



Acknowledgements

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County Executive

Janet S. Owens

County Council

Pamela G. Beidle

C. Edward Middlebrooks

Ronald C. Dillon, Jr.

Bill D. Burlison

Cathleen M. Vitale

Barbara Samorajczyk

Edward R. Reilly

Anne Arundel County Office of Planning and Zoning

Joseph Rutter, Planning and Zoning Officer

Denis Canava, Director of Planning and Research

Richard Josephson, Planning Administrator, Long Range Planning

George G. Cardwell, Planning Administrator, Transportation Planning

Natalie C. Latham, Transportation Planner, Transportation Planning

Jody Vollmar, Public Outreach Coordinator

Sharon Faulkner, Administrative Assistant

Dana Wootton, Administrative Assistant

Tanya Bishop, Administrative Assistant

Anne Arundel County Department of Public Works

Edward Meehan, Deputy Director, Bureau of Highways

James Schroll, Chief, Traffic Engineering

Raymond Hutzler, Chief, Road Operations

Kenneth Fleming, Engineer Manager, Bureau of Engineering

Daniel Anderson, Senior Engineer

Dennis Fretz, Engineer

Anne Arundel County Department of Recreation and Parks

Jack Keene, Chief, Planning and Construction

Brian Woodward, Chief, Natural and Cultural Resources

David Dionne, Parks Superintendent

Maryland Department of Transportation

State Highway Administration

Maryland Transit Administration

Baltimore Metropolitan Council

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Consultant Team

Sprinkle Consulting, Inc., Laurel, Maryland

Environmental Resources Management, Annapolis, Maryland



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Section 1: Executive Summary

Bicycling and walking are popular activities in Anne Arundel County both for transportation and recreation. There are places in the County where walking and bicycling are pleasant and enjoyable activities. The Governor's Smart Growth Initiative has resulted in communities with well-designed sidewalks, multi-use trails, comfortable streetscapes and destinations that are close to home.

In many places, however, travel by foot and bicycle is difficult. Destinations are often separated by major highways and thoroughfares, leaving people with no choice but to drive to every destination. Parents who grew up walking or riding their bikes to school and around their neighborhoods are afraid to let their children do the same today, and with good reason. In 2000, an average of four pedestrians per week were injured or killed by automobiles in Anne Arundel County¹.



(BWI Trail)

Anne Arundel County is in the process of establishing an outstanding network of off-road trails, several of which are already used as alternative transportation routes by residents and visitors to the County. However, there are limited opportunities to access these trails via local streets and roadways. In order to achieve a multi-faceted transportation network with a variety of opportunities for bicycle and pedestrian travel, physical improvements are needed to existing and future roadways throughout the County.

In addition to physical improvements, the bicycle program in Anne Arundel County must include other programs that support and encourage bicycling and walking. More County residents can be encouraged to bicycle and walk for short trips, especially those that are less than 2 miles in length (which accounts for over 40% of all trips in the County). As

¹ Anne Arundel County 2000 Bicycle-Vehicle Crash Report



new bike lanes and sidewalks are built throughout Anne Arundel County, additional education and enforcement programs will be needed as well.

Continued efforts must be made now to ensure that bicyclists and pedestrians will be able to use the future roadway network throughout Anne Arundel County. The County is not alone in this initiative. There is growing support for bicycling and walking at the state and federal levels as well. The Maryland Department of Transportation (MDOT) has begun a number of new initiatives to fund bicycle and pedestrian improvements to transit facilities and roadways, and the U.S. Congress has been providing a consistent source of funding for these activities for the past ten years.

There are a variety of reasons bicycling and walking issues are important to Anne Arundel County residents:

1.1 Bicycling and Walking Benefits

Economic Benefits

Developing trails, bikeways and walkable communities makes good economic sense for Anne Arundel County.

- Businesses tend to invest more in locations that have a high quality of life, and corporate employers have an easier time attracting good workers to these locations. Anne Arundel County's future as a first class employment location will depend on its perception as a high quality place to live.
- Bicycle tourism is big business in the United States, bringing millions of dollars in revenue to some parts of the country. For example, in Vermont, bicycle touring brings in more revenue than the maple syrup industry. Anne Arundel County has already gained national recognition for trails such as the Baltimore and Annapolis Trail and the BWI Trail. The East Coast Greenway (the urban equivalent of the Appalachian Trail) and the American Discovery Trail (the nation's major east-west route) will one day intersect in Anne Arundel County. It is clear that bicycle tourism should become a key feature of the region's future tourism strategy.
- A 1994 study of the Northern Central Rail Trail in Baltimore County indicated that \$3.4 million in goods were purchased in 1993 because of the trail. Additionally, the study indicated that the trail supports an estimated 264 jobs.

Transportation Benefits

Bicycling and walking are a necessary part of the transportation system in Anne Arundel County.

- Bicycle and pedestrian facilities are needed to form important connections between activity centers, population centers, shopping areas, parks and tourist attractions in the region.
- Many people in Anne Arundel County need an alternative method of travel to the automobile. A 1993 survey conducted by the Baltimore Metropolitan Council



found that 17% of households in the Baltimore region had either no licensed drivers or no vehicles. Bicycling is an extremely affordable option when compared to the expense of owning and operating an automobile (\$120 per year compared to over \$5,000 per year).

- According to drivers license records, approximately one third of Maryland's population does not have a driver's license. Based on a population of 5.2 million, 1.8 million Maryland residents must rely on alternative modes of transportation. Many of these are seniors and children who need transportation alternatives.
- The 1993 Baltimore Metropolitan Council household survey found that while bicycling and walking account for 13 percent of all trips and 3.9 percent of commuting trips, the potential to use these modes is far greater. Sixty-three percent of all trips in the region were found to be less than five miles, and 44 percent were less than three miles – many of these short trips could be made on foot or bicycle.
- According to a survey conducted as part of the 1998 Baltimore Regional Transportation Plan, 61% of respondents indicated that they would walk or ride a bicycle to work or for other errands if it was safe and convenient.

Environmental Benefits

More greenways and increased levels of bicycling and walking will help to improve air and water quality in Anne Arundel County

- Anne Arundel County is classified as a severe non-attainment area for ground level ozone by the U.S. Environmental Protection Agency. This means air quality in the County is below federal health-based standards for clean air. Motor vehicle pollution is a major contributor to ozone pollution.
- Increased levels of bicycling and walking can play an important role in reducing air pollution: By substituting a bicycling or walking trip for short auto trips, area residents can significantly reduce the amounts of pollutants generated by automobiles. Shorter auto trips produce far more pollution per mile than longer trips.
- Trails and greenways² can serve a dual purpose of offering an alternative transportation route while also preserving critical open space corridors in urban and suburban areas. Greenways filter stormwater run-off, remove pollutants from the air, and provide migratory routes for animal species.
- More bicycling and walking (and less driving) will mean better air quality and fewer non-point source pollutants in Anne Arundel County, which will help to improve the health of the Chesapeake Bay.

Recreation and Health Benefits

Bicycling and walking can play a vital role in improving the health of Anne Arundel County area residents.

- Research conducted in 1999 by the Centers for Disease Control found that "obesity and overweight are linked to the nation's number one killer – heart disease – as well as diabetes and other chronic conditions." The report also

² Greenways are protected corridors of open space that sometimes include trails.



states that one reason for Americans' sedentary lifestyle is that "walking and cycling have been replaced by automobile travel for all but the shortest distances." (October 1999 issue of the JAMA - Journal of the American Medical Association).

- In Maryland, the prevalence of obesity increased by 75.6% between 1991 and 1998, the fourth highest increase in the nation. By 1998, 20.5 % of adults in Maryland were obese. (Maryland Department of Health and Mental Hygiene, 1999).
- Total costs attributed to obesity (medical costs and lost productivity) amounted to an estimated \$99 billion in 1995, 10% of total national health care costs.
- Studies have shown tremendous health benefits for even a brief amount of light exercise (such as walking) each day.

Quality-of-Life Benefits

Providing a livable community is a necessary part of attracting and keeping businesses, keeping our best and brightest young people here at home, and ensuring that Anne Arundel County remains competitive in the 21st century. Bicycling and walking are integral to the image of Anne Arundel County as a friendly and welcoming community.

1.2 Summary of Recommendations

The Anne Arundel County Pedestrian and Bicycle Master Plan provides recommendations for specific actions, responsibilities, policies and procedures for future bicycle and pedestrian projects. The following are brief descriptions of each recommendation.

Recommendation 1:

Build for success – begin construction of key on-road bicycle and pedestrian projects throughout the county.

In order for Anne Arundel County to make this Plan a success, a variety of bicycle and pedestrian projects must be designed and built. The efforts to implement these improvements will require additional coordination between the County and SHA District Offices. In addition to the County's ongoing sidewalk construction projects, the following goals have been set for pedestrian and bicycle facility construction:

<i>Type of improvement</i>	<i>During Years 1-5</i>	<i>During Years 6-10</i>	<i>During Years 11-15</i>	<i>Total Years 1-15</i>
<i>Bike Lanes/Shoulders</i>	20 miles (4mi./yr.)	+75 miles (+15 mi./yr.)	+120 miles (+24 mi./yr.)	+215 miles
<i>Pedestrian Safe Intersections¹</i>	40 intersections (8./yr.)	+60 intersections (+12./yr.)	+80 intersections (+12./yr.)	+180 intersections

¹ There are many intersections in the County with dangerous conditions for pedestrians. These will require special studies either in conjunction with roadway improvement projects or as independent projects to determine better design treatments for pedestrians.



This plan includes seven corridor studies that provide conceptual bicycle and pedestrian improvements that can be made to specific streets and intersections in Anne Arundel County. These example locations were chosen based on public input – both in the form of comments received during the planning process and recommendations in Small Area Plans. Corridor plan locations were also chosen in locations in which there are obvious origin and destination points in close proximity (i.e. walking or bicycling distance) to each other. These corridor plans serve as example projects that can be completed in a short time frame at relatively low cost.

Recommendation 2:

Build on the success of the trails program in Anne Arundel County – increase access to off-road trails.

Anne Arundel County's existing trail network is one of the best in the country. We also have tremendous opportunities: Anne Arundel County is at the crossroads of the American Discovery Trail and the East Coast Greenway. The trails network should be expanded throughout the County, particularly in areas that are more heavily populated or are under development pressure. An expanded trail network will provide viable transportation alternatives and enhance recreational opportunities in the County.

Recommendation 3:

Integrate bicycling and walking as a standard part of each new development and transportation project.

Anne Arundel County residents have made it clear that they want communities where bicycling and walking are comfortable and convenient transportation options. This will require substantial changes to current policies and practices, both on the part of County and state agencies with jurisdiction over transportation facilities in the County. Section 6 provides more detailed recommendations for this strategy.

Recommendation 4:

Establish new sources of funding for pedestrian and bicycle improvements.

The most common method for funding bicycle and pedestrian projects is to combine local, public sector and private sector funds with funds from state, federal and other organizations. Many communities involved with bicycle, pedestrian and greenway implementation projects are choosing to leverage local money as a match for outside funding sources – something Anne Arundel County has done successfully in the past, and can improve upon in the future. Anne Arundel County needs to actively pursue innovative ways to obtain funding for pedestrian and bicycle improvement projects. Section 8 of this report provides detailed recommendations for funding the projects and activities identified in this Plan.

Recommendation 5:

Provide increased opportunities for children and adults to become more educated on safe riding and walking behaviors.

Education and awareness efforts are key ingredients to building a transportation system and community that encourages bicycling and walking. Education and awareness efforts also contribute to making the two modes safer and more enjoyable. In order to



continue to improve the overall physical network, effective support and education programs need to be developed. Section 7 of this Plan provides a compendium of model education and safety programs that should be considered for implementation in Anne Arundel County.

Recommendation 6:

Create an organizational structure within the County to implement bicycle and pedestrian programs and projects.

It will be necessary to assign staff members to implement the recommendations set forward in this Plan. A staff liaison within the Department of Public Works should be assigned to work closely with an inter-agency Pedestrian and Bicycle Workgroup to oversee various implementation activities, including the pedestrian and bicycle components of roadway improvement projects. This person should also be designated as the public point of contact on bicycle and pedestrian issues. Staff from other departments (including Planning and Zoning, Recreation and Parks, and others as appropriate) should be assigned implementation responsibilities through the DPW/OPZ work program.

The Pedestrian and Bicycle Workgroup will serve to coordinate the variety of programs and activities that result from this Plan. The Workgroup should work with designated county staff members to establish a volunteer program for a variety of education and promotional events.

Conclusion

Communities across America are supporting bicycling and walking in order to improve their physical infrastructure and quality of life. Anne Arundel County also recognizes this need to improve conditions for bicycling and walking in order to enhance its communities. The Anne Arundel County Pedestrian and Bicycle Master Plan establishes new goals for the County's transportation system, and will serve as a blueprint to improve the walking and bicycling environment for many years to come. In summary, a successful system will be accomplished by implementing the actions that are identified in this report. Specifically:

1. Construction of key on-road bicycle and pedestrian projects throughout the county.
2. Increased access to Anne Arundel County's growing system of off-road trails.
3. Integration of bicycling and walking as a standard part of each new development and transportation project.
4. Establishment of new funding sources for pedestrian and bicycle improvements.
5. Increased opportunities for children and adults to become more educated on safe riding and walking behaviors.
6. Creation of an organizational structure within the County to implement bicycle and pedestrian programs and projects.

Finally, as bicycle and pedestrian facilities and programs are put in place, it will be necessary to update this Master Plan on a regular basis to assess progress and establish new priorities.



Section 2: Introduction

Bicyclists and pedestrians are legitimate road users who have the legal right to use our roadways. Each time a person walks or rides a bicycle instead of driving, our region experiences a direct effect in reduced traffic congestion and air pollution. In accordance with the Baltimore Regional Plan and the County's General Development Plan, Anne Arundel County has developed a plan of action to encourage more trips on foot and by bicycle.

2.1 Purpose

The purpose of this effort is to present a Plan for bicycling and walking in Anne Arundel County that ensures that residents and visitors have the convenient and comfortable option of bicycling and walking for transportation and recreation. The following are specific components of the Plan:

- Route Network Plan (map) showing high priority routes and pedestrian improvement zones*
- An Action Plan for initial projects and programs*
- Recommendations for future bicycle and pedestrian policies and procedures*
- List of sample corridors for pedestrian and bicycling improvements*
- Strategies to establish education and safety programs for children and adults, including bicyclists, pedestrians and motorists.*
- Funding recommendations*

2.2 Plan Relationships

Various plans have been produced in Maryland and in Anne Arundel County that either directly or indirectly address bicycle and pedestrian improvements. The following section illustrates significant planning efforts at the state, regional and local levels.

Anne Arundel County Greenways Master Plan:

This Pedestrian and Bicycle Master Plan was closely coordinated with a parallel planning effort, the Anne Arundel County Greenways Master Plan. While the Pedestrian and Bicycle Master Plan primarily addresses alternative transportation, the Greenways Master Plan is focused on preserving ecological open space corridors that also serve a recreation and transportation purpose. Some County Greenways contain trail corridors that have been shown on the Route Network Plan. These routes reflect opportunities that were identified during the Greenways Master Plan. The Greenways Plan complements this study, particularly in locations where future greenways may serve a transportation purpose.



Anne Arundel County General Development Plan (1997):

The General Development Plan (GDP) is a long range comprehensive plan adopted by the County to provide guidance in regards to future growth, development resource management, protection and the provision of services. The GDP provides policies and recommendations for the County in order to effectively plan for growth in an environmentally sound and efficient manner. The plan recommends adoption of improved development requirements that emphasize mixed land uses and enhanced community design to improve the function and appearance of new development and redevelopment projects.

The GDP provides over a 120 recommendations on how the County can better manage growth, conserve the environment and meet resident needs. A number of these recommendations directly relate to bicycle and pedestrian access including:

- Designing roadways to move people by car, bus, commercial, emergency vehicles and by bicycle.
- Designing roadways to accommodate pedestrians.
- Promote and encourage a safe efficient multi-modal transportation system that adequately serves the public, minimizes negative environmental impacts, improves air quality, reduces resource consumption and reflects and strengthens the County's land use goals.
- Reduce the length and frequency of travel to housing, employment and service.
- Provide walkways and bikeways to connect residential areas with nearby activity centers
- Improve access and safety along major pedestrian and biking routes.
- Develop interconnected pedestrian ways and bikeways through Small Area Planning.

Anne Arundel County Small Area Plans:

Anne Arundel County's General Development Plan recommends that the County begin planning initiatives within sixteen specified community areas, called Small Area Plans. The purpose of the Small Area Plans are to enhance the quality of life in our communities, to help implement the goals and recommendations of the General Development Plan, and to promote citizen, business and County cooperation in the planning and development process.

Small Area Plans Identify:

- ❑ *where land uses should occur;*
- ❑ *how land should be zoned;*
- ❑ *where pedestrian and road improvements are needed; and*
- ❑ *how communities can use design to improve their overall function and appearance.*

The following excerpts are taken from Anne Arundel County's web site describing the Small Area Planning purposes and citizen participation:



Citizens play a central role in developing the Small Area Plans. The County Executive appoints Small Area Plan committees. The appointees are selected from community, business and environmental organizations within the boundaries of the small areas.

Most of the Small Area Plans that are completed contain references to a variety of bicycle and pedestrian issues throughout the County. Some have identified networks of paved and natural surface pathways to serve area residents and to link to other small area planning efforts. Primarily the Small Area Plan committees and planning staff work collaboratively to develop the best plan for the area. Together, they agree on a work program and schedule, review land use, zoning, environmental features, and infrastructure, including schools, roads, sewer, water facilities and parks.

Various Local Planning Efforts:

Other planning efforts at the local level have been done to specifically address issues regarding bicycle and pedestrian planning and design. These additional plans include the Parole Pedestrian and Bicycle Plan (1999) and the MD Route 175 Roadway and Streetscape Plan/Odenton Town Center Master Plan (1999). The Parole Plan identifies conceptual streetscapes for the pedestrian and bicycle routes that will make the route network prominent, attractive and safe. The plan considers treatment for specific problem areas where full design improvements cannot be provided because of limited right-of-way or other constraints. The Odenton/MD175 Plan provided an innovative process in which planners, architects, landscape architects, engineers, and a citizens' advisory committee pooled expertise to develop a plan for the roadway and adjacent land corridor that would respond to Odenton's diverse needs

City of Annapolis Take-A-Step Map:

Although the City of Annapolis has not formally completed a bicycle and pedestrian master plan, the Anne Arundel Pedestrian and Bicycle Master Plan was coordinated with the development of Annapolis' bicycle and pedestrian "Take-A-Step" wayfinding map, and with the City's bikeway consultant. A number of exciting initiatives have been initiated in the City of Annapolis, including a bike rental program and a bikes-on-bus program (Annapolis Transit).

The Maryland Statewide Greenway Atlas:

The Maryland Department of Natural Resources has done excellent work developing a statewide inventory of greenways and open space throughout the Baltimore region, and has been a central source of support for local greenway projects through Program Open Space funding and technical assistance. The purpose of their work has been to increase the amount of green infrastructure throughout Maryland, with an ancillary benefit being that greenway corridors can also serve non-motorized travel in locations where trails are provided.



The Maryland Statewide Bicycle and Pedestrian Plan:

Simultaneously with the development of this Pedestrian and Bicycle Master Plan, the Maryland Department of Transportation is conducting the Maryland Statewide Bicycle and Pedestrian Plan with a completion date set for October 2002. This is an extremely positive development for bicycling and walking in Anne Arundel County and throughout Maryland.

One aspect of the statewide plan is to collect data on sidewalk conditions on all state roadways, data which was not collected for this Plan, and which may be very helpful to local jurisdictions that wish to make improvements.

In addition to the inventory of bicycling and walking conditions on state roads, the Statewide Plan will set a variety of policies within Maryland State Highway Administration (SHA) for accommodating bicycles and pedestrians on state roadways. This is important, because a number of the roadways in the regional network are owned by the state. Local jurisdictions should participate in the statewide planning process to ensure that policies and practices are coordinated at the state and local levels.

2.3 Existing Conditions

Anne Arundel County is bounded to the east by the Chesapeake Bay, the north by Baltimore County, the west by Howard and Prince George's Counties, and on the south by Calvert County. The County is home to 527 miles of winding shoreline along the Chesapeake Bay and its various tributaries. The City of Annapolis, a historic bay town where our State Capitol is located is situated in the County. This unique location enables Anne Arundel County to provide its community with a variety of living environments. Due to its reputation as an attractive place to live and work, the population of Anne Arundel County is projected to increase considerably during the next 50 years. According to census 2000 data the County has already grown approximately 15% in the last 10 years from a population of 427,000 residents in 1990 to 490,000 residents in the year 2000.

The county's topography is both rolling and flat and is generally well suited for bicycling and pedestrian travel. The County also retains a rural character between the major population centers and is primarily rural in the southern portion of the County.

Current Bicycling Conditions:

It is important to identify the current situation in order to analyze, benchmark and improve bicycle and pedestrian conditions.

According to Anne Arundel County 2000 Census Data:

205,415 people drive alone to work

27,302 people arrive in car pools

14,728 people walk or work at home

6,438 people arrive via public transportation

1,975 people use other means

A number of roads in Anne Arundel County provide opportunities for bicycling but dangers still exist in areas that fail to provide for bicycle and pedestrian access. There are limited numbers of bicycle facilities in the County. The following were concerns



raised in the Small Area Plans and local community meetings regarding bicycling conditions in Anne Arundel County:

- Lack of providing bicycling opportunities within the general street infrastructure.
- Lack of striped bicycle lanes.
- Lack of designated bicycle routes.
- Poorly maintained street conditions.
- High speed traffic areas.
- Lack of logical connections for desired destinations

However, despite the lack of on-road facilities there has been a strong effort to increase the amount of multi-use trails within the County. Currently, the County has approximately 28 miles of existing multi-use trails with many more miles planned. The following highlights regionally significant trails within the County.

- Baltimore and Annapolis Trail - existing 13.3 miles
- BWI Trail Park - existing 14.5 miles
- Chesapeake Beach Rail Trail (South County) - proposed 3 miles
- South Shore Trail - proposed 10.5 miles
- West County Trail (WB&A) - proposed
- Poplar Trail (Annapolis) – near completion .5 miles (final link to connect the Annapolis Colonial Maritime Trail, BWI Trail and the B&A Trail.)
- Annapolis Colonial Maritime Trail – Urban trail comprised of on-road bikeways, off road multi-use trails and pedestrian facilities.

Various national trails are proposed to extend through Anne Arundel County, including the East Coast Greenway, American Discovery Trail and the Civil War Discovery Trail. The proposed national trail routes follow existing and proposed County trail routes, and will ultimately enable Anne Arundel County residents to travel cross country.

Current Pedestrian Condition:

Anne Arundel County is home to one of America's most walkable and historic cities, Annapolis. In 1999, *Walking Magazine* named the City of Annapolis as one of the ten best American cities for walking. The city is a draw for thousands of tourists each year and walking is a key mode of transportation.

A number of residential communities have focused on walkability. Piney Orchard is one example of a planned community in the County with sidewalks, trails and other pedestrian-friendly design elements, which make the community a safe and accessible place to walk.



Despite these examples of pedestrian-oriented environments in the County, there are many areas that need to be improved. High traffic volume streets, dangerous intersections, inaccessible connections make it difficult for pedestrians throughout the County. The following were concerns from the local Small Area Plans and community meetings regarding pedestrian conditions in Anne Arundel County:

- Lack of pedestrian links between neighborhoods and activity centers.
- Lack of sidewalks and streetscape improvements on public roads.
- Current pedestrian access is not safe and easily accessible.
- Lack of pedestrian facilities (crosswalks, signs, signals etc.) at intersections

Access to Commercial Development

Many shopping centers and office complexes in Anne Arundel County do not encourage access by walkers and bicyclists. The traditional style of commercial development usually includes a main building that is separated from the street by wide and expansive parking lots. Entrance to many malls and shopping centers offer no sidewalks or crosswalks. There are also very few bicycle racks in these developments.

In addition, many shopping centers do not provide connections between the main complex and adjacent commercial facilities such as fast food restaurants and banks. People are therefore encouraged to drive a few hundred feet to the next location. When there are not logical and accessible connections between retail stores within the same shopping complex, unnecessary trips are made adding to the congestion and potential pedestrian dangers. Section 6 of this report provides a detailed review of local land development and transportation design practices which affect bicyclists and pedestrians.

Access to Public Transportation

Currently Anne Arundel County provides some opportunities for people to use public transportation. The County supports an integrated bus route and commuter train system connecting to places within the county and adjacent jurisdictions. In order for Anne Arundel County to have a complete multi-modal transportation system, public transportation stops need to be accessible by walking or biking.

Pedestrian and bicycle access to bus stops, park and ride lots, and train stations is critical to the success of the overall transit system in the County, since many public transportation users either walk or bicycle to the bus stops, park and ride lots and MARC train stations. In locations where pedestrian and bicycle access to the bus is not provided, residents may be forced to drive to access transit or simply choose to drive instead of using transit at all. With safer and more comfortable sidewalks, waiting areas, bike lanes and paths near the bus stops and stations, it is likely that people will be able to access transit as pedestrians and bicyclists. In addition to the benefits of personal health, the people accessing transit by walking and bicycling will begin to reduce the pollution and congestion that result from making trips by automobile.



Section 3: Action Plan

This section provides an overview of recommended actions and programs that will be needed in order to meet the visions and policies set forth by the Anne Arundel County Pedestrian and Bicycle Master Plan.

The Anne Arundel County Pedestrian and Bicycle Master Plan provides recommendations for specific actions, responsibilities, policies and procedures for future bicycle and pedestrian projects. The following is a description of each recommendation.

3.1 Recommendations

Recommendation 1:

Build for success – begin construction of key on-road bicycle and pedestrian projects throughout the County.



