Mill Mountain Park Management Plan

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Adopted as part of the Roanoke Comprehensive Plan by
The Council of the City of Roanoke, Virginia
and by
The Roanoke Planning Commission

As Submitted by
The Mill Mountain Advisory Committee
Roanoke Parks and Recreation
and The Department of Landscape Architecture
Virginia Polytechnic Institute & State University

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PART I
INTRODUCTION

The City of Roanoke is blessed with an abundance of parkland. With a park system totaling more than 1350 acres within the city limits (752.7 acres without Mill Mountain and Carvins Cove; 1352.7 for total urban acres including Mill Mountain, and 13,152.7 total acres including Carvins Cove), the City provides almost 8 acres of parkland for every 1,000 residents—a figure that comfortably exceeds the 6 acres per 1,000 residents recommended by the National Recreation & Parks Association. All but two of Roanoke's more than 60 parks, however, are classified as either neighborhood or community parks and serve a limited area within the City. At less than 10 acres each, neighborhood parks represent the smallest classification and draw users from the smallest radius—typically those living within walking distance. These parks provide opportunities for passive recreation and limited informal active recreation such as children's playgrounds. Community parks represent the next largest park unit, ranging from 10 to 100 acres. These parks draw users from a larger area within the City (approximately a 2-mile radius) by providing opportunities for organized sports and informal active recreation that require more elaborate infrastructure, such as sports fields and aquatic centers (Roanoke Parks & Recreation, 2000, p. 24; McLeod, 2005).

Within this system of neighborhood and community parks, Mill Mountain, located in Southeast Roanoke, is unique. As one of only two regional parks within the city limits, Mill Mountain draws visitors from all over the City as well as from the Roanoke Valley and beyond because of the unique recreational opportunities it offers. These include panoramic views of the City and surrounding valley from its summit; the Roanoke Star, a national landmark and symbol of civic identity for the City; Mill Mountain Zoo; the Discovery Center, which offers a variety of family-oriented environmental education programs; and hiking and biking trails that are easily accessed by greenways from both the City and the Blue Ridge Parkway. Mill Mountain's uniqueness and regional draw puts it on par with other nearby regional parks, such as Carvins Cove and Explore Park. Given its broad appeal and convenient location within City limits, it is not surprising that Mill Mountain has long been Roanoke's most visited park (Roanoke Parks & Recreation, 2000; McLeod, 2005).

Since long before Big Lick grew into Roanoke, residents and visitors have been drawn to the recreational opportunities afforded by Mill Mountain's natural setting and scenic views. But despite its popularity, the park has evolved over the years often without a real sense of purpose or overarching vision. For most of its past 250 years, the mountain has been in private hands. During this time, its physical development was driven by numerous (mostly ill-fated) money-making ventures. Some of these ventures, like the incline railway on the northwestern slopes, altered the physical environment of the mountain substantially. Other projects, such as the residential/resort complex planned by William Henritze, would have had a lasting effect on the mountain's appearance and natural systems had they come to fruition. It was not until the 1940s, when local businessman Junius B. Fishburn bought much of Mill Mountain and gave the land to the City with the stipulation that it be used as a public park, that public good slowly began to eclipse profit as the guiding force behind the mountain's development. During the last six decades, the more intensive forms of development once seen on and planned for the mountain have gradually given way to a greater emphasis on preserving the natural character of this urban oasis.

This transition to low-impact development on Mill Mountain can be understood as part of a larger attitudinal change in American society toward urban green space over the past 20 years. Whereas the value of undeveloped parcels within the urban fabric was once based on the maximum number of homes or greatest amount of retail space they could accommodate, these open spaces are now recognized as rare urban gems whose natural character should be enhanced in order to make the urban environment a more pleasant place to live and work. Advances in our understanding of ecology and natural systems in the past few decades have also revealed that these green areas play an essential role in protecting the health of a city by improving air quality and stormwater control and preserving wildlife habitat. Recently, design scholars Galen Cranz and Michael Boland (2004) have identified the emerging urban park type as the *sustainable park.* Sustainable parks exhibit three main characteristics: (1) They strive to be self-maintaining, rather than drawing heavily on city resources; (2) They reach outside their boundaries to improve citywide and regional conditions, for example, by reclaiming contaminated sites, energizing citizen groups to participate in park maintenance, and augmenting urban infrastructure with additional vehicular and greenway connections; and (3) They present an alternative aesthetic to the static, manicured formality of the tradition urban park by employing informal native plant assemblages and accommodating seasonal as well as successional landscape changes.

Many of Roanoke's most recent citywide and regional planning initiatives embody the spirit of the sustainable park model. The *Comprehensive Parks & Recreation Master Plan* (Roanoke Parks & Recreation, 2000) and the *Vision 2001/2020* City Master Plan, for example, both emphasize creating self-sustaining, livable communities. They recognize that the economic health of the City is linked to its ability to sustain the health of its physical environment and its residents. Both of these documents seek to preserve and enhance urban green space in order to create a healthy urban environment and provide residents and visitors with a variety of recreational opportunities. The development of the *Roanoke Valley Open Space Study* (1999) and the Roanoke Valley Greenway System also seek to maximize recreational opportunities while improving the environmental health of the region. The public input solicited during the development of all of these initiatives has strongly supported environmental sustainability and low-impact recreation.

The time is now ripe to develop and implement a sound management plan for Mill Mountain Park—one that is consistent with the emerging concept of the sustainable park and respectful of the unique features of this urban oasis. With the development of a clear vision for the park and the enumeration of the management strategies needed to accomplish it, Mill Mountain Park will continue to be a unique and cherished presence in the City of Roanoke for the generations to come.

PART II
MANAGEMENT PLAN: PURPOSE & ORGANIZATION

PURPOSE

This management plan is intended to guide the future management, maintenance, and development of Roanoke's Mill Mountain Park and its resources. It documents the current conditions, mission, and history of the park and, from this information, develops a set of Resource Management Zones (RMZs). These zones group various areas of the park based on shared characteristics and common management concerns. For each zone, a set of management recommendations, including appropriate types of land use, have been developed, and a development review process is described. In this way, the management plan establishes a decision-making framework for evaluating the appropriateness of future development within each zone and ensures consistent treatment of similar areas throughout the park.

In order to ensure that the management recommendations outlined in the plan are thorough and comprehensive, many factors were considered across several scales. In addition to considering management issues at the site scale (e.g., managing park resources in a manner compatible with the environmental conditions of the site), the guidelines also take into account the park's role relative to the City of Roanoke as a whole (e.g., the park's place within the City's parks system) and to the region (e.g., the park's role in the environmental health of the Roanoke Valley).

The types of information collected at these various scales include:

- the mission and vision established for the park by citizens and the City
- the recreational, economic, and environmental roles of the park within the City of Roanoke and the greater Roanoke Valley
- the park's existing natural features and conditions
- the historical and cultural resources existing within the park
- the site's historical evolution

This information was drawn from a variety of sources, including existing City planning documents, previously documented public input regarding Mill Mountain Park, historical documentation on the mountain's development, geospatial data on the physical features of the mountain, and walking surveys of the park (see the Documents Cited or Consulted section for the list of published sources).

As with all planning documents, this management plan is a living document. As Mill Mountain, the City, and the region continue to evolve, the management plan will require periodic review and revision, including citizen input.

SCOPE

This management plan covers the entire park, consisting of approximately 568 acres. Figure 1 identifies the location of Mill Mountain Park in the City of Roanoke. Figures 2, 3, and 4 depict existing conditions in the park (base maps), and Figure 5 shows in detail the mountain top where park development is concentrated.

ORGANIZATION

This management plan begins with a review of the park mission, its significance to the City and the region, and its history. It then provides an inventory of its current natural conditions, cultural features, and programming. The final section describes the management zones (RMZs) themselves and recommends appropriate types and levels of activity for each zone, as well as potential land uses.

The management plan concludes with description of a process by which future development proposals for the park can be evaluated. This process includes review by the Parks & Recreation Advisory Board, the Roanoke Planning Commission, and City Council of any proposed use of Mill Mountain Park that is not consistent with the RMZ descriptions.

PART III
MILL MOUNTAIN PARK: MISSION & SIGNIFICANCE

MISSION

Providing recreational opportunities for the residents of Roanoke and the surrounding region has long been the primary mission of Mill Mountain, but ideas about the types of recreational facilities appropriate to the mountain have changed dramatically over the years. Early on, while the mountain was owned by various private individuals and corporations, appropriate forms of development were considered to be those that held the greatest potential to generate profits for investors. As the Rockledge Inn, the Mill Mountain Incline, and the Old Toll Road suggest, developers tended to associate bigger profits with bigger, higher impact building projects.

Even the legally binding restrictions placed on Mill Mountain in 1941 by the Fishburn land grants were initially interpreted in a manner consistent with that era's preference for intensive development. Although the Fishburn deed restrictions ensure in perpetuity that the park be "developed and forever preserved, improved, and maintained for the use and pleasure of the people of the City of Roanoke, Virginia, and vicinity" (Hill Studio, 2004), these restrictions tended to be interpreted broadly relative to the types of development considered appropriate. Indeed, the language used in the deed restrictions themselves, which permit construction of "parks, playgrounds, buildings, structures, and things similar thereto," tend to invite loose interpretation (Hill Studio, 2004). The deed restrictions simply mandate that any proposed development "afford the people of this community and their children . . . healthful and pleasant recreation" (Hill Studio, 2004). Through the 1980s, numerous proposals came before the City for intensive development of Mill Mountain's summit and slopes, including hotels, ridge-top overlook restaurants, parking structures, and even a ski slope. None of these proposals were judged to violate the Fishburn deed restrictions, and each was subsequently approved by the then-sitting Mill Mountain Advisory Committee and City Council (although for a variety of reasons none were ultimately carried out). Even the construction of the Roanoke Star in 1949 was approved by Junius B. Fishburn (the author of the development restrictions) himself, according to E. C. Moomaw, head of the Roanoke Merchants Association at the time the group commissioned the Star (Moomaw, 1982).

Gradually, however, the vision for Mill Mountain Park—and the interpretation of the Fishburn deed restrictions—began to change. As the general public's interest in the environment grew and spawned a desire to spend recreational time in natural settings, the mission of the park and its role within the City were redefined accordingly. A new understanding of the relationship between profit and development began to emerge, as urban green spaces like Mill Mountain became valued for their undeveloped state. Environmental conservation and compatible, low-impact development was seen as enhancing the park's value rather than diminishing it.

The most detailed statement of this newly evolving vision for Mill Mountain Park came in 1991 with Rhodeside & Harwell's *Mill Mountain Park: Design Evaluation and Development Criteria.* This report, developed through historical analysis, physical site analysis, citizen interest group meetings, and citizen surveys, was adopted by the Roanoke City Council in December of 1990. The following summary of the park's mission, as provided in the report, indicates the growing importance of maintaining Mill Mountain's natural environment (p. iii):

1. Preserve visual integrity both to and from Mill Mountain.
2. Preserve Mill Mountain as a natural resource.
3. Preserve Mill Mountain as a symbol of Roanoke.
4. Enhance Mill Mountain as a place for recreation.

The document elaborates on each of these directives with more specific strategies designed to protect the natural environment of the mountain, including "Protect natural forested slopes" and "Maintain and enhance the natural character of Mill Mountain" (pp. 31, 32).

The park mission detailed in the Rhodeside & Harwell (1991) report was further crystallized by the Mill Mountain Advisory Committee (formerly the Development Committee), the body charged with guiding park development since the late 1960s, after a visioning retreat and a series of meetings to gather public input in early 1997. They distilled the mission of the park into the phrase, "Progress with preservation." The Committee further resolved to "mak[e] Mill Mountain as accessible and pleasurable to all persons while preserving the environmental and aesthetic integrity of the mountain" (Hill Studio, 2004).

This emphasis on preserving the natural environment of Mill Mountain and encouraging compatible development is also consistent with the current mission statement developed by the Roanoke Parks & Recreation Department for the City's park system, which commits the department to "improving the quality of life for the citizens and visitors of Roanoke by providing recreational opportunities through diverse programs and facilities and promoting environmental stewardship through beautification, management, and care of public spaces." The Department's vision statement goes on to emphasize the role of the City's parks as places in which people can "experience and appreciate the natural beauty and quality of life in Roanoke" (Roanoke Parks & Recreation Department, 2000, pp. iv–v).

This environmental emphasis in the park's mission is also supported by a wider vision established for the Roanoke Valley region. For example, the *Roanoke Valley Open Space Study* (Fifth Planning District Commission, 1999) which engaged residents from all over the Roanoke Valley in a series of citizen focus groups, found that a majority of participating residents favored preserving much of the region's open space. Specifically, participants rated the preservation of

forested mountains and "urban forests" as highly desirable, as well as the preservation of scenic views. Many participants specifically named the views to the forested slopes of Mill Mountain as important to protect (Results of the Public Review Process, pp. 5–6).

For over a century, Mill Mountain's mission has been to provide recreational opportunities to residents and visitors. Yet the understanding of how to best provide such opportunities has evolved. Emphasis has shifted from amenities requiring intensive development of the mountain to low-impact development that preserves and compliments the park's natural environment and encourages visitors to develop a deeper knowledge of and appreciation for their natural surroundings.

SIGNIFICANCE

Mill Mountain Park represents a unique resource for the City of Roanoke and the greater region. Key contributions of the park to the City and the greater Roanoke Valley region include the following:

1. Functions as a regional park for the City and the surrounding valleys. Although Roanoke has numerous neighborhood and community parks, which draw users from adjacent areas of the City, Mill Mountain Park is one of only two regional parks within city limits. It draws visitors from every sector of the City as well as from the greater Roanoke Valley/New River Valley region and beyond because of the unique features and activities it offers, including the city zoo, scenic overlooks, the Roanoke Star, greenways and trails, and its educational programming for children and adults.

2. Provides citywide and regional greenway connections. The Mill Mountain Greenway, which begins near Elmwood Park, connects the City to Mill Mountain's summit via the retired Prospect Road. This greenway will also provide a connection to the Roanoke River Greenway, which is planned to stretch the length of the county. Mill Mountain's greenways also provide a connection to trails on Chestnut Ridge and the Blue Ridge Parkway and Explore Park via the Mill Mountain Spur Road. Developing a greenway connection between Roanoke City and Explore Park via Mill Mountain was designated one of eleven high-priority greenway segments in the *Conceptual Greenway Plan* for the Roanoke Valley Region (Greenways, Inc., 1995). The completion of these greenways is identified as a priority in the City's *Vision 2001/2020* master plan (City of Roanoke, 2001, Chap. 3, Policy EC A6).

3. Encourages tourist traffic into the City of Roanoke by providing a direct vehicular connection to the City from other regional attractions. Visitors to the Blue Ridge Parkway and Explore Park can easily access the City through the Mill Mountain Spur Road and Fishburn Parkway. This link is reinforced through Mill Mountain Park's designation as a Regional Information Center of the Blue Ridge Parkway. Signs along the Parkway in the Roanoke region direct visitors to the Mill Mountain Information Center. This connectivity facilitates increased attendance at all three sites and encourages overnight stays in Roanoke. Tourism, which contributed more than $200 million to Roanoke's economy in 1999, has been identified by the City as an important component of its fiscal health (City of Roanoke, 2001, Chap. 3, p. 53).

4. Provides important environmental education opportunities for residents of all ages through Discovery Center and Mill Mountain Zoo programming. This activity is consistent with Roanoke Parks & Recreation's Action Strategy 7, which urges the department to be "an environmental educator through recreational programming" (Roanoke City Parks & Recreation, 2000, p. vi).

5. Includes the largest contiguous area of mature tree canopy within city limits. This feature represents not only a unique recreational opportunity within city limits but also an important resource for improving air quality in the Roanoke Valley. This is especially important given the Roanoke Valley's impending violation of Environmental Protection Agency standards for ozone levels. In order to avoid classification as a nonattainment area, which would mandate strict vehicle and industrial emission limits that could have a negative economic effect on the region, an *Ozone Early Action Plan* has been implemented by Roanoke Valley jurisdictions, including the City of Roanoke (Cities of Roanoke and Salem *et al.*, 2004). Under this plan, parties have until 2007 to reduce ozone levels. As part of the plan's implementation, the City's *Vision 2001/2020* master plan calls for "maintaining and increasing tree canopy coverage as a way to improve air quality" (Chap. 3, Policy EC P5) and the City's Urban Forestry Taskforce has set a goal of 40% tree canopy for the City. Preservation of the mature forests on Mill Mountain is critical to the success of this plan, as a larger tree is estimated to filter 60 pounds of pollutants per year, whereas a newly planted tree will filter no more than 20 pounds per year (*Roanoke Valley Area Ozone Early Action Plan*, 2004).

6. Plays a major role in preserving wildlife habitats within the City and the region. The park provides important wildlife habitats within its own boundaries as well as extending a critical forested corridor that runs from the Blue Ridge Parkway through Roanoke Mountain to Mill Mountain. In recognition of its importance in preserving wildlife, Mill Mountain Park has been incorporated into the Virginia Birding & Wildlife Trail developed by the Virginia Department of Game and Inland Fisheries. This driving and hiking trail links diverse wildlife viewing sites throughout the state. The Star City Loop incorporates the Star Trail, the Mill Mountain Greenway, and the connection to the Blue Ridge Parkway via the Mill Mountain Spur Road. The Virginia Fish and Wildlife Information Service lists over 500 species of fauna in the Mill Mountain region, including state endangered species such as Bewick's wren and state threatened species such as the peregrine falcon (Virginia Department of Game & Inland Fisheries Web site).

7. Hosts the Roanoke Star, a National Landmark and the most recognized symbol of the City of Roanoke for more than 50 years. The Star's image can be seen on the City's logo and is incorporated into the names of many local businesses. In addition to attracting tourists, the Star also represents an important cultural resource for Roanokers, as evidenced by the many marriage proposals that have occurred beneath it. Its location on Mill Mountain allows nighttime views to the Star from most of the City and the Roanoke Valley.

8. Plays an important role in the marketing of Roanoke as an outdoors recreation destination. The availability within city limits of hiking and biking trails, as well as the other outdoor activities that Mill Mountain offers, is an important selling point for both potential visitors and new residents. The *Vision 2001/2020* master plan identifies the development of a comprehensive marketing strategy to promote Roanoke as an outdoors destination as a priority in order to sustain the economic growth of the City (Chap. 3, Policy EC A21).

PART IV
HISTORY OF DEVELOPMENT ON MILL MOUNTAIN

Mill Mountain has always figured prominently in the lives of those living near it – not simply because of its physical presence, but also because of its importance as a community resource. The exact nature of this resource has been redefined through the generations in order to best suit the ever-changing needs of the community. And yet, through all these changes, the bond between community and mountain has remained strong. Mill Mountain is an integral part of Roanoke. Although its value to residents will continue to be redefined as times goes by, a look at the community's relationship to Mill Mountain in the past may help us to more clearly anticipate its future. The following history traces the major events in the history of the Mill Mountain and attempts to interpret the changing attitudes toward the mountain in terms of its value as a community resource. By no means is this the only interpretation that can be distilled from the events, but it is a place to start. Appendix A of this Management Plan presents a straightforward timeline of activity on the mountain and includes events not covered in this section.

Early indigenous peoples were drawn to the fresh water spring at the base of what would later be called Mill Mountain. Archaeological studies in the immediate vicinity of Crystal Spring have uncovered artifacts indicating Native American occupation of the site as early as 6000 B. C. (Rhodeside & Harwell, 1991). In addition to the presence of a reliable water source, the brackish swamps on which Roanoke would later be built would have attracted animals and provided fertile hunting grounds. In an account of the Batts, Woods, and Fallam Expedition, which set out from eastern Virginia in 1671, the party reports staying briefly in a Totero settlement believed to have been on the site of the Roanoke Industrial Park (Bruce, 1982).

Early European settlers also saw the value of the area around Mill Mountain. In the early 1740s, Mark Evans, a middle-aged justice of the peace fleeing a violent border dispute between Maryland and Pennsylvania, became one of the first permanent settlers in the Roanoke Valley. His 1,900-acre land grant encompassed 87 acres along the northwestern slopes of Mill Mountain, including the spring later called Crystal Spring (Figure 6). Evans and his son Daniel built a gristmill—and some sources say also a sawmill (Harrington, 1995; Montgomery, 2002b)—at the spring. By all accounts, Evans Mill, as it became known, prospered. Its success was guaranteed by not only the reliable water source provided by the spring, but also the mill's proximity to a major north–south transportation route, known variously as the Warrior's Path or the Carolina Road, which passed between Mill Mountain and present-day U.S. 220. This made the mill an important supply stop for settlers making their way south to the Carolinas. In 1753, for example, Moravian settlers traveling south through the Shenandoah Valley along the Warrior's Path reported stopping to resupply at Evans Mill before continuing on to present-day Winston-Salem

(Bruce, 1982). Only a few years later, the mill's location would also make it an important regional supply depot supporting various military actions during the French and Indian War. A granary was built at the mill during this time for the stockpiling and distribution of grain. In 1756, George Washington, then a 24-year-old commander-in-chief of the militia, reportedly spent a night at Evans Mill while reviewing fort construction in the Valley (White, 1982).

After Daniel Evan's death sometime in the 1750s, his brothers and their descendants apparently kept the mill running for several decades (White, 1982). In the 1790s, William McClanahan, a Roanoke Valley resident and colonel in the Revolutionary War militia, bought the Evans' milling operation. Already one of the largest landowners in the Valley, McClanahan acquired the mill as part of a 3,170-acre land purchase. For almost a century, McClanahan's descendents ran the mill and farmed the surrounding lands until selling portions of their property that included the spring and Mill Mountain in the late 1870s and early 1880s (White, 1982). Little documentary evidence has come to light regarding the McClanahans's management of their land during these decades. In addition to milling and farming operations, it is possible that at least a portion of the mountain's slopes were timbered during this time. When the Virginia & Tennessee Railroad laid its tracks through town in the 1850s, local businessman John Trout bought and timbered a portion of Roanoke Mountain, just to the south of Mill Mountain, in order to supply the railroad with ties (White, 1982). It is possible that the McClanahans also saw an opportunity to supplement their income with timber harvested from Mill Mountain.

The coming of the Virginia & Tennessee in 1852 marked the first significant growth spurt for the little town then known as Big Lick. Although the event was virtually ignored by most residents, this first shrill call of the steam whistle in town signaled the beginning of a new era in which the quiet farming community would transform into a bustling railroad town. To accommodate the new railroad's route, the town's population center shifted southeast, moving away from the Gainsborough area and closer to Mill Mountain. This area would later become the nucleus of Downtown Roanoke. With the coming of the railroad, Big Lick also became an important manufacturing and distribution center in the region. Warehouses sprung up along the river to store and process the tobacco brought by wagon from Franklin, Henry, Pittsylvania, and Floyd counties before being shipped by rail to Richmond. This industry would continue briefly after the Civil War, and by 1874, Big Lick's population had grown to the level required for incorporation (White, 1982).

But the wave of growth spurred by the Virginia & Tennessee was only a ripple in a puddle compared to the surge initiated by the coming of a new railroad in the 1880s. Early in the decade, surveyors appeared in the Roanoke Valley to determine a route for the extension of the Shenandoah Valley line south from Waynesboro. The owners of the line, Norfolk & Western, had previously acquired the Virginia & Tennessee and intended to connect the two lines somewhere in the region. Having personally profited from the economic opportunities that came with the Virginia & Tennessee line in the 1850s, Big Lick's civic and business leaders realized the potential windfall that would accompany the building of a major railroad terminal in town. After a frantic series of strategy meetings, the group put together an incentive package that succeeded in convincing Norfolk & Western to join their lines in Big Lick. The little town of Big Lick would never be the same (White, 1982).

The coming of the Norfolk & Western led to exponential growth, as the town would swell from a total population of just 669 in 1880 to more than 5,000 just four years later. Railroad jobs, including those at the Norfolk & Western machine shops (also known as the Roanoke Machine Works), drew new residents from all over the region. With them came an urgent demand for new housing and city infrastructure. The price of farmland surrounding the small town began to skyrocket. It was in this atmosphere of rampant land speculation that the Roanoke Land & Improvement Company, a real estate subsidiary of Norfolk & Western, would buy up more than 1,150 acres in and around town in order to sell it to developers at huge profits. In March of 1882, the company bought McClanahan Spring from Elijah McClanahan to supply water to the railroad. They also purchased Mill Mountain from local businessman Peyton Terry (owner of Elmwood), who had purchased it five years earlier. Housing for railroad workers began to spring up in the former farm fields between town and Mill Mountain. The demand for building supplies became so great that Big Lick soon exhausted the stockpiles of local lumber suppliers. By 1884, the sleepy little mountain town of Big Lick was granted a city charter as the bustling boomtown named Roanoke. And aside from two brief downturns in the local economy, Roanoke's expansion would continue to run at full steam until the Great Depression hit the City in 1930 (White, 1982).

During these frenzied decades of land speculation and profiteering, Mill Mountain's potential value as a recreational and an economic resource did not escape the attention of Roanoke's business elite. Since the earliest days of Big Lick, residents had often hiked to the top of Mill Mountain to enjoy the panoramic views. With the city's population expanding southeast, businessmen saw an opportunity to build on the mountain's popularity as a recreation spot. And like all entrepreneurs in Roanoke at that time, they planned big. In 1891 Roanoke Gas & Water Company acquired Mill Mountain and the lands running up to its western slopes from its sister company, Roanoke Land & Improvement. Although more research is needed into company records in order fully elucidate their intentions, their subsequent development activities suggest that the company envisioned Mill Mountain as a resort/recreational complex, with its foot slopes offering entertainment focused on the City's lower to middle socioeconomic classes and its summit reserved for a more exclusive clientele (Dotson, 2003).

In addition to installing water mains throughout the City to provide residents with water from Crystal Spring, Roanoke Gas & Water set about developing the rest of their Mill Mountain land. In the tradition of the region's springs resorts frequented by Southern elites since before the Civil War, the summit was envisioned as a seasonal retreat for the wealthy—a refuge from the heat and summertime diseases that would continue to plague the Roanoke area into the next century. To carry out this vision, the company hired local builder F. D. Booth in 1891 to develop a $10,000 hotel and $2,000 observatory at the summit and provide a graded carriage road up the side of the mountain (Dotson, 2003). Booth completed a winding dirt road with a 10% slope up the northwestern face of the mountain called Prospect Road. His crews also installed heavy wooden guardrails along the downhill side of the road to offer a measure of safety on the steep route. Workers were still busily landscaping the summit when the 11-room Rockledge Hotel (hereafter referred to as the Rockledge Inn, as it was called in more recent years) (Figures 7 and 8) celebrated its grand opening on May 3, 1892 with a lavish supper party that included local business leaders and railroad executives from as far away as Philadelphia. Although hastily constructed and somewhat primitive in its appointments, the hotel was praised for its spacious dining porch that allowed guests to enjoy magnificent views along with their meal, its large brick

fireplaces, and indoor room for dining and dancing. A new carriage stood by to shuttle guests between the train depot and the hotel in comfort. Shortly after its opening, landscaping was completed on the hotel's grounds with the installation of ornamental flowers, rustic benches, and gravel strolling paths. Plans were also developed for a tennis court and croquet grounds behind the hotel (*Roanoke Times,* May 4, May 28, June 1, 1892).

The first observation tower on Mill Mountain also opened at this time (Figure 9). Quite a bit of discrepancy exists in the written record regarding the observation towers, but it appears that as many as three separate towers existed on the summit through the years. The first was constructed with the Rockledge Inn and opened in 1892. An admission fee was charged to all visitors except guests staying at the Rockledge Inn (*Roanoke Times,* May 24, 1892). The exact location of the observatory on the summit is uncertain, as is its description. Additional research into the original contract between F. D. Booth and Roanoke Gas & Water as well as related company documents may clarify information about this tower.

At the same time that Roanoke Gas & Water was improving Mill Mountain's summit, they also set to work developing recreational facilities around its base. A 20-acre public park (Figure 10) was constructed around Crystal Spring. The spring's waters were channeled into a small man-made lake surrounded by turf and walking paths enclosed by a fence. A modest structure was built to serve as a café (*Roanoke Times,* May 28, 1892). The company also extended Jefferson Street south across the river with the construction of an iron bridge. This improved access to the Crystal Spring/Mill Mountain area. Crystal Spring would remain a popular park for residents for decades to come, and citywide celebrations such as those for Labor Day or the Fourth of July were often held there (*Roanoke Times,* August 13, 1910).

But despite the success of Crystal Spring, the summer resort at the summit of Mill Mountain failed to attract a steady flow of guests. Several possible reasons existed for the Rockledge's failure. Certainly, the 2- to 3-hour carriage ride along the dangerously winding dirt road did not help business. Additionally, the cost-conscious construction of the hotel had left the guestrooms noisy and lacking in modern conveniences (Barnes, 1960). In addition, the mountain's proximity to the city, although an asset for the park at Crystal Spring, worked against the Rockledge's billing as an exclusive, upscale resort. Even working-class residents who could not afford to stay or dine at the hotel could easily hike to the summit for an afternoon (walking to the summit was reportedly much quicker than taking the carriage). Many of Roanoke's well-to-do preferred to recreate at McAfee's Knob instead. The remoteness of this spot from the City combined with the difficulty of the climb proved to be a formidable barrier to all but the wealthiest residents, who typically climbed to the overlook by horse and mounted elaborate picnics and overnight camping trips (Dotson, 2003). Finally, timing did not favor the Rockledge, as the effects of a national depression were felt in Roanoke shortly after its opening. The financial downturn slowed growth in Roanoke temporarily, and certainly contributed to the closing of the Rockledge Inn in 1893, after only its second season of operation (White, 1982).

By the turn of the century, however, Roanoke's economy was back on track. The Norfolk & Western Railway, which had encountered financial problems during the previous few years, emerged from receivership with new vigor. By 1900, Roanoke ranked as Virginia's third largest city behind only Richmond and Norfolk and was home to the largest locomotive manufacturing operation in the South (Bruce, 1982; White, 1982). The upward trajectory of the City's financial

health was also reflected in new development projects on Mill Mountain. In 1900, Roanoke Hospital opened at the northwestern foot of the mountain (where Roanoke Memorial stands today). When the City ran short of funds before construction was completed, Norfolk & Western Railway, which had donated land for the hospital, also provided funds to complete construction. Although the Rockledge Inn had failed as an exclusive resort, the park at Crystal Spring was still quite popular. By 1902, the Roanoke Railway & Electric Company decided to develop another park on the slopes just south of Crystal Spring (east of present-day Jefferson Street and extending south to the current location of Fern Park). Whereas Crystal Spring hosted primarily passive forms of recreation, Mountain Park (Figures 11 and 12) was conceived of as a place of active recreation and entertainment. It would offer a range of attractions that would appeal to a broad spectrum of residents, from "common" pastimes such as bowling and baseball to more "gentile" activities such as dancing and theatrical productions. The first building constructed within the 40-acre park was an 800-seat theater for live performances and moving pictures referred to as the Casino (Figure 13). The Casino would host a variety of national and international performers, including the famous tenor of the Metropolitan Opera Enrico Caruso in 1910 (*Roanoke Times,* July 3, 1910). The city street car was extended along Jefferson Street to within 20 feet of the Casino's front steps. Developers also built an extravagantly lit dance pavilion that contained a soda fountain, arcade-style concession booths, and a 9,000-square-foot maple dance floor (Figure 14). By 1904, the park also offered a bowling alley, baseball field, and picnic areas. Eventually, a rollercoaster (Figure 15) called The Thriller was added (Bruce, 1982; *Roanoke Diamond Jubilee,* 1957).

Although Mountain Park, like the park at Crystal Spring, was successful because of its convenient access by street car and its varied set of activities, it is important to acknowledge that one large segment of Roanoke's population was barred from both parks as well as from the developments on Mill Mountain's summit—the African American community. As in most of the South, Roanoke adopted Jim Crow policies that segregated the races in all aspects of city life. For the most part, black Roanokers were forced to develop their own venues for entertainment and recreation within the City. Only rarely did Mountain Park offer "colored days," during which African Americans were allowed access to the park's amenities, and then only with ample warnings and apologies to white patrons (Dotson, 2003). Until integration, Washington Park would remain the only City park open to African Americans.

In 1908, Roanoke experienced another short-lived financial downturn, and just as it had 15 years earlier, Norfolk & Western fell on hard times and was forced to lay off many Roanoke employees. By the next year, however, the economy was rebounding, and local investors were again looking to turn the recreational opportunities on Mill Mountain into profits. In November 1909, Mill Mountain Incline Incorporated was formed by a group of local investors including J. B. Fishburn (who would later donate Mill Mountain to the City). The company planned to build an incline railroad from the vicinity of Crystal Spring and Mountain Park, just south of the hospital, to the summit of Mill Mountain. They also planned to purchase the summit from the Roanoke Gas & Water Company in order to build a larger, more modern lodge that they hoped would be more attractive to an upscale clientele. Investors believed the incline would solve the summit's access problems by reducing travel time to the mountain top from a few hours to a few minutes. The company also hoped that the location of the incline terminal near the heavily patronized Mountain Park and Crystal Spring would drastically increase ridership among day-trippers. Thus, before the decade was over, development had resumed on Mill Mountain.

The incline company contracted with the Roanoke Iron Company for fabrication of the incline's rails, and J. G. Brill Company of Philadelphia, a prominent street car manufacturer, built the electric pulley assembly and the two cars. Although Mill Mountain Incline Incorporated initially estimated construction costs for the 1,000-foot-long incline at $15,000, the company would ultimately spend $40,000 for its completion (Figures 16 and 17).

Despite the cost overruns, the Mill Mountain Incline's opening day on August 14, 1910 seemed promising, as 1,500 people lined up to make the 25-cent roundtrip on the novelty (*Diamond Jubilee Program,* 1957). Concurrent with the construction of the incline, the company also leased the Rockledge Inn and tried to renovate it as best they could. Within a few months of opening the incline, the company would try several times to purchase the summit from the Roanoke Gas & Water Company in order to pursue their plans to build another hotel. The utility company, however, refused to sell. By 1911, the incline company had completed renovations of the landscape at the summit, adding new strolling paths, benches, and swings. The company also turned its attention to the observation tower on the mountain, but the historical documentation is again contradictory as to whether it simply refurbished the 1892 tower or constructed a new one (Bruce, 1982; Dotson, 2003; White, 1982). Whichever the case, the company certainly added an electric searchlight and a telescope to the tower's observation level. They also opened a gift shop on its first floor that sold, among other Mill Mountain souvenirs, postcards produced by the print shop owned by Edward Stone, one of the principal investors in the incline. Once again, the mountain top was ready for business and poised to become a successful tourist destination.

Yet after the incline's first year of operation, business began to slide. Unsuccessful in their attempts to acquire the summit from Roanoke Gas & Water, the incline company's leaders feared that the small, outdated Rockledge Inn would never draw the number of visitors necessary to earn a profit. As the hoped-for influx of tourists failed to materialize and the novelty of the incline for local residents wore off, ridership on the incline began to decline. By 1912, the company was paying more in operating expenses for the hotel and incline than it was taking in. In an attempt to boost patronage, several of the company's principal investors supported placing a large electric sign at the summit to promote the incline and the City. This plan, however, drew immediate and intense criticism from the Roanoke Chamber of Commerce, and the Roanoke Gas & Water Company refused to permit the sign on its land. Perhaps as an omen of the financial collapse to come, the observation tower at the summit blew down on March 3, 1914 after a violent wind storm. It would be rebuilt later in the same year (Figure 18) (*Roanoke Times,* March 3, 1914).

After holding on for several years in the hope that business would improve, the incline's investors decided to sell out in 1919, and Roanoke Gas & Water purchased (and continued to operate) the $40,000 incline for $7,000. Although the incline company's vision of Mill Mountain as a major tourist destination had never materialized, the land would not sit idle for long before attracting the next investor with a dream for capitalizing on the mountain's assets.

By 1920, Roanoke Gas & Water was ready to extricate itself from the hospitality business on Mill Mountain and sold its property, including the incline, to the Mill Mountain Corporation, which was owned by William P. Henritze and his brother John (*Roanoke Times & World-News,* June 5, 1980). Like the original investors in the incline, Henritze believed that a profitable resort development was still possible on Mill Mountain, especially if it evolved in conjunction with the

development of a residential complex on the mountain's slopes. The idea of residential development on the mountain certainly seemed profitable at the time. Roanoke's population had expanded to 50,000 by 1920 (White, 1982), and the City had annexed its southern suburbs up to and including the western slopes and summit of Mill Mountain in 1915. Part of this expansion was fueled by American Viscose Corporation's rayon manufacturing facility, which opened in 1917 and would add a total of 5,000 new jobs to the City's economy within a decade. Even the popular Mountain Park became a casualty of the inflated land prices caused by the new housing demands. The park would close in 1923 and be subdivided for the "high-class" residential subdivisions named Clermont Heights and Mountain Park (*Roanoke Times,* August 25, 1924). With the city again growing at a rapid rate, Henritze would build Mill Mountain into a successful recreational facility—if only for a brief time.

Shortly after purchasing the mountain, Henritze's Mill Mountain Corporation set to work building a $90,000 scenic toll road roughly along the same route as the older carriage road built to the Rockledge Inn. By this time, mass-production had made the automobile affordable for more Americans, and driving was quickly becoming one of America's favorite leisure activities. With the opening of his toll road on August 30, 1924, Henritze was well-positioned to capitalize on the new craze—if only at the modest rate of 25 cents per car. The road, which was advertised as Roanoke's greatest attraction (*Roanoke Times,* August 30, 1924), was indeed state-of-the-art for its time. It was reputed to be the longest continuous 6% concrete road in the world and featured a "loop-the-loop," at which the road passed over itself by means of a large concrete culvert (Figures 19 and 20) . (Figure 21 depicts a portion of a 1926 Roanoke city map that includes Mill Mountain, the new road, and the incline.) William Henritze would soon build his personal residence, which he named Rockledge, in the bare spot next to the loop. The road was a comfortable 18 feet wide, but expanded to 30 to 40 feet across at the sharpest curves. As an additional safety measure, it was bordered by a strong guardrail constructed from iron railroad rails and cables and locust posts. But even these precautions did not prevent several drivers from wrecking their automobiles along the road.

The winding road among the treetops proved to be a success. Toll records indicated that 20,000 cars per year were still using the road by the late 1930s (Sponaugle, 1940). In addition to attracting scores of local residents, the road also succeeded in drawing some driving enthusiasts from a wider region. In 1933, for example, Chet Miller set a speed record of 1 minute and 37 seconds to the top of Mill Mountain on the road in his Essex Terraplane car. The popularity of the toll road soon eroded the incline's remaining business. Mill Mountain Corporation closed the incline permanently in 1929 and sold it for scrap in 1930. One era's novelty had been supplanted by another's.

Decades of exponential growth and profiteering in Roanoke suddenly derailed in 1929 and 1930 as America was gripped by the Great Depression. The presence of the railroad and American Viscose, however, helped insulate Roanoke from its worst effects. Although Roanoke's unemployment rate reportedly never rose above 2% during this time (White, 1982), numerous businesses in the City went bankrupt (Bruce, 1982). Facing financial uncertainties, Roanoke decided to postpone its Golden Anniversary celebration for two years, until 1934, hoping for brighter financial times (White, 1982).

The financial troubles gripping the City also reached Mill Mountain. In addition to the demise of the incline, the Rockledge Inn permanently closed in 1929 (*Roanoke Times,* July 13, 1995). Financial difficulties prevented William Henritze from pursuing his vision of a residential/resort complex on Mill Mountain beyond the toll road and his Rockledge mansion. Facing bankruptcy by 1932, Henritze offered to sell Mill Mountain (with the exception of his residence) to the City for $165,000. With its own finances on shaky ground, however, the City declined (Sponaugle, 1940). Two years later, creditors foreclosed on the property, and the mountain was bought for $50,000 by a group of investors affiliated with Washington & Lee University. This group also offered the mountain to the City—this time for $75,000. Again, the City felt it could not allocate such a large sum of money and declined (Sponaugle, 1940). Two years later, in 1936, perhaps to signal the failure of another attempt at developing Mill Mountain, the observation tower at the summit was again destroyed—this time by fire. Unlike the last time, however, it would not be rebuilt. It was indeed the end of an era for Mill Mountain.

For the next several years, little attention was paid to Mill Mountain as the City concentrated instead on rebuilding its financial house. The year 1941, however, would mark a pivotal moment in the history of Mill Mountain: its transition from private to civic ownership. In that year, Mr. and Mrs. Junius B. Fishburn purchased Mill Mountain from Washington & Lee University and conveyed 100 acres to the City of Roanoke to be developed as a park. Fishburn, often referred to as Roanoke's First Citizen, had come to Roanoke as a young man to work in his uncle's grocery store. Despite lacking any formal education, he built several successful city businesses, including the local newspaper (the *Roanoke Times*) and the City's most successful bank. Before his death in 1955, Fishburn would donate about 175 acres on Mill Mountain to the City, in addition to land for several other parks throughout Roanoke (Bruce, 1982). (See Figure 22 for a map of land acquisitions, including the Fishburn lands, that have created the existing Mill Mountain Park.)

Although the transfer of the property from private hands to the City was easily accomplished on paper, the shift in attitude required of the City to fulfill the Fishburns's vision for a public park would take several decades to accomplish. After 50 years of leaving the fate of the mountain in the hands of businessmen and developers, the City was now thrust into the unfamiliar role of guardian of the mountain and of the public's interest regarding the mountain. This new role was made necessary by the deed restrictions the Fishburns attached to the land to ensure that the mountain would be "developed and forever preserved, improved, and maintained for the use and pleasure of the people of the City of Roanoke, Virginia, and vicinity." The City would now have to make its presence felt on the mountain in order to see that the Fishburns's directives were respected.

The City had failed to act once before on a proposal to make Mill Mountain a public park. The idea had first been suggested by prominent landscape architect and planner John Nolen in 1907, who was hired by the Woman's Civic Betterment Club to develop a citywide master plan for Roanoke. Nolen proposed a linear greenway connecting Downtown Roanoke to a major city park on Mill Mountain. Little of Nolen's plan was ever implemented. The City would leave the development of Mill Mountain, as well as the rest of Roanoke, to private entrepreneurs. But after 1941, the City would not have the option of simply ignoring the Fishburn land grants and their conditions.

Perhaps uncertain of how to carry out its new leadership role, the City would continue to leave development on the mountain to private interests for many years to come. This is evident in the first major project undertaken on Mill Mountain during the City's ownership: the Roanoke Star. Its development was initiated and carried out wholly by Roanoke's business community. Although previous development schemes on the mountain had typically been couched in terms of civic pride and public improvement, the driving force behind them clearly remained the prospect of financial gain. The birth of the Roanoke Star was no exception to this. On Thanksgiving Eve in 1949, the now-famous neon Star on the northern portion of the summit was lit for the first time (Figure 23). Conceived of and funded by the Roanoke Merchants Association as a Christmas decoration designed to tie in with the star decorations hung along the City streets, the group described the project as an expression of their civic pride. But certainly, the Merchants Association and the numerous City businesses that contributed a total of $27,000 to the project also hoped the 88½-foot-tall neon star would attract curious Christmas shoppers to Roanoke from throughout the region (*Roanoke Times & World-News,* 1982). Whether the 1949 holiday shopping season broke any records for Roanoke merchants is unknown, but the Star quickly received so much favorable press that the Merchants Association decided to pay to keep it lit year-round. Although the Star would ultimately take on a symbolic life beyond the intentions of its creators, the process of its development clearly illustrates that the business community was still the driving force behind development on the mountain.

