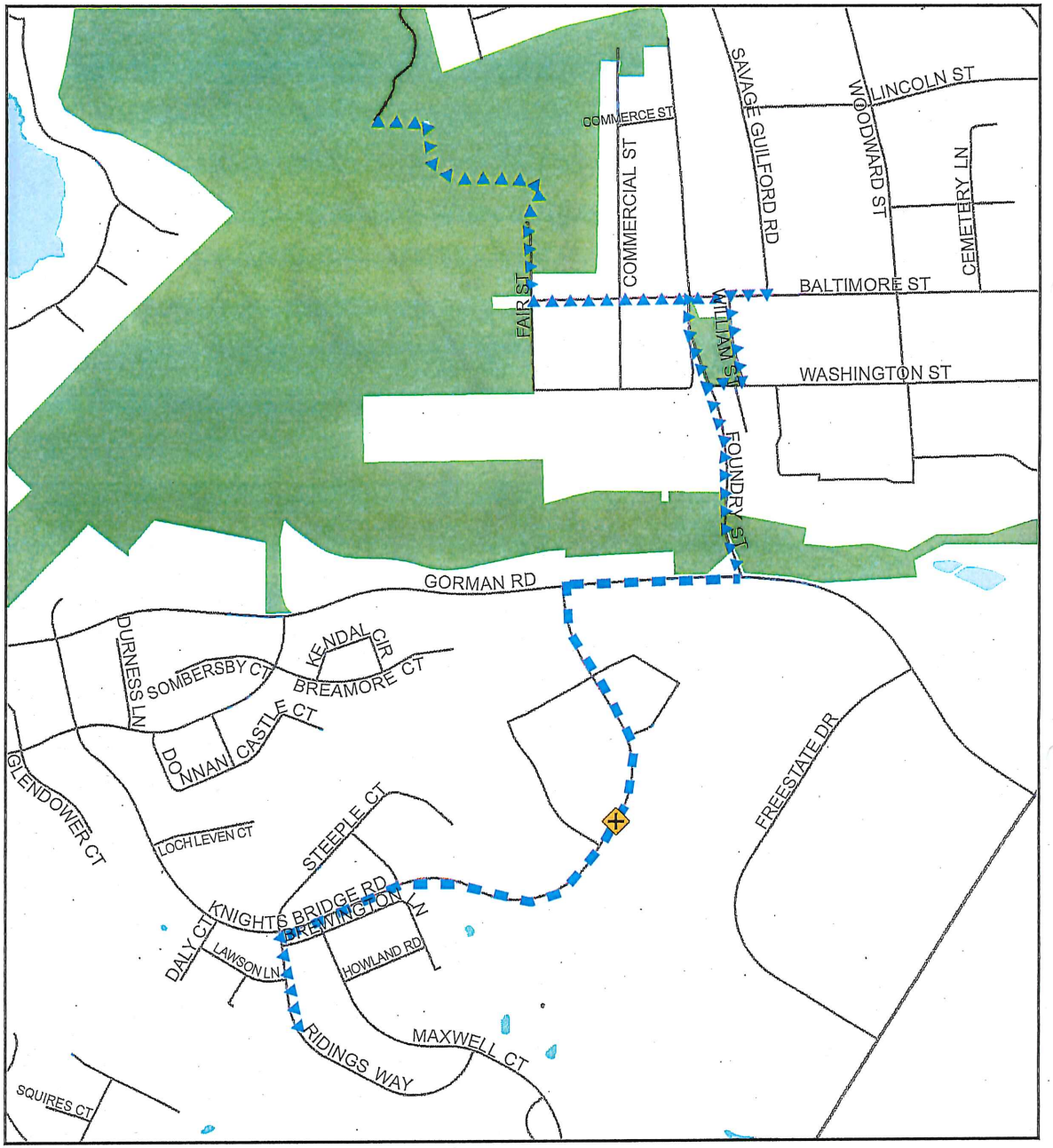
Linear Recommendations
- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

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)

Proposed/Preliminary
Structured Project Number: 6

N



BIKE HOWARD
Structured Projects

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.

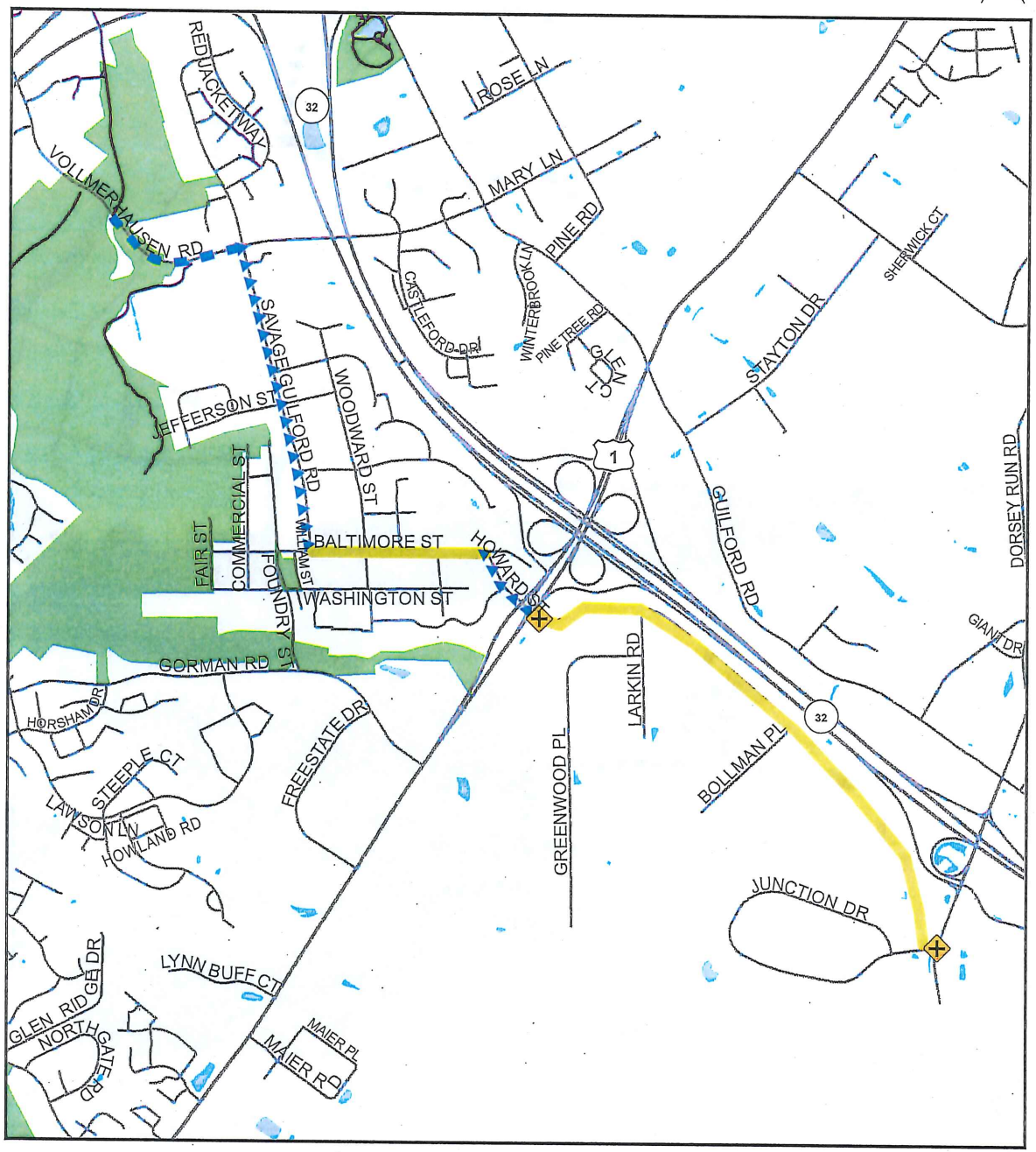
Start: Terminus of Patuxent Branch Trail/ Vollmerhausen Road
End: Savage TOD/MARC Station

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)

Proposed/Preliminary
Structured Project Number: 7



BIKE HOWARD
Structured Projects

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)

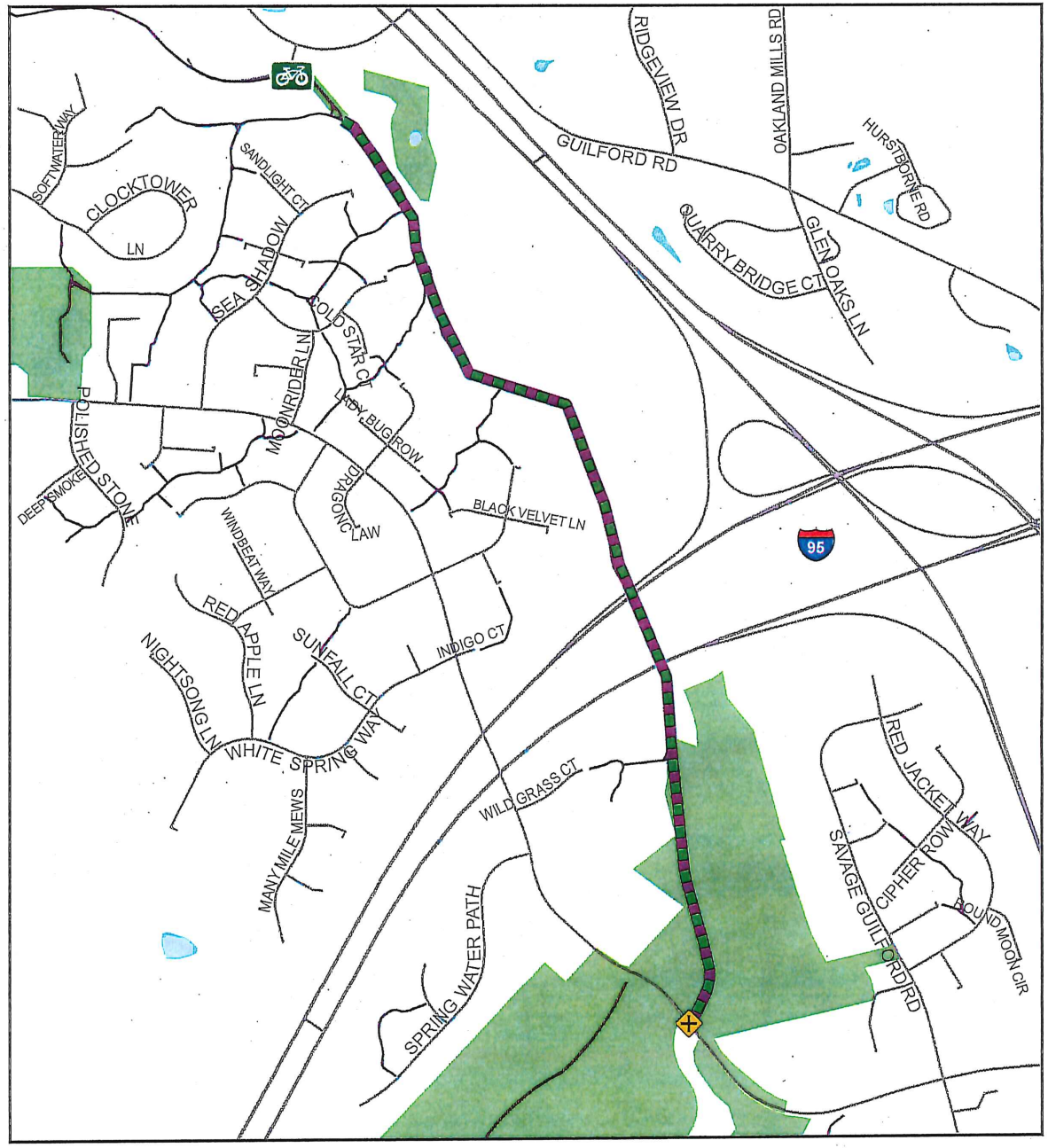
Start: Trailhead at Guilford Road
End: Vollmerhausen Road

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)

Proposed/Preliminary
Structured Project Number: 8



BIKE HOWARD
Structured Projects

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)

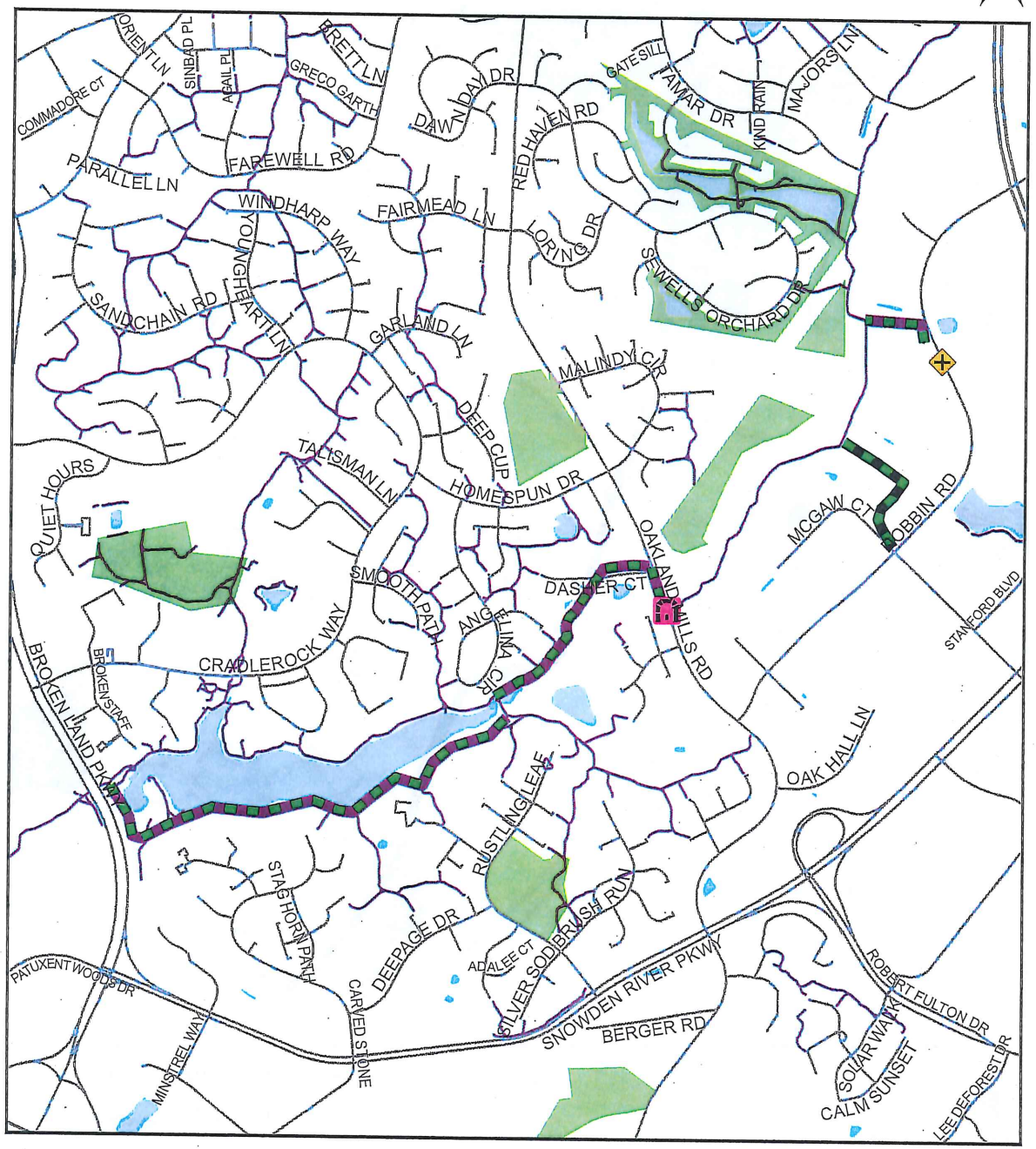
Start: Broken Land Parkway/Lake Elkhorn
End: Dobbin Road Commercial Area

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)

Proposed/Preliminary
Structured Project Number: 9



BIKE HOWARD
Structured Projects

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

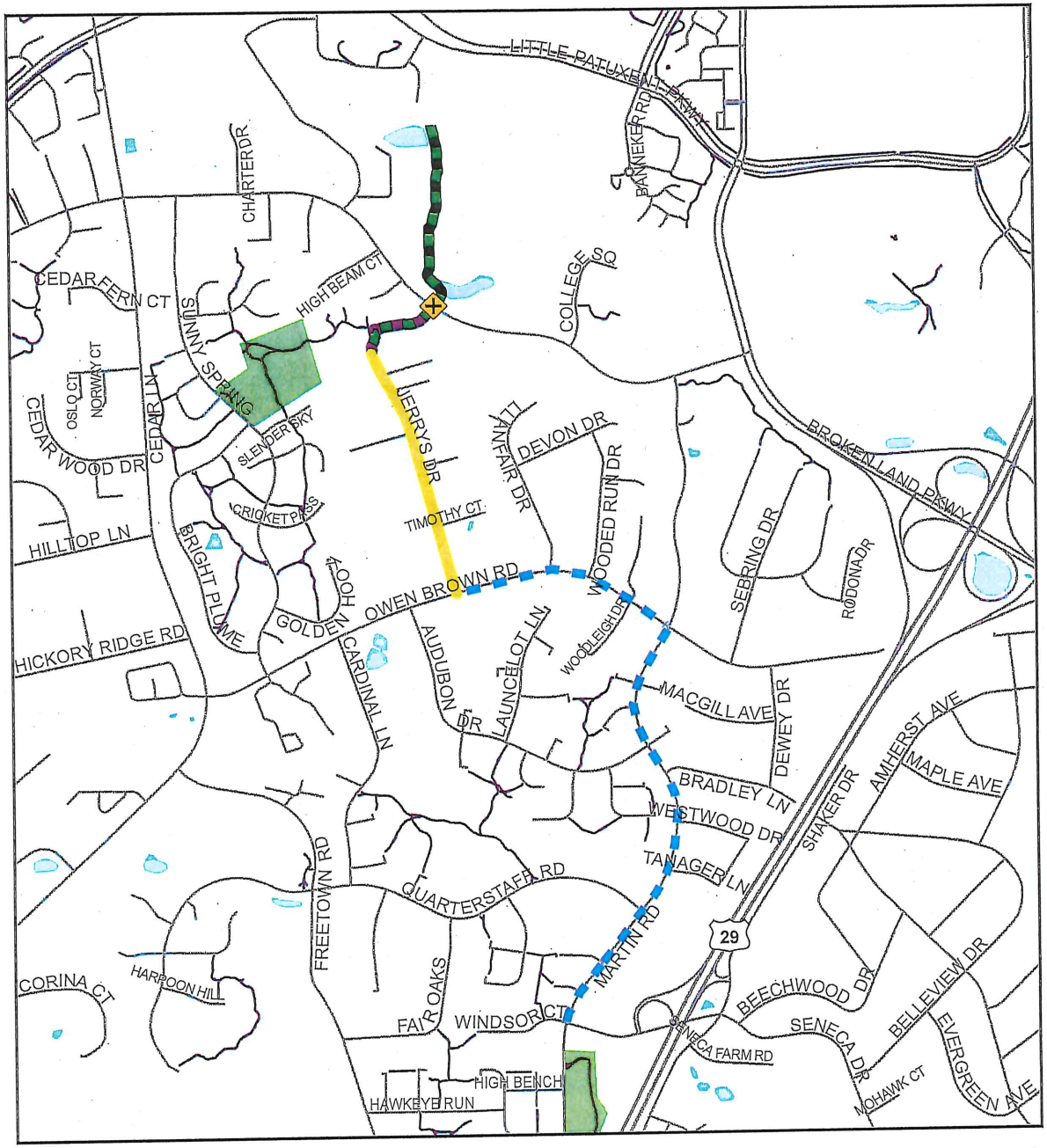
Spot Recommendations

- 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)

Proposed/Preliminary
Structured Project Number: 10



BIKE HOWARD
Structured Projects

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

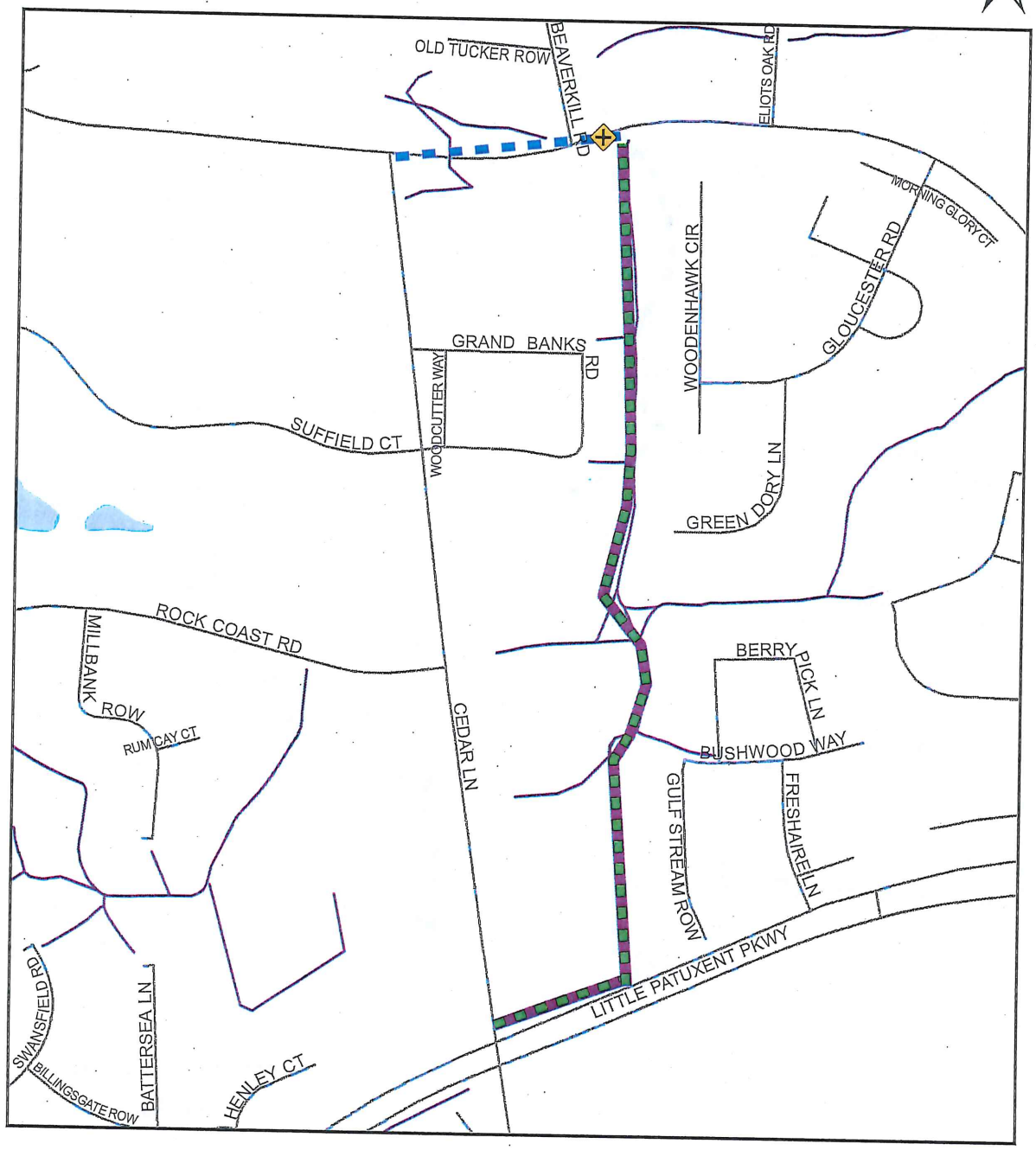
Start: Little Patuxent Parkway
End: Harpers Farm Road

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)

