

**Roanoke Valley, Blue Ridge Parkway Trail Plan
Final Draft
1/28/04**

**Compiled by
Blue Ridge Parkway
Roanoke Valley Greenway Commission
National Park Service, Rivers & Trails Program
and
The Roanoke Valley Blue Ridge Parkway Planning Team**

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- Attachment B. Mission, Purpose, and Significance of Blue Ridge Parkway
- Attachment C. UTAP Trail Section Data Collection Form and “Fast Facts” Sheet
- Attachment D. Natureshapes, Natural Surface Trail Design Matrix
- Attachment E. Environmental Compliance Documents
- Attachment F. Sharing the Trail with Horses
- Attachment G. National Park Service Policy on Bicycling, CFR Title 36
- Attachment H. National Park Service Management Policy
- Attachment I. Trail Relocations
- Attachment J. Conceptual Design Drawings for Trailhead and Camping Facilities
- Attachment K. New Trail Construction
- Attachment L. Sources of Trail Funding

I. Executive Summary

The Roanoke Valley, also known as “the Capital of the Blue Ridge,” is located immediately west of the Blue Ridge Mountains in southwest Virginia. Noted for its natural beauty and scenic qualities, the Valley has long been a center for outdoor recreation and Appalachian heritage. Located in the heart of the valley is the Roanoke-Salem-Vinton urban core. The cities are surrounded by Roanoke County and framed on both the east and west by mountain ridges, providing both stunning scenery, and close-to-home opportunities for outdoor recreation.

The four local governments in the Roanoke Valley have developed a regional greenway plan with 51 routes, including trail connections to the Blue Ridge Parkway, Jefferson National Forest, Appalachian Trail, Havens Wildlife Management area, Virginia’s Explore Park, and city and county reservoirs. In the past five years, 14 miles of the greenway have been completed, and the initiative has been recognized as an important component in the region’s quality of life and economic development.

In addition to hiking and horseback riding, mountain biking is another rapidly growing outdoor recreation activity in the Roanoke valley. Volunteers have built 12 miles of mountain biking trails at Explore Park and several miles on Mill Mountain. The connection of these two areas would be very popular, although the most feasible route would be the pedestrian/horse trail paralleling the Parkway, which is currently closed to mountain biking. Other challenges include upgrading the existing Blue Ridge Parkway trail system to a sustainable design, rerouting several sections that have become washed out and gullied, and developing a strategy to address long term management and maintenance needs.

The Blue Ridge Parkway trails were planned with the original design of the Parkway. The trails were intended to follow the Parkway from Stewart’s Knob at milepost 110.6 to State Route 220 at milepost 121.4. The Chestnut Ridge Trail loop surrounding the Roanoke Mountain Campground was added to complete the trail system with the construction of the campground a few years later. Both equestrian and hikers have shared the trail systems since its construction.

The purpose of this trail study is as follows:

- 1) To explore the potential for development of an integrated, inter-jurisdictional trail system for the Roanoke area that would connect Blue Ridge Parkway and Roanoke Valley Greenway trails.
- 2) To identify the issues, challenges, and opportunities for managing the system for shared use to include mountain biking in addition to the traditional equestrian and hiking use.
- 3) To upgrade the highly eroded and substandard existing trail system within the Parkway boundary, in order to provide a more sustainable, easier to maintain system,

that includes safer road crossings, and that meets the National Park Service trail construction standards.

- 4) To propose extension of the existing mapped trail system within Blue Ridge Parkway to include connections to the Jefferson National Forest, Wolf Creek Greenway, Roanoke River Greenway, Roanoke City's Mill Mountain Park, and Virginia's Explore Park.
- 5) To provide updated trail recreational facilities for enhanced public use that might include horse trailer parking and camping at the Roanoke Mountain Campground, and additional horse trailer parking at Stewart's Knob and Roanoke River Parkway overlooks.
- 6) To establish a network of trail maintenance volunteers managed by the Parkway adopt-a-trail system that would participate in the future long term maintenance and preservation of the entire trail system.

This study includes:

- A trail inventory and assessment of current conditions utilizing the Universal Trail Assessment Process;
- Identification of trail sections needing maintenance and relocation;
- An analysis of the benefits and challenges to developing a shared use trails system in the Roanoke area.
- Recommended design guidelines for trail tread construction and maintenance, trailhead facilities, road crossings, parking, and signage to include:
 - Conceptual site plans for new horse trailer parking planned for Roanoke River Parkway Overlook #1, and Stewart's Knob Parking Overlook
 - Conceptual site plans to modify the existing Roanoke Mountain Campground to accommodate equestrian camping and extended horse trailer parking
- Maps of the combined Blue Ridge Parkway, Roanoke Valley Greenway system including a detail map showing trail system connections and new trail construction.
- Estimated costs and funding sources for development of the proposed network
- Recommendations regarding future planning including project phasing and actions to involve the public in trail planning and long-term maintenance activities.

The trail system recommendations proposed in the Roanoke Valley Blue Ridge Trail Plan will be considered as a component of the Blue Ridge Parkway General Management Plan, scheduled for completion in 2006. It is intended that the Roanoke Plan serve as a model for connecting Parkway trails to adjacent community greenway trail systems.

II. Introduction

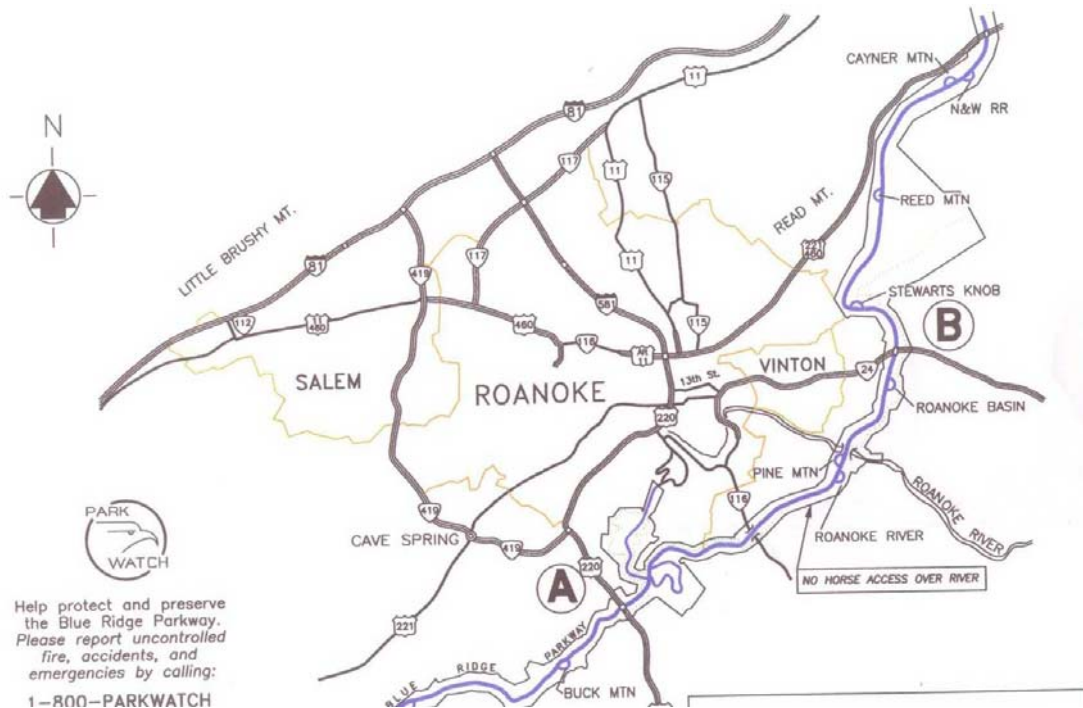
Background

The Blue Ridge Parkway was established by an Act of Congress on August 25, 1916 (39 Stat.535), as a 469 mile recreational motor road connecting Shenandoah and Great Smoky Mountains National Parks. Specifically, the intended purpose of the Blue Ridge Parkway is:

"To conserve, interpret, and exhibit the unique natural and cultural resources of the central and southern Appalachian Mountains, as well as provide for leisure motor travel through a variety of environments."

The park encompasses 82,000 acres of federal land and has more than 1,000 miles of boundary to manage. There are also 4,000 adjacent landowners, 29 county governments and several town and city governments along the border, and 181 access points from regional roads. In the vicinity of Roanoke, the parkway snakes along the top of the mountain ridge to the east of the greater Roanoke urban area (refer to Figure 1). Designed as a "scenic drive," the Parkway provides both protection for the cultural and natural features of the mountains, as well as a place of discovery for visitors to the park.

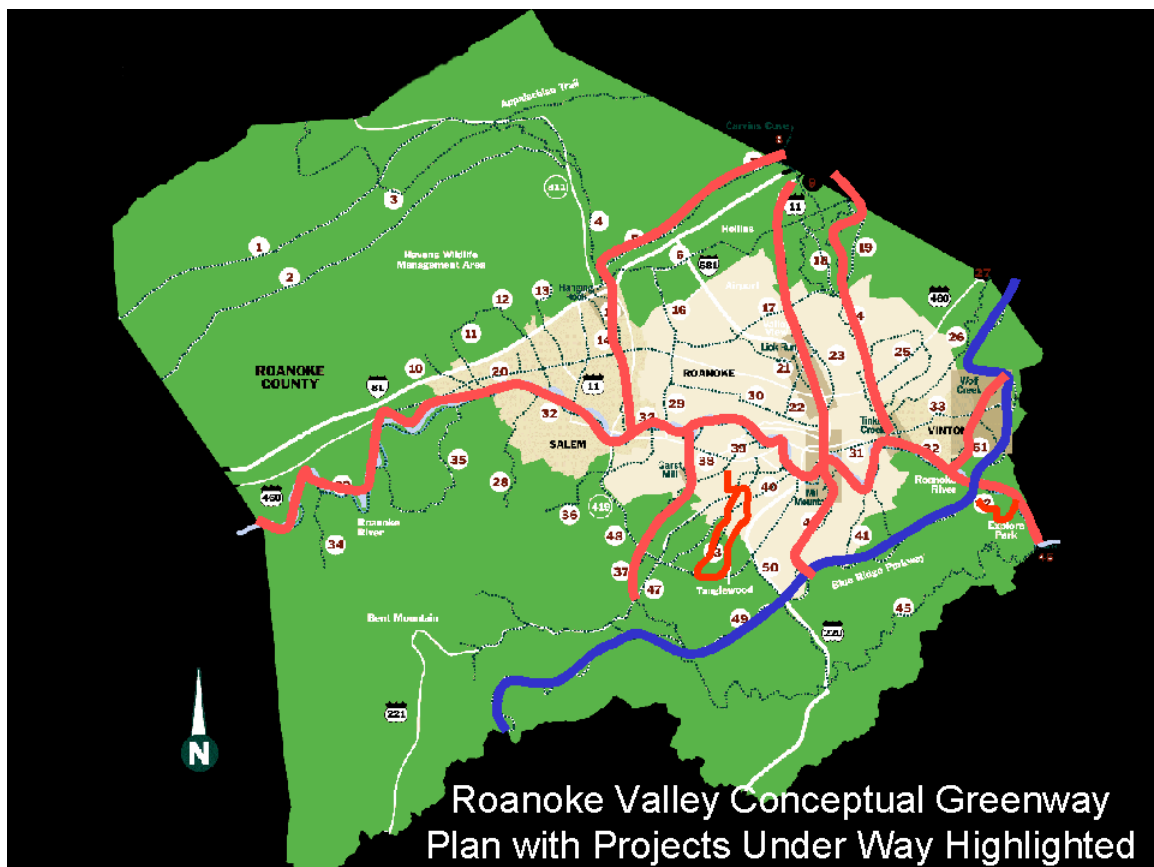
Figure 1. Blue Ridge Parkway in Roanoke, Virginia



In 1995, the Roanoke Valley Greenways/Open Space Steering Committee was established to spearhead efforts in the development of a regional greenway system. Coordinated by the Fifth Planning District Commission, and consisting of Roanoke County, the Cities of Roanoke and Salem, and the Town of Vinton, the committee went to work at facilitating the efforts of numerous citizens, interest groups, public and private entities in the development of a Greenways Conceptual Plan. Adopted in 1997, the plan is providing a framework for the development of an interconnected network of trails and greenway corridors throughout the Roanoke region. In 1997 the Roanoke Valley Greenway Commission was established to oversee implementation of the plan.