Although the City was still absent from the mountain, the transfer of the property to the public sector opened the door for another set of stakeholders to take an active role on the mountain. By the 1950s, community volunteer organizations had become a major presence on Mill Mountain and began initiating civic improvement projects. In 1952, for example, the Roanoke Civitan Club built the Mill Mountain children's zoo (Figure 24), and the Jaycees contributed the miniature train known as the Zoo-Choo that still circles the zoo today. In the early 1960s, a group of citizens also remodeled the dilapidated Rockledge Inn. Using seats donated from a local movie theater, they converted what had been a seldom-used recreation center into a live theater for the Mill Mountain Players. The theater would remain on the mountain for twelve years until the Rockledge was destroyed by fire in 1976 and the group relocated to Center in the Square. In the 1970s, the Mill Mountain Garden Club, which was originally founded in 1927, initiated a plan to install a wildflower garden at the summit.

The prominence of civic organizations in this era of Mill Mountain's development is also consistent with the active role they played in the community as a whole at this time. In 1952, Roanoke was named one of eleven All-America Cities in the nation based several community improvement projects initiated by volunteer groups, including a clean up of the Roanoke River and construction of a new library, a downtown parking garage, and a Negro high school (White, 1982). Roanoke's early years as a boom town had led to such rapid population growth that city services and infrastructure often could not keep up. As a result, by the turn of the century, the Woman's Civic Betterment Club had been formed to address many of the social and sanitation problems that plagued the City. In the process, they had set a precedent for spearheading community improvement projects by volunteer organizations. The 1950s and 1960s saw a resurgence of these groups, as Roanoke's downtown faced a new set of challenges. Suburban sprawl had triggered the slow decay in Roanoke's urban core. Downtown stores were vacant, and residents were leaving the City. Volunteer groups mobilized. By 1960, the City had developed its own list of projects it hoped would reverse the process of decay. With the City's attention

focused on the Downtown, Mill Mountain would be left in the hands of civic organizations as well as the business community for the next several years (*Roanoke Times & World-News*, 1982). Mill Mountain would languish for another decade without any overarching direction.

By the early 1960s, the City began to turn its attention back to Mill Mountain, and it seemed ready to take a more active role in determining the future of the park. Yet vestiges of the old profit-driven development mentality on the mountain remained, and with the financial woes of the Downtown still a concern, City officials began to look to Mill Mountain as a potential revenue generator for the City. As a result, twenty years into the City's ownership of the mountain, the generation of revenue was still driving development, and the City's first concerted efforts in the park would be virtually indistinguishable from the grand schemes for resort complexes pursued by the private companies that had once owned the mountain. Like these earlier plans, the City hoped to generate revenue by drawing visitors from outside the City—this time via the newly completed Blue Ridge Parkway. As a first step in transforming this vision to reality, the City joined with the Chamber of Commerce in negotiating with the U.S. Park Service to build a connecting roadway between the Blue Ridge Parkway and Mill Mountain. The hope was that the new Mill Mountain Spur Road would draw Parkway tourists to Mill Mountain and Roanoke. With an agreement for the road in place, the City then hired landscape architect Stanley Abbott in 1965 to develop a master plan for Mill Mountain (Andrews, 1973). Abbott was a logical choice for this task because, years earlier, he had also designed the Blue Ridge Parkway. Consistent with the new vision the City had for the park, Abbott's plan presented Mill Mountain as an extension of the Parkway in both form and function. The plan accommodated an anticipated 6,000 visitors per day (Rhodeside & Harwell, 1991).

Abbott's plan called for intensive development of the summit and slopes of Mill Mountain. In addition to trails, picnic areas, and naturalistic landscaping with native shrubs and trees in keeping with the Parkway aesthetic, the plan included parking for 1,000 cars midway up the mountain with a tramway to the top, a bird sanctuary, ski slope, and zoo upgrade. In addition, he proposed moving the Roanoke Star to Read Mountain in order to make room for a large building complex on the summit's north brow that would include a visitor center, a vista restaurant with seating for 300 people, a 60-room lodge, and a theater for 250 people. Much of the construction and operating costs were to be financed by private development companies. City Council approved the plan and appointed the Mill Mountain Development Committee to spearhead its implementation. According to newspaper accounts, however, the committee never met, and no further action was taken on the $4 million plan (Andrews, 1973).

But equally consistent with historical precedent, the City's business community was ready to step in. After nearly two years of inactivity by the City's Development Committee, the president of the Roanoke Chamber of Commerce recruited local businessman M. Carl Andrews to head a special committee to spur development on Mill Mountain. This committee was called the Mill Mountain Park Committee. Within a few months, the City's committee was also revived, and the two groups soon merged into the Mill Mountain Development Committee with M. Carl Andrews as chair (this group would later be renamed the Mill Mountain Advisory Committee). The newly blended committee then asked the City Planning Department to revise Abbott's two-year-old plan as a first step in pushing forward the development process (Andrews, 1973).

By the end of the 1967, the Department of City Planning released its *Master Development Plan: Mill Mountain Park.* This revised plan retained many of the features Abbot had proposed, but in a scaled back form. Certainly, cost was a major limiting factor in the development of the new proposal. As in Abbott's plan, responsibility for the bulk of the development on the summit would fall to private enterprise, further reducing the City's costs (and also the City's control of the project) from an estimated $2.4 million in the original plan to $312,000. Additionally, the 1,000-space parking lot that Abbott sited lower on the mountain (and connected to the summit by tram) was divided into three separate lots located on the top of the mountain. This was proposed, in part, to provide faster access for patrons of the Mill Mountain Theatre.

In 1969, the Mill Mountain Development Committee sent the revised master plan to City Council with its recommendation for approval. The only amendment to the plan stipulated that the Old Toll Road should remain open to cars, although construction of the J. B. Fishburn Parkway was identified as a priority because of the deteriorating condition of the older road. Developing a summit restaurant was also stressed as a priority, and although there was some disagreement regarding the construction of a hotel on the mountain top, the committee recommended using the possibility of a hotel as a negotiating point to encourage development of the restaurant. City Council approved the updated plan, but it simply recommended that the elements of the plan be carried out "from time to time" (City Council Resolution No. 18608, Rhodeside & Harwell, 1991).

Despite the Council's less than enthusiastic endorsement of the master plan, some development did begin on the mountain. In 1971, construction was completed on the J. B. Fishburn Parkway, a 1.6-mile road that replaced the Old Toll Road as the primary route from town to the summit. The Mill Mountain Development Committee also began looking for a developer to build a restaurant and possibly a hotel on the summit. In 1972, Ken Wilson Associates, the developers of the Groundhog Mountain resort on the Blue Ridge Parkway near Hillsville, voiced their interest in the project, with the stipulation that they first conduct an economic feasibility study (at the City's expense). When the study finally reached the Development Committee and City Council in 1974, however, the groups were dismayed to discover that rather than an economic feasibility study, the firm had submitted an alternative development proposal. Rather than advancing the development process, the Development Committee and City Council were forced to reconsider the development plans they had already approved in light of this new proposal (Rhodeside & Harwell, 1991).

Despite this frustrating turn of events, the unexpected submission by Ken Wilson Associates may have ultimately benefited the development process by stimulating further debate and helping the Development Committee and City Council refine their vision for Mill Mountain. Although the Wilson plan was never approved or pursued, some of the new ideas it proposed would nevertheless exert a strong influence on subsequent development plans for the mountain. For example, unlike the previous two master plans, which emphasized drawing Parkway visitors to the mountain, the Wilson proposal concentrated on strengthening the park's connection to the City. The plan was also the first to recognize the Star as a Roanoke icon and recommend that it remain on its traditional Mill Mountain home. It also proposed that the Old Toll Road become a pedestrian-only route. These elements would all become important features of development plans later approved for the mountain.

But the Wilson plan would also have the distinction of being the last plan to propose intensive development of Mill Mountain. Like the previous two master plans, this proposal called for a building complex on the northern portion of the summit. This cluster of structures would include a restaurant, ski lodge, and gift shop. In addition, a portion of the mountainside would be clear-cut for a ski slope covered in "polysnow" for year-round skiing. During the review of the Wilson plan, however, the Development Committee's enthusiasm for the grand development schemes of old began to fade. The exact reasons for this shift are unknown but most likely stem from a combination of many factors. Certainly, the committee's frustration over the developer's failure to deliver the promised economic feasibility report predisposed the group to view the master plan with skepticism. Perhaps the committee had also begun to grasp what businessmen in previous eras had learned the hard way—that despite its recreational opportunities, the mountain could not sustain a profitable tourism business. Additionally, the nationwide environmental movement that had started with Rachel Carson's *Silent Spring* in 1962 may have begun to influence public sentiment in Roanoke and changed committee members' perceptions of the effects of intensive development on the mountain. Whatever the causes, in a January 3, 1975 report to City Council, the Mill Mountain Development Committee indicated that its support for a hotel on the north brow of the mountain was eroding. The group also voiced concern that removal of the Star from the mountain in order to make room for more development would probably be unpopular with the public. And although they still supported construction of a restaurant, the committee also began to voice a desire for less invasive development on the mountain top. They reaffirmed their support for the wildflower garden to be installed by the Mill Mountain Garden Club and requested funding for additional landscaping and beautification on the summit (Rhodeside & Harwell, 1991). By the late 1970s, the long-standing quest to develop the park as a source of revenue—whether to fill private or public coffers—had fallen out of favor. The City seemed to be on the cusp of adopting a new approach to Mill Mountain.

By the 1980s, a new attitude toward decision-making on the mountain began to emerge. With the quest for revenue no longer driving development, a new guiding principle for the park had to be found. The needs of park users began to move to the fore of planning and development activities on Mill Mountain. This transition from profit-driven to patron-driven development was also occurring across the City's planning efforts as a whole, and reflected a national trend toward greater government accountability to citizens, including the opening up of the urban planning process to meaningful public participation. In 1981, for example, the Parks & Recreation Department developed a master plan for the parks system entitled *Roanoke's Parks: Today and Tomorrow*. This plan established the City's first process for gathering community input on issues of park planning, construction, and maintenance. The plan also began to articulate a concrete vision for the citywide park system based on user input. Planning implications of this user-centered approach included an expansion of educational and recreational programming in response to residents' changing recreational interests and an increased emphasis on the environmental health of the park system in response to growing public concern for the environment.

It was within this general atmosphere that the Mill Mountain Development Committee and City Council revisited the language of the Fishburn deed restrictions. Through the lens of this new era, the Fishburns's wishes seemed to necessitate that the City engage the public more actively in the planning process. If the mountain were truly to be "for the use and pleasure of the people of the City of Roanoke, Virginia, and vicinity," then certainly the City would need to understand

what patrons wanted in the park. The results of this first attempt at gauging the public's desires resulted in several specific recommendations for Mill Mountain Park in the *Today and Tomorrow* document. These included development of nature and fitness trails on the forested slopes of the mountain and creation of two additional scenic overlooks. Construction of a modest restaurant near the picnic shelter was also proposed in the document. Although restaurants had been a consistent element of development proposals on the mountain since the Rockledge Inn opened in 1892, this plan was the first to suggest a restaurant as a way of better serving park patrons rather than simply a way of generating revenue. This is not to suggest, however, that the cost-to-profit ratio of the restaurant would not have been considered at all, simply that in a patron-oriented development philosophy, economic viability would not be the primary consideration.

Under this user-centered philosophy, the City began to implement a series of park enhancements designed to improve patrons' overall experience on Mill Mountain. In a two-phase process from 1983 to 1987, renovations on the mountain included landscaping upgrades, new park furnishings, underground placement of overhead power lines, the opening up of new views off the mountain, and the conversion of some vehicular roads to accessible pedestrian paths. The present-day parking lots were also constructed at this time. The City also completed construction of a permanent restroom facility with an information kiosk, realignment of the park entrance road at Fishburn Parkway and improvements to the picnic area.

With many of the short-term issues in the park addressed, by the start of the 1990s, the City was also ready to take a more proactive role in determining the park's long-term future. In the preceding years, City Council had reviewed many development proposals from private companies and community groups for projects on Mill Mountain. These proposals included a restaurant, a national D-Day memorial (which would eventually be built in Bedford), a zoo expansion, and a new incline railway. Yet the City still had no concrete development criteria on which to base decisions about future development. In 1990, the City hired the landscape architecture firm of Rhodeside & Harwell to gather public input and conduct an in-depth site analysis in order to generate a set of development criteria for the park. The results of the firm's work indicated that preservation and enhancement of the natural character of the mountain with the development of compatible forms of recreation should be the main thrust of any future development. Rhodeside & Harwell then developed a detailed set of criteria that is still in use today. With the Rhodeside & Harwell work, an important step was taken in defining the park's future with not only the mountain's natural environment in mind but also the needs and wishes of park patrons.

By 1996, the City felt it was time to build on the work begun by Rhodeside & Harwell and establish official language describing the vision for Mill Mountain Park. As a first step in this process, Mayor David Bowers hosted a "Summit on the Summit" and momentum began to build. By 1997, after a visioning retreat, the Mill Mountain Development Committee presented the newly crafted vision and mission statements for the park to the City Council. With the acceptance of this report by Council, the Development Committee hired the landscape architecture firm Hill Studio to provide a conceptual design plan that would bring the park into better alignment with its newly crafted vision. Hill Studio was asked to address numerous improvements, including the renovation of the existing restroom structure into a welcome center, the construction of a picnic shelter and playground, and identification of an area suitable for a

concert lawn. At a public meeting held in October of 1997 to discuss the improvements, citizens enthusiastically endorsed the proposal. After several revisions, the plan was approved by the Mill Mountain Advisory Committee (formerly known as the Mill Mountain Development Committee) in December 1997 and by the City Council in April 1998.

Currently, the City continues to implement the plans established in the 1990s. The award-winning 2,200-square-foot Discovery Center and the picnic shelter were completed in 2001. A park supervisor was hired in 2001 to oversee the park and the Discovery Center and to develop additional educational programming focused on Mill Mountain's unique natural environment. Additionally, conceptual design plans for a "children's adventure area" near the picnic shelter are under development by Parks and Recreation. This customized play environment will be designed to both capture the mountain's natural character and to also provide a holistic sensory adventure for children of all ages and abilities.

The City has also worked hard to develop projects not in the Hill Studio plan as they respond to the needs of park user groups. For example, when the 1995 *Conceptual Greenway Plan* developed by Greenways Incorporated documented strong public support for development of a citywide greenway system, the City moved to begin greenway construction, including designation of the Mill Mountain Greenway from Downtown Roanoke to the summit of Mill Mountain. This greenway had been identified in Greenways Incorporated's plan as one of eleven high priority segments in the City. The Mill Mountain Star Trail, built by volunteers, was completed in 1999 to serve the park's hikers, especially as a route of passage to the summit for Roanoke's more eastern residents. This work will also continue through the trails management plan included with this Management Plan by providing a strategy for making Mill Mountain's trail system not only more ecologically sound and sustainable, but also more responsive to user needs, including those of mountain bikers, hikers, bird-watchers, naturalists, and educators. Through the stewardship of Roanoke Parks and Recreation, Mill Mountain will continue to expand upon its unique opportunities to reach beyond its own borders and involve citizens in development and maintenance decisions and activities.

The planning documents that currently guide City development also advance the model of patron-driven development. The *Comprehensive Parks & Recreation Master Plan* developed by the City Parks & Recreation Department in 2000 considers the goals and objectives of Roanoke's Parks & Recreation system for seven to ten years. Eleven broad action strategies have been developed to help the department achieve this vision. In general, key aspects of the plan include continued support for trails and greenways; continued development of programming, especially for children, teens, families, and seniors (age groups projected to expand in Roanoke in the next ten years); further maintenance and upgrades to park facilities and landscapes; greater citizen input; and greater emphasis on environmental stewardship through the planning and design process.

The citywide master plan entitled *Vision 2001/2020: Planning for Roanoke's Future Economic Development, Neighborhoods, and Quality of Life* (2001) is the strongest statement to date for a citywide citizen-centered development approach. In stark contrast to the early railroad days of the City in which profits drove urban development, this master plan supports economic vitality as a means to an end, rather than an end in itself. The primary goal for the City, it states, is to make Roanoke a "livable community" for its residents. Rather than developing amenities in

order to create profits, *Vision 2001/2020* encourages the generation of revenue in order to fund amenities and improvements that increase the quality of life for residents. With its current master plan, the City has codified an important shift for the benefit of its citizens.

Mill Mountain has matured alongside the City of Roanoke. From the earliest settlement of the region, the mountain has figured as an important community resource, whether for its natural resources or its recreational opportunities. The evolution of the major development trends on the mountain—from private profit to public revenue to user preference—can also be traced in the City of Roanoke as a whole, as it has transitioned from a railroad boom town to a diversified modern economy. Over the years, the mountain has responded to its patrons' changing cultural attitudes—from recreational opportunities restricted by class and race to the rise of environmentalism—and changing recreational preferences—from driving to hiking to mountain biking. Mill Mountain has also become a vital environmental resource for Roanoke by providing contiguous habitat for plants and animals and helping to protect the air and water quality of the region. Although the nature of Mill Mountain's importance to the community has changed over the centuries, its significance to the community has not diminished. Just as native peoples and the first European settlers depended on the mountain's natural resources to sustain their physical existence, Roanokers now rely on Mill Mountain to sustain their spirit. The history of city and mountain are inseparably linked, as is their future.

PART V
EXISTING CONDITIONS: INVENTORY & DESCRIPTION

In Section 3 of this management plan, the significance of Mill Mountain Park is discussed. Previous Mill Mountain plans have emphasized the importance of the mountain as a visual resource, as a natural resource (suggesting its ecological values), as a symbol of Roanoke, and as a place for recreation. Mill Mountain plays a critical role in many different "systems" in the City of Roanoke, to understand these roles, one must look beyond the boundaries of the park and consider the park's connections to the City itself and the greater region.

Mill Mountain is part of an urban system – including the City's social and economic systems. It is nearly surrounded by urban development and is linked to the City's neighborhoods (Figure 25). The evolving greenway system strengthens this connection between the Mountain and city residents. The existing Mill Mountain Greenway and the Star Trail create connections to the City, and the Roanoke River Greenway, under development, will provide greater access to Mill Mountain. The scenic quality of Mill Mountain, its uniqueness as a mountain within city limits, and the recreational opportunities it provides are values that the city dwellers in Roanoke cherish. Mill Mountain is a critical part of not only the City's park system, but also the regional park system.

Mill Mountain is also an important component of the region's ecological system. Figure 26 depicts ecological connections between Mill Mountain and the surrounding area. By examining this map, it is clear that Mill Mountain offers a respite for urban wildlife (it is the City's largest forested patch). In the region, other larger natural areas like the Jefferson National Forest, Carvins Cove, and Havens Wildlife Management Area provide the most significant ecological "hubs," but the linear features like the Roanoke River and Tinker Creek and the City's parkland,

especially Mill Mountain and Yellow Mountain, offer a way to extend habitat into the City and to points south. Mill Mountain Park offers important urban wildlife habitat and other ecological services, like benefits to air quality and urban stormwater because of its tree cover. In short, Mill Mountain is significant both for its many contributions to the urban environment and its role in the regional ecosystem.

The following sections discuss in detail the specific characteristics of Mill Mountain Park. These characteristics are divided into natural resources, cultural resources, visual characteristics, and park programming and recreational facilities.

NATURAL RESOURCES

TOPOGRAPHY, GEOLOGY, & SOILS

The topography, geology, and soil types of Mill Mountain have been analyzed in terms of their suitability for development. In general, the topography, geology, and soil types of Mill Mountain present formidable constraints for future development throughout the park. Most of the mountain consists of steep slopes (15% and greater) and fragile soils, which present potentially serious erosion problems as well as higher costs of development in terms of grading and drainage. In addition, on much of the mountain, the bedrock is estimated to be no more than 5 feet under the soil surface, so any extensive grading and construction would likely require blasting (Rhodeside & Harwell, 1991, p. 25).

Elevation. Figure 27 is an elevation map of Mill Mountain with the major drainage swales delineated. Elevation in Mill Mountain Park ranges from 896 feet to 1800 feet.

Slopes and Topography. Consistent with Rhodeside & Harwell's (1991) site analysis, slopes (Figure 28) have been divided into categories of 0-8%, 9-15%, 16-25%, and over 25%, although this fourth category has been further divided into 2 parts – 25%- 40% and greater than 40% to distinguish the steepest areas on the site. Maintaining consistency with the Rhodeside & Harwell plan regarding slope categories makes it easier for the City to use the Rhodeside & Harwell development criteria in the future if it chooses to do so.

- 0–8%: These relatively flat areas present fewer development constraints than the remainder of the site.
- 9–15%: Development in these areas would likely require terracing, regrading, and installation of drainage features. Limited development may be acceptable in some of these areas.
- 16–25%: These areas would require extensive regrading, which in turn would have a major impact on drainage and soil erosion. Development is not recommended in these areas.
- 25-40%: Such steep slopes are best preserved as vegetated open space. Removal of vegetation may lead to slumping and severe erosion problems during moderate to heavy rains.
- Greater than 40%: These slopes are the steepest on the site. Like the category above, these areas are best preserved as vegetated open space.

As Figure 28 and Table 1 indicate, 69% of the mountain consists of slopes greater than 25%, and these areas are not suitable for development. Gentler slopes under 15%, which total 12% of the park land area, are found predominantly at the summit, where extensive grading has already occurred, along the saddle area on the southern portion of the mountain, and in the lower elevations on the east and southeast side of the mountain.

Table 1. Land area in each slope category

Percent slope	Area (acres)	Percent of land area
0 - 8%	21	4
9 - 15%	45	8
16 - 25%	109	19
26 - 40%	206	36
Greater than 40%	187	33
	568	100

Geology. Mill Mountain is capped by the Antietam (Erwin) quartzite in a large outlier of the Blue Ridge thrust sheet now eroded back to the Blue Ridge Mountains on the southeast side of the Roanoke Valley (Henika, 1997). The Mill Mountain thrust sheet has been preserved on the gently dipping southeast anticlinal limb of the Crystal Spring structure and in a synclinal trough to the southeast of Mill Mountain. Several other smaller outliers of the thrust sheet form quartzite cappings on hills in the densely developed South Roanoke residential areas. Large quartzite blocks and boulders left on the steep slopes above homes in this area may constitute natural hazards because of potential landslides during Hurricane Camille-type storms or seismic events following the documented seismic history of this part of southwestern Virginia.

The Antietam (Erwin) Formation is the uppermost unit of the Cambrian Chilhowee Group of metasedimentary and metavolcanic rocks recognized by the Division of Mineral Resources in the Roanoke area and along the Blue Ridge northeastward to the Potomac River and Maryland (Henika, 1981 p. 2-4). The unit is correlative with the Erwin Quartzite southwestwards to Tennessee.

The Antietam contains thick-bedded, medium-to coarse-grained quartzite in the lower part and medium-bedded quartzite and phyllite in the upper part. The quartzite ledges are light-gray to white and commonly show fine cross bedding . Poorly preserved Skolithos "tubes" are in the more massive beds as vertical striations or localized closely spaced vertical parting surfaces in the rock. Examination of the bedrock at this location shows that the unit is extremely hard and resistant to erosion. The rock is closely jointed and breaks up into rectangular blocks. Excavations in the bedrock generally require blasting. It is extremely abrasive and may be hard on ripping and grading equipment. In the Roanoke area, the Antietam is generally confined to ridgetops and steep slopes with strongly acid, very shallow and rocky, excessively drained soils. Groundwater conditions may be difficult because of extremely deep percolation to water tables near river level, steep fractures, and exceptionally hard drilling conditions.

An important geological feature at the base of Mill Mountain is Crystal Spring. Crystal Spring is a huge spring that has been used for public water supply for many years and has had flow rates reported as high as 6,000,000 gallons per day (Woodward, 1932, p. 147). The spring that once powered McClanahans Mill was a major attraction to the early railroad builders.

The spring is emergent in an ancient sink that has been breached along the floodplain of the Roanoke River as it cut against the base of Mill Mountain. The spring is now contained within a concrete channel that emerges from beneath a ledge of massive Shady Dolomite. The cavern is developed along the northwestern, overturned limb of a broad subthrust anticline that uplifted the Shady Dolomite from beneath the Rome-Waynesboro formation in the Big Lick area that is now downtown Roanoke.

H. P. Woodward (1932, p.92-93) described the earthquake felt in the Roanoke area on Christmas night 1924 and documented some quake damage here at Crystal Spring. A sixteen-inch cast iron water main leading from the spring pumping station to a reservoir on the mountain above was fractured about 40 feet above the spring at the base of the hill. The broken pipe was an ordinary cast iron leader ... of three-quarter-inch metal. The break cut obliquely across the pipe. The broken edges of the pipe show that the fracture was caused by wrenching or twisting , and that it produced a series of chatter marks along one side of the broken surface. Bollinger and Hooper (1972, p. 27), classified the Christmas night quake as a category "V" on the modified Mercalli scale.

Because Crystal Spring is part of the Roanoke public water supply, it is important to recognize that it is part of an ancient karst aquifer system which was developed in fractured, cavernous Shady Dolomite beneath the Blue Ridge thrust fault. The fractures in the dolomite are recharged from above by rain water percolating down through the highly permeable fractured quartzite caprock and thin, sandy soils developed above the Blue Ridge thrust fault in the mountains southeast of the spring. Several large sinks that actually penetrated the Blue Ridge fault were the locus of extensive iron mineralization in quartzite breccias and residual clay pockets developed on the fractured dolomite below the fault. Many of the larger bodies of iron ore that were mined along Chestnut Ridge and in the Rorer mines area along the Parkway southeast of Mill Mountain are evidence of the ancient karst erosion and depositional system which is still very active at Crystal Spring. A one-hundred-fifty foot diameter sinkhole, some fifty feet deep in the upper Uniquoi quartzite, is a central feature of the National Park picnic area on top of Roanoke (Yellow) Mountain. The bottom of the surface sink is at least 600 feet above the top of the dolomite exposed in quarries on the east and west sides of the northerly trending ridge.

Fortunately, the Crystal Spring recharge area is still relatively undeveloped, forested and largely inaccessible. It contains abandoned mined lands within the Mill Mountain Park and the Blue Ridge Parkway Reservation along Chestnut Ridge from Mill Mountain to Roanoke (Yellow) Mountain. There are few sewer lines to leak and no heavily fertilized yards, crop, or pasture lands to create runoff pollution within the hills to the southeast of the spring. Besides some degree of protection due to low levels of development, water from Crystal Spring is now treated by the City of Roanoke, so risk of contamination is less of a factor than it was when it was untreated.

Soils The soils on the mountain are relatively uniform, consisting primarily of Edgemont channery sandy loams (Figure 29). What differentiates the Edgemont soils is the degree of slope. In the areas where the slope ranges from 0-8%, the soils are relatively deep, but the depth to bedrock decreases as the percentage of slope increases. On the side slopes of Mill Mountain, these soils present a severe erosion hazard and are best suited to forest. The resistance of the

underlying Tuscarora sandstone to weathering also creates soils that are relatively shallow and infertile. The following characteristics apply to the Edgemont soils (Natural Resources Conservation Service, 1997):

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Medium for 15C; Rapid for 15D and 15E
Depth to bedrock: More than 60 inches
Erosion potential: Medium for 15C; High for 15D and 15E
Organic matter content: Low
Depth to the seasonal high water table: More than 72 inches

According to the Natural Resources Conservation Service (NRCS), the only Edgemont soils that do not have severe limitations for development, including recreational development like picnic areas trails, are the 15C soils, found on the summit of Mill Mountain. It should be noted, however, that the mapping scale used by NRCS is too coarse (1:24,000) to capture other smaller areas in the park that might also be 15C, like the areas with slopes less than 15% located on the eastern and southern portions of Mill Mountain Park.

The only exceptions to the Edgemont soils are located on the southern and western edges of the Mill Mountain Park site. There is an area of Grimsley cobbly loam on the southern panhandle of the park. Characteristics of this soil indicate that it is deep and well-drained, a product of deposition from erosion of slopes above it (found in colluvial fans and foot slopes). It has a cobbly surface with large stones that limit its development potential. According to the Natural Resources Conservation Service (NRCS) (1997), the Grimsley soils pose moderate limitations for recreational development such as camp and picnic areas and trails. On the western side of the park in the vicinity of the tennis courts is another unique area of soil that is identified by NRCS `as "urban land complex." Its characteristics are described as "variable," typically the result of urban land development including substantial grading and/or fill.

DRAINAGE

There is one intermittent stream and several major drainage swales on the southern and southeastern slopes of the mountain. These are indicated on Figure 27. Almost all of the concentrated drainage (not generalized sheet flow) coming from Mill Mountain is found on the side of Mill Mountain that abuts the Garden City neighborhood. Past flooding events in Garden City have most likely been influenced by the intermittent streams flowing from Mill Mountain. Keeping the slopes forested and minimizing impervious surface on the mountain help prevent further exacerbation of this problem.

VEGETATION & PLANT COMMUNITIES

A generalized map of plant communities is presented in Figure 30. Details of the park's vegetation are discussed below.

Summit Vegetation

Most of the indigenous vegetation at the summit of Mill Mountain has been cleared over the years during various development projects. This process began as early as 1891, when the area directly southeast of the present-day lower overlook was cleared and regraded for construction of the Rockledge Hotel and its grounds. Subsequent development has continued to replace the natural vegetation with turf and—predominantly non-native—ornamental plantings.

It is also important to note that views to the mountain from the City and the surrounding valley are of a forested ridgeline. The only exceptions to this are the Roanoke Star and the antenna tower.

Significant Trees. The manicured park at the summit contains some of the oldest and largest trees on the mountain. Most are oaks. These randomly spaced trees add to the aesthetic appeal of the park's lawn space and also provide much-needed shade for visitors in the summer. Many of these large trees, however, have sustained extensive wind and ice damage.

Understory and Young Trees. Most of the flowering understory trees planted at the summit are healthy and in good condition. One important exception to this is the stand of hemlocks planted along the Star parking lot, which shows signs of wooly adelgid infection.

Shrubs and Perennials. The ornamental plantings throughout the summit park are predominantly non-native. Overall, the ornamental shrubs and perennials have suffered substantially from deer browsing. Perhaps the hardest hit plantings are the *Taxus* spp. planted along the pathway between the two overlooks.

Turf. Most of the regularly mown lawn areas are healthy, except in several areas along the pathways where grading and drainage problems have led to soil erosion.

Wildflower Garden. The purpose of the Wildflower Garden, which was completed in 1977 by the Mill Mountain Garden Club, was to give visitors a sense of the native vegetation that would have been found on the summit before development took place. In addition to evergreen and deciduous trees, the garden contains several varieties of native herbaceous shrubs and perennials.

Rare, Threatened, or Endangered Species. The majority of the vegetation within the summit park area has been intentionally planted as part of an ornamental landscape. The exceptions to this are the areas of naturalized vegetation that occur along the outer periphery of the park area and an area along the northern portion of the summit, adjacent to the Roanoke Star, inside the gravel loop road. A botanical survey found no rare, threatened, or endangered plant species within these naturalized areas.

Within the ornamental landscape of the summit park, one rare species was found. The Wildflower Garden currently contains at least two small patches of *Jeffersonia diphylla* (twinleaf) between the Discovery Center and the garden's pond. Named for Thomas Jefferson, this 8- to 10-inch-tall native plant has deeply divided leaves and produces white flowers in

April–May (Figure 31). It prefers rich, shaded slopes with limestone soil. Although its occurrence is considered rare, the U.S. Fish & Wildlife Service does not list this as a threatened or endangered plant.

Figure 31. Twinleaf *(Jeffersonia diphylla).* Photo courtesy of the National Park Service. http://www.nps.gov/plants/pubs/chesapeake/plant/1995.htm

Mountain Slopes

Although heavily logged in the past, the slopes of Mill Mountain are today heavily wooded, and the dominant visual image of the mountain from Roanoke and the surrounding valley is one of a forested mountain.

Forest Canopy. A botanical reconnaissance survey was conducted on May 16th, 2005 (Tom Wieboldt, Virginia Polytechnic Institute & State University, personal communication). Findings indicate that the mountain is comprised of Appalachian oak forest, a low diversity forest type dominated by oaks (chestnut, red, black and scarlet) mixed with other hardwoods, especially red maple. Scattered pine stands occur on portions of some ridges and spurs. These are comprised of pitch, table mountain, and Virginia pines, and the pines are largely dead due to bark beetle infestation. Nevertheless, these areas still provide a different community type. Exotic invasive species are especially frequent and troublesome at lower elevations, but have not much affected the drier forest at mid-slope and above.

Most of the mountain is underlain by acidic rocks which weather to a fairly sterile soil. This, combined with a leaf litter mostly of oak, limits the number and diversity of herbaceous plants. A low elevation area at the south end of the property which shows a more moderate soil type (the

area of Grimsley soils) was found to be vegetated with a similar forest type to that on the mountain. It was visited to see if a mesic, non-oak-dominated forest might be present, but the area looked similar to the rest of the mountain.

A geologic map consulted for the survey shows a dolomite formation surrounding the mountain. This would support considerably more mesic vegetation. Only a few such rocks were observed low on the north slope, and no appreciably different flora was observed. It still could be present in very small areas very close to the perimeter of the property. Further field work in the summer and fall of 2005 will investigate this. In general, the more interesting plant communities occur on the north-facing, more mesic slopes (area shown as greater than 40% slope in Figure 28) and an area of large trees on the northwest lower slope.

Table 2 contains a list of noteworthy tree species identified in the botanical survey.

Table 2. Noteworthy tree species

COMMON NAME	SCIENTIFIC NAME	COMMENTS
Butternut	*Juglans cineria*	Becoming scarce due to a canker that is killing most trees
Pawpaw	*Asimina triloba*	
Shortleaf pine	*Pinus echinata*	A few scattered individuals; uncommon in this part of the state

The mountain has been heavily logged over the years, as evidenced by the many old logging roads found on the mountain and the small diameter of the trees. Although documentation describing these logging activities has yet to be found, it is reasonable to assume that the mountain has seen several cycles of logging, starting with the earliest European settlement in the 1740s, when Mark Evans and his son Daniel built a gristmill and sawmill at the base of the mountain, at what would later be known as Crystal Spring (Montgomery, 2002b; *Roanoke Times*, July 13, 1995). In the 1850s, part of nearby Roanoke Mountain was logged to supply cross ties for the Virginia & Tennessee Railroad (White, 1982; *Roanoke Diamond Jubilee Program*, 1957). It is likely that Mill Mountain also supplied construction material for this project, as well as possibly for the building of the Norfolk & Western and Shenandoah Valley railroads in the 1880s. The mountain would also have provided a convenient (and profitable) source of wood for the building booms that accompanied the railroads to Roanoke. By the 1940s, however, the mountain is reported to be covered with trees and vines (Sponaugle, 1940).

In addition to logging, small areas of trees have also been destroyed by fire in previous years (for example, a small area along the Star Trail). No fire management plan exists for the park, although the Roanoke Fire Department does have a fire response plan.

Understory Species. The understory of much of the mountain is sparse due to both relatively infertile soil and deer browsing. This has, in turn, given the forest a very open feeling. The following herbaceous species were noted in the botanical survey:

Table 3. Noteworthy understory plant species

COMMON NAME	SCIENTIFIC NAME	COMMENTS
Birchleaf spirea	*Spiraea betulifolia*	Somewhat unusual in that it becomes very scarce in the mountains south and southwest of here
Black snakeroot	*Sanicula odorata*	
Broadleaf sedge	*Carex platyphylla*	

Carolina sedge	*Carex caroliniana*	
Cut-leafed toothwort	*Dentaria laciniata*	
Eastern gray beardtongue	*Penstemon canescens*	
Eastern narrowleaf sedge	*Carex amphibola*	
Eastern woodland sedge	*Carex blanda*	
Fuzzy wuzzy sedge	*Carex hirsutella*	
Glomerate sedge	*Carex aggregata*	
Lanceleaf figwort	*Scrophularia lanceolata*	Quite infrequent to the west
Pink lady slipper	*Cypripedium acaule*	
Rosy sedge	*Carex rosea*	
Shallow sedge	*Carex lurida*	
Shining wedgegrass	*Sphenopholis nitida*	
Singlehead pussytoes	*Antennaria solitaria*	Several populations seen; this species is common eastward but is generally absent to the west
Slender woodland sedge	*Carex digitalis*	
Variableleaf heartleaf	*Hexastylis heterophylla*	
Wild comfrey	*Cynoglossum virginianum*	
Wild oregano, dittany	*Cunila origanoides*	
Wild sarsaparilla	*Aralia nudicaulis*	

Invasive Species. Invasive species are usually non-natives that spread rapidly and often out-compete more desirable species. If left unchecked, invasives can alter ecosystems and wildlife habitat. Invasive vines—including grape, honeysuckle, and English ivy—are a major problem on the forested slopes of Mill Mountain. In areas where they have reached the forest canopy, they will eventually kill trees if not removed. Invasive vines are especially a problem at the summit of the mountain, near the Star Trail entrance. The vines have begun killing some of the trees and give this portion of the park an unkempt appearance. This is particularly undesirable because the summit area presents an overall image of a more manicured landscape. English ivy has also become a problem along the Old Toll Road. Kudzu dominates the parking area for the Star Trail at the base of the mountain. Table 4 lists the exotic invasive species noted in the botanical survey.

Table 4. Exotic invasive plant species

COMMON NAME	SCIENTIFIC NAME
Amur Honeysuckle	*Lonicera maackii*
Chinese Wisteria	*Wisteria* sp. (probably *sinensis*)
English Ivy	*Hedera helix*
European Euonymus	*Euonymus europea*
Japanese Honeysuckle	*Lonicera japonica*
Kudzu	*Pueraria lobata*
Oriental Bittersweet	*Celastrus orbiculatus*
Tree-of-Heaven	*Ailanthus altissimus*

Rare, Threatened, or Endangered Species. There are no known state or federally listed threatened or endangered plant species in Mill Mountain Park. There are no known rare species in Mill Mountain Park outside of the Wildflower Garden.

WILDLIFE

Mill Mountain serves as a refuge for urban wildlife. Generalist species that are fairly tolerant of disturbances by people dominate, although the mountain does serve as habitat for some interior-forest dwelling birds. The urban condition of Mill Mountain means that domestic dogs and cats play a role as predators and limit the occurrence of sensitive species.

Faunal Species. Laurie Spangler of the Mill Mountain Zoo has been keeping a record of the faunal species she has encountered on Mill Mountain over the past 8 years. She has provided the following lists of Mill Mountain species (Tables 5 through 8) to the *WildlifeMapping* program of the Virginia Department of Game and Inland Fisheries. These lists are based on informal observations and are not meant to be exhaustive. They are indicative of developed, light, urban forests, the primary habitat designation for Mill Mountain as found in the *WildlifeMapping* database.

Table 5. Bird species identified on Mill Mountain

COMMON NAME	SCIENTIFIC NAME
American crow	*Corvus brachyrhynchos*
American goldfinch	*Carduelis tristis*
American kestrel	*Falco sparverius*
American redstart	*Setophaga ruticilla*
American robin	*Turdus migratorius*
Baltimore oriole	*Icterus galbula*
Barred owl	*Strix varia*
Black vulture	*Coragyps atratus*
Black-and-white warbler	*Mniotilta varia*
Blackburnian warbler	*Dendroica fusca*
Black-capped chickadee	*Parus atricapillus*
Black-billed cuckoo	*Coccyzus erythropthalmus*
Blackpoll warbler	*Dendroica striata*
Black-throated blue warbler	*Dendroica caerulescens*
Black-throated green warbler	*Dendroica virens*
Black vulture	*Coragyos atratus*
Blue jay	*Cyanocitta cristata*
Blue-gray gnatcatcher	*Polioptila caerulea*
Broad-winged hawk	*Buteo platypterus*
Brown creeper	*Certhia americana*
Brown thrasher	*Toxostoma rufum*
Brown-headed cowbird	*Molothrus ater*
Carolina chickadee	*Parus carolinensis*
Carolina wren	*Thryothorus ludovicianus*
Catbird	*Dumetella carolinensis*
Cedar waxwing	*Bombycilla cedrorum*
Chestnut-sided warbler	*Dendroica pensylvanica*
Chimney swift	*Chaetura pelagica*
Chipping sparrow	*Spizella passerine*
Common grackle	*Quiscalus quiscula*

Common raven	*Corvus corax*
Cooper's hawk	*Accipiter cooperii*
Dark-eyed junco	*Junco hyemalis*
Downy woodpecker	*Picoides pubescens*
Eastern bluebird	*Sialia sialis*
Eastern phoebe	*Sayornis phoebe*
Eastern towhee	*Pipilo erythrophthalmus*
Eastern wood-pewee	*Contopus virens*
Field sparrow	*Spizella pusilla*
Golden-crowned kinglet	*Regulus satrapa*
Great crested flycatcher	*Myiarchus crinitus*
Great horned owl	*Bubo virginianus*
Hairy woodpecker	*Picoides villosus*
Hermit thrush	*Catharus guttatus*
House finch	*Carpodacus mexicanus*
Indigo bunting	*Passerina cyanea*
Least flycatcher	*Empidonax minimus*
Mourning dove	*Zenaida macroura*
Northern bobwhite	*Colinus virginianus*
Northern cardinal	*Cardinalis cardinalis*
Northern flicker	*Colaptes auratus*
Northern goshawk	*Accipiter gentilis*
Northern mockingbird	*Mimus polyglottos*
Pileated woodpecker	*Dryocopus pileatus*
Pine warbler	*Dendroica pinus*
Purple finch	*Carpodacus purpureus*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-eyed vireo	*Vireo olivaceus*
Red-tailed hawk	*Buteo jamaicensis*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Ruby-crowned kinglet	*Regulus calendula*
Ruby-throated hummingbird	*Archilochus colubris*
Ruffed grouse	*Bonasa umbellus*
Scarlet tanager	*Piranga olivacea*
Screech owl	*Otus asio*
Solitary vireo	*Vireo solitarius*
Song sparrow	*Melospiza melodia*
Tree swallow	*Tachycineta bicolor*
Tufted titmouse	*Parus bicolor*
Turkey vulture	*Cathartes aura*
White-breasted nuthatch	*Sitta carolinensis*
White-crowned sparrow	*Zonotrichia leucophrys*
White-throated sparrow	*Zonotrichia albicollis*
Wild turkey	*Meleagris gallopavo*
Wood thrush	*Hylocichla mustelina*
Worm-eating warbler	*Helmitheros vermivorus*
Yellow warbler	*Dendroica petechia*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Yellow-billed cuckoo	*Coccyzus americanus*
Yellow-rumped warbler	*Dendroica coronata*

Table 6. Mammal species identified on Mill Mountain

COMMON NAME	SCIENTIFIC NAME
Eastern chipmunk	*Tamias striatus*
Gray squirrel	*Sciurus carolinensis*
Mole spp.	
Mouse spp.	
Norway rat	*Rattus norvegicus*
Raccoon	*Procyon lotor*
Red fox	*Vulpes vulpes*
Silver-haired bat	*Lasionycteris noctivagans*
Virginia opossum	*Didelphis virginiana*
White-tailed deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*

Table 7. Reptile and amphibian species identified on Mill Mountain

COMMON NAME	SCIENTIFIC NAME
American toad	*Bufo americanus*
Black rat snake	*Elaphe obsoleto*
Broad-headed skink	*Eumeces laticeps*
Bullfrog	*Rana catesbeiana*
Eastern box turtle	*Terrapene carolina*
Eastern smooth green snake	*Opheodrys vernalis*
Eastern wormsnake	*Carphophis amoenus amoenus*
Five-lined skink	*Eumeces fasciatus*
Jordan's salamander	*Plethodon jordani*
Northern copperhead	*Agkistrodon contortrix mokesen*
Northern ring-necked snake	*Diadophis punctatus edwardsii*
Spotted salamander	*Ambystoma maculatum*
Tree frog	

Table 8. Insect species identified on Mill Mountain

COMMON NAME	SCIENTIFIC NAME
American painted lady	*Vanessa virginiensis*
Black swallowtail	*Papilio polyxenes*
Black widow spider	*Latrodectus mactans*
Brown elfin	*Callophrys augustinus*
Bumblebee	*Bombus spp.*
Cabbage white	*Pieris rapae*
Clouded sulphur	*Colias philodice*
Common walkingstick	*Diapheromera femorata*
Daddy-long-legs	*Mitopus morio*
Eastern tiger swallowtail	*Papilio glaucus*
European skipper	*Thymelicus lineola*
Fiery skipper	*Hylephila phyleus*
Great spangled fritillary	*Speyeria cybele*
Milkweed bug	
Monarch butterfly	*Danaus plexippus*
Moth, Hummingbird	*Hemaris thysbe*
Moth, Imperial	*Eacles imperialis*
Moth, Luna	*Actias luna*
Moth, Tulip-tree silk	*Callosamia angulifera*
Moth, Virginia creeper sphinx	*Darapsa myron*
Mourning cloak	*Nymphalis antiopa*

Orange-striped oakworm	*Anisota senatoria*
Pearl crescent	*Phyciodes tharos*
Praying mantis	*Mantis religiosa*
Red admiral	*Vanessa atalanta*
Silver-spotted skipper	*Epargyreus clarus*
Spicebush swallowtail	*Papilio troilus*
Spring azure	*Celastrina ladon*
Walking stick	*Diaphermomera femorata*
Yellow jacket	*Vespula maculifrons*
Zebra swallowtail	*Eurytides marcellus*

White-Tailed Deer. Deer have damaged the landscape plants on the summit and browsed most of the understory on the slopes. Currently, a hunting season sharp-shooter program is in effect on the mountain to control the population. This program is only a year old, and consequently, the results of these efforts are not yet known.

