



Northern Virginia Regional Bikeway and Trail Network Study

Final Report



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ACKNOWLEDGEMENTS

Jurisdictions / Organizations participating in this study included:

- Arlington County
- City of Alexandria
- City of Falls Church
- City of Fairfax
- City of Manassas
- City of Manassas Park
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- Town of Vienna
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- Fairfax County Non-Motorized Transportation Committee
- Virginia Bicycling Federation
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EXECUTIVE SUMMARY

The Northern Virginia Regional Bike Network Study provides a coordinated and strategic approach to developing a regional transportation system for bicycling in Northern Virginia. While local jurisdictions are primarily responsible for bicycle planning in Virginia through the development of local bicycle plans and transportation plans, Virginia Department of Transportation (VDOT) plays an important role as the agency responsible for constructing and maintaining many of the primary and secondary roads, which provide Northern Virginia with regional connections between activity clusters¹.

In order to further enhance Northern Virginia's non-motorized transportation network and advance bicycling as a viable mode of travel throughout the region, VDOT initiated the following study. This study coordinates local planning efforts and identifies key regional connections.

The purpose of this study is to identify facilities and outline the steps that could be taken to develop a network of bikeways in Northern Virginia linking activity clusters throughout the region.

The development of a regional bikeway network is supported by federal and state transportation policy goals. At the time of this report's distribution, VDOT is involved in two projects that will further support bicycling within the transportation system. One project is a review of policies and procedures to ensure that motorized and non-motorized modes of transportation receive the same consideration in the planning, design, funding, construction, operation, and maintenance of Virginia's transportation network. VDOT is also working with the state's transportation agencies on a statewide initiative to integrate planning for highways, bicycle and pedestrian accommodations, passenger rail and transit, freight rail, airports, and ports, which will produce the statewide long-range multimodal transportation plan, VTrans2025. One goal of this comprehensive approach to such planning is to move towards implementation activities that will build a balanced transportation infrastructure.

Regional Focus of the Study

A considerable effort was undertaken to coordinate bikeway planning and implementation projects from a wide range of local jurisdictions in Northern Virginia. The study reflects the guidance and input of a working group of representatives from local jurisdictions including Arlington, Fairfax, Loudoun and Prince William counties; the cities of Alexandria, Falls Church, Fairfax,

¹ Important regional concentrations of employment and households as identified by the Metropolitan Washington Council of Governments.

Manassas and Manassas Park; and the towns of Herndon, Leesburg, and Vienna. The regional bikeway network proposed by this study has also been closely coordinated with the adopted plan for each of these jurisdictions.

Bicycling - A Viable Alternative?

This project comes at an important time for the future of bicycling, and transportation in general, in this region. With increasingly challenging requirements for better air quality in the region and traffic delays growing worse each year, there is a great deal of interest in new approaches to land use and transportation in Northern Virginia. In fact, bicycling is already becoming a more accepted alternative for Washington area commuters. The W&OD, Custis and Mount Vernon trails experience a morning rush hour, and the neighborhoods that lie along these trails have higher bike commute levels than other parts of the region. Northern Virginians are looking for alternatives to single-occupant vehicle trips.

In Northern Virginia, many bicyclists find roadway conditions to be challenging for long distance bicycle commuting. Particularly on the primary routes that lead to important destinations, bicyclists face heavy volumes of high-speed traffic on roads that lack dedicated bicycle facilities. This study continues VDOT's efforts to improve bicycling conditions in Northern Virginia and provide first-class facilities for all users of the transportation system.

Study Process

The planning process for this study involved a number of different activities and outreach efforts. The process is outlined briefly below.

1. **Field Analysis**

An analysis of conditions on existing trails and roadways was conducted in the field. It included a trail facility inventory, roadway lane width measurements, and assessment of pavement conditions. Other issues such as connections to transit facilities were also examined and extensive background research and field measurements were taken to develop solutions at each of the 14 demonstration project study locations.

2. **Public Input**

Public input on the study was received through a public meeting held in centrally-located Fairfax County in July 2002 and through the project website. Electronic newsletters and regular updates to the project web page were also used to keep interested individuals and groups aware of the project progress. More than 200 emails with suggestions and comments were received from the public. In addition, several

representatives of bicycle coalitions and other groups participated in the working group meetings.

3. Jurisdiction Input/Coordination

Input was received from a working group of local representatives from the counties, cities, and towns in Northern Virginia. This input was particularly important since the study is based upon local adopted plans and planning efforts.

4. Latent Bicycle Travel Demand

The study included measuring latent bicycle travel demand, which provided information on routes that serve a high number of potential bicycling origin and destination points.

5. Demonstration Projects

Local jurisdictions recommended locations for more in-depth field analysis to demonstrate the range of various types of bikeway improvements that may be possible for different roadway corridors. Demonstration project studies completed in 14 locations throughout Northern Virginia.

6. Final Network Map and Recommendations

The final regional bikeway network map and study recommendations in this report were based on all of the input and analysis described in the steps above utilizing the locally adopted bicycle plans as guides.

Summary of Recommendations

The recommendations outlined below are steps towards the creation and continued support of a regional network of bikeways in Northern Virginia. These recommendations are divided into two categories, A) Bikeway Network Recommendations and B) Planning and Policy Recommendations. In order to successfully implement these recommendations, a cooperative effort on behalf of the state and local jurisdictions will be necessary.

A. Bikeway Network Recommendations

The locations of the proposed network facilities are shown on the proposed regional bikeway network maps provided in the full report. The system of facilities includes both on-road bike lanes and paved shoulders, as well as off-road shared use paths.

- **Establish a regional network of on-road bike lanes, paved shoulders and shared use paths within and between activity clusters in Northern Virginia.**

This study provides a framework for creating a more coordinated system by recommending a network of regional bikeways and trails that extends between and through all of the Metropolitan Washington Council of Government (MWCOCG)'s activity clusters in Northern Virginia, as well as connecting to activity clusters in Maryland and the District of Columbia. This network of facilities should be among the top priorities for stand-alone projects under VDOT's new policy that allows for the funding of independent bicycle facility projects.²

- **Eliminate critical gaps in the existing bikeway network.**

A number of short gaps in the existing network were identified during public meetings, through field visits, and from analysis of the network map. Future planning efforts should focus on eliminating known gaps, as well as other gaps that are identified during project development.

- **Upgrade regionally-significant trails to industry standards.**

While most of the responsibility for major commuter trails in Northern Virginia is outside of the jurisdiction of VDOT, local jurisdictions, in coordination with VDOT, should undertake a program to widen and further improve trails that do not meet national guidelines for bikeway design. A number of needed upgrades were identified during this study and are listed below:

- W&OD Trail: Widen narrow sections of the W&OD Trail to 10-foot wide minimum, 12-foot wide in areas with heavier volumes. The trail is currently less than eight feet wide in several sections. In addition, intersection safety improvements are needed at Sterling Boulevard, Church Street in Sterling, Hunter Mill Road, West Street in Falls Church, and Route 29 in Arlington.
- Mt. Vernon Trail: Widen narrow sections of the Mt. Vernon Trail to 10-foot wide minimum, 12-foot wide in areas with heavier volumes. Improve the trail alignment along the Roosevelt Island parking lot; widen pinch points, such as the sidewalk over the inlet to the Boundary Channel. Provide connections from the trail to the Washington D.C. bridges, especially the connection across the George Washington Parkway to Arlington Memorial Bridge. Also, improve connections to the Pentagon and north Crystal City.

² Resolution of the Commonwealth Transportation Board, December 19, 2002, Section 1B.

- Accotink Trail: Widen narrow sections of the Accotink Trail to 10-foot wide minimum. The trail is 6' six feet to eight feet wide near King Arthur Road.
 - Trails along arterials: Widen narrow (defined as less than eight feet wide) shared-use paths along arterials such as Wiehle Avenue, Telegraph Road, and Lee Highway (Route 29), and others.
- **Establish a system of high quality commuter corridors that connect outlying areas directly to core urban areas.**

There are a number of key corridors that cross jurisdictional boundaries which should be considered high priority because they provide viable bicycle connections through areas that are not currently served. Two trunk routes are already in place: the W&OD Trail/Custis Trail connection and the Mt. Vernon Trail from the south. Other bicycle trunk routes that need to be developed include Route 50 (Arlington Boulevard), Braddock Road and Route 1. These routes are shown as proposed routes on the regional bikeway network map.
- **Establish a route signage system that is easily and quickly understood by bicyclists.**

A signage system should be developed to identify the regional bikeway network in Northern Virginia. Signs should be enhanced to show bikeway route numbers or names. Additional signage should also be installed to show a pictorial of the bikeway with destination and interest points.
- **Improve the mass transit system to offer seamless connections for bicycle commuters.**

Continue to improve bicycle access to transit in Northern Virginia by adding bike racks to local buses, by providing secure bike parking at transit stations and park-and-ride lots, by improving bicycle connections in the vicinity of transit stations, and by ensuring bicycle and pedestrian through transit area design.
- **Provide bicycle access across major barriers.**

There are a variety of major barriers to bicycling in Northern Virginia including major highways such as I-495, I-95 and I-66, major arterial roadways, rivers, rail lines and property sites that can force bicyclists to travel miles out of their way to cross. Providing access across these barriers should be a standard component of roadway and bridge design, including interchanges between roads.