The Roanoke Valley Greenway Conceptual Plan identifies 51 specific greenway segments, radiating outward from the urban core of Roanoke, Salem, and Vinton (refer to Figure 2). In order to realize the Roanoke Greenway vision, the Commission works continuously to explore potential trail linkages, as well as potential new partnerships to complete these segments. Over the past few years attention has been given to the areas south and east of the urban core. In this part of the region, the urban area abuts the Blue Ridge Mountain. Located on the ridge crest is the Blue Ridge Parkway, which is one of the 51 routes in the plan.

Figure 2. Roanoke Valley Greenway System



On November 1, 2001, the Roanoke Valley Greenway Commission and Blue Ridge Parkway signed a General Agreement, allowing the Commission to assist with trail planning, mapping and rehabilitation under the direction of Parkway staff (refer to Attachment A). Discussions were initiated in Spring 2002 between Parkway staff and the Commission to explore options for development of an integrated system that would provide critical linkages between the two systems, providing the public with a greatly enhanced range of trail opportunities.

Inventory and assessment of the Roanoke trail system began in June 2002, in conjunction with an International Mountain Bicycling Association (IMBA) Trailbuilding School hosted at Explore Park. Project sponsors included National Park Service, Roanoke Valley Greenway Commission, and IMBA. Participants also included staff from Virginia Department of Conservation and Recreation, Roanoke County, the Town of Vinton, Roanoke City Parks and Recreation, and local volunteers. During the school many of the trails on and around Blue Ridge Parkway were walked and examined, and the potential for a valley wide trail system that connected to the Parkway was discussed.

A vision of several loop trails began to emerge, using portions of the Roanoke Greenway system and Blue Ridge Parkway lands. The first loop would consist of a 17 mile loop from downtown Roanoke, to Mill Mountain, to Chestnut Ridge, along the horse trail paralleling the parkway to Explore Park and the Roanoke River, and back into Roanoke. A second 7 mile loop could be established from the Roanoke River north to the Wolf Creek Greenway and back into Vinton. Completion of these loops would require new trail connections at Mill Mountain, Roanoke River, Explore Park, and Wolf Creek.

Project Purpose, Goal, and Partners

The purpose of the Roanoke Valley Blue Ridge Parkway Trail Plan is to determine the feasibility of developing a shared-use trail network, linking Blue Ridge Parkway and the Roanoke Valley trail network. The project goal is stated as follows:

To expand outdoor recreational opportunities for both residents and visitors to the Roanoke region by providing a network of shared use trails that link downtown Roanoke and surrounding neighborhoods to locally and national significant open space resources.

To accomplish the above stated goal, a planning team was established consisting of various trail interests and resource managers with expertise in trail assessment, planning, design, and construction. Consensus was reached on the overall partners' roles, as described below.

Roanoke Valley Greenway Commission: Established in 1997 as a regional greenway and trail advisory body, the Commission served as the overall project coordinator. With representatives from the City of Roanoke, Town of Vinton, and Roanoke County, as well as trail interest groups, the Commission has a proven track record in greenway planning, public involvement, and realizing tangible on-the-ground conservation successes. They are often recognized as one of the most successful greenway planning efforts in the

Commonwealth of Virginia, and received the Kodak Greenway Award from The Conservation Fund in 2001 and the Virginia Environmental Stewardship Award in 2003.

Pathfinders for Greenways: A non-profit trail group established in 1997, Pathfinders supports and assists the Roanoke Valley Greenways Commission with trail development through outreach, trail construction, maintenance, and fundraising. Pathfinders provided valuable volunteer hours for data collection and will play a key role in long-term maintenance of the trail system.

Blue Ridge Parkway (BLRI): Parkway staff are responsible for all decisions affecting the park including: establishing park policy, park operations, long term management of park facilities, and the challenging task of balancing the numerous demands of various interest groups and stakeholders, while protecting the Park's resources. During the Roanoke trail study, park staff assisted in all phases of data collection, analysis and plan development.

National Park Service, Rivers, Trails, and Conservation Assistance Program (RTCA): RTCA, also known as the Rivers and Trail Program, works with community groups and local and State governments to conserve rivers, preserve open space, and develop trails and greenways. In Roanoke, assistance was provided in facilitation, multiple jurisdiction coordination and partnership development; coordination of the trail inventory; and coordination of final plan recommendations.

Virginia Department of Conservation & Recreation (DCR): Staff from DCR provided assistance in data collection, and provided funding for trail construction through a Virginia Recreational Trails Fund grant.

International Mountain Biking Association (IMBA): Established in 1988, IMBA promotes the development of trails that encourage public access to natural settings without harming the ecosystem. The IMBA Trail Care Crew is nationally known for its expertise in trail design, layout, and construction utilizing principles of sustainable trail design. IMBA provided training and technical expertise to the project.

Valley Area Shared Trails Coalition (VAST): Consisting of the various user groups in the Roanoke Valley, VAST provided a link to local trail interests, as well as volunteer hours for data collection.

Other supporting entities include: Roanoke Valley Horseman's Association, Roanoke County, City of Roanoke, Town of Vinton, Roanoke Valley/Alleghany Regional Commission, Virginia's Explore Park, and Friends of the Blue Ridge Parkway.

Project Scope

The planning team identified the following tasks needed to document existing conditions, assess the benefits and challenges of developing a shared-use facility, and develop recommendations for future trail planning.

Primary Tasks

1. Develop trail planning work group to provide oversight and guidance in trail assessment work and plan development.
2. Research trail assessment methodologies including TRAC, UTAP, NPS, and provide recommendation on preferred process for the Roanoke study.
3. Develop GIS base maps of the trail system, through a collaborative effort of Roanoke Valley Greenways Commission, local governments, and the Roanoke Valley/Allegheny Regional Commission.
4. Assemble trail survey team with skills and expertise in trail assessment, and conduct fieldwork to document existing conditions.
5. Facilitate discussion to define and prioritize problem areas, analyze options, and develop recommendations to resolve trail issues including:
 -) Assess feasibility of providing mountain biking opportunities on the trails
 - a) Identify sections requiring maintenance, sections requiring relocation, and provide recommended techniques
 - b) Assess environmental impacts of potential actions
 - c) Provide recommendations for connections to the regional greenways network including location and design considerations
 - d) Solicit input from trail users, adjacent property owners, and cooperating agencies
 - e) Provide trail system planning recommendations to design and construct a sustainable trail network for the study area
 - f) Provide cost estimates, funding strategies, and a phasing plan for trail system construction
6. Work in collaboration with Roanoke Valley Greenways Commission, BLRI and trail interest groups to compile the final report.

Blue Ridge Parkway will:

7. Incorporate the Roanoke Trail Plan as a part of the Blue Ridge Parkway, General Management Plan, to serve as a model for shared use trails. The GMP is targeted for completion in 2006, with public input meetings planned for the Spring of 2004.

Products:

1. UTAP Trail Assessment
2. GIS base maps of existing trail network
3. Roanoke Valley Blue Ridge Parkway Trail Plan

Relationship to Blue Ridge Parkway General Management Plan

Construction of the 469 mile Parkway began in 1935, but was not completed until the dedication of the Linn Cove Viaduct in 1987. With the completion of most of the Parkway's major infrastructure, recent years have seen a shift in management focus from park facility development, to protection of the park's scenic, natural, cultural, and recreational qualities. In Spring 2002, the Blue Ridge Parkway began a comprehensive planning effort to develop the park's first General Management Plan (GMP) and Environmental Impact Statement.

GMPs are required for all units in the national park system and are intended to set the park's management direction for the next 15 to 20 years. General management planning is the broadest level of decision making for national parks. The GMP process provides the opportunity to examine the parks long-range goals and management issues, and explore the range of resource conditions and visitor experiences that should be achieved and maintained over time for the Parkway. Adjacent land uses and transportation improvements, their effect on park resources and visitors, and strategies for cooperation among public and private land managers are also explored.

The Roanoke Blue Ridge Parkway Trail Plan will focus on a specific geographic area within the park, the 14.4 mile segment located adjacent to the Roanoke urban area (milepost 107, Coyner Mountain Parking Overlook, to mile post 121.4, State Route 220). The study is intended to provide a greater understanding of the issues, challenges, and opportunities for development of an integrated trail network in the Roanoke area. It will also provide a deeper level of analysis and recommendations regarding mountain biking, given site specific conditions and constraints. Finally, the study is intended to be a model for those areas of the Parkway coming under increased development pressure from expanding urban centers, by demonstrating a collaborative approach to trail planning and management.

(For a more in-depth description of the Blue Ridge Parkway's mission, purpose, and significance refer to Attachment B)

III. Trail Inventory

In October 2002, a Universal Trail Assessment Process (UTAP) workshop was conducted to document trail conditions. The workshop was organized by the National Park Service, Rivers and Trails Program, and lead by staff from the Denver office, with UTAP training and field experience. Fieldwork began during the October training, and continued through November 2002, to complete the Chestnut Ridge Loop, the Roanoke River Trail, and the southern portion of the BLRI equestrian trail paralleling the parkway, a distance of 12 miles. An abbreviated trail assessment was completed in May 2003 for the remaining 8 miles of equestrian trail. The inventory was a collaborative effort, utilizing a variety of trained volunteers, local park staff, state resource managers, and staff from the Rivers & Trails program. IMBA provided on-going advice and assistance related to trail design issues.

In addition to the trail inventory, GIS-GPS methods and equipment were used to develop a GIS based map of the trail system. The mapping effort was coordinated by the Roanoke Valley Greenway Commission with support provided by Roanoke County Community Development, City of Roanoke Engineering, Parks, and Recreation, and Roanoke Valley/Allegheny Regional Commission. Numerous technical and logistical challenges such as insufficient satellite coverage, seasonal vegetative interference, and staffing needs were overcome, and by July 2003 a work map was completed showing the trail system on a 2' contour base map (scale 1:200 foot). In areas where the 2' contour base was not available, the trail system was overlaid on a 1:200 foot scale aerial photogrametric base showing landscape features such as drainage, vegetation, and structures.

The following section describes the trails in the study area. Also included is a description of the process and methods used to inventory the trails, and a summary of existing conditions.

Description of Project Study Area

Approximately 20 miles of trail are included in the Roanoke study. The trail network includes 4 primary segments:

- | | |
|---|---------|
| * Chestnut Ridge Loop | 6 miles |
| * Parkway Equestrian Trail –Route 220 to Roanoke River
(BLRI Horse Trail, South of the River) | 8 miles |
| * Parkway Equestrian Trail – Roanoke River to Stewarts Knob
(BLRI Horse Trail, North of River) | 5 miles |
| * Roanoke River Trail | 1 mile |

Each of these segments were further broken down into sections as shown in Table 1, below.

