

BICYCLE MASTER PLAN UPDATE CITY OF ROCKVILLE

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DECEMBER 13, 1996



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CITY OF ROCKVILLE BICYCLE MASTER PLAN UPDATE

FINAL REPORT

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December 13, 1996



City of Rockville Bicycle Master Plan

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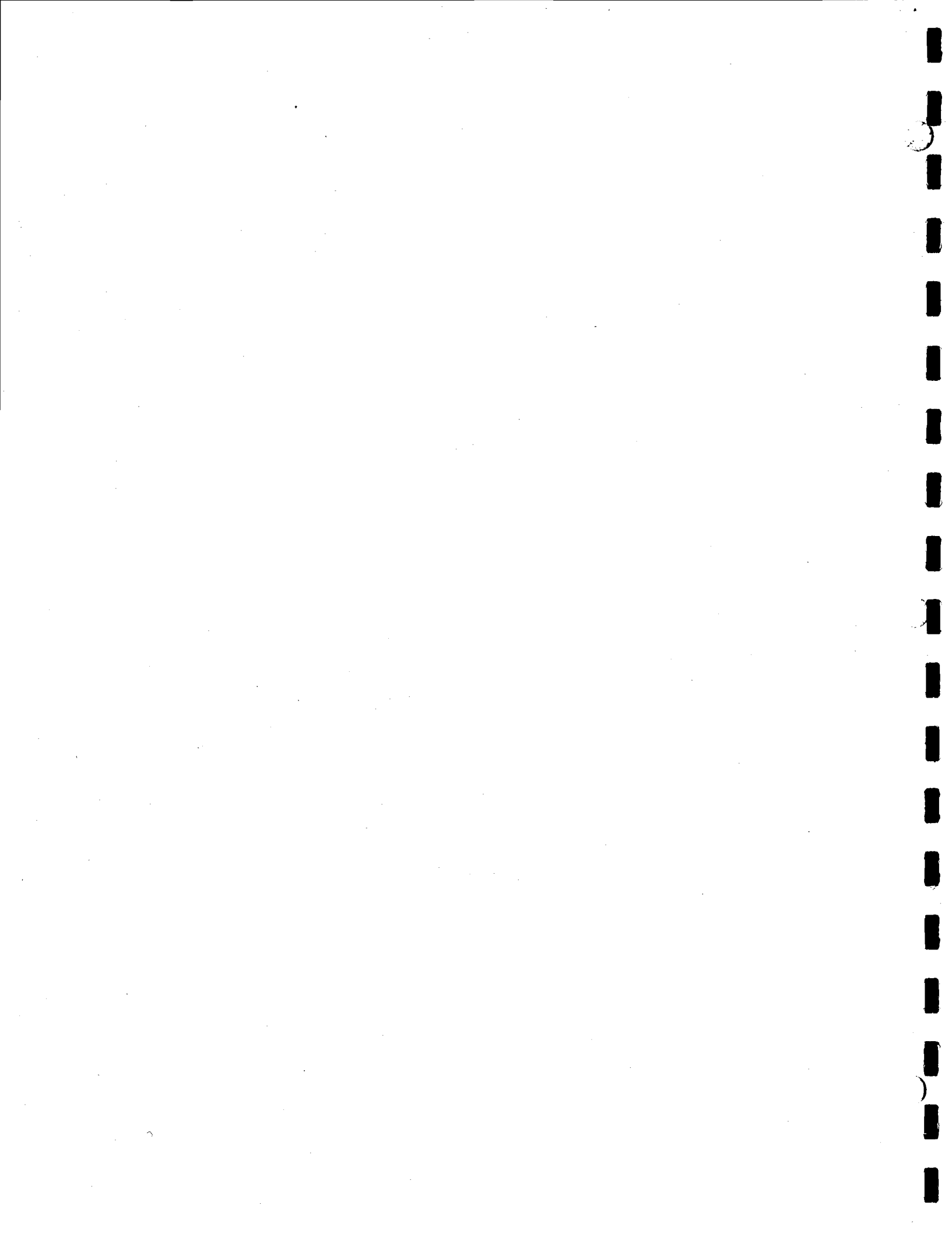


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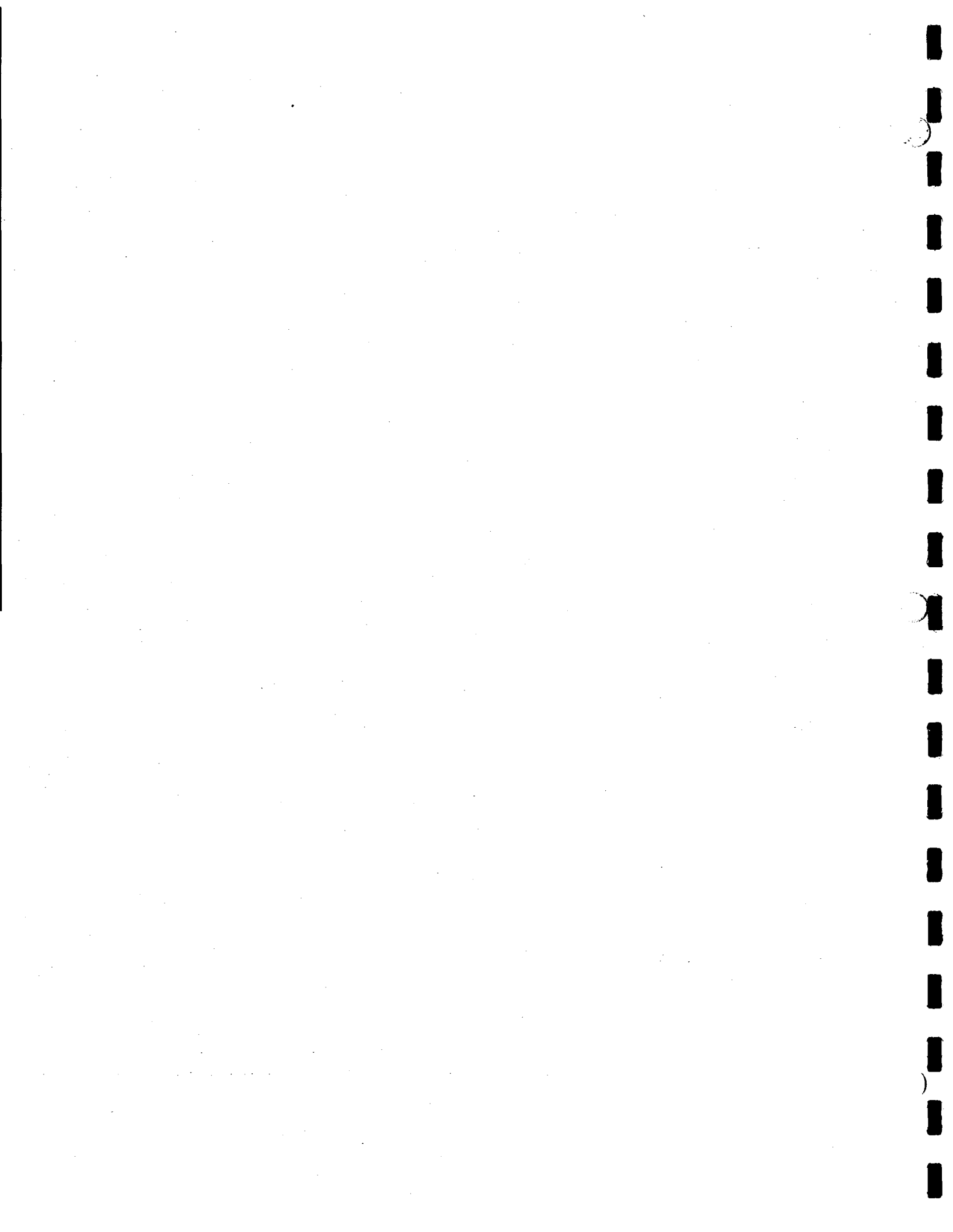


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ROCKVILLE BICYCLE MASTER PLAN UPDATE

I. INTRODUCTION

A. Vision, Goals and Priorities

The City of Rockville has bicycling in its future. The combination of interested and energized citizens, committed agency staff, and responsive and responsible elected officials and City managers is creating a livable community in which people have a range of safe and convenient travel choices, including bicycling.

This Bicycle Master Plan Update was developed for the Mayor and Council, and supersedes the 1981 Bicycle Master Plan. Changes in local conditions and increased interest in bicycling, both as a form of recreation and mode of transportation, warrant an update of the City's policy and progress toward creating a more bicycle-friendly community.

The project goal that was established by the City of Rockville stated the following:

Employing a citizen driven process, the Bikeway Master Plan Study will develop recommendations designed to make the City of Rockville a bicycle-friendly community, in which bicycling is accepted as a comfortable alternative to other modes of transportation and recreation.

Based on this and through the study process, this plan provides a framework in which the City can achieve the following vision:

Rockville will be a place where people have the convenient and comfortable option of traveling by bicycle - for recreation and transportation. Citizens will be able to access all public services, as well as recreational, cultural, commercial and employment areas by bicycle.

The National Bicycling and Walking Study, published by U.S. Department of Transportation outlines two major goals for bicycling in the United States:

- To double the percentage of trips taken by bicycling and walking; and
- To simultaneously reduce the number of bicycle related injuries and fatalities by ten percent.

These goals provide direction on what improvements need to be made in order to create more, and safer, opportunities for bicycling in the City.

During the public involvement process, and the planning charrette in particular, several priorities for physical improvements were identified:

- Improve access to the Rockville City Center, including municipal, cultural, and shopping locations;
- Improve access to local and regional recreation opportunities; and
- Provide for the safe crossing of major highways and Interstates.

In addition to these physical improvements, several programmatic recommendations were noted:

- Improvement in bicycle and motor vehicle operator education
- Consideration of the needs of bicyclists in the regular maintenance programs
- Promotion of opportunities for bicycling in the City

These priorities can be translated into goals, as a way of channeling efforts to improve conditions for bicycling in the City of Rockville.

B. How this plan should be used

This Bicycle Master Plan Update is designed to be used by citizens, public policy decision-makers, and City staff. It introduces the broad issues in bicycle planning, and applies these concepts to the physical environment within the City of Rockville. It also provides information, guidance and recommendations for improvements.

Appendices containing additional information have also been included for the interest and use of citizen advocates, policy makers, and City staff.

C. Changes in policies and orientation

The Intermodal Transportation Efficiency Act of 1991 (ISTEA) marked a significant shift in the focus of Federal transportation policy. New opportunities for funding, along with increased public involvement in transportation planning processes made it possible.

The Maryland State Legislature has also passed *Bike/Ped Access 2000*, which outlines strategies to increase travel by those two modes. Montgomery County and the Maryland National Capital Parks and Planning Commission (M-NCPPC) also have policies that positively affect bicyclists, and the communities that provide for them, including the retrofitting of Ride-On buses with bicycle carrier racks:

The development of this report reaffirms the City's commitment to recognize and accommodate citizens who now choose to travel by bicycle, and provide the option of traveling by this mode, safely and comfortably to all its citizens.

D. Benefits of integrating non-motorized considerations

According to the National Personal Transportation Study, bicycling produces multiple benefits, both for the individual and their community. Approximately sixty percent of all daily trips are less than five miles, fifty percent are less than three miles, and twenty five percent are under one mile - well within the range of an average cyclist. Rockville's compact scale, traditional development areas and its downtown make bicycling an attractive travel option. Taking short trips, from home to the town center, brings with it manifold benefits - including reduced road congestion and air pollution, decreased requirement for motor vehicle parking, and increased quality of life within the City of Rockville.

The physical, built environment can create opportunities for, or barriers against the choice to travel by bicycle. According to the 1990 census data, a full two-thirds of people commuting to work from Rockville drove alone. Often, the process of delivering public roadway facilities focuses on accommodating this "demand", while limiting the choices of its users. Only twenty percent of the total trips made are work commutes; the remaining eighty percent are trips to school, for recreation, and errands (National Personal Transportation Study). The potential for increasing use of bicycles is dependent on taking a more comprehensive perspective when developing public roadways.

Providing Rockville with transportation *choices* allows citizens the option of biking or driving, putting the "livability" of Rockville in the hands of its citizens. Bicycling and walking are clean modes of transportation, requiring no fossil fuels. Errands around-town often consist of several short trips within a few blocks of each other, requiring an automobile to be turned on and off emitting excess exhaust. Trips made on a bicycle produce no air pollution, contribute less to road congestion, and may take less time, especially if convenient bike parking is provided.

Biking to the store, school, or work is a time-efficient way of attaining an acceptable level of fitness. In addition to the health benefits, personal benefits may include

improved productivity, self-image, greater sense of independence, and improved social relationships.

The integration of bicycle facilities extends far beyond the needs of just the cyclist. These facilities can simultaneously benefit the motorist by enhancing the safety and attractiveness of the road. For example, roads with wide paved shoulders have been shown to reduce automobile accidents and decrease road degradation, thus lowering maintenance costs. Construction measures taken to reduce speed on roads will benefit both the motorist and cyclist in that the road is safer for all users and it encourages greater use of non-motorized modes of transportation.

The creation of trails and greenways can have a positive effect on the value of properties adjacent to and near a proposed trail route. Recent studies of the preferences of new home buyers indicate that there is a demand for more livable communities in general, and better bicycle and pedestrian facilities in specific. Multiple-use pathways generate more "recreation hours" per dollar than any other type of recreation facility. Regional trail systems demonstrate the demand for these opportunities, among many users and for many purposes.

E. How bicycles are accommodated for transportation and recreation

Bicycle network planning requires an integrative approach to improving public facilities. Bicycles are used for transportation, recreation and leisure trips - by a wide range of users, including adults, seniors and children. Bicycle facilities take three basic forms - separate facilities, designated roadways, and public roadways. Traditionally these facilities have been known as Class I, II, and III.

Bicycle Paths (Class I) - A bicycle facility separate from motorized vehicular traffic. A bicycle path may be located within a highway right-of-way or on an independent right-of-way. A bicycle path is not a sidewalk but may be designed to permit shared use with pedestrians.

Bicycle Lanes (Class II) - A lane designated for exclusive or preferential bicycle use through the application of pavement striping or markings and signage.

Bicycle Routes (Class III) - Roadways designated for bicycle use through the installation of directional and informational signage.

Most bicycling takes place on ordinary streets. Public roadways may be made more accommodating for bicyclists by removing common hazards (i.e. bicycle-unsafe drainage grates) and by following regular maintenance procedures (i.e. smooth pavement free from defects.) However, compatible, but undesignated roadway accommodations may not be the most appropriate for all types of bicyclists.

Designated roadways may be signed as "Bicycle Routes" (Class III) or marked with special striping to create "Bicycle Lanes" (Class II). These designations have been shown to encourage increased use of the roadway by bicyclists. Designation criteria and design standards in use by other communities have been provided within this report.

Public open space and greenways can create separate opportunities for a wide range of activities, including bicycling. Designing separate pathways (Class I) with all users in mind, like providing adequate width and clearance, makes them more successful. Brief sections of pathway can create important links between communities separated by land use or other physical barriers.

Providing these facilities requires the cooperation of many City Departments, including, but not limited to Recreation and Parks, Public Works, Police and Community Development. These departments, as well as the citizen-led Bicycle Advisory Committee have worked together to develop this report.

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II. THE PLANNING PROCESS

A. Participants

Mayor and Council

The Mayor and Council approved this study as part of the Capital Improvements Program. They will be responsible for approving and adopting the plan.

Recreation and Parks Department

This report is an update of the Bicycle Master Plan developed by the Department in 1981. This earlier plan, although not officially adopted by the City, served as a guiding document for this study.

The Recreation and Parks Department (R&PD) manages dozens of parks within the City. The department also provides support and encouragement programs for these facilities, including public information and special events, and has a long-standing policy of promoting bicycling within the City.

Advisory Committee

The Citizen Bicycle Advisory Committee (CBAC), represents a range of user types and have been involved in the development of the Bicycle Master Plan Update from the earliest stages. A preliminary team meeting with Advisory Committee members confirmed the orientation of the plan - to be comprehensive in its approach to different users and trip types. Transportation and recreational use, integration with transit, and other issues were discussed in this preliminary meeting.

The Advisory Committee's comments were integrated into the development of the public involvement tools, a brochure and questionnaire. These served as the basis for obtaining input and support for the project.

Other Departments

There are established links between Public Works and Recreation and Parks Departments. These links are essential in developing the working relationship necessary to implement a program which will consider all transportation users.

Other Agencies

The Maryland-National Capital Park and Planning Commission has developed a 2020 master plan for the region. This plan will need to maximize areas of mutual interest to identify priorities and resources for consideration in the next round of planning.

Montgomery County Department of Park and Planning is currently preparing a new master plan of bikeways and trails while undertaking a number of projects to improve bicycle and pedestrian facilities in the County. Through the Transportation Emissions Reduction Pilot Program, the County is concentrating on improving bicycle and pedestrian facilities in North Bethesda to evaluate improvements which will attract new users of these facilities.

The Maryland State Highway Administration administers projects that directly impact conditions within the City limits. A coordinating function between the City and the State needs to be instituted so that projects of this type have positive outcomes for cyclists, as well as motorists.

B. Public Involvement

Survey distribution and results

A brochure was developed to promote the bicycle planning process, and to gather information on the perceptions and preferences of bicyclists in the City. These brochures were mailed to a preselected list of individuals, and multiple copies were delivered to five local bicycle retail stores and the County Administration Building. A copy of the brochure is located in **Appendix "A"**.

These brochures were prepared to notify the public of the study and obtain public input. A survey questionnaire was included in the brochure which was used to develop a profile of bicycle usage by the citizens. A summary of the responses to the questionnaire is included in Appendix A.

Charrette process and results

A charrette, or interactive workshop, was prepared and delivered by the project team on May 15, 1996. A range of participants, including citizen advocates, seniors, City and County representatives, were introduced to key concepts in bicycle network planning,

and were asked to respond to a brief questionnaire on their current practices and attitudes on bicycling in the City of Rockville.

Participants were divided into five working groups, each moderated by one team member. Each group worked through a series of questions, indicating their personal trip origins and destinations, current preferred routes, identifiable obstacles or barriers, and opportunities for improvement.

Each working group member then marked these locations on a scale map of the City using color-code markers. After each individual completed the exercise, the group discussed the similarities and differences in their responses - and developed a set of three "priority issues."

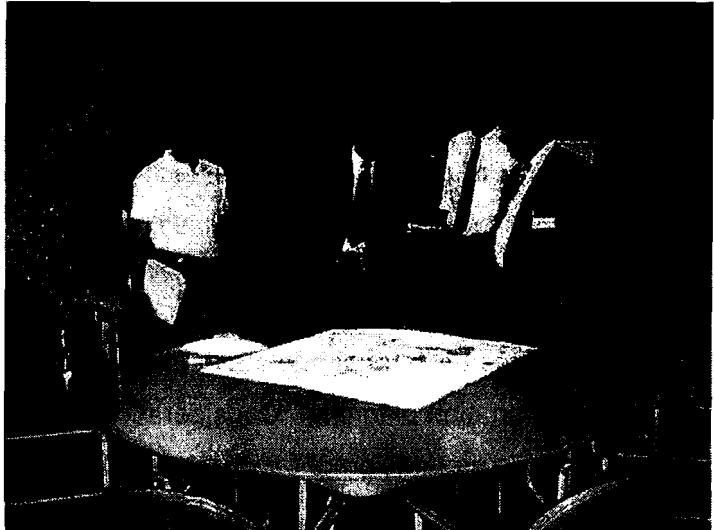


Figure 2.1 - The Charrette Process

Each group then presented its findings to the other groups with their responses being recorded for reference. The "priority issues" for the groups were noticeably similar, resulting in the development of the priorities and goals section of this report. Informal surveys of participants found enthusiastic support for both the process and its result.

Trip Generators

Input generated by the charrette process was compared to known development and land use patterns. Residential land uses are generally regarded as trip generation areas, and commercial, civic, and recreational uses as trip attractors. The following were identified as major generators for bicycle:

Schools

Children are an important part of the transportation mix. Trips to school by bus are creating a stressed demand on Montgomery County Public Schools' Transportation Department. Alternatives to private auto and public school bus should be promoted wherever possible. These hubs also inherently generate many trips in concentrated areas.

Recreation areas

With the cooperation of the City Recreation and Parks Department, the project team identified local and regional recreation areas and the transportation corridors that provide access to them. Priority must be placed on access to local park resources, but a significant number of charrette participants identified a desire to access Rock Creek Park and the C&O Canal pathway systems.

Civic and cultural centers

Municipal centers, City and County buildings, social service centers, libraries must be made accessible by all modes, including bicycles. It is the right of all citizens to access these services whether or not they own a car.

Employment areas

Commute trips constitute about 20% of all trips, and are a focal point in normal transportation planning. Consideration of bicycle commuters should be factored into planning and design of facilities.

Retail Services

Many participants identified both the lower Rockville Pike corridor and town center as key destinations, yet there is only impaired access in parts of each of these areas. Participants expressed frustration in their inability to access the MD 355 corridor with any convenience or comfort.

It is also important to note that any measures to improve access for bicycles to these services will not impede business. In fact, improving the flow of all modes invites more active business.

Transit Centers

Access to, from, and parking at the Rockville and Twinbrook Metrorail stations were discussed. These fall along general desire lines in East-West access. Key elements will be identifying access points along MD355 and through the downtown areas.

Barriers/Obstacles

With much of Rockville currently "built-out", many constraints exist throughout the City. Some obstructions that were known going in to the study, were emphasized during the charrette process. These include:

- Crossings along I-270 and Rockville Pike;
- Access to downtown;
- Access to Rock Creek bike path;
- East-west access throughout the city;
- Additional roadways that were identified as being barriers/obstacles are shown on **Figure 2.2** and include:
 - Veirs Mill Road
 - Norbeck Road
 - West Montgomery Avenue
 - East Gude Drive
 - Southlawn Lane
 - Glen Mill Road
 - Falls Road
- Specific intersections identified as being barriers/obstacles are also shown on **Figure 2.2** and include:
 - Gude Drive @ Rockville Pike
 - Frederick Avenue @ Metro
 - West Middle Lane @ Washington Street
 - Veirs Mill Road @ Rockville Pike
 - First Street/Wootton Parkway @ Rockville Pike
 - Edmonston Drive @ Rockville Pike
 - Baltimore Road @ Norbeck Road
 - Veirs Mill Road @ First Street
 - West Montgomery Avenue @ I-270
 - Great Falls Road @ I-270

Although It is not the intent of this plan to provide a bike path or lane to each and every part of the city, it is intended to provide a safe, efficient bikeway system that would allow access to each part of the City. Those barriers or problem routes identified above will either need to be improved or alternate routes will need to be designated. By providing the bike route lanes, and paths along key roadways and completing bicycle improvements at other key locations throughout the city, access along local, low volume, low speed roadways can be achieved.

