Table 2-2 *Countywide Bikeways*

Route #	1978 Route # reference	Bikeway Name	Bikeway Type	Limits		Plan Reference	Status/ Condition	BLOC Score*	Discussion
				From	To				
SR-46		Whites Ferry Road - Poolesville connector	Signed shared roadway	Beallsville Road (MD109)	Whites Ferry/Potomac River	N/A	New proposal		Provides part of connection between Poolesville and the Gaithersburg and Germantown area; needs shoulder improvements
SR-47		Beallsville Road (MD109)	Signed shared roadway	Whites Ferry Road (MD107)	Barnesville Road (MD117)	N/A	New proposal	No score	Provides connectivity between Pooleville and Barnesville. Also provides important connection to Barnesville MARC station; needs shoulder improvements

SP = Shared Use Path (Class I); BL= Bike Lanes (Class II); SR = Signed Shared Roadway (Class III); DB = Dual Bikeway
(*BLOC = bicycle level of comfort score for state highways, see p. 29)

CHAPTER 3
Bikeway Facility Design Guidelines

Introduction

Bicycles are legally classified as vehicles by Maryland Vehicle Law and are allowed on most public roads in Montgomery County, with a few exceptions (freeways like I-495 and I-270). As such, all roadways should be designed with bicycle use in mind. In this plan, bikeways are designated on roadways where there is a particular need to provide a connection to a major destination. The appropriate bicycle facility for any given roadway, or segment of roadway, depends on the road's classification, pavement and right-of-way width, motor vehicle speeds and volumes, adjacent land uses and expected growth patterns, and other factors. Bikeway selection guidelines are covered in Chapter 2.

Bikeways can generally be divided into two broad categories:

1. On-street facilities generally consist of bike lanes, paved shoulders or shared roadways (with and without wide outside lanes; with or without signing).

2. Off-street facilities consist of hiker-biker trails in parks or shared use paths along roadways.

Shared use paths along roads are generally best used to supplement the on-street bikeway network in corridors not served by roadways and/or along utility, rail, or other linear corridors. However, the County already has an extensive network of shared use paths along roadways. This plan acknowledges these bikeways, and recommends additional shared use paths along county and state roads to supplement and make connections to the existing off-road shared use path network. Shared use paths can best be used to accommodate bicycles on high-speed roadways without driveways and with few intersections (e.g., Great Seneca Highway).

Purpose of Bikeway Design Guidelines

Including a chapter on bikeway design guidelines serves primarily three purposes:

- To ensure consistently designed facilities throughout the County
- To inform engineers and planners of effective bikeway designs and of potential design solutions to complex design problems
- To educate the public on safe and effective bikeway design so that they know what to expect to see on the ground when a bikeway is implemented

First and foremost, including bikeway design guidelines in this plan helps to ensure that bikeways are consistently designed and implemented througout the County. The guidelines establish a base of knowledge from which all interested parties can discuss and debate bikeway implementation. The design guidelines are also intended to serve as an aid to engineers, designers, planners and others in safely accommodating bicycle traffic in different riding environments and encouraging predictable bicycling behavior. Finally, the guidelines provide the public with an idea of what they can expect to see and experience when a bikeway is actually built or implemented.

The guidelines are based primarily on the 1999 Guide for the Development of Bicycle Facilities (AASHTO Guide, see Figure 3-1), published by the American Association of State Highway and Transportation Officials (AASHTO) and the Manual on Uniform Traffic Control Devices (MUTCD; see Figure 3-2), published by the U.S. Department of Transportation.

All bikeways built or implemented in the County will be expected to meet AASHTO and MUTCD standards whereever possible. The guidelines are consistent with the County's "Roadway Design Manual" published by

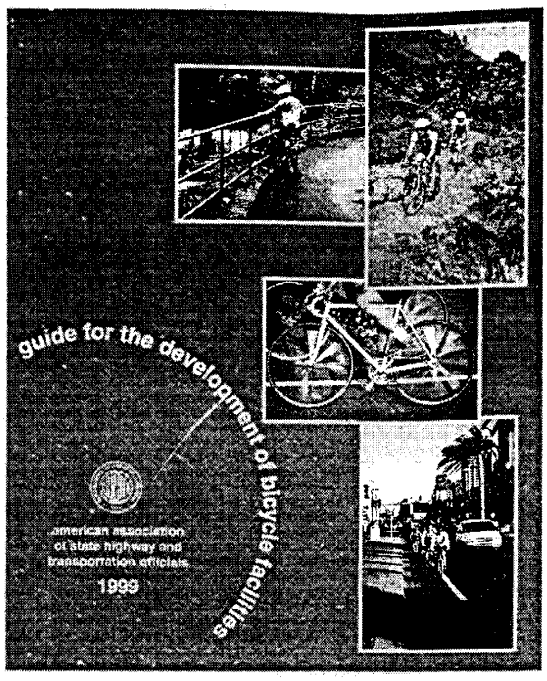

Figure 3-1.
AASHTO Guide For the Development of Bicycle Facilities

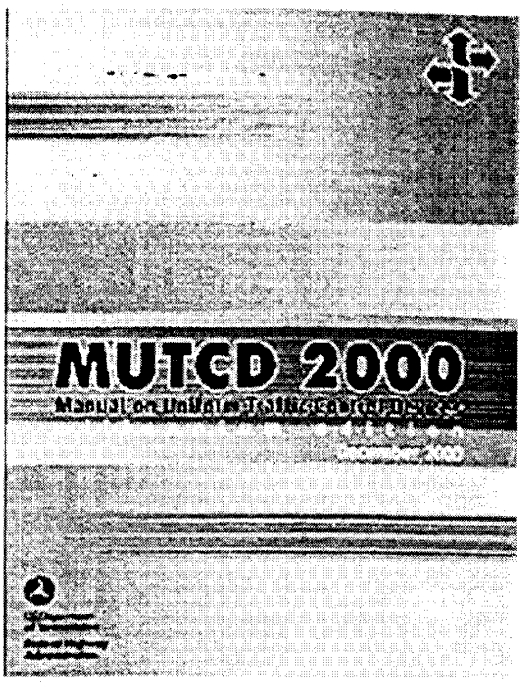

Figure 3-2.
Manual on Uniform Traffic Control Devices (MUTCD)

the County's Department of Public Works and Transportation. The plan borrows additional ideas and concepts from the Oregon Department of Transportation Bicycle and Pedestrian Plan.

The guidelines are a primer on bicycle facilities design along County roads. They are not a stand-alone document and do not necessarily address bikeways along State highways and State roads (see Appendix E for SHA policies governing bikeway design along State highways). These guidelines highlight important issues, but do not cover all of the design details that might be encountered in developing bicycle facilities. This section is not a complete reference, but rather serves as an overview of the possible solutions to problems designers are faced with when implementing bicycle facilities.

Detailed roadway engineering drawings are provided in the County's roadway design standards manual, updated periodically. Furthermore, designs for specific facilities are addressed during project planning (See chapter 4, Bikeway Implementation, for a description of County and state project planning processes). Where details are not covered in these guidelines or in the County's design manual, appropriate engineering principles and judgment should be applied during project planning to provide for the safety and convenience of bicyclists, pedestrians and motorists. Additionally, these guidelines will help with updating bikeway design aspects of the County's road code.

Goals of Bikeway Design Guidelines

- To design and construct bikeway facilities in the County consistent with the latest thinking in safe bikeway design, recognizing that many concepts presented in this chapter may become outdated over the life of the plan.

- To design and construct facilities that will encourage people to use them

Relation to County's Road Code

The County's Roadway Design Manual serves as the official County policy for roadway design. The Manual shows only cross-sections (not illustrations) of roads and shows engineering specifications for minimum widths for travel lanes, bike paths and landscape panels, etc. The Manual does not include specifications or illustrations for on-road bikeways or for intersection treatments. The bikeway design guidelines contained in this plan simply serve as an aid to engineers on possible ways to design on-road bicycle facilities, recognizing that specific design solutions are typically determined during facility planning.

The Design Bicyclist

Bicycles come in a variety of shapes and sizes and bicyclists come in a variety of skill levels. To effectively design bicycle facilities, the range of dimensions and characteristics of common commercially available bicycles and the physical details of the typical bicyclist (e.g., dimensions, speed) should be understood (see Figure 3-3).

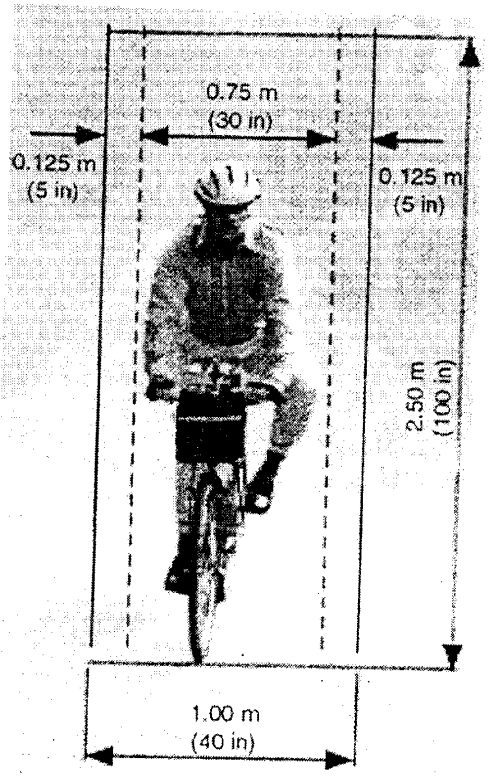

Figure 3-3. Bicycle operating space (Source: AASHTO Guide for the Development of Bicycle Facilities, 1999)

Bicyclists generally require three feet of operating width based solely on their profile. Due to steering wobble, bicyclists typically track over at least a 4-foot width. The necessary width is increased to 5 feet or greater for steep hill climbs and descents.