Table 1. Existing Trail Segments

Trail Name	Section Number	Section Termini	Section Termini
Chestnut Ridge Loop Trail – West	1	Parkway at Yellow Mtn. Road	Welcome Valley Road (Rt. 672)
Chestnut Ridge Loop Trail – East	2	Welcome Valley Road (Rt. 672)	Parkway at Yellow Mtn. Road
BLRI Horse Trail South of River	3	Welcome Valley Road (Rt 672)	Gum Spring Overlook
BLRI Horse Trail South of River	4	Route 220	Gum Spring Overlook
BLRI Horse Trail South of River	5	Gum Spring Overlook	Yellow Mountain Road
BLRI Horse Trail South of River	6	Yellow Mtn Road	Bandy Road
BLRI Horse Trail South of River	7	Bandy Road	Rt. 116
BLRI Horse Trail South of River	8	Rt. 116	Pitzer Road
BLRI Horse Trail South of River	9	Pitzer Road	Rutrough Road
BLRI Horse Trail South of River	10	Rutrough Road	Highland Road
BLRI Horse Trail South of River	11	Highland Road (west of the Parkway)	Roanoke River Overlook
Roanoke River Trail	12	Access from Trailhead Parking Lot	Loop Trails to Roanoke River and Scenic Overlook
BLRI Horse Trail North of River	13	Roanoke River north, east side	Hardy Road
BLRI Horse Trail North of River	14	Hardy Road	Rt. 24
BLRI Horse Trail North of River	15	Rt 24	Mountain View Road
BLRI Horse Trail North of River	16	Mountain View Road	Stewarts Knob Overlook

Refer to Figure 3-A, Figure 3-B, and Figure 3-C, to locate specific trail sections listed above.

During the course of this project, potential additions to the system were identified for future study. Specifically, greenway trail connections should be considered for:

- 1) Stewarts Knob Overlook and Coyner Mountain Overlook to Jefferson National Forest lands, and
- 2) Buck Mountain Parking Overlook at milepost 123.2, which would include possible connections to county parks and schools south of State Route 220. For this connection to become a shared use trail, however, the challenge of crossing Route 220 safely would have to be designed and solved.

Trail ends at U.S. Route 220
MP 121.4

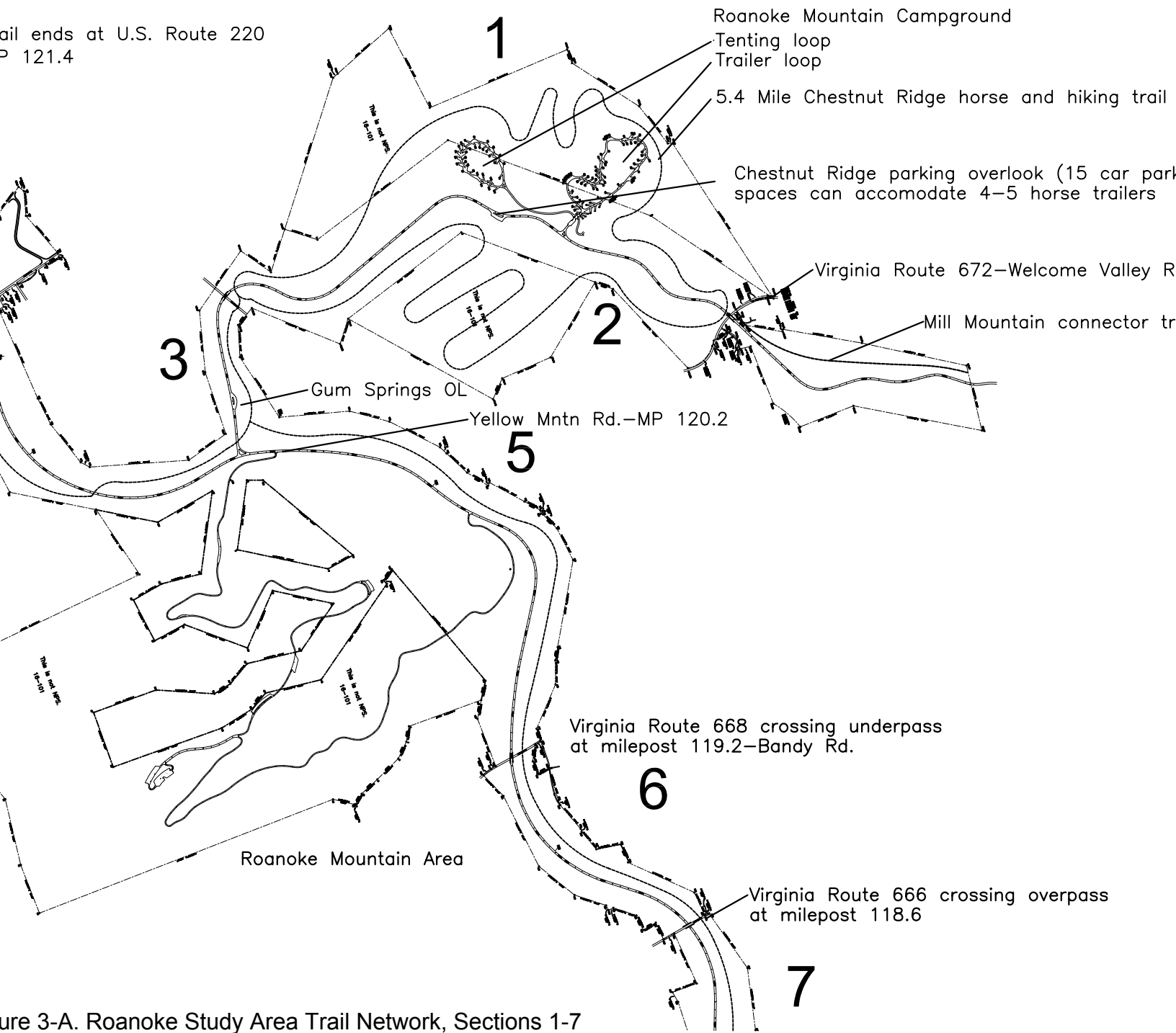
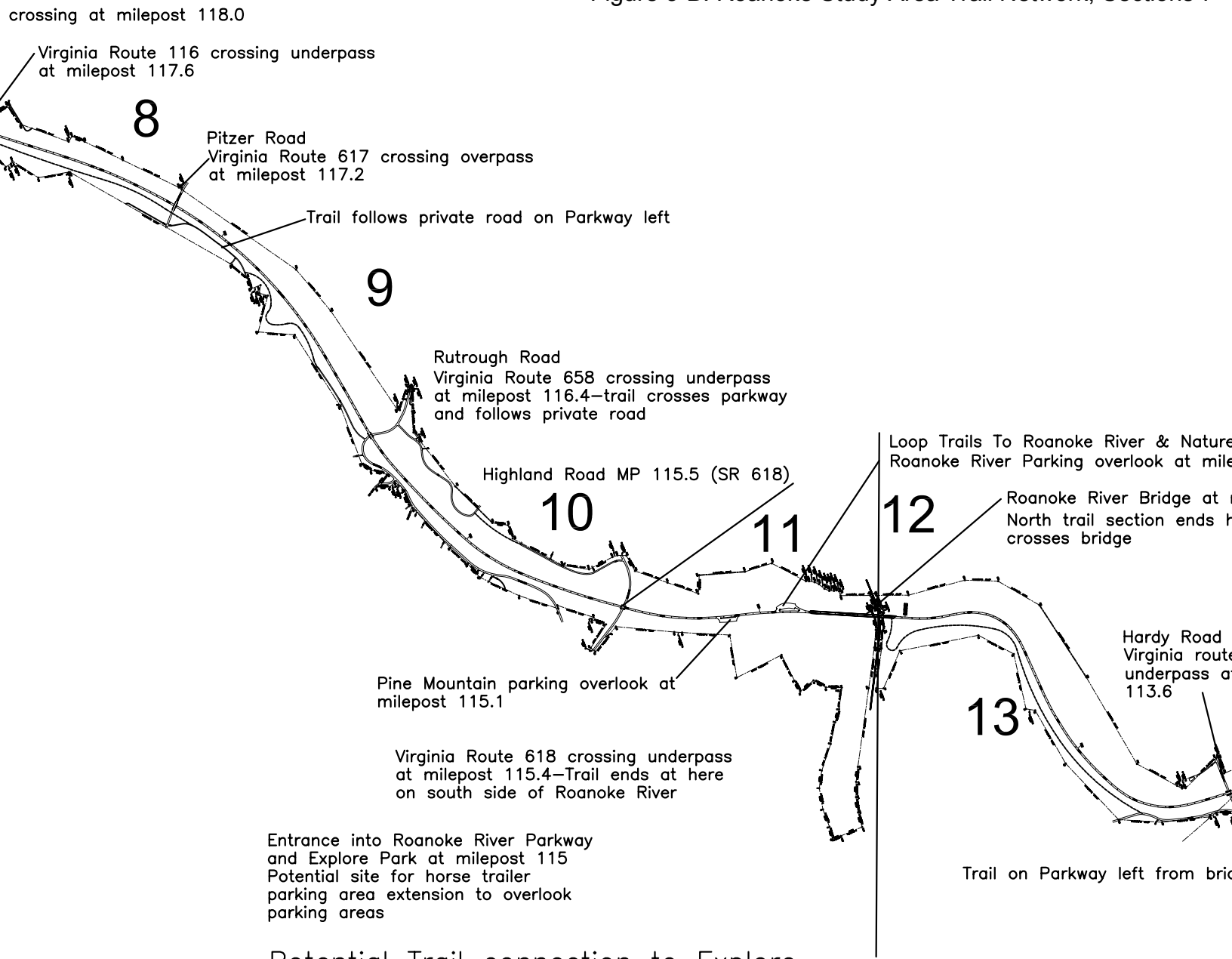


Figure 3-A. Roanoke Study Area Trail Network, Sections 1-7

Figure 3-B. Roanoke Study Area Trail Network, Sections 7 –



Entrance into Roanoke River Parkway and Explore Park at milepost 115
 Potential site for horse trailer parking area extension to overlook parking areas

Potential Trail connection to Explore Park needs to be designed and included in a development concept plan