In order for Anne Arundel County to make this Plan a success, a variety of bicycle and pedestrian projects must be designed and built. The efforts to implement these improvements will require additional coordination between the County and State Highway Administration (SHA) District Offices. In addition to the County's ongoing sidewalk and trail construction projects, the following goals have been set for pedestrian and bicycle facility construction:

Type of Improvement	During Years 1-5	During Years 6-10	During Years 11-15	Total Years 1-15
<i>Bike Lanes/Shoulders</i>	20 miles (4mi./yr.)	+75 miles (+15 mi./yr.)	+120 miles (+24 mi./yr.)	+215 miles
<i>Pedestrian Safe Intersections¹</i>	40 intersections (8./yr.)	+60 intersections (+10./yr.)	+60 intersections (+10./yr.)	+160 intersections

Action 1: Work with SHA, Anne Arundel County Department of Public Works (DPW) and Office of Planning and Zoning to identify already scheduled road improvement projects, both in the private and public sectors, which may be modified to include pedestrian and bicycle facilities. This should include improvements for pedestrians and bicycles whenever feasible.

¹ There are many intersections in the County with dangerous conditions for pedestrians. These will require special studies either in conjunction with roadway improvement projects or as independent projects to determine better design treatments for pedestrians.



Action 2: Look for opportunities to re-stripe existing roadways (during resurfacing) to include bike lanes.

Action 3: Evaluate the current sidewalk system within one mile of every school and one and one-half miles of every secondary school to ensure that the Anne Arundel County Public School Transportation Policies are being met. For those areas that do not meet the Transportation Policies, improvements should be given high priority. The condition of the existing routes should be evaluated for safety.

Action 4: Ensure that new storm drains and storm drain retrofits on all County roads are bicycle safe.

Action 5: In addition to bikeways and sidewalks, ensure that developers provide other necessary support facilities for people who walk and bike to work and other destinations, such as secure bike parking, shower and changing facilities, etc.

Action 6: Update this Plan as facilities are built. It is estimated that updates will be needed every three to five years in order to show achievements and to adjust for future improvement goals.

Recommendation 2:

Build on the success of the trails program in Anne Arundel County – increase access to off-road trails.

Anne Arundel County's existing trail network is one of the best in the country. It is recommended that the trails network should continue its expansion, particularly in areas that are more heavily populated or are under development pressure. An expanded trail network will provide viable transportation alternatives and enhance recreational opportunities in the County.



Action 1: Maintain momentum on construction of proposed off-road trails.

Action 2: Continue to acquire land and do necessary planning for additional off-road trail developments.

Action 3: Encourage private developers to construct and connect residential trail systems to the overall County trail network, as well as provide dedicated on-road bicycle connections to the trail network.

Action 4: Make connections between trails and on-road bikeways a priority for roadway improvement projects.

Action 5: Encourage schools and libraries to construct links to nearby off-road trails where available.



Action 6: Continue to provide opportunities for volunteers to become involved with trail construction, maintenance, beautification, and events (the B&A Trail is a national model in this respect).

Recommendation 3:
Integrate bicycling and walking as a standard part of new development and transportation projects.

Anne Arundel County residents are clearly in favor of improving conditions for walking and bicycling. This will require significant changes to current policies and practices, both on the part of county and state agencies with jurisdiction over transportation facilities in the County. A full set of recommendations for bicycle and pedestrian-related policies and procedures are found in Section 6. The objectives of the recommendations are to:



Action 1: Integrate pedestrian and bicycle issues more fully into all levels of the planning and development process.

Action 2: Ensure that planners, designers, engineers and reviewers consider the full range of design elements that are important in the creation of pedestrian and bicycle-friendly communities and places.

Action 3: Improve the content and organization of regulatory requirements so that pedestrian and bicycle considerations are incorporated at all levels of decision making.

Please refer to Section 6 for detailed policy recommendations and specific actions.

Recommendation 4:
Establish new sources of funding for pedestrian and bicycle improvements.

The most common method for funding bicycle and pedestrian projects is to combine local, public sector and private sector funds with funds from state, federal and additional private sector sources. Many communities involved with bicycle, pedestrian and greenway implementation projects are choosing to leverage local money as a match for outside funding sources – something Anne Arundel County has done successfully in the past, and can improve upon in the future. Anne Arundel County needs to actively pursue innovative ways to obtain funding for pedestrian and bicycle improvement projects. (More details on this topic is found in Section 8)





Action 1: Continue to fund sidewalks and bikeways through the Capital Improvement Program. Maintain a funding program that provides matching funds for state roadway retrofit projects, and establish a new revolving funding account for retrofitting county roadways with pedestrian and bicycle facilities.

Action 2: Increase local funding amounts that are set-aside on a yearly basis to serve as a match for other state transportation funding programs (such as Enhancements, National Recreational Trails Funds, Neighborhood Conservation Assistance, and others).

Action 3: Incorporate funding for pedestrian and bicycle facilities into the budgets of existing capital roadway projects. Incorporating pedestrian and bicycle access will increase the cost of these projects; therefore higher funding levels will be needed.

Recommendation 5:

Provide increased opportunities for children and adults to become educated on safe riding, walking and driving behaviors.

Education and awareness efforts are key ingredients to building a transportation system and community that encourages walking and bicycling. Education and awareness efforts also contribute to making the two modes safer and more enjoyable. In order to continue to improve the overall physical network, effective support and education programs need to be developed.

Action 1: Work with the Maryland Office of Highway Safety to implement Maryland's new Bicycle and Pedestrian Curriculum for elementary school students (release expected in 2003). This will require the support of volunteers as well the Department of Education.



Action 2: Establish an education and safety task force to monitor and promote education initiatives throughout the County.

Action 3: Provide for senior pedestrian safety education in coordination with the County's Department of Aging.

Action 4: Apply for community grants for pedestrian and bicycle education, safety and injury prevention (see Sections 7 and 8 of this Plan for details). A continued effort to apply for community funding will ensure the longevity and effectiveness of proposed safety education programs.

Action 5: Offer effective cycling instruction courses for adult riders through regional advocacy groups, bicycle clubs and local colleges.

Action 6: Encourage colleges and universities in Anne Arundel County to develop a "Guide to Bicycling" publication for distribution each year to new students.



Action 7: Promote and support the development of a pedestrian and bicycle component of the driver's education training program and manual in order to help educate new drivers on pedestrian and bicycle awareness (activity would be undertaken by the Maryland Motor Vehicle Administration).

Action 8: Conduct a public awareness campaign to reach out to motorists regarding pedestrian and bicycle use on roadways.

See Section 7 of this Plan for more detailed information and recommendations for education and safety programs.

Recommendation 6:

Create an organizational structure within the County to implement bicycle and pedestrian programs and projects.

It will be necessary to assign staff members to implement the recommendations set forward in this Plan. A staff liaison within the Department of Public Works should be assigned to work closely with an inter-agency Pedestrian and Bicycle Workgroup to oversee various implementation activities, including the pedestrian and bicycle components of roadway improvement projects. This person should also be designated as the public point of contact on bicycle and pedestrian issues. Staff from other departments (including Planning and Zoning, Recreation and Parks, and others as appropriate) should be assigned implementation responsibilities through the DPW/OPZ work program.



The Pedestrian and Bicycle Workgroup will serve to coordinate the variety of programs and activities that result from this Plan, including construction projects, education initiatives, volunteer efforts, etc. The Workgroup could also help coordinate the efforts of local, county, and state agencies to improve conditions for walking and bicycling. The Workgroup should work with designated county staff members to establish a volunteer program for a variety of education and promotional events. This workgroup will be comprised of representatives of Anne Arundel County's various staff departments, as well as citizen representatives.

Action 1: Set goals and milestones for the Inter-Agency Workgroup.

Action 2: Prepare a quarterly newsletter with updates regarding bicycle and pedestrian improvements, education and funding initiatives.

Action 3: Establish a program to encourage the involvement of volunteers in various bicycle and pedestrian activities, including promotional events (such as Walk-A-Child-to-School Day, Bike to Work Day, etc), the elementary school-based education curriculum (see Recommendation #5), and other programs in Anne Arundel County.

Action 4: Conduct an update of this Master Plan on a regular basis (every 5 years) to assess progress and establish new priorities.



Section 4: Pedestrian Improvement Zones and Prioritized Bicycle Network Plan

The Pedestrian Improvement Zones and Prioritized Bicycle Network Plan identifies needed connections in order to create a countywide network of bicycle routes and pedestrian improvements. The network identifies locations where facilities are needed to eliminate the gaps in the regional network, connections needed to existing and proposed facilities in adjacent small planning areas. Location of pedestrian improvement zones and the prioritization of the bicycle route network are based on the following criteria:

- Bicycle Level of Service Analysis
- Ease of Implementation/Cost
- Network/Transit Connectivity
- Small Planning Area Public Support
- Areas for Pedestrian Improvements

Each of these criteria are discussed in more detail below.

It is important to recognize that the zones and routes shown on the map are not currently well suited for bicycle and walking. The map is not intended to identify safe locations to bicycle and walk; rather, it identifies locations where this travel is desired but not presently accommodated.

4.1 Analysis Process

Bicycle Level of Service Analysis

The Bicycle Level of Service (LOS) Model is recommended to determine the most appropriate cross-section for roadways where bicycle facilities are being considered. This recommendation is consistent with the anticipated adoption by SHA of the bicycle suitability model as the standard for analyzing on-road bikeways. What follows is a basic explanation of how Bicycle LOS can be used to determine the appropriate cross-section on a given roadway.

The Bicycle LOS Model is a scientifically calibrated method of evaluating a bicyclist comfort level on a roadway given existing bicycling conditions. It is based on standard roadway factors such as:

- Lateral separation between bicyclists and adjacent motor vehicle traffic (measured by the width of the right-most lane)
- Volume and speed of motor vehicle traffic
- Percentage of trucks
- Number of travel lanes
- Presence of a paved shoulder/bike lane
- Pavement conditions



Table 1.1 Bicycle Level of Service Categories

Level of Service	Bicycle LOS Score
A	≤ 1.5
B	> 1.5 and ≤ 2.5
C	> 2.5 and ≤ 3.5
D	> 3.5 and ≤ 4.5
E	> 4.5 and ≤ 5.5
F	> 5.5

The results of the Bicycle LOS evaluation are represented by a numerical score, which is stratified into six grades or levels of service (see Table 1). Level "A" reflects the best conditions for bicyclists; Level "F" represents the worst conditions. Details about the Bicycle LOS Model are presented in Appendix B.

The Bicycle LOS Model should be used to determine the appropriate cross-section (bicycle accommodation) on a given roadway. The impact of proposed bicycle accommodations on vehicle level of service can then be analyzed in an effort to maintain the existing conditions for motor vehicles while improving conditions for bicyclists.

Bicycle LOS Example

Increased Shoulder			Lanes (L)		Traffic Data		Post Spd. (SP) mph	Width of Pavement			Occ. OSP % (OSPA) (%)	Post. Cond. (PR) (1-5)	Bicycle LOS	
Route Name	From	To	Th	Con.	Vol. (ADT) (vpd)	Pct. (HV) (%)		Wt (ft)	Wl (ft)	Wps (ft)			Score	Grade (A-F)
Mt. Road	Alvin Rd.	Schmidts Lane	3	U	17,875	8	40	15	3	0	0	3.0	5.14	E
	Alternative		3	U	17,985	8	35	17	6	0	0	3.0	3.10	C

Th = # of travel lanes

Con. = lane configuration

Vol(ADT) = volume of average daily traffic rates

Pct. (HV%) = percent of heavy vehicle travel

Post Spd. = posted speed limit (mph)

Wt = total width of outside lane (feet)

Wl = width of paving between outside lane stripe and edge of pavement (feet)

Wps = width of parking spaces (feet)

Occ = percentage of segment with occupied on-street parking

Score = bicycle LOS score

Grade = Rating of segment

There are a number of routes that have been identified for pedestrian and bicycle improvements that are already scheduled for roadway capacity improvements. This represents an opportunity to include bicycle and pedestrian facilities at a lower cost, as part of a larger roadway-widening project.



Ease of Implementation and Cost

The level of difficulty and cost for constructing facility improvements can be used to prioritize potential improvement areas. The Network Plan addresses this issue in order to provide recommendations that can be built quickly and efficiently. The following list identifies some of the key issues when looking for relatively low cost and easily implemented facility improvements.

- Existing paved roadway shoulders
- Potential for restriping the road
- Wide designated right of ways
- Projects scheduled for future roadway improvements
- Eliminating short gaps in the existing sidewalk network
- Repairing older sidewalks
- Improving ADA accessibility in vital locations
- Adding high visibility crosswalks
- Streetscape improvements/buffering from traffic (i.e. adding street trees)
- Pedestrian and bicycle signage
- Trail connections at key locations

Network/Transit Connectivity

Identifying routes that increase the connectivity of the network is a vital component of the Network Plan. The desired goal is to eliminate gaps in the existing network, with an eye toward achieving a system of facilities that is fully interconnected.

- Connecting to existing trail and on-road networks.
- Connecting to private developed trail networks.
- Connecting to destinations such as commercial areas, recreation facilities, neighborhoods and schools.
- Addressing intersection issues within the on-road network.

Small Area Planning Public Support

The purpose of the Small Area Planning process in Anne Arundel County is to enhance the quality of life in communities, to help implement the goals and recommendations of the General Development Plan, and to promote citizen, business and County cooperation in the planning and development process. Within these plans, a section was devoted to identifying potential improvements for pedestrian and bicycle facilities, trails and greenways. This planning process provided a forum for public concern and comment in sixteen planning areas within the County. At the time of this writing, plans substantially completed and/or adopted include:

- | | | | |
|-----------------------------|---------------------|----------------------|------------------------|
| <i>Annapolis Neck</i> | <i>Broadneck</i> | <i>Crownsville</i> | <i>Crofton</i> |
| <i>Edgewater/Mayo</i> | <i>Severna Park</i> | <i>BWI-Linthicum</i> | <i>Deale/Shadyside</i> |
| <i>Jessup/Maryland City</i> | <i>Odenton</i> | <i>Severn</i> | <i>South County</i> |

The remaining small area plans are currently underway. They include:

- | | | | |
|--------------------|----------------------|-------------------|------------------------|
| <i>Glen Burnie</i> | <i>Brooklyn Park</i> | <i>Lake Shore</i> | <i>Pasadena/Marley</i> |
|--------------------|----------------------|-------------------|------------------------|



These plans were used to gather public input regarding pedestrian and bicycle improvements throughout the County. For the areas that had not yet started their small area planning process, a special meeting was held to collect additional input regarding pedestrian and bicycle improvements.

Areas for Pedestrian Improvements

The purpose of identifying potential locations for pedestrian improvements is to develop a working pedestrian network that address gaps and critical areas that need physical improvements.

- Identify gaps in the existing sidewalk network
- Identify areas that need ADA accessibility in vital locations
- Identify high use intersections that need pedestrian improvements

4.2 Overview of the Network Plan

This Network Plan is a map produced as a part of the master plan process showing the locations of County routes, existing conditions and potential improvement areas. The map depicts Tier 1 recommended improvements, Tier 2 recommended improvements, recommended pedestrian improvement zones, signed shared roadways, corridor plan locations, existing trails, proposed trails, colleges and universities, schools, transit stations, streets, railroads, parks, county boundary, City of Annapolis, and major bodies of water. The following is a list of definitions regarding key items identified on the Network Plan.

Tier 1 Recommended Improvements:

These corridors are considered high priority locations for pedestrian and bicycle improvements. The specific type of improvement for each corridor will be determined by further investigation. Once improved, these routes will form the backbone of the on-road bicycle and pedestrian network.

Tier 2 Recommended Improvements:

These designated routes are also recommended for pedestrian and bicycle improvements when opportunities arise in the future to make such improvements.

Recommended Pedestrian Improvement Zones:

These areas are high priority locations needing pedestrian improvements. The improvement zones shown on the map will eliminate critical gaps in the network and improve safety for pedestrians. Although general types of improvements have been described for these areas (see Section 5.2), specific solutions for each zone will be determined by further investigation.

Corridor Locations:

The corridor locations were areas chosen for further analysis and to serve as examples (illustrative purposes only, found in Appendix A) of a variety of bicycle and pedestrian improvements.

Proposed Trails:

Depicts locations of proposed off-road trails in Anne Arundel County.



Existing Trails:

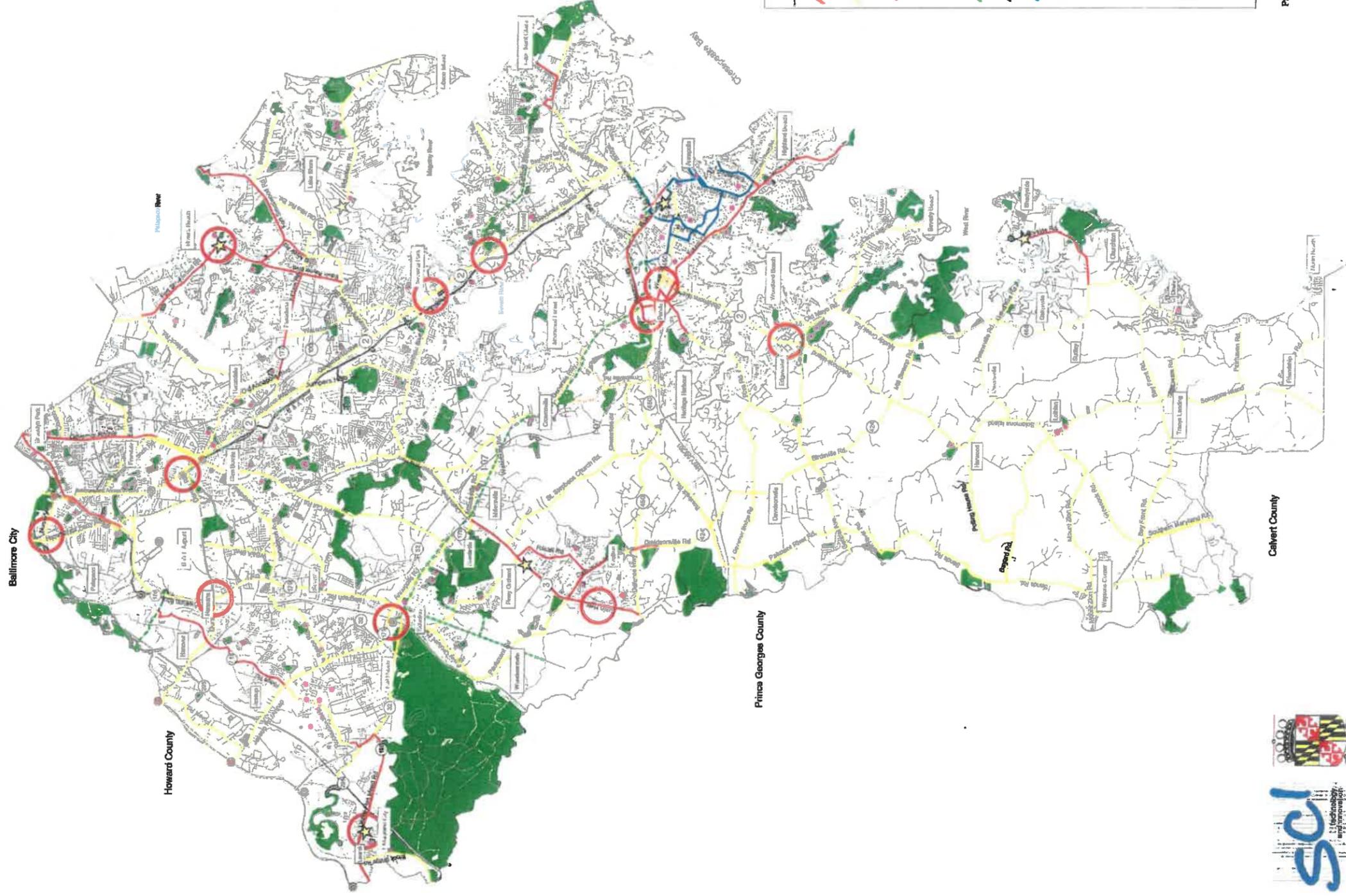
Depicts locations of existing trails in Anne Arundel County (primarily those that are suited for transportation use).

Signed Shared Roadways:

Existing roadways that have been designated by signage in order to caution motorists to share the road with bicyclists.

Anne Arundel County Pedestrian and Bicycle Master Plan

Pedestrian Improvement Zones and Prioritized Bicycle Route Network



SCI
Sustainable
Community
Infrastructure
PLANNING AND ENGINEERING

Calvert County

Prince Georges County

Baltimore City

Howard County

Prepared for: Anne Arundel County
January 2003
by Sprinkle Consulting, Inc
535 Main St. Suite 211
Laurel, MD 20707

Sprinkle Consulting, Inc.



4.3 Network Recommendations

The Tier 1 Recommendations shown on the network map indicate important segments that need to be retrofitted in order to better accommodate walking and bicycling. These routes are the highest on the list for pedestrian and bicycle improvement projects. They were selected because they connect to key destinations throughout the County, and represent some of the most important (and often difficult) areas where bicycle access is needed. Even though some of the Tier 1 routes are located on State roads, they are still key components to building the core network for pedestrian and bicycle transportation. The public has noted that proposed improvements on State routes will improve the overall connectivity of the route network and provide immediate access to a variety of destinations. It is also necessary to suggest state roads for improvements to denote that state roads are vital components within the Anne Arundel County Route Network.

The Recommended Pedestrian Improvement Zones are areas designated as potential places for pedestrian oriented redesign. The areas chosen were based upon small area plan recommendations, public participation and fieldwork. These improvement zones will be vital network connections and immediately improve pedestrian safety.

Design solutions for these roadways will range from simple low cost solutions to complex engineering and design projects. Below is a list of Tier 1 Recommendations and Recommended Pedestrian Improvement Zones. Please note that some of the Tier 1 Recommendations are also listed as high priority routes designated by the Baltimore Regional Transportation Board (BRTB) in its bicycle, pedestrian and greenway plan.

Tier 1 Recommended Improvements

Area of Anne Arundel County	Tier 1 Recommendations
Annapolis Area (County)	<i>Northern Loop</i> from Defense Highway along Housley Road to Generals Highway, then along Bestgate Road and Ridgely Avenue to Taylor Avenue. (BRTB Plan)
Annapolis Area (County)	<i>Riva Rd.</i> from Aris T Allen Blvd. To West St.
City of Annapolis	<i>King George St.</i> from Taylor Ave. to College Ave.
Annapolis Area (City and County)	<i>Forest Dr</i> / <i>Chinquapin Round Rd.</i> / <i>Bay Ridge Rd.</i> / <i>Arundel on the Bay Rd.</i> from Solomons Island Rd. and West St. to Arundel on the Bay.
Parole Area	<i>Riva Rd.</i> From West St. to Annapolis S.H.S.
Parole Area	<i>Parole Area.</i> From Solomons Island Road along West St. and Generals Highway to Bestgate Road, and from West Street along Defense Highway to Housley Road.
Cape St. Claire	<i>College Parkway</i> from Saint Margarets Rd. (MD 179) to Sandy Point State Park (BRTB)
Pasadena Area	<i>Mountain Rd.</i> from Hogneck Rd west to Old Annapolis Blvd.
Lake Shore Area	<i>Hogneck Rd.</i> From Ft. Smallwood Rd. to Mountain Rd.



Lake Shore Area	<i>Edwin Raynor Blvd. From Ft. Smallwood Rd. to Magothy Bridge Rd.</i>
Riviera Beach	<i>Ft. Smallwood Rd. From Marley Neck Rd. to Ft. Smallwood Park</i>
Shadyside Area	<i>Shadyside Rd. from Shadyside Park to Deep Cove Road</i>
Crofton Area	<i>Crain Highway from Millersville Rd. to Defense Highway. (BRTB)</i>
Crofton Area	<i>Davidsonville Rd. from Crain Highway to Defense Highway</i>
Crofton Area	<i>Reidel Rd. From Davidsonville Rd. to Crain Hwy.</i>
Laurel/Maryland City Area	<i>Laurel Fort Meade Rd. (Rt. 198) from the Prince George County line to Route 32 & Rockenbach Rd</i>
BWI Airport Area	<i>Ridge Rd. to MD 100</i>
Brooklyn Park Area	<i>Belle Grove Rd. from Governor Ritchie Hwy to the B&A Trail (BRTB)</i>
Brooklyn Park Area	<i>Governor Ritchie Highway from Belle Grove Rd. to Furnace Branch Rd. (BRTB)</i>

Recommended Pedestrian Improvement Zones

Area of Anne Arundel County	Recommended Pedestrian Improvement Zones
Woodland Beach/Edgewater	Solomons Island Road between Central Ave. and Mayo Rd.
Arnold/Severna Park Area	College Parkway and Governor Ritchie Highway (Rt. 2) connection to the B&A Trail.
Severna Park Area	Intersections of Mckinsey Rd. and Governor Ritchie Highway (Rt. 2)
Gambrills	Crain Highway between Davidsonville Rd. and Defense Highway
Odenton	Annapolis Rd.-Connections to MARC and proposed Town Center.
Riviera Beach	The intersection of Fort Smallwood Rd and Bar Harbor Rd.
Glen Burnie	The intersection of Dorsey Rd and B & A Blvd.
Near Baltimore City	Intersection of Hammonds Ferry Rd. and Nursery Rd.
Near BWI Airport	Intersection of Dorsey Rd and Aviation Blvd.
Laurel/Fort Meade	Intersections of Laurel/Fort Meade Rd (Rt 198) and Corridor Rd/Russet Green East Rd.
Parole/Annapolis Area	West St. between Solomons Island Rd and Riva Rd.
Parole Area	Areas to include various intersections and corridors along Generals Hwy/Defense Hwy /West St/Bestage Rd.



Next Steps

- Conduct a **Bicycle Level of Service** analysis on Tier 1 Recommended Routes and recommend design treatments during improvement projects (see Appendix A: Conceptual Corridor Plans for examples).
- Conduct more detailed design studies for intersection locations.
- Implement projects independently and in conjunction with roadway improvements.



Section 5: Conceptual Corridor Plan

As described in Chapter 4, the Pedestrian Improvement Zone and Prioritized Network Plan identifies locations for future pedestrian and bicycle improvements. Seven corridor locations were chosen for more detailed analysis and to serve as examples (illustrative purposes only, found in Appendix A) for bicycle and pedestrian improvements. These areas were chosen based on the following factors (order does not indicate importance).