Proposed/Preliminary
Structured Project Number: 11



BIKE HOWARD
Structured Projects

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

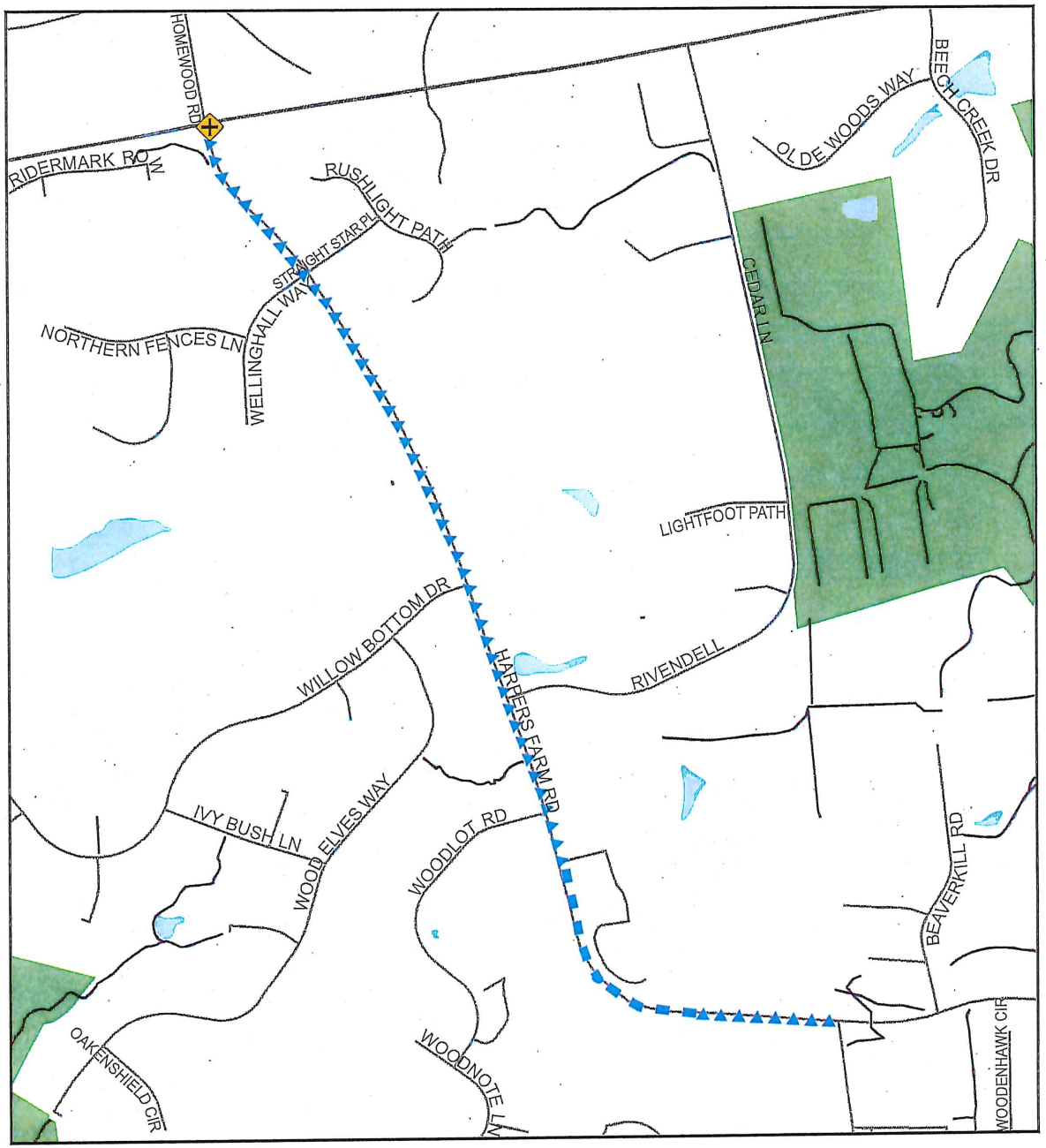
Existing Facilities

- 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)

Proposed/Preliminary
Structured Project Number: 12



BIKE HOWARD
Structured Projects

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

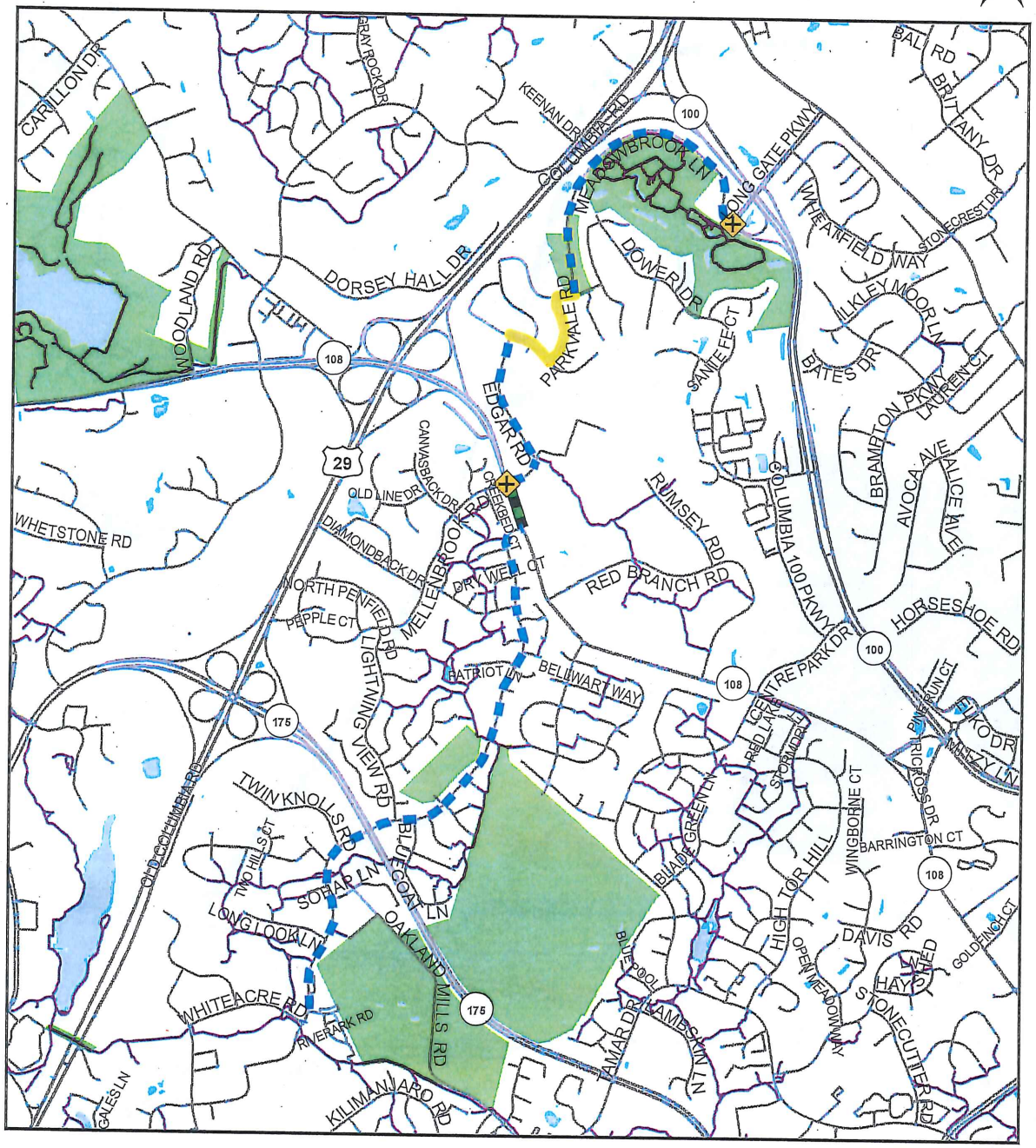
Spot Recommendations

- 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: 13



BIKE HOWARD
Structured Projects

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

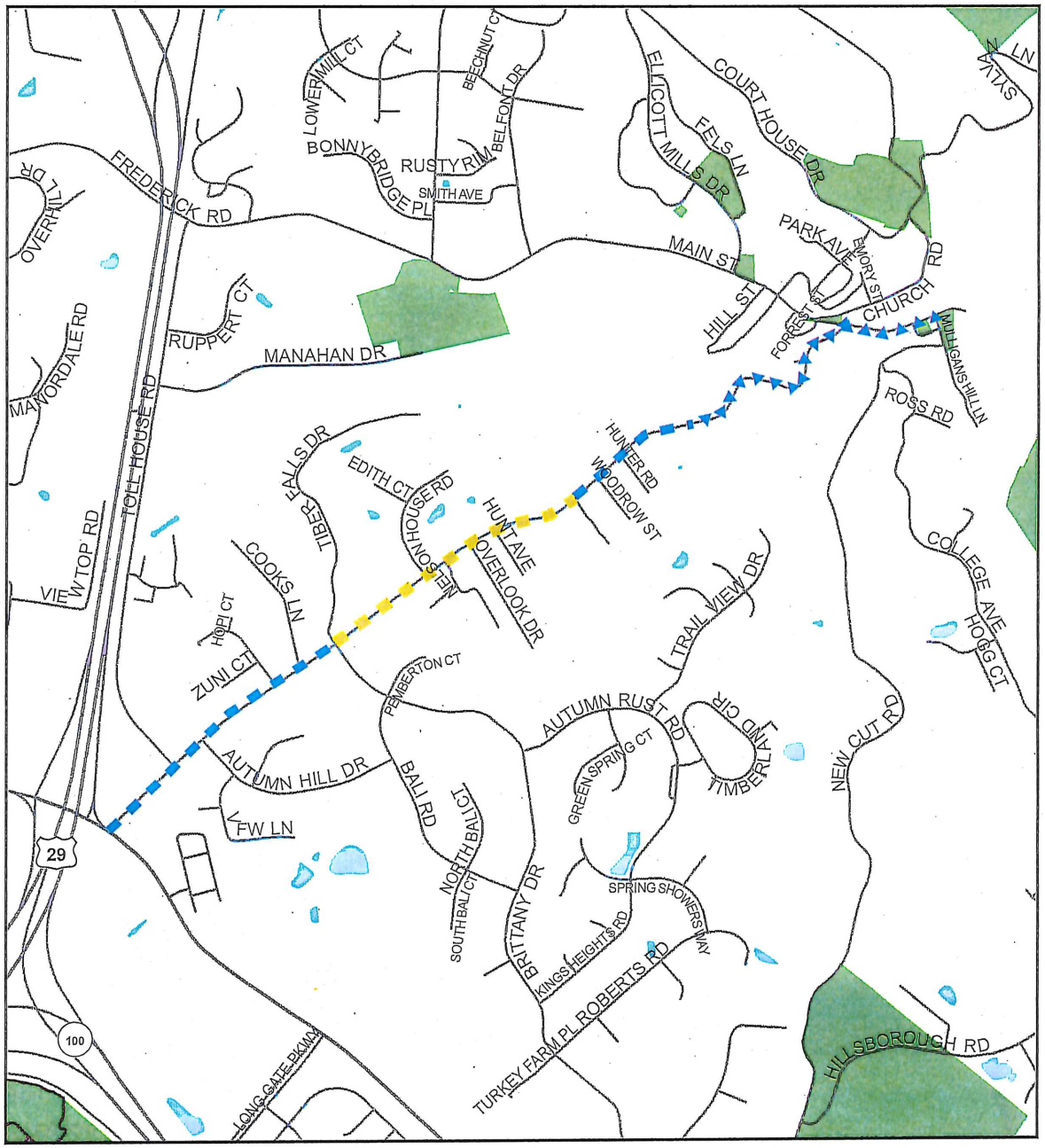
Start: MD 108
End: Historic Ellicott City

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)

Proposed/Preliminary
Structured Project Number: 14



BIKE HOWARD
Structured Projects

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

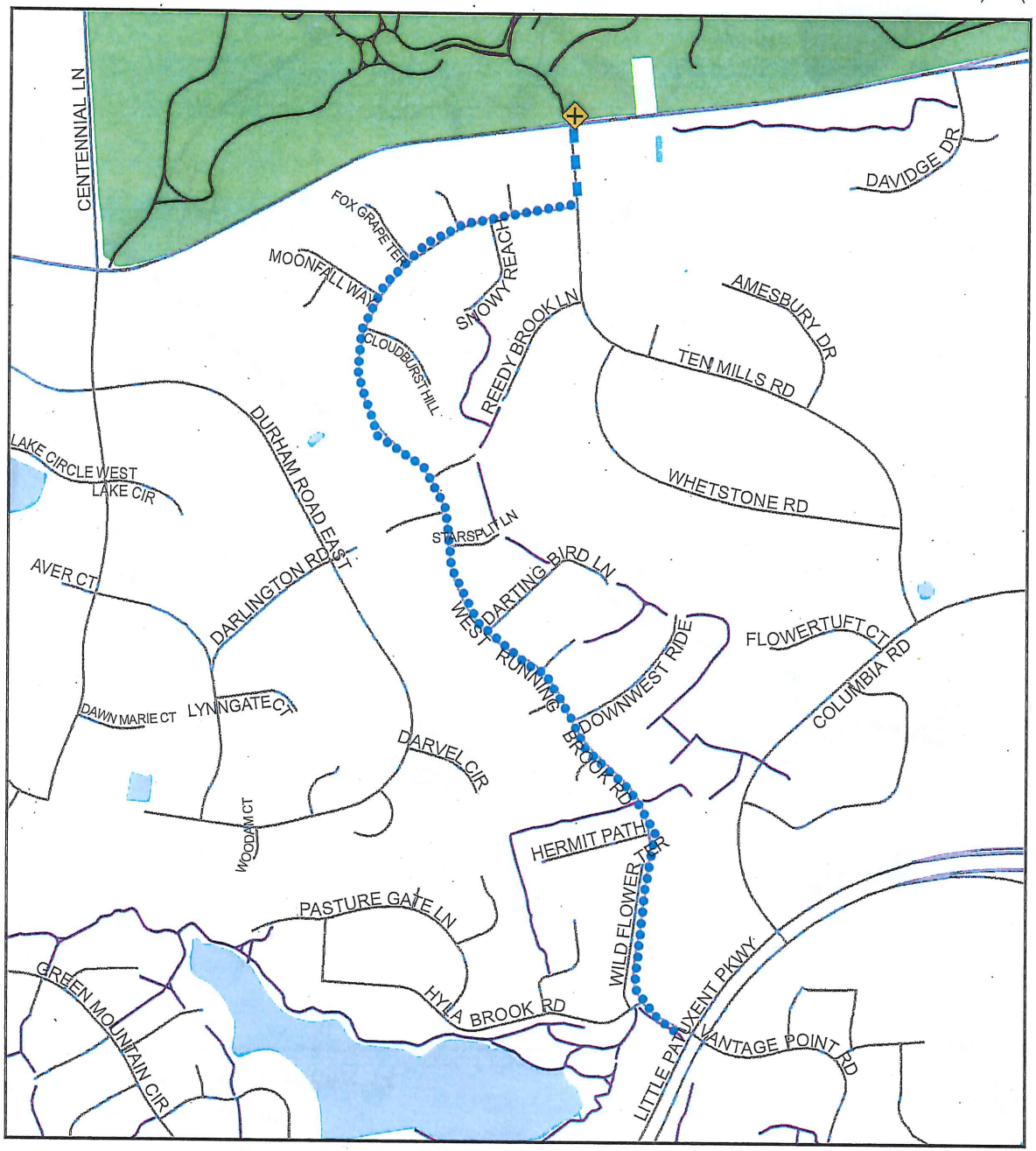
Start: Little Patuxent Parkway
End: MD 108

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)

Proposed/Preliminary
Structured Project Number: 15



BIKE HOWARD
Structured Projects

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

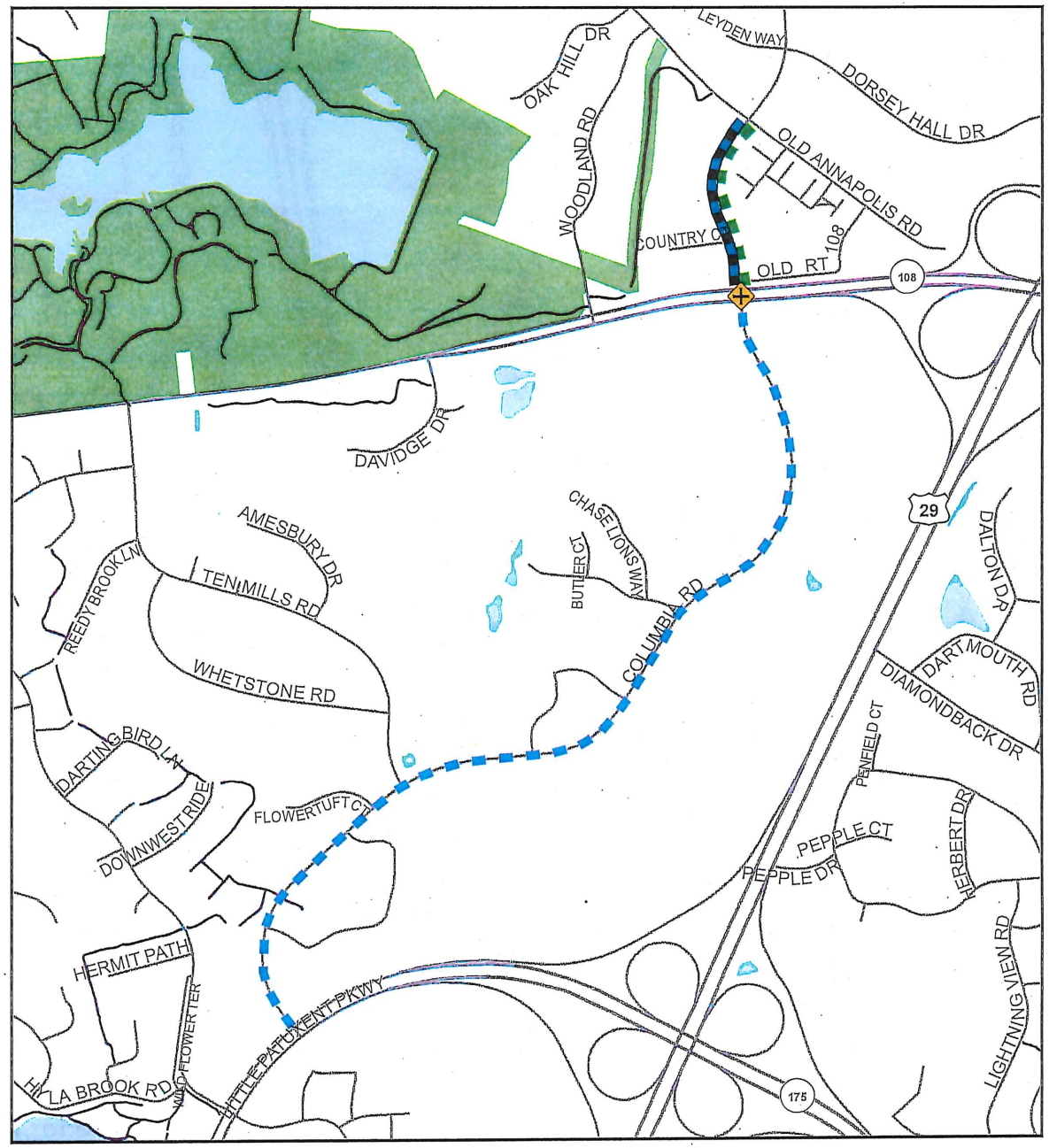
Spot Recommendations

- 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: 16



BIKE HOWARD
Structured Projects

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

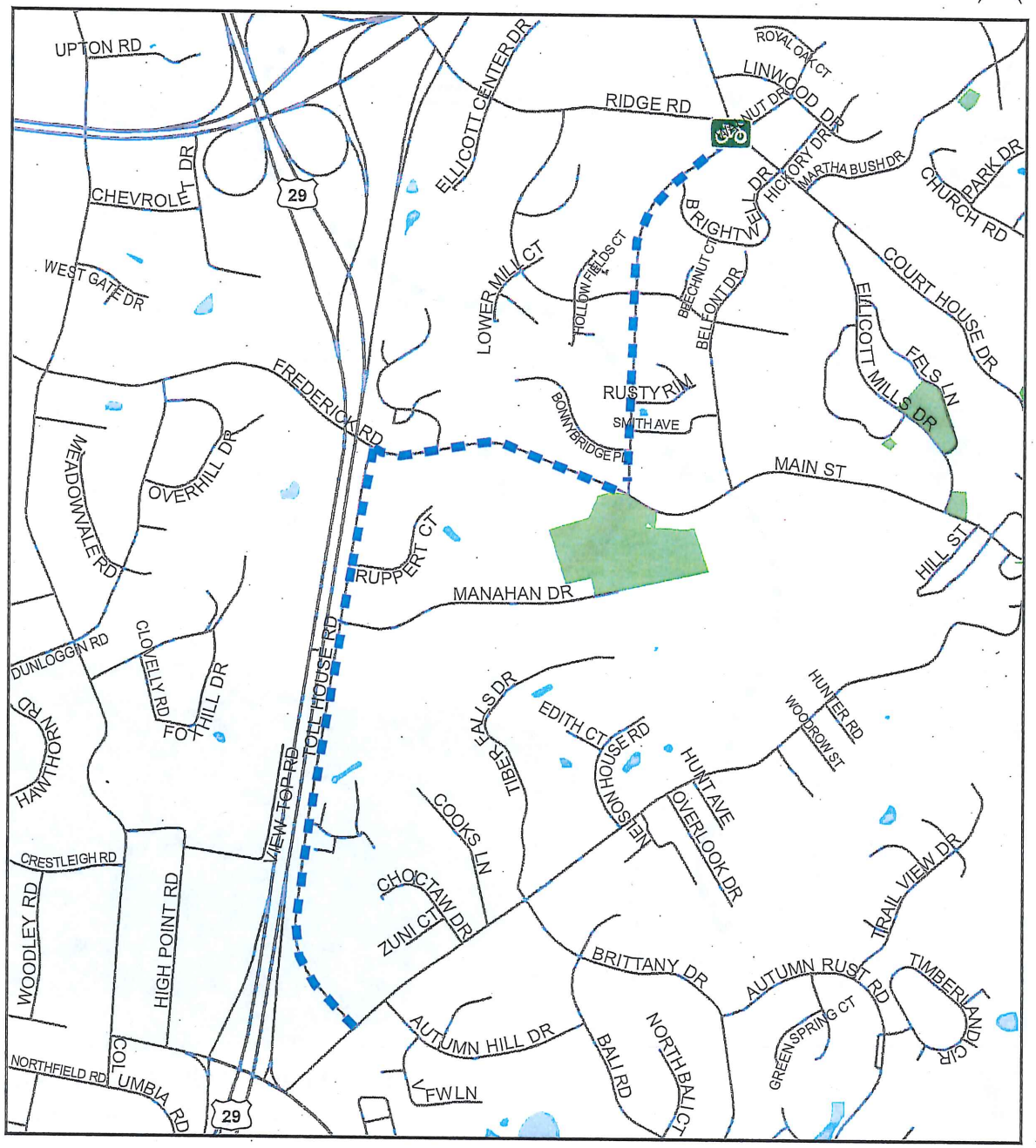
- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

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

Proposed/Preliminary
Structured Project Number: 17

N



BIKE HOWARD
Structured Projects

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

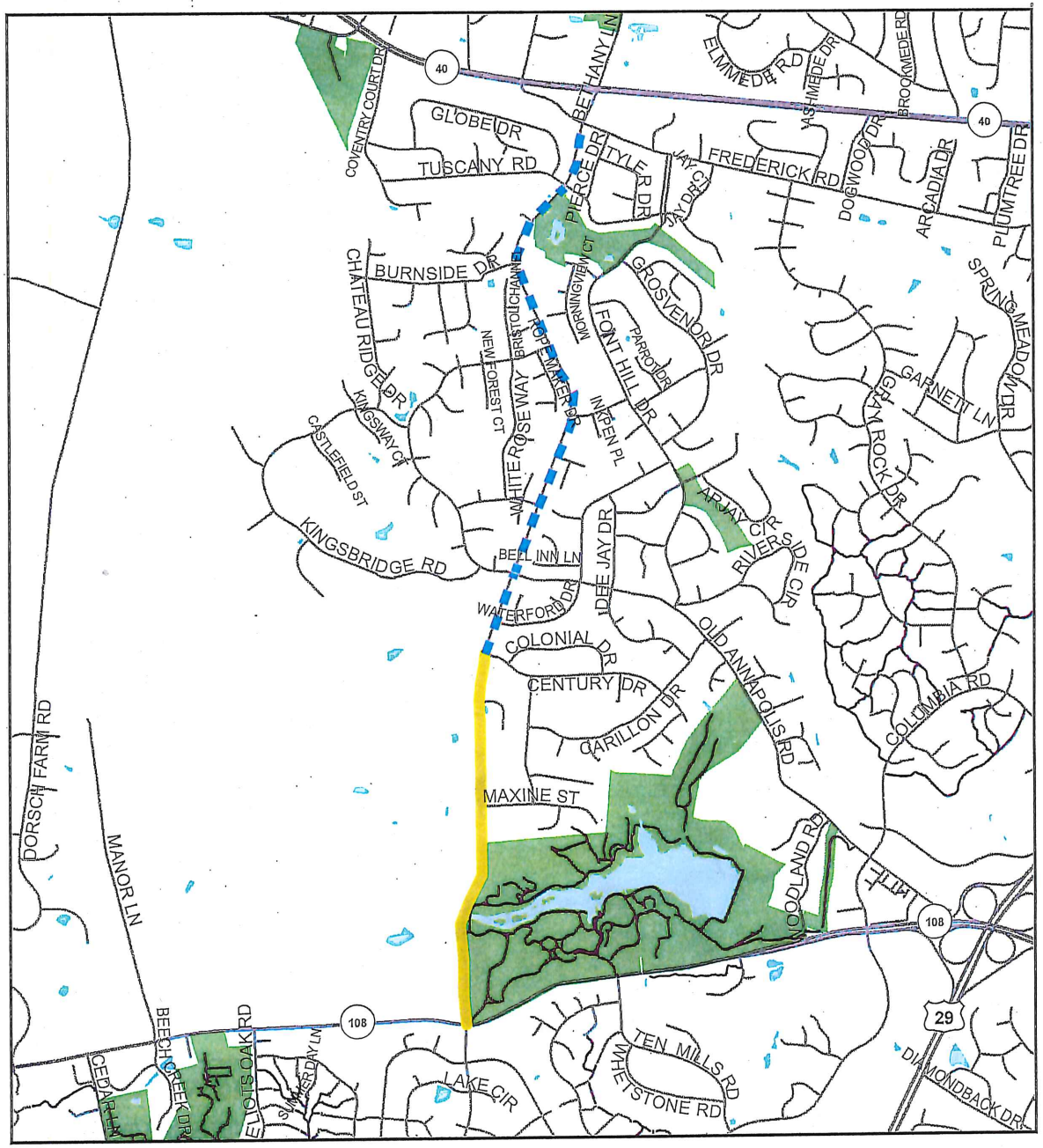
Spot Recommendations

- 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)