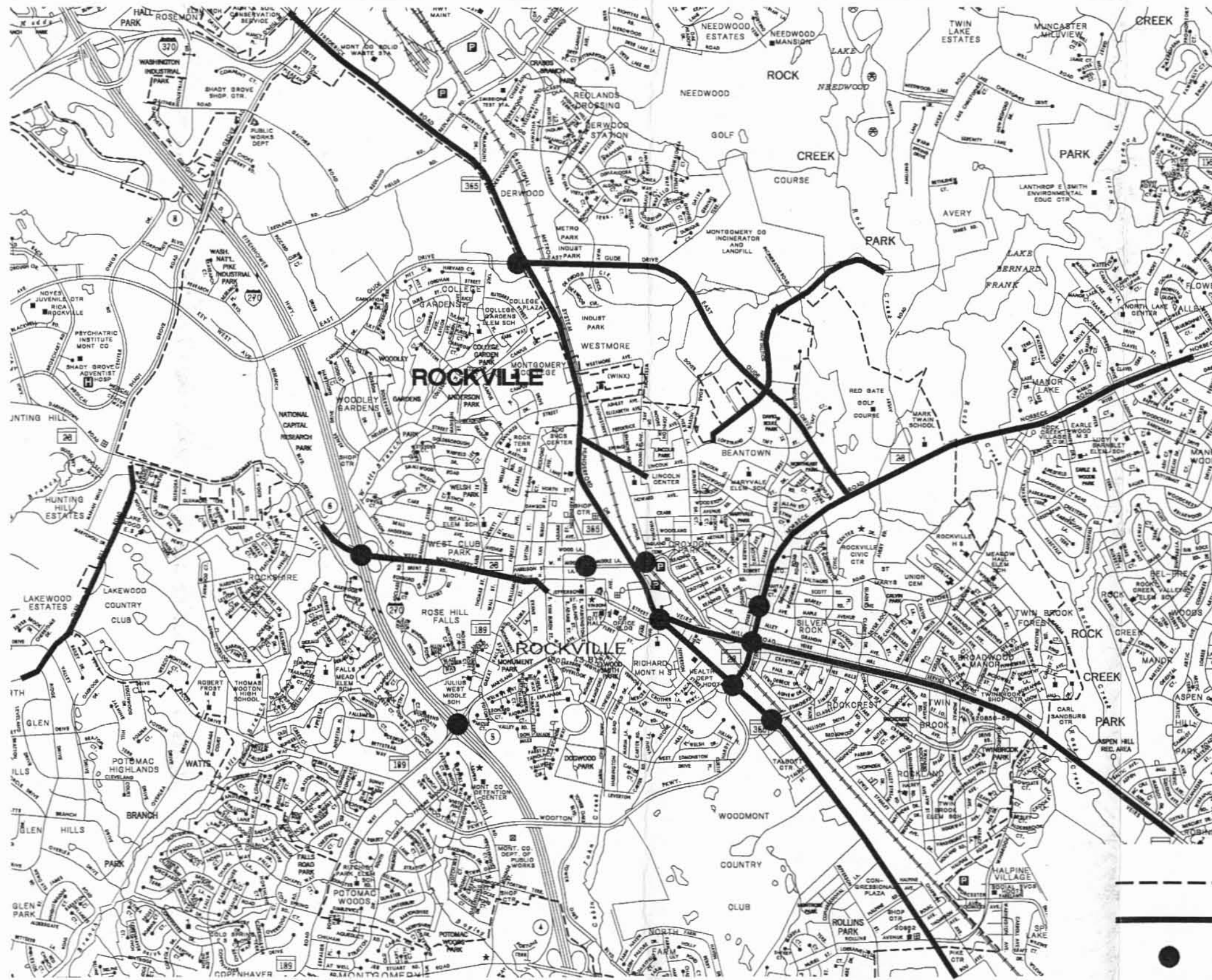
Opportunities

Through the redevelopment process, opportunities exist for the City of Rockville to provide for adequate bicycle facilities. By making bikeways a condition of approval of development during the subdivision process, bikeways can be added along several key corridors. Routes that are identified as part of the Bicycle Master Plan can be identified during the site plan development process and can be coordinated with other planned facilities to provide for a continuous bikeway network.

Several key locations that should be included:

- The extension of Jefferson Street pathway to provide for a parallel connection to MD 355;
- Redevelopment that occurs along MD 355 and other commercial areas;
- As conditions of development at various locations throughout the City will require roadway improvements/upgrades (signals, addition of lanes, etc.), bicycle compatibility should be integrated into the design process.

New development that will occur in the Thomas and King Farms will also provide excellent opportunities to provide bicycle facilities. Section V of this plan identifies some of the specifics that can be undertaken through this process.



LEGEND

- EXISTING BICYCLE FACILITY
- PROBLEM ROADWAY
- PROBLEM INTERSECTIONS

**FIGURE 2.2
PROBLEM ROADWAYS AND INTERSECTIONS**



III. THE BICYCLE PLAN

A. Overview of Plan

Based on the charrette and brochure survey results, an overall plan was developed to provide a network that would meet the goals of the study and provide the framework for the proposed bikeway system. The enclosed fold out map displays the overall bicycle plan. Existing facilities are shown in green and proposed are shown in red. Various line types were used to differentiate between the proposed bicycle facility types.

The following improvements were identified as having highest priority from the participants in the public workshop:

- Provide for safe crossings at intersections
- Provide for "bicycle beltway" around the City with spokes linking to downtown and outward to County facilities, including the Rock Creek bike path
- Provide bicycle-friendly roadways
- Improve access to Metro stations
- Provide for route on or parallel to MD 355 and Falls Road
- Improve bicycle parking facilities
- Improve traffic calming
- Extend the Jefferson Street bike path
- Improve Baltimore Road bike path
- Improve bike path maintenance
- Provide access to Montgomery College
- Provide improved connections to existing bike paths

B. Prioritization of activities

Once the plan was set, the individual projects were reviewed to identify the projects which would provide the greatest benefit.

For purposes of prioritization, improvements were classified into three levels:

1. Projects that must be completed to achieve the identified goals;
2. Projects that would help achieve the identified goals; and

3. Projects that could help achieve the identified goals.

It is the intent of this section to identify the priorities as provided by the community. The plan will provide for a workable, realistic bikeway system that can be easily implemented. In order to establish a prioritization of bicycle activities, factors that were identified by the charrette participants were reviewed.

The need to provide at least one good east-west and one north-south connection along with a circumferential loop around the city connecting the Gude Drive and Wootton Parkway facilities was established as having the highest priority. Without a good solid base to work from, bits and pieces of the system will not be effective. Access to downtown, linking to schools, Metro stations, Montgomery College, park links and connections to outside facilities such as the Rock Creek bike path were identified as having the next highest priority.

The last priority, "filling in the pieces", now allows bicyclists to have full access throughout the City. It also provides alternative routes to the already established system.

As one of those "pieces", the connection along the Watts Branch stream valley should be of high importance. This connection provides for an excellent opportunity to provide a crossing under I-270 by utilizing the existing culverts that cross I-270 and Nelson St. Capital Improvement Projects (CIP) should be reviewed to incorporate bicycle design into these planned projects.

Coordination with Montgomery County to tie into County proposed facilities will also need to be prioritized as these segments are completed. Providing adequate parking, locker space and showers at work places should also be of importance to allow full use of the system. And finally, a maintenance program needs to be put into place. Ensuring the upkeep of these facilities will be imperative to their success.

C. Phasing of Priorities

With the priorities set, a phasing plan was developed to implement projects that would complete a proposed bikeway system. Ongoing CIP projects and developer improvements need to be constantly monitored for any integration of bikeway facilities that can be incorporated into these projects. As CIP projects are planned, they should

be reviewed for compatibility with the proposed bikeway system and bicycle design should be integrated into the project if applicable.

The intent of this section is to provide a strategy to complete a bikeway system that meets the priorities as outlined above. The strategy will explore projects that can be planned, designed and constructed through the CIP program.

Projects have been developed to provide an efficient approach to completing a bicycle-compatible facility system. The following projects have been identified and are meant to be used as a guide and can be modified to adjust to existing and proposed projects or developments. Some projects have been broken down into sub-projects to allow easier integration into the CIP program. The first six projects (sub-projects 1A-1D and projects 2 and 3) identified should be completed first to provide a solid base bicycle system (Bicycle Beltway). Once a solid base is set in place, projects 4 and 5 can be implemented in any order as funding or other resources become available to further enhance the system.

Each of the projects identified complete a portion of the overall system. Each project identifies the routes which need to be upgraded and identifies proposed improvements by designating a facility that would be best suited for the proposed connection. Proper signing, striping and intersection modifications will need to be completed along the identified routes. The first seven projects (1A - 4) generally combine bike routes and/or designated bike lanes. However, there are a few locations that will require off-road facilities, which are identified. The eighth project (Project 5) is a group of individual projects that are primarily bike paths, most of which are included as park facilities.

The majority of these projects will need to be funded through the City's CIP program and from grants. However, some improvements may be incorporated into existing CIP projects. These segments, along with the corresponding CIP project names, numbers and descriptions are identified.

The following sections detail the proposed eight (8) projects and list roadways to be improved and the type of improvement (I, II, or III). The improvement types listed are intended only as a guide. Planners and designers are encouraged to investigate all facility type options prior to design to determine the most cost efficient and suited facility.

A cost summary is included for each project. Appendix "J" includes a summary of unit prices and the actual cost breakdowns by facility. It should be noted that these cost estimates are based on a collection of resources from other municipalities throughout the United States. The costs do not include right-of-way acquisition or modifications to existing signal timing systems.

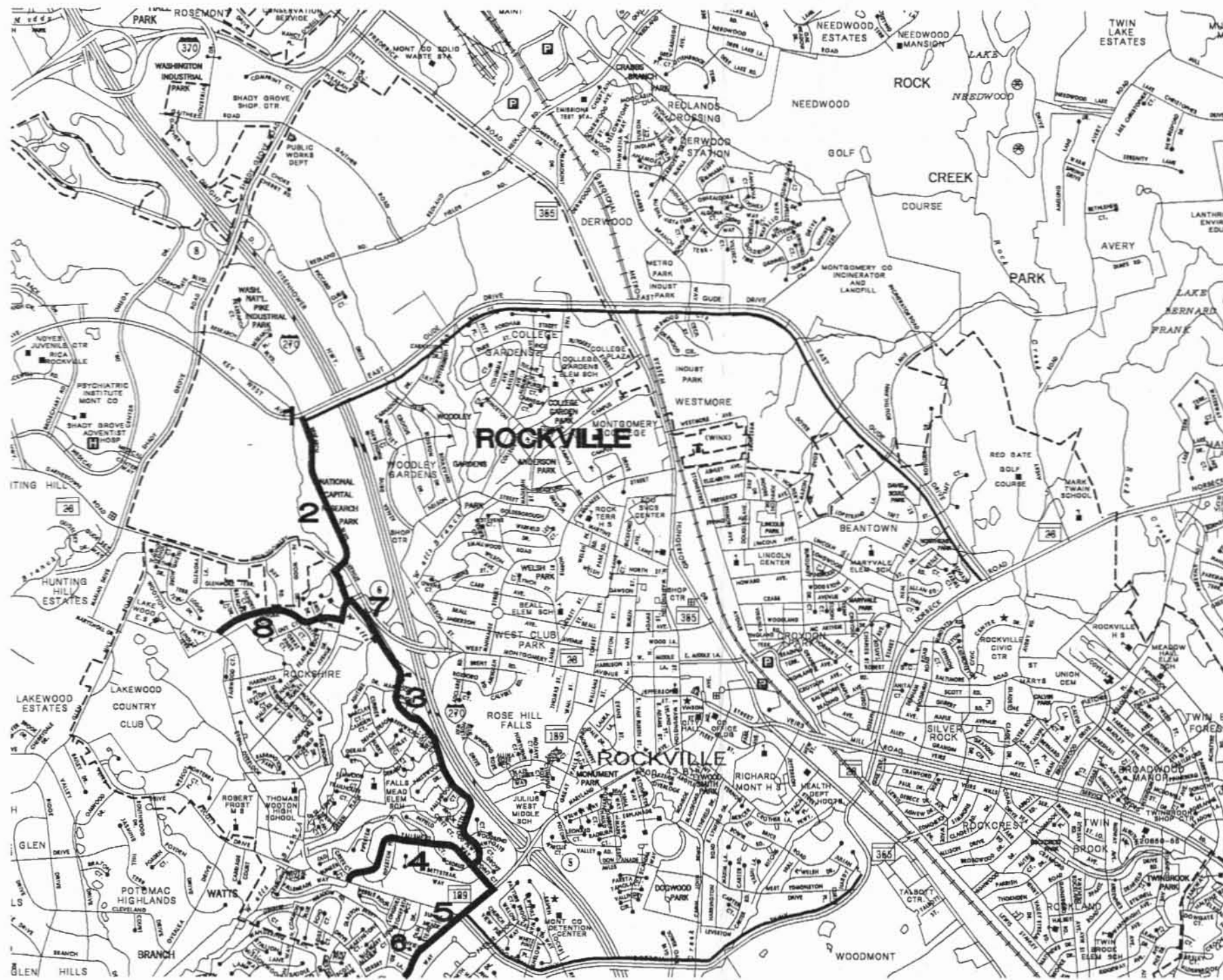
PROJECT 1 - Rockville Bicycle Beltway - Provide an east-west and north-south connection along with a circumferential loop around the City. The routes designated below could be signed with unique signage to include a logo designating the beltway.

PROJECT 1A - West side loop connection

This section would tie the west end of the existing bike paths along Gude Drive and Wootton Parkway and would provide the missing link that would put 75% of the "bicycle beltway" in place. One capital project (420-850-5A11 - Gude Drive - Right turn lane at Research Blvd.) was identified that could accommodate additional intersection modifications (striping and signing) to provide improved bicycle accessibility. This project is scheduled for FY 97 and any modifications would need to be implemented immediately. Future CIP project (420-850-0B11 - Wootton Parkway - Falls Road to MD 28) will construct two (2) additional lanes and intersection improvements along Wootton Parkway. Bikeway improvements, including upgrades to the existing path and new connections should be incorporated into the design of this project. This project would complete the bike path that currently runs from Dundee to Hurley Avenue. This project also includes upgrading sections of the existing Gude Drive and Wootton Parkway bike paths to current design standards.

The following roadways would be improved under project 1A and are shown in **Figure 3.1:**




<u>Location</u>	<u>Facility Type (Class)</u>
Research Boulevard	I
Hurley Avenue	III
Dundee Road	III
Watts Branch Parkway	II
Fallsmead Way	II



**PROJECT 1A
BICYCLE IMPROVEMENTS**

1. GUDE DRIVE
2. RESEARCH BOULVARD
3. WATTS BRANCH PARKWAY
4. FALLSMEAD WAY
5. WOOTTON PARKWAY
6. FALLS ROAD
7. HURLEY AVENUE
8. DUNDEE ROAD

LEGEND

-  EXISTING BICYCLE FACILITY
-  EXISTING FACILITY TO BE UPGRADED
-  PROPOSED BICYCLE FACILITY

**FIGURE 3.1
PROJECT 1A - ROCKVILLE BICYCLE BELTWAY WEST SIDE LOOP CONNECTION**



Falls Road	I
Wootton Parkway	I
Gude Drive	I

Two additional projects that are not directly a part of the connection but would enhance the usage are the designation of Dundee Road and Hurley Avenue as bicycle routes. Both of these roads have sufficient width and low volumes and speeds that they could easily be designated as bike routes (shared lane) by simply installing adequate signing.

The estimated cost of Project 1A, as summarized in Appendix J, is \$1.34 million.

PROJECT 1B - East side loop connection

This project would tie the east end of the existing bike paths along Gude Drive and Wootton Parkway and would provide the missing link that would complete the "bicycle beltway."

The following roadway sections are to be upgraded under this project and are shown in Figure 3.2:

<u>Location</u>	<u>Facility Type (Class)</u>
Edmonston Drive	II
Grandin Avenue	II
McAuliffe Drive	II
Broadwood Drive	I
Joseph Street	III
First Street	III
Taft Street	I
Southlawn Lane	I

These roadways would need to be upgraded to accommodate bike routes as indicated.

Also, the intersections of First Street at Rockville Pike and First Street at Veirs Mill Road would need to be upgraded to be more accommodating to the cyclists through proper striping, signing and channelization.

As part of this phase, several other improvements should be investigated and completed. These include: upgrading the intersections that have been identified as being barriers (i.e. Rockville Pike (MD 355) and Gude Drive) and construct a bike path along Broadwood Drive to connect to the existing bike path at Fletcher Place.

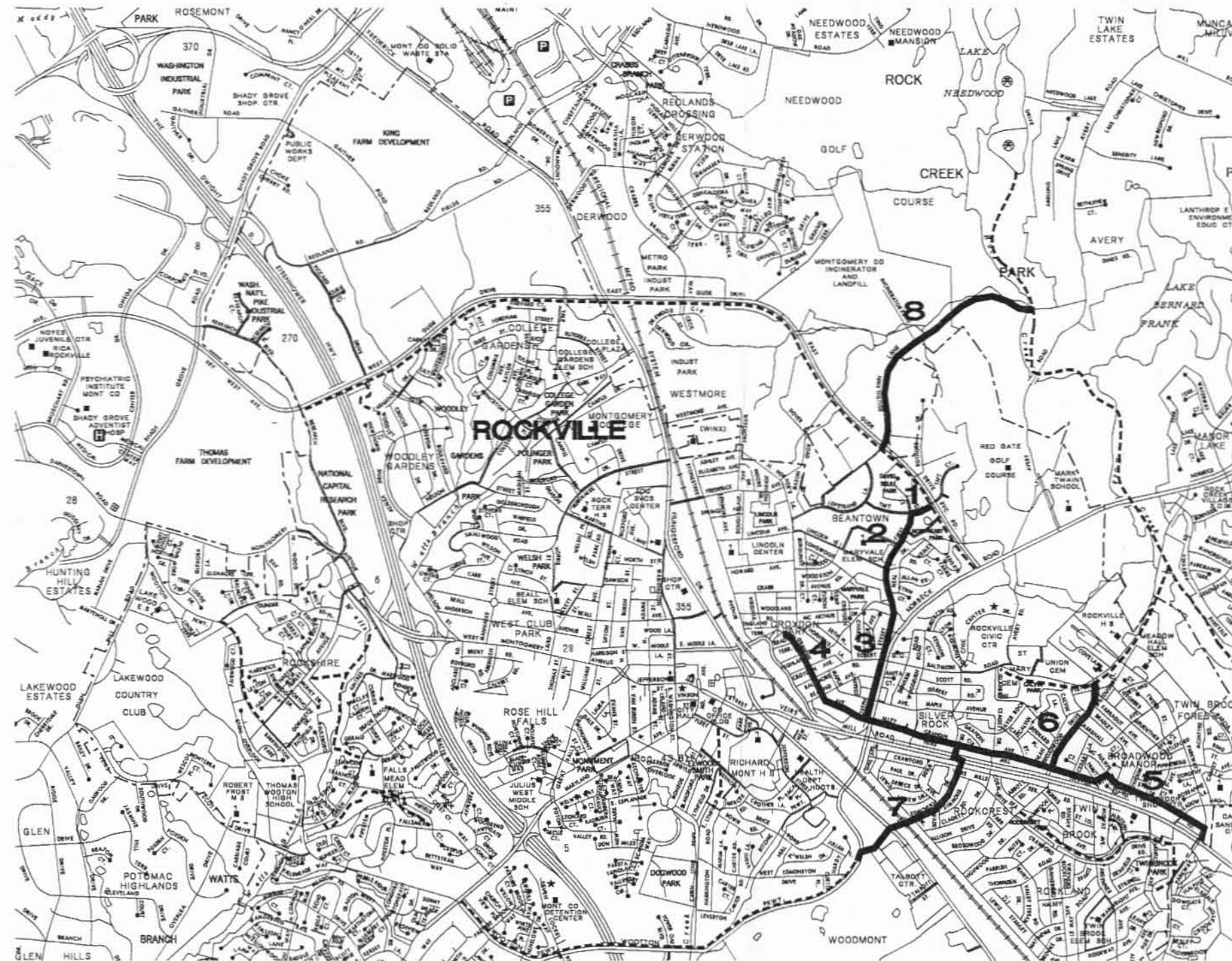
The estimated cost of Project 1B is \$634,100.

PROJECT 1C - East-West Connection

This project would provide for an east-west connection that would begin the spokes to the circumferential loop that was completed in projects 1A and 1B. However, as previously stated, as opportunities arise through CIP or development improvements, those portions of this or any other project can be completed. By providing this east-west connection, access to downtown would be greatly improved. One CIP project (420-850-1A72 - Park Road/Stone Street Traffic Control) has been identified that could be integrated to include bicycle improvements. This project calls for median reconstruction, street lighting, and upgrading signs and markings. Scheduled for construction in FY 98-99, this project is currently in the preliminary design stages and should be identified to incorporate adequate bicycle improvements.

The remainder of this section would combine bike routes (shared and shoulder lanes) and designated bike lanes along the following routes and as shown in **Figure 3.3**.