- **Public Input** – locations that received a high level of public support for pedestrian and bicycle improvements either in the Small Area Plans or during the public outreach efforts organized held for this Plan.
- **Network/transit connectivity** – projects that would eliminate critical gaps in the existing network, with an eye toward achieving a system of facilities that is fully interconnected, both within the study area and to transportation networks in adjacent jurisdictions.
- **Poor conditions/high demand** – locations with poor conditions that exhibit a high level of demand for bicycling and walking based on nearby destinations
- **Ease of implementation** – locations where opportunities exist to develop bicycle and pedestrian facilities at a reasonable cost.
- **Fieldwork**– fieldwork was conducted by the consulting team to verify existing conditions and potential for bicycle and pedestrian improvements.

Each bicycle corridor study includes a description of the corridor, existing roadway conditions and the proposed improvements. A table showing the before and after Bicycle Level of Service score for each corridor is also included. The majority of the proposed bicycle improvements can be implemented in the short term and include restriping and resurfacing of the roadways to provide more space for bicyclists. These improvements should include the appropriate signs and pavement markings (per the MUTCD and AASHTO Guide for Development of Bicycle Facilities). The potential pedestrian improvements identify problem areas within each corridor and recommend design solutions, focusing on a number of typical problems that exist throughout the County. The following roads were identified as corridor plan study areas.

List of Corridor Plan Study Areas:

□ **Davidsonville Road (MD 424) – Crofton**

This location was identified in the Crofton SAP, and was verified (through field work) as a needed connection to a variety of destinations.

□ **Shadyside Road - Shadyside**

This location was identified in the Deale/Shadyside SAP, and was verified (through field work) as a needed connection to a variety of destinations. This corridor



also provides an example of how to potentially redesign similar semi-rural roads in the South County area.

□ **Laurel/Ft. Meade Rd (MD 198) - Jessup/Maryland City**

This location was identified in the Jessup/Maryland City SAP, and was chosen because it shows an example of an opportunity to upgrade pedestrian and bicycle facilities at a relatively low cost. Citizens also showed strong support for this corridor at a public meeting.

□ **Roscoe Rowe Blvd. (MD 70) – Annapolis**

This area was chosen through consultation with the City of Annapolis. It provides an opportunity to connect commuter vehicle lots at the Navy Stadium to the downtown area. Fieldwork showed that this corridor was a potential candidate for a cost-efficient restriping project. Currently, the corridor bridges are proposed to be redesigned.

□ **Mountain Road (MD 177) – Lake Shore**

This corridor area was chosen after the initial public meeting in Glen Burnie. Citizens supported pedestrian and bicycle improvements in this corridor due to the existing hazardous conditions. The corridor also connects a variety of different land uses.

□ **Intersection of Waugh Chapel Rd and MD 3 – Gambrills**

This location was identified in the Crofton SAP. During the Master Plan process, there were numerous public suggestions regarding the potential for redesigning this route to connect the newly developing communities to each other and to the surrounding amenities.

□ **Fort Smallwood Road Intersection – Riviera Beach**

The people participating in public meeting about the Plan in Pasadena strongly recommended pedestrian and bicycle improvements in this area. The need for improvements were verified by fieldwork.

See Appendix A for detailed Corridor Plans and Appendix B: for Bicycle Level of Service Descriptions.

5.1 Potential Bicycle Improvements

The following facility types are recommended for on-road routes identified by this Plan.

□ ***Shared Lanes***

Since bicycles have a legal right to use the roadway system (except limited access freeways), all roads have shared lanes. For streets with low traffic volumes and slower motor vehicle speeds, bike lanes may be unnecessary. Shared lanes may adequately serve bicyclists needs on these roadways. Bicycle route signs can be erected if these streets serve as important connectors.

Policy on "Share the Road" Signs

"Share the Road" signs are sometimes used on a *temporary basis* in locations where bicyclists should be expected, but where improvements have not yet been



made to accommodate bicycle travel. The County's policy is to use these signs as a temporary device (to be used on a case by case basis) in locations where bicyclists are known to ride in areas with high speed and/or high volumes of motor vehicle traffic on narrow cross sections. The precedent and purpose of these signs is established in the Manual on Uniform Traffic Control Devices.

- **Wide Outside Lanes**
Curb lanes that are 14' wide (exclusive of the gutter pan) can provide more space for motorists to share the road with bicyclists. Since a standard travel lane is 12' wide, the wide outside lane provides an extra 2' of maneuverable space. Wide curb lanes typically serve the needs of advanced cyclists on urban roadways, but may also have a detrimental effect of higher motor vehicle speeds due to added lane width.
- **Paved Shoulders**
Like bike lanes, paved shoulders for bicycle use should also be located on both sides of the road. Paved shoulders serve bicyclists of all skill levels, and in rural areas they can also provide a place for pedestrian travel. In urban areas, paved shoulders can serve as an interim facility in places where there is not enough space for a standard bike lane. There is no minimum width for paved shoulders, however a width of at least 4' is required if the facility is publicized as a bike lane and road construction is required.
- **Bike Lanes**
A bike lane is a portion of the roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes in urban areas are intended to meet the needs of basic bicyclists by providing them with adequate riding space and a higher level of comfort. Bike lanes are always located on both sides of the road (except one way streets), and carry bicyclists in the same direction as adjacent motor vehicle traffic. The minimum width for a bicycle lane is 4' excluding the gutter.
- **Multi-Use Trails**
Multi-use trails are an important component of a bicycle and pedestrian transportation system, because they can provide a high quality walking and bicycling experience in a more protected environment that is separated from traffic. Trails can encourage people to begin using their bicycles for transportation. After gaining some experience, they may become more confident in their ability to use on-road bikeways. Trails also can provide connections to the existing on-road bicycle network and create new opportunities for bicycle and pedestrian travel where they did not exist before.

Design standards and guidelines for bicycle and pedestrian facilities are available from a variety of sources. Designers should consult these following documents when planning and designing bicycle and pedestrian facilities.

- *A Policy on Geometric Design of Highways and Streets, AASHTO*
- *Guide for the Development of Bicycle Facilities, AASHTO*



- *Manual on Uniform Traffic Control Devices for Streets and Highways, USDOT, Federal Highway Administration*

5.2 Potential Pedestrian Improvements

The following pedestrian facilities are recommended within this Plan.

- ***Sidewalks***
While many of the older communities within Anne Arundel County have sidewalks (such as Downtown Annapolis), many other communities were built without them. Sidewalks (5' minimum width recommended) are essential in order to provide connections throughout the community.
- ***Intersection Improvements***
Street intersections are perhaps the greatest barrier that pedestrians face in Anne Arundel County. The lack of pedestrian safety at intersections inhibits walking. Improvements such as high visibility crosswalks, wheelchair ramps, curb extensions, and center median refuge areas will be needed to better accommodate people on foot.
- ***Traffic Calming***
Perceived high-speed traffic on residential and local streets creates apprehension and anxiety for both pedestrians and bicyclists. Slower motor vehicle speeds enhance safety, and should therefore be encouraged in areas that attract pedestrians and bicyclists, such as near schools, shopping areas and residential areas. Traffic calming is a form of roadway engineering that is gaining in acceptance throughout the United States. Traffic calming uses a variety of roadway design techniques to slow traffic, including interrupted sight lines, narrower traffic lanes, changes in street surface, speed tables, curb extensions and traffic circles.

5.3 Facility Maintenance Program

Maintenance of bicycle and pedestrian facilities is a major concern for Anne Arundel County. As more facilities are built, the burden of maintaining these facilities will become greater. However, just as roadways are maintained for motorist safety, facilities for non-motorized transportation must be maintained as well. Fortunately, Anne Arundel County Parks and Recreation already has a comprehensive maintenance program in place for its County trails and the Public Works Department currently sweeps all curbed County roadways. Appendix D contains more information on bicycle and pedestrian maintenance issues and recommendations for future roadway corridor maintenance as the Bicycle and Pedestrian Network grows.



Section 6: Policies and Procedures

This part of the plan recommends changes to policies and procedures to improve the planning, development, and management of bicycle and pedestrian facilities in Anne Arundel County. The chapter focuses on planning; the zoning, subdivision and site development regulations, including the County's Design Manual; the Capital Budget and Program (CIP)¹; and maintenance issues. The objectives of the recommendations are to:

- ***Integrate pedestrian and bicycle issues more fully into all levels of the planning and development process in Anne Arundel County.***
- ***Ensure that planners, designers, and reviewers consider the full range of design elements that are important in the creation of pedestrian and bicycle-friendly communities and places.***
- ***Improve the content and organization of regulatory requirements so that pedestrian and bicycle considerations are incorporated at all levels of decision making.***

In this Section, policies are the goals, objectives and recommended actions that form the basis for decisions affecting the development of bicycle and pedestrian facilities. Procedures are the various ways these policies are implemented.

6.1 Recommendations for Existing Planning Documents

Plans provide the policy basis for many of the regulations and procedures that affect walking and bicycling in Anne Arundel County. Important planning documents are the General Development Plan (GDP), Small Area Plans (SAP), and other specialized plans. Below is a discussion of plans that have an impact on bicycle and pedestrian policies and procedures.

General Development Plan

Anne Arundel County's General Development Plan (GDP), adopted in 1997, is the County's official policy document guiding decisions relating to future growth, development, resource management, and provision of services in the County. Although the GDP does not have a separate pedestrian-bicycle element, its policies are generally strong with respect to bicycle and pedestrian transportation, especially in supporting improved connections among different land uses, and in calling for revisions to regulations to help achieve such improvements. Under County law (Code Art. 24 §1-103) the Office of Planning and Zoning must review the GDP every five years.

¹ Formally known as the Capital Budget and Program, this document is more commonly known and referred to as the CIP (Capital Improvements Program).



Policy Recommendation

Strengthen the policies in the GDP to serve as the foundation for implementing regulations.

Action 1: Community Design (GDP, Part 2 Chapter 5 Section B) - Incorporate a policy regarding the central importance of pedestrian and bicycle mobility to community design.

This policy would further strengthen the GDP's concepts and guidelines for community design and development².

Action 2: Transportation (GDP Part 2 chapter 5 Section C) - Incorporate a policy regarding the importance of integrating pedestrian and bicycle issues into all levels of planning, project design and development and maintenance.

Pedestrian and bicycle facilities are not currently given adequate consideration in the public and private sector project design and review process. This policy would serve as the foundation for procedures to improve this situation.

Action 3: Mixed Use - Evaluate the effectiveness of mixed-use development district regulations in promoting mixed-use development in the County with provisions for multi-modal transportation.

Encouraging mixed-use development is a major theme of the current GDP. The GDP recognizes that mixed-use developments are more conducive to walking and bicycling compared to communities where origin and destination points are separated by distances or other barriers to pedestrians and cyclists. In July 2001, the County adopted amendments to the Zoning Regulations (Bill No. 29-01) to promote Mixed Use Development Districts at locations identified in Small Area Plans. Time is needed to allow these new regulations to work, but the next GDP should evaluate the effectiveness of the existing and new regulations and whether modifications are needed.

Small Area Plans and Special Plans

It has been the County's policy to prepare special plans to help guide land use and transportation decisions³. When adopted by the County Council, special plans are listed in the County Code (Art. 24, §1-102) among documents used in the future development of land and the location of public facilities and services. Some of these plans include a bicycle and/or pedestrian element, but the plans vary significantly in the amount of attention each pays to bicycle and pedestrian issues, and are not consistent in their approaches. To ensure consistency in these plans' approaches, the following action is recommended:

² See Appendix 1 of the GDP.

³ These special plans include 16 Small Area Plans that cover the entire County; the Glen Burnie Urban Renewal Plan (1980); the Parole Urban Design Concept Plan (1994 as amended); the Parole Pedestrian and Bicycle Plan (1999 – advisory document, not formally adopted by County Council); the MD Route 175 Roadway and Streetscape and Odenton Town Center Master Plan (1999 – advisory document, not formally adopted by County Council); and the Greenways Master Plan (in preparation).



Action 4: *Adopt a checklist of pedestrian and bicycle considerations to be addressed in the remaining small area plans to be completed, future small area plan revisions and special plans.*

A checklist would serve as a guide for people charged with developing the plan, and ensure that all special plans give comprehensive and consistent consideration to walking and bicycling. The checklist could be adopted administratively and should include the following topics:

- Existing conditions (pedestrian and bicycle audit) assessing the degree to which the study area displays the following characteristics of pedestrian and bicycle friendly areas: supportive land use patterns; linkages to a variety of land uses; continuous connecting systems; pedestrian separation from traffic; well-functioning facilities; designated space; security and visibility; pedestrian and bicycle furnishings; and accessibility by all users;
- Review of previous plans/studies/recommendations (if any);
- Specific concerns arising from the audit, such as access to schools, parks, and other community facilities (libraries, churches), business areas; safety issues;
- Relation/connections to areas around the study area;
- Priority projects;
- Maintenance issues;

6.2 Zoning Ordinance, Subdivision Regulations and Design Manual

The Zoning Ordinance, Subdivision Regulations, and Design Manual are the three documents that have the most effect on pedestrian and bicycle facilities in Anne Arundel County. Through these regulations the County manages both the location and type of development that occurs (including density and intensity) as well as the design, layout and construction of sites and facilities. The Zoning Ordinance governs how land is used and the Subdivision Regulations govern how property parcels are developed⁴. The Design Manual sets forth procedures, standards, and criteria to be used by planners, engineers, and other design professionals in preparing designs and construction documents for approval by the County⁵. Unlike some jurisdictions, Anne Arundel County does not have a distinct set of site development or land development regulations containing consolidated requirements for design. Anne Arundel County's Zoning Regulations are unusual (compared to many other Maryland county codes) in that they

⁴ The Zoning Ordinance is Article 28 of the Anne Arundel County Code. The Subdivision Regulations are Article 26 of the Code. In this Plan, for simplicity, we refer to the Zoning Ordinance as the Zoning Regulations.

⁵ Often thought of as a single document, the Design Manual actually comprises two sets of two documents each: the Design Manual comprising i) the Design Manual; ii) A Supplement to the Design Manual; and the Standard Specifications and Details for Construction comprising, i) Standard Details for Construction; and ii) Standard Specifications for Construction. Although the Design Manual comprises the first two documents only, the Standard Details and Specifications are used in close conjunction with the Design Manual. In this Plan we refer to all four documents collectively as the Design Manual. The Design Manual covers the full range of construction design from right-of-way and land acquisition, to water and sewer, landscaping and buildings. The Design Manual is adopted administratively pursuant to responsibility delegated by ordinance, resolution, and executive or administrative order.



contain some design instructions that are more typically found in subdivision, land development or site plan regulations⁶.

Overall Assessment

The County has made recent amendments to the Zoning Regulations addressing pedestrian and bicycle needs. The mixed-use development regulations adopted in July 2001, strongly emphasize pedestrian and bicycle access⁷. Also, in March 2000, new language was added to the commercial and industrial sections of the Zoning Regulations requiring pedestrian and bicycle-oriented site layout. Overall, the Zoning and Subdivision Regulations and the Design Manual remain limited in their support of pedestrian and bicycle mobility:

- Regulations relating to pedestrian and bicycle mobility are scattered throughout the Zoning Regulations, are inconsistent from zoning district to zoning district, and are hard to follow.
- There is little practical guidance on how to design an enjoyable walking environment in residential areas.
- The pedestrian and bicycle requirements for commercial and industrial districts are different from what is required under the newly adopted mixed-use regulations.
- The regulations for Planned Unit Developments lack detailed and specific standards for walking and bicycling⁸.
- The roads components of the Design Manual are oriented almost exclusively to the needs of motor-vehicles. As a result, the needs of pedestrians and bicyclists are not sufficiently considered during the design process and often go unmet.
- Design issues are particularly important for pedestrians and cyclists. A myriad of design issues need to be considered in developing safe, comfortable, and attractive places to walk and bike. The Design Manual does not give adequate guidance for how to implement the Zoning and Subdivision regulations' requirements with respect to pedestrian and bicycle facilities.

⁶ The Zoning Regulations do contain a Site Plans section, Art. 24, at Title 15, but this section applies to only a limited set of development types.

⁷ See especially Art 28, §6-534 to §536 .

⁸ Nevertheless, more pedestrian and bicycle facilities such as sidewalks and off-road trails are provided in PUDs than in standard subdivisions. This appears to be a function of the PUD developers' desire to provide "amenities" in these developments, and the additional design review that is required for PUD approval compared to other types of development.



To address these deficiencies the following policy is recommended:

Policy Recommendation

Amend the Zoning Ordinance, Subdivision Regulations, and Design Manual to improve conditions for walking and bicycling in Anne Arundel County.

Discussion

The way the County's regulations are structured makes it difficult to easily incorporate new regulations addressing the needs of pedestrians and bicyclists. Facility and design considerations for bicyclists and pedestrians need to be fully integrated into all aspects of project design and development, not merely "added in" as a set of supplementary considerations.

This Plan's approach to making these changes is to put *general requirements* to address bicycle and pedestrian needs in the Zoning and Subdivision Regulations and to place the *detailed design provisions* in appropriate sections of the Design Manual. In order to ensure consistency between different zoning districts in the Zoning Regulations, this would mean moving some of the detailed site layout design requirements relating to pedestrian and bicycle facilities that are currently in the Zoning Regulations into the Design Manual.

This proposed approach is favored over simply amending the language in the current Zoning Regulations or recommending the creation of a new stand-alone design section in the Code for the following reasons:

- 1) Amending the current Zoning Regulations would require adding detailed language in each of the over 25 different zoning and special districts, which would be legislatively cumbersome and give undue weight to bicycle and pedestrian considerations.
- 2) Including design requirements for pedestrian and bicycle accommodations demonstrates that roads are transportation facilities, not merely automobile conveyances.

Some communities such as Portland, OR, Wilmington, DE, and Birmingham, AL have developed detailed, stand-alone, pedestrian and bicycle design guidelines. In the future, Anne Arundel County should develop such guides. However, in the short term, amendments and additions to existing documents would be more easily developed and simpler to integrate into existing regulations.

Zoning and Subdivision Regulations:

Action 5: Incorporate general requirements to address pedestrian and bicycle needs into the Zoning and Subdivision Regulations.

The general requirements should be consistent in different sections of the regulations and require the following:



1) Provide pedestrian and bicycle facilities as part of site design or subdivision. The existing language in the commercial and industrial zoning districts that was adopted in 2000 could be adapted for use in the other zoning districts. This language reads: "Convenient functional linkages shall be achieved by providing vehicular, bicycle, and pedestrian connections to promote the circulation and flow of vehicles, bicycles, and pedestrians between the development and existing uses."

2) Make pedestrian and bicycle considerations integral to the development layout.

3) Connect to existing pedestrian and bicycle facilities and destinations in the vicinity of the proposed development. The vicinity would vary depending on the size and scale of the development, and could be defined further in the Design Manual. Destinations would include schools, recreation facilities, open space, community facilities, and transit.

4) Use the Design Manual as a guide to locating and designing pedestrian and bicycle facilities to achieve the above three requirements.

Table 1 identifies the specific sections of the Zoning and Subdivision Regulations that should be reviewed for changes to address pedestrian and bicycle requirements in all land use and development types.

Table 1: Sections of the Zoning and Subdivision Regulations to be Reviewed for Possible Amendments to Accommodate Pedestrian and Bicycle Needs

Land Use/ Development Type	Code Sections Where References Should Be Revised Or Added	Notes
Parole Town Center, Odenton Town Center	Zoning Regulations: Art. 28, §1B & §1C, Art. 28 §15-102.(a)(6), §15-104A, and §15-104B	Section 15 is the Site Plans section of the Zoning Regulations.
Residential Districts	Subdivision Regulations: Art. 26, §2-203 Pre-submittal Art 26, §2-304 Contents of Sketch Plan Art 26, §3-201 Highways Streets and Roads	Unnecessary to include requirements in the Zoning Regulations since all residential developments would either go through subdivision or be covered under other regulations such as PUD or Town Center regulations. Important to consider pedestrian and bicycle provisions at the sketch plan stage so that needs are considered in initial designs. It is also important to allow for review at "final" plan stage since some types of projects skip the sketch plan stage and make their initial plan submittal as a final plan.
Commercial and Industrial zoning districts	Zoning Regulations Titles 3 and 4: Site layout requirements of each district e.g. Art. 28 §3-107, §3-209, §3-309, §3-408. Subdivision Regulations: general requirements per Residential Districts plus Art 26, §4-206 Street System	Add to the existing language: "Convenient functional linkages shall be achieved by providing bicycle and pedestrian connections..."
Special Exceptions Maritime Districts Town Center Districts Suburban Community Centers	Zoning Regulations Art. 28 §15-102.(a)(6)	§15-102 is the required information section. Rather than include all four requirements here, some of the requirements could be added to Art. 28, §15-101.
Planned Unit Developments	Zoning Regulations	This is the Conceptual Development Plan and Report section.



Mixed Use	Art. 28 §13-103(b) Zoning Regulations Art. 28 §6-531 to §6-536	These are sections of the regulations adopted in July 2001.
Parking	Zoning Regulations Art. 28 §7-101 §7-103	
Subdivisions	Art. 28, §1-104 (2)	Consideration should be given to adding language to the legislative intent section of the Subdivision Regulations that the intent is to provide access for pedestrians and bicycles. The intent section of the Zoning Regulations is very brief and less suited to amendment.

Action 6: Adopt bicycle parking requirements. Providing secure parking is a key ingredient in efforts to encourage bicycling. The lack of secure place to leave bicycles discourages potential cyclists from making bicycle trips. A three-part strategy is recommended to implement bicycle parking.

1) *Bicycle parking requirements should be added to the Zoning Regulations so that adequate bicycle parking is provided in new development.*

General bicycle parking requirements should be added to the Zoning Regulations at Art. 28, Title 7 (Off-Street Parking) and include:

- Requirement to provide bicycle parking.
- Required number of bicycle spaces.

Typical requirements used around the U.S. include: for commercial uses, places of assembly, and recreation facilities, one bicycle space per ten to 20 auto spaces (depending on expected use); for schools and colleges, one space per four to ten students; and for multi-family dwellings one space per dwelling unit (see sample ordinances in appendix).

Bicycle parking design requirements should be included in Landscape Manual¹⁰, per the Association of Pedestrian and Bicycle Professionals Bike Parking Standards.

Bicycle parking should be installed along roads and at public destinations (e.g. at schools, libraries, government offices, parks, parking garages, and transit hubs). Businesses should be encouraged to provide bicycle parking for their customers and employees.

Design Manual

As discussed above, a myriad of design issues need to be considered in developing safe, comfortable, and attractive places to walk and bike. With respect to bicycle and

⁹ The regulations contain good, general design prescriptions for pedestrians. The language for bicycles, however, could be strengthened. The following specific provision should be reconsidered as it could produce unsafe conditions for pedestrians; Art. 28 §6-536.(B) states that "Walkways shall be designed to accommodate bicycles as well as pedestrians, with facilities for the temporary storage of bicycles".

¹⁰ Art. 28, §7-102 refers to the Landscape Manual for off-street parking design standards. The Landscape Manual is a stand-alone document prepared by the Office of Planning and Zoning, serving as Chapter X of the County's Design Manual.



pedestrian issues, the two key parts of the Design Manual are the Manual itself and the Standard Details for Construction. Key design provisions that should be incorporated into the Design Manual are discussed in this section. To ensure design issues are addressed comprehensively, this Plan recommends the following:

Policy Recommendation

Incorporate detailed design standards and guidelines for pedestrian and bicycle facilities into the Design Manual.

General Design Manual Provisions

Action 7: Reference design guides, special plans and studies in the Design Manual.

1) Reference as a guide for designers the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities (1999).

The Guide would supplement the Design Manual's existing reference to AASHTO's A Policy on Geometric Design of Highways and Streets (often referred to as the Green Book). The Guide for the Development of Bicycle Facilities covers a broad range of design issues including different types of bicycle facilities, lane markings, intersection treatments, and design criteria for off-road trails.). AASHTO is currently preparing a similar guide for the development of Pedestrian Facilities, which should also be referenced when complete. Suggested location: Design Manual Chap III.I (General).

2) Reference special plans and studies to be used when considering pedestrian and bicycle facilities.

The Design Manual already cites the GDP (Chap. III. Sec. II.B.4), and the County Code cites not only the GDP but the approved Small Area Plans to be used as guides in decision making (Art 24, §1-102). The Design Manual would reinforce use of these documents by citing them and should also reference this Pedestrian and Bicycle Master Plan, including the facilities network plan. Other special plans such as the Parole Pedestrian and Bicycle Plan (1999), MD Route 175 Roadway and Streetscape and Odenton Town Center Master Plan (1999), and the Greenways Master Plan could also be referenced. Suggested location: Design Manual Chap III.II (Design Criteria).

3) Add a general statement describing the need for flexible and context-sensitive roadway design practices.

This will give designers and the County the flexibility to adjust design to fit particular circumstances. The Manual already gives overall flexibility to the County in design decisions, but specifying the context sensitive aspect of designing facilities for pedestrians and bicycles would be advantageous. For example, where right-of-way is limited, choices may need to be made between desirable design features such as sidewalks, buffers and their respective widths. Generally, a sidewalk without a buffer is preferable to no sidewalk at all, but



these decisions require flexibility and consideration of the specific context.
Suggested location: Design Manual Chap III.II (Design Criteria).

Right-Of-Way, Standard Road Sections and Utility Easements

Action 8: *Revise standard road sections to better accommodate the needs of bicycles and pedestrians.*

(1) Include bicycle facilities on standard sections.

The design characteristics¹¹ of different road types in the County are shown on eight standard road sections in Section VI (Paving) of the Standard Details for Construction. None of the sections currently include bicycle lanes. Bicycle lanes (minimum width of 5-feet adjacent to a curb, 4-foot minimum on an open road section) or wide paved shoulders need to be shown on the standard paving detail for the appropriate road types so that they are considered for inclusion when roads are built or reconstructed, or even when roads are repaved and restriped. A Bicycle Level of Service (BLOS) analysis would be used as the basis for decisions regarding the inclusion and type of a bicycle facility to be designed on any given roadway (see Section 4).