Proposed/Preliminary
Structured Project Number: 18



BIKE HOWARD
Structured Projects

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

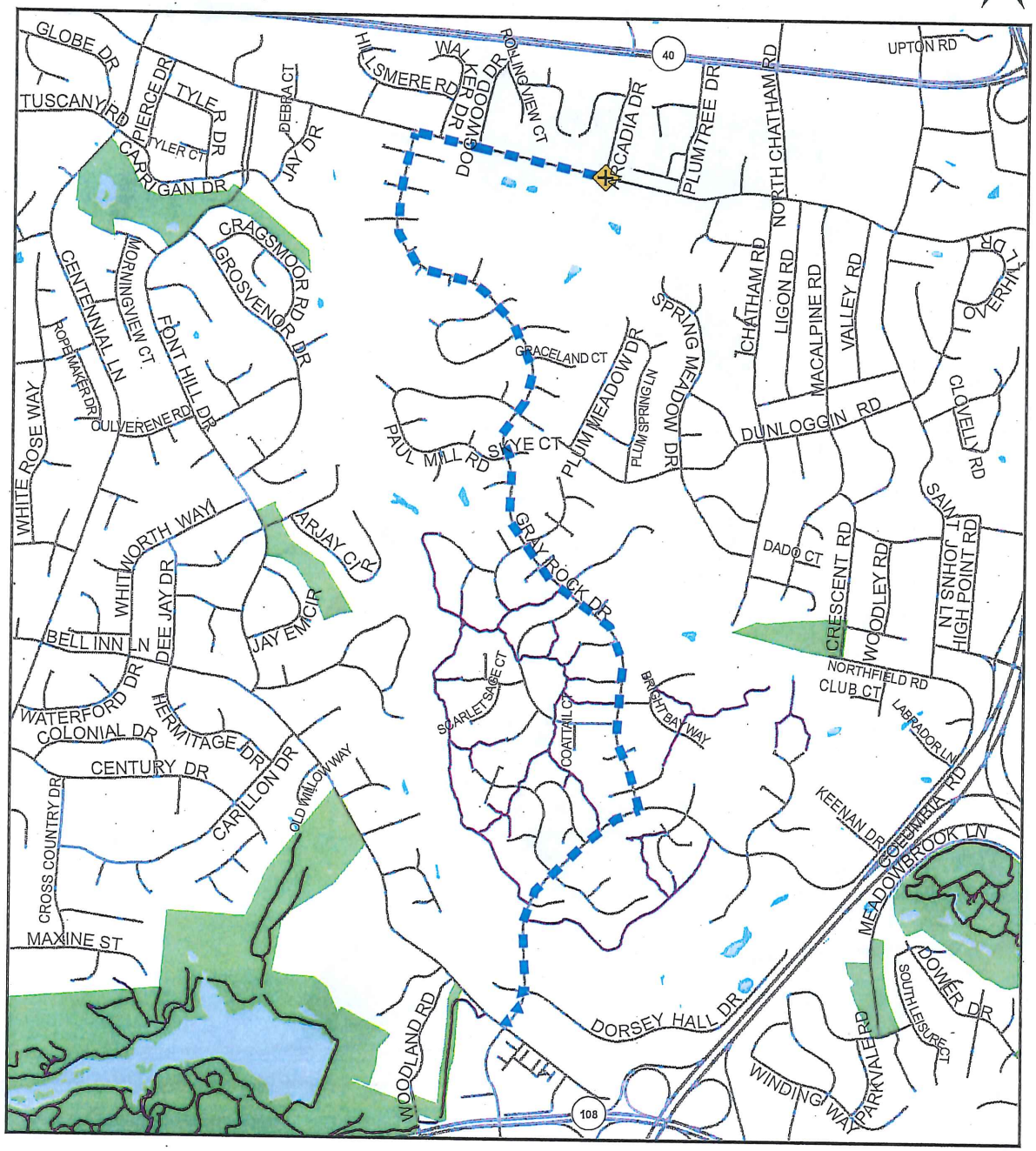
Existing Facilities

- 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)

Proposed/Preliminary
Structured Project Number: 19



BIKE HOWARD
Structured Projects

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

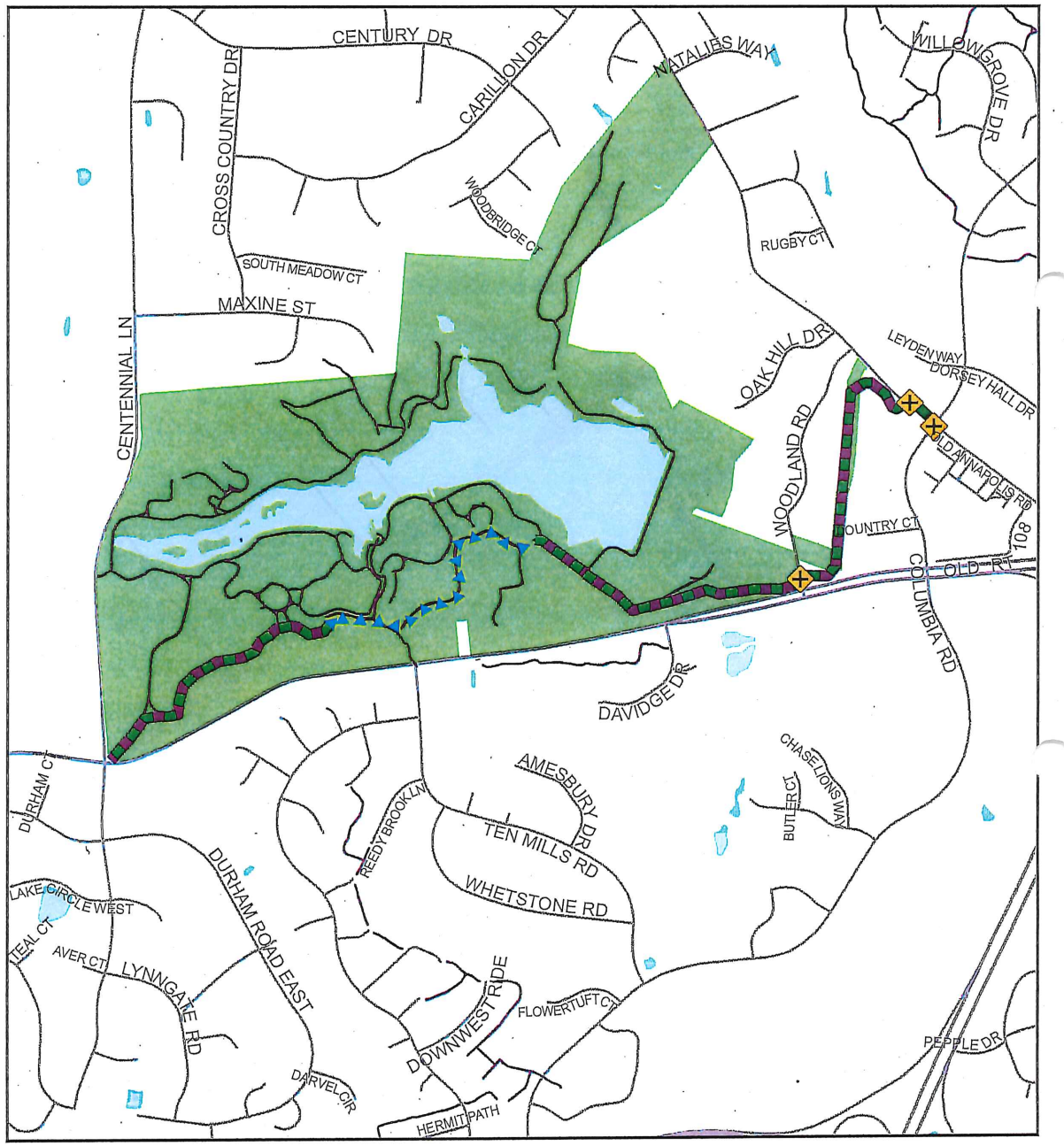
Spot Recommendations

- 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)

Proposed/Preliminary
Structured Project Number: 20



BIKE HOWARD
Structured Projects

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

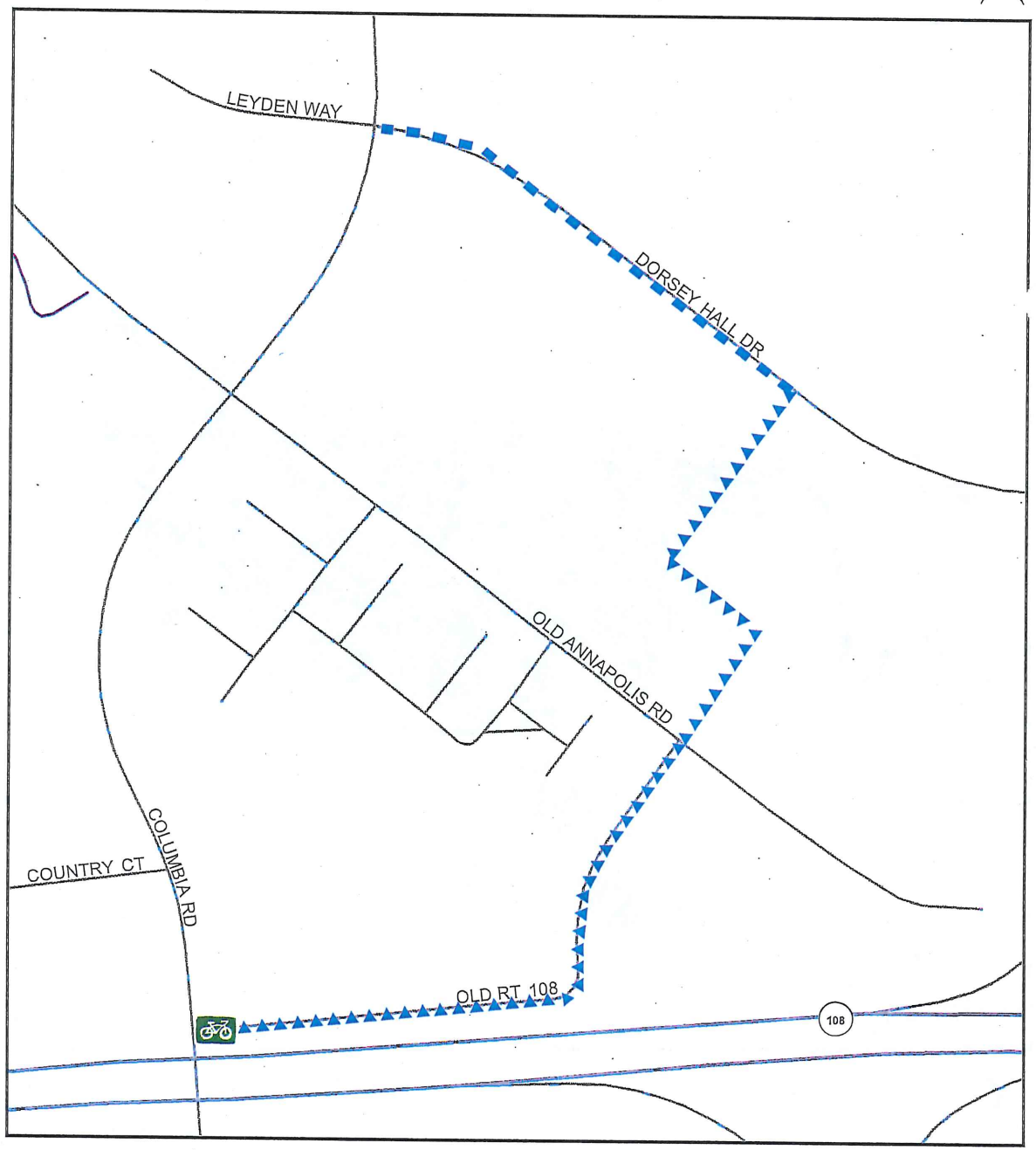
Start: Old Annapolis Road
End: Old Annapolis Road/Dorsey Hall Road

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

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: 21



BIKE HOWARD
Structured Projects

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

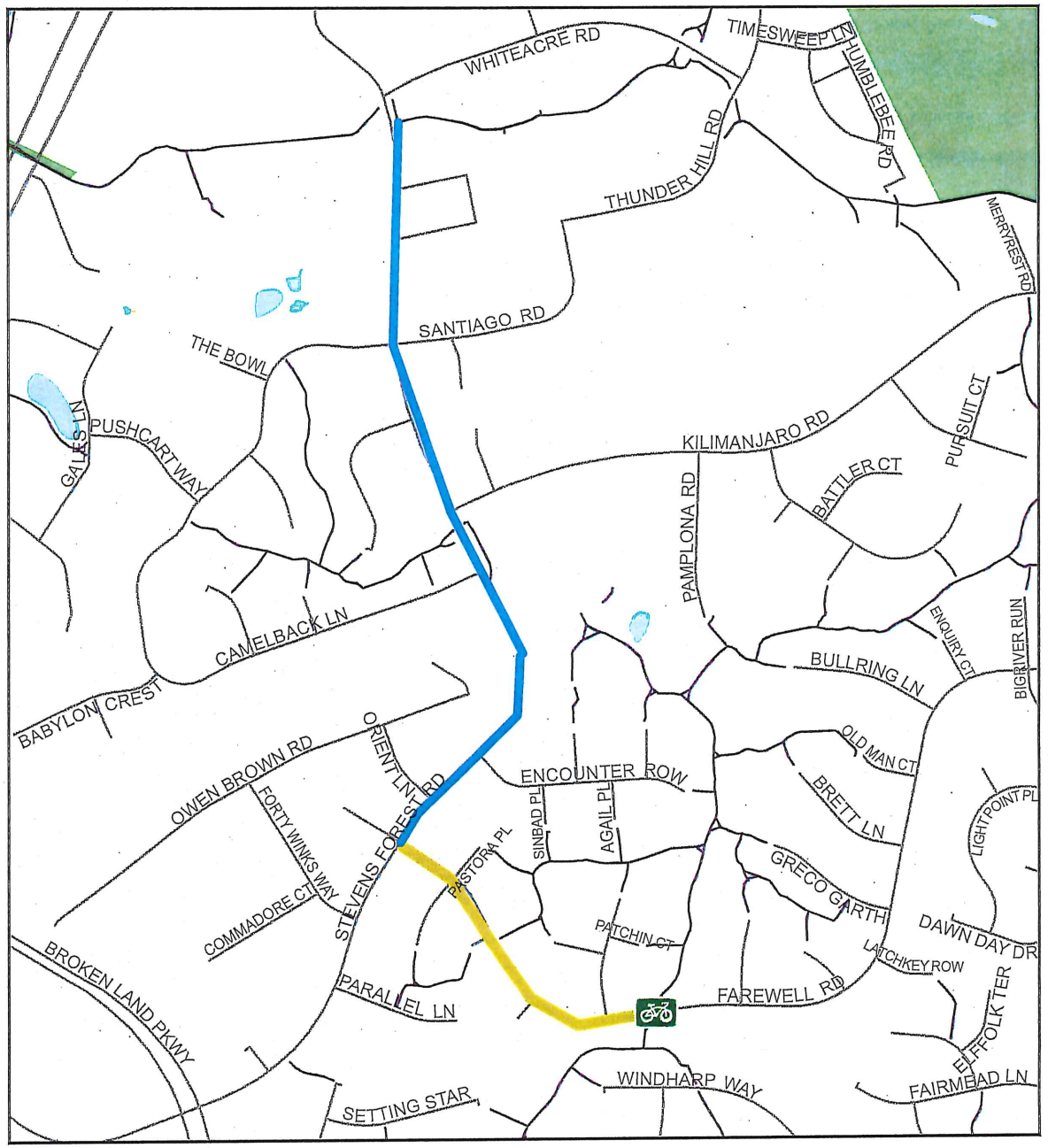
Spot Recommendations

- 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: 22



BIKE HOWARD
Structured Projects

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

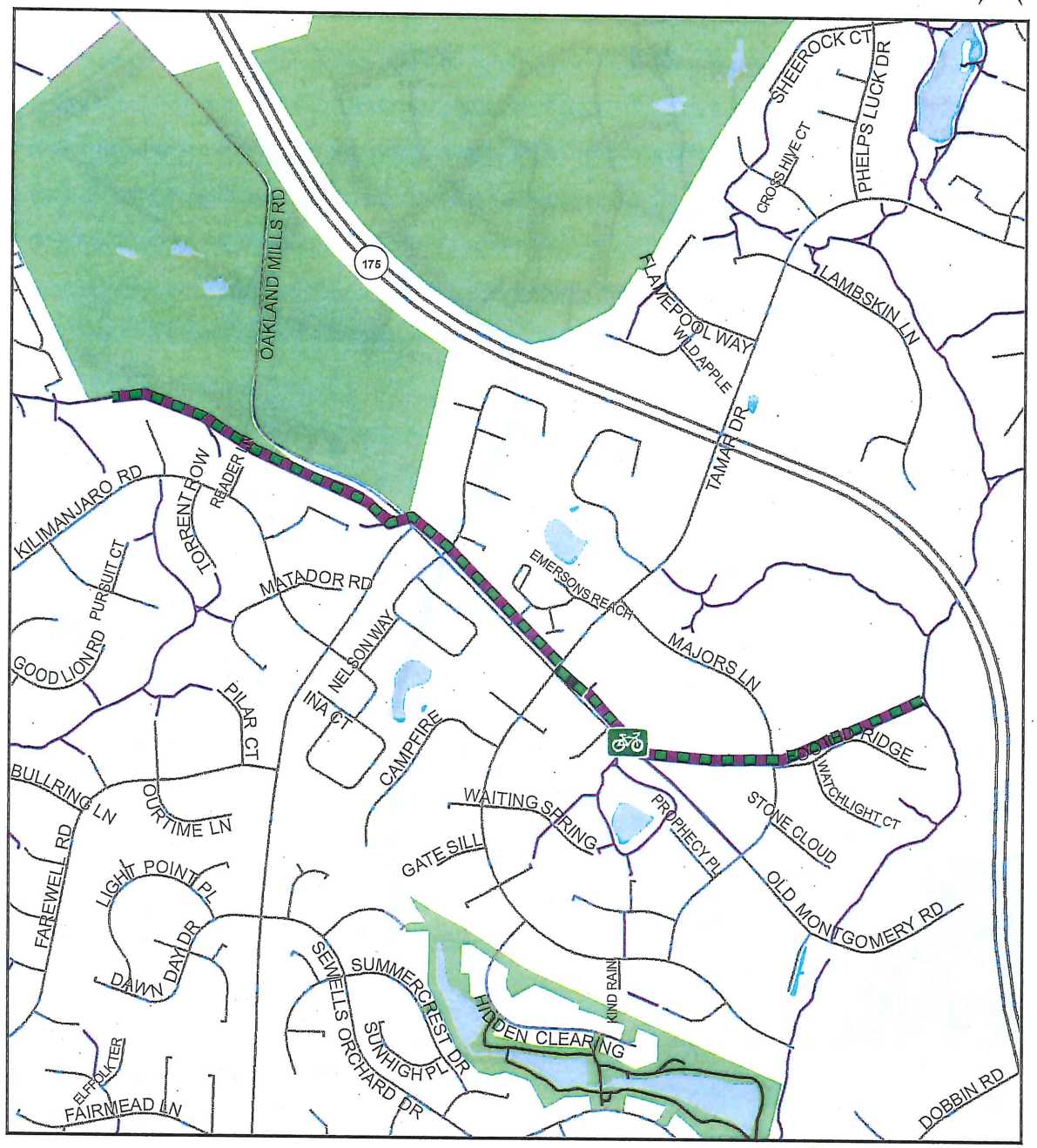
Spot Recommendations

- 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: 23



BIKE HOWARD
Structured Projects

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

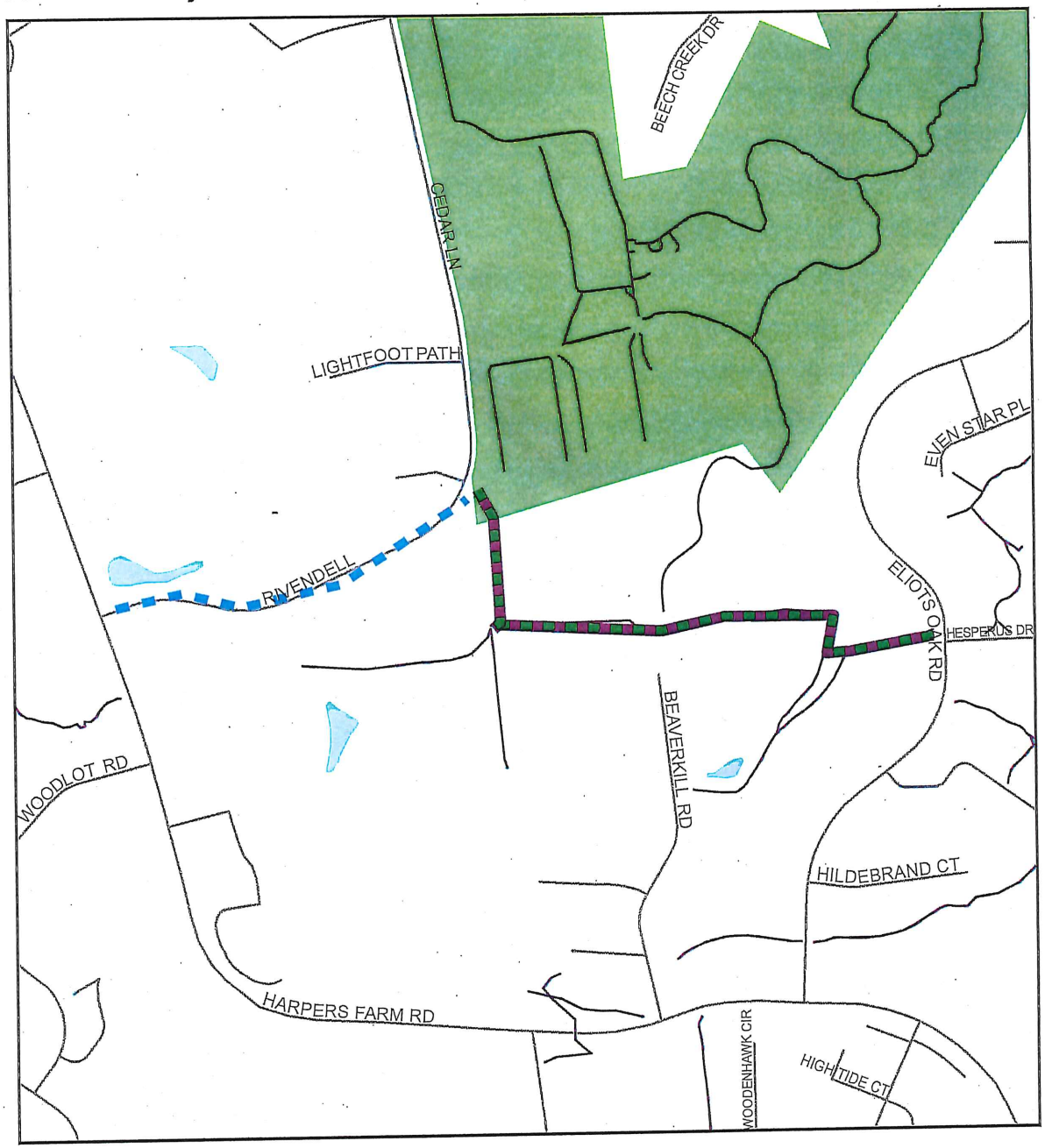
Spot Recommendations

- 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: 24



BIKE HOWARD
Structured Projects

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)