Types of Bikeways

The 2003 Maryland Vehicle Law defines a bikeway as: 1) any trail, path, part of a highway, surfaced or smooth shoulder, or sidewalk; or 2) any travelway specifically signed, marked or otherwise designated for bicycle travel. The basic design treatments used to accommodate bicycle travel on the road are: signed shared roadway; shoulder bikeway (signed or not); or bike lane. Another type of facility is located alongside a road but is separated from motor vehicle travel lanes: shared use path. More detailed descriptions of bikeway types with desirable applications for each can be found in Table 2-1.

Construction of a bicycle route or restriping a roadway with bicycle lanes has been shown to encourage the increased use of bicycles. However, it would be incorrect to say that bikeway facilities are inherently safer than roads without special bicycle-safe designs. Signage and marking can increase a user's level of confidence and provide a more defined, predictable road environment for both the motorist and the bicyclist, however, bikeways cannot ensure a reduced or eliminated risk of a possible accident. Accidents may be caused by many variables other than facility design, including poor judgment or behavior by the motorist, the bicyclist or a pedestrian.

Shared Use Paths

The County features an extensive network of existing and proposed roadside shared use paths as well as shared use paths along abandoned or future active transit-ways. In some cases, these bikeways serve as a primary bikeway, meaning the facility is the only existing or proposed bicycle accommodation for a particular segment of road. In other cases, the roadside shared use path supplements an existing or potential on-road bikeway, whether bike lanes, shared travel lane or wide shoulder. Roads with both off-road and on-road bicycle accommodation are said to have dual bikeways.

Shared Use Path - General Design Characteristics

- 8-12' concrete or asphalt path
- Located with the right-of-way (ROW) of a road or transitway
- Designed and constructed by, or under the supervision of, a transportation agency (SHA, MTA, DPWT) or municipal agency (Rockville or Gaithersburg)
- May be maintained and/or managed by DPWT or M-NCPPC
- Intended for off-road non-motorized transportation (biking and walking), but may be used for recreation (joggers, roller-bladers, etc.)
- Prohibit motorized vehicles (exceptions include electric wheelchairs and Segways)
- Should be designed and constructed to AASHTO and MUTCD standards, including appropriate informational, warning and regulatory signs.

Figure 3-4. Shared use path along a major road or highway
(Source: www.pedbikeimages.org/Dan Burden)

Examples of shared use paths in the County include: Falls Road, Greencastle Road, Robey Road, Great Seneca Highway, North Bethesda Trail, Norbeck Road extended.

Shared use paths should not be confused with sidewalks. Sidewalks are designed and intended for pedestrian travel and can be as narrow as 4' depending on the road classification. Sidewalks often include street furniture (benches, bus shelters, trash receptacles) and other characteristics that are intended to only enhance the pedestrian experience, and serve as dangerous obstacles to bicyclists.

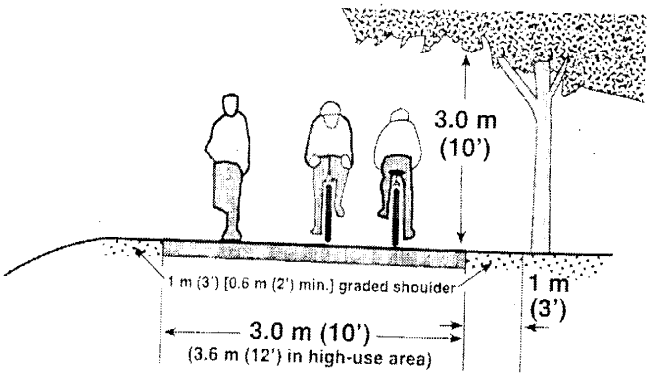

Figure 3-5. Cross section of a typical shared use path (Source: Oregon Department of Transportation)

Shared Use Path - Other Design Considerations

Pavement Width and Clearance Zones

AASHTO recommends a pavement width of at least 10 feet, but the County road standards currently recommend eight feet. This discrepancy needs to be reconciled. The 10-foot standard allows two bicyclists to pass each other with a one- or two-foot buffer and minimizes the need to leave the path. Ten feet is recommended by this plan and twelve feet is recommended for areas expecting intensive use. Widths less than 10 feet may be acceptable where right-of-way is limited or for locations with severe site constraints. These decisions can be made during project planning or during subdivision review.

Where possible, a three-foot wide graded horizontal clear zone should be provided and maintained on each side of the path. Every effort should be made not to install signs, posts, guardrails, fences, and telephone poles or other devices in this clear zone. In addition, the DPWT or municipal agency is responsible for maintaining any vegetation that may encroach into this clear space.

A 10-foot high vertical clearance should be provided and maintained. DPWT and/or municipal agencies are responsible for trimming overhanging tree branches.

Landscape Panel

AASHTO recommends a five-foot minimum buffer between the path edge and the curb. However, the County's roadway design manual requires a six-foot minimum width for the planting of trees. Because trees provide for a more pleasant riding environment and visual barrier to motorized traffic, a six-foot landscape panel width is recommended (the minimum acceptable for trees). Placing the trees in the center of a six foot panel would provide only a three-foot clear zone, therefore, a seven foot panel is desirable to provide the necessary clearance and also eliminate the path getting warped by driveways.

A barrier should be provided between paths and the roadway when the minimum width for a landscape panel is not possible. Such barriers also serve to prevent path users from making unwanted movements into the motor vehicle travel lanes and to reinforce the path as an independent travel corridor. The barrier should be at least 42 inches high to prevent bicyclists from toppling over it. This is not current design policy and the potential operational conflicts with motorized vehicles would need to be resolved.

Curb Ramps and Crosswalks

At all driveways and intersections for which a shared use path crosses, curb cuts and crosswalks should be eight-feet wide (as opposed to four or five for a typical sidewalk). Where a path is located adjacent to a sidewalk, crosswalks and curb ramps only should be provided for the path, but the ramp should be at least 8' wide.

Trail crossings at intersection

Intersections should be marked and signed in such a manner as to adequate notify motorists that bicycles may be present and may cross using the crosswalk, including the use of special pavement textures in crosswalks to create "crossbikes."

Signs For Bicyclists

Bicyclists need to be warned of possible conflicts with motor vehicles and with pedestrians. Therefore, all major, non-signalized intersections should be properly signed or marked to warn bicyclists to slow down or stop.

- Appropriate MUTCD-approved signs should be installed at periodic intervals along the path to remind bicyclists to yield to pedestrians and to notify users that the shared use path is a designated bike route.

- At signalized intersections, appropriate MUTCD-approved signs should be installed to warn bicyclists to stop and use the pedestrian signal to cross.

- Appropriate MUTCD-approved signs also should be installed at all major commercial driveways and locations where the path crosses a residential primary.

- Other appropriate MUTCD-approved signs may be suitable for minor residential or neighborhood roads. Signs and/or pavements markings are not necessary at all independent residential or commercial driveways that may cross the path.

Signs For Motorists (Driveways/Crosswalks)

Motorists need to be notified of the potential presence of bicyclists at intersections and locations where a path crosses a major commercial driveway or residential primary. Appropriate MUTCD-approved signs should be installed at these locations, facing the motorist crossing the path from the outside. Additionally, these signs should be accompanied by the diagonal downward pointing arrow to show the location of the crossing.

Lighting
If nighttime or twilight time use of the path is expected (i.e., used for commuting), adequate pedestrian-oriented lighting for the path should be provided. Types, locations, intervals and illumination levels can be determined during facility planning. Good lighting is especially needed at intersections. The latest recommendation of the Illuminating Engineering Society of North America (IESNA) should be followed. In addition, all lighting should conform to the County's Lighting policy.

Bike Lanes

Bike lanes provide a designated travel lane adjacent to other travel lanes for the preferential or exclusive use of bicycles. They are one-way facilities that carry bicycle traffic in the same direction as adjacent motor-vehicle traffic. Bike lanes should never be provided on only one side of a two-way street; this may cause confusion and encourage bicyclists to use the bike lanes as a two-way on-street bike path. Motorists are prohibited from using bike lanes for driving or parking, but may use them for emergency avoidance maneuvers or breakdowns.

Bike Lanes - General Design Characteristics

- 4'- 6' marked lane
- Delineated by 6" wide solid white line to separate it from motor vehicle travel lanes
- Identified by pavement markings (bike logo or bike lettering with arrow (see Figures 3-6 and 3-7)
- Designed and constructed to AASHTO and MUTCD standards, including appropriate informational, warning and regulatory signs.

Bike Lanes - Other Design Considerations

Width Standards
The AASHTO recommended minimum width of a bike lane for a closed section road is 1.8 m (5 ft), as measured from the center of stripe to the curb or edge of pavement. This width enables cyclists to ride far enough from the curb to avoid debris and drainage grates, yet far enough from passing vehicles to avoid conflicts. By riding away from the curb, cyclists are more visible to motorists than when hugging the curb. The minimum bike lane width is four feet on open shoulders and five feet from the face of a curb, guardrail or parked cars. A clear riding zone of four feet is desirable if there is a longitudinal joint between asphalt pavement and the gutter section. On roadways with flat grades, it may be preferable to integrate the bike lane and gutter to avoid a longitudinal joint in the bike lane.