(2) Revise standard road sections to specify five feet as the standard sidewalk width and to specify a minimum buffer width between roadway and sidewalk.

Four feet of sidewalk width is not wide enough for two people to walk comfortably abreast. Throughout the U.S. many communities are moving towards installing five-foot wide sidewalks as a standard. Further, the Design Manual's four-foot minimum sidewalk requirement meets the current, but not the proposed national recommendations for the Americans with Disabilities Act or AASHTO's national pedestrian design guidelines. These standard guidelines, which are expected to be adopted in 2003, will recommend five feet as a minimum sidewalk width. Although five feet might not be possible in all locations, the Design Manual should require five feet as the standard, and six feet where the sidewalk directly abuts a roadway curb (that is, where there is no buffer).

The Design Manual's standard details for paving do not specify a minimum buffer width between roadway and sidewalk. Generally a five-foot landscaped buffer is adequate where automobile traffic is light, but a buffer wider than five feet may be needed along busy roads. Shoulders, bicycle lanes, or on-street parking can also assist in buffering pedestrians from vehicle travel lanes. The Federal Highway Administration has developed new guidelines (Designing Sidewalks and Trails for Access, 2001) for sidewalk placement based on adjoining land use, which should be reviewed for applicability to Anne Arundel County.

Adding bicycle lanes, wide shoulders and wider sidewalks would increase the amount of impervious surface along roadways in the County by a small amount. Reducing impervious surface, in general, is a goal of the County and the State in order to reduce pollution from urban storm water runoff. The total increase in

¹¹ Right-of-way, pavement width, closed or open section, sidewalk etc.



impervious surface from new bikeways and wider sidewalk is likely to be very small compared to the miles of roadway in the County. Few roads will need wider pavement widths to accommodate bicycles due to low traffic volumes, existing shoulders or where a bicycle lane can be added through restriping, Bicycle Level of Service (BLOS) will likely be adequate without a new dedicated bicycle lane. In addition, any small increase in storm water runoff from pedestrian or bicycle facilities needs to be balanced against the environmental and health benefits of providing transportation alternatives that reduce vehicle trips as a result of more people walking and bicycling.

(3) Revise standard road sections to show wider right-of-way that may be needed in some cases to meet the needs of all users.

The Design Manual's standard road sections generally require a minimum of 60 to 80 feet of right-of-way. This width does not allow sufficient room for the needs of all users (motor vehicles, bicycles, and pedestrians) in all situations. As a result, when right-of-way is constrained, the needs of some users, often pedestrians or bicyclists, are compromised through narrow or non-existent sidewalk, reduced or non-existent buffers, disappearing shoulders at intersections, and/or lack of room for bikeways.

Acquiring more right-of-way can be costly and procedurally difficult and is therefore a very sensitive issue. There are options, however, for achieving a wider section width without acquiring more right-of-way. One option is to allow sidewalk and/or the sidewalk buffer to be placed outside the right-of-way in a "sidewalk easement" that allows for public access and maintenance. Another option is to reduce motor vehicle lane widths. On a case-by-case basis, decisions on road sections should take into account the desired bicycle and pedestrian level of service.

Action 9: Add a standard section for off-road trails into the Design Manual.

The Anne Arundel County Department of Recreation and Parks has standards for off-road trails¹² and the AASHTO's Guide for the Development of Bicycle Facilities (1999) also contains a typical section.

Action 10: Investigate the potential of modifying utility easement agreements to allow for shared use utility and trail development.

- 1) Trails can be built on existing utility easements, if a dual recreation use agreement is in place. A modification to existing utility easements would require the permission of each property owner with an easement along a particular corridor.*
- 2) When new easements are being negotiated in areas that have a high potential for future trail development, dual use easements should be pursued.*

¹² 11-foot base (10-foot wide trail section plus one foot to protect trail edges) with a two inch asphalt surface layer.

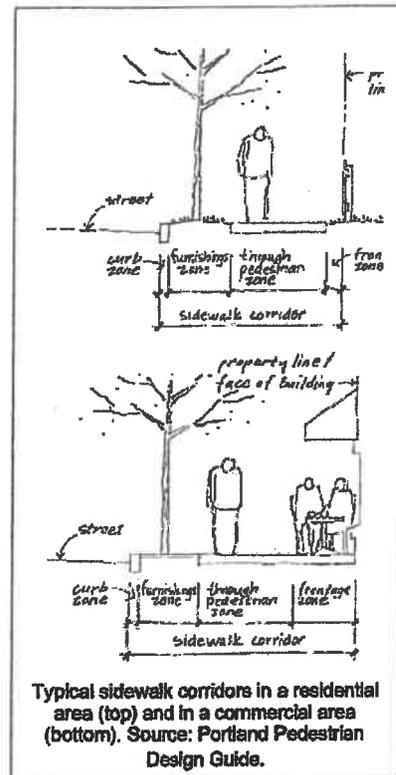


The Pedestrian Environment

Action 11: Add a new chapter to the Design Manual addressing the design needs of pedestrians.

This is not envisioned as a long chapter. It could even be a separate document like the Office of Planning and Zoning's Landscape Manual, which the Design Manual incorporates by reference. The chapter's purpose would be to give general guidance to designers and reviewers on improving the function of streets and sites for the comfort and enjoyment of pedestrians, balancing these improvements with motor vehicle capacity and safety interests. Although some of this guidance could be placed in existing chapters of the Design Manual, especially Chapters III, and XI¹³, no existing chapter is suitable for consolidating the full range of design issues so that the needs of pedestrians are fully considered at all stages of a project. It is into this proposed chapter that some of the general design language currently in the Zoning Regulations could be moved. Guidance that should be in this chapter includes:

- 1) General statement regarding the importance and value of design for pedestrians.
- 2) Direction to consider pedestrian issues at the earliest stage of project conception.
- 3) Definition of "vicinity" for purpose of identifying existing pedestrian and bicycle facilities and destinations in the vicinity of a proposed development (as described above, the requirement to address the vicinal connections would be in the Zoning Regulations).
- 4) General guidance for designing streets and sites to serve pedestrians including:
 - Low vehicle design speeds (traffic calming)
 - Street trees and landscaping (including root guard considerations)
 - Street furnishings
 - Narrow auto vehicle lanes
 - Reduced curb radii at intersections
 - Pedestrian (and bicycle) connections through to adjacent streets at the end of cul-de-sacs
 - Buffers for pedestrians from roadways
 - Lighting
 - Street intersection design
- 5) General guidance for commercial, business development regarding pedestrian access:



¹³

Chapter III covers Roads and Streets, Chapter XI covers Buildings.



- Placement of parking
- Delineated walkways through parking lots
- Direct access to the front of buildings from sidewalks and nearby transit connections
- Alignment of walkways for convenient and reduced travel distances
- Pedestrian connections between buildings on-site and adjacent properties
- Avoiding barriers (walls, ditches, landscaping or roads without safe crossings) to pedestrian and circulation between buildings on and adjacent to development sites

Action 12: *Address sidewalk corridor design issues in the Design Manual.*

Chapter III of the Design Manual has a brief discussion of sidewalks that includes a reference to the need to vary sidewalk width depending on pedestrian volume (Section II.F.5). The Design Manual should add specificity to the general design guidance in the proposed new chapter on pedestrian environment by describing or referencing the many factors that should be considered in designing attractive, safe, comfortable sidewalk corridors. A sidewalk corridor, for example, contains four distinct zones each with its own design considerations: the curb zone, furnishings zone, through pedestrian zone, and frontage zone.

Bicycles

Chapter III of the Design Manual (Section II.F.6) discusses bikeways, but in an ambiguous manner. Bicycle facilities need more detailed consideration in the Design Manual.

Action 13: *Revise and expand the treatment of bicycle facilities in the Design Manual*

- 1) *Use and define standard terms for bicycle facilities, and reconsider use of the term "bikeway".*

The Design Manual uses the term "bikeway" but it is not defined leaving ambiguity about what constitutes a bicycle facility. AASHTO's Guide for the Development of Bicycle Facilities describes bikeway as a "generic term for any road, street, path, or way which in some manner is specifically designated for bicycle travel...". Since bikeway is a generic term, the Design Manual should use terms in the AASHTO guide including "signed shared roadway", "bicycle lane", and "shared use path".

- 2) *Remove restrictions for bikeways on roads where the design speed exceeds 40 mph.*

The Design Manual¹⁴ currently places restrictions to bikeways on such roads. This is inconsistent with national standards and places severe limitations on the

¹⁴ Design Manual Chap III, Sec. II.F.6



County's ability to accommodate bicyclists where it is needed most. There is no precedent for this requirement, in fact, national standards recommend bike lanes in locations with higher design speeds, and therefore the restrictions should be revised. Currently, SHA policy has no design speed limitations for bikeway facility development. However, SHA does prohibit bicycle use on interstates, toll roads and in travel lanes on roadways posted speed limits of 50 mph and over

- 3) *Cite Bicycle Level of Service (BLOS) analysis as the basis for decisions regarding the design of a bicycle facility on any given roadway, including the most appropriate cross-section. (See Section 4 of this Pedestrian Bicycle Master Plan)*
- 4) *Use standard pavement markings and signs for bicycle facilities as described in the AASHTO guide (1999) and the MUTCD (2000).*
- 5) *Reference traffic signal loop sensors that can be triggered by bicycles and the use of bicycle-friendly drainage structures and covers.*

Drainage inlet grates are potentially dangerous obstacles to bicyclists if they are not bicycle-friendly. The County's Standard Details for Construction include a standard for a bicycle-friendly reticular replacement grate (type D/31 Type E & H Replacement), but it should also be referenced in the Design Manual.

- 6) *Include bicycle parking design requirements.*

These should include guidance for the appropriate location of bicycle parking areas on site, the design of bicycle parking areas, access requirements, lighting requirements, provision of racks in parking garages and other indoor parking areas. These requirements might be best added to the Landscape Manual, which contains the Design Manual's criteria for parking and loading spaces and for parking lot design (See Action 6).

Intersections

Action 14: *Expand the Design Manual's treatment of intersection design to accommodate the needs of all users.*

The Design Manual devotes a complete subsection to intersection design (Chap. 3 Section II.G). More detailed treatment is needed, however, to accommodate the needs of all users. Discussion of the following items should be added:

- Pedestrian and bicycle crossing measures at different types of intersections, including free right turn intersections, circles, driveways, and commercial entrances
- Measures to reduce crossing distance at intersections including designating tighter turn radii, and curb extensions
- Use of high-visibility crosswalks, including use of different street surface materials, and angled crosswalks through streets with medians.
- Lane markings for bicycles at different types of intersections



- Pedestrian refuge islands
- Mid-block crossings
- ADA Accessible curb ramps
- Pedestrian signal heads, including audible pedestrian signals for the visually impaired
- Guidance for shared use paths (off-road trails) when crossing roads
- Crossing times
- Pedestrian scale lighting
- Appropriate pedestrian signage

Buildings

Action 15: *Expand the Design Manual's section on buildings to address pedestrian access.*

Chapter 11 of the Design Manual (Buildings) includes a short section on design criteria for site plans (Chap. 11, II.B). This section should describe the importance of site planning for pedestrian needs, referencing the recommended new Design Manual chapter on general pedestrian environment and site design, and citing criteria such as direct access to the front of buildings from sidewalks, delineated walkways through parking lots, and pedestrian furnishings.

6.3 Project Design and Review

Bicycle and pedestrian facilities are designed and developed through the County's CIP and through the private development process (for subdivisions and site developments). The Department of Public Works (DPW) is the lead county agency for implementing capital projects. The Office of Planning and Zoning's Development Review Division is the lead agency for the review of private sector development proposals that can include bicycle and pedestrian facilities. The Department of Inspections and Permits also reviews private development proposals, and is the lead agency for some categories of projects that receive little or no review by the Office of Planning and Zoning.

Policy Recommendation

Optimize the project design and review processes to incorporate the needs of pedestrians and bicyclists in transportation projects, and to improve the level of interagency coordination with respect to pedestrian and bicycle project design and implementation.

Action 16: *Expand input from OPZ's Transportation Division, into project review.*

A particular strength of the current private sector development review process is the coordinated review by planners and engineers within the OPZ's Development Review Division. However, from a bicycle and pedestrian perspective, the Development Review Division would also benefit from expanded input from OPZ's Transportation Division. An expanded level of input would bring a broad perspective to the review of specific



development projects. As the County completes more Small Area Plans, these broader perspectives will become more important.

Action 17: Consider expanding the role of the Department of Inspections and Permits in reviewing projects for pedestrian and bicycle considerations.

The Department of Inspections and Permits is the lead review agency for a number of types of projects that do not go through lead review by the Office of Planning and Zoning. These include commercial developments that do not involve a subdivision or a site plan, and residential development on legally existing lots. Although such projects may be small, they can be important to the County's pedestrian and bicycle route networks. For example, they may form a gap between two subdivisions that provided a sidewalk along their street frontages. If the gap is not filled as part of development approval, the County's only option to complete the connection will be a capital project that may involve costly or difficult right-of-way acquisition.

Changes to the permitting process could involve a major level of effort, as the Department of Inspections and Permits reviews a very large number of projects. Amendments to Code Article 20 (Construction) would also be needed to ensure the Department of Inspections and Permits has clear legislative authority to require dedication of right-of-way or improvements along road frontage as part of project approval.

Considering the high level of effort that will be needed to change the permitting process (which would be primarily for non-commercial projects that don't go through review by the Office of Planning and Zoning), and the concern that such changes may result in only modest gains for the bicycle and pedestrian network. It is recommended that permit changes be pursued as a long-term goal. It is also recommended that the Pedestrian and Bicycle Coordinator become more familiar with the permitting process, particularly those projects that may have the potential to "fall through the cracks" during this process.

In order to address bicycle and pedestrian gaps, the Department of Inspections and Permits will need legislative authority to require right-of-way dedication and provision of facilities. These types of changes will enable the Department to require bicycle and pedestrians as a condition of permit approval.

Action 18: Revise project reviewer checklists to incorporate pedestrian and bicycle elements.

The County's project reviewers use checklists to ensure they consider the broad and complex range of regulations, policies, and procedures that need to be reviewed in any project. These checklists should be revised to include the pedestrian and bicycle elements discussed in this Section.



6.4 Capital Budget and Program (CIP)

The CIP is the County's land acquisition and facilities development program. It is the County's most important tool for the physical development of pedestrian and bicycle facilities. The following actions are recommended:

Action 19: Incorporate Tier 1 Recommended Areas and Designated Pedestrian Improvement Zones (as denoted on the Network Plan in Section 4 of this Plan) into the CIP.

Action 20: Incorporate pedestrian and bicycle elements into all capital projects.

Insufficient representation of bicycle and pedestrian interests in the project and design review process means that bicycle and pedestrian facilities are generally not given adequate consideration. The project design and review processes should be optimized to incorporate the needs of pedestrians and bicyclists in all capital projects from the outset of project design.

Action 21: Review potential restriping opportunities during all resurfacing projects.

Routine transportation projects such as resurfacing projects or intersection improvements can offer the opportunity to improve conditions for walking and/or cycling in a particular area. In some cases, based on Bicycle Level of Service, low cost improvements can be made through restriping that can greatly benefit pedestrians and/or bicyclists.

Action 22: Incorporate the Neighborhood Traffic Control program into the CIP.

This existing County program improves conditions for walking and bicycling through traffic calming. Including it in the CIP would give it greater prominence.

6.5 Maintenance

Pedestrians and bicyclists are very sensitive to the condition of their facilities. Attractive, well-maintained facilities attract users. A bicyclist who encounters frequent or recurring maintenance issues on their regular route may find biking too difficult or hazardous. The County has a model maintenance and management program for its trail system, but until recently, the County has done limited maintenance of on-street pedestrian and bicycle facilities. This is a function both of the County's currently limited pedestrian and bicycle network and of its sidewalk repair policy which states that repair of sidewalks is the responsibility of the property owner¹⁶. The County has made progress in the past few years initiating new maintenance-related capital projects including masonry reconstruction and the installation of sidewalk rootguard. Maintenance of pedestrian and bicycle facilities will become a very important issue as the physical network grows. The following actions are recommended:

¹⁶ Code Article 25, §4-112.



Action 23: *Establish a system to address both regular and remedial inspection and maintenance of the on-road and off-road network.*

The first step in developing a maintenance program is to identify what tasks need to be undertaken and who is responsible for each task. A maintenance schedule then lays out maintenance tasks and identifies the division or department that should have primary responsibility for each task. The Pedestrian and Bicycle Coordinator (as recommended in Section 3 of this Plan) should coordinate the execution of the maintenance schedule and be the point of contact for citizens with questions regarding maintenance.

Recommended maintenance practices include:

- Sweeping bicycle lanes and shoulders regularly to remove debris
- Surface repairs to provide a smooth surface, free of cracks, potholes, bumps and other physical problems
- Cutting back vegetation including intrusive tree roots to prevent encroachment
- Maintenance of bicycle signs, striping, and markings
- Maintenance of drainage facilities including catch basins and drainage grates
- Careful repair of utility cuts to prevent rough surfaces for cyclists
- Snow removal

(See Appendix D for more details)

A Facility Improvement Request Form would give citizens an easy means of reporting maintenance concerns supplementing or replacing the DPW's existing service request program. The form would allow citizens to notify the County about existing conditions affecting bicycling or of more general concerns or suggestions regarding bicycling in the County. The requests would be submitted to the Pedestrian and Bicycle Coordinator who would then refer the request to the appropriate division.

Action 24: *Work with the State Highway Administration to address the maintenance of sidewalk on state roads.*

In the past, responsibility for maintenance of sidewalk along state roads was not clearly defined. In recent years, SHA's policies on pedestrian and bicycle issues have been undergoing changes. Clear policies and procedures for maintenance should be established with the State being responsible for all transportation modes, including bicycling and walking, along its rights-of-way.



Section 7: Education and Safety Programs

Residents and visitors to Anne Arundel County currently receive a very limited amount of pedestrian and bicycle safety education. This is a concern, since bicycle and pedestrian injuries and deaths are a serious risk in the County, particularly for children and seniors. The following statistics were taken from the 2000 Anne Arundel County Bicycle Crash Report issued by Maryland SHA.

- ❑ *In the year 2000, the County recorded 72 bicycle-vehicle crashes and the City of Annapolis recorded 17 crashes for an average of 1.7 crashes per week.*
- ❑ *55 percent of the recorded crashes in the County involved children age 17 and under.*

The following section of the Plan provides an overview of the existing safety education programs for motorists, pedestrians and bicyclists. The chapter then recommends a series of actions to meet the bicycle and pedestrian education needs of county residents.

The *Baltimore Region Bicycle, Pedestrian and Greenways Transportation Plan*, approved in 2001 by the Baltimore Regional Transportation Board, set forward the following bicycle and pedestrian safety education milestone and actions:

"All elementary school students in the region will receive bicycle and pedestrian safety instruction by the year 2012".

The Plan also identifies the following actions:

- ❑ Offer effective cycling instruction classes for adult riders through local colleges and universities.
- ❑ Develop cycling information guides for local college students that contain safety tips.
- ❑ Launch an initiative to offer training to motorists on bicycle and pedestrian safety.

7.1 Recommended Actions

The following section recommends specific Anne Arundel County actions for pedestrian and bicycle education and safety programs. These goals are tailored to provide a basis of education for the Countywide population, and to meet the objectives of the regional plan as well.



Action 1: Work with the Maryland Office of Highway Safety to implement Maryland's new Bicycle and Pedestrian Curriculum for elementary school students (release expected in 2003).

Child pedestrians and bicyclists are a particularly vulnerable group. They often do not understand the rules of the road, and are unable to gauge the speed of oncoming traffic. Pedestrian and bicycle safety are basic skills that should be taught in Anne Arundel County Schools. This can be achieved either through the school systems physical education program or through volunteers. The first step in implementing this recommendation will be to conduct a "train the trainer" event in Anne Arundel County to unveil the new curriculum and teach instructors how to use it. Grants are available through the MD Highway Safety Office to support these activities.

Action 2: Establish an education and safety task force

The education and safety task force should confirm the key bicycle/pedestrian education and safety issues and audiences to be addressed, determine who is responsible for implementing the bicycle/pedestrian education and safety programs around the region, recommend necessary legislative or regulatory changes, and coordinate the work of the many agencies, institutions, private groups and businesses who should be involved with the work.

Action 3: Provide for senior pedestrian safety education

Develop and implement a senior pedestrian safety awareness component within all bicycle and safety educational projects and within targeted senior oriented programs. Coordinate with the County's Department of Aging.

Action 4: Apply for community grants for pedestrian and bicycle education, safety and injury prevention.

A continued effort to apply for community funding will ensure the longevity and effectiveness of proposed safety education programs. Funding sources are provided in a separate chapter.

Action 5: Offer effective cycling instruction courses for adult riders through regional bicycle clubs, local colleges and advocacy groups.

The education needs of adult cyclists can be addressed through various cycling programs. Courses can be taught independently through local bicycle clubs. In other areas of the country, universities offer bicycle safety instruction courses for adults. Local colleges and universities such as the Naval Academy, Anne Arundel Community College, St. John's College and the University of Maryland should be encouraged to develop such programs.



Action 6: Encourage the colleges and universities in Anne Arundel County to develop a "Guide to Bicycling" publication for distribution each year to new students.

Many universities have developed bicycling guides both to encourage safe riding and to encourage students to bicycle to class instead of driving their automobiles. A guide of this type should be a standard item in the orientation packages provided to new students each year. A comprehensive bicycle safety handbook usually includes the following:

- Tips on the best routes for getting around and through campus, along with a discussion of troubled areas on campus with congested traffic.
- A section explaining the traffic laws as they apply to cyclists.
- Instructions of what to do in case of a bicycle crash, along with helmet promotion information
- Description and contact name for local bicycle and pedestrian clubs, and bicycle shops.
- Instructions on preventing bicycle theft.
- Rules regarding bicycle parking on campus.
- Bicycle maintenance instructions.

Action 7: Develop a pedestrian and bicycle component of the drivers education training program and manual.

Anne Arundel County should work with state and regional bicycle coordinators and the Maryland Motor Vehicle Administration (MVA) to develop a bicycle and pedestrian component within the driver's education training manual, and ensure that local driver training programs incorporate these instructions.

In conclusion, all bicycle and pedestrian education efforts should be coordinated with Anne Arundel County's Highway Safety Coordinator (HSC). The HSC coordinator will work with local and regional task forces to advocate and implement bicycle and pedestrian education safety solutions.

7.2 Existing Anne Arundel County Safety Education Resources

Pedestrian and bicycle education and safety programs in Anne Arundel County are sponsored by several state and local agencies, however; on the whole, there are limited resources for this type of instruction in Anne Arundel County. Based on background research done for this study, it is estimated that less than 2% of the general countywide population receives pedestrian and bicycle safety instruction. Most of the existing programs are targeted toward children.

The following section describes existing organizations in Anne Arundel County that conduct some degree of bicycle and pedestrian safety and motorist education.



Anne Arundel County Police Department

Presently, the Anne Arundel County Police Department devotes time and resources toward bicycle safety education each year. All of the department's bicycle officers receive specialized bicycle safety training. These trained officers conduct bicycle safety events, rodeos and make presentations on a request basis. The target audience is primarily elementary school students. The number of children who participate in these presentations vary from year to year, but on average, the County Police reach 500 students annually. According to the Department spokesperson, these numbers have been dwindling each year. In addition, the Department organizes an annual bicycle safety course for the members of their Youth Activity Program. Other efforts include helmet distribution to low income families (when funding is available).

The Anne Arundel County Police Department does recognize that pedestrians are often overlooked when it comes to traffic safety. In general, pedestrian safety instruction is offered less frequently in comparison to bicycle safety throughout the County. However, the County Police Department is one of the few departments in Maryland to participate in the *Walk a Child to School* event. Each year, the police department helps rally local schools throughout the county to participate in this nationally celebrated activity. During the first week in October, parents, caregivers, faculty, staff and children are encouraged to walk to school together as many days as possible, and to learn and practice safe pedestrian behaviors.

Anne Arundel County Injury Prevention Coalition

A key component to bicycle and pedestrian safety education is injury prevention. The Anne Arundel County Injury Prevention Coalition is a Chapter of the Maryland Safe Kids Coalition and chaired by the Anne Arundel County Health Department Injury Prevention Coordinator. The coalition is comprised of a number of local agencies that work together to share information, ideas and resources relative to injury prevention programs. In the past, this coalition has submitted a safety grant to the Community Traffic Safety Team (CTST) for bicycle helmets. These helmets were distributed to low-income children in bicycle rodeos, safety events, and at presentations carried out by the Anne Arundel County Police Department. Grant funding used to support this program is nearly depleted; therefore more funding will be needed in the future.

Anne Arundel County Public School System

The Anne Arundel County Public School System has a staff of more than 4,100 teachers and educates a culturally and economically diverse population of nearly 74,000 students. The Anne Arundel County Public School system is comprised of 115 schools, including 76 elementary schools, 18 middle schools, 12 high schools and a variety of other special learning centers.¹ This system is considered one of the best in the state and provides an excellent resource for potential pedestrian and bicycle safety education.

¹ Anne Arundel County Public School System web site <http://www.aacps.org/>



Currently, under the direction of Anne Arundel County Schools Physical Education and Athletics Supervisor, 76 elementary schools in the County have access to a 4th and 5th grade bicycle safety curriculum (which includes some bicycle and safety equipment). This program is offered as an optional supplemental unit to the physical education curriculum and not as a part of the Anne Arundel County Public Schools formal education program. This program covers the basics of bicycle instruction, but does not address pedestrian safety.

Approximately six schools offer the curriculum to their students annually, representing less than two percent of the total student population. Schools in Anne Arundel County have not been active in this program due to lack of promotion, lack of equipment, storage issues and lack of training for teachers. Currently, the County has 30 bicycles available for teachers to use with the bicycle curriculum. The program contains a brief number of lessons (ranging from four to six lessons).

Anne Arundel County 4-H and Extension Program

The County 4-H and Extension program organizes an annual Bicycle Safety contest at the County fair for 4-H members between 8 – 18 years of age. Individual 4-H leaders may conduct programs that discuss bicycle and pedestrian safety or include bicycle safety as a component of a project, but it is not otherwise an emphasized topic. All other pedestrian and bicycle safety instruction in Anne Arundel County is carried out by a past 4-H Leader, independently of the 4-H Extension Office.