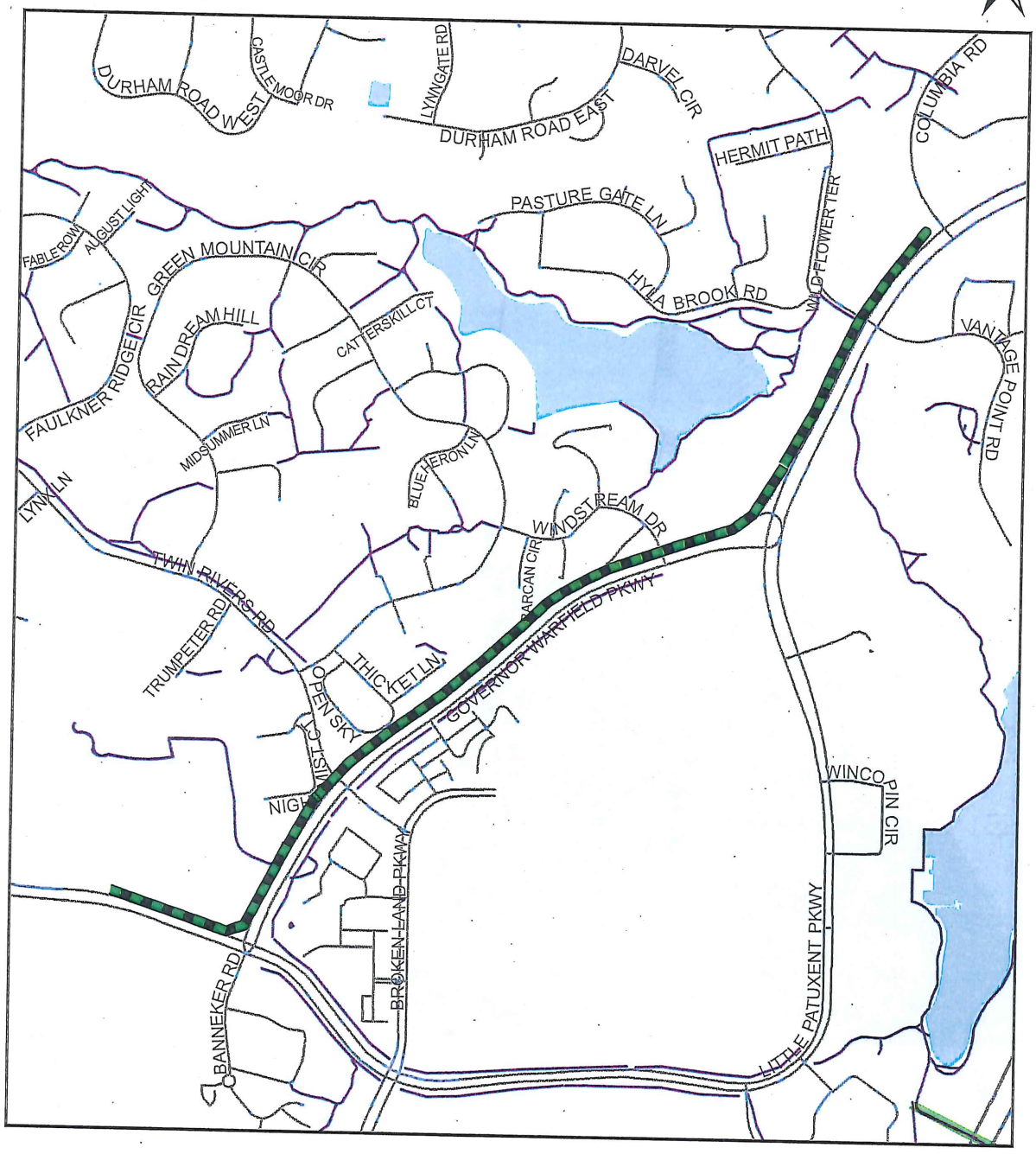
Start: Columbia Road
End: Little Patuxent Parkway /Governor Warfield

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)

Proposed/Preliminary
Structured Project Number: 25



BIKE HOWARD
Structured Projects

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

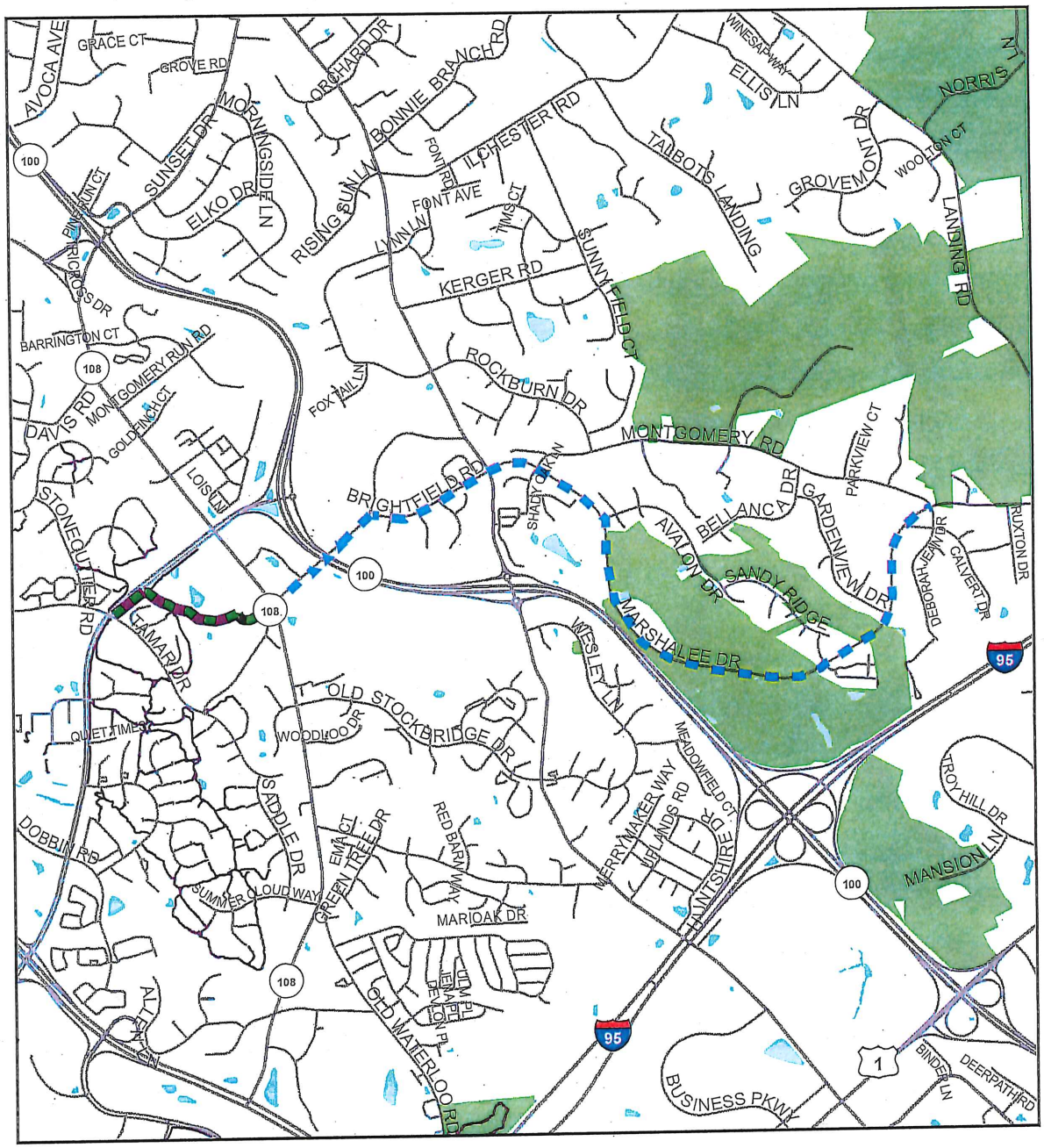
Spot Recommendations

- 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: 26



BIKE HOWARD
Structured Projects

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

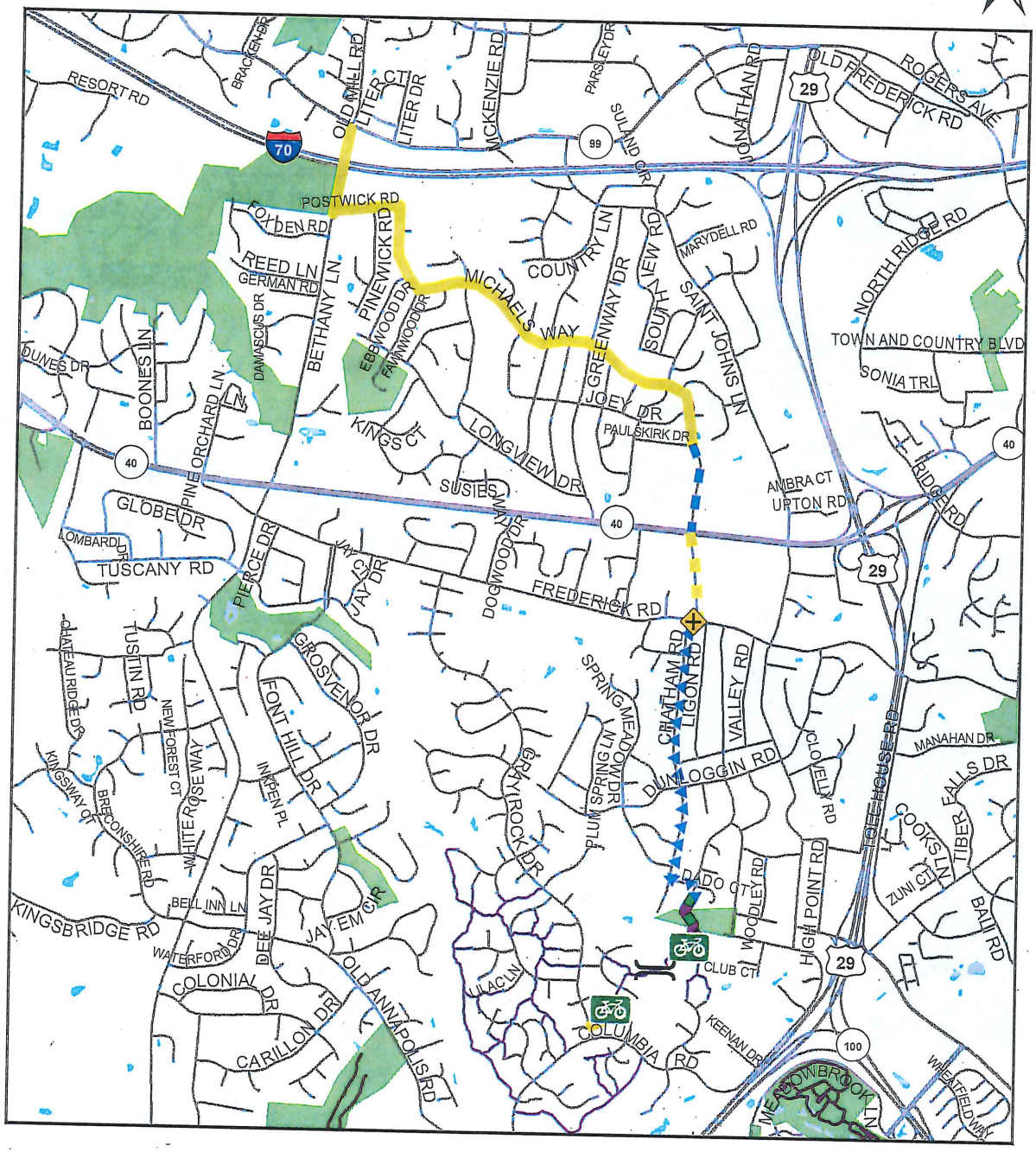
Start: Columbia Road
End: MD 99

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

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: 27



BIKE HOWARD
Structured Projects

Proposed/Preliminary

Structured Project Number: 28

Estimated Cost: $438,917

Length (Miles): 3.6

Project Description:

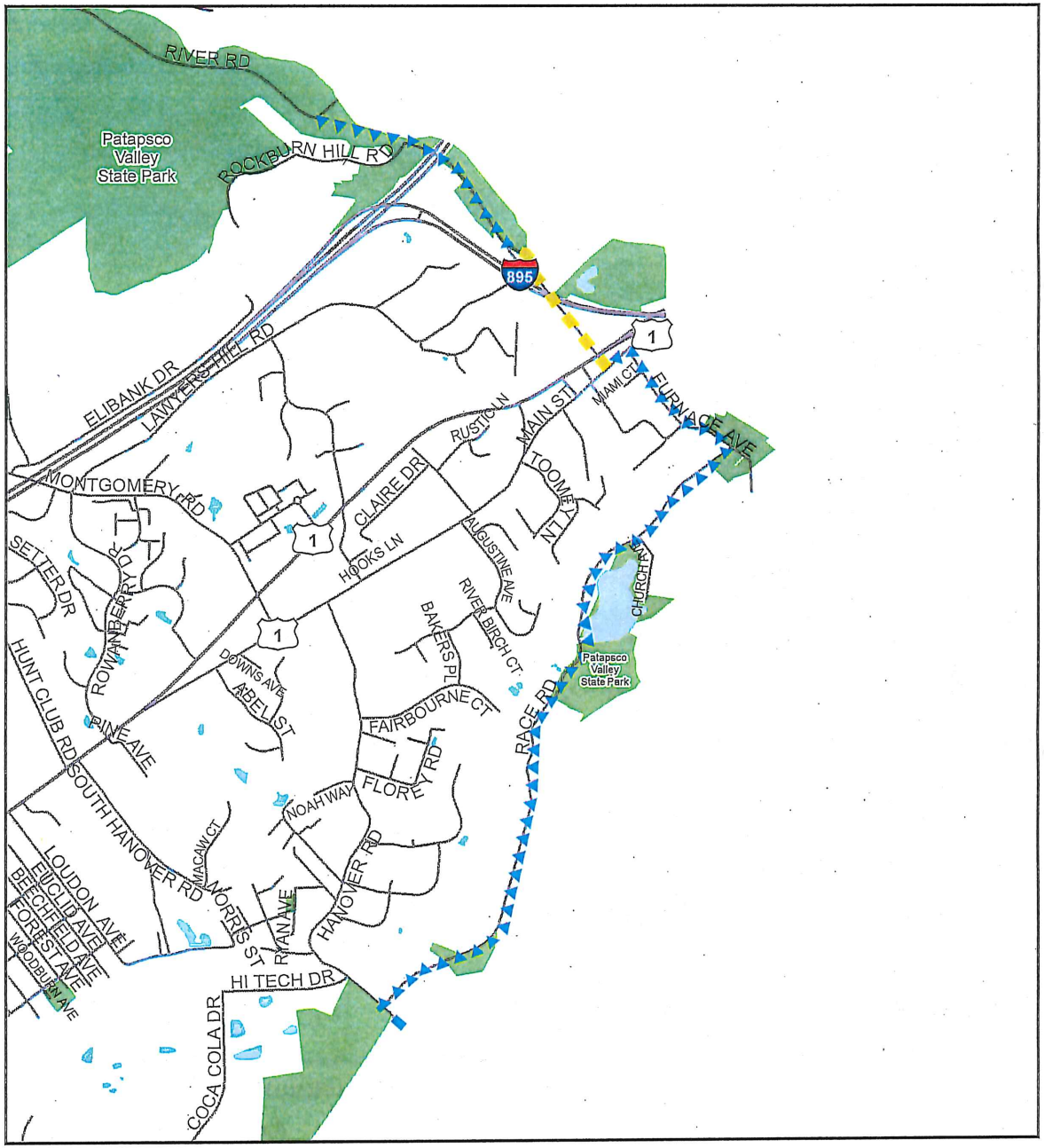
Develop a series of bike lanes, avenue and striped shoulders, and sharrows to provide for passage in this popular cycling area. Provides access to the BWI trail and Grist Mill Trail.

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

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

Spot Recommendations

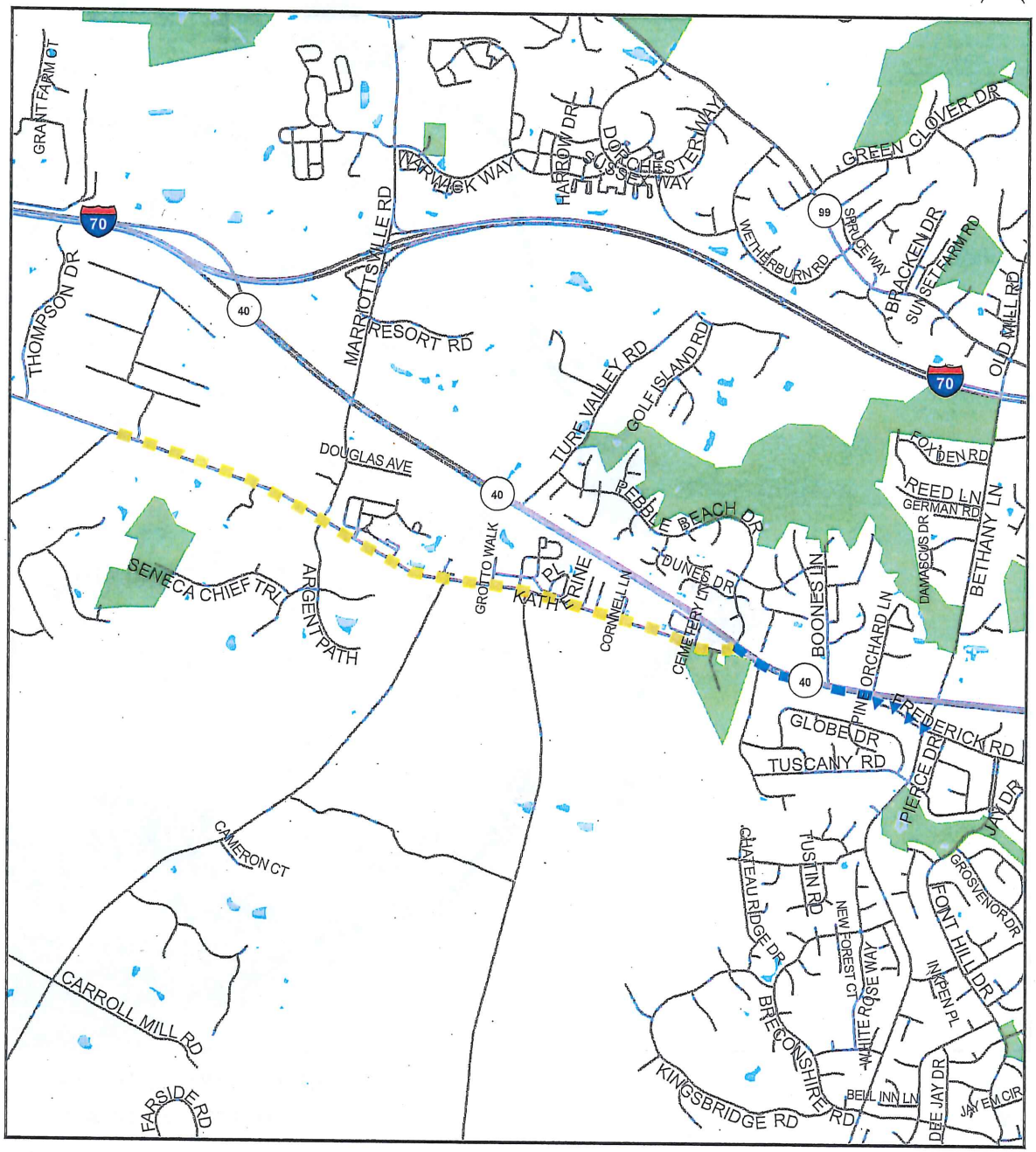
- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

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

Proposed/Preliminary
Structured Project Number: 36

N



BIKE HOWARD
Structured Projects

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

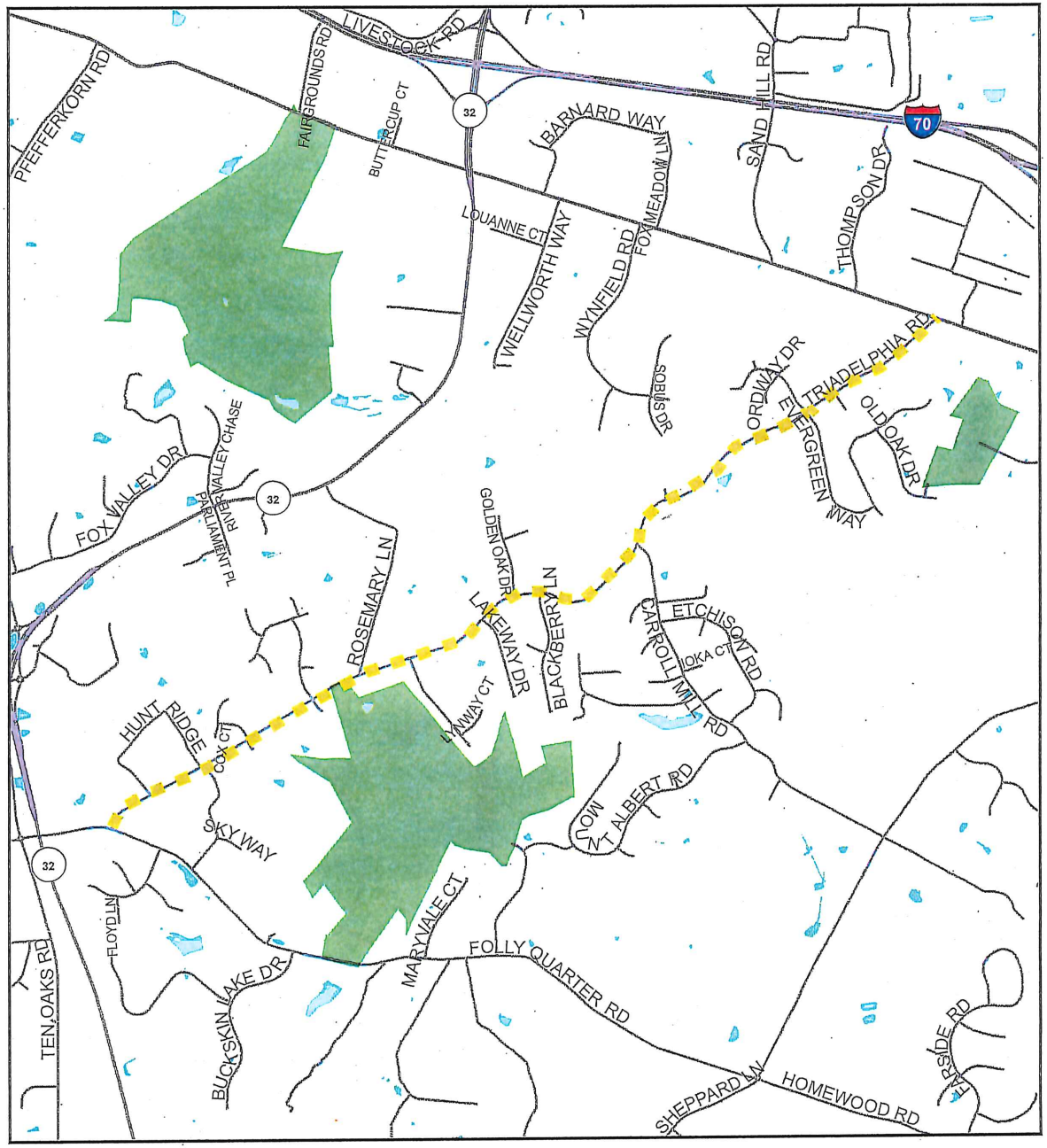
Spot Recommendations

- 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: 37



BIKE HOWARD
Structured Projects

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

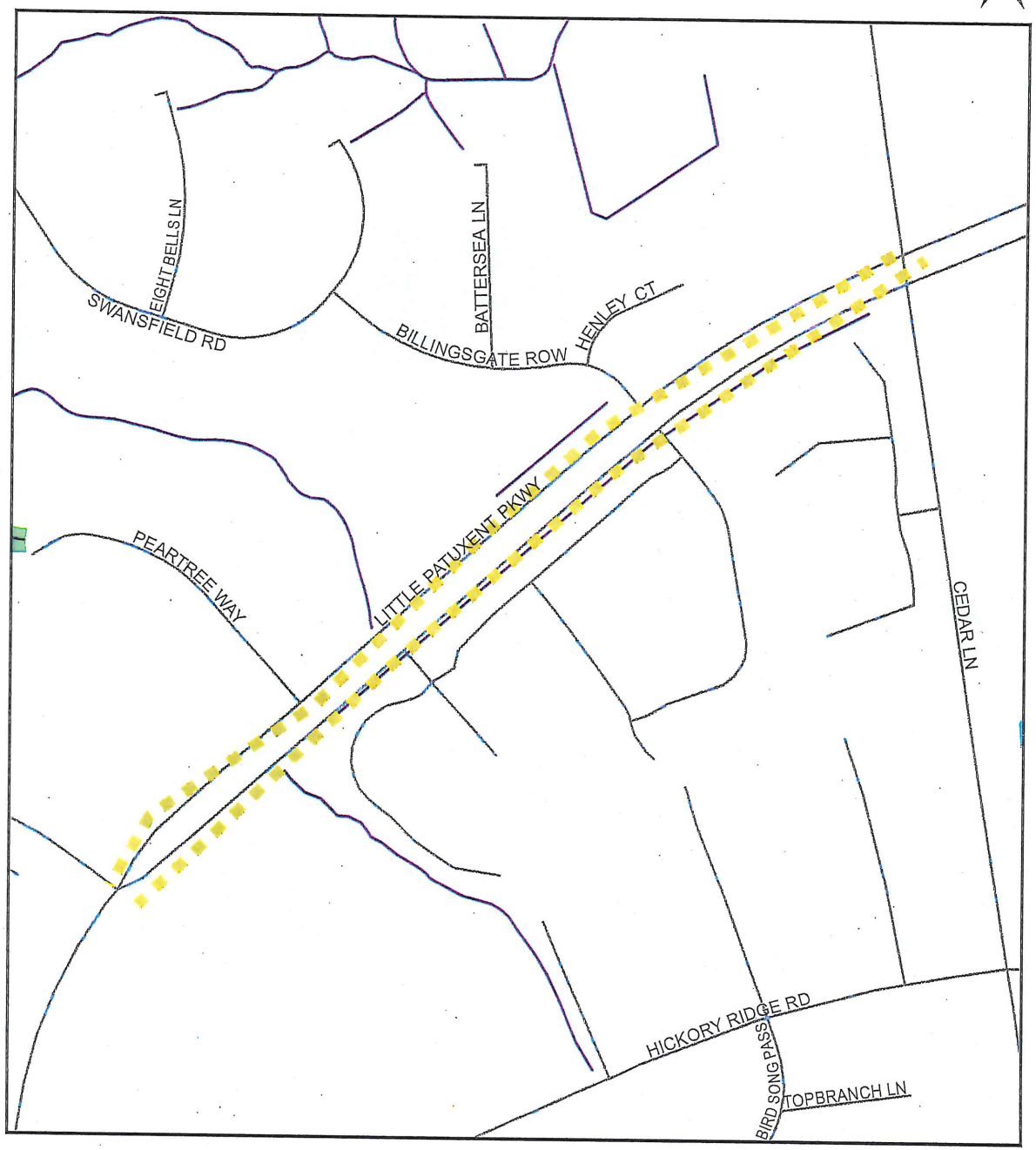
Start: Little Patuxent Parkway/Cedar Lane
End: Little Patuxent Parkway/Clary's Forest Loop