Trail on Parkway left from bridge

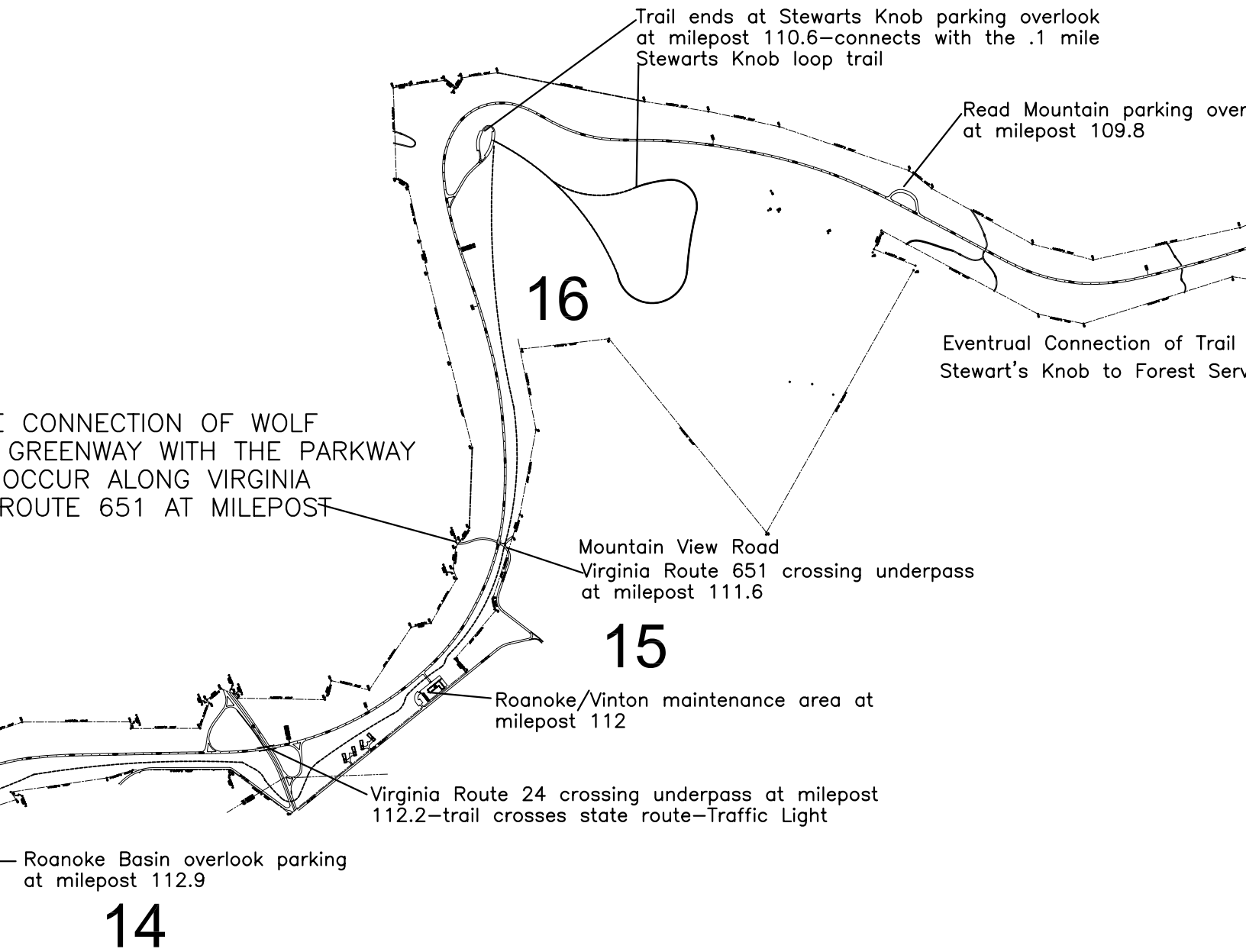


Figure 3-C. Roanoke Study Area Trail Network, Sections 13

Data Collection Process and Methods

After researching various trail assessment methodologies, the Universal Trail Assessment Process (UTAP) was selected to document trail conditions. UTAP, developed by Beneficial Designs, Inc., is a tool for trail managers and agencies to inventory trails for access and maintenance conditions. Information regarding trail characteristics are collected such as trail width, slope, tread, side-slope, and obstacles or safety conditions. This information can be summarized for each trail in terms of its specific range of conditions, providing valuable information to both the trail manager and user.

The data collected assists the manager in determining if the trail meets intended specifications for access. In addition, trail managers can use information obtained in the field to identify and catalogue sites in need of maintenance or access improvement, which can assist with planning, prioritizing and budgeting of construction projects. Parkway staff are especially interested in identifying potential trail segments or loops that could be designated as accessible under the Americans with Disabilities Act (ADA), particularly in the area of the campground.

For the benefit of the trail user, UTAP data can be processed and summarized to obtain typical trail conditions (i.e. average and maximum grades and cross slopes, minimum widths, surface types and the size and location of obstacles). The data can then be presented in signage, maps, and/or guidebooks providing valuable information to the trail user, in order to make informed decisions about the trails they intend to visit.

UTAP Methodology

UTAP is an on-the-ground data collection exercise in which the trails are walked and features recorded in the field. Trail features are defined as the natural and human-made structures found on or seen from the trail such as waterfalls, stream crossings, facilities, trail junctures, and road crossings. In addition to trail features, measurements are taken of the trail's characteristics (i.e. grade, cross-slope, width, surface type). Stations are established to serve as reference points along the trail and are marked with flags or flagging tape. To begin the assessment, the trail crew begins at the trailhead and uses a rolatape to measure the distance from the trailhead to the first station. Stations are established whenever there is a change in direction or grade, or where the trail branches or intersects another trail. The rolatape is also used to measure the distance from the trailhead to each feature.

Trail information is recorded on trail data forms consisting of two sections: one for trail station data, and one for trail feature data. A summary of the data collected is shown below:

- Trail Data Section: Recorded at each station:
- Tread width
 - Distance in feet to the station from the trailhead

- Cross-slope at the station
 - Surface type (rating)
- Recorded between stations:
- Typical grade
 - Compass bearing (or GPS lat/log coordinates)
 - Length and magnitude of maximum grade (if any)
 - Length and magnitude of maximum cross-slope (if any)

Trail Feature Section:

- Distance to feature from trailhead
- Feature zone (trailbed or visual)
- Name and size of feature
- Action to be taken (if any)
- Remaining tread width (for obstacles found in the trailbed)

A sample trail data form has been included as Attachment C, as well as the “UTAP Fast Fact” sheet to serve as a quick reference guide. For additional information on UTAP process or procedures, refer to the “Universal Trail Assessment Process Training Guide,” published by Beneficial Designs, Inc. or visit their website at: www.beneficialdesigns.org.

Abbreviated Trail Assessment Methodology

Using the UTAP methodology as a model, an abbreviated process was developed to document conditions on the remaining 8 miles of the BLRI Horse Trail. During field mapping of the trail corridor, the GPS operator recorded the following features as point data to document existing condition:

- | | |
|----------------------------------|---------------------------------------|
| road crossings | erosion sites |
| stream crossings | steep slope areas |
| trail intersections | obstacles found in the trail corridor |
| bridges, culverts, built feature | |

Although not as comprehensive as the full UTAP process, the abbreviated trail assessment was much less time consuming, and still provided the information needed for a preliminary assessment of trail conditions. A complete UTAP assessment will be conducted for the remaining sections of the trail, as work progresses to future phases of trail network planning.

Summary of Current Trail Corridor Conditions

The Blue Ridge Parkway trail network is an incredible recreational resource, providing miles of off-road trail opportunities for visitors to the park. The trail system also provides vital links between other public landholdings and existing trail corridors. A major challenge to park management is that the trail system was originally developed many years ago, and has not had the advantage of more current design practices.

For example, the trail inventory found that many of the Blue Ridge Parkway trails are severely eroded, due to their location on the fall line of steep slopes, or in stream valleys adjacent to perennial or intermittent streams. Some of these sections are fairly short, while others are extensive, and will require relocation. Today, trail designers are able to avoid these situations by implementing techniques that utilize sideslope trails, and features to redirect water off the trail surface.

A second issue is the many user-created social trails found in the corridor, making it difficult to differentiate between the official park system trails and the unofficial trails. In addition, there are areas where the Parkway property is extremely narrow, and new development is occurring in close proximity to the Parkway boundary. Some of the social trails developed in confined locations, are located inappropriately on steep slopes, which has exacerbated the erosion problem. A related issue is that limited funding and staff constraints have not allowed for consistent maintenance of existing trails.

Fieldwork also verified two existing crossings of the Blue Ridge Parkway at mile post 118 and milepost 121. There is one crossing on Fishburn Parkway (Chestnut Ridge Trail) at Yellow Mountain Road. In addition, the proposed loop trail system would include road crossings at the following locations:

Welcome Valley Road (Rt. 672)	Rutrough Road
Bandy Road	Highland Road
State Route 116	Hardy Road
Pitzer Road	Mountain View Road
Stewartsville Road, Rt 24	Possible State Route 220

Finally, fieldwork noted the difficulty in determining the exact location of the parkway boundary in relationship to the trail and adjacent private property. To address this issue, parkway staff (David Anderson) has overlain the Blue Ridge Parkway boundary on aerial photo mapping showing the proposed final trail. The final trail maps will depict the trail layout on aerial photo and topographic contour base maps, and will show the layout of the trail in relationship to the Blue Ridge Parkway boundary.

Specific recommendations will be provided in the Trail System Planning section of this plan, to address the following conditions trail crews observed through out the study area:

- Trail tread degradation due to erosion, poor drainage, and siting on steep slopes;
- Potential environmental impacts from trails in wet areas and in close proximity to streams; and
- Improvements needed to increase safety at road crossings

IV. Trail Management Issues

Accommodating the trail needs of both residents and visitors to the Roanoke valley, while protecting the resources base, is a challenging task. But it is one that is becoming common for trail managers across the country, with the growth of urban front country trail systems that see thousands of users a week. Long term management of these areas

will require an understanding of sustainable trail design, the challenges created by local topography and site conditions, the tools available, and the continued development of a partnership approach to planning and managing trail resources.

Various strategies to accommodate trail user demand are being tested by trail managers across the country. They include single use trails for different user groups, multi-use trails for all or portions of trail networks, and time-sharing programs in which various user groups are allowed on the trail at different times of the week. In addition, some areas have used a phased approach, in which a portion of the network is opened to multi-use on a demonstration basis. Whatever strategy is implemented, an adaptive management approach is needed in order to monitor for impacts. The following section provides information on the current "state of the practice" in addressing issues related to sustainable trail design and shared-use trail systems.

Sustainable Trail Design

What is a sustainable trail? The National Park Service has defined sustainable trails as follows:

Sustainability is the ability of the travel surface to support current and anticipated appropriate uses with a minimal impact to the adjoining natural systems and cultural resources. Sustainable trails have negligible soil loss or movement and allow the naturally occurring plant systems to inhabit the area, while allowing for the occasional pruning or removal of plants necessary to build and maintain the trail. If well built, a sustainable trail minimizes seasonal muddiness and erosion. It should not normally affect fauna adversely nor require rerouting and major maintenance over long periods of time.

- US Department of the Interior, National Park Service, Natural Resource Management Guidelines, 1997

Trail Tread Considerations

Two key considerations in designing sustainable trails are proper siting and construction to reduce erosion. Trail erosion is caused by a combination of grade, water, soil type, and trail users. Water damages the trail surface by removing soil when it flows across its surface. The steeper the grade, the more velocity and power the water has to move material downhill. Trail users increase this erosion potential by loosening the surface of the tread, making it easier for water to scour it away. In order to prevent erosion, it is critical to site the trail in a manner that encourages sheet flow (a dispersed flow of water across the trail) rather than channeling the water down the trail, leading to a down-cutting of the trail tread.

Most trail designers have recognized that the easiest and most effective way in which to reduce erosion and protect the trail tread is through contour trail design. Contour trails, also referred to as sideslope trails, follow grades that are $\frac{1}{4}$ to $\frac{1}{2}$ of the side slope of the hill, and outslope slightly toward the low side. These features encourage sheet flow of

water across the trail, and thus minimize erosion by redirecting water off the trail. Grade reversals or “dips” are also used to reduce erosion by redirecting water off the trail.

A National Park Service report (Duffy, 1991) synthesized much of the research on contour trail design, and found acceptable ranges for maximum profile grade to be between 8% and 12%. The maximum profile grade of the trail relative to existing cross slope (fall line) is determined by a number of variables including: soil types, aspect, exposure, climatic conditions, volume and type of use, and level of maintenance. Fieldwork conducted by the National Park Service in Colorado suggested a maximum grade of less than 15%, with less than ¼ the prevailing cross slope. Research by the Appalachian Mountain Club (1981) and others have found that trails with profiles greater than 15% in any cross slope area are usually prone to erosion. Trails in cross-slope areas of less than 10% will usually require surfacing and drainage improvements if they receive even a moderate amount of use.

Current work by Troy Scott Parker, Natureshapes, Inc., a noted expert in natural trail surface design, confirms earlier findings and provides additional insight into the complex set of variables that determine optimum design criteria. In addition to the factors noted above, Natureshapes recommends an assessment of the vegetation type, soil type, and surface area of the tread watershed (drainage area above the trail segment under consideration). Natureshapes has developed a matrix of suggested maximum segment lengths between dips based on various soil types and slopes, as well as environmental factors or other conditions that effect dip spacing. (Refer to Attachment D.)

These recommendations are consistent with both sustainable trail guidelines used by IMBA, as specified in Spring 2002 and Fall 2003 by IMBA’s Trail Care Crew conducting field work at Blue Ridge Parkway, as well as literature on equestrian trail design. (Miller, 1983).

Trail Corridor Design

Various trail standards and recommendations are available for designing trails for various types of activities. The Virginia Department of Conservation has developed "The Virginia Greenway and Trails Toolbox," that specifies minimum widths, surface types and clearance heights for hiking, biking, equestrian, and multi-use trails. These recommendations are comparable to recommendations developed by the US Forest Service, Minnesota Extension Service, BikeCentennial, and Appalachian Trail Club.