Support for these aforementioned programs, both financial and non-monetary, has been made available through the State via the Maryland State Highway Administration by way of the Maryland Comprehensive Traffic Safety Program.

7.3 Existing Maryland State Safety and Education Resources

Comprehensive Traffic Safety Program

In addition to County resources described above, there are a variety of State resources available for safety education. The State of Maryland's Comprehensive Traffic Safety Program was created to address transportation safety issues. Within each of the 23 counties and Baltimore City there is a designated Highway Safety Coordinator (HSC) who works with local task forces to identify traffic safety issues/problems, develop countermeasures, and implement or advocate for solutions. Each task force also helps prioritize a pre-determined amount of funding for local projects, such as the helmet give-away program managed by the Anne Arundel County Health Department and the Injury Prevention Coalition. The amount of funding received greatly influences project priorities.

Another example of an innovative awareness project managed by the Anne Arundel County HSC and the Anne Arundel County Traffic Safety Task Force is the Share the Road project. The purpose of the Share the Road project is to identify dangerous roads for cycling and install Share the Road signs in these locations.²

² Share the Road signs are bicycle-warning signs with a sub plate that says, "Share the Road".



Some education materials are available through the Maryland Highway Safety Office for local programs and events (coloring books, safety brochures, etc.). This education material can be used as a resource for future pedestrian and bicycle safety programs.

Maryland's Motor Vehicle Administration (MVA)

Maryland's Motor Vehicle Administration (MVA) has mandatory education requirements in order for residents to receive a State of Maryland driver's license. There are very few references to pedestrians and bicycles in the current version of the Driver's Manual. The manual briefly describes the basic actions that should be taken when encountering a bicyclist, and rules for yielding to pedestrians.

Maryland Safe Routes Program

In 2001, the Maryland General Assembly adopted the Transportation - Bicycle and Pedestrian Safety Legislation, House Bill 717. One component of the Bill is the development of a pedestrian safety program. This pedestrian safety program will be targeted for children, focusing on local "safe" routes to schools. This program is due for completion in 2003, and should be an excellent resource for Anne Arundel County Schools. It will consist of a toolkit (or set of instructions) for implementing a Safe Routes Project at a local school, and may be associated with special assistance from the State for implementation.

The task of educating children and adult bicyclists, pedestrians and motorists about traffic safety in a region as large as Anne Arundel County is a significant challenge. Currently, bicycle and pedestrian safety education programs in the County are limited. These programs provide a small portion of the population with bicycle and pedestrian safety educational opportunities. Anne Arundel County should build their future pedestrian and bicycle safety education program from this existing base, in coordination with other State and regional initiatives.



Section 8: Funding Recommendations

The most common method for funding pedestrian and bicycle projects is to combine local, public and private funds with funds from state, federal and additional private-sector sources. Many communities involved with greenway and bikeway implementation are choosing to leverage local money as a match for outside funding sources, in essence multiplying their resources.

During future development of bicycle and pedestrian facilities in Anne Arundel County, local advocates and government staff should pursue a variety of funding sources for land acquisition and facility construction. A program that relies on limited funding sources may one day come to a halt should these funding sources be reduced or eliminated.

The funding sources cited below represent a few of the funding opportunities that have been pursued by other communities.

Funding is one of the keys to success for any bicycle and pedestrian program. An aggressive funding strategy in Anne Arundel County will be essential to implementing the engineering solutions, education programs, and other projects recommended in this Master Plan. Fortunately, Anne Arundel County already has a history of funding bicycle and pedestrian facilities through the Capital Budget and Program.

8.1 Funding Actions

The funding strategy recommended for Anne Arundel County is based on three primary actions:

Action 1. Continued local funding, look for more opportunities to address bicycle and pedestrian concerns during "regular" roadway improvement projects and maintenance schedules.

It is recommended that the County continue its tradition of funding sidewalks and bikeways through the Capital Budget (as described above). The County is already doing an impressive job of setting aside special funds for bikeways and trails – this practice should be strengthened by including pedestrian and bicycle components within as many "regular" roadway projects as possible. Each roadway improvement project should be viewed as an opportunity to also improve bicycle and pedestrian conditions, whether it is a bridge reconstruction, an intersection design, a widening project, or a resurfacing project. In fact, resurfacing projects are likely to represent the best opportunities for inexpensive bikeway improvements. The County should set aside resources within the resurfacing program to review current striping patterns and determine if a bike lane or additional shoulder space can be accommodated by narrowing the existing travel lanes.

Maintenance funding is becoming a bigger issue in Anne Arundel County. As more bikeways, trails and sidewalks are built, maintenance costs will rise. Beyond establishing funding for maintenance in the Capital Budget, there are not many other sources of funding for these activities (there are no federal programs that fund



bikeway maintenance). Some additional funding in the Capital Budget will therefore be needed, however some communities have effectively reduced on-road bikeway and sidewalk maintenance costs by re-examining the way they do sweeping (including bike lanes and sidewalks rather than just the roadway space), and otherwise incorporating routine maintenance tasks into their existing maintenance schedule. Other communities offer an "Adopt a Bikeway" program to help lessen the maintenance burden.

It will be important to develop an effective program of reporting maintenance needs to the SHA District office on a regular basis, since the State's current policy is to address on-road bikeway maintenance on a request basis. This will require an effective communication program between the County's Pedestrian and Bicycle Coordinator and the local bicycling public. Some communities have established a maintenance request area on their website to enable people to report maintenance problems.

Action 2. Competitive Local Matches

The County should continue (and strengthen) the existing matching funds program (included in the CIP) that sets aside competitive levels of local funds to use as a match for larger sums of state and federal funding. Maryland Department of Transportation has a history of providing increasingly larger Enhancement Grants to communities that have proven their ability to spend these monies on successful projects. Staff resources should be assigned to pursue this and other sources identified later in this section of the report.

Action 3. More Public/Private Partnerships

The County should initiate a renewed effort to establish public/private partnerships to encourage development of pedestrian and bicycle facilities (see examples in this chapter). One method would be to require developers to set aside funds for bikeways and sidewalk linkages, or to otherwise require them to build connections to the county's network of open spaces and trails. This has been a very successful technique in several urban Maryland communities. In Rockville, for example, local developers are required not only to provide on-site bikeways and sidewalks throughout their projects, but also to set aside considerable sums for off-site improvements that will link internal trails and on-road bikeways to the City's bikeway network. Other methods include providing incentives for developers who include bicycle friendly design, such as bicycle parking and rest areas.

By initiating an aggressive funding program for pedestrian and bicycle facilities, Anne Arundel County will be able to achieve far more improvements, and will reap the benefits of increased public and political support for walkable and bikable communities. These funding strategies will require staff resources and partnerships with local advocates, who can help to play an effective role in supporting the county's funding goals.

One idea for future consideration would be to establish a bond referendum on the local ballot for the purpose of funding bicycle and pedestrian improvements, as well as open space and greenway programs. These types of referendums have been extremely successful in other jurisdictions with demographics that are similar to Anne Arundel



County (see examples below). Considering the high level of local public support for better bicycling and walking environments and greenways, this type of referendum could be successful. (Note: Implementing a bond referendum in Anne Arundel County may require a change in the County's charter.)

Example Bond Referendums

- Mecklenburg County, NC: voters approved a 7.24 million bond referendum for greenways and trails
- Seattle, WA: voters approved a \$100 million bond issue to protect open space in the urban area - \$33 million was set aside for trail development.
- Denver, CO: \$5 million bond issue for trails and bikeways program
- Broward County, FL: voters approved a \$400 million bond referendum for open space and greenways. This bond retained a 77% approval rating.
- Gallatin County, MT: voters approved a 20 year, \$10 million bond measure to preserve open space.
- Wake County, NC: voters approved a \$15 million dollar bond issue for the conservation of open space with an approval rate of 76%.

8.2 Compendium of Funding Sources and Strategies

The most common method of funding is to combine various monies from state, federal, and local funds. Funding sources for pedestrian and bicycle facilities and programs can be found at all levels of government as well as in the private sector. There are also numerous opportunities for local money leveraging to use as a match for outside funding resources. Prior to the 1990's only a few million dollars a year of federal funds were being invested in bicycle or pedestrian facilities. Starting with the passage of ISTEA (the Intermodal Surface Transportation Efficiency Act) in 1992, hundreds of millions of dollars are now being spent annually on bicycle, pedestrian and trail facility development. Millions more are spent regularly on planning, safety and promotion programs.

The following table highlights current Federal, State and Local transportation and non-transportation funding sources. Type indicates the name of the funding opportunity. Award range lists the potential amounts of funding available for a project. Level of competitiveness indicates the competitive factor of the indicated funding, with the darkest dot being the most competitive. Cycle indicates the funding schedule of the corresponding fund type.

**Federal Funding:**

Type	\$ Award Range	Level of Competitiveness			Cycle
		● High	○ Med.	○ Low	
The Transportation and Community System Preservation Pilot Program	100,000- 2 million		●		Application January Awarded October
Public Lands Highways Discretionary Program	250,000-500,000		●		Funding through Fiscal Year 2003
HUD Community Block Grants (administered locally)	10,000-800,000		○		Twice annually

State (or State-Administered) Transportation Funding:

Type	\$ Award Range	Level of Competitiveness			Cycle
		● High	○ Med.	○ Low	
The Neighborhood Conservation/Urban Reconstruction Program	Any range		○		Year Round
Sidewalk Retrofit Program	Any range		○		Year Round
The Bicycle Retrofit Program	10,000-20,000		○		Year Round
The Transportation Enhancement Program	350,000-400,000		●		Twice Per Year
The National Recreation Trails Program	30,000		○		Mid-November Deadline
Maryland Scenic Byways Program	20,000-2.7 million		○		June 1 Deadline
The Federal Highway Safety (Section 402) Grant Program	Varies widely		○		March-Commitment Letters, October-Award



State Non-Transportation Funding:

Type	\$ Award Range	Level of Competitiveness			Cycle
		● High	○ Med.	○ Low	
Program Open Space	Any range		○		Yearly
The Community Legacy Program	Any range	●			Yearly July Deadline
Community Parks and Playground Fund	2,000-150,000	●			Yearly

Private Sector Funding Sources:

Type	\$ Award Range	Level of Competitiveness			Cycle
		● High	○ Med.	○ Low	
The 2002 Kodak American Greenways Awards Grants	500-1,000		○		Yearly
Recreation Equipment, Inc (REI)	200- 1,000		○		Yearly

Government Funding Sources

FEDERAL—TRANSPORTATION (ISTEA AND TEA-21)

Leading the way in government funding sources is federal funding through the Transportation Equity Act for the 21st Century, or "TEA-21." This six-year funding bill (FY 1998 - FY 2003) authorizes \$217 billion in Federal gas-tax revenue and other federal funds for all modes of surface transportation, including highways, bus and rail transit, bicycling and walking. More than half of these funds are made available through programs for which bicycling and walking activities are eligible expenditures; however, none of these funds are dedicated solely for pedestrian or bicycle facilities or programs.

TEA-21 is the successor to "ISTEA," the Intermodal Surface Transportation Efficiency Act, which provided federal funding for the years 1992-1997. ISTEA is now viewed as the federal Act that initiated a major policy shift in federal funding priorities making federal funds much more accessible for state and local walking and bicycling facilities



and programs. TEA-21 continues and strengthens this new emphasis on improving conditions for bicycling and walking.

TEA-21 funds are administered by the State of Maryland, through the Maryland Department of Transportation.

The Transportation and Community and System Preservation Pilot Program (TCSP)

The TCSP is a comprehensive initiative of research and grants to investigate the relationship between transportation and land use, in partnership with private sector-based initiatives. States, local governments, and metropolitan planning organizations are eligible for discretionary grants to plan and implement strategies that improve the efficiency of the transportation system. A total of \$120 million is authorized for this program for FY's 1999-2003. The TCSP Program is a FHWA program being jointly developed with the Federal Transit Administration, the Federal Rail Administration, the Office of the Secretary, and the Research and Special Programs/Volpe Center within the US Department of Transportation, and the US Environmental Protection Agency.

State agencies, MPOs, tribal governments, and units of local governments recognized by a State are eligible recipients of TCSP grant funds. This includes towns, cities, public transit agencies, air resources boards, school boards, and park districts, but not neighborhood groups or developers. While non-governmental organizations are not eligible to receive TCSP funds, these organizations are encouraged to form partnerships with an eligible recipient as the project sponsor.

Applicants are to submit a 15-page application using the format provided on-line at www.fhwa.dot.gov by January 31 of each year to the appropriate FHWA Division office. The FHWA and a multi-agency technical review panel will review the applications before making recommendations to the Federal Highway Administrator and the USDOT Secretary for final approval. Grant projects are awarded after October 1.

Public Lands Highways Discretionary Program was originally established in 1930. The program has been continued with each highway or transportation act since then, the latest act to fund the program is TEA-21, which provides funds through FY 2003. The intent of the program is to improve access to and within Federal lands of the nation. Funds are available for projects within, adjacent to or that provides access to areas served by public lands highways. Eligible projects may include transportation planning, research, engineering, and construction of the highways, roads, and parkways or transit facilities. Providing provisions for pedestrians and bicyclists is also acceptable. Approximately \$83.6 million is appropriated annually for the PLH Discretionary Program, however, roughly \$65 - \$70 million will be available for candidate projects in FY 2002-2003. Projects selected under this program are eligible for 100% federal funding. State transportation departments are the only agencies that can submit projects to the FHWA division office. A solicitation notice is typically released in March and submissions are due in July. Projects selected for funding are announced by mid-November. A specific timetable of the process is provided in the solicitation memorandum.

Funding cycle: Yearly

Contact: Highway Engineer, Office of Program Administration



FEDERAL—NON-TRANSPORTATION

Outside of the Federal transportation programs, there are a wide range of other federal funds that can be used for bicycling and walking facilities. Some of the most common include funds through the federal land agencies such as the National Forest Service, National Park Service or Bureau of Land Management, however these funds are primarily for trails and must be on federal lands. Community Development Block Grants through HUD, the Department of Housing and Urban Development are a likely source of funds for community-based projects, such as commercial district streetscape improvements, sidewalk improvements, safe routes to school, or other neighborhood-based bicycling and walking facilities that improve local transportation options or help revitalize neighborhoods. The National Transportation Enhancements Clearinghouse has prepared a useful Technical Brief: Financing and Funding for Trails that sites over thirty federal and national funding sources that could be used to help fund walking and bicycling facilities and/or programs, especially trails: www.enhancements.org

Clean Air Transportation Communities: Innovative Projects to Improve Air Quality and Reduce Greenhouse Gases: The Environmental Protection Agency (EPA) recently announced the availability of funds for projects that involve climate change and transportation/air quality issues, or pilot projects that have a high potential to encourage innovations in the reduction of transportation-related emissions and vehicle miles traveled (VMT's) at the local level and throughout the United States. The EPA is particularly interested in projects that incorporate at least one of the following: smart growth efforts that reduce transportation-related emissions, commuter choice and cleaner vehicles, and clean, renewable fuels. EPA will make available financial assistance ranging from \$50,000 up to \$300,000 to each recipient, in the form of cooperative agreements. Proposals will be accepted from state, local, multi-state, and tribal agencies. For instructions on how to submit Intent to Apply and final proposals see Section IX of the Federal Register announcement located on-line at: www.ite.org/government/epaaairq.htm

State—Transportation

The Neighborhood Conservation/Urban Reconstruction Program began in 1996 to assist in the revitalization of neighborhoods through roadway improvements to state highways and urban state highways. Three phases of funding are available: 1) concept development, 2) design, and 3) construction. Some of the eligible projects funded by this program include: adding or upgrading drainage, curb and gutter construction/reconstruction, conventional sidewalks, bus shelters and transit station access improvements, landscaping and specialized signage. Projects on State highways in State Designated Neighborhoods or on the State's urban highway system can receive 100% of the project's cost. Counties or municipalities can send concept development or design proposals to SHA District Engineer's anytime during the year. Construction projects, however, are accepted semi-annually (spring and fall). The proposal will then be submitted to the Chief Engineer's Office for review and selection.

Funding Cycle: Year Round
Contact: SHA District Engineer



The Sidewalk Retrofit Program was established in 1995 to provide funding for the construction of new and the reconstruction of existing sidewalks and pathways. In the first three years of the Retrofit Sidewalk Program, 170 communities received a total of \$4.1 million for sidewalk construction. The program receives \$3 million annually and allocates funds to counties based on a distribution formula. Counties can spend the funding directly or distribute them to local municipalities. Sidewalk construction or reconstruction projects on State Roads in State Designated Neighborhoods are eligible for 100% funding by SHA, anything outside these neighborhoods are eligible for 50% SHA funding and 50% by the local jurisdiction. Local jurisdictions should discuss and prepare potential project proposals with the SHA District Engineer. Proposals are accepted on an ongoing basis. The Chief Engineer's Office will review and select projects.

Funding Cycle: Year Round
Contact: SHA Program Coordinator

The Bicycle Retrofit Program was initiated by the State Highway Administration in 2000. The purpose of the program is to fund minimal on-road improvements on state highways that would benefit bicycling. Eligible improvements include projects that can be completed quickly and without the need for permits or right-of-way. One million dollars is allocated annually to the Bicycle Retrofit Program. Individuals and local jurisdictions can submit project requests to SHA's Pedestrian and Bicycle Coordinator on an on-going basis.

Funding cycle: On-going
Contact: Maryland Bicycle and Pedestrian Coordinator

The Transportation Enhancement Program is administered by SHA and uses Federal appropriations (Federal Surface Transportation Program funds) to fund transportation-related community amenities. Less than \$8 million is left through 2003 for the Transportation Enhancement Program. Projects such as pedestrian and bicycle facilities and education programs, acquisition of scenic easements and preservation of abandoned railways are examples of projects funded each year; approximately 70% of the program funds have gone toward bicycle and pedestrian education programs and trail projects. Up to 50% of each project's cost is eligible for funding the other 50% must be matched by the project sponsor. Funds are awarded to new projects semi-annually, in the summer and fall. The average award is between \$350,000 – \$400,000, however, it varies depending on the project.

Funding Cycle: Twice per year
Contact: Enhancement Program Manager

The National Recreational Trails Program, administered by SHA, matches federal funds up to 50% with local funds to implement trail projects. Eligible activities include trail construction, reconstruction, maintenance, restoration, and easement or property acquisition. Currently \$760,000 is available to SHA from the Federal Highway Administration; the amount of money varies each year. The average project cost is around \$30,000. Projects are proposed by local governments, other state agencies, counties or municipal governments. Applications should be submitted to SHA's Office of



Environmental Design. In order for non-governmental agencies such as a non-profit agency, a community group, or individual to apply for program funds, co-sponsorship from an appropriate local governmental agency is required. Applications are distributed in September for a mid-November deadline. Typically, funds are awarded in January or February of each year.

Funding Cycle: Mid-November Deadline
Contact: SHA Recreational Trails Coordinator

The Maryland Scenic Byways can provide communities with the framework and funding to create a community-based Corridor Management Plan (CMP) along State Designated Scenic Byways. A CMP serves as a guide to promote, preserve, and develop a scenic byway that addresses issues such as tourism development, roadway safety, preservation of natural features and historic structures. The State must first designate a scenic byway in order for CMP projects to be considered. Once a CMP has been developed, project sponsors may apply for additional funding for a number of projects such as safety improvements, construction of pedestrian and bicycle facilities, and highway shoulder improvements to name a few. County and municipal governments, private non-profit agencies, or community groups with appropriate governmental agency co-sponsorship can apply for CMP funds. \$25 million dollars is available nationwide for scenic byways programs, some states receive as much as \$1 million or more each year, depending on the need. Maryland has received on average \$500,000 in federal funds each year; however, this amount may increase because the Maryland Scenic Byways Program Maryland has recently designated 31 State Scenic Byways. Southern Maryland has two designations, the Calvert Maritime Tour in Calvert County and the Religious Freedom Tour that runs through Charles and St. Mary's Counties.

This program is unique in that SHA can award up to 80% of the project's cost and sponsors are only required to match expenses by 20 percent. The deadline for applying for Scenic Byways funds is June 1. Applications are available on-line at www.byways.org and should be submitted to the State Scenic Byways Coordinator. The State Scenic Byways Advisory Committee reviews and approves potential projects.

Funding Cycle: June 1 Deadline
Contact: SHA Recreational Trails Coordinator

The TEA-21 Congestion Mitigation and Air Quality Improvement Program (CMAQ) provides over \$8.1 billion dollars in funds to State Departments of Transportation, Metropolitan Planning Organizations and transit agencies to invest in projects that reduce transportation-related emissions. Each State is qualified for an apportioned amount of funding each year based on county populations residing within ozone and carbon monoxide (CO) non-attainment and maintenance areas and the severity of the areas air quality problems. Departments of Transportation or Metropolitan Planning Agencies must submit projects to FHWA for approval before funds are actually received. Anne Arundel County is listed among the non-attainment areas for FY 2001. SHA in cooperation with County officials and staff, review and select approximately 80% of all projects for submission at one time; the other 20% of potential projects are reviewed continually throughout the Fiscal Year. Once projects have been identified, SHA applies for the funding directly to FHWA. SHA typically seeks CMAQ funding for HOV

lanes; however, it is possible to submit an application for a bicycle and pedestrian project.

Funding Cycle: On-Going

Contact: Contact the State Highway Administration

The Federal Highway Safety (Section 402) Grant Program is administered by the Maryland Highway Safety Office (MHSO), a division of SHA. Federal 402 funds are used for pedestrian and bicycle public information and education programs. Funds are distributed to states annually from the National Highway Traffic Safety Administration (NHTSA) according to a formula based on population and road mileage. Maryland receives Federal 402 funds each year. Local jurisdictions submit Expression's of Interest (EOI) to the MHSO in March and commitment letters announcing the approval of the proposed projects are distributed in June. Funds are generally awarded sometime after October 1st each year. Government agencies or government-sponsored entities are eligible to apply for 402 Grant funds. Every county in the state and the City of Baltimore is assigned a Community Traffic Safety Program Coordinator who organizes local Task Forces to identify and prioritize traffic safety issues and develop appropriate countermeasures. Agencies are encouraged to work with their local Task Force to determine the feasibility and eligibility of proposed projects prior to submitting a 402 Grant.

Funding Cycle: EOI (March), Commitment Letters (June), Award (October)

Contact: Maryland Highway Safety Office

State – Non-Transportation

Program Open Space's (POS) primary focus is to acquire outdoor recreation and open space areas for public use. POS is administered by Maryland's Department of Natural Resources (DNR) and is funded through the State Real Estate Transfer Tax. The money set aside for this program is divided equally between local and state projects. Half of the money is used by the state for direct land acquisitions, while the other half is granted to local governments. Using a population-based formula, every July 1, each county in the state and the City of Baltimore is apportioned a specific amount of the money for Program Open Space. In order to receive these funds, counties are required to create Land Preservation and Recreation Plan that outlines acquisition and development goals, of which bicycle and pedestrian facilities may be included. POS provides 100% funding for local land acquisition and will contribute 75% for development costs for county and city parks and recreation areas. As much as 90% of development costs can be funded if Land and Preservation and Recreation Plan goals are met.

Funding Cycle: July 1 Fiscal Year

Contact: Program Open Space Coordinator

The Rural Legacy Program was enacted by the 1997 General Assembly as part of Governor Parris N. Glendening's Smart Growth and Neighborhood Conservation Initiative. The program encourages local governments and private land trusts to identify Rural Legacy areas and to competitively apply for funds to protect the state's most valuable agricultural, forestry, natural, and cultural resources or create new ones. A



combination of Maryland Program Open Space dollars and general obligation bonds from the state's capital budget subsidize the Rural Legacy Program. During the first five years of the Rural Legacy Program, between \$110 and \$128 million will be committed to preserving from 50,000 to 75,000 acres of Maryland's farms, forests, and open spaces. While the focus of this initiative is not specifically for bicycle and pedestrian facilities and programs, they can be proposed as an adjunct or compliment to eligible projects, and may be used to help acquire greenway lands.

Applications may be made by local governments or organizations endorsed by local government to the Rural Legacy Board. The Rural Legacy Board, in turn, makes final recommendations to the Governor and the Board of Public Works. The Board of Public Works approves the grants for Rural Legacy funding.

Funding Cycle: January Deadline
Contact: Director of Rural Legacy Program
www.dnr.state.md.us/rurallegacy

The Community Legacy Program was created by the Legislature in 2001 to help existing communities develop comprehensive revitalization plans and implement projects targeted at reducing sprawl and enhancing community life for businesses and residents. The program is intended to complement the Rural Legacy Program. A wide variety of projects are eligible for funding under the program including streetscape improvements and community development plans, both of which can include bicycle and pedestrian facilities. Applications are submitted by local governments or community development organizations to the community Legacy Board in late July and award decisions are made by late September.

Funding Cycle: July Deadline
Contact: Department of Housing and Community Development

Local Funding Sources

Examples of local communities taking action on their own to increase revenue streams for improving conditions for bicycling and walking are not hard to come by. Three common approaches include: special bond issues, dedications of a portion of local sales taxes or a voter-approved sales tax increase, and use of the annual capital improvement budgets of Public Works and/or Parks agencies. Anne Arundel County has a history of committing local funds to sidewalk and trail projects. Currently, the Capital Budget and Program for the fiscal years 2001-2006 list 25 projects where a bicycle or pedestrian component is specifically listed.

The following lists local funding examples found throughout the country:

- San Diego County residents voted to impose a ½-cent sales tax for transportation purposes. Out of those funds (\$171 million in year 2000), \$1 million is set aside for bicycle projects. The tax is administered by the San Diego Association of Governments and is scheduled to expire in 2008.
- The City of Albuquerque, New Mexico, and Bernalillo County, both have a 5% set-aside of street bond funds, which go to trails and bikeways. For the City, this has amounted to approximately \$1.2 million every two years for these facilities. The City



voters last year passed a ¼ cent gross receipts tax for transportation, which includes approximately \$1 million per year for the next ten years for trail development. In addition, many of the on-street facilities are being developed as a part of other road projects and are incorporating the bike facilities in the roadway budget for new roads, or when a resurfacing project is planned.