Bike lanes wider than six feet may be desirable in areas of very high use, on high-speed roads where wider shoulders are warranted, or where they are shared with pedestrians. Care should be taken so they are not mistaken for a motor vehicle lane or parking area, with adequate marking or signing.

Pavement Markings and Signs
A bike lane should be marked with pavement stencils and a wide stripe. If parking is permitted, the bike lane should be placed between the parking lane and the travel lane, and have a minimum width of 1.5 m (5 ft). The official pavement stencil for all future or renovated bike lanes should be a bike logo or "bike lane" lettering and an arrow pointing bicyclists in the direction of traffic.

- Motorists should be alerted to presence of a bike lane using appropriate MUTCD-approved signs ("Bike Lane Ahead) at least 50 feet prior to the beginning of a bike lane, unless at an intersection where it should be placed within 25 feet of the intersection.
- Appropriate MUTCD-approved signs (Bike Lane Ends) should be placed where a bike lane suddenly terminates, whether at an intersection or middle of a road segment.
- Appropriate MUTCD-approved signs (Bicycle Right Lane Only) should be placed every 500 feet on both sides of the road.
- Appropriate MUTCD-approved signs (No Parking, Bike Lane) should be placed every 200 feet on both sides of the road to discourage illegal use of a bike lane by motorists.

- All signs should be installed within 3 feet of the curb or shoulder edge, and be no higher than 10 feet and no lower than 6 feet from the ground. Signs should be visible (unobstructed by poles, trees or bushes) from at least 25 feet away.

Extruded Curbs (Parking Curb Stops)
This plan recommends against the use of extruded curbs. Parking curb stops are often used throughout the U.S. to separate motor vehicle travel space from bicycle travel space. However, these create an undesirable condition; either the cyclist or motorist may hit the curb and lose control, with the motor vehicle crossing onto the bikeway or the cyclist falling onto the roadway. At night, the curbs cast shadows on the lane, reducing the bicyclist's visibility of the surface. Extruded curbs make bikeways difficult to maintain and tend to collect debris. They are often hit by motor vehicles, causing them to break up and scatter loose pieces onto the surface.

Reflectors & Raised Pavement Markers
Raised , reflective pavement devices are also often used throughout the U.S. to separate motor vehicle travel space from bicycle travel space. These can deflect a bicycle wheel, causing the cyclist to lose control and should not be used in the County.

Two-Way Bike Lane
This plan recommends against the use of two-way bike lanes. Two-way bike lanes essentially function as a shared use path located on-road, adjacent to motor vehicle travel. They create a dangerous condition for bicyclists and encourage illegal riding against traffic and should not be employed in the County.

Continuous Right-Turn Lanes
This configuration is difficult for cyclists; riding on the right puts them in conflict with right-turning cars, but riding on the left puts them in conflict with cars merging into and out of the right-turn lane. The best solution is to eliminate the continuous right-turn lane, consolidate accesses and create well-defined intersections wherever possible.

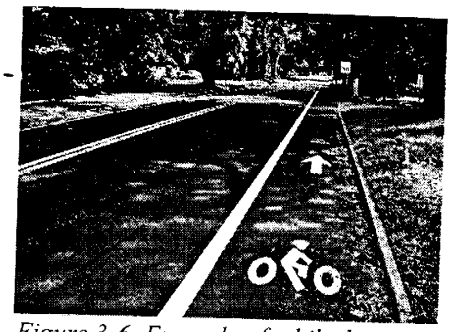

Figure 3-6. Example of a bike lane in Portland, Oregon with logo and arrow.
(Source: www.pedbikeimages.org/Dan Burden)

Figure 3-7. Example of a bike lane in Honolulu, Hawaii with text and arrow.
(Source: www.pedbikeimages.org/Dan Burden)

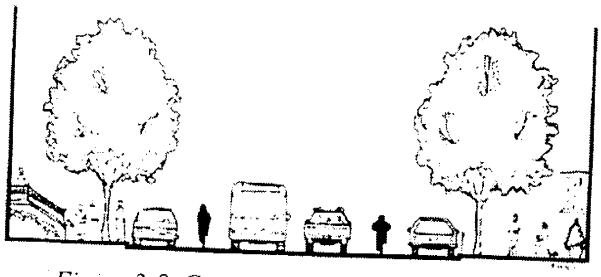

Figure 3-8. Cross-section of a bike lane between travel lanes and on-street parallel parking

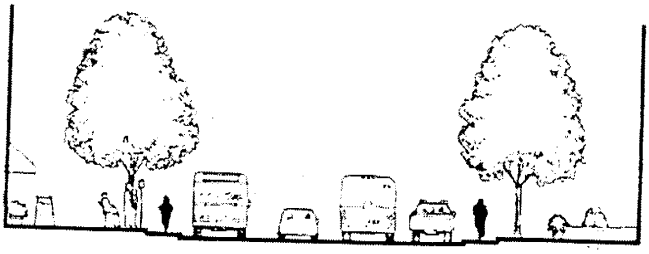

Figure 3-9. Cross-section of a bike lane between travel lanes and the curb

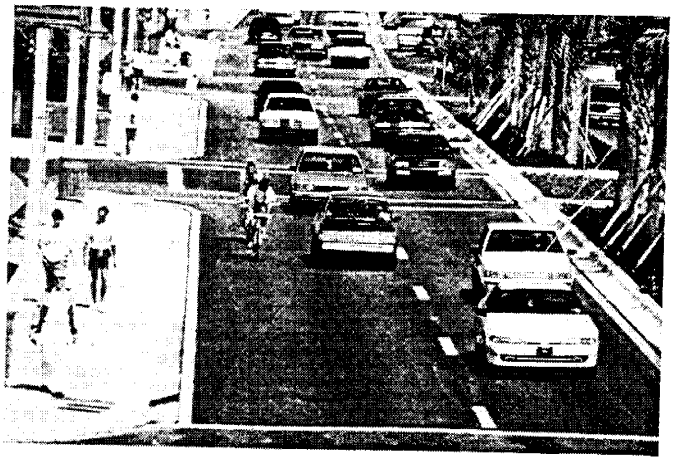

Figure 3-10. Example of a signed shared roadway, wide outside lane (Source: www.pedbikeimages.org/Dan Burden)

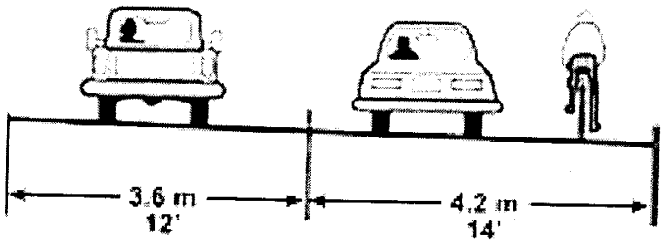

Figure 3-11. Cross-section of a wide curb lane (Source: Oregon Department of Transportation)

Bike Lanes at Intersections

Properly designing bike lanes at intersections and in locations with multiple turning movements is probably among the most difficult design issues. The AASHTO Guide provide practical, detailed guidance to designing and installing bike lanes at intersections, including proper design of pocket lanes.

Space Constraints

For roads with serious space limitations or right of way constraints, a 3-foot striped lane may suffice as an unofficial bike lane (SHA "bicycle areas"); these roads are classified under this plan as a shared roadway, not bike lanes, and do not have to be signed or marked.

Signed Shared Roadways
(Class III Bikeway)

The County features an extensive network of proposed signed shared roadways. Mile per mile, shared roadways are the most common bikeway type in the United States and the least complicated and least costly to implement.

To a varying extent, bicycles are used on most county roads and state highways, except where prohibited. In fact, a large percentage of bicycling takes place on shared roadways with no dedicated space for bicyclists. Local streets with low traffic volumes and speeds safely accommodate bicyclists (except young children) without any special treatments.

There are three general types of shared roadways as identified in this plan: 1) Wide Curb Lane; 2) Shoulder Bikeway; and 3) Local Street.

Wide Curb Lanes

A wide curb lane is typically implemented on a closed section (with curb) road. To be effective, a wide lane should be at least 4.2 m (14 ft) wide, but less than 4.8 m (16 ft). Usable width is normally measured from curb face to the center of the lane stripe, but adjustments need to be made for drainage grates, parking and the ridge between the pavement and gutter. Widths greater than 4.8 m (16 ft) encourage the undesirable operation of two motor vehicles in one lane. In this situation, an informal bike lane or shoulder bikeway should be striped. Wide curb lanes more than 14 feet wide should be striped to create an informal 3-4' bike lane. See Figures 3-10 and 3-11

Shoulder Bikeways

Paved shoulders provide suitable bicycling conditions for most riders. When providing paved shoulders for bicycle use, a minimum width of 1.8 m (6 ft) is desirable. See Figures 3-12 and 3-13. This allows a cyclist to ride far enough from the edge of pavement to avoid debris, yet far enough from passing vehicles to avoid conflicts. If there are physical width limitations, narrower shoulders may be suitable; the actual width would be determined by posted speed limits and traffic volumes.