- **Coordinate maintenance activities for bikeways to ensure a high quality, safe experience for every user of the facilities.**
VDOT and local jurisdictions should coordinate maintenance program activities that address both regular and remedial maintenance of bicycle facilities throughout the region. One component of this may be an “Adopt-a-Trail” program.

B. Planning and Policy Recommendations

The following actions are recommended to better incorporate bicycle access into standard policies and procedures of local and state government.

- **Encourage the use of context sensitive roadway design that facilitates bikeway development in all jurisdictions.**
Flexibility should be encouraged in the VDOT Roadway Design Manual to ensure that bicycle facilities can be accommodated in corridors with constrained rights-of way.
- **Undertake comprehensive changes to land use policies to encourage bicycle mobility and discourage development that is solely oriented to automobile access.**
In order for bicycling and walking to become comfortable and convenient transportation options, these modes must continue to be fully integrated into local land use decisions in Northern Virginia. While this is outside of VDOT’s specific area of responsibility, the department can provide assistance through land development recommendations and permitting process.
- **Augment regional planning efforts with local bikeway planning, design and encouragement/ promotional projects.**
It will be important for local governments to continue to advance high priority regional bikeway projects through the established channels of the transportation funding process such as the VDOT Six Year Transportation Improvement Program, Secondary Road Program, Incidental and Revenue Sharing funds and local funding.
- **Identify sufficient funding sources to establish the regional bikeway network.**
- **Establish mechanisms to enable on-going coordination and public involvement in regional bicycling issues.**
Continued coordination will be needed in the future in order to effectively implement this recommended regional bikeway network. This recommendation addresses the on-going planning, coordination, and

oversight that will be needed to advance bicycling as a viable transportation alternative in the region.

Conclusion

The thirteen recommendations described above form the basis for creation of a bikeway facilities network. This will provide the option of bicycling as a practical mode of transportation to major destinations throughout the region. These recommendations are intended to support local activities and coordination between jurisdictions as these facilities, programs, and policies are put in place.

CHAPTER 1: PURPOSE AND VISION

The Northern Virginia Regional Bike Network Study provides a coordinated and strategic approach to developing a regional transportation system for bicycling in Northern Virginia. While local jurisdictions are primarily responsible for bicycle planning in Virginia through the development of local bicycle plans and transportation plans, VDOT plays an important role as the agency responsible for constructing and maintaining many of the primary and secondary roads, which provide Northern Virginia with regional connections.

Study Purpose

VDOT initiated this study to help coordinate local planning efforts and to focus on forming key connections between activity clusters (areas with high concentrations of both jobs and households)³ in Northern Virginia, with the purpose of promoting the advancement of bicycling as a viable alternative to travel throughout the region. This study identifies the desired future regional bikeway network based on input from the public and the local jurisdictions. The study also provides a series of recommendations that outline the necessary steps to make this network a reality.

The purpose of this study is to identify facilities and outline the steps that may be taken to establish a Northern Virginia network of bicycle facilities.

Further, this study supports both federal and state transportation policy goals to ensure a balanced multi-modal transportation system:

- Section 1202 of the 1998 federal law, the Transportation Equity Act for the 21st Century (TEA-21) states that
 - *"Bicyclists and pedestrians shall be given due consideration in the comprehensive transportation plans developed by each metropolitan planning organization and State."* (Section 1202(a));
 - *"Bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction and transportation facilities, except where bicycle and pedestrian use are not permitted."* (Section 1202(a)); and
 - *"Transportation plans and projects shall provide due consideration for safety and contiguous routes for bicyclists and pedestrians."* (Section 1202(a))

³ As defined by the Metropolitan Washington Council of Governments.

- Virginia's Statewide Intermodal Long-Range Transportation Policy Plan (1995), states that the Department's policy is to *"ensure the availability of a full range of modal choices . . . and to incorporate intermodal planning, including planning for bicycle, pedestrian and telecommuting facilities, in the transportation planning efforts at the state and regional levels."*⁴

At the time of this report's distribution, VDOT is involved in two projects that will further support bicycling within the transportation system. One project is a review of policies and procedures to ensure that motorized and non-motorized modes of transportation receive the same consideration in the planning, design, funding, construction, operation, and maintenance of Virginia's transportation network. The results of this effort are scheduled to be presented to the Virginia Commonwealth Transportation Board (CTB) by early 2004. VDOT is also working with the state's transportation agencies on a statewide initiative to integrate planning for highways, bicycle and pedestrian accommodations, passenger rail and transit, freight rail, airports, and ports, which will produce the statewide long-range multimodal transportation plan, VTrans2025. One goal of this comprehensive approach to such planning is to move towards implementation activities that will build a balanced transportation infrastructure.

A regional bikeway network in Northern Virginia is also supported by the recommendations of the Virginia Department of Conservation and Recreation (DCR) in *The 2002 Virginia Outdoors Plan*. DCR has identified the need to provide *"transportation alternatives, specifically trails for walking, hiking and cycling and to connect people with destinations"* in its Northern Virginia Planning District. The Metropolitan Washington COG's *Bicycle Plan for the National Capital Region (1995)* provides further support for regional and local bicycle planning activities. It states: *"Bicycling...must be developed as an integral part of the transportation network...Bicycle and pedestrian transportation modes, either alone or combined with mass-transit modes, are some of the most cost effective, viable alternatives to increasing use of the automobile."*

Need for Regional Bicycling Improvements

Traffic congestion and air quality have become central "quality of life" issues for Northern Virginians. The number of Code Red Air Quality Days⁵ more than doubled between 2001 and 2002, and by some reports, area residents spend more than an average of 35 hours per year stuck in traffic, nearly 10 hours longer than

⁴ Virginia Statewide Intermodal Long-Range Transportation Policy Plan. 1995. Section 4.0, pp. 6-7.

⁵ As defined by the Washington Metropolitan Council of Governments. Code Red indicates an unhealthy air quality level (index of 150 - 200). On such days, MWCOG recommends that individuals limit driving; children and elderly individuals should reduce outdoor activities; healthy individuals should limit strenuous outdoor work or exercise; individuals with heart or respiratory ailments, emphysema, asthma, or chronic bronchitis should limit their outdoor activities.

the national average⁶. Alternatives to single occupant vehicle trips have become a key part of the region's approach to these problems. As past experience has shown, Northern Virginians are open to alternatives as exhibited by record-breaking numbers of Virginia Railway Express (VRE) and Metrorail riders, successful HOV facilities, increased telecommuting, and well utilized long-distance bikeways.

In fact, a number of transportation surveys have reported an increase in the number of bicycle trips that are made in Northern Virginia and in the Washington DC region.

- Census data from 1990 shows increased levels of bicycling in census tracts that lie alongside major regional trails in Northern Virginia.
- MWCOG's Household Travel Survey shows a 79 percent increase in total bicycle trips between 1988 and 1999 and a 61 percent increase in home-based work trips (commuting). (See table 1.)⁷

Table 1: Bicycle Trips in the Washington DC Region

Bicycle Trips	In 1988	In 1994	% increase between 1988 and 1994	In 1999	% increase between 1988 and 1999
Total trips per day	43,000	72,000	67%	76,800	79%
Home-Based work trips ⁸ per day (commuting)	13,200	19,900	51%	21,300	61%

Source: Council of Governments Household Travel Surveys, 1988, 1994 and 1999.

By reducing the number of auto trips, bikeways can improve air quality, improve traffic congestion, and potentially reduce the need for large parking lots at transit stations, shopping centers, and employment areas. In addition to the transportation and air quality benefits of bicycling, there are other environmental, health, and recreation benefits to establishing a regional bikeway network.

⁶ Texas Transportation Institute, 2003.

⁷ Most of this increase is the result of an actual increase in bicycling activity. Some can be attributed to improvements in survey methodology.

⁸ See above.

Regional Focus

As a regional initiative, this study focuses on longer distance connections within Northern Virginia. The goal of this initiative is to provide a focused approach and possible mechanism to connect a wide range of activity clusters throughout the region so that bicycle travel between and within them is possible.

It is equally important to note that portions of the regional bikeway network already exist. Major regional trail corridors extend across long distances and through multiple jurisdictions. In many cases, a high level of success can be achieved by closing critical gaps in this network or by connecting an existing trail to a nearby regional activity cluster.

Vision for a Future Bikeway Network

The recommendations of this study are based on a long-term vision for bicycle transportation in Northern Virginia. This vision is an important statement intended to guide the overall direction of future efforts by VDOT and local jurisdictions, as the recommendations in this study are implemented.

Vision: Northern Virginia should become a place where people have the convenient and safe option to travel by bicycle between and within activity clusters throughout the region.