<u>Location</u>	<u>Facility Type (Class)</u>
Woodley Drive	III
Azalea Drive	III
Nelson Street	II
Anderson Avenue	III
Harrison Street	III
Forest Avenue	III



**PROJECT 1B
BICYCLE IMPROVEMENTS**

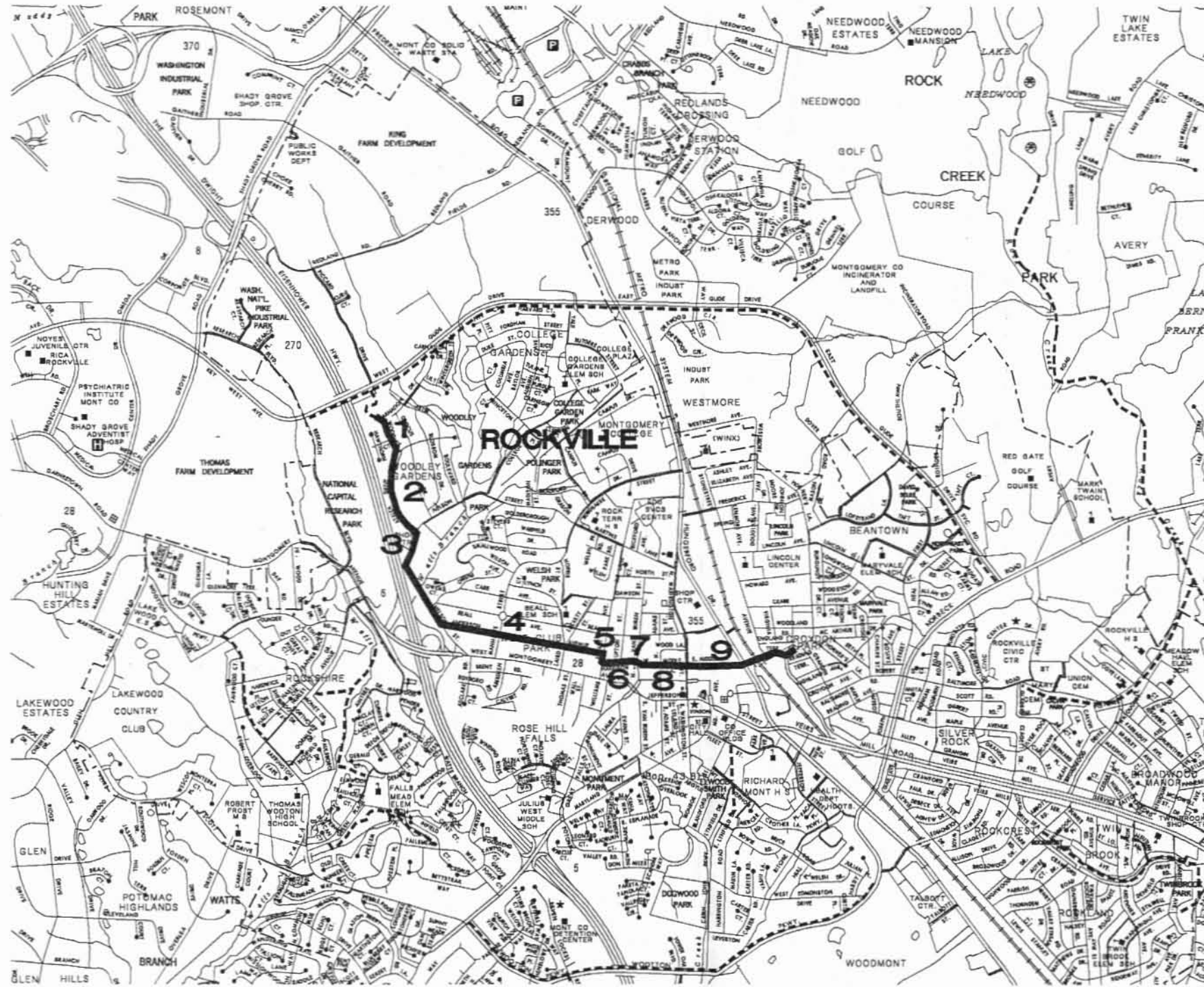
1. TAFT STREET
2. FIRST STREET
3. JOSEPH STREET
4. GRANDIN AVENUE
5. McAULIFFE DRIVE
6. BROADWOOD DRIVE
7. EDMONSTON DRIVE
8. SOUTHLAWN LANE

LEGEND

- EXISTING BICYCLE FACILITY
- PROPOSED BICYCLE FACILITY

FIGURE 3.2
PROJECT 1B - ROCKVILLE BICYCLE BELTWAY EAST SIDE LOOP CONNECTION





**PROJECT 1C
BICYCLE IMPROVEMENTS**

1. WOODLEY DRIVE
2. AZALEA DRIVE
3. NELSON STREET
4. ANDERSON AVENUE
5. FOREST AVENUE
6. HARRISON STREET
7. N. VAN BUREN STREET
8. WEST MIDDLE LANE
9. EAST MIDDLE LANE

LEGEND

- EXISTING BICYCLE FACILITY
- PROPOSED BICYCLE FACILITY

**FIGURE 3.3
PROJECT 1C - ROCKVILLE BICYCLE BELTWAY EAST-WEST CONNECTION**



N. Van Buren Street	III
West and East Middle Lane	II

The estimated cost of Project 1C is \$117,000.

PROJECT 1D - North-South Connection

This project, similar to Project 1C, would provide improved access to the downtown area, but would provide it along a north-south route. No existing CIP projects were identified under this project that bikeway improvements could be incorporated.

The route, which would combine bike routes, designated bike lanes, and off-road pathways to complete this connection. The southern portion of Cabin John Parkway (currently not built) to Wootton Parkway would be excluded as a Class I bikeway. An alternate, traversing through Dogwood Park and the new Tower Oaks residential section, was also designated.

The following roadways are proposed for improvements under project 1D and shown in Figure 3.4:

<u>Location</u>	<u>Facility Type (Class)</u>
College Parkway	II
Nelson Street	II
Martins Lane	II
North and South Washington Street	II/III
Argyle Street	III
Monroe Street	I/II
Cabin John Parkway	I/II
New Mark Esplanade	II
Tower Oaks Boulevard North	I
Potomac Valley Road	II

The estimated cost of Project 1D is \$544,100.

PROJECT 2 - Provide access to schools

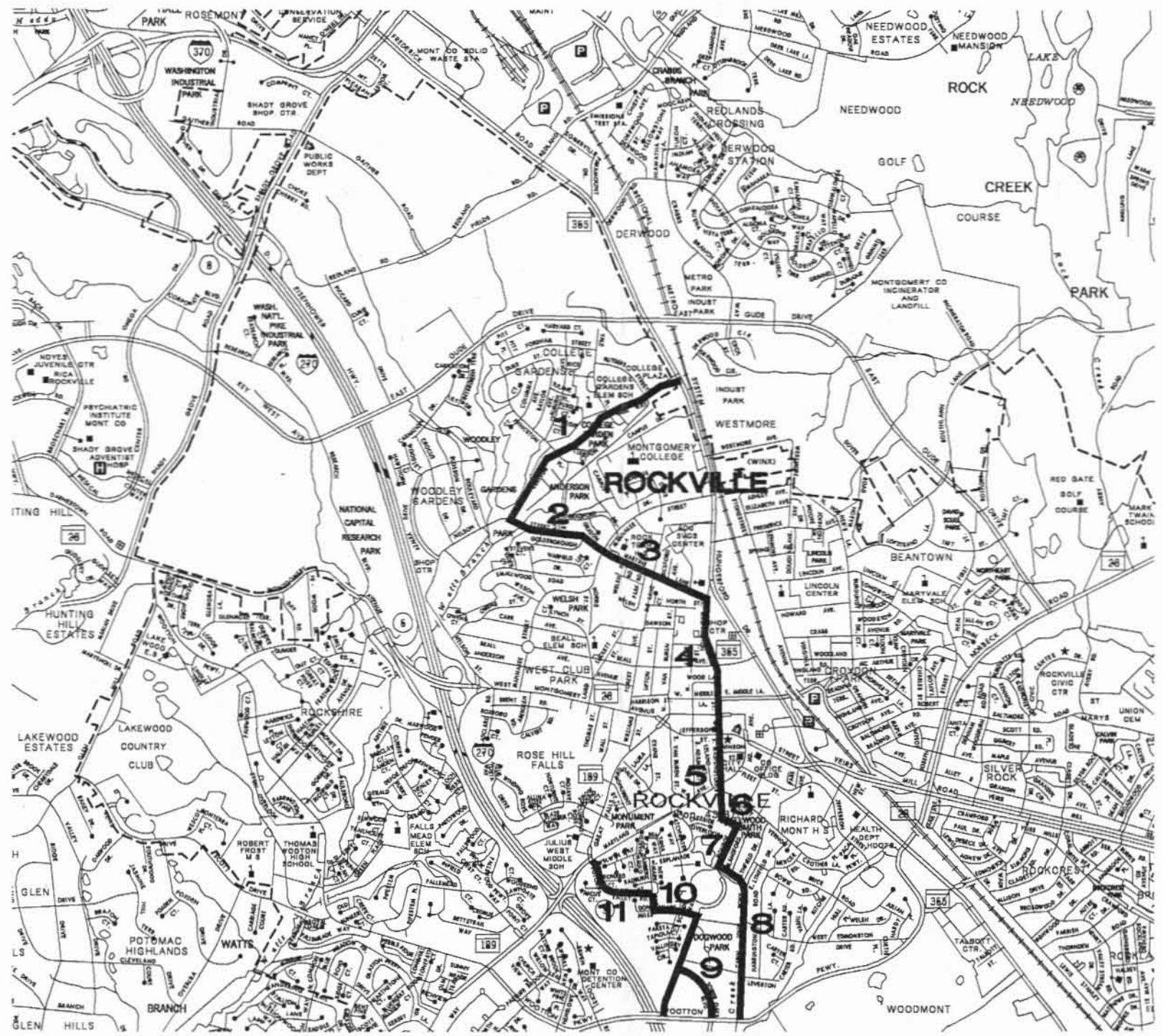
This project would provide for various routes throughout the city to link the beltway and spokes to the schools within the City. As with the routes suggested under project 1, this project would be completed as a CIP project that would consist of proper signing, striping and intersection modifications to bring the roadways up to current bicycle compatible standards. The routes suggested would combine bike routes (shared and shoulder lanes) and designated bike lanes. The following roadways are proposed for improvements under project 2 and are shown in Figure 3.5:

<u>Location</u>	<u>Facility Type (Class)</u>
Glen Mill Road	I
Veirs Drive	I
Scott Drive	I
Great Falls Road	I
Falls Road	I
Mannakee Street	II
N. Van Buren Street	III
Stonestreet Avenue	II
Lincoln Avenue	III

The estimated cost of Project 2 is \$920,000.

PROJECT 3 - Link Metro stops and complete pathways in southeast quadrant of the City (includes parallel route to Rockville Pike)

This project would provide access to Metro stops and complete the bicycle system in the southeast quadrant. There were three (3) CIP projects (420-850-6A71 - Signal at East Jefferson at Halpine Road & 420-850-6C11 - Halpine west of MD 355 & 420-850-PW09 - Median Construction and Beautification) that were identified as having potential to include bicycle facility upgrades. These three (3) projects involve upgrades along Halpine Road and could integrate improvements that would allow these sections to be bicycle compatible. Each project is scheduled for different construction periods between FY 97-99.



**PROJECT 1D
BICYCLE IMPROVEMENTS**

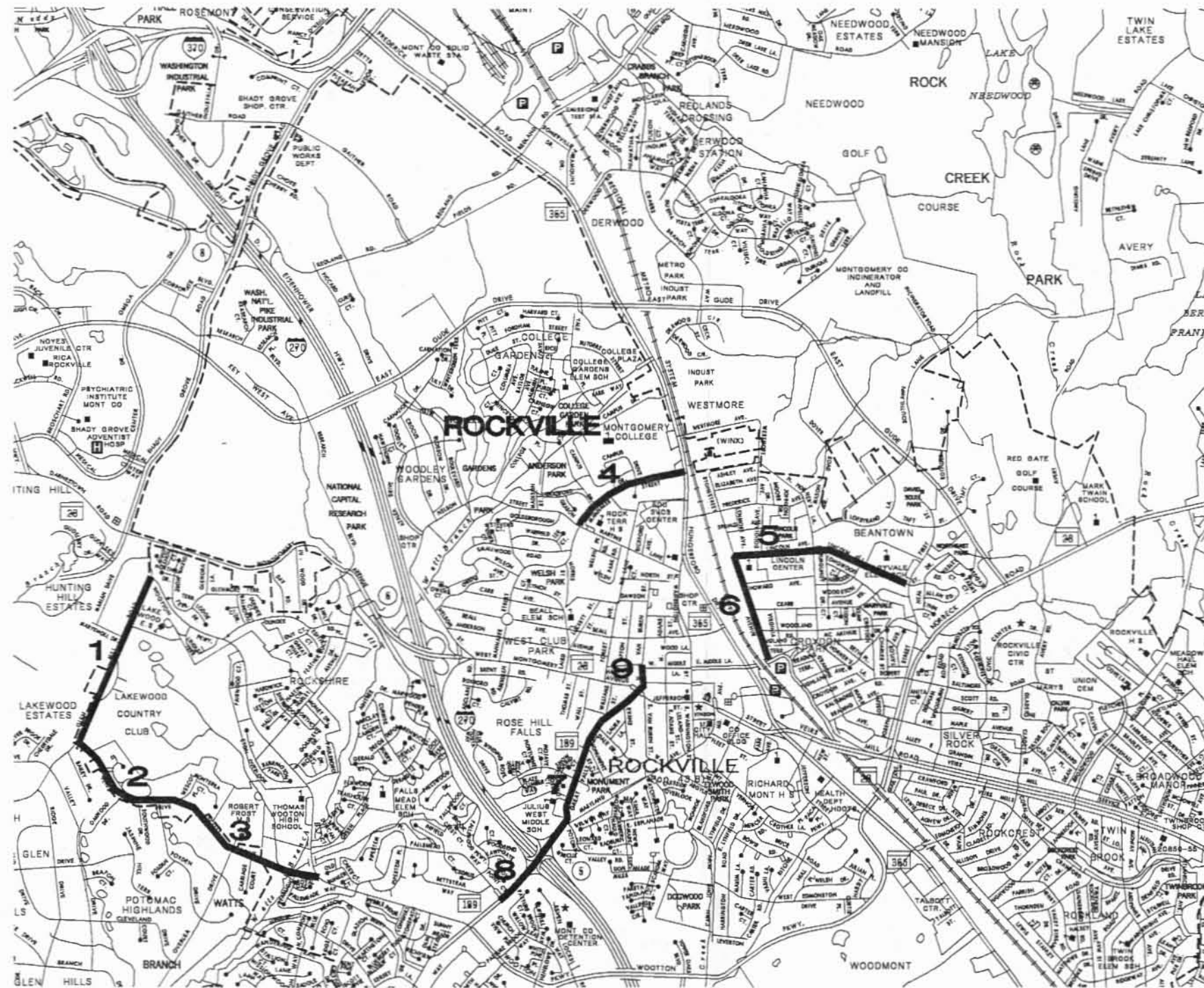
1. COLLEGE PARKWAY
2. NELSON STREET
3. MARTINS LANE
4. NORTH WASHINGTON STREET
5. SOUTH WASHINGTON STREET
6. ARGYLE STREET
7. MONROE STREET
8. CABIN JOHN PARKWAY
9. TOWER OAKS BLVD. NORTH
10. NEW MARK ESPLANADE
11. POTOMAC VALLEY ROAD

LEGEND

- EXISTING BICYCLE FACILITY
- PROPOSED BICYCLE FACILITY

**FIGURE 3.4
PROJECT 1D - ROCKVILLE BICYCLE BELTWAY NORTH-SOUTH CONNECTION**





**PROJECT 2
BICYCLE IMPROVEMENTS**

1. GLEN MILL ROAD
2. VEIRS DRIVE
3. SCOTT DRIVE
4. MANNAKEE STREET
5. LINCOLN AVENUE
6. STONESTREET AVENUE
7. GREAT FALLS ROAD
8. FALLS ROAD
9. N. VAN BUREN STREET

LEGEND

- EXISTING BICYCLE FACILITY
- PROPOSED BICYCLE FACILITY

**FIGURE 3.5
PROJECT 2 - ACCESS TO SCHOOLS**



The following sections of roadway are proposed for improvements under Project 3 and are shown in **Figure 3.6**:

<u>Location</u>	<u>Facility Type (Class)</u>
Tower Oaks Boulevard	I
Wainwright Avenue	I
Atlantic Avenue	III
Vandegrift Avenue	III
Ardennes Avenue	III
Twinbrook Parkway	III
Rollins Avenue	II
Jefferson Street	II
Lewis Drive	III
Halpine Road	III
Viers Mill Drive	III
Chapman Avenue	III

The estimated cost of Project 3 is \$330,400.

PROJECT 4 - Complete pathways in northeast quadrant of the City (includes parallel route to Rockville Pike)

This project would complete the bikeway system in the northeast quadrant of the City. The CIP project (420-850-PW04 - Fleet Street Extension) was identified as having potential to integrate bicycle facility upgrades connected with this project. The Fleet Street extension project is currently in the design stage and needs to be explored for bicycle compatibility as construction is scheduled to take place in FY 99. By integrating bicycle facilities into the design, this section would provide additional parallel access to Rockville Pike.

Three other CIP projects (420-850-6K11 - Southlawn Lane - Loftstrand to Gude; 420-850-9F12 - Southlawn Lane West; and 420-850-9E12 - Southlawn/Dover Connector Road) are all proposed upgrades and/or new roadways. Bicycle compatibility should be integrated into the design of these roadways scheduled for construction in FY 01-02.

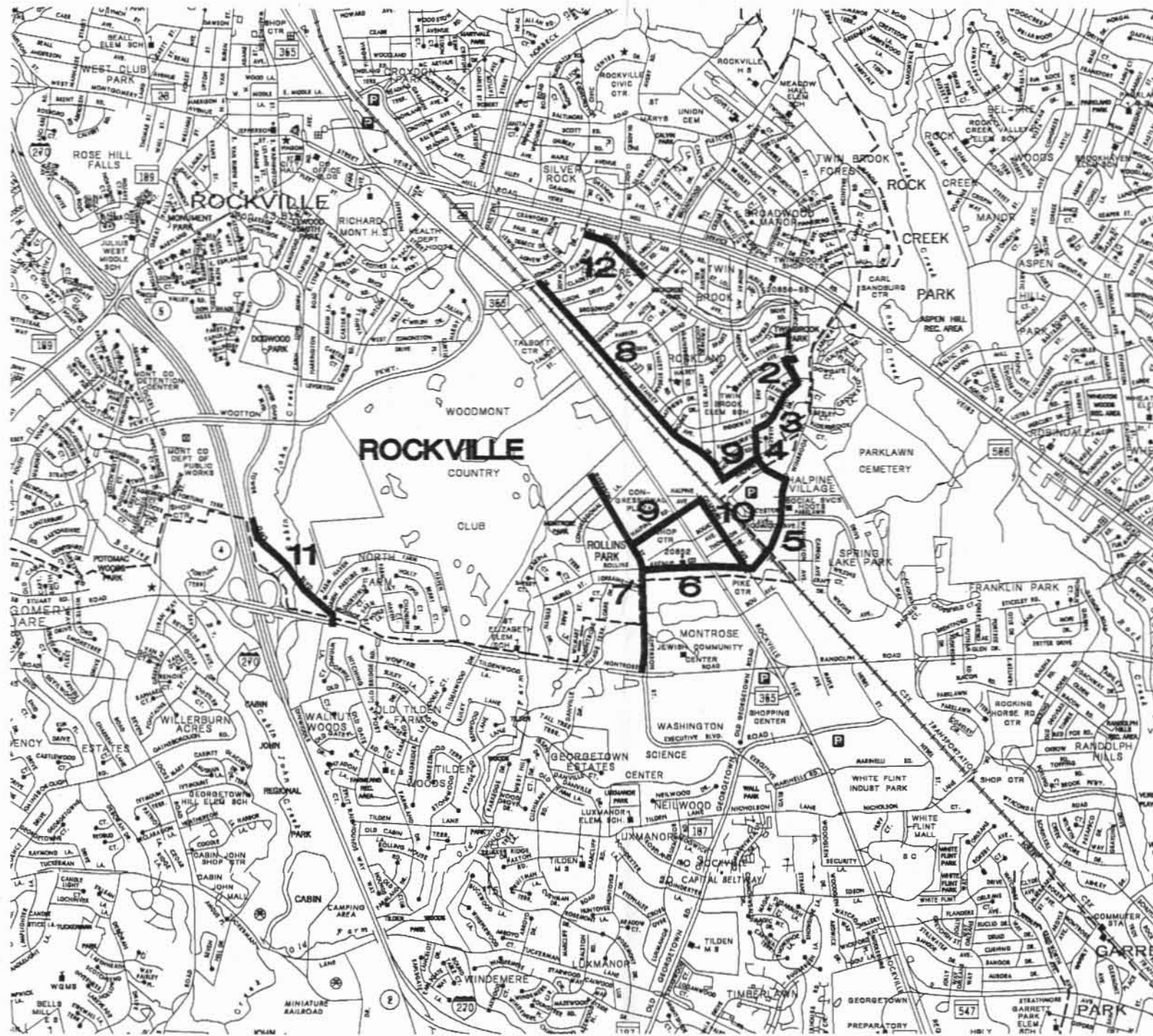
Key intersections that will need to be upgraded to accommodate the connections include Wootton Parkway @ Rockville Pike and First Street @ Veirs Mill Road. The following roadway sections are proposed for improvements under project 4 and are shown in Figure 3.7:

<u>Location</u>	<u>Facility Type (Class)</u>
• Dover Road	II
• N. Horners Lane	II
• Loftstrand Lane	II
• Taft Street	II
• Frederick Avenue	II
• Stone Street	II
• Baltimore Road	I
• Maryland Avenue	II
• Fleet Street	II
• Jefferson Street	II
• Ritchie Parkway	II
• Wootton Parkway	I
• Westmore Avenue	II
• Ashley Avenue	III

The estimated cost of Project 4 is \$799,000.