For hiking trails:	Trail tread:	2' single, 5' double
	Horizontal clearing:	2' on either side
	Total trail corridor:	range 6 to 9 feet
	Vertical clearance:	8 feet

For equestrian trails:	Trail width:	4 feet single lane, 8' double lane
	Horizontal clearance:	2' min on either side of trail
	Total trail corridor:	range 8 to 12 feet
	Vertical clearance:	10 feet

For mountain bike trail:	Single track:	2 foot min tread
	Double track:	5 foot min tread
	Total trail corridor:	2' min on either side of trail
	Vertical clearance:	8 feet

Another aspect of sustainable trails is the consideration of user capacity. In a situation like Roanoke, where there is a high volume of anticipated use, it becomes even more critical that the trail be designed using sustainable practices. According to IMBA, “Well built, well designed trails can withstand more than 2000 user passes a week and show no negligible impact.” (Edwards, 2003) There is currently no documentation of trail usage on parkway trails in the Roanoke area. If usage is expected to exceed this threshold, managers may need to take additional measures to adequately protect the resource from the impacts of high volume use.

Benefits & Challenges of a Shared-Use Trail System

Trail managers face many challenges in their attempts to provide a safe and high quality trail user experience, while protecting the area’s natural resources. This becomes increasingly difficult as the number and diversity of trail users increase. Researchers believe that people who participate in outdoor recreation activities do so for certain desired outcomes, such as solitude, challenge, spend time with family or friends, experiencing nature or others. These desired outcomes vary differently across user groups, within user groups, and even within individuals on different outings. In fact, individuals are often attempting to satisfy multiple desires in a single outing.

In a perfect world, land managers would be able to provide a high quality opportunity for every type of experience trail users might possibly seek, but given the sheer numbers of trail users with differing preferences, a limited land base, limited budgets, and limited staffing, this is rarely possible. A multi-use trail, defined as a trail that is used by more than one user type (or for more than one activity), is favored by managers in addressing the increasing needs for close-to-home outdoor recreation. An important caveat is that all three challenges of resource protection, visitor experience, and safety need to be achieved. The following section will address these trail management issues in more detail.

Resource Protection

Trails must be properly designed and sited in order to minimize erosion and subsequent impacts to local natural and cultural resources, such as archeological sites, plants, wildlife, and water features. As trails experience erosion, or form depressions with standing water, many trail users will ride or walk around the degraded site, creating a wider trail. Increasing trail width leads to trampling of vegetation, and creates larger canopy openings, which are detrimental to many wildlife species.

Sediment from eroding trails can increase water turbidity in adjacent streams or rivers. Turbid conditions can reduce the availability of light to aquatic plants, and smother the breeding grounds of both invertebrates and fish. Because of these environmental impacts it is important to locate trails, especially those that will receive heavy use, in a manner that avoids wet areas, steep slopes, and/or highly erodible soils. Specific design recommendations for the Roanoke trail system will be provided in the next section of this report (Trail System Planning Recommendations), to address resource protection issues.

In addition, environmental regulations for the National Park Service, as for all government agencies, require trail construction activities to be in compliance with the National Environmental Policy Act (NEPA) of 1969, signed into law on January 1, 1970. NEPA is an interdisciplinary framework for environmental planning by federal agencies, whereby federal agencies must study the environmental effects of their actions. The environmental review process established under NEPA includes three key phases: 1) preliminary screening for NEPA applicability; 2) preparation of an environmental assessment (EA) to determine whether an environmental impact statement (EIS) is required; and 3) preparation of an EIS. As an NPS policy, an EIS is required in conjunction with the development of a park's GMP.

A Categorical Exclusion (CE) level of NEPA approval has been granted with certain conditions, for the proposed trail relocations recommended for the Roanoke Trail System. (The details and justification for granting of this CE can be reviewed in Attachment E.)

Managing Trail User Conflict

The combination of trail conditions, levels of trail use, and mix of users may lead to conflicts among various user groups. Conflicts are related to several factors including:

- existing trail conditions, such as poor sight lines, narrowness, or wide open sections of trail that may encourage excessive speed
- a lack of knowledge of, or disregard for, trail user etiquette and trail regulations,
- the relative or perceived different speeds of various user groups, and
- a high concentration of users in one area resulting in a perception of crowding.

Mitigation measures for trail use conflicts generally fall within one of four categories: education, regulations and enforcement, site design improvements, and monitoring. Education, is a critically important tool in addressing user conflicts by promoting a shared-use ethic based on trail etiquette. Techniques frequently used by trail managers include: signage, brochures, ranger patrols, trail guides, presentations to civic organizations or user groups, and volunteer patrols.

In a recent study of backcountry recreation management in 93 National Parks (Marion, Roggenbuck, and Manning, 1993), managers listed actions they had taken to reduce crowding and conflict in backcountry areas. The top five responses are listed below:

1. Inform visitors about crowded conditions they may encounter in certain areas.
2. Encourage quiet behavior and activities.

3. Inform visitors about conflicting uses they may encounter in certain areas.
4. Encourage use of less popular access points and backcountry areas.
5. Encourage off season use.

Conflicts on trails can be a serious issue, and there may be some situations when site conditions warrant the designation of separate trails for different user groups. This strategy also has its drawback. Some trail designers have found that single use trails can be expensive, difficult to enforce, and may limit opportunities for communication among user groups (McCoy and Stoner, 1992). These researchers believe that positive interaction among user groups on a trail is the best way to foster communication, understanding, and a strong cooperative trail community.

Research presented at the “1998 National Symposium on Horse Trails in Forest Ecosystems,” identified locations where shared use trails have been successful. One example cited was China Camp State Park in the San Francisco Bay area (Kelley, 1998). In the San Francisco region, where the amount of public land is decreasing due to development and population pressure, and the number of trail users are increasing, shared use trails have brought trail users together to focus on protecting the trail resource for all users.

According to Kelley, “ Our biggest challenge is to build the community of trail users and open space advocates into a proactive force to enable all of us to use trails together, and to ensure that trails will be available for future generations of trail users. We must do this together, and the consequences may be severe if we do not.” (Kelley, 1998)

Safety

Trail design, education, and enforcement all play a part in ensuring safety on the trail. During the trail design process, attention should be given to ensuring adequate sight lines and stopping site distance. This is particularly true of shared use trails where user groups travel at different speeds. The Community Trails Handbook developed by the Brandywine Conservancy (1997), recommends a stopping site distance of 50 feet for shared-use trails, with sight lines of 60 feet. This is consistent with recommendations from the Angeles National Forest trail selection criteria for mountain bike use which recommend 50 feet stopping sight distance on forest trails with grades of 10–15%. Sight distances should increase as the speeds, tread width, and surface quality increase (US Forest Service, 1990).

Strategies to slow down speeds of mountain bikers include: establishing a maximum gradient for the trail, limiting the length of steep slope areas, adding level sections and/or grade reversals for long downhill sections, reducing trail width and adding turns to limit sight distances. (Edwards, 2003).

Finally, education between the various users groups is critically important for each trail user to have an awareness of the needs and constraints of others using the trail. Trail etiquette signs or “rules of the trail” should be posted at major access areas. In addition,

joint training events can be held to build understanding between trail users. There are many good reference materials on this topic that can be utilized in developing a training program. One example is the work of Judi Daly, author of Trail Training for the Horse and Rider. (Refer to Attachment F for more information.)

National Park Service Policy for Multi-Use Trails

The National Park Service does not currently have a specific national policy that addresses multi-use trails. Bicycling in National Parks is regulated, however by Code of Federal Regulations, Title 36, Volume1, Part 4, Sec 4.3 which states:

“The use of a bicycle is prohibited except for park roads, in parking areas and on routes designated for bicycle use; provided however the superintendent may close any park or parking area to bicycle use pursuant to the criteria and procedures of Sec 1.5 and 1.7 of this chapter. Routes may only be designated for bicycle use based on a written determination that such use is consistent with the protection of a park area’s natural, scenic, and aesthetic values, safety considerations and management objectives and will not disturb wildlife or park resources.”

The regulations also state that bike routes may be designated in developed areas and special use zones, but in all other areas routes designated for bicycling use shall be promulgated as special regulations. (Refer to Attachment G)

Bicycle touring in National Parks is a popular activity, although in the past, most of the focus has been on road riding. There are only a few examples where bicycling is allowed off-road in National Parks. Most of these off-road areas are on fire roads or jeep roads or rails-to-trails corridors, with 10 to 12 foot wide minimum tread widths. For example, the C&O Canal National Historical Park near Washington DC maintains a 200 mile long canal towpath that is open to all users - equestrians, hikers, and bicyclist. The carriage road system at Acadia National Park, White Rim Trail at Canyonlands National Park and the system of old roads at Great Smoky Mountain and Everglades National Park are also areas that allow bicycles on dirt roads or jeep roads that are closed to cars.

The only current example of a singletrack trail that allows bicycling on National Park Service land is the “Cactus Forest Trail” at Saguaro National Park in Tucson, Arizona. The trail was opened to bicyclists in October 1992, and has been a successful model for shared-use for the past 11 years. Managers have been carefully monitoring the trail and have documented no significant safety problems or adverse impacts to resources. In April 2002, The Cactus Trail was temporarily closed due to a lawsuit claiming the National Park Service did not follow agency regulations when it opened the trail to bicyclists. The trail was reopened in September 2003 when a final rule was issued allowing its continued use as a shared use facility.

There are abundant examples of National Forests and National Recreation Areas that allow off road riding on large expanses of public lands, outside of designated wilderness areas. For example, the Sawtooth National Recreation Area in south-central Idaho maintains thousand miles of singletrack trail open to mountain biking. Mount Rogers NRA in Virginia maintains over 200 miles of trails and forest roads that are open to mountain biking. Other examples include the Chickasaw NRA in south central Oklahoma, the Ed Jenkins NRA in Chattahoochee-Oconee National Forest, and the Allegheny NRA in Allegheny National Forest in Pennsylvania. Big South Fork National River and Recreation Area on the Tennessee/North Carolina border was one of the first to develop mountain bike designated trails and have been working with both the mountain biking and equestrian communities to improve understanding and communication between various trail user groups.

The National Park Service Management Policies, adopted 2001, Chapter 9, provides additional guidance regarding trail development. For example, the management policies direct National Park Service units to work cooperatively with other land managers, non-profits, and user groups to facilitate local and regional access to parks (9.2.3.1), and to plan trail facilities as an integral part of the park's transportation system (9.2.2). (Refer to Attachment H). All future trails and facilities developed at Blue Ridge Parkway will be in compliance with these policies

V. Trail System Planning Recommendations

Trail system guidelines assist trail planners in designing and constructing a safe and enjoyable trail network that minimizes impacts to the resources base. There are many good references for trail design, construction, and maintenance, that are included in the final section of this report (Section VII). The planning team found the "Trails for the Twenty First Century: Planning, Design, and Management Manual for Multi-Use Trails," (Lee-Ryan, editor, 1993) to be especially helpful, in that it addresses issues specifically related to multi-use facilities.

The following section provides recommended guidelines for the Roanoke shared use trail system including trail tread considerations, stream crossings, road crossings, trailhead parking, campground facilities and signage. Also included are recommendations regarding monitoring and evaluation, as well as guidelines for upgrading and maintaining current substandard trail segments.

Sustainable Trail Design

Based on the best available information to date, the planning team recommends that future trail tread design conform to the following guidelines:

1. Maximum trail grade should not exceed 20%, or no greater than half the grade of the hillside or sideslope.

2. The trail's overall grade should not exceed 10%.
3. The trail should be designed to tilt or "outslope" from the hillside to ensure that water will sheet across the trail, except where inslope and ditches are required to ensure tread stability.
4. Trail alignment should follow the natural topography using undulating grades, not linear grades, and should use grade reversals to help divert water off the trail.