This vision is supported by the recommendations (Chapter 5), which focus primarily on establishing the physical infrastructure needed to support bicycle travel in Northern Virginia. Achieving this vision will require a high level of commitment and a sustained funding effort on the part of local and state partners over the next 20 years. Implementation issues are discussed in Chapter 6.

CHAPTER 2: STUDY PROCESS

This chapter provides an overview of the planning process that was undertaken for this study, focusing on key factors that were considered during the development of the regional bikeway network.

Throughout the development of this study, VDOT actively sought the input of a wide range of stakeholders, including local citizens, bicycle advocacy groups, local bicycle advisory committees, local transportation planning agencies, local and regional parks and recreation agencies, and VDOT staff representatives from a variety of disciplines. The recommendations of this study reflect a direct relationship to the input received from these stakeholders.

Public Input

Public input on the development of the Northern Virginia Regional Bikeway and Trail Network Study revealed a clear interest on the part of the local citizens to develop and improve bicycle facilities to make bicycling a more viable transportation mode. Overall, Northern Virginians expressed concerns that busy streets, fast traffic, and physical infrastructure barriers make bicycling difficult in their communities.

Public comments were received throughout the study through the project website; each question submitted to the website received an individual response. Newsletters were also sent to interested citizens in June 2001, April 2002, and August 2002. The Washington Area Bicyclist Association provided contact information for all of their Northern Virginia members (over 800 bicyclists), which enabled the newsletter to be distributed to a wide audience. In addition, Northern Virginians provided input at public informational meetings held in July 2001 and October 2003 (see Appendix C for a summary of public comments on the Draft Study Report).

The comments received through the public outreach process helped guide the recommendations of this study. Several major themes were identified in the public comments:

1. Existing Bikeways

The public comments showed that people who use established long distance trails in Northern Virginia are, on the whole, satisfied with these trails. A number of bicyclists commented that street crossings of the Washington and Old Dominion Trail are difficult in the Herndon and Falls Church areas, and suggested that some trails need to be wider to

accommodate the number of bicyclists and pedestrians using them. Access to reach the region's trails was identified as an opportunity for improvement.

2. New Bikeways

Many citizens expressed a desire for continuous and high-quality bicycle routes along major highway corridors in Northern Virginia. Examples cited were I-66, Route 1, and Route 28. New trails were also requested along stream valleys and in active railroad rights-of-way, such as along active CSX rail corridors. Many citizens requested building shared-use paths, wide shoulders, or both during construction work on roadways such as the Tri-County Parkway, Loudoun County Parkway, and Belmont Ridge Road.

3. Access to Major Employment Centers

Public input suggested that bicycle commuters should have better access to major employment destinations in the region. Specific locations that were mentioned include: Tyson's Corner, George Mason University, Reston, Springfield, Fairfax City, Leesburg, Ashburn, downtown Washington, the Route 1 Corridor, and government complexes such as the Pentagon and the Central Intelligence Agency.

4. Gaps in the Existing Bikeway Network

Many citizens commented on gaps between existing bicycle facilities. For example, citizens recommended providing a connection between the Washington and Old Dominion Trail and the Four Mile Run Trail underneath I-395 and completing missing sections of the Fairfax County Parkway Trail to facilitate regional bicycle travel.

5. Bicycle Access to Transit

Bicycle access to transit is a high priority for citizens. Some connections already exist, but bike routes should connect to all Metro stations, transit centers, and park and ride lots. Further, citizens stressed the importance of providing good bicycle parking facilities at transit stops.

6. Cross-connections between Major Regional Routes

Citizens asked for additional connections between major routes. A few of the routes that residents mentioned were Duke Street in the vicinity of Telegraph Road in Alexandria, connecting the Holmes Run Trail to the Mount Vernon Trail; Prosperity Boulevard in Fairfax County, connecting the Little River Turnpike to Arlington Boulevard; and Stringfellow Road in Fairfax County, connecting VA 28 to the Fairfax County Parkway Trail.

7. Bridges

Bicycle facilities on bridges and connecting to bridges were mentioned consistently. In some cases bicycle facilities on bridges do not exist at all and in other cases, they are narrow, poorly maintained or difficult to access. Many citizens requested new facilities on the bridges over the Capital Beltway and on the bridges from Fairfax County into Prince William County over Bull Run and the Occoquan River. Other suggestions were to improve access to the bridges into downtown Washington, especially Chain Bridge and Roosevelt Bridge.

8. Barriers

Roadway barriers were cited many times as problems in public comments. Barriers include I-395 at Four Mile Run, Route 50 in Chantilly, the Capital Beltway throughout Fairfax County, the Dulles Toll Road, and the Fairfax County Parkway, among others.

9. Signage

The need for improved informational signage was also cited frequently in public comments. Several citizens recommended developing an informational signage system along the Fairfax County Parkway Trail. Others suggested providing signs on Old Courthouse Road to show bicyclists how to connect to the Washington and Old Dominion Trail.

10. Maintenance

Residents suggested making lighting improvements to all bicycle facilities, as well as regular maintenance such as sweeping, removing snow, and repairing existing trails as needed. Tree roots that are buckling the pavement were cited as a problem on several trails.

Local Jurisdiction Input

A working group with representatives from each county and all municipalities in Northern Virginia was set up at the beginning of the project. This group met together and separately throughout the planning process to:

- provide existing plans and GIS data from their jurisdiction
- act as liaisons between the study team and elected officials, other government employees, and local citizens in their jurisdiction
- help VDOT answer questions from citizens that were specific to their jurisdiction
- help select the routes in their jurisdiction to be studied in the technical analysis phase
- review draft maps of bicycle facilities for accuracy

- identify locations for demonstration project studies and provided needed background information
- approve the inclusion of regional bikeway network routes in plan

Input from the working group was a fundamental aspect in the development of the recommendations herein.

CHAPTER 3: EXISTING CONDITIONS

This chapter describes current bicycle conditions in Northern Virginia, including descriptions of existing bikeways (both on and off-road), as well as challenges to bicycling in the region.

Existing Bikeways

There are a number of existing bikeways in Northern Virginia that are heavily used by the region's residents and visitors. (See enclosed regional bikeway network map for locations.) The Washington and Old Dominion and Mount Vernon Trails are often cited for their high use for both transportation and recreation. Other major, heavily used trails in Northern Virginia include the Custis Trail, Four Mile Run Trail, Fairfax County Parkway Trail, and Prince William Parkway Trail, among others.

Key connections are also made with on-road bike facilities, including bike lanes on Commonwealth Avenue in Alexandria and Eads Street in Arlington. Critical bicycle connections in the region are provided by grade-separated crossings of major highways, including several bridges over Interstates 66, 395, 495 and Route 50.

The enclosed map shows the locations of existing and planned bikeways in Northern Virginia. Planned facilities that are shown on this map are limited to facilities that have been funded, either by VDOT or local jurisdictions. Only those existing and proposed bikeways that are suitable for bicycle transportation trips are shown – the map does not show locations of mountain bike trails, sidewalks or other narrow paths. This map provides a “snapshot” of the amount of activity that is already underway in each jurisdiction and the need to coordinate these activities with the goal of regional connectivity. A tally of a number of regionally significant bikeways that already exist or are fully funded in Northern Virginia includes:

- 189 miles of bike lanes, shared-use paths and trails that extend alongside roadways
- 69 miles of bicycle facilities have been planned and are funded.

In addition to bikeways that are considered regionally significant (i.e. connect across longer distances), there are also numerous local routes (i.e. shorter segments of paths, bike lanes, and shoulders). These facilities are also critical components of the bikeway system serving this region, because they provide direct access to individual neighborhoods and local destinations.

Challenges to Bicycling in the Region

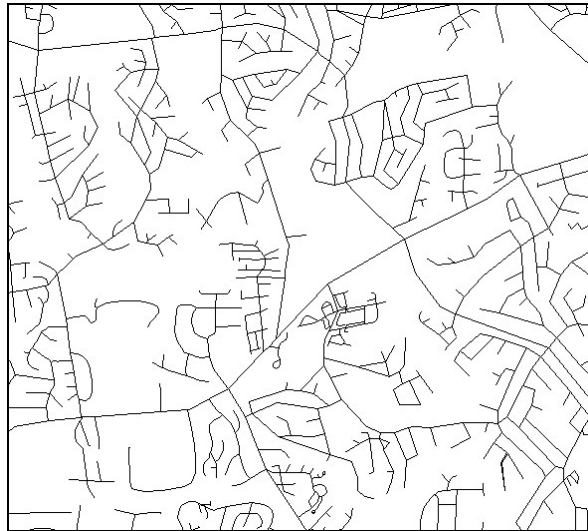
Although significant pieces of a regional bikeway system exist in Northern Virginia, there are still many routes where bicycling is inconvenient and may pose difficulties for bicyclists. The region has few bike lanes and paved shoulders outside Arlington and Alexandria, and it is difficult for many people to bicycle to major activity clusters in the region, such as Tysons Corner, Springfield, the Route 7 Technology Corridor, Manassas, Leesburg, and Woodbridge. Because many routes are heavily congested with high-speed traffic, people who would like to bicycle are often reluctant to try without the provision of bicycle facilities.