PROJECT 5 - Miscellaneous connections (including park improvements)

This project would complete the bikeway system in the City of Rockville. It is not intended to be prioritized after any of the previous projects; however, given the magnitude of some of the projects below, these are categorized to allow each to be treated as separate, stand-alone projects. These connections will add additional access that is not part of the base street system and will integrate with proposed park facilities. The following are descriptions of the sub-projects that are proposed under project 5 (see Figure 3.8):



**PROJECT 3
BICYCLE IMPROVEMENTS**

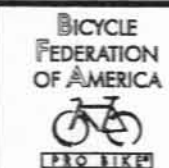
1. WAINWRIGHT AVENUE
2. ATLANTIC AVENUE
3. VANDEGRIF AVENUE
4. ARDENNES AVENUE
5. TWINBROOK PARKWAY
6. ROLLINS AVENUE
7. JEFFERSON STREET
8. LEWIS ROAD
9. HALPINE ROAD
10. CHAPMAN AVENUE
11. TOWER OAKS BOULEVARD
12. VEERS MILL DRIVE

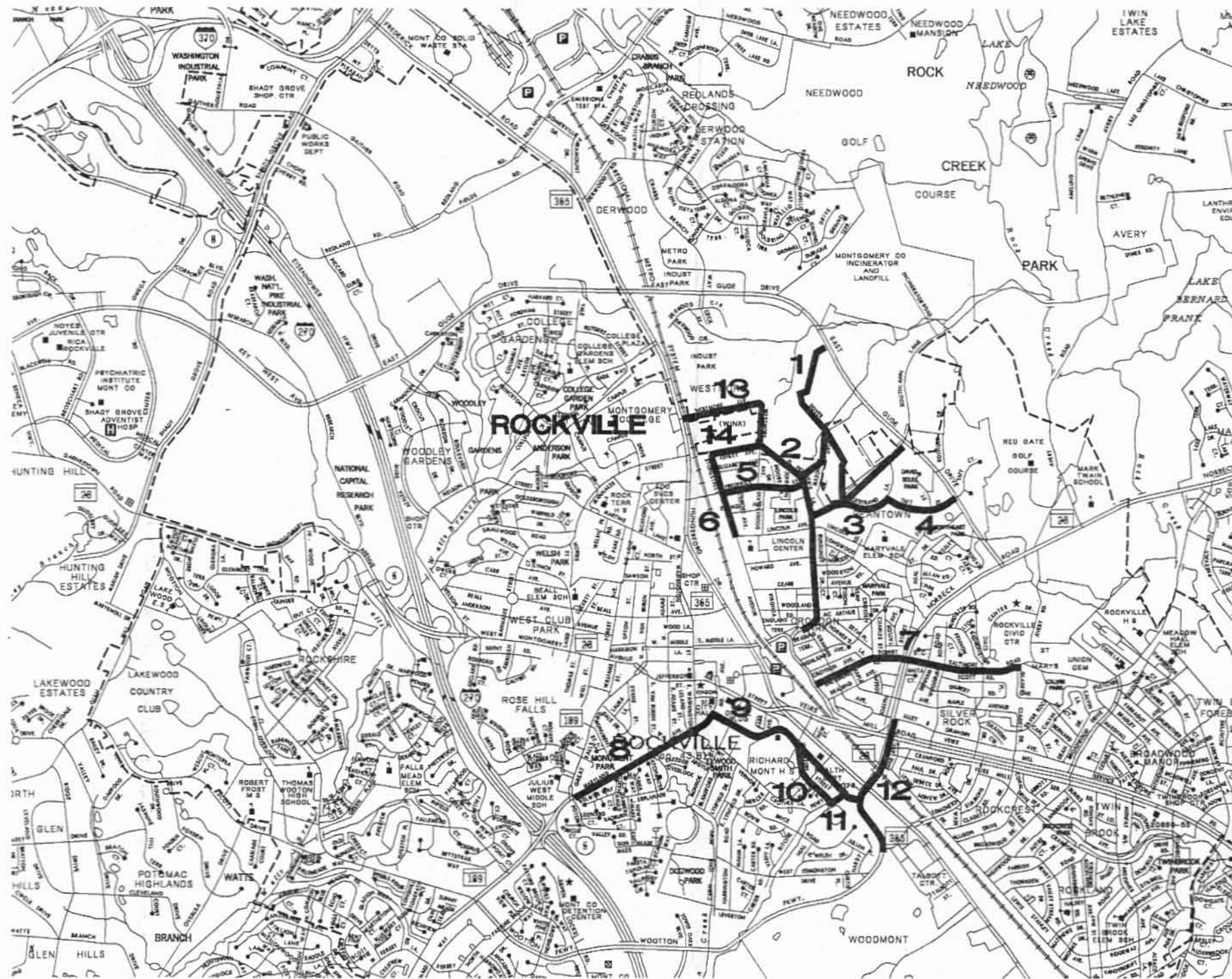
LEGEND

- EXISTING BICYCLE FACILITY
- PROPOSED BICYCLE FACILITY

FIGURE 3.6

PROJECT 3 - LINK METRO STOPS AND COMPLETE PATHWAYS IN SOUTHEAST QUADRANT OF THE CITY





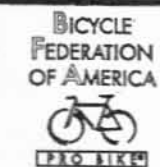
**PROJECT 4
BICYCLE IMPROVEMENTS**

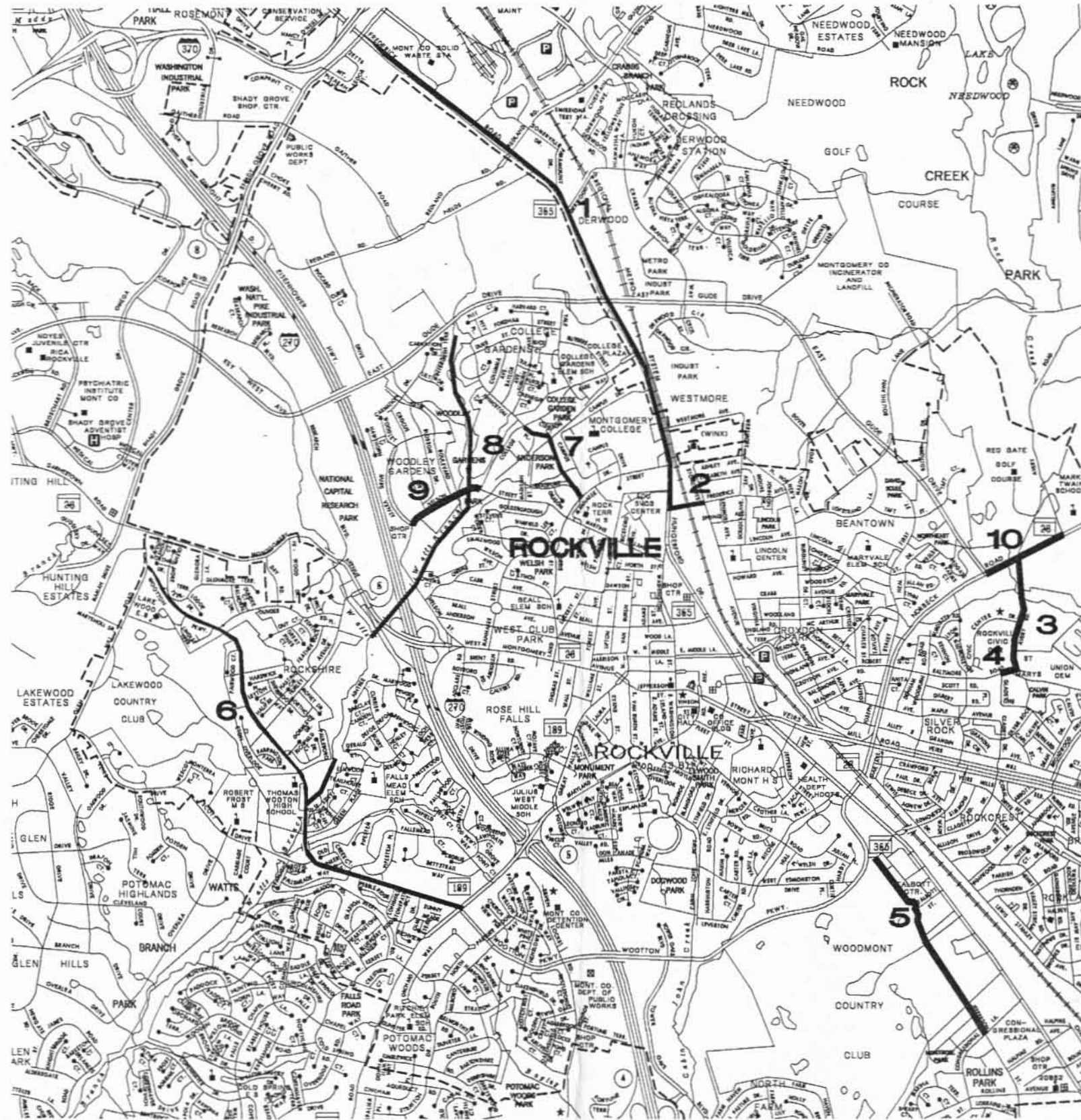
1. DOVER ROAD
2. N. HORNERS LANE
3. LOFTSTRAND LANE
4. TAFT STREET
5. FREDERICK AVENUE
6. STONESTREET AVENUE
7. BALTIMORE ROAD
8. MARYLAND AVENUE
9. FLEET STREET
10. JEFFERSON STREET
11. RITCHIE PARKWAY
12. WOOTTON PARKWAY
13. WESTMORE AVENUE
14. ASHLEY AVENUE

LEGEND

- EXISTING BICYCLE FACILITY
- PROPOSED BICYCLE FACILITY

FIGURE 3.7
PROJECT 4 - COMPLETE PATHWAYS IN NORTHEAST QUADRANT OF THE CITY





**PROJECT 5
BICYCLE IMPROVEMENTS**

1. MD 355
2. FREDERICK AVENUE
3. AVERY ROAD
4. BALTIMORE ROAD
5. JEFFERSON STREET
6. WOOTTON PARKWAY
7. CAMPUS PLACE
8. WATTS BRANCH STREAM VALLEY
9. NELSON STREET
10. NORBECK ROAD

LEGEND

----- EXISTING BICYCLE FACILITY

———— PROPOSED BICYCLE FACILITY

**FIGURE 3.8
PROJECT 5 - MISCELLANEOUS CONNECTIONS**

BICYCLE FEDERATION OF AMERICA

 PRO BIKES

A/E GROUP, INC.

WATTS BRANCH STREAM VALLEY BIKE PATH - This section of the bikeway system would be entirely off-road. It would follow the Watts Branch Creek from West Gude Drive and tie into the existing bikeway just south of Watts Branch Parkway; also extending the existing bikeway south to Wootton Parkway.

The major incentive for this project would be tying the bicycle improvements to the proposed upgrades to the Watts Branch trunk main sewer line. A bike trail through the stream valley would provide an attractive recreational amenity while creating permanent access to the sewer line for maintenance purposes.

Modifications to existing culverts under Nelson Street and I-270 would need to be constructed to accommodate the bicycle facility. CIP project (420-850-0A11 - Bridge Rehabilitation) could integrate design modifications for the culverts since they are both identified for improvement in FY 98. Appendix "B" sites two examples of culverts being converted to a bikeway.

ANDERSON PARK EXTENSION - This section would provide an off road facility along Anderson Park and Montgomery College (MC) from Mannakee Street to Princeton Place. This connection would provide additional access to the college.

ROCKVILLE CIVIC CENTER EXTENSION - This section would provide an off street pathway along the Rockville Civic Center from Baltimore Road to Norbeck Road. A portion of this could be constructed as a dedicated, on-street bikeway (South of the Civic Center). This section would provide additional access to Rockville Civic Center.

MD 355 (ROCKVILLE PIKE) EXTENSION - This facility would provide a pathway along MD 355 from the Lincoln Park Metro crossing to northern City Limit. Since parallel access is limited along this section of MD 355, it is intended to provide a bike path that would run along the MD 355 corridor. The County has proposed a similar connection north of the City and has recently constructed and is currently in the process of designing similar sections south of the City. It is intended to obtain most of this pathway through the redevelopment process.

FREDERICK ROAD METRO CROSSING - Currently, only a pedestrian crossing exists at this location. This connection would provide for modifications to the existing pedestrian crossing to accommodate bicyclists. The existing walkways approaching the walkway would need to be modified to allow bicycle access. A spiral ramp or traditional ramps could be used. This location is a vital link between the east and west sides of the City.

JEFFERSON STREET EXTENSION - This would complete the connection along Jefferson Street in front of the Woodmont Country Club. The northern portion of this extension (north of Talbot Street) may be a candidate for redevelopment conditions. The southern section (south of Talbot St.) will need to be funded as a CIP project. This connection would provide an additional parallel route to Rockville Pike.

Two other miscellaneous connections that would add to this overall continuity of the plan include facilities along the following roadways.

<u>Location</u>	<u>Facility Type (Class)</u>
Nelson Street	II
Norberk Road	I

The estimated cost of Project 5 is \$1.65 million.

**TABLE 3.1
PRIORITY OF PROJECTS**

PRIORITY	PROJECT	COMMENTS
1	West side Loop Connection	Tie west end of existing Gude Dr. and Wootton Parkway bike paths together and improve the existing sections
	East Side Loop Connection	Tie east end of existing Gude Dr. and Wootton Parkway bike paths together and improve the existing sections
	East-West Connection	Provide a continuous east-west connection and access to downtown
	North-South Connection	Provide a continuous north-south connection and access to downtown
2	Access to Schools	Various routes to link schools throughout the city
	Access to Metro and southeast quadrant	Provide access to Metro Stops and complete bikeway system in SE Quad, including parallel route to Rockville Pike
	Complete bikeway system in northeast quadrant of the City	Complete bikeway system in NE quadrant of the City, including parallel route to Rockville Pike
3	Watts Branch Extension	Bike path that runs parallel with Watts Branch Creek, from West Gude Dr. to Watts Branch Parkway
	Wootton Parkway Improvements	Complete path that runs from Dundee to Hurley Ave.
	Anderson Park Extension	Bike Path from Mannakee St. to Princeton along Anderson Park and Montgomery College
	Rockville Civic Center Extension	Bike Path along Rockville Civic Center from Baltimore Road to Norbeck Rd.
	MD 355 (Rockville Pike) Extension	Bike Path Along MD 355 from Frederick Road to City Limit
	Frederick Road Metro Crossing	Modify existing pedestrian crossing to accommodate bicyclists
	Jefferson Street Extension	Complete Connection along Jefferson St. in front of Woodmont Country Club
	Dogwood Park Extension	Bike Path along Dogwood Park to Wootton Parkway

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IV. DESIGN STANDARDS

A. Overview

There are existing standards for the development of new bicycle facilities and accommodating bicycles through roadway redevelopment. The American Association of Highway and Transportation Officials (AASHTO) *Guide to the Development of Bicycle Facilities* and the Federal Highway Administration Report *Selecting Roadway Design Treatments to Accommodate Bicycles* should be adopted as guidance to the implementation of this Bicycle Master Plan. The Federal Highway Administration's *Manual on Uniform Traffic Control Devices (MUTCD)* should also be utilized for standard pavement markings and signing that pertain to bicycle facilities.

Much of the information included within this section of the plan was taken from the documents identified above. This section is not intended to provide a complete reference, but rather serve as an overview of the possible solutions to problems designers are faced with in the implementation of bicycle facilities.

Improvements can be classified into three categories: marginal roadway improvements, roadway designations, and separated facilities. Supplemental facilities can also be completed to act as an extension to the actual roadway and/or pathway facilities. The choice of which improvements should be made depends on the goal of the improvement, the likely user groups, and existing physical conditions.

Marginal Roadway Improvements

Marginal improvements generally take the form of minor improvements to the surface quality of roadway pavement, the removal of minor barriers to bicycle travel, and improvement of traffic signalization.

Roadway Designation

Selecting to implement a bicycle route or restripe a roadway with a bicycle lane has been shown to encourage increased use by bicycles. However, it would be imprudent to suggest that these facilities are inherently safer. Signing and marking can increase a users level of confidence, however they cannot ensure a reduced or eliminated risk. Designated roadways should meet the guidelines outlined under the section Marginal

Roadway Improvements, and comply with the guidance of the Guide to the Development of Bicycle Facilities.

Separate Facilities

Open right-of-way (ROW) is limited in the City of Rockville. However, there are still opportunities for the development of separate Pathways or Trails. In addition to the Guide for the Development of Bicycle Facilities, The Rails to Trails Conservancy book, *Trails for the Twenty-First Century*, and the guide, *Greenways*, should be consulted for additional information.

Examples and details of each of these types of improvements are cited in the following sections.

B. Types of Bicyclists

One of the first things that must be done is to identify the type of bicyclist that will use the facility. Bicyclists have a wide range of abilities. Some bicyclists ride frequently and feel very comfortable riding in heavy traffic at high speeds. Others ride less frequently and prefer low volume roadways or off-road facilities. Children who do not understand traffic rules and regulations and are not physically able to perform at a level that would allow them to safely ride in traffic also prefer to ride off-road or on low volume streets.

This provides for three general categories of cyclists, which are called "design bicyclists". By knowing the "design bicyclist", design decisions can be made based on the needs of the users, while considering existing roadway conditions. The three categories of bicyclists are:

Advanced Bicyclists (Type A): These are experienced riders who can operate under most traffic conditions. They comprise the majority of the current users of collector and arterial streets and are best served by the following:

- Direct access to destinations usually via the existing street and highway system.
- The opportunity to operate at maximum speed with minimum delays.

- Sufficient operating space on the roadway or shoulder to reduce the need for either the bicyclist or the motor vehicle operator to change position when passing.

Basic Bicyclists (Type B): These are casual or new adult and teenage riders who are less confident of their ability to operate in traffic without special provisions for bicycles. Some will develop greater skills and progress to the advanced level, but there will always be many millions of basic bicyclists. They prefer:

- Comfortable access to destinations, preferably by a direct route, using either low-speed, low traffic-volume streets or designated bicycle facilities.
- Well-defined separation of bicycles and motor vehicles on arterial and collector streets (bike lanes or shoulders) or separate bike paths.

Children (Type C): These are pre-teen riders whose roadway use is initially monitored by parents. Eventually they are accorded independent access to the system. They and their parents prefer the following:

- Access to key destinations surrounding residential areas, including schools, recreation facilities, shopping, or other residential areas.
- Residential streets with low motor vehicle speed limits and volumes.
- Well-defined separation of bicycles and motor vehicles on arterial and collector streets or separate bike paths.

Basic bicyclists and children are generally combined for purposes of selecting design criteria. The "design cyclist" concept is viewed as recognizing two broad classes of bicyclists: Advanced (Type A) and Basic/Children (Type B/C) riders. This plan is intended to provide for the basic riders (type B/C).

C. Types of Facilities

Due to the large difference in skill levels among bicycle riders, different types of facilities need to be provided. Generally, advanced bicyclists will be best served by designing all roadways to be *compatible* with a shared use between bicycles and motor vehicles. This can be accomplished by:

- Establishing and enforcing speed limits to minimize speed differentials between bicycles and motor vehicles on neighborhood streets and/or by implementing "traffic-calming" strategies.
- Providing wide outside lanes on collector and arterial streets built with an "urban section" (i.e., with curb and gutter).
- Providing usable shoulders on highways built with a "rural section" (i.e., no curb and gutter).

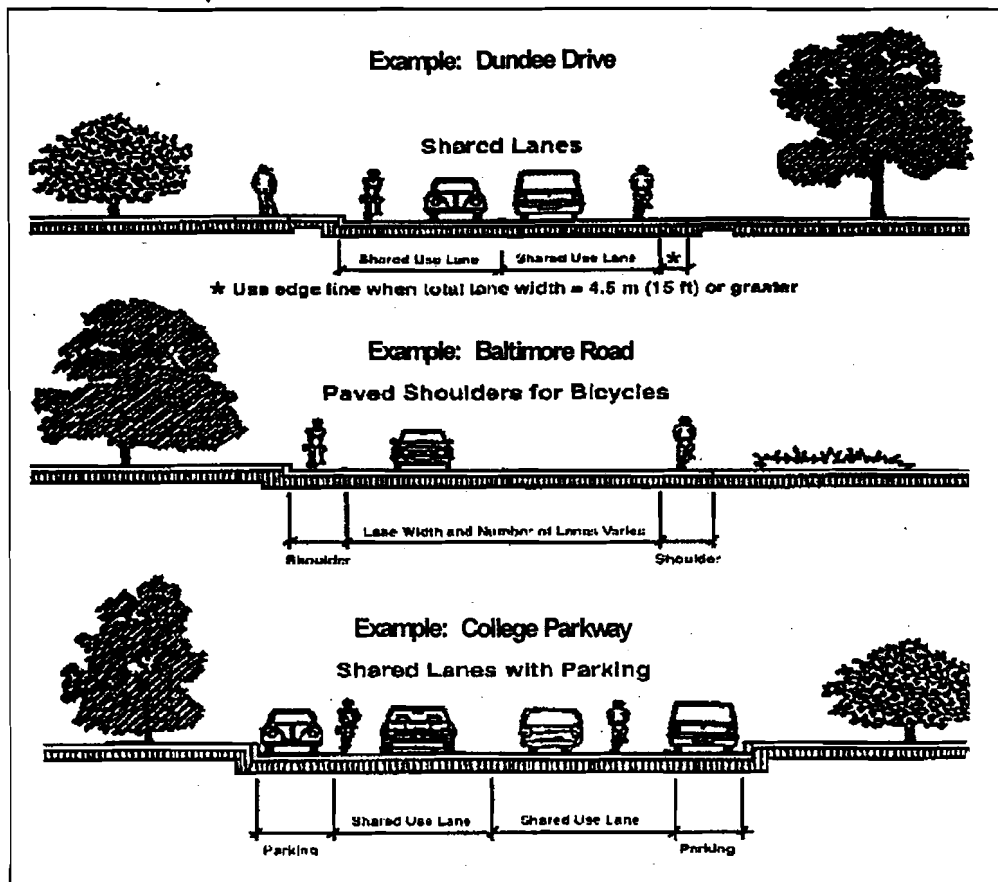
Generally, basic riders and children bicyclists will be best served by a network of neighborhood streets and *designated* bicycle facilities, which can be provided by:

- Ensuring neighborhood streets have low speed limits through effective speed enforcement or controls and/or by implementing "traffic calming" strategies.
- Providing a network of designated bicycle facilities (e.g., bike lanes, separate bike paths, or side-street bicycle routes) through the key travel corridors typically served by arterial and collector streets.
- Providing usable roadway shoulders on rural highways.