In addition the following guidelines are recommended for designing the trail corridor:

Trail users:	hikers, equestrians, mountain bikers
Tread surface:	natural surface
Tread width:	3-4 feet minimum
Horizontal clearance:	2' min on either side of trail
Clearance height:	10 foot minimum

Trail Relocation and Maintenance

The following actions are recommended to upgrade existing degraded trail segments to a sustainable level. If no action is taken the trails will continue to degrade, with subsequent resource impacts, as well as a reduction in the safety and satisfaction of the users' experience. Using the sustainable trail design guidelines established in this plan, an assessment was conducted to identify those areas needing routine maintenance, and those areas that are so degraded, they need to be relocated in order to build a sustainable tread.

Upon review by Parkways staff, it was found that the trail relocations and realignments proposed for the Roanoke system, comply with the Categorical Exclusion level of NEPA, and a CE approval has been granted with certain conditions. The details and justification for granting of this CE can be reviewed in Attachment E.

Trail Relocation Decision-Making Framework

The decision on whether to reroute degraded trail sections was based on an assessment of resource impacts, safety, and user satisfaction, using three primary inter-related factors: terrain, soil type, and location in the watershed. Additional consideration was given to contributing factors such as magnitude and type of use, exposure, and proximity to the park boundary.

1. Terrain: This factor assessed the steepness of the longitudinal grade of the trail as well as it's relationship to its side slope. In steep areas, (trail segments with gradients

between 15 % and 25 %) consideration was given to the relationship between the trail gradient and the existing side slope (fall line) to determine if it could be maintained to standards (i.e. ½ of the side slope, with an average grade of 10%). For trails with a gradient of greater than 25% it was generally recommended that the trail be relocated, unless the segment was short in length (i.e. less than 20 feet), or there was some constriction in the trail corridor (e.g. proximity to the park boundary). This was consistent with findings in the field in that these trail segments were severely eroded and it would take extensive staff time and allocation of supplies and materials to maintain them to standard. On extremely flat sections of trail with minimal side slope, drainage improvements were recommended to move water off the trail surface.

2. *Soils*: In addition to terrain, consideration was given to the soil type on which the trail was located. Soils in the corridor include a mix of deep well drained soils suitable for trail development, as well as some areas with moderate limitations, and some with severe limitations due to the potential for severe erosion. One of the factors assessed was the erodibility of the soil. In steep slope areas, if the trail was located on soils classified as highly erodible, the recommendation was to relocate the trail if possible, and at a minimum to provide enhanced drainage measures to move water off the trail. Soil erodibility was also assessed in determining the location of new or relocated trails.

The majority of the trail corridor contained the soil classes shown in Table 2, below:

Table 2. Soil Types in the Trail Corridor

Soil Classification Name	Slope	Limitation for Trail Development	Map
Edgemont channery sandy loam	7 – 15%	Slight: sloping, deep, well drained soils	15C
	15 – 35%	Moderate: moderately steep slope	15D
	35 – 60%	Severe: very steep, high erosion potential	15E
Hayesville fine sandy loam	7 – 15%	Slight: sloping, deep, well drained soils	26C
	15 – 25%	Moderate: moderately steep slope	26D
Hayesville gravelly fine sandy loam	7 – 15%	Slight: sloping, deep, well drained soils	27C
	15 – 25%	Moderate: moderately steep slope	27D
Hayesville gravelly fine sandy loam, very stony	15 – 25%	Severe: very steep, high erosion potential	28E

3. *Location in the watershed*: The location of the trail in the landscape was evaluated based on two factors:

- 1) extent of land area upslope of the trail segment from which run-off would flow to that point on the trail (i.e. contributing watershed). This was important in terms of its relationship to the amount and velocity of runoff that would impact that section of the trail during rain events.
- 2) proximity to perennial or intermittent streams, and/or wetlands, due to potential water quality impacts. For example, if a trail segment was located on relatively moderate slopes with stable soils, but was immediately adjacent to, or in the bottom of a drainage way, it was recommended that the trail be relocated to higher ground.

Trail Relocation Sites

Based on the trail assessment, it is recommended that 18 segments of trail be relocated as shown in Table 3 below.

Table 3. Trail Relocation Sites, Roanoke, Blue Ridge Parkway

Trail Segment	Number of sites	Linear Feet
Chestnut Ridge Loop		
West	6	5,900'
East	<u>3</u>	<u>825'</u>
Chestnut Ridge Loop: Total	9	6,725'
BLRI Horse Trail South	9	15,700'
BLRI Horse Trail North	4	2,450
Total Relocation Sites	22	24,875

One of the most serious problem areas is the area around the campground where the trail descends a steep slope and then travels in a stream bottom area before ascending another steep slope. The site has been named the "Big Gulch." Erosion at some places in the Big Gulch, reach a depth of 5 to 5 ½ feet. Relocation of the Big Gulch section to a side slope trail that connects into the amphitheater will result in approximately 2,775 feet of relocated trail.

The BLRI Horse Trail South restoration work includes a series of re-alignments throughout segments A, B, and C, to eliminate sections with excessive trail grade and/or deeply eroded sections. In addition, there are several areas where the trail needs to be relocated off roadways or private drives. (Refer to Attachment I. for detailed information on relocation sites.) The BLRI Horse Trail North realignments are to avoid muddy sections and reduce impacts on drainages.

Trail Maintenance

Trail maintenance is needed throughout the entire trail corridor, although there are varying degrees of work required. For example, during the UTAP assessment, field crews documented 25 segments totaling 6725 feet on the Chestnut Ridge Loop that could be upgraded to standards through routine maintenance. Volunteers coordinated by the Roanoke Valley Greenways Commission and Pathfinders for Greenways have been assisting park staff in addressing this backlog of maintenance needs. In FY03, over 1700 total volunteer hours were logged on trail rehabilitation and maintenance tasks.

Stream Crossings

Most stream crossings along this trail have gentle sloping banks, are narrow, shallow, and slow moving where the trail crosses. These crossings would optimally be crossed by armoring the trail to the stream bank, and armoring the stream bottom with large and small rock. Stepping stone sized rocks would be positions on the down stream side of the

stream course armoring for hikers to cross. Where stream banks are steep, or the stream channel is deeper, the crossing should be made with wooden bridge construction or large culvert installation and should be designed on an individual basis. Bridges provide the best protection for aquatic resources, however they also have the highest cost. Bridges would need to meet NPS standards and be designed for bike, hike, and equestrian use. Culverts are less expensive and would be suitable on smaller and/or seasonal drainages.

NPS policies allow for trail bridges to be used for crossing swift waters, areas prone to flash-flooding, and other places presenting potential safety hazards. As specified in the NPS policy manual, less obtrusive alternatives to bridges, such as culverts, fords, and trail relocation, will be considered before a decision is made to build a bridge. If a bridge is determined to be appropriate, it will be kept to the minimum size needed to serve trail users, and be designed to harmonize with the surrounding natural scene and be as unobtrusive as possible. (NPS Management Policy Manual, 2001, Chapter 9.2.3.9 Trail Bridges)

The only area where a substantial watercourse needs to be traversed is the crossing of the Roanoke River. Various design options will be researched to identify the most feasible approach to this crossing. Trail development of this segment of the system is projected to begin in the latter phases of planning (5-10 years) and needs to be coordinated with development of the Roanoke River Greenway under development by local jurisdictions.

Access, Trailhead Parking, and Campground Facilities

There are currently three overlook parking facilities on the Blue Ridge Parkway between Coyner Mountain Overlook (milepost 107), and State Route 220 (milepost 121.4). From north to south they are: Stewarts Knob, Roanoke River, and Roanoke Basin. In addition there are two overlooks on Fishburn Parkway: Chestnut Mountain and Gum Spring, and three overlooks on Roanoke River Parkway between the Blue Ridge Parkway and Explore Park. All of these areas have access to the trail network except the Roanoke Basin Overlook. Fieldwork indicated that there was an access trail at Roanoke Basin from the parking area to the BLRI horse trail at one time, but it is currently overgrown. This 800' section can be re-opened with routine maintenance.

Trailhead Parking Areas

The following guidelines are recommended in order to provide safe and adequate access to the trail system.

1. All trailhead access facilities should be provided from Blue Ridge Parkway, or other park access roads, not from an intersecting state or county roadway.
2. A trail connection should be provided from the Roanoke Basin Overlook to the BLRI horse trail.

Equestrian Accommodations

With the opening of the loop trail system, there will be an increased need for parking to accommodate horse trailers. Current facilities include two existing overlooks on Fishburn Parkway, and facilities on Roanoke River Parkway. The planning team recommends:

1. Improved horse trailer parking and trail connection to the overlooks on Roanoke River Parkway and at Stewart's Knob Parking.
2. One loop of the Roanoke Mountain Campground should include dedicated spaces for horse trailer parking.

(See Attachment J, which contains conceptual design drawings for horse trailer parking and campground facilities at these sites.)

Road Crossings

As the Roanoke region grows and traffic volumes increase, road crossings on the trail network need to be monitored, to ensure adequate safety through good sightlines, visibility, and traffic control. Table 4 below summarizes current conditions at the 12 existing trail-roadway crossings in the Roanoke system.

Table 4. Trail–Roadway Crossings, Roanoke Trail System

Route Name	Route No.	Ave. Daily Traffic	% Heavy Vehicles	Speed Limit	Road Width	No. Lanes	Striping	Visibility	Comments
Yellow Mountain Road near Chestnut Ridge	668	2,200	4	25	26	2	Double yellow	Fair	Large pull off on north east side: 4-6 cars.
Welcome Valley Road	672	20	Not Available	30	20	2	Double yellow	Fair to good	ADT incorrect; probably 2200. Small pull off under BRP.
Yellow Mountain Road - horse trail	668	2,200	4	25	20	2	Double yellow	Fair	Small pull off at NE utility box. (Trail is west.)
Bandy Road	666	1,000	5	35	20	2	Double yellow	Fair to good	Dip to west restricts visibility. Pull off north side: 1 car.
Jae Valley Road	116	5,800	1	45	20	2	Solid yellow east bound; broken west bound	Good	High speeds; heavy traffic. Pull off south side: 2-3 cars.
Pitzer Road	617	760	Not Available	>25	20	2	Double yellow	Good	Speed not posted. Has "End of 25 mph" sign.
Simsmore	712	20	Not Available	Not posted	16	2	None	Fair	Possible road walk. Dead end.

Rutrough Road	658	900	Not Available	> 25, curve 25	22	2	Double yellow	Poor	Bad curve. Road walk.
Highland Road	618	220	4	>25	18	2	None	Fair	Speed not posted. Has "End of 25 mph" sign.
Hardy Road	634	8,800	2	45	22	2	Double yellow	Good	High speeds. No pull off. May need culvert to provide trail landing area.
Stewartsville Road	24	19,000	4	45	88	6 = 2wb, 4 eb	Stoplight; 8' grass median	Good	Stoplight activated by cars only. Turn lane stopbar is too far forward.
Mountain View Road	651	800	Not Available	35	42	2	Double yellow	Fair	Needs stop sign on Falling Creek Rd.

To ensure the safety of both trail users and vehicle operators, trail crossing recommendations should be coordinated with VDOT. The following guidelines are recommended:

1. Install crosswalks and/or trail crossing signage including MUTCD standard horse crossing signs for either direction of travel depicting a horse and rider on a yellow diamond caution sign.
2. Consult VDOT and local traffic engineers to determine if a caution light, stop light or other safety measures should be installed to improve safety of the trail crossing at uncontrolled intersections.
3. The Stewartsville Road intersection is currently a signalized intersection. The installation of a pedestrian activated signal change as well as other safety measures are needed to allow pedestrians to safely cross Stewartsville Road.
4. Where sight distances are less than 100 feet in either direction, speed limits should be reduced to a maximum of 25 miles per hour.

Parkway staff have noted that bridges on the Blue Ridge Parkway were not historically designed for equestrian or pedestrian crossing, and are considered unsafe and unacceptable for this purpose.