In many cases, the most direct routes between major activity clusters are the region's primary highways, such as Route 7, Route 123, Route 620, Route 1, Route 29, and Route 50. These highways have been built to accommodate large volumes of motor vehicles at high speeds, often with little or no shoulder space, creating a poor environment for bicycling. While segments of shared-use paths do exist along some of these major facilities, they do not connect to provide a continuous facility. Many gaps between segments exist and they lack signs that alert users to changes or alternatives. Outside the older sections of Arlington and Alexandria, there are few or no parallel streets that offer alternatives to these main roads (see Figures 1 and 2 below).

Figures 1 and 2. Street Pattern Examples



Old Town Alexandria – street network offers many choices of alternative bicycle routes



Dale City – street network offers few or no alternative bicycle routes

Physical Barriers

In addition to poor bicycling conditions on through routes, there are other barriers to regional bicycle travel, including major highways, rivers, rail lines and property sites that can force cyclists to travel miles out of their way to cross. Bicyclists are prohibited by state law from riding on the majority of limited access freeways and all interstates that cross through Northern Virginia. The region's expressways and multi-lane thoroughfares divide neighborhoods and separate residences from office and shopping destinations. In locations where pedestrian and bicycle bridges are not provided, the most direct bicycling route across an interstate highway is often through an interchange, which involves crossing high-speed traffic at entrance/exit ramps and riding along a heavily traveled roadway, often with little separation from vehicles. Examples of highway barriers that were identified in the public comment period include:

- I-395 at Four Mile Run
- Route 50 in Chantilly
- I-495/Capital Beltway throughout Fairfax County
- Dulles Toll Road
- Fairfax County Parkway
- I-95 in Prince William County
- I-66

In order to fully accommodate bicycling across these major thoroughfares, separate overpasses and underpasses can be constructed or interchanges can be redesigned to allow for bicycle and pedestrian access.

Major intersections also create barriers. There are many locations in Northern Virginia where two four-lane or six-lane arterial roadways meet, creating long signal phases and wide crossings in all directions that often put bicyclists in conflict with turning vehicles. Examples include the intersection of Gallows Road and Lee Highway and the intersection of Prince William Parkway and Smoketown Road.

While this study focuses on bicycle access within Northern Virginia, connections across the rivers to Maryland and Washington, D.C. are vital to connecting Northern Virginians with key destinations. Along the 70 miles of riverfront along the Potomac River, there are ten crossings that provide access to and from Northern Virginia. Four of the five bridges into Washington, D.C. have wide sidewalks to accommodate bicyclists; however, they are difficult to reach. Bicyclists must first cross the interchanges and freeways of the George Washington Parkway/ Route 110 Corridor before getting to these bridges. The Beltway bridges, the old Woodrow Wilson Bridge and the American Legion

Bridge, do not have bicycle facilities, though the reconstruction of the Wilson Bridge, which is currently underway, will provide a separated facility for bicyclists and pedestrians. In Loudoun County, White's Ferry, while not a bridge, provides a connection for bicyclists between Northern Virginia and Montgomery County, MD. It is difficult to reach because of poor bicycling conditions on Route 15 north of Leesburg. (A section of this route is being improved between Balls Bluff Road and Whites Ferry Road.) The Potomac River bridges in Loudoun County have very narrow sidewalks and are not currently designed to accommodate bicyclists. Bull Run, the Occoquan River, and Four Mile Run are also barriers to regional bicycle travel at some locations.

Land Use Barriers

Land use patterns are a significant deterrent to bicycle travel in Northern Virginia. Sprawling, low-density development has created longer travel distances between origins and destinations. Housing communities are isolated from services, workplaces, and schools. For many years, residential community design in Northern Virginia has been primarily oriented to automobile access, leaving people without a convenient and/or safe alternative mode of travel. Despite a new emphasis on smart growth, many of the developed areas in Northern Virginia will require a significant retrofit in order to accommodate and encourage bicycle transportation. This applies to nearly every aspect of development: from residential communities to Metro rail stations to office parks to neighborhood shopping centers and malls.

Low density, single-use development patterns are prevalent in southern and western Fairfax County and in parts of Loudoun and Prince William counties. In some areas, such as Tysons Corner, employment density is high, but there are few residences in the immediate area. The employment core is surrounded by multi-lane roadways with high traffic volumes that discourage bicycle commuting. In cases where there is a shopping area close to a residential development, bicycle access is often inconvenient and dangerous because there are high-speed, busy roadways and wide parking lots between the homes and the store entrances.

Bicycling is more convenient in established urban areas such as downtown Alexandria, Arlington, Fairfax, Falls Church, Leesburg, and Manassas. These areas have higher building density and a greater mix of offices, stores, parks, and residences. Some new developments, such as the transit-oriented developments around the Metrorail stations in Arlington and Alexandria, are an exception to the single-use, low-density pattern. They tend to have higher densities and a variety of land uses that facilitate shorter trips that can often be made by bicycle.

Connections to Transit

Bicycle mobility is an important element of the multi-modal transportation system in Northern Virginia. In August 2002, the Metrobus system began installing bicycle racks on its buses, increasing the mobility of transit users. However, there are many transit stations that are not adequately served by bicycle facilities. Virginia Railway Express rail stations and Metrorail stations in southern Fairfax County are not easily accessed by bicycle from nearby neighborhoods and destinations, and most park and ride lots and bus stops do not have bicycle parking facilities. Further, there are few signs that show bicyclists how to get from trails and roadways to nearby transit stations.

Maintenance Issues

Some of the maintenance problems mentioned by the public included crumbling pavement and potholes, pavement buckled by tree roots, overgrown shrubbery, and low-hanging branches. Other maintenance problems include slippery surfaces due to snow and ice, especially on trails that are shaded in the winter, and the presence of roadway debris on shoulders and bicycle lanes. With the exception of Arlington County that maintains its own secondary roads, VDOT maintains primary and secondary roads in the counties. Local jurisdictions maintain primary and secondary roads in the cities and towns with some exceptions for cities and towns with small populations.

In conclusion, the Northern Virginia region has a mix of opportunities and challenges to bicycle transportation. Future advances in bicycle mobility will depend on the region's ability to overcome considerable barriers, as well as to capitalize on the growing number of residents who have begun to use the regional trail network to get to their workplace and other destinations. Chapter 5 presents a detailed set of recommendations to achieve these goals.

CHAPTER 4: FUTURE BIKEWAY NETWORK

The enclosed regional bikeway network map is the underlying framework for the recommendations of this study and is discussed in the following chapter. This map identifies the regional network of on-road bike lanes and off-road trails that will connect activity clusters in Northern Virginia. The development of the regional bikeway network involved a mix of inputs from many different plans and stakeholders. This section provides an overview of the process that was undertaken to develop the regional bikeway network map and associated recommendations.

Routes have been included in the regional bikeway network based on:

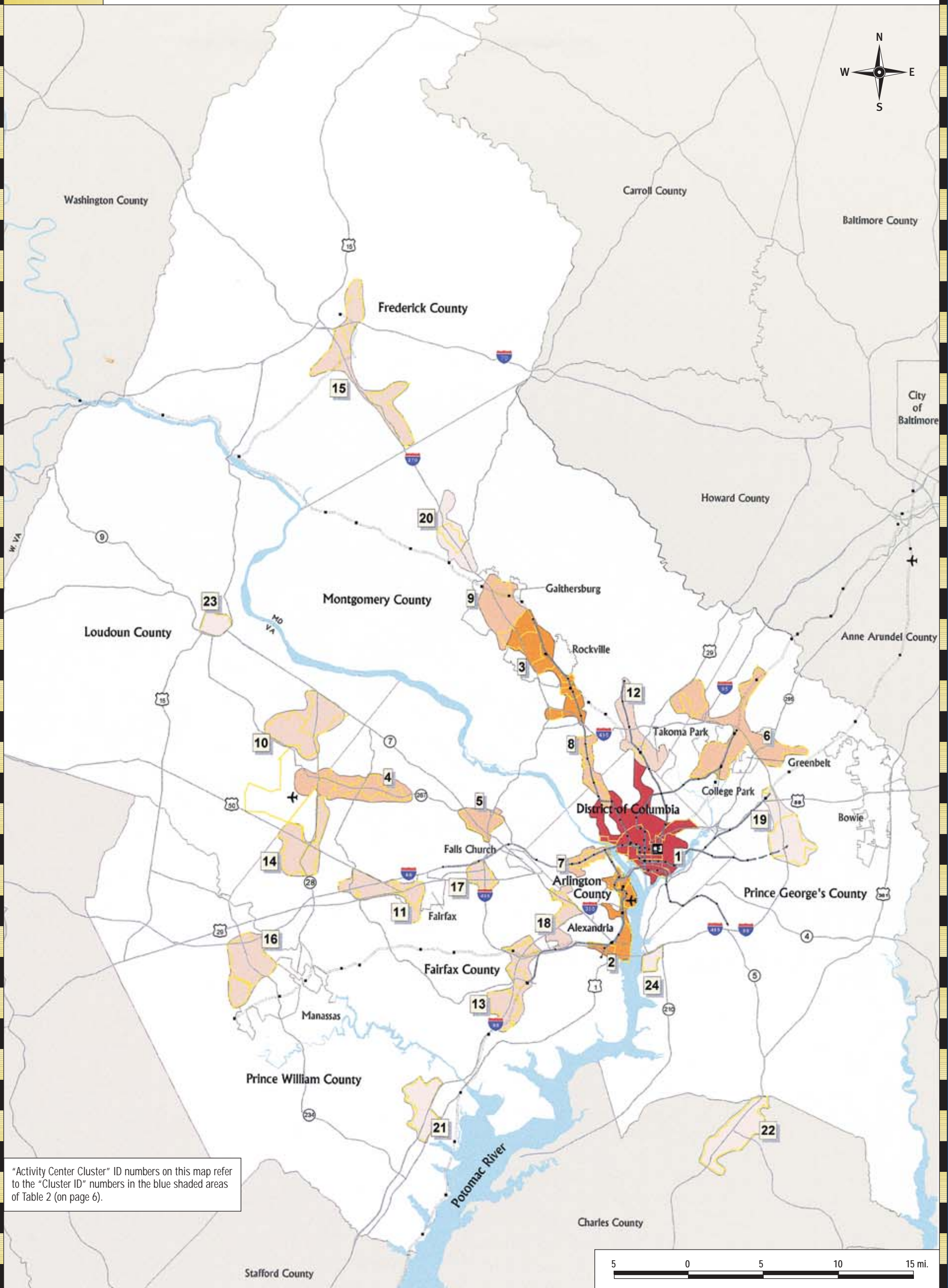
- connections to activity clusters, as established by the Metropolitan Washington Council of Governments (MWCOG) in 2002
- bike/trail/greenway plans developed by local jurisdictions (see list below)
- input from local jurisdiction and VDOT staff
- field work
- public comments
- latent demand analysis (see description below)

The proposed regional network includes a total of 828 miles of existing and proposed bikeways throughout Northern Virginia. Of this total mileage, 258 miles are either already existing or have been funded for construction. The existing and proposed network only includes facilities suitable for regional bicycle transportation trips (sidewalks, narrow bikeways, hiking trails and mountain bike trails are not included).

Activity Clusters

In 2002, the Metropolitan Washington Council of Governments (MWCOG) and the National Capital Region Transportation Planning Board (TPB) unveiled an important planning and policy tool that had been under development for several years, the identification of the Metropolitan Washington Regional Activity Centers. These centers, called clusters when grouped together, refer to important regional concentrations of employment and households. The regional bikeway network seeks to improve connections within and between these clusters in Northern Virginia. A map of activity clusters is provided below.

Regional Activity Centers and Clusters



"Activity Center Cluster" ID numbers on this map refer to the "Cluster ID" numbers in the blue shaded areas of Table 2 (on page 6).

LEGEND

ACTIVITY CLUSTERS (Employment 2025)

- 15,000 - 49,000
- 50,000 - 99,999
- 100,000 - 149,999
- 150,000 - 199,999
- 200,000 - 700,000
- Activity Center Boundaries

- Metro Stations
- ▲ Metro Stations (under construction)
- Commuter Rail Stations

- Union Station
- Airports
- Major Roads

- Metro Rail Lines
- Metro Rail Lines (under construction)
- Commuter Rail Lines



Bike/Trail/Greenway Plans

The Regional Bikeway and Trail Network identified in this study utilizes a number of existing bikeways as well as those with full funding for construction. Adopted bike plans from local jurisdictions were used initially to establish the study network, and ultimately to help determine the development of the regional network map. Other data, such as informal bike route maps, proposed connections, and priority routes identified through public comments were also considered. Local plans and other sources of data used in this study include:

Regional Sources

- Virginia Department of Transportation – *Northern Virginia 2020 Transportation Plan*, 1999
- Metropolitan Washington Council of Governments – geographic information system data, compiled 2001
- Alexandria Drafting Company – *Washington DC Regional Bike Map*, 1998
- public information meeting (July 31, 2001) – maps marked and comments collected from break-out groups
- project website – public comments received through the comment area on the website
- field data collection, summer 2001-2002

Arlington/ Alexandria

- Arlington County – *Bicycle Transportation Plan*, 1994; *Arlington County Bikeways Map*, 2001
- City of Alexandria – *Alexandria Bicycle Transportation and Multi-use Trail Master Plan*, 1998; *Alexandria Recreation Facilities and Trails Map*, 2000
- *Extending the Mount Vernon Trail from Key Bridge to The American Legion Bridge (I-495): Options and Recommendations* (Washington Area Bicyclist Association and Virginia Bicycling Federation)

Fairfax County/Falls Church

- Fairfax County – *Proposed Countywide Trails Plan Amendment Map*, 2001
- Town of Herndon – *Master Trails Plan*, 1992
- Northern Virginia Regional Commission – geographic information system data
- City of Fairfax – trails map
- City of Falls Church – *Transportation Network Plan*

Loudoun County

- Loudoun County – *Bicycle and Pedestrian Transportation Master Plan*, 2003
- Loudoun County – *Comprehensive Transportation Plan*, 2001
- Town of Leesburg – *Pedestrian/Bicycle Trail Map*, 1993

Prince William County

- Prince William County – *Prince William County Comprehensive Plan, 1998;*
Prince William County Trails and Greenways Master Plan, 1993
- City of Manassas – *2001 Bike Trail Master Plan*
- City of Manassas Park – *Bike Route Map*

Input from Local Jurisdictions and VDOT Staff

In addition to using the plans listed above from local jurisdictions, input from the working group established at the beginning of the study process was also critical to establishing the regional bikeway network. The working group was composed of representatives from each county and all municipalities in Northern Virginia as well as representatives from VDOT. This group helped select the routes in their jurisdiction to be studied in the technical analysis phase, identified locations for demonstration project studies, and approved the final recommended regional bikeway network routes. Input from the working group was a fundamental aspect in the development of the recommendations of this study.

Public Comments

The public comments gathered at the public informational meetings, through the interactive website, and through community representatives who participated in the working group also played an important role in the determination of the regional bikeway network. A summary of these comments was provided in Chapter 2.

Latent Demand Analysis

The routes in the Northern Virginia regional bikeway network were also selected based on their potential to serve bicycle trips. Land use patterns can help determine this potential. Routes that are more likely to be used when bicycle facilities are improved or added are those that are near high concentrations of population and close to destinations, such as offices, stores, parks, transit stops, and schools. This study used the Latent Demand Method to determine the relative potential of roadways to be used by bicyclists. A detailed description of the method is provided in Appendix B. This analysis was completed on over 1,650 miles (1,968 segments) of roadways and trails in Northern Virginia.

In conclusion, the recommended route network and study recommendations in Chapter 5 build upon previous regional and local planning activities (i.e. MWCOCG's activity clusters and bicycle network plans done by local jurisdictions), as well as outreach and analysis that was conducted as a part of this current planning effort.

CHAPTER 5: STUDY RECOMMENDATIONS

This chapter presents the recommendations of the Northern Virginia Regional Bikeway and Trail Network Study. The recommendations are designed to achieve the vision of an interconnected network of bikeways that provide a comfortable, convenient, and safe transportation option.

While this study focuses on the physical network, there are a number of other important issues including enforcement, encouragement/promotion, education and awareness that should also be part of a comprehensive bicycle program. These are covered in detail in the *Virginia Bicycle Facility Resource Guide, 2001* and other sources and were not included in the scope of this study. This should not diminish their importance in the overall effort to promote bicycle travel.

The recommendations of this study represent a coordinated program, each part of which contributes to the success of the others. The local jurisdictions and VDOT will need to work together in order to ensure the implementation of these recommendations. The thirteen recommendations are divided into two categories bikeway network recommendations and policy/planning recommendations. Recommendations are not presented in any priority order.

- As discussed in Chapter 1, these recommendations support federal and state transportation policy goals.

A. Bikeway Network Recommendations

The recommended actions described below are needed in order to develop and support a regional network of bikeways in Northern Virginia. There are a total of eight recommendations in this category.

❖ Establish regional network of on-road bike lanes, paved shoulders and shared use paths within and between activity clusters in Northern Virginia.

It will be important to avoid the piecemeal effect that could occur as bicycle accommodations are incorporated into short stretches of roadway under reconstruction. This study provides a framework for creating a more coordinated system. It recommends a network of regional bikeways that extends between and through all of the Metropolitan Washington Council of Government (MWCOC)'s activity clusters in Northern Virginia, as well as connecting to activity clusters in Maryland and the District of Columbia. The

recommended regional bikeway network was strongly supported by public comments received during the study, which stressed the importance of providing bicycle facilities to major employment centers such as Tyson's Corner, George Mason University, Reston, Springfield, Fairfax City, Leesburg, Ashburn, Arlington, downtown Washington, the Route 1 Corridor, and government complexes such as the Pentagon.