The difference between a *compatible* roadway and a *designated* roadway can be summarized as follows:

Compatible Roadways

These roadways have design features which allow competent bicyclists to safely share the roadway with motor vehicles. Compatible roadway design guidelines differ based on traffic volumes, speed and environmental setting. Because advanced bicyclists can be anticipated to use most of the roadways in the City, it is important that all roadways be designed to be compatible with bicycle use. **Figure 4.1** represents three types of bicycle compatible roadways.

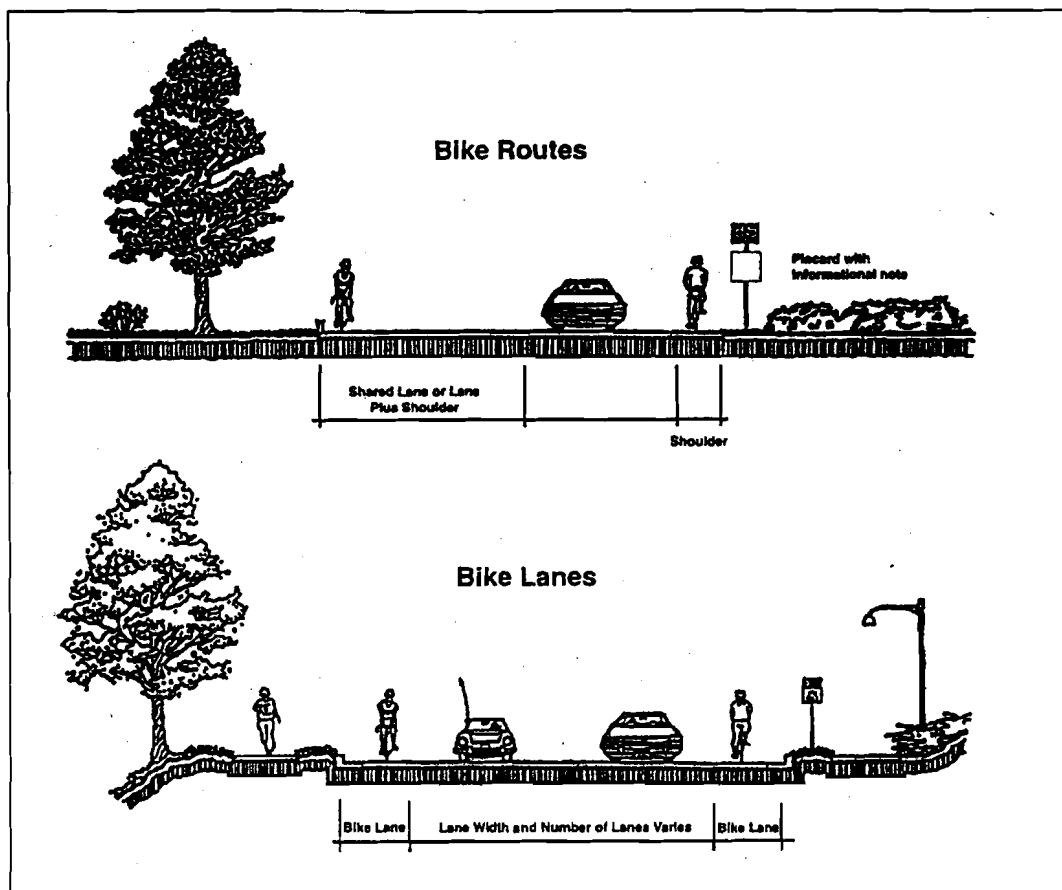


Source: Greenways Incorporated - NJDOT Bicycle Plan, 1996

Figure 4.1 - Compatible Roadways

Designated Roadways

These roadways are those on which bicycle use is anticipated and invited through the use of lane markings, signage, maps or tour guides. Designated bicycle facilities provide greater safety for less experienced or less confident riders. Designated roadways are located where encouragement of bicycle use is desired based on consideration of traffic condition, pavement width and geometrics, and appropriateness and directness of the particular route. They are also often located in areas which offer especially pleasing rides, such as in parks or through quiet subdivisions. Because basic riders will be more apt to be riding for pleasure, bikeways are often located in resort areas or in regional parks. Figure 4.2 provides a graphical representation of Designated Roadways.



Source: Greenways Incorporated - NJDOT Bicycle Plan, 1996

Figure 4.2 - Designated Roadways

Three categories of bikeways exist for *designated* bicycle facilities:

Bicycle Paths (Class I)- A bicycle facility separate from motorized vehicular traffic. A bicycle path may be located within a highway right-of-way or on an independent right-of-way. A bicycle path is not a sidewalk but may be designed to permit shared use with pedestrians.

Bicycle Lanes (Class II) - A lane designated for exclusive or preferential bicycle use through the application of pavement striping or markings and signage.

Bicycle Routes (Class III) - Roadways designated for bicycle use through the installation of directional and informational signage.

D. Selection of Design Treatments

This section provides recommendations for selecting roadway design treatments to accommodate bicycles. Specific dimensions are suggested for the width of the

recommended facility type. These recommendations reflect the current state of the practice in the design of bicycle-friendly roadways. Users of this plan are encouraged to treat these recommendations as "guidelines" rather than absolute standards.

When design treatments are provided primarily to serve advanced riders, designation is optional. In some cases, it may be more desirable not to designate the facility for bicycle use. For instance, although never permitted in Maryland, if bicycle use is permitted on the shoulder of a controlled access freeway, it is usually not appropriate to designate this roadway as a bicycle facility unless this route serves as the only link between two points.

Another consideration involves minor or marginal roadway improvements for bicyclists, such as providing a narrow (less than 4-ft [1.2-m]) shoulder. This can significantly improve riding conditions for advanced bicyclists and should be considered if no better treatment is possible. However, this width is less than the minimum called for in virtually all design specifications and therefore should not be designated as a bicycle facility. Where a facility is intended to be designated as a "bicycle facility" it is essential the design conform to Maryland State standards and/or AASHTO guidelines.

As previously stated, the roadways specifically identified in this plan are intended to be treated as *designated* routes. All other roadways should be treated as *compatible*.

Appendix "C" contains six tables for roadway treatment recommendations. Three are for basic cyclists (Type B/C) and three are for advanced bicyclists (Type A). These tables are from the Federal Highway Administration's Report *Selecting Roadway Design Treatments to Accommodate Bicycles*. All streets and highways where bicycles are permitted to operate should, *at a minimum*, incorporate the design treatments recommended in the tables for advanced bicyclists. The basic group design treatments will also accommodate advanced bicyclists.

E. *New Construction and Reconstruction vs. Retrofitting*

The recommended design treatments in the tables are most easily implemented when new construction or reconstruction is planned. Projects that are currently in the City's CIP program have been previously identified and could include bicycle improvements that incorporate the treatments identified herein. The primary element of providing

bicycle compatible roadways is requiring a minimum 14 foot wide outside lane on all roadways.

Implementation involving retrofitting existing roadways to accommodate bicycle use may make projects more complex. Existing streets built with a curb and gutter section will often be viewed as having a fixed width and improvements will likely be limited to "moving paint," that is, restriping the existing lanes.

When working with existing streets and highways, planners should investigate the opportunity to make at least minor or marginal improvements. Where bicycle routes have been identified to serve group B/C bicyclists, it is essential to commit the resources necessary to provide facilities that meet the recommended design treatments. Only then can routes and facilities be designated for bicyclists and provide the desired access to the community.

F. Use of Tables to Determine the Recommended Treatment

Recommended roadway design treatments and widths to accommodate bicycles that are presented in Appendix "C" contain separate tables for group A and group B/C bicyclists. The design treatments for group A bicyclists should be used as a guide to the minimum design for any roadway on which bicycle use is permitted. The recommended design treatments for group B/C bicyclists should be considered the desirable design for any route on which this type of bicyclist is likely to ride. There are separate tables for the two basic types of roadway sections: urban (with curb and gutter) and rural (without curb and gutter). Separate tables are provided for highways with urban sections with on-street parking and with no on-street parking.

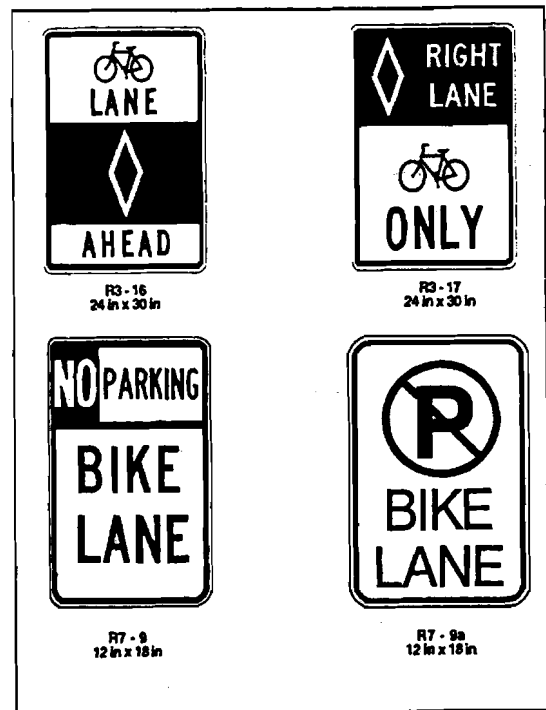
Note: controlled-access freeways are considered a special case and are not addressed by the tables. Several states now permit bicyclists to operate on the shoulder of some or all of their controlled-access freeways. Controlled-access freeway rights of way also have been used for separate bike paths.

Recommendations are provided for the width of the various recommended design treatments. These recommended dimensions are considered to be "desirable widths." They should be treated as "minimum widths" unless special circumstances preclude such development. Any treatment specifically designated for bicycle use must meet the minimum design standards called for in the *AASHTO Guide* or Maryland State standard.

One final note, these recommendations are preliminary findings and will be tested and refined over time. It is anticipated that these values will be revised to reflect the continuing evolution of the state of the practice in selecting design treatments for roadways to accommodate shared use by bicycles and motor vehicles. It is recommended that designers refer to the appropriate design reference guide for the most up to date treatments. The treatments recommended herein are based on the research and findings in Selecting Roadway Design Treatments to Accommodate Bicycles, FHWA, 1994.

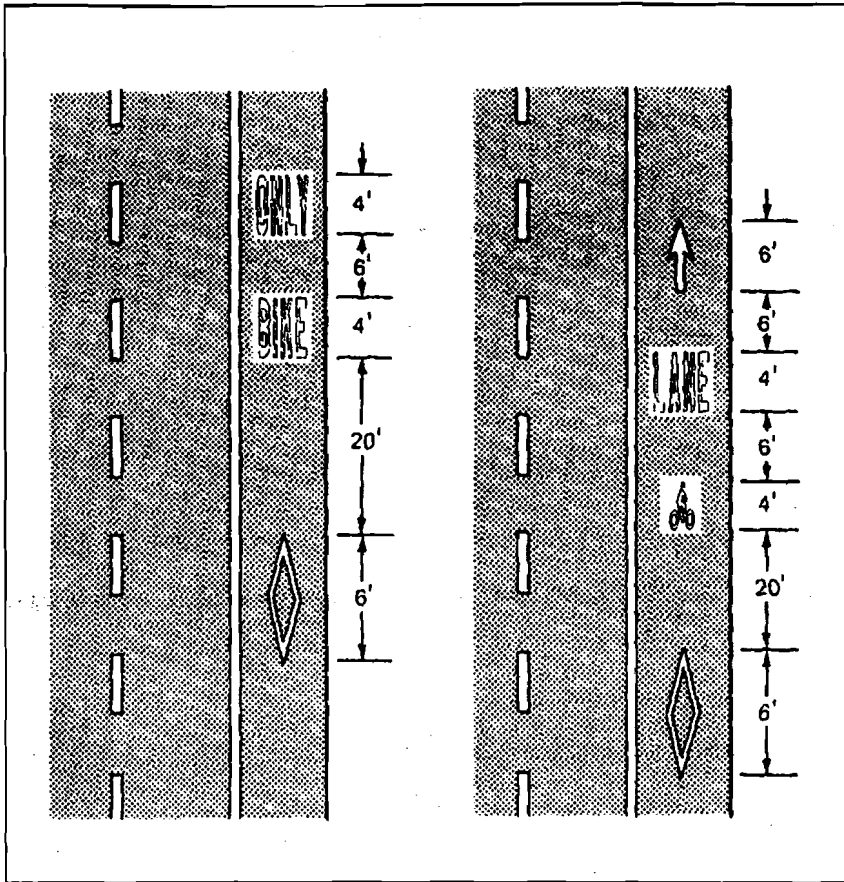
G. Signing and Striping

Bicycle lanes should be well marked and signed to ensure clear understanding of the presence and purpose of the facility by both bicyclists and motorists. The MUTCD specifies standard signage and markings to be used with bicycle facilities. **Figure 4.3** represents several typical signs and **Figure 4.4** represents typical word and symbol pavement markings utilized with bicycle facilities. Designers should refer to the MUTCD and Maryland State Highway Administration Sign Manual for all appropriate signing and markings that can be used in conjunction with bicycle facilities. AASHTO Guide for Development of Bicycle Facilities also contains typical pavement marking layouts and descriptions of uses.



Source: Manual on Uniform Traffic Control Devices (MUTCD)

Figure 4.3 - MUTCD Typical Signage



Source: MUTCD

Figure 4.4 - Typical pavement markings

H. Intersection Treatments

Due to the conflicts that are experienced at intersections between motor vehicles and bicycles, special care and treatment must be provided at these locations. Just as motorists approaching intersections desire all turning movement, (left, through and right), so do bicyclists. Proper treatment to help reduce these conflicts must be utilized.

The MUTCD provides good recommendations for signage that may clarify motor vehicle and bicycle merging activities prior to and at the intersection. *AASHTO Guide for Development of Bicycle Facilities* provides numerous pavement layouts that help alleviate conflicts between motor vehicles and bicyclists. Figure 4.5 represents several options for intersection treatment for a bicycle lane approaching motor vehicle right-turn-only lane.

These and others are detailed in the AASHTO guidelines and MUTCD for more detail and other methods of treatment.

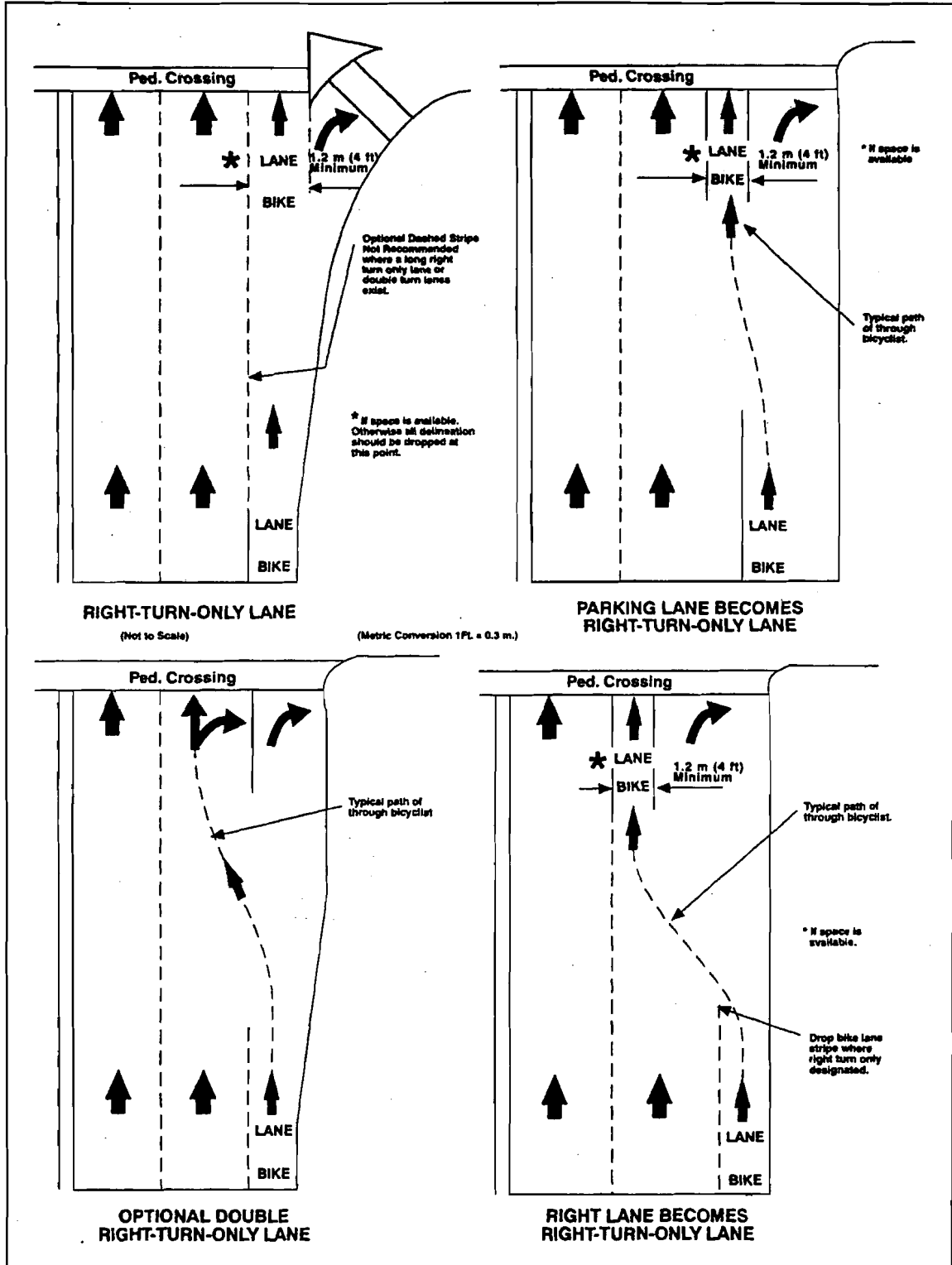


FIGURE 4.5 - Typical bicycle approaches at right-turn only lanes

I. **Bicycle Routes and Lanes**

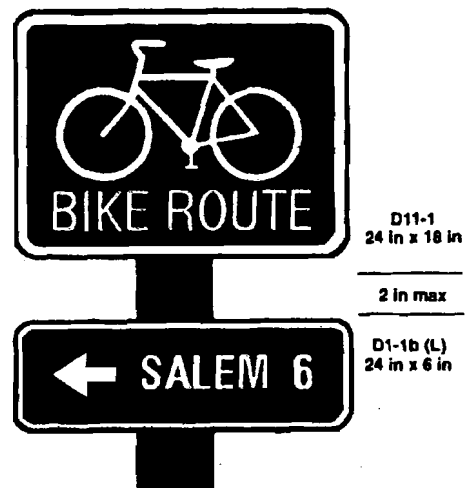
The majority of facilities proposed within this plan will need to be completed by retrofitting existing urban streets with bike lanes or designating as bike routes.

Bike routes can be accommodated by installing proper signing along the route. The following minimum conditions should be met in order for a roadway to be designated as a bike route:

- The roadway is bicycle compatible by having suitable traffic volumes, curb lane widths, and traffic speeds.
- The roadway has no significant barriers. The route should not end at barriers.
- The roadway has no significant hazards.
- The route is designated as a segment of an interconnected system of bicycle facilities.

Typical bike route signage should follow standards as described in the MUTCD, Part IX. The MUTCD provides several types of signing with descriptions and uses for each.

Figure 4.6 displays two types of signage that could be used to identify bike routes. The D11-1 sign is intended to be used on bike routes that are not differentiated by number. According to the MUTCD, this sign should be placed "at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclist." The bike route sign should be used with sub-plates with directional information, distance measurements, or destination points indicated.



Source: MUTCD
Figure 4.6 - Typical Bike Route Signs

Bike lanes can be completed per the following:

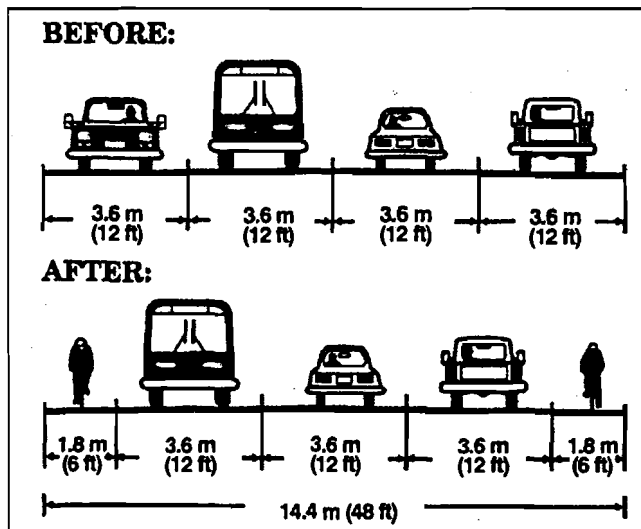
1. Install pavement markings and signage on existing paved shoulders;

2. Physically widen the roadway as necessary to include bike lanes; or
3. Re-stripe the roadway to provide extra space for bike lanes.

In review of Rockville's existing roadway system, many of the facilities proposed as part of this plan can be accomplished by re-stripping the roadway. Adequate space exists that will allow for bicycle lanes without impacting existing traffic patterns. Several options exist when re-stripping is required. They are as follows:

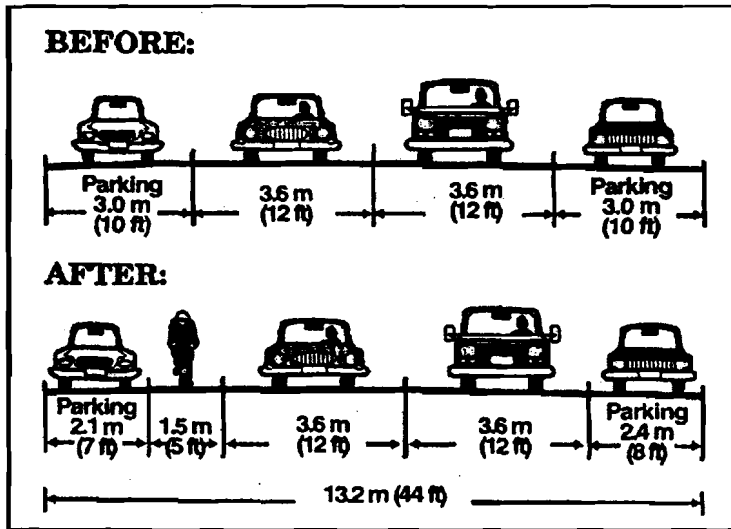
- Reduce travel lane widths
- Reduce the number of travel lanes
- Reconsider the need for parking
- Narrow the parking lanes
- Remove parking on one side only
- Change diagonal to parallel parking
- Prohibit parking by employees
- Create a wider outside lane

Figures 4.7 - 4.11 represent typical roadway sections with before and after scenarios for adding bike lanes.