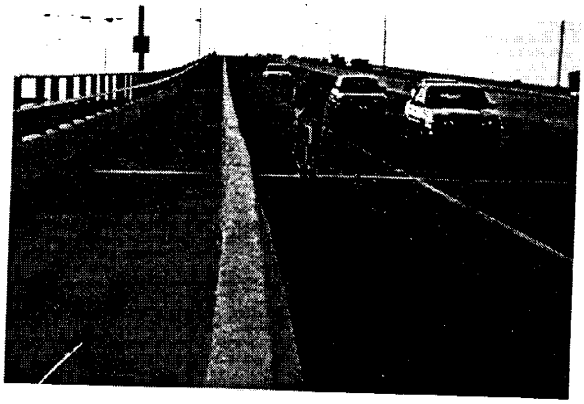

Figure 3-12. Shoulder bikeway on a bridge (Source: www.pedbikeimages.org/Dan Burden)

Local Street

There are no specific bicycle standards for most local signed shared roadways; they are simply the roads as constructed. Bicyclists truly share the road with motor vehicles. See Figure 3-14. However, it is important that shared roadways leading to key destinations be signed as a bike route, including arrow signs to help with navigation. All signed shared roadways should be signed as bike routes and include relevant accompanying directional, distance and informational signs.

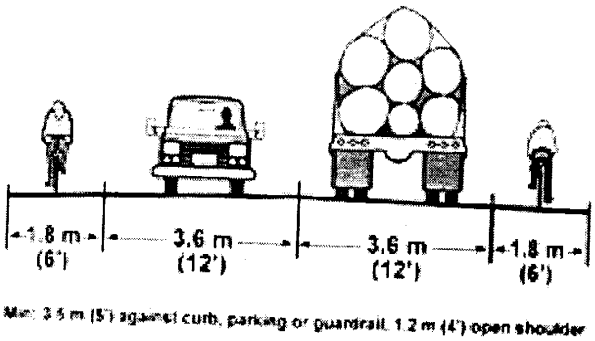

Figure 3-13. Cross-section of shoulder bikeway along two-lane open section road or highway (Source: Oregon Department of Transportation)

Other Design Considerations

All roads in Montgomery County should be designed to safely accommodate bicycling, regardless of whether the roads has been designated as a bikeway or has a shared use path alongside it. The design considerations below should be applied to all roadways in the county, regardless of designation as an official bikeway.

Drainage Grates

Drainage grates are potential obstructions to bicyclists. Grates with slots parallel to the travel lane are especially hazardous; the grate traps the front wheel and throws the bicyclist off the bicycle. Care should be taken to ensure that drainage grates are bicycle-safe, and that they have narrow slots perpendicular to or at a 45-degree angle to traffic. See Figure 3-15.

Railroad Crossings

Special care should be taken wherever a bikeway intersects railroad tracks. Refer to AASHTO Guide for details.

Figure 3-14. Bicyclists on a local street (Source: www.pedbikeimages.org/Dan Burden)

Sidewalk Ramps on Bridges

These can help cyclists if the bridge sidewalks are wide enough for bicycle use (minimum 1.2 m [4 ft]). They should be provided where motor vehicle traffic volumes and speeds are high, the bridge is fairly long and the outside traffic lanes or shoulders on the bridge are narrow. Sidewalk railings should be 42" high. See Figure 3-16.

Shared Use Paths on Bridges

Where a shared use path crosses a bridge, the path should have a railing on the traffic side and should be widened by two feet on each side to provide a shy distance from the rail and the bridge parapet (see AASHTO recommendations in Highway Safety Design and Operations Guide). Railings should be 42" high.

Rumble Strips

Rumble strips are provided to alert motorists that they are wandering off the travel lanes onto the shoulder. They are most common on long sections of straight freeways in rural settings, but are also used on sections of two-lane undivided highways. Bicyclists generally do not like them and the application of rumble strips should be limited along roads for which an on-road bikeway exists or is planned.

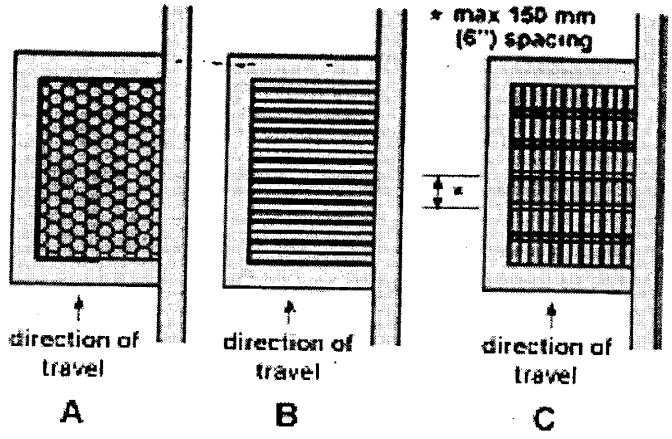

Figure 3-15. Sample designs of safe drainage grates (Source: Oregon Department of Transportation)

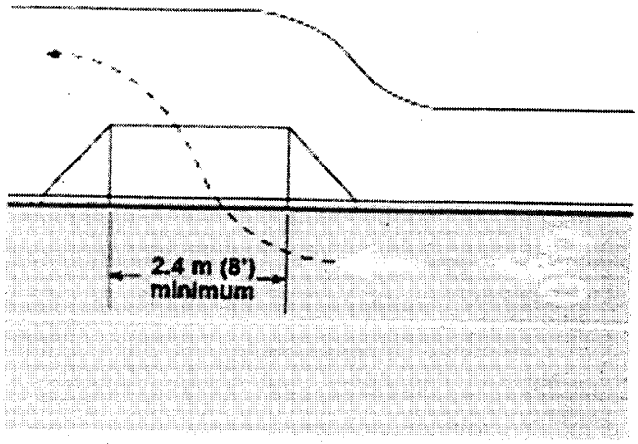

Figure 3-16. Aerial view of a curb cut for bridge (Source: Oregon Department of Transportation)

CHAPTER 4
Implementation

The countywide system of bikeways will be developed and enhanced incrementally in a number of ways, including:

1) Through subdivision review/dedication, in which a developer constructs a master planned facility (e.g., shared use path along Observation Drive);

2) In conjunction with roadway and sidewalk improvements, in which the County or State builds or provides a bikeway as part of the project scope (e.g., shared use path along Norbeck Road extension);

3) As independent "retrofit" bikeway projects programmed and funded through the County's CIP (e.g., Wayne Avenue Green Trail; bike lanes on Old Columbia Pike); and

4) Minor "spot" improvements through DPWT's Annual Bikeways Program (i.e., filling in gaps in the bikeway network).

The countywide bikeway system is a tool that allows the County to focus and prioritize its implementation efforts and make efficient investments in improving bicycling conditions along the County's major county roads and state highways. While this plan recognizes and affirms all bikeways recommended in community master plans and sector plans as well as most of those called for in the 1978 MPB, countywide bikeways as identified in this plan should receive priority consideration for implementation.

Plan Policies Regarding Bicycle Facilities

Chapter 1 of this plan outlines the needs of bicyclists, which include safe, convenient, well-designed bicycle facilities. Since bicyclists are permitted to ride on nearly all roadways, **bicycle facilities should be included as part of all appropriate roadway projects** unless there is a compelling reason not to include them (e.g., would reduce safety or the cost is excessively disproportionate to projected use). Both the County and the State already currently have similar policies.

Of particular importance is weighing the needs of bicyclists and the needs of motor vehicles equally as part all future facility planning projects along roads for which a bikeway exists or is planned. And related, an existing bikeway should not be eliminated as part of any future roadway or intersection improvements by the County, by the State or by developers.

Finally, all bikeways built or implemented in the County must conform to AASHTO and MUTCD bikeway design standards.

Prioritization

By inclusion in this plan, all countywide bikeways are considered high priority to enhance countywide bicycle connectivity and access to major activity centers and other countywide destinations. In general, any bikeway providing a direct connection, or serving as part of a vital connection, to a countywide destination or activity center is considered a high priority. Especially high priority is afforded to bikeways for which no viable parallel alternative exists.

Major activity centers and countywide destinations, as defined in Chapter 2, include:

- Transit Stations (Metrorail, MARC and Corridor Cities Transitway)
- Municipalities, Central Business Districts and Town Centers
- Major employment centers located outside municipalities and CBDs
- Hard surface park trail corridors

Also considered high priority are bikeway projects that:

- Can be implemented as part, or a logical extension, of a roadway, intersection or streetscape improvement project
- Correct an existing unsafe bicycling condition (where bicycling conditions along a current or planned bikeway are obviously dangerous or where a bicycle accident record exists)
- Fill in or complete a major gap along a countywide bikeway
- Upgrade an existing substandard bikeway (i.e., MacArthur Boulevard bike path)
- Require only signage improvements (signed shared roadways only)

Following are lists of bikeways categorized by activity center in order to inform the public, decision makers and developers on which bikeways are higher priorities in the context of this plan.

Other bikeways in this plan, that provide important links between other countywide bikeways or are part of larger transportation projects (e.g., ICC bike path) are considered moderate priority, but are still higher priority than local or neighborhood bikeways identified in community master plans and sectors plans that are not included in this plan.

The County can take advantage of opportunities outside the list of priorities in order to augment the countywide bikeway network. For example, it may be possible to add a bikeway to the scope of another transportation project if the County has adequate right-of-way to accommodate it. Another example would involve requiring a shared use path along a local/neighborhood road as part of subdivision approval. This plan does not preclude any efforts to augment the countywide bikeway network through such opportunities.

It is also important for the County to try to implement improvements for bicycle travel outside the purview of existing bikeway funding programs. For example, the County features a number of funding programs designed to improve pedestrian or motor vehicle safety. These programs also can enhance the safety of bicyclists. Examples include the County's Annual Sidewalk Program, the Sidewalk and Infrastructure Revitalization Program and the CBD Streetscape Improvements Program.