- County, Florida built much of the Pinellas Trail system with a portion of a one-cent sales tax increase voted for by county residents.
- Seattle, Washington, and King County voters approved a \$100 million bond issue to protect open space in the urban area; \$33 million was set-aside for trail development. The Seattle Department of Public Works used about \$6 million per annum for the City's bike program.
- Denver, Colorado also invested \$5 million in its emerging trail network with a bond issue, which also funded the city's bike planner for a number of years.
- Eagle County, Colorado (which includes Vail) voters passed a transportation tax that earmarks 10% for trails, about \$300,000 a year.
- In Colorado Springs, Colorado, 20 percent of the new open space sales tax is designated for trail acquisition and development; about \$5-6 million per year.

Private Sector Funding Sources

Just as the use of public transportation funding for pedestrian and bicycle projects has been on the increase throughout the 1990's, private sector funding has become more plentiful. For example, the environmental land trust movement has mushroomed in the past twenty years and many of these organizations have raised funds for purchase of land where trails are built, especially rail-trails. In recent years, local corporations, and businesses from the bicycling and outdoor recreation industry have joined in financial support of local projects and programs. Additionally, pedestrian and bicycle improvements are often included in local development projects, often as a condition of approval for the projects.

The 2002 Kodak American Greenways Awards program provides small grants as seed money to stimulate the planning and design of greenways in communities throughout America. Grants may be used for activities such as: mapping, ecological assessments, surveying, conferences, and design activities; developing brochures, interpretative displays, audio-visual productions or public opinion surveys; hiring consultants, incorporating land trusts, building a foot bridge, planning a bike path, or other creative projects. In general, grants can be used for all appropriate expenses needed to complete a greenway project including planning, technical assistance, legal and other costs. Grants may not be used for academic research, general institutional support, lobbying, or political activities. The maximum grant is \$2,500. However, most grants range from \$500 to \$1,000. Applications may be submitted to American Greenways, The Conservation Fund from March 1 to June 1 each year. Announcement of awards will be made in early fall. Applications are available on-line at: www.conservationfund.org/conservation/amgreen/index.html.



Recreational Equipment, Inc. (REI)

Recreational Equipment, Inc. (REI) provides protection and enhancement grants for outdoor recreation. The grants range upwards toward \$5,000. They are often used for preservation of wildlands, open space, advocacy organization, campaigning for public land, water recreation issues and organizing trail advocates at the local level.

Community Fundraising and Creative Partnerships

- In Prince George's County, local funds were used for the development, construction, and maintenance of the WB&A Trail. The trail project was primarily funded by the Maryland National Capital Park and Planning Commission (MNCPPC). Additional funding was provided by the Maryland's Program Open Space and ISTEA dollars. While the MNCPPC continues to support the trail financially, trail advocates are in the process of establishing a citizen based organization, similar to the existing group called the Friends of Anne Arundel County Trails, that will organize fundraising events and partake in trail beautification and enhancement projects.
- In Ashtabula, Ohio, the local trail organization raised one-third of the money they needed to buy the land for the trail, by forming a "300 Club." Three hundred acres were needed for the trail and they set a goal of finding 300 folks who would finance one acre each. The land price was \$400 an acre and they found just over 100 people to buy an honorary acre, raising over \$40,000.
- In Jackson County, Oregon, they had a "Yard Sale." The Bear Creek Greenway Foundation sold symbolic "yards" of the trail and placed donor's names on permanent markers that are located at each trailhead. At \$40 a yard, they raised enough in private cash donations to help match their \$690,000 Transportation Enhancements program award for the 18-mile Bear Creek trail linking Medford, Talent, Phoenix and Ashland.
- Selling bricks for local sidewalk projects, especially those in historic areas or on downtown Main Streets, is increasingly common. Donor names are engraved in each brick, and a tremendous amount of publicity and community support is purchased along with basic construction materials. Portland, Oregon's downtown Pioneer Square is a good example of such a project.
- In Colorado Springs, the Rock Island Rail-Trail is being partly funded by the Rustic Hills Improvement Association, a group of local homeowners living adjacent to the trail. Also, ten miles of the trail was cleared of railroad ties by a local Boy Scout troop.
- A pivotal 40-acre section of the Ice Age Trail between the cities of Madison and Verona, Wisconsin, was acquired with the help of the Madison Area Youth Soccer Association. The soccer association agreed to a fifty-year lease of 30 acres of the parcel for a soccer complex, providing a substantial part of the \$600,000 acquisition price.

Corporate and Business Community

- In Evansville, Indiana, a boardwalk is being built with corporate donations from Indiana Power and Light Co. and the Wal-Mart Foundation.



- In Arizona, trail directional and interpretive signs are being provided by the Salt River Project a local utility. Other corporate sponsors of the Arizona Trail are the Hughes Missile Systems, BHP Cooper and Pace American, Inc.
- Recreational Equipment, Inc. (REI) has long been a financial supporter of local trail and conservation projects.
- The Kodak Company now supports the American Greenways Awards program of The Conservation Fund, which was started in partnership with the Dupont Company. This annual awards program provides grants of up to \$2500 to local greenway projects for any activities related to greenway advocacy, planning, design or development.

For further details and tips for accessing the corporate and business community contact the Trails and Greenways Clearinghouse at the Rails-to-Trails Conservancy: 1-877-GRNWAYS (476-9297), or on the web at: www.trailsandgreenways.org

Foundations

Wide ranges of foundations have provided funding for bicycling and walking. A few national and large regional foundations have supported the national organizations involved in bicycle and pedestrian policy advocacy. However, it is usually regional and local foundations that get involved in funding particular bicycle, pedestrian or trail projects. These same foundations may also fund statewide and local advocacy efforts as well. The best way to find such foundations is through the research and information services provided by the national Foundation Center. They maintain a huge store of information including the guidelines and application procedures for most foundations, and their past funding records. They can be reached on the World Wide Web at: www.fdncenter.org

The Bicycle Industry—Bikes Belong Coalition

The Bikes Belong Coalition is sponsored by member companies of the American bicycle industry. The Coalition's stated goal is to put more people on bikes more often through the implementation of TEA-21. One of the Coalition's primary activities is the funding of local bicycle advocacy organizations that are trying to ensure that TEA-21-funded bicycle or trail facilities are built. Grants are awarded for up to \$10,000 on a rolling basis. By June 2000, almost \$200,000 has been awarded to advocacy organizations in the District of Columbia, Marin County, CA, Milwaukee, WI, Dallas, TX, Los Angeles, New York City, Portland, Maine, and others. Information about the Coalition, including grant applications and related information, is on the web at: www.bikesbelong.org



Appendix A: Corridor Plans

Corridor Plan List:

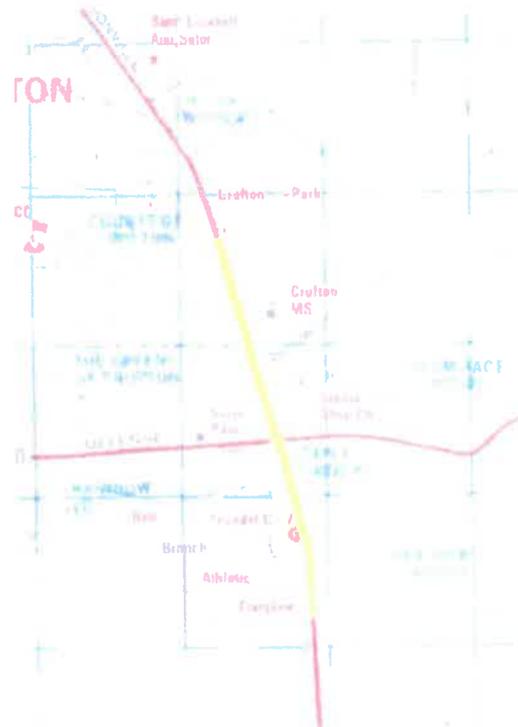
1. Davidsonville Road (MD 424) - Crofton.....	72
2. Shadyside Road - Shadyside	75
3. Laurel/Ft. Meade Rd (MD 198) - Laurel/Maryland City.....	78
4. Roscoe Rowe Blvd. – Annapolis.....	81
5. Mountain Road (MD 177) – Lake Shore.....	84
6. Intersection of Waugh Chapel Rd and MD 3 – Gambrills.....	87
7. Fort Smallwood Road Intersection – Riviera Beach	90

Pedestrian and Bicycle Corridor Profiles: Davidsonville Rd. MD 424 Crofton

Location: Davidsonville Rd. from Bell Branch Athletic Complex to Layton St.

This segment is located in a setting of commercial, residential and municipal land uses. The intersection of MD 450 and MD 424 in Davidsonville has the potential to become a thriving commercial hub.

As the commercial area is developed, better pedestrian and bicycle connections should be included to connect the area with the surrounding schools and parks.



Location Map, Corridor in Yellow

ADC The Map People P.U.N. #20202113

Existing Conditions

Maryland Routes 450 and 424 intersect in Crofton. Both are arterial roads with curbs and gutters at the intersections and are predominately an open cross-section in the remainder of the corridors. There are some sidewalks near the intersection on the northeast quadrant of the intersection and a few sections on the northern approach of MD 424. Davidsonville Rd. varies, but averages close to 22-feet for two travel lanes. The roadway shoulders range between 2 to 3.5 feet in width. The existing speed limit is currently 45 m.p.h. with observed speeds near 50 m.p.h.



Looking South towards Bell Branch Park



Intersection of Rt. 424 and Rt. 450

Potential Pedestrian Improvements

Install and connect sidewalks

The corridor has high potential for encouraging pedestrian travel, though the few sidewalks that do exist currently are short and unconnected. Sidewalks should be connected and/or constructed through the commercial area of the segment and also extended to the local elementary school and athletic complex. The roadway should be curbed to increase the comfort level of pedestrians and protect them from traffic along the corridor.

Install Curb Ramps

Current design guidelines recommend that two curb ramps be installed on each corner of an intersection to serve street crossing in both directions. The intersection of state routes 424 and 450 do not have adequate curb ramp access. As pedestrian connections are developed, curb ramps will be required at all existing intersections.



Looking north from Bell Branch Park

High Visibility Crosswalks

High visibility crosswalks should be located on all four legs of the intersection. The crosswalks should direct pedestrian traffic to the specified access points for the adjacent sidewalks.



Looking south towards Bell Branch Park turning lane

Pedestrian Signal

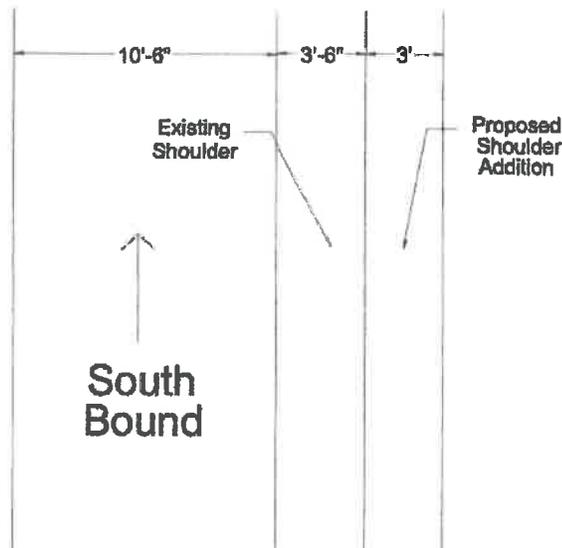
A pedestrian walk signal should be provided at the intersection of MD 450 and MD 424. This signal will enable pedestrians to cross the intersection safely and reduce significant pedestrian delays. The pedestrian push button should be in compliance with ADA guidelines.

Increased Shoulder Width

Providing greater separation between pedestrians and motorists helps increase the safety and comfort level of pedestrians. In situations where sidewalks are not feasible to construct, increased shoulder widths could provide an alternative for pedestrian movement throughout the corridor.

Potential Bicycle Improvements

Increasing the shoulder width throughout the corridor will provide better conditions for bicycling. An additional three to four feet of shoulder pavement on each side of the segment will allow a bicycle lane that will connect the residential and commercial areas to the athletic complex. The design of the bicycle lane will require special attention when approaching the intersection of MD 450 and MD 424. It may be also necessary to acquire additional right of way. Below is an example showing the additional shoulder width needed. Shoulder width varies throughout the corridor.



Bicycle Level of Service

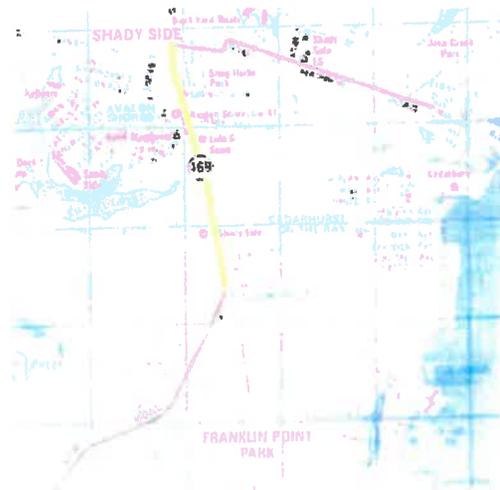
In order to increase the level of service grade on Davidsonville Rd. the following improvements will have to be made. These improvements include decreasing the travel and turning lanes where possible and adding three feet of shoulder to the road. This additional shoulder width will raise the level of service two grades to a "D". However, any additional shoulder width over three feet will continue to help improve the level of service grade.

Route Name	From	To	Lanes (L)		Traffic Vol. (AADT)	Pct. (HV %)	Post. Spd. (SPP) mph	Width of Pavement			Occu. Park. (OSP) (%)	Pvmt. Cond. (PC ₂) (5..1)	Bicycle LOS	
			Th #	Con.				(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score (1..7)	Grade (A..F)
Davidsonville Rd.	Reidel Rd.	Defense Hwy.	2	S	16,825	8	45	14.0	3.5	0	0	3.0	5.79	F
Alternative			2	S	16,825	8	45	18.0	6.5	0	0	5.0	3.83	D

Pedestrian and Bicycle Corridor Profiles: Shadyside Rd. Shadyside Area

Location: Rt 468 East/West: Shadyside Rd. From the Halle Pkwy. to Shady Side Park.

Shadyside Road is located in southern Anne Arundel County near the small communities of Shadyside and Deale. The surrounding land use is primarily residential with an active recreation area anchoring the eastern end of the segment and a small mix of commercial and residential development anchoring the western end of the segment. The west end commercial uses include a market/convenience store, auto repair shop, and carwash/laundry/retail complex is also located at the west end of the corridor. The Shadyside Post Office and a day care facility. The athletic park located at the eastern end of the segment includes a variety of formal recreation opportunities dominated primarily by soccer fields.



Location Map (Corridor in Yellow) pun # 20202113

Existing Conditions

Currently there are no bicycle facilities along Shadyside Road. The current conditions need to be improved in order to provide for adequate and safe bicycle navigation along the corridor. Shadyside Road is a two lane rural road that links the villages of Shadyside and Deale. The two-lane road has significant drainage swales running parallel with the road. These swales need repair and cleanout. The pipes that cross under the existing driveways are often clogged and function only at half-capacity. Currently there are no pedestrian facilities along this corridor.



Looking north, towards commercial district



Looking south from Shadyside/Snug Harbor Rd.

Potential Pedestrian Improvements

Install Sidewalks

Upon future commercial development, sidewalks should be installed to connect the commercial businesses to each other and to the adjacent residential uses along Shadyside Road. If proposed engineering improvements for stormwater management are made, it will be possible to connect the athletic complex to the post office with a retrofitted sidewalk.



Looking north, poor drainage swales

Increased Shoulder Width

Providing separation between pedestrians and motorists helps increase the safety and comfort level of pedestrians. In situations where sidewalks are not feasible to construct, increased shoulder widths can provide an alternative for pedestrian movement throughout the corridor. Adding this shoulder width would also allow existing stormwater channels to be redesigned.

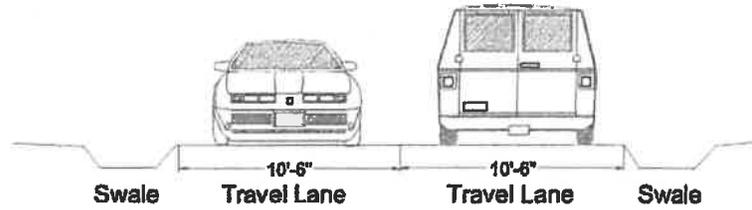


Looking south, towards Snug Harbor Rd.

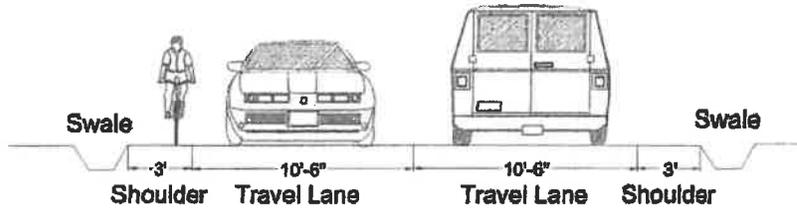
Potential Bicycle Improvements

Consider restoring and regrading parallel drainage swales to function more effectively and to provide for additional shoulder space to construct a paved shoulder. This three to four foot wide paved shoulder will significantly improve conditions for bicyclists. Bicycle route signage with direct information to local destinations throughout the corridor should also be provided. These signs will help to encourage cycling and indicate to local residents and others that the road is a good place to ride. Traffic speed may also be reduced to 25 mph throughout the corridor in order to improve the bicycle level of service grade from a "D" to a "C".

Existing Conditions



Proposed Improvements



Bicycle Level of Service

In order to increase the level of service grade from "E" to "C" on Shadyside Rd., several improvements will have to be made. These improvements include increasing the shoulder by three feet and repaving the entire segment. An increase in width and improved pavement condition will improve the LOS grade to an acceptable "C" level.

Route Name	From	To	Lanes (L)		Traffic Vol. (AADT)	Pct. (HV %)	Post. Spd. (SPP) mph	Width of Pavement			Occu. Park. (OSP) (%)	Pvmt. Cond. (PC ₅) (5..1)	Bicycle LOS	
			Th #	Con.				(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score (1..7)	Grade (A..F)
Shadyside Rd.	Deale Rd.	Snug Harbor Rd.	2	U	9,375	4	30	11.0	0.0	0	0	3.0	4.82	E
Alternative			2	U	9,375	4	30	14.0	3.0	0	0	5.0	3.49	C

Pedestrian and Bicycle Corridor Profiles: MD 198-Laurel/Maryland City

Location: MD 198: from Corridor Rd to the Patuxent Research Reserve

Maryland Route 198 is an important arterial road serving west/central Anne Arundel County, connecting MD 32 and the Maryland City/Laurel area. The west end of the corridor is primarily a commercial area, and the road becomes more rural to the east of the Baltimore/Washington Parkway near MD 32. The corridor runs between the commercial center on Corridor Road and the Patuxent Research Reserve.



Location Map (Corridor in Yellow) ADC The Map People pun # 20202113

Existing Conditions

Conditions along MD 198 vary throughout the corridor. At Corridor Road, MD 198 is 48-foot wide and has two through lanes and right and left turn lanes. Westbound the road is 43-foot wide with two through lanes, a right turn lane and a separated left turn lane. East of Baltimore Washington Parkway the road narrows and becomes a two-lane facility, with two 12-foot travel lanes and two 10.5-foot shoulders. Posted speed limits are 35 m.p.h. west of the Parkway and 50 m.p.h. to the east. Currently, MD 198 is a project in the Regional Long Range Plan.



Looking west towards the
BW Pkwy Exchange



Wide shoulder, looking west towards
Welch's Ct.

Potential Pedestrian Improvements

Install and connect sidewalks

Sidewalks and sidewalk connections should be implemented at the intersection of Route 198 and Corridor Road. Currently there are unconnected or nonexistent sidewalks in all four quadrants of the intersection. This lack of sidewalk continuity discourages pedestrian travel between the Russett Community on the north and shopping areas on the south.



Lack of sidewalk connections on Corridor Rd.

Install Curb Ramps

The Corridor Road/MD198 intersection does not have accessible curb ramps serving all corners of the intersection. Two curb ramps should be installed at each corner to serve pedestrian traffic traveling in all directions. Providing these curb ramps will help to encourage pedestrian travel in the area.

Pedestrian Refuges

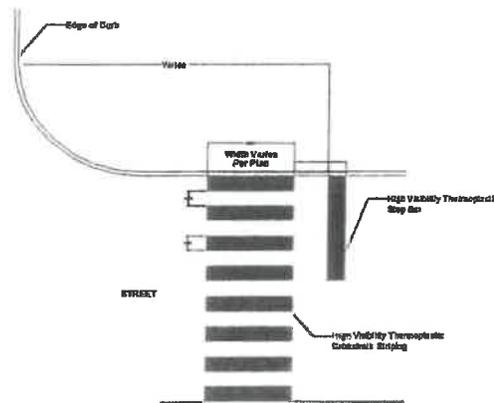
Pedestrian refuges should be constructed to help facilitate crossing MD 198 at the 198/Corridor Road intersection. The existing grass medians should be improved to have fully accessible, concrete median islands at the intersection. These median islands allow pedestrians to address one direction of traffic at a time, and allow slower moving pedestrians to only have to cross one direction of traffic per signal cycle.



Corridor Rd. and MD 198 Intersection

Install High Visibility Crosswalks

High visibility crosswalks should be located on all four legs of the intersection. The crosswalks should direct pedestrian traffic to the specified access points to the adjacent sidewalks.



Potential Bicycle Improvements

East of the Baltimore Washington Parkway, the existing shoulders should be marked as bike lanes. Some modification of the road striping will be needed in areas where the shoulder is striped to allow thru traffic to pass vehicles waiting to turn left at T-intersections. This section of MD 198 already has a good bicycle level of service (BLOS), but signing and marking the road with bike lanes will make this segment more attractive to bicyclists. Where MD 198 widens to a four-lane facility crossing over the Parkway, bike lanes should also be added. There is sufficient space for bikes using the existing shoulders as the road passes over the Parkway in both lanes and in the eastbound lane. Particular attention to the design of the bike lanes as they cross exit and entrance ramps to the Parkway will be required. The eastbound lane, west of the Parkway, can be restriped to allow two 12-foot through lanes, a 12-foot right turn lane and a 5-foot bike lane. The added bike lanes west of the Parkway will improve the BLOS from B to A.

Bicycle Level of Service: Russett Green Rd. to Portland Rd.

In order to increase the bicycle level of service on Laurel/Ft. Meade Rd. between Russett Green Rd. and to MD 295, the following improvements will have to be made. These improvements include adding shoulder width via restriping and construction and designing for access bicycle access over the MD 295 bridge.

Route Name	From	To	Lanes (L)		Traffic Vol. (AADT)	Pct. (HV %)	Post. Spd. (SPp) mph	Width of Pavement			Occu. Park. (OSP) (%)	Pvmt. Cond. (PC ₂) (5..1)	Bicycle LOS	
			Th #	Con.				(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score (1..7)	Grade (A..F)
Laurel/Ft. Meade Rd MD 198	Russett Green Rd	MD 295	6	D	39,175	10	35	15.0	0.0	0	0	3.0	6.30	F
Alternative			6	D	39,175	10	35	22.0	7.0	0	0	5.0	2.73	C

Bicycle Level of Service: Portland Rd to Bald Eagle Dr.

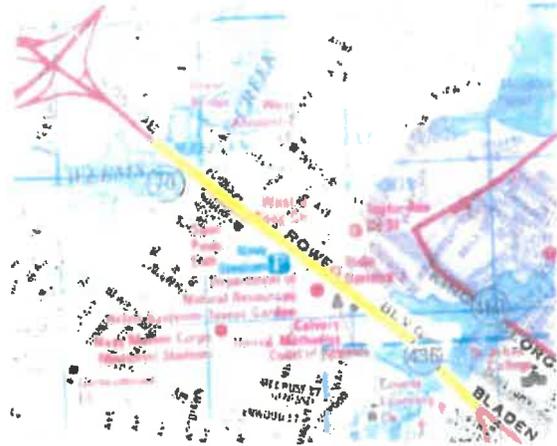
The level of service grade for the segment from Portland Rd. to Bald Eagle Dr. is currently a "C" grade. In order to lower the LOS grade, restriping the travel lanes to 11' and improving the pavement condition would be necessary.

Route Name	From	To	Lanes (L)		Traffic Vol. (AADT)	Pct. (HV %)	Post. Spd. (SPp) mph	Width of Pavement			Occu. Park. (OSP) (%)	Pvmt. Cond. (PC ₂) (5..1)	Bicycle LOS	
			Th #	Con.				(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score (1..7)	Grade (A..F)
Laurel/Ft. Meade Rd MD 198	Portland Rd.	Bald Eagle Dr.	2	U	27,325	10	50	22.5	10.5	0	0	3.0	3.00	C
Alternative			2	U	27,325	10	50	22.5	11.5	0	0	5.0	2.17	B

Pedestrian and Bicycle Corridor Profiles: Roscoe Rowe Blvd. Annapolis

Location: Roscoe Rowe Boulevard: U.S. 50 to Bladen Street

Rowe Boulevard, in the City of Annapolis is an important arterial road providing access from the County to downtown Annapolis from the northwest. The Navy Marine Corps Memorial Stadium, the Maryland Department of Natural Resources and West II Shopping center are all located adjacent to this one-mile stretch of Rowe Boulevard. Rowe Boulevard is also the only road in Annapolis crossing both Weems Creek and College Creek. The College Creek Bridge is designated as a signed shared roadway and there is significant pedestrian traffic in the corridor. Currently there is a state study in process for this corridor.