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

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: 40



BIKE HOWARD
Structured Projects

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

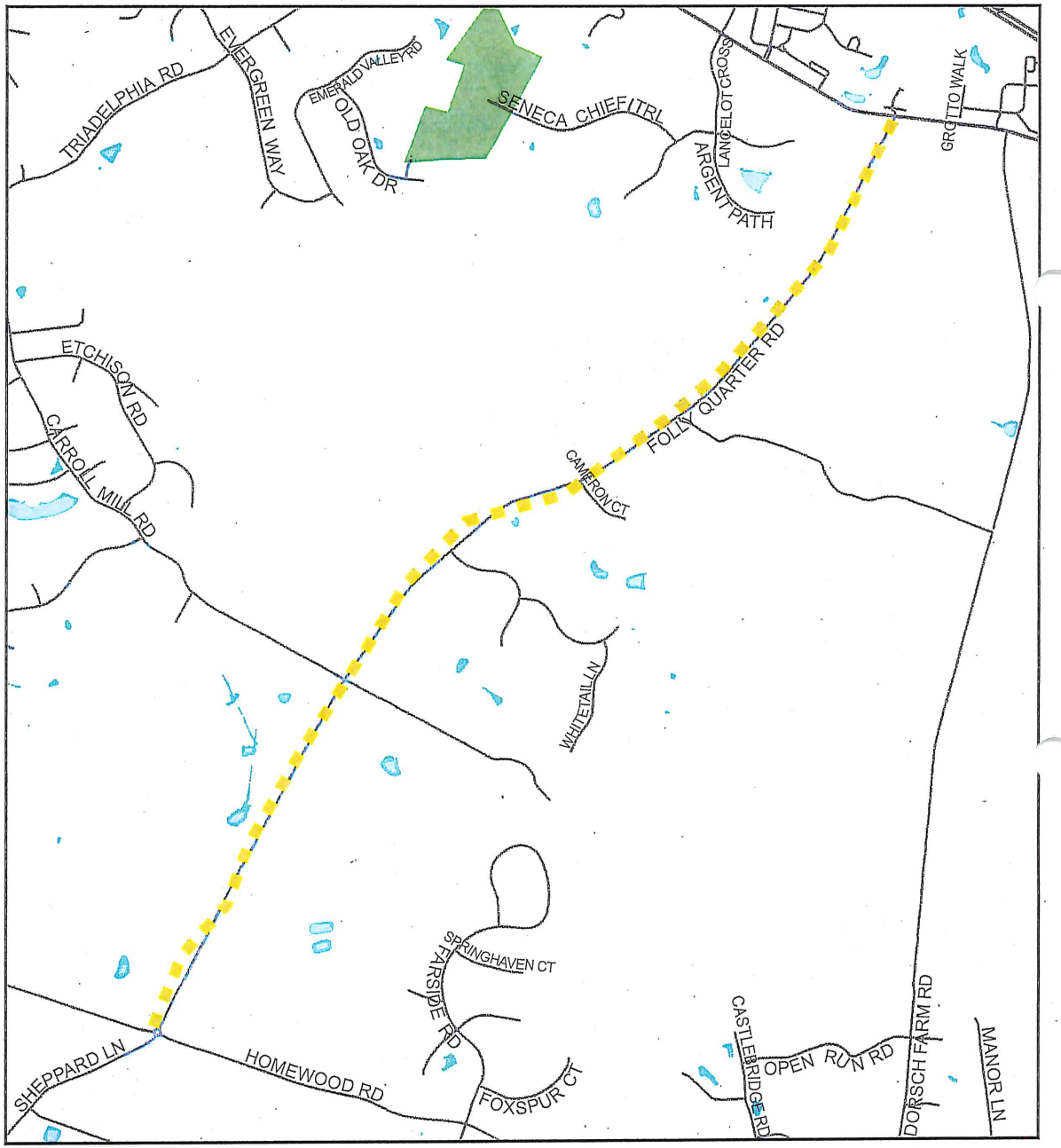
Spot Recommendations

- 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: 41



BIKE HOWARD
Structured Projects

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

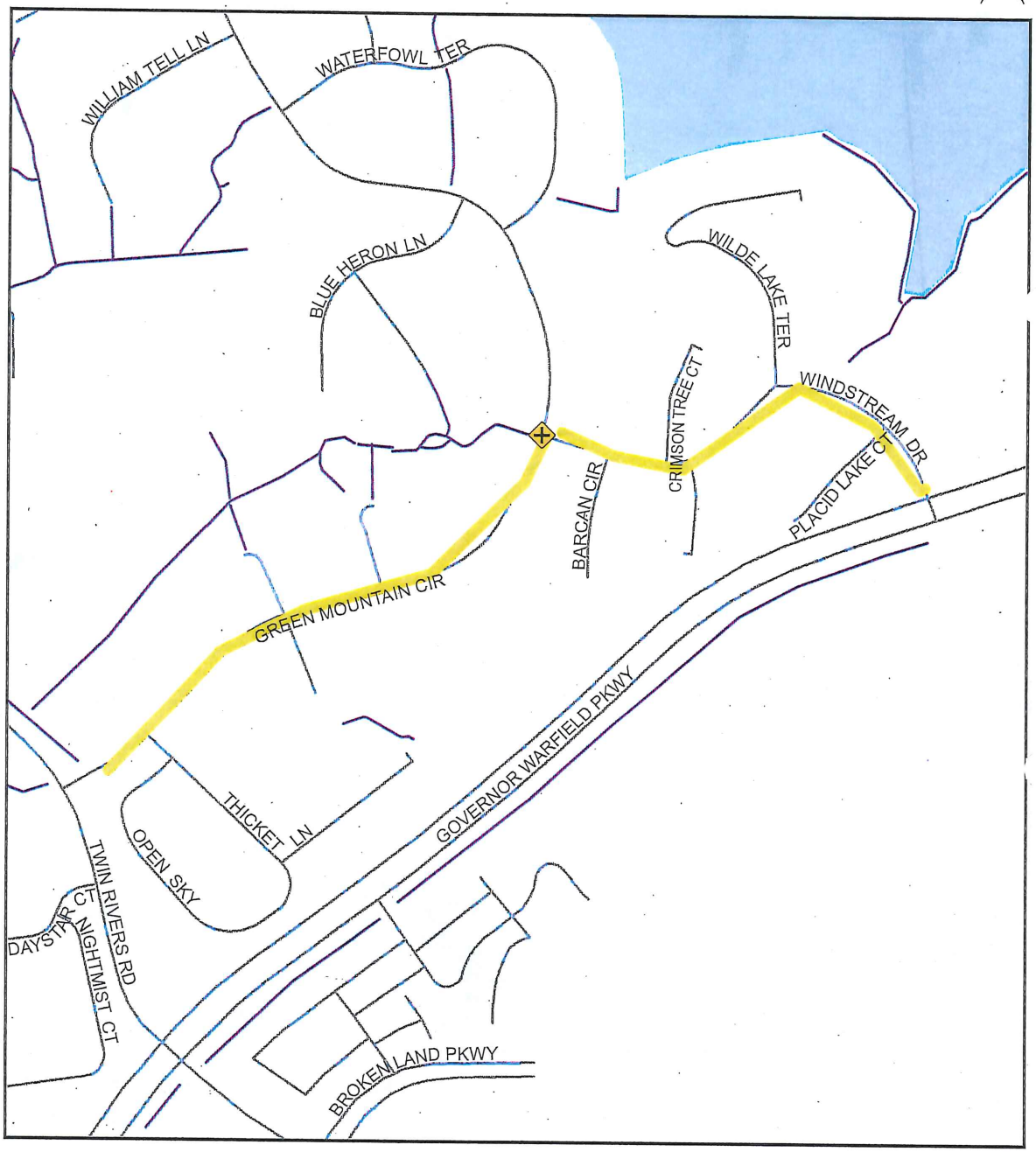
Start: Governor Warfield Parkway
End: Twins Rivers Road

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

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: 42



BIKE HOWARD
Structured Projects

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

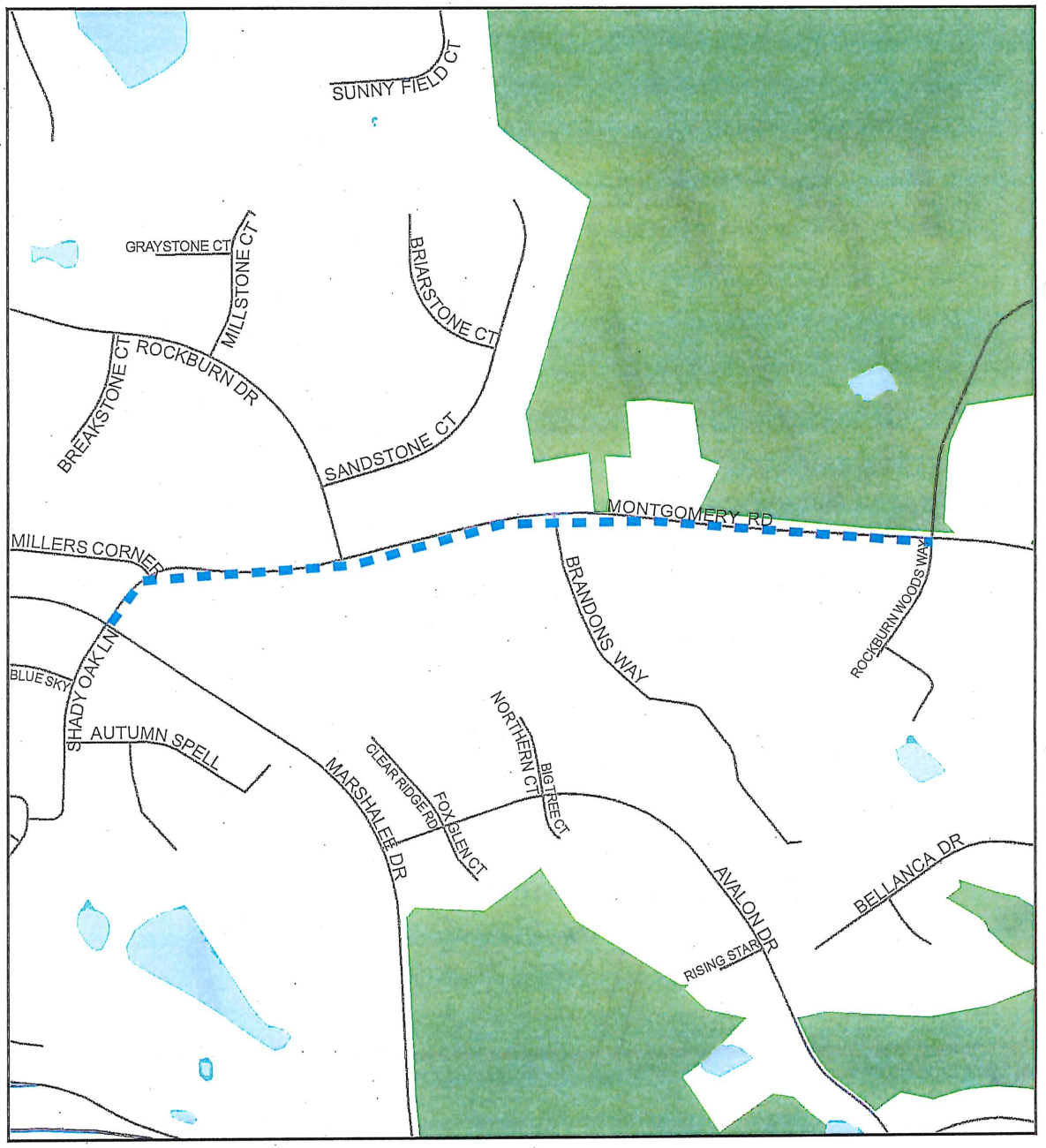
Spot Recommendations

- 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: 43



BIKE HOWARD
Structured Projects

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

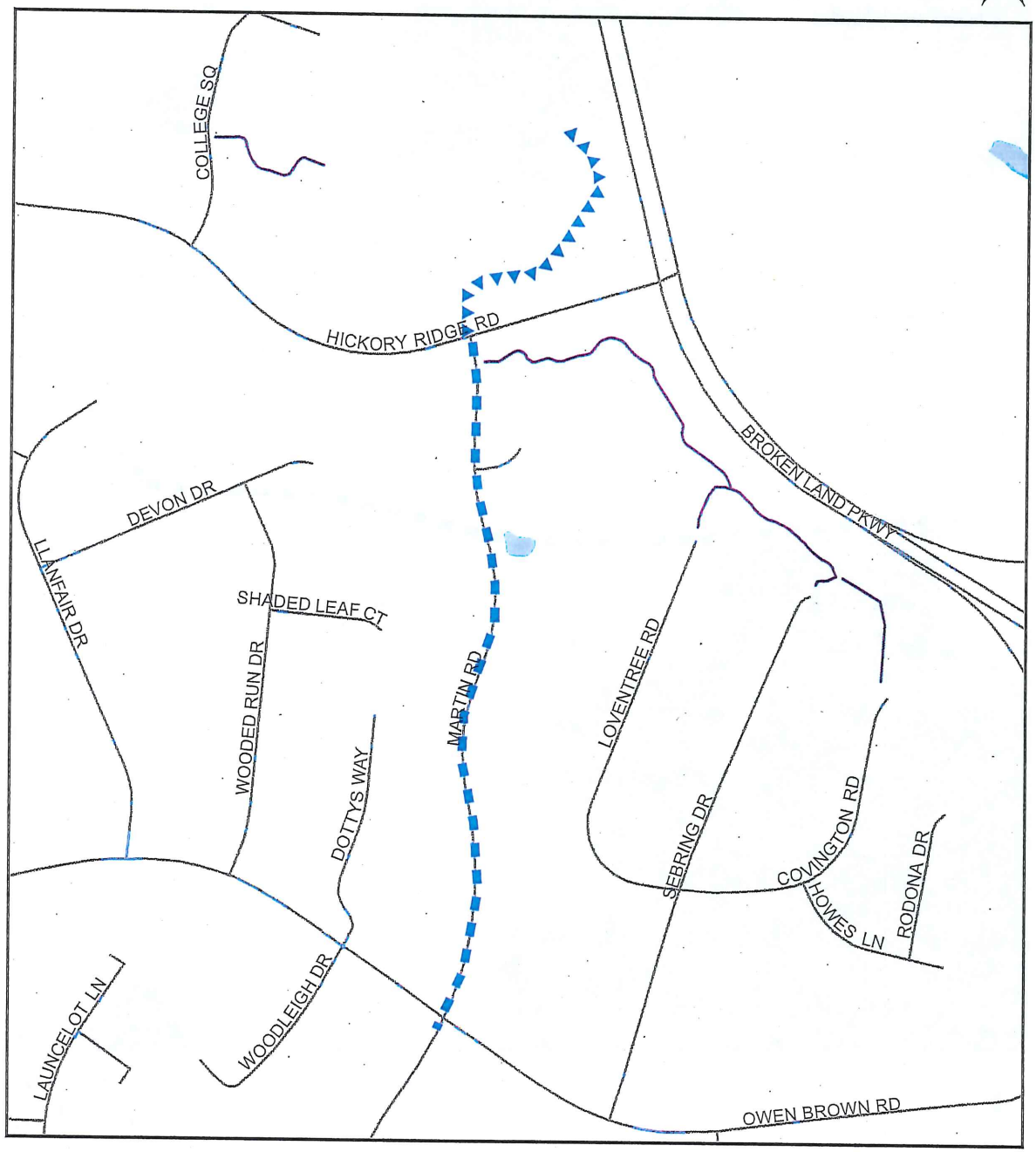
Start: Owen Brown Road
End: Hickory Ridge and Neighborhood roads

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

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: 44



BIKE HOWARD
Structured Projects

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

Spot Recommendations

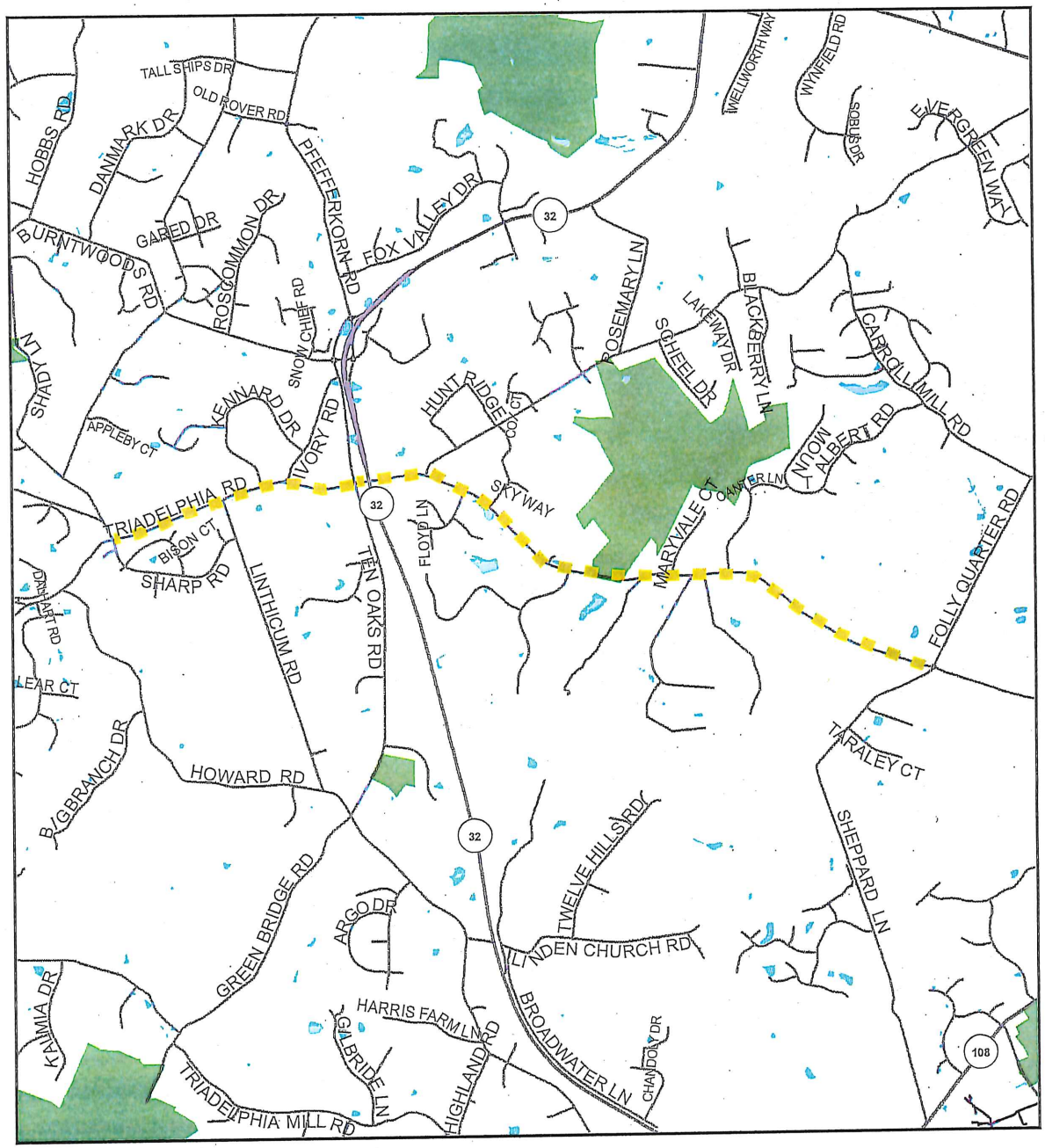
- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

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

Proposed/Preliminary
Structured Project Number: 45

N



BIKE HOWARD
Structured Projects

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

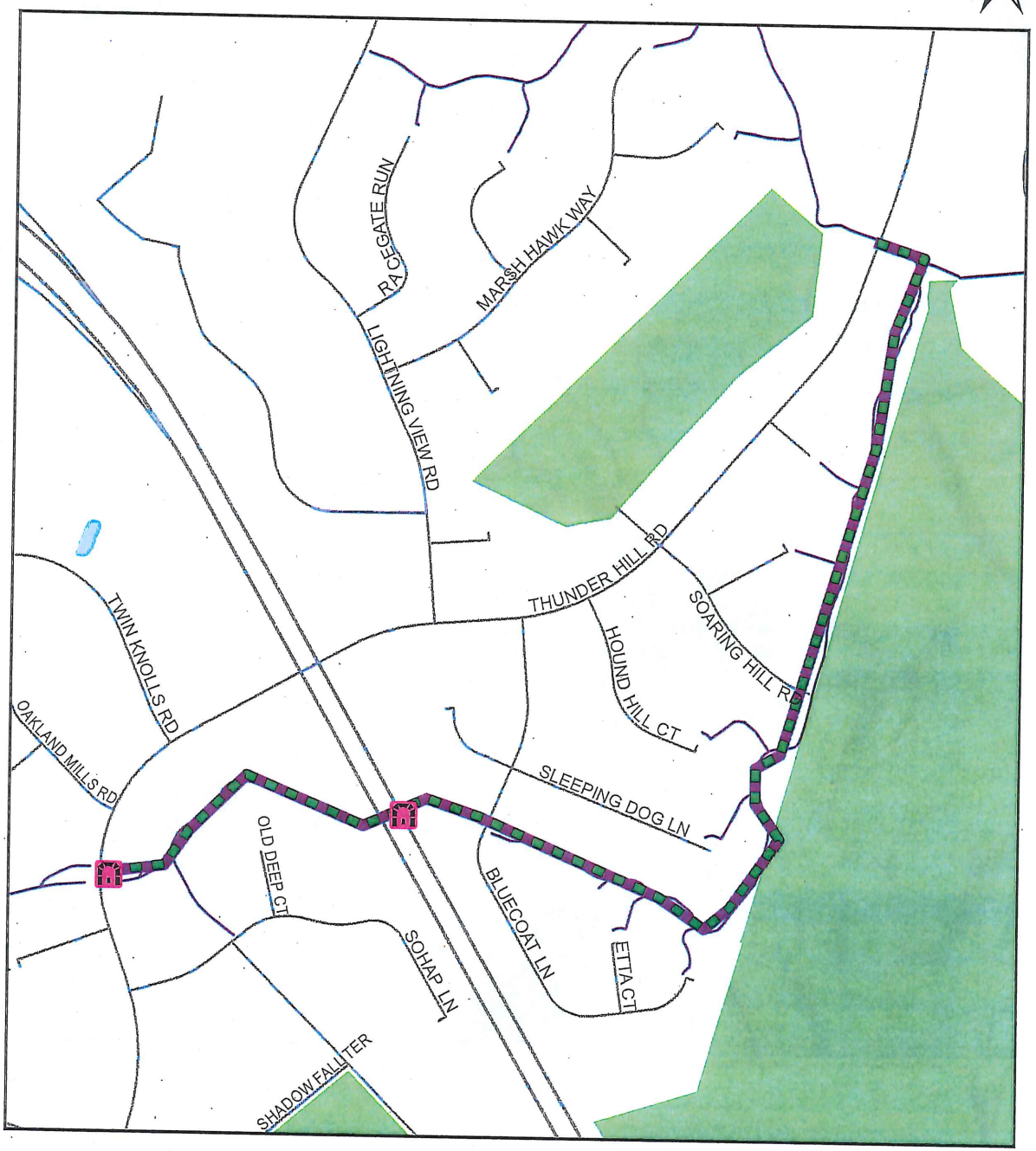
Start: Thunder Hill Road
End: Trail intersection at Thunder Hill Road just north