Note: Some bikeways may appear in multiple categories. A bikeway connection to a Metrorail Station that is located within a CBD, for example.

Bikeways Connecting to Transit

Metrorail

The following bikeways provide direct or near direct connections to Metrorail stations.

Bethesda

- Woodmont Avenue (BL-6), Elm Street (BL-7), Edgemoor Lane (SR-8), Norfolk Avenue (p/o SR-11), Bethesda Avenue (SR-9)

Forest Glen

- Forest Glen Road (SP-13, SR-22, SR-23), Georgia Avenue (SR-19), Georgia Avenue alternative (SR-20), Forest Glen-Silver Spring connector (SR-52)

Friendship Heights

- Western Avenue (SP-7), Willard Avenue (BL-8, SR-12), Wisconsin Avenue path (SP-8), River Road (DB-2), other bikeways in the D.C. bicycle master plan that connect or lead to the Metro station.

Glenmont

- Georgia Avenue (SP-29), Layhill Road (BL-18), Randolph Road (SP-26), Glenallen Road (SP-24)

Grosvenor

- Tuckerman Lane (BL-23, SP-42), Beach Drive (SR-16), Grosvenor Lane (SR-36), Strathmore Avenue (SR-18), Strathmore Avenue - Grosvenor

Metro connector (SP-11), Garrett Park - Grosvenor Metro connector (SR-57)

Medical Center - NIH

- Wisconsin Avenue/Woodmont Avenue (SP-62), West Cedar Lane (SP-4), Jones Bridge Road (SR-3), Fernwood Road/Greentree Road (BL-4), Cedar Lane/Summit Avenue (SR-54), Beach Drive (SR-16)

Rockville

- Norbeck Road (SP-52, SR-38), Falls Road (DB-19), Gude Drive (SP-51), Darnestown Road - south (SP-59), multiple bikeways in the City of Rockville Bikeway Master Plan

Shady Grove

- Redland Road (BL-29), Needwood Road (DB-14), Shady Grove Road-East (BL-30), Shady Grove Road - West (DB-15), Crabbs Branch Way (SP-53), Frederick Road (SP-64), Corridor Cities Transitway bike path (SP-66), Bowie Mill Road (BL-20), Muncaster Mill Road (BL-35), numerous bikeways in the City of Rockville bikeway master plan that pass through or adjacent to the King Farm community

Silver Spring

- Interim Capital Crescent Trail (SR-63), Georgetown Branch Trail (SP-6), Metropolitan Branch Trail (SP-12), Wayne Avenue Green Trail (SP-10), Sligo Creek Parkway (SR-14), Sligo Creek Trail-Silver Spring Metro connector (SR-15), Colesville Road/MD 384 connector to Silver Spring Metro Station (DB-6), East-West Highway (SP-9), Columbia Pike/ US 29 - south (SR-31), Forest Glen-Silver Spring CBD Connector (SR-52)

Takoma Park (D.C.)

- Metropolitan Branch Trail (SP-12), Carroll Avenue (BL-10), Piney Branch Road (SR-49), Sligo Creek Parkway (SR-14), Sligo Creek-Takoma Metrorail Connector (SR-51)

Twinbrook

- North Bethesda Trail (SP-41), Rockville Pike (SP-49), Twinbrook Parkway (BL-28), Nicholson Lane/Parklawn Drive (BL-27), Montrose Parkway (SP-50), Randolph Road (BL-15), Nebel Street extended (SP-47)

Wheaton

- Veirs Mill Road alternative (SR-21), Plyers Mill Road (SR-24), Georgia Avenue (SR-19), Georgia Avenue alternative (SR-20), University Boulevard (DB-5)

White Flint

- North Bethesda Trail (SP-41), Tilden Lane (BL-24), East Jefferson Street (DB-22), Executive Boulevard (BL-25), Nicholson Lane (SR-37), Marinelli Road (SP-45), Nicholson Lane/ Parklawn Drive (BL-27), Nebel Street-south (DB-13), Nebel Street-north (BL-26), Old Georgetown Road (SP-46), Montrose Parkway (SP-50), Randolph Road (BL-15)

MARC

The following bikeways provide direct or near direct connections to MARC stations.

Silver Spring

- Same as Metro Station

Kensington

- Strathmore Avenue (SR-18), Connecticut Avenue corridor (SR-17), Players Mill Road (SR-24)

Garrett Park

- Strathmore Avenue (SR-18), Beach Drive (SR-16), Beach Drive-Grosvenor Metrorail Connector (SR-57), Strathmore-Grosvenor Metrorail Connector Path (SP-11)

Rockville

- Same as Metro Station

Washington Grove

- City of Gaithersburg bike plan

Gaithersburg

- City of Gaithersburg bike plan

Metropolitan Grove

- Corridor Cities Transitway bike path (SP-66),

Long Draft Road (SP-60), Clopper Road (DB-17), Quince Orchard Road (SP-58), local bikeways in the City of Gaithersburg bike plan

Germantown

- Germantown Road DB-25), Father Hurley Boulevard (SP-68), Middlebrook Road (SP-71), Observation Drive (SP-69)

Boyds

- Clarksburg Road (DB-18), Barnesville Road (SR-40), Clopper Road (DB-17)

Barnesville

- Beallsville Road (SR-47)

Dickerson

- Dickerson Road (SR-42)

Corridor Cities Transitway

Actual stops for this new transitway have yet to be determined, therefore this list comprises those bikeways that would intersect with the currently proposed route (south to north)

- Frederick Road (SP-64), Shady Grove Road-west (DB-15), Great Seneca Highway (SP-63), Muddy Branch Road (DB-24), Quince Orchard Road (SP-58), Clopper Road (DB-17), Middlebrook Road (SP-71), Germantown Road (DB-25), Observation Drive (SP-69), Father Hurley Boulevard (SP-68), Old Baltimore Road/Newcut Road (DB-26),

Bikeways Connecting to Municipalities, Central Business Districts and Town Centers

District of Columbia

- MacArthur Boulevard (DB-1), Massachusetts Avenue (SR-50), River Road (DB-2), Brookville Road (SR-4), Beach Drive (SR-16), Jones Mill Road (SR-28), Colesville Road (DB-6), Metropolitan Branch Trail (SP-12) Piney Branch Road (SR-49), Carroll Avenue (BL-10), New Hampshire Avenue (DB-7)

City of Rockville

- Darnestown Road (DB-16), Travilah Road (SP-57), Piney Meetinghouse Road (SP-56), Shady Grove Road-west (DB-15), Shady Grove Road-east (BL-30), Falls Road (SP-1), Gude Drive (SP-51), Darnestown Road-south (SP-59), Seven Locks Road (DB-3), multiple bikeways in the City of Rockville Bikeway Master Plan

City of Gaithersburg

- Great Seneca Highway (SP-63), Longdraft Road (SP-60), Clopper Road (DB-17), Corridor Cities Transitway Bike Path (SP-66), Darnestown Road (DB-16), Quince Orchard Road (SP-58), Dufief Mill Road (BL-32), Riffleford Road (BL-34), Muddy Branch Road (DB-24), Frederick Avenue (SP-72), MidCounty Highway (SP-70), Watkins Mill Road (SP-74), Goshen Road (DB-29), Shady Grove Road-east (BL-30), Shady Grove Road -west (DB-15)

City of Takoma Park

- Metropolitan Branch Trail (SP-12), Carroll Avenue (BL-10), Piney Branch Road (SR-49), New Hampshire Avenue (DB-7), University Boulevard (DB-5), Sligo Creek-Takoma Metrorail Connector (SR-51)

Town of Poolesville

- Whites Ferry -Poolesville connector (SR-46), Whites Ferry Road (SR-45), Beallsville Road (SR-47)

Town of Laytonsville

- Olney-Laytonsville Road (SP-36), Laytonsville Road (SR-43), Sundown/Brink Road (SR-62)

Town of Barnesville

- Beallsville Road (SR-47), Barnesville Road (SR-40)

Town of Kensington

- Connecticut Avenue alternative (SR-17), Plyers Mill Road (SR-24), Strathmore Avenue (SR-18), Cedar Lane/Summit Avenue (SR-54)

Bethesda CBD

- Georgetown Branch Trail (SP-6),Bradley Boulevard (DB-4), Bradley Lane (SR-1), Wisconsin Avenue/Woodmont Avenue (SP-62), Wilson Lane (BL-2, SR-2), Goldboro Road (BL-1), Jones Bridge Road (SR-3)

Silver Spring CBD

- Interim Capital Crescent Trail (SR-63), Georgetown Branch Trail/Future Capital Crescent Trail (SP-6), Metropolitan Branch Trail (SP-12), MD 384 connector to Silver Spring Metro Station (DB-6), Sligo Creek Trail - Silver Spring Metro connector (SR-15), US 29/Columbia Pike - south (SR-31), East West Highway (SP-9), Forest Glen-Silver Spring CBD Connector (SR-52), Wayne Avenue Green Trail (SP-10)

Wheaton CBD

- Plyers Mill Road (SR-24), Westfield Shopping Town connector (SR-25), Westfield Shopping Town Mall Ring Road (SR-26), Veirs Mill Road alternative (SR-21), Reedie Drive (SR-27), Amherst Avenue/Sligo Creek Trail connector (SP-77), University Boulevard (DB-5), Georgia Avenue (SR-19), Georgia Road alternative (SR-20)