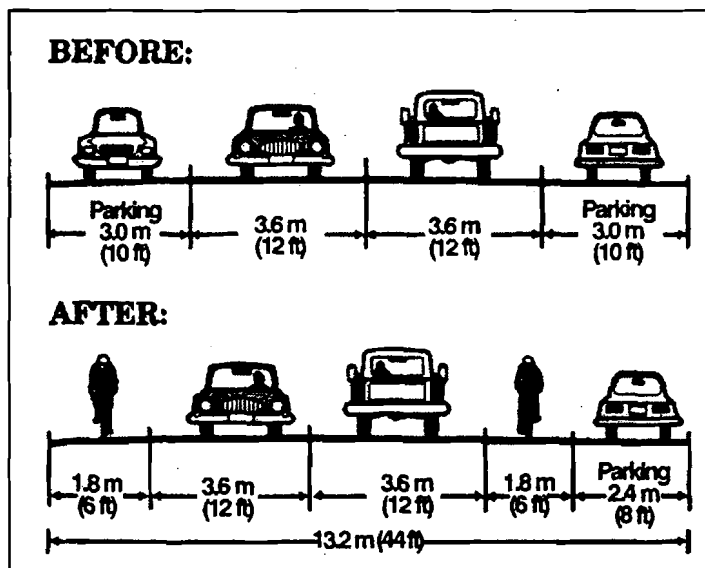
Source: Oregon Bicycle Plan, 1992

Figure 4.7 - Travel lanes reduced from 4 to 2 lanes with a two-way left turn lane



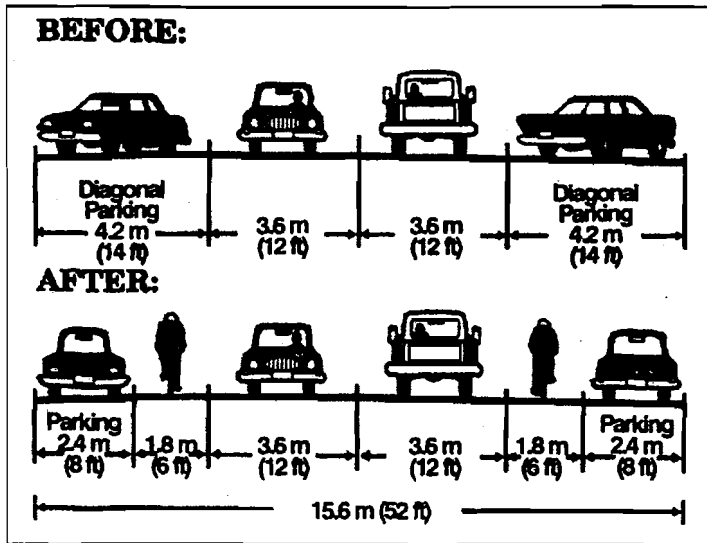
Source: Oregon Bicycle Plan, 1992

Figure 4.8 - Narrowing parking to 7 feet on one-way street



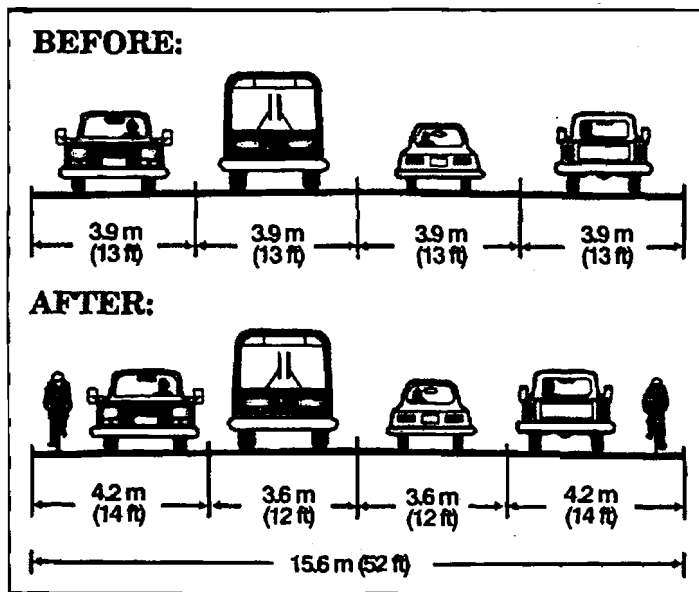
Source: Oregon Bicycle Plan, 1992

Figure 4.9 - Parking Removed along one side of one-way street



Source: Oregon Bicycle Plan, 1992

Figure 4.10 - Changed parking from diagonal



Source: Oregon Bicycle Plan, 1992

Figure 4.11 - Re-striping to create wider outside lane

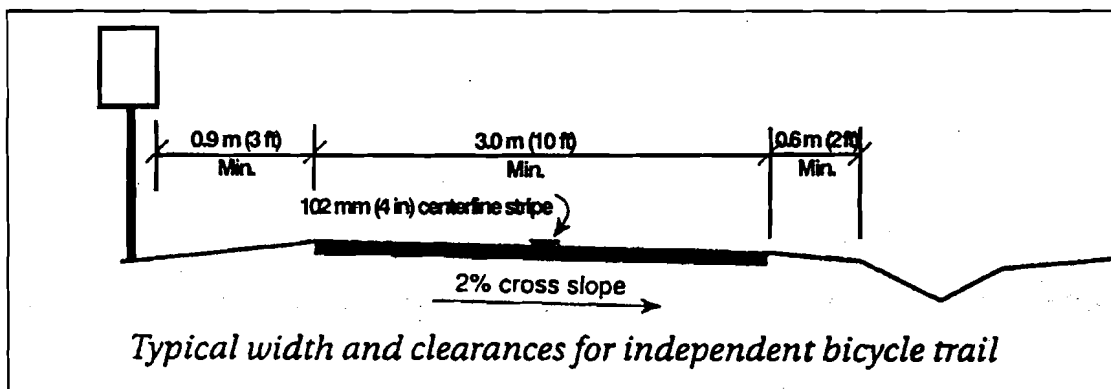
J. Bike Paths

Bike paths (Class I) are a valuable addition to the highway system as they will improve conditions for all categories of bicyclists. They can serve both a transportation and recreation function and have proven significant generators of bicycle use. As it is desirable to provide an adequate roadway bikeway system within the City of Rockville, it will be just as important to provide bike paths to complete the system. AASHTO defines a bicycle path as:

A bikeway separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within independent right-of-way.

These bike paths may also be referred to as "multi-use trails" or "greenways", even though they are slightly different facilities. A trail typically runs along an independent right-of-way such as an abandoned railroad corridor, and a greenway is an independent park-type corridor of land that may or may not incorporate a trail within it's boundaries.

Two-way bike paths should be at least 10 ft. wide. Where possible, especially if bicycle or pedestrian traffic is expected to be high, paths should be a minimum of 12 feet wide. Figure 4.12 represents a typical section of a multi-use bike path. One-way trails are not recommended since they are likely to be traveled in both directions and have been proven hard to enforce.



Source: Bicycle Federation of America

Figure 4.12 - Typical section of a multi-use bike path

The above information is intended to provide an overview of design standards associated with bicycle paths. Designers are once again referred to the *AASHTO Guide for the Development of Bicycle Facilities* for further design criteria.

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V. SUPPLEMENTAL FACILITIES AND POLICIES

A. Bicycle Parking

If a bicycle network is to be used to its full potential, cyclists must have safe and secure parking available at likely destination points. Bicycle parking (or the lack of) can make the difference between a trip that is taken by bicycle and one that is not. A survey conducted by BICYCLING Magazine revealed that 43.5% of adults who had ridden a bike in last year, but not to work in the past month, said they would bicycle to work if there were showers and secure bicycle storage.

One type of bicycle parking doesn't meet all needs, rather a combination of facilities should be investigated to accommodate the needs of bicyclists. The biggest fear is theft. A bike rack placed close to building entrances, visible to others, offers adequate security for short-term parking, while lockers are preferred for long-term storage. Local legislation can be used to develop a comprehensive parking program. An example can be found in San Francisco, where local law requires the city to provide its employees the equivalent of a locker, "sheltered and access restricted" while visitors to municipal buildings have the more appropriate bike rack outdoors for short term use.

Ordinances

Adoption of a comprehensive local bicycle ordinance is one method of assuring that safe and adequate bicycle parking is provided at key locations. A bicycle parking ordinance should require new developments to provide a certain number of bicycle parking spaces. The number of spaces is usually calculated either as a ratio of the number of dwelling units or square footage of the proposed development. For example, Boulder, CO requires that bicycle parking be provided equal to 10% of automobile parking, where as Ann Arbor, MI calculates the required spaces based on the number of dwelling units, employees, or square footage of proposed developments.

Some ordinance examples from other jurisdictions that have adopted plans are listed in **Appendix "D"**.

Location

The location of bicycle parking facilities might be considered the most important element of creating an effective bicycle parking system. Facilities should be located with the user in mind. Bicyclists, more than motorists and pedestrians, enjoy a freedom of mobility that allows them to travel within feet of their final destination. Facility site location should consider this element heavily. A bicyclist will find another option to secure their bicycle if the provisions provided are not near the final destination.

Good location for parking facilities is dependent on several items. Several bicycle-friendly cities have adopted standards that ensure good placement of bicycle parking facilities. Examples are listed in **Appendix "E"**.

Types of Parking

There are three basic types or levels of parking available for bicycles, based on the level of security provided for the bike and the needs of the intended users. The first level of parking generally serves the needs of short term users, such as shoppers and college students, and is often called low-security parking and is the least expensive. Standard bike racks fall into this category. Racks should be designed to support the bike by its frame and allow for the use of various types of locks. Medium-security racks allow the frame and both wheels of the bike to be secured using various types of locks. These racks serve longer term users, such as people accessing transit stations, and usually involve moving parts. The highest level of security is provided by bicycle lockers. Lockers not only provide protect for the bike from theft, but also provide protection from the elements and a security for the bicycles components, lights and other gear. **Appendix "F"** provides greater detail about the various types of bike parking, as well as cost estimates.

B. New Development Policies

Although Rockville is, for the most part, developed, proposals for new development through annexation or redevelopment of existing sites will be submitted to the City and it is important that accommodation of bicycles be

addressed in the planning and design of these projects. Redevelopment, especially in commercial areas, also provides the opportunity to accommodate bicycles. Policies and ordinances should be adopted to ensure that minimal bicycle improvements are accommodated, and preferably encouraged, in all new development and redevelopment projects.

The zoning ordinance and the subdivision ordinance are two places that accommodation of bicycling should be addressed. Zoning requirements to provide bicycle parking and other amenities that encourage bicycling should be adopted. Details regarding these proposed ordinance revisions for bike parking are discussed in other sections of the plan. Ordinances requiring the provision of shower and locker facilities in commercial developments, as are in place in Arlington, VA, should be considered.

Revisions to the subdivision ordinance could include modification of standard road cross-sections to include space for bicyclists. Also, street layout and lot configuration impact bicycle accessibility to the street system, and language in the ordinance to require or encourage development patterns that encourage bicycling should be considered. Grid street patterns and providing pedestrian and bicycle connections between cul-de-sacs and/or long block faces are examples of development patterns that provide options to cyclists and encourage people to use bikes to get around. Appendix "G" provides examples of a typical suburban development and one designed using what are referred to as neotraditional or new urbanist concepts.

The figures also illustrate the relationship between land use and zoning patterns and urban design that encourages bicycling. Providing people with convenient and close access to shopping, schools and churches increases the potential that people will choose to bicycle to these locations as opposed to driving a car. Mixed use zoning districts or provisions within the Zoning ordinance that allow small scale, neighborhood oriented commercial development within residential zones can create neighborhoods where people will choose to walk and ride their bikes.

Right-of-way should also be dedicated, which will allow bicycle connections between adjacent development and land uses.

KING FARM BICYCLE INTEGRATION

Objective

Creating increased opportunities and access for bicyclists is the central theme of the City of Rockville Bicycle Master Plan Update. Application of the basic findings of the Master Plan Update and most current facility planning and design information to the proposed King Farm plan is the core objective of this section.

The proposed plan for the King Farm area includes great potential for increasing the safe use of bicycles for many trips types. Further consideration of the range of user types, available facility treatments, and planning considerations will make the final plan and designs more effective in promoting the increased use of the non-motorized modes.

Interior Circulation

While there is existing infrastructure, particularly on plan boundary areas, which pose planning and design challenges, the interior of the planning areas provides many options and opportunity for travel by bicycle. The gridded street network gives all roadway users many options for path of travel, and diffuses the total demand for roadway space more evenly across the network than traditional highway planning and design methods. The conscious management of roadway speeds and congestion enhances the opportunity for many cyclists. However, the current plan may not meet the needs of the full range of bicyclists.

Consideration of additional facility and planning options through the final planning, design and implementation will ensure the adequate accommodation of bicyclists.

Facility Designs

The Bicycle Master Plan Update focuses on providing, at a minimum, equal access to common destinations by way of bicycle-compatible streets. The core of the proposed bicycle network is a system of designated, compatible bicycle routes (Class III), augmented where appropriate by other designated facilities: bicycle lanes and multiple-use paths. The current King Farm plan recognizes only one type of designated facility: multiple-use paths [Framework Street

Sections: A, B, D, E, K, and F; Optional Street Sections 1]. Pathways are appropriate facilities for some users under certain conditions. The assumption should not be made that these pathways meet the needs of all cyclists for all purposes. Bicycle-friendly communities incorporate a range of facility options.

The standard width for these pathways in Street Sections A,B,D,E, K and Option 1 is shown as eight feet. The AASHTO Guide for the Development of Bicycle Facilities says: *Under most conditions, a recommended all paved width for two-directional bicycle path is 10 feet (3 meters)*. It does note that a width of eight feet may be adequate, but only where the following conditions prevail:

1. bicycle traffic is expected to be low, even on peak days and peak hours
2. pedestrian use of the facility is not expected to be more than occasional
3. there will be good horizontal and vertical alignment providing safe and frequent passing opportunities
4. the path will not be subject to maintenance vehicle loading conditions that would cause pavement edge damage

The designation of certain lines of travel as bicycle routes through signing provide additional encouragement. These travel lines, while they may follow the same desire lines as primary routes or boulevards, should not necessarily be on primary motor vehicles routes. Better use of the gridded street system can be made by designating alternate routes through the street network. While it is the intention to make all streets within the planning area bicycle-compatible for experienced cyclists, others with different skill levels or experience would benefit from this designation. A special consideration for the use of bicycle lanes should be made in the case of the King Farm Boulevard.

Street Section Type L

Median bikeways are recognized by most bicycle design professionals and many State Departments of transportation as being sub-standard for bicycle use. Conflicts between pathway bicyclists and motor vehicles at street intersections and mid-block locations are known to be factors in a significant number of serious and fatal bicycle/motor vehicle crashes. Implementation of this type of facility as a designated space for use by cyclists would likely result in increased

exposure to liability by the implementing agency. This facility design is not recommended by the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, and is specifically noted as substandard in the recently published Oregon Bicycle and Pedestrian Plan published by the Oregon Department of Transportation.

It is mentioned in the King Farm plan that implementation of the Future Rail indicated in the typical section would not likely occur for many years. It is unclear what use of the right-of-way designated for Future Rail would be in the meantime. Bus service is mentioned as a possibility, however simply inserting bus service in the space currently marked for Future Rail would result in increased exposure to conflict by pedestrians by forcing them to first cross the active roadway before being able to access busses. An alternative is to provide more traditional curbside bus service for pedestrians with a designated bus lane. This lane could be a shared bike and bus lane, as used in Madison, Wis. and Toronto, Ont. Canada. Special attention to signing and pavement marking would be needed, particularly at intersections. However, these designated shared lanes would provide increased bicycle access for a wide range of bicyclists. If the designated Future Rail width is to be temporarily recovered as green space, six feet of this width may be used for a more traditional bicycle lane.

Street Section K

The typical section drawn as Type K either does not convey sufficient design detail, or is substandard in design. The AASHTO Guide for the Development of Bicycle Facilities recommends for multiple use paths either a five foot horizontal separation or a four and one-half foot vertical separation from the path edge to the roadway. The addition of a vertical barrier between the edge of the path and the roadway is highly recommended. The designation of one side of the right of way as a Class I Bikeway should not assume that only bicycles will use this space (the illustration shows a pedestrian in this space - which is more realistic.)

Site Access

As previously mentioned, the site is bounded by existing infrastructure that may inhibit access and travel by bicycle. Travel forecasts for surrounding roadways

for the year 2010 show dramatic increases in motor vehicle traffic. West Gude Drive and Frederick Road are expected to exceed 33,000 and 78,000 vehicles per day, respectively. Volumes this high pose significant barriers to any crossing movements by bicyclists and make traveling along these roadways nearly impossible, except for the most experienced cyclists.

In addressing existing barriers of this type in the Bicycle Master Plan Update, it was found that channelizing bicyclists to the most accommodating crossing point was necessary. Channelizing bicyclists to these points assumes that accommodating conditions either currently exist or are planned in the immediate future. Clearly, in the exterior of the proposed plan, designs are not currently accommodating. Of particular concern is access to the Shady Grove Metro station via Redland Road, and the intersection of Redland to Frederick Road. In the interior of the plan, this is proposed to be provided by the median pathway across Frederick Road. It can hardly be stated strongly enough that this would place bicyclists at significant risk in this intersection as currently designed. At this time, there are no concurrent designs for similar bicycle accommodation on the other side of the intersection. It is unclear where cyclists would be expected or encouraged to cross. A more detailed examination of this crossing in the context of other planning efforts by the City, County and State is critical. Failure to integrate considerations of cyclists in this corridor would, at the least, inhibit bicycle travel; and, possibly, create conditions which precipitate a serious or fatal bicycle/motor vehicle crash.

Transportation Demand Management

The TDM Plan for the site area mentions *...environmental design factors that either prevent direct pass or that put ...bikers in conflict with vehicular traffic as barriers to increased travel by bicycle.* The plan also states that it *...has been carefully designed to minimize these barriers and encourage ...bike travel.* If TDM efforts as they apply to bicycling are to be successful, they must carefully consider the content of the Bicycle Master Plan in general, and this section of the plan specifically.

The (draft) TDM plan says there are three important way in which non-motorized modes might be used for TDM purposes. The plan then only lists two items: As a

primary mode, and as a feeder mode. While this may be a simple omission, revision of this document should provide a more complete and detailed strategy for how these modes can enhance the options for people traveling within and through the community.

C. Funding Opportunities

Federal Funds Administered by the State Highway Administration

The Maryland State Highway Administration administers federal transportation programs under ISTEA and determines how the federal funds will be allocated around the state. Bicycle projects and programs are eligible for funding under ten ISTEA programs. The ten programs are:

- National Highway System
- Surface Transportation Program
- Transportation Enhancement Activities
- Congestion Mitigation and Air Quality Program
- National Recreational Trails Fund
- Scenic Byways
- Federal Lands Highways Funds
- Bridge Program
- Planning
- Federal Transit Program

The regulations and requirements of each program differ, but all require at least 20% matching funds from a state or local source. The Transportation Enhancements Activities program, where bicycle facilities are one of only ten eligible types of projects, has provided the most funding for bicycle projects since the adoption of ISTEA in 1991.

State, County and local Funding

Remember that while ISTEA is a valuable and high-profile source of money, it only accounts for roughly one-third of transportation investments made by state and local governments every year. Of the \$70 billion spent annually on roads,

most comes from state and local sources, including sales and income taxes. Much of this money is invested in local roads, where most bicycling and walking takes place. Examples of projects funded using the sources discussed below are included in **Appendix "H"**.

1. Gas and vehicle taxes.

The price of every gallon of gasoline includes between 11 and 25 cents of state taxes, depending on the state you are in, and goes to the state Department of Transportation. Vehicle purchase and registration fees often end up in the same place. At the local level, additional sales and gasoline taxes are levied and spent on transportation services. A number of states have constitutions which require these state vehicle and gas taxes to be spent exclusively on facilities for motor vehicles, or on highway projects only — and may prevent the use of funds for bicycle and pedestrian improvements. However, most do not. Some states, such as Illinois and Iowa, actually set-aside motor vehicle taxes for trail and other improvements.

2. Bond Issues.

Although there is a strong general sentiment towards lower taxation, communities across the nation have been willing to tax themselves and sell bonds to fund specific transportation or community investments. Bicycle and pedestrian improvements have frequently been singled out for funding in these citizen initiatives.

3. Incidental Projects.

Every time a new highway is built or old highway improved, resurfaced or restriped, an opportunity exists to improve conditions for bicycling and walking. In fact, in most communities the primary method of providing better bicycling and walking facilities is to piggy-back bike projects onto highway projects — without ever creating a line-item for bicycle improvements. In many cases, there is no additional cost at all.

4. Developer Dedications.

Developers can be required to provide certain facilities as part of the terms of allowing a new retail, office or residential development to go ahead, despite a

recent a Supreme Court Case (Dolan vs. Tigard) which appeared to challenge this principle. Developers can be asked to provide street improvements, sidewalks, trails, parking and shower facilities and many other amenities. Similar requirements can be made as part of the mitigation of major development projects — including highway projects.

5. Recreation funds.

Although trail advocates have looked to transportation funds as a good source of money for new projects, there are a lot of recreation agencies willing and able to invest in better conditions for bicycling and walking. In most states, bicycling and walking are two of the top three or four recreation pursuits and the demand for more places to walk and bicycle is growing every day. Park and recreation departments have their own funds and funding mechanisms which are worth discovering.

D. Maintenance Program

A maintenance program is needed to provide for safe, smooth, and clean bicycle facilities. Specifics that should be included are:

- Sweeping
- Surface Repair
- Pavement Overlays
- Vegetation
- Signs, Striping, and Legends

A bikeway maintenance program is necessary to ensure adequate maintenance of facilities. Sufficient funds should be budgeted to accomplish the necessary tasks. Neighboring jurisdictions should consider joint programs for greater efficiency and reduced costs. **Appendix "I"** contains a sample of a maintenance program that was adopted from the Oregon Bicycle and Pedestrian Plan.