In addition, the following guidelines are recommended for trail construction at roadway approaches:

1. Align the trail to cross the road at a perpendicular and at a location to provide maximum sight distances to traffic.
2. Trail approaches should be on relatively flat grades, and stopping sight distances should ensure trail users have adequate warning before approaching the intersection.
3. Warning signage should be installed, and in some cases, it might be advisable to put a choke point or sharp turn in the trail before the crossing to force trail users to slow down to a safe intersection speed.

Crossing of the Blue Ridge Parkway will require special consideration due to park policies related to visual intrusions that may impact the aesthetics of the parkway

experience. It is suggested that a design charrette be conducted with various experts in highway safety, visual impact analysis, transportation planning, and highway engineering to identify options and impacts. Recommendations should be integrated with work related to the park's GMP.

Signage

Clear, consistent signage should be developed for the Roanoke trail system to communicate important information to trail users. The following recommendations are provided:

1. A signage plan for the trail system should be developed that is consistent with and integrated into the Blue Ridge Parkway Sign Plan.
2. Four categories of signs should be considered: road safety signage, which would identify highway crossings, informational and directional / wayfinding signage, visitor safety / regulatory signage, and user education signage that specifies the operational rules for shared-use trails.
3. New signs will be limited to the minimum necessary to meet information, warning, and regulatory needs, without creating confusion or visual intrusion.
4. Traffic signs and pavement markings on roadways will be consistent with the standards contained in the Manual on Uniform Traffic Control Devices, and on park roads will also be consistent with the National Park Service Sign Manual. (NPS Management Policy Manual, 2001, Chapter 9.2.4 Traffic Signs and Markings) In addition, all roadside signs and markings will conform to good traffic engineering practices.

New Trail Construction

To compete the vision of a looped trail system that integrates segments of both Blue Ridge Parkway and Roanoke Greenway trails, nine new trail connections need to be constructed, as described below.

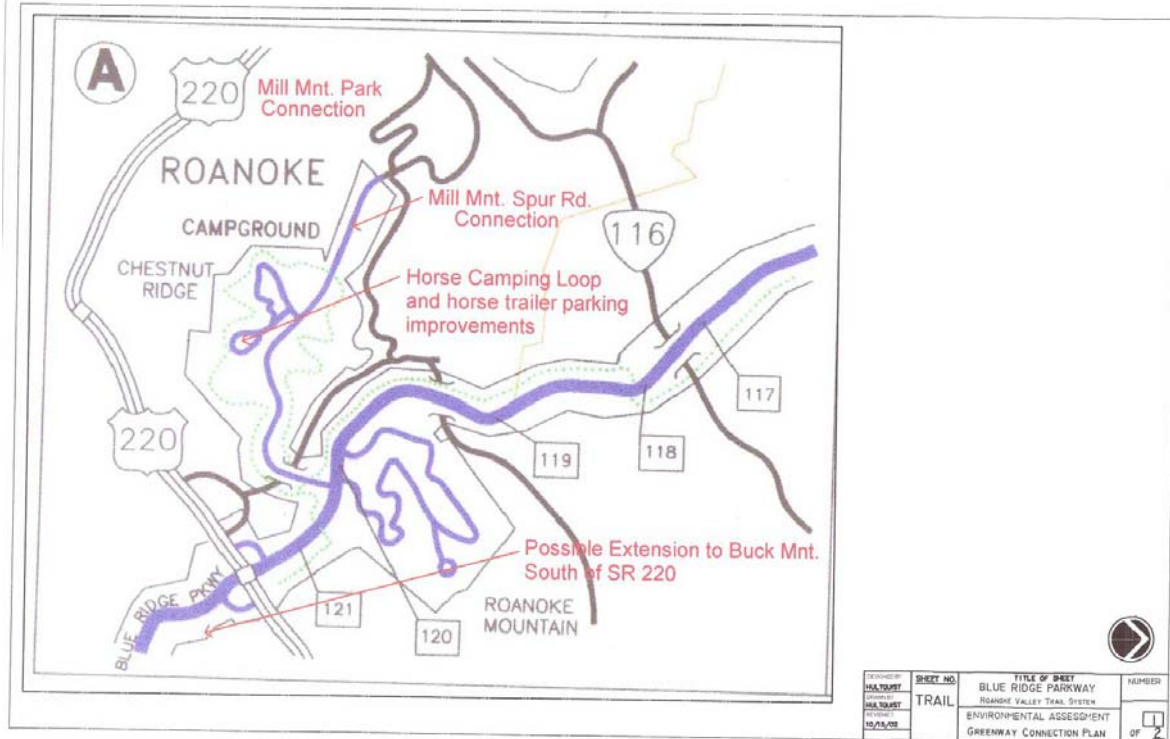
Southern Trail Loop:

The City of Roanoke has recently completed the Mill Mountain Greenway. The connection proposed between Mill Mountain and the Chestnut Ridge Loop Trail would complete the 7 mile trail segment from Mill Mountain to Gum Spring Overlook. The proposed connections to the Roanoke River Greenway, Explore Park, and parking lot access trails would complete the southern loop trail allowing linkages from downtown Roanoke to both the BLRI Horse Trail and Explore Park (refer to Figure 4). The amount of new trail that would be constructed to complete this loop is as follows:

Southern Loop:	Mill Mountain to the Chestnut Ridge Loop	1,300'
	Nature Trail Loop /Chestnut Ridge Campground	1,275'
	Fern Park connection	400'
	Roanoke River Greenway – west connection	700'
	Roanoke River Greenway – east connection	2,600'
	Explore Park connection	5,500'
	Explore Park Horse Trailer parking access trail	<u>5,300'</u>

New trail, southern loop: 17,075'

Figure 4. New Trail Connections, South of the Roanoke River

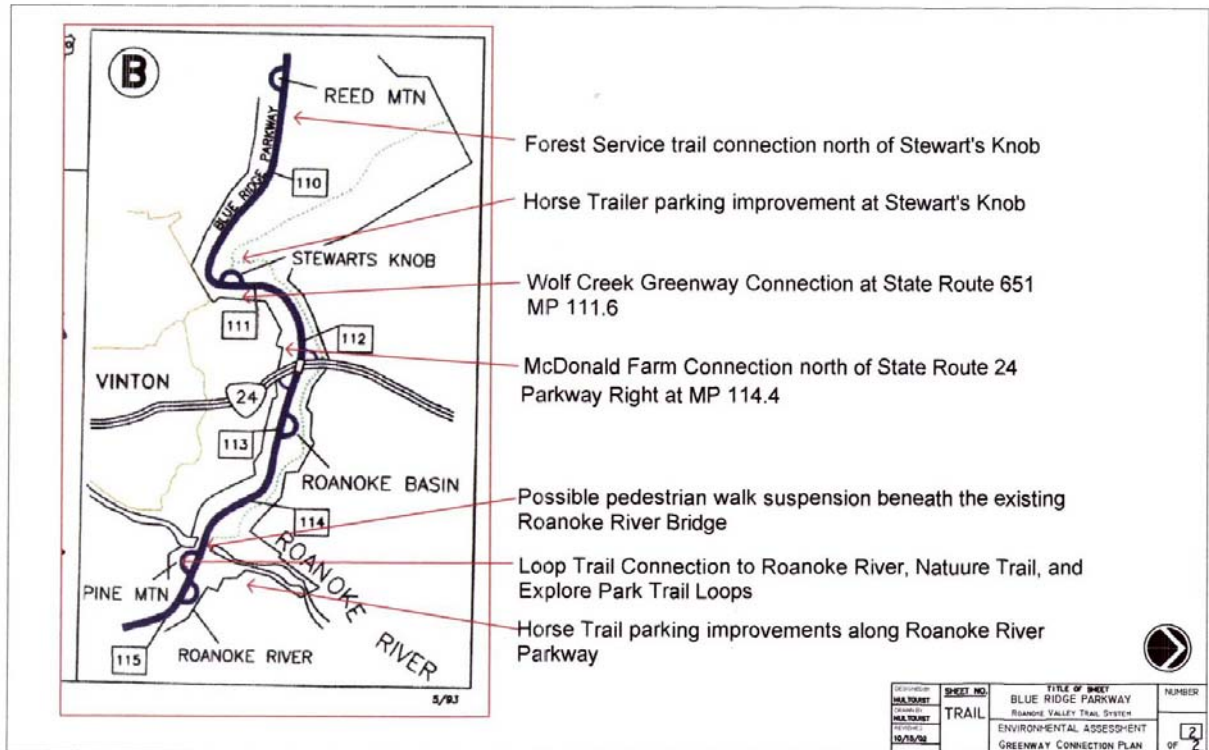


Northern Trail Loop

The Wolf Creek Greenway connection would provide a linkage to the BLRI Horse Trail near Stewart’s Knob. The proposed MacDonald Farm connection would allow for a connection to the Town of Vinton north of the Roanoke River, completing the northern loop (refer to Figure 5). Total distance of new trail construction needed to complete the northern loop is as follows:

Northern Loop:	MacDonald Farm connection	5,400'
	Wolf Creek Greenway connection	<u>1,000'</u>
	New trail, northern loop:	6,400'

Figure 5. New Trail Connections, North of the Roanoke River



The total distance of new trail construction needed to complete both loops is 22,475 feet. (Refer to Attachment K, for additional information)

Guidelines for Connecting Trails

For the purposes of this plan, it is recommended that approved, shared use trail connectors be defined as follows:

1. Connector trails would directly connect to public lands such as a county or state park, national forestry lands, or historic site with equitable missions or purpose to provide recreational or visitor experience opportunities to that of Blue Ridge Parkway. This compatibility is to be reviewed and approved by the Superintendent of the Blue Ridge Parkway. The trail connection would permit user traffic to-and-from the Blue Ridge Parkway.
2. The trail provides a connection to a county or state road, which is intended for use by the general public and is a part of the county greenway system. This trail connection would permit user traffic to-and-from the Blue Ridge Parkway. Trail connections by other than the Roanoke Valley Greenway would require a Memorandum of Agreement between the Blue Ridge Parkway and the interested connecting organization. Parking facilities associated with the proposed public road connection would require review and approval of the Blue Ridge Parkway Superintendent, and a possible right of public access, if it is located on private lands, as defined under item number four.

3. The connector trail would be subject to the same sustainable trail construction guidelines as the main trail system. Should an existing or proposed greenway trail connector not meet the required guidelines, as reviewed by the Blue Ridge Parkway, the trail would be considered an unacceptable social trail and would be reviewed for an appropriate action by the Blue Ridge Parkway. An appropriate action might include reconstruction, removal, or relocation of the trail connector.
4. Connector trails from or through private lands will require individual review by the appropriate administrating lands office and Parkway Management. The required administrative instrument to legalize such a connection is a land easement deed, which would provide the right of public access through the private land area requesting the connection. The right of public access would be deeded to the Department of the Interior and the National Park Service, Blue Ridge Parkway. The right-of-public access deed would be at no cost to the National Park Service.

In addition, new trail construction will avoid crossing of Agriculture Leases dedicated to cattle or horse grazing. These areas of the Parkway shall be avoided due to potential conflicts, as well as to ensure safety of trail users.

Monitoring and Evaluation

Monitoring is critically important, in order to evaluate the effectiveness of actions taken in the Roanoke valley to protect natural resources, minimize conflicts, and provide for a safe, high quality trail experience. Monitoring is the only way to determine if management policies or programs need to be changed or modified. Effective monitoring is dependent upon clearly understood and agreed upon objectives for each trail area. Two visitor impact frameworks to consider are:

Visitor Impact Management System (VIMS): A model developed by the National Park And Conservation Association for the National Park Service to assist managers in setting objectives, selecting impact indicators, and monitoring impacts against measurable standards.

Limits of Acceptable Change (LAC): a system developed by and for the US Forest Service and similar to the VIM framework, assists in setting objectives and monitoring impacts of change.