Germantown Town Center

- Great Seneca Highway (SP-63), Corridor Cities Transitway Bike Path (SP-66), Germantown Road (DB-25), Father Hurley Boulevard/Ridge Road (SP-68), Middlebrook Road (SP-71)

Olney Town Center

- Olney-Laytonsville Road-Olney West (SP-34), Olney-Sandy Spring Road-Olney East (SP-35), Olney-Sandy Spring Road-Ashton (SP-37), Georgia Avenue - North (SP-39), Georgia Avenue-Upcounty (BL-22), Bowie Mill Road (BL-20), Hines Road - North Branch connector (SP-33), Hines Road (BL-19), Norwood Road (SP-38)

Clarksburg Town Center

- Corridor Cities Transitway Bike Path (SP-66), Frederick Road - upcounty (SP-71), Clarksburg Road (DB-18), Old Baltimore Road-New Cut Road (DB-26), MidCounty Highway (SP-70)

Damascus Town Center

- Ridge Road (SR-39), Woodfield Road (DB-19, SR-61), Damascus Road (SR-44), Kemptown Road (SR-48)

Bikeways Connecting to Other Employment Centers

US 29 Corridor

- ICC bike path (SP-40), Old Columbia Pike (BL-12), Columbia Pike (DB-9), MD 198 (SP-20, SP-21), Greencastle Road (SP-23), Robey Road (SP-22), Briggs Chaney Road (BL-14), Fairland Road (BL-13), East Randolph Road/Cherry Hill Road (SP-16), New Hampshire Avenue (DB-7), Lockwood Drive (DB-10), Columbia Pike-south (SR-31)

North Bethesda/White Flint

- North Bethesda Trail (SP-41), Tilden Lane (BL-24), Executive Boulevard (BL-25), East Jefferson Street (DB-22), Marinelli Road (SP-45), Old Georgetown Road (SP-46), Nebel Street-south (DB-13), Nebel Street-north (BL-26), Nebel Street extended (SP-47), Nicholson Lane (SR-37), Nicholson Lane/Parklawn Drive (BL-27)

Rock Spring Office Park

- Rock Springs connector (SP-48), Fernwood Road/ Greentree Road (BL-4), Tuckerman Lane (SP-42, BL-23), Democracy Boulevard (SP-2), Grosvenor Lane (SR-36), Old Georgetown Road -Wildwood Shopping Center Path (SP-1)

Medical Center/NIH

Bikeways Connecting to Major County Park Trails

Rock Creek Trail/Beach Drive

- Woodbine Street (SR-5), East West Highway (SP-9), Georgetown Branch Trail (SP-6), Jones Mill Road SR-28), Jones Bridge Road (SR-3), Kensington Parkway (SR-29), Rock Creek Trail - Forest Glen Metro Station connector (SP-14), West Cedar Lane (DB-21), Cedar Lane/Summit Avenue (SR-54), Grosvenor Lane (SR-36), Tuckerman Lane (SP-42), Strathmore Avenue (SR-18), Randolph Road (BL-15), Montrose Parkway (SP-50), Veirs Mill Road (BL-16), Aspen Hill Road (SR-32) Baltimore Road (Rockville plan), Norbeck Road (SR-38), Southlawn Drive (Rockville plan), Needwood Road (DB-14), ICC bike path (SP-40), Muncaster Mill Road (BL-35), Hines Road-Rock Creek connector (SP-33), Bowie Mill Road (BL-20), Olney-Laytonsville Road (SP-36)

Sligo Creek Trail/Sligo Creek Parkway

- New Hampshire Avenue (DB-7), Carroll Avenue (BL-10), Piney Branch Road (SR-49), Wayne Avenue Green Trail (SP-10), Franklin Avenue (SR-13), Sligo Creek Trail - Silver Spring Metro Station connector (SR-15), Columbia Pike-south (SR-31), Forest Glen Road (SP-13, SR-23), Plyers Mill Road - Sligo Creek Trail connector (SR-55), University Boulevard (DB-5), Amherst Avenue-Sligo Creek Trail connector (SP-77)

Capital Crescent Trail/Georgetown Branch Trail

- MacArthur Boulevard (DB-1), Massachusetts Avenue (SR-50) River Road (DB-2), Bradley Boulevard (DB-4), Jones Bridge Road (SR-3), Jones Mill Road (SR-28), NIH-Georgetown Branch Connector (SR-11), NIH-CCT connector alternative (SR-10), East-West Highway (SP-9), Metropolitan Branch Trail (SP-12)

Matthew Henson Trail

- Montrose Parkway (SP-50), Veirs Mill Road alternative (SR-21), Connecticut Avenue corridor (SR-17), Connecticut Avenue -Aspen Hill (SP-27), Georgia Avenue - North (SP-29), Layhill Road (BL-18), ICC bike path (SP-40)

Shared Use Paths Providing Significant Pedestrian Benefits

The following shared use paths (or dual bikeways that include a shared use path) currently serve as important direct pedestrian connections to a countywide or local destination or have the potential in the future to serve as an important pedestrian connection. Therefore, these paths should be considered higher priority than other shared use paths.

- MacArthur Boulevard (DB-1); River Road (DB-2); Falls Road (DB-19); Democracy Boulevard (SP-2; DB-20); North Bethesda Trail - NIH connector (SP-3); Cedar Lane (SP-4); Wisconsin Avenue/Woodmont Avenue (SP-62); Georgetown Branch Trail/Future Capital Crescent Trail (SP-6); Western Avenue (SP-7); Wisconsin Avenue (SP-8); East-West Highway (SP-9); Silver Spring Green Trail (SP-10); University Boulevard (DB-5); MD384 connector to Silver Spring Metrorail station (DB-6); Forest Glen Road-central (SP-13); Rock Creek Trail-Forest Glen Metro connector (SP-14); New Hampshire Avenue - Hillendale/Takoma Park (DB-7); New Hampshire Avenue - Ashton (SP-15); Lockwood Drive (DB-10); Fairland Road - east (SP-18); Spencerville Road (SP-20); Randolph Road (SP-25, SP-26); Connecticut Avenue - Aspen Hill (SP-27); Georgia Avenue - north (SP-29); Bel Pre Road - east (SP-30); Olney-Laytonsville Road - Olney West (SP-34); Olney-Sandy Spring Road - Olney East (SP-35); Olney-Sandy Spring Road - Ashton (SP-37); Georgia Avenue - Brookeville (SP-39); North Bethesda Trail (SP-41); Old Georgetown Road - Wildwood Shopping Center Path (SP-1); Tuckerman Lane (SP-42); Grosvenor Connector (SP-43); Strathmore-Grosvenor Metrorail Station connector path (SP-11); East Jefferson Street (DB-22); Marinelli Road (SP-45); Old Georgetown Road (SP-46); Nebel Road (DB-13); Nebel Street Extended (SP-47); Rock Spring Connector (SP-48); Westlake Drive - south (SP-44); Montrose Road/Parkway (SP-50); Gude Drive - east (SP-51); Crabbs Branch Way (SP-53); Needwood Road (DB-14); Redland Road - west (SP-54); Shady Grove Road - west (DB-

15); Clopper Road/Diamond Avenue (DB-17); Muddy Branch Road (DB-24); Great Seneca Highway (SP-63); Frederick Road (SP-64; SP-72); Corridor Cities Transitway bike path (SP-66); Germantown Road (DB-25); Father Hurley Boulevard (SP-68); Observation Drive (SP-69); MidCounty Highway (SP-70); Middlebrook Road (SP-71); Clarksburg Road (DB-18); Old Baltimore Road/Newcut Road (DB-26); Watkins Mill Road (DB-27); Woodfield Road - north (DB-30); Woodfield Road - south (DB-28).

On-going Implementation - Local/Neighborhood Bike Routes

The plan acknowledges all approved and adopted local and neighborhood shared roadway bikeways in community master plans and sector plans. When combined, these plans identify hundreds of miles of shared roadways along neighborhood streets and residential primaries. For those shared roadways not specified under this plan, an on-going program to install bike route and/or Share the Road signs is recommended. The County should continue to sign local/neighborhood shared roadways as part of the County's Annual Bikeways Program.

About Facility Planning

Facility planning for projects, including bikeways, is divided into three phases. Funding for these phases often is separate. Facility planning serves as the transition stage for a project between the master plan or conceptual stage and its inclusion as a stand-alone project in the CIP.

During Phase I of facility planning, DPWT performs a rigorous planning level investigation of the following critical project elements: purpose and need, usage forecasts, traffic impacts, community impacts, public participation. investigation of non-County sources of funding, and cost estimates.

At the end of Phase I, DPWT determines if the project has the merits to advance to Phase II, which involves preliminary (35 percent level of completion) engineering design. During this phase, construction plans are developed showing the specific alignment and detailed features of the project, from which its impacts, including environmental, and costs can be more accurately assessed.

At the completion of the preliminary engineering design, the County Council and County Executive hold project-specific public hearings to determine whether the candidate project has the merits to advance into the CIP as a fully funded stand alone project and enter into Phase III which involves final design and construction. It is important to note that this process changes every now and then, but this basic process is typically followed.

In 2002, DPWT hired a consultant to study and develop a bike route signing program. The final report, produced in April 2003, found 123 bike route signs currently posted throughout the entire County. The report suggests guidelines from which all Montgomery County bike route signage plans should be based. It identified 34 priority routes for improved signage. The majority of these routes are identified in this plan as Countywide Bikeways. The report does not address local or neighborhood bikeway signing needs, however.