The enclosed future regional bikeway network map shows the specific locations of recommended bikeways that are included in this section of the report. The map also provides the following information:

- locations of existing on-road bike lanes and off-road shared use paths, as well as fully funded facilities in each of these categories
- locations of proposed bikeways recommended for the regional network based on the local jurisdictions' plans and input during the study process
- other notable local bicycle facilities that exist today

Facility Selection

The particular type of facility –i.e. bike lane vs. parallel shared use path has not yet been determined for each route in the proposed regional network. This type of determination should be made by the local jurisdictions according to their respective adopted plans and coordination with VDOT during the project development phase. The demonstration projects in Appendix A provide examples of the type of analysis that can be done in order to determine what type of facility is feasible/appropriate given existing condition.

While this study has not determined the precise type of facility for the proposed routes, it will be essential that the regional bikeway network include both on-road bicycle facilities (such as bike lanes and paved shoulders) as well as shared-use paths in dedicated corridors and along roads. In many corridors on-road bikeways will be a more practical and cost effective accommodation, particularly where the right of way is constrained and there is little room for a pathway.

On-road bike facilities are specifically distinguished from off-road facilities by the AASHTO *Guide for the Development of Bicycle Facilities* (1999), which states that *“shared use paths should not be considered a substitute for street improvements even when the path is located adjacent to the highway, because many bicyclists will find it less convenient to ride on these paths compared with the street, particularly for utility trips.”*⁹ Therefore, a regional bikeway network should include both on-road and off-road facilities.

⁹ AASHTO *Guide for the Development of Bicycle Facilities* (1999), p. 35

New Construction vs. Retrofit

In partnership with local jurisdictions, VDOT has capitalized on past opportunities to improve bicycle access during the course of major road construction and reconstruction projects. Examples include the Prince William County Parkway Trail and the Fairfax County Parkway Trail. From the outset, these four-lane highways were designed to accommodate a trail within their right of way.

A big issue for the future will be the need to retrofit roadway corridors that are already severely constrained within their right of way. In these locations, previous road widening projects have left little room for bicycle facilities, yet there is no question that these routes serve as critical connections to regional activity clusters, such as Tyson's Corner, Rosslyn, Manassas, and the office corridors near Dulles Airport in western Fairfax and eastern Loudoun Counties.

Prior to a December 2002 policy change that allows for independent bicycle facility projects, VDOT participated in the planning and implementation of several bicycle facilities but only when these facilities were part of a broader road improvement project. The new policy states, "*the Department's participation in bicycle facilities is oriented toward facilities that may be constructed either as part of a highway construction project or an independent transportation project.*" (Section 1b) While VDOT should continue to take advantage of the efficiencies of improving bicycle access during roadway improvement projects, retrofit projects should be among the top priorities for stand-alone projects under the VDOT's new policy.

In many cases, retrofit solutions will be a compromise, rather than an ideal bicycle accommodation. In some cases, accommodating safer bicycle travel will require a balance between competing interests. Compromise will be essential in order to achieve a balanced transportation system that accommodates alternative modes of travel.

Demonstration Projects

In order to provide more detailed recommendations for several key regional connections that are shown on the regional bikeway network map, demonstration project studies were completed in fourteen locations throughout Northern Virginia using federally accepted design approaches described in such documents as the AASHTO *Guide for the Development of Bicycle Facilities* (1999). Local jurisdictions were asked to submit a list of potential demonstration project study locations, and provided input on the recommendations in each report. These demonstration project studies serve several purposes:

- The demonstration projects provide innovative design recommendations that, in some cases, can be implemented in a short timeframe in order to immediately improve bicycling conditions.
- Several of the demonstration projects provide examples of solutions that are feasible, and also relatively low cost.
- The projects demonstrate retrofit solutions and offer an opportunity to review policy issues that will be inherent in these types of projects.
- The demonstration projects include on-road bike lanes, paved shoulders and off-road shared-use paths, providing an opportunity for VDOT and local jurisdictions to test a variety of different design treatments that are recommended in the AASHTO design guide.

The location of the demonstration projects is listed below and the full studies are provided in Appendix A.

Arlington/Alexandria

- Route 27 (East Cemetery Wall Connection-Joyce Street to Route 110)
- Route 50 / Arlington Boulevard (Park Drive to Glebe Road)
- VA 120 / North Glebe Road (Old Dominion Drive to Old Glebe Road)
- Route 7 / King Street (Janneys Lane to Commonwealth Avenue)
- Route 420 / Seminary Road/Janneys Lane, Route 7 / King Street, and Braddock Road (I-395 to King Street Metro and Braddock Road Metro)

Fairfax County

- Route 617 / Amherst Road / Backlick Road (one-way pair) (Highland Street to Old Keene Mill Road)
- Route 50 / Arlington Boulevard (Fairfax City Limit to Arlington County Limit)
- Route 620 / Braddock Road (Route 651 / Guinea Road to Route 613 / Lincolnia Road)
- University Drive/Old Lee Highway in Fairfax City (George Mason University to the Vienna Metro Station)
- Route 7 / Broad Street in Falls Church (Route 703 / Haycock Road to Washington and Old Dominion Trail)
- South West Street in Falls Church (Route 29 / Washington Street to Route 7 / Broad Street)
- Interstate Bicycle Route One (Fort Belvoir area)
- Gallows Road (Tysons Corner to Dunn Loring Metro)

Prince William County

- Route 28 / Centreville Road (Liberia Avenue to Fairfax County Line)

❖ Eliminate critical gaps in the existing bikeway network.

Over the past 20 years, a number of long distance trails have been developed that pass through the heart of Northern Virginia activity clusters. The success of these trail facilities as transportation routes can be further enhanced by providing connections between short gaps between trails or gaps between trails and nearby destinations. Such relatively small public investments can have large benefits for bicycling in Northern Virginia and therefore should be among the highest priority improvements.

❖ Upgrade regionally-significant trails to industry standards.

A number of trails in Northern Virginia do not meet national guidelines and recommendations for bikeway design as set forward by the AASHTO *Guide for the Development of Bicycle Facilities* (1999), mainly due to substandard width. While most of the responsibility for major commuter trails in Northern Virginia is outside of the jurisdiction of VDOT, Northern Virginia jurisdictions should undertake a program to widen and otherwise improve these trails.

AASHTO states that, *"Under most conditions, a recommended paved width for a two-directional shared use path is 3.0 m (10 feet). In rare instances, a reduced width of 2.4 m (8 feet) can be adequate."*¹⁰ *Under certain conditions it may be necessary or desirable to increase the width of a share use path to 3.6 m (12 feet), or even 4.2 m (14 feet) due to substantial use by bicycles, joggers, skaters and pedestrians, use by large maintenance vehicles, and/or steep grades."*¹¹ Paths of inadequate width could potentially create uncomfortable and unsafe conditions, particularly on trails that are heavily used by bicyclists, pedestrians, joggers, rollerbladers, and other users.

Sharp turns and blind curves on existing trails in Northern Virginia cause safety problems for bicyclists. In addition to addressing substandard widths, future upgrades to existing trails should also be designed to meet AASHTO guidelines for horizontal curves.

¹⁰ " This reduced width should be used only where the following conditions prevail: (1) bicycle traffic is expected to be low, even on peak days or during 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, and (4) during normal maintenance activities the path will not be subjected to maintenance vehicle loading conditions that would cause pavement edge damage. AASHTO *Guide for the Development of Bicycle Facilities* (1999), p.36

¹¹ Ibid.

Lighting for night-time use is another issue that is important to bike commuters, particularly considering the growing number of people in Northern Virginia who commute during alternative hours to avoid rush hour traffic. Night lighting can help to make the trail system more functional for all users, including those that use trails during the winter months when the morning and evening commutes are often made in the dark. Local park authorities and trail managers should be encouraged to provide lighting for off-road paths for safety and security reasons.

Specific recommendations for upgrades to existing trails in Northern Virginia include:

- W&OD Trail: Widen narrow sections of the W&OD Trail to 10-foot wide minimum, 12-foot wide in areas with heavier volumes. The trail is currently less than eight feet wide in several sections, such as near Dry Mill Road. In addition, intersection safety improvements are needed at Sterling Boulevard, Church Street in Sterling, Hunter Mill Road, West Street in Falls Church, and Route 29 in Arlington.
- Mt. Vernon Trail: Widen narrow sections of the Mt. Vernon Trail to 10-foot wide minimum, 12-foot wide in areas with heavier volumes. Improve the trail alignment along the Roosevelt Island parking lot; widen pinch points, such as the sidewalk over the inlet to the Boundary Channel. Provide connections from the trail to the Washington D.C. bridges, especially the connection across the George Washington Parkway to Arlington Memorial Bridge.
- Accotink Trail: Widen narrow sections of the Accotink Trail to 10-foot wide minimum. The trail is 6' six feet to eight feet wide near King Arthur Road.
- Trails along arterials: Widen narrow (defined as less than eight feet wide) shared-use paths along arterials such as Wiehle Avenue, Telegraph Road, and Lee Highway (Route 29), and others.