VI. SUMMARY AND RECOMMENDATIONS

A. Continuing Programs

Citizen Advisory Committee

There are a number of reasons to maintain an active citizen-led advisory committee, the least of which is maintaining a direct line of communication between a municipality's "customers" and the agencies charged with responding to community needs. The Citizen Bicycle Advisory Committee's (CBAC) function is not only to represent the more visible and active bicyclist community, but also to advocate for increasing the viability of bicycling as a mode of transportation and recreation in the City as a way of providing a broader range of travel options for all citizens.

The CBAC acts as a forum for developing consensus on priorities for improving conditions for bicycling and finding specific solutions for identified problems. Working in cooperation with City agencies, the CBAC legitimizes the concerns of the bicycling public and broadens the constituency for the City's public-service programs. CBAC members also act as moderators to change in agency/program staff lending continuity in a changing environment.

The Committee's mandate for action should come from a proclamation of the Mayor and City Council, and should include the following tasks:

- Assist in the development of the City's bicycle and pedestrian specific policies, as well as other policies that affect the conditions for bicycling in the City;
- Oversee the implementation of the City's Bicycle Master Plan Update, and report progress toward completion;
- Review current and proposed CIP projects to ensure bicycle needs are incorporated into design and construction when appropriate; and
- Deliver updates on the needs and desires of bicyclists in the community, with recommendations for action.

A City staff liaison should be appointed to the committee to provide communication between agency staff and the committee. The committee should

consist of eight to ten members, representing a broad range of bicyclist types. The committee should convene regularly scheduled meetings throughout the year, and should prepare a yearly progress report on implementation of this Bicycle Master Plan Update, as well as recommendations for change.

Task Force For Implementation

An interagency task force for implementation would include the Department staff responsible for the identified actions in this report:

- Supervisor, Department of Recreation and Parks
- Supervisor, Department of Public Works
- Supervisor, Public Information
- Chair, Citizen Bicycle Advisory Committee
- Supervisor, Office of City Manager

These members would meet regularly to track progress on action items, coordinate resources and efforts, and review items of common concern and interest. The results of these meetings would be provided to the City Manager, City Council, and the Citizen Bicycle Advisory Committee.

Regular Public Involvement/Outreach

As a part of providing its educational and public information campaigns, the Department of Recreation and Parks should institute a regular channel of communication for receiving comments and ideas for change in the Bicycle Master Plan. This might take the form of brochure/questionnaires [as used for the plan development process], informal meetings, etc.

In addition, the Department is encouraged to conduct an annual open house on bicycling in the City. This could coincide with the development of the annual Progress Report by the Citizen Bicycle Advisory Committee. A workshop format similar to the charrette could be used to channel input.

Other Programmatic Recommendations

The institution of a Spot Improvement Program will help provide information on existing conditions and concerns from citizens to implementing agencies. The

City of Portland Oregon uses printed index cards, distributed through local bicycle retailers and the public information office to gather this input.

PORTLAND BICYCLE PROGRAM FACILITY IMPROVEMENT REQUEST FORM			
The bicycle facility improvement program is intended to enhance bicycle safety and encourage bicycling through low-cost, small scale improvements suggested by concerned bicyclists (e.g., pavement maintenance and sweeping, hazard removal, bike rack installation, and grating repair).			
Location:	STREET _____		
Suggestion:	CROSS STREET, ADDRESS, OR LANDMARK _____ _____ _____		
Requested by:	NAME _____		
	STREET _____	CITY _____	ZIP _____
	DAY PHONE _____	DATE _____	
DO NOT WRITE BELOW THIS LINE—FOR OFFICE USE ONLY			
Referred to:	_____		
Investigation:	PDOT STAFF: LIST CONDITION BEFORE AND AFTER JOB IS COMPLETED _____ _____		
	Signed _____	Date _____	

Figure 6.1 - SIP example

By responding to these often minor requests, the City significantly reduces their exposure to liability from maintenance failure. The City's Maintenance divisions use this information to help program maintenance activities, not specific to bicyclists, but for all roadway users. Appendix "I" provides an example of a bikeway maintenance program to preserve bikeways and walkways.

B. What It Will Take To Make This Plan Successful

Achieving the vision, goals and objectives is not a result of the planning process. Success in improving conditions and increasing use depends on three basic ingredients: Public involvement in the planned use of public resources, the implementation of planned actions by City Departments, and the support of public policy decision-makers and stakeholders.



"Bicycling in Rockville" Survey

Please return this short questionnaire to the address on the reverse to help us get a better picture of bicycling in Rockville.

1. Age: _____

2. Gender: Male Female

3. Which area of the city do you live in?

4. How many times have you ridden a bicycle in the last:
week _____ month _____ year _____

5. What is the average length of trips you make?
_____ miles

6. What type of trips do you usually make?
 Work Recreation Shopping School

7. Why do you ride a bicycle?
 Fun Fitness Economics Environment
 Save time No other choice No car
 No car parking

8. Have you ridden to work in the last 6 months?
 Yes No

9. What are best routes/roads for bicycling in Rockville?
(Please attach a map/list showing your bike ride to work, most common bike ride, etc.)

10. What are the worst roads/intersections for bicycling in Rockville?
(Please attach a map/list showing them.)

11. What would encourage you to ride more often?
 Designated bicycle facilities (bike lanes, trails, shoulders)
 Signed bike routes
 Better road surfaces
 Safe crossings at I-270 and Rockville Pike (Md. 355)
 Bike-to-work events/promotions
 Education for children/motorists/adult bicyclists
 Bicycle parking and/or locker facilities
 Other _____

12. Comments: _____

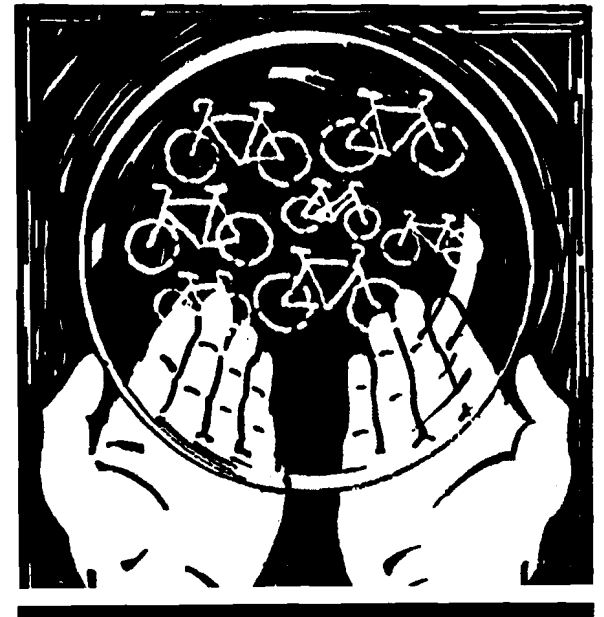
Please detach and return

Mark your calendar, and plan to attend the meeting that will shape the future of bicycling in Rockville.
Monday, April 29, 1996, 7-10 p.m.
Rockville Senior Center
Carnation Room
1150 Carnation Drive
Rockville, MD 20850



Betsy Thompson
City of Rockville
Recreation and Parks Department
111 Maryland Ave.
Rockville, MD 20850-2364

The future of bicycling in Rockville is in your hands...





What is the future for bicycling in Rockville?

Throughout the U.S., the popularity of bicycling is growing. More than one-third of all adults enjoy bicycling for recreation, and an increasing number are choosing to bicycle as a means of everyday transportation.

Rockville has many features that encourage bicycling. For example, our city is relatively flat, and compact. Employment, shopping, and transit centers, as well as schools and parks are within cycling distance of most residences. Active bicycle clubs promote bicycling for both recreation and transportation.

However, Rockville also has some challenges for cyclists. Crossing Rockville Pike or I-270 is difficult and dangerous. Continued development and redevelopment can add traffic and increase the potential for conflicts between motorists and bicyclists. Getting from point A to point B shouldn't have to mean getting in your car.

Fortunately, the City of Rockville recognizes there are both problems and opportunities for bicycling in this area. As planners for the future of Rockville, we are developing a new plan to address bicycle issues, and your input is needed.

We need your help . . .

The City of Rockville Bikeway Master Plan will shape the future of bicycling in the city. To produce the best plan possible, we need the input from active bicyclists as well as those who would like to bicycle if conditions were better. We want to hear from motorists and pedestrians, too. The plan must balance the needs of all roadway users.

Specifically, we're inviting you to help us...

Create a vision

The Rockville Bikeway Master Plan looks forward — years into the future. What is the city going to look and feel like in the year 2015?

Will Rockville be more bicycle-friendly and livable — or more dangerous and less convenient? Will people have a real choice to bicycle to work, or to the store? You can help determine the answer to these, and other questions.

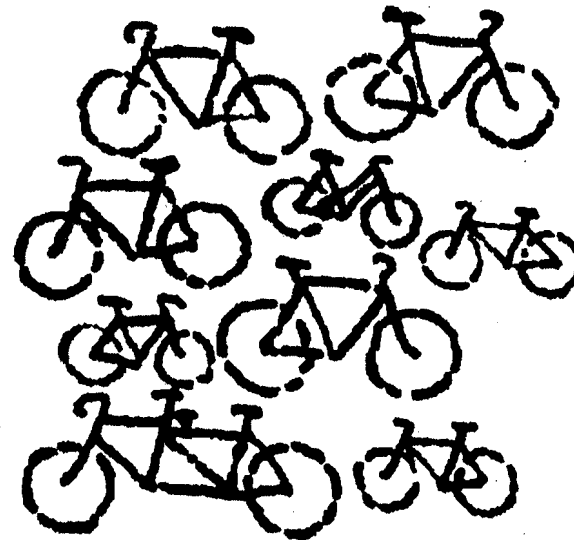
Identify problems

How close to your vision of a bicycle-friendly city is Rockville today? We need to know what problems exist in Rockville before we can develop a plan to address them. What makes bicycling more difficult or dangerous than it could be? Why don't you, or your friends and family, ride more often? We're looking for a complete picture of the current conditions for bicycling - from nasty potholes to inhospitable developments and highways.

Balance the needs of bicyclists and motorists

What is an appropriate balance among bicycling, walking, transit, and driving, and are we achieving that balance today? Demand is high for space and funds — what is an appropriate level of investment to make the streets safe and inviting for bicyclists?

We need your help to answer these and other important questions in coming months.



What you can do to help

The City of Rockville wants your help in creating a plan for bicycling in the Rockville area. You can help in many ways:

1. Participate in an interactive public meeting scheduled for Monday, April 29. The meeting will give you a chance to have your say on all the issues raised in this brochure, and to give us information on your favorite routes and the worst roads and intersections you encounter.

Where: Rockville Senior Center
Carnation Room
1150 Carnation Drive
Rockville, MD 20850

When: Monday, April 29, 1996
7:00 until 10:00 p.m.

Another meeting will be scheduled later this summer. By returning the survey and form below, you'll be notified directly of the next meeting.

2. Complete the short survey in this brochure.

3. Write in with your comments. Send your ideas, comments, and information about your favorite and worst routes for bicycling in the city to the address below. Be sure to include your name, address, and affiliation, if any.

4. Mail to:

Betsy Thompson
City of Rockville
Recreation and Parks Department
111 Maryland Ave.
Rockville, MD 20850-2364.



It is the City of Rockville's policy to provide access to all programs and services to everyone, regardless of disability. Call the ADA Coordinator for more information at 309-3300; TDD 309-3187.



City of Rockville

1. Number of people per household				
	2.3 (average)			
2. Ages of household members:				
	Ages 0-4	6	8%	
	Ages 5-15	11	15%	
	Ages 16-20	3	4%	
	Ages 21-64	49	68%	
	Ages 65+	3	4%	
3. Possess driver's license?				
	Yes	28		
	No	3		
4. Public transportation available?				
	Yes	30		
	No	1		
	If yes, how far from your home is the nearest transit stop?			
	1-2 blocks	14	47%	
	3-4 blocks	9	30%	
	1/4 to 1/2 mile	3	10%	
	1/2 to 1 mile	2	7%	
	1 to 2 miles	1	3%	
	More than 2 miles	1	3%	
5. Frequent destinations:				
	Shopping	16	28%	
	Parks/Recreation	14	25%	
	Personal/social	11	19%	
	Work/School	8	14%	
	Civic	4	7%	
	Religious	4	7%	
6. Reason for bicycling:				
	Utilitarian	11	17%	
	Shopping	9	14%	
	Fitness	19	29%	
	Recreation	27	41%	
		On trails	17	
		Bicycle Touring	16	
7. Primary concern in route selection:				
	Convenience to destination	11	22%	
	Recreational/scenic value	13	27%	
	Comfort	9	18%	
	Personal safety	16	33%	
8. Factors affecting decision to ride:				
	Traffic volume	19	19%	
	Traffic speed	18	18%	
	Type of traffic	8	8%	
	Convenient parking	7	7%	
	Distance to destination	15	15%	
	Major intersections	14	14%	
	Weather	20	20%	
9. Priorities for improvement:				
	Access to downtown			
	Access to local and regional parks			
	Access along MD355 commercial corridor			



APPENDIX B
CULVERT TO BIKEWAY EXAMPLES

The City of Coralville, IA received Transportation Enhancement funding to convert an existing culvert under I-80 into a bikeway that will connect the north and south areas of the City. Due to construction of stormwater detention facilities and a recreational pond upstream from the culvert, the required drainage capacity of the culvert has been reduced. The floor of the culvert will be raised with pipes placed beneath the new floor to carry the normal flow of water through the culvert. The project is currently being designed and should be constructed in the summer of 1997. Contact the City Engineers Office for more information.

Denver, CO converted a drainage culvert into a bikeway. The culvert being converted was 20 feet wide and a 4.5 foot wall was constructed in the middle of the culvert to create the bikeway. The normal flow of the drainageway continued on one side of the wall while the other side allowed for the passage of bicyclists and pedestrians. the wall was constructed in a way that resulted in only a minimal reduction in the capacity of the culvert to carry stormwater. Contact the City Bicycle and Pedestrian Planner for further information.

In both of these cases there will be times when the culverts will fill with water and be closed to bicyclists and walkers. Signs have been or will be posted to warn users of times when the culverts will be closed.



Table 1. Group A bicyclists, urban section, no parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume												
	less than 2,000				2,000-10,000				over 10,000				
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		
less than 30 mi/h	sl 12	truck, bus, rv		wc 14	sl 12	truck, bus, rv		wc 14	wc 14	wc 14	truck, bus, rv		wc 14
		sl 12	wc 14			wc 14	wc 14				wc 14	wc 14	
30-40 mi/h	wc 14	wc 14	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15	wc 14	WC 15	wc 15	wc 15	
41-50 mi/h	wc 15	wc 15	wc 15	wc 15	wc 15	wc 15	SH 6	SH 6	WC 15	WC 15	SH 6	SH 6	
over 50 mi/h	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	

1 mi/h = 1.61 km/h

Key:* wc = wide curb lane** sh = shoulder sl = shared lane** bl = bike lane na = not applicable

* See page 11 for definitions.

** WC and SL numbers represent "usable widths" of outer lanes, measured from lane stripe to the edge of gutter pan, rather than to the face of the curb. If no gutter pan is provided, add 1 ft (0.3 m) minimum for shy distance from the face of the curb.



Table 2. Group A bicyclists, urban section, with parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
less than 30 mi/h	wc 14	truck, bus, rv		wc 14	wc 14	truck, bus, rv		wc 14	wc 14	truck, bus, rv		wc 14
		wc 14	wc 14			wc 14	wc 14			wc 15	wc 15	
30-40 mi/h	wc 14	wc 14	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15
41-50 mi/h	wc 15	wc 15	wc 15	wc 15	wc 15	wc 16	wc 16	wc 16	wc 15	wc 15	wc 16	wc 16
over 50 mi/h	na	na	na	na	na	na	na	na	na	na	na	na

1 mi/h = 1.61 km/h

Key:*

wc = wide curb lane** **sh** = shoulder **sl** = shared lane **bl** = bike lane **na** = not applicable

* See page 11 for definitions.

** WC numbers represent "usable widths" of outer travel lanes, measured from the left edge of the parking space (8 to 10 ft [2.4 to 3.0 m] minimum from the curb face) to the left stripe of the travel lane.



Table 3. Group A bicyclists, rural section.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
less than 30 mi/h	sl 12	truck, bus, rv		wc 14	sl 12	truck, bus, rv		wc 14	wc 14	truck, bus, rv		sh 4
		sl 12	wc 14			wc 14	wc 14			wc 14	sh 4	
30-40 mi/h	wc 14	wc 14	sh 4	sh 4	wc 14	wc 15	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4
41-50 mi/h	sh 4	sh 4	sh 4	sh 4	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6
over 50 mi/h	sh 4	sh 6	sh 6	sh 4	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6

1 mi/h = 1.61 km/h

Key:* wc = wide curb lane** sh = shoulder sl = shared lane** bl = bike lane na = not applicable

* See page 11 for definitions.

** WC and SL numbers represent "usable widths" of outer lanes, measured from the lane stripe to the edge of the pavement if a smooth, firm, level shoulder is adjacent. If rough or dropped pavement edges or a soft shoulder exists, add 1 ft (0.3 m) minimum for shy distance from the edge of the pavement.



Table 4. Group B/C bicyclists, urban section, no parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
less than 30 mi/h	wc 14	truck, bus, rv		wc 14	wc 14	truck, bus, rv		wc 14	bl 5	truck, bus, rv		bl 5
		wc 14	wc 14			wc 14	wc 14			bl 5	bl 5	
30-40 mi/h	bl 5	bl 5	bl 5	bl 5	bl 5	bl 6	bl 6	bl 5	bl 5	bl 6	bl 6	bl 5
41-50 mi/h	bl 5	bl 5	bl 5	bl 5	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6
over 50 mi/h	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6

1 mi/h = 1.61 km/h

Key: * **wc** = wide curb lane** **sh** = shoulder **sl** = shared lane **bl** = bike lane** **na** = not applicable

* See page 11 for definitions.

** **WC** numbers represent "usable widths" of outer lanes, measured from lane stripe to edge of gutter pan, rather than to face of curb. If no gutter pan is provided, add 1 ft (0.3 m) minimum for shy distance from face of curb. **BL** numbers indicate minimum width from the curb face. The bike lane stripe should lie at least 4 ft (1.2 m) from the edge of the gutter pan, unless the gutter pan is built with adequate width to serve as a bike lane by itself.



Table 5. Group B/C bicyclists, urban section, with parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
less than 30 mi/h	wc 14	truck, bus, rv		wc 14	wc 14	truck, bus, rv		wc 14	bl 5	truck, bus, rv		bl 5
		wc 14	wc 14			wc 14	wc 14			bl 5	bl 5	
30-40 mi/h	bl 5	bl 5	bl 5	bl 5	bl 5	bl 6	bl 6	bl 5	bl 6	bl 6	bl 6	bl 6
41-50 mi/h	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6
over 50 mi/h	na	na	na	na	na	na	na	na	na	na	na	na

1 mi/h = 1.61 km/h

Key:*

wc = wide curb lane** **sh** = shoulder **sl** = shared lane **bl** = bike lane **na** = not applicable

* See page 11 for definitions.

** WC numbers represent "usable widths" of outer lanes, measured from left edge of the parking space (8 to 10 ft [2.4 to 3.0 m] minimum from the curb face) to the left stripe of the travel lane.



Table 6. Group B/C bicyclists, rural section.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
		truck, bus, rv				truck, bus, rv				truck, bus, rv		
less than 30 mi/h	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4
30-40 mi/h	sh 4	sh 4	sh 4	sh 4	sh 4	sh 6	sh 6	sh 4	sh 6	sh 6	sh 6	sh 6
41-50 mi/h	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6
over 50 mi/h	sh 6	sh 6	sh 6	sh 6	sh 8	sh 8	sh 8	sh 8	sh 8	sh 8	sh 8	sh 8

1 mi/h = 1.61 km/h

Key:*

wc = wide curb lane sh = shoulder sl = shared lane bl = bike lane na = not applicable

* See page 11 for definitions.



Appendix D

Ordinance Examples

1. City of Ann Arbor, MI, bicycle parking ordinance is available from the City of Ann Arbor Planning Department. Highlights of the ordinance include:

- 3 classes of bicycle parking (short term, short to medium term, and medium to long term parking).
- Revisions on the number of parking spaces required.
- Lighting requirements for bicycle parking.

For more information contact the City of Ann Arbor Planning Department, P.O. Box 8647, Ann Arbor MI 48107, or call Jeff Kahan (313) 994-8184.

2. City of Olympia, WA bicycle development standard is available from the Olympia City Council (360) 753-8450. Key successes include:

- Class 1 bicycle storage is required at virtually all workplaces.
- All bike racks must be covered.
- Bike racks that support the bike by the wheel only are not permitted.
- Bike racks must be at least as close to the building entrance as the nearest non-handicapped parking stall.

3. City of Madison, WI has incorporated bicycle parking language into its general zoning ordinance on off-street parking and loading facilities. Provisions include:

- Bicycle parking equal to 10% of automobile parking.
- Bicycle racks must be designed to accommodate U-shaped locks.

For more information contact Arthur Ross, Madison Bicycle Coordinator, Madison DOT, P.O. Box 2986 Madison, WI (608) 266-47614. City of Denver's adopted Bicycle Parking Rules and Regulations are based on Municipal Codes calling for standards, and the recommendations set forth in the "1993 Denver Bicycle Master Plan". Key elements include:

- Inverted U-type bike rack is the first choice for all applications.
- Off-street automobile parking facilities of 20 spaces or more must provide off-street bicycle parking equal to 5% of the automobile parking space requirement.

For more information contact James Mackay, Denver Bicycle and Pedestrian Planner at (303) 640-BIKE.

5. San Francisco City/County has legislation that requires all city-owned and leased buildings to provide bicycle parking. Highlights include:

- Bike parking to be retrofitted in existing buildings where City employees work.



- City employee parking must be protected from the elements and in an area with restricted access.
- Visitor parking must be as close to the entrance as the nearest car space.