A major outcome of the report is a GIS database that provides DPWT with an interactive medium through which sign installations, orientation, location and condition may be monitored and enhanced over time. This is important because the origin, or date of installation, for the majority of the 123 signs is unknown. This database will allow the County to better track bike route signing efforts in the future.

Funding for Bikeways

Implementing the nearly 600 miles of bikeways identified under this plan--some existing, some planned, some newly proposed--will require considerable financial investment by the County, State and others. The County will not only need to increase the amount of funding for planning, engineering and design, it also will need to increase funding for routine and systematic bikeway maintenance as well as basic roadway maintenance. Additionally, this plan urges the County to consider developing a bicycle safety education program and enhancing bicycle promotional efforts (described in Chapter 5), each of which would have ramifications for the County's operating budget as well. These costs could be offset by reducing the need or urgency for roadway projects.

Putting a price tag on this plan is difficult if not impossible. First, a critical element in extimating bikeway costs is right-of-way: how much is owned by the County or state and does additional ROW need to be acquired? These questions can only be answered during initial project planning. Second, bikeways are implemented in numerous ways. Short segments will be built by developers as part of land development projects, segments will be built by the State Highway Administration as part of planned improvements for state highways or interchanges, segments will be built or provided by the county as part

of county road improvements, and segments or entire bikeways will be built as part of independent projects. Furthermore, the County's Annual Bikeways Program will be continuously implementing local bikeways and developing small projects along Countywide Bikeways to fill in gaps, provide needed connections and correct small problem areas to improve bicycle safety.

Estimating Bikeway Costs

Nevertheless, it is useful to have a basic understanding of current costs related to straightforward bikeway construction and implementation. The following calculations are estimated average cost per mile for engineering, design and construction for bikeways implemented by the DPWT as of September 2003. The calculations do not include costs associated with unforeseen land acquisition, utility relocation or other major issues. These issues can increase the overall project costs by a significant factor.

Shared Use Paths

- Major projects = $2.1M per mile (includes Phase I & II Facility Planning, Final Design, Construction and Construction Management.

- Minor projects = $50-$150 per linear foot

Bike Lane

- $3,500 per mile (signing only; includes signs, posts and labor). Bike lanes are often part of the scope for larger roadway improvement projects, therefore comprehensive estimates are not available.

Signed Shared Roadway

- $3,500 per mile (signing only; includes signs, posts and labor)

Understanding Bikeway Implementation

With the exception of dedication of bikeways by developers as part of subdivision and land development, the County and the State are both responsible for implementation. The County primarily implements bikeways through its Capital Improvements Program (CIP), while the state primarily implements bikeways through its Consolidated Transportation Plan (CTP).

Montgomery County

The County implements and provides funding for bikeway improvements through its CIP. County code requires that every two years the County Executive submit a comprehensive six-year program for capital improvements to the County Council. The CIP includes a statement of the objectives of capital programs and the relationship of capital programs to the County's long-range development and master plans. It also recommends capital projects and a construction schedule, and provides an estimate of costs, a statement of anticipated revenue sources, and an estimate of the impact of the program on County revenues and the operating budget. County code requires the County Council to annually review, amend as necessary, and approve the CIP.

Many projects in the CIP are generated from recommendations or proposals contained in community master plans, sector plans and functional master plans. This is particular true for independent bikeway projects. Bikeway or bikeway-related projects can generally be found in at least two CIP funding categories: 1) Transportation; and 2) M-NCPPC.

Projects under the transportation category that might involve or affect bikeways include: road improvement projects; intersection improvement projects; independent bikeway projects; the annual bikeway program; the annual sidewalk program; independent sidewalk projects; and streetscape projects. Projects under the M-NCPPC category that may involve or affect bikeways include: on-road bikeways (park trail connectors); on-road bikeways (Beach Drive and Sligo Parkway), independent park trail projects (Montrose Trail), Hard Surface [Trails] Design and Construction and Hard Surface [Trails] Renovation.

Independent bikeway projects are specified in the CIP by individual project-by-project descriptions. Montgomery County DPWT and M-NCPPC annually select projects for implementation. The planning and funding of individual bikeway projects has been and will continue to be primarily a local responsibility. A substantial amount of new planning and design funding has been accomplished over the years as bicycle transportation continues to play an ever-increasing, and highly visible role in the county's transportation system.

Many projects in the CIP may appear unrelated to bikeways, when in fact, they affect or may involve bikeways in the project scope. This is often true for many road and intersection improvement projects for which bikeway improvements may only be a minor consideration in the overall design and engineering for the project.

State of Maryland

The State primarily funds and implements bikeways through Maryland Department of Transportation's (MDOT) Consolidated Transportation Program (CTP). The CTP is a compilation of all transportation projects currently funded for construction or development and engineering as recommended by the Governor. These projects are funded utilizing the financial resources of the state's Transportation Trust Fund. The Transportation Trust Fund is used to pay for capital transportation projects throughout Maryland. Revenues from State vehicle titling and registration fees, gas taxes, a portion of the corporate income taxes and federal funds fuel it.

Each fall, at the direction of the Governor, MDOT staff meets with planners, elected officials and citizens of the County. These meetings are opportunities for the community to comment and provide input on transportation enhancements planned over the six-year period covered by the CTP. With this input, a final CTP is developed and submitted to the General Assembly each year for its approval.

Many of the countywide bikeways identified in this plan will be implemented as part of State highway improvement projects. Constructing shared use paths or adding a bike lane or shoulder as part of a road improvement project, as opposed to doing it as an independent project, is more cost effective for both the County and the State.

Federal Government

The State of Maryland administers federal funds and distributes the monies to counties on a competitive basis through programs such as Neighborhood Conservation and Access 2000. Counties annually submit to the State a list of priority projects they want to be eligible for federal funding. The State selects a certain number of projects for funding each year.

As an example of these sources, funding for bikeways and trails is typically made through a category called TEA-21 Transportation Enhancements. Several projects in the County were completed using TEA-21 enhancement funds, including the North Bethesda Trail bridges over I-495 and I-270 as well as the Capital Crescent Trail.

Funding for bicycle parking

Getting bicyclists to and from destinations is the primary focus of this plan. However, providing adequate parking facilities at destinations is equally important. Bicyclists should not have to lock bicycles to lamp posts and railings. In fact, the Maryland Vehicle Law prohibits it in certain situations. Therefore, adequate bicycle parking must be provided at all countywide bicycling and local destinations, including transit stations, employment centers and office buildings, retail and dining establishments (especially those located in municipalities and CBDs), and locally oriented destinations like schools, libraries, community centers and playgrounds.

While bicycle parking is often required as part of new developments or are included as part of new County buildings and facilities, older buildings and older developments typically do not feature any bicycle parking accommodations. Finding space for bicycle parking at these older buildings often is often not an issue. Many building owners or developers simply are not familiar with bicycle parking needs, designs and costs. Therefore, the county should consider creating a dedicated funding source for retrofit bicycle parking. Additionally, the Planning Board should continue to enforce bicycle parking subdivision regulations and ensure that community plan recommendations for bicycle parking are fully implemented.

Funding for Bikeway Maintenance

This plan recognizes that maintaining and preserving existing bikeways plays an important role in sustaining and increasing the levels of bicycling in Montgomery County and the region.

There are two general types of maintenance. Routine maintenance involves clearing debris and snow from the roadway surface that tends to accumulate in the curb lanes and in bike lanes. It also involves removing debris and trimming trees along shared use paths adjacent to roads.

Systematic maintenance involves making physical improvements to a bikeway facility over time to keep it safe, including ensuring consistently smooth, unobstructed pavement condition. These improvements may include re-striping a bike lane, replacing signs, or repaving a portion of a shared use path damaged by tree roots.

The County DPWT is responsible for routine and systematic maintenance along all County roads, including bikeways and sidewalks, while M-NCPPC is responsible for routine and systematic maintenance along hard surface trails located in County parkland.

In order to ensure safe bikeways in the future, the County should consider developing a new program for routine maintenance of bikeways, or include bikeway maintenance as part of other maintenance programs. Under this new initiative, shared use paths, bike lanes and signed shared roadways (wide curb lanes and shoulders) in the County would be periodically swept of debris, sand and gravel and overhanging branches and brush along shared use paths would be trimmed. The County also should consider including both routine and systematic bikeway maintenance in the County DPWT's annual roadway maintenance program as well as include adequate funding for minor safety improvements along countywide bikeways as part of the Annual Bikeway Program. Lastly, the Planning Board should encourage routine maintenance for countywide hiker-biker trails in parkland. Debris, sand and gravel should be swept and overhanging branches and brush trimmed along all hard surface hiker-biker trails at least twice a year (spring and fall).

APPENDIX A
Related Programs and Policies

In order to ensure that this plan can be implemented effectively and efficiently and to ensure that goals of the plan are achieved, the County should consider providing more resources for, and mking some changes to, bicycle-related policies and programs. Zoning and subdivision policies, bicycle safety and education programs, and bicycle outreach and promotional efforts are all important complementary aspects of a fully integrated bicycle program in Montgomery County.

Policies

The County's zoning ordinance generally addresses bicycles and bicycle facilities well. Most zoning categories reference the need to safely accommodate bicycling and bikeways. Likewise, the County's zoning code also generally addresses bicycles and bicycle facilities. The bicycle parking zoning ordinance is confusing however and should be clarified. The current ordinance is vague and does not specify the desired type of bike rack. It also does not differentiate between bike racks and bike lockers.