❖ Establish a system of high quality commuter routes that connect outlying areas directly to core urban areas.

As described earlier, bicycle commuting in Northern Virginia has increased in recent years due to the availability of several high quality trails – primarily the Custis Trail in Arlington, the W&OD Trail, and the Mount Vernon Trail. A large part of the reason for the success of these trails is that they offer high quality, direct, and safe connections for bicycle users.

It is clear that Northern Virginia commuters are interested in alternatives to traffic congestion; however in order for more commuters to choose bicycling as an alternative, it is critical that better bicycling accommodations be provided. More on-road bike lanes and shoulders are needed throughout the region to help bicyclists reach their ultimate destination in a more efficient manner. This is particularly important for regional long distance commutes.

For these reasons, it is recommended that VDOT and local jurisdictions initially focus attention and funding on a number of key routes in the regional bikeway network that should be carefully designed with longer distance commuter bike trips in mind. These bikeways should be designed to provide high quality, direct, and safe connections for bicycle users – in effect, serving as trunk routes for bicycle travel. As such, improvements along these corridors should provide a coherent and clear path of travel for bicyclists, with as little interference from motor vehicle traffic as possible. Two trunk routes are already in place: the W&OD Trail/Custis Trail connection and the Mt. Vernon Trail from the south. The other two bicycle trunk routes that need to be developed are Route 50 (Arlington Boulevard) and Braddock Road. These routes are shown as proposed routes on the regional bikeway network map.

A distinctive and clear signage program (see the following recommendation) will be especially important to guide bicyclists along these corridors and direct them to other key bikeway connections.

❖ Establish a route signage system that is easily and quickly understood by bicyclists.

A signage system should be developed to identify the Northern Virginia Regional Bikeway and Trail Network. This will be particularly important for the trunk routes detailed above. Standard green bike route signs are used currently to designate facilities for bicycling. These signs should be enhanced to show the bikeway route number or name. Additional signage should also be installed to show a pictorial of the bikeway. It may be possible to design these additional signs like the Metrorail system signs, showing the trail end point, and all the destinations in the direction of that terminus. Other pertinent information such as park and ride lots and transit stations should be displayed in the background. Above all, bicyclists should be aware that they are riding on a route that is part of a continuous system of bikeways throughout Northern Virginia.

❖ **Improve the mass transit system to offer seamless connections for bicycle commuters.**

Bicycle access to transit is a high priority to citizens in Northern Virginia. Some recent advances in accommodating bicyclists in the region include: bike racks are being installed on all Metro and Arlington Transit buses, bicycles are allowed on Metrorail during off-peak hours, and bicycle lockers have recently been installed at several of the newly built VDOT park and ride lots (nearly 100 lockers). But in general, access to transit remains difficult for Northern Virginia commuters, and the following actions are recommended:

- add bike racks to all buses that serve Northern Virginia (CUE, DASH, Fairfax Connector, Loudoun Commuter Bus, Omniride, TAGS)
- provide high quality, secure bike parking at all Metrorail and VRE stations, and Park-and-Ride lots, per the recommendations in VDOT's NOVA District Bicycle Locker Program Assessment (2002)
- conduct a transit access study, focusing on improving connections for bicycles and pedestrians within a 1.5-mile radius of existing transit stations and large park-and-ride lots
- make bike and pedestrian access a major component in the design of all future transit stations and park-and-ride lots
- The recommended route network provides regional bike routes to all Metrorail stations and nearly all transit centers and park-and-ride lots. Connections to the Alexandria, Tyson's Corner, and Springfield Transit Centers and the Herndon/Monroe park-and-ride facilities were specifically cited in public comments.

❖ **Provide bicycle access across major barriers.**

There are currently many barriers to regional bicycle travel in Northern Virginia, including freeways and interchanges, rivers, and intersections of major arterial roadways (see description of these barriers under the existing conditions in Chapter 3). Gaining access across these barriers will, in many cases, carry significant costs, and should be based on a careful analysis of potential demand. A number of major highway and bridge crossings are heavily used by bicyclists, such as the W&OD Trail bridge over I-495, and the Key Bridge into Washington DC. This indicates that these types of crossings can be very successful at encouraging bicycle travel when they are located in optimum crossing locations that do not require bicyclists to make significant detours.

All new river bridges, highway bridges and interchanges should be designed from the outset to accommodate bicycle travel and prevent these facilities from creating barriers to bicyclists.

In the case of interchange design where it is necessary to cross free-flowing on and off-ramps, the suitability of at-grade crossings should be carefully weighed based on projected traffic volumes and speeds. In many cases, it will be necessary to cross ramps with grade-separated structures.

All new bridges should provide for bicycle access per the AASHTO *Guide for the Development of Bicycle Facilities (1999)*. If special circumstances exist that effectively prevent the inclusion of bicycle accommodation in new bridges or highway interchanges, VDOT and the local jurisdictions should work together to identify clear alternative routes for bicyclists that minimize travel distances. VDOT and the locals should also continue to work together to provide alternative routes to overcoming existing barriers.

❖ Coordinate maintenance activities for bikeways to ensure a high quality, safe experience for every customer.

Bikeway maintenance is an issue that was regularly cited as a problem by citizens who submitted comments for this study. Proper maintenance of facilities is critical to the mobility of bicyclists. Due to fact that most bicycles lack suspension and have narrow wheels, they are particularly sensitive to irregularities in pavement condition caused by tree roots, weathering, snow, ice, and other surface debris. Overhanging tree branches and overgrown shrubbery also create hazards for bicyclists. In addition to improving bicycling conditions, proper maintenance and management of bikeways will also serve to reduce state and local governments' exposure to liability claims.

Currently, maintenance of bicycle facilities in Northern Virginia is shared by VDOT, local jurisdictions, federal and regional agencies. On-road bike lanes and shoulders are included as a part of regular roadway maintenance programs. Several major regional trails are maintained by federal and regional agencies: the Mount Vernon Trail is maintained by the National Park Service, and the W&OD Trail is maintained by the Northern Virginia Regional Park Authority. In general, shared-use paths that are entirely in the VDOT right-of-way are maintained by VDOT; otherwise they are the responsibility of the local jurisdiction. In some cases when the sidepath meanders in and out of the VDOT right-of-way (e.g. the Fairfax County Parkway Trail) there are agreements between the jurisdiction and VDOT to perform all maintenance.

Maintenance activities for shared-use paths include repaving (only when there are problems over a significant portion of a trail) and trimming branches. VDOT does not plow or use salt on trails in the winter, though Arlington County does this for several of their higher volume trails during winter months. Maintenance work is typically performed after problems are reported by citizens or are noted by field crews.

It is therefore recommended that VDOT and local jurisdictions coordinate both regular and remedial maintenance of bicycle facilities in the region. The program should be funded jointly by VDOT and local jurisdictions, with VDOT designating a team to proactively monitor and fix problems on the designated regional route network and local jurisdictions monitoring and maintaining on other bikeways.

This joint program would also include the following:

- Comprehensive list of all bikeways in NOVA and jurisdiction/agency responsible for maintenance. This can be included as a field in the regional GIS database that has been developed as part of this study.
- Advertisement and encouraged use of a central phone number/contact within VDOT for all remedial bikeway maintenance requests. The division formerly known as maintenance has for many years encouraged bicyclists to report problems through the highway helpline (1-800-367-ROAD or through VDOT's website at <http://www.virginiadot.org/comtravel/eoc/citizen.asp>). If the reported facility is not a VDOT facility, the request can be routed to the appropriate agency, based on the information provided in the database described above
- Training for local and state agency personnel regarding proper maintenance of on-road and off-road bicycle facilities.

Another option, in addition to this joint effort by VDOT and the local governments, is to establish an **Adopt-a-Trail program**. This program would be modeled after the Adopt-a-Highway program. It would include both in-kind contributions by adopters who would help with litter clean up and simple trail maintenance as well as monetary contributions that would help pay for repaving, plowing, and other maintenance duties performed by local jurisdictions and other agencies.

B. Planning and Policy Recommendations

The actions described below are needed in order to incorporate bicycle access into standard policies and procedures of local and state government. There are a total of five recommendations in Category B.

❖ Encourage the use of context sensitive roadway design that facilitates bikeway development in all jurisdictions.

As explained in the recommendations above, *on-road* bike lanes and shoulders will be an essential part of Northern Virginia's regional bikeway network. Unfortunately, many road corridors are constrained in their rights-of-way. In some cases, widening these roads to include bike lanes would require land acquisition and relocation of expensive infrastructure such as utilities, sidewalks, and curbs.