Location Map (Corridor in Yellow)

ADC The Map People pun # 20202113

Existing Conditions

Rowe Boulevard is a four lane arterial road, with both right-and left-turn lanes added at its intersections with Farragut Road/Melvin Avenue and Taylor Avenue. A ten-foot wide shoulder exists on both sides of the road between the two bridges, except at the two intersections mentioned previously. A raised median exists for the entire corridor, and is approximately 16-foot wide between the bridges and 4 feet wide on the bridges. There are sidewalks along both sides of the road from College Creek to Taylor Ave and in front of the Courthouse. There are no sidewalks from Melvin Ave to the Weems Creek Bridge or shoulders along the bridge. There are also some crosswalks at all intersections, but not for all legs of any intersection. Currently, the only designated bicycle facility on Rowe Boulevard is the section of signed shared roadway on the College Street Bridge. The Rowe Boulevard/Taylor Avenue intersection has been designated by the City of Annapolis as a high priority funding area.



Heading west, before the Taylor St. intersection



Heading west, on the College Creek Bridge

Potential Pedestrian Improvements

Install High Visibility Crosswalks

High visibility crosswalks should be located on all four legs of both the Farragut Road/Melvin Avenue and Taylor Avenue intersections. Currently, only three legs of each intersection have crosswalks and the paint on the existing crosswalks has faded.



Intersection of Rowe and Taylor Ave.
No high visibility crosswalks.

Install/Replace Curb Ramps

Current design guidelines recommend that two curb ramps be installed on each corner of an intersection to make street crossings accessible in both directions. At many intersection corners only one curb ramp exists to serve pedestrians crossing in both directions or only serves one direction of travel. On the southeast corner of the Taylor Avenue intersection there is a depression in the curb for the east west crossing, but no sidewalk or ramp exists.



Intersection of Rowe and Taylor Ave.
No ramp access.

Potential for Pedestrian Countdown Signals

Countdown pedestrian signals should be considered at the Taylor Avenue intersection. In addition to the standard symbols used for a pedestrian signal head, a countdown signal has a display indicating the number of seconds remaining in the pedestrian phase of the signal. Cities that have used these signals report that pedestrians find them useful and that the display of time remaining to cross the street is a clearer indication of when it is appropriate for a pedestrian to begin crossing than the standard symbols.



Intersection of Rowe and Taylor Ave.
Possible location for pedestrian signals.

Bike lanes on the Weems Creek and College Creek Bridges

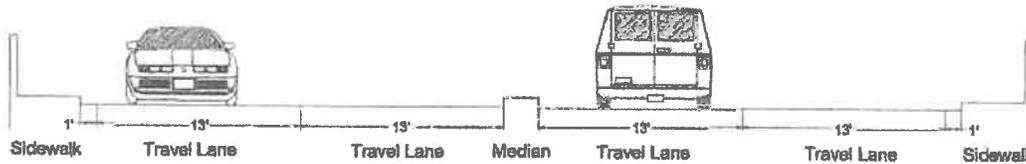
Currently there is no separation between the sidewalk and travel lanes on either of these bridges. Providing separation for adjacent motor vehicle traffic is an important factor in creating a comfortable pedestrian facility. Installing bike lanes on the bridges would have the additional benefit of separating pedestrians from motor vehicle traffic, thereby increasing the pedestrian comfort level.

Potential Bicycle Improvements

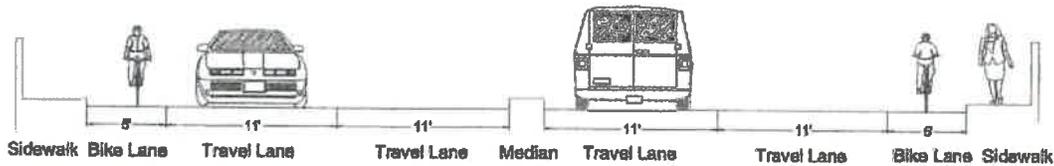
Install a bicycle lane from the Weems Creek Bridge to Bladen Street.

A five to six foot bike lane can be installed on the segment of Rowe Boulevard using the existing shoulder areas between intersections and by restriping the roadway on the two bridges and at its intersections with Farragut Road/Melvin Avenue and Taylor Avenues. On the two bridges there is 27 feet of pavement between the median and the curbs in both directions of travel. The area can be restriped with two 11-foot travel lanes creating space for a five foot bike lane. At the intersections the existing through lanes and turn lanes can be reduced to 11 feet, creating space for bicycle lanes to be installed between the right turn lanes and through lanes. Transition from the proposed bike lane to a shared roadway situation at the Calvert Road intersection will require special attention to address the comfort of less experienced cyclists.

Existing Conditions Weems Creek Bridge



Proposed Improvements Weems Creek Bridge



Bicycle Level of Service

To increase the level of service from an "E" grade to a "D" grade, six foot wide bike lanes need to be constructed along the roadway and a five foot bike lanes need to be established on the connecting bridges along with reducing the travel lanes 10-5'.

Route Name	From	To	Lanes (L)		Traffic Vol. (AADT)	Pct. (HV %)	Post. Spd. (SPp) mph	Width of Pavement			Occu. Park. (OSP) (%)	Pvmt. Cond. (PC ₂) (5..1)	Bicycle LOS	
			Th #	Con.				(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score (1..7)	Grade (A..F)
Rowe Blvd.	Kirkley Rd.	Bladden St.	4	D	44,000	10	40	12.0	0.0	0	0	4.0	6.91	F
Alternative			4	D	44,000	10	40	18.0	7.5	0	0	5.0	4.22	D

Pedestrian and Bicycle Corridor Profiles: Mountain Road Rt 177. Lake Shore

Location: Mountain Road Route 177 from Maryland St./Lake Shore Elementary to Schmidts Lane.

Mountain Road is a major arterial road connecting the Lake Shore Area to Governor Ritchie Highway (Route 2). This road provides access to variety of residential and commercial zones, including Lake Shore Elementary, Lakeshore Volunteer Fire Department and a variety of service-oriented businesses. The study corridor begins near Maryland St. and the Lake Shore Elementary School and ends just short of Hogs Neck Road at Schmidts Lane.



Location Map (Corridor in Yellow)
ADC The Map People pun # 20202113

Existing Conditions

Mountain Road (MD 177) is a two lane arterial road with a middle turning lane during designated hours. The middle lane changes from a turning lane to a west bound only lane during morning rush hours and to an east bound only lane during evening rush hours. The road ranges in width from 39.5 feet to 46 feet. It has two 12-foot travel lanes and an 11-foot wide middle turning lane. The variable shoulder ranges from 6 feet wide to 3 feet wide throughout the corridor. The existing speed limit is 40 m.p.h., but the observed speed seems to be closer to 50 mph. There are limited and discontinuous sidewalks located on both sides of the road and some pedestrian access at the major intersections. Currently there are no designated bicycle facilities on the route.



Wide shoulder in the commercial area looking west



Near Lake Shore Elementary, looking east

Potential Pedestrian Improvements

Install and connect sidewalks

The corridor has strong potential for encouraging pedestrian travel. However, the few sidewalks that do exist are short and unconnected. Sidewalks should be connected and/or constructed through the commercial area of the segment and should also be extended to the Lake Shore Elementary School. A curb should be installed along with new sidewalks to increase the comfort level of pedestrians and protect them from traffic along the corridor.

Install Curb Ramps

Current design guidelines recommend that two curb ramps be installed on each corner of an intersection to serve street crossing in both directions. The intersection located in front of the Lake Shore VFD does not have a curb ramp to provide access through a curbed median. As sidewalks are developed, curb ramps will be required at all intersections

Pedestrian Signal Accessibility

The pedestrian signal provided at the Lake Shore VFD intersection should be free of obstructions and universally accessible. The pedestrian push button should be in compliance ADA guidelines.

Increased Shoulder Width

Providing a separation for pedestrians and motorists helps increase the safety and comfort level of pedestrians. In situations where sidewalks are not feasible to construct, widened shoulders could provide an alternative for pedestrian movement throughout the corridor.



Heading west, past the commercial district

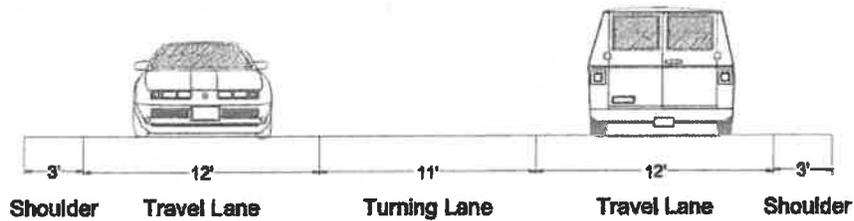


Existing shoulder in front of Royal Farms, heading east

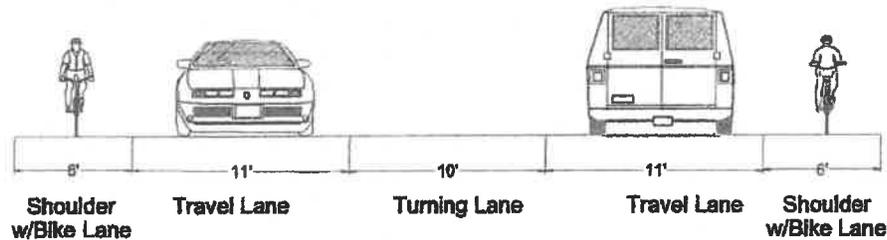
Potential Bicycle Improvements

Increase the shoulder width along the corridor to provide for bicycle use. Providing a shoulder at least six-foot wide will greatly improve bicycle conditions in the corridor. In most sections of the corridor this can be accomplished by restriping the travel lanes to 11 feet, the middle turning lane to 10 feet and adding additional shoulder pavement. The design and striping of the shoulders through the commercial area near Lake Shore Elementary School will require special attention due to the variable width of the existing pavement and numerous existing driveways. Additional study is recommended for this corridor in order to develop recommendations for traffic direction designations, signal changes, traffic volumes and speed.

Existing Conditions



Proposed Improvements



Bicycle Level of Service

In order to increase the level of service grade on Mountain Road several improvements will have to be made. This includes decreasing the width of travel and turning lanes and providing a minimum of seven feet of shoulder width for each travel direction. These improvements will improve the level of service grade by two increments.

Route Name	From	To	Lanes (L)		Traffic Vol. (AADT)	Pct. (HV %)	Post. Spd. (SPP) mph	Width of Pavement			Occu. Park. (OSP) (%)	Pvmt. Cond. (PC _s) (5..1)	Bicycle LOS	
			Th #	Con.				(Wt) (ft)	(Wl) (ft)	(Wps) (ft)			Score (1..7)	Grade (A..F)
Mountain Rd.	Alvind Rd.	Schmidts Ln.	2	S	28,204	8	40	15.0	3.0	0	0	3.0	5.80	F
Alternative			2	S	28,204	8	40	18.0	7.0	0	0	5.0	3.81	D

Location: Maryland Route 3 at the northern edge of Crofton between Waugh Chapel Road, Reidel Road and Brickhead Road.

Maryland Route 3 is an important, principal arterial highway serving western and central Anne Arundel County. MD 3 runs in a north-south direction. East of MD 3 is a primarily residential area under active development with single family and townhouses. West of MD 3, south of Waugh Chapel Road is the Village of Waugh Chapel, a large regional commercial mixed-use development, under active development as of January 2002. A Project Planning Study is currently being conducted for this area.



Entrance to the Village of Waugh Chapel from North Bound MD 3

Existing Conditions

MD Route 3 south of Waugh Chapel Road has three through lanes northbound and southbound plus shoulders and turn lanes. The northbound and southbound average pavement widths are approximately 53'. MD 3 has a wide partially wooded median varying in width but is over 200 feet in some sections. At the signalized intersection with Waugh Chapel Road and Riedel Road, MD 3 has additional turn lanes including a triple left turn from MD 3 northbound to Waugh Chapel Road. Approximately 1,800 feet south of this intersection, near Ogden Way, there is another signalized intersection providing northbound vehicles left turn access to the Village of Waugh Chapel. Posted speed limits are 50 m.p.h. on MD 3 and 35 m.p.h on Riedel Road and Waugh Chapel Road. There is sidewalk on Riedel Road and Waugh Chapel Road but not along MD 3. The Village of Waugh Chapel has included some good elements for internal pedestrian circulation such as wide sidewalks, raised crosswalks, and street furnishings.



Pedestrian Circulation within the Village of Waugh Chapel

Potential Pedestrian Improvements

Provide safe ways to cross MD 3

The stores and services at the Village of Waugh Chapel are a major draw for people but most local residential development is on the east side of MD 3. The distance between residential areas and even the east side of the Village of Waugh Chapel (over 0.25 miles) will discourage heavy pedestrian activity, but for people without cars there is currently no safe way to cross MD 3 from Crofton to Waugh Chapel Village.



Intersection of MD 3 and Waugh Chapel Rd.

Install Curb Ramps and Pedestrian Signals

Install accessible curb ramps and a pedestrian signal at the MD 3-Waugh Chapel Road-Riedel Road intersection. There is sidewalk along Riedel Road but it terminates at MD 3 and pedestrians must cross four lanes of traffic in each direction plus the northbound triple left turn. Providing ramps and a signal will provide a safe way to cross MD 3 at this location.

Install Sidewalks

Install sidewalks and a pedestrian signal at the signalized Village of Waugh Chapel entrance on MD 3 and within the Village across from the intersection. Because it is located closer to the center of both the residential development on the east side of MD 3 and the Village of Waugh Chapel, this intersection has higher potential for pedestrian use than the MD 3-Waugh Chapel Road-Riedel Road intersection. No provisions for pedestrians currently exist. Northbound traffic has continuous flow through this intersection because left turns out of the Village (i.e. to go northbound) are not permitted. A pedestrian signal could be installed without affecting northbound vehicle flow due to breaks in MD 3 northbound traffic from the signalized intersection at MD 424 (Davidsonville Road). Sidewalk should be added along the Village entrance road across from the intersection.

Plan for future pedestrian movement from the north side of Waugh Chapel Road to the Village of Waugh Chapel

A convenience store is located at the north-west corner of the MD 3-Waugh Chapel Road intersection. North and west of this store is land recommended for use as low to medium-density housing according to the Odenton Small Area Plan. A pedestrian connection should be reserved from this area across Waugh Chapel Road to the existing entrance to Village of Waugh Chapel where there is an internal sidewalk system.



Convenience store/gas station looking south on MD 3 towards the Village of Waugh Chapel.

Potential Bicycle Improvements

Provide a pedestrian-bicycle pathway along the east side of MD 3 between Davidsonville Road and Riedel Road.

There are no sidewalks along either side of MD 3. The area on the east side of MD 3 between Riedel Road and Davidsonville Road is partially developed in medium density housing with new areas under active development. Riedel Road serves this residential area and has reasonably good pedestrian accommodations (sidewalks, buffers, street trees) but MD 3 is the shortest route through the area. A pathway along the east side of MD 3 would provide a pedestrian route from Crofton to the Village of Waugh Chapel and a link for the residential areas between MD 3 and Riedel Road. A minimum 8 to 12-foot wide landscaped strip would buffer the pathway from fast moving traffic along MD 3.

Bicycle Level of Service

In order to increase the level of service grade on MD 3 Crain Highway, 3 feet of expanded shoulder width will be needed in both directions. Due to the high speed and volume of traffic on this road, further analysis of alternative design options should be developed for bicycle and pedestrian movements.

Route Name	From To		Lanes (L)		Traffic Vol. (AADT)	Pct. (HV %)	Post. Spd. (SPp) mph	Width of Pavement			Occu. Park. (OSP) (%)	Pvmt. Cond. (PCs) (5..1)	Bicycle LOS	
	Th #	Con.	(Wt) (ft)	(Wl) (ft)				(Wps) (ft)	Score (1..7)	Grade (A..F)				
Crain Hwy (MD 3)	Defense Hwy	St. Stephens Church Rd.	6	D	48,600	15	50	22.5	10.5	0	0	4.0	4.59	E
Alternative			6	D	48,600	15	50	25.5	13.5	0	0	5.0	2.27	B

Location: Fort Smallwood Road (MD 173) at the intersection with Riviera Drive and Bar Harbor Road

Fort Smallwood Road is a minor arterial highway serving the Riviera Beach area of north-east Anne Arundel County. Riviera Drive and Bar Harbor Road are both collector roads. Riviera Beach is an older part of Anne Arundel County developed in single family homes at medium densities (four to eight dwelling units per acre). At the Fort Smallwood Road-Riviera Drive-Bar Harbor Road intersection, is a commercial and service area serving local residential needs. Commercial development in the area includes the Riviera Beach Fire Company, Riviera Plaza and a McDonalds on the south west corner. On the south east corner a CVS drugstore was under construction as of January 2002. A large number of homes are within walking distance of the commercial area.



Fort Smallwood Rd. Commercial District



Intersection of Bar Harbor Rd and Fort Smallwood Rd.

Existing Conditions

Fort Smallwood Road has one travel lane in each direction plus a center turn lane. Riviera Drive and Bar Harbor Road have one travel lane in each direction. Speed limits are 35 mph on Fort Smallwood Road and 25 mph on Riviera Drive and Bar Harbor Road. Fort Smallwood Road has four-foot sidewalks on both sides west of Riviera Drive, but for only a short distance south of Bar Harbor Road. We anticipate there will be a sidewalk in front of the new CVS. Currently Riviera Road has a sidewalk on the west side only. There are functioning pedestrian crossing signals on all four legs of the Fort Smallwood Road-Riviera Drive-Bar Harbor Road intersection. In these specified locations the amount of available right-of-way is constrained.

Potential Pedestrian Improvements

Install high visibility crosswalks and signage

High visibility crosswalks (raised or colored) should be installed on all four legs of the main intersection. Installing high visibility fluorescent yellow pedestrian signage would also alert drivers to the presence of pedestrians.



Free Right Turn on Fort Smallwood Rd.

Improve conditions for pedestrians crossing at the free right turn on Fort Smallwood Road at Riviera Drive

A free right turn is permitted for southbound traffic on Fort Smallwood Road at Riviera Drive. Southbound vehicles pull onto the pedestrian crossing in order to check for traffic coming south from Riviera Drive before they make the right turn. This is a heavy vehicle movement that makes pedestrian crossing hazardous. Potential improvements are to 1) disallow free right turns altogether, 2) allow a free right turn only after a stop, and 3) pulling the stop bar back (west) along Fort Smallwood Road.



Westside of Fort Smallwood Rd.

Install sidewalk along the west side of Fort Smallwood Road south of McDonalds

Sidewalks should be installed within the commercial corridor. Ideally this would be accomplished through a comprehensive streetscape project that would consolidate driveway entrances, relocate utility poles, provide street trees and incorporate bicycle facilities.

Enlarge the pedestrian refuge at Bar Harbor Road and Riviera Drive

The existing refuge is non-ADA accessible and is taken up mostly by the signal pole. Enlarging the refuge would provide an added level of safety and comfort for pedestrians.



Pedestrian Refuge at Bar Harbor Rd. and Riviera Dr.



Appendix B: Bicycle Level of Service Definitions

Bicycle Level of Service Model Description

The Bicycle LOS Model is a "supply-side" criterion. It is an evaluation of bicyclists' perceived safety with respect to motor vehicle traffic. It identifies the quality of service for bicyclists that currently exists within the roadway environment. Following the model description, the data requirements, data collection and compilation guidelines, and results of the evaluation are documented.

The statistically calibrated mathematical equation entitled the *Bicycle Level of Service (Bicycle LOS)¹ Model (Version 2.0)* was used for the evaluation of bicycling conditions. This model is the most accurate method of evaluating the bicycling conditions of shared roadway environments. It uses the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. With statistical precision, the *Model* clearly reflects the effect on bicycling suitability or "compatibility" due to factors such as roadway width, bike lane widths and striping combinations, traffic volume, pavement surface conditions, motor vehicle speed and type, and on-street parking.

The *Bicycle Level of Service Model* is based on the proven research documented in *Transportation Research Record 1578* published by the Transportation Research Board of the National Academy of Sciences. It was developed with a background of over 100,000 miles of evaluated urban, suburban, and rural roads and streets across North America. Many urbanized area planning agencies and state highway departments are using this established method of evaluating their roadway networks. These include Anchorage AK, Baltimore MD, Birmingham AL, Buffalo NY, Gainesville FL, Houston TX, Philadelphia PA, Lexington KY, Sacramento CA, Springfield MA, Tampa FL, as well as the Delaware Department of Transportation (DelDOT), Florida Department of Transportation (FDOT), New York State Department of Transportation (NYDOT), Maryland Department of Transportation (MDOT) and many others.

Widespread application of the original form of the *Bicycle LOS Model* has provided several refinements. Application of the *Bicycle LOS Model* in the metropolitan area of Philadelphia resulted in the final definition of the three effective width cases for evaluating roadways with on-street parking. Application of the *Bicycle LOS Model* in the rural areas surrounding the greater Buffalo region resulted in refinements to the "low traffic volume roadway width adjustment". A 1997 statistical enhancement to the *Model* (during statewide application in Delaware) resulted in better quantification of the effects of high speed truck traffic [see the

¹ Landis, Bruce W. et.al. "Real-Time Human Perceptions: Toward a Bicycle Level of Service" *Transportation Research Record 1578*, Transportation Research Board, Washington DC 1997



$SP_t(1+10.38HV)^2$ term]. As a result, *Version 2.0* has the highest correlation coefficient ($R^2 = 0.77$) of any form of the *Bicycle LOS Model*².

Version 2.0 of the *Bicycle Level of Service Model (Bicycle LOS Model)* was employed to evaluate the roads and streets within the First Coast MPO region. Its form is shown below:

$$\text{Bicycle LOS} = a_1 \ln(\text{Vol}_{15}/L_n) + a_2 SP_t(1+10.38HV)^2 + a_3 (1/PR_6)^2 + a_4 (W_e)^2 + C$$

Where:

Vol_{15} = Volume of directional traffic in 15 minute time period

$$\text{Vol}_{15} = (\text{ADT} \times D \times K_d) / (4 \times \text{PHF})$$

where:

ADT = Average Daily Traffic on the segment or link

D = Directional Factor (assumed = 0.565)

K_d = Peak to Daily Factor (assumed = 0.1)

PHF = Peak Hour Factor (assumed = 1.0)

L_n = Total number of directional *through* lanes

SP_t = Effective speed limit

$$SP_t = 1.1199 \ln(SP_p - 20) + 0.8103$$

where:

SP_p = Posted speed limit (a surrogate for average running speed)

HV = percentage of heavy vehicles (as defined in the 1994 Highway Capacity Manual)

PR_6 = FHWA's five point pavement surface condition rating

W_e = Average effective width of outside through lane:

where:

$$W_e = W_v - (10 \text{ ft} \times \% \text{ OSPA})$$

$$W_e = W_v + W_l (1 - 2 \times \% \text{ OSPA})$$

$$W_e = W_v + W_l - 2 (10 \times \% \text{ OSPA})$$

and $W_l = 0$

and $W_l > 0$ & $W_{ps} = 0$

and $W_l > 0$ & $W_{ps} > 0$

and a bikelane exists

where:

W_t = total width of outside lane (and shoulder) pavement

OSPA = percentage of segment with occupied on-street parking

W_l = width of paving between the outside lane stripe and the edge of pavement

W_{ps} = width of pavement striped for on-street parking

W_v = Effective width as a function of traffic volume

and:

$$W_v = W_t \quad \text{if} \quad \text{ADT} > 4,000 \text{veh/day}$$

$$W_v = W_t (2 - 0.00025 \times \text{ADT}) \quad \text{if} \quad \text{ADT} \leq 4,000 \text{veh/day}$$



and if the street/ road is undivided and unstriped

a_1 : 0.507 a_2 : 0.199 a_3 : 7.066 a_4 : - 0.005 C: 0.760

($a_1 - a_4$) are coefficients established by the multi-variate regression analysis.

The Bicycle LOS score resulting from the final equation is pre-stratified into service categories "A, B, C, D, E, and F", according to the ranges shown in Table 1, reflecting users' perception of the road segments level of service for bicycle travel. This stratification is in accordance with the linear scale established during the referenced research (i.e., the research project bicycle participants' aggregate response to roadway and traffic stimuli). The *Model* is particularly responsive to the factors that are statistically significant. An example of its sensitivity to various roadway and traffic conditions is shown in Figure 2.

TABLE 1 Bicycle Level-of-Service Categories

LEVEL-OF-SERVICE	Score	Bicycle LOS
A		≤ 1.5
B		> 1.5 and ≤ 2.5
C		> 2.5 and ≤ 3.5
D		> 3.5 and ≤ 4.5
E		> 4.5 and ≤ 5.5
F		> 5.5

The Bicycle LOS Model is used by planners and engineers throughout the US and Canada in a variety of planning and design applications. This can be used to conduct a benefits comparison among proposed bikeway/roadway cross-sections, identify roadway restriping or reconfiguration candidates for bicycle improvements, and to prioritize and program roadways for bicycle improvements.



FIGURE 1 Bicycle LOS Model Sensitivity Analysis

$$\text{Bicycle LOS} = a_1 \ln(\text{Vol}_{15}/L_n) + a_2 \text{SP}_p (1 + 10.38 \text{HV})^2 + a_3 (1/\text{PR}_5)^2 + a_4 (W_a)^2 + C$$

a_1 : 0.507 a_2 : 0.199 a_3 : 7.066 a_4 : -0.005 C: 0.760

Baseline Inputs:

ADT = 12,000 vpd % HV = 1 L = 2 lanes
 SP_p = 40 mph W_a = 12 ft PR₅ = 4 (good pavement)

	<u>BLOS</u>	<u>% Change</u>
Baseline BLOS Score (Bicycle LOS)	3.98	N/A

Lane Width and Lane striping changes (T-statistic = 9.844)

W _t = 10 ft		4.20	6% increase
W _t = 11 ft		4.09	3% increase
W _t = 12 ft	-- (baseline average) -----	3.98	no change
W _t = 13 ft		3.85	3% reduction
W _t = 14 ft		3.72	7% reduction
W _t = 15 ft (W _l = 3 ft)		3.57 (3.08)	10%(23%) reduction
W _t = 16 ft (W _l = 4 ft)		3.42 (2.70)	14%(32%) reduction
W _t = 17 ft (W _l = 5 ft)		3.25 (2.28)	18%(43%) reduction

Traffic Volume (ADT) variations (T-statistic = 5.689)

ADT = 1,000 Very Low		2.75	31% decrease
ADT = 5,000 Low		3.54	11% decrease
ADT = 12,000 Average - (baseline average) --		3.98	no change
ADT = 15,000 High		4.09	3% increase
ADT = 25,000 Very High 4.35			9% increase

Pavement Surface conditions (T-statistic = 4.902)

PR ₅ = 2 Poor		5.30	33% increase
PR ₅ = 3 Fair		4.32	9% reduction
PR ₅ = 4 -- Good - (baseline average) - - -		3.98	no change
PR ₅ = 5 Very Good		3.82	4% reduction

Heavy Vehicles in percentages (Combined speed and heavy vehicles T-statistic = 3.844)

HV = 0 No Volume		3.80	5% decrease
HV = 1 --- Very Low - (baseline average)		3.98	no change
HV = 2 Low		4.18	5% increase
HV = 5 Moderate		4.88	23% increase ^a
HV = 10 High		6.42	61% increase ^a
HV = 15 Very High		8.39	111% increase ^a

^aOutside the variable's range (see Reference (1))



The BLOS Model provides a grading system (A-F) for rating bicycle riding conditions on each roadway segment. Level A reflects the best conditions for bicyclists; level F represents the worst conditions. The photos provided show examples of real world locations that depict the existing conditions, which generate the various Level of Service grades.