Zoning and Subdivision

The Maryland-National Capital Park and Planning Commission (MNCPPC) requires all developers to submit a pedestrian impact statement as part of all subdivision and special exception applications (see Appendix E for sample pedestrian impact statement for both road projects and development applications), as of January 1, 2003. The statement should address but not be limited to the following topics related to pedestrian and bicycle safety, operations and access, as agreed upon with staff:

- Pedestrian and/or bicycle counts at intersections.
- Existing and/or proposed sidewalks and/or bikeways adjacent to the site and/or off-site of sufficient width, offset from the curb per county standards.
- Lead-in sidewalks to the site and connectivity to the local area.
- Existing and/or proposed bus stops, shelters and benches, including real time transit information.
- Pedestrian accommodations at nearby intersections, e.g. crosswalks, pedestrian signals, push buttons, median refuges, ADA-compatible ramps.
- Sufficient bicycle racks and/or lockers on-site.

Off-road bikeways (shared use paths) are provided as called for in the Master Plan, typically eight-feet wide. As for on-road bike accommodation, if the road is being newly constructed or widened, bike-accessible travel lanes, separate bike lanes or a shared use path would be provided as called for in the Master Plan. The Planning Board typically requires developers to implement bikeways as part of overall roadway improvements. Developers also pay a development impact tax, which can be used to construct or implement on-road bikeways as part of major road improvement projects initiated by the County or the State.

Sidewalks and bikeways are required to be constructed by the developer of the adjacent property along the property's frontage. The Planning Board occasionally requests and/or requires developers to extend such sidewalks or shared use paths to an intersection or other terminus off-site if it can be justified.

All M-NCPPC divisions and departments comprehensively review all development proposals and site design plans. The Commission's Development Review Committee (DRC) reviews these plans. The DRC consists of representatives from Development Review, Transportation, Community Planning, Environmental Planning, Historic Preservation and Park Planning and Resource Analysis. In addition, the DRC solicits comments from and coordinates with state and local agencies such as Permiting Services, Environmental Protection, Public Works and Transportation, as well as the Washington Suburban Sanitation Commission and others.

During DRC, each division and agency has an opportunity to provide comments on the proposal or site plan.

Any bikeways recommended by Master Plans are identified and a recommendation is made at that time as to which side of the road the bikeway should be provided.

Concepts or Programs To Consider

The County should consider creating or expanding several programs in order to improve bicycle safety and encourage more people to use a bicycle for commuting and other trip purposes.

Bicycle Safety

Expanding, enhancing and improving the County's bikeway network will likely encourage more people to ride a bicycle for a variety of trips, both for recreation and transportation. Developing and expanding the bikeway network is only the first step to creating a bicycle-friendly county. However, programs that educate bicyclists on riding in traffic and educate motorists on how to share the road with bicyclists are also needed.

Education and encouragement are important elements to increase levels of bicycling while also improving safety. Together, they can improve skills and confidence of bicyclists to ride safely in traffic, which is critical for improving overall regional mobility. Enforcement refers to the extent to which the local motor vehicle laws that protect and enhance the safety of bicyclists are enforced, particularly speeding and failing to yield right of way.

The impact of facility improvements on bicycling levels is increased when combined with education, training and promotion. According to the Federal Highway Administration, as more bicycles enter the traffic stream, the accident rate for bicyclists is reduced. Educating motorists on safely sharing the road with bicyclists is very important, but especially so in Montgomery County which is part of the nation's third most congested region and an area becoming increasingly plagued by road rage and reckless driving.

Bicycle Education Program

The County should consider investing in a bicycle education program. This program could, among other services, offer effective cycling courses for both adults and children, coordinate with Montgomery County Public Schools to incorporate bicycle safety into existing health education programs, and work with police to enforce existing traffic laws that are critical to ensuring a safe bicycling environment. This program could be combined with the County's Pedestrian Safety Program currently housed in the County Executive's Office as part of Go Montgomery!

Any bicycle safety or bicycle education program should involve members of the Montgomery County Bicycle Action Group (MCBAG), a group of bicyclists in the County interested in recreational and on-road bicycling issues that provides advice to the DPWT on current issues, programs and projects relating to cycling in Montgomery County.

Bicycle Encouragement and Promotion

Many County residents already bicycle regularly for recreation or transportation, or both. Significant potential exists to increase the number of people who use a bicycle for transportation. So, what needs to be done to make bicycling a more attractive transportation option?

Societal attitudes toward bicycling on-road are likely the largest barrier for Montgomery County. Because the County has one of the region's best park trail networks, motorists expect bicyclists to ride along these paths and to get off the road. This plan emphasizes that bicycles are legal vehicles and that they have a right to use the road as much as motorists. Changing the perception of bicycles as only for recreation is a major barrier than can only be overcome with extensive outreach and education. "Share the Road" signs will only go so far.

Getting more people to view bicycling as a viable daily transportation mode will not be easy. Traffic congestion is undeniably getting worse in the County, yet many residents are still reluctant to find alternatives. A small percentage of total trips (work and non-work) are on the County's excellent public transportation system, yet the majority of residents are seemingly still content to sit in traffic congestion in the comfort of their single-occupant automobiles. Therefore, targeted outreach, marketing and education are essential tools for convincing people to use any alternative transportation mode. Bicycle transportation is no different.

The County's residents and workforce not only must know where bikeways are located, they need to know how to get from place to place and how to research and identify a safe and efficient route to work or other destinations. Once there, they will need to know how to properly park and secure their bicycle and determine whether their employer provides showers and lockers. In addition, poten-

tial bicycle commuters must learn safe bicycle navigation and handling techqniues, proper attire and bicycle commuting equipment.

Fortunately, the County and region's government agencies and non-profit organizations already operate several programs or services that help residents and workers with these issues. This plan recommends that these programs continue to be funded and/or supported by the County.

Existing Programs To Continue

The following existing programs should continue or be expanded.

DPWT Bikeway Program

The Bikeway Program provides the linkage between Master Plan recommendations and the implementation of bicycle facilities (paths, bike lanes and shared lanes on roads). The program develops and constructs new projects. In addition, the program develops innovative bicycle-friendly features for the County including bike racks on county buses, bike lockers/rack programs, borrow a bike programs, and alternative mode endorsement. The Bikeway Program produces and publishes an attractive 48 page booklet-style bike route map (accurate as of April 2002) that can be used by bicycle commuters to identify safe and efficient bike routes to work and other destinations. The booklet actually contains 19 large-scale maps of different areas of the County.

Figure A-1. Cover for Montgomery County Bicycle Route Map booklet

Better Ways to Work!

Montgomery County Commuter Services (CSS) promotes bicycling as part of its Better Ways to Work! Program. The Program:

- Encourages employers to designate a bike coordinator who markets the biking program, provide showers and lockers for employers, provide incentives to get more employees to bicycle to work (free ride home for emergencies) and inquire CSS about bike amenities that may be available to employers.
- Educates employers on safe bicycling practices (e.g., wearing a helmet)
- Promotes the Bikes On Bus Program and educates employees on other bike-transit possibilities
- Partners with MWCOG's Commuter Connections and the Washington Area Bicyclist Association to help employers with launching a bicycle commuting program and to help employees start commuting by bicycle.

Through the County's Transportation Management Districts (TMDs), Commuter Services also coordinates annual Bike To Work Day (BTWD) activities each May and manages all the BTWD pit stops in the county.

Commuter Connections

Commuter Connections is a regional network of transportation organizations coordinated by the Metropolitan Washington Council of Governments. The program provides residents of the region with information on all the various commuting options so they can make a smart choice about to travel to work. Commuter Connections also helps employers establish commuting benefits and assistance programs

Commuter Connections publishes and distributes a booklet titled "Biking to Work in the Washington Area: A Guide for Employees (flipside of booklet reads "A Guide for Employers"). This attractive booklet provides all the information an employer or resident would need to start commuting to work by bicycle.

For employers, it highlights the benefits of having employees who bike to work (e.g., increased productivity, reduced parking costs), how to support a bike-to-work program in the workplace, provides guidance on selecting and installing bicycle parking facilities, and offering incentives to employees to bike to work more often (e.g., offering flex schedules).

For employees, the booklet highlights reasons to bike to work, provides advice on how to ride in traffic, how to select a safe bicycle route to work, and how to combine bicycle commuting with using transit. The booklet also educates readers on basic bicycling accessories and attire and highlights the various resources in the region available to bicycle commuters.

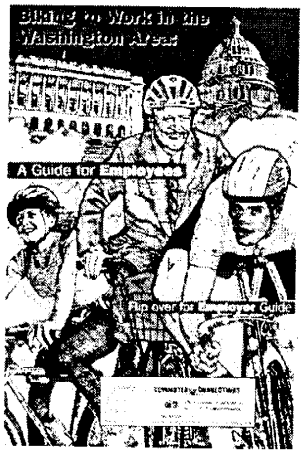

Figure A-2. Cover for "Biking to Work in the Washington Area" published by MWCOG Commuter Connections.

WABA's Bicycle Commuter Assistance Program

The Bicycle Commuter Assistance Program, developed and managed by the Washington Area Bicyclist Association, is an interactive bicycle commuter guide that provides detailed commuter information and maps online (www.waba.org). Bicyclists can use it to find the most convenient routes to various destinations in the Washington area. The maps show all the area bike trails and bike shops, and will eventually show the best commuter routes.