Under the VIMS and LAC frameworks, numerical standards can be set for individual impact parameters to specify the limits of acceptable change. These limits define the critical boundary line between acceptable and unacceptable conditions, establishing a measurable reference point to which future conditions can be compared. These frameworks evolved from and are currently replacing management approaches based on the more traditional carrying capacity model.

A phased approach of trail development is recommended for the Roanoke trail network. For example, the Chestnut Ridge Loop Trail could be designated and signed to allow for

mountain biking on a demonstration basis. A public outreach strategy that includes activities to increase awareness, understanding, and communication between various user groups could be implemented with the help of local trail groups like Friends of Blue Ridge Parkway, Pathfinders for Greenways, and VAST. Once the initial phase is on the ground, the trail should be monitored, based on an agreed upon methodology, and feedback provided to managers. An analysis of findings and recommendations for future actions could be prepared to provide additional guidance and future direction for managing the entire trail network as a shared-use system.

VI. Implementation

The following section outlines a strategy for development of the proposed Roanoke Trail System including information on project cost, funding opportunities, project phasing including the development of a shared use demonstration area, and recommendations related to outreach and partnerships. Also included is information on the National Park Service process for review and adoption of the Blue Ridge Parkway General Management Plan.

Project Cost

Two scenarios were considered when estimating development costs. The first scenario is the cost to construct the trail using non-mechanized trail crews such as the Appalachian Trail Crews. The second scenario would include contracted work with the use of power equipment such as a Dingo or Swecko.

The Appalachian Trail Conference typically estimates trail crew hand work at approximately \$5,768 per mile, based on AT club trail construction experience. This figure shows the value of the volunteer crew hours based on a minimum wage of \$5.15/hour. This estimate is based on the following:

- A crew of 7 people working a 40 hour week for 4 weeks can construct approximately 1 mile of trail. (7 x 40hr x 4week = 1120 crew hours)
- Total volunteer hours of 1120 x \$5.15 minimum wage = \$5,768 per mile.

Using trail construction equipment, in addition to a trail construction crew, the best estimates available from contractors show trail construction cost at \$2.50 per foot or \$13,200 per mile.

It is estimated that 22,475 linear feet of new trail will be required to complete the loop trail proposed in this plan. Trail construction costs would therefore fall between \$25,000 and \$56,000. Relocating 24,875 linear feet of existing substandard trail would require an additional \$27,000 to \$62,000, plus the cost of rehabilitating the old trail corridor. Based on these assumptions, and using a mix of both volunteers and contract labor, it is estimated that the trail system will cost approximately \$100,000 to construct. Signage, amenities, maintenance and long term operating costs also need to be considered.

Sources of Funding

Roanoke Valley Greenway Commission has already obtained a Virginia Recreational Trail Grant in the amount of \$43,000 for trail construction work. These funds are targeted to complete trail relocation and maintenance work on the Chestnut Ridge Loop. In addition, volunteers have proven to be an extremely valuable resource, providing over 1700 hours in FY03. Using the minimum wage rate of \$5.15, this in-kind contribution could be valued at \$8,755. It is anticipated that volunteer services will continue to be used at this rate or grow in future years.

The next phase of project development will include an analysis of potential funding sources for construction of the Roanoke trail system. This will include an investigation of federal and state programs as well as non-profit and private sector sources including the following:

1. TEA-21, Transportation Enhancement Program
2. TEA-21, Public Lands Highways Program
3. VDOT Recreational Access Program
4. VDOT Highway Construction Funds
5. Scenic Byways Program, Federal Highway Administration
6. Virginia Recreational Trails Fund
7. Virginia Outdoors Fund
8. Virginia Department of Motor Vehicles, Highway Safety Grants
9. Virginia Tourism Corporation
10. Bikes Belong Coalition Grants
11. National Park Service Programs

(For more information on these programs, refer to Attachment L.)

Project Phasing

The recommended phasing plan for completion of the loop trail system is as follow:

Phase I. 2004

Task 1. Complete restoration of the Chestnut Ridge Loop Trail

- a) contract trail design and construction for relocation segments
- b) use volunteer trail crews for minor realignments and maintenance

Task 2. Complete connection to Mill Mountain to north, and Gum Spring Overlook to the south

- a) contract trail design and construction for Chestnut Ridge Loop to Gum Spring Overlook

- b) use volunteer crews for improvements needed on connecting trail from Mill Mountain connection to Chestnut Ridge Trail

Task 3. Assess road crossings of Welcome Valley Road for any needed safety improvements

Phase II. 2005

Task 1. Complete restoration of BLRI Horse Trail from Stewarts Knob to Roanoke River

Task 2. Complete connection to Wolf Creek Greenway

Task 3. Complete MacDonaldis Farm Connection

Phase III. 2006-2008

Task 1. Complete restoration of BLRI Horse Trail from Gum Spring to Roanoke River

Task 2. Complete connections to Roanoke River Greenway (east and west)

Task 3. Complete connection to Explore Park and horse trailer parking area access trail

Phase IV. 2008-2010

Task 1. Construct/retrofit bridge crossing of Roanoke River

Shared Use Trail Demonstration Area

The planning team proposes that the 5.5 mile Chestnut Ridge Trail loop be designated as a shared use demonstration area. The demonstration area would include the addition of mountain bikers to the system of trails that are already shared by equestrians and hikers. The reason the planning team selected this section for the demonstration area is as follows:

- This loop is the first priority section of the trail system slated for completion in the reconstruction effort. This section of trail will likely be the first section updated to the new sustainable design standards as referenced in this plan.
- The Chestnut Ridge Loop has access to Chestnut Ridge Overlook, where the only horse trailer parking for the Roanoke Trail system is presently permitted. Parking facilities at Gum Springs Overlook, Chestnut Ridge Overlook, Roanoke Mountain Campground, and in Mill Mountain City Park, all with access to the Chestnut Ridge Trail loop, would provide adequate existing parking for hikers and mountain bikers as well.
- The access to this section of trail is limited to the parking facilities available and to the new Mill Mountain Greenway connection.

Once implemented, new trail head signage would be installed at the major access points that would list the rules and guidelines that would govern the new system of shared use trails. The trail head signage could also include mapping of the trail system limits for shared use trails, event planning, approved access points, and other pertinent information.

The Chestnut Ridge Loop demonstration area would be patrolled by Parkway Rangers. A system of shared use trail patrol is already in place in Roanoke County at Explore Park. The Explore Park shared use trail system could serve as a model for implementation and training for the Chestnut Ridge Loop demonstration area. The demonstration area would be monitored for impacts, and a summary report developed at six months and at the end of one year, or as requested by either or both governing agencies.

The evaluation and review process would allow for input by the public, by observation of Parkway Rangers, maintenance and planning personal, and by Roanoke County and the Roanoke Valley Greenway Commission. Public input might be obtained by polling trail users with questionnaire forms, or by public meetings. Under no circumstances at this time would shared use be extended to motorized vehicles commonly referred to as ORV. Based on the findings, recommendations would be developed that include any needed mitigation measures. Some possible mitigation alternatives include the following:

1. The shared use trail system appears satisfactory to all trail users and system monitors and thus no changes would be necessary. In this case the shared use trail plan would be carried through to all sections of the Roanoke Trail System as reconstruction is completed. A first year review would be carried out after implementation of the entire trail system and evaluated for continuation.
2. Conflict is demonstrated between trail user groups, and a system of trail use mitigation is preferred as determined by public input and cooperative agreement of the Parkway and Roanoke County and City. Under this alternative, user conflict must be resolved and several possible solutions might be considered. Some possible solutions might include separating user groups on individual sections of the Roanoke Trail System. Other forms of user separation might include time share planning. It might also be determined that user conflict might be resolved by additional trail planning, new trail connections, more organized parking facilities, or user group training to resolve conflict and develop a system of refined trail use guidelines or rules.
 - . If further user group training is considered a viable alternative, the Parkway Ranger and Planning staff might organize a training session with Roanoke County. Possible solutions might include development of more detailed trail use guidelines, developing a system of trail enforcement, or perhaps developing a web site or organized training in collaboration with local friends groups.
 - . If time share planning is considered a viable alternative, then various sections of the trail or the entire trail system would be dedicated to various user groups at alternating times. One example that has been used in other areas is to allow equestrian and hikers to use the entire trail system on alternating days, weeks,

or months from mountain bikers and hikers. Another possible time share user group separation system is to dedicate various sections of the entire trail system for use on specific time schedules. As an example the Chestnut Ridge Trail Loop might be separated from other sections of the trail for use by mountain bikers and hikers to a posted and advertised time schedule. One scenario that has worked in other trail systems is to swap use of various sections of the entire trail system to alternating days, weeks, or by month. The challenge of the time share system is enforcement and adequate education and advertising system scheduling.

- Separation of trail users might include dedication of specific sections of the Roanoke Trail system to one or two user groups. The most preferred separation as determined by many other trail planning efforts is to separate equestrian and hikers, from mountain bikers and hikers. If this alternative becomes the preferred approach, the trail system would be studied by the Parkway and Roanoke County to determine the most logical separation scheme.
- The final user conflict plan might be development of a system that utilizes portions of, or all of sections (a) through (c) or a hybrid of the three possible mitigating solutions.

Outreach and Partnership Development

Consideration should be given to the establishment of a long-term public participation program that allows for meaningful community involvement in trail planning and management. There are many compelling reasons to do so. Collaborative planning provides different users the opportunity to learn about and better understand the needs of other groups. It allows user groups to identify and discuss common goals, which builds understanding, cooperation, and trust through constructive interaction.

Collaborative planning also gives trail advocates, planners, and managers an efficient channel to communicate and develop interdisciplinary solutions that have been reviewed and tested by different perspectives and areas of expertise. Allowing trail users to participate in planning activities, builds a sense of ownership that can lead to long-term support through volunteer activities, political support, in-kind services, and even financial assistance. Pathfinders for Greenways is an example of the vital resources that can be provided through volunteer programs.

There are many techniques already in use by staff of Blue Ridge Parkway, and the Roanoke Valley Greenway Commission to encourage public participation in trail development activities. With the designation of the Chestnut Ridge Loop Trail as a demonstration area, a more formal process should be implemented to allow for continued education and information sharing among various user groups. Trail advisory councils, interactive workshops, joint trail construction or maintenance projects, joint skills building workshops, volunteer trail patrols, and “Trail Days” events, are some examples. Local club newsletters/listserves and the media are also avenues for reaching trail users and providing information.

National Park Service Review Process

Blue Ridge Parkway staff will incorporate the Roanoke Trail Plan as a component of the Blue Ridge Parkway, General Management Plan, with public input meetings planned for the Spring of 2004. The GMP is scheduled for completion in 2006. During the GMP process, the issues raised by this report will be reviewed by the public, including recommendations for linkages to the Roanoke greenway system, and the expansion of uses on the shared-use Parkway trail system to allow for mountain biking. Additional information and updates on the GMP process can be found at:
<http://planning.den.nps.gov/plans.cfm>.

In future years, Blue Ridge Parkway staff will also be responsible for NEPA review of all site specific development activities on parkway lands related to new trail construction, maintenance, and management. Additional information regarding National Park Service planning policies can be found on the National Park Service website at:
<http://planning.den.nps.gov/policy.cfm>

The National Park Service, Draft Directors Order#75, Public Participation and Involvement, provides guidance in terms of public participation in National Park Service decision making. It builds on GMP policy and NEPA regulations that require the National Park Service to include the public in decision-making, and emphasizes the importance in being a good neighbor, and doing more than merely meeting legal or regulatory requirements. Managers and staff of Blue Ridge Parkway have demonstrated a commitment to this concept in their continuous work with stakeholder groups outside of park boundaries. This philosophy of collaborative planning will be critical to the success of future implementation measures.

The National Park Service, Rivers & Trails Program will be available to consult with Roanoke Greenway and BLRI staff, if needed, during additional phases of the project.

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