BLOS A



BLOS B



BLOS C



BLOS D



BLOS E



BLOS F



Bicycle Level of Service Model Definitions

The following list provides a definition for each of the data fields required for computation of the *Bicycle Level of Service* scores, as well as the associated guidelines for their collection and compilation into the programmed database.

Average Daily Traffic (ADT) - is the average daily traffic volume on the segment or link. The programmed database will convert these volumes to Vol_{15} using the Directional Factor (D), Peak to Daily Factor (K_D) and Peak Hour Factor (PHF) for the road segment.

Percent Heavy Vehicles (HV) - is the percentage of heavy vehicles (as defined by the 1994 Highway Capacity Manual or the Client) on the segment or link.

Number of lanes of traffic (L) - is the total number of *through* traffic lanes of the road segment and its configuration. (e.g., D = Divided, U = Undivided, OW = One-Way, S = Center Turning Lane). The programmed database will convert these lanes into directional lanes. The presence of continuous right-turn lanes should be noted in the comments field. In the other direction it will be noted in the comments if there is a different number of through lanes.

Posted Speed Limit (S_p) - Recorded as posted.

W_t total width of pavement - is measured from the center of the road, yellow stripe, or (in the case of a multilane configuration) the lane separation striping to the edge of pavement or to the gutter pan of the curb. When there is angled parking adjacent to the outside lane, W_t is measured to the traffic-side end of the parking stall stripes.

W_l width of paving between the outside lane stripe and the edge of pavement - is measured from the outside lane stripe to the edge of pavement or to the gutter pan of the curb. When there is angled parking adjacent to the outside lane, W_l is measured to the traffic-side end of the parking stall stripes.

W_p width of pavement striped for on-street parking - Record this factor only if there is parking to the right of a striped bike lane. If there is parking on two sides on a one-way, single lane street, report the combined width of the striped parking.

Total Pavement Width (TPW) - is measured from the center of the road or yellow stripe to the edge of pavement or to traffic side of the gutter pan of the curb. Record this dimension only when the roadway has four or more thru lanes and has no striped paved shoulder or bike lane.

OSPA % - estimated percentage (measured in increments of 25%) of the segment (excluding driveways) along which there is occupied on-street parking at the time of survey. Each side should be recorded separately. If parking is allowed only during off-peak periods and parking restrictions change widths and laneage, indicate the geometric



changes in the comments field. Note: Indicate any "angled parking" in the comments field.

Travel Lane (PC_t) - Evaluate the pavement condition of the motor vehicle travel lane according to the FHWA's five-point pavement surface condition rating shown below

Shoulder or Bike lane (PC_s) - Evaluate the pavement condition of the shoulder or bike lane according to the FHWA's five-point pavement surface condition rating.

PAVEMENT SURFACE CONDITION RATING

5.0 - Only new or nearly new pavements are likely to be smooth enough and free of cracks and patches to qualify for this category.

4.0 - Pavement, although not as smooth as described above, gives a first class ride and exhibits signs of surface deterioration.

3.0 - Riding qualities are noticeably inferior to those above; may be barely tolerable for high-speed traffic. Defects may include rutting, map cracking, and extensive patching.

2.0 - Pavements have deteriorated to such an extent that they affect the speed of free-flow traffic. Flexible pavement has distress over 50 percent or more of the surface. Rigid pavement distress includes joint spalling, patching, etc.

1.0 - Pavements that are in an extremely deteriorated condition. Distress occurs over 75 percent or more of the surface.



Appendix C: Sample Bicycle Parking Ordinances

Madison, Wisconsin (for example only)

Please contact the City of Madison for more detailed information. The following was generated from the City of Madison General Ordinances.

"1. Subsection (1) entitled 'Statement of Purpose' of Section 28.11 entitled 'Off-Street Parking and Loading Facilities' of the Madison General Ordinances is hereby amended to read as follows:

"(1) Statement of Purpose. The purpose of this section is to provide for the regulation of accessory off-street parking and loading facilities for different uses. The regulations and requirements which follow are established to promote the safety and general welfare of the community by:

"(a) Increasing the safety and capacity of public streets by requiring off-street parking or off-street loading facilities to be provided.

"(b) Minimizing adverse effects of off-street parking and off-street loading facilities on adjacent properties through the requirement of design and maintenance standards.

"(c) Lessening congestion and preventing the overtaxing of public streets by regulating the location and capacity of accessory off-street parking or off-street loading facilities.

"(d) Providing adequate and safe facilities for the storage of bicycles.

"2. Paragraph 4. of Subsection (2) entitled 'General Regulations' of Section 28.11 entitled 'Off-Street Parking and Loading Facilities' of the Madison General Ordinances is hereby created to read as follows:

"4. Bicycle parking facilities shall be provided as required for all new structures and uses established as provided in Sec. 28.11(2)(a)1. or to changes in uses as provided in Secs. 28.11(2)(a)2. and 3.; however, bicycle parking facilities shall not be required until the effective date of this paragraph. Notwithstanding Secs. 28.08(1)(i) and 28.09(5)(a), bicycle parking facilities shall be provided in all districts including districts in the Central Area.'

"3. Paragraph 1. of Subdivision (a) entitled "Utilization" of Subsection (3) entitled "Off-Street Parking Facilities" of Section 28.11 of the Madison General Ordinances is hereby amended to read as follows:

"1. In the residential district, accessory off-street parking facilities provided for uses listed herein shall be solely for the parking of passenger automobiles and bicycles of



patrons, occupants or employees and not more than one truck limited to one (1) ton capacity.'

"4. Subdivision (e) entitled 'Size' of Subsection (3) entitled 'Off-Street Parking Facilities' of Section 28.11 of the Madison General Ordinances is hereby amended to read as follows:

"(e) Size. Off-street parking spaces shall comply with the minimum width, length and access requirements as specified in Sec. 10.08 of the Madison General Ordinances. Required bicycle parking spaces shall be at least 2 feet by 6 feet. An access aisle of at least 5 feet shall be provided in each bicycle parking facility. Such space shall have a vertical clearance of at least 6 feet.'

"5. Subparagraph d. of Paragraph 2. of Subdivision (h) entitled 'Design and Maintenance' of Subsection (3) entitled 'Off-Street Parking Facilities' of Section 28.11 of the Madison General Ordinances is hereby created to read as follows:

"d. Bicycle Parking Facilities. Accessory off-street parking for bicycles shall include provision for secure storage of bicycles. Such facilities shall provide lockable enclosed lockers or racks or equivalent structures in or upon which the bicycle may be locked by the user. Structures that require a user-supplied locking device shall be designed to accommodate U-shaped locking devices. All lockers and racks must be securely anchored to the ground or the building structure to prevent the racks and lockers from being removed from the location. The surfacing of such facilities shall be designed and maintained to be mud and dust free.'

"6. Paragraph 3. of Subdivision (i) entitled 'Location' of Subsection (3) entitled 'Off-Street Parking Facilities' of Section 28.11 of the Madison General Ordinances is hereby created to read as follows:

"3. Bicycle parking facilities shall be located in a clearly designated safe and convenient location. The design and location of such facility shall be harmonious with the surrounding environment. The facility location shall be at least as convenient as the majority of auto parking spaces provided."

"7. New paragraph 1. of Subdivision (1) entitled 'Schedule of Required Off-Street Parking Facilities' of Subsection (3) of Section 28.11 entitled 'Off-Street Parking Facilities' of the Madison General Ordinances is hereby created to read as follows:

"1. Bicycle parking facility spaces shall be provided in adequate number as determined by the Zoning Administrator. In making the determination, the Zoning Administrator shall consider when appropriate, the number of dwelling units or lodging rooms, the number of students, the number of employees, and the number of auto parking spaces in accordance with the following guidelines (see chart at left).'

"8. Current Paragraphs 1., 2., 3., 4., 5. and 6. of Subdivision (1) entitled 'Schedule of Required Off-Street Parking Facilities' of Subsection (3) of Section 28.11 entitled 'Off-



Street Parking and Loading Facilities' of the Madison General Ordinances are hereby renumbered to Paragraphs 2., 3., 4., 5., 6. and 7."

Off-Street Bicycle Parking Guidelines

Land Use	Bike Space
Dwellings/lodging rooms	1 per dwelling unit or 3 lodging rooms
Clubs/lodges	1 per lodging room plus 3% of person capacity
Fraternities/sororities	1 per 3 rooms
Hotels/lodging houses	1 per 20 employees
Galleries/museums/libraries	1 per 10 auto spaces
Colleges/universities/junior and high schools	1 per employees plus 1 per 4 students
Nursery/elementary schools	1 per 10 employees plus students above second grade
Convalescent and nursing homes/institutions	1 per 20 employees
Hospitals	1 per 20 employees
Places of assembly, recreation, entertainment, and amusement	1 per 10 auto spaces
Commercial/manufacturing	1 per 10 auto spaces
Miscellaneous/other	To be determined by the zoning administrator based on the guideline for the most similar use listed above.

"a. In all cases where bicycle parking is required, no fewer than two (2) spaces shall be required.

"b. After the first fifty (50) bicycle parking spaces are provided, additional bicycle parking spaces required are 0.5 (one half) space per unit listed.

"c. Where the expected need for bicycle parking for a particular use is uncertain due to unknown or unusual operating characteristics of the use, the Zoning Administrator may authorize that construction and provision of not more than fifty (50) percent of the bicycle parking spaces be deferred. Land area required for provision of deferred bicycle parking spaces shall be maintained in reserve."

For more information on Madison's ordinance, contact [Arthur Ross](#), the city's bicycle/pedestrian coordinator.



Schaumburg, Illinois

154.125 BICYCLE PARKING REQUIREMENTS

Cited from:

<http://www.ordlink.com/cgibin/hilite.pl/codes/schaumbu/>

(A) Required number of spaces. The following uses are required to install bicycle parking:

(1) Retail centers Minimum of ten spaces to be located at each main building entrance(s).

(2) Office and professional uses (sq. ft. gross floor area)

0 - 49,999 One rack or five spaces
50,000 - 99,999 Two racks or ten spaces
100,000 or more Four racks or 20 spaces

(3) Restaurants

Type A (full service One rack or five spaces

Type B (carry out, One rack or five spaces

Type C (full/carry-out, Two racks or ten spaces

(4) Cultural, recreational and entertainment uses

Health clubs; Minimum of 30 spaces
racquetball,
handball and tennis
clubs; swim clubs
and pools; community
centers; and similar
uses as determined
by the Director of
Planning

(5) Bowling alleys; To be determined on a skating rinks; case by case basis by the movie theaters; Director of Planning or similar uses as his/her authorized determined by designee, acting in the the Director of capacity of Zoning Ad-Planning or his/ ministrator her authorized designee



(B) Location. Bike racks shall be located such that they are highly visible from the street and/or building entrance from where bicyclists approach. Bicycle parking areas shall be separated from motor vehicle parking areas.

(C) Design Criteria and Dimensions.

(1) Bicycle racks must be capable of locking the bicycle and of supporting the bicycle in an upright position.

(2) A hard surfaced parking area is required. Racks must be securely anchored to supporting surface.

(3) Installation of bike racks shall conform with the requirements set forth by the bike rack manufacturer with a rectangular space no less than two and one-half feet wide by six feet long per bicycle unless a locker or permanent device to stand the bicycle on end is provided.

(4) Bicycle racks shall be installed with adequate space beside the parked bicycle so that a bicyclist will be able to reach and operate the locking mechanism.

(D) Collective provisions. Off-street bicycle rack facilities for separate uses may be provided collectively if the total number of spaces provided collectively is not less than the sum of the separate requirements for each such use and provided that all regulations governing location of accessory parking spaces in relation to the use served are adhered to.

(Ord. 163, passed 12-5-61; Am. Ord. 1992, passed 5-26-81; Am. Ord. 92-112, passed 10-13-92; Am. Ord. 95-62, passed 6-13-95)



Appendix D: Facility Maintenance

The first step in developing a maintenance program is to identify what tasks need to be undertaken and who is responsible for each task. The maintenance schedules below lay out potential maintenance tasks, and the likely frequency of these tasks. The County's Bike and Pedestrian Coordinator should be responsible for coordinating the execution of on-road bikeway maintenance and should be the point of contact for citizens with questions regarding maintenance.

Recommended Pedestrian Maintenance Practices

Sidewalk maintenance will be necessary, particularly along portions of sidewalk which are not maintained by SHA or adjacent property owners. Sidewalk maintenance should include periodic sweeping and edging, mowing during spring and summer months, vegetation trimming, and spot repairs. Periodic inspection and maintenance of sidewalks should be coordinated by the Bicycle and Pedestrian Coordinator.

Surface Repair

Surface cracking is a major step in sidewalk deterioration. Extensive freeze and thaw cycles are major culprits for cracking. If the surface is allowed to continue to crack, vegetation may invade the crack and rapidly increase surface deterioration. Drain grates that are located in the path of pedestrian travel can also become a hazard if not properly maintained. The following section of County Code addresses the repair of sidewalks bounding on a public road. In most cases where the sidewalk is integral with the curb, the County will maintain it.

Article 25: § 4-112. Improvement of sidewalks; sidewalk assessments.

- (a) The Director may cause and direct the owner of real property bounding on a public road to grade, lay out, pave, repave, construct, reconstruct, repair, extend, widen, straighten, or improve a sidewalk in accordance with the plans and specifications prepared by the Department whenever in the judgment of the Director the work is required in the interest of public safety and welfare.
- (b) Work required of a property owner under subsection (a) of this section shall be done at the expense of the property owner after receipt of a notice from the Director to perform the work. The notice shall specify the work to be done, the manner of doing the work, and the materials to be used. The notice shall also state a time limit within which to comply with the notice. The time limit shall not be less than 30 days from the service of the notice.
- (c) The notice shall be:
- (1) served personally on the owner of the property or the owner's agent, trustee, or guardian;



- (2) sent by certified mail to the owner of the property;
- (3) left at the owner's place of residence; or
- (4) published once a week for four successive weeks in a newspaper of general circulation published in the County.

(d) A person aggrieved by the terms and conditions of the notice may apply to the Director for a hearing and shall be given an opportunity to be heard. At the hearing the Director may revise, alter, affirm, or rescind the notice.

(e) On the failure of a property owner to comply with a final notice within the time specified in the notice, the Director may procure the performance of the work by the County work force or by contract. The cost and expense of the work, including overhead and administrative costs, shall be certified to the Controller, together with the names of the owners of property in front of which the work was done. The amount shall be levied, collected, and enforced in the same manner as County real property taxes, and shall have the same priority rights, bear the same interest and penalties, constitute a lien on the real property so assessed, and be treated the same as County real property taxes.

(f) On application the County may provide for payment of an assessment in not more than five annual installments. Installment payments shall not be permitted unless an agreement was made between the property owner and the County before the performance of the work.

(Code 1967, § 15-709; Bill No. 78-85, § 1)

Recommendations

- Periodically check sidewalk surface of major pedestrian routes based on citizen request and random field checks.
- Check sidewalks for heaves and elevation changes that cause tripping hazards
 - Vertical displacement of 3/4" high or greater for 12" of joint
 - Horizontal displacements of greater than 1/2" for crack 3' or longer
- Repair cracks early before additional deterioration is encouraged.
- Repair or replace drain grates that create an uneven surface.
- Provide extra sweeping in the fall in areas where leaves/cones accumulate in bike lanes.

Sweeping

A regularly scheduled inspection and maintenance program based upon citizen request helps ensure that sidewalk litter is regularly picked up or swept. During extended icy conditions, it may not be cost-effective to frequently remove sanding materials; however, they should be swept after major storms in high-use areas and after the winter season ends.



Recommendations

- Establish a seasonal sweeping schedule per citizen requests;
- Sweep sidewalks whenever there is a noticeable accumulation of debris

Vegetation

Vegetation encroaching into sidewalks is both a nuisance and a problem. Roots should be controlled to prevent break-up of the surface. Adequate clearances and sight-distances should be maintained at driveways and intersections: pedestrians and bicyclists must be visible to approaching motorists.

Recommendations

- Cut back vegetation to increase pedestrian visibility, where appropriate
- Plant trees that are sidewalk friendly
- Remove hazardous roots, consult an arborist for safe tree root removal

Drainage Improvements

Flowing or standing water will warp concrete sidewalks and create dips and potholes in roadway shoulders. Good drainage will help prolong the life of an accessible sidewalk. After periods of rain or snow melt, sidewalks and shoulders with puddles will be uncomfortable for pedestrians. Poor drainage may cause pedestrians to walk in the roadway or jump sideways suddenly to avoid a puddle, creating the risk of a crash. Drainage structures that are installed within the sidewalk area must not create a gap of more than 12.5 millimeters (1/2 inch) in the direction of travel.

Recommendations

- Raise catch basin grates flush with pavement;
- Modify or replace deficient drainage grates with bicycle-safe grates; and

Repair or relocate faulty drains at intersections where water backs up onto the curb cut or into the crosswalk;

Winter Season Maintenance

Snow removal will ensure that the minimum five-foot width is accessible to all pedestrians. Sidewalk continuity will be disrupted if a single home or business does not remove snow from their portion of the sidewalk. When this happens, pedestrians are often forced to travel in the street with automobiles, which is especially dangerous in snowy and icy conditions. Property owners should also remove ice or apply appropriate traction materials to prevent slipping.

Snow banks often block openings between sidewalks and marked and unmarked crosswalks, especially at mid-block locations. It is essential for highway agencies to note the locations of crosswalks and ensure that pedestrian access



to them is maintained. The following section of County Code addresses the issues of snow and ice on public walkways

Article 25: § 5-108. Snow and ice on walkways.

(a) Except as provided in subsection (b) of this section, the owner, user, or occupant of property situated on a street along which there is a paved sidewalk shall remove the snow and ice from the sidewalks fronting the property within six hours after the fall of snow.

(b) Whenever it snows between 3:00 p.m. and 6:00 a.m., the owner, user, or occupant of property situated on a street along which there is a paved sidewalk shall remove the snow and ice from the sidewalks fronting the property before 11:00 a.m.

(c) Whenever a person fails to comply with subsections (a) or (b) of this section, the Department of Public Works may cause the snow or ice to be removed and shall certify the cost of removal to the Controller. The costs of removal shall be paid to the County by the person who failed to remove snow or ice and the costs may be recovered by the County in an action at law.

(d) A person who violates any provision of subsections (a) or (b) of this section is guilty of a misdemeanor and on conviction is subject to a fine not exceeding \$10.

(Code 1967, §§ 15-710, 15-711)

Intersection Maintenance

Intersections should be checked yearly for maintenance of existing pedestrian facilities. Intersections can become pedestrian hazards in the facility controls are in need of maintenance and repair.

Recommendations

- Contact the Maryland State Highway Administration for problems relating to State roads.
- Contact Anne Arundel County Department of Public Works for problems relating to County roads
- Do spot checks for painted crosswalk wear
- Do spot checks for curb ramp deterioration



PEDESTRIAN MAINTENANCE SCHEDULES

Anne Arundel County Maintained Sidewalks

TASK	FREQUENCY	COMMENTS
Regular Inspection	2 times per year	Includes all heavy pedestrian traffic sidewalk routes
Sidewalk Sweeping	As needed	All sidewalks maintained by the County will need extra attention in the fall
Sidewalk repairs	As needed	Repair cracks or other problems on the sidewalks
Sidewalk snow removal	As needed	As long as sidewalk is maintained by Anne Arundel County
Debris removal from sidewalk	As needed	Remove debris from sidewalk such as gravel, broken glass and dirt.

Major Pedestrian Intersections

TASK	FREQUENCY	COMMENTS
Regular Inspection	2 times per year	Includes pedestrian signal and timing of major pedestrian intersections.
Curb Ramp Inspection	As needed	To maintain compliance with ADA
Signs and markings	As needed	Repair or replace signs and markings identified during inspections

Recommended Bicycle Maintenance Practices

It will be necessary in the future to establish necessary funds to maintain on-road bikeways that are built on County roads. Typically, additional on-road bikeway maintenance can be incorporated into regular roadway maintenance schedules, rather than being a separate program. The County's Bicycle and Pedestrian Coordinator will be responsible for forwarding requests to the County Maintenance Department.

On-road bikeways on State-owned roadways are the responsibility of Maryland SHA. The County's Bicycle and Pedestrian Coordinator should forward these maintenance requests to the District office.

Sweeping

Bicyclists often avoid bike lanes filled with sand, gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface); nor should debris be swept from the sidewalk onto the roadway.

A regularly scheduled inspection and maintenance program helps ensure that travel way litter is regularly picked up or swept. During extended icy conditions, it may not be cost-



effective to frequently remove sanding materials; however, they should be swept after major storms in high-use areas and after the winter season ends.

Recommendations

- The County already sweeps curbed roadway sections on a regular basis, (approximately 1400 curb miles a year). It is recommended that this process continue as future roads are built, thereby including bike lane sweeping on curbed roadways. Added mileage accepted into the existing inventory would require additional resources.
- Work with DPW to establish a seasonal sweeping schedule for open roadway sections per citizen requests through the County's Bicycle and Pedestrian Coordinator.
- Provide extra sweeping, when necessary, in areas where debris regularly accumulates in bike lanes and wide shoulders areas.
- As the road network develops and Citizen requests increase, a corresponding increase in the maintenance budget is recommended.

Surface Repairs

A smooth surface, free of cracks, potholes, bumps and other physical problems should be provided and maintained.

Recommendations

- Respond to citizen complaints in a timely manner;
- Repair potentially hazardous conditions as soon as possible;
- Prevent the edge of a repair from running through a bike lane; and
- Sweep a project area after repairs.

Pavement Overlays

Pavement overlays are good opportunities to improve conditions for cyclists if done carefully: a ridge should not be left in the area where cyclists ride (this occurs where an overlay extends part-way into a bike lane). Overlay projects offer opportunities to widen the roadway, or to restripe the roadway with bike lanes. Pavement overlays are to be coordinated with the County Bicycle and Pedestrian Coordinator.

Recommendations

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge;
- If this is not possible, and there is adequate bike lane width, it may be appropriate to stop at the bike lane stripe, provided no abrupt ridge remains;
- Raise inlet grates, manhole and valve covers to within 6 mm (1/4") of the new pavement surface and ensure grates are bicycle-safe; and



- Sweep the project area after overlay.

Vegetation

Vegetation encroaching into bikeways is both a nuisance and a problem. Adequate clearances and sight-distances should be maintained at driveways and intersections: pedestrians and bicyclists must be visible to approaching motorists, rather than hidden by overgrown shrubs or low-hanging branches, which can also obscure signs.

Recommendations

- Cut back vegetation to prevent encroachment

Signs, Stripes & Legends

New bikeway signs and legends are highly visible, but, over time, signs may fall into disrepair and legends may become hard to see, especially at night. Signs and legends should be kept in a readable condition, including those directed at motorists: pedestrians and bicyclists rely on motorists observing the signs and legends that regulate their movements.

Recommendations

- Inspect signs and legends regularly, including reflectivity at night;
- Replace defective signs as soon as possible; and
- Retrace legends, crosswalks and other pavement markings in the spring; in high-use areas, these may require another paint application in the fall.

Drainage Improvements

New drainage facilities function well, but may sink and deteriorate over time. Catch basins may need to be adjusted or replaced to improve drainage. A bike-safe drainage grate at the proper height improves bicycle safety. At intersections, there should be no drainage problems in crosswalks. All drainage improvements should be made in conjunction with a scheduled resurfacing or reconstruction effort unless special circumstances exist.

Recommendations

- Raise catch basin grates flush with pavement;
- Modify or replace deficient drainage grates with bicycle-safe grates
- Repair or relocate faulty drains at intersections where water backs up onto the curb cut or into the crosswalk;

Utility Cuts

Utility cuts can leave a rough surface for cyclists if not back-filled carefully.



Recommendations

- Wherever possible, place cut line in an area that will not interfere with bicycle travel;
- Back fill cuts in bikeways flush with the surface (humps will not get packed down by bicycle traffic);
- Ensure that cuts parallel to bicycle traffic don't leave a ridge or groove in the bicycle wheel track; and

Snow Removal

Snow stored on bike lanes and paved shoulders impedes bicycling in winter.

Recommendations

- On streets with bike lanes, remove all snow from street surface, including bike lanes and shoulders.

ON-ROAD BIKEWAY MAINTENANCE SCHEDULE

On-Road Bikeways Department of Public Works

TASK	FREQUENCY	COMMENTS
Regular Inspection	2 times per year	Includes all on-road bikeways, identify needed repairs of pavement, signs, marking, etc.
Street Sweeping	4 times per year	All streets with bike lanes, extra attention in the fall
Street repairs	As needed	Repair of streets including potholes, cracks or other problems on streets with bikeways
Bike lane snow removal	As needed	Clear snow completely from streets with bike lanes
Debris removal	As needed	Remove debris from on-street bikeways such as gravel, broken glass
Signs	As needed	Repair or replace signs identified during inspections
Markings	As needed, at least every 2 years	Includes all bike lane markings and symbols and crosswalks

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