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)

Proposed/Preliminary
Structured Project Number: 46



BIKE HOWARD
Structured Projects

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

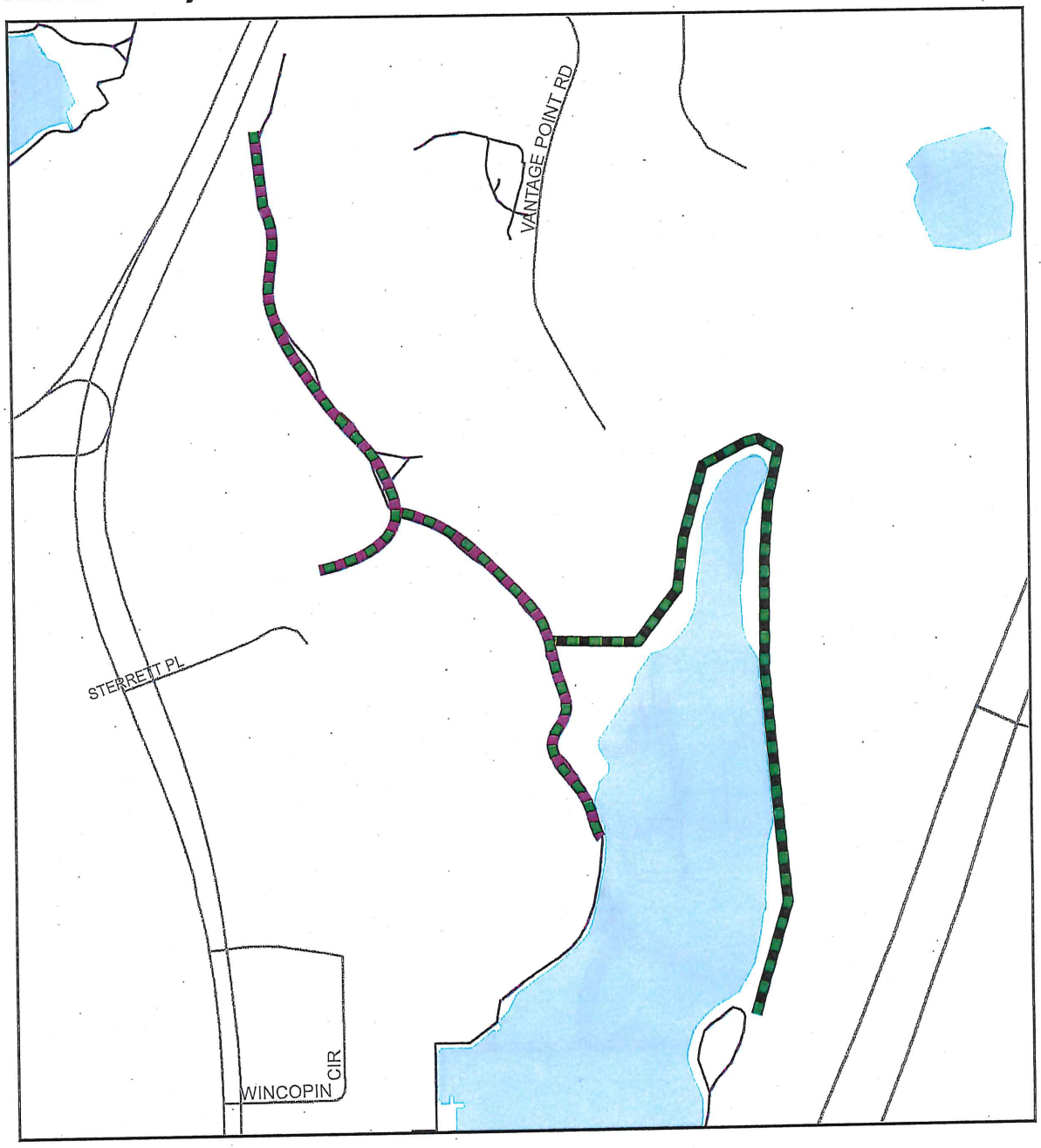
Spot Recommendations

- 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)

Proposed/Preliminary
Structured Project Number: 47



BIKE HOWARD
Structured Projects

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

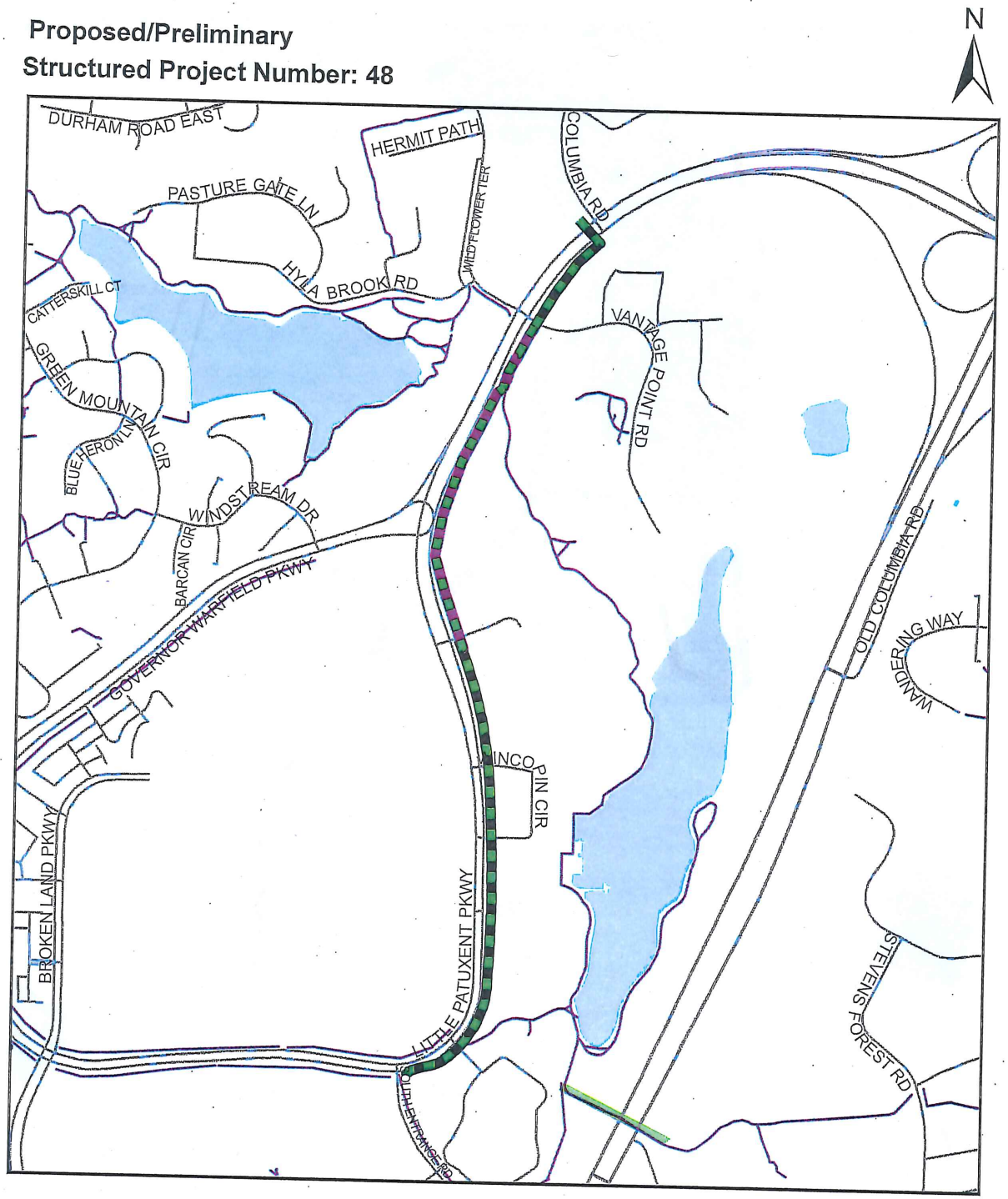
Existing Facilities

- 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)

Proposed/Preliminary
Structured Project Number: 48



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

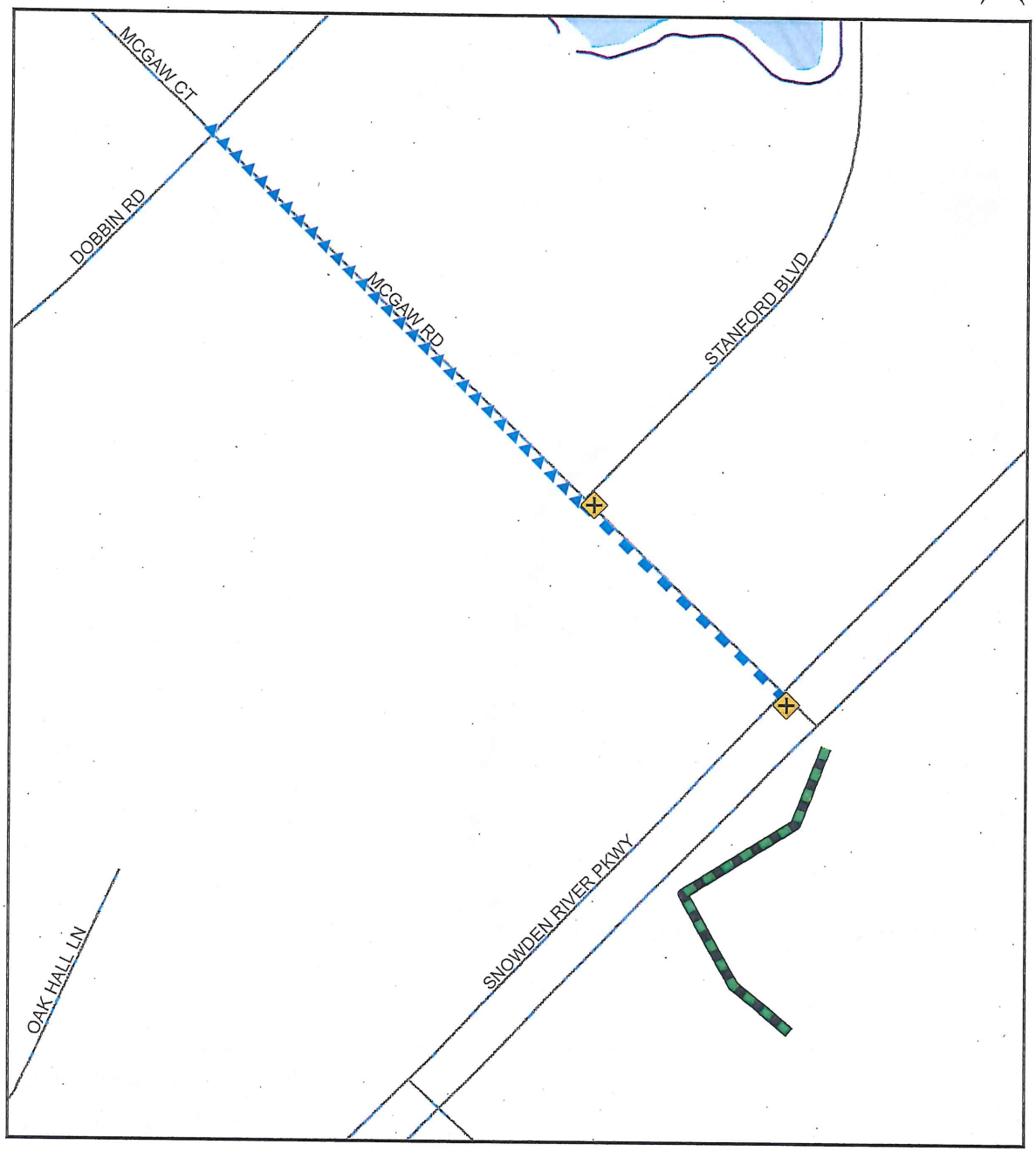
Project Description:

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

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

Spot Recommendations

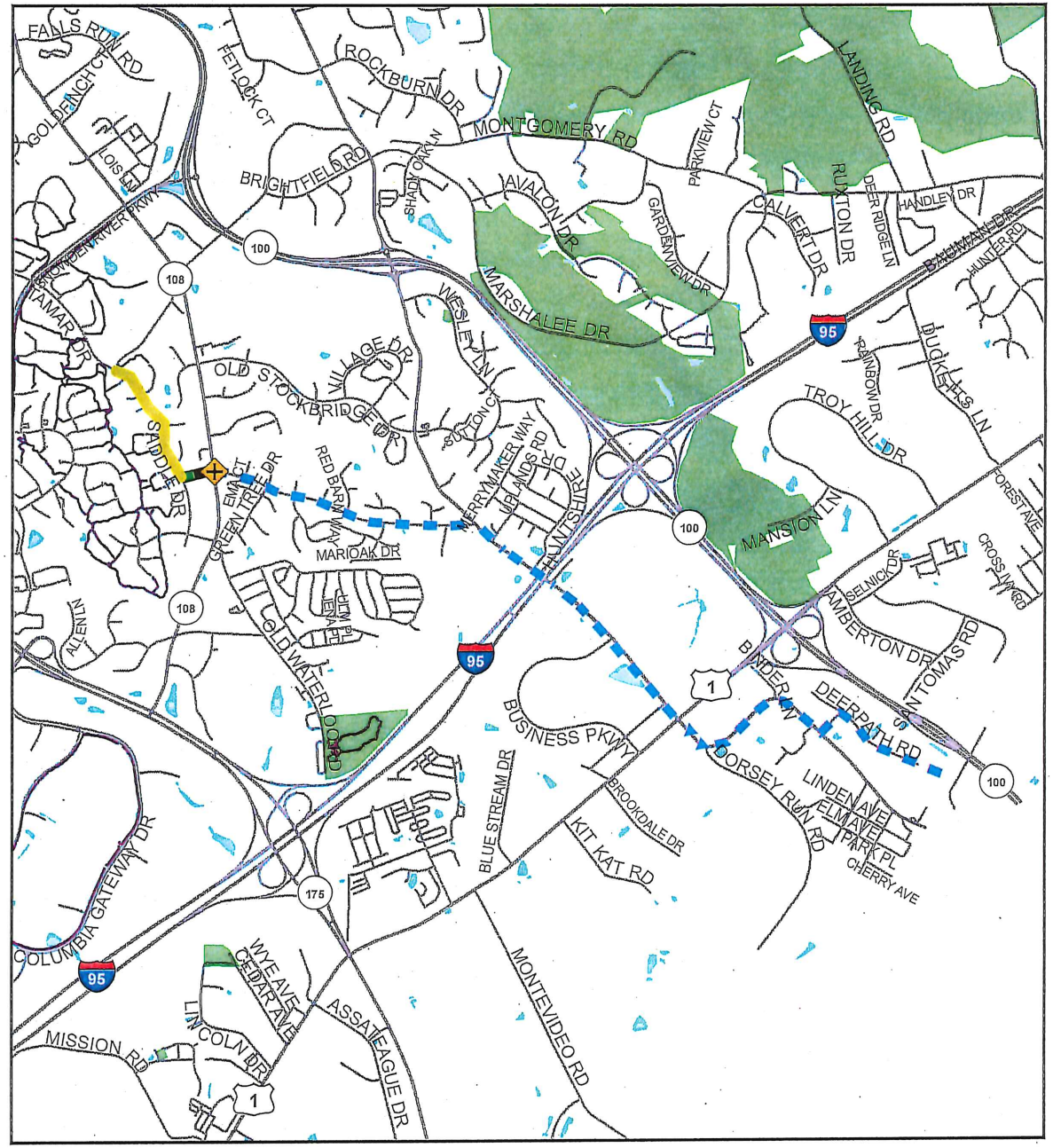
- Bike Link or Signs Needed
- Bridge (Improvement/build)
- Crossing Improvement or Pathway Crossing
- Tunnel (Minor Improvements)

Existing Facilities

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

Proposed/Preliminary
Structured Project Number: 57

N



BIKE HOWARD
Structured Projects

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

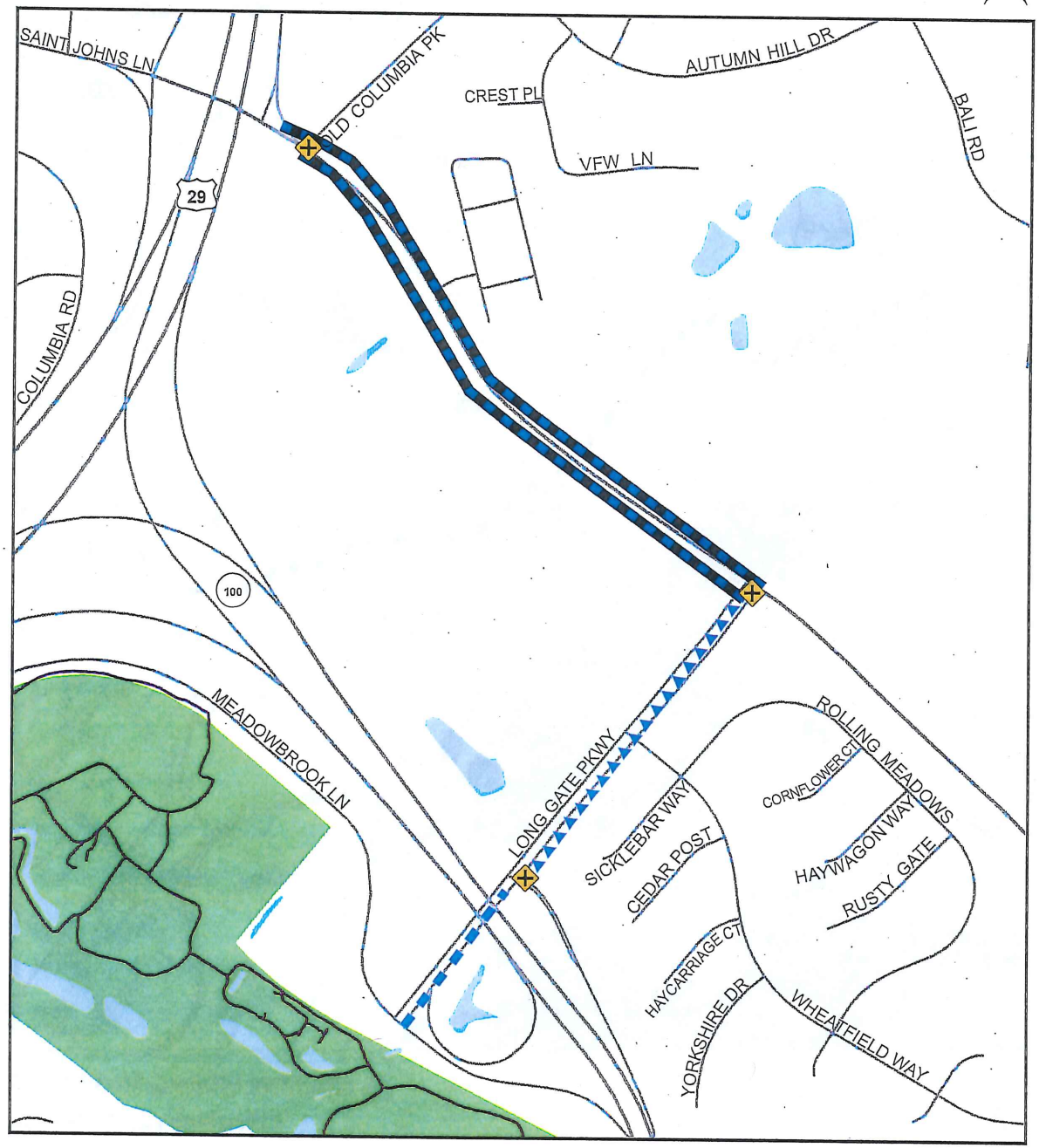
Spot Recommendations

- 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: 58



BIKE HOWARD
Structured Projects

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

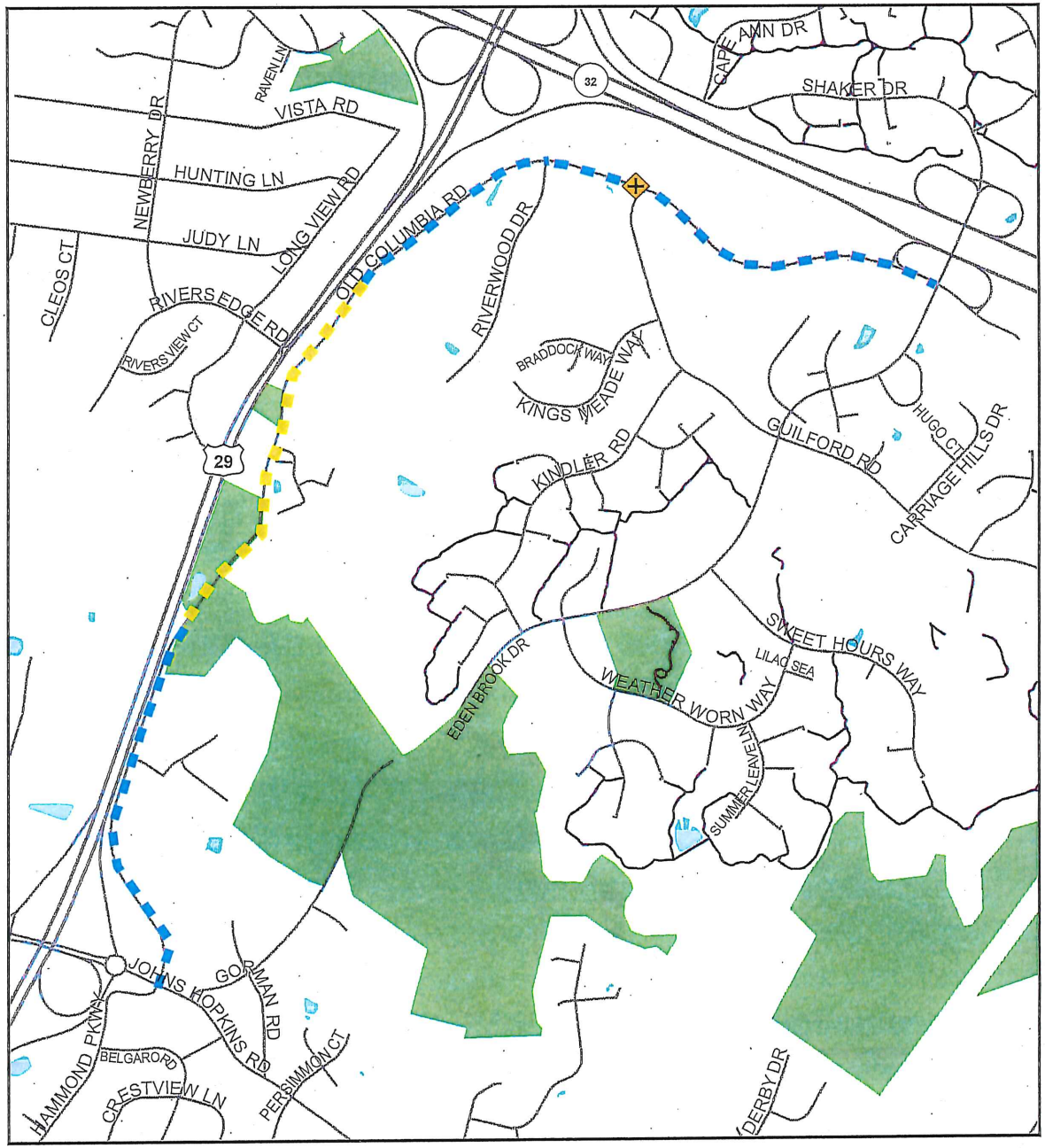
Start: Eden Brook Drive
End: Johns Hopkins Road