Rare, Threatened, or Endangered Species. There are no known state or federally listed threatened or endangered animal species in Mill Mountain Park.

CULTURAL RESOURCES

The following assessment of the cultural resources of Mill Mountain Park was compiled from a walking tour of the park and the official and unofficial walking trails throughout the mountain slopes (see Figures 2, 3, and 4 for the location of the features discussed below).The purpose of this assessment was twofold: (1) to document and provide a preliminary assessment of known cultural resources, and (2) to identify, document, and provide a preliminary assessment of previously unidentified or undeveloped cultural resources. All assessments of the current conditions of these features are based on a visual survey only; in many cases, it may be necessary to call in engineers, architects, or other experts to more thoroughly assess current conditions and develop management strategies for specific features.

Summit Resources

The Roanoke Star. Perched 1,045 feet above the City on the northern side of the summit, this 88-½-foot-tall neon and steel star is a source of civic pride and identity for Roanoke's citizens. Visible from much of the City and the surrounding valley, the Star is the most recognized symbol of the Roanoke, which has come to be known as the Star City of the South. The Star has also been incorporated into the names of many Roanoke businesses as well as the City's logo. Along with its overlook, the Star draws many Roanokers and tourists alike and is even a popular site for marriage proposals and weddings.

Ironically, the star was originally intended as only a seasonal installation. After considering several different suggestions for Christmas decorations, the City's Merchants Association settled on the idea of a star atop Mill Mountain to tie in with star decorations used along the City streets at the time (*Roanoke Times & World-News*, 1982). First lit at a dedication ceremony on Thanksgiving Eve of 1949, the Star was touted as "the largest artificial star in the universe," and word of the novelty quickly spread. Within a month of its debut, it was featured in *Life*

magazine, on national radio, and even made the newspapers in Australia. Ultimately, Roanoke's nickname—The Magic City—was replaced with The Star City. As a result of its popularity (and despite its critics), the Merchants Association decided to keep it lit every night until midnight.

In addition to its importance to Roanoke's identity, the Star also functions as a form of community expression. Starting in 1957, the Star, which originally burned white, was turned red for two nights after each traffic fatality in the City. This practice continued for 17 years. The Star also burned red after the assassination of President John F. Kennedy in 1963 and the destruction of the space shuttle Challenger in 1986. The Star's color scheme was changed to red, white, and blue in 1974 to celebrate the nation's Bicentennial and again in 2000, when Roanoke was named an All-America City for a record-tying fifth year. Since the 9-11 terrorist attacks, the Star has returned to red, white, and blue. The Star was designated a State and National Historic Landmark in 1998.

The Star has undergone several renovations throughout its lifetime. Its most recent overhaul came in the spring of 1997, when workers replaced damaged sheet metal, rewired the lighting, and painted the entire structure. Officials predicted that another renovation would not be necessary for another 20 years (WDBJ-7, April 23, 1997). Today the Star and its scaffolding appear to be in good condition. The plantings around it, however, currently do not provide an effective screen for the structure's base.

Overlooks. The park currently contains two overlooks with panoramic views of the City and the Roanoke Valley.

- The M. Carl Andrews Overlook is located adjacent to the Roanoke Star, on the northern side of the mountain. The wooden overlook currently features a double-sided bench. Although a modest wooden overlook is evident in this location from the 1950s, the current overlook was built in 1995 with funding from the *Roanoke Times* and dedicated to the memory of M. Carl Andrews, the first chair of the Mill Mountain Development Committee and leading voice for the preservation of Mill Mountain for 30 years. He also served as the *Roanoke Times'* editorial page editor while the paper was owned by J. B. Fishburn, the Roanoke businessman who donated the Mill Mountain property to the City of Roanoke to be preserved as a public park. Although some graffiti is visible on some of its surfaces, it is otherwise in good condition.
- The lower overlook, located to the west of the Star, is consistent with the Andrews Overlook in materials and design, except that it lacks a bench. It too displays some graffiti but is otherwise in good condition.

Incline Railway Station. Although the incline railway running up the northwestern slope of Mill Mountain was dismantled in 1930, remains of the platform and machinery foundations are still visible along the perimeter road at the summit, between the parking lot and the zoo. Although numerous photographs of the incline still exist, all that have been found to date are taken from the bottom of the mountain. Thus, little has been found in the historical record regarding the appearance of the station at the top of the mountain.

Rockledge Hotel Footprint. Although only a faint trace of its footprint is visible today on the lower lawn of the park, the Rockledge Hotel stood on Mill Mountain for over 80 years, weathering the boom and bust cycles of the local economy and reinventing itself as times changed. The 28-room inn was built in 1892 by the Roanoke Gas & Water Company, who had purchased the mountain and Crystal Spring the previous year. The hotel was hastily constructed to take advantage of the local surge in prosperity created by the coming of the railroads (White, 1982). The resort opened with great fanfare, as coaches waited at the Hotel Roanoke to whisk railroad officials and other dignitaries to the hotel. Once they arrived at the summit, visitors enjoyed views of the City below during lunch on the hotel's spacious dining porch.

The Rockledge Inn would ultimately find it impossible to succeed as a overnight destination. With the opening of the Mill Mountain Incline Railway in 1910, however, the hotel gained new life as a restaurant and Saturday night gathering spot for locals, as the travel time to the hotel was reduced from a 2- to 3-hour carriage ride to 4 minutes. Its popularity lasted through the Roaring Twenties, when the Roanoke German Club's parties there became legendary. The festivities were ultimately put to an end by the Great Depression, however, and the hotel shut down permanently in 1929. Nevertheless, the old Rockledge Hotel remained a local landmark for many Roanokers, and the building was renovated and maintained for occasional use as a recreation center over the next several decades. In 1964, it was repurposed as the Mill Mountain Playhouse and hosted live theater until the building burned down in 1976. Interpretive signage might be used to tell the story of the Rockledge Inn.

Wildflower Garden. The wildflower garden, located between the Discovery Center and the zoo, was designed by Joe Beer, a former Blue Ridge Parkway landscape architect, and installed by the Mill Mountain Garden Club in 1973 (*Roanoke Times*, April 1, 1973). The Garden Club is still active in its care and maintenance. Today, most visitors take the path through the garden when walking between the zoo entrance and the Discovery Center/main parking lot. The garden contains a water feature constructed in the form of a stream and pond.

The garden was designed with native mountain vegetation in order to give visitors a sense of what the summit environment may have looked like before the land was developed and native vegetation was replaced by turf and ornamentals.

Mill Mountain Zoo. Mill Mountain Zoo, initiated by Roanoke's Civitan Club, has been a fixture in Roanoke since it opened in 1952 as a seasonal children's zoo with a nursery rhyme theme. Originally, the zoological park was run by the Roanoke Parks and Recreation Department until it was closed in 1976 because of monetary losses. At this time, the Roanoke Jaycees stepped in and created a nonprofit corporation to run the zoo, which reopened in 1977. After reopening, the zoo underwent a series of physical improvements and expansions, and the nursery rhyme theme was replaced by an emphasis on North and South American animals. The Zoo Choo, a miniature G-16 train, has carried children around the zoo since 1952.

The zoo has evolved and expanded to 7+ acres over the years. Now accredited by the American Zoo and Aquarium Association, the zoo has been run by the Blue Ridge Zoological Society since 1988. In the 1980s, plans were suggested to move the zoo to Explore Park, which was then under construction. These plans fell through, however, and zoo officials decided to keep the facility on Mill Mountain. In 1991, the zoo adopted a master plan by Hill Studio that emphasizes its Asian

Highlands collection and ties in with Roanoke's Sister City of Wonju, Korea. Although the availability of funding has slowed the implementation of the Hill Studio plan, a new tiger exhibit was built according to the plan in 1992. A snow leopard exhibit was added in 1997.

The zoo currently contains about 200 animals, including five endangered species (tiger, red wolf, snow leopard, white-naped crane, and clouded leopard). The zoo participates in nine active species survival programs (red panda, tiger, red wolf, snow leopard, white-naped crane, clouded leopard, fishing cat, Japanese macaque, and wrinkled hornbill). Yearly attendance reaches about 70,000, with about 45% of visitors coming from outside the Roanoke Valley (http://www.mmzoo.org/).

Mountain Slopes

The Old Toll Road. A portion of today's Mill Mountain Greenway now follows the roadbed of the "concrete road" or Old Toll Road winding up the northwest face of the mountain. In the early 1920s, William P. Henritze bought most of Mill Mountain in hopes of developing a residential/resort complex there. As one of the first steps in this plan, his Mill Mountain Corporation sought to capitalize on the building popularity of the automobile by building a winding concrete toll road up the mountain in 1924 along the approximate route of an older carriage road. The new road was considered something of an engineering marvel, as it included a tight switchback in which the road looped over itself by means of a large concrete culvert (for this reason, the road is sometimes referred to as the Loop Road). For 25 cents, visitors could indulge in the growing American obsession with recreational driving along the scenic 18-foot-wide road, which featured a gentle 6% grade all the way to the top.

When the City of Roanoke eventually took possession of the mountain in the 1940s, they continued to performed basic maintenance on the road, but it soon became impassible for vehicular traffic beyond the loop culvert and was replaced as the main route to the summit by the Fishburn Parkway in 1971. Today, the road remains remarkably intact, although the concrete has been paved over with asphalt and the original wooden railings have been replaced by metal guardrails painted brown. The road is today preserved as part of the Mill Mountain Greenway and is closed to vehicular traffic above the loop culvert.

Several historic features of the 1924 toll road remain well-preserved today. These features include:

- *Toll House.* This structure, located at the entrance to the toll road, includes a stone archway over the road with an attached toll house. Although the road opened before construction was completed on the toll house, it should be considered an original feature of the 1924 road. In general, the structure appears to be in good condition, although a crack is visible in the toll house's uphill-facing wall. In addition, the wood shingle roof requires some repairs, and the wood cornice over the archway has suffered some rot. Photographs from the 1960s indicate that at least at that time, the structure had a tile roof (see Figures 32 and 33). More research is needed to determine if this roof was the original.

- *Loop Culvert.* About halfway up the Old Toll Road is "The Loop," a switchback at which the road loops over on itself by means of a large concrete culvert. Considered an engineering marvel in its day, the Loop was featured on several City postcards of the time (Figure 20). The City has continued to maintain the structure, and it appears to be in good condition overall.
- *Stone Retaining Walls and Drainage Structures.* Stone retaining walls run the length of the road on its uphill side. With the exception of a few areas where tree roots or erosion have damaged the walls, they are in remarkably good condition. However, several "patches" are visible in which cement was used to fill cracks in the mortar. These repairs are inconsistent with the original construction and materials of the wall. Incorporated into the retaining walls are two types of drainage structures. They are elegant examples of early 20th century masonry and engineering. The system does not appear to be functional; the drains are clogged with soil and leaf litter, and the road's original grade, which sheet-drained water to the road's interior side, was changed when it was resurfaced in asphalt so that water now drains off the downhill side. Beyond these observations it was impossible to determine the integrity of the drainage system on the basis of a brief walking survey.

Historic Mansions. Although not open to the public, two historic mansions sit along the Old Toll Road (now the Mill Mountain Greenway). Both were built by William P. Henritze.

- *Rockledge Mansion.* Rockledge was built in the 1920s with the stone blasted from the mountain to carve out the building site. The three-story mansion is located adjacent to the concrete culvert "loop" in the Old Toll Road. Rockledge remained the family home of the Henritze's until 1983, when it was sold to a Roanoke couple. In 1992, Rockledge was bought by Ralph Smith, who would later serve as Roanoke's mayor (*Roanoke Times,* Sept. 3, 1989). Mayor Smith sold the property in 2005.
- *Terra Alta Mansion.* The Henritze's also built Terra Alta, the mansion that sits lower on the mountain slopes, near the entry to the Old Toll Road (*Roanoke Times,* Sept. 3, 1989).

Incline Railway. Opening in 1910, the 1,000-foot-long incline was considered a marvel (*Railway History Monograph*). In addition to the double track, the complex included timber frame buildings at the top and the bottom for passengers. The power line right-of-way now visible behind the hospital is close to the incline's path, but does not follow it. Two unofficial hiking trails (the Ivy/Water and the Car/Pace Trail) now cross the incline's path. At the summit of the mountain, in the forest edge along the gravel road leading to the zoo, remains of a building and two sets of massive concrete footings presumably associated with the incline are still visible. More research is needed to determine exactly what these were, but when the incline opened, the *Roanoke Times* described the machinery housed at the top of the incline as "a large drum around which the cable winds, a number of smaller wind wheels and a large dynamo and three transformers" (*Roanoke Times,* Aug. 14, 1910).

Old Logging Roads. Old logging roads are abundant all over Mill Mountain, especially on its southern and eastern faces. Many of them have been mapped by the Roanoke Valley Greenways organization for potential use as hiking or biking trails.

Mill Mountain Greenway. Dedicated in September of 2003, the 3.5-mile Mill Mountain Greenway extends from Church Avenue, north of Elmwood Park, to the top of Mill Mountain, via the Old Toll Road (*Roanoke Times*, Sept. 9, 2003). Eventually, this route will connect with the Roanoke River Greenway, which, when completed, will follow the river across the length of the county.

The construction of this regional greenway system enjoys heavy public support. Greenways Incorporated produced the *Conceptual Greenway Plan* in 1995 that provided the basic structure of the system and guidance for implementation. The *1997 Bikeway Plan*, developed by the Roanoke Valley Area Metropolitan Planning Organization, also identified the Mill Mountain Greenway and Fishburn Parkway as important bikeways. Inclusion of these roadways in the Bikeway Plan means that State and Federal funding may be available for roadway improvements.

Star Trail. The Star Trail was built in 1999 by volunteers. The 1.7-mile dirt trail is restricted to hikers. A gravel parking lot off of Riverland Road near the power station allows hikers to access the trail at the foot of the mountain. The Star Trail then crosses Fishburn Parkway and continues up the southeastern face of Mill Mountain through a series of switchbacks until it reaches the summit behind the Star. The trail is currently marked at top and bottom by signs and by yellow blazes along the trail.

Social or Unofficial Trails. Many other trails exist throughout the public lands on the mountain, but, until recent work by the Roanoke Valley Greenways organization and other volunteers (See Appendix B), these trails remained unmarked and unmapped. Many of these unofficial trails, heavily used by those who know about them, evolved organically, not necessarily taking into consideration sustainable routes or construction methods.

Currently, mountain bikes are permitted only on the Mill Mountain Greenway, but cyclists also occasionally use the Star Trail and the Monument/Terra Alta trail as bike trails. Because these trails were not designed with lines of sight and turning radii appropriate for bikes, use of hiking trails for biking presents possible safety concerns.

Crystal Spring. The many layers of occupation of this site speak to the importance of this natural water source. Although modern development has obliterated many of these past layers, a survey by the Virginia Department of Historic Resources recovered artifacts from the Middle Archaic (6000–2500 B.C.) and Middle Late Woodland (900–1600 A.D.) periods (Rhodeside & Harwell, 1991). European occupation began in the 1760s, when Mark Evans built a mill near the site (the precise location of the mill is not known). Since then, the site has seen continuous occupation and has served as the early water source for Roanoke, as well as a heavily used town park beginning in 1893 (see Figures 6 and 10). The site currently contains the Crystal Spring Pumping Station, which is listed on the National Register of Historic Places and is open for tours.

Quartzite Quarry Site. This quarry, located south of the mountain near the entry from the Blue Ridge Parkway, was used by prehistoric Native Americans for stone tool production. It represents an important cultural resource, because few such sites have been documented or studied (Rhodeside & Harwell, 1991).

VISUAL CHARACTERISTICS

Mill Mountain, rising approximately 800 feet over the City to a total elevation of over 1800 feet, is the most visually prominent natural feature in Roanoke. The Rhodeside & Harwell (1991) study found that the preservation of views of the mountain from downtown and the surrounding valley was a significant limiting factor for future development on Mill Mountain: "While soils and slopes in [some] areas may, in many instances, be deemed suitable for certain types of construction, their visibility from either downtown Roanoke or the Blue Ridge Parkway discourages development that may pose threats to the overall scenic quality of the mountain" (Executive Summary, p. ii).

PARK PROGRAMMING & RECREATIONAL FACILITIES

Discovery Center. Opened in 2001, the 2,200-square-foot Discovery Center operates year-round and fulfills several functions at Mill Mountain Park. Its primary mission is to promote an awareness of and appreciation for the mountain's natural environment. To this end, the Center and its staff host a variety of educational exhibits, classes, and activities focusing on topics such as the geology, ecology, flora, and fauna of the mountain. Examples of the family-oriented programs recently offered include Introduction to GPS, Conservation Easement Basics, and watershed hikes. Costs for the Discovery Center's programs range from free to $14, with most classes offered for $5 or less.

The Center is also affiliated with the Blue Ridge Parkway Association as a Regional Information Center and provides local tourist information through a touch-screen kiosk and brochure rack. As part of this program, signs at major intersections along the Blue Ridge Parkway in the Roanoke area direct travelers to the Discovery Center. The Discovery Center also currently offers the only permanent public restrooms on the mountain. However, these facilities are available only during the center's business hours.

Mill Mountain Zoo. The 7-acre zoo is open year-round and houses about 200 animals, including a selection of domesticated animals that children can feed and pet. The zoo offers a variety of programs, the majority of which are oriented toward families and children (e.g., reduced prices on Mother's Day and Grandparents' Day). The zoo also serves 42 school districts. Many of the programs center on conservation-oriented educational opportunities, such as Zoobilation! for Conservation and International Migratory Bird Day. The zoo also offers a recycling program for paper, plastic, and glass, as well as plastic 6- pack rings, tin, and fishing line.

Picnic Facilities. The summit park offers both a covered picnic shelter and free-standing picnic tables in the lawn. The rustic picnic shelter, built in 2001, is furnished with several picnic tables, as well as a grill, water fountain, and water spigot. The shelter can be reserved, and has become a popular place for wedding receptions and family reunions.

Trails and Walking Paths. Two types of trails are available at Mill Mountain. At the summit are paved, handicapped-accessible pathways that wind through the landscaped park grounds, passing by both overlooks. Most trails on the forested slopes are natural surface trails.

Vehicular Roads and Parking Areas. Existing roadways leading to the summit of Mill Mountain allow convenient access to the park for both City residents (via Walnut Avenue and the Fishburn Parkway) and visitors from the Blue Ridge Parkway (via the Mill Mountain Spur Road).

Once visitors arrive at the summit, however, the roadways and parking areas tend to be at best awkward and confusing, and at worst potentially hazardous. The summit has two parking areas—a 19-space lot (including 2 handicapped parking spaces) adjacent to the Roanoke Star and the Star Trail and a main parking area adjoining the Discovery Center with space for 59 cars (including 3 handicapped parking spaces) and a bus lane that accommodates 2 buses or an additional 6 cars. This main parking area presents several problems. First, the one-way traffic flow pattern is awkward and not well marked. As a result, drivers often try to make a sharp left turn into the first row of parking. Second, the lot is too small for special events that draw large crowds (e.g., zoo events and the concert series formerly held in the park) and forces visitors to parallel park along the grass shoulder of the Spur Road below the Discovery Center. This not only poses a risk for visitors (especially young children) who must step onto the roadway to exit and enter their cars but also presents a maintenance problem for landscape crews. Another major safety concern is the zoo service vehicles that drive through the main parking lot, past the Discovery Center, and to the zoo along the paved pedestrian path that parallels the Spur Road.

PART VI
PARK MANAGEMENT ISSUES

Based on the inventory and description of existing natural conditions and cultural features (Section V), the park mission and significance (Section III), and input from interviews of parks staff and the Mill Mountain Advisory Committee, the management issues listed in Table 9 have been identified.

Table 9. Mill Mountain management issues

Issue	Problem Description	Response
Views	Preserving views to Mill Mountain from surrounding parts of the City is critical; Maintaining views from the lookout areas is also important. Height restrictions on the summit have been discussed.	Incorporate viewshed and height restriction protection into local zoning (conservation easement would assist in this effort); place viewshed maintenance plan in the annual maintenance operation of the park; **Parks Maintenance**
Forest cover and forest health	Mill Mountain is the largest contiguous area of mature tree canopy within the city limits. Preserving the ecological functions of the forest is important, but there is no existing forest management plan or fire management plan for the mountain.	Initiate supplemental funding requests to create forest management plans through Urban Forestry, Virginia Department of Conservation and Recreation Division of Natural Heritage, and the Virginia Department of Forestry. **Urban Forestry**
Wildlife	Status as urban wildlife habitat is important and should be protected and/or enhanced. Deer control is needed.	Create programmatic partnerships with Virginia Department of Game & Inland Fisheries to inventory wildlife species and create habitat management plans; seed funding will need to be established through

		City sources to match state & federal grant opportunities. **Outdoor Recreation**
Invasive exotic plant species	There is a need to control these plant species in some park areas, especially along roads and in open areas.	Develop community awareness via educational venues about the need for exotics management and create volunteer database and network to schedule "greening" programs; **Outdoor Recreation & Park Maintenance**
Stream and drainage swales	Stream crossings on trails are currently unmanaged.	Within the trail management process, establish crossing alternatives in plan and schedule work days for our established trail crews and scout groups; new seed monies will need to be obtained for matching state & federal grants. **Planning & Outdoor Recreation**
Trails	Unofficial and unmarked trails are a problem. Questions about which trails can and should accommodate uses other than hiking are unresolved. One portion of a public trail crosses private land.	The trail management process is 90% complete; wayfinding, naming, mapping, and suitability guidelines to follow; **Planning & Outdoor Recreation**
Cultural resources	There is currently little maintenance and interpretation of historic artifacts on the mountain.	Supplemental funding needs to be requested in department budget for historic and educational interpretive exhibits; **Planning & Outdoor Recreation**
Litter control	There is a need for volunteer groups to help with litter on the trails.	Establish "Leave No Trace" ethics for packing in and packing out litter. **Outdoor Recreation & Parks Maintenance**
User needs	No user needs survey has ever been done for the park.	Each program of the Discovery Ctr currently has a user survey attached to it as well as drop-in survey availability. A more comprehensive survey process needs to be created for the overall management area to be conducted every 5 years. **Outdoor Recreation & Planning**
Safety issues and parking	Parking for special events and service vehicle access to the zoo need to be addressed.	The design and operational requirements have been identified, and a plan has been created and accepted by the City and the Mill Mountain Zoo **Planning**
Illegal uses and encroachment	There is evidence of ATV use and other illegal behavior taking place in the more remote portions of the eastern and southern parts of the park. Unclear, unmarked park boundaries have led to encroachment	Proper funds need to be identified for a survey and appropriate marking to include all official access information kiosks to the park for park usership guidelines **Planning & Outdoor Recreation**
Design issues	There is a need for aesthetic (design) guidelines for any new proposed facilities in the park. On the summit – design issues include non-native plantings, need for	

	erosion control, ADA accessibility, and access to restrooms during park hours.	
Long-term conservation	The possibility of placing a conservation easement on the mountain is being explored. No long-term conservation protection exists other than the Fishburn deed restrictions that cover a portion of the park. The deed restrictions have not been interpreted in a consistent manner over the years.	The imposition of a conservation easement be explored and a report returned to the Planning Commission within one year of the adoption of this report by the Mill Mountain Advisory Committee
Environmental education	Even with the outstanding efforts of the Discovery Center, the full potential of environmental education opportunities on Mill Mountain remains untapped.	Outdoor Recreation continues to bring new programming partners into the umbrella of the mountain; improved marketing of our needs will strengthen community awareness of what we have to offer; possibly a "Friends" organization may be established to actively lead the educational efforts under the leadership of **Outdoor Recreation**

Trail issues have long been ignored on Mill Mountain, but the spring of 2005 marked a change in that the trails were inventoried and their locations verified using global positioning systems (GPS). A trail assessment and trail management plan has been developed concurrently with this management plan, and it is found in Appendix B. The proposed trail map showing only the trails that will be maintained into the future is shown in Figure 34 (revised figure to be inserted).

Designation of park resource management zones (RMZs), discussed in the following section, requires an understanding of the landscape resources found on Mill Mountain. Management recommendations for each zone, aimed at addressing the issues outlined above, are also detailed below.

PART VII
PARK RESOURCE MANAGEMENT ZONES

The park mission and significance, resource inventory, and staff and Advisory Committee input formed the basis for the designation of RMZs for Mill Mountain Park. These zones group various areas of the park based on shared characteristics and common management concerns. In this way, management strategies can be defined for each zone, so that similar areas of the park are treated in a consistent manner.

The first step in identifying homogeneous areas in Mill Mountain Park that might be logical management "zones" was to create a composite analysis map from the various analyses detailed in Part V. Figure 35 depicts this composite analysis. Slope is the most significant factor affecting development suitability in Mill Mountain Park. An examination of Figure 35 reveals that the steepest slopes are located on the mountain's north face, and the Fishburn Parkway acts as a dividing line between the mountain's upper and lower slopes. The area above Fishburn Parkway contains most of the steepest slopes on the site. Fishburn Parkway is therefore one of the boundary lines that delineate the RMZs shown in Figure 36.

RMZs And The Park's Mission

It is important to note that management recommendations are not simply based on physical characteristics like those depicted in Figure 35. Management recommendations evolve from the vision of the park's stewards. In this case, the park's stewards are the members of the Mill Mountain Advisory Committee and the citizens of Roanoke whose perspectives have been documented in recent open space and park system plans, as well as previous Mill Mountain plans.

Various mission statements for the role of Mill Mountain have been expressed over the years and are summarized in Part III of this report. The main ideas are very broad and lack the precision necessary to give clear direction when proposals for Mill Mountain are brought before the City and the Advisory committee:

1. Preserve visual integrity both to and from Mill Mountain.
2. Preserve Mill Mountain as a natural resource.
3. Preserve Mill Mountain as a symbol of Roanoke.
4. Enhance Mill Mountain as a place for recreation.
   and "progress with preservation."

Setting the course for the future of Mill Mountain requires clarity of vision and a commitment to a particular mission that goes beyond what is stated above. The following expansion of the vision statement is proposed to guide the development of management recommendations for the RMZs.

The RMZs detailed below are based on the following expanded vision for Mill Mountain:
Mill Mountain will continue to enrich the quality of life for those who live in, work in, and visit the Roanoke Valley. It is an integral component of the green infrastructure of the region, of our urban fabric, and of the evolution of the City, that shall be honored and preserved.

Through sound stewardship, Mill Mountain will offer environmentally sensitive educational, recreational, and civic opportunities while preserving its natural character and resources.

The following discussion of the RMZs includes the characteristics of each zone and the level or intensity of activity appropriate to each zone. Five zones are depicted in Figure 36:

Management Zone 1 – Intensive Recreational Development Zone
Management Zone 2 – Natural Resource Protection Zone
Management Zone 3 – Low Impact Recreation Zone
and two linear zones:
Management Zone 4 – Cultural Resource Zone
Management Zone 5 – Entrance Road Zone

MANAGEMENT ZONE 1 – INTENSIVE RECREATIONAL DEVELOPMENT ZONE

Management Zone 1 encompasses the Mill Mountain summit, the only portion of the mountain that is suitable for the development of structures because of its more gentle slopes. This is the part of the mountain that has already experienced development such as the Mill Mountain Zoo, the Discovery Center, and the Mill Mountain Star. Support structures like parking, picnic shelters, and overlooks are located here. Much of Management Zone 1 has slopes of less than 8%, and the area has an open tree canopy, one that is not as dense as the side slopes of the mountain.

MANAGEMENT ZONE 2 – NATURAL RESOURCE PROTECTION ZONE

Management Zone 2 contains the majority of the steepest slopes on Mill Mountain, those over 40%. The steep north-facing slopes in Zone 2 offer the greatest possibility of interesting and/or unusual plant communities because of the more mesic (moist) conditions found there. If the deer population can be controlled and other impacts minimized, these areas may exhibit more floral diversity than they presently do. Management Zone 2 is crossed by several existing trails, but there are relatively few existing impacts to natural resources in this area other than the trails. Steepness of slope has been a natural form of protection for this area over the years and is probably the reason that some of the largest trees on the mountain are found in this zone. Because of its ecological and physical sensitivity, Management Zone 2 will have the greatest restrictions on future development.

MANAGEMENT ZONE 3 – LOW IMPACT RECREATION ZONE

Management Zone 3 is defined by three main characteristics: it is currently the most remote part of Mill Mountain Park, it contains the largest area of slight-to-moderate slopes apart from the summit, and it contains the only true stream in the 570-acre park. A portion of Management Zone 3 is located on the western edge of the park, near Ivy Trail and the tennis courts. Another part of this zone, designated Zone 3a, is found on the eastern edge, and it contains an old landfill and unused water tank. (See Figure 36.) The remote quality of Zone 3 (excluding the portion with the tennis courts) probably explains why the illegal activities recorded in the park, including ATV use, have largely occurred here.

The fact that this zone is remote and contains running water for at least part of the year may explain why wildlife sightings have been reported here. Approximately half of Management Zone 3 lies near the Garden City neighborhood. Encouraging use of the trails by Garden City residents could decrease undesirable activities in this area by providing more "eyes on the park." The gentle slopes in portions of Management Zone 3 would accommodate new trailheads for access and other low impact recreational amenities such as wildlife viewing platforms or blinds.

SUBMANAGEMENT ZONE 3.A – DISTURBED LANDSCAPE ZONE. Zone 3a shares many of the characteristics of Zone 3 and is suitable for low impact recreation. What distinguishes Zone 3a is the fact that this area, located on the eastern edge of the park, is the site of a former landfill. A gravel road also extends up the steep slope, through the landfill, to a large, unused water tank. In general, this area is characterized by disturbance of the natural ecology of Mill Mountain, as

evidenced by thin forest cover and significant amounts of invasive plant species, like kudzu, lining the forest edges. The gravel road found in Zone 3a leads from the Star Trail parking lot to the beginning of the Star Trail above the water tank.

MANAGEMENT ZONE 4 – CULTURAL RESOURCE ZONE

Management Zone 4 follows the route of the old Toll Road and the current Mill Mountain Greenway. This zone offers the best possibility for the interpretation of cultural and historic resources on the mountain, along with some of the historic features found in Management Zone 1 (see the Cultural Resources section of Part III).

MANAGEMENT ZONE 5 – ENTRANCE ROAD ZONE

Management Zone 5 is identified as the "entrance road zone" to differentiate it from the surrounding Management Zone 2, the zone with the highest level of resource protection. The fact that the lower portion of the entrance road, the area near the Fishburn Monument, offers one of the few locations for future parking or shuttle facilities suggests that the option for limited development in this area not be curtailed. Management Zone 5 also represents the "arrival sequence" into the developed portion of the park, and any proposed changes to the roadside should be considered in light of this zone's role in sustaining the image of the park.

RECOMMENDATIONS BY MANAGEMENT ZONE

<u>Management Zone 1</u>

a. Civic uses, recreational uses, and support services should be allowed in Management Zone 1.
b. Any development at the summit should remain below the tree line to preserve the forested ridgeline.
c. Periodic evaluation by the City's urban forester is needed to assess the health of the older summit trees and ensure that damaged limbs do not pose a hazard to visitors or property.
d. One potential source for replacing dying trees on the summit is the City's Commemorative Tree Program, which allows individuals to donate a tree to honor an individual or event on City property. Several commemorative trees have already been planted in the summit park, but all are flowering understory trees. Amending the list of tree types that donors can choose from would encourage the selection of overstory trees. Any new trees planted should be sufficiently large to discourage deer browsing.
e. Currently, the tree canopy directly below both existing overlooks has begun to encroach on views of the valley below. Overlooks should be maintained and an expanded back-planting of the native tree-line shall be implemented to preserve the upward viewshed of the mountain thus enhancing a clean ridgeline. The regular 3-year pruning schedule should be maintained to preserve views.
f. Hemlock trees at the summit should be replaced as soon as possible with another species—preferably a native evergreen hedge that would continue to help screen the electrical shed behind the parking lot and the Star's metal support structure.

g. Given the expressed preference of citizens for a natural environment, the concept of the native garden on which the Wildflower Garden is based should be extended beyond the confines of the Wildflower Garden to the entire summit area. Transitioning to a native palate throughout the summit may also reduce the amount of time and expense required to maintain ornamental plants that are not particularly suited to the mountaintop environment.
h. Permanent bathrooms open during park hours should be provided on the summit.
i. A new circulation pattern should be developed for the main parking lot and Discovery Center area that will separate pedestrian and vehicular pathways. A new route should be found for service vehicles making deliveries to the zoo. One possibility is to complete the service entrance constructed off of the Spur Road to the zoo.
j. Conduct a study to determine the feasibility of a special events park-and-ride shuttle service between the summit and remote parking areas.
k. Design guidelines should be developed to insure that any new development proposed on Mill Mountain is done in a way that respects the natural character of the mountain.

Management Zone 2.

a. Any development that involved large-scale tree removal on the mountain side would be highly visible and would contradict the expressed public desire to preserve the forested slopes of the mountain (Rhodeside & Harwell, 1991, p. iii).
b. A fire management plan for the park should be developed in coordination with the Virginia Department of Forestry and put in place as soon as possible.
c. A forest health maintenance plan could be developed concurrently with the fire management plan. This should include a tree inventory and a suggested list of species for replacement of trees that must be removed for safety reasons.
d. The wildlife data collection begun by Laurie Spangler and organized through the *WildlifeMapping* program of the Virginia Department of Game & Inland Fisheries should be continued. Observations such as these, collected over time, are a valuable resource for both park management purposes and environmental education.
e. A deer exclosure area, fenced to keep deer out, should be developed. Such exclosures allow native plants that might currently be limited by browsing to return to an area, and thus provide an environmental education opportunity.

Management Zone 3.

a. Intermittent streams within this zone should be protected by the City's stream buffer (50 feet on either side of the stream). Prohibiting development within these buffers will help preserve natural drainage patterns, prevent additional erosion, and preserve stream quality. When hiking trails must cross these drainage areas, care must be taken to select the lowest impact route. Constructing bridges over these sensitive areas will ensure that the natural drainage routes are not blocked or altered.
b. Any development that involved large-scale tree removal on the mountain side would be highly visible and would contradict the expressed public desire to preserve the forested slopes of the mountain (Rhodeside & Harwell, 1991, p. iii).

c. This management zone contains several unofficial, unmarked trails. These trails have been surveyed and recommendations have been made regarding their continued use. The assessment and management recommendations are contained in Appendix B, Mill Mountain Trail Plan. The plan provides for multiuse trails in Zone 3, some closures of unofficial trails, and some single use trails in Management Zone 2.
d. As per the Mill Mountain Trail Plan, existing approved trails should be evaluated and repaired or rerouted as needed to prevent erosion and other negative impacts. After the Trail Plan is accepted, the trail system should also be documented and incorporated into visitor maps. Trail conditions should be periodically evaluated.

Management Zone 4.

a. Develop interpretive signage for the mountain top incline structure that remains. Selective clearing of low-lying vegetation and debris removal from the area will be necessary to better reveal the ruins.
b. As is the case with the incline railway station, interpretive signs at the site of the Rockledge Inn and observation towers would add to visitors' understanding and experience of the park.
c. The Old Toll Road represents an important piece of the cultural legacy of Roanoke. Its features should continue to be preserved and/or restored as needed, and can be incorporated into a historic walking tour.
d. A stone mason or architect should be called in to evaluate the toll house, including the crack in the uphill-facing wall. A strategy should be developed for performing repairs and periodic maintenance to prevent further deterioration. In addition, tiles from the roof pictured in photographs from the 1960s are now scattered among the vegetation along the roadway, and at least one should be preserved in the event that restoration of this roof becomes feasible.
e. In order to prevent further deterioration of the retaining walls, a stone mason and engineer should be consulted in order to develop a preservation plan for the wall and drainage structures.
f. In addition to protecting and preserving the individual elements of the toll road, pursuing state and federal historic landmark status for the road as a whole should be considered. Further research into the design and construction of the road would be necessary. An important facet of this research would be determining if the toll road served as a design precedent for the Blue Ridge Parkway. Given the proximity of the Parkway to Mill Mountain, it is possible that Stanley Abbott, the Parkway's designer, visited the Toll Road while in the area laying out the route for his Parkway. Abbott is already linked to Mill Mountain in terms of the master plan he developed for it in the 1960s, but it is worth researching whether this connection extended further back in time.

Management Zone 5.

a. Design guidelines should be developed to maintain the aesthetic quality of the entrance road sequence.

The recommendations for each RMZ, described above, address current concerns in Mill Mountain Park and offer some guidance for future development proposals. However, these recommendations alone will not provide sufficient guidance to direct action on future proposals for the mountain. Development guidelines, listed in the next section, together with the set of management recommendations above, will provide the comprehensive tools necessary to guide future decisions about the use of Mill Mountain.

DEVELOPMENT GUIDELINES

1. Roanoke Parks & Recreation shall preserve and maintain the natural vegetative resources of Mill Mountain and will deter from any further fragmentation that would cause harm to the various viewsheds of the mountain.

    - Adhere strictly to the Roanoke Comprehensive Plan, City zoning ordinance, and management areas as described within this plan.
    - Establish subcategories of the new City recreation open space (ROS) zoning category to enhance the long-term preservation of these resources as outlined within this plan.

2. Any potential human development shall be in strict conformance to the Department's Planning & Development Guidelines; clearly meet or exceed specific action items within the City Comprehensive Plan, City zoning ordinance; the Parks & Recreation Master Plan, and the Mill Mountain Management Plan's Resource Management Zones (RMZs).

3. Per the approved RMZs described within the Mill Mountain Management Plan, such designations should be officially included within the subcategories of the City's ROS zoning criteria. Thus any proposal that would fall counter to such zoning would require the authorization of three entities for authorization in the following order: the Parks & Recreation Advisory Board, the Roanoke Planning Commission, and City Council.

4. Roanoke Parks & Recreation shall conduct a capacity analysis of the top of the mountain to insure that quantifiable data is obtained to provide us with our user capacity for any future structure, program, and/or event.

5. The Department shall create a sustainable design criteria to establish ecological friendly, aesthetically pleasing, and unobtrusive design elements for park structures and amenities that would be utilized on either Mill Mountain or any other natural setting within the Department. The guidelines would address features such as culverts, trail bridges, educational kiosks and displays, access control devices, and landscaping materials and methods.

6. Parks and Recreation should explore opportunities as they develop to acquire adjacent parcels of land to add to the park it if supports the general precepts and mission of the plan.

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APPENDIX A: HISTORICAL TIMELINE OF MILL MOUNTAIN

Entries in italic indicate events that pertain to Roanoke City in general rather than specifically to Mill Mountain. They are included in the timeline to provide context for the development described on Mill Mountain.

6000 B.C.-early 1700s	Indigenous peoples occupy the Roanoke Valley, including the area around what will later be called Mill Mountain. They are drawn by the spring at its base and the surrounding fertile hunting grounds offered by the salt marshes on which the City of Roanoke will later be built.
1740s	Fleeing a violent Pennsylvania–Maryland border dispute, Mark Evans builds and operates a grist mill at what will later be known as Crystal Spring, at the western base of Mill Mountain.
1756	George Washington, a 24-year-old commander-in-chief of the militia, spends the night at Evans Mill while reviewing local fort construction for the French and Indian War.
1790s	William McClanahan, a colonel in the Revolutionary War and one of the largest landowners in the Valley, buys Evans Mill and the surrounding land from the Evans family.
1852, November 1	*The first Virginia & Tennessee train arrives in Big Lick. The event is largely ignored by most residents. Only a handful of local businessmen recognize the potential for economic prosperity that comes with the railroad.*
1874	*The town of Big Lick is incorporated.*
1881, spring	*After Big Lick's leaders provide financial incentives, Norfolk & Western (formerly the Virginia & Tennessee) agrees to route their Shenandoah Valley line through town, where it will join their existing line. They also locate their corporate headquarters in town. This fuels an economic boom and rampant land speculation.*
1881, July 15	*The Roanoke Land & Improvement Company, a real estate development subsidiary of Norfolk & Western, is formed. Over the next few years, the company buys more than 1,150 acres in and around Roanoke and sells most of it as land prices rise.*
1882	*The Norfolk & Western Railway machine shops, known as the Roanoke Machine Works, open and become the town's largest employer.*

	The Roanoke Land & Improvement Co. begins buying up farm land between town and Mill Mountain for housing lots as railroad jobs draw new residents to town.
	The Roanoke Land & Improvement Co. buys McClanahan Spring (later Crystal Spring) from Elijah McClanahan to supply water to the railroads. They also buy Mill Mountain from Peyton Terry (owner of Elmwood), who had purchased it 5 years earlier.
1882, November	J. B. Austin, president of the Roanoke Land & Improvement Co., finalizes plans to build a road up the western face of Mill Mountain and offers municipal water to the southern half of Roanoke from Crystal Spring.
1883, January 15	A charter is granted to the Rorer Iron Company. Started by local businessman Ferdinand Rorer, the company buys the mineral rights to an ore deposit on the western ridges of Roanoke Mountain. A narrow gauge railroad, which crosses the river below Wasena Park, is built to link the mines to the Norfolk & Western. The mine remains open into the 1920s.
1884, January 31	*Roanoke is granted a city charter after its population swells to 5,000, an eightfold increase in the 2 ½ years since the arrival of Norfolk & Western.*
1880s, mid	The McClanahan Mill is accidentally burned to the ground by a group of boys carrying an oil lamp to explore the unused structure.
1891	In the midst of the economic boom spurred by the railroads, part of Mill Mountain, including the summit and Crystal Spring, is acquired by the Roanoke Gas & Water Company from its sister company, Roanoke Land & Improvement. In addition to installing water mains throughout the city, the company begins to develop Mill Mountain as a resort. Local contractor F. D. Booth is hired to build the $10,000 Rockledge Inn as well as a $2,000 observatory at the summit. This wooden tower stands 60 feet tall from its concrete foundation to the lookout level, and another 20 feet to the tip of the flagpole. It includes a searchlight. Booth also builds a dirt road at a steady 10% slope up from the spring to the summit called Prospect Road.
1892	In order to facilitate development of Mill Mountain, Roanoke Gas & Water Co. builds an iron bridge across the Roanoke River to extend Jefferson Street to Crystal Spring. They also install a bridge at Walnut Avenue.