Appendix E

Location Examples

1. Seattle Engineering department uses the following criteria for locating bicycle racks:

- Racks are installed in public space, usually on a wide sidewalk with five or more feet of clear sidewalk space remaining.
- Racks are placed to avoid conflicts with pedestrians. They are usually installed near the curb and away from building entrances and crosswalks.
- Racks can be installed in bus stops or loading zones only if they do not interfere with boarding or loading patterns and there are no alternative sites.

For more information contact:

Seattle Engineering Bicycle Program
900 Municipal Building
Seattle, WA 98104

2. Bicycle Parking Rules and Regulations for the City of Denver calls for the location of bicycle racks:

- Within 50' of building entrances (where bicyclists would naturally transition into pedestrian mode)
- Within view of people.
- On concrete, and located a minimum of 24" from a parallel wall, and 30' from a perpendicular wall.

The placement of the racks should minimize conflicts with both pedestrians and motorized traffic.



Appendix F

Parking Examples

There are 3 basic types of bicycle parking, each having advantages not afforded by others.

1. The most common and the least expensive facilities are often characterized as inverted U's or rail racks:

Advantages: Simple design, affordable, can be manufactured by local welder.

Disadvantages: Offers low-security for long-term parking.

Average cost: \$65-\$80 per bike.

Note: This facility type is most practical in short term situations such as in downtown or campus settings.

2. Racks that secure both wheels and bicycle frame usually have moving parts and provides medium security with a user-supplied lock.

Advantages: Medium security, great when coupled with covered protection from the elements.

Disadvantages: Complex design, most do not work with the common U-lock.

Average cost: \$65-\$150

Note: These facilities are often found at transit locations and are often under used because of their complex design.

3. Bike lockers or locked/guarded storage areas provide high-security protection.

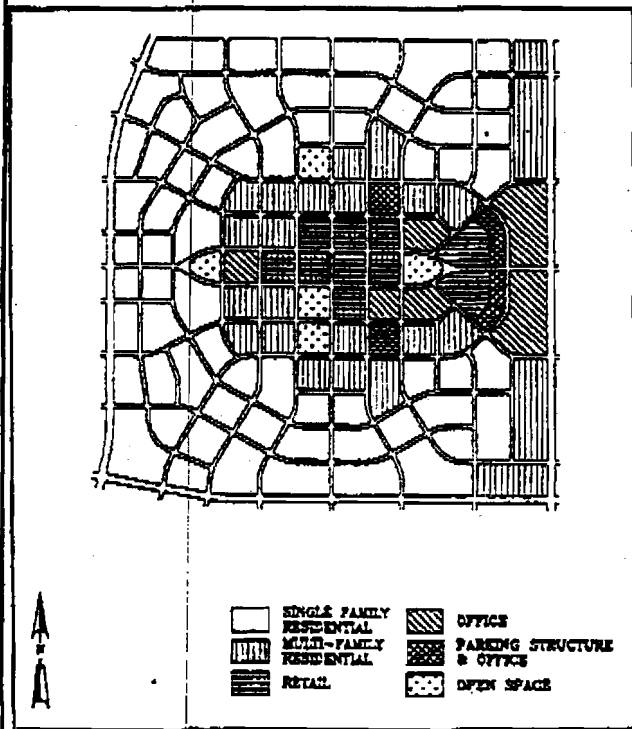
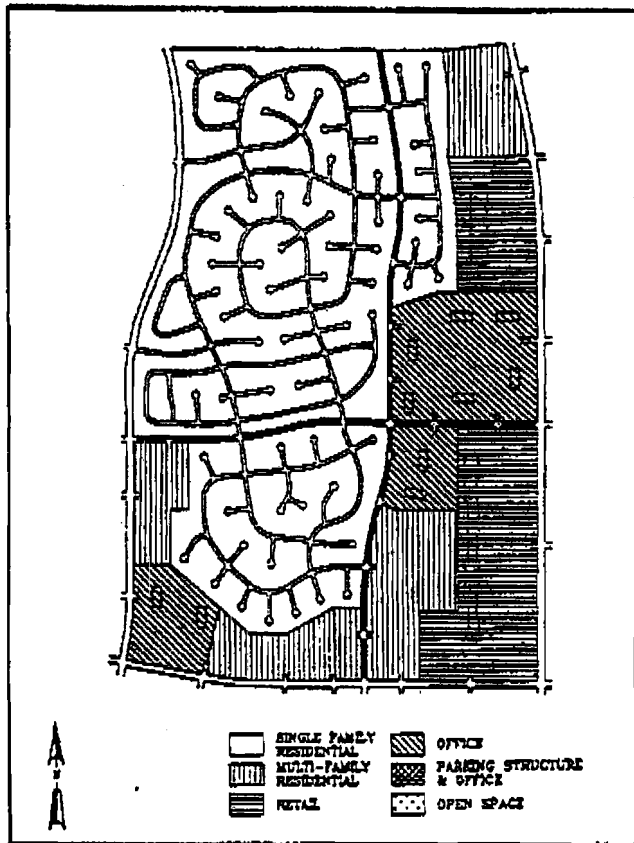
Advantages: High security storage and are ideal for long-term storage.

Disadvantages: Expensive, often unmarked and unused.

Average cost: \$500-\$1500 per 1-2 bikes.

Note: The use of bike lockers should be coupled with signage or other media that conveys what the bicycle lockers are and how they are used.







Appendix H

Funding Examples

Examples of State Tax-funded Projects:

- Oregon and Michigan have state laws requiring a minimum of one percent of state transportation funds be spent on bicycle and pedestrian projects. (Oregon s has worked and Michigan s has not.).
- California has two set-aside programs — a Bicycle Lane Account, funded from fuel taxes, and a portion of the State Highway Account — dedicated to funding bike projects.
- Illinois puts \$1.50 of every car title transfer tax into bicycle path development, raising up to \$5 million every year.
- The Iowa legislature created a \$1 million annual Recreational Trails Program from their Road Use Tax Fund to fund bicycle improvements

Examples of Bond Issue-funded Projects:

- Seattle and King County, Wash. Voters approved a \$100 million bond issue to protect and use open space in the urban area. \$33 million was set-aside for trail development, generating about \$6 million per annum for the city of Seattle s bike program.
- Sales tax increases in Los Angeles and San Diego have been approved by voters as a way to finance transportation improvements — with portions of the income reserved for bicycle and pedestrian improvements.
- The city of Denver is nearing completion of a \$5 million trail network financed by a bond issue which also covered the salary of the city s bike planner.

Examples of Incidental Projects:

- Interstates 90 in Seattle and 70 in Glenwood Canyon, Colo. have extensive bicycle and walking facilities built into them as part of the interstate construction costs. The 8-mile I-90 trail includes a one-mile bridge across Lake Washington and a quarter-mile tunnel. The I-70 project is twice this length and is incorporated into one of the more remarkable highway engineering projects in the nation.



- DOT s in Texas and Alaska have adopted a policy of reviewing every highway project - including those that have already been approved and designed - to see how bicycle and pedestrian access can be improved by restriping or other techniques.
- The Florida DOT reported in 1989 that through policy decisions within the Department between \$8-\$12 million in bicycle-friendly highway improvements are made to the urban area state highway system every year.
- The city of Austin works with the Texas Bicycle Coalition to review every restriping project to see if bike lanes or wide curb lanes can be created by a simple reallocation of the available space.

Examples of Developer Dedications:

- The city of Gilbert, Ariz. Has an extensive network of bike lanes on every arterial street. Developers of new housing and retail are required to include bike lanes in the streets they are required to provide.
- Arlington, Va., and Los Angeles are among the communities that require new office and residential developments to have bike parking, showers and clothes lockers.

Examples of Recreation-funded Projects:

- Maintenance of trails in Seattle and Arlington, Va. is carried out by the Parks and Recreation Department, as is some trail construction.
- The Charleston (SC) County Parks and Recreation Commission recently paid for a regional bike plan to be developed, and has planned and developed on-street improvements to county parks, using their own bond moneys.
- The Utah Division of Parks and Recreation distributes \$200,000 a year to trail projects.



Appendix I **Maintenance**

adapted from the Oregon Bicycle and Pedestrian Plan

BIKEWAY & WALKWAY MAINTENANCE

STRATEGY: *Adopt maintenance practices to preserve bikeways and walkways in a smooth, clean and safe condition.*

INTRODUCTION

Bikeways are subject to debris accumulation and surface deterioration, and require maintenance to function well. Maintenance protects the investment of public funds in bikeways, so they can continue to be used safely. Poorly maintained facilities become unusable and a legal liability, as cyclists who continue to use them may risk equipment damage and injury. Others will choose not to use the facilities at all.

A. User Characteristics & Needs

Bicyclists ride on two narrow, high-pressure tires. What may be an adequate roadway surface for automobiles (with four wide, low-pressure tires) can be treacherous for cyclists. Small rocks, branches and other debris can deflect a wheel, minor ridges in the pavement can cause spills, and pot-holes can cause wheel rims to bend. Wet leaves are slippery and can cause cyclists to fall. Gravel blown off the travel lane by traffic accumulates in the area where bicyclists ride. Broken glass can easily puncture bicycle tires.

B. Recommended Maintenance Practices

B.1. Sweeping

Bicyclists often avoid shoulders and bike lanes filled with sanding materials, 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 travelway 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 the winter season ends or after major storms in high-use areas.

Recommendations

- Establish a seasonal sweeping schedule;
- Sweep walkways and bikeways whenever there is an accumulation of debris on the facility;
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders;
- Pave gravel driveway approaches to reduce loose gravel on paved roadway shoulders;



- Provide extra sweeping in the fall in areas where leaves or pine cones accumulate in bike lanes; and
- Require parties responsible for debris to either:
 - (1) Prevent problem in the first place (e.g. by placing tarps over trucks loaded with gravel or other small particles) or;
 - (2) Sweep up debris immediately (ordinances can require tow-vehicle operators to remove glass after crashes).

B.2. Surface Repairs

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

Recommendations

- Inspect bikeways and walkways regularly for surface irregularities;
- 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 or shoulder;
- Perform preventative maintenance operations such as keeping drains in operating condition and cutting back intrusive tree roots; and
- Sweep a project area after repairs.

B.3. 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 shoulder bikeway or bike lane). Overlay projects offer opportunities to widen the roadway, or to restripe the roadway with bike lanes.

Recommendations

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge;
- If this is not possible, and there is adequate shoulder or bike lane width, it may be appropriate to stop at the shoulder or bike lane stripe, provided no abrupt ridge remains;
- After overlays, raise inlet grates, manhole and valve covers to within 6 mm (1/4") of the pavement surface;
- Pave gravel driveways and approaches 4.5 m (15 ft) from the edge of pavement to prevent gravel from spilling onto shoulders or bike lanes (see Figure 16, page 69); and
- Sweep the project area after overlay.

B.4. Vegetation

Vegetation encroaching into bikeways 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: bicyclists must be visible to approaching motorists, rather than hidden by overgrown shrubs or low-hanging branches, which can also obscure signs.

Local ordinances should allow road authorities to control vegetation that originates from private property. Some jurisdictions require adjacent land owners to control vegetation, or else maintenance personnel perform the work and bill the property owner.



Recommendations

- Cut back vegetation to prevent encroachment; and
- Perform preventative operations such as cutting back intrusive tree roots.

B.5. 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: bicyclists rely on motorists observing the signs and legends that regulate their movements. Examples include STOP and RIGHT TURN YIELD TO PEDS signs, stop bars, fog lines, etc.

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.

B.6. 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. Curbs used to divert storm water into catch basins should be designed so they do not create hazard for cyclists.

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; and
- Remove existing drainage curbs that encroach into shoulders or bike lanes.

C. Other Maintenance Activities That Affect Bicycling

The following activities, when performed incorrectly, may degrade conditions for cyclists.

C.1. Chip Sealing

Chip seals leave a rough surface for bicycling. Chip seals that cover the travelway and part of the shoulder area leave a ragged edge or ridge in the shoulder, causing problems for cyclists.

Recommendations

- Where shoulders or bike lanes are wide enough and in good repair, cover only the travel lanes with chip seal;
- If the shoulders or bike lanes must be chip sealed, cover the shoulder area with a well-rolled, *fine-textured* material: 3/8"-10 or finer for single pass, 1/4"-10 for second pass;
- Sweep the shoulder area following chip seal operations; and



- Ensure that inlet grates, manhole and valve covers are within 6 mm (1/4") of the final surface.

C.2. Patching Activities

Loose asphalt often ends up on the shoulder, adhering to the surface and creating roughness.

Recommendation

- Sweep fresh loose materials off the road before they adhere to the pavement.

C.3. Blade Patching Activities

Road graders can provide a smooth pavement patch; however, the last pass of the grader sometimes leaves a rough tire track in the middle of the shoulder.

Recommendations

- Equip road graders with smooth tires;
- Cover the entire shoulder width;
- Roll the shoulder area after the last pass of the grader; and
- Sweep fresh loose materials off the road before they adhere to the pavement.

C.4. 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
- Require by ordinance high levels of service repair along designated bikeways.

C.5 Raised Pavement Markers

Raised pavement markers (RPM) present many problems for bicyclists. The MUTCD states that "Raised markers generally should not supplement right edge lines."

Recommendations

- Remove existing RPM's if not needed for motorist safety;
- If needed, install RPM's on the motorists' side of the stripe.

C.6 Snow Removal

Snow stored on bike lanes impedes bicycling in winter.

Recommendations

- On streets with bike lanes, remove all snow from street surface;



D. MAINTENANCE PROGRAM

A bikeway maintenance program is necessary to ensure adequate maintenance of facilities. Sufficient funds should be budgeted to accomplish the necessary tasks. Neighboring jurisdictions should consider joint programs for greater efficiency and reduced cost.

The program should establish maintenance standards and a schedule for the regular inspections and maintenance activities recommended in the previous sections.

E. SPOT IMPROVEMENT PROGRAMS

Road users are often the first to experience deficiencies. Spot-improvement programs enable bicyclists to bring problems to the attention of authorities in a quick and efficient manner.

Postage-paid, pre-addressed postcards can be made available to the public, to be sent in when they notice a needed improvement. Telephone numbers of staff contacts are included. Quick response from the city improves communications between the public and staff.



Project	Roadway	Limits	Facility Type	Length (Feet)	Cost
1A	Research Boulevard	West Gude Drive to Hurley Ave.	I	4616	\$ 192,100
	Hurley Avenue	Research Blvd. to Watts Branch Pkwy	I	1085	\$ 45,200
	Watts Branch Parkway	Hurley Ave. to Fallsmead Way	II	6006	\$ 117,000
	Fallsmead Way	Watts Branch Pkwy to Falls Road	II	745	\$ 14,500
	Falls Road	Falls Mead Way to City Limits	I	3750	\$ 156,300
	Wootton Parkway	Falls Road to Edmonston Dr. (Existing)	R	9960	\$ 283,000
	Gude Drive	Research Blvd. to Norbeck Road	R	18470	\$ 524,700
	Dundee Road	Wootton Parkway to Hurley Ave.	III	2800	\$ 3,800
	Project 1A Total				\$ 1,336,600
1B	Edmonston Drive	Wootton Parkway to Grandin Ave.	II	3815	\$ 74,400
	Grandin Avenue	Park Rd. to McAuliffe Dr.	II	8485	\$ 165,500
	McAuliffe Drive	Grandin Ave. to Twinbrook Parkway	II	2600	\$ 48,900
	Broadwood Drive	Grandin Ave. to Fletcher Pl.	I	2190	\$ 91,300
	Joseph Street	Grandin Ave. to Baltimore Rd.	III	1670	\$ 2,200
	First Street	Baltimore Rd. to Taft St.	III	2440	\$ 3,300
	First Street	First St. to Gude Dr.	II	500	\$ 9,300
	Southlawn Lane	Gude Dr. to Rock Creek	I	5730	\$ 238,800
	Project 1B Total				\$ 634,100
1C	Woodley Drive	West Gude Drive to Azalea Dr.	II	1750	\$ 2,400
	Azalea Drive	Woodley Dr. to Nelson St.	III	1750	\$ 2,400
	Nelson Street	Azalea Dr. to Anderson Ave.	II	2260	\$ 2,200
	Anderson Avenue	Nelson St. to Forest Ave.	III	2960	\$ 4,000
	Forest Avenue	Anderson Ave. to Harrison St.	III	600	\$ 800
	Harrison Street	Forest Ave. to N. Van Buren St.	III	600	\$ 800
N. Van Buren Street	Harrison St. to W. Middle Lane	III	100	\$ 100	
West and East Middle Lane	N. Van Buren St. to Park Rd.	II	3297	\$ 64,300	
	Project 1C Total				\$ 117,100



Project	Roadway	Limits	Facility Type	Length (Feet)	Cost	
1D	College Parkway	MD 355 to Nelson St.	II	4700	\$ 92,900	
	Nelson Street	College Parkway to Manatee St.	II	2000	\$ 39,000	
	Martins Lane	Manatee St. to N. Washington St.	II	2400	\$ 48,400	
	North Washington Street	Martins Ln. to W. Middle Ln.	II	2160	\$ 42,100	
	South Washington Street	W. Middle Ln. to Argyle St.	III	2100	\$ 3,000	
	Argyle Street	South Washington St. to Monroe St.	III	220	\$ 300	
	Monroe Street	Argyle St. to Cabin Johns Parkway	II	900	\$ 17,800	
	Cabin John Parkway	Monroe St. to Leverton Rd.	II	2220	\$ 43,300	
	Cabin John Parkway	Leverton Rd. to Wootton Parkway	I	1200	\$ 50,000	
	Monroe Street	New Mark Esplanade to Wootton Parkway	I	2200	\$ 91,700	
	Towhee Park Boulevard North	Dogwood Park to Wootton Parkway	I	1000	\$ 50,300	
	New Mark Esplanade	Monroe St. to Potomac Valley Rd.	II	1000	\$ 19,500	
	Potomac Valley Road	New Mark Esplanade to Maryland Ave.	I	1000	\$ 37,800	
	Project 1D Total					\$ 544,100
2	Glen Mill Road	Wootton Parkway to Veirs Dr.	I	3000	\$ 163,000	
	Veirs Drive	Glen Mill Rd. to Scott Dr.	I	3000	\$ 125,000	
	Scott Drive	Veirs Dr. to Wootton Parkway	I	3000	\$ 163,000	
	Great Falls Road	Maryland Ave. to N. Van Buren St.	I	3500	\$ 145,800	
	Falls Road	Fallsmead Way to Maryland Ave.	I	3500	\$ 145,800	
	N. Van Buren Street	Falls Road to W. Middle Ln.	III	400	\$ 500	
	Stonestreet Avenue	Lincoln Ave. to Grandin Ave.	II	2250	\$ 43,900	
Project 2 Total					\$ 920,000	
3	Wainwright Avenue	Atlantic Ave. to Twinbrook Park (Ex.)	I	250	\$ 10,400	
	Vandegrift Avenue	Atlantic Ave. to Ardennes Ave.	III	1200	\$ 1,600	
	Twinbrook Parkway	Ardennes Ave. to Rollins Ave.	III	1790	\$ 2,400	
	Jefferson Street	Congressional Ln. to S. City Limit	II	2575	\$ 50,200	
	Halpine Road	Lewis Drive to Ardennes Ave.	III	1400	\$ 1,900	
	Chapman Avenue	Halpine Rd. to Twinbrook Parkway	III	1625	\$ 2,200	
	Project 3 Total					\$ 330,400



Project	Roadway	Limits	Facility Type	Length (Feet)	Cost
4	Dover Road	E. Gude Dr. to N. Homers lane	II	600	\$ 11,700
	N. Homers lane	Dover Rd. to Grandin Ave.	II	4680	\$ 91,300
	Longland Lane	N. Homers lane to Taft St.	II	1300	\$ 35,100
	Taft Street	Loftstrand Ln. to E. Gude Dr.	II	1320	\$ 25,800
	Frederick Avenue	Stonestreet Ave. to N. Homers Ln.	II	1800	\$ 36,300
	Stonestreet Avenue	Ashley Ave. to Lincoln Ave.	II	1860	\$ 36,300
	Baltimore Road	S. Stonestreet Ave. to Avery Rd.	I	2100	\$ 195,000
	Maryland Avenue	Falls Rd. to Fleet St.	II	4150	\$ 81,000
	Fleet Street	Maryland Ave. to Jefferson St.	II	2000	\$ 39,000
	Jefferson Street	Fleet St. to Ritchie Parkway	II	1700	\$ 33,200
	Ritchie Parkway	Jefferson Parkway to Fleet St.	II	1000	\$ 19,700
	Wootton Parkway	Edmonston Dr. to Grandin Ave.	I	3500	\$ 145,800
	Westmore Avenue	MD 355 to N. Homers Ln.	I	1000	\$ 62,700
	Ashley Avenue	Stonestreet Ave. to Westmore Ave.	III	920	\$ 1,300
Project 4 Total					\$ 799,000
5	Watts Branch Stream Valley Bike Path	W. Gude Dr. to Watts Branch Parkway	I	3000	\$ 33,000
	Frederick Ave. Metro Crossing	MD 355 to Stonestreet Ave.	SP		\$ -
	Avery Road	Civic Center Dr. to Norbeck Rd.	I	725	\$ 72,500
	Avery Road	Baltimore Rd. to Civic Center Dr.	II	725	\$ 14,100
	Baltimore Road	Gladstone Drive to Avery Rd.	III		\$ -
	Nelson Street	Azalea Dr. to College Parkway	II	1550	\$ 30,200
	Norbeck Road	Gude Dr. to Avery Rd.	I		\$ -
	Jefferson Street Extension	Edmonston Dr. to Congressional Ln.	I	4025	\$ 167,700
	Wootton Parkway	Glen Mill Rd. to Falls Rd.	I	500	\$ 37,500
Anderson Park Extension	College Parkway to Manakee St.	I	1920	\$ 80,000	
Midway (Rockville) Extension	Frederick Ave. to N. City Limits	I	1200	\$ 49,300	
Project 5 Total					\$ 1,651,000
Total All Projects					\$ 6,332,300

Bicycle facility Key:

- I - Class I
- II - Class II
- III - Class III
- R - Improve Existing Class I
- Sp - Special Case

Unit Cost (per mile)

- \$220,000
- \$103,000
- \$7,200
- \$150,000
- N/A