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)

Proposed/Preliminary
Structured Project Number: 59



BIKE HOWARD
Structured Projects

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
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

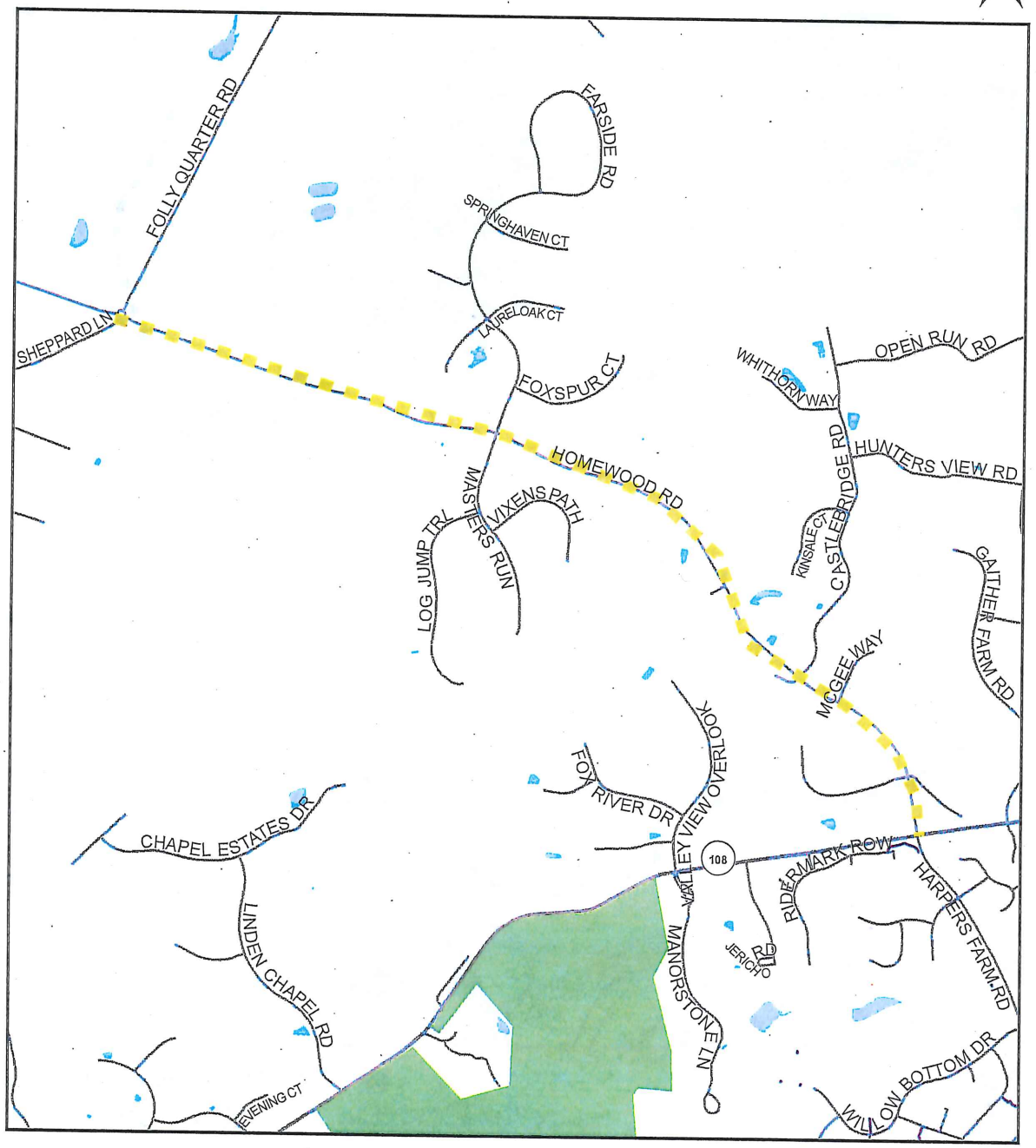
Spot Recommendations

- 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: 60



BIKE HOWARD
Structured Projects

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

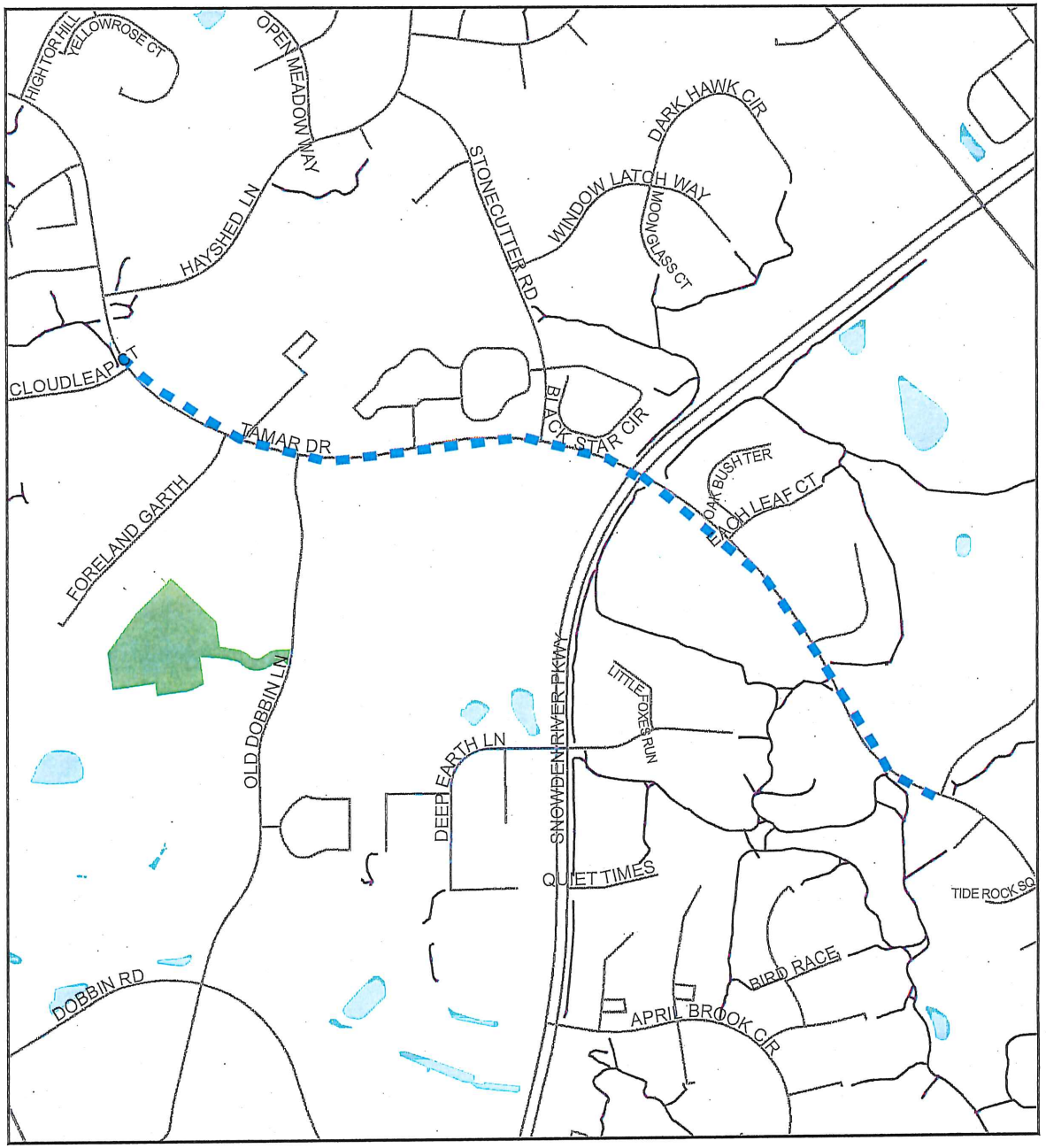
Existing Facilities

- 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)

Proposed/Preliminary
Structured Project Number: 61



BIKE HOWARD
Structured Projects

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)

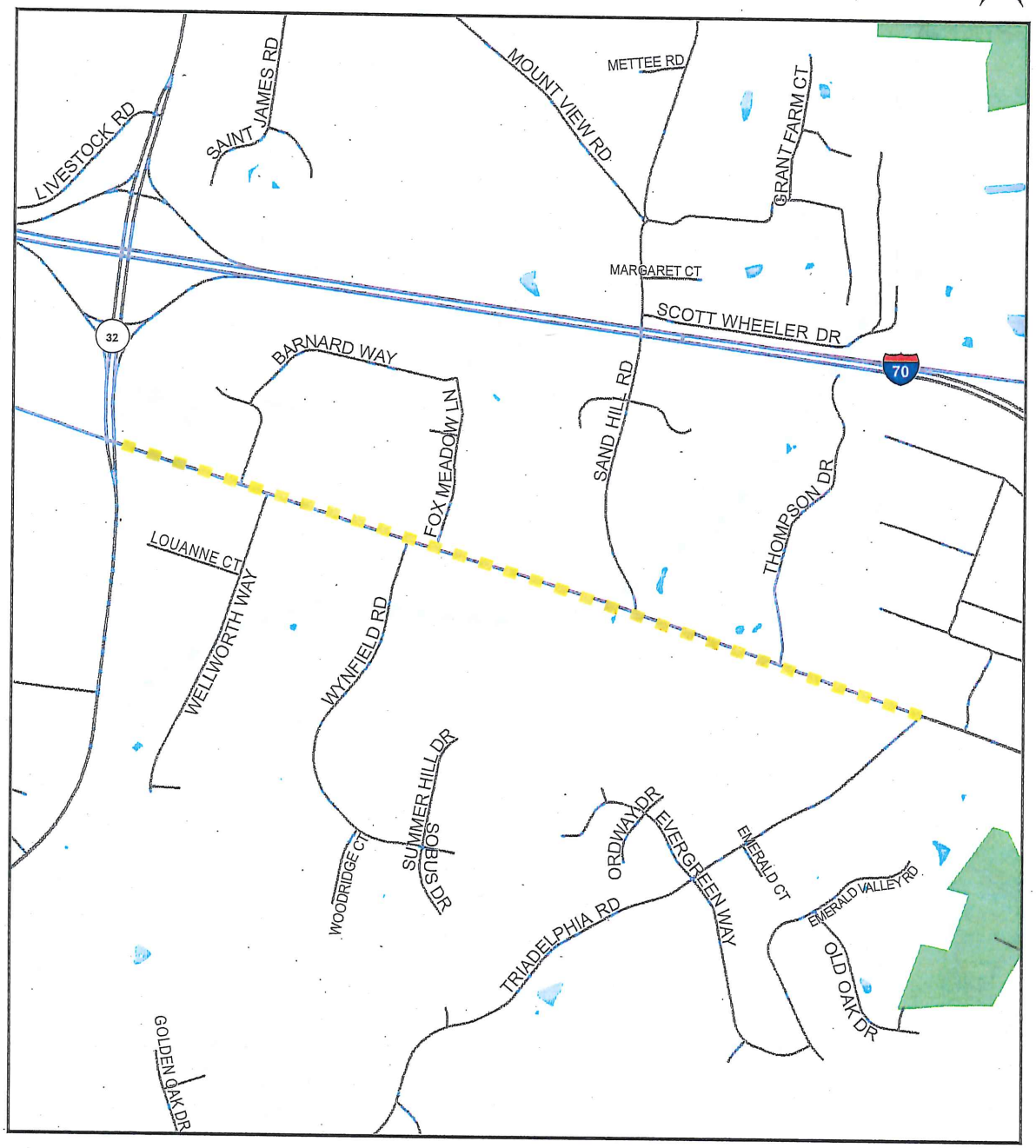
Start: Triadelphia Road
End: MD 32

Linear Recommendations
- Shared Use Path Construct New
- Shared Use Path Upgrade
- Sidewalk w/ Bikes Permitted
- Neighborhood Greenway
- 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: 62



BIKE HOWARD
Structured Projects

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
- Bike Lane/Climbing Lane/Buffered Bike Lane
- Sharrow
- Cycletrack
- Shared Roadway/Paved and Striped Shoulder Advisory Bike Lane

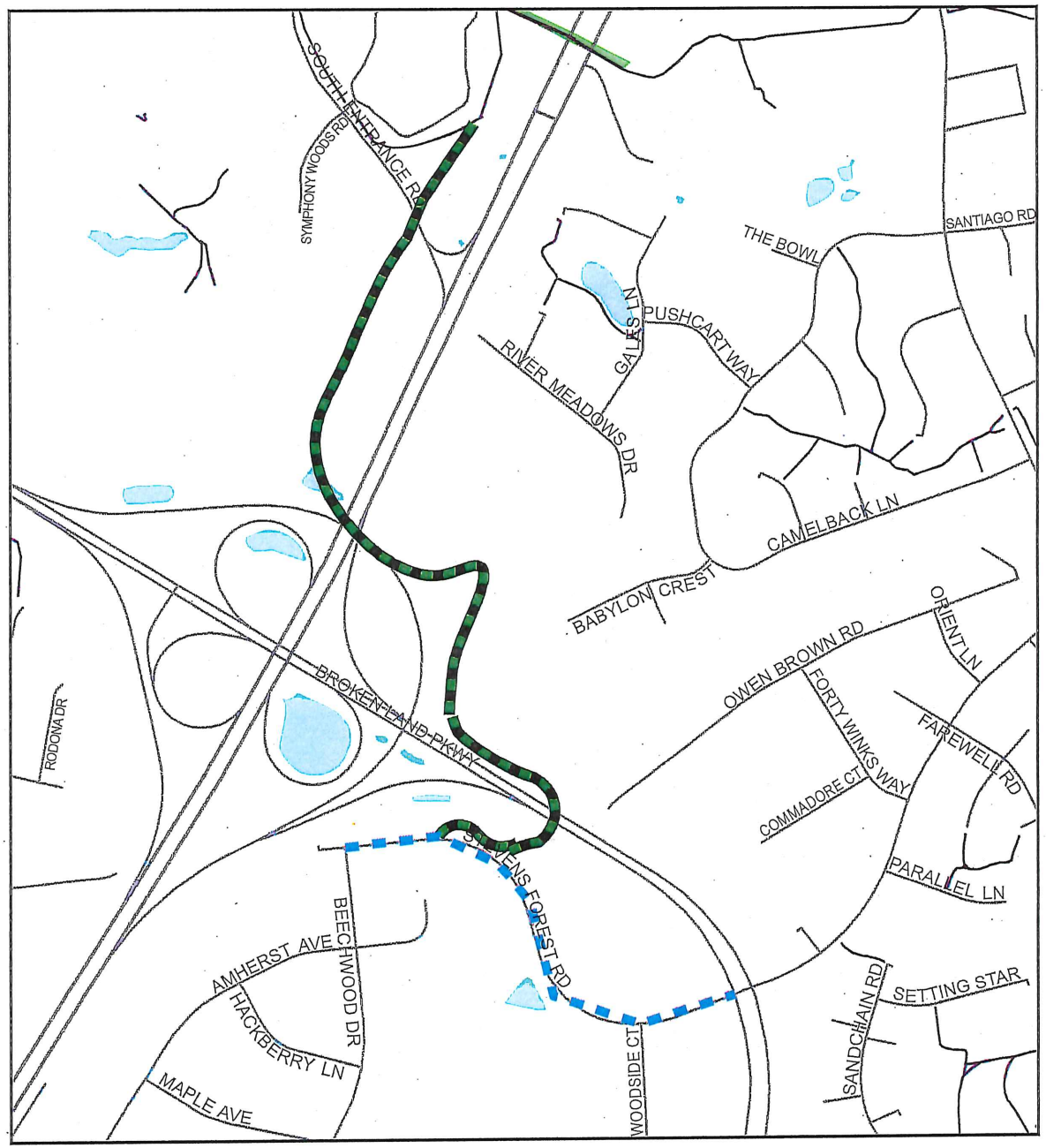
Spot Recommendations

- 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: 63



BIKE HOWARD
Structured Projects

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

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)

Proposed/Preliminary
Structured Project Number: 64

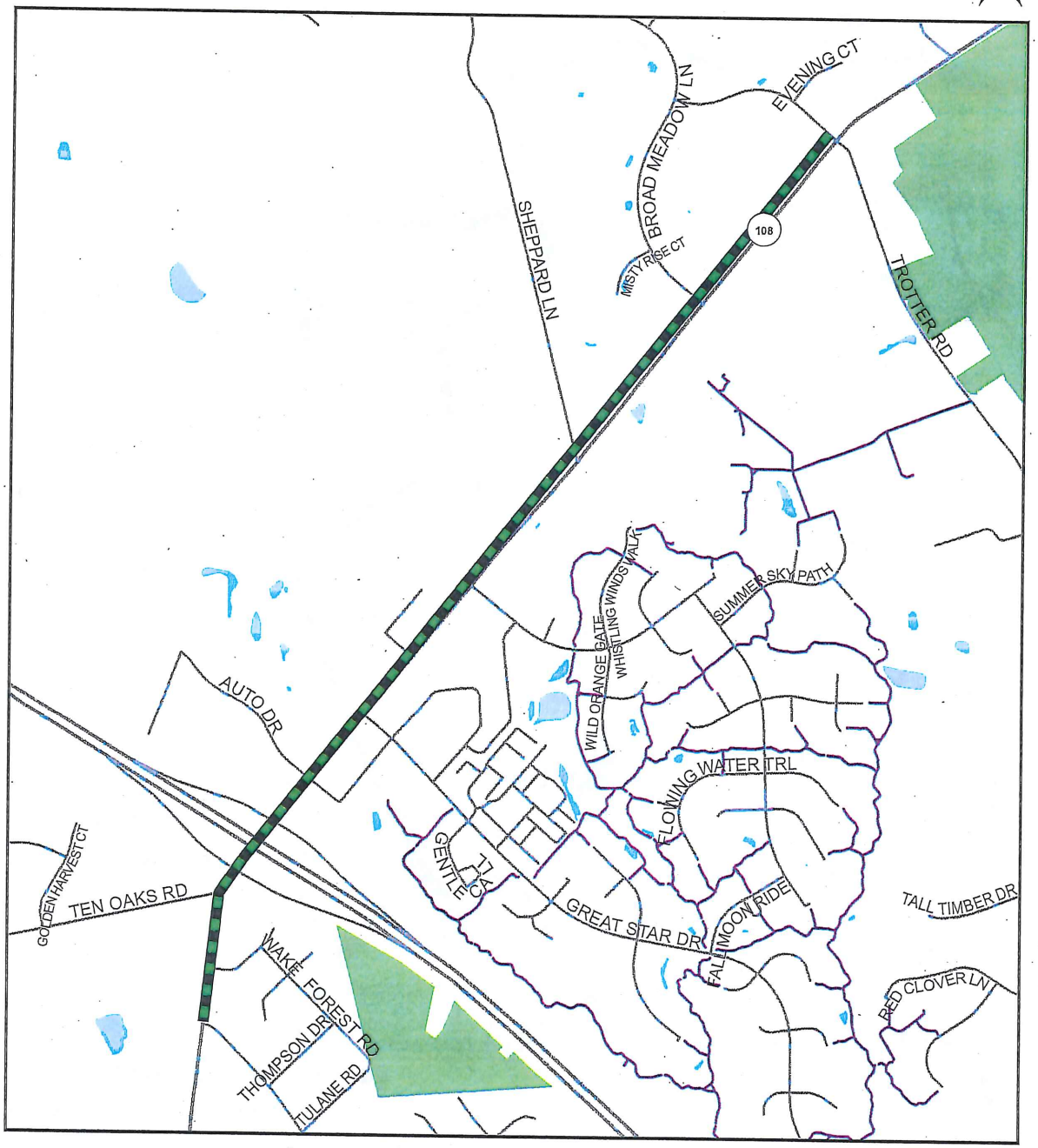


Table 6: Summary of State and Federal Funding Programs

	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			✓	

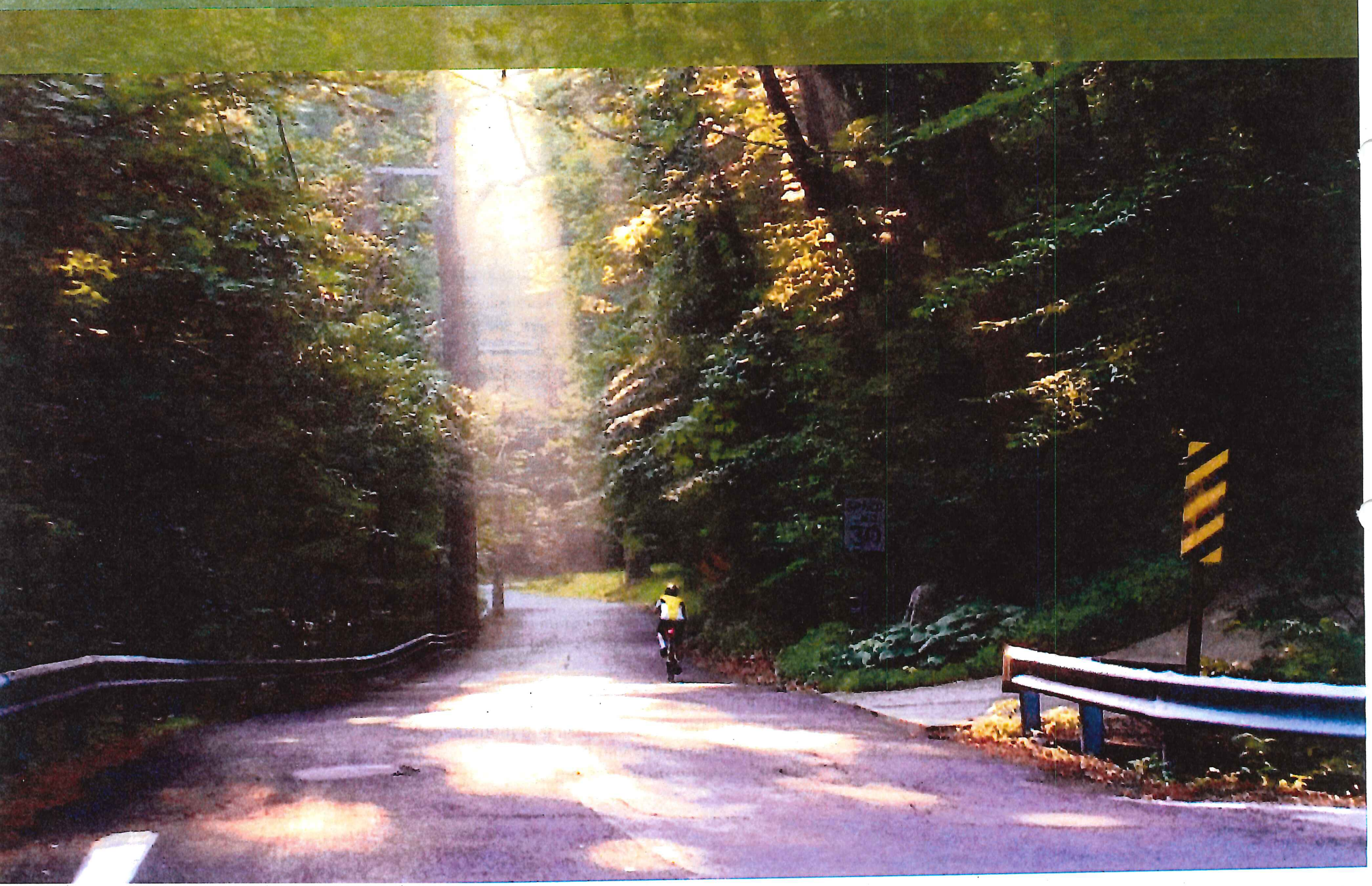
IMPLEMENTATION MATRIX						
			Policy and Program Timeframes			
		Principal Organizations	Ongoing	Short-Term (1-2 Years)	Mid-Term (2-5 Years)	Long-Term (5+ Years)
Section 7: End of Trip Facilities						
	Howard County should initiate a publically supported Bicycle Parking retrofit program	DPW, OOT			✓	
	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 including 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.