1892, May 3	The Rockledge Inn and Mill Mountain Observatory open with a dinner party that includes local business leaders and railroad executives from as far away as Philadelphia.
1892–1893	Roanoke Gas & Water Co. develops a 20-acre park at the foot of Mill Mountain around Crystal Spring. The spring's waters are channeled into a small man-made lake, which is surrounded by turf and walking paths.
1893	*The national economic depression hits Roanoke.*
	Rockledge Inn closes after failing to attract a steady business. The 2- to 3-hour carriage ride up the mountain is cited as one of the reasons for its failure.
1893, fall	The Virginia College for Young Ladies opens at the western foot of Stone Mountain.
1900	Roanoke Hospital opens at the foot of Mill Mountain, at the present location of Roanoke Memorial Hospital. When the city runs out of money during construction, Norfolk & Western steps in with the needed funds.
	Roanoke becomes Virginia's third largest city, behind Richmond and Norfolk, and home to the largest locomotive manufacturing operation in the South.
1902, June 21	Roanoke Railway & Electric Co. purchases 40 acres at the base of Mill Mountain, south of Crystal Spring, to develop a recreational facility named Mountain Park.
1902, fall	Virginia College students hike to the summit of Mill Mountain and find an elderly African American woman living in the abandoned Rockledge Inn. She grows tobacco on the hotel's picnic grounds and cures it in the dining room.
1903, June 15	Mountain Park opens. The park includes a dance pavilion, an 800-seat theater for live performances and motion pictures known as The Casino, picnic grounds, a bowling alley, and eventually a roller coaster. The city street car is extended out to the park via Jefferson Street.
1905, June	Roanoke Gas & Water Co. starts construction of a new reservoir at Crystal Spring.

1907	*John Nolen, an urban planner prominent in the City Beautiful movement, is hired by the Woman's Civic Betterment Club to develop a master plan for Roanoke. His million-dollar plan, detailed in* Remodeling Roanoke, *calls for a linear greenway extending from the City to Mill Mountain. The plan is recognized as one of the first in the country to mesh City Beautiful ideals with urban planning. Only small portions of the plan are ever implemented.*
1908–1909	*A short-lived financial panic hits Roanoke. Norfolk & Western begins laying off employees.*
1909, November	As the economy improves, local businessmen launch another effort to profit from recreational development of Mill Mountain. They form Mill Mountain Incline Incorporated to finance construction of an incline on the western side of the mountain near the hospital. Initially estimated at $15,000, the project ultimately costs $40,000. The Roanoke Iron Company fabricates the rails, and Philadelphia's J. G. Brill Company builds the electric pulley system and the two cars. Hoping to entice visitors to take the incline to the summit, the company also leases and refurbishes the Rockledge Inn and its grounds and builds a new and taller observation tower near the present-day location of the Star.
1910	*Roanoke's population expands to almost 39,000, an increase of more than 7,000 residents in a decade.*
1910, August 14	Mill Mountain Incline opens. More than 1,500 passengers turn out to take a ride on the novelty on opening day.
1911, May	Continuing their improvements in order to draw more visitors, the incline owners install new walkways, benches, and swings at the summit. A gift shop, telescope, and powerful electric searchlight are added to the observation tower. Despite these efforts, the incline would never clear a profit after its first season of operation.
1914, March 2	After standing for 23 years, the Mill Mountain observation tower is destroyed during a wind storm.
1914, May	A second observation tower, similar to its predecessor in design but 90 feet tall, is constructed through the cooperation of the Adams, Payne and Gleaves Company, Roanoke Water Company, and the Mill Mountain Incline Company. Roanoke Railway & Electric Company rebuilds the searchlight.

1914	*The city's population expands to more than 38,000, with an additional 1,200 residents in the suburbs.*
1915	Roanoke City annexes South Roanoke, including Mill Mountain.
1917	*American Viscose Corporation opens a rayon manufacturing facility in Roanoke that employs 1,000. By 1928, they would employ 5,000.*
1919	Mill Mountain Incline Inc. sells the railway for $7,000 to Roanoke Gas & Water.
1920	William P. Henritze acquires most of Mill Mountain and the incline from Roanoke Gas & Water. He forms the Mill Mountain Corporation in hopes of developing a residential/resort complex on the mountain.
	Roanoke's population increases to 50,000.
1923	Mountain Park closes. With the city's population still growing, the land is subdivided and advertised as a "high-class" residential subdivision.
1924, August 30	Henritze and his Mill Mountain Corporation open a $90,000 concrete toll road up the northwestern face of the mountain along the approximate route of the older dirt road. The road features a unique Loop Bridge, in which the road loops over on itself by means of a concrete culvert.
1924	Henritze completes construction of his personal residence, which he names Rockledge, adjacent to the toll road's Loop Bridge.
1928	The first caretaker's house is constructed on the summit.
1929	The Rockledge Inn closes permanently. Over the next 45 years, it will find limited use as a recreation center.
	Mill Mountain Incline closes. After operating at a loss for many years, the completion of the automobile toll road up the mountain seals its fate.
1930	*The Great Depression hits Roanoke, although its railroad and other industries help to cushion the blow.*
1930	Mill Mountain Incline is dismantled and sold for scrap.

1932	Facing bankruptcy, William P. Henritze offers Mill Mountain to the City for $165,000, but with its own finances on shaky ground, the City declines.
1933	The Virginia College for Young Ladies closes.
1934	Creditors foreclose on most of William P. Henritze's holdings on Mill Mountain. The property is bought for $50,000 by Washington & Lee University, which offers it to the City for $75,000. The City again declines.
1936	The 90-foot-tall observation tower at the summit is destroyed by fire. It had fallen into disrepair in the preceding years and is no longer used by this time.
1941	Junius B. Fishburn, a prominent local businessman, purchases Mill Mountain from Washington & Lee University and conveys 100 acres of the property to the City of Roanoke for a park.
1942	The Fishburns give an additional 36 acres on Mill Mountain to the City.
1949, Thanksgiving Eve	The Roanoke Star is first lit. Originally intended as a Christmas decoration by the Roanoke Merchants Association, the Star attracts so much positive publicity for the city that the group decides to keep it lit year-round.
1950	The city receives an additional 38 acres of Mill Mountain from the Fishburns.
1950s	A power line right-of-way is cleared up the western slope of Mill Mountain, near the hospital. This right of way is near (but not on) the old incline path.
1952	Mill Mountain Zoo, built by the Civitan Club, opens as a petting zoo with a nursery rhyme theme. The Roanoke Jaycees provide the miniature Zoo Choo.
	Roanoke is named an All-America City.
1955	*Junius B. Fishburn dies.*
1957	The City's Traffic Safety Council persuades the Roanoke Merchants Association to turn the white Roanoke Star red for two nights after every traffic fatality in the City. This tradition would continue for 17 years.

1958	*Viscose Corporation closes and Norfolk & Western lays off 2,000 workers. Many of the unemployed find work in the newly opened General Electric plant in Salem.*
1960	*City planning efforts turn to revitalizing the struggling downtown, which has lost residents and businesses to the suburbs.*
1963, November	The Roanoke Star is turned red for three nights to mark the assassination of President John F. Kennedy.
1964	The Mill Mountain Players repurpose the old Rockledge Inn as a live theater.
1965, May	Stanley Abbott, designer of and former landscape architect for the Blue Ridge Parkway, submits his master plan for Mill Mountain Park. The plan presents Mill Mountain as an extension of the Parkway and proposes heavy development, including an elaborate summit complex housing a welcome center, hotel, restaurant, and theater, and parking for 1,000 cars on the slopes with a tramway shuttle to the summit. The plan proposes relocating the Star to Read Mountain.
1960s, mid	The Spur Road is constructed to connect the Blue Ridge Parkway and Roanoke via Mill Mountain. It is hoped that the road will draw visitors from the Parkway into Roanoke.
1965, September 7	City Council appoints the Mill Mountain Development Committee to guide implementation of the Abbott plan.
1967, February 14	Frustrated by the stalled development plans for the park, the Roanoke Valley Chamber of Commerce forms its own committee—the Mill Mountain Park Committee—to spur development.
1967	The Chamber of Commerce's Mill Mountain Park Committee and the City Council's Mill Mountain Development Committee join forces, deciding to keep the latter name. M. Carl Andrews is named chair. The City of Roanoke purchases an additional 310.33 acres to add to Mill Mountain Park.
1967, September	The Department of City Planning releases their *Master Development Plan: Mill Mountain Park*, a scaled down version of Abbott's design. The plan increases parking at the summit and sets

	the relocation of the Star and construction of a restaurant and visitor center as priorities. With concerns rising about the condition of the Old Toll Road, construction of a new road to the summit via Walnut Avenue is recommended.
1969, March 10	City Council formally accepts the City Planning Department's *Master Development Plan: Mill Mountain Park,* along with the Mill Mountain Development Committee's recommendation that the Old Toll Road remain open. Council sets no timeline for implementing the plan, instead stating that portions will be undertaken "from time to time."
1970s	*Passenger rail service to Roanoke ends.*
1970	The Mill Mountain Development Committee begins the search for a developer interested in building a restaurant and perhaps a hotel at the summit.
1971	The J. B. Fishburn Parkway opens. Running from the intersection of Walnut Avenue and Sylvan Road to the Spur Road, this parkway replaces the Old Toll Road as the primary route to Mill Mountain's summit.
1973	The original caretaker's cottage is demolished to make way for construction of the Wildflower Garden, designed by former Blue Ridge Parkway landscape architect Joe Beer. A new caretaker's cottage is installed near the current Discovery Center. Work on the Fishburn Memorial, at the intersection of the Fishburn Parkway and the Spur Road, also begins.
1974	The Roanoke Star begins shining red, white, and blue in celebration of the nation's Bicentennial.
1975, January 3	Mill Mountain Development Committee reports to City Council that the idea of a hotel on the brow of the mountain has fallen out of favor. Construction of an overlook restaurant, however, is still supported. They also state that removing the Star would probably be publicly unpopular.
1975, January 13	Ken Wilson Associates, a developer hired to complete an economic feasibility study for a restaurant and hotel at the summit, instead presents City Council with another master plan. Unhappy with the firm's deviation from its specified task, City Council shelves the document. Although the plan itself is never pursued, some of its key elements survive to influence later plans for Mill

	Mountain, including a focus on drawing City residents rather than tourists to the park and the retaining of the Star as an important fixture on the mountain.
1975, June 24	The J. B. Fishburn Memorial is dedicated.
1976	The Mill Mountain Playhouse (formerly the Rockledge Inn) burns down.
	Mill Mountain Zoo, run by Roanoke Parks & Recreation, closes because of financial troubles.
1977	The Mill Mountain Garden Club completes the Wildflower Garden.
	Roanoke Jaycees reopen the Mill Mountain Zoo as a nonprofit corporation.
1981	The Parks & Recreation Department issues its Roanoke Parks Today and Tomorrow master plan. It suggests only minor improvements to Mill Mountain.
1982	An anti-graffiti ordinance is passed by City Council in response to ongoing vandalism at Mill Mountain Park.
1983	Phase I improvements to Mill Mountain Park begin. This includes construction of the two present-day parking lots, installation of wooden bollards to block vehicle access to the paved path behind the Star parking lot, and renovation of park furnishings and landscaping (including grading and drainage work). Construction documents are prepared by Hayes, Seay, Mattern & Mattern.
	The Henritze family sells Rockledge, their family home for almost 60 years. It currently remains in private ownership.
1984	The Mill Mountain Development Committee requests that the City install an entry gate at the summit of Mill Mountain in order to help prevent unauthorized access after park hours.
1980s, early	The Mill Mountain Zoo plans to relocate to Explore Park.
1985	*The* Comprehensive Development Plan for Roanoke, 1985–2005 *is issued. This city master plan reaffirms Parks & Recreation's* Today and Tomorrow *master plan and stresses the development of greenways, conservation of the city's natural environments, and provision of youth programs. It emphasizes the creation of neighborhood parks. Mill Mountain is not mentioned specifically.*

1985, July 8	Mill Mountain Development Committee requests that City Council extend the sand-blasting and repainting of the guardrails along the Old Toll Road up to the Loop Bridge and that repairs be made to the Toll Booth/Archway.
1986, January	The Roanoke Star shines red for one week in memory of the astronauts killed in the explosion of the space shuttle Challenger.
1987	Phase II renovations to Mill Mountain Park are completed. These include construction of a visitor center with restrooms on the present site of the Discovery Center, placement of overhead power lines underground, new lighting on the approach road, realignment of the park entrance at Fishburn Parkway because of numerous accidents, and installation of a picnic area and additional walking paths at the summit. As part of their 100th anniversary celebration, *The Roanoke Times & World News* gives $37,800 to fund construction of a new Star Overlook. The work includes replacing the wooden retaining wall around the Star with a stone wall. City Council seeks a developer for a restaurant to be built on the grounds of the zoo once it moves to Explore Park.
1980s, late	The City receives numerous proposals for development on Mill Mountain, including the D-Day Memorial (later built in Bedford) and the refurbishment of the incline railway. The City hires Rhodeside & Harwell to establish development criteria for the park based on in-depth site analysis and public input.
1988	The Blue Ridge Zoological Society takes over operation of the Mill Mountain Zoo.
1989	The planned move of the zoo to Explore Park falls through. The zoo remains on Mill Mountain.
1990	Rhodeside & Harwell submits *Mill Mountain Park Design Evaluation and Development Criteria* to the city. After extensive site analysis and public input, the firm recommends preserving the natural state of the mountain and outlines long-term goals and objectives for the mountain, as well as a set of development criteria. City Council “unanimously concur[s], in general, with the goals and development criteria developed” on December 17.

1993	The City receives a recommendation to stabilize the Loop Bridge on the Old Toll Road rather than reconstruct it.
	At the request of Mill Mountain Zoo, Hill Studio develops plans for a 300-space, multilevel parking garage at the summit. Although approved by City Council and a committee of city personnel that evaluated the plan against the Rhodeside & Harwell development criteria, the project is later abandoned.
1994	The Roanoke Star goes dark for several days after it is damaged by a 3-acre forest fire.
1995	The M. Carl Andrews Overlook is dedicated at the Star. Andrews had been editorial page editor of Fishburn's newspaper, *The Roanoke Times*, and had served as the first chair of the Mill Mountain Development Committee in 1969, a position he served in for almost 25 years. He'd been a strong advocate for the preservation of Mill Mountain.
	Greenways Incorporated produces the *Conceptual Greenway Plan* for Roanoke City and the Valley. One proposed greenway passes through Mill Mountain. The plan has had wide public support since its publication.
1996	At the request of Mothers Against Drunk Driving, City Council agrees to turn the Roanoke Star red for one night after each drug- or alcohol-related traffic death in the Valley.
1996, September 12	Mayor David Bowers hosts a "Summit on the Summit" to develop short- and long-term goals for Mill Mountain Park.
	The Women's Club of Roanoke upgrades the landscaping around the Star. Parking area improvements are also made.
1997, January 18	The Mill Mountain Development Committee holds a visioning retreat to continue the work of the Summit on the Summit.
1997, October 21	A meeting is held in Council Chambers to gather public input into the vision for Mill Mountain.
1997, November	The Mill Mountain Development Committee changes its name to the Mill Mountain Advisory Committee.
1997, November 20	Mill Mountain Advisory Committee approves the Mill Mountain Master Plan developed by Hill Studio. The plan includes renovation of the existing restroom building as a visitor center,

	construction of a picnic shelter, and designation of a concert lawn. Plans for a playground are postponed indefinitely because of a lack of funding. After heated debate about the planned installation of the Sister Cities sculptures on Mill Mountain, they are relocated to Century Square in Downtown Roanoke.
	The Roanoke Valley Area Metropolitan Planning Organization's *Bikeway Plan* identifies potential bike routes throughout the Valley. The Mill Mountain Greenway and Fishburn Parkway are both included in the plan.
1997	An assessment of park security by the Roanoke City Police Department is completed.
	The Mill Mountain Trails Committee is formed to explore trail development on the mountain.
1998	The second caretaker's house is removed.
1998, June	At the request of the Mill Mountain Advisory Committee, City Council ends the practice of turning the Roanoke Star red after drug- and alcohol-related traffic deaths.
1999	The Star Trail opens. This 1.7-mile-long dirt trail was built by volunteers.
	The Fifth Planning District Commission (consisting of Roanoke City, Roanoke County, Salem, and Vinton) develops the *Roanoke Valley Open Space Study.* Citizen input from focus group surveys and mapping exercises indicates a high level of public support for preserving views of forested ridgelines and mountain slopes. Views of Mill Mountain from the City and surrounding region were specifically mentioned as important.
2000	The *Comprehensive Parks & Recreation Master Plan* is approved by City Council. This is the current parks master plan. Action strategies that apply to Mill Mountain include developing multiuse trails and greenways; increasing programming, especially for children, teens, families, and seniors; and preserving the city's natural and cultural assets through interpretation and education. The plan includes a "mini market plan" for Mill Mountain, which was never acted on. The plan seeks to strengthen the park as a tourist destination by adding more picnic shelters and a playground area, as well as upgrading the landscape and giving park amenities a more consistent look. The plan revives the call for a lookout restaurant and a tram ride as important sources of revenue. It also

	identifies the limited parking on the mountain as a problem, especially for special events. City Council approves the plan in May.
2000	The Roanoke Star's color scheme is changed to red, white, and blue for three months when Roanoke is named an All-America City for a record-tying fifth year.
2001	The 2,200-square-foot Discovery Center opens and the present-day picnic shelter is built. A Mill Mountain Supervisor is hired for the park and Discovery Center. Vision 2001/2020: Planning for Roanoke's Future Economic Development, Neighborhoods, and Quality of Life *lays out the City's vision of itself over a 20-year period. It identifies the City's natural environment as one of its most valuable assets and recommends the protection of environmental, historic, and cultural tourist attractions from visual or physical encroachment by incompatible uses. It calls for a comprehensive regional marketing strategy that promotes Roanoke as an outdoors destination offering such attractions as the Blue Ridge Parkway, Carvins Cove, and Mill Mountain.*
2001, September	The Roanoke Star is turned red, white, and blue in response to the 9-11 terrorists attacks.
2002	The Discovery Center receives the Best New Facility Award from the Virginia Recreation & Parks Society.
2003, September	The 3.5-mile Mill Mountain Greenway & Birding Trail is dedicated. 2004–2005 Mark McConnel & Associates develops plans for a custom playground that reflects the unique mountain environment of Mill Mountain in materials and form.
2005	The City of Roanoke expands its zoning classifications for open space. As a result, Mill Mountain Park's total acreage nearly doubles, to 639 acres.

APPENDIX B
FIGURES 1 - 36

Figure 1. Location map

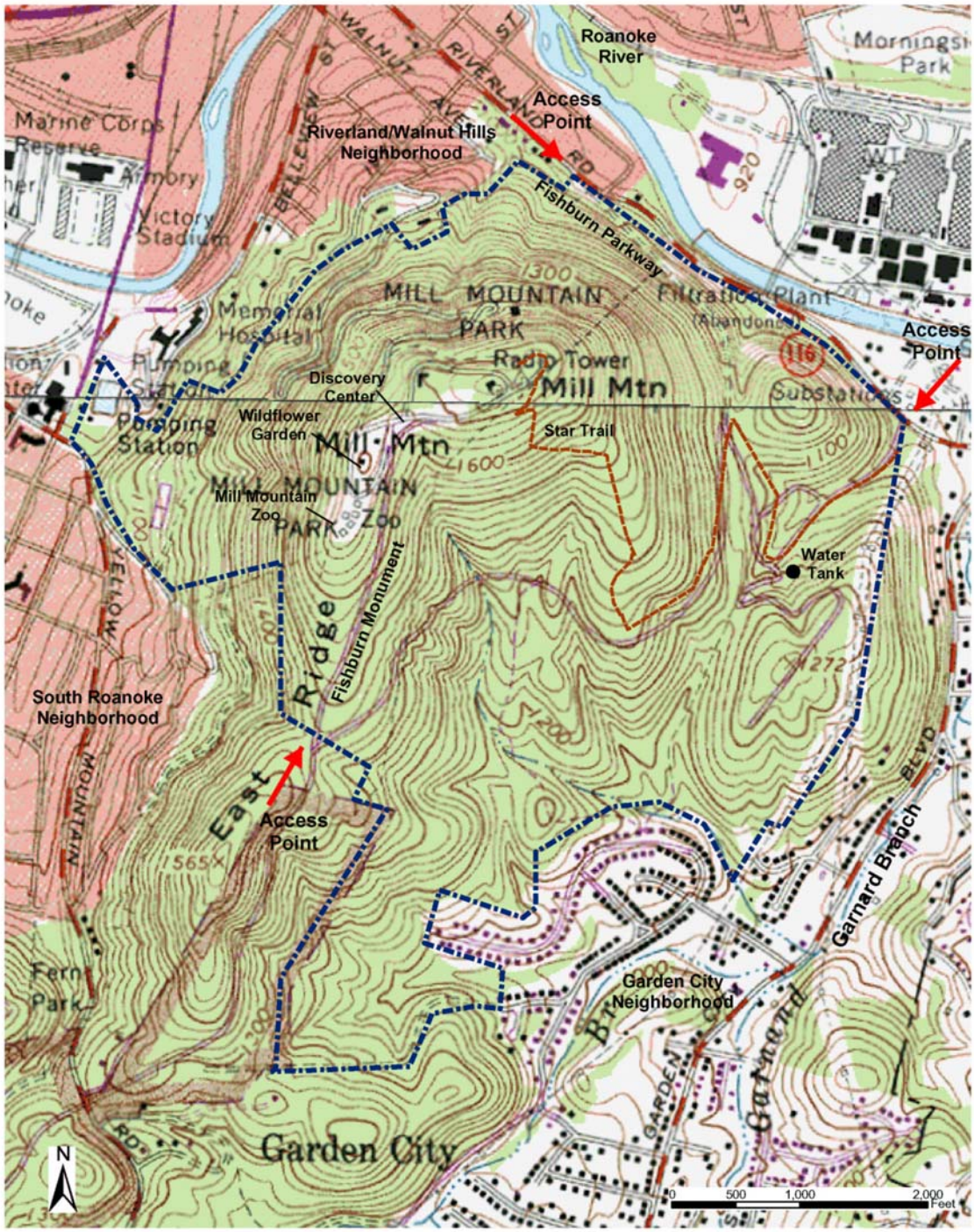


Figure 2. U.S.G.S. topographic quadrangle

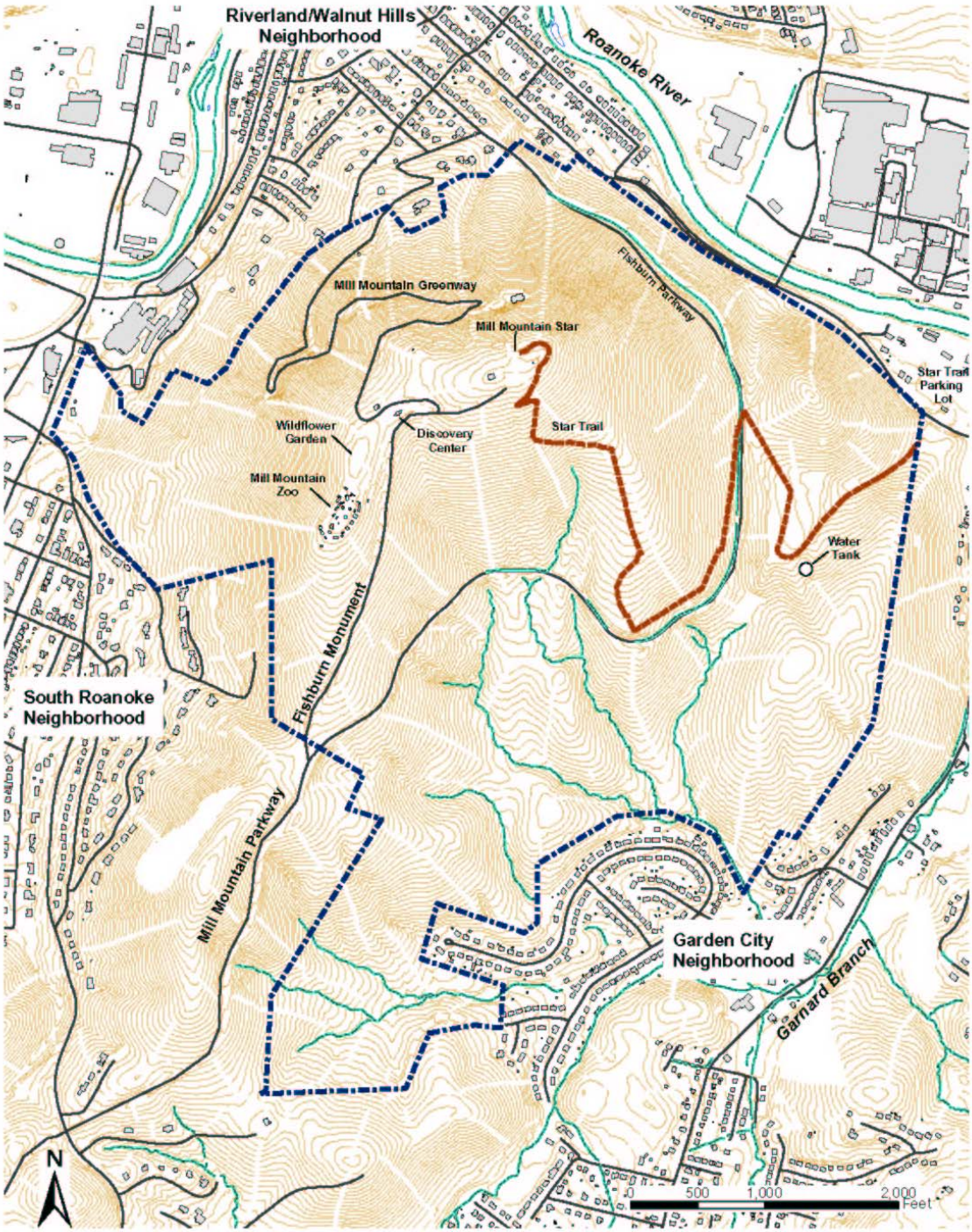


Figure 3. Existing conditions

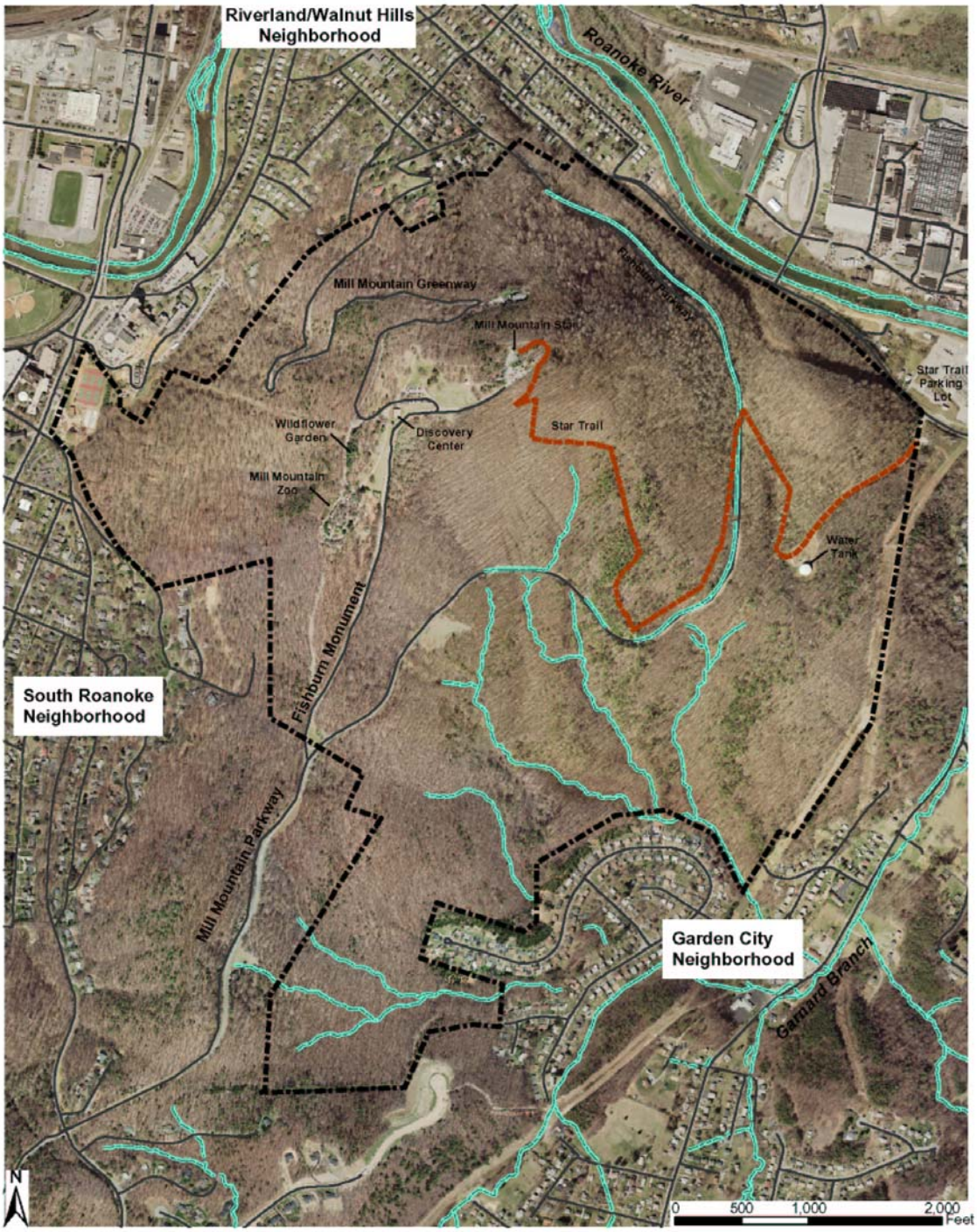


Figure 4. Aerial photograph

Figure 5. Detail of mountain top

Figure 6. Crystal Spring c.1890

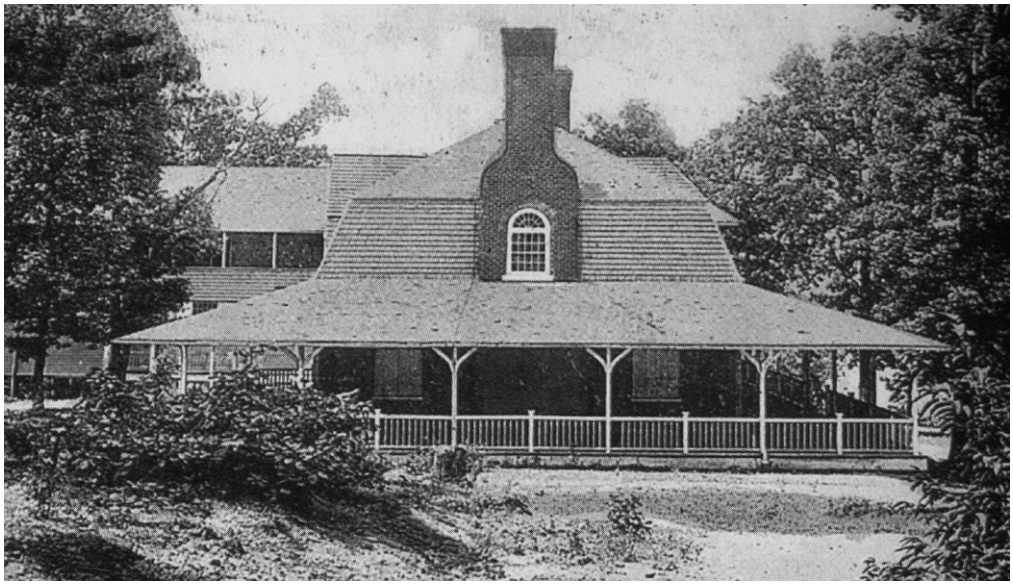


Figure 7. Rockledge Inn

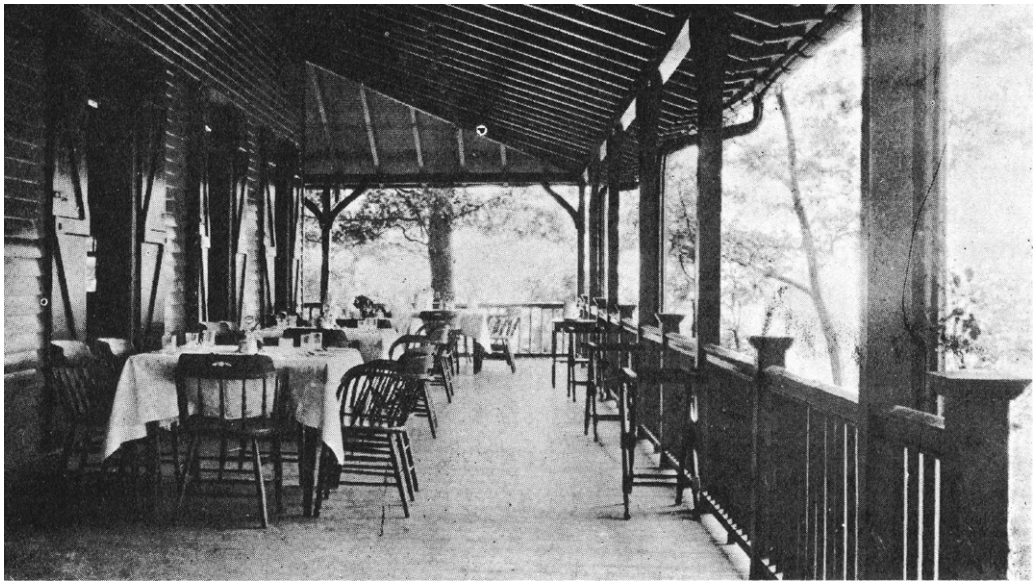


Figure 8. Rockledge Inn porch

Figure 9. First observation tower

Figure 10. Crystal Spring Park c.1915

Figure 11. Mountain Park

Figure 12. Mountain Park aerial view

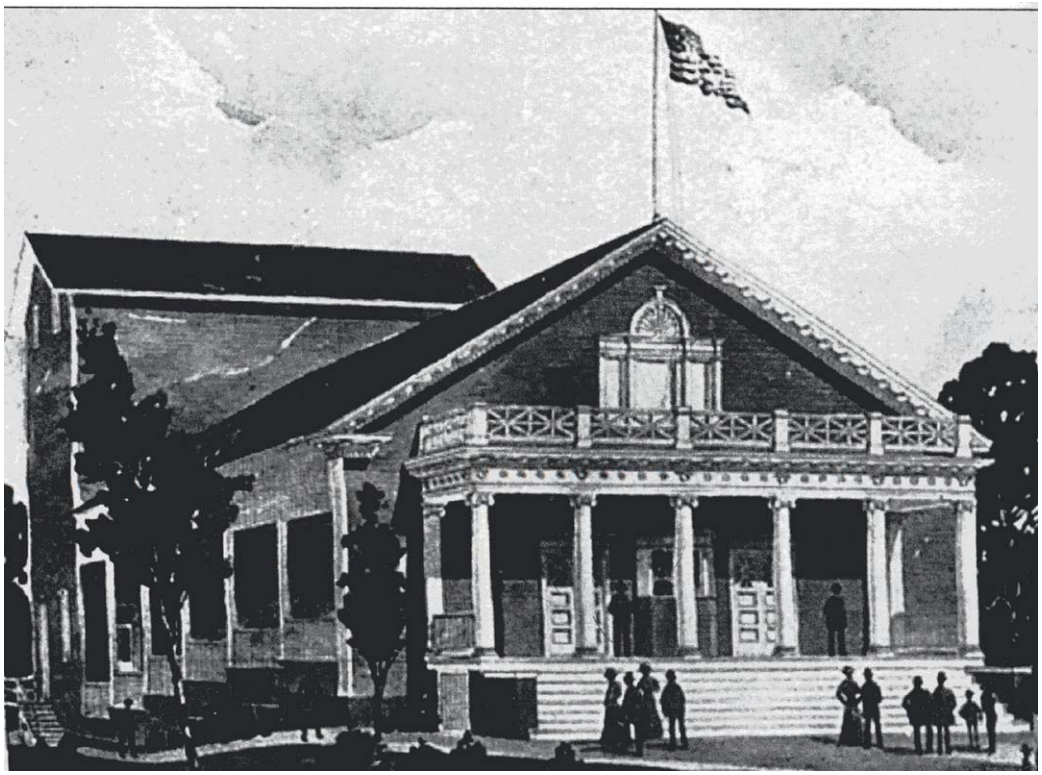


Figure 13. Casino at Mountain Park

Figure 14. Mountain Park dance pavilion

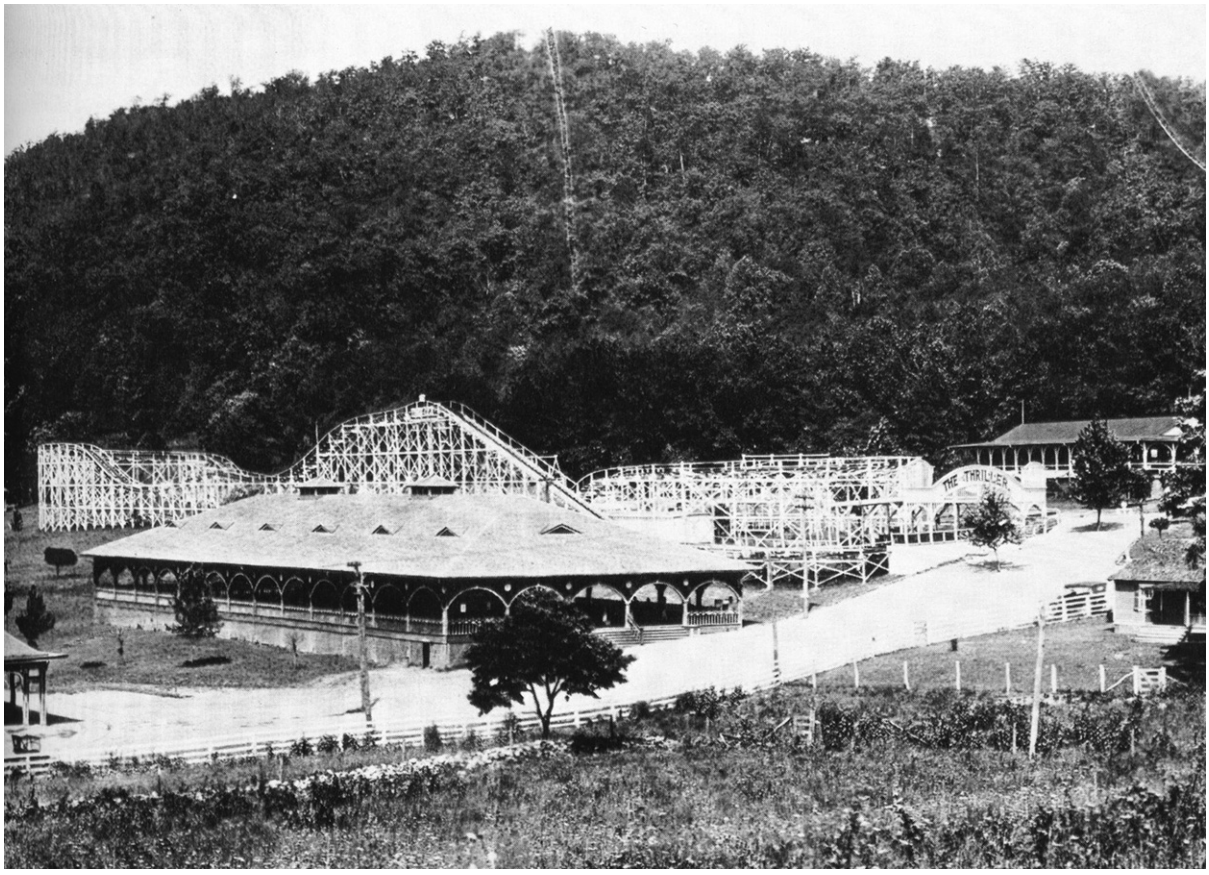


Figure 15. Mountain Park roller coaster

Figure 16. Mill Mountain Incline with hospital in background

Figure 17. Side view of the incline

Figure 18. Second observation tower

Figure 19. Carriage Road

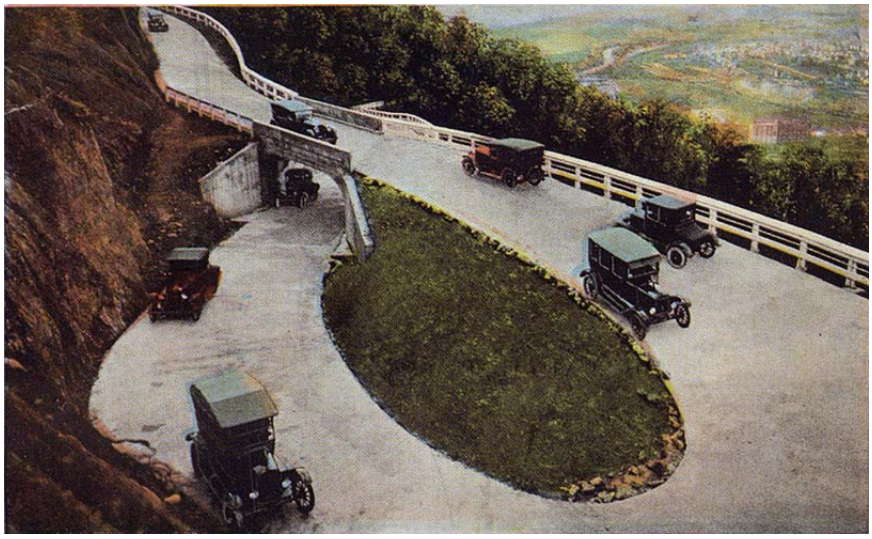


Figure 20. Loop-the-loop

Figure 21. 1926 city map

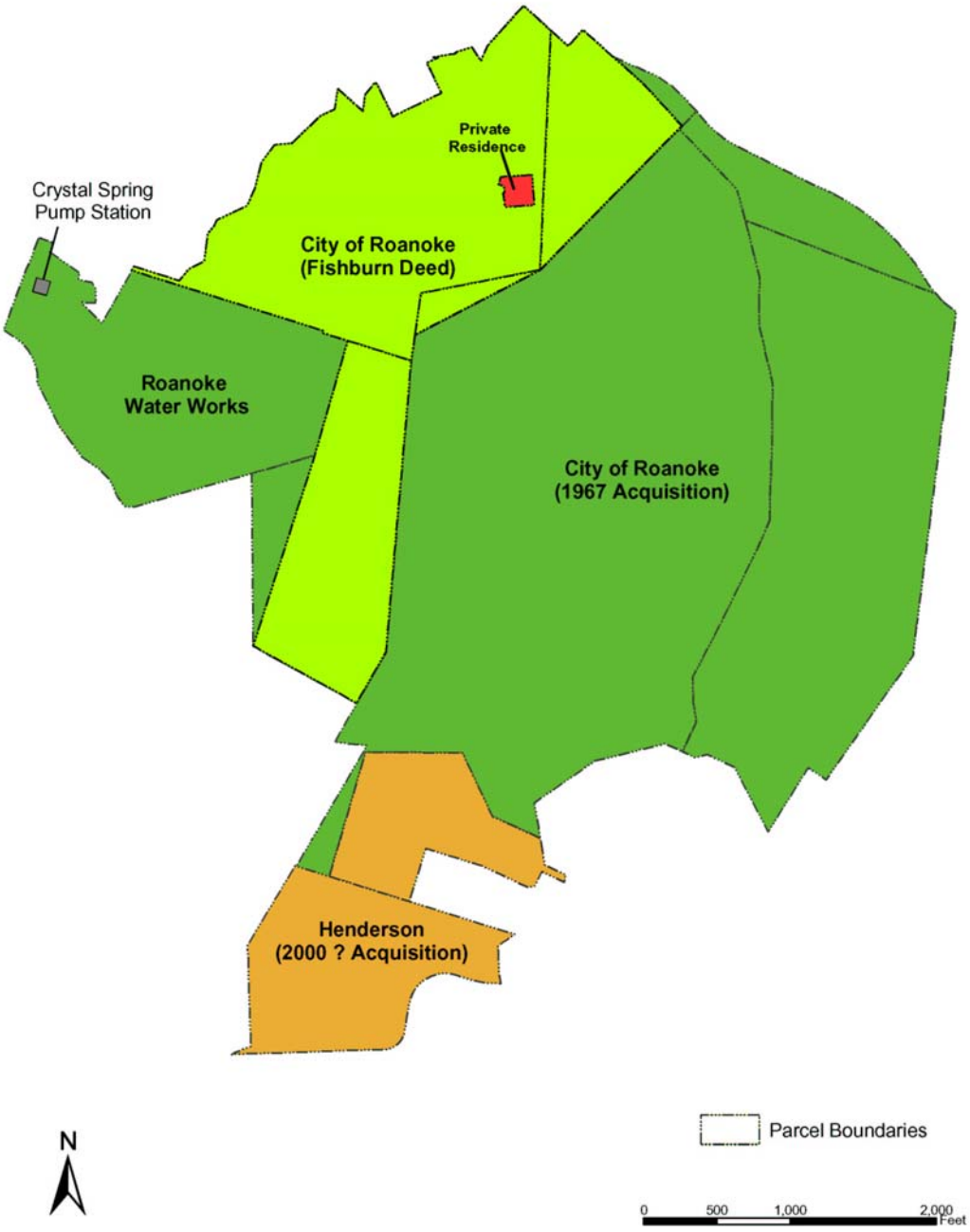


Figure 22. Land acquisition

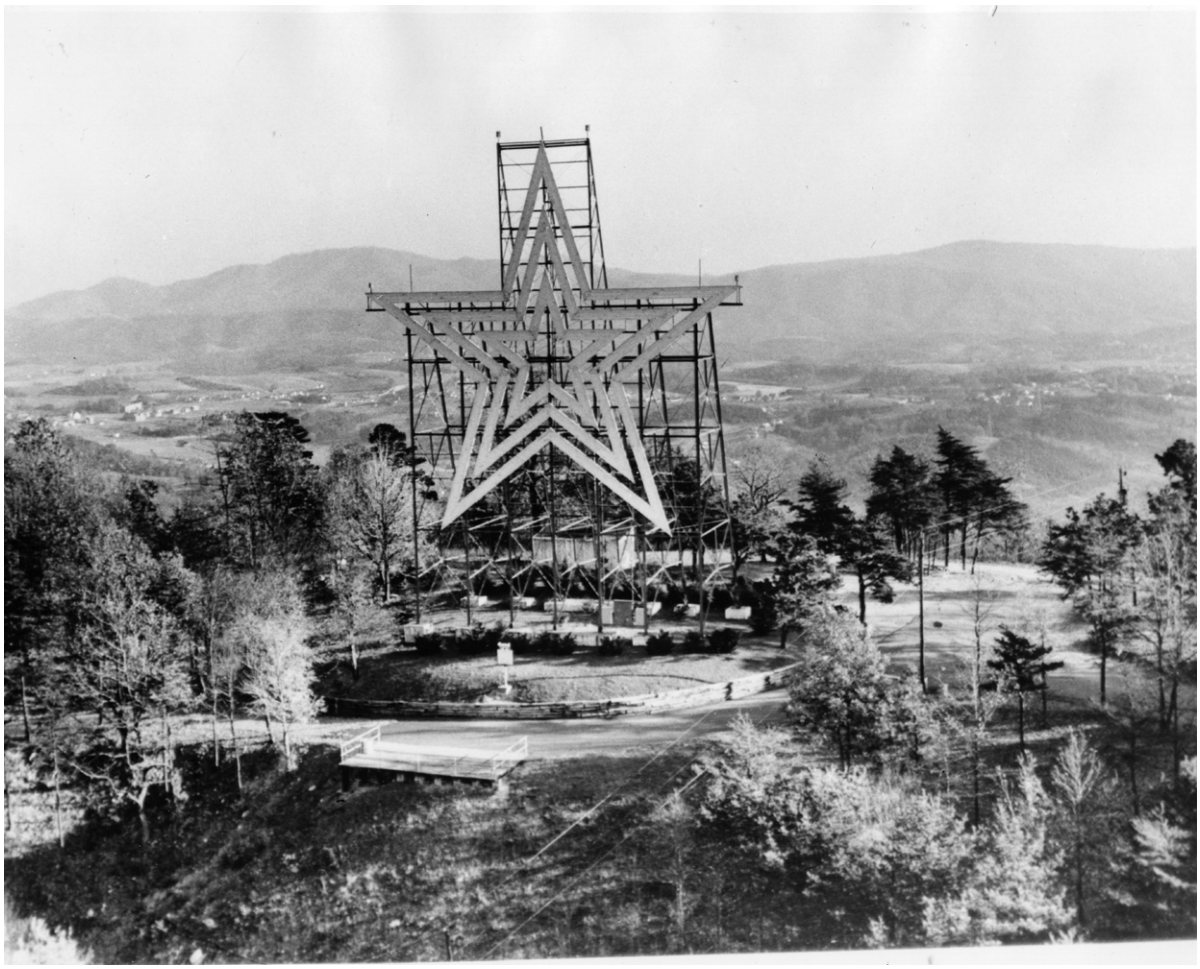


Figure 23. Mill Mountain Star c. 1950

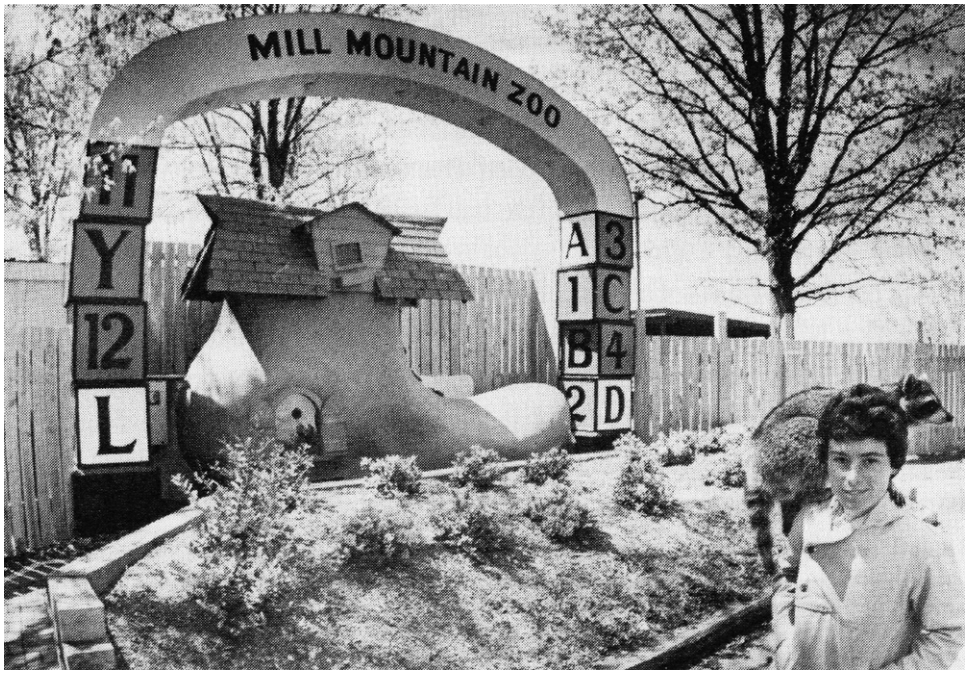


Figure 24. Mill Mountain Zoo

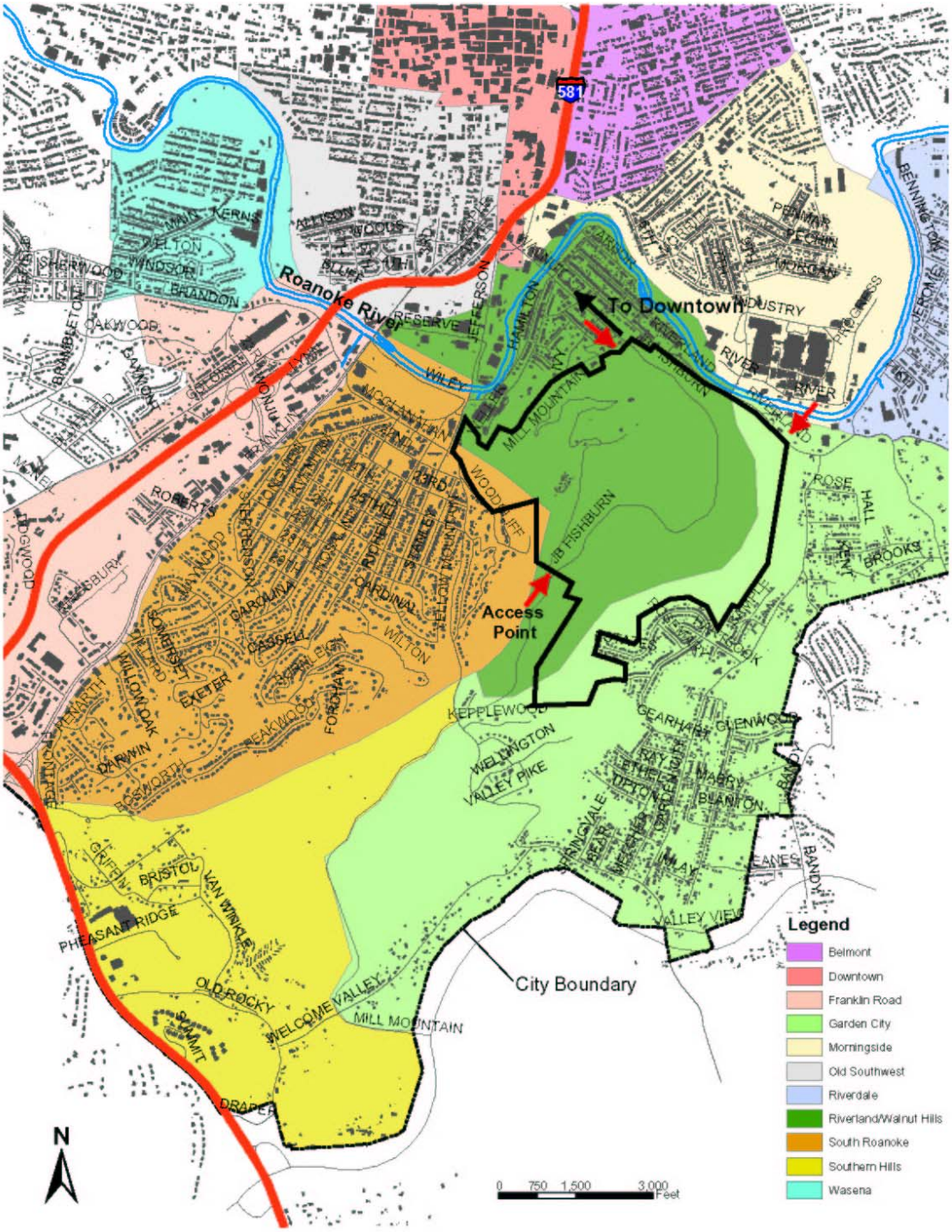


Figure 25. Urban connections

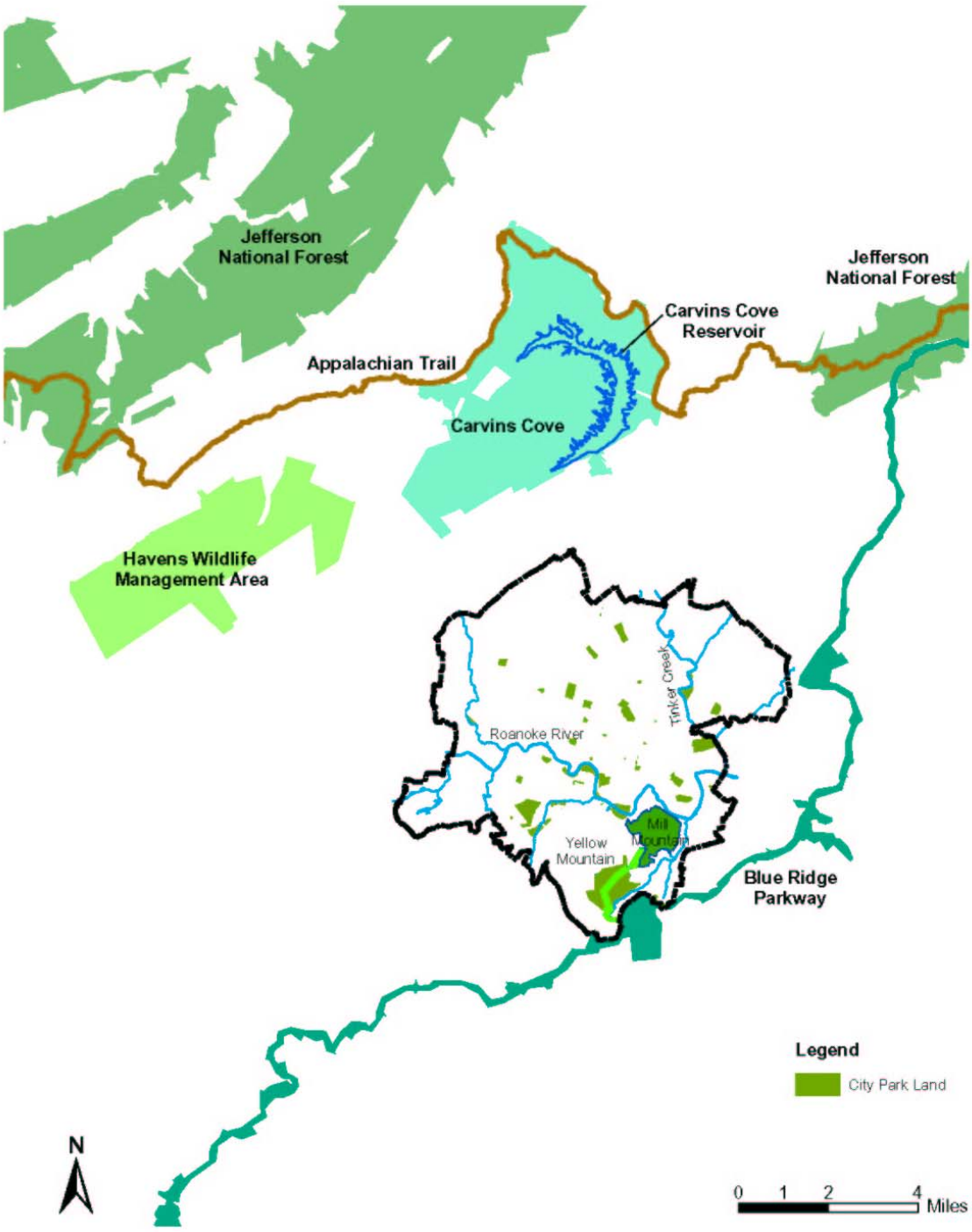


Figure 26. Ecological connections

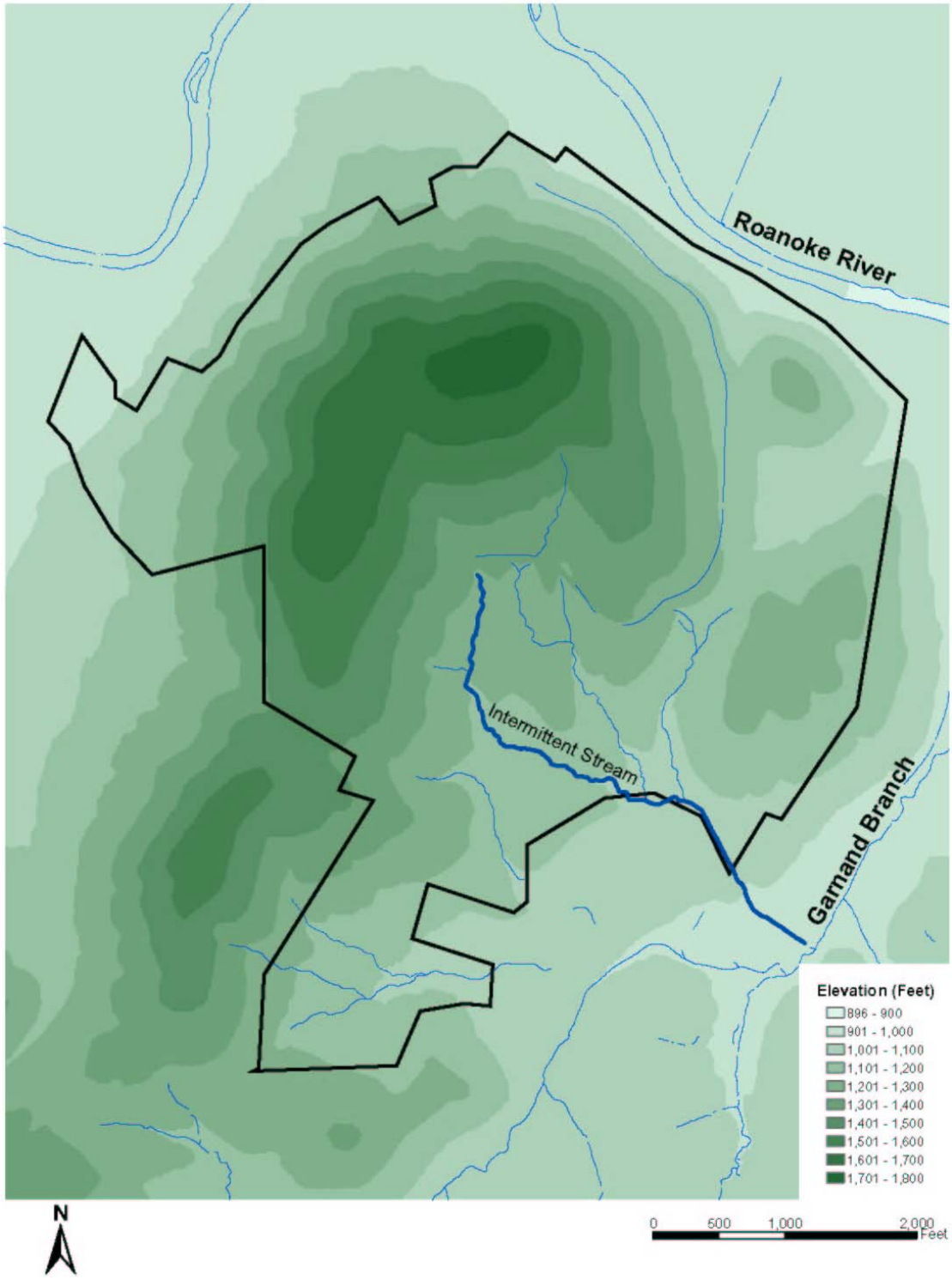


Figure 27. Elevation

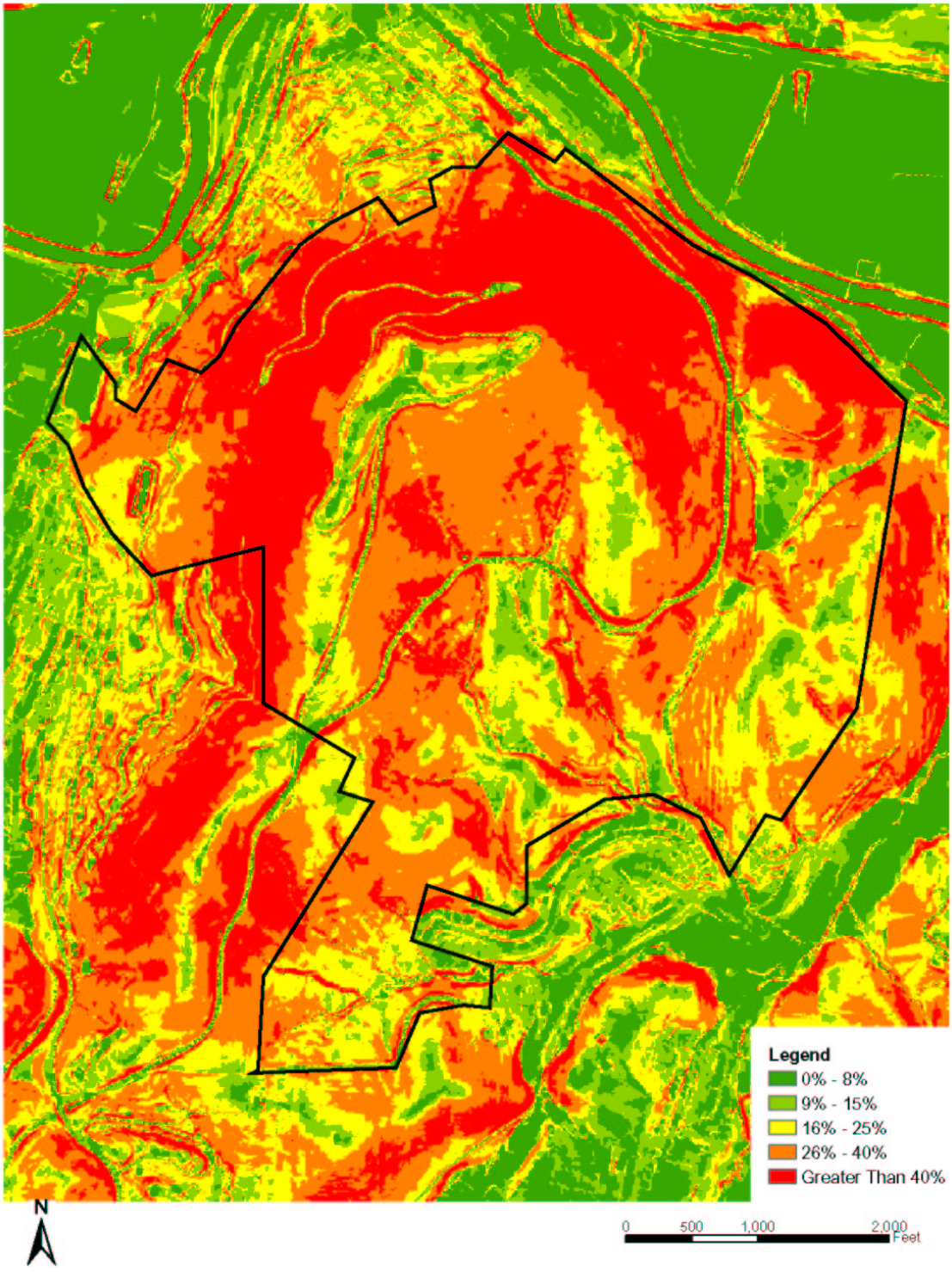


Figure 28. Slope

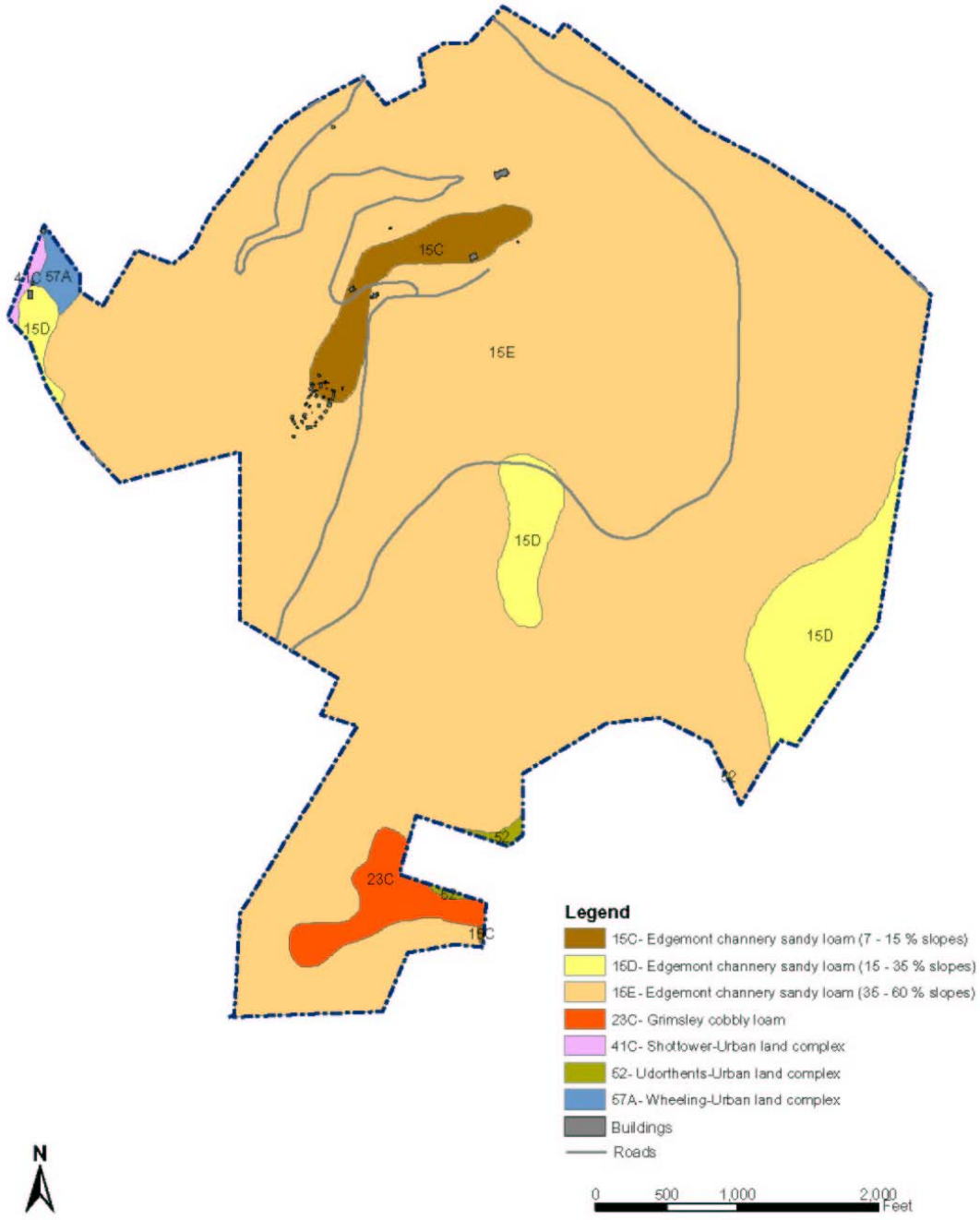


Figure 29. Soils

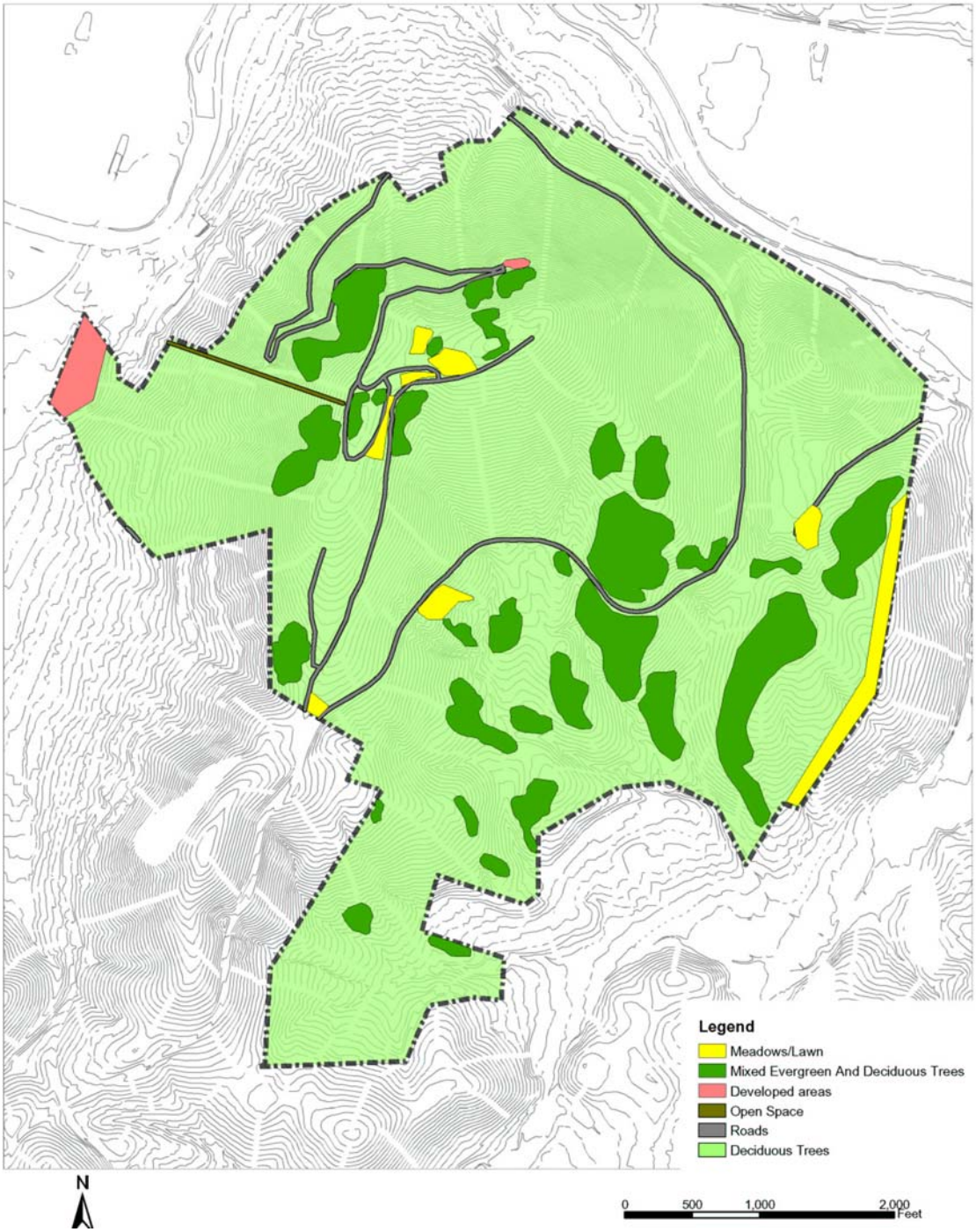


Figure 30. Vegetation

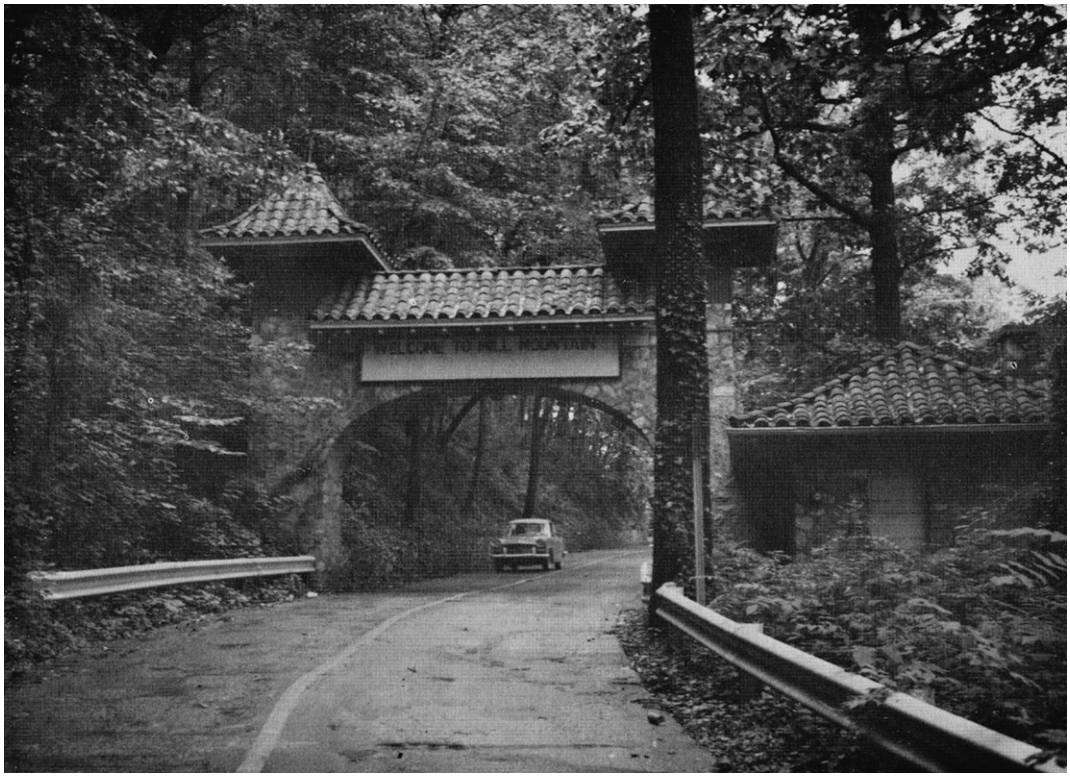


Figure 32. Toll road entrance

Figure 33. Toll road exit

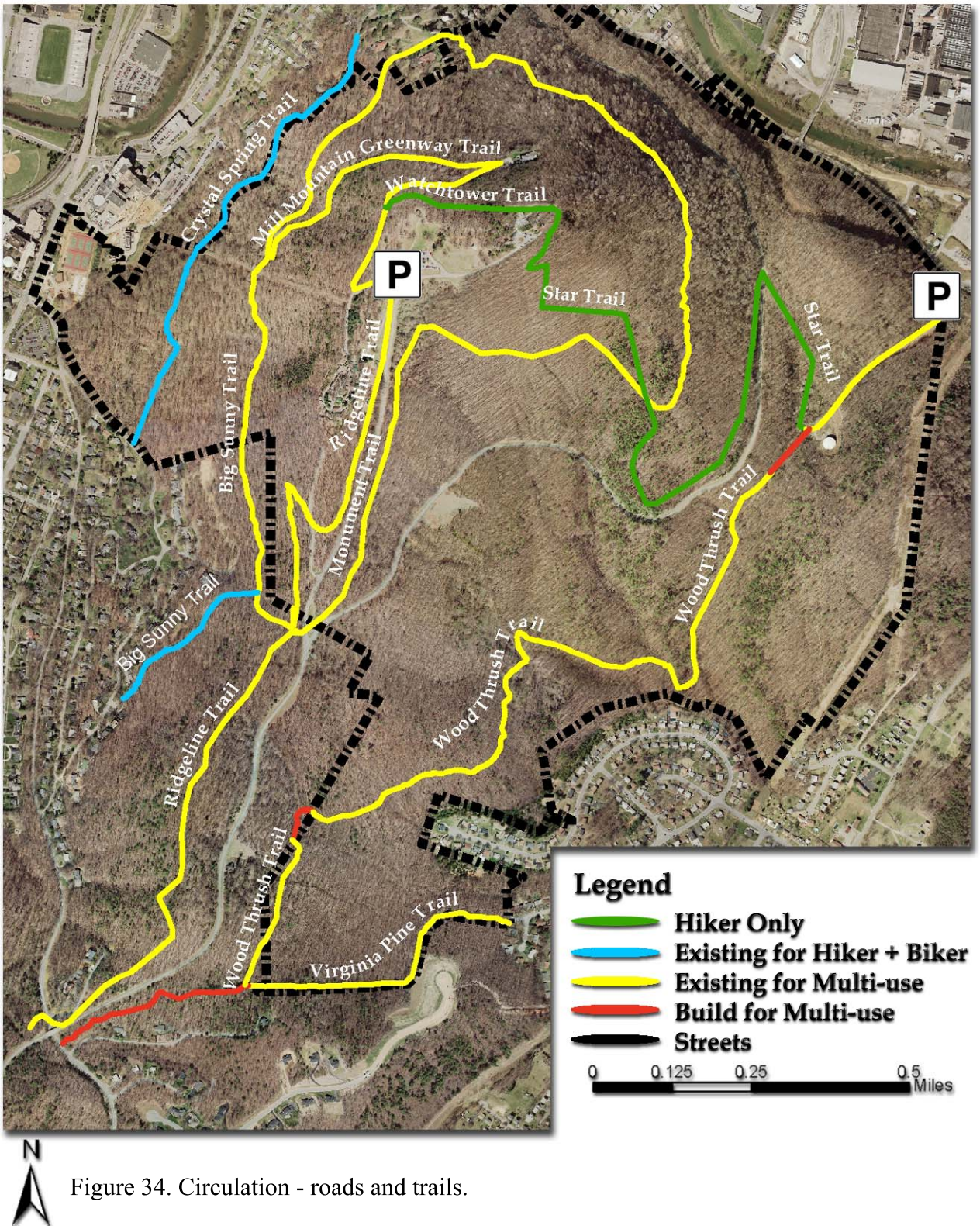


Figure 34. Circulation - roads and trails.

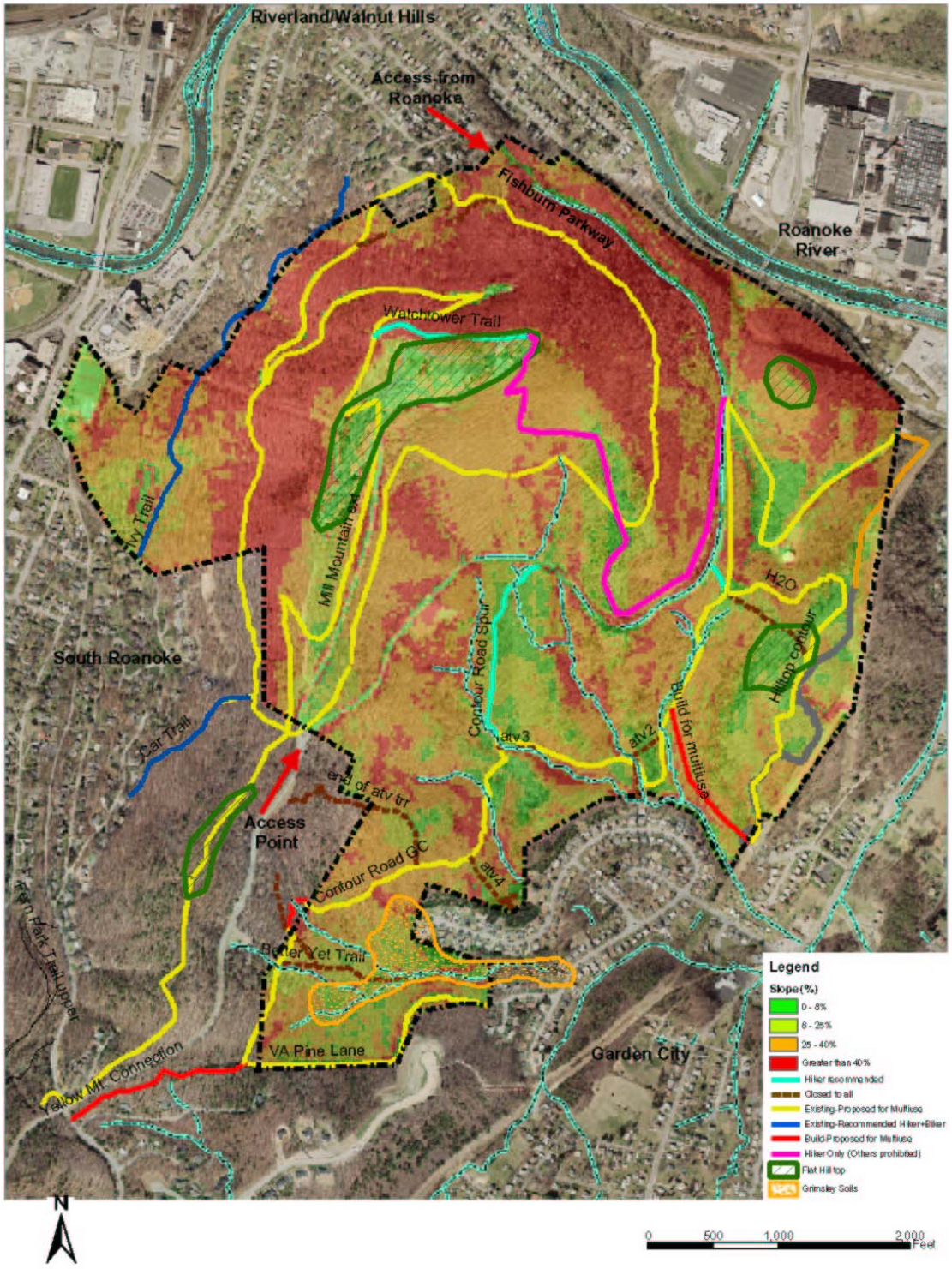


Figure 35. Composite analysis

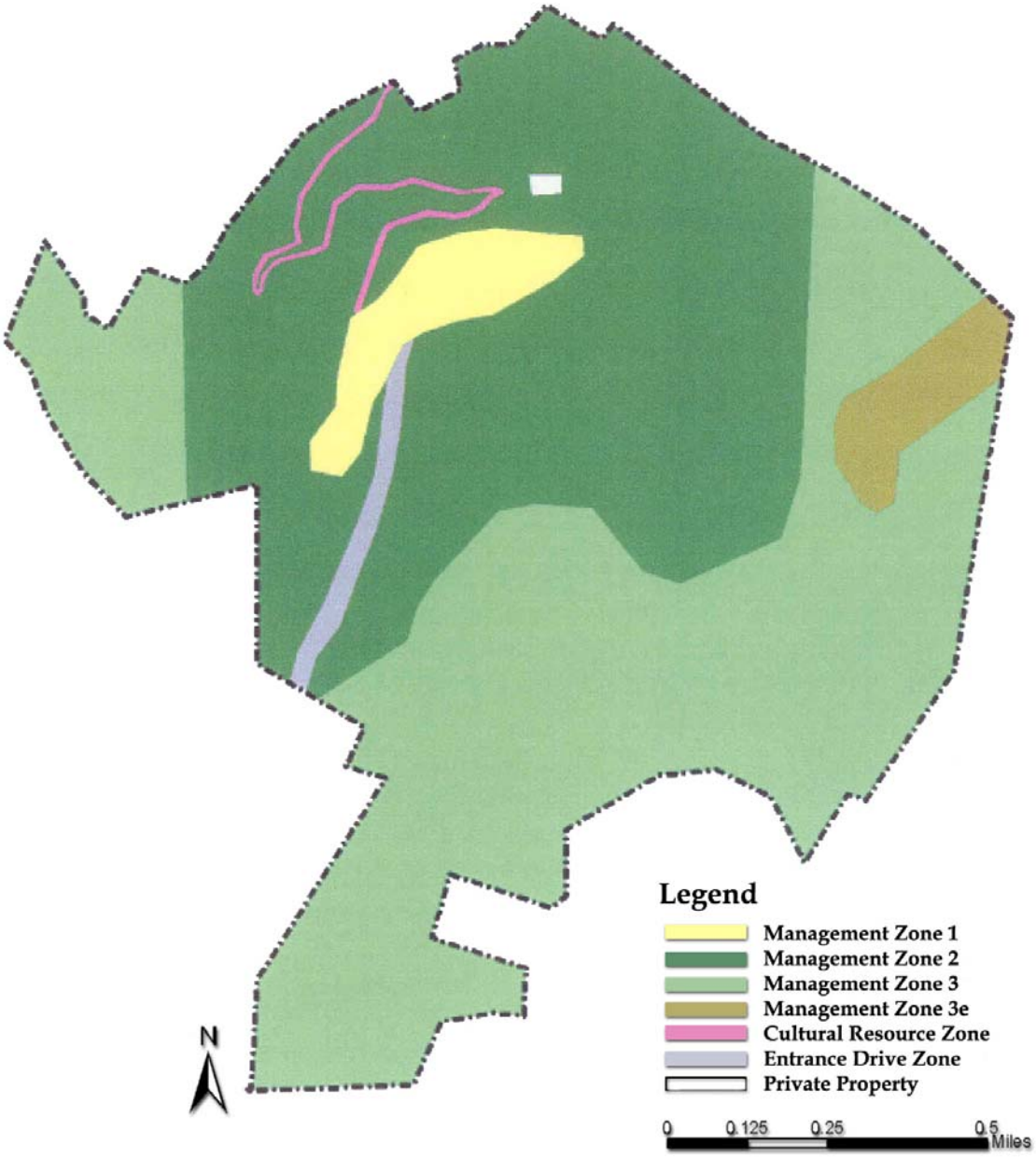


Figure 36. Resource Mangement Zones

Mill Mountain Trails Plan

Submitted to

City of Roanoke Parks & Recreation

and the

Mill Mountain Advisory Committee

September 1, 2005

Table of Contents

I. Preface

from Donnie Underwood, Roanoke Parks and Greenways Planner

…the perfect setting for leaving the paradigm of our life situation behind for just long enough to begin to feel and see what really concerns us……

Trails, open spaces and our parks are, indeed, vital structural components to a community due to their provision of, at least for a moment in time, a perfect setting. A park trail is not simply a route from here to there, rather it is a place to reconnect with ourselves and nature. In the development and care of these trails, we need to think about the experience for which we provide stewardship…….what will it look, feel, smell, taste, and sound like to each user?

Gifford Pinchot, Chief Forester under President Theodore Roosevelt, coined it best when charged with the administrative task of creating a policy directive that could be used to guide resource management for a wide variety of issues including wildlife, forestry, public parks and open spaces …..*…" the greatest good for the greatest number for the longest time";* thus, the phrase for ever-after would be known as *conservation!*

Sound conservation and stewardship are at the heart of Roanoke's philosophy regarding appropriate access to our natural landscapes. It was this same ethic that prompted both the Mill Mountain Advisory Committee and the Department of Parks and Recreation to work jointly towards a sound and sustainable access plan for Mill Mountain's trails; in essence, *the **Mill Mountain Trails Management Plan.***

The process that you are about to discover is best described as a "labor of love" that was crafted by eight individuals who cherish the resource known as Mill Mountain. With an excess of two-hundred service hours logged and countless additional hours of data analysis spread-out over numerous evenings and weekends, our trails task force made up of volunteers and City staff has brought this management plan to fruition for the enjoyment of trail users for decades to come.

It is the trail user, both you and I, and thousands of users yet to come that are indebted to the care and dedication this team has forged for our enjoyment……..

<u>The Mill Mountain Trail Task Force – "The Team"</u>

Brian Batteiger, Chair of Valley Area Shared Trails
Liz Belcher, Roanoke Valley Greenway Commission
Paul Chapman, Roanoke Parks and Recreation
Dick Clark, Mill Mountain Advisory Committee
Tom Clarke, Roanoke Parks and Recreation
Betty Field, Mill Mountain Advisory Committee
Bill Gordge, Pathfinders for Greenways
Linda Oberlender, Pathfinders for Greenways
Donnie Underwood, Roanoke Parks and Recreation

II. Glossary of Terms and Acronyms

BMP – Best Management Practices, standards of the profession for the best ways in which to implement actions

Front country – A natural area close to population centers, as opposed to backcountry which is remote and removed from access points

GPS – Global Positioning System, equipment communicating with satellites to pinpoint locations and provide mapping

IMBA – International Mountain Bicycling Association, an organization promoting the sharing of trails with mountain bikers

MMAC – Mill Mountain Advisory Committee, a City Council appointed board of citizens.

Multi-use – Trails that are used by more than user group, such as hikers, mountain bikers, and equestrians. Also referred to as shared-use trails

NPS – National Park Service, an agency in the Department of Interior, responsible for management of the Blue Ridge Parkway

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

Team – Trail Plan Team

UTAP – Universal Trail Assessment Process, a system developed by Beneficial Designs to rank the accessibility of trails for handicap users

VAST – Valley Area Shared Trails, a group representing a variety of trail users and dedicated to assisting local governments with expanding trail opportunities

Vision 2001 – City of Roanoke's Comprehensive Plan

III. Introduction

A. Brief History of Mill Mountain's Trails

For centuries Mill Mountain has drawn people to its slopes and summit for natural resources and recreation. As early as 6,000 B.C. indigenous people were attracted to the large natural spring at the base of the mountain. In 1882, the first documented road was built up the western slope to increase the municipal water supply. Later, other roads and trails were built either to bring people to the summit for outdoor recreation, to provide access to the forested slopes for loggers or fire management, or to reach the mountainous area behind Mill Mountain. A 1943 map shows most of today's roads and trails as existing fire trails. The trail system also holds regional, state, and national significance via the Mill Mountain Greenway Trail which connects to downtown Roanoke, the Star Trail which is on the Virginia Birding and Wildlife Trail, and Ridgeline and Wood Thrush trails through Mill Mountain Park which connect to the Blue Ridge Parkway trail system.

Due to the mountain's unique character and prominence, City Council created 'The Mill Mountain Development Committee", later known as the Mill Mountain Advisory Committee (MMAC). This appointed body's role is to advise City Council, via the Department of Parks and Recreation, on any and all development proposals for the park. In 1998, the MMAC established a trails subcommittee. This subcommittee worked with the Department of Parks and Recreation to investigate possible trail connections using existing paths. The result was a proposed trail from the base of the mountain near Riverland Road to the summit, behind the Mill Mountain Star, later known as the "Star Trail". The MMAC recommended this action to City Council, and the trail was built by volunteers and opened in 1999.

In 2001, the Department of Parks and Recreation was approached with the notion of having the trails on the mountain open for mountain bike usage. City policy at the time prohibited bicycle usage within public parks except on paved roads. A group of trail users from the differing user-groups (hikers, bikers, and equestrians) together with staff from Parks and Recreation coordinated to form the *Valley Area Shared Trails (VAST)* group. VAST has resulted in over one-hundred thirty men, women, boys, and girls joining forces to help create and repair trails on Mill Mountain as well as other natural trails in the Roanoke Valley.

In 2003 the most recent initiative by Parks and Recreation and the MMAC began to help enthusiastic volunteers inventory existing trails on the mountain and obtain accurate GPS locations of each pathway, trail, and fire road. Over the years a labyrinth of old road beds, trails, and utility corridors had developed on Mill Mountain. Many of these receive significant use as trails, but are unmarked and inconsistently maintained. In some areas only people who know where the trails are located, where they begin and end, can find the connections. Within the last two years, both the MMAC and Department of Parks and Recreation have taken great strides in changing public policy and steering an ethic of responsible natural resource stewardship regarding the mountain and how human access is best managed. The initiative of this trail management plan was a direct result of a series of consistent and thoughtful processes led by City staff and dedicated volunteers.

B. Project Partners and Scope of Work

In the winter of 2005, Parks and Recreation created a team of volunteers and staff from the Greenway Commission, Pathfinders for Greenways, and the Valley Area Shared Trails group to address the growing need for managing Mill Mountain's trails. As part of the land-use planning process of Parks and Recreation and the MMAC, the team's initial assignment was to inventory existing trails and utilize Best Management Practices (BMP's) for trail assessment to identify which trails were best suited for the different types of usage (hiking, biking, and horseback riding). The process of developing that plan highlighted the importance of the trail

system for outdoor recreation and environmental education opportunities. Consequently, the trail team developed a trail management plan which could be incorporated into the Mill Mountain Land-Use Plan.

The Trail Plan Team's objectives were:

1) To inventory and map existing trails, road beds, and paths within the Park.
2) To evaluate the suitability of each trail for use by hikers, equestrians, and mountain bikers.
3) To identify an official trail network for Mill Mountain Park.
4) To explore connecting the trail system for Mill Mountain Park with the Blue Ridge Parkway and Roanoke Valley Greenway trails.
5) To identify the issues, challenges, and opportunities for managing the trail system.
6) To identify needs, such as improvements to trails and ancillary facilities.
7) To identify operation and maintenance issues to be addressed by Parks and Recreation.
8) To provide input from representative trail users for the planning process.

C. Existing Direction Relevant to Trails

The Trail Plan Team reviewed existing deeds, goals, plans, study findings and vision statements to crystallize direction pertinent to trails. These include:

Fishburn Deed (1941):
[Mill Mountain …]"Developed and forever preserved, improved, and maintained for the use and pleasure of the people of the City of Roanoke, Virginia, and vicinity".

Rhodeside and Harwell (1991):
"B. Presentation of Goals and Objectives

1. Preserve visual integrity both to and from Mill Mountain.
2. Preserve Mill Mountain as a natural resource.
3. Preserve Mill Mountain as a symbol of Roanoke.
4. Enhance Mill Mountain as a place for recreation.
    - Maintain Mill Mountain as a predominantly passive park environment.
    - Enhance the close relationship between the Blue Ridge Parkway and Mill Mountain by developing scenic and nature-oriented recreational opportunities on the Mountain."

Comprehensive Parks and Recreation Master Plan (2000):
Action Strategies:

9. "Develop trails, greenways, and on-road bicycle facilities, doing so in a way to interconnect shopping areas, schools, work sites, parks, other important places in the valley, and future open spaces. Where appropriate, trails should be multi-use trails, accommodating activities such as hiking, bicycling, and horseback riding.
The development of greenways has very strong grassroots support throughout the City and Roanoke Valley."

Vision 2001/2020 (2001)
EC A7 "Promote trails on City-owned land, where feasible and suitable."
EC A8 "Promote and increase access to trails and natural areas by providing parking, guide maps, and appropriate marking."

Mill Mountain Vision Statement (2005):
"Mill Mountain will continue to enrich the quality of life for those who visit, work and live in the Roanoke Valley. It is an integral component of the green infrastructure of the region, or our urban fabric, and of the evolution of the City, which shall be honored and preserved.

Through sound stewardship, Mill Mountain will offer environmentally sensitive educational, recreational, and civic opportunities while preserving its natural character and resources."

A review of the literature about Mill Mountain, and a series of meetings with representative citizen's groups indicated that the mountain has been viewed in many ways by the people of Roanoke. These views generally fit within four descriptive categories:

1. Mill Mountain as a beautiful, natural environment that should be retained
2. Mill Mountain as an important symbol for the City of Roanoke
3. Mill Mountain as a significant visual landmark
4. Mill Mountain as a recreational resource

D. Goals, Objectives, and Strategies for the Trail System on Mill Mountain

The Trail Plan Team developed the following goals and objectives for the trail system on Mill Mountain.

Goal:
To provide a sustainable network of trails which provides residents and visitors with opportunities to enjoy the natural environment in ways which fulfill their physical, emotional, and spiritual needs while protecting the mountain resources.

Objectives:
To provide opportunities for multiple uses, including hiking, mountain biking, bicycling, and horseback riding.
To provide opportunities for disabled users and young people.
To provide sustainable trails.
To provide trails with a range of difficulties, but generally rated as easy to more difficult.
To provide linkages to other trail networks, including Roanoke Valley greenways and Blue Ridge Parkway trails.
To provide a spectrum of opportunities for educators, including scientists, artists, naturalists, and teachers.

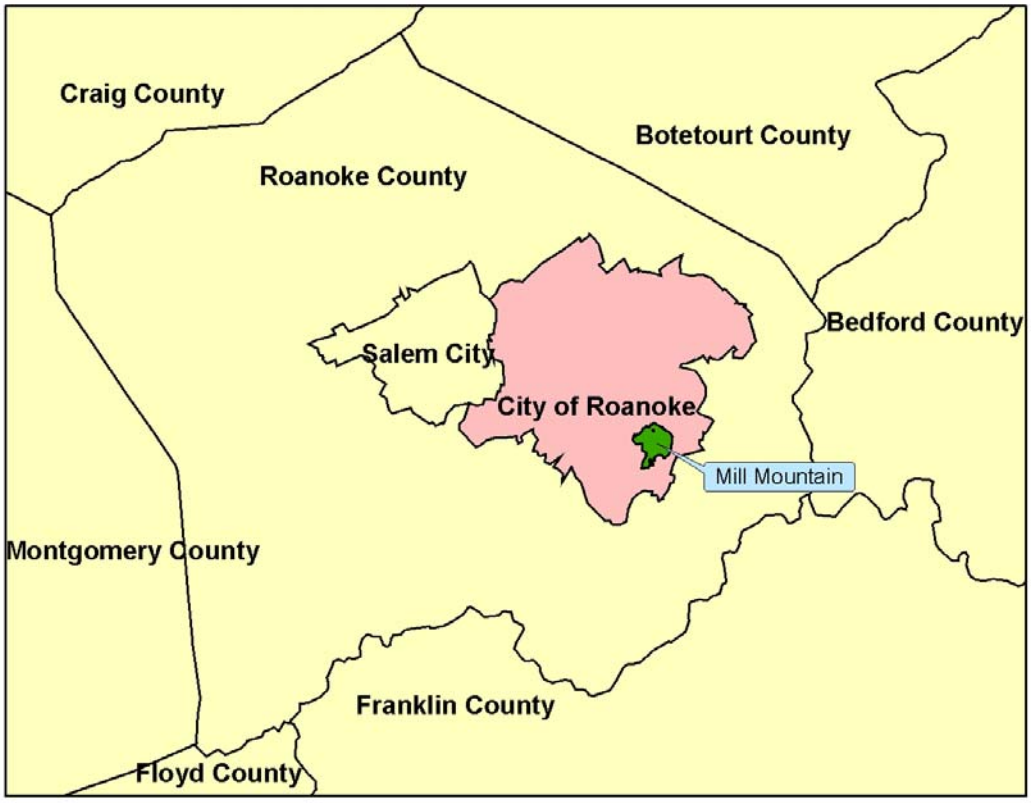
Strategies:
Provide loops.
Provide sustainable trails built to standards of U.S. Forest Service and International Mountain Bicycling Association (IMBA).
Provide connectivity among trails and destinations.
Provide for multi-use trails, including hikers, mountain bikers, bicyclists, and equestrians.
Provide signage and wayfinding.
Develop a cadre of volunteers to assist with maintenance.
Provide parking for a variety of users and vehicles.

IV. Trail Inventory

A. Description of Project Study Area

The project study area included 574-acres of Mill Mountain Park. In addition, the Team assessed the Fern Park Trail as a potential connection to the Blue Ridge Parkway trails. Mill Mountain Park is approximately a mile from Interstate I-581 and abuts the Blue Ridge Parkway. The Park is predominately a natural area, except for approximately 10 acres at the summit that are maintained for the Mill Mountain Star, picnic area, Discovery Center, wildflower garden, scenic paths, Mill Mountain Zoo and parking areas.

Vicinity Map for Mill Mountain Park



B. Data Collection Process and Methods

Process

The team used the following process:

1. Inventory
    a. Development of inventory forms and system.
    b. Training and procedure review with team.
    c. Inventory of existing trails and road beds.
    d. Review of potential trails and connections.
2. Mapping of existing and potentials trails.
3. Review and definition of standards by user group.
4. Review of trail data to determine user suitability and difficulty.
5. Coordination with Mill Mountain Management Plan team.
6. Recommendations for each trail of user groups and actions needed.
7. Composition of trail plan for presentation to Mill Mountain Advisory Committee.

Methods

The team reviewed several existing trail inventory systems, including the U.S. Forest Service, National Park Service, and Appalachian Trail Conference. Four of the Team members had been involved with the Blue Ridge Parkway trail inventory and plan, which used the Universal Trail Assessment Process (UTAP). The team decided to use a simplified version of that process. The UTAP system is a method developed by Beneficial Designs for assessing the accessibility of the trail for wheelchairs. The system records trail characteristics such as corridor width, tread width, slope, cross slope, obstacles and condition. Because UTAP is most useful when a trail system is complete, the Team made modifications to the forms to make them more suitable for collection of pertinent data. A sample cover sheet, data sheet, guidelines to the team, and a UTAP instruction sheet are included in Appendix A.

The inventory data was collected in leaf-off season in the winter of 2005. Trails were mapped using Trimble GeoExplorer and TDC1 GPS equipment with assistance from the Roanoke Valley Governor's School. There are significant gaps in satellite coverage for certain parts of the mountain due to topographical and forest canopy challenges; these sections were mapped multiple times. The raw data and draft mapping were then presented to Virginia Tech for GPS correction and final trail mapping.

With regard to trail names, some of the trails had existing colloquial names. These were used during inventory. Others were given names by the team as illustrated via the tables on the next page that show the trails which were inventoried and those which were only mapped. Those which were only mapped were either "not yet in existence but potential connections" or created by "illegal motorized activity".

Trails Assessed with Inventory Names

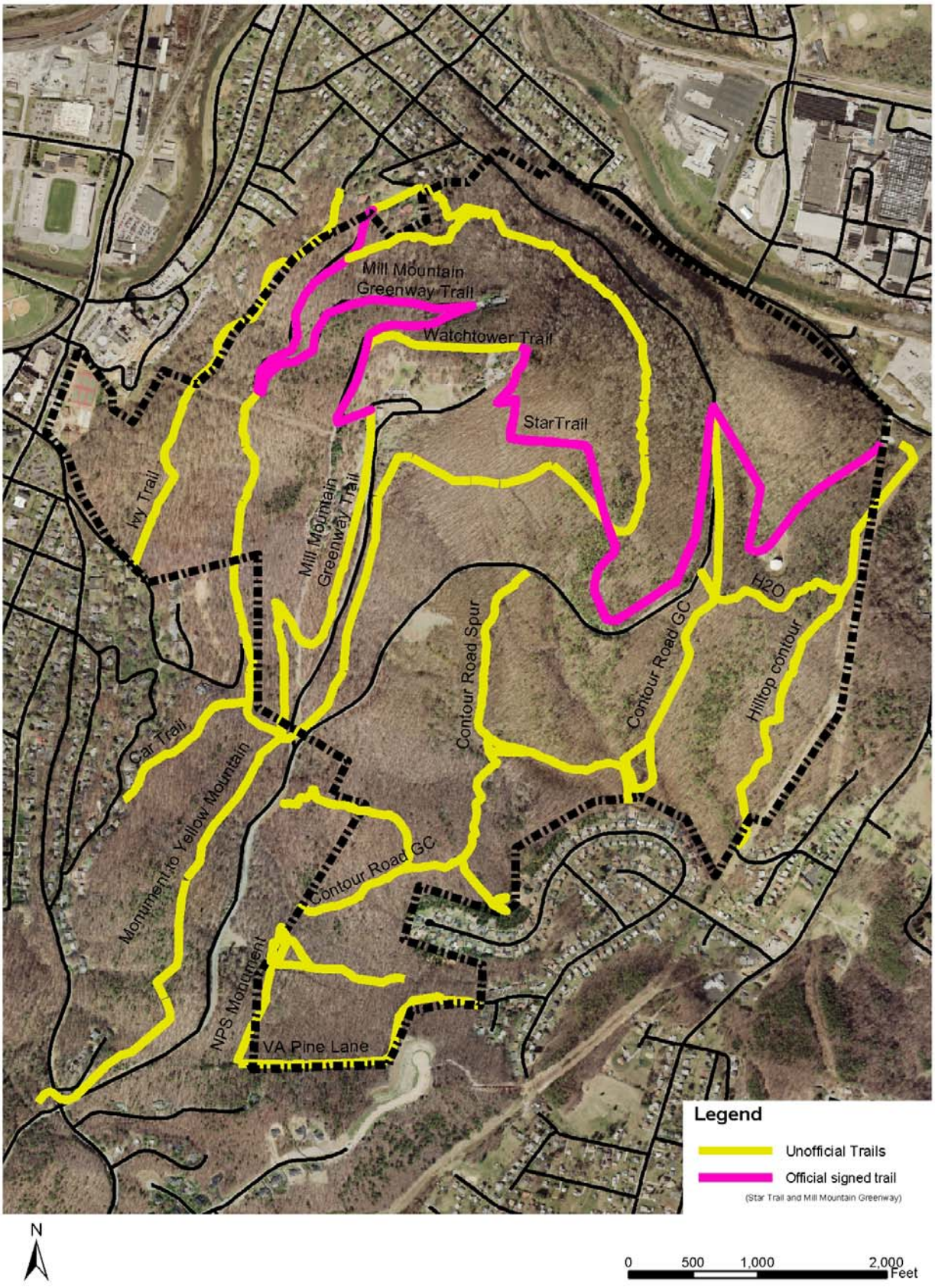
Name Used During Inventory	Segment Start	Segment End
West Side		
Car Trail	Prospect Road at Big Sunny	Robin Hood Rd.
Connecting Trail	Car Trail	Saddle
Fern Park Trail - Upper	Developed area	House site
Fern Park Trail - Lower	Developed area	Upper trail
Ian's Spot	Fishburn Parkway	Dead end below Monument Trail
Ivy Trail	Ivy Street	Woodcliff Road
Kepley Trail	Saddle	Morrison Street
Mill Mountain Greenway	Prospect Road at Sylvan	Discovery Center
Mill Mountain Greenway Extension	Saddle	Discovery Center
Mill Mountain Star Trail - Lower	Parking lot at Riverland	Edge of woods near water tower
Mill Mountain Star Trail - Upper	Edge of woods near water tower	Mill Mountain Star Trail Connection
Mill Mountain Star Trail Connection	Parking lot at Star (going to right)	Star overlook
Monument Trail	Monument near Fishburn Parkway	Star Trail
Terra Alta Trail	Star Trail	Sylvan Road
Watchtower Trail	Mill Mountain Star Trail Connection	Mill Mountain Greenway
Garden City Side		
ATV Trail - Unauthorized	Tree line at Parkway	Contour Road
Bear Here Trail	Triangle Corner on NPS Monument	Better Yet Trail
Better Yet Trail	NPS Monument Trail	3 ravine convergence
Contour Road - Garden City	NPS boundary by ravine	"The Flat"
Contour Road Spur #1	Contour Rd Segment 3	Fishburn Parkway
Contour Road Spur #2	The Flat	Fishburn Parkway
H*2* O Trail	The Flat	Hilltop Contour Rd.
Hilltop Contour Road	Powerline	Crown Point St.
Hilltop Loop Trail	The Flat	Hilltop Contour Rd.
NPS Monument Trail	Virginia Pine Lane	Triangle Corner
Neighborhood Loop	Contour Rd #4	Contour Rd #5
Virginia Pine Lane	Hartsook Blvd.	NPS boundary/NPS Monument Tr.

The table below shows the routes which were mapped, but not inventoried because they either were not built yet or were illegal ATV paths.

Trails Mapped but Not Assessed – Potential Connections or Closures

Mapped Trails Not Inventoried- Potential Connections or Closures		
Name Used During Inventory	**Segment Start**	**Segment End**
ATV Trail 2 - Unauthorized	Contour Road/Neighborhoood Tr.	Contour Road Segment 5
ATV Trail 3 - Unauthorized	Contour Road Segment 3	Contour Road Segment 4
ATV Trail 4 - Unauthorized	Contour Road Segment 2	Back yard on Estates Drive
Crown Point Connector - new	Crown Point St.	Contour Road Segment 5
Fern Park Trail - new	Upper trail	Chestnut Ridge Trail
Kepley Trail (New to replace road)	Near Morrison St.	Yellow Mtn Road.
Powerline Trail	Riverland Rd. Trailhead	Hilltop Contour Road
Tower-Flat Connector	The Flat	Water tower
Yellow Mtn. Connector	Virginia Pine Lane	Yellow Mtn Road

Inventory of Existing Trails on Mill Mountain – Winter 2005



C. Summary of Current Trail Conditions

Most of the trails on the mountain are in good condition with little erosion. This stability is largely attributable to the age of the roadbeds and the rockiness of the soil. Some of the road beds with excessive grade (>20%) are eroded and rutted, particularly the Hilltop Contour Road. Other erosion is evident on the multiple trails made by all terrain vehicles (ATVs) and motor bikes on the Garden City side of the mountain. There is one creek crossing on the Contour Road Trail which has been significantly rutted out by ATVs.

The table below summarizes the trail conditions found during inventory. Data sheets are in Appendix B.

Name Used During Inventory	Length	Typical Width	Typical Grade	Max Sustained Grade	Surface
West Side					
Car Trail	3839'	24" for 1328' 60" for 2511'	5%	23% for 50' 21% for 30'	Natural
Connecting Trail	702'	36"	22%	27% for 140' 24% for 140'	Natural
Fern Park Trail - Upper	1674'	24"	9%	25% for 81' 21% for 84'	Natural
Ian's Spot	375'	48"	17%	45% for 15' 20% for 60'	Natural
Ivy Trail	3540'	110"	3%	25% for 230' (paved section)	Gravel
Kepley Trail	3383'	48"	12%	21% for 150' 19% for 205'	Natural
Mill Mountain Greenway	6481'	210"	10%	12% for 435' 11% for 410'	Paved
Mill Mountain Greenway Extension	4000'	24"	8%	15% for 50'	Natural
Mill Mountain Star Trail - Lower	1296'	168"	11%	14% for 225'	Gravel
Mill Mountain Star Trail - Upper	7204'	48"	12%	35% for 70' 21% for 90'	Natural
Mill Mountain Star Trail Connection	468'	144"	3%	7% for 150'	Gravel
Monument Trail	4214'	24"	8%	18% for 85'	Natural
Terra Alta Trail	3952'	24"	8%	24% for 60' 17% for 110'	Natural
Watchtower Trail	1228'	60"	7%	12% for 205'	Natural
Garden City Side					
ATV Trail - Unauthorized	1495'	46"	15%	>20 for 200' >15 for 500'	Natural
Bear Here Trail	300'	84"	20%	28% for 75'	Natural
Better Yet Trail	1100'	84"	15-20%	>20 for 225'	Natural
Contour Road - Garden City -#1	968'	48"	6%	18% for 75'	Natural
Contour Road - Segment #2	1293'	60"	10%	23% for 110'	Natural
Contour Road - Segment #3	99'	72"	5%	5%	Natural
Contour Road - Segment #4	1058'	60"	5%	12% for 60'	Natural
Contour Road - Segment #5	2417'	72"	10%	21% for 55' 19%for 65'	Natural
Contour Road Spur #1	1668'	72"	10%	16% for 220'	Natural
Contour Road Spur #2	236'	72"	>15%	19% for 170'	Natural
H_2O Trail	1194'	72"	6%	11% for 110'	Natural
Hilltop Contour Road	2342'	60-72"	1/2 = 5% 1/2=16%	>15% for 400' in two places	Natural
Hilltop Loop Trail	830'	54"	15%	>17% for 410' 22% for 160'	Natural
NPS Monument Trail	1059'	96"	8%	10% for 210'	Natural
Neighborhood Loop	298'	48"	8%	10% for 75'	Natural
Virginia Pine Lane	2233'	96"	8%	20% for 60'	Natural

D. Access and Parking

Mill Mountain's strategic location between South Roanoke, Garden City, and the Blue Ridge Parkway contributes to its functioning both as a neighborhood park and an important destination site. Many people walk, bike, or ride to the trails from their homes. Others drive to one of the parking lots and use the trails from there. Some of the trails with termini on neighborhood streets are principally accessed without a vehicle; others have minimal on-street parking. The table below lists the various access points and facilities.

Inventory of Access to Mill Mountain Trails

Location	Type	Number of Vehicles	Other facilities
Mill Mountain Discovery Center	Parking Lot	54 cars; 3 buses,RVs	Visitor center; bathrooms; picnicking; overlook
Mill Mountain Star Parking Area	Parking Lot	15	Overlook; bathroom; kiosk
Riverland Road Trailhead	Parking Lot	10	Brochure dispenser
Crown Point St.	On street parking	4	None
Fern Park/Jefferson St.	On street parking	2	Park, playground
Fishburn Parkway at Monument	On street parking	3	Designated by curbing
Fishburn Parkway at Star Tr.	On street parking	2	Designated by guardrail
Hartsook Blvd.	On street parking	6	None
Morrison Street	On street parking	2	None
Robin Hood Road	On street parking	2	None
Woodcliff Road	On street parking	4	Gate, utility building
Yellow Mtn. Rd. - east side	On street parking	6	Gravel pull-off
Ivy Street	Walk/ride-in	0	Gate
Prospect Road at Big Sunny	Walk/ride-in	0	None
Prospect Road at Sylvan	Walk/ride-in	0	None
Yellow Mtn. Rd. - west side	Walk/ride-in	0	None

V. Trail Management Issues

The team members recognize that accommodating the trail needs of both residents and visitors to the Roanoke Valley, while protecting the resource base, is a challenging task. Mill Mountain provides an urban, "front country" trail system that could see hundreds of users a week. Long term management will require sustainable trail design and the continued development of a partnership approach to planning and managing trail resources.

The team identified the following issues which Parks and Recreation managers will need to address in managing the trails. Additional information is provided in Appendix C.

A. Sustainable Trail Design

Sustainable trails are needed to protect the soils of Mill Mountain and provide facilities that require minimal maintenance. Trails should be located in such a way that they can be used without significant trail degradation or erosion. Such trails are aligned with a rolling contour design, using grade dips as a standard drainage structure to remove rain water. The IMBA book Trail Solutions is an excellent resource for designing trails.

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.
Blue Ridge Parkway Trail Plan, Final Draft

B. Trail User Designation

In developing this plan, the team discussed strategies available to manage types of use on trails. These strategies 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. This plan recommends that most trails on the mountain allow multi-use with hikers, mountain bikers, and equestrians, but that some trails be reserved for single use.

C. Trail Standards

The team reviewed trail design standards from a wide range of agencies and published sources, as listed at the end of this document. After review and comparison of recommendations, Park staff selected the U.S. Forest Service guidelines for use in developing this plan.

	Hiker	Mountain Bike	Horseback
Grade			
Max for Easiest	20% for 100'	10% for 100'	15% for 200'
Max for More Difficult	30% for 300'	30% for 300'	25% for 300'
Max for Most Difficult	+30% for 500'	+30% for 500'	=30% for 500'
Max. sustained		5%, 10%, 15%	
Turning radius		6', 3', 2'	
Clearing (width x ht)			
Easiest	48" x 8'	48" x 8'	8' x 10', 6' between trees
More Difficult	36-48" x 8'	36-48" x 8'	6' x 8'
Most Difficult	36" x 8'	36" x max. 8"	3-4' x max 8'
Tread (width & surface)			
Easiest	18-24", spot gravel	24", relatively smooth	24", surface for stability
More Difficult	12-18", some obstacles	12-24", rough sections	24", leave roots&rocks
Most Difficult	12", no graded tread	12", some portage	18", not graded exc. >30% side slope

D. User Conflicts and Responsible Behavior

Trail conflicts develop for a variety of reasons, usually related to users expectations and desired experience. Many conflicts occur because of inconsiderate user behavior. Such conflicts can be avoided by education on trail etiquette, posting of guidelines and regulations, and enforcement of rules. Frequency of contact is an important factor, as hikers normally travel at 2 miles per hour, horses at 5-6 mph, and mountain bikers at 3-15 mph. Interaction among users can be reduced through careful design and construction or management actions by Parks and Recreation, such as restricting the direction of use, days of use, or types of users. The team recommends an educational program to instill a trail ethic of etiquette in all users.

All trail users should know who has the right of way. Bikers yield to hikers and horses, with hikers also yielding to horses.

Trail Right of Way Symbol

Etiquette guidelines for various users are included in Appendix D. All users should be courteous, speak to others and horses when approaching to pass, restrict noise, and “leave no trace”.

VI. Trail Recommendations

A. **Trail Prescriptions for Usage and Closure**

The team reviewed each trail in light of the standards presented above in Section V-C and the goals and objectives from Section III-D. The recommendations are shown in the tables below and on the following page:

Trail Uses and Closures

Name Used During Inventory	Recommended Name	Recommended Use	Rationale
West Side			
Car Trail	Big Sunny Trail	Open to hikers, mtn. bikers, equestrians	Historically open; grades moderate, condition good.
Connecting Trail	Riser Trail	Open; one way for horses and mtn. bikes	Historically open; grades steep; one way uphill needed for safety and sustainability.
Fern Park Trail	Fern Park Trail	Extend to Chestnut Ridge Trail; hikers only	Not part of Mill Mtn Park or Plan; provides connectivity to Parkway trails and access for Mill Mtn. Parkway trails are hiker, equestrian only.
Ian's Spot	No name	Close	Too steep; does not connect to trails.
Ivy Trail	Crystal Spring Trail	Open to hikers, mtn. bikes	Easy grade, good condition; too close to neighborhoods for horses.
Kepley Trail	Ridgeline Trail	Open to hikers, mtn. bikers, equestrians	Historically open; fair-good condition; major connector to Parkway's Chestnut Ridge Trail.
Mill Mountain Greenway	Mill Mountain Greenway	Open to all	Historically open; paved; connection to downtown.
Mill Mountain Greenway Extension	Ridgeline Trail	Open to hikers, mtn. bikers, equestrians	In Greenway Plan; connectivity to Discovery Center
Mill Mountain Star Trail - Lower	Wood Thrush-Star Access Trail	Open to hikers, mtn. bikers, equestrians	Gravel road suitable for any use; sign as access to Star and Wood Thrush Trails. Consider improvement or off-road route. Need connection to Roanoke River
Mill Mountain Star Trail - Upper	Star Trail	Open to hiking only	Built for hikers; steep grades; modify termini so that gravel road is not part of Star Trail
Mill Mountain Star Trail Connection	No name	Open to hikers, mtn. bikers, equestrians	Major connection to Star from parking lot and trail; more of a pathway than trail
Monument Trail	Monument Trail	Open to hikers, mtn. bikers, equestrians; combine with Terra Alta	Good sidehill trail; good connectivity; combining the two will simplify trail system.
Terra Alta Trail	Monument Trail	Open to hikers, mtn. bikers, equestrians; combine with Monument	Good sidehill trail; good connectivity; combining the two will simplify trail system.
Watchtower Trail	Watchtower Trail	Open to hiking only	Good width and grade, but steps required to connect to Mill Mountain Greenway/Prospect Road

Name Used During Inventory	Recommended Name	Recommended Use	Rationale
Garden City Side			
ATV Trail - Unauthorize	No name	Close	Illegal Parkway access; too steep; not sustainable.
Bear Here Trail	No name	Close	Too steep; not sustainable
Better Yet Trail	No name	Close	Too steep; not sustainable; no access on downstream end
Contour Road - Garden City -#1	Wood Thrush Trail	Open to hikers, mtn. bikers, equestrians	Good sidehill trail; dual track; sustainable. Need connections on each end to form continuous trail from Yellow Mtn. Road to water tower and Riverland Rd. Trailhead.
Contour Road - Segment #2	Wood Thrush Trail	Open to hikers, mtn. bikers, equestrians	Combine with segment #1 above.
Contour Road - Segment #3	Wood Thrush Trail	Open to hikers, mtn. bikers, equestrians	Combine with segment #1 above.
Contour Road - Segment #4	Wood Thrush Trail	Open to hikers, mtn. bikers, equestrians	Combine with segment #1 above.
Contour Road - Segment #5	Wood Thrush Trail	Open to hikers, mtn. bikers, equestrians	Combine with segment #1 above.
Contour Road Spur #1	No name	Not recommended	Connects to J.P. Fishburn Parkway, but guardrail blocks users.
Contour Road Spur #2	No name	Not recommended	Connects to J.P. Fishburn Parkway, but guardrail blocks users.
H_2O Trail	No name	Do not open	Currently grown up; do not open; connection to Hillside trails not recommended.
Hilltop Contour Road	No name	Close	Too steep; very eroded in places; not sustainable; provides illegal access to ATVs and motor bikes
Hilltop Loop Trail	No name	Close	Too steep; not sustainable
NPS Monument Trail	Wood Thrush Trail	Open to hikers, mtn. bikers, equestrians	Sustainable; connection from Contour Road Trail to Yellow Mtn. Rd.; used by NPS for boundary maintenance
Neighborhood Loop	No name	Close	Dead end into a yard on Estate St.
Virginia Pine Lane	Virginia Pine Trail	Open to hikers, mtn. bikers, equestrians	Needs rehabilitation, but could be sustainable and provides best access to Garden City neighborhood.
Mapped Trails			
ATV Trail 2 - Unauthorized	No name	Close	ATV created; significant erosion and stream degradation.
ATV Trail 3 - Unauthorized	No name	Close	ATV created; stream degradation.
ATV Trail 4 - Unauthorized	No name	Close	Too steep; dead end into a yard.
Crown Point Connector - new	No name	Do not open	Trail access at Hartsook instead. No need to build if access closed.
Fern Park Trail - new	Fern Park Trail	Build	Provides connection from Fern Park Trail to Chestnut Ridge and thus Ridgeline Trail.
Kepley Trail (New to replace road)	Ridgeline Trail	Future	Possible short connection in future if road walk on Morrison becomes problematic.
Powerline Trail	No name	Close	Steep; not sustainable; illegal motorized use.
Tower-Flat Connector	Ridgeline Trail	Build	Connection from Contour Road Trail/Flat to water tower and Riverland Rd. Trailhead; provides connection for multi-use on Garden City side.
Yellow Mtn. Connector	Ridgeline Trail	Build	Connection from NPS Monument Trail to Yellow Mtn. Rd for multi-use trail. Need NPS approval.

B. Trail Names and Termini

The team reviewed the existing colloquial and inventory names and the City standard practices for naming facilities. The trail recommendations above involve combining several of the trails into continuous sections. The following names are recommended for the trail system.

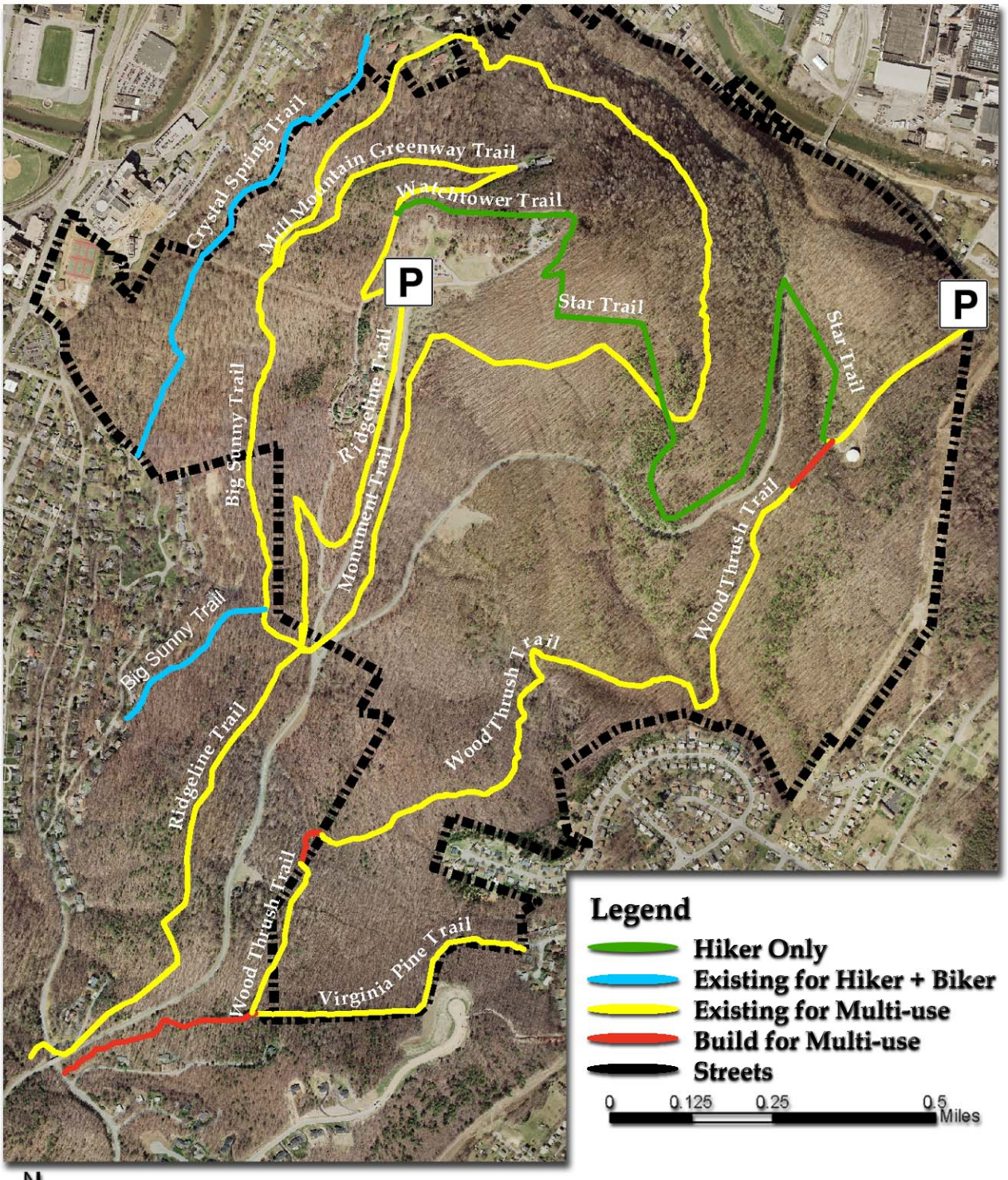
Mill Mountain Trail System Names

Name Used During Inventory	Official Name
West Side	
Car Trail	Big Sunny Trail
Connecting Trail	Riser Trail
Ivy Trail	Crystal Spring Trail
Kepley Trail	Ridgeline Trail
Mill Mountain Greenway	Mill Mountain Greenway
Mill Mountain Greenway Extension	Ridgeline Trail
Mill Mountain Star Trail - Lower	Wood Thrush - Star Access Trail
Mill Mountain Star Trail - Upper	Star Trail
Mill Mountain Star Trail Connection	No name
Monument Trail	Monument Trail
Terra Alta Trail	Monument Trail
Watchtower Trail	Watchtower Trail
Garden City Side	
Contour Road Trail - Segments 1-5	Wood Thrush Trail
NPS Monument Trail	Wood Thrush Trail
Virginia Pine Lane	Virginia Pine Trail
Tower-Flat Connector	Wood Thrush Trail
Yellow Mtn. Connector	Wood Thrush Trail

The termini of the official trails are shown in the table below.

Termini of Trails in Mill Mountain System

Trail Name	Termini
Big Sunny Trail	Mill Mtn. Greenway/Prospect Rd to Robin Hood Rd
Crystal Spring Trail	Ivy St. to Woodcliff Rd
Mill Mountain Greenway	Sylvan Rd. to Discovery Center
Monument Trail	The Monument to Sylvan Rd.
Ridgeline Trail	Discovery Center to Yellow Mtn. Rd.
Riser Trail	Big Sunny Trail to Mill Mtn. Park entrance
Star Trail	Wood Thrush-Star Access Trail to Star
Virginia Pine Trail	Hartsook Blvd. to Wood Thrush Trail
Watchtower Trail	Star to Mill Mtn. Greenway/Prospect Rd.
Wood Thrush Trail	Wood Thrush - Star Access Trail to Yellow Mtn. Rd.
Wood Thrush - Star Access Trail	Riverland Road Trailhead to water tower



Official Mill Mountain Trail System

C. Trails by User Group

The table below shows facilities open to each user group.

Hikers	Mountain Bikes	Road Bicycling	Horses
Big Sunny Trail	Big Sunny Trail	J. P. Fishburn Parkway	Big Sunny Trail
Crystal Spring Trail	Crystal Spring Trail	Mill Mountain Greenway	Mill Mountain Greenway
Mill Mountain Greenway	Mill Mountain Greenway	Mill Mountain Spur Road	Monument Trail
Monument Trail	Monument Trail		Ridgeline Trail
Ridgeline Trail	Ridgeline Trail		Riser Trail
Riser Trail	Riser Trail		Virginia Pine Trail
Star Trail	Virginia Pine Trail		Wood Thrush Trail
Virginia Pine Trail	Wood Thrush Trail		Wood Thrush - Star Access Trail
Watchtower Trail	Wood Thrush - Star Access Trail		
Wood Thrush Trail			
Wood Thrush - Star Access Trail			

D. Specific Trail Improvement Recommendations

The recommendations in the table below are in addition to general recommendations above and signage issues.

Trail Name	Recommendations
Big Sunny Trail	1. Acquire a permanent easement across the Pace property, and work with property owners to acquire necessary public trail easements.
	2. Widen trail sections near Prospect Road to 24-36".
Crystal Spring Trail	1. Improve surface for trail use.
Mill Mountain Greenway	1. Install entrance sign.
	2. Provide brochures at Discovery Center.
Monument Trail	1. Widen any areas that are not yet 24".
	2. Post warning signs on steep slopes near Sylvan.
Ridgeline Trail	1. Install grade reversal at top of steep hill.
	2. Coordinate with Mill Mountain Zoo to relocate fencing and complete trail.
	3. Consider a side trail to views from the rocks.
Riser Trail	1. Post for one way use uphill by mtn. bikes and horses.
	2. Consider improvement/alternatives to accommodate two way use.
Star Trail	1. Revise termini to start at end of gravel road near water tower.
	2. Rehabilitate eroded sections, eliminate braided sections, install reverse grades where needed.
	3. Establish a nature trail section or loop near the Discovery Center, incorporating a wildflower section.
Virginia Pine Trail	1. Rehabilitate, installing grade reversals, access control, and drainage features.
Watchtower Trail	1. Install steps at wall on Prospect Road.
Wood Thrush Trail	1. Build three sections of trail to provide continuous route.
	2. Coordinate with Blue Ridge Parkway on construction of section near Yellow Mtn. Rd., including improvements at Yellow Mtn. Road with directional signage and map of trail network.
Wood Thrush - Star Access Trail	1. Improve surface for trail users or consider alternate location.

Connections to Other Systems	
Fern Park Trail	1. Complete new connection from Fern Park to Chestnut Ridge Trail with signage to Ridgeline Trail.
	2. Regrade intersection of upper and lower trails.
Chestnut Ridge Trail	1. Provide connections and signage at Yellow Mountain Road on east and west sides.
Roanoke River Greenway	1. Provide connection from Riverland Road Trailhead to Roanoke River Greenway.

E. Trail Difficulty Rating

Trails on Mill Mountain were given difficulty ratings based on trail assessment data and the Team's input. Rating each trail's difficulty can: 1) help users make informed decisions, 2)encourage visitors to use trails that match their skill level, 3) minimize risk and injuries and 4) improve visitors' experiences. Trail difficulty ratings should be posted on trails, kiosks, and maps.

The difficulty of the trail will vary depending on the user and mode of travel. Hikers can negotiate most obstacles. Mountain bikers are more affected by trail surface obstacles. Horses are less affected by distances, but restricted by clearances. In general, the following factors are important in rating trail difficulty: tread width, trail clearance, tread surface, trail grade, natural obstacle, and technical features.

Trail difficulty ratings are assigned under ideal conditions and are based on difficulty compared to other routes in the area. A trail rated easy by local standards could possibly be rated moderate or difficult elsewhere. Conditions are always subject to change due to weather and other unusual conditions. The following system will be used on Mill Mountain trails.

(Easy) These routes are appropriate for novice through advanced users. They generally follow obvious, well-marked trails and roads. Grades are gentle, and few obstacles will be encountered.

(More Difficult) These routes are appropriate for intermediate through advanced users. Terrain may be steeper, trails narrower, and some obstacles may be encountered.

(**Most Difficult**) These routes are recommended for physically fit users. Terrain is steep, and technical obstacles may be encountered.

The following table shows the recommended trail difficulty rating by user group for the Mill Mountain Trail System.

	Degree of Difficulty			
	Hiker	Horseback	Mountain Bike	Road Bicycling
Trail Name				
Big Sunny Trail				n/a
Crystal Spring Trail		n/a		n/a
Mill Mountain Greenway				
Monument Trail				n/a
Ridgeline Trail				n/a
Riser Trail				n/a
Star Trail		n/a	n/a	n/a
Virginia Pine Trail				n/a
Watchtower Trail		n/a	n/a	n/a
Wood Thrush Trail				n/a
Wood Thrush - Star Access Trail				n/a
Roads				
J.P. Fishburn Parkway	n/a	n/a	n/a	
Mill Mountain Spur Road	n/a	n/a	n/a	
= Easy	= More Difficult			= Most Difficult

F. Access and Parking

Existing access and parking options facilitate dispersed use of the Park trails. Limited or dedicated parking should be allowed at all on-street access points. All of the parking lots are full on occasion, but restriction of parking is one technique to prevent overcrowding on trails.

Parking Improvements

Parking Lots	
Discovery Center Parking Lot	1. Provide clear signage for access to trails.
	2. Install kiosks with maps, trail routes and difficulty, rules, and contacts.
	3. Continue to allow trailers to park in bus slots.
Mill Mountain Star Parking Area	1. Provide clear signage for access to trails.
	2. Finish kiosk.
Riverland Road Trailhead	1. Enlarge to accommodate horse trailers.
	2. Install kiosks with maps, trail routes and difficulty, rules, and contacts.
On-street Parking	
Crown Point St.	1. Close to parking.
Fern Park/Jefferson St.	1. Continue to allow parking and consider expansion.
Fishburn Parkway at Monument	1. Retain; sign trails.
Fishburn Parkway at Star Tr.	1. Retain.
Hartsook Blvd.	1. Provide trail signage and kiosk.
Morrison Street	1. Allow on-street parking.
Robin Hood Road	1. Allow on-street parking.
Woodcliff Road	1. Allow on-street parking.
Yellow Mtn. Rd. Parking	1. Improve parking area with accommodation for horse trailers.
Walk/ride-in Access	
Ivy Street	No parking.
Prospect Road at Big Sunny	No parking.
Prospect Road at Sylvan	No parking.
Yellow Mtn. Rd. - west side	No parking.

Equestrian users are currently the ones for whom parking is most difficult. Vehicles with trailers require longer parking spots and larger turning radius. The following recommendations should be considered in addressing equestrian parking:

1. Work with the Blue Ridge Parkway in establishing horse trailer parking at Chestnut Ridge Overlook or Roanoke Mountain Campground.
2. Enlarge or redesign the Riverland Road Trailhead to accommodate horse trailers.
3. Explore parking options in partnership with AEP.
4. Allow trailers to park at the Discovery Center parking lot, and consider horses in any re-design of parking areas.
5. Explore improvements to the Yellow Mountain Road pull off to make it accessible for horse trailers.

VII. Trail Management Recommendations

The team discussed issues related to specific trails as well as many management issues. The Team proposes the following recommendations for implementation of the plan.

A. Minimize illegal uses and activities.
B. Develop an operations and maintenance schedule for the trails.
C. Develop a volunteer program.
D. Establish trail management guidelines for resource protection.
E. Improve trails with signage.
F. Enhance educational program.

A. Illegal Uses

Numerous illegal activities were noticed during inventory of the trails. These include ATV and motor bike use, littering, dumping, and destruction of vegetation. There should be a multi-pronged approach to reduce illegal activities on Mill Mountain Park Trails.

1. Signs should be erected at borders where access challenges are most prevalent.
2. Signage at trailheads should indicate rules of the trail.
3. Signage at trailheads should give contact information for reporting trail conditions and illegal activities.
4. Park staff should coordinate with Roanoke City Police Department for assistance in law enforcement, including regular patrolling of parking lots, ticketing illegal activities, and trail patrolling with police on bikes and horses.
5. Volunteer monitoring should be encouraged.
6. Because dumping encourages more dumping, staff should utilize clean-up programs such as Clean Valley Day and inmate labor to clean up existing problems.
7. An “Adopt-A-Trail” program is highly recommended to provide more frequent monitoring.

B. Operations and Maintenance Plan

Parks and Recreation staff should complete a maintenance plan for the Mill Mountain Trail system and incorporate it into their annual maintenance operations. This plan will specify maintenance schedules and responsibilities, amenities and improvements needed, budgets, materials, supplies, and specific trail maintenance management staffing through the department’s Parks Maintenance Division. In addition, the process should address policies on special events, event bonding, camping, volunteers, special uses, and patrolling. Periodic coordination with

other departments on search and rescue, fire prevention and suppression, access maps for emergency services, and communication channels with reports to Parks staff should also be addressed.

C. Volunteer Assistance

Roanoke is indebted to the trail volunteers who have dedicated countless hours and labor in helping to maintain the trails upon Mill Mountain. Both the Department of Parks and Recreation as well as the team recommends that the Parks and Recreation establish a cadre of Mill Mountain trail volunteers (similar to the existing team at the Carvins Cove Natural Reserve) to assist with maintenance, construction, and monitoring. This program should be established under the existing Parks and Recreation trail volunteer program and be coordinated by Parks and Recreation. Volunteers should receive training on their duties, report quarterly on standard reports, and log volunteer hours. An overseer should be assigned for each trail. The program could include an annual meeting of Mill Mountain trail volunteers and partners with a cook-out, annual recognition of groups and departments, identification for volunteers such as t-shirts, a tool shed and inventory, and a quarterly newsletter.

D. Resource Protection Issues

Parks and Recreation staff will need to develop specific resource protection guidelines for trail management. These might include:

1. Vegetation management, including tree protection, invasive species, and protection of sensitive communities adjacent to trails.
2. Conformity with Land Use Zones in Mill Mountain Management Plan.
3. Temporary trail closures after rain events or when conditions warrant.
4. Stream crossings, using bridges over perennial streams and hardened crossings at dry stream beds.
5. Monitoring of trail conditions, using standard Forest Service methods, with annual photographs taken at key impact areas.
6. Recognition and elimination of bootleg trails.
7. Annual review of impacts to prevent tread changes and correct problem areas.
8. System for users to provide comments and input, such as kiosk and web site.
9. User counts using trail counters.

E. Signage

Parks and Recreation is finalizing a signage plan that will be implemented in all City owned parks, recreation facilities, greenways, trails, and front-country trails. The plan will be implemented on Mill Mountain Park's trails once complete. Signs will address:

- Wayfinding, with trail names, difficulties, and distances to destinations
- Rules and regulations
- Trail etiquette
- Interpretation of natural and cultural features

In addition, the signage program will include:

- Kiosks at trailheads
- Trail blazing, possibly with each trail in a different color
- Brochures and maps

Conceptual Samples are shown below.

F. Education

The Parks and Recreation Department has a very active educational program at the Discovery Center. Enhancement of the program in relation to trails will involve providing additional information to users and utilizing trails more for environmental education. Options include:

1. Provide trail etiquette information at all trailheads and parking areas.
2. Utilize the yield symbol on all trails and provide educational brochures on techniques for approaching horses.
3. Provide safety information on all kiosks.
4. Provide simple brochures and maps of the trail network, with permitted uses and difficulty ratings.
5. Expand birding information for those utilizing the Birding and Wildlife Trail.
6. Expand the wildflower garden to adjacent trails, using native plants. Involve partners such as Mill Mountain Garden Club and Blue Ridge Native Plants Society.
7. Expand environmental education programs for schools utilizing trails.
8. Utilize City's marketing avenues to provide information on the trails, special events, etiquette, and programs.

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Appendix A
Trail Inventory Forms

TRAIL COVER SHEET

Trail System: Mill Mountain
Trail Name: _____
Mgt. Agency: Roanoke Parks and Rec

Status: ___Existing ___Potential
Termini: _____
_____

Trailheads/ Access: _____
_____
_____

Summary Trail Data
Total Length: _____
Average Width: _____
Average Slope: _____
Elevation Start_____ End_____
Min _____ Max_____

Usage/Activities	Allowed?	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No
_____	___Yes	___No

Assessment Date: _____

Assessment Team
_____
_____
_____

Attractions/Detractions
_____
_____
_____
_____

Trail Junctions
_____
_____
_____

Trail Notes
_____
_____
_____
_____

Maintenance
____Well maintained
____Partly maintained
____Unmaintained

Data Collection Form

Date ________

Trail Name ________ Segment Start ________ Trail Surface ________ Page ____ of ____

Segment End ________ Trail Construction Origin ________
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)	Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0				1				

Guidelines for Mill Mountain Trail Assessment

1. Fill out one Trail Cover Sheet and at least one Data Collection Form for each trail.
2. Fill out one Data Collection Sheet for each Trail Segment.
3. Use the Universal Trail Assessment Process Fast Facts Sheet for guidelines.
4. Start a new segment (and new Data Collection Form) if:
    * trail surface changes signficantly, e.g. from gravel to natural
    * trail crosses a road or intersects another trail
    * trail changes from existing to potential
5. On the Data Collection Sheet, put a station marker whenever:
    * trail changes direction by > 15degrees
    * trail grade or cross slope changes by >5%
    * trail grade (up or down) changes for more than 20 feet
    * the last station flag is almost out of sight
    * surface type changes
    * intersection with other trails
6. Short dips, ruts and bumps can be recorded as features instead of stations.
7. For Features:
    * Feature Numbers should be consecutive - 1,2,3,4, etc.
    * Feature Distance should correspond to the Station reading from the wheel at that location.
    * Provide as many details as possible.
    * The Features list can be longer or shorter than the Station list.
    * Natural features (large rocks, etc) do not have to have a Condition ranking.
    * Be sure to note vertical obstructions as well as items on the surface.

Universal Trail Assessment Process

Fast Facts

Measure the "best path of travel."
Measure each segment separately.

Rolawheel – Trail Distance

- Set counter to zero at trailhead or at the start of a new trail segment.
- Start with peg in front of arm.
- Measure center of best path of travel.
- Do not roll over tread obstructions.

TAI Stations – Flags

Establish where:

- Visual direction change of ≥ 15°.
- Visual change in grade or cross slope of ≥ 5%.
- Previous station not out of sight.
- Significant change in tread width.
- Trail branches or intersects another trail.
- Surface type changes.
- Trailhead or destination.

Mark flag with rolawheel distance.

Typical Grade – Clinometer

- Stand in the best path of travel at consecutive stations.
- Hold clinometer vertically with window facing your left.
- Look into the peephole with one eye, keeping both eyes open.
- Target hairline to eye level on partner.
- Read % from right side of the scale.
- Readings must be within 1% or retaken.
- Person sighting forward reports sign: positive = uphill, negative = downhill.
- Person sighting backward will see the reverse sign.

Trail Direction – Compass

- Stand in center of the best path at consecutive stations.
- Hold compass level so scale floats.
- Look into the peephole with dominant eye, keeping both eyes open.
- Bisect partner with hairline.
- Looking forward, read numbers in large type, bottom row.
- Looking backward, read numbers in small type, top row.

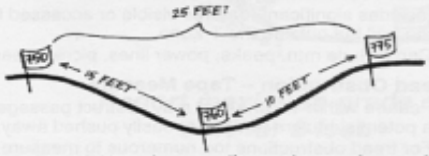
Note: Metal near compass, such as a bridge, eyeglasses, station flags or pen tip, may cause incorrect readings.

Maximum Grade – Inclinometer

- Greater than typical grade.
- Report to nearest 1% or as displayed.
- Length is all areas within maximum tolerance.
- Report grade (%) and length (ft/m) of maximum grade segment.

Maximum Grade	Tolerance
≤ 10%	2%
11% - 20%	4%
21% - 30%	6%
31% - 40%	8%
≥ 41%	10%

Report maximum grade of 36 % for 8 feet.



Establish new TAI stations on dips and mounds over 20 feet or to enhance typical grade accuracy.

Ruts and bumps (grade changes within 2 feet) are recorded as features.

Record dips and mounds as a feature and maximum grade. Maximum grade, 11% for 10 feet.

Typical Cross Slope – Inclinometer

- Representative location between stations.
- Report to the nearest 1% or as displayed.
- Record inslope as negative.

Maximum Cross Slope – Inclinometer

- Greater than typical cross slope.
- Report to nearest 1% or as displayed.
- Record inslope as negative.
- Length is all areas within maximum tolerance.
- Report cross slope (%) and length (ft/m) of the max. cross slope segment (see Maximum Grade procedure).

Features – Tape Measure

- Maintenance/trail improvement (culverts, bridges, etc.).
- Natural (rocks, roots, ruts, etc.).
- Built facilities (picnic tables, toilets, etc.).
- Fill out boxes in Feature Log.
- Remaining tread for all obstructions.
- Length is parallel to direction of travel.
- Width is perpendicular to direction of travel.
- Height is vertical above or below ground level.

Tread Width – Tape Measure

- Record typical width of clear path of travel or visible trail surface at representative location between stations.

Trail Bed Zone (T)

- Covers visible trail right-of-way.
- May vary in width along a single trail.
- Width = tread width or specified design width of trail, whichever is smaller.
- Height depends on designated user groups (e.g. 84" for a pedestrian trail, 3m for an equestrian trail).

Visual Field Zone (V)

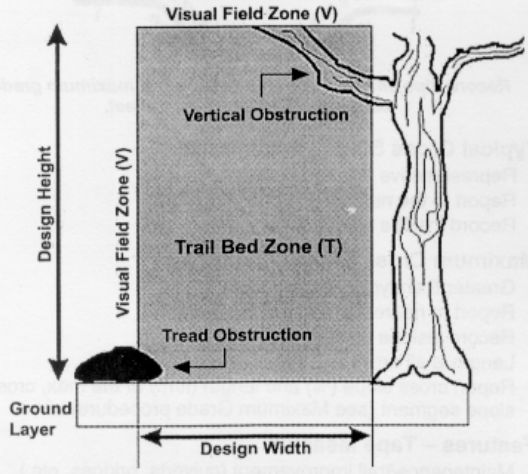
- Includes significant features visible or accessed from the trail but outside the T Zone.
- Can include mtn. peaks, power lines, picnic areas, etc.

Tread Obstruction – Tape Measure

- Feature within T Zone that may obstruct passage or be a potential hazard and is not easily pushed away.
- For tread obstructions too numerous to measure individually (such as roots and rocks), record the distance where the tread obstructions begin and end.
- Complete all feature boxes.
- Measure remaining tread width.

Vertical Obstruction – VO

- Obstructions that protrude across or down into the T Zone but do not contact tread surface.
- Only rigid objects such as big tree branches not easily pushed away.
- Record clear space under VO in Size.
- Record object dimensions in Description.
- Complete all feature boxes.



Minimum Clearance Width – MCW

- Occurs when boundary on both sides of the trail limits the passage space to less than the design width and there is no alternative path.
- Objects easily pushed away do not cause an MCW.
- Boundary height based on user group.
- Record MCW information or cause as a Feature.

Surface Characteristics

Determine surface firmness at representative location between stations and report by category:

Paved	P	Soft	S
Hard	H	Very Soft	V
Firm	F		

Surface Type

Record and report most common surface type at representative location:

Aggregate/Gravel	Ice	Soil
Asphalt	Other	Vegetation - mowr
Bedrock	Rock/Boulder	Vegetation - natur
Brick/Paver stone	Rubber	Water
Concrete	Sand	Wood - chip/mulch
Crushed stone (fines)	Shell	Wood - decking
Duff	Skree	
Engineered wood fiber	Snow	

Examples of Trail Features

Actions

brush/trim	narrow
clear	reconstruct
construct	rehab
install	relocate
maintain	remove
monitor	reroute

Built Features

bench	picnic table
bridge	picnic area
campsite	restroom
corral	stile
gate	

Tread Obstructions

ditch	rut
hole	step
rock	stump
root	waterbar

Maintenance

bridge-out	landslide
graffiti	tree-downed

Natural Features

canopy	prairie
creek/stream	ridge
lake	river
meadow	scenic viewpt.
mesa	summit
outcrop	tree
pond	waterfall

Drainage

culvert	headwall
drainage dip	swale
drainage lens	

Safety

dropoff	noxious plant
ford	railing
geothermal	water crossing
nox. animal	water-potable

Tread

boardwalk	riprap
causeway	step
climbing turn	switchback
entrenchment	turnpike
intersection	way trail

Support Structures

abutment	retaining wall
berm	stringer
crib	trestle

Signage

Describe construction materials, dimensions, text, and any graphics.

Appendix B
Trail Data Sheets

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name ATV Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Fishburn Pkwy

End: Near Saddle

Trailhds/ Access

Summary Trail Data

Total Length 1495

Average Width 46

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/1/2005

Assessment Team

Linda Oberlender

Liz Belcher

Paul Chapman

Bill Gordge

Tom Clarke

Attractions/Detractions

Trail Junctions

Contour Trail (Garden City)

Trail Notes

Maintenance

____Well maintained

___Partly maintained

____Unmaintained

Data Collection Form

Date: 2/1/2005

Trail Name: ATV Trail **Segment Start:** Saddle @ Fishburn Pkwy **Trail Surface:** Dirt/Natural **Page:**

Segment End: Garden City Contour Rd. **Trail Const. Origin:** ATV
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T/V	Tree line and Fishburn Pkwy	
85	46	8.4	-18		2	37	V	Burl on tree	
175	46	16.3	-8		3	291	T	Switchback	
213	46	1.5	-21		4	657	V	Ancient oak point	
272	46	7.6	-12		5	693		NPS monument 30' to right	
291	46		-4						
318	46		-15						
382	46	9.7	-5						
442	46	3.9	-12						
596	46		-7						
639	46		-12						
693	46	2.7	-20						
757	46		-22						
887	46		-25						
975	46		-17						
1038	46		-18						

Data Collection Form

Date: 2/1/2005

Trail Name: ATV Trail **Segment Start:** Saddle @ Fishburn Pkwy **Trail Surface:** Dirt/Natural **Page:**

Segment End: Garden City Contour Rd. **Trail Const. Origin:** ATV
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
1112	46	9.7	-17						
1251	46	0.8	-14						
1316	46		-12						
1355	46		-18						
1445	46	5.9	-22						
1495	46		-29						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Bear Here Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Triangle Corner

End: Better Yet Trail

Trailhds/ Access

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
__x_ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/22/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Attractions/Detractions

(Detractions) Very Steep

Trail Junctions

Trail Notes

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/22/2005

Trail Name: Bear Here Trail

Segment Start: Triangle Corner

Segment End: Better Yet Trail

Trail Surface: Natural

Trail Const. Origin: Road (road, utility line, social trail, etc.)

Page:

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	300	T	Trail intersection	
74	72	-7.8	-28		2				
174	84	2.4	-15		3				
250	84	entrenched	-20		4				
300	84	entrenched	-18		5				

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Better Yet Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** NPS Monument Rd.

End: 3 ravine convergence

Assessment Date 2/22/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Trailhds/ Access

Attractions/Detractions

Relatively steep- old rd.- trenched.

some ATV use

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
__x_ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/22/2005

Trail Name: Better Yet Trail

Segment Start: NPS Monument Rd. MP-821

Segment End: Convergence of 3 ravines

Trail Surface: Natural

Trail Const. Origin: Rd.
(road, utility line, social trail, etc.)

Page:

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	244	T	Dip	
92	84	2.4	-17		2	309	T	Bear Here Trail	
187	84	4.4	-19		3	860	V	ATV cross country trail (to VA Pine Lane?)	
309	96	6.4	-12		4	954		Yellow paint on trees to left of trail	
348	96	entrench	-17		5	1024	V	Plywood on VA Pine Trail	
467	96	entrench	-20		6	1024	V	To left 2 ravines converging	
556	96	entrench	-15		7	1100	T	3 ravines converging	
658	84	entrench	-20		8				
724	84	entrench	-21		9			Trail does not end but becomes maze of ATV and social trail	
778	84	entrench	-20		10			between houses on Hartsook and houses on Estates	
860	84	entrench	-11		11			Yellow/orange paint around	
954	84	entrench	-9		12				
1024	84	entrench	-10		13				
1100	84	entrench	-11		14				

Data Collection Form

Date: 2/6/2005

Trail Name: Car Trail **Segment Start:** Prospect Rd **Trail Surface:** Natural **Page:**

Seg. #1 **Segment End:** Connecting trail to Saddle **Trail Const. Origin:** Old rd.
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T	Guardrail	
94	30	0	4		2	23	T	Large tree blocking trail	
145	36	12	3		3	25	V	Manhole	
195	20	15	23		4	115	T	Cross drain	
270	24	6	7		5	145	V	Powerline, water meter	
315	24	7	3		6	195	V	Carilion	
360	24	7	2		7	405	T	Pinchpoint 12"	
387	24	7	21		8	548	V	Rock	
412	24	12	-12		9	548	T	Rock cribbing	
548	24	7	2		10	550	T	Pinchpoint w/ tree leaning 15"	
660	24	12	5		11	660	T	Cross drain, rocky	
835	18	8	2		12	708	T	Dip, hole	
886	18	9	4		13	720	T	Pinchpoint 15"	
913	18	9	10		14	1207	T	Start of roadbed	
1023	18	5	0		15	1512	V	Yellow house with slate roof	
1098	18	7	4		16	1604	V	"The car"	

Data Collection Form

Date: 2/6/2005

Trail Name: Car Trail **Segment Start:** Prospect Rd **Trail Surface:** Natural **Page:**

Seg. #1 **Segment End:** Connecting trail to Saddle **Trail Const. Origin:** Old rd.
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
1207	18	8	0		17	2533	V	Drainage survey pin	
1328	36	2	-5		18	2558	T	Connecting trail	
1512	36	2	-3						
1613	48	6	-4						
1716	60	2	3						
1813	60	0	0						
1894	60	1	-5						
2032	60	0	-6						
2110	60	2	-9						
2212	60	2	-8						
2382	60	0	-10						
2533	60	0	-9						
2558	60	7	0						

Data Collection Form

Date: 2/8/2005

Trail Name: Star Trail Seg. #2 | **Segment Start:** Connecting Trail (Woodcliff) | **Segment End:** RobinHood Rd | **Trail Surface:** Dirt | **Trail Const. Origin:** old rd. (road, utility line, social trail, etc.) | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0		Trail intersection	
219	80	8.5	-10		2	299	T/V	Old engine block, rusty	
375	80	8.5	-3		3	1104		Fence on right (wood and chicken wire) 60'	
438	80	8.5	-5		4	1281		Stone step (one step down to pavement)	
519	80	8.5	-11		5	1281		Drain inlet on right in pavement	
634	80	8.5	-11		6	1281		5 round Lowes stepping stones	
949	80	8.5	-5						
1016	80	8.5	-7						
1183	80	8.5	-13						
1281	80	8.5	-11						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Connecting or Woodcliff Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Intersection w/ Car Trail

End: Intersection w/ Kepley Trail

near Fishburn Monument.

Trailhds/ Access

Assessment Date 2/8/2005

Assessment Team

Linda Oberlender

Dick Clark

Paul Chapman

Christine Langan

Attractions/Detractions

Summary Trail Data

Total Length 702'

Average Width 42"

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Steep grade

Unmaintained but in good shape

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

____Well maintained

___Partly maintained

_x__Unmaintained

Data Collection Form

Date: 2/8/2005

Trail Name: Connecting or Woodcliff **Segment Start:** Intersection w/ Car Trail **Segment End:** Intersection w/ Kepley Trail **Trail Surface:** Dirt **Trail Const. Origin:** Trail (road, utility line, social trail, etc.) **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	189		Switchback	
19	25	10.4	26		2	189		Intersection of unoffical alt. trail	
133	35	11.2	4		3	702		Intersection w/ beginning of Kepley trail	
189	45	16.3	6		4				
326	32	8	27		5				
427	36	5.7	23		6				
564	48	3.6	24		7				
610	48	10.4	14		8				
673	48		22		9				
702	48		9		10				

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Garden City Contour Road

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing __Potential

Termini **Start:**

End:

Trailhds/ Access

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
___Walking/jogging	__Yes	___No
___Hiking	__Yes	___No
___Bicycling	__Yes	___No
___Horseback riding	__Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date Multiple

Assessment Team

Bill Gordge (2/1/05, 2/15/05)

P.Chapman (2/1/05, 2/15/05)

Liz Belcher (2/1/05, 2/15/05)

Tom Clarke (2/1/05)

Dick Clark (2/15/05)

L. Oberlender(2/1/05, 2/15/05)

Attractions/Detractions

Trail Junction

Trail Notes

Maintenance

____Well maintained

__ _Partly maintained

____Unmaintained

Data Collection Form

Date: 2/1/2005

Trail Name: Contour Roac **Segment Start:** NPS boundary by ravine **Trail Surface:** Natural **Page:**

Seg. #1 **Segment End:** ATV side trail to pkwy **Trail Const. Origin:** Rd
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1			NPS boundary flags on trees	
75	48	11	-18		2	580		Grade reversal and swale/drainage	
139	48	14.7	-12		3	722		Grade dip	
195	48	11.3	-4		4	968		ATV trail to left uphill to Pkwy	
226	48		2						
271	48	7	14						
311	48		-6						
362	48	6	6						
412	48		-4						
482	48	8	2						
580	48	8.8	-7						
632	48		8						
717	48	12	1						
762	48		-1						
793	48		-5						
875	48		9						

Data Collection Form

Date: 2/1/2005

Trail Name: Contour Roac **Segment Start:** NPS boundary by ravine **Trail Surface:** Natural **Page:**

Seg. #1 **Segment End:** ATV side trail to pkwy **Trail Const. Origin:** Rd

(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
968	48	9.5	8						

Data Collection Form

Date: 2/1/2005

Trail Name: Contour Rd. Seg. #2 **Segment Start:** ATV trail **Segment End:** Old fire rd. **Trail Surface:** Natural **Trail Const. Origin:** Road **(road, utility line, social trail, etc.)** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0		ATV uphill	
90	60	10.2	-7		2	283		ATV rut/berming	
188	60		-10.0		3	418		Illegal trail to residence Estate St.	
290	60	13	-23		4	561		Low spot	
337	60		-6		5	557		bump	
384	60	11.8	-4		6	635		Low spot	
418	60		-14		7	921	T	Dry creek drainage	
514	60	5.6	-17		8	921	V	Entering girdled tree flat (where teepee was)	
561	60		-15		9	1190		Old rd. to left to no-longer-existing tent	
635	60		-6		10	1190		Right old rd. bed- logging loading flat	
733	60		4		11	1293		End of section at well-constructed fire rd.	
831	60		4						
921	60		-9						
945	60		6						
1024	60		10						
1132	60		14						
1215	60		11						
1293	60		-7						

Data Collection Form

Date: 2/1/2005

Trail Name: Contour Rd Seg. #3 **Segment Start:** Old fire rd. **Segment End:** Intersection w/ trail to Garden City Food Lion **Trail Surface:** Natural **Trail Const. Origin:** Road **(road, utility line, social trail, etc.)** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1				
99	72		-5		2	41		ATV shortcut to left	
					3	99		Intersection w/ rd. towards GardenCity Food Lion	

Data Collection Form

Date: 2/1/2005

Trail Name: Contour Rd. Seg. #4 **Segment Start:** Contour Spur #1 **Segment End:** Neighborhood Loop **Trail Surface:** Natural **Trail Const. Origin:** Road **(road, utility line, social trail, etc** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0		ATV shortcut trail/rd./drainage to right	
0	84	4	-1		2	86	T	Wet weather branch	
80		4	3		3	110	T	Connection to contour spur (recent deed to update #3 sheet)	
110			5		4	145	T	Trenching starts 125'	
145	72	-2	-7		5	277	T	#1 intersection ATV shortcut on right	
277		2.8	-3		6	417	T	#2 intersection ATV shortcut	
417		6.5	3		7	927	V	View of houses leaf off	
539	60	2.2	2		8	927	V	Large gorge	
753	60	6.1	-5		9	1058	T	Intersection to Neighborhood Loop	
826	60	8	-9						
927	60	7	-5						
997	60	8.7	-12						
1058									

Data Collection Form

Date: 2/15/2005

Trail Name: Contour Rd. Seg. #5 **Segment Start:** Intersection Neighborhood Loop & seg. 4 **Segment End:** Flat near Pkwy **Trail Surface** dirt **Trail Const. (**Old Rd **(road, utility line, social** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0		Segment intersect w/ neighborhood loop	
36			-8		2	184		Spur to 946 Estate St.	
92	60		-21		3	203		Creek crossing	
162	60	6.5	-14		4	544		Trash/dump	
184	60	-1.6	-5			657		Bull dozed rd. to neighborhood	
220	60		2			670	T	Bottom of steep drop in trail	
279	72	6	2			737	V	Foot bridge across creek	
397	72	-3.6	-4			745	V	Graffiti beech tree	
493	72	-0.9	-9			1125	T	ATV trail	
544	72	6	12			1175	T	Drainage	
617	72	-4.2	7			1257	T	ATV trail	
657	72		-17			1257	T/V	Large flat area w/ white oaks	
670	72	-0.9	12			1257	T	Trenching	
737	84	-4.4	5			1366	T	Down red oak, obstruction	
988	84	3.6	2			1880		Old roadbed	
1155	84	4.6	4			1930		Trail causeway across drain	

1257	84	trenched	13			2355		Flat fill area	
1339	72	-0.6	10			2412		End of Segment	
1634	72	3.4	6						
1880	72	2.4	5						
1955	60	5	17						
2025	60	17	5						
2089	60	4	19						
2204	60	9	2						
2417									

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Contour Spur Trail #1

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Contour Rd. Intersection

End: Near Fishburn Pkway @ rock out crop

Trailhds/ Access

Assessment Date 2/1/2005

Assessment Team

Linda Oberlender

Bill Gordge

Paul Chapman

Tom Clarke

Liz Belcher

Attractions/Detractions

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

____Well maintained

___Partly maintained

____Unmaintained

Data Collection Form

Date: 2/1/2005

Trail Name: Contour Spur Trail

Segment Start: Contour Rd. Intersection #3/4

Segment End: Near Fishburn Pkway @ rock out crop across from cave

Trail Surface: natural

Page:

Trail Const. Origin: Old Rd.
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	90	T	Creek	
85	72	-2.5	-2		2	241	T	Rd. entrenched 500'	
140	72		5		3	1017	V	Camping spot/trash of mentally unstable	
241	72		10		4	1227	T	Crest of ridge, possible trail connect to Fishburn pkwy	
440	72		16		5	1364	T	Drainage crossing	
664	72		16		6	1439		side trail to Fishburn Pkwy, 161' long, 3' wide, 11%	
756	72		14		7	1668	T	Cool terminus rock out cropping, end of segment	
974	72	2	8		8	1668	V	Cave across road	
1074	72		13						
1153	72		12						
1227	72		7						
1319	72		-9						
1381	72		-2						
1452	72		10						
1497	72		2						
1598	72	2.7	11						
1668	72		10						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Contour Spur #2 Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Flat w/ Contour Road

End: Fishburn Pkwy

Trailhds/ Access none

Assessment Date 2/15/2005

Assessment Team

Linda Oberlender

Dick Clark

Paul Chapman

Liz Belcher

Bill Gordge

Attractions/Detractions

Summary Trail Data

Total Length 236

Average Width 72

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Very wide, old roadbed to a flat loading area or building site.

Usage/Activities	**Allowed?**	
__x_Walking/jogging	___Yes	___No
_x_Hiking	___Yes	___No
__?_Bicycling	___Yes	___No
__?_Horseback riding	___Yes	___No
__x_ATV	___Yes	_x_No
____Camping	___Yes	_x_No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/15/2005

Trail Name: Contour Spur #2 **Segment Start:** Flat **Segment End:** Fishburn Pkwy **Trail Surface:** Dirt **Trail Const. Origin:** Rd. (road, utility line, social trail, etc.) **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0			
67	72	-3	8		2	236		Fishburn Pkwy- End	
236	72	6.9	19						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Fern Park Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_ Existing _x_ Potential

Termini **Start:** Fern Park

End:

Trailhds/ Access

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
__x_Walking/jogging	_x_Yes	___No
__x_Hiking	_x_Yes	___No
__ _Bicycling	_ _Yes	___No
___Horseback riding	__Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/10/2005

Assessment Team

Betty Field

B. Fitzpatrick

Liz Belcher

Tom Clarke

Dick Clark

Linda Oberlender

Attractions/Detractions

Could provide connection from South Roanoke to Chestnut Ridge Trail & Mill Mt.

Trail Junction

Trail Notes

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/10/2005

Trail Name: Fern Park Upper trail

Segment Start: Fern Park

Segment End: Lower trail

Trail Surface: Natural

Trail Const. Origin: Built trail **(road, utility line, social trail, etc.)**

Page:

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T	Fern Park, edge of grass	
92	24	2.9	8		2	446	T	Down tree	
162	24	13	9.5		3	530	V	Social trail	
329	24	7.7	6		4	611	T	Large down tree	
444	20-24	14.1	6		5	729	T	Intersection w/ lower trail	
521	24	4.9	9						
611	24	5.1	7						
714	24	9.4	2						
729	20		-33						

Data Collection Form

Date: 2/10/2005

Trail Name: Fern Park **Segment Start:** Upper Trail **Trail Surface:** Natural **Page:**

lower trail, upper end **Segment End:** House foundation **Trail Const. Origin:** Rd, social trail

(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	200	V	Wringer washer, old culvert	
141	48	0	15		2	212	T	Dip	
201	36	2	2		3	296	T	Dip	
261	18	24	-15		4	350	V	Old trail crossing, better grade-approzimate same elevation	
306	15	30	5		5	453	T	Grade reversal	
387	24	9.6	25		6	573	V	Power pole and guy wire opposite side of trail	
430	24	19	12		7	604	V	Old rd to a house across swale	
501	24	17	-2		8	888	V	Large white oak	
608	24	19	1		9	937	V	Root cellar, house foundation	
662	24	20	9						
704	24	21	-9					**Still need to do lower trail , lower end**	
743	24	16	-1						
774	18	14	6						
858	18	17	21						
888	20	19	-11						
898	20	19	15						
945	24	10	-1						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name H2O Trail

Mgt. Agency Roanoke Parks and Rec

Status __Existing _X_Potential

Termini **Start:** Flat on GC Contour Road

End: Hilltop Contour Rd (near powerline)

Trailhds/ Access None

Assessment Date 2/17/2005

Assessment Team

Linda Oberlender

Gary Oberlender

Betty Field

Liz Belcher

Attractions/Detractions

Old roadbed w/ numerous trees growing in it. Good location if cleared. Good continuation of Contour Rd. Trail.

Summary Trail Data

Total Length 1194

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
__x_Other	___Yes	_x_No
Illegal Dumping	___Yes	___No

Maintenance

____Well maintained

___Partly maintained

__x_Unmaintained

Data Collection Form

Date: 2/17/2005

Trail Name: H20 Trail **Segment Start:** Flat on GC Contour Rd. **Trail Surface:** Natural **Page:**

Potential, grown over **Segment End:** Hilltop Contour Rd. near powerline **Trail Const. Origin:** Road **(road, utility line, social trail, etc.)**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	75	T	Trees growing in road bed	
57	84	-1.6	2		2	275	V	Water tank	
166	72	5.3	2		3	350	T	Paralleling road below	
188	72	9.2	-7		4	544	T	Cross drain	
272	72	5.9	5		5	600	T	Large down oak obstruction	
343	60	5.6	3		6	666	T	Grade reversal	
440	60	8.4	2		7	814	V	Trash	
499	72	12	5		8	1142	T	Side trail to Hilltop Contour Rd trail (75'),	
539	72	5	-4		9	1194		End of trail- pile of rocks	
598	72	-2.3	6		10				
632	72	0.7	10		11				
697	72		0		12				
767	72	2	-1		13				
914	84	-3.4	8		14				
1011	96	berm an edge	1		15				
1083	108		7		16				
1194	96		11		17				

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Hilltop Contour Rd. T

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Powerline

End: Crown Point St.

Trailhds/ Access Crown Point St

Assessment Date 2/17/2005

Assessment Team

Linda Oberlender

Gary Overlender

Betty Field

Liz Belcher

Attractions/Detractions

Much of trail is good contour road, but then drops steeply into Garden City (Crown Point)

Summary Trail Data

Total Length 2342'

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Usage/Activities	**Allowed?**	
__x_Walking/jogging	___Yes	___No
__x_Hiking	___Yes	___No
__x_Bicycling	___Yes	___No
__?_Horseback riding	___Yes	___No
_x_ ATV	___Yes	_x_No
____Camping	___Yes	___No
__x_Other	___Yes	?___No
Utility Maintenance vehicles	___Yes	?___No

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/17/2005

Trail Name: Hilltop Contour Rd. Trail **Segment Start:** Powerline Rd. **Segment End:** Crown Point St. **Trail Surface:** Natural **Trail Const. Origin:** Road (road, utility line, social trail, etc.) **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope %=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	27	T	Edge of clearing for powerline	
84	60	4	14		2	84	T	Intersection w/ potential trail to water tower (H2O trail)	
144	60	5.3	7		3	250	T	Grade reversal that does not drain	
227	60	11	-1		4	393	T	Falling tree	
303	60	0.1	4		5	625	T	Hilltop Loop intersection	
366	72	0	1		6	837	T	Intersection w/ spur to powerline (well used, ATV)	
483	60	4.9	-2		7	990	T	Slight trench	
603	72	1.9	4		8	1200	T	Inslope trench	
697	72	7	-3		9	1217	T	Trail widened out to 96"	
743	72	5.7	-4		10	1250	T	Trail trench switches sides to 1560	
837	72	9.1	-11		11	1406	V	Appliance dump	
979	60	5.8	-8		12	1495	T	Trail intersection to powerline	
1095	72	4.6	-10		13	1580	T	Drain crossing (grade reversal)	
1168	60	10	-5		14	1604	T	Trail to right narrower, nice grade, not well used, doesn't go far	
1217	84	-19	-17		15	1831	T	Trenched	
1334	84	13.8	-20		16	1891	T	More erosion	
1495	96	12	-18		17	2096	V	Monte Carlo, shed (2114)	

Data Collection Form

Date: 2/17/2005

Trail Name: Hilltop Contour Rd. Trail **Segment Start:** Powerline Rd. **Segment End:** Crown Point St. **Trail Surface:** Natural **Trail Const. Origin:** Road **(road, utility line, social trail, etc.)** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
1560	60	-0.2	-15		18	2197	T	Edge of powerline	
1604	60	8	-3		19	2200	V	Much stuff parked here, trees	
1684	72	8	-13		20	2200	T	Powerline/Gasline	
1773	72	1.3	-6		21	2342		Street- end of Street (Crown Point)	
1831	72	6.2	-18		22				
1977	72	-2.1	-20		23				
2096	84	0.9	-19		24				
2197	84	5	-15		25				
2342	84	0.9	-13		26				

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Hilltop Loop Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Flat

End: Hilltop Contour Rd.

Trailhds/ Access none

Summary Trail Data

Total Length 830

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
__x_Walking/jogging	_x_Yes	___No
__x_Hiking	___Yes	___No
__?_Bicycling	___Yes	___No
__?_Horseback riding	___Yes	___No
__x_ATV	___Yes	_x_No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/17/2005

Assessment Team

Linda Oberlender

Gary Oberlender

Betty Field

Liz Belcher

Attractions/Detractions

Steep connection from flat to powerline. Would be better to use H2O trail

Trail Junctions

Trail Notes

Mostly on old road. Gully erosion on steeper grades

Trenching of road/trail

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/17/2005

Trail Name: Hilltop Loop Trail | **Segment Start:** "The Flat" | **Segment End:** Hilltop Contour Trail | **Trail Surface:** Dirt | **Trail Const. Origin:** Rd. or ATV (road, utility line, social trail, etc.) | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T	Large flat	
56	48	-4.5	-2		2	250	T	Rock waterbar	
125	72	4.5	17		3	830	T	Trail intersection	
281	54	-1.5	22		4				
469	54	3.8	17		5				
573	54	7.1	5		6				
669	54	8.2	-4		7				
755	54	3.2	-7		8				
830	72	3.5	-15		9				

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Ian's Spot Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Ditch at edge of Fishburn Pkwy

End: New Monument trail

Trailhds/ Access

Assessment Date 3/10/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Attractions/Detractions

Summary Trail Data

Total Length 375

Average Width 48

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Trenching of road/trail

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 3/10/2005

Trail Name: Ian's Spot Trail

Segment Start: Ditch at edge of Fishburn Pkway

Segment End: New Monument Trail

Trail Surface: Natural

Page:

Trail Const. Origin: utility? **(road, utility line, social trail, etc.)**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T	Ditch	
13	48	Cupped	45		2	375	T	Trail fades out	
165	48	Cupped	12		3	370	V	Nice rocks on right	
313	48	Cupped	17						
375	48	Cupped	20						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Ivy Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_ Existing ___ Potential

Termini **Start:** Woodcliff Rd.

End: Ivy St at Henritze House

Trailhds/ Access

Assessment Date 2/10/2005

Assessment Team

Linda Oberlender

Dick Clark

Betty Field

Tom Clarke

Liz Belcher

Attractions/Detractions

Recently graveled

Summary Trail Data

Total Length 3540'

Average Width 9'

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

None

Trail Notes

Recently changed by Water Authority from a woods road/trail to a road. Needs finer surface.

Usage/Activities	Allowed?	
__x_ Walking/jogging	_x_ Yes	___ No
__x_ Hiking	_x_ Yes	___ No
__x_ Bicycling	_x_ Yes	___ No
__?_ Horseback riding	_x_ Yes	___ No
____ ATV	___ Yes	___ No
____ Camping	___ Yes	___ No
__x_ Other	___ Yes	___ No
stray vehicles	___ Yes	_x_ No

Maintenance

_x__ Well maintained

___ Partly maintained

____ Unmaintained

Data Collection Form

Date: 2/8/2005

Trail Name: Ivy Trail **Segment Start:** Woodcliff Rd. **Trail Surface:** Asphalt/Gravel **Page:**

Segment End: Henritze House Drive **Trail Const. Origin:** Street ROW (on USGS and 1943 m
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	25	T	Gate Paved	
234	120	2.2	25		2	125	V	Building	
521	110	0.4	6		3	145	T	Trail surface changes to gravel	
735	110	2.1	4		4	291	V	Cage for Crystal Springs	
877	110	1	0		5	1130	V	Can see hospital	
960	110	2.7	-3		6	1450	T	Powerline	
1129	110	-3.6	-6		7	2320	V	Houses in Belleview	
1328	110	2	-6		8	2600	V	Pet cemetery rock	
1511	110	4.6	-5		9	2813	T	Gate (under construction)	
1657	110	1.1	-6		10	2993	V	House on left	
1741	110	0.5	-3		11	3010	T	Gravel-- fine gravel	
1927	110	5	-4		12	3350	V	Paved driveway to Henritze house, Street now, broken asphalt	
2042	110	0	-5		13	3540		Intersection of driveway, Ivy	
2198	110	4.3	-2						
2258	110	3.7	2						
2320	110	4.7	1						

Data Collection Form

Date: 2/8/2005

Trail Name: Ivy Trail **Segment Start:** Woodcliff Rd. **Trail Surface:** Asphalt/Gravel **Page:**

Segment End: Henritze House Drive **Trail Const. Origin:** Street ROW (on USGS and 1943 m
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
2490	110	0.8	-2						
2600	110	1.8	-2						
2720	110	5.6	-2						
2813	110	0.3	-3						
2869	110	3.4	-3						
3010	110	-0.4	-2						
3185	250	1.2	-1						
3350	250	1.2	-1.5						
3540	200	5.4	-4						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Kepley Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Saddle/Fishburn Monument

End: Morrison Rd. @ Kepley House

Trailhds/ Access Fishburn Parkway at Monument

Morrison Rd.

Summary Trail Data

Total Length 3383

Average Width 48"-72"

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities **Allowed?**

____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/8/2005

Assessment Team

Linda Oberlender

Dick Clark

Paul Chapman

Christine Langan

Attractions/Detractions

Trail Junctions

Trail Notes

Mostly on old road. Gully erosion on steeper grades

Trenching of road/trail

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/8/2005

Trail Name: Kepley Trail **Segment Start:** Saddle/Fishburn Monument **Trail Surface:** Dirt **Page:**

Segment End: Morrison Rd. @ Kepley House **Trail Const. Origin:** Trail & Old Rd.
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0		Intersection Fishburn Monument pavement	
79	48	2.7	1		2	22		Dip	
249	48	2.9	10		3	79		Intersection Kepley to road	
275	48	22.2			4	275		Steep X-slope for 25'	
363	48		8		5	447		Some slight trenching, 200'	
447	48	2.2	10		6	858		Wildlife tree (on ridge)	
620	48	3	14		7	848		Start re-route around blown down tree	
768	48	3.7	9		8	943		@ roots of blowndown tree	
858	48	0.8	5		9	992		End of re-route	
943	48		1		10	1303		Top of crest	
1017	48		5		11	1450		Down tree with branches (re-route around tree)	
1176	48	5.7	8		12	1480		Other side of downed tree	
1303	48	4.3	0		13	1692		Trenched trail (slight to moderate), 500'	
1425	48	5.5	-9		14	2175		Start trenching again	
1630	48	2.6	-19		15	2465		Erosion & gully in center of trail/road, 350'	
1789	48		-16		16	2821		End of gully	

Data Collection Form

Date: 2/8/2005

Trail Name: Kepley Trail **Segment Start:** Saddle/Fishburn Monument **Trail Surface:** Dirt **Page:**

Segment End: Morrison Rd. @ Kepley House **Trail Const. Origin:** Trail & Old Rd.
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
2015	48		-12		17	3135		Pile of roofing to right	
2152	48	1.3	-13		18	3209		Dip	
2362	72		-17		19	3383		Pavement at Kepley's house on Morrison Rd.	
2465	72		-17		20				
2563	72		-21		21				
2611	72		-24		22				
6756	72		-18		23				
2995	72	5.9	-4		24				
3034	75	8.1	-2		25				
3019	75		-1		26				
3135	75		-10		27				
3229	75	7.6	-14		28				
3383	75		-12		29				

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Mill Mt. Greenway

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Prospect/Sylvan intersection

End: Discovery Center

Trailhds/ Access

Summary Trail Data

Total Length 6481

Average Width 210"

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
__x_Walking/jogging	_x_Yes	___No
__x_Hiking	_x_Yes	___No
__x_Bicycling	_x_Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 3/10/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Attractions/Detractions

Trail Junctions

Trail Notes

Street

Maintenance

__x_Well maintained

___Partly maintained

____Unmaintained

Data Collection Form

Date: 3/10/2005

Trail Name: Mill Mt. Greenway | **Segment Start:** Prospect/Sylvan intersection | **Segment End:** Discovery Center | **Trail Surface:** Paved | **Trail Const. Origin:** Street (road, utility line, social trail, etc.) | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	980		Gate House	
448	210		10		2	4276		Over Pass (above)	
781	210		10		3	4407		Drive entrance Rockledge	
1193	210		10		4	4407		Apex of switchback	
1459	210		12		5	4540		Bridge (overpass) over G/W	
1629	210		12		6	4791		Grey Peq. On left	
1710	210		11		7	4825		Rock steps uphill on left	
2022	210		8		8	4870		ROW Flags-- yellow paint	
2219	210		10		9	4910		Green reg. on right	
2445	210		5		10	5432		Watch Tower Trail head	
2771	210		10		11	5445		Sewer manhole	
2955	210		7		12	5490		Sewer manhole	
3150	210		10		13	5656		Bollards	
3346	210		9		14	6116		Zoo access Rd. on right	
3678	210		10		15	6213		Enter Free Island roadway	
3986	210		10		16	6385		Leave Free Island roadway	

Data Collection Form

Date: 3/10/2005

Trail Name: Mill Mt. Greenway | **Segment Start:** Prospect/Sylvan intersection | **Segment End:** Discovery Center | **Trail Surface:** Paved | **Trail Const. Origin:** Street (road, utility line, social trail, etc.) | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
4223	210		11		17	6481		Entrance Bollard (Discovery Center)	
4383	210		8						
4435	210		5						
4868	210		10						
5169	210		10						
5380	210		9						
5705	210		10						
6116	210		11						
6213	210		6						
6481	210		0						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Monument Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Fishburn Pkwy

End: Prospect Rd.

Assessment Date 1/27/2005

Assessment Team

Linda Oberlender

Dick Clark

Paul Chapman

Liz Belcher

Trailhds/ Access

Attractions/Detractions

Summary Trail Data

Total Length 4214

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 1/27/2005

Trail Name: Monument Trail | **Segment Start:** Fishburn Pkwy | **Segment End:** Star Trail | **Trail Surface:** Dirt | **Trail Const. Origin:** (road, utility line, social trail, etc.) Built trail | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T	Trailhead, Dirt	
190	36	0	8		2	0	V	Monument, concrete, walk 30'	1
236	27	0	15		3	0	V	Fishburn Pkwy- width 20'	1
296	27	0	10		4	0	V	Mill Mt. Park sign and spur road (30 yards)	1
318	27	0	11		5	80	T	Root (2" high, 2.5' long)	
410	24	0	0		6	190	T	Root (3" high, 3' long)	
502	24	0	0		7	236	T	27" width	
543	24	0	2		8	271	T	17" width: root/rock on right/ tree on left	
676	24	0	9		9	789	T	Bouder to left of trail 3.5' x 4'	
789	24	0	11		10	1540	T	Hump 17' max grade 6.2	
824	24	0	13		11	1744	T	Trail width 21' - tree on right angles out	
970	24	0	3		12	1826	V	Invasives: royal pawlonia, paradise, kudzu, 466' long	
1050	24	0	0		13	1845	T	Boulder on each side	
1225	24	0	12		14	1907	T	21" root 2" high across trail, tree on right	
1341	24	0	15		15	1978	T	Eroded wash, washed trail, roots	
1430	24	0	15		16	1995	T	Berm 2'-3', 20' long	

Data Collection Form

Date: 1/27/2005

Trail Name: Monument Trail | **Segment Start:** Fishburn Pkwy | **Segment End:** Star Trail | **Trail Surface:** Dirt | **Trail Const. Origin:** (road, utility line, social trail, etc.) Built trail | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
1490	24	0	10		17	2237	T	Dead tree buried in trail	
1525	24	0	-2		18	2247	T	Swale	
1645	24	0	4		19	2296	T	Dead root and dead tree on left	
1826	24	0	3		20	2438	T	Berm 37' long	
1872	24	0	12		21	2438	V	Rockgarden 1784' long	
1907	18	0	-6		22	2953	T	Max grade 12.7, rock out cropping 10' long	
1990	18	0	-5		23	3027	T	Rock encroaching on trail, 27" wide rock	
2092	18	0	11		24	3027	T	Berm 68' long	
2140	18	0	11		25	3183	V	Swale	
2210	18	0	11		26	3222	T	Berm 202' long	
2270	24	0	1		27	3524	V	Swale	
2304	24	0	-16		28	3588	T	Rock out cropping across trail 4' high	
2355	24	0	-18		29	3719	V	Pine forest 500' long	
2405	24	0	-8		30	4164	T	Trench/berm 3.5' wide, 50' long, 3' deep	
2460	24	0	-7		31	4214	V	Intersection w/ Star trail, Mt. Laurel	
2556	24	0	-5						
2728	24	0	-4						

Data Collection Form

Date: 1/27/2005

Trail Name: Monument Trail | **Segment Start:** Fishburn Pkwy | **Segment End:** Star Trail | **Trail Surface:** Dirt | **Trail Const. Origin:** (road, utility line, social trail, etc.) Built trail | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
2931	28	0	-3						
3027	28	0	-8						
3111	28	0	0						
3139	28	0	-5						
3183	28	0	2						
3218	24	0	-8						
3285	36	0	-5						
3457	28	0	-4						
3524	28	0	12						
3555	28	0	-10						
3588	28	0	-8						
3660	28	0	-7						
3844	30	0	-6						
3939	42	0	-5						
4164	36	0	-4						
4214	40	0							

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Neighborhood Loop

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Contour Trail 4

End: Contour Trail 5

Trailhds/ Access

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/15/2005

Assessment Team

Linda Oberlender

Dick Clark

Paul Chapman

Bill Gordge

Liz Belcher

Attractions/Detractions

Trail Junctions

Trail Notes

Maintenance

____Well maintained

___Partly maintained

____Unmaintained

Data Collection Form

Date: 2/15/2005

Trail Name: Neighborhood Loop Trail **Segment Start:** Contour Trail 4 **Segment End:** Contour Trail 5 **Trail Surface:** Dirt **Page:** **Trail Const. Origin:** Old Rd. **(road, utility line, social trail, etc.)**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0		Trenching	
89	48	2.7	1		2	164		Camping impact area	
164	48	2.9	10		3	298		Intersection to trail to 946 (Estates on rt. Side of creek, Contour	
221	48	22.2			4	298		Estates on rt. Side of creek, ContourTrail on left side of creek	
298	48		8		5	298		Trail turns left	
								End at Contour Rd.	

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name NPS Monument Rd.

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** VA Pine Lane

End: Triangle Corner

Trailhds/ Access

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
__x_ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/22/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Attractions/Detractions

Existing Contour Rd.

Trail Junctions

Trail Notes

Ends at Triangle of roads around 2 NPS monuments

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/22/2005

Trail Name: NPS Monument Rd. Trail **Segment Start:** Va Pine Lane **Segment End:** Bear Here Trail to neighborhood near NPS Triangle **Trail Surface:** Natural **Trail Const. Origin:** Rd. **(road, utility line, social trail, etc.)** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	564	T	Flat spot	
138	96	2.4	-11		2	794	T	Drainage into ravine	
217	96	6.8	-7		3	803	T	Hump	
426	120	9.6	-10		4	821	T	Better Yet Trail	
505	120	2.2	-4		End	1059		Triangle corner- 3 Rds. 2 NPS monuments	
721	96	3.3	-2						
794	96	12	-9						
869	84	5	-2						
987	84	-0.4	9						
1013	84	5.2	10						
1059	84	15	-9						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Star Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Parking lot- Riverland

End: Mill Mtn Star trailhead

Trailhds/ Access

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date Mulitple

Assessment Team

Attractions/Detractions

Trail Junctions

Trail Notes

Assessed in 5 section, first three continuous stations, 4 & 5 separate

Maintenance

____Well maintained

___Partly maintained

____Unmaintained

Data Collection Form

Date: 2/25/2005

Trail Name: Star Trail **Segment Start:** Parking lot- Riverland **Trail Surface:** Gravel, dirt **Page:**

Seg. #1-3 **Segment End:** Terra Alta/ Monument Trail **Trail Const. Origin:** Road, trail
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	V	Parking lot for 10 cars	1
396	168	level/crown	8		2	0	T	Trailhead- gate	1
647	168	level/crown	8		3	0	T	Trail name sign & brochure box	Gravel
925	168	level/crown	14		4	32	V	Sign & regulations 3' to left of rd.	1
1148	168	level/crown	11		5	396	V	Sign 5' off trail	1
1296	168	level/crown	11		6	396	V	View over trail utility line for 250'	
1452	48	flat	-3		7	647	V	View right side of trail utility line for length	
1640	48	flat	-4		8	647	T	Erosion 6 " deep x 18" wide (for 200+ ft)	
1663	48	flat	0		9	925	V	Sign (S.T. up)	1
1765	48	flat	-8		10	1296	V	Sign (S.T. -->)	1
1786	48	flat	2		11	1296	V	H2O tower left	
1813	48	flat	-7		12	1296	T	Trail goes into woods- right; end seg. #1; Gravel changes to dirt	
1844	48	flat	-3		13	1366	T	Wood bench- 2 slats removed, needs nuts	
1879	48	flat	3		14	1444	T	hump 10' long, 1' high	
1905	48	flat	3		15	1640	T	dip 12' x 1'	
2005	48	flat	4		16	1905	V	Sign propped up against tree/ graffiti 3' to right of trail	

Data Collection Form

Date: 2/25/2005

Trail Name: Star Trail **Segment Start:** Parking lot- Riverland **Trail Surface:** Gravel, dirt **Page:**

Seg. #1-3 **Segment End:** Terra Alta/ Monument Trail **Trail Const. Origin:** Road, trail
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
2053	48	flat	16		17	2053	T	Roots & stumps for 80'	
2129	48	flat	19		18	2129	T	Berming erosion, 3" deep for 70'	
2205	48		19		19	2205	V	House foundation 50yds to right	
2241	48		18		20	2205	T	Roots & light erosion 50'	
2291	48		15		21	2291	V	Old Woods Rd. on right merges into trail	
2403	48		11		22	2340	T	20 grade 10'	
2571	48		4		23	2487	T	Dip	
2615	48		4		24	2615	T	7 steps to rd.	5
2629	48				25	2615	V	Illegal short cut to right of steps	
2700	48		20		26	2615	V	Sign to right- direction sign ok, 2 name sign missing	3
2750	48		15		27	2615	V	Old foundation right 70'	
2839	72		12		28	2626	V	7' Fishburn Pkwy	1
2924	72		12		29	2626	T	pedestrian cross walk	1
3176			up step		30	2629		pedestrian signs 13" (side of rd.)	1
3199	42	level	15		31	2629	T	Fishburn Pkwy crosswalk; end of segment #2	
3252		20	16		32	2679	T	12 steps & bridge across conc. Gutter & wood rail	1
3274		13	2		33	2700	T	2 Star Trail signs need replace	3

Data Collection Form

Date: 2/25/2005

Trail Name: Star Trail **Segment Start:** Parking lot- Riverland **Trail Surface:** Gravel, dirt **Page:**

Seg. #1-3 **Segment End:** Terra Alta/ Monument Trail **Trail Const. Origin:** Road, trail
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
3357		flat	-3		34	2750	T	Roots in trail 30'	
3410			7		35	2830	T	Small stump & roots in trail for 50'	
3456	72		10		36	2945	T	Cut log 18" d., trail width 3'	
3544			12		37	2945	V	Old rd. to right parallet trail	
3769	84		10		38	3176	T	8 steps locust to right rock cribbing	
3920	96		12		39	3206	T	1 step rock 10" high	
4021			9		40	3206	T	Rocky tread 20'	
4130			10		41	3283	T	Dip 10' and 1' deep	
4378			12		42	3774	T	Cross slope 27% for 15'	
4528			10		43	3398	T	Tree in trail (trail width 2' bet. Tree + cut bank)	
4644	60		16		44	3429	T	"Braided trail" 15' thru + around trees	
4698	36		4		45	3575	T	Eroded cross ditch 8" deep 5'long	
4741	72		12		46	3862	V	Rock formation to left adj. trail and rt. Up slope in woods	
4887	60		12		47	4021	T	Dip 8' wide 8" deep from run off	
4968	36		10		48	4073		Scattered large rock clusters along trail 60'	
5034			14		49	4120		Rock surfaces in trail 20'	
5057			5		50	4120		Pine forest 750'	

Data Collection Form

Date: 2/25/2005

Trail Name: Star Trail **Segment Start:** Parking lot- Riverland **Trail Surface:** Gravel, dirt **Page:**

Seg. #1-3 **Segment End:** Terra Alta/ Monument Trail **Trail Const. Origin:** Road, trail
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
5146			10		51	4528	V	Pine blown down off trail 100'	
5166	30		13		52	4698	V	Overlook to left by 20' side trail	
5264			12		53	4851	T	Rocky trail tead starts for 100'	
5354	36		7		54	4887	V	10 years ago forest fire area 400' open canopy fire	
5475	72		12		55	5166	T	Wood & metal post bench	
5563			11		56	5166	T	Heavy erosion, rocks and roots 200'	
5630			8		57	5222	T	Stump in trail	
5670					58	5630	T	Eroded rock and roots 50'	
					59	5670	T	Sign (Star Trail up)	
					60	5670	T	Intersect Terra Alta and Monument Trails	

Data Collection Form

Date: 1/27/2005

Trail Name: Star Trail Seg. #4 | **Segment Start:** Terr Alta/ Monument Trail | **Segment End:** Star access rd. | **Trail Surface:** Dirt | **Trail Const. Origin:** Built for trail (road, utility line, social trail, etc | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T	Trail erosion, exposed roots for 362'	
100	60	0	8		2	0	V	Many dead pines	
191	72	0	15		3	0	V	Tree island erosion 34" trail width, braided trail 4'	
208	60	0	12		4	100	V	Tree island illegal trail 51' long	
277	60	0	14		5	197	T	2 tree island, illegal trail to rt 4' wide, rocks on lft up slope 18' long	
365	60	0	21		6	208	T	15" wide rock slab on right, tree on left	
446	60	0	13		7	294	T	2" stump 5" tall, 7' wide trail	
524	60	0	11		8	384	T	Tree island 32" trail, 2.5' illegal trail on right 10' long	
641	60	0	17		9	382	T	Primarily rock tread	
766	60	0	12		10	425	T	Braided trails illegal, eroded 11' wide 40' long	
890	60	0	5		11	472	T	Rock out cropping 181' long	
1009	84	0	18		12	472	V	Winter view to right 181' long	
1145	36	0	7		13	475	T	3 tree islands	
1225	36	0	5		14	563	T	Tree islands 152' long, 11' wide	
1335	30	0	7		15	748	T	Tree island, trail 4', tree 4', illegal trail	
1429	48	0	15		16	813	T	3' trail on left, 2 trees, 2.5 illegal trail	

1495	60	0	35		17	855	T	Exposed roots 20' long, 7' trail width	
1500	36	0	18		18	929	T	Mild erosion 6' wide, 60' long	
1579	30	0	12		19	1303	T	Dip 32' long 4.3 degrees	
1641	48	0	8		20	1344	T	Root across trail 2.5" tall	
1713	60	0	14		21	1362	T	Trail narrow to 16", rock on left, tree on right	
1733	60	0	2		22	1439	T	Trail narrows to 26", rock on left, tree on right	
1772	60	0	14		23	1452	T	Rock slab across trail, 11" high	
1882	48	0	16		24	1495	T	2 rock steps, 11" and 13" tall	
1993	36	0	15		25	1526	T	Max grade 27 degrees, dip 23' long	
2147	36	0	20		26	1577	T	Switchback to left, eroded	
2192	60	0	14		27	1595	T	Hump 17' long, 16.5 degrees max grade	
2286	42	0	-5		28	1620	T	2 rock steps, 15" and 23" tall	
2366	36	0	3		29	1628	T	Switchback to right, bench, gully upslope, slight eroded	2
2456	36	0	10		30	1677	T	Rock out cropping in trees	
2517	36	0	12		31	2192	T/V	Switchback to left, direction sign missing arrow, rock step	
2545	36	0	17		32	2456	T	Rock out cropping cluster 28' long	
2597	48	0	9		33	2545	T	Switchback to right	
2680	48	0	12		34	2545	V	Star in view	
2830	48	0	12		35	2680	T	Rocks in trail 210'	
					36	2831	T	Tree island, tree and stump 12' long 5' wide	
					37	2914	T	3 rock steps 12" tall 15" long	
					38	2914	V	Star, trailhead sign, brochure box, sign with arrow missing, gravel	3

Data Collection Form

Date: 1/27/2005

Trail Name: Star Trail Seg. #5 **Segment Start:** Mill Mtn. Star Trailhead **Segment End:** Star Overlook **Trail Surface:** Gravel **Trail Const. Origin:** Road **(road, utility line, social trail, etc.)** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope - %=inslope +%=outslope	Typ Grade (±%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	V	Parking lot A 50 yards	
144	144	0	-5		2	200	V	City view 268' long	
227	144	0	-3		3	468	V	Star on right, overlook on left	
312	144	0	1						
468	144	0	7						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Terra Alta Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Star Trail

End: Driveway off Sylan/Prospect

Trailhds/ Access Sylvan/Prospect

Assessment Date 2/6/2005

Assessment Team

Brian Batteringer

Dave Tompkins

Liz Belcher

Attractions/Detractions

Great Trail

Connection to town

Summary Trail Data

Total Length 3952'

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

1. Issue: finish connector from Terra Alta to Toll Gate?
2. Logically could be one trail w/ Monument Trail

Usage/Activities	Allowed?	
__x_Walking/jogging	_x_Yes	___No
__x_Hiking	_x_Yes	___No
__x Bicycling	_x_Yes	___No
__x_Horseback riding	_x_Yes	___No
__x_ATV	___Yes	_x_No
__x_Camping	___Yes	_x_No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

__x_Well maintained

___Partly maintained

____Unmaintained

Data Collection Form

Date: 2/6/2005

Trail Name: Terra Alta Trail | **Segment Start:** Star Trail | **Segment End:** Sylvan/Prospect driveway | **Trail Surface:** Natural | **Trail Const. Origin:** (road, utility line, social trail, etc.) Built trail, fine trail on 1943 map | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	35	T	Old social shortcut to Star Trail (up: down)	
53	36	2.7	-9		2	22	T	0-222 Bermed on out slope, cupped	
137	30	5	-8		3	644	V	Large rocks	
183	30	0	-8		4	740	T	Old road bed	
22	30	5	-8		5	1092	T	Junction w/ old road that goes down back toward Star/Fishburn	
390	36	-1	-8					could be potential	
542	36	0	-8		6	1092	V	Side road up, steep	
650	36	2	-8		7	1092	T	Create dip at old road bed	
740	48	4.5	-8		8	1175	T	Hump	
896	48	4.4	-10.5		9	1252	V	9th St. industrial park (Viscose)	
677	48	8.4	-7		10	1510	V	Large rock	
1035	48	6	-4		11	1596	T	Narrow tread 20"	
1092	48	6	-24		12	1995	T	Overhanging widow tree	
1207	60	7	-4		13	1995	T	Grade reversal	
1252	36	8	-2		14	1751	T	Tree pinch points	
1354	48	8	-8.5		15	1800	V	Steep drop off (500') to Fishburn Pkwy(2293')	

Data Collection Form

Date: 2/6/2005

Trail Name: Terra Alta Trail | **Segment Start:** Star Trail | **Segment End:** Sylvan/Prospect driveway | **Trail Surface:** Natural | **Page:** | **Trail Const. Origin:** (road, utility line, social trail, etc.) Built trail, fine trail on 1943 map

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
1379	48	7	-1		16	1885	T	Grade dip	
1426	36	10	9		17	2139	V	Large boulders	
1507	36	9	-11		18	2157	T	Grade reversal	
1560	36	9	-6		19	2198	T	30' rock wall on lower side	
1668	24	7	-17		20	2250	T	Pinchpoint 18" rock	
1751	24	6	-7		21	2392	T	Rock slide scree field for 200', cupped	
1823	24	8	-7		22	2525	T	Grade reversal at tree	
1918	24	7	-8		23	2595	V	Large poplar and other large trees	
1981	24	8	-8		24	2717	V	Boulders near trail	
2071	24	7	-7		25	2795	V	Town downtown	
2254	20	7	-10.5		26	2880	T	Rock/scree field	
2293	20	6	-4		27	2950	T	Grade reversal	
2341	20	7	-9		28	3065	T	Large rocky drain	
244	20	3	-13		29	3228	T	Root hump	
2587	20	8	-9		30	3340	V	Alternate Terra Alta partially built (potential trail to Toll arch)	
2660	24	1	-4.5		31	3551	T	Grade reversal	

Data Collection Form

Date: 2/6/2005

Trail Name: Terra Alta Trail | **Segment Start:** Star Trail | **Segment End:** Sylvan/Prospect driveway | **Trail Surface:** Natural | **Trail Const. Origin:** (road, utility line, social trail, etc.) Built trail, fine trail on 1943 map | **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
2744	24	1	-11		32	3565	T	18-20" pinchpoint at retaining log	
2795	24	2	-4		33	3634	V	Ravine w/ trash	
2880	20	0	-11		34	3550	V	Debris dump	
3003	24	0	-7		35	3900	T	Pinchpoint w/ 2" rock	
3065	20	5	-11		36	3952	T	Driveway off Sylvan/Prospect, Private drive sign	
3129	20	0.6	-6						
3192	24	7	-10						
3258	24	6	-10						
3400	36	5	-9.5						
3471	36	5	-8						
3513	24	8	-3						
3565	24	7	-5						
3634	24	12	-10						
3683	30	2	-8						
3752	36	0.1	1						
3864	36	0	-4						
3900	36	1	-1						

Data Collection Form

Date: 2/6/2005

Trail Name: Terra Alta Trail | **Segment Start:** Star Trail | **Segment End:** Sylvan/Prospect driveway | **Trail Surface:** Natural | **Page:** | **Trail Const. Origin:** Built trail, fine trail on 1943 map (road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
3952	48	2	-2						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name VA Pine Lane Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Hartsook St.

End: NPS boundary (potentially Yellow Mt. Rd.)

Trailhds/ Access Hartsook St.

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
__x_ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/22/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Attractions/Detractions

Existing, wide constructed road, often trenched

Trail Junctions

Trail Notes

Not cleared beyond NPS boundary

Trail Origin: Road

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 2/22/2005

Trail Name: VA Pine Ln. Trail

Segment Start: Hartsook St.

Segment End: Pine deadfall near 2 NPS monuments

Trail Surface: Natural

Trail Const. Origin: Rd. **(road, utility line, social trail, etc.)**

Page:

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0		Private land	
107	96	entrenched	9		2	107	T	Ditch on right- 189 cross it in trail (40" wide) 12-18" deep	
207	96	entrenched	9		3	485	T	Start of worst part of ditch	
382	96	trench	8		4	515	V	Some paint on trees	
515	96	2.5	8		5	716	T	ATV trail to right, yellow paint off in woods, Dick says its Betty Oat	
620	96	slight trench	7		6	716		Wide trench to 925	
716	96	-2	10		7	1028	V	Wellington Subdivision to left. Survey marker 30-40' off trail	
925	96	trench	8					foot of hill encroaching	
1028	96-120	0	3		8	1195	T	Minor dip	
1111	96	0.7	2		9	1700	T	Width of trench is twice trail width	
1248	96	3.1	9		10	1840	T	Big flat	
1408	72	4.6	10		11	1960	V	House on left	
1573	84	-2	5		12	2101	V	NPS monument 20' to right	
1700	84	-8	11		13	2101	V	Boulder filled path on left of pink flags and monument	
1837	96	-5.5	5		14				
1956	120	-0.9	0		15			From end of trail (2233) great potential trail to Yellow Mt. Rd.	

Data Collection Form

Date: 2/22/2005

Trail Name: VA Pine Ln. Trail **Segment Start:** Hartsook St. **Segment End:** Pine deadfall near 2 NPS monuments **Trail Surface:** Natural **Trail Const. Origin:** Rd. **(road, utility line, social trail, etc.)** **Page:**

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
2101	84	0.5	10		16				
2164	96	4.3	20		17				
2233	96	trench	15		18				

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Watchtower Trail

Mgt. Agency Roanoke Parks and Rec

Status _x_Existing ___Potential

Termini **Start:** Star Trail across from Watch Tower Steps

End: Mill Mt. Greenway (Prospect)

Assessment Date 3/10/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Trailhds/ Access

Attractions/Detractions

Summary Trail Data

Total Length 1228

Average Width 24-96

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Trail Junctions

Trail Notes

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Maintenance

____Well maintained

__x_Partly maintained

____Unmaintained

Data Collection Form

Date: 3/10/2005

Trail Name: Watchtower Trail

Segment Start: Star Trail (Watchtower Steps

Segment End: Mill Mt. Greenway/Prospect Rd.

Trail Surface: Natural/gravel

Page:

Trail Const. Origin: Rd.
(road, utility line, social trail, etc.)

Station distance (ft)	Tread Width (in)	Typ X-slope -%=inslope +%=outslope	Typ Grade (+%)		Feature Number	Feature Distance	Trail/ View	Item, Description & Details	Condition 1=Good 5=Bad
0					1	0	T	Steps to old watchtower	
109	72		-7		2	22	T	Wash from other road	
260	72		-11		3	160	T	Side trail to Star (very steep) overlook rock= pinch point	
355	72		-9		4	529	T	Drainage dip	
457	60		-6		5	645	V	Tapped Maple	
565	48		-9		6	798	T	Drainage dip	
658	60		-12		7	850	V	Big rock cliff uphill on left	
770	96		-12		8	983	T	Cleared width is narrow but road bed still 8'	
847	96		-7		9	1228	T	Social trail too steep, meed wheeled tie into paved road	
926	48		-3		10	1228	T	Wall-- 3' drop, need rock steps	
983	48		-4						
1063	48		-8						
1162	60		-7						
1186	60		-8						
1228	24		-2						

TRAIL COVER SHEET

Trail System Mill Mountain

Trail Name Yellow Mt. Connection

Mgt. Agency Roanoke Parks and Rec

Status __Existing _x_Potential

Termini **Start:** Va Pine Lane

End: Yellow Mt Rd/Chestnut Ridge Trail

Trailhds/ Access Yellow Mt Rd

Summary Trail Data

Total Length

Average Width

Average Slope

Elevation Start_____ End_____

Min _____ Max_____

Usage/Activities	**Allowed?**	
____Walking/jogging	___Yes	___No
____Hiking	___Yes	___No
____Bicycling	___Yes	___No
____Horseback riding	___Yes	___No
____ATV	___Yes	___No
____Camping	___Yes	___No
____Other	___Yes	___No
_____	___Yes	___No

Assessment Date 2/22/2005

Assessment Team

Linda Oberlender

Dick Clark

Liz Belcher

Attractions/Detractions

Great Opportunity to connect to Chestnut Ridge Trail w/ very short piece of new sidehill construction on NPS land

Trail Junctions

Trail Notes

Would be approximately 200- 400 yds

Maintenance

____Well maintained

___Partly maintained

___Unmaintained

Appendix C
Trail Management Issues

In developing the *Blue Ridge Parkway Trail Plan, Final Draft*, the Parkway trail committee looked at a variety of trail management issues, including design, maintenance and user conflicts. The following excerpts are taken from that Plan. These issues and others are more fully discussed in the List of Resources referenced at the end of the Mill Mountain Trail Plan.

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." *(pp.18-19)*

Sustainable Trail Design

"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 ¼ to ½ 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." *(p.17)*

Benefits and Challenges of 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." (p.17)

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 mangers 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." (pp.19-20)

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."

(pp. 21-21)

Appendix D
Guidelines and Etiquette for Trail Users

In order for a multi-use trail system to work well, all users must exhibit high standards of behavior and protect the resource they use. The following guidelines for trail etiquette are accepted standards for each user group. The Mill Mountain Trail Plan encourages posting these guidelines and utilizing brochures and other techniques to educate users on trail etiquette and practices.

Etiquette and Safety for Hikers

The following guidelines are taken from the *Leave No Trace* Center for Outdoor Ethics. Leave No Trace is a national non-profit organization dedicated to promoting and inspiring responsible outdoor recreation through education, research and partnerships. These principles can be applied for bicyclists and horseback riders as well hikers.

1. Plan Ahead and Prepare

- *Know the regulations and special concerns for the area you'll visit.*
- *Prepare for extreme weather, hazards, and emergencies.*
- *Schedule your trip to avoid times of high use.*
- *Visit in small groups. Split larger parties into groups of 4-6.*
- *Repackage food to minimize waste.*
- *Use a map and compass to eliminate the use of marking paint, rock cairns or flagging.*

2. Travel on Durable Surfaces

- *Concentrate use on existing trails.*
- *Walk single file in the middle of the trail, even when wet or muddy.*

3. Dispose of Waste Properly

- *Pack it in, pack it out. Inspect your rest areas for trash or spilled foods. Pack out all trash, leftover food, and litter.*
- *Deposit solid human waste in catholes dug 6 to 8 inches deep at least 200 feet from water, camp, and trails. Cover and disguise the cathole when finished.*
- *Pack out toilet paper and hygiene products.*

4. Leave What You Find

- *Preserve the past: examine, but do not touch, cultural or historic structures and artifacts.*
- *Leave rocks, plants and other natural objects as you find them.*
- *Avoid introducing or transporting non-native species.*
- *Do not build structures, furniture, or dig trenches.*

5. Respect Wildlife

- *Observe wildlife from a distance. Do not follow or approach them.*
- *Never feed animals. Feeding wildlife damages their health, alters natural behaviors, and exposes them to predators and other dangers.*
- *Protect wildlife and your food by storing rations and trash securely.*
- *Control pets at all times, or leave them at home.*
- *Avoid wildlife during sensitive times: mating, nesting, raising young, or winter.*

6. Be Considerate of Other Visitors

- *Respect other visitors and protect the quality of their experience.*
- *Be courteous. Yield to other users on the trail.*
- *Step to the downhill side of the trail when encountering pack stock.*
- *Take breaks away from trails and other visitors.*
- *Let nature's sounds prevail. Avoid loud voices and noises*

http://www.lnt.org/programs/lnt7/#lnt1

Etiquette and Safety for Equestrians

These guidelines are posted by *Equestrian Trails, Inc*., a nonprofit corporation established in 1944 with the charter to be "Dedicated to the Acquisition and Preservation of Trails, Good Horsemanship, and Equine Legislation."

- *Make sure your horse has the temperament and training for riding on congested public trails. Busy multi-use trails are not the proper place for schooling green horses.*
- *Advise other trail users of your horse's temperament, e.g. a horse with a tendency to kick should always wear a red ribbon on the tail or a stallion should wear a yellow ribbon. Assume that not everyone will know what these ribbons mean, so be prepared to explain or take the necessary precautions to avoid trouble.*
- *Obey posted speed/gait limits and use common sense in crowded areas. Cantering/galloping on crowded trails endangers everyone.*
- *Move to the right to allow faster trail users to pass.*
- *Announce your intentions to pass other trail users and reduce speed in order to pass safely. Pass on the left only.*
- *Remove your horse from the trail if you begin experiencing behavior problems.*
- *Stay on equestrian approved trails.*
- *As a courtesy to others in your group, use appropriate hand signals for turning, slowing, etc., and give verbal warning for dangers on the trail (e.g. holes, low branches).*
- *Remember that other trail users may not be familiar with horses or their reactions to new experiences. Your horse may be another trail users introduction to horses, what you do is a reflection of the local horse community. Cheerfully answer questions about your horse. You are an ambassador for the entire equestrian community.*
- *Do not clean out your trailer in the parking area.*
- *On multiple use trails, step off the trail (if possible) if your horse needs to relieve himself or kick the droppings off the trail.*

http://www.etinational.com/trailetiquette.html

Etiquette and Safety for Mountain Bikers

The International Mountain Bicycling Association guidelines are recognized around the world as the standard code of conduct for mountain bikers.

1. Ride on Open Trails Only.

Respect trail and road closures (ask if uncertain); avoid trespassing on private land; obtain permits or other authorization as may be required. Federal and state Wilderness areas are closed to cycling. The way you ride will influence trail management decisions and policies.

2. Leave No Trace

Be sensitive to the dirt beneath you. Recognize different types of soils and trail construction; practice low-impact cycling. Wet and muddy trails are more vulnerable to damage. When the trailbed is soft, consider other riding options. This also means staying on existing trails and not creating new ones. Don't cut switchbacks. Be sure to pack out at least as much as you pack in.

3. Control Your Bicycle!

Inattention for even a second can cause problems. Obey all bicycle speed regulations and recommendations.

4. Always Yield Trail

Let your fellow trail users know you're coming. A friendly greeting or bell is considerate and works well; don't startle others. Show your respect when passing by slowing to a walking pace or even stopping. Anticipate other trail users around corners or in blind spots. Yielding means slow down, establish communication, be prepared to stop if necessary and pass safely.

5. Never Scare Animals

All animals are startled by an unannounced approach, a sudden movement, or a loud noise. This can be dangerous for you, others, and the animals. Give animals extra room and time to adjust to you. When passing horses use special care and follow directions from the horseback riders (ask if uncertain). Running cattle and disturbing wildlife is a serious offense. Leave gates as you found them, or as marked.

6. Plan Ahead

Know your equipment, your ability, and the area in which you are riding -- and prepare accordingly. Be self-sufficient at all times, keep your equipment in good repair, and carry necessary supplies for changes in weather or other conditions. A well-executed trip is a satisfaction to you and not a burden to others. Always wear a helmet and appropriate safety gear.

http://www.imba.com/about/trail_rules.html