Fortunately, on many VDOT roadways in the region, wide motor vehicle lanes will make it possible to provide bike lanes and shoulders without the need for additional pavement width. For some roadway types, the minimum lane widths in VDOT's Roadway Design Manual exceed those established by AASHTO's *Policy on the Geometric Design of Highways and Streets* (Greenbook). In fact, the 2001 edition of the Greenbook encourages design professionals to use minimum lane widths in locations where other roadway users are impacted. The guide states:

"The intent of this policy is to provide guidance to the designer by referencing a recommended range of values for critical dimensions. It is not intended to be a detailed design manual that could supercede the need for the application of sound principles by the knowledgeable design professional. Sufficient flexibility is permitted to encourage independent designs tailored to particular situations. Minimum values are either given or implied by the lower value in a given range of values. The larger values within the ranges will normally be used where the social, economic and environmental (S.E.E.) impacts are not critical." (emphasis added)¹²

Reducing lane widths can be one way of providing facilities in locations where bicycle accommodations are planned. For example, allowing 10-foot lane widths on urban roadways through developed areas with low truck volumes and low speeds would make it possible to provide for safer bicycle access in corridors with constrained rights-of-way. Several VDOT projects have already

¹² AASHTO's *Policy on the Geometric Design of Highways and Streets* (2001), p. xli, fourth paragraph.

implemented narrower lane widths to improve safety, such as the 10-foot lanes recently provided on the newly resurfaced Route 9 in Loudoun County.

Bicycle accommodations are affected by other design features, such as intersection turn lane and curb radii design; signal timing and loop detector design; interchange design; and design speeds. These features should be planned with bicycle accommodation in mind.

VDOT faces continuous demands to focus on maintaining high levels of capacity throughout the roadway system and to address growing levels of traffic congestion. It will also be important to consider alternative modes of travel throughout the region, in order to alleviate traffic congestion and improve air quality. Reasonable compromises should be sought to accommodate bicycles within the existing roadway network.

❖ Undertake comprehensive changes to land use policies to encourage bicycle mobility and discourage development that is solely oriented to automobile access.

In order for bicycling and walking to become comfortable and convenient transportation options, these modes must be fully integrated into everyday land use decisions in Northern Virginia; such as where new schools will be located, how residential communities will be designed, and where commercial and employment centers are located. Past practices of providing segregated, low density developments have resulted in trip distances that are better suited to the automobile than to bicycle travel. Nonetheless, nationally half of all trips made in urban areas are less than three miles, a distance that can be traveled in 15 minutes on a bike.¹³

Changing long-standing land development policies and practices is no small task. In addition to changes in land development codes and ordinances, policy changes will require more awareness of walking and bicycling issues on the part of planning and code enforcement staff, developers, roadway designers, comprehensive planners, and others. Site layout and design decisions for developments (both large and small) should encourage bicycle and pedestrian access by providing a direct connection “to the front door” via shared use paths, bike lanes, and paved shoulders.

¹³ National Household Travel Survey 2001.

Bicycle parking ordinances should be adopted to ensure not only that adequate amounts of parking are provided but that the parking is located and designed correctly. Parking garages should be designed to include bike parking areas that are within sight of parking garage attendees.

Land use planning and site plan review are primarily the responsibility of local jurisdictions in Northern Virginia, however, as much as possible, VDOT should assist and encourage more bicycle compatible development through land development and site plan review.

❖ **Augment regional planning efforts with local bikeway planning, design, transportation demand management programs and encouragement/ promotional projects.**

The establishment of a regional network of bikeways in Northern Virginia will clearly require a partnership among local jurisdictions and the state. Since the majority of programmed improvements outlined in VDOT's implementation programs (such as the VDOT Six Year Transportation Improvement Program) are in response to requests made by local jurisdictions, it will be necessary for local governments to continue to advance high priority regional bikeway projects, including upgrades to substandard shared-use paths, locations for new trails and on-road bikeways (such as the commuter corridors described in the earlier recommendations), and bicycle retrofit projects during roadway resurfacing.

In addition to facility construction projects, local jurisdictions are encouraged to develop transportation demand management programs to support and promote bicycle commuting, to increase public awareness of bicycling as a mode of transportation, and to provide educational opportunities for motorists and bicyclists. Examples of the types of programs that have been implemented in Northern Virginia, and in other communities in the U.S., include:

- transportation demand management programs to encourage employers to reduce motor vehicle trips to the workplace by offering incentives to employees who choose to bicycle or walk
- elementary and middle school bicycle safety education programs such as the new Maryland Pedestrian and Bicycle Safety Education Program.
- public awareness/outreach programs that promote bicycling to transit and other health and transportation benefits of bicycling
- Bike-to-Work events, such as those already held in the Washington area each year in May

More information on these and other types of programs can be found in the *Virginia Bicycle Facility Resource Guide* and at www.bicyclinginfo.org.

❖ **Identify sufficient funding sources to establish the regional bikeway network.**

It will be critically important to establish or identify funding sources to support the construction of the regional bikeway network. More detailed information on funding and implementation is provided in Chapter 6.

❖ **Establish mechanisms to enable on-going coordination and public involvement in regional bicycling issues.**

The planning process for the Northern Virginia Regional Bikeway and Trail Network Study has been particularly helpful in bringing together adjacent jurisdictions to discuss bikeway issues. Continued coordination will be needed in the future in order to effectively implement this regional network. The following actions are therefore recommended:

- Continue the working group established for this study to form a Northern Virginia Bicycle Advisory Committee. This committee should include several members of the general public, in addition to staff from local jurisdictions.
- Regularly update/amend the regional bikeway network and GIS database developing short-term priorities and reassessing priorities as needed. The short-term priority list should serve as a recommendation to the annual VDOT Six Year Transportation Improvement Program, regional bicycle plans, and local improvement plans.
- Conduct feasibility studies for critical cross-jurisdictional routes identified in this Study, as identified in the Demonstration Projects in Appendix A.

Conclusion

The thirteen recommendations described above form the basis of a network of bikeway facilities that will improve bicycle access to major destinations throughout the region for Northern Virginia residents. While these recommendations focus on a regional network, additional local activities and connections will continue to be of utmost importance.

CHAPTER 6: IMPLEMENTATION

Implementation of the recommendations in this regional study will require the commitment of many people and effective partnerships among many organizations. The task of building a regional bikeway network in Northern Virginia will not fall on any one single agency or jurisdiction – rather it must be shared among a variety of state, regional, and local agencies. Citizens will play a strong role in the process as well, providing support for new projects and programs at the local and regional level.

Implementation Schedule

The recommendations in Chapter 5 suggest a critical path to achieving a successful regional network of bikeways. Some activities will need to begin immediately in order to build on the cooperation and momentum that has been generated by this study. There are other activities that will naturally follow and will be determined, in a large part, by opportunities that emerge in the future. The schedule below concentrates, on the highest priority actions that are needed in the near term.

HIGH PRIORITY ACTIONS	
Category A: Network Construction	Partner Organizations
1. provide facilities to fill key gaps between existing parts of the regional bikeway network	state, local transportation and public works agencies, and citizens
2. implement the improvements recommended in the demonstration project studies (see Appendix A)	state, local transportation and public works agencies, citizens
3. construct parts of the regional bikeway system in conjunction with roadway improvements in the VDOT Six Year Transportation Improvement Program	state, Local Transportation and Public Works Agencies, citizens
4. upgrade existing trails to industry standards	state, local transportation and public works agencies, NVRPA, NPS, citizens
5. develop at least one new regional trunk route and promote the route to residents	state, local transportation and public works agencies, citizen advocates
6. coordinate maintenance activities and schedule for bicycle facilities	state, local transportation and public works agencies
7. design and adopt signage system design for regional routes and sign existing parts of the network, including improved signage to transit stations	state/local jurisdictions

8. provide bicycle accommodation on transit systems	Metro, VRE, Arlington Transit, DASH (Alexandria), Fairfax Connector, CUE (Fairfax City), Loudoun County Commuter Bus, RIBS (Reston), TAGS (Springfield), Tysons Shuttle
Category B: Policy and Planning Activities	Partner Organizations
9. establish a bicycle advisory group for regional bicycling issues and to oversee implementation of the recommendations of this study	state, MWCOG, local transportation and public works agencies, NPS, NVRPA, NVRC, citizens
10. include bikeway component within local comprehensive plans, advance high priority projects	local transportation and planning agencies
11. identify and secure funding for regional bikeways, bike parking, and other necessary expenditures	state, local transportation and public works agencies
12. initiate discussions on lane width standards	state
13. adopt new site, subdivision, and land use development guidelines	local planning agencies
14. monitor and report the number of miles of the regional bikeway system that are completed each year	state
15. offer context-sensitive design training to all design professionals in the region	state, MWCOG, local transportation, planning, and public works agencies

APPENDICES:

Appendix A: Demonstration Project Studies

Bicycle Level of Service Model Summary

Summary Table of Demonstration Project Study Locations

Demonstration Project Case Studies

Summary of Additional Routes Requested by Local Jurisdictions

Appendix B: Latent Demand Method

Appendix C: Summary of Public Comment on the Draft Study Report