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

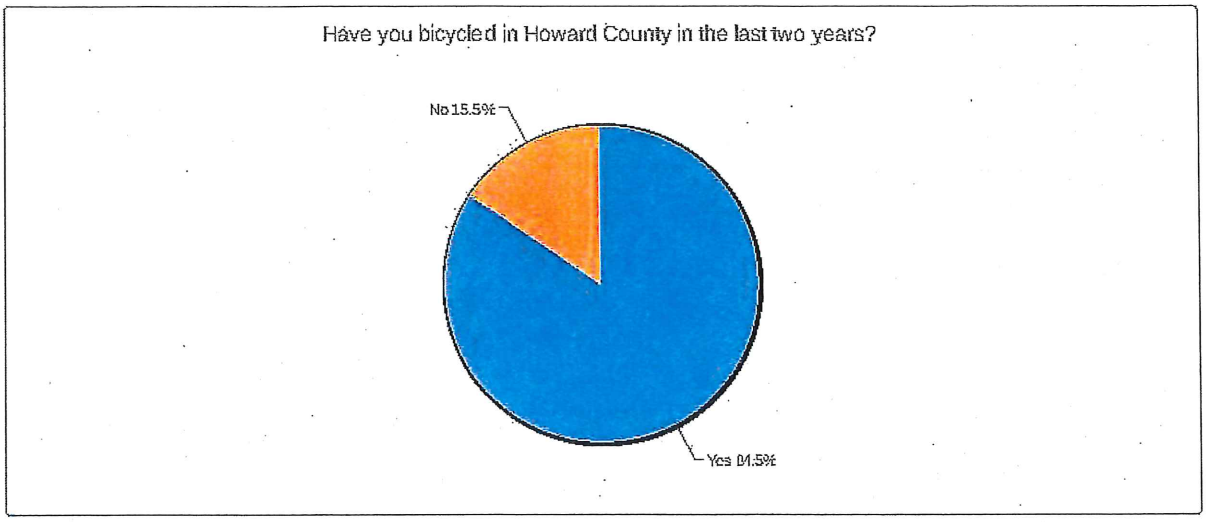
The interactive online map was available for public use from mid September 2012 through the end of November 2012. More than 500 people provided more than 450 specific comments on the map showing where they would like to see bike lanes, and shared use paths, and where intersections are particularly difficult 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.

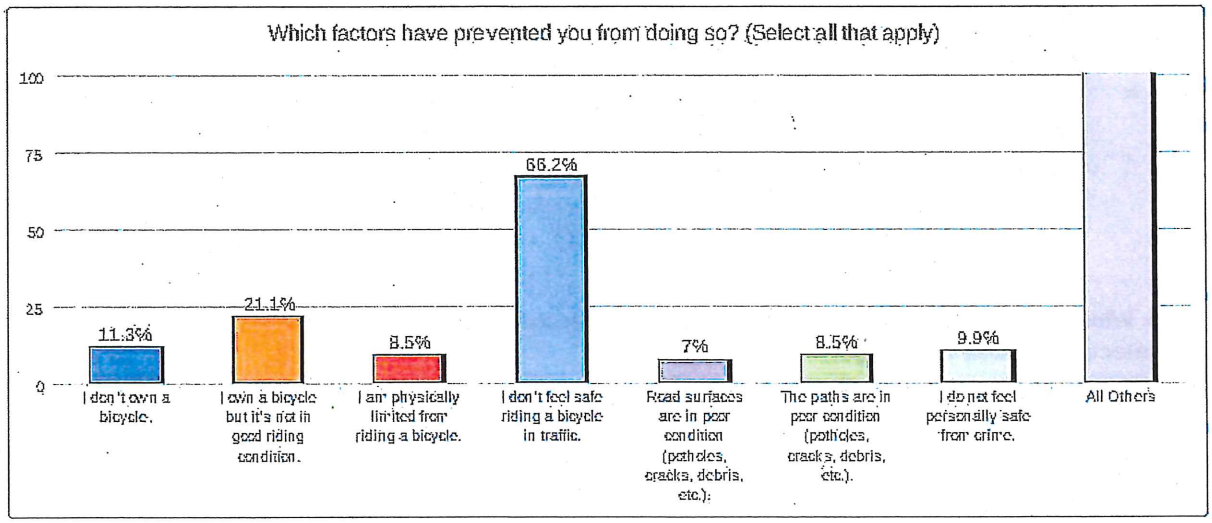
- More than 50% of respondents said that the paved paths and trails are what they like most about biking in Howard County.
- Helping the environment and enjoying well maintained road surfaces were selected by 20% of respondents.
- When asked about their trip purpose, 70% said they biked for fun; 55% 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



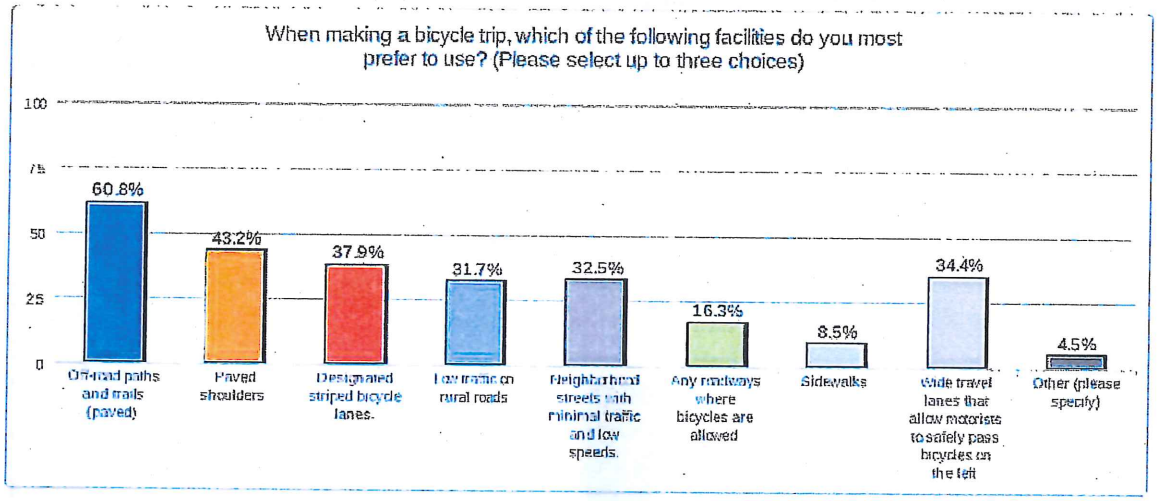
2. Which factors have prevented you from doing so? (Select all that apply)

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%

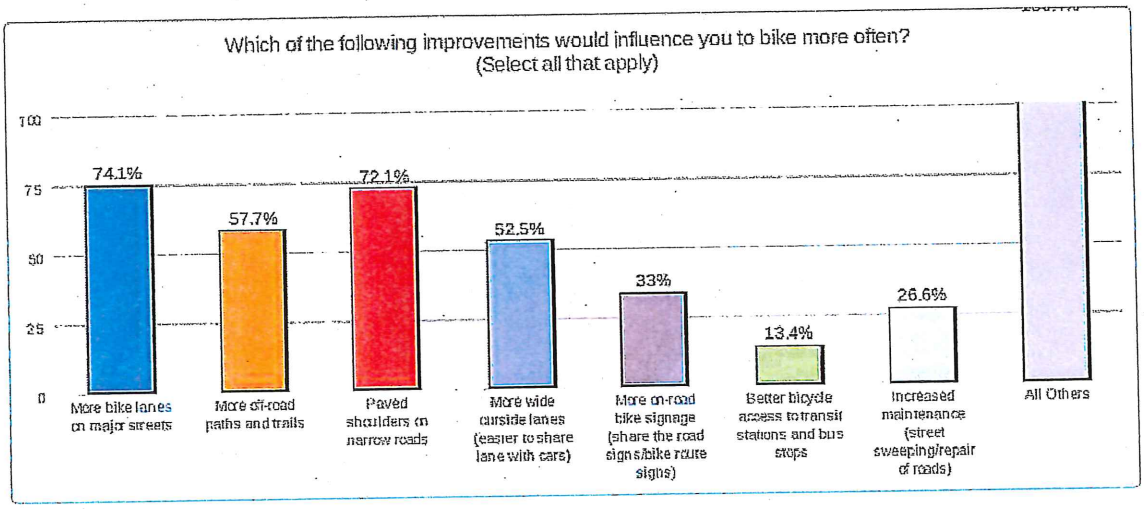
Statistics	
Total Responses	374



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



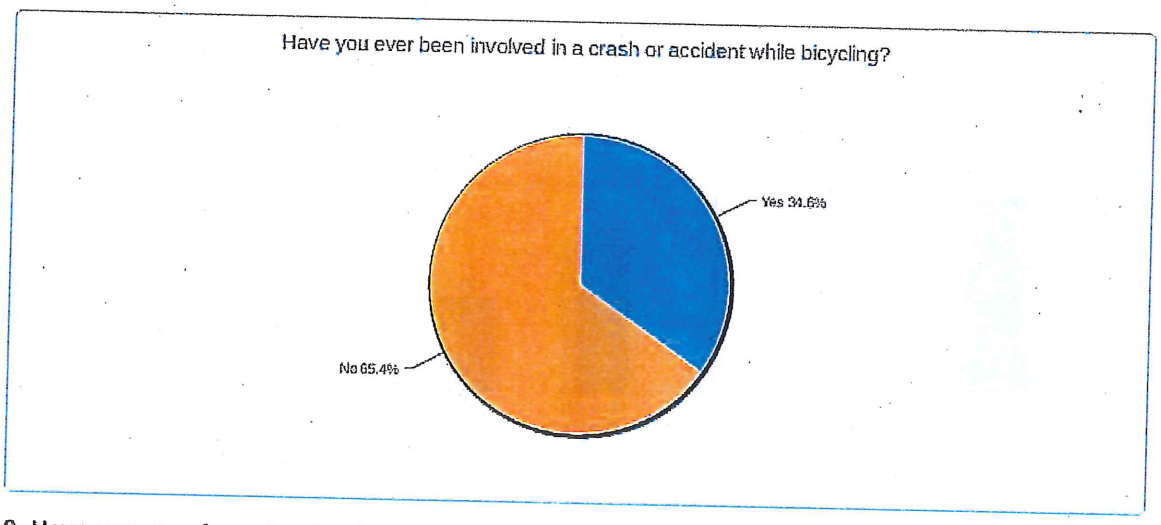
6. Which of the following improvements would influence you to bike more often? (Select all that apply)

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?

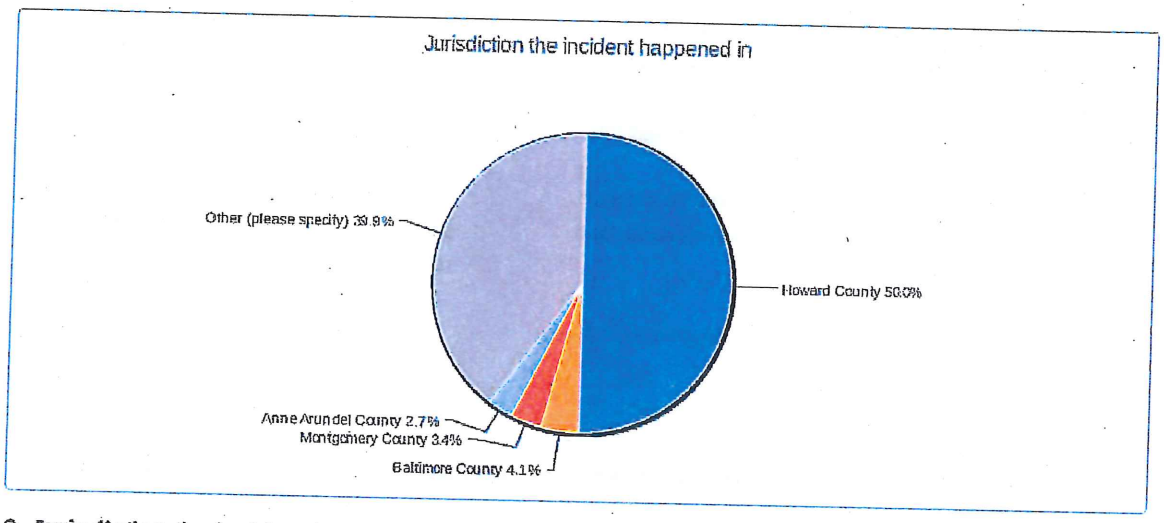
	Yes	No	Responses
Bus	3.2% 14	96.8% 419	433
Metrorail in DC Area	6.5% 28	93.5% 406	434
Folding bike on the MARC Train	0.2% 1	99.8% 430	431
Light Rail or subway in Baltimore	3.0% 13	97.0% 419	432



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

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

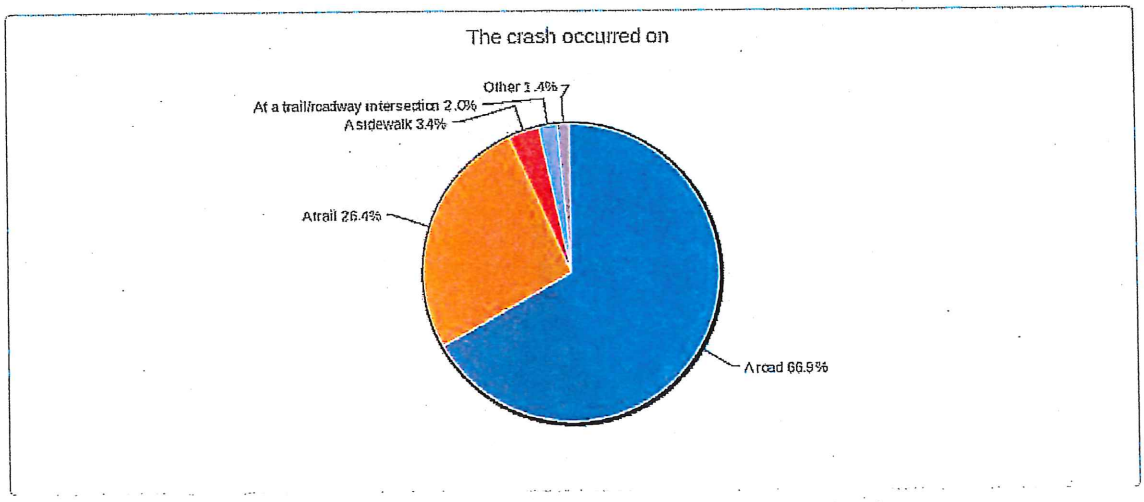
Statistics	
Total Responses	439



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%

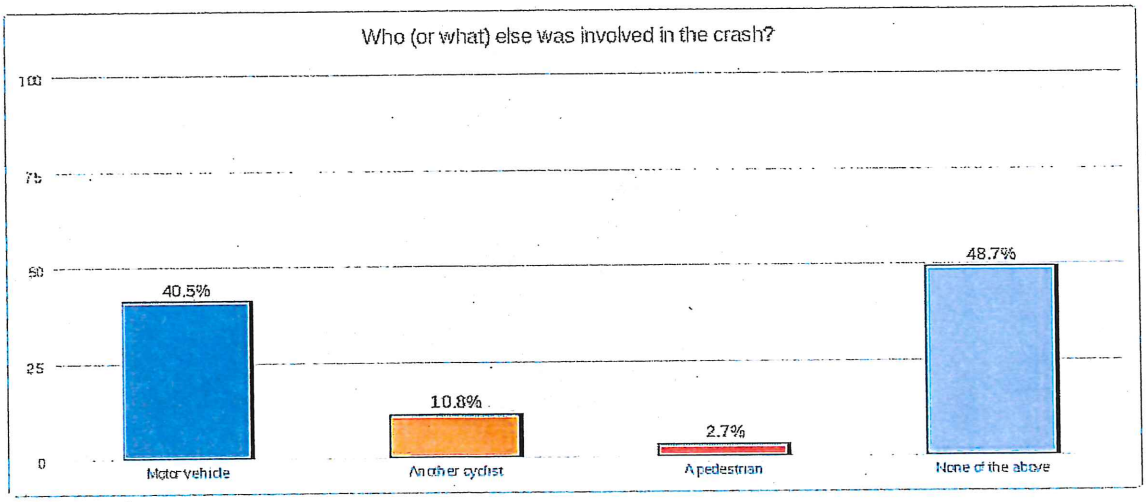
Statistics	
Total Responses	148



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%

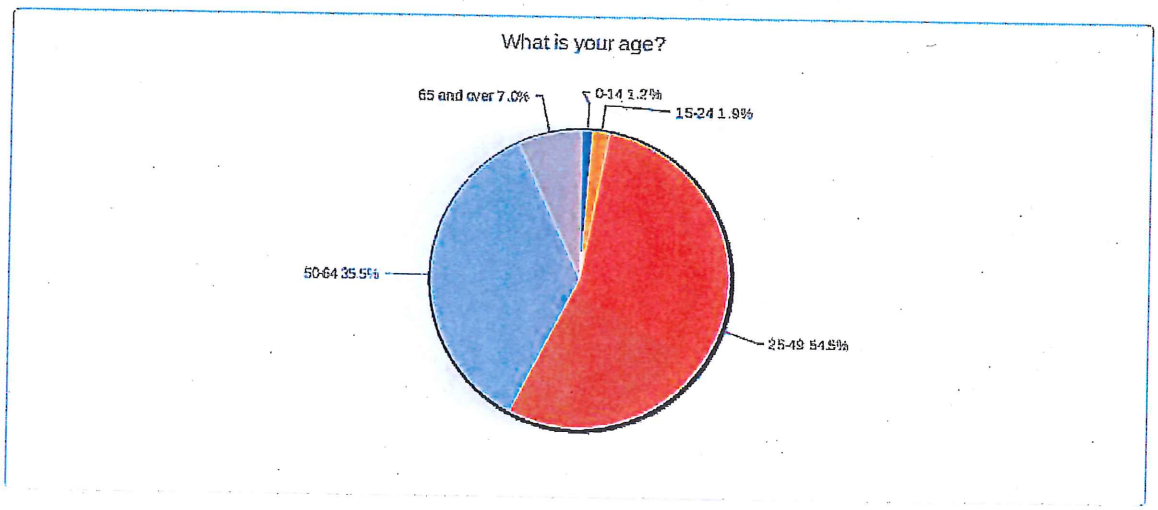
Statistics	
Total Responses	148



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%

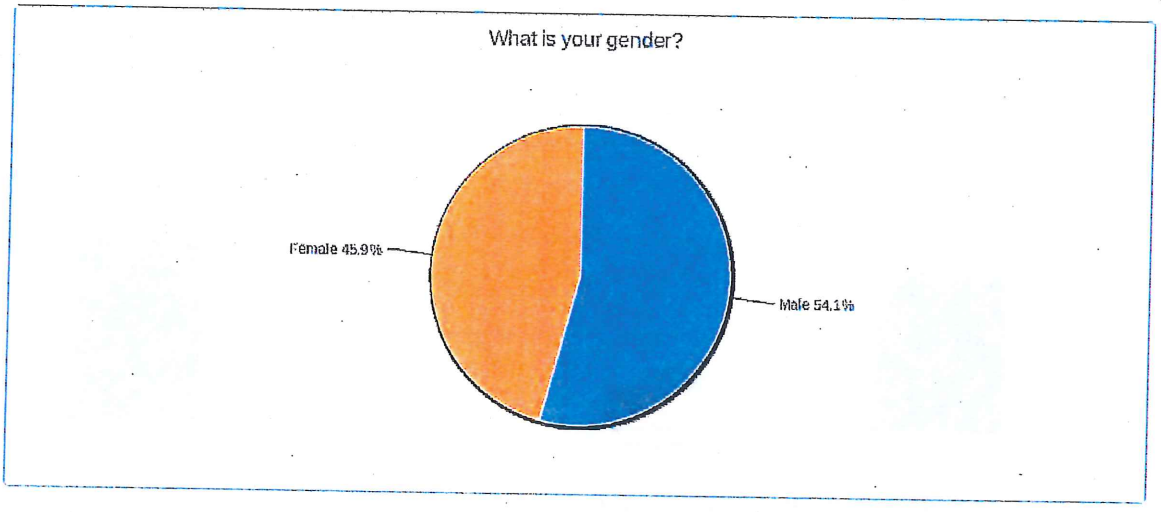
Statistics	
Total Responses	148



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%

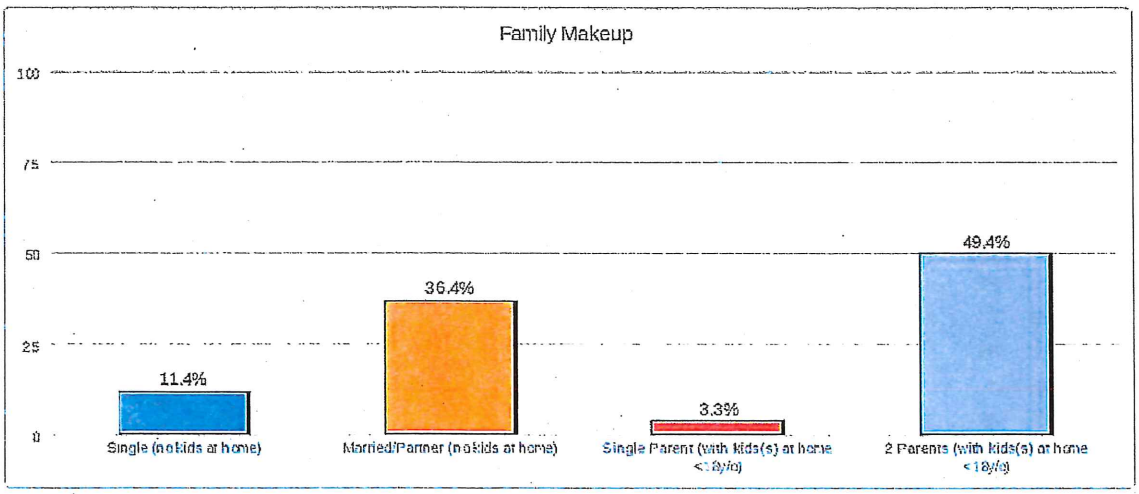
Statistics	
Total Responses	431
Sum	15,595.0
Avg.	36.6
StdDev	14.3
Max	65.0



13. What is your gender?

Value	Count	Percent %
Male	231	54.1%
Female	196	45.9%

Statistics	
Total Responses	427



14. Family Makeup

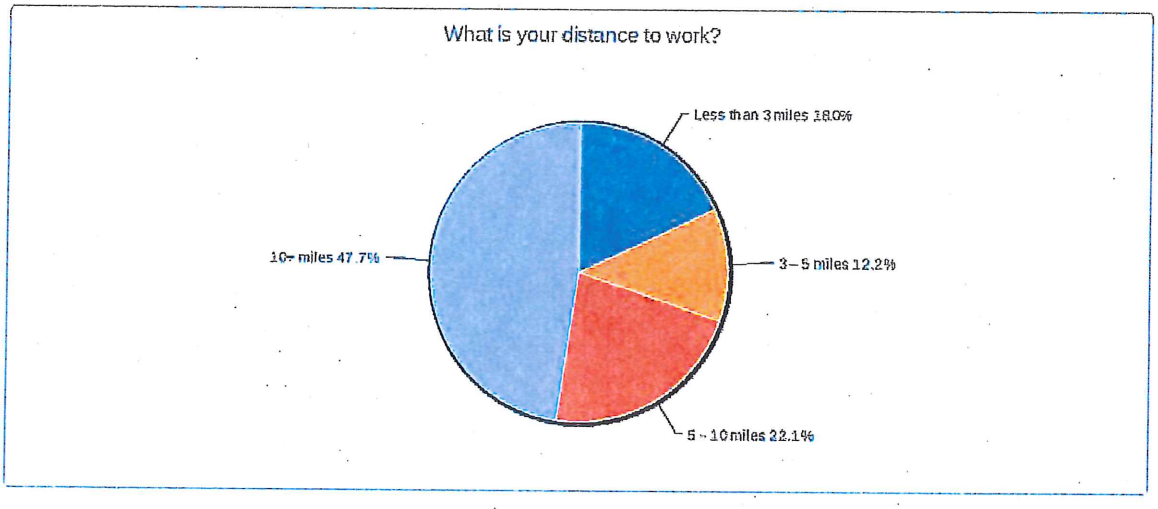
Value	Count	Percent %
Single (no kids at home)	49	11.4%
Married/Partner (no kids at home)	157	36.4%
Single Parent (with kids(s) at home <18y/o)	14	3.3%
2 Parents (with kids(s) at home <18y/o)	213	49.4%

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: