



Bikeway Plan for the Roanoke Valley Area Metropolitan Planning Organization



August 2005

Roanoke Valley Area
MPO METROPOLITAN
PLANNING
ORGANIZATION

This report was prepared by the Roanoke Valley Area Metropolitan Planning Organization (RVAMPO) in cooperation with the U.S. Department of Transportation (USDOT), the Federal Highway Administration (FHWA), and the Virginia Department of Transportation (VDOT). The contents of this report reflect the views of the staff of the Roanoke Valley Metropolitan Planning Organization (MPO). The MPO staff is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, VDOT, or RVARC. This report does not constitute a standard, specification, or regulation. FHWA or VDOT acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

Inquiries should be submitted to the:

Roanoke Valley Area Metropolitan Planning Organization

P.O. Box 2569

Roanoke, Virginia

Phone: 540.343.4417

Fax: 540.3434.416

Email: rvarc@rvarc.org

Web site: www.rvarc.org



Roanoke Valley Area
MPO METROPOLITAN
PLANNING
ORGANIZATION



Roanoke Valley Area

Metropolitan Planning Organization

313 Luck Avenue, SW / PO Box 2569 / Roanoke, Virginia 24010

TEL: 540.343.4417 / FAX: 540.343.4416 / www.rvarc.org / rvarc@rvarc.org

The 25th day of August, 2005

RESOLUTION

Approval of the 2005 Bikeway Plan for the Roanoke Valley Area Metropolitan Planning Organization (MPO)

WHEREAS, federal regulations implemented as a result of the Transportation Equity Act for the 21st Century encourage urbanized area Metropolitan Planning Organizations to include bikeway planning as part of their intermodal planning activities, and

WHEREAS, the Roanoke Valley Area Metropolitan Planning Organization approved the previous *Bikeway Plan* on August 28, 1997, and

WHEREAS, the *Bikeway Plan* is meant to serve as a non-binding guide to the development of bicycle facilities in the MPO Study Area, and

WHEREAS, the update to the Bikeway Plan has been thoroughly reviewed by the Bikeway Plan Update Committee and the Transportation Technical Committee,

NOW, THEREFORE BE IT RESOLVED, that the Roanoke Valley Area Metropolitan Planning Organization does hereby approve the *2005 Bikeway Plan for the Roanoke Valley Area Metropolitan Planning Organization*.

Don Davis
Chairman

ACKNOWLEDGEMENTS

The Bikeway Plan for the Roanoke Valley Area MPO was prepared under the direction and guidance of the Bikeway Plan Advisory Committee, in cooperation with the Roanoke Valley – Alleghany Regional Commission, Botetourt County, the City of Roanoke, the City of Salem, Roanoke County, and the Town of Vinton.

Bikeway Plan for the Roanoke Valley Area MPO Advisory Committee Members:

Tim Beard, Roanoke County
Liz Belcher, Roanoke Valley Greenway Commission
Matt Braun, Botetourt County
Rob Cary, Virginia Department of Transportation
Barbara Duerk, Blue Ridge Bicycle Club
Anthony Ford, Roanoke County
Michael Gray, Virginia Department of Transportation
Mark Jamison, City of Roanoke
Anita McMillan, Town of Vinton
Shane Sawyer, RVARC
Dave Thompkins, East Coasters Cycling and Fitness
Rick Williams, City of Roanoke Planning Commission

The Advisory Committee would like to thank the Blue Ridge Bicycle Club and other stakeholders for assistance and input throughout the update process.

TABLE OF CONTENTS

SECTION I. INTRODUCTION..... 1
 Overview of the MPO Study Area..... 1
 Overview of the Bikeway Plan and Planning Process..... 4
 Existing Bicycling Conditions and Accommodations..... 5

SECTION II. REGIONAL BICYCLE ACCOMMODATIONS PLANNING -
BEST PRACTICES..... 9
 Implementation of “Best Practices”..... 13

SECTION III: CORRIDORS FOR BICYCLE ACCOMMODATION..... 14
 Overview of Priority Lists and Vision Lists..... 14
 Bicycle Accommodations for Priority and Vision Lists..... 14
 Priority Lists for Localities..... 15
 Vision Lists for Localities..... 20
 Examples of On-Street Bicycle Accommodations..... 28
 Off-Road Facilities..... 28
 Bicycle Signage and Ancillary Facilities..... 29

SECTION IV: ANNUAL REVIEW OF BIKEWAY PLAN..... 30

Appendix A: VDOT Policy for Integrating Bicycle and Pedestrian
Accommodations..... 31
Appendix B: Manual on Uniform Traffic Control Devices (MUTCD) – Bicycle
Related Signage..... 38
Appendix C: Virginia Bicycling Laws..... 43
Appendix D: VDOT Tips for Safe Bicycling..... 50
Appendix E: List of Bicycle Related Resources..... 52
Appendix F: Overview of the Bicycle Compatibility Index and the Bicycle Level
of Service Model..... 55

LIST OF FIGURES

Figure 1: RVAMPO Study Area..... 2
Figure 2: Bike-and-Chevron Shared Lane Pavement Marking..... 24
Figure 3: Paved Shoulder..... 25
Figure 4: Wide Outside Travel (Curb) Lane..... 26
Figure 5: Bicycle Lane..... 27
Figure 6: Bicycle Lane with Parking..... 27
Figure 7: Bicycle Lane with Right Turn..... 28
Figure 8: Shared Use Path..... 29

LIST OF TABLES

Table 1: Roanoke Valley Area MPO Study Area.....	3
Table 2: Botetourt County - Priority List of Corridors for Bicycle Accommodation..	15
Table 3: City of Roanoke - Priority List of Corridors for Bicycle Accommodation..	16
Table 4: Roanoke County - Priority List of Corridors for Bicycle Accommodation..	17
Table 5: City of Salem - Priority List of Corridors for Bicycle Accommodation.....	18
Table 6: Town of Vinton - Priority List of Corridors for Bicycle Accommodation...	19
Table 7: Botetourt County - Vision List of Corridors for Bicycle Accommodation.	20
Table 8: City of Roanoke - Vision List of Corridors for Bicycle Accommodation...	21
Table 9: Roanoke County - Vision List of Corridors for Bicycle Accommodation...	22
Table 10: City of Salem - Vision List of Corridors for Bicycle Accommodation.....	23
Table 11: Town of Vinton - Vision List of Corridors for Bicycle Accommodation..	23

SECTION I. INTRODUCTION

The *Bikeway Plan for the RVAMPO* represents a coordinated effort by the Roanoke Valley Area MPO and local jurisdictions to facilitate development of a regional transportation network that accommodates and encourages bicycling as an alternative mode of travel and as a popular form of recreation in the MPO study area.

The *Bikeway Plan for the RVAMPO* provides a coordinated and strategic approach to the development of a regional bicycling network that provides greater connectivity between activity centers and cultural resources such as greenways, public areas, downtown areas, commercial centers, employment concentrations, educational institutions, transit facilities, scenic corridors, and other points of interest in the MPO study area. The regional network outlined in this plan will also facilitate inter-jurisdictional connectivity between localities in the MPO study area.

The *Bikeway Plan* should also facilitate the long-range transportation planning process and the allocation of limited funding for bicycle and pedestrian improvements. This plan should be used in concert with local, regional, state, and national plans, programs, and policies including the *VDOT Policy for Integrating Bicycle and Pedestrian Accommodations* and the *VTrans2025 Statewide Bicycle and Pedestrian Plan*, as well as continued public involvement in the transportation planning process.

Overview of the MPO Study Area

The Roanoke Valley Area Metropolitan Planning Organization is the designated MPO for the Roanoke Urbanized Area. A Metropolitan Planning Organization is a federally required planning body responsible for transportation planning and project selection in urbanized areas with a population greater than 50,000 people. Established in 1979, the Roanoke Valley Area MPO represents the fourth largest urbanized area in the Commonwealth of Virginia.

The Roanoke Valley Area MPO study area includes the cities of Roanoke and Salem, the urbanized portions of Botetourt and Roanoke counties, the town of Vinton, and the western portion of Bedford County (Figure 1). The MPO study area encompasses approximately 220 square miles and has a population of 215, 433. The overall population of the MPO study area is increasing with considerable variation among individual localities, with Botetourt and Roanoke counties experiencing the greatest increases. The population density of the MPO study area is 978 persons per square mile with densities of localities, or portions thereof, located within the MPO study area ranging from 332 persons per square mile in Botetourt County to more than 2,200 persons per square mile in the City of Roanoke and the Town of Vinton.

The topography of the MPO study area is varied and includes mountains, rolling hills, and river valleys. Due to its proximity to the Roanoke River and its tributaries, as well as the number of railroad tracks in the area, there are numerous bridges in the study area that can present obstacles to safely accommodating motorists and bicyclists.

Roanoke Valley Area Metropolitan Planning Organization (MPO)

2025 MPO Study Area Boundary

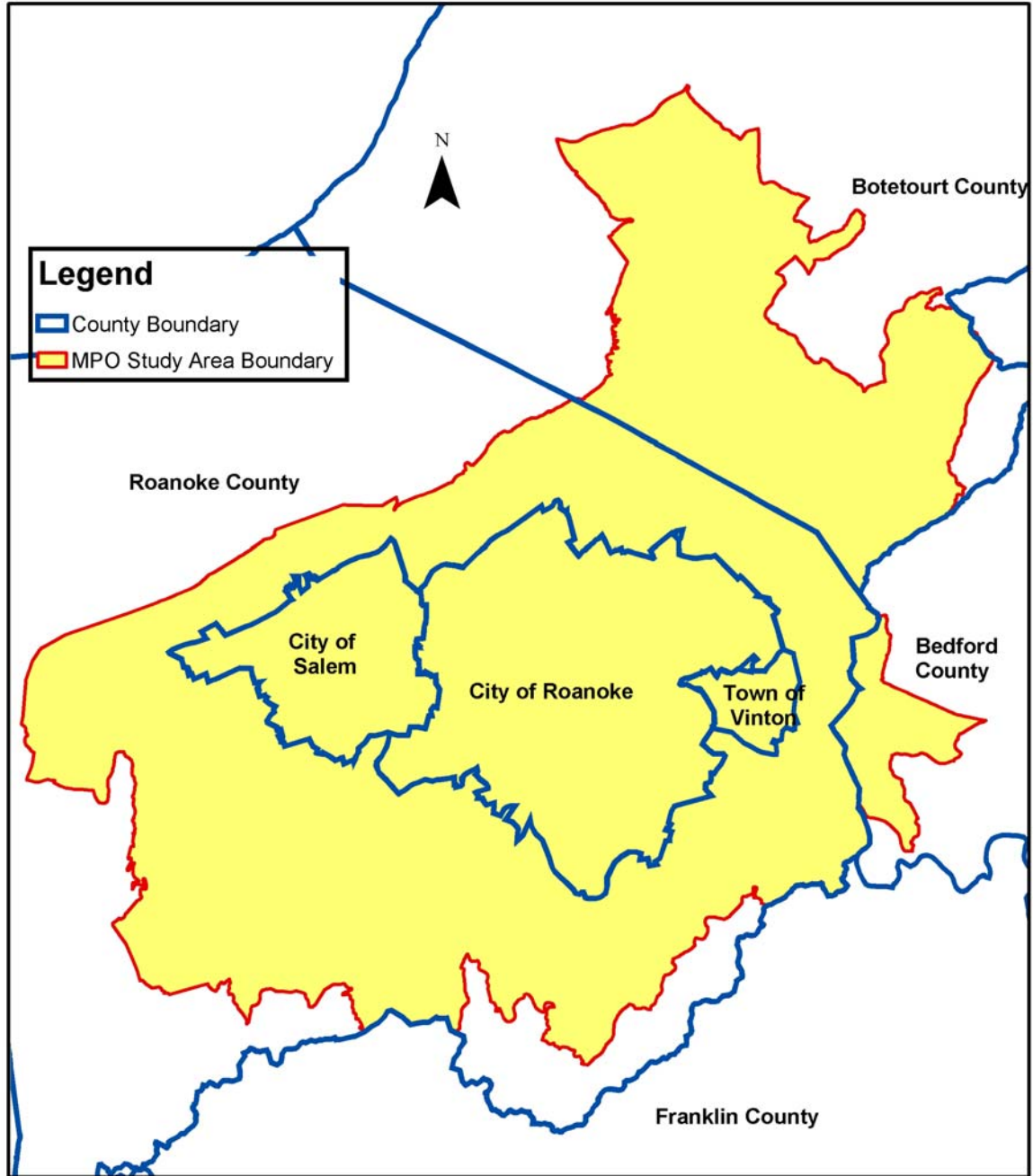


Figure 1: RVAMPO Study Area

BIKEWAY PLAN FOR THE ROANOKE VALLEY AREA MPO

The built environment within the MPO study area varies from intensely developed downtown and commercial areas to outlying areas with less dense development. As such, the transportation infrastructure, needs, and priorities vary considerably among the MPO jurisdictions. This varied topography, unique cultural landscape, and scenic beauty offer a wide range of bicycling opportunities and challenges.

Table 1
Roanoke Valley Area MPO Study Area

	Botetourt County	Roanoke City	Roanoke County*	Salem City	Vinton Town	MPO Study Area Total
MPO Area (square miles)	48	43	112	14	3.2	220.2
Population in MPO Area, 2000	15,919	94,911	72,074	24,747	7,782	215,433
MPO Area Population Density (persons per square mile)	332	2,207	644	1,768	2,432	978
Percent Population** Change 1990-2000	22.0	-1.6	8.2	3.8	1.5	4.8

Source: US Census Bureau, 2001

*Does not include Vinton

** Percent change for all portion of localities and is not limited to MPO study area portions

Note: The MPO study area includes a small portion of Bedford County, which is not included in this table



US 460 / West Main Street in Salem



Police officer on bike patrol on Franklin Avenue in the City of Roanoke



Route 311 in Roanoke County



Brambleton Avenue/Route 221 in the City of Roanoke

Overview of the Bikeway Plan and Planning Process

The *2005 Bikeway Plan for the RVAMPO* is an update to the 1997 *Roanoke Valley Bikeway Plan*. The *2005 Bikeway Plan* was composed by the staff of the MPO as a component of the FY 2005 Unified Planning Work Program for the Roanoke Valley Area MPO. Development of this plan was facilitated by previous bicycle planning efforts including the [*Regional Bicycle Suitability Study – Phase I and Phase II*](#), completed in FY 2003 and FY 2004. Findings, data, and work products from the *Regional Bicycle Suitability Study* were used and referenced throughout the *Bikeway Plan*. The *Regional Suitability Study* is available at <http://www.rvarc.org/bike/suit.htm>.

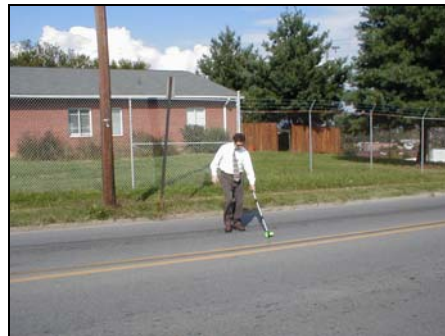
An advisory committee composed of representatives from local governments, the MPO, the Greenway Commission, the Virginia Department of Transportation, citizens, and other stakeholders guided the development of this plan. The Advisory Committee worked closely with MPO staff throughout the development of the plan and provided input and guidance on policy recommendations, network development, and other components. MPO staff will continue to work closely with the Advisory Committee on



Bikeway Plan public workshop

implementation of the *Bikeway Plan* and related bicycle planning efforts.

Input and data used in developing this plan came from a range of sources including the advisory committee, surveys, field analysis, public workshops, meetings with staff from various locality departments, and review of local comprehensive and neighborhood plans.



Roadway measurements and evaluation

As part of the *Regional Bicycle Suitability Study*, MPO staff developed and distributed a survey to solicit public input on a range of bicycle related issues. These findings were considered and addressed throughout the development of the *Bikeway Plan*. A detailed analysis of surveys received is included in Chapter 4 of the [*Regional Bicycle Suitability Study – Phase I*](#). Field analysis of existing conditions was also conducted for many of the roadway segments in the regional bicycling network. This analysis included a range of roadway parameters such as lane width, posted speed limits, traffic volume, presence of shoulder and on-street parking, and connections to key destinations. Using these data, the level of service for many corridors in the *Bikeway Plan* were evaluated using the *Bicycle Compatibility Index (BCI)*. The *Bicycle Compatibility Index* is a level of service (LOS) model that can be used by bicycle coordinators, transportation planners, traffic engineers, and others to evaluate the capability of specific roadways to accommodate both motorists and bicyclists.

In addition to introductory and reference material, this plan is divided into several major components. These are:

- Regional Bicycle Facilities Planning – Best Practices
- Priority List and Vision List of Corridors for Bicycle Accommodation
- Annual Review of the *Bikeway Plan*

These components are discussed in detail throughout this plan.

Existing Cycling Conditions and Accommodations

Currently, there are three (3) on-road bike lanes in the MPO study area are limited, along portions of Memorial Avenue, and Colonial Avenue, in the City of Roanoke, and Hardy Road in the Town of Vinton. These bike lanes have been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists. The width of these lanes ranges from 4 to 5 feet based on roadway design (i.e., presence of curb and gutter or on street parking, etc.). Moreover, a bike lane is scheduled for construction in

Roanoke County on Mountain View Road / Route 651.

Although on-road bike lanes are limited, examples of other bicycle accommodations are present in the MPO study area. Many roadways have paved shoulders that provide bicyclists additional riding space adjacent to motor vehicle traffic. Also, several roadways have wide travel lanes that provide additional width to accommodate bicycle and motor vehicle traffic. However, issues such as

consistency, maintenance, traffic speed, and traffic volume can greatly impact the utility of these facilities. Several of the “best practices” listed in Section III encourage effectively utilize and improve these existing accommodations to improve bicycling conditions in the MPO study area.

There are a limited number of signed routes in the MPO study area. The TransAmerica



Bike lane on Colonial Avenue in the City of Roanoke



Paved shoulder along Route 419/Electric Road in Roanoke County



Wide travel lane on Brambleton Avenue in the City of Roanoke.

Bicycle Route 76 follows several roads in Botetourt and Roanoke counties. Although signed as a bike route, there are no specific on-road facilities to accommodate bicyclists.



Interstate Bicycle Route 76 in Botetourt County

The City of Salem has an 11.2 mile signed bike route designed for riders of all ages and skill levels. This bike route connects various activity centers and destinations within the city. This follows neighborhood and other low traffic volume streets and has bicycle-specific accommodations along portions of the route. A map and route directions for the Salem Bike Route are available on the City of Salem's website.



Paved shoulder along the Salem Bike Route

The Blue Ridge Parkway runs through portions of the MPO study area in Botetourt and Roanoke counties and is a popular route for many recreational cyclists. The Blue Ridge Parkway is popular among bicyclists because of its limited access and lower traffic levels when compared to most community streets and



*Bicyclists on the Blue Ridge Parkway
Source: Roanoke Valley CVB*

highways. However, there is considerable commuter traffic between US 460 and US 220. The *Blue Ridge Parkway Multi-Use Path Feasibility Study* was completed in February of 2005 to understand the potential for better accommodation of bicycle use along the Blue Ridge Parkway. The multi-use path considered in the study is defined as a paved path, approximately 10-feet wide, to be used by bicyclists and pedestrians. Given the Blue Ridge Parkway's wide right-of-way, historical

significance, and mission, the *Blue Ridge Parkway Multi-Use Path Feasibility Study* did not consider widening the paved road travel surface to accommodate bicycling and other non-motorized uses. Although the Blue Ridge Parkway is under the jurisdiction of the National Park Service, its operation impacts localities within the MPO study area, thus has been considered in the *Bikeway Plan for the Roanoke Valley Area MPO*.



Roanoke River Greenway in the City of Roanoke

The Roanoke Valley Greenway system offers a range of bicycle amenities including off-road facilities as well as paved, shared use trails. Currently sixteen (16) miles of greenway trails have been built, and engineering has been completed for seven (7) additional miles of trail that are ready for construction. An update to the *Roanoke Valley Conceptual Greenway Plan* is schedule to begin in July 2005. An expanded and interconnected regional greenway network will significantly promote multi-modal connections and enhance non-motorized transportation in the region. As such, the Roanoke Valley system is a major component of the Bikeway Plan for the Roanoke Valley and the regional bicycling network.

There are several off-road bicycling facilities within, or in close proximity to, the MPO study area. The more popular trails include Carvins Cove Natural Reserve and Virginia’s Explore Park, each having many miles of off-road trails and other recreational opportunities. Explore Park, located at milepost 115 on the Blue Ridge Parkway, has an International Mountain Biking Association (I.M.B.A) designed trail system. A limited number of off-road trails are located at Green Hill Park, Fort Lewis Mountain, Mill Mountain, and other parks and/or open space in or near the MPO study area.

The most common ancillary facilities in the MPO study area are bicycle racks. Currently, a number of bicycle racks located throughout the study area with the majority being located in the cities of Roanoke and Salem. Common locations for bicycle racks include parking garages, libraries, and other public buildings, parks, colleges, and to a much lesser extent retail establishments. The age, design, and utility of bicycle racks found in the MPO study area varies considerably. Many of the bicycle racks are grid-style racks, designed for high volume, low security use. Another common design is the wave-style bicycle rack. These types of racks are less desirable to many bicyclists because they provide insufficient support and can potentially cause damage to the bicycle and/or components.



Mountain biking trails at Explore Park
Source: Exploresingletrack.com



Grid-style bicycle rack at the City of Roanoke Library main branch



Wave style bicycle racks at a parking garage



Inverted U design bicycle rack is Recommended

However, wave type racks can be used "broadside" to increase stability and security.

Recently installed bike racks around the MPO study area utilize the "inverted U" design. This is the recommended bicycle rack design as it provides sufficient support and security. The City of Roanoke has installed numerous "inverted U" design bicycle racks throughout the downtown area. Additional information on bicycle parking is provided in Section III of this document.



Share the Road sign with bicycle symbol

These are examples of bicycle related signage in the MPO study area. *Share the Road* signs are the most common type of signage in the area. *Share the Road* signs are often accompanied by a bicycle symbol. Consistency in bicycle signage between localities in the MPO study area is encouraged and is discussed in later sections of this document.

Valley Metro, the region's transit service provider, has routes throughout portions of the cities of Roanoke and Salem, Roanoke County, and the Town of Vinton providing multimodal transit options. The Smart Way Commuter Bus also provides connections between the New River Valley and the Roanoke Valley. Although these buses are not equipped with bicycle racks, bicycles can be brought aboard and transported inside the bus, thus facilitating multimodal travel.



Smart Way Commuter Bus



Valley Metro bus.

SECTION II. REGIONAL BICYCLE ACCOMMODATION - BEST PRACTICES

Although this plan will serve as a guide to the provision of bicycle accommodations on selected corridors in the MPO, it is important to note all roads in the transportation system (except where prohibited - i.e., interstates, limited access highways) are open to bicyclists. As such, all corridors potentially form part of the regional bicycling network, be it formally or informally. Therefore, consideration of improvements to better accommodate bicyclists should not be limited to corridors on any list provided in this document. Instead, “best practices” that improve bicycling conditions should be applied to the transportation infrastructure throughout the MPO study area.

This section outlines some broad principles and actions to be considered and applied to corridors, where applicable, in the MPO study area. These “best practices” involve a range of treatments and considerations to include planning, design, and engineering, funding, awareness and education, and political decision-making. Moreover, these best practices emphasize effectively utilizing the existing (and planned) transportation infrastructure to better accommodate bicyclists, and capitalizing on opportunities to improve bicycling conditions when they arise. Consideration of bicycle-friendly practices should not be limited to a specific list. Therefore, other relevant bicycle-related “best practices” should be considered to provide an environment that encourages and facilitates bicycling.

- **Apply by default, the VDOT *Policy for Integrating Bicycle and Pedestrian Accommodations* to all corridors in the transportation network**

This policy provides the framework of how VDOT will accommodate bicyclists and pedestrians in the planning, funding, design, construction, operation, and maintenance of Virginia’s transportation network. In the VDOT policy, and in this plan, an accommodation is defined as any facility, design feature, operational change, or maintenance activity that improves the environment in which bicyclists and pedestrians travel. The terms bicycle accommodation, facility, and treatment are used synonymously throughout this document. The *VDOT Policy for Integrating Bicycle and Pedestrian Accommodations* is provided in Appendix A.

- **Encourage adoption and implementation of the *Bikeway Plan for the RVAMPO* by local governments and other stakeholders**

Following review and comment, the MPO and the Regional Commission will approve the Bikeway Plan. Jurisdictions within the MPO study area are encouraged to recognize and/or adopt the Bikeway Plan as a guiding document in developing a regional bicycling network that promotes and facilitates bicycle use. Local governments, along with VDOT, will be the primary entities responsible for the implementation and provision of bicycle accommodations.

- **Utilize cost-effective techniques, where applicable and practicable, to better accommodate bicyclists**

A range of cost-effective techniques and treatments are available to better accommodate bicyclists. Consideration and application of various techniques can be coordinated with paving, maintenance, and construction schedules for individual localities and VDOT. Cost-effective techniques to better accommodate bicycles may include, but are not limited to:

- Striping on right edge of lanes to provide paved shoulder for bicyclists
- Changes in roadway design or operation
- Spot improvements
- Roadway and shoulder maintenance
- Improved signage and other pavement markings

When paving, resurfacing, or restriping a street, the City of Roanoke Transportation Department attempts to configure the roadway design to allow for as much usable shoulder as conditions will allow. Examples of the application of such techniques include Brandon Avenue and Peters Creek Road, where an edge stripe was installed, using existing pavement, to create additional paved shoulder width. The City of Roanoke also installed *Share the Road* signs along these corridors to alert drivers to the shared use nature of these corridors. The previously referenced *Bicycle Compatibility*



Edge striping creating a 2-foot paved shoulder along Brandon Avenue in the City of Roanoke.

Index can assist in analysis of the impact of various cost-effective accommodations. Based on evaluation using the *Bicycle Compatibility Index (BCI)*, these changes in the roadway configuration significantly raised the level of service for bicyclists along both corridors. Examples of the application of the BCI are discussed in Chapter 4 of the *Regional Bicycle Suitability Study – Phase II*.



Street cleaning near Rivers Edge Park

Spot improvements can address physical barriers or other impediments that are site-specific, often requiring minimal improvements. Moreover, other activities, such as street and shoulder maintenance, (i.e., street cleaning, repairing shoulders and street edges) can also improve bicycling conditions by increasing the amount and quality of usable paved shoulder or travel lane width along a corridor. Other activities such as traffic calming and urban forestry can also assist in creating a bicycle-friendly environment. Urban forestry techniques can effectively improve bicycling conditions by providing protection from the elements along bicycling corridors (i.e. shade from the sun or cover from the rain).

- **Encourage cross-jurisdictional consistency in bicycle-related signage**

Proper signage is an integral part of the transportation system. Signage conveys a variety of messages and instructions to motorists, bicyclists, and other users other the

transportation infrastructure. Improving bicycle-related signage can be a cost-effective way to improve safety, increase driver awareness of the presence of bicyclists, and encourage bicycling as a means of transportation in the region. Moreover, cross-jurisdictional consistency in bicycle-related signage can facilitate understanding of relevant signage, throughout the RVAMPO. To ensure cross-jurisdictional consistency the *Manual on Uniform Traffic Control Devices* (MUTCD) should be the default reference document for bicycle and pedestrian related signage. Examples of signs for bicycle facilities from the MUTCD are provided in Appendix B and include regulatory, warning, and guide signs. The MUTCD is available at <http://mutcd.fhwa.dot.gov/kno-2003r1.htm>.

In addition to signage, the use of pavement markings can be employed to improve bicycling conditions. Examples include “shared lane pavement markings” designed to indicate the shared use nature of a corridor and alert motorists to expect and accept cyclists as users of the roadway. Examples of pavement markings and other bicycle accommodations are discussed in more detail in Section III.

- **Improve ancillary bicycle accommodations and support facilities**

Ancillary facilities are the supporting facilities located at the bicyclists’ destination. They are also important components of a bicycle network and contribute directly to the overall success and usefulness of the bicycle system. Ancillary facilities include:

- Bicycle racks
- Benches
- Bicycle lockers
- Bicycle racks on transit buses
- Shower facilities
- Water fountains
- Rest areas
- Signage



Bicycle rack, bench, and crosswalk in Grandin Village

Bicycle racks should permit the locking of the bicycle frame and one wheel to the rack and support the bicycle in a stable position without damage to wheels, frame or components. The preferred bike rack design is the “inverted U” that allows for the frame and one wheel to be secured to the rack with commonly used “U-locks” or a cable. In addition to the design of the bicycle rack other considerations for location include access, visibility, security, lighting, and weather protection. In general, bicycle racks should be highly visible, conveniently located near entrances to buildings, minimize conflicts with both pedestrians and motorized traffic, and provide adequate security. Bicycle parking signs can also assist by directing bicyclists to parking facilities.

- **Regularly review and update the Bikeway Plan for the RVAMPO**

To ensure that the Bikeway Plan remains reflective of, and responsive to, existing transportation priorities, and to facilitate the implementation of the recommendations of the plan, it should be reviewed annually as part of the RVAMPO work program. Review and update procedure for the Bikeway Plan for the RVAMPO is outlined in Section IV of this document.

- **Develop and distribute a mobility map for the RVAMPO Study Area**

As part of the FY 2006 Transportation Work Program, RVAMPO staff will produce a “mobility” map of the RVAMPO study area, containing mobility-related information including on-street bicycle accommodations and routes, greenways, public transit routes, activity centers and other points of interest, and other relevant information. This map should facilitate route selection and encourage bicycling and multimodal travel in the area.

- **Incorporate the Bikeway Plan for the RVAMPO into other transportation and community planning documents and efforts**

Implementation of the recommendations from the Bikeway Plan, and developing a regional bicycling network, will require coordination with a variety of transportation planning and community planning documents and efforts. Relevant transportation documents and efforts include the Roanoke Valley Area MPO Long Range Plan (LRTP), Transportation Improvement Program (TIP) and the *Ozone Early Action Plan*. Other documents include greenway and outdoor recreation plans, comprehensive and neighborhood plans, and economic development and tourism plans. These and related plans should be reviewed for bicycle-related components as part of the annual review of the plan outlined in Section VI of this document.

- **Increase bicycle-related education, awareness, and advocacy to encourage bicycling**

Creating an environment that encourages bicycling involves much more than the provision of on-street bicycle accommodations. The behavior of both bicyclists and motorists, in addition to the built environment, can also significantly impact bicycling conditions. Behavior that negatively impacts conditions may be the result of drivers and/or cyclists not understanding or complying with traffic laws. At a minimum, bicyclists and motorists should be familiar with all pertinent traffic laws and basic bicycle safety. To facilitate this understanding, the following documents are presented as appendices. Additional bicycle related information is available from VDOT at <http://virginiadot.org/infoservice/bk-laws.asp>.

- Virginia Bicycling Laws (Appendix C)
- VDOT Tips for Safe Bicycling (Appendix D)

Moreover, to help ensure safety and enjoyment, numerous other items should be considered, such as cycling ability, fitness level, where to ride, proper clothing and equipment, and basic bicycle maintenance. These issues can often be effectively addressed

through education, awareness, and advocacy efforts involving a range of stakeholders and programs. Examples of programs and activities that can address these items and promote bicycling include:

- *Safe Routes to School* Program
- Bike Smart Virginia
- Public Service Announcements (RVTV, Cox Communications, Blue Ridge Public Television, etc.)
- Driver education class (high school, Department of Motor Vehicles)
- Physical Education (local schools)
- Bicyclists education (Police departments bicycle Rodeos)
- “How To” workshop (area bike shops, bicycle clubs and advocacy groups)
- Ride Solutions (i.e., Guaranteed Ride Home)
- Incentive/encouragement programs that promote and facilitate bicycling (local governments, employers, etc.)
- Bicycle-related articles in various other media outlets (local and regional news papers, radio (VWTF), etc).

A list of bicycling related resources is provided in Appendix E. This list includes information on bicycle safety, education, facilities design, advocacy, and other bicycle related topics. Also, the Regional Commission’s library has numerous documents related to bicycle facility planning. Regional Commission website at <http://www.rvarc.org/bike/home.htm>.

Implementation of “Best Practices”

Collectively, the previously referenced “best practices” can significantly improve bicycling in the region. Encouragement and implementation of these “best practices” and related activities will require participation and input from a range of stakeholders from the public and private sectors. As previously stated, local traffic departments and VDOT are the primary decision makers for implementing on-street accommodations. However, participation by other stakeholders can encourage and facilitate implementation of regional best practices to better accommodate bicyclists in the MPO study. Additional stakeholders may include other locality departments (parks and recreation, planning, public works, etc.), area schools, local employers, local bicycle shops, bicycle clubs and advocacy groups, media, tourism and economic development agencies, and others.

The MPO *FY 2006 Unified Transportation Work Program* has allocated staff time to facilitate and coordinate implementation of the *Bikeway Plan* and related activities. Moreover, other activities in the *FY 2006 Unified Transportation Work Program* and the *Regional Commission Comprehensive Work Program* can also support and facilitate development of a bikeway network and advance bicycling in the region. These work program items include the update to the *1997 Rural Bikeway Plan, Roanoke Valley Greenway Master Plan* update, regional signage study, and development of mobility maps. A complete listing of FY 2006 projects for the RVAMPO and the Regional Commission is available at <http://www.rvarc.org/work/work.htm>.

SECTION III: CORRIDORS FOR BICYCLE ACCOMMODATION

This section includes the Priority Lists and Vision Lists of corridors for bicycle accommodation for each locality within the MPO study area. This section also provides a brief overview of various bicycle accommodations available to improve bicycling conditions in the region.

Priority List

Corridors comprising the Priority List will form the foundation of a bikeway system in the RVAMPO. Moreover, the Priority list, analogous to the financially constrained list of projects in the LRTP, will assist in prioritizing corridors to receive limited funding for bicycle improvements, with corridors listed receiving priority. In developing the Priority List, corridors were selected in each locality that connect and incorporate the greenway and transit systems, activity centers, and other points of interest. The number of corridors selected for inclusion on the Priority List was purposely limited, in part, to ensure that it reflects regional priorities and is simply not a “wish list” of corridors and projects. Priority List corridors are presented by locality in Tables 2 – 6.

Vision List

Vision List corridors support the framework of the Priority List and fill in any gaps in connectivity. Corridors from the Vision List can be moved to the Priority List, as appropriate, as part of the annual review process. Vision List corridors are presented by locality in Tables 7 – 11.

Note: A map showing all Priority List and Vision List corridors is provided at the end of this document.

Bicycle Accommodations for Priority and Vision Lists

It should be noted that specific accommodations are not recommended for corridors listed on the Priority and Vision lists. For the purposes of this plan, all types of bicycle accommodations are considered as possible means to improve bicycling conditions in the region. Accommodations may include, but are not limited to:

- On-street facilities
- Off-road facilities
- Ancillary facilities

Any treatment designed to better accommodate bicyclists should be applied based on location-specific analyses of roadway characteristics, geometric and operational design parameters, and other considerations. Examples of various bicycle accommodations are provided in this section.

Table 2
 Botetourt County
 Priority List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
Alternate Route 220	Roanoke County CL	Route 11	Roanoke County
Catawba/Valley Road / Route 779	Route 11	MPO Boundary	
Read Mountain Road / Route 654	Alt. Route 220	Route 11	
Route 11	Roanoke County CL	MPO Boundary	Roanoke County
Route 220	Route 11	Glebe Road	
Shadwell Drive / Route 601	Roanoke County CL	Route 11	Roanoke County

Table 3
City of Roanoke
Priority List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
10th Street	Ferdinand Avenue	Williamson Road	
Brandon Avenue	Franklin Road	City of Salem CL	City of Salem
Colonial Avenue	Dogwood Drive	Brandon Avenue	
Dale Avenue	13th Street	Town of Vinton CL	Town of Vinton
Grandin Road	Brandon Avenue	Memorial Avenue	
Melrose Avenue	Salem Turnpike	Peter Creek Road	
Memorial Avenue	Campbell Avenue	Grandin Road	
Peters Creek Road	Brandon Avenue	Cove Road	Roanoke County
Shenandoah Avenue	Williamson Road	City of Salem CL	City of Salem
Walnut Avenue / Mill Mountain Spur	Jefferson Street	Blue Ridge Parkway	
Williamson Road	Shenandoah Avenue	Hershberger Road	Roanoke County
Wise Avenue	Campbell Avenue	8th St. / Walnut Avenue	Town of Vinton
Lick Run Greenway			
Mill Mountain Greenway			
Murray Run Greenway			
Roanoke River Greenway			
Tinker Creek Greenway			

Table 4
 Roanoke County
 Priority List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
Bent Mountain Road / Route 221	Electric Road / Route 419	Cotton Hill Road	
Brambleton Avenue / Route 221	City of Roanoke CL	Electric Road / Route 419	City of Roanoke
Buck Mountain Road	Starkey Road	Franklin Road / Route 220	
Catawba Valley Drive / Route 311	Electric Road / Route 419	Carvins Cove Road	
Colonial Avenue	Bent Mountain Road / Route 221	Electric Road / Route 419	
Electric Road / Route 419	Roanoke County CL	Catawba Valley Drive / Route 311	
Hardy Road	Town of Vinton CL	Blue Ridge Parkway	
Hollins Road	Shadwell Drive	Plantation Road	
Loch Haven Drive	Electric Road / Route 419	Belle Haven Road	
Merriman Road	Ranchcrest Drive	Starkey Road	
Mountain View Road	Vinton CL	Blue Ridge Parkway	Town of Vinton
Plantation Drive	I-81	Hollins Road	
Ranchcrest Drive	Bent Mountain Road / Route 221	Merriman Road	
Riverside Drive	Salem CL	Harborwood Road / Diuguuids Lane	City of Salem
Shadwell Drive	Williamson Road / Route 11	Hollins Road	Botetourt County
Starkey Road	Merriman Road	Buck Mountain Road	
Thompson Memorial / Route 311	Electric Road / Route 419	City of Salem CL (Main St.)	City of Salem

Table 5
 City of Salem
 Priority List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
Apperson Drive	City of Roanoke CL	Electric Road / Route 419	City of Roanoke
College Avenue	Colorado Avenue	Main Street	
Colorado Avenue	Apperson Drive	College Avenue	
Diuguids Lane	West Main Street	Riverside Drive	Roanoke County
East Riverside Drive	Apperson Drive	Colorado Avenue	Roanoke County
Thompson Memorial Avenue / Route 311	Main Street	Route 311 / Catawba Valley Drive	Roanoke County
Twelve O'Clock Knob Road	Roanoke County CL	West Riverside Drive	Roanoke County

Table 6
Town of Vinton
Priority List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
Hardy Road	Terminus of bike lane	Roanoke County CL	Roanoke County
Mountain View Road	Washington Avenue	Roanoke County CL	Roanoke County
South Pollard Street	Gus Nicks Boulevard	Virginia Avenue	City of Roanoke
Virginia Avenue	South Pollard Street	City of Roanoke CL	City of Roanoke
Walnut Avenue	Lee Street	Wise Avenue	City of Roanoke

Table 7
 Botetourt County
 Vision List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
Route 220	Glebe Road	MPO Boundary	
Challenger Avenue / Route 460/221	Roanoke County CL	MPO Boundary	Roanoke County
Stoney Battery Road / Route 651	Route 11	MPO Boundary	
Webster Road / Route 738	Route 460	Route 460	
Route 652 (Mountain Pass Road)	Route 11	Route 460	
Blue Ridge Parkway	Roanoke County CL	MPO Boundary	Roanoke County

Table 8
 City of Roanoke
 Vision List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
13th Street / Bennington	Rutrough Road	Dale Avenue	
13th Street / Hollins Connector	Dale Avenue	Orange Avenue	
Brambleton Avenue	Garst Mill Road	Brandon Avenue	
Franklin Road	Reserve Drive	Route 220	Roanoke County
Grandin Road	Garst Mill Road	Brandon Avenue	Roanoke County
Hollins Road	Orange Avenue	Liberty Road	
King Street	8th / Braddock Street	Orange Avenue	
Liberty Road	Hollins Road	Burrell Street	
Plantation Road	Liberty Road	Roanoke County CL	
Garden City Boulevard	Yellow Mountain Road	Riverland Road	
Belle Avenue	King Street	Roanoke County CL	Roanoke County
Ogden Road	Roanoke CL	Electric Road / Route 419	
Mount Pleasant Boulevard	Riverland Road	Roanoke County CL	Roanoke County
Riverland Road	Garden City Boulevard	Mt. Pleasant Boulevard	

Table 9
 Roanoke County
 Vision List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
221 Bent Mountain Road	Cotton Hill Road	Twelve O'clock Knob Road	
Belle Haven Road	Loch Haven Road	North Barrens Road	
Carson Road	City of Roanoke CL	460 Challenger Avenue	City of Roanoke
Catawba Creek Road	Catawba Valley Drive/ Route 311	Roanoke CL	
Colonial Avenue	Electric Road / Route 419	Ogden Road	
Colonial Avenue	Ogden Road	City of Roanoke CL	City of Roanoke
Cotton Hill Road	Bent Mountain Road / Route 221	Blue Ridge Parkway	
Dallas Road	Webster Road	Enon Drive	
Electric Road / Route 419	City of Roanoke CL	Brambleton Avenue / Route 221	City of Roanoke
Enon Drive	Dallas Road	Walrond Drive	
Feather Road	Route 24 / Washington Ave	Rte 634 Hardy Road	Town of Vinton
Garst Mill Road	Brambleton Avenue / Route 221	City of Roanoke CL	City of Roanoke
Feather Road	Washington Avenue	Hardy Road	Town of Vinton
Jae Valley Road	City of Roanoke CL	Blue Ridge Parkway	City of Roanoke
Laban Road	North Barrens Road	Webster Drive	
North Barrens Road	Belle Haven Road	Laban Road	
Ogden Road	Colonial Avenue	Electric Road / Route 419	
Peters Creek Road	City of Roanoke CL	Williamson Road	City of Roanoke
Rte 24 Washington Avenue	Vinton CL	Blue Ridge Parkway	Town of Vinton
Starkey Road	Electric Road / Route 419	Buck Mountain Road	
Twelve O'clock Knob Road	Bent Mountain Road / Route 221	W. Riverside Drive	City of Salem
Walrond Drive	Enon Drive	Plantation Road	
Walrond Park Road	Enon Drive	Walrond Drive	
Webster Drive	Laban Road	Dallas Road	
Wildwood Road	City of Salem CL	I-81 / City of Salem CL	City of Salem
Williamson Road	Peters Creek Road	Botetourt County CL	Botetourt County

Table 10
 City of Salem
 Vision List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
Boulevard Roanoke	Electric Road / Route 419	College Street	
Idaho Street	Texas Street	Lynchburg Turnpike	
Twelve O'clock Knob Road	Roanoke County CL	West Riverside Drive	Roanoke County
Wildwood Road	West Main Street	Roanoke County CL / I-81	Roanoke County
Academy Street	Roanoke County CL / I-81	Main Street	Roanoke County

Table 11
 Town of Vinton
 Vision List of Corridors for Bicycle Accommodation

Street	From	To	Inter-jurisdictional Connection
Gus Nicks Blvd./Washington Avenue	Vinton CL	Blue Ridge Parkway	Roanoke County
Third Street	Virginia Avenue	Hardy Road	

Examples of On-Street Bicycle Accommodations

The choice of facility type is dependent upon several factors including an examination of the environment, the targeted user group, corridor conditions, and facility cost. Examples of on-road facility designs provided in this section are intended for illustrative purposes and do not constitute recommendation of a specific design standard. The following publications provide guidance and detailed information regarding bicycle facility design guidelines to assist planners, engineers, and bicycle advocates developing and applying design criteria most applicable to local conditions and place-specific considerations.

- *Regional Bicycle Suitability Study – Phase I and Phase II*, RVARC, 2003-2004
- *VDOT Road Design Manual*, Section A-5-Bicycle Facility Guidelines, 2001
- *Guide for the Development of Bicycle Facilities*, AASHTO, 1999
- *Selecting Roadway Design Treatments to Accommodate Bicycles*, FHWA, 1994
- *Manual on Uniform Traffic Control Devices*, FHWA, 2000
- *Virginia Bicycle Facility Resource Guide*, VDOT, 2001
- *Bicycle and Pedestrian Facility Guide*, Bicycle Federation of America, 1995

- Shared Roadway

Shared roadways are corridors that are used by motorists and bicyclists, without any special bicycle accommodation. Shared roadways that best accommodate motor vehicle and bicycle travel are low-traffic, low-speed corridors such as residential street or rural roads. Bicycle-related signage along these routes is intended to increase motorists' awareness of potential bicycle activity along a particular roadway and heightens the overall presence of bicycling within the corridor. The use of pavement markings can be employed to improve bicycling conditions. Examples include "shared lane pavement markings" designed to indicate the shared use nature of a corridor and alert motorists to expect and accept cyclists as users of the roadway.



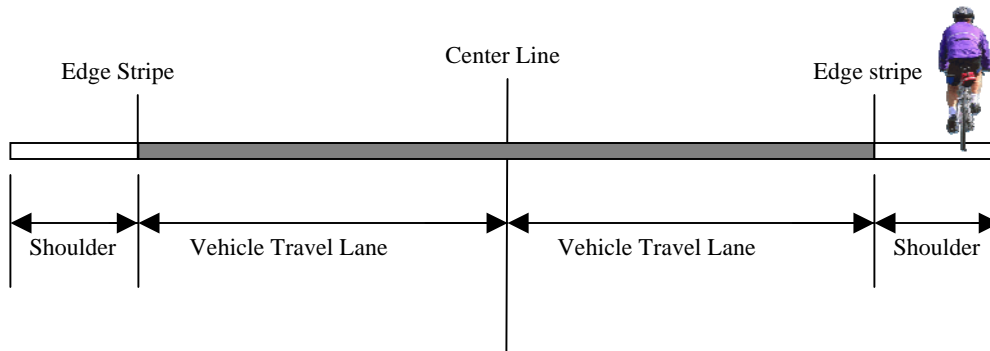
Figure 2: Bike-and-chevron shared lane pavement marking

- Paved Shoulder

Shoulder improvements are often effective in accommodating bicycle travel on a shared roadway. However, in order for paved shoulders to be effective in accommodating bicyclists they need to be uniform, smooth, and well maintained. A shoulder with a minimum width of 4 feet is recommended for bicycle travel. Additional shoulder width may also be appropriate under the following conditions:

- high bicycle usage is expected
- motor vehicle speeds exceed 50 mph
- steep grades are present (bicycles need additional width when traveling uphill)
- the percentage of trucks, buses, and recreational vehicles is high

Although a 4-foot paved shoulder is recommended for bicycle travel, there is no design standard. In general, any additional shoulder width that can be provided, even if less than 4 feet, will provide greater benefit than no shoulder at all. In addition to accommodating bicyclists, paved shoulders also provide additional maintenance and safety benefits such as pull over areas, recovery areas, and increased pavement structure durability.



Width may vary depending on a combination of potential widening impacts and traffic flow/cross-section characteristics.

Figure 3: Paved Shoulder



Paved shoulder along Brandon Avenue in the City of Roanoke

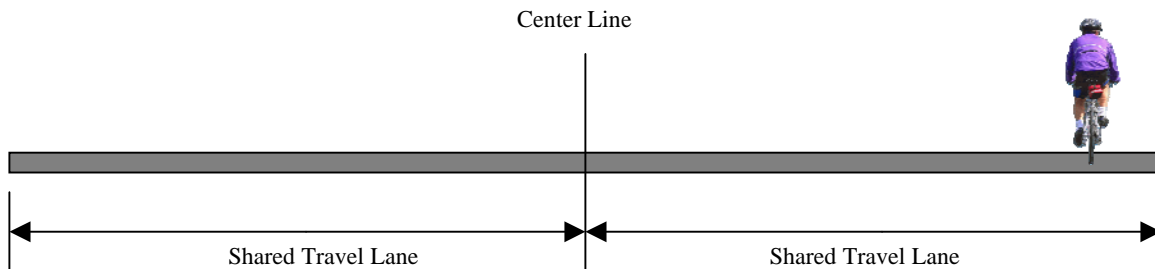


Paved shoulder on Brambleton Avenue

- Wide Outside Lane (Wide Curb Lane)

Wide outside lanes are outside vehicle travel lanes that provide adequate width for both motor vehicle and bicycle travel. Wide outside lanes have no stripes to delineate a separate lane for bicycles. The minimum recommended standard for wide outside lanes is 14 feet of usable lane width (Figure 4). Usable width is defined from edge stripe to lane stripe or from the longitudinal joint of the gutter pan to lane stripe. The gutter pan should not be included as usable width. The *Virginia Bicycle Facilities Resources Guide* suggests that a slightly wider outside lane width (i.e., 15 feet) may be necessary under the following conditions:

- on stretches of roadway with steep grades where bicyclists need more maneuvering space
- adjacent to on-street parking where hazardous conditions for passing bicyclists exist
- where drainage grates and raised reflectors reduce the effective width of the outside lane



Additional width may be needed due to traffic flow/cross-section characteristics

Figure 4: Wide Outside Travel (Curb) Lane

Although wide outside travel lanes can increase the ability of a corridor to accommodate both motorists and bicyclists, based on level of service models, the improvement is slightly less than that provided by a striped paved shoulder. Motorists tend to drive to right of the travel lane. As such, a right edge stripe on the lane is beneficial to bicyclists.



Wide travel lane on Shenandoah Avenue in the City of Roanoke

- Bike Lane

A bike lane is a portion of a roadway, which has been designated by striping, signing and pavement markings, for the preferential or exclusive use of bicyclists. The minimum recommended bike lane width is 4 feet (Figure 4). The *Virginia Bicycle Facility Resource Guide* recommends the following minimum widths for bicycle lanes:

- 4-foot minimum for bike lanes on roadways with gutter pan and curb
- 5-foot minimum for bike lanes adjacent to barrier curb or other static side obstruction
- 5-foot minimum for bike lanes with adjacent on-street parking
- 6-foot bike lanes are desirable where substantial truck traffic is present or where motor vehicle speeds exceed 50 mph

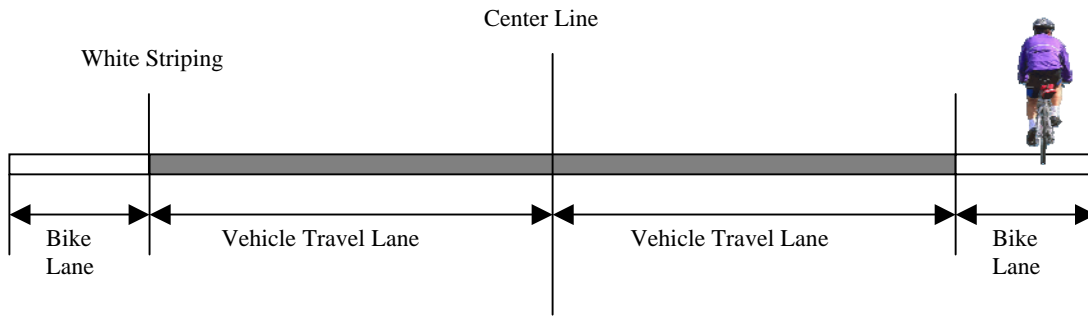


Figure 5: Bicycle Lane

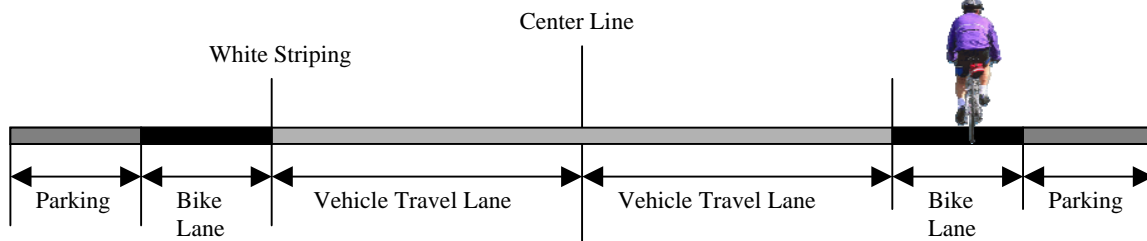


Figure 6: Bicycle Lane with Parking



Bike lane with curb and gutter along Hardy Road in Vinton



Bike lane with on-street parking along Memorial Avenue in the City of Roanoke

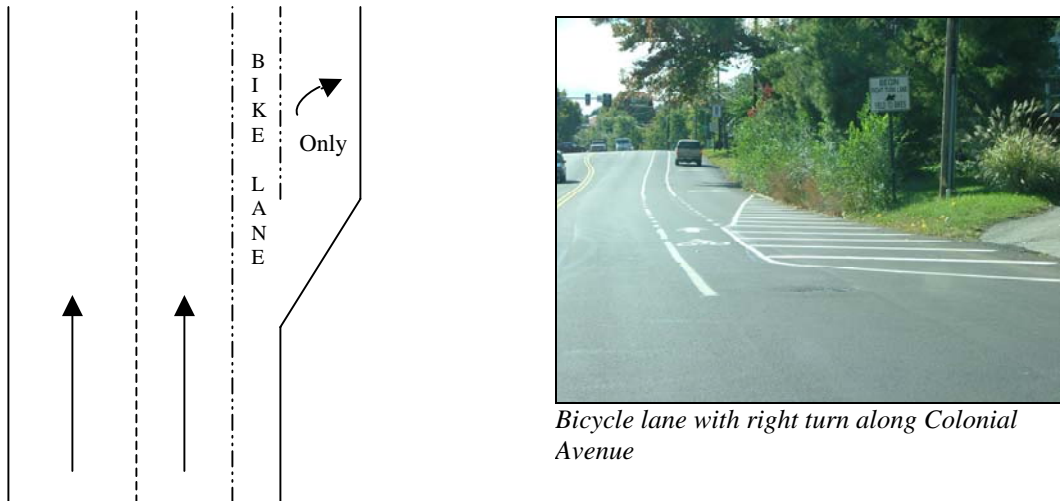


Figure 7: Bicycle Lane w/ Right Turn

Off-Road Facilities

- Shared Use Path

A shared use path is a bikeway physically separated from motorized vehicular traffic by an open space or barrier. Typical users include bicyclists, pedestrians, skaters, wheelchair users, joggers, and other non-motorized users in urban, suburban, and rural environments. Shared use paths should have a minimum width of 10 feet. According to the *Virginia Bicycle Facility Resource Guide*, these facilities have been very successful in reintroducing communities to bicycling as a form of transportation and recreation. Shared use paths are often the catalysts for developing a bicycle network connecting a variety of attractions in the community (i.e., activity centers). These paths may serve as important linkages in the bicycling network providing increased connectivity and mobility.

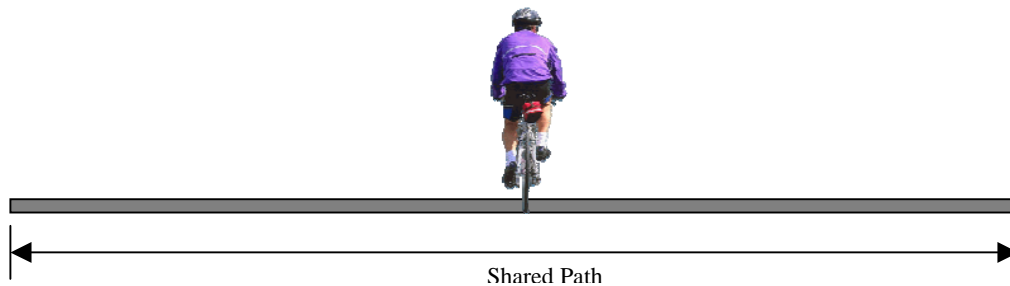


Figure 8: Shared Use Path

In Roanoke the paved greenways are examples of shared use paths. A number of the area greenways are 10-foot, paved surface, shared use paths, suitable for all levels of bicyclists.

These and other greenways (i.e., gravel or natural surface) provide bicycle commuting corridors and connections, in addition to recreational opportunities.



Roanoke River Greenway, paved surface



Murray Run Greenway, gravel and natural surface

Bicycle Signage and Ancillary Facilities

The importance of bicycle signage and ancillary facilities has been discussed throughout this plan. In addition to on-street facilities, these treatments are considered integral components of the regional bicycling network. Several of the regional bicycle accommodation best practices discussed in Section II specifically address these topics. Examples of bicycle related signage from the MUTCD is provided in Appendix B.

SECTION IV: ANNUAL REVIEW OF BIKEWAY PLAN

This plan is intended to be a dynamic document that can be revisited and amended to reflect changing, new, or emerging transportation needs, desires, and realities. As such, the procedure for future updates should be sufficiently flexible to allow needed changes to be made without complete update of the entire plan. To ensure that the plan is current and accurately reflects the transportation needs of the RVAMPO and local governments comprising the RVAMPO, it will be reviewed each year and changes will be made as deemed necessary.

- Benchmark general progress
- Update Priority and Vision Lists
- Incorporate other relevant information from new or updated documents

A range of quantitative and qualitative methods can be employed to assist in reviewing the *Bikeway Plan* and measuring progress toward making the MPO study area a more bicycle-friendly environment that encourages and facilitates bicycling as a safe and viable means of transportation and recreation.

Level of service (LOS) models were utilized in the [Regional Bicycle Suitability Study](#) to evaluate the capability of a variety of roadways in the region to accommodate both motorists and bicyclists using geometric and operational characteristics such as lane widths, speed, and volume. The Bicycle Compatibility Index (BCI) and the Bicycle Level Of Service (BLOS) are emerging as national standards for quantifying the bike-friendliness of a roadway. These models can assist in operational evaluation, planning, design, and route selection. New roadways or roadways that are being re-designed or retrofitted can be assessed to determine if they are bicycle compatible. An overview of the BCI and BLOS is provided in Appendix F.

Stakeholder input regarding the *Bikeway Plan for the Roanoke Valley Area MPO* or related activities is welcomed and encouraged on an on-going basis and will be considered in the annual review of this document. The *Bikeway Plan for the Roanoke Valley MPO* and other bicycle-related information is available on the Regional Commission's website at <http://www.rvarc.org/bike/home.htm>.

The FY 2006 *Unified Planning Work Program* provides staff time for bicycle-related activities, including review of the *Bikeway Plan for the Roanoke Valley Area MPO*. The Bikeway Plan Advisory Committee will continue to meet to provide guidance and assist in implementing the recommendations of the Bikeway Plan.

Appendix A

Virginia Department of Transportation Policy for Integrating Bicycle and Pedestrian Accommodations

Virginia Department of Transportation

Policy for Integrating Bicycle and Pedestrian Accommodations

1. Introduction

Bicycling and walking are fundamental travel modes and integral components of an efficient transportation network. Appropriate bicycle and pedestrian accommodations provide the public, including the disabled community, with access to the transportation network; connectivity with other modes of transportation; and independent mobility regardless of age, physical constraints, or income. Effective bicycle and pedestrian accommodations enhance the quality of life and health, strengthen communities, increase safety for all highway users, reduce congestion, and can benefit the environment. Bicycling and walking are successfully accommodated when travel by these modes is efficient, safe, and comfortable for the public. A strategic approach will consistently incorporate the consideration and provision of bicycling and walking accommodations into the decision-making process for Virginia's transportation network.

2. Purpose

This policy provides the framework through which the Virginia Department of Transportation will accommodate bicyclists and pedestrians, including pedestrians with disabilities, along with motorized transportation modes in the planning, funding, design, construction, operation, and maintenance of Virginia's transportation network to achieve a safe, effective, and balanced multimodal transportation system.

For the purposes of this policy, an accommodation is defined as any facility, design feature, operational change, or maintenance activity that improves the environment in which bicyclists and pedestrians travel. Examples of such accommodations include the provision of bike lanes, sidewalks, and signs; the installation of curb extensions for traffic calming; and the addition of paved shoulders.

3. Project Development

The Virginia Department of Transportation (VDOT) will initiate all highway construction projects with the presumption that the projects shall accommodate bicycling and walking. Factors that support the need to provide bicycle and pedestrian accommodations include, but are not limited to, the following:

- project is identified in an adopted transportation or related plan
- project accommodates existing and future bicycle and pedestrian use
- project improves or maintains safety for all users
- project provides a connection to public transportation services and facilities
- project serves areas or population groups with limited transportation options
- project provides a connection to bicycling and walking trip generators such as employment, education, retail, recreation, and residential centers and public facilities
- project is identified in a Safe Routes to School program or provides a connection to a school
- project provides a regional connection or is of regional or state significance
- project provides a link to other bicycle and pedestrian accommodations
- project provides a connection to traverse natural or man-made barriers

- project provides a tourism or economic development opportunity

Project development for bicycle and pedestrian accommodations will follow VDOT's project programming and scheduling process and concurrent engineering process. VDOT will encourage the participation of localities in concurrent engineering activities that guide the project development.

3.1 Accommodations Built as Independent Construction Projects

Bicycle and pedestrian accommodations can be developed through projects that are independent of highway construction, either within the highway right-of-way or on an independent right-of-way. Independent construction projects can be utilized to retrofit accommodations along existing roadways, improve existing accommodations to better serve users, and install facilities to provide continuity and accessibility within the bicycle and pedestrian network. These projects will follow the same procedures as those for other construction projects for planning, funding, design, and construction. Localities and metropolitan planning organizations will be instrumental in identifying and prioritizing these independent construction projects.

3.2 Access-Controlled Corridors

Access-controlled corridors can create barriers to bicycle and pedestrian travel. Bicycling and walking may be accommodated within or adjacent to access-controlled corridors through the provision of facilities on parallel roadways or physically separated parallel facilities within the right-of-way. Crossings of such corridors must be provided to establish or maintain connectivity of bicycle and pedestrian accommodations.

3.3 Additional Improvement Opportunities

Bicycle and pedestrian accommodations will be considered in other types of projects. Non-construction activities can be used to improve accommodations for bicycling and walking. In addition, any project that affects or could affect the usability of an existing bicycle or pedestrian accommodation within the highway system must be consistent with state and federal laws.

3.3.1 Operation and Maintenance Activities

Bicycling and walking should be considered in operational improvements, including hazard elimination projects and signal installation. Independent operational improvements for bicycling and walking, such as the installation of pedestrian signals, should be coordinated with local transportation and safety offices. The maintenance program will consider bicycling and walking so that completed activities will not hinder the movement of those choosing to use these travel modes. The maintenance program may produce facility changes that will enhance the environment for bicycling and walking, such as the addition of paved shoulders.

3.3.2 Long Distance Bicycle Routes

Long distance bicycle routes facilitate travel for bicyclists through the use of shared lanes, bike lanes, and shared use paths, as well as signage. All projects along a long distance route meeting the criteria for an American Association of State Highway and Transportation Officials (AASHTO) or *Manual on Uniform Traffic Control Devices* (MUTCD) approved numbered bicycle route system should provide the necessary design features to facilitate bicycle travel. Independent construction projects and other activities can be utilized to make improvements for existing numbered bicycle routes. Consideration should be given to facilitating the development of other types of long distance routes.

3.3.3 Tourism and Economic Development

Bicycling and walking accommodations can serve as unique transportation links between historic, cultural, scenic, and recreational sites, providing support to tourism activities and resulting economic development. Projects along existing or planned tourism and recreation corridors should include bicycle and pedestrian accommodations. In addition, the development of independent projects to serve this type of tourism and economic development function should be considered and coordinated with economic development organizations at local, regional, and state levels, as well as with other related agencies. Projects must also address the need to provide safety and connectivity for existing and planned recreational trails, such as the Appalachian Trail, that intersect with the state's highway system.

3.4 Exceptions to the Provision of Accommodations

Bicycle and pedestrian accommodations should be provided except where one or more of the following conditions exist:

- scarcity of population, travel, and attractors, both existing and future, indicate an absence of need for such accommodations
- environmental or social impacts outweigh the need for these accommodations
- safety would be compromised
- total cost of bicycle and pedestrian accommodations to the appropriate system (i.e., interstate, primary, secondary, or urban system) would be excessively disproportionate to the need for the facility
- purpose and scope of the specific project do not facilitate the provision of such accommodations (e.g., projects for the Rural Rustic Road Program)
- bicycle and pedestrian travel is prohibited by state or federal laws

3.5 Decision Process

The project manager and local representatives will, based on the factors listed previously in this section, develop a recommendation on how and whether to accommodate bicyclists and pedestrians in a construction project prior to the public hearing. The district administrator should confirm this recommendation prior to the public hearing. Public involvement comments will be reviewed and incorporated into project development prior to the preparation of the design approval recommendation. When a locality is not in agreement with VDOT's position on how bicyclists and pedestrians will or will not be accommodated in a construction project, the locality can introduce a formal appeal by means of a resolution adopted by the local governing body. The resolution must be submitted to the district administrator to be reviewed and considered prior to the

submission of the design approval recommendation to the chief engineer for program development. Local resolutions must be forwarded to the chief engineer for program development for consideration during the project design approval or to the Commonwealth Transportation Board for consideration during location and design approval, if needed for a project. The resolution and supporting information related to the recommendation must be included in the project documentation.

The decisions made by VDOT and localities for the provision of bicycle and pedestrian travel must be consistent with state and federal laws regarding accommodations and access for bicycling and walking.

4. Discipline Participation in Project Development

VDOT will provide the leadership to implement this policy. Those involved in the planning, funding, design, construction, operation, and maintenance of the state's highways are responsible for effecting the guidance set forth in this policy. VDOT recognizes the need for interdisciplinary coordination to efficiently develop, operate, and maintain bicycle and pedestrian accommodations. Procedures, guidelines, and best practices will be developed or revised to implement the provisions set forth in this policy. For example, objective criteria will be prepared to guide decisions on the restriction of bicycle and pedestrian use of access-controlled facilities. VDOT will work with localities, regional planning agencies, advisory committees, and other stakeholders to facilitate implementation and will offer training or other resource tools on planning, designing, operating, and maintaining bicycle and pedestrian accommodations.

4.1 Planning

VDOT will promote the inclusion of bicycle and pedestrian accommodations in transportation planning activities at local, regional, and statewide levels. These planning activities include, but are not limited to, corridor studies, small urban studies, regional plans, and the statewide multimodal long-range transportation plan. To carry out this task, VDOT will coordinate with local government agencies, regional planning agencies, and community stakeholder groups. In addition, VDOT will coordinate with the Virginia Department of Rail and Public Transportation (VDRPT) and local and regional transit providers to identify needs for bicycle and pedestrian access to public transportation services and facilities.

4.2 Funding

Highway construction funds can be used to build bicycle and pedestrian accommodations either concurrently with highway construction projects or as independent transportation projects. Both types of bicycle and pedestrian accommodation projects will be funded in the same manner as other highway construction projects for each system (i.e., interstate, primary, secondary, or urban). VDOT's participation in the development and construction of an independent project that is not associated with the interstate, primary, secondary, or urban systems will be determined through a negotiated agreement with the locality or localities involved.

Other state and federal funding sources eligible for the development of bicycle and pedestrian accommodations may be used, following program requirements established for

these sources. These sources include, but are not limited to, programs for highway safety, enhancement, air quality, congestion relief, and special access.

VDOT may enter into agreements with localities or other entities in order to pursue alternate funding to develop bicycle and pedestrian accommodations, so long as the agreements are consistent with state and federal laws.

4.3 Design and Construction

VDOT will work with localities to select and design accommodations, taking into consideration community needs, safety, and unique environmental and aesthetic characteristics as they relate to specific projects. The selection of the specific accommodations to be used for a project will be based on the application of appropriate planning, design, and engineering principles. The accommodations will be designed and built, or installed, using guidance from VDOT and AASHTO publications, the MUTCD, and the *Americans with Disabilities Act Accessibility Guidelines (ADAAG)*. Methods for providing flexibility within safe design parameters, such as context sensitive solutions and design, will be considered.

During the preparation of an environmental impact statement (EIS), VDOT will consider the current and anticipated future use of the affected facilities by bicyclists and pedestrians, the potential impacts of the alternatives on bicycle and pedestrian travel, and proposed measures, if any, to avoid or reduce adverse impacts to the use of these facilities by bicyclists and pedestrians.

During project design VDOT will coordinate with VDRPT to address bicyclist and pedestrian access to existing and planned transit connections.

Requests for exceptions to design criteria must be submitted in accordance with VDOT's design exception review process. The approval of exceptions will be decided by the Federal Highway Administration or VDOT's Chief Engineer for Program Development.

VDOT will ensure that accommodations for bicycling and walking are built in accordance with design plans and VDOT's construction standards and specifications.

4.4 Operations

VDOT will consider methods of accommodating bicycling and walking along existing roads through operational changes, such as traffic calming and crosswalk marking, where appropriate and feasible.

VDOT will work with VDRPT and local and regional transit providers to identify the need for ancillary facilities, such as shelters and bike racks on buses, that support bicycling and walking to transit connections.

VDOT will enforce the requirements for the continuance of bicycle and pedestrian traffic in work zones, especially in areas at or leading to transit stops, and in facility replacements in accordance with the MUTCD, *VDOT Work Area Protection Manual*, and *VDOT Land Use Permit Manual* when construction, utility, or maintenance work, either by VDOT or other entities, affects bicycle and pedestrian accommodations.

VDOT will continue to research and implement technologies that could be used to improve the safety and mobility of bicyclists and pedestrians in Virginia's transportation network, such as signal detection systems for bicycles and in-pavement crosswalk lights.

4.5 Maintenance

VDOT will maintain bicycle and pedestrian accommodations as necessary to keep the accommodations usable and accessible in accordance with state and federal laws and VDOT's asset management policy. Maintenance of bike lanes and paved shoulders will include repair, replacement, and clearance of debris. As these facilities are an integral part of the pavement structure, snow and ice control will be performed on these facilities.

For sidewalks, shared use paths, and bicycle paths built within department right-of-way, built to department standards, and accepted for maintenance, VDOT will maintain these bicycle and pedestrian accommodations through replacement and repair. VDOT will not provide snow or ice removal for sidewalks and shared use paths. The execution of agreements between VDOT and localities for maintenance of such facilities shall not be precluded under this policy.

5. Effective Date

This policy becomes effect upon its adoption by the Commonwealth Transportation Board on March 18, 2004, and will apply to projects that reach the scoping phase after its adoption.

This policy shall supersede all current department policies and procedures related to bicycle and pedestrian accommodations. VDOT will develop or revise procedures, guidelines, and best practices to support and implement the provisions set forth in this policy, and future departmental policies and procedural documents shall comply with the provisions set forth in this policy.

Source: [http://virginiadot.org/infoservice/resources/Policy on Integrating BP Accommodations.pdf](http://virginiadot.org/infoservice/resources/Policy%20on%20Integrating%20BP%20Accommodations.pdf)

Appendix B

Manual on Uniform Traffic Control Devices - Bicycle Signage

Figure 9B-2. Regulatory Signs for Bicycle Facilities

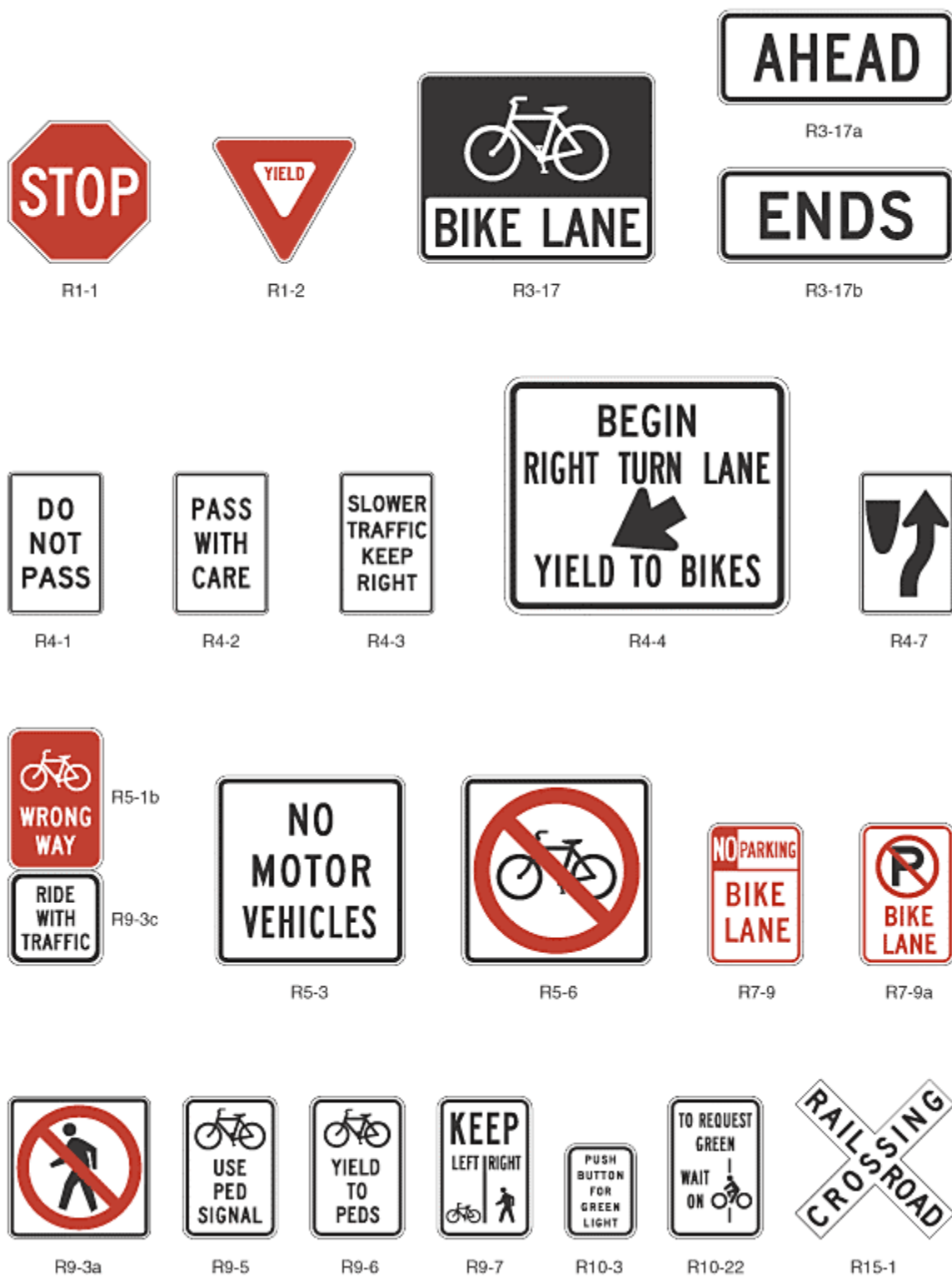


Figure 9B-3. Warning Signs for Bicycle Facilities (Sheet 1 of 2)



W1-1



W1-2



W1-3



W1-4



W1-5



W1-6



W1-7



W2-1



W2-2



W2-3



W2-4



W2-5



W3-1



W3-2



W3-3



W5-2



W5-4a



W7-5



W8-1



W8-2



W8-10



W8-10p

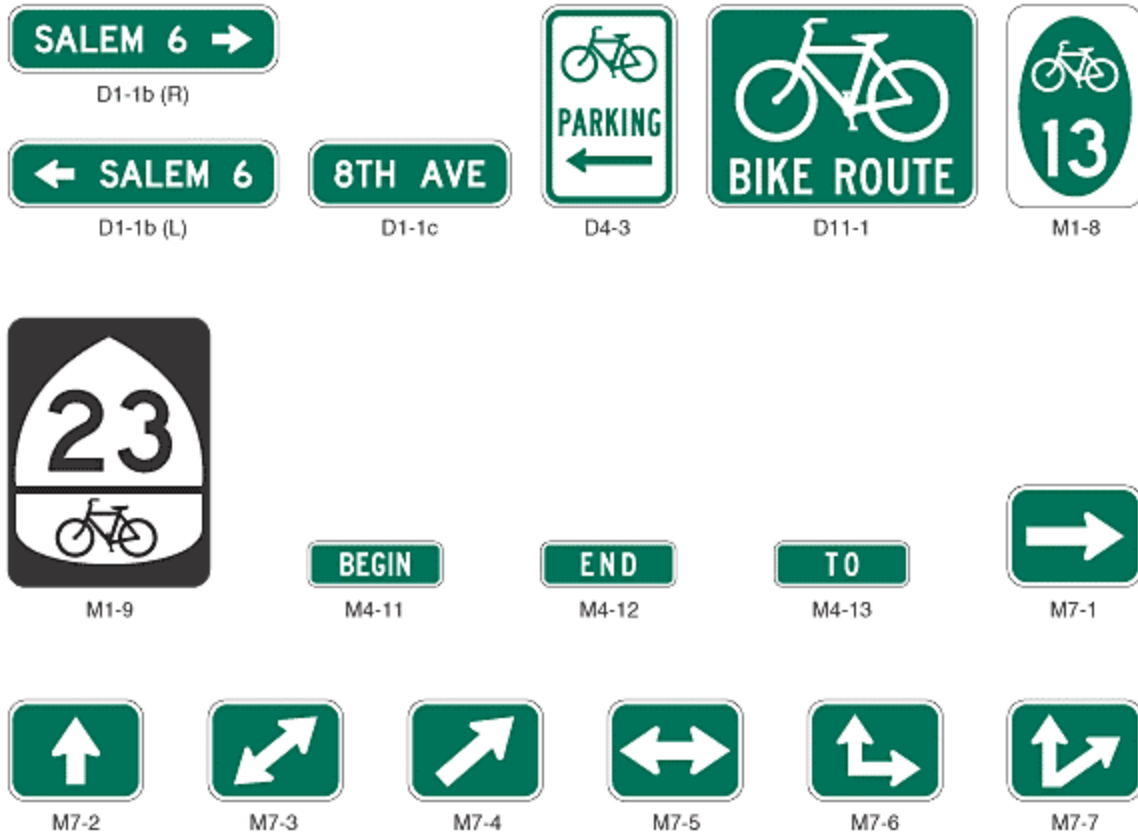


W10-1

Figure 9B-3. Warning Signs for Bicycle Facilities (Sheet 2 of 2)



Figure 9B-4. Guide Signs for Bicycle Facilities



Source: Manual on Uniform Traffic Control Devices (MUTCD)

Appendix C

Virginia Bicycle Riding Laws

Virginia Bicycle Riding Laws *(From Code of Virginia On-line)*

§ 46.2-1015. Lights on bicycles, electric personal assistive mobility devices, electric power assisted bicycles, and mopeds.

Every bicycle, electric personal assistive mobility device, electric power-assisted bicycle, and moped when in use between sunset and sunrise shall be equipped with a white light on the front emitting a white light visible in clear weather from a distance of at least 500 feet to the front and a red reflector visible from a distance of at least 600 feet to the rear when directly in front of lawful lower beams of headlights on a motor vehicle. Such lights and reflector shall be of types approved by the Superintendent. In addition to the foregoing provisions of this section, a bicycle or its rider may be equipped with lights or reflectors. These lights may be steady burning or blinking.

§ 46.2-1066. Brakes.

Every motor vehicle when driven on a highway shall be equipped with brakes adequate to control the movements of and to stop and hold such vehicle. The brakes shall be maintained in good working order and shall conform to the provisions of this article. Every bicycle, electric power-assisted bicycle, and moped, when operated on a highway, shall be equipped with a brake that will enable the operator to make the braked wheels skid on dry, level, clean pavement. Every electric personal assistive mobility device, when operated on a highway, shall be equipped with a system that, when activated or engaged, will enable the operator to bring the device to a controlled stop.

§ 46.2-1078. Unlawful to operate motor vehicle, bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped while using earphones.

It shall be unlawful for any person to operate a motor vehicle, bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped on the highways in the Commonwealth while using earphones on or in both ears.

§ 46.2-1081. Slow-moving vehicle emblems.

The provisions of this section shall not apply to bicycles, electric power-assisted bicycles, or mopeds. Display of a slow-moving vehicle emblem on a bicycle, electric power-assisted bicycle, or moped shall not be deemed a violation of this section.

§ 46.2-800. Riding bicycles, electric personal assistive mobility devices, electric power assisted bicycles, or mopeds; riding or driving animals.

Every person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, moped, or an animal or driving an animal on a highway shall be subject to the provisions of this chapter and shall have all of the rights and duties applicable to the driver of a vehicle, unless the context of the provision clearly indicates otherwise.

§ 46.2-839. Passing bicycle, electric personal assistive mobility device, electric power assisted bicycle, moped, animal, or animal-drawn vehicle.

Any driver of any vehicle overtaking a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, moped, animal, or animal-drawn vehicle proceeding in the same direction shall pass at a reasonable speed at least two feet to the left of the overtaken bicycle, electric personal assistive mobility device, electric power-assisted bicycle, moped, animal, or animal-drawn vehicle and shall not again proceed to the right side of the highway until safely clear of such overtaken bicycle, electric personal assistive mobility device, electric power assisted bicycle, moped, animal, or animal-drawn vehicle.

§ 46.2-847. Left turns by bicycles, electric personal assistive mobility devices, electric power-assisted bicycles, and mopeds.

A person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped and intending to turn left shall either follow a course described in § 46.2-846 or make the turn as provided in this section. A person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped and intending to turn left shall approach the turn as close as practicable to the right curb or edge of the roadway. After proceeding across the intersecting roadway, the rider shall comply with traffic signs or signals and continue his turn as close as practicable to the right curb or edge of the roadway being entered. Notwithstanding the foregoing provisions of this section, the Commonwealth Transportation Board and local authorities, in their respective jurisdictions, may cause official traffic control devices to be placed at intersections to direct that a specific course be traveled by turning bicycles, electric personal assistive mobility devices, electric power-assisted bicycles, and mopeds. When such devices are so placed, no person shall turn a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped other than as directed by such devices.

§ 46.2-849. How signals given.

Signals required by § 46.2-848 shall be given by means of the hand and arm or by some mechanical or electrical device approved by the Superintendent, in the manner specified in this section. Whenever the signal is given by means of the hand and arm, the driver shall indicate his intention to start, stop, turn, or partly turn by extending the hand and arm beyond the left side of the vehicle in the manner following:

1. For left turn or to pull to the left, the arm shall be extended in a horizontal position straight from and level with the shoulder;
2. For right turn or to pull to the right, the arm shall be extended upward;
3. For slowing down or stopping, the arm shall be extended downward.

Wherever the lawful speed is more than 35 miles per hour, such signals shall be given continuously for a distance of at least 100 feet, and in all other cases at least 50 feet, before slowing down, stopping, turning, or partly turning.

A person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped shall signal his intention to stop or turn. Such signals, however, need not be given continuously if both hands are needed in the control or operation of the bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped. Notwithstanding the foregoing provisions of this section, a person operating a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped may signal a right turn or pull to the right by extending the right hand and arm in a horizontal position straight from and level with the shoulder beyond the right side of the bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped, and may signal slowing down or stopping by extending the right arm downward.

§ 46.2-856. Passing two vehicles abreast.

A person shall be guilty of reckless driving who passes or attempts to pass two other vehicles abreast, moving in the same direction, except on highways having separate roadways of three or more lanes for each direction of travel, or on designated one-way streets or highways. This section shall not apply, however, to a motor vehicle passing two other vehicles when one or both of such other vehicles is a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped; nor shall this section apply to a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped passing two other vehicles.

§ 46.2-857. Driving two abreast in a single lane.

A person shall be guilty of reckless driving who drives any motor vehicle, including any motorcycle, so as to be abreast of another vehicle in a lane designed for one vehicle, or drives any motor vehicle, including any motorcycle, so as to travel abreast of any other vehicle traveling in a lane designed for one vehicle. However, this section shall not apply to any validly authorized parade, motorcade, or motorcycle escort, nor shall it apply to a motor vehicle traveling in the same lane of traffic as a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped.

§ 46.2-903. Riding or driving vehicles other than bicycles, electric power-assisted bicycles, or electric personal assistive mobility devices on sidewalks.

No person shall ride or drive any vehicle other than (i) an emergency vehicle, as defined in § 46.2-920, (ii) a vehicle engaged in snow or ice removal and control operations, (iii) a wheel chair or wheel chair conveyance, whether self-propelled or otherwise, (iv) a bicycle, (v) an electric personal assistive mobility device, or (vi) an electric power-assisted bicycle on the sidewalks of any county, city, or town of the Commonwealth.

§ 46.2-904. Use of roller skates and skateboards on sidewalks and shared-use paths; operation of bicycles, electric power-assisted bicycles, and electric personal assistive mobility devices on sidewalks and crosswalks and shared-use paths; local ordinances.

The governing body of any county, city, or town may by ordinance prohibit the use of roller skates and skateboards and/or the riding of bicycles, electric personal assistive mobility devices, or electric power-assisted bicycles on designated sidewalks or crosswalks, including those of any church, school, recreational facility, or any business property open to the public where such activity is prohibited. Signs indicating such prohibition shall be conspicuously posted in general areas where use of roller skates and skateboards, and/or bicycle, electric personal assistive mobility devices or electric power-assisted bicycle riding is prohibited. A person riding a bicycle, electric personal assistive mobility device, or an electric power assisted bicycle on a sidewalk, shared-use path, or across a roadway on a crosswalk, shall yield the right-of-way to any pedestrian and shall give an audible signal before overtaking and passing any pedestrian. No person shall ride a bicycle, electric personal assistive mobility device, or an electric power assisted bicycle on a sidewalk, or across a roadway on a crosswalk, where such use of bicycles, electric personal assistive mobility devices, or electric power-assisted bicycles is prohibited by official traffic control devices. A person riding a bicycle, electric personal assistive mobility device, or an electric power assisted bicycle on a sidewalk, shared-use path, or across a roadway on a crosswalk, shall have all the rights and duties of a pedestrian under the same circumstances. A violation of any ordinance adopted pursuant to this section shall be punishable by a civil penalty of not more than \$50.

§ 46.2-905. Riding bicycles, electric personal assistive mobility devices, electric power assisted bicycles, and mopeds on roadways and bicycle paths.

Any person operating a bicycle, electric personal assistive mobility device, electric power assisted bicycle, or moped on a roadway at less than the normal speed of traffic at the time and place under conditions then existing shall ride as close as safely practicable to the right curb or edge of the roadway, except under any of the following circumstances:

1. When overtaking and passing another vehicle proceeding in the same direction;
2. When preparing for a left turn at an intersection or into a private road or driveway;
3. When reasonably necessary to avoid conditions including, but not limited to, fixed or moving objects, parked or moving vehicles, pedestrians, animals, surface hazards, or substandard width lanes that make it unsafe to continue along the right curb or edge;
4. When avoiding riding in a lane that must turn or diverge to the right; and
5. When riding upon a one-way road or highway, a person may also ride as near the left-hand curb or edge of such roadway as safely practicable.

For purposes of this section, a "substandard width lane" is a lane too narrow for a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped and another vehicle to pass safely side by side within the lane. Persons riding bicycles, electric personal assistive mobility devices, or electric power-assisted bicycles on a highway shall not ride more than two abreast. Persons riding two abreast shall not impede the normal and reasonable movement of traffic, shall move into a single file formation as quickly as is practicable when being overtaken from the rear by a faster moving vehicle, and, on a laned roadway, shall ride in a single lane. Notwithstanding any other provision of law to the contrary, the Department of Conservation and

Recreation shall permit the operation of electric personal assistive mobility devices on any bicycle path or trail designated by the Department for such use.

§ 46.2-906. Carrying articles or passengers on bicycles, electric personal assistive mobility devices, electric power-assisted bicycles, and mopeds.

No person operating a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped on a highway shall carry any package, bundle, or article that prevents the driver from keeping at least one hand on the handlebars. No bicycle shall be used to carry more persons at one time than the number of persons for which it was designed or is equipped, except that an adult rider may carry a child less than six years old if such child is securely attached to the bicycle in a seat or trailer designed for carrying children.

§ 46.2-906.1. Local ordinances may require riders of bicycles, electric personal assistive mobility devices, and electric power-assisted bicycles to wear helmets.

The governing body of any county, city or town may, by ordinance, provide that every person 14 years of age or younger shall wear a protective helmet that at least meets the Consumer Product Safety Commission standard whenever riding or being carried on a bicycle, an electric personal assistive mobility device, or an electric power-assisted bicycle on any highway as defined in § 46.2-100, sidewalk, or public bicycle path. Violation of any such ordinance shall be punishable by a fine of \$25. However, such fine shall be suspended (i) for first-time violators and (ii) for violators who, subsequent to the violation but prior to imposition of the fine, purchase helmets of the type required by the ordinance. Violation of any such ordinance shall not constitute negligence, or assumption of risk, be considered in mitigation of damages of whatever nature, be admissible in evidence, or be the subject of comment by counsel in any action for the recovery of damages arising out of the operation of any bicycle, electric personal assistive mobility device, or electric power-assisted bicycle, nor shall anything in this section change any existing law, rule, or procedure pertaining to any civil action.

§ 46.2-907. Overtaking and passing vehicles.

A person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped may overtake and pass another vehicle on either the left or right side, staying in the same lane as the overtaken vehicle, or changing to a different lane, or riding off the roadway as necessary to pass with safety. A person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped may overtake and pass another vehicle only under conditions that permit the movement to be made with safety. A person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or moped shall not travel between two lanes of traffic moving in the same direction, except where one lane is a separate turn lane or a mandatory turn lane. Except as otherwise provided in this section, a person riding a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, or

moped shall comply with all rules applicable to the driver of a motor vehicle when overtaking and passing.

§ 46.2-908. Registration of bicycle, electric personal assistive mobility device, and electric power-assisted bicycle serial numbers.

Any person who owns a bicycle, electric personal assistive mobility device, or electric power assisted bicycle may register its serial number with the local law-enforcement agency of the political subdivision in which such person resides.

§ 46.2-932. Playing on highways; roller skates, skateboards, toys, or other devices on wheels or runners; persons riding bicycles, electric personal assistive mobility devices, electric power-assisted bicycles, mopeds, etc., not to attach to vehicles; exception.

No person shall play on a highway, other than on the sidewalks thereof, within a city or town or on any part of a highway outside the limits of a city or town designated by the Commonwealth Transportation Commissioner exclusively for vehicular travel. No person shall use roller skates, skateboards, toys, or other devices on wheels or runners, except bicycles, electric personal assistive mobility devices, electric power-assisted bicycles, mopeds, and motorcycles, on highways where play is prohibited. The governing bodies of counties, cities, and towns may designate areas on highways under their control where play is permitted and may impose reasonable restrictions on play on such highways. If the highways have only two traffic lanes, persons using such devices, except bicycles, electric personal assistive mobility devices, electric power-assisted bicycles, mopeds, and motorcycles, shall keep as near as safely practicable to the far right side or edge of the right traffic lane so that they will be proceeding in the same direction as other traffic. No person riding on any bicycle, electric personal assistive mobility device, electric power assisted bicycle, moped, roller skates, skateboards, toys, or other devices on wheels or runners, shall attach the same or himself to any vehicle on a roadway.

Source: BikeWalk Virginia

<http://bikewalkvirginia.org/resources/documents/VirginiaBicycleRules2004.pdf>

Appendix D

Virginia Department of Transportation - Tips for Safe Bicycling

VDOT Tips for Safe Bicycling

- Be a responsible bicyclist - obey all traffic control devices and use proper hand signals.
- Always ride with the flow of traffic.
- Dress safely - wear a helmet, wear bright colored clothing, and secure loose pant legs.
- Ride defensively - anticipate the actions of other road users and watch for road hazards.
- Pass vehicles with extreme care - turning vehicles may not see you.
- Be aware of motor vehicle blind spots whether while riding or when stopped at an intersection.
- Maximize your visibility at night - wear reflective clothing and apply reflective tape to your bicycle.
- Walk your bicycle when you get into traffic situations beyond your cycling abilities.
- Exercise great caution when riding in bus traffic - watch out for buses pulling to and from curbs and passengers getting on and off buses.
- Park your bicycle so you do not block sidewalks, handicap and building accesses, or emergency drives.
- Lock your bicycle - secure both wheels and the frame to a stationary object using a sturdy lock.
- Register or license your bicycle if required or provided by your community.

Source: Virginia Department of Transportation. <http://viriniadot.org/info/service/bk-laws.asp> - Tips

Appendix E

List of Bicycling Related Resources

America Bikes

http://www.americabikes.org/archive/default_archivejune2005.asp

Association of Pedestrian and Bicycle Professionals

<http://www.apbp.org/website/>

Bicycle Compatibility Index

<http://www.hsrx.unc.edu/research/pedbike/98095/index.html>

Bikes Belong Coalition

<http://bikesbelong.org/site/intro.cfm>

Bicycling Life

<http://bicyclinglife.com/>

Bike Smart, Virginia!

<http://www.vahealth.org/civp/bike/index.asp>

BikeWalk Virginia

<http://www.bikewalkvirginia.org/>

Blue Ridge Bicycle Club

<http://www.blueridgebicycleclub.com/>

Federal Highway Administration (FHWA) - Bicycle & Pedestrian Program

<http://www.fhwa.dot.gov/environment/bikeped/>

League of American Bicyclists

<http://www.bikeleague.org/index.cfm>

Manual on Uniform Traffic Control Devices

http://mutcd.fhwa.dot.gov/kno-millennium_12.28.01.htm

National Center for Bicycle and Walking

<http://www.bikewalk.org/>

National Household Travel Survey (NHTS)

http://nhts.ornl.gov/2001/html_files/introduction.shtml

Pedestrian and Bicycle Information Center

http://www.bicyclinginfo.org/de/signs_markings.htm

Roanoke Times - Outdoors

<http://www.roanoke.com/outdoors/>

Safe Routes to Schools

<http://www.saferoutestoschools.org/>

Surgeon General's Call To Action To Prevent and Decrease Overweight and Obesity

<http://www.surgeongeneral.gov/topics/obesity/calltoaction/toc.htm>

Thunderhead Alliance

<http://www.thunderheadalliance.org/index.asp>

Virginia Department of Transportation – Bicycling and Walking Program

<http://www.virginiadot.org/infoservice/bk-default.asp>

Virginia Department of Transportation - Road Design Manual (2001), Section A-5-
Bicycle Facility Guidelines.

<http://www.virginiadot.org/infoservice/resources/bk-designguide.pdf>.

Appendix F

Overview of the Bicycle Compatibility Index and the Bicycle Level of Service Model

Bicycle Compatibility Index (BCI)

The Bicycle Compatibility Model was developed by the FHWA. The BCI evaluates the capability of specific roadways to accommodate both motorists and bicyclists.

BCI can assist in:

- Operational Evaluation
- Design
- Planning
- Route Selection

BCI Inputs:

- Number of travel lanes
- Curb lane travel width
- Bike lane or shoulder width
- Land use - residential/commercial
- Speed limit
- 85th percentile speed
- AADT and HV%
- On-street parking information

Bicycle Compatibility Index (BCI) Categories

LOS	BCI Range	Compatibility Level
A	≤ 1.50	Extremely High
B	1.51 – 2.30	Very High
C	2.31 – 3.40	Moderately High
D	3.41 – 4.40	Moderately Low
E	4.41 – 5.30	Very Low
F	> 5.30	Extremely Low

More information regarding the Bicycle Compatibility Index is available at <http://www.hsrx.unc.edu/research/pedbike/98095/index.html>.

Bicycle Level of Service Model (BLOS)

The *Bicycle Level of Service Model (Bicycle LOS Model)* is an evaluation of bicyclist perceived safety and comfort with respect to motor vehicle traffic while traveling in a roadway corridor. It identifies the quality of service for bicyclists or pedestrians that currently exists within the roadway environment.

The *Bicycle LOS Model* is used by planners, engineers, and designers throughout the US and Canada in a variety of planning and design applications. Applications of the Model include:

- Conducting a benefits comparison among proposed bikeway/roadway cross-sections
- Identifying roadway restriping or reconfiguration opportunities to improve bicycling conditions
- Prioritizing and programming roadway corridors for bicycle improvements
- Creating bicycle suitability maps
- Documenting improvements in corridor or system-wide bicycling conditions over time

BLOS Inputs:

- Number of travel lanes
- Lane Width
- AADT and HV%
- Speed limit
- Travel lane width
- Bike lane Width
- Shoulder width
- On-street parking information
- Pavement Condition

Bicycle Level of Service Categories

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

Bicycle Compatibility Index (BCI) Data Entry Worksheet
Buck Mountain Road

Data Entry													
Location	Geometric & Roadside Data					Traffic Operations Data					Parking Data		
Midblock Identifier (Route/Intersecting Streets, Segment Number, Link Number, Etc.)	No. of Lanes (one direction)	Curb Lane Width (ft)	Bicycle Lane Width (ft)	Paved Shoulder Width (ft)	Residential Development (y/n)	Speed Limit (mi/h)	85th %tile Speed (mi/h)	AADT	Large Truck % (HV)	Right Turn % (R)	Parking Lane (y/n)	Occupancy (%)	Time Limit (minutes)
Buck Mountain Rd. - Starkey Rd. to 1960	1	10.0	0.0	0.0	y	35	44	5800	5	2.0	n	0.0	0.0
Buck Mountain Rd. - 1960 to 917	1	10.0	0.0	0.0	y	35	44	5000	5	3.0	n	0.0	0.0
Buck Mountain Rd. - 917 to BR Park.	1	10.0	0.0	0.0	y	45	54	4600	5	4.0	n	0.0	0.0
Buck Mountain Rd. - Starkey Rd. to 1963	1	10.5	0.0	0.0	y	45	54	4700	5	5.0	n	0.0	0.0

Bicycle Compatibility Index (BCI) and Level of Service Computations
Buck Mountain Road

Bicycle Compatibility Index and Level of Service Computations												
Location	BCI Model Variables									Results		
Midblock Identifier (Route/Intersecting Streets, Segment Number, Link Number, Etc.)	BL	BLW	CLW	CLV	OLV	SPD	PKG	AREA	AF	BCI	Level of Service	Bicycle Compatibility Level
Buck Mountain Rd. - Starkey Rd. to 1960	0	0.0	10.0	319	0	44	0	1	0.6	4.66	E	Very Low
Buck Mountain Rd. - 1960 to 917	0	0.0	10.0	275	0	44	0	1	0.6	4.58	E	Very Low
Buck Mountain Rd. - 917 to Blue Ridge Parkway	0	0.0	10.0	253	0	54	0	1	0.6	4.88	E	Very Low
Buck Mountain Rd. - Starkey Rd. to 1963	0	0.0	10.5	259	0	54	0	1	0.6	4.82	E	Very Low

Bicycle Level of Service Data Entry and Calculations

Route Name	From	To	Traffic Data														Bicycle LOS		
			Len.	Dir.	Lanes (L)			Pct.	Spd.	Pavement				Park.	Rum b.	Cond	Cond	Score	Grade
			(Ls)	of	Th	Co n.	(ADT)	(HV)	(SPp)	(Wt)	(WI)	(Wps)	N/E	S/W	Stps.	Lane	Shdr		
			(Mi)	Sur.	#		(vpd)	(%)	mph	(ft)	(ft)	(ft)	(%)	(%)	(Y/N)	(5..1)	(5..1)		
Hersheberger Rd.	Peters Creek Rd.	Cove Rd. (116)	1.34	E	2	U	10000	1	35	12.5	1.0	0.0	0	0	N	4.0	0.0	3.75	D
Hersheberger Rd.	Peters Creek Rd.	Cove Rd. (116)		W	2	U	10000	1	35	11.5	1.0	0.0	0	0	N	4.0	0.0	3.87	D
Hersheberger Rd.	Cove Rd. (116)	I-581		E	6	D	28000	1	35	11.5	0.0	0.0	0	0	N	4.0	0.0	3.83	D
Hersheberger Rd.	Cove Rd. (116)	I-581		W	6	D	28000	1	35	11.0	0.0	0.0	0	0	N	4.0	0.0	3.89	D
Hersheberger Rd.	I-581	Rutgers Rd.		E/W	6	D	37000	1	40	12.0	0.0	0.0	0	0	N	5.0	0.0	3.83	D
Hersheberger Rd.	Rutgers Rd.	Williamson Rd.		E	6	D	37000	1	35	12.0	0.0	0.0	0	0	N	4.0	0.0	3.91	D
Hersheberger Rd.	Rutgers Rd.	Williamson Rd.		W	6	D	37000	1	35	12.5	0.0	0.0	0	0	N	4.0	0.0	3.85	D