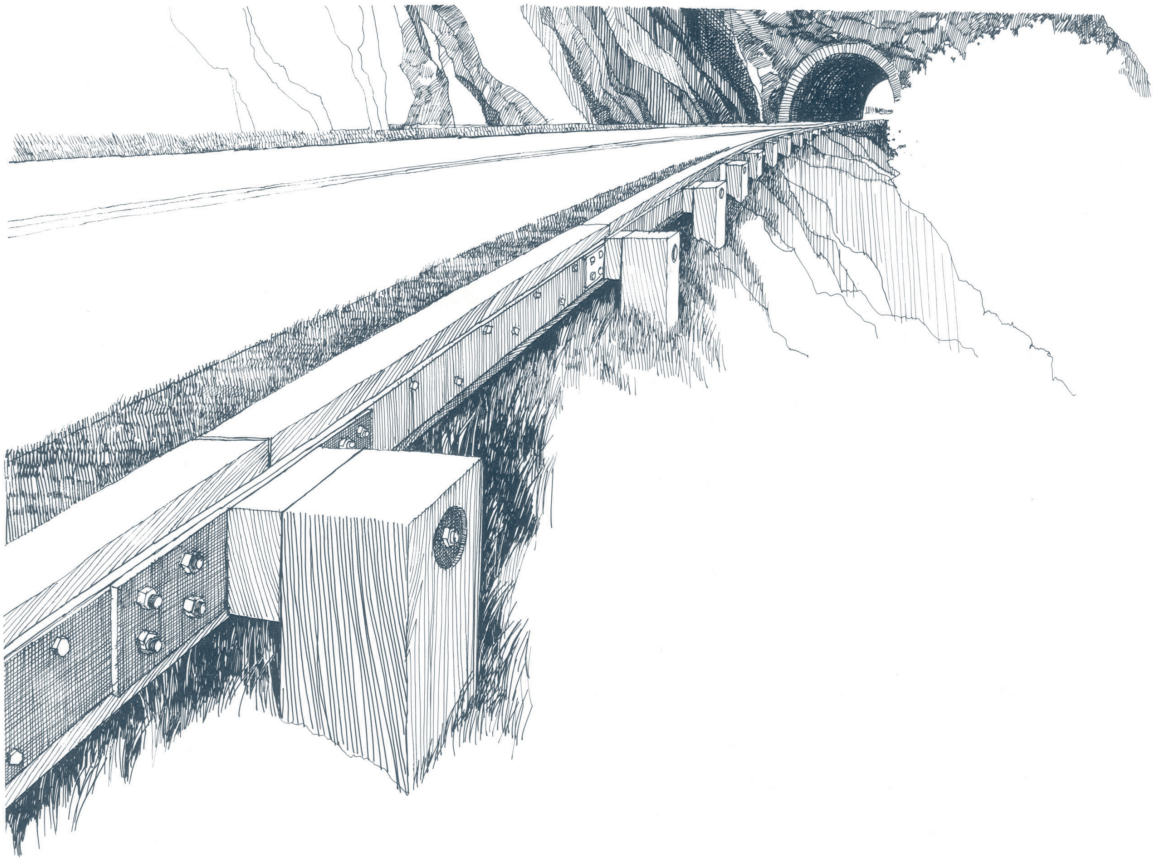
Blue Ridge Parkway

Cultural Landscape Report for Guardrails



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Cover Illustration: From *Visual Character of the Blue Ridge Parkway*, United States Department of the Interior, National Park Service, p. 141, Carlton S. Abbott.

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Management Summary

The purpose of this report is to provide an assessment of character-defining features, existing conditions, and the appropriateness of guardrails in an approximate 100 - mile long portion of the Blue Ridge Parkway. Appropriateness has been determined first on safety requirements and secondly, on the options for making new guardrails a compatible feature of the parkway. The report documents the design and use of guardrails, and how these elements have changed over time. All types of existing guardrails were inventoried and evaluated in terms of present conditions and their ability to meet safety standard regulations.

In the year 2001, the parkway received funding to repair damaged guardrails, to add flared taper extensions to existing guardrails, to replace existing substandard guardrails, and to add standard guardrails where conditions have been deemed unsafe. Newly installed guardrails continue with no interruption for great distances and in some cases, occupy both sides of the roadway to create a "tunnel vision" effect. These new installations also include straight sections of roadway, medians, and overlook pull-off areas, all of which do not typically warrant safety devices. The overuse of guardrails created a concern regarding impact of the visual experience to the parkway and was a catalyst for this study.

This report has been organized in a Cultural Landscape Report (CLR) format, but it is different than most CLRs. This study has been limited to a single feature, the guardrails, rather than the all-inclusive cultural landscape. The guardrails have been evaluated within the context of the parkway. This effort has been further challenged by the fact that the guardrails are not an original feature of the parkway's historic landscape. The sections of this report are described below.

Part I includes the Site History, which is based on research and historical documentation. Existing Conditions describes the parkway corridor, as it currently exists, with an emphasis on guardrails. The Analysis and Evaluation section compares findings from the Site History and Existing Conditions to identify the significance of landscape characteristics and features in the context of the landscape as a whole. Individual Character-Defining Features provides details about the components found in the landscape along the parkway that give it its unique rustic character and help to identify its design vocabulary. The Threats to Historic Character and Integrity section identifies contemporary components or alterations that are not in keeping with the parkway's rustic character. Accident Statistics are also included to provide data regarding

locations within the study area where safety concerns are high. Standards for safety were explored with reference to The Blue Ridge Parkway Safety Improvements Review and Federal Highway Administration Standards.

Part II provides Treatment Recommendations based on the *Secretary of the Interior's Standards* for cultural landscape projects. Numerous publications, other guardrail study reports and other cultural landscape reports served as guides for structuring this report. Recommendations offer a framework to guide park managers, planners and designers when making decisions about future design and construction of guardrails for the parkway. A preservation maintenance plan will be important to ensure that historic features are preserved. In addition, long-range planning concerns, as they pertain to safety issues and maintaining the historic integrity of the parkway, will be the challenge for future NPS employees. For reference, purpose and significance statements used in strategic and general management plans are included in this section.

Part III provides a Record of Treatment, explaining how the Treatment Recommendations were implemented. (To be added at a later time, following new construction of guardrails or rehabilitation of existing guardrails).

Historical Overview

The Blue Ridge Parkway is a linear park, connecting the Shenandoah National Park to the Great Smoky Mountains National Park, for a distance of 469 miles. Construction began in 1935, but was briefly suspended during World War II and all sections were completed by 1987. The parkway is more than just a roadway linking the two parks, it is also a destination in itself. Due to the length of the parkway, designers recognized the importance of scenic variety. They appreciated the value of spectacular wilderness views, and developed a comprehensive approach to the conservation of rural landscapes. Recreational areas were added to offer travelers opportunities for rest, refreshments, and outdoor activities. In addition, interpretive exhibits were developed to commemorate southern Appalachian culture.

The parkway's landscape architects and the Bureau of Public Roads engineers, led by Stanley W. Abbott and William M. Austin respectively, realized the importance of establishing some design parameters to define themes and provide a context for the parkway's design. These principles have been honored by those who followed them and include: (1) maintaining a broad right-of-way to allow for restoration and preservation of the roadside landscape; (2) scenic control of certain areas; (3) rustic simplicity of all structures to harmonize with natural and cultural environments; (4) all design elements relating to each other and complementing the parkway as a whole; and (5) recreational parks and areas for scenic protection at intervals along the parkway right-of-way.

Today, the parkway comprises approximately 90,000 acres of land. In addition to the long roadway corridor landscape, there are fifteen recreational parks along the parkway. With over twenty million visitors per year, this is the most heavily visited unit within the National Park System.

The insertion of a highway into a very mountainous terrain, with a design layout that focused on aesthetics rather than on typical engineering practices, has always raised safety concerns. In the beginning, stacked stone retaining walls provided restraining elements along the roadside edge. At later dates, guardrails were strategically added in key locations to increase safety.

Scope of Work and Methodology

The work was divided into the following phases: (1) Review of Background Information; (2) Research; (3) Inventory; (4) Analysis; and (5) Draft Report Review at 75%, 90% and 100%. A meeting was held at the outset of the project in Asheville, North Carolina, between consultants and National Park Service (NPS) staff from both the Southeast Regional Office in Atlanta, Georgia, and the Blue Ridge Parkway *(Appendix A)*. Background data was obtained from the NPS at the outset of the project and has since been supplemented with other materials. Hard copies of half-scale Parkway Land Use Maps (PLUM) drawings, Inventory Data Charts with existing guardrails– types, locations, lengths, conditions, etc. and Construction Details were also provided by NPS.

A survey of existing conditions and an inventory of guardrails were conducted on several trips. All guardrail types were photographed, measured and assessed in terms of design, safety effectiveness and impact on visual integrity of the parkway. Outstanding information, such as newer guardrail installations that were not documented in The Guardrail Inventory *(Appendix B)*, have been measured and drawn to scale on PLUM maps for NPS to digitize at a later date. In addition, sections recommended for removal were measured and marked on the PLUM Maps in red pencil. Also provided is a summary chart that identifies locations and lengths of new guardrail installations recommended for removal *(Appendix C).* A complete set of PLUM Maps hand-marked with outstanding information has been provided to NPS as a companion submittal to this report.

The treatment recommendation section in this report includes a five-mile long corridor case study between mileposts 375 and 381. This particular section of the parkway encompasses some of the most extensive new guardrail installations in the study area. For accuracy and due to the close spacing between installations, the entire stretch was documented on foot with a measuring wheel.

Description of Study Boundaries

The study area comprises an approximate 100 – mile long section of parkway that begins at milepost 355 and ends at milepost 462 (107 miles). This section covers the southernmost portion of the Parkway, beginning near Mount Mitchell State Park and ending at the entrance to The Great Smoky Mountains National Park *(Illustrations 1 and 2)*. This section also contains the highest point on the parkway, Richland Balsam Mountain, with an elevation of 6,047 feet *(Illustration 2).*

Summary of Findings

The CLR for the guardrails has several objectives. The first objective is to document the historical development and evolution of guardrail design. The second objective is to evaluate how guardrails contribute to the site's historical significance, and finally the impact of guardrail installations to the visual integrity of the site. Federal Highway Administration (FHWA) Standards and Safety Regulations and NPS Standards were considered in order to assess the effectiveness of existing guardrails and any need for new guardrail installations.

More recent walls and rails that can withstand crash test requirements are referred to as guard walls and guardrails. Older walls and rails that do not meet crash test requirements are referred to as *guide* walls and *guide* rails. The walls are typically some type of stone construction and the rails are of timber components. The standards for determining safety eligibility are focused primarily on height and resilience to impact.

During the initial windshield survey (September 2002) four types of timber guardrails were observed in the study area. Of the four types, it was determined that some were still serving as adequate roadside barriers, especially those that were at least twenty-four inches high and had steel reinforcement components. Other types were less effective due to substandard heights, a lack of steel reinforcement, general decline, damage from accidents, or from having sunk into the ground to depths that essentially rendered the guardrails useless. These types are not considered to be guardrails and are referred as *guide* rails. Recently installed guardrails are taller with an improved steel backing system, making them the most highly evolved design in terms of meeting current safety regulations. However, the increased height and extensive coverage tends to obstruct views and compromises the visual integrity of the parkway experience. This overuse has raised concern with parkway officials.

When intensive field survey began in December 2002, materials for replacing deficient guardrails were seen on site in various locations along the study area. When the field survey was finalized in May 2003, all Type One and Type Two timber guardrails had been replaced or were in the process of being replaced with Type Four timber guardrails. Type Three guardrails had been modified to increase safety.

The primary preservation treatment recommendation for the existing guardrails that meet safety standards is *rehabilitation.* These guardrails can be modified to increase safety standard eligibility. Guardrails that cannot meet safety standards should be *replaced*. Other treatment recommendations include the *removal* of some portions of newly installed guardrails occupying locations that do not warrant safety devices.

PART I:

Site History
Existing Conditions
Analysis & Evaluation
Individual Character-Defining Features
Threats to Historic Character & Integrity
Accident Statistics
Safety Standards

- **Federal Highway Standards**
- **National Park Service Park Road Standards**

Site History

The Parkway Concept

In the history of road development, ease of passage between points often defined road travel. The end result, the paved high-speed highway, is a product of twentieth-century travel technology. The modern scenic parkway never evolved to the level of a high-speed travel road. Instead, designers took cues from existing tree-lined boulevards that connected city parks to create roadways that placed the automobile within a natural or scenic environment. Travel on a scenic parkway would be more than just a connector road between points.

Taking cues from designed manor entrance roads in Europe, Frederick Law Olmsted and Calvert Vaux designed carriage drives to fit within the planned landscape and separated park roadways from the city street grid in late nineteenth-century landscape designs. The arrival of the automobile forever changed the economy, the society, and the environment in America. Automobile speed allowed for greater distances to be traveled in less time, thus making the countryside more accessible to city dwellers. As automobile transportation increased in popularity, the design of the roadways on which they traveled evolved from broad boulevards to large suburban expressways that linked the city with regional open space. The role of the automobile parkway adapted to take the form of an elongated park, with design of both the roadway and the landscaping on either side adapted to accommodate the speed of travel. [1]

With construction beginning in 1916, the Bronx River Parkway was the first modern motor parkway built with public funds. The route connected the New York Zoological Park in the Bronx to the Kensico Reservoir and Dam in Westchester County, some fifteen miles away. Completed in 1925, the limited-access road featured a curvilinear alignment that was designed for automobiles traveling thirty-five miles per hour (mph). Properties adjacent to the Bronx River Parkway were separated by a wide right-of-way and the densely planted naturalistic setting along either side was designed for the automobile with the focus on the view ahead, rather than to the side.[2]

The Bronx River Parkway was well received and its success led to the construction of similar parkways in Westchester County. Created in 1922, the Westchester County Park Commission had the authority to acquire land for new

[1] Ian Firth, "The Blue Ridge Parkway Historic Resource Study" (National Park Service, 1992), 14-17.
[2] Richard Quin, "Blue Ridge Parkway" (Historic American Engineering Record NC-42, National Park Service, 1997), 13, Firth, 18-20.

parks and parkways. These new parkways expanded upon the formula used for the Bronx River Parkway and featured recreational sites in addition to a landscaped corridor. They had the same four lanes cross-section, but often had more sweeping curves to better fit the roadway into the landscape. Although emphasis was given to the scenic landscape, these new parkways were utilized as commuter roads.[3]

The first federally authorized parkway was the 2.5 -mile Rock Creek and Potomac Parkway in Washington, D.C. Authorized by Congress in 1913 as an urban renewal project, the road was completed in 1936. Although it was not authorized until 1928, the Mount Vernon Memorial Parkway was opened in 1932, making it the first completed federal parkway. The route spanned fifteen miles between the entrance to Mount Vernon and the proposed Arlington Memorial Bridge. Since this was the Bureau of Public Roads first attempt at parkway design and development, the staff landscape architects received assistance from experienced Westchester County Commission designers. The road used spiral transition curves, separated roadway sections, designed landscape screening, and naturalistically graded cross sections and was completed in time for the 200th anniversary of the birth of George Washington.[4]

In 1930 Congress authorized the Colonial Parkway that linked Jamestown, Yorktown, and Colonial Williamsburg. Modeled after the Mount Vernon Parkway, the route took advantage of the scenic features of the Tidewater Region. Although this was the first parkway in which the NPS was formally involved, Park Service designers and engineers had become familiar with the design concept of the road harmonizing with the landscape with their road building experience in western park design. In western parks such as Glacier, designers sought to sensitively fit necessary infrastructure into the natural landscape by using a rustic style of architecture and incorporating a naturalistic approach to landscape design. By 1926 new standards had been jointly created by NPS and the Bureau of Public Roads engineers for planning, design, and construction of park roads. Their objective was simple:

"The landscaping of the National Park System has as its essential aims the diminution of scars; the introduction of certain elements of grace in alignment; the use of architecturally pleasing structures; and the protection of trees, shrubs, and other natural growths from destruction and damage during construction."[5]

[3] Quin, 13-14, Firth, 21-22.
[4] Firth, 22-23.
[5] Firth, 27.

In the 1930s, NPS decided to develop a more elaborate system of parkways that expanded upon the New York parkway concepts. These park system roads came to be known as "scenic rural parkways." In 1931 construction began on Skyline Drive in Shenandoah National Park, the road that would most greatly influence the Blue Ridge Parkway. Although not technically a parkway because the entire length of the route was contained within a national park, designers employed many techniques that would later be used for the Blue Ridge Parkway. Designed by Charles E. Peterson and William M. Austin, who worked on western park roads, Skyline Drive was the first example of an eastern park road built with western park road building standards. The Blue Ridge Parkway would ultimately represent a fusion of ideas drawn from the Westchester County parkways on the east coast and western National Park roads.[6]

A Scenic Parkway through the Blue Ridge Mountains

The Blue Ridge Parkway was initially conceived as a rural parkway that would serve to linearly link two prominent east coast national parks—Shenandoah National Park in Virginia and Great Smoky Mountains National Park in North Carolina and Tennessee. The idea for such a parkway through the southern Appalachians was not new, however. In 1906, almost thirty years before construction would begin on the Parkway, Joseph Hyde Pratt, a North Carolina geologist, advocated a scenic "Crest of the Blue Ridge" highway stretching from Marion, Virginia, to Tallulah, Georgia, along the mountaintops of the Blue Ridge for some 350 miles. Pratt had the route surveyed and construction began in North Carolina on the section between Altapass and Linville in 1912. The road was completed to Pineola before World War I halted all road building efforts. Materials and manpower shifted to the war effort and the scenic toll road was never completed.[7]

Proposal, Authorization, and Planning

Although it was not originally authorized as a National Park Service project, the Blue Ridge Parkway soon fell under NPS auspices. Promoted as a New Deal project, the road would provide employment and accordingly was funded with $4,000,000 of public works funds. Responsibility for planning the route rested with the National Park Service and a project staff was assembled. Stanley L. Abbot, who had worked on the Westchester County Parkway System in New

[6] Quin, 17-18.
[7] Quin, 25-26.

York, served as the resident landscape architect for the project and held the leading role in planning and designing the parkway.

While observing construction progress on Skyline Drive in 1933, Virginia Senator Harry Byrd suggested to President Franklin Roosevelt the possibility of continuing Skyline Drive southwestward to Great Smoky Mountains National Park. Roosevelt was receptive and Byrd moved ahead with the idea, including the governors of Virginia, North Carolina and Tennessee in the process. A planning team was selected to study the project in depth and on November 24, 1933, Interior Secretary Harold Ickes authorized construction of the "Park to Park Road."[8]

Abbott established parkway design principles that would help to define a parkway theme and provide a design context. He envisioned the parkway as a linear park that contained waysides, overlooks, and recreational parks along the route that would provide the traveler with opportunities to experience the scenic qualities of the region. Additionally, all elements of the parkway would relate to one another and provide a unified experience that harmonized with the natural environment. Throughout design and construction the following unifying themes were applied.

The right-of-way would be wider than the average road, averaging about 100 acres per mile. All structures, bridges, tunnels, signage, park buildings, and site details would be characterized by a rustic simplicity. Design elements would relate to each other to provide a "complete road." At staggered intervals, the parkway boundary would widen from its linear path to accommodate recreational parks or protect scenic areas.[9]

Route Selection and Construction

The original parkway concept merely provided a general route from Virginia through the Blue Ridge to Great Smoky Mountains National Park. Field reconnaissance presented several feasible route options through some combination of the Virginia, North Carolina, and Tennessee mountains. A vigorous debate that took almost a year to resolve emerged between politicians in North Carolina and Tennessee, as both states recognized the value of having a parkway located in their state. After further surveying and political lobbying, the

[8] Quin, 27; 30, Firth, 47-48.

[9] Francis P. Noe and William E. Hammitt, editors, *Visual Preferences of Travelers Along the Blue Ridge Parkway*, (Washington, DC: US Department of the Interior, National Park Service, 1988), 2-30.

Virginia-North Carolina route was chosen, with consideration given to economic, scenic, land acquisition, and topographic factors.[10]

The final design of the Blue Ridge Parkway was a compromise between the engineers' desire to meet modern highway standards for grade and curvature and the landscape architects' attempt to best unify the road and landscape in a way that minimized construction scarring on the mountainside yet still provided an interesting route. As stipulated by the public works funding, the states would purchase the land and the federal government would construct the road. The Blue Ridge Parkway was the longest road ever to be planned as a single unit in America at that time. Parkway engineers divided the proposed roadway into forty-four distinct sections to facilitate simultaneous multi-district construction. The sections consist of twenty in Virginia that are identified by the number 1 and letters of the alphabet; and twenty-four in North Carolina that are identified by the number (2), followed by letters of the alphabet. Until 1936, the project was generally referred to as the "Appalachian Parkway." That year, Congress passed a law that formally named the route the Blue Ridge Parkway and placed it under the administration of the National Park Service.[11]

The first road construction began near Cumberland Knob in North Carolina on September 11, 1935, with work beginning in Virginia the following February. Each section of the road was built by private contractors, for the most part based in North Carolina, Virginia, or adjacent states. Skilled laborers such as stonemasons came from outside the region; unskilled hand labor came from Works Progress Administration (WPA), Emergency Relief Administration (ERF), and Civilian Conservation Corps (CCC) crews. By the end of 1936 over 133 miles were under construction and, in 1939, a fifty-mile stretch of parkway was opened to the public just south of Roanoke, Virginia.[12]

United States involvement in World War II halted the road-building effort as manpower and resources were concentrated on the war effort. At that time, only 170 miles of the parkway were complete and open for travel, with another 160 miles in various stages of completion, and 144 miles that had yet to be started. Funds initially allotted for the parkway were impounded by Congress, due to war expenditures. By July of 1943, parkway administrative staff had been reduced by 34.1 percent and the New Deal programs that provided much of the development and landscaping manpower were suspended. At war's end, the

[10] Firth, 48-51.
[11] Firth, 43-44, Quin, 42.
[12] Firth, 69-70; 75-77.

parkway operations recovered slowly. Funding, equipment, and personnel were not as readily available as they were prior to 1940. Postwar planning continued and construction to complete the parkway proceeded slowly.[13]

Mission 66

By the mid-1950s, over one-half of the parkway still remained incomplete. Remaining sections involved complex construction over difficult terrain. Post-war construction received a much needed boost with the Park Service's implementation of the Mission 66 development program. Implemented in 1956, this ten-year program prioritized parkway completion. In 1958, expenditures totaling $16 million proved to be an all-time high for construction projects on the road. In addition to the roadway, many new buildings and facilities were also constructed. By the end of the program in 1966, all but 7.7 miles had been completed.[14]

A Completed Parkway

To complete the road, an acceptable alignment around Grandfather Mountain in North Carolina, the highest mountain in the Blue Ridge, had to be agreed upon. The Park Service had tried to acquire right-of-way along the privately owned mountain several times. The landowner believed that suggested routes would negatively impact the beauty of his private recreation area, and desired that the parkway follow a lower alignment away from the mountain's crest. In 1968 a mid-level compromise was created that satisfied both parties. Construction began, but in the early 1970s, the Nixon Administration froze funding for the parkway preventing project completion.[15]

The steep and rugged terrain along the side of Grandfather Mountain proved too unstable to cut a bench for the roadway. A FHWA engineer suggested that a viaduct be constructed to carry the road around the mountain. The completion of the Linn Cove Viaduct, a segmental post-tension viaduct built of custom-cast interlocking sections, brought fifty-two years of parkway construction to an end in 1987. The entire 469-mile route from Shenandoah National Park to the Great Smoky Mountains could finally be traversed in its entirety.

Guardrails in the Parkway Context

Designers carefully chose the parkway location so that it provided frequent changes of scenery. Landscape plans followed behind road construction and

[13] Quin, 78-82.
[14] Quin, 87-91.
[15] Quin, 92-94.

attempted to heal construction scars and maintain a naturalistic setting along the roadside. The absence of roadside edge striping helped the roadway blend into the landscape, as boundaries were meant to be invisible. Site details, including roadside barriers, were carefully thought out and designed in such a way that they complemented the visual experience. Scale, proportion, and relationship to the road were all important considerations made when designing such details. Although timber guardrails were not officially introduced until the 1950s, they too have been detailed with respect to parkway aesthetics.

Despite a forty-five mph speed limit, designing a roadway through mountainous terrain necessitated that certain measures be taken to accommodate traveler safety. Because the initial design layout focused on aesthetics rather than standard engineering safety practices, roadside safety barriers were designed to promote safety in a manner that was still aesthetically pleasing. Technological advances in safety barriers over the years have allowed for the rustic look of vehicle barriers to be maintained while the overall safety value has been increased. According to NPS definition, newer walls and rails that meet FHWA crash test requirements are referred to as guard walls and guardrails. Older walls and rails that do not meet crash test requirements are referred to as *guide* walls and *guide* rails. The standards for determining safety status are focused primarily on height and resilience to impact.

Four basic types of safety barriers were found on the Blue Ridge Parkway. The distinctions are based on materials and height above grade. Although discussed in more detail later in this report, a basic definition of each type is provided here for clarity purposes.

> **Guide wall:** dry-stacked stone wall, top of wall less than twenty-four inches above grade.
>
> **Guard wall:** mortared stone wall, top of wall height twenty-four inches or taller above grade.
>
> **Guide rail:** post and rail, top of rail lower than twenty-four inches above grade, typically lacking steel reinforcement.
>
> **Guardrail:** post and rail, top of rail twenty-four inches or taller above grade, with steel reinforcement. Design must meet FWHA Standards in order to be considered a guardrail.

The Blue Ridge Parkway was not the first national park to incorporate harmonious design into safety features along scenic park roads. The precedent for some type of safety barrier in national parks came from the west. In the mid-1920s, masonry guide walls were constructed in western parks – on the El Portal Road in Yosemite and Going-to-the-Sun Road in Glacier. Barriers were essential for public safety at overlooks and along steep roadway inclines. Yet, designers still incorporated irregularity of the stonework pattern, avoidance of right angles and straight lines when setting stones, and the elimination of parallel joints along the top course that helped the guard wall better blend with its surroundings.

Under the guidance of Thomas Chalmers Vint in the Western Field Office, landscape architects provided road engineers with designs for road details – intersections, parking areas, road bank treatment, and roadside barriers – all with the intent of creating a harmonious design. Numerous barrier types used in public parks were examined, but park designers eventually settled on two types: a masonry curtain wall of native stone and a log structure of roughly hewn posts and cross rails. Log barriers were used in forested areas, and masonry walls were located in open, steep, or mountainous areas. In 1928, Vint issued standardized designs for six types of stone guard walls and five types of wood barriers for National Park road projects in the west. The designs provided patterns for the arrangement of logs or placement of stone in elevation, plan, and section.[16]

Charles Peterson, who had worked under Vint, left the Western Field Office to head the Eastern Office of the Landscape Division in 1930. He brought the standard guardrail plans with him, but adapted them to the less rugged topography and geology of eastern parks such as Great Smoky Mountains National Park. This "eastern" style developed by Peterson's staff had a greater rectilinear emphasis in stone shape, but still avoided right angles and straight lines. The influence of Vint, Peterson, and the standard Park Service guardrails can be seen in the Blue Ridge Parkway guide rails and guardrails.[17]

As construction progressed in the 1930s, the Bureau of Public Roads (BPR) engineers and NPS architects disagreed on what materials should be used for safety barriers. The BPR looked to the masonry wall design recently constructed on Skyline Drive as an example of what the parkway should have. NPS staff argued in favor of a rustic timber rail mounted on concrete posts for the following reasons:

[16] Linda Flint McClelland, *Building the National Parks* (Baltimore: Johns Hopkins University Press, 1988), 215-217.
[17] McClelland, 217-220.

Cost: timber was inexpensive due to an abundant supply of lumber.

Availability: suitable stone for constructing guide walls was unavailable on many sections of the parkway and would be expensive to bring in.

Shoulder width: in many places construction of a stone guide wall would reduce the shoulder width.

In sections where there were rock outcroppings or stone was available from dynamite blasting during road and tunnel construction, stone guide walls were constructed to create safety barriers. These low walls were made of large dry-laid stacked stones that had the smooth side facing towards the road and the irregularly-shaped edge facing the outside. The guide walls complemented the visual character of the parkway by using indigenous materials and by reinforcing the curvilinear alignment of the road.[18]

In 1940, stone parapet walls were constructed along North Carolina in Sections 2A, 2B, and 2C by the Bureau of Public Roads. Parkway staff criticized this construction for its poor quality of stone, its high cost, the inappropriateness of stone walls blocking views across meadows, and the encroachment effect of narrowing the road shoulders. However, it was not until after World War II that timber guide rails would be constructed on the parkway.[19]

Stanley Abbott had advocated timber rails over masonry walls as early as 1938. Under Abbott's direction, parkway landscape architects constructed a full-scale model of the (6" x 8") timber rail with a concrete post. Abbott wanted the timber rail used at all points along the route where a safety rail was required, with the exception of retaining walls and at certain overlooks where stone walls would be appropriate. He further suggested that the concrete be blackened and the timbers stained gray to allow for better harmony between these safety structures and the existing stone walls, fences, and weathered wooden buildings in the viewshed.[20]

The Bureau of Public Roads conceded to the use of timber rails along the Parkway in 1946. Although Thomas Vint, now chief landscape architect for the National Park Service, commended the change, he noted that flattening and planting the slopes adjacent to some areas of the roadway would reduce the

[18] Quin, 112-113, Noe and Hammitt, 134-137.
[19] Quin, 113-114.
[20] Quin, 113, Stanley Abbott, Memorandum to Mr. Vint, 7 December 1938.

amount of guide rail needed. This recommendation helped to limit large amounts of unnecessary barriers. The first timber rails with concrete posts were constructed south of Cumberland Knob in 1951. This design is referred to as Type One in this report. Log guard walls that had been previously installed in several locations were replaced in 1953, either by Type One timber rails or by stone parapet walls.[21]

In the mid 1960s, the timber rail design was slightly modified. Concrete posts designed for Type One barriers were replaced with timber posts, creating a design made entirely of wood. This design is referred to as Type Two in this report. Although all types of timber rail barriers were intended to function as guardrails, both Type One and Type Two designs do not meet current safety standards because they lack steel backing and are twenty inches or less in height. These types are now considered to be *guide* rails.

As a result of stringent safety testing by the Federal Highway Administration (FHWA), new and improved timber rail designs have continued to develop. Timber rails are still being used on the parkway today but have been updated with modifications, such as the addition of steel plate reinforcement to the backside of the rail. When viewed from the road, the guardrail appears to be only of wood construction. However, the continuous steel plate backing absorbs impact and disperses the force along the length of the rail. The top of rail height is approximately twenty-four inches above grade. This design is referred to as Type Three and is considered to be a guardrail.

More recent guardrail installations on the parkway consist of taller timber posts and thinner rails, with an improved steel backing system that includes a splicing plate. The top of rail elevation of this design is twenty-seven inches above grade and is referred to as Type Four (guardrail) in the report.

[21] Quin, 114.

Existing Conditions

Since its conception, The Blue Ridge Parkway has remained relatively true to its original design. Today, one can experience the parkway much as it was originally intended and can benefit from the level of quality being upheld by the National Park Service. Original structures and buildings remain and are still in use for visitor services. There are also a number of original character-defining features found in the immediate roadway corridor that contribute to the landscape's historic character. These features are discussed in detail later in this report, with a particular emphasis on timber guardrails.

The parkway road is paved in asphalt with centerline striping only. Portions of the roadway are currently undergoing patch repair and a number of drainage swales and walkways at overlooks have been recently resurfaced in asphalt. Other drainage swales, comprising the shoulder width, adjacent to rock faces along the parkway, are undergoing resurfacing with mortared flat stones. In a number of places, vehicles were observed parked at informal pull-off areas, which have become bare dirt patches where grass used to grow.

Grassed shoulders and grass bays are maintained by basic mowing practices, and wildflowers have been allowed to naturalize at the rear of the lawn spaces. The presence of the wildflowers has diminished the original size of the grass bays, but they provide desirable habitat for insects and birds, and offer visual interest for motorists. Successional forest growth has filled in on down slopes adjacent to the roadway and in some areas invasive species, particularly *Ailanthus altissima* (Tree of Heaven), have become a problem where vistas were traditionally maintained. As with any landscape, plants are ephemeral and subject to all sorts of destruction such as storm damage, drought or pathogens. Due to a predominantly native and indigenous palette, which was encouraged by the early parkway designers, it is likely that many of the original plants and/or their offshoots are still present in the landscape today.

There are several different types of roadside barriers found along the parkway. These elements were constructed primarily of stone or timber. The earliest forms of roadside safety barriers were rustic dry-stacked stone guide walls, mortared stone guard walls and bridge parapet walls, *(Figures 1, 2, & 3).* These photographs were provided by NPS, as noted. All other photographs were taken by staff of The Jaeger Company in the preparation of this report.

Also occurring along the parkway are four different types of timber rail barriers that were implemented at later dates. These four distinct types of timber rail barriers are referred to collectively in this report as "guardrails," although Type One and Type Two are now considered to be "guide rails." A "guide rail" as noted previously was identified to be less than 24" in height, does not contain steel backing, or both. Types Three and Four do meet current safety standards and are considered to be "guardrails." Additional descriptive information for all four types of timber rail barriers is included in the Analysis and Evaluation section to follow.

During the initial windshield survey in September 2002, many of the timber rail barriers found along the parkway were in various states of disrepair due to wear and tear from accidents and general decline. Concrete posts for Type One barriers showed some exposed iron reinforcement material where concrete had worn off the post. The timber rail sections were warped and cracked. A majority of the Type Two timber posts had sunk into the ground to heights well below the originally intended twenty inches above grade. In addition, many sections of timber rail were cracked, worn or damaged from vehicular impact.

Prior to this study, The National Park Service conducted a Guardrail Inventory to identify types and conditions of timber guardrails throughout the entire parkway, the results of which were printed in December of 2001. Inventory data is organized in a chart with columns for describing where the guardrails were located on the parkway, existing lengths, proposed cut and roll down extension lengths, and general comments about conditions. Locations of existing timber rail barriers were indicated on the chart, as they would be on Parkway Land Use Maps (PLUMS), by numbered and lettered sections, mileposts, and in relation to sides of the parkway. Sides of the parkway are abbreviated LT for left and RT for right, which applies only when traveling in a southerly direction. Many existing sections of guardrails were slated for "cut" and "roll down" additions. Sections that needed repair or were slated for removal were also noted. New guardrail installations and the status of project completion at that time were also noted. Examples of newly completed or in-progress projects occupy nearly half of the study area. The inventory has two sections, one for Virginia and one for North Carolina. The study area for this report falls in the latter. See *Appendix B* for a complete copy of the Guardrail Inventory for North Carolina.

A color-coded map indicating general locations of the four different types of timber rail barriers found in the study area has been included with this report, *(Illustration 2).* This illustration is based on findings during the initial windshield

survey conducted in September 2002. In the months that followed, previously funded projects to modify or replace existing timber rail barriers were carried out. To date, Type One and Type Two timber rail barriers have been or are in the process of being replaced by Type Four guardrails. This effort overrides the recommendations in the Guardrail Inventory, as most of these sections were slated to remain with modifications for improved safety. Type Three barriers remain in place and have had new roll down tapered extensions added to the ends. This effort does follow the recommendations in the Guardrail Inventory.

New installations of Type Four guardrails in locations where guardrails did not previously exist were also observed in the study area. In some locations the guardrails extend without interruption for over 3,000 feet. They also appear to be used as a decorative element, as in the case of flanking an entrance drive to NPS Headquarters. A number of these installations seem excessive or out of place and are what prompted this Cultural Landscape Report. What follows are more detailed descriptions for each type of timber rail barrier:

Type One:
This type is the oldest guardrail found on the parkway (documented in construction drawings dated from 1953). The concrete posts are a standard grey reinforced concrete, with a rounded back and a notched front for supporting the timber rail. The average top of rail height is 20" above grade and is double bolted to the post. Typical placement for the posts and rails is 5'-0" offset parallel with the edge of road pavement. This type of guardrail is also found abutting stone parapet walls at bridge crossing points. Type One occurs in the southernmost portion of the study area only, beginning at milepost 411.9 and ending at milepost 435. This twenty-three mile long stretch comprises approximately twenty-two percent of the study area. Overall, these structures have withstood the test of time and are in relatively good shape. The Guardrail Inventory recommended roll down flared end extensions for most of the existing sections *(Figures 4-7).* However, during the May 2003 field survey, all Type One post and rails had been removed and were observed in large piles. Type Four guardrails had been installed in the exact locations where Type One had been removed.

Type Two:
This type was the second guardrail design implemented on the parkway (documented in construction drawings dated from 1965) and is nearly identical to the design of Type One. The main difference is a timber, instead of concrete post. Type Two comprises approximately nineteen percent of the total study area and only occurs in the northern section, from the beginning at milepost 355 south

to Craven Gap at milepost 375.1. This type has suffered the most damage of all the types, with many sections bent or broken from vehicle impact and general decline due to apparent underground instability. Like Type One, this type was designed to a standard height of 20" above grade, but has sunk substantially and in most places is considerably lower than that today. The Guardrail Inventory recommended the addition of roll down extensions for some of the ends of sections of this type that are still maintaining an adequate profile elevation, and that portions of or entire sections are to be removed completely *(Figures 8-10)*. However, during the May 2003 field survey, Type Two post and rails were in the process of being removed and replaced with Type Four guardrails.

Type Three:

Considered the "original" steel-backed design (as identified by park personnel), this type was the first all-timber guardrail with steel backing implemented on the parkway. The design used 12"x 12" timber posts, 8" x 10" timber rails triple bolted with steel backing and 'L'-shaped steel brace plates attached to the sides of the posts. Type Three occurs between mileposts 393.5 and 411.9, an 18.4 - mile long stretch that comprises approximately seventeen percent of the study area. These guardrails are in relatively good shape and maintain an average height of 24 " above grade. The Guardrail Inventory noted that the first and last two sections of each run of this type guardrail are not steel-backed. Reinforced extensions have been recommended for a number of these sections *(Figures 11-13)*. During the May 2003 field survey, steel-backed roll down extensions had been added to the existing guardrails, where noted in the Guardrail Inventory.

Type Four:

This is the most highly evolved form of timber guardrail implemented on the parkway today and consists of (10" x 12") timber posts and (6" x 8") timber rails. The average top of rail height measures 27" above grade. Reinforcement consists of quadruple bolted steel backing that includes a splicing plate. This is an improved reinforcement system from the previous Type Three. End portions are flared and tapered with steel-backed roll down segments that transition the guardrails back to the ground plane. This type occurs in two sections of the study area: the first is an 18.4 - mile long stretch between mileposts 375.1 and 393.5; the second is a twenty-six - mile long stretch between mileposts 435 and 461. Both sections create a total length of 44.4 miles and occupy approximately forty-two percent of the study area *(Figures 14-18)*. Since the initial windshield survey in September 2002, efforts to replace deficient guardrails, as indicated in the Guardrail Inventory of December 2001 are nearly completed. When finished, all

guardrails in the study area will be Type Four guardrails, with the exception of modified Type Three guardrails that remain between mileposts 394.6 and 409.1.

Recent Type Four installations involve earthwork to create mounds for terminal taper sections to transition back into the ground *(Figure 19)*. Also observed during the May 2003 field survey is a new six-bolt timber post and rail connection adjacent to bridge abutments *(Figure 20).*

Analysis & Evaluation

Within the context of the history of American Parkways, the period of significance is 1935 – 1942.[22] However, later developments such as guardrails are also of historical value. The period of significance for the Blue Ridge Parkway is somewhat ambiguous, as it was constructed in stages over six decades and was not a complete route until 1987. At present, a draft of the Historic Resource Study (1993) is being revised and the National Register Nomination for the parkway is being updated. As part of this effort, the period of significance for the parkway is being redefined.

As previously discussed in the Site History, Blue Ridge Parkway landscape architects were advocating the installation of guardrails at all points along the parkway where they felt a safety barrier was needed. Designs for stone and timber guardrails were available as early as 1928 and in 1938 a full-scale prototype of a timber rail with a concrete post was constructed, presumably detailed according to the 1938 drawing generated by NPS *(Illustration 3)*. However, timber guardrails were not officially approved for parkway use until 1946 and not implemented until 1951. When considering roadside barriers generally, (including timber guardrails), the arrangement and interrelationship of such character-defining elements can be assessed as they relate to the parkway landscape as a whole.

Timber Guardrails

At the time of the initial field survey, all four types of timber rail barriers found in the study area, were in keeping with the parkway's rustic character aesthetic. Components and reinforcement techniques have evolved over time, but the guardrail design is basically the same. With each new installation project, a newer and more improved type replaced its predecessor. Of the four types, the most recently installed, Type Four, is a taller structure with an improved steel backing system, and is therefore the most advanced in terms of meeting current safety standards and regulations. Older guardrail designs, such as Type One and Type Two no longer meet safety standards and are therefore no longer considered to be guardrails. Type Three is still considered to be a guardrail and has acquired or will acquire proposed steel backing to the flared tapered end segments to improve safety standards. The following is a more detailed look at the design components of each type:

[22] Firth, 191.

Early Prototype:
A 1938 drawing details a guardrail design with a vertical battered precast concrete post, which is rounded in the back and notched in the front for supporting timber rails. Posts are specified to be spaced 10'-0" apart with the timber rails abutting at the center of the posts. The rails are connected to the posts with ½" u-bolts cast in the concrete and wooden plugs set in mastic are called out for plugging bolt holes on the front side of the rail. A lamp black pigment was specified as an additive to the cement mix for the concrete posts. The top of rail height was dimensioned 20" above grade, with 36" of footer below grade. This design is likely the prototype constructed in 1938 that no longer exists *(Illustration 3)*.

Type One:
Signed construction drawings, (dated November 1953), document the Type One guardrail design that was observed in the field at the beginning of this study. Similar to the 1938 drawing, the concrete posts have rounded backs and notched fronts to support "rough sawed timber" rails, which are double bolted to the post. Unlike the earlier u-bolt connection, this drawing shows a rail to post connection detail with a bolt penetrating through the entire thickness of the post and the rail. The posts appear to be a standard grey concrete and are straight-sided. Posts dimensions are 9.5" x 11" with an overall length of 49", leaving a 2'-6" footer below ground and the exposed post 19" above ground. The posts are spaced 10'-0" on center, except terminal posts which are centered 12" from the end of rail. The timber rails are pressure treated Southern Yellow Pine and measure 10'-0" long, with 1" chamfered ends. The top of rail elevation is dimensioned to a height of 20" above grade. In plan, post and rails are specified to be located 5'-0" out from the edge of pavement with a 20'-0" long flared terminus extending an additional 2'-0" out from the roadway for "cut slopes" and a note that appears to apply to all other conditions stating, "Flare at ends of guard rail to be staked in field." Approximately five years later, drawings (dated January 1958) illustrate an improved concrete reinforcement design for these same guardrail posts. This is how they appeared during the initial field survey. It is likely that since reinforced concrete components added to the cost and labor intensiveness for implementation, that this method for post construction was later abandoned with the use of wooden posts *(Illustrations 4-6).*

Type Two:
This is the next type of timber guardrail implemented on the parkway and is often referred to by NPS employees as a "guide" rail due its inadequate height. Documented in drawings (dated March 1965) this is a very similar design to

Type One, with a notched post and double bolted rail. Post spacing, flared ends, and 5′-0″ setback distance from the edge of pavement are also the same. The major difference is a timber instead of a reinforced concrete post. Additionally, the absence of a concrete footer to anchor the post is apparently what has caused these guardrails to sink into the ground, making them considerably lower than the intended top of rail elevation of 20″ above grade (as shown on plans). The lower height and lack of steel reinforcement make this type the least effective of all four types as a roadside barrier. These structures are not tall enough, nor strong enough to meet safety standards *(Illustrations 7-8).*

Type Three:

This guardrail was the next design implemented on the parkway and is also an all timber construction. The timber rail is triple bolted front to back to a timber post. Steel plate backing is bolted to the rail and to the side of the post with 'L'-shaped brace plates and follows the entire length of the rail except for the terminal portions. The last two 10′-0″ long segments are tapered and flared and do not contain any steel plate reinforcement. The timber components are 12″x 12″ posts and 8″ x 10″ rails that reach a total height of 24″ above grade. There is not much in the way of documentation for this type because it was not used for a very long period of time. There are no known plans that detail this design and its dates in use on the parkway have not been verified. According to NPS, for a number of reasons including the heavy look of the railing, parkway landscape architects requested discontinuation of this type.

Type Four:

When the Federal Highway Administration completed crash testing of the steel-backed guardrail, they redesigned the steel backing to include a splicing plate mounted on the back of the guardrail post and rail. This system creates a backing that will hold components together upon impact as a unified structural system capable of withstanding crash testing with smaller dimensioned wooden posts and railing. In addition to the improved method for bolting/securing steel backing to the guardrail posts and railings, other modifications include: a reduced post size (10″ x 12″); and a reduced rail (6″ x 10″). In order to meet new crash test requirements, the guardrail height was increased by several inches. The overall height now reaches 27″ above grade, making this the tallest timber guardrail on the parkway. The 2003 contract improves this guardrail safety design further by extending the steel backing into the turn down flared end segments. Sections of this type of guardrail have also been proposed to connect at tunnel openings for increased safety. Drawings dated from 2001 represent the design for guardrails installed on the parkway for the last twelve to fifteen years,

and include details for the splicing plate and steel backing design improvements *(Illustrations 9-13).*

Individual Character-Defining Features of the Roadside

A parkway, by definition, is a linear park with a roadway crossing through it. The invention of automobiles and speed of travel made the countryside more accessible to more people. With the advent of twentieth century suburban parkways, roadway designers now had to consider maneuverability of vehicles, speed of travel, and safety while maintaining a diverse visual experience. New requirements for roadway design and treatment of the adjacent landscape included: a need for long radius curves and easy grades; curves carefully calculated in relation to topography and safety considerations; banking on curves (super elevation); centerlines marked; harder, smoother road surface; intersections kept to a minimum; and an emphasis on views ahead instead of views to the side.

In 1926 a new agreement between the Bureau of Public Roads and the National Park Service dictated a low impact approach to all future park road construction projects. Rustic stonework became a standard feature of parkway design and was utilized in the detailing of bridges and culverts, retaining and parapet walls and tunnel portals. Natural vegetation was protected to the extent possible and used to re-establish areas of disturbance.[23]

The Blue Ridge Parkway traverses a varied landscape with extreme changes in elevation and views that encompass a rich natural and cultural heritage. In addition to the road alignment and varied gradients on slopes, landscape features and structural elements contribute to the overall visual experience. There are a number of individual character-defining features that give the Blue Ridge Parkway its distinctive character. Following are more detailed descriptions of components that contribute to the overall parkway roadside experience:

Horizontal Alignment

Landscape architects, unlike typical civil engineers, laid out the parkway to create as much visual variety as possible. The horizontal alignment is comprised of descending radial curves (no constant radii) versus spiral curves, which are more commonly implemented in roadway design. In addition to the alignment,

[23] Firth, 17-27.

long and graceful curves help to establish a rhythm and a uniform design speed, allowing for ease of driving and experiencing the landscape.[24]

Vertical Alignment

The alignment of the Blue Ridge Parkway follows the Blue Ridge Mountains for 355 of its 469 miles. In the remaining 114 miles, the parkway crosses some of the highest and most rugged mountains in the Southern Appalachian Range. These dramatic changes in elevation occur within this study area, which begins at Ridge Junction (milepost 355), where the Blue Ridge Mountains are intersected by the Black Mountains. At this point the parkway turns west, crosses the Black Mountains south of Mount Mitchell, and heads toward the Great Craggies, reaching an elevation of 5,676′ above sea level. Beyond the Craggies, the parkway descends to an elevation of 3,000′ to the valley of the French Broad River, crossing at the river milepost 393.5. The road then skirts around the southeastern side of Asheville and passes through the Biltmore Estate with an average elevation of 2,230′. In the final sections, the parkway winds through extremely rugged terrain. Southwest of Asheville, the road climbs steadily to Mount Pisgah. At Beech Gap (milepost 423.2), the parkway reaches its most southerly point and turns northwest into the Great Balsam Mountains. At Richland Balsam (milepost 431.4), the road reaches its highest elevation of 6,043′. The road then follows a winding route through the Plott Balsams before descending to its terminus in the Great Smoky Mountains.[25]

Cross Section

During preliminary planning stages of the parkway project, a 250′ right-of-way was proposed. However, this standard did not allow for enough flexibility to shift routing across the difficult mountainous terrain, nor the opportunity to take advantage of enough extensive views. In February 1935 a new proposal was presented to allow for an approximate right-of-way width of 825′, with an additional 400′ scenic easement. Virginia and North Carolina adopted different standards for determining their right-of-way widths, but both states placed an emphasis on protecting an adequate buffer for the parkway from the surrounding landscape and viewshed protection. In many places the right-of-way exceeds 1000′, but the basic goal was to achieve an average width of 100 acres per mile.[26]

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[24] Williams, Stephen, "Motorcycle Crash Analysis*"* (Department of the Interior, National Park Service, 2000), 1-3, Appendix A.
[25] NPS, "Visual Character of The Blue Ridge Parkway" (January 1997), 19.
[26] NPS, 16, 33.

The concept of streamlined cross-sections was introduced for parkway design in an effort to blend new road construction with the existing landscape. The basic principle was to provide adequate transition from cut and fill areas by generously rounding intersecting ground planes, thereby giving the parkway a more natural appearance. This also facilitated ease of maintenance with mowing, regeneration of slopes, and erosion control.[27]

The road pavement width of the parkway is only 22', as compared to a standard two-lane road width of 24'. Edge striping is intentionally absent in order to visually blend the roadway into the landscape, and in most areas grass meets the edge of pavement. In cross-section, curves on the parkway are banked or super-elevated to allow for proper drainage. Shoulder edges are rounded into drainage ditches or flattened back slopes.

Overlooks
Extending the streamlined cross-section outward from the roadway created a more generous ledge of open space to support overlooks. These viewing platform areas are paved with a limited number of parking spaces and typically have granite curbed asphalt sidewalks adjacent to the parking.

Masonry Medians
Masonry paved medians are present at a number of scenic overlooks. These medians act as "rumble strips" for drivers to realize their vehicles have left the roadway. They also provide a visual separation between the roadway and the overlook.

Views & Vistas
The parkway is aligned to take advantage of views and vistas within and beyond the road right-of-way. The parkway encompasses features of interest in the immediate vicinity of the roadside corridor. In turn these elements often help to frame views out in the distance for a "borrowed landscape" effect. The result is a feeling of being completely buffered and surrounded by a vast natural landscape.

Vegetation
Under the direction of landscape architect Thomas Chalmers Vint in the late 1920s, park planning and development was based on principles of landscape preservation and harmonious design. The general provisions for all park projects

[27] NPS, 52-53.

called for the protection of natural features during construction. Special procedures for excavating earth and rock were incorporated to minimize destruction of the surrounding landscape. Land clearing was limited to the width of the road and measures were taken to protect the surrounding vegetation. Trees and shrubs of "value to the appearance of the roads" were preserved.[28]

Embankments
In 1929, Vint's office issued four cross-section drawings for slopes to show cut and fill areas along parkway roads under construction. The diagrams introduced a technique for rounding the tops of cut and fill slopes and to flatten the slopes so they attained a proportion of 3:1. Therefore slopes were not to exceed a ratio of three feet of horizontal depth to every one foot of vertical elevation. This idea of creating continuity between roadway and the surrounding landscape by flattening the slopes was first developed by John C. Olmsted in an article in *Garden and Forest* in 1888. Olmsted promoted the benefits of "lessening the incline to avoid unnatural appearances" by learning from nature how to make more graceful curves. This practice would also decrease erosion problems and ease mowing and maintenance practices.[29]

Vegetated Shoulder & Ditch
In addition to properly grading newly cut slopes adjacent to the roadway, there was an interest in speeding up and controlling the process of revegetation by planting or sodding. Particularly in areas where there were no views, roadside plantings became important for achieving scenic beauty.

Drainage
Original drainage structures are still present in the landscape today. Metal surface drains and stone culvert components are most visible. Drainage swales were originally lined in stone, sodded, or paved in asphalt.

Tunnels
Tunnels were constructed in order to minimize the road's impact on the mountainside, allowing the ridgeline to be undisturbed. Originally parkway tunnels were unlined with existing rock face exposed. In 1941, NPS began lining the interior of tunnels with concrete for maintenance purposes. In the 1950s and 1960s, stone portals were added. These arched masonry entrances were designed

[28] McClelland, 202-203.
[29] NPS, 204-205.

with parapet walls set back into the rock outcroppings and were a complement to the natural mountainside.[30]

Bridge Parapet Walls
Bridges that support the parkway are reinforced concrete arched structures with a stone veneer. The stone parapet height is 2′-0″ above the road surface level and capped with full-width flat stones.

Rustic Stone Guide Walls
Rustic dry-laid stone walls were the first safety devices implemented on the parkway to protect motorists from steep slopes. Guide walls were constructed of heavy fieldstone salvaged from dynamite blasts (for tunnel excavation and road construction). Later, granite from a local quarry at Grandfather Mountain (now closed) was used to construct many of the walls. The smoothest side of the stone was placed to face the roadway and the irregular side faced away from the road. Over the years, park maintenance staff has cemented some of the stones in place.[31]

Stone Guard Walls
Stone guard walls are often present at the ends of metal bridge rails and steel and concrete bridge constructions. Stone was also used in the wing walls, abutments and piers, helping to create a transition from engineered forms back into the rustic landscape.

Wooden Guardrails
Wooden guardrails were generally used where stone was not indigenous, was not available, or where the shoulder was too narrow to fit the width of a stone wall. These guardrails were designed not only to protect travelers from the hazards of steep slopes, but also to help visually reinforce roadway alignment. Today's more contemporary timber guardrails contain steel backing, but still offer an aesthetically pleasing appearance. Steel reinforcement components are attached to the backs of the timber rails, allowing for a consistent wood front that conveys a rustic quality to complement scenic roadways, while providing a stronger roadside barrier. Four different types of wooden guardrail designs have been constructed on the parkway since 1953. These have been described in detail in the Analysis and Evaluation section of this report.

[30] NPS, 117-123.
[31] NPS, 134-137.

Threats to Historic Character & Integrity

The parkway was not intended to provide fast and convenient transportation, but rather to offer an enjoyable and leisurely experience while providing safe and efficient access for visitors. For some, the parkway is a means of access to other parks, for others the parkway itself is the destination. With the completion of the Linn Cove Viaduct in 1987, the parkway became a continuous route. Since then, there has been a concern that a marked increase of visitors will compromise the overall integrity of the parkway. Steps must be taken in order to ensure that the quality of the park experience remains a primary concern.

It is important to note that spatial organization is created by the arrangement of natural and built features. The organization of such features helps to define spaces as they relate to land use. Both the functional and visual relationship between spaces is an integral part of the historic character of a property. In addition, a variety of factors can contribute to changes in the historic character of a property, including: environmental impacts, plant growth and succession, maintenance practices, and changes in technology.

Over time, many alterations have been made to the character-defining features of the parkway. Examined individually, these changes appear to be minor, however the cumulative effect can be major. In some cases, entirely new features have been installed which adversely affect the historic character of the parkway. This includes contemporary signs, bridge construction and new expanses of guardrail installations.

A Guardrail Management Plan is in effect for the Parkway, which recommends placing more guardrails along high priority areas. Designated areas include locations with drop-offs, outside curves, and bridge embankments.[32] Many of the threats described below are somewhat peripheral to this effort. The focus of this report, as stated previously, is the evaluation of existing guardrails. The other threats have been included to provide a context in the analysis of existing guardrails and recommendations for their use.

Views & Vistas

There are over 900 vistas maintained by the NPS. Funding for maintenance staff and routine repair/rehabilitation projects has decreased substantially over the past several decades. As a result, the frequency of vista clearing has declined,

[32] Williams, 2.

leaving many views partially or totally obscured by shrub and tree growth. Native succession has filled in many of the clearings along the side of the road and while considered important for certain animal habitat, from a cultural resource standpoint, this growth is an obstruction of historic views and vistas. In addition, invasive exotic species such as *Ailanthus altissima* (Tree of Heaven) compete with the native species, grow rapidly and are very difficult to eradicate.

Many viewing opportunities along the parkway are on outside curves. Therefore, guardrail installation is another potential threat to view enjoyment, especially because they are frequently placed on outside curves. The parkway was designed to allow for adequate room on the shoulder for cars to pull off or slow down and enjoy views. However, new guardrail installations are much closer to the roadway than they used to be and prohibit space for cars to ease over and allow others to pass. The lack of an adequate shoulder width pressures traffic to keep moving, therefore compromising the amount of viewing opportunities.

Lawn Maintenance

In the early 1980s, parkway management revised mowing practices of roadside spaces, grass bays and visitor use areas as originally shown on the parkway land use maps. Overall mowing of lawn spaces was reduced in areas that contain threatened, endangered or rare plant species, and those that contain outstanding displays of wildflowers and bird habitat. These practices, while necessary for preserving valuable resources, have compromised the original design intent and visual integrity of the parkway over the past twenty years. Additionally, new guardrail installations have been located in front of these features and obscure them even more.

Informal Pull-Offs

There are several areas where vehicles repeatedly pull off onto the vegetated shoulder, creating bare spots where grass used to grow. These dirt patches detract from the visual experience and compact the soil, making re-establishment of turf grass difficult. Also, vehicles backing in and pulling out of non-designated parking areas can be dangerous. Methods to discourage this practice should be explored *(Figure 21)*.

Signs

Even though billboards and other commercial signs are banned from the parkway, small park signs are allowed (original signs have been replaced over the years). Of concern is the number of them: approximately 14,000 signs occupy

the parkway corridor, comprising forty-two percent of signs in the entire park system.

Bridge Overpasses
During the 1960s through the mid 1980s, bridges were constructed of concrete parapet walls with metal railings and narrow curbed sidewalks, a deviation from the earlier stone faced parapet walls. The concrete and metal materials are not in keeping with the parkway's rustic character. An example of this type of construction can be found at the Interstate 26 Bridge *(Figure 22).*

Tunnels
Interiors of tunnels were originally rock-lined. Due to the hazards of leaks and freezing water in winter months, most of the tunnel interiors have been sealed and resurfaced with concrete. This resurfacing has diminished the natural quality the tunnels once had with original solid rock face interiors.

Walls
Reconstructed stone guard walls are made from pre-cast concrete with a stone veneer. The contemporary stone detailing is patterned after historic stone structures, but looks formal and lacks the rustic charm.

Extensive New Guardrails
As was determined earlier in the Analysis and Evaluation section of this report, the newest guardrail type (Type Four) conveys rustic character and is the best design for meeting current safety standards. However, the extent to which recent installations have been applied is cause for concern. In addition to serving as roadside barriers, there are several locations where these new guardrail installations seem to function as decorative elements. Guardrails now appear as gateway features, lining entrance drives to the NPS Headquarters and to The Folk Art Center. In some cases, guardrails occupy both sides of the parkway, creating a tunnel effect. They extend for great distances with no interruption, encompass straight away areas, up slopes, overlooks, inside curves and other non-hazard areas that do not warrant a need for safety barriers. These guardrails are also located closer to the roadway, which minimizes the shoulder width and leaves very little room for bicyclists and pedestrians. In general, this extensive use creates more work for maintenance personnel and depletes resources for other more deserving projects. Finally, new guardrails are taller and potentially interfere with scenic views from automobiles. See *Figures 23-25* for examples of overuse.

Federal Highway engineers have taken the stance that many of the parkway curves have radii that are too small and too many of these curves occur in succession, which results in an overly winding road and is the basis for their justification to install long expanses of new guardrails. Unfortunately, this approach is focused solely on caution and safety, and does not consider aesthetic criteria. In addition, having an obstruction in closer proximity to the road is likely to cause more accidents, as motorists now have reduced clearance from guardrail encroachment.

Accident Statistics

Accident Statistics are valuable for identifying locations and specific conditions that are conducive to accidents along a given roadway. Contributing factors include roadway design, excessive speed and weather conditions.

The design of the parkway is unique in that it was designed by civil engineers in the Bureau of Public Roads, working in close consultation with landscape architects in the NPS. Therefore the emphasis on the road layout was for the best interest of the visitors and viewing the scenery. Roads designed by engineers typically have curves with radii that are constant. The parkway is comprised of a series of descending radius curves. A descending radius curve does not have a constant radius throughout the length of the curve. This aspect of the design forces motorists to stay focused on the road because the turning angle is constantly changing.

Speed limit is another contributing factor to the parkway design, with a maximum speed limit of forty-five miles per hour (mph) and a minimum of twenty-five mph. At the time of construction forty-five mph was a speed that most vehicles would have never been able to reach, especially since the parkway was originally a dirt road. Today, forty-five mph is a minimum speed limit for most roadways.

Road width is another contributing factor of the parkway design. All 469 miles of the parkway is a restricted two-lane paved road with a standard pavement width dimension of 22′-0″ – most two-lane roads are typically 24′-0″ wide. The average shoulder width along the parkway is an average of 4′-0″ wide, with areas where this is reduced to only 1′-0″ from the road surface. This reduced shoulder width can be contributed to the encroachment of plants, rock faces and guardrails, all of which do not allow much room for error when driving through this narrow corridor or adequate space to pull-off for viewing opportunities.

Other design features of the parkway that contribute to a unique driving experience are: the steepness of grade, limited sight distance and super-elevated curves. Most state highways have a maximum slope of six percent (6%), while the parkway has a maximum of eight percent (8%). The combination of limited sight distance and curves with steep drop offs and super-elevation (banked

curves where the outside of curve is higher than the inside) can be very dangerous.[33]

The Blue Ridge Parkway Traffic Safety Improvements Review

The Blue Ridge Parkway Traffic Safety Improvements Review is a compilation of Accident History, Site Maps showing accident locations, Collision Diagrams, Site Photographs, Existing Conditions Maps with all signs identified, and a list of Recommended Improvements with estimated cost implications and a site plan showing locations for the recommended improvements. Also included with this report are the Stars Accident Maps that provide enlarged plans of the accident locations. The map legend is keyed to symbols on the plans that identify fatal accidents, injury accidents, and property damage-only accidents. This report was published in 1990 and may include recommendations superseded by the Guardrail Inventory, which was published in 2001.

Twenty sites along the parkway were identified as having high numbers of accidents. Sites 18, 19 and 20 fall within the study area and are described in greater detail below.

Site 18

This is the section of parkway located at milepost 384.6 to 384.8, just east of Asheville, North Carolina. The site includes access and intersections that connect the parkway to U.S. 74, an overpass. The majority of accidents in this location occurred where the exit ramps intersect the parkway and in the curve on the north exit ramp. Most of these accidents occurred during the day when site conditions were dry and clear. Excessive speed was a major contributing factor. Nearly half of the accidents involved collision with a fixed object such as the guardrail on the north exit ramp. The Guardrail Inventory recommends roll down extensions for the existing guardrails at this location.

Site 19

This location consists of a single curve located near parkway milepost 388.0 (just south of Asheville) and is used for commuter traffic. A majority of the accidents that took place here were a result of icy conditions during winter months. Improvement recommendations include modification to the roadway shoulder in order to minimize the likelihood of vehicle roll over or collision with fixed objects. The Guardrail Inventory proposes extensions for the bridge over U.S.

[33] Williams, 2

Route 25. The addition of new guardrail just south of the bridge on the outside curve would also be beneficial for redirecting errant vehicles.

Site 20

This site contains a "T" intersection formed by the junction of the parkway and an access road to Waterrock Knob Overlook near milepost 451.0. This "T" intersection is located in the middle of a 180-degree curve where sight distance is very limited. Recommendations to improve safety standards at this location include extending existing guardrail, which is located on the outside of the curve at its sharpest point. According to the Guardrail Inventory, this section of parkway is also slated for new guardrail installation.[34]

Motorcycle Crash Analysis

A Motorcycle Crash Analysis for The Blue Ridge Parkway was conducted over a three-year period (1998-2000). The study shows that in recent years the number of accidents on the parkway has been significantly higher due to the increased popularity of touring motorcycles. Many of the motorcyclists have traveled great distances to reach the parkway and most of their accidents are caused by fatigue, inexperience, or particular design features that create confusion. Certain features of the parkway such as an asphalt curbing at an overlook that visually blends with the roadway can be a hazard to an unfamiliar motorcyclist. The variety of vertical and horizontal road alignment and speeding contribute to a number of mishaps. Statistics show a majority of the accidents involve a single person and occur on a weekend. The most common mistake the driver made was "failed to give full time and attention."[35]

It is also important to note that guardrails will not help to increase safety for motorcyclists, who are most likely to be thrown over these structures upon impact – rather than contained and redirected, as a car or bus would be.

[34] U.S. Department of the Interior, "Blue Ridge Parkway Traffic Safety Improvements Review North Carolina and Virginia," (June 22, 1990), 176-197.
[35] Williams, 4-11.

Safety Standards

Adopting and implementing safety standards is an evolving process and must be a series of compromises between "absolute" safety and engineering, environmental and economic constraints. In preparing this report, publications were examined for obtaining information about roadside safety design, including: Federal Highway Administration Standards and The National Park Service Standards. Both of these organizations are involved in the decision-making process, with regard to what sorts of improvements are made to the parkway. In general, the Federal Highway perspective is focused on the practical, ideally wanting to update the entire parkway to meet current safety regulations for roadway design. This would enable travel at all times, including at night and especially during winter months when conditions are unsafe and portions of the parkway are typically closed. The Park Service is more discretionary and values the importance of protecting the parkway design aesthetic. Both organizations would agree that placement and design of guardrails should be consistent for safety and appearance throughout the entire length of the parkway.

Federal Highway Standards

The American Association of State Highway and Transportation Officials (AASHTO) publishes a guidebook of current information and operating practices as they relate to roadside safety. This guidebook is intended to provide guidance to road designers and to construction and maintenance personnel. The following items are important to consider when making decisions for providing safe roadside environments:

- **Clear Roadside Concept**

The clear zone is defined as a variable distance from the edge of pavement, free of obstacles, where an errant vehicle could recover. On average the distance for an adequate recovery area is between twenty and forty feet. Factors such as speed, cross slopes, and design of drainage elements can impact the effectiveness of the recovery area. Other factors, such as increased banking on curves where the super-elevation is not adequate, can reduce the distance requirements for a recovery area.

The clear zone requirements for a highway with much greater speeds of travel, do not apply to the parkway. The average speed limit on the parkway is forty-five miles per hour. This speed would require a roadside recovery zone of approximately ten feet. However, in many locations along the parkway there are

natural and built features that restrict the width of passage and do not allow adequate space for roadside recovery.

- **Embankments**

Most embankments on the parkway have slopes of 3:1 or steeper and are considered "critical slopes" in which an errant vehicle is likely to overturn. Speed is the main factor when determining design standards for safety.

Embankment height and side slope are the basic factors considered in determining barrier need. Embankments with slope and height combinations on or below a curve do not warrant shielding, unless they contain obstacles that present a hazard to errant motorists. Trees with calipers greater than six-inches represent such an obstacle. Rounded slopes help reduce chances for errant vehicles becoming airborne. Therefore, embankment height and side slope are basic factors in determining barrier (guardrail) need.[36]

- **Roadside Barriers**

A roadside barrier is a longitudinal barrier used to shield motorists from natural or man-made hazards located on either side of the roadway. The primary purpose of all roadside barriers is to prevent a vehicle from leaving the roadway and striking a fixed object or terrain feature that is considered more hazardous than the barrier itself—this is accomplished by containing or redirecting the impacting vehicle.

Guardrails are barriers intended to redirect an errant vehicle, to delineate a roadway, or to warn of roadside hazards. Guardrails should be installed at points of unusual danger such as sharp curves, steep embankments, or bridge overpasses.

There are three basic types of roadside barriers:

1. rigid
2. semi-rigid
3. flexible

Rigid barriers are solid structures with no deflection upon impact, such as masonry stone walls or concrete walls with a stone veneer. These are the strongest and longest lasting, but they are also very expensive to construct and

[36] American Association of State Highway and Transportation Officials (AASHTO), "Roadside Design Guide" (1989), Chapter 5: pg. 2

take up more of the roadside space. Flexible barriers such as cable, box beam, or w-beam rails on weak posts are generally less expensive to install and are shallow in depth, taking up very little roadside space. Because these systems are designed to give way upon impact, they are reliant on an adequate clear zone space behind the guardrail. Due to the rough terrain that the parkway traverses and inadequate clear zone space, this is not a feasible option. Steel-backed timber guardrails are considered semi-rigid types of roadside barriers, which are strong and designed to redirect errant vehicles. This system was developed as an aesthetic alternative to the conventional guardrail systems and has been adopted by the National Park Service to maintain a rustic appearance.[37]

National Park Service Park Road Standards

Parkway management continues to practice former chief landscape architect Thomas Vint's approach to flattening and planting roadside slopes, thereby reducing the need for guardrails. A working premise now is that vegetated slopes containing trees and/or shrubs in sufficient quantity and distance from the roadside shoulder are such that an errant vehicle will impact vegetation and be stopped from plunging down a steep embankment, therefore providing a reasonable alternative to adding guardrails.

National Park Service Park Road Standards (1984) identifies the following criteria to install guardrails:

- Guardrails are intended to redirect an errant vehicle, to delineate a roadway, or to warn of roadside hazards.
- These barriers should be installed at points of unusual danger such as sharp curves and steep embankments.
- Criteria for warranting installation of guardrails on high-speed, high-volume highways do NOT apply to low-speed, low-volume traffic conditions on park roads.
- Placement and design of guardrails should be consistent for safety and appearance throughout the length of a particular parkway.
- Choice of materials and design should be sensitive to the setting or environment.
- If a factor, design and location should recognize snow-removal practices.[38]

[37] AASHTO, Chapter 5
[38] NPS, "Park Road Standards", (1984), 32-33.

PART II: TREATMENT

Standards for Preservation
Specific Treatment Recommendations
Preservation Maintenance Plan
Long-range Planning Concerns

- **Scenic Legislative Mandates**
- **Mission, Purpose, and Significance**

Standards for Preservation

Throughout the parkway history, the design for guardrails has remained relatively unchanged, with some alterations made to improve safety. All types of timber guardrails fall within the parkway management zone. Since this study began Type One and Type Two timber rail barriers have been or are in the process of being removed and replaced with Type Four guardrails. The primary reason for this is a substandard design that does not meet current safety standards.

Type Three guardrails have been determined to meet current safety standards and can be made safer with minor modifications. However, it should be noted that while Type Three guardrails are similar in appearance to other types of timber guardrails, the rail component is made of a larger timber rail, creating a heavier visual appearance. Although Type Three conveys a rustic appearance, further evolution in guardrail design has led to the thinner Type Four horizontal rail that also meets current safety standards. Having rustic qualities does not always mean that the design is good or appropriate in keeping with the aesthetic qualities of parkway design. As guardrail design continues to evolve over time, it is important to balance vehicle safety with aesthetic quality.

Specific Treatment Recommendations

Rehabilitation

The primary treatment recommended for the Type Three guardrails is rehabilitation. Since a majority of these existing guardrails can be repaired and upgraded to maintain adequate use, meet required safety standards, and new additions are of a compatible design, the integrity of the parkway environment is unimpaired. Limited and sensitive upgrading of existing guardrails in order to meet safety standards is a practical and cost-effective solution. For this reason, Type Three guardrails are recommended to remain. As funding permits, it is recommended that Type Three guardrails be replaced over time with a more aesthetically pleasing guardrail that continues to meet safety standards.

The Guardrail Inventory identifies improvements for Type Three guardrails to increase safety. The primary recommendation is to add steel plate backing to the end sections that taper into the ground. Regular maintenance inspections to detect damaged components will help with upkeep of repairs and when

components can no longer be repaired, guardrails should be replaced with Type Four guardrails.

To the extent possible, Type Four guardrails should be repaired and maintained as functional roadside barriers.

Replacement
Sections of guardrail that have suffered extensive damage and cannot be corrected with repairs should be replaced with Type Four guardrails. Above all, safety should be the major consideration when determining the need for replacement. As previously stated, Type Three guardrails should be replaced over time for aesthetic reasons.

New guardrail designs should continue to strive for compatibility with the rustic and historic character of the parkway landscape and continue to meet safety standards. Recent installations of Type Four guardrails include earthen mounds at the terminal portions, which were added to establish a transition from the new guardrails back to the ground plane. Freestanding mounds unrelated to the existing topography are not in keeping with the historic character of the parkway, and even the extension of existing slopes should be carefully designed to preserve the streamlined cross section of the roadway.

Installing new sections of guardrails should be on an as-needed basis. Extreme conditions that warrant safety devices should be weighed with aesthetic impact. Traditional materials should be used and structures should be appropriately scaled and located.

Removal
Other treatment recommendations include the removal of some sections of new Type Four guardrails. Although in keeping with the rustic aesthetic of the parkway design, these newer guardrails are taller and closer to the road, which makes them more noticeable to travelers. In some locations, they are occupying both sides of the roadway and create a tunnel effect that detracts from the viewing experience. The close proximity of these structures to the roadway also makes them an encroachment, not allowing adequate space, if needed, for roadside recovery. This condition requires drivers to concentrate more on moving through the space the guardrails occupy, instead of enjoying the parkway experience in those locations. Of particular concern are recent guardrail installations in locations that do not warrant safety devices. These projects are examples of how site elements can be used in excess, thus creating a threat to the

visual integrity of the parkway. In addition, pedestrians and bicyclists have no room to clear the roadway if a vehicle approaches. The following is a list of situations that do NOT warrant the use of roadside barriers:

- Straightaway – section of roadway where there are no curves or extreme grade changes.
- Inside curves – the inner traffic lane of a turning radius.
- Upslope – shoulder areas adjacent to the road with a rising hill or rock face.
- Heavily vegetated slopes – plants are serving as roadside barriers*.
- Curbed medians – these areas should be free of encroachment elements.
- Overlooks – these areas should be free of visual obstruction.
- Entrance drives – guardrails should not be used as decorative gateway features.

*The exception to this recommendation is if these particular locations are slated for future vista clearing, which would re-expose any dangerous drop-offs that previously warranted the need for roadside barriers.

Recommended removals of new guardrail installations within the entire study area are provided with this report. These recommendations are based on findings during the May 2003 field inventory/windshield survey and should be considered an addendum to the Guardrail Inventory (*Appendix B).* The Recommended Removals chart is organized with the following columns: NPS PLUM Map sheet numbers, milepost locations, the total amount of recommended removals in linear feet and the reason for the recommended removal (*Appendix C)*. Some of the reasons concur with the previous recommendations of the Guardrail Inventory. If a PLUM Map and the Guardrail Inventory did not contain a removal recommendation and this was concurred from the field inventory, it was not included in this chart.

Type Four Guardrail Case Study

An approximate five-mile long section of parkway within the study area has been used to illustrate locations of new guardrail installations with recommendations for retention of portions that are in appropriate locations and removal of portions in locations that do not warrant a need for safety barriers. This section in particular seemed to contain some of the most extensive new installations of guardrail within the study area. Due to the close proximity of the installations and desired accuracy, all five miles had to be inventoried with a measuring wheel on foot. NPS PLUM Map sheets from Section 2Q (sheets 1-8)

were scanned and used as a background to illustrate where original guardrails were located (in green) and where newly installed Type Four guardrails are located (in blue). Also indicated are the removal recommendations of new sections (in red). Original guardrails, stone walls, retaining walls and rock outcroppings are legible on these maps with distinguishing line types and symbols. See the PLUM Map Legend *(Illustration 14).*

As a general rule of thumb, new replacement guardrails should follow original locations and lengths. In some locations where vegetation has filled in on downslopes and there are no plans for vista clearing, guardrail replacement may not be needed. New guardrail installations now include flared and tapered terminal segments with steel-reinforced backing. These segments comprise approximately 20'-0 at either end and serve to provide transition back to the ground level. In many locations, new guardrail installations overlap with the original guardrail locations but extend in other directions to cover unsafe conditions in these areas. In some places new guardrail installations extend well beyond the original locations or occupy new locations. One section of new guardrail continues without interruption for over 3,000 linear feet along a straightaway stretch. This section of parkway (between mileposts 379 and 381) has a substantial incline and a steep drop off on the descending side, but due to the dense vegetation filling in on the down slope, it should be examined further to determine necessity of guardrail. Original guardrails that occupied this location were nearly as extensive as the new guardrails and probably justified at the time they were installed to protect the exposed drop off. However, there were some breaks in this stretch before, and as long as they are located in places that do not compromise safety, that would be something worth including again. If possible more removal would be desirable, but at the very least, having some interruptions at regular intervals may help to minimize the visual impact of continuous guardrail and help to break up the monotony. For color-coded plans with inventory and removal recommendation notes see *Illustrations 15-22.*

The following summary chart shows linear feet totals of original, new, proposed and recommended removals in the case study area. The difference between original guardrails and the new guardrail installations is a marked increase of 4,900 linear feet. This number represents more than half as many new guardrails as before. The difference between original lengths and new installations recommended to remain are reflected in the balance column below, indicating a total increase of 340 linear feet of new guardrail. This includes an additional 320 linear feet suggested for an outside curve where guardrails would be needed, between mileposts 379 and 380, *Illustration 21*. Therefore, the total length of new

guardrails to remain is only twenty linear feet more than the original total length. The recommended installations to remain are in strategic locations and the amount of coverage is much more in keeping with the extent of original guardrails.

SHEET #	GUARDRAILS					
	ORIGINAL	NEW	REMOVE	TO REMAIN	PROPOSED	BALANCE
2Q-1	550	2,160	1,100	1,060	0	510
2Q-2	1,300	1,600	450	1,150	0	-150
2Q-3	1,990	1,950	340	1,610	0	-380
2Q-4	450	880	420	460	0	10
2Q-5	650	1,210	750	460	0	-190
2Q-6	220	220	0	220	0	0
2Q-7	1,500	2,800	1,000	1,800	320	620
2Q-8	2,600	3,340	820	2,520	0	-80
TOTAL	***9,260***	***14,160***	***4,880***	***9,280***	***320***	***340***

Prototype

The recent replacement of Type One guardrails between mileposts 411 and 435 to Type Four guardrails is a good example of appropriate usage. This section of parkway traverses the most rugged terrain and contains the highest point on the parkway at Richard Balsam (6,047 feet), yet the placement of guardrail is strategic and conservative. There are some new additions in this section in places that seem justified, but they are no longer than 500 feet. This section typifies a good balance of incorporating safety devices while preserving the parkway experience and is probably more in keeping with what the early parkway planners had envisioned.

Preservation Maintenance Plan

For preservation maintenance operations to be effective, thoughtful planning and documentation will be important to ensure that historic features are preserved. The following is a list of priorities for preservation maintenance:

- Safety issues
- Protect and preserve historic materials and features
- Perpetuate historic character
- Support property operations and current use
- Use historic methods and materials
- Encourage lower cost maintenance
- Improve aesthetics

Long-range Planning Concerns

The intent of this document is to provide guidance when making decisions that pertain to safety issues and concerns, while upholding the historic parkway aesthetic. Prior to this report and the recently published Guardrail Inventory (2001), decisions about where to place guardrails have been an "oral tradition"[39] maintained by NPS employees. This report serves to document that tradition and offer a framework for guiding future generations of NPS employees. The challenge of those to follow will be to continue finding creative solutions to effectively provide safety measures, while maintaining the parkway's aesthetic integrity.

Careful analysis of the following should be considered before any recommendations are made on guardrail placement:

- the curve itself,
- roadway design features,
- accident statistics,
- vista management practices,
- roadway maintenance and
- road closure management

Placing guardrail as the principle safety measure is not a feasible solution. These and other insights were shared at the kick-off meeting for this project report (September 2002) and are summarized in *Appendix A*.

Scenic Legislative Intent and Mandates for the Blue Ridge Parkway

The legislative history for the Blue Ridge Parkway establishes the importance of scenic resources as follows:

Act of August 25, 1916, NPS Organic Act

"…*To conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in a manner and by such means as will leave them unimpaired for future generations.*"

Letter from Harold L. Ickes, Secretary of the Interior to Chairman, Committee on the Public lands, House of Representatives, April 23, 1936.

[39] See Appendix A: NPS Meeting Summary (9.12.02).

"Standards for parkway right-of-way acquisition embodying necessary traffic, scenic and recreational features and control have been set up…"

"Certain areas adjacent to the parkway present fine possibilities of scenic or recreational development for the benefit of the public…"

House of Representatives Report No 2544, April 29, 1936
"The purpose of the Blue Ridge Parkway is to provide a connecting scenic highway…"

Parkway Purpose and Significance
The legislated purpose of the Blue Ridge Parkway, under the Act of June 30, 1936, is to link Shenandoah National Park in Virginia and Great Smoky Mountains National Park in North Carolina and Tennessee by way of a recreation-oriented motor road intended for public use and enjoyment. Under the provisions of the Act of Congress approved August 25, 1916 (39 Stat. 535), the intended purpose of the Blue Ridge Parkway is to conserve, interpret, and exhibit the unique natural and cultural resources of the central and southern Appalachian Mountains, as well as provide for leisure motor travel through a variety of environments. The agricultural leasing program has been a valuable management tool for preserving the agriculture scene along the Blue Ridge Parkway. The following Mission, Purpose, and Significance statements of the Blue Ridge Parkway are used in Strategic and General Management Plans:

Mission Statement

The Blue Ridge Parkway, in linking the Shenandoah and Great Smoky Mountains National Parks, is dedicated to enhancing the outstanding scenic and recreational qualities of the corridor that it traverses, conserving unimpaired its significant natural and cultural resources, and promoting in perpetuity the public enjoyment and appreciation of the Central and Southern Appalachian mountains.

Purpose Statements

The legislated purpose of the Blue Ridge Parkway, under the Act of June 30, 1936, is to link Shenandoah National Park in Virginia and Great Smoky Mountains National Park in North Carolina and Tennessee by way of a recreation-oriented motor road intended for public use and enjoyment. Under the provisions of the Act of Congress approved August 25, 1916 (39 Stat. 535), the intended purpose of the Blue Ridge Parkway is to conserve, interpret and exhibit the unique natural and cultural resources of the Central and

Southern Appalachian Mountains, as well as provide for leisure motor travel through a variety of environments.

The general interpretation of the Parkway's purpose has been refined into the following more specific purpose statements:

- *Connect Shenandoah and Great Smoky Mountains National Parks by way of a "national rural parkway"—a recreational, destination-oriented motor road traveling through a variety of scenic ridge, mountainside and pastoral farm landscapes.*
- *Conserve the scenery and preserve the natural and cultural resources of the Parkway's designed and natural areas.*
- *Provide for public enjoyment and understanding of the natural resources and cultural heritage of the Central and Southern Appalachian Mountains.*

Provide opportunities for high quality scenic and recreational experiences along the Blue Ridge Parkway and within the corridor through which it passes.

Significance Statements

The route of the Blue Ridge Parkway follows mountain and valley landscapes to link Shenandoah and Great Smoky Mountains National Parks. Its location was selected to provide the best in a variety of scenic, historic, and natural features that evoke the regional image of the Central and Southern Appalachian Mountains. In order to maximize scenic views and give Parkway visitors the impression that they are in a park with boundaries to the horizon, the Parkway was located in mountainous terrain that normal roads would have avoided.

The Parkway extends 469 miles through the Blue Ridge, Black, Great Craggy, Great Balsam and Plot Balsam Mountains. It is known for spectacular mountain and valley vistas, quiet pastoral scenes, sparkling waterfalls, colorful flowers and foliage displays, and interpretation of mountain history and culture. Designed for recreational driving, the Parkway provides visitors with quiet, leisure travel, free from commercial traffic and the congestion of high-speed highways. As its All-American Road status indicates, it is one of the most diverse and high quality recreational driving experiences in the world.

The following significance statements summarize the importance or distinctiveness of the aggregate of resources along the Parkway:

- *The Blue Ridge Parkway was the first national rural parkway to be conceived, designed, and constructed as a leisure-type driving experience. Its varied topography and numerous vista points offer easy public access to spectacular views of Southern Appalachian rural landscapes and forested mountains.*
- *The Parkway is recognized throughout the world as an international example of landscape and engineering design achievements with a roadway that lays easily on the land and blends into the existing scene.*
- *The Parkway is the highest and longest continuous route in the Appalachian area. Along its 469-mile length the Parkway provides scenic access to crests and ridges of five major ranges within the Central and Southern Appalachian Mountains, encompassing geographic and vegetative zones that range from 649 feet at James River in Virginia to 6,053 feet at Richland Balsam in North Carolina.*
- *The Parkway's uninterrupted corridor facilitates the protection of a diverse range of flora and fauna including rare and endangered plant and animal species and areas designated as National Natural Landmarks.*
- *The Parkway is a primary catalyst for promoting regional travel and tourism, serving as a unifying element for 29 counties through which it passes, engendering a shared regional identity, providing a common link of interest, and being a major contributor to regional economic vitality.*

PART III: RECORD OF TREATMENT

Record of Treatment

The Guardrail Inventory database created by the Denver Service Center, published in October of 2001, can serve as the basis for the Record of Treatment. During the time the Cultural Landscape Report was prepared, it was observed that some of the recommendations from the Guardrail Inventory were carried out. In some areas recommendations were not followed and other plans were executed. For example, many of the guardrails observed earlier in the study that were designated to remain with safety improvement modifications have since been removed and replaced with new guardrails. In some places, these new installations extend beyond the recommended lengths. Therefore, it is important to update and maintain the database on a regular basis.

Since the Guardrail Inventory does not include location maps of existing guardrails, proposed projects or new installations, copies of PLUM Maps (original parkway design plans) were marked by hand with colored pencils to record this information. As of May 2003, portions of Type Two (marked in green pencil) were in the process of being replaced by new installations of Type Four (marked in blue pencil). Sections of new guardrail installations recommended for removal were marked with red pencil. This information should be digitized and updated as projects are completed, in order to help with record keeping.

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Figure 1: Stone Guide Wall, National Park Service.

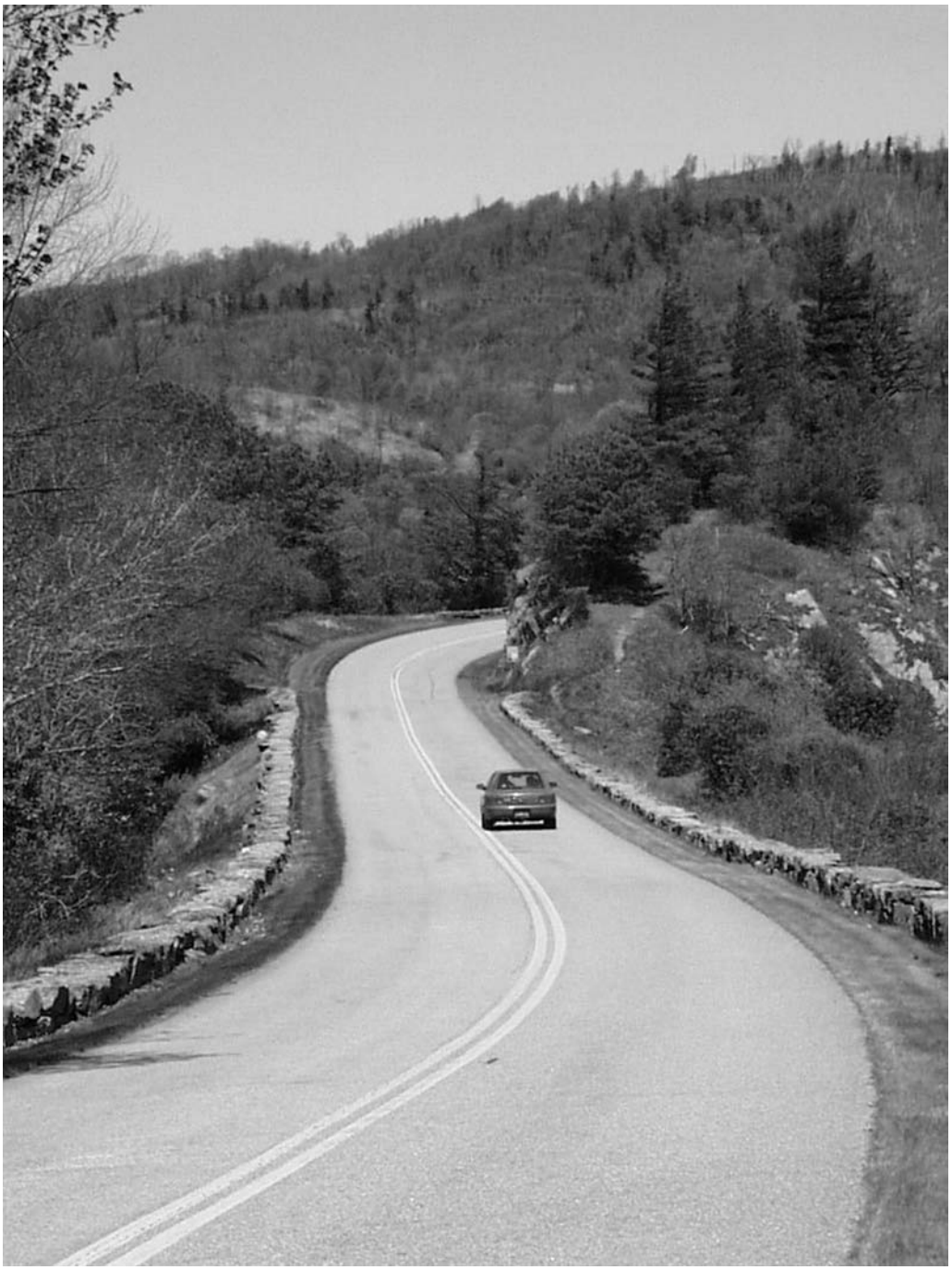


Figure 2: Stone Guard Walls, National Park Service.

Figure 3: Stone Parapet Wall, National Park Service.

Figure 4: Stone Parapet Wall with Type One Guardrail Connection.

Figure 5: Type One Guardrail, Front View.

Figure 6: Type One Guardrail, Rear View.

Figure 7: Type One Guardrail, Side View.

Figure 8: Type Two Guardrail, Front View.

Figure 9: Type Two Guardrail, Rear View.

Figure 10: Type Two Guardrail, Side View.

Figure 11: Type Three Guardrail, Front View.

Figure 12: Type Three Guardrail, Rear View.

Figure 13: Type Three Guardrail, Side View.
Note: no steel backing on end sections in foreground.

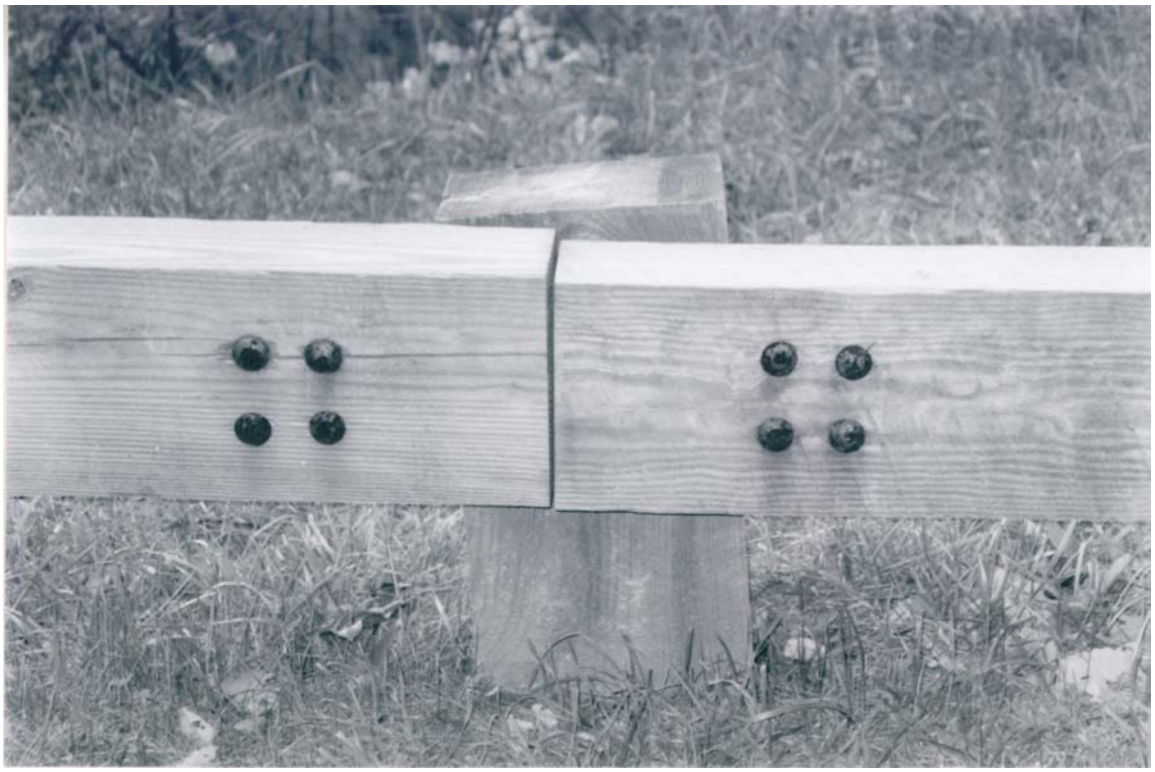


Figure 14: Type Four Guardrail, Front View.

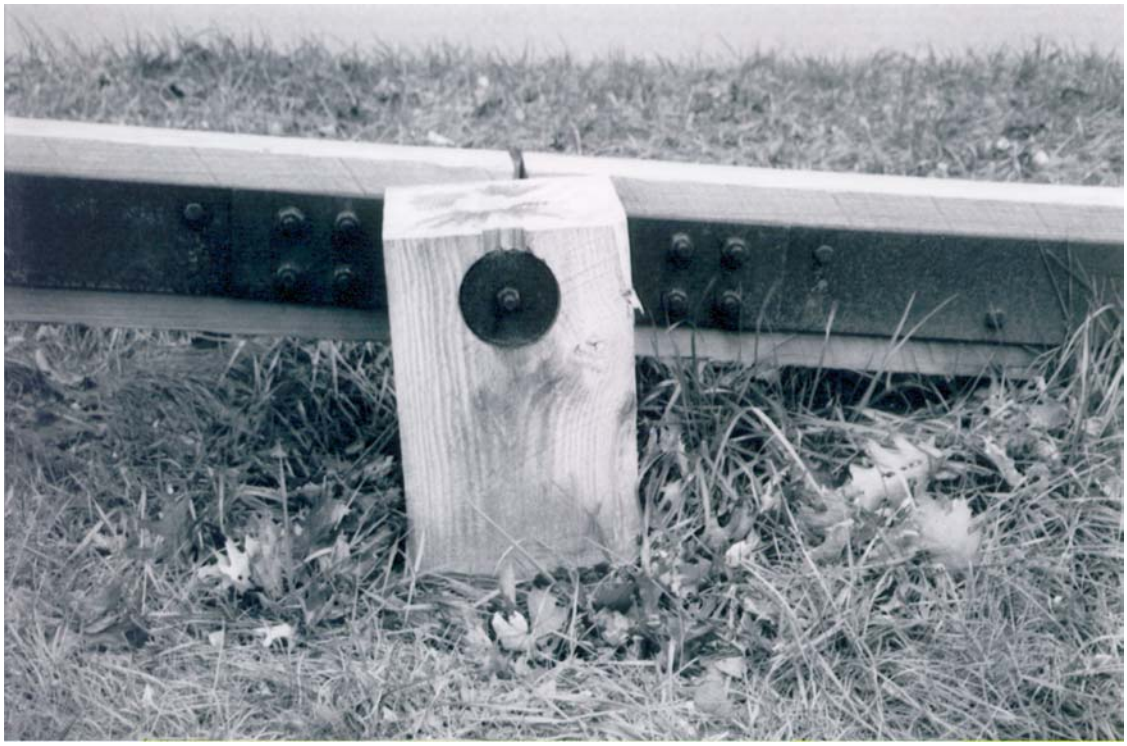


Figure 15: Type Four Guardrail, Rear View.

Figure 16: Type Four Guardrail, Side View.

Figure 17: Type Four Guardrail, Taper into Ground.

Figure 18: Type Four Guardrail, Taper into Ground, Rear View.

Illustration 19: Type Four Guardrail with taper into new embankment.

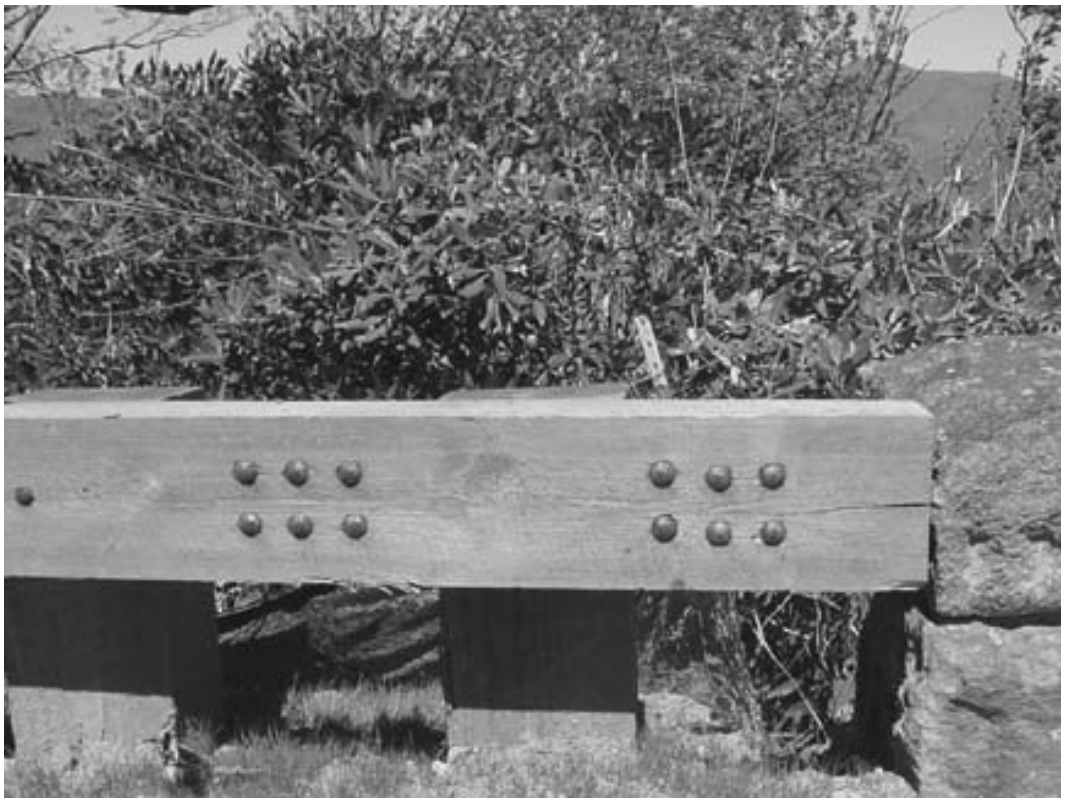


Illustration 20: New six-bolt construction at bridge abutment.

Figure 21: Informal Pull-Offs

Figure 22: Concrete Bridge with Metal Railing

Figure 23: Guardrails on an Upslope

Figure 24: Guardrails Used as Gateway Features

Figure 25: Guardrails on Both Sides of the Roadway

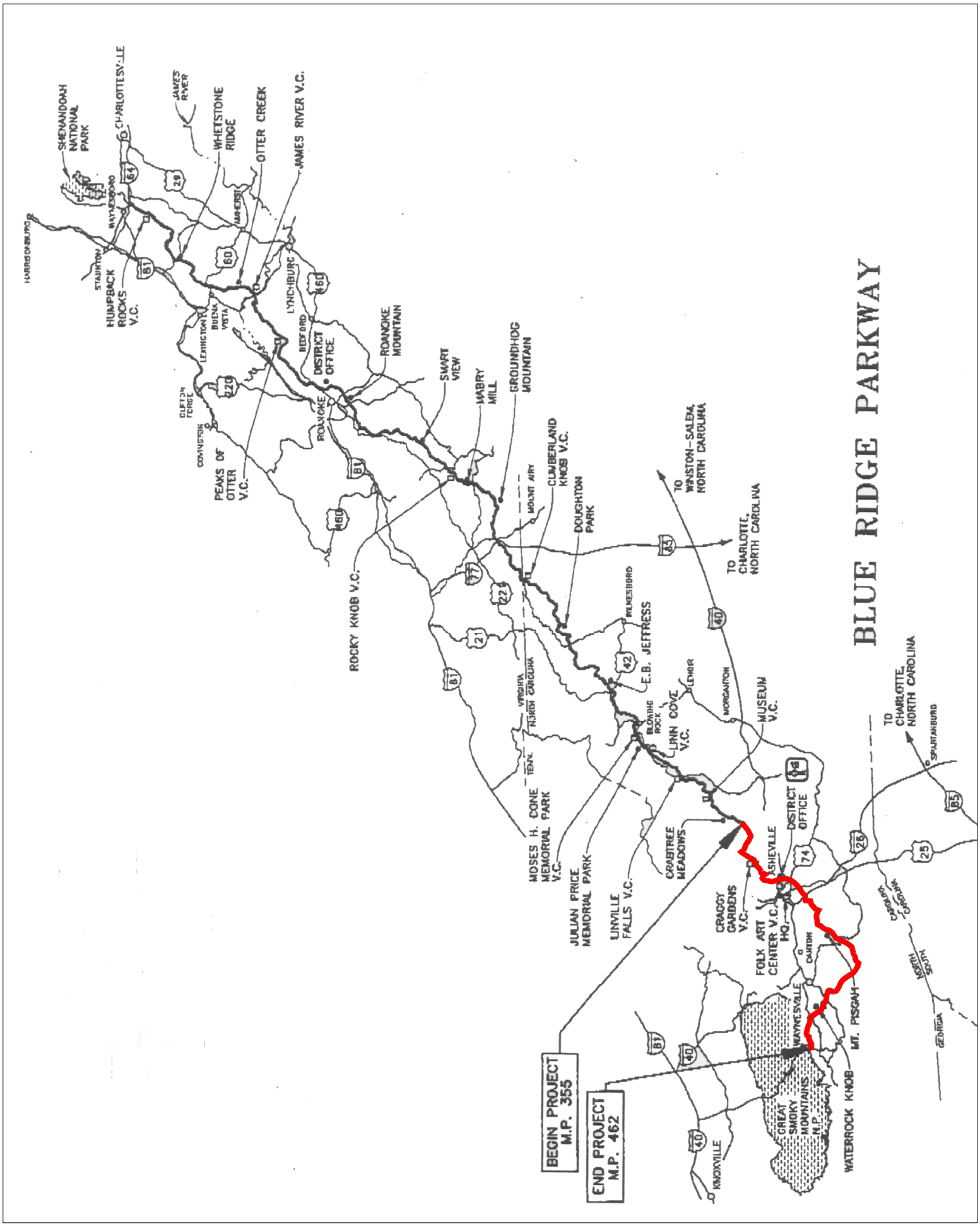


Illustration 1: Project Location Map

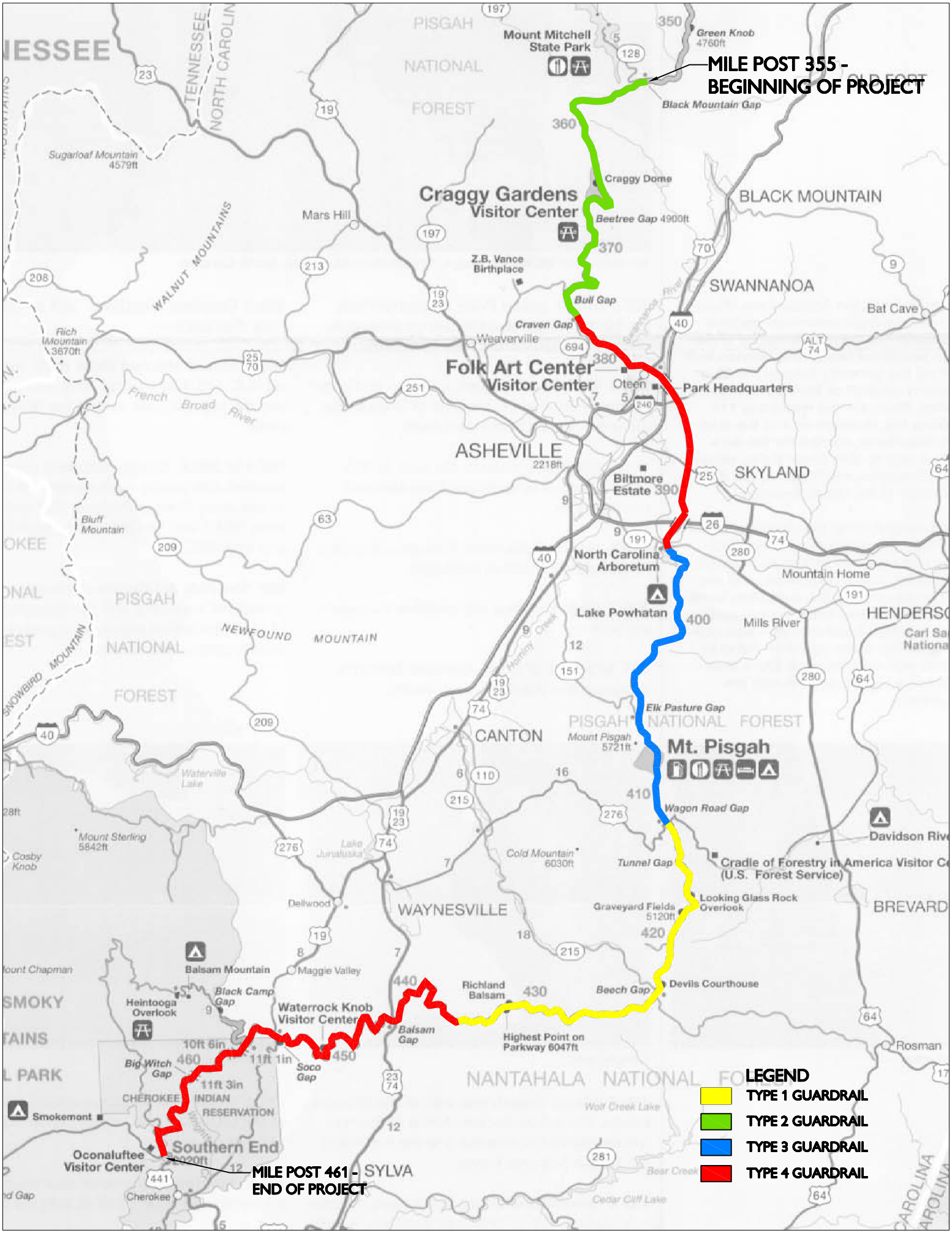


Illustration 2: Guardrail Location Map

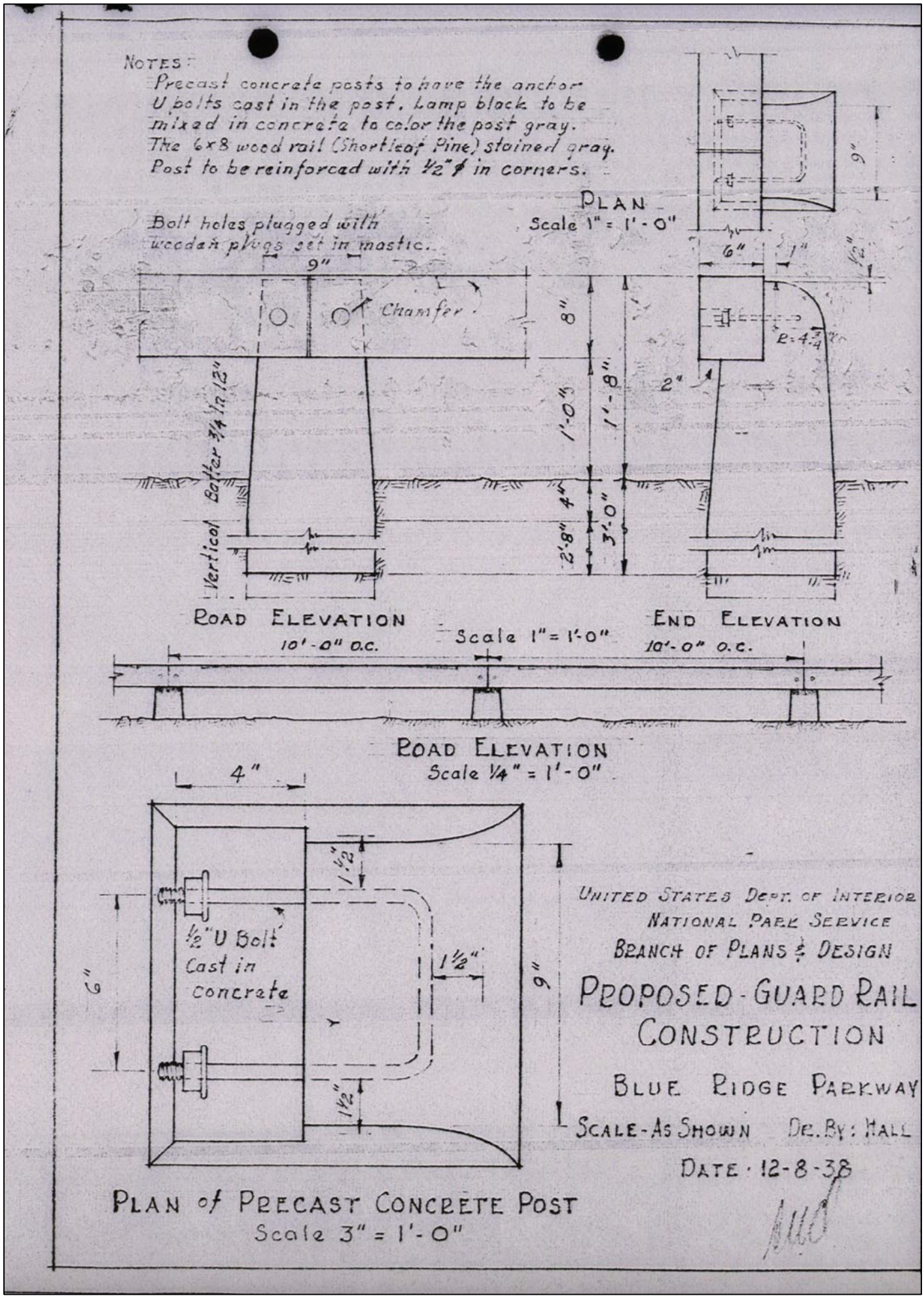


Illustration 3: 1938 NPS Drawing of Proposed Guardrail Construction

BLUE RIDGE PARKWAY

PROJ. NO. | SHEET OF

10'-0" | 10'-0" | 9'-0"

6" X 8" TIMBER RAIL | 6" X 8" TIMBER RAIL

TERMINAL POSTS CENTERED 12" FROM END OF RAIL.

CHAMFER

GROUND LINE

ELEVATION

SCALE: 0 ½ 1' 2'

CUT SLOPE | FILL SLOPE

GUARD RAIL

5' MIN. UNLESS OTHERWISE DIRECTED

PAVEMENT EDGE

FLARE AT ENDS OF GUARD RAIL TO BE STAKED IN FIELD

PLAN - SHOWING FLARES AT ENDS

SCALE: 0 8' 16'

1" CHAMFER ON END OF TERMINAL RAIL

FRONT ELEVATION | SIDE ELEVATION | REAR ELEVATION

44:2 SLOPE

WATERPROOF MASTIC

¾" GALV. ST. PIPE

⅝" DIA. X 12" GALV. STEEL CARRIAGE BOLT

14 Ga Washer, 3/4 Hole x 1/2" Dia.

DRILL ⅝" HOLE

6"X8"X10'-0" RAIL
ROUGH SAWED TIMBER

WATERPROOF MASTIC

#5 REINF. BARS

E. Reinf. Bar

FULL SIZE SECTION

0 1' 2' 3'

BASIC DATA

¾" CHAMFER ON FOUR CORNERS

PLAN

TYPICAL POST

SCALE: 0 ½ 1'

NOTES

POSTS: PRECAST CONCRETE, COLORED GREY BY ADDING ONE POUND OF CARBON BLACK PER BAG OF CEMENT. REINFORCING TO BE #5 BARS. TWO 3/4" DIA. GALV. STEEL PIPES CAST IN POST FOR RAIL BOLTS.

RAILS: TREATED STRUCTURAL GRADE TIMBER, ROUGH SAWED TO 6"X8"X10'-0" WITH 3/4" DIA. HOLES DRILLED FOR CARRIAGE BOLTS. TIMBER SHALL BE SOUTHERN YELLOW PINE, DENSE NO.1 STRUCTURAL, OR DOUGLAS FIR, NO.1, 1450#f, PRESSURE TREATED WITH PENTACHLOROPHENOL.

HARDWARE: ALL ASSEMBLY HARDWARE TO BE HOT-DIPPED GALVANIZED STEEL.

REVISED: 2-5-62 BY WEN., REINFORCING STEEL POSITION CHANGE MADE TO STRENGTHEN TOP OF POST IN ORDER THAT A HOIST COULD HANDLE POST DURING LOADING, UNLOADING AND SETTING.

SCALE AS SHOWN

RECOMMENDED _____ SUPERINTENDENT DATE 11-5-53

RECOMMENDED E. M. LISLE ASSISTANT REGIONAL DIRECTOR DATE 11/9/53

RECOMMENDED ELBERT COX REGIONAL DIRECTOR DATE 11/9/53

APPROVED RECOMMENDED THOS. C. VINT CHIEF OF DESIGN & CONSTRUCTION DATE 12/16/53

~~APPROVED~~ _____ ~~DIRECTOR~~ DATE _____

RECOMMENDED _____ DIVISION ENGINEER BUREAU OF PUBLIC ROADS DATE _____

APPROVED _____ DEPUTY COMMISSIONER BUREAU OF PUBLIC ROADS DATE _____

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DESIGN & CONSTRUCTION DIVISION
PREPARED BY
ROANOKE VA.
OFFICE

REGION ONE

PCP No.

SHEET 1 OF 1

GUARDRAIL-CONCRETE POSTS AND TIMBER RAILS
NAME OF ITEM
GENERAL
LOCATION
BLUE RIDGE PARKWAY
NAME OF AREA

DRAWING NO. PKY-BR GEN-2040D

DATE 3 NOV 53

REVIEWED

LANDS — REGIONAL OFFICE, WASHINGTON OFFICE
NATURAL HISTORY — REGIONAL OFFICE, WASHINGTON OFFICE
CONCESSIONS — REGIONAL OFFICE, WASHINGTON OFFICE
SAFETY — REGIONAL OFFICE, WASHINGTON OFFICE
U. S. PUBLIC HEALTH SERVICE
FORESTRY — REGIONAL OFFICE, WASHINGTON OFFICE
HISTORY — REGIONAL OFFICE, WASHINGTON OFFICE
ENGINEER — REGIONAL OFFICE, WASHINGTON OFFICE
ARCHITECT — REGIONAL OFFICE, WASHINGTON OFFICE
LANDSCAPE ARCHITECT — REGIONAL OFFICE, WASHINGTON OFFICE

DRAWN BY LEWIS
CHECKED BY ABBUEHL

Illustration 4: 1953 NPS Drawing of Type One Guardrail.

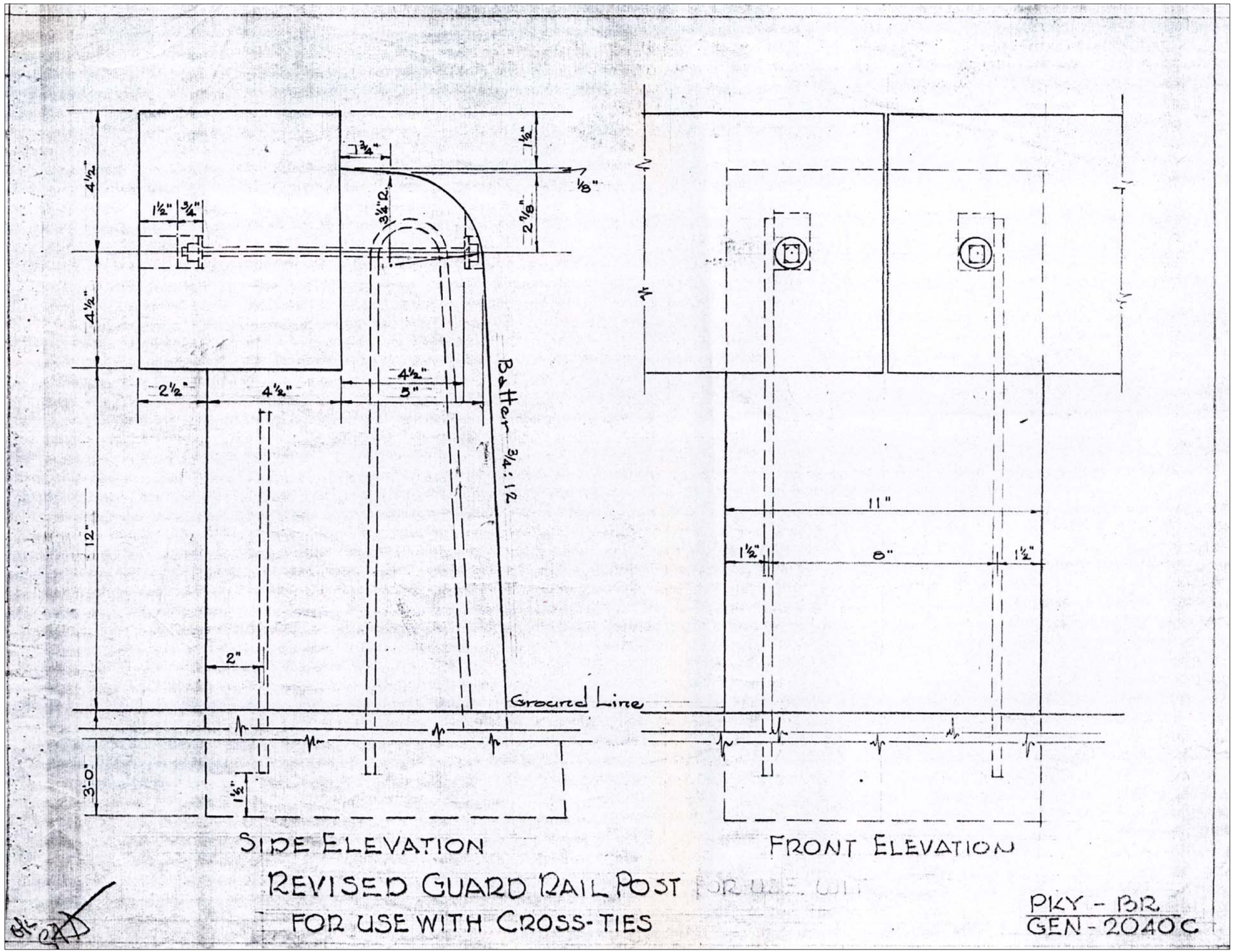


Illustration 5: 1958 NPS Revised Drawing of Type One Guardrail with Cross-Ties

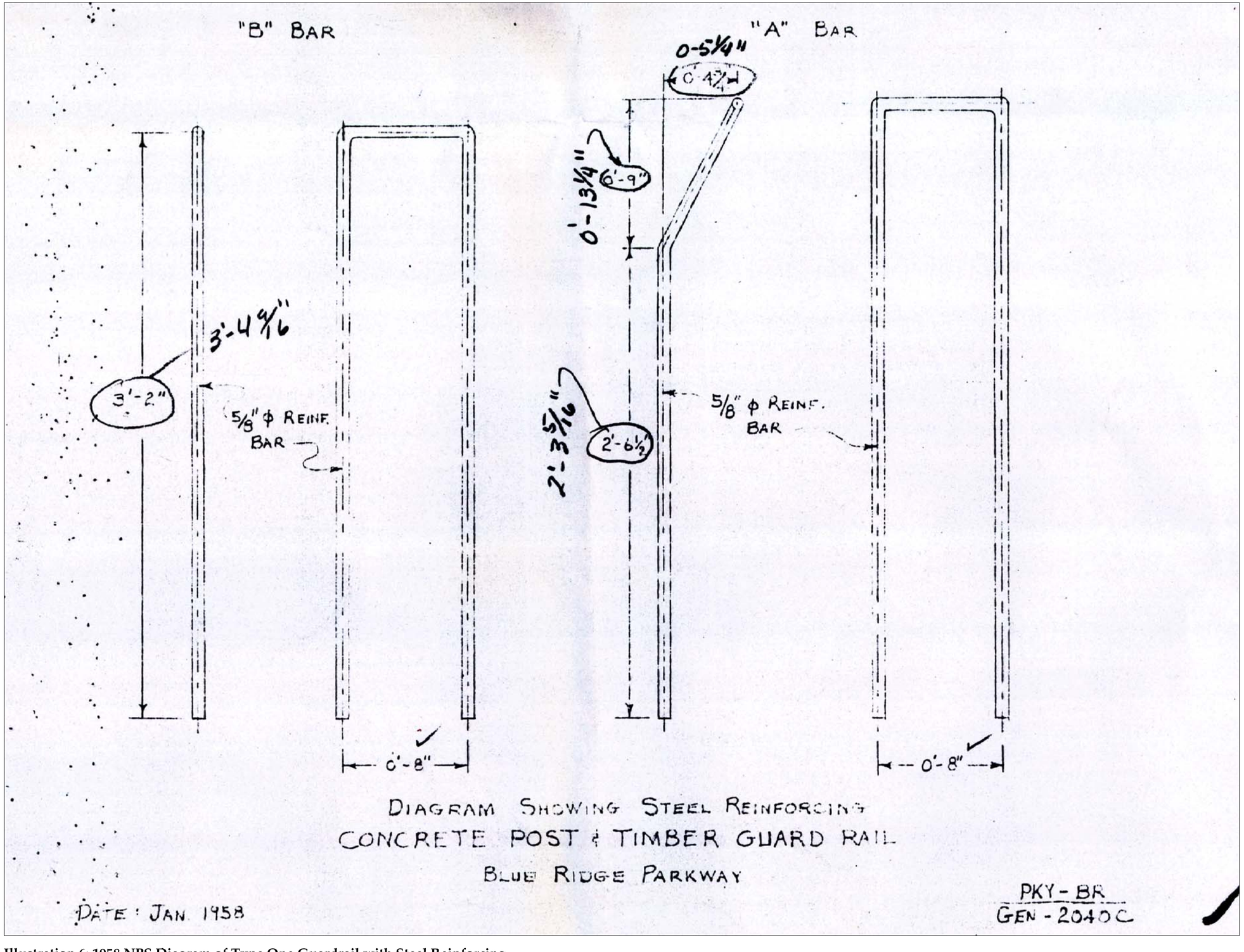
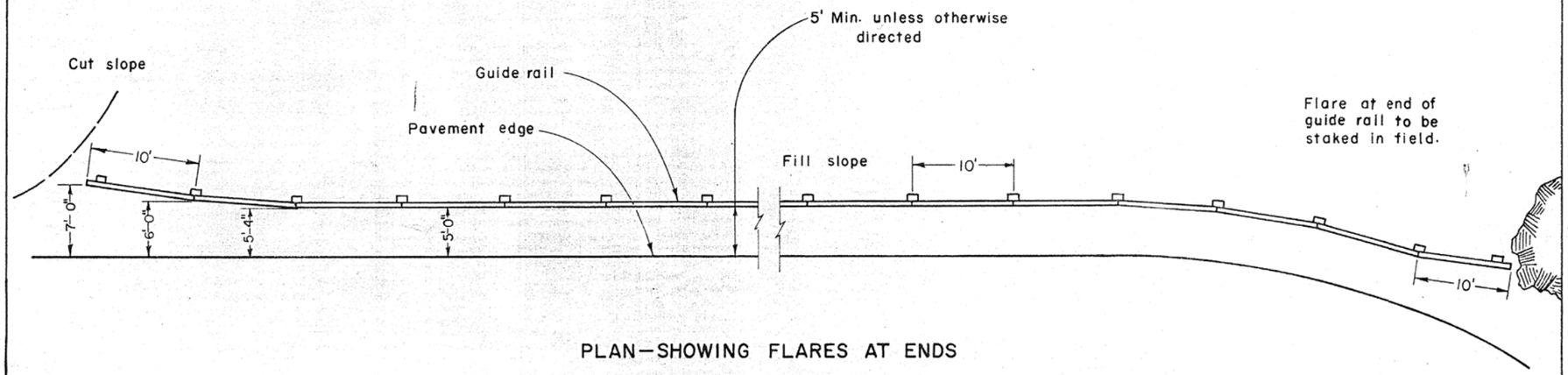
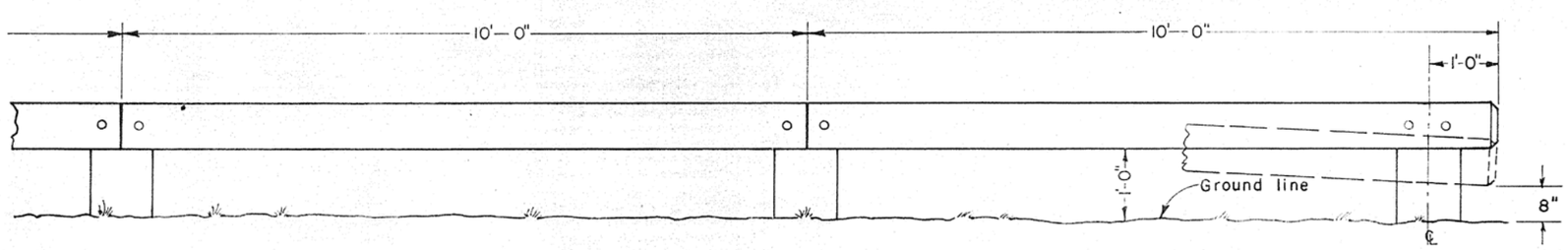


Illustration 6: 1958 NPS Diagram of Type One Guardrail with Steel Reinforcing

GR-2



PLAN—SHOWING FLARES AT ENDS



ELEVATION

Transition ends to 8-inches in 20 to 30 feet using a parabolic curve, or as directed.

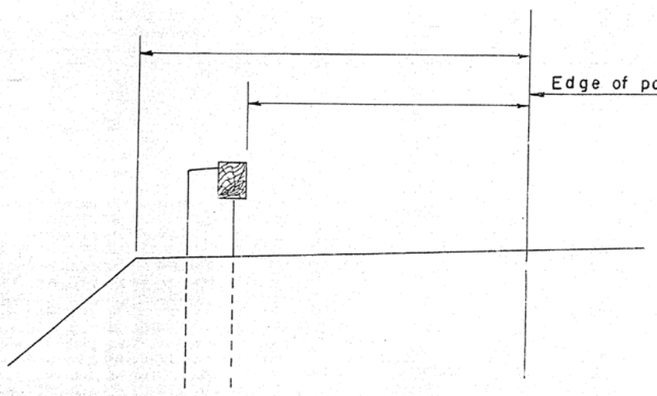
NOTES

Posts: Treated structural grade timber, rough sawed to 10"x12"x 4'-0"

Rails: Treated structural grade timber, rough sawed to 6"x 8"x 10'-0"

All timber shall be either southern yellow pine, dense No.1 structural grade, or Douglas fir No.1, 1450f, pressure treated with pentachlorophenol.

Hardware : All assembly hardware to be hot dipped galvanized steel.



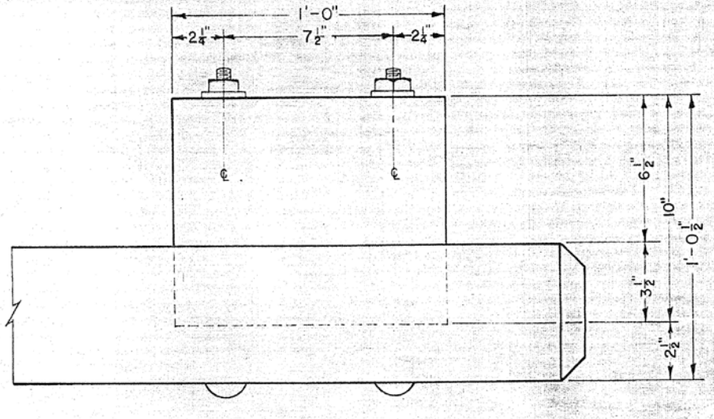
BUREAU OF PUBLIC ROADS
ARLINGTON, VIRGINIA

TIMBER GUIDE RAIL
WITH
TIMBER POSTS

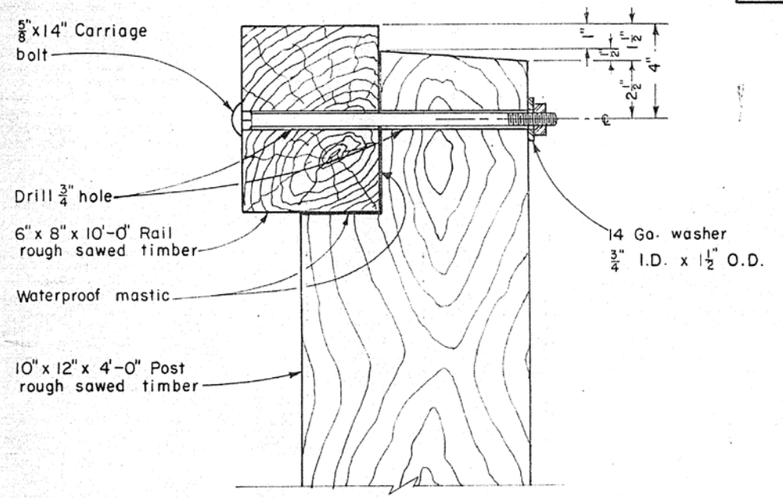
MARCH 1965 | SHEET 1 OF 2

Illustration 7: 1965 NPS Drawing of Type Two Guardrail, Sheet 1 of 2

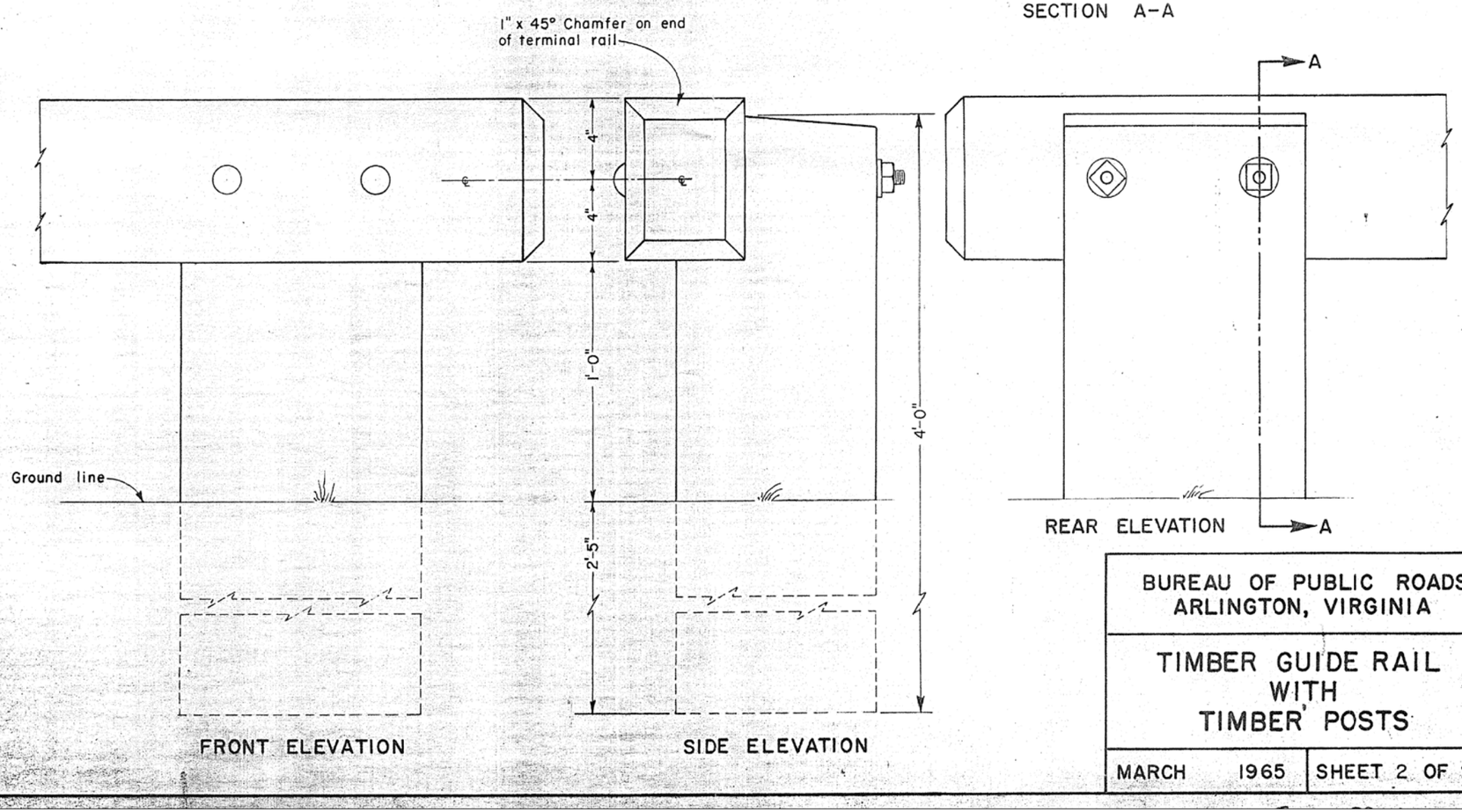
GR-2



PLAN



SECTION A-A



BUREAU OF PUBLIC ROADS
ARLINGTON, VIRGINIA

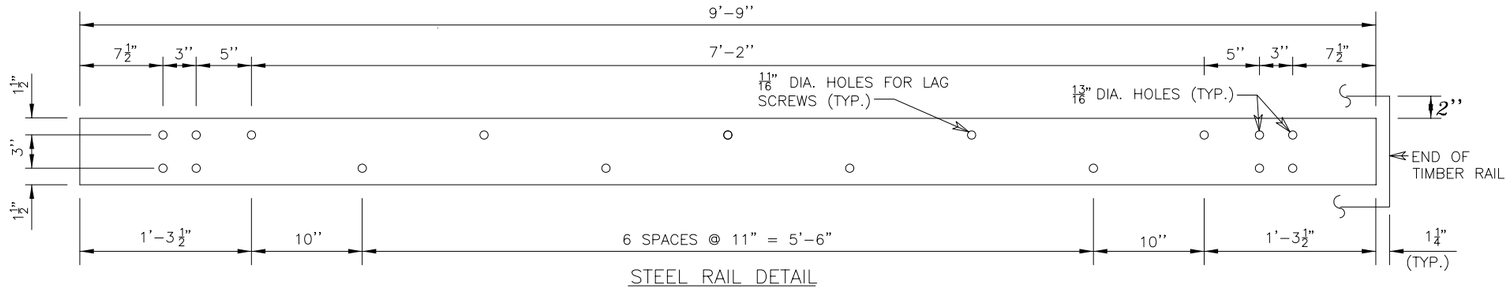
TIMBER GUIDE RAIL
WITH
TIMBER POSTS

MARCH 1965 | SHEET 2 OF 2

Illustration 8: 1965 NPS Drawing of Type Two Guardrail, Sheet 2 of 2

NOTES

1. USE WEATHERING STEEL FOR ALL STRUCTURAL STEEL AND FASTENER HARDWARE AS SPECIFIED.
2. PLACE A TERMINAL SECTION (SEE SHEETS 8 AND 9) ON BOTH APPROACH AND TRAILING ENDS OF BARRIER INSTALLATIONS.
3. PLACE A TERMINAL SECTION (SEE SHEETS 10 AND 11) WHERE GUARDRAIL ENDS AT A STONE MASONRY HEADWALL / GUARDWALL.



STEEL RAIL DETAIL
6"x 3/8"x9'–9"

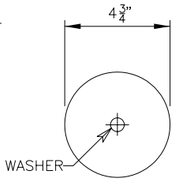
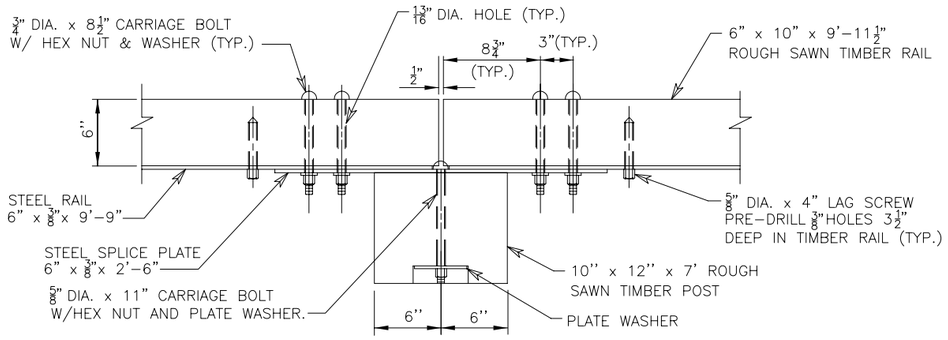
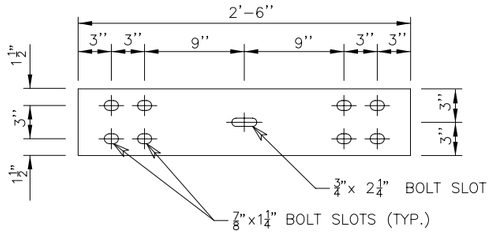
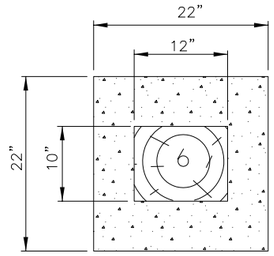


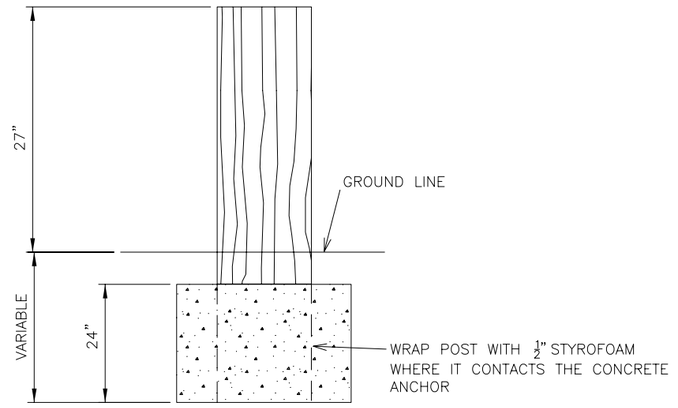
PLATE WASHER DETAIL
4¾" DIA. x ¼"





STEEL SPLICE PLATE DETAIL
6"x ⅜"x2'–8"

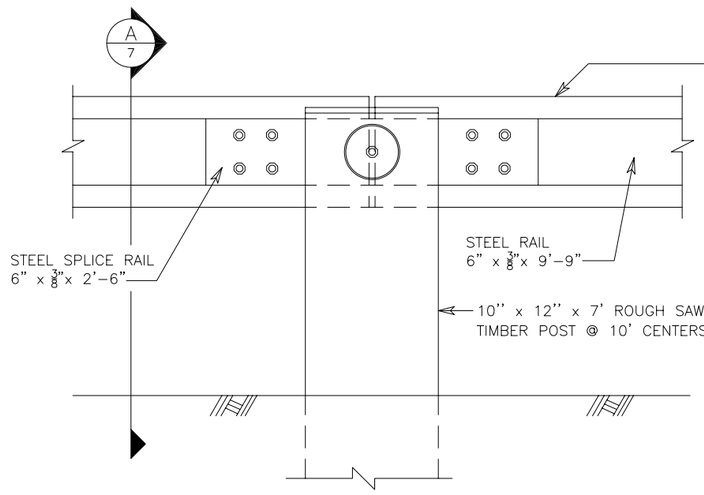




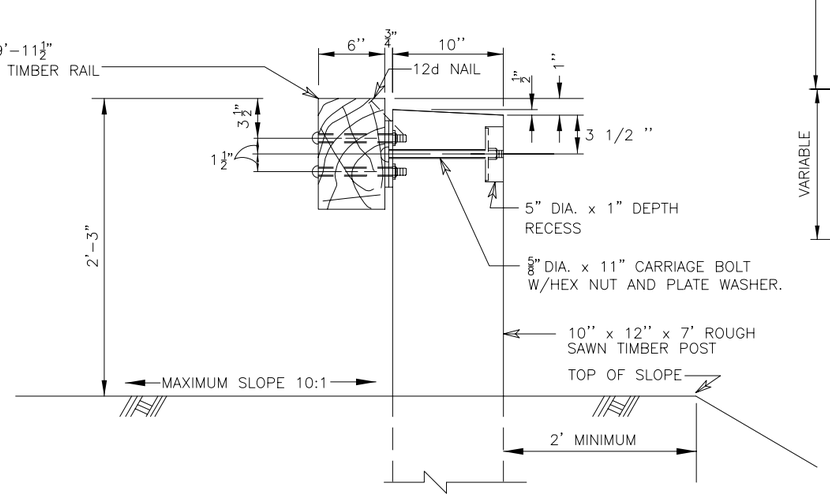
USE 25" DIA. ROUND ANCHOR OR 24" SQUARE ANCHOR.
REDUCED SIZE ACCEPTABLE IN SOLID ROCK.

CONCRETE ANCHOR FOR SHORT GUARDRAIL ASSEMBLY

POST CONNECTION PLAN



POST CONNECTION ELEVATION



A 7 SECTION

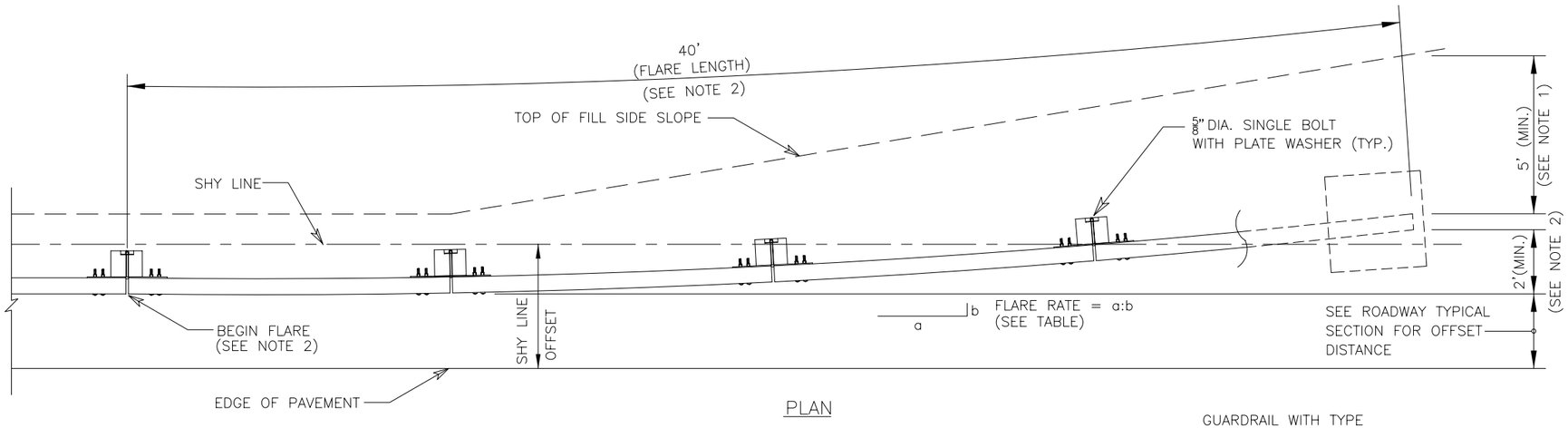
BOLT LENGTHS FOR RAIL/POST CONNECTION

Type B (NO BLOCK OUT)
11"

NO SCALE

DESIGNED: HOLLISTER STAHLECKER CADD SAVAGE TECH. REVIEW: DSC DATE: 4/02	SUB SHEET NO.	TITLE OF SHEET DETAIL STEEL–BACKED TIMBER GUARDRAIL, TYPE B	DRAWING NO. 601 41,071 PKG. NO. BLRI 159 SHEET 7 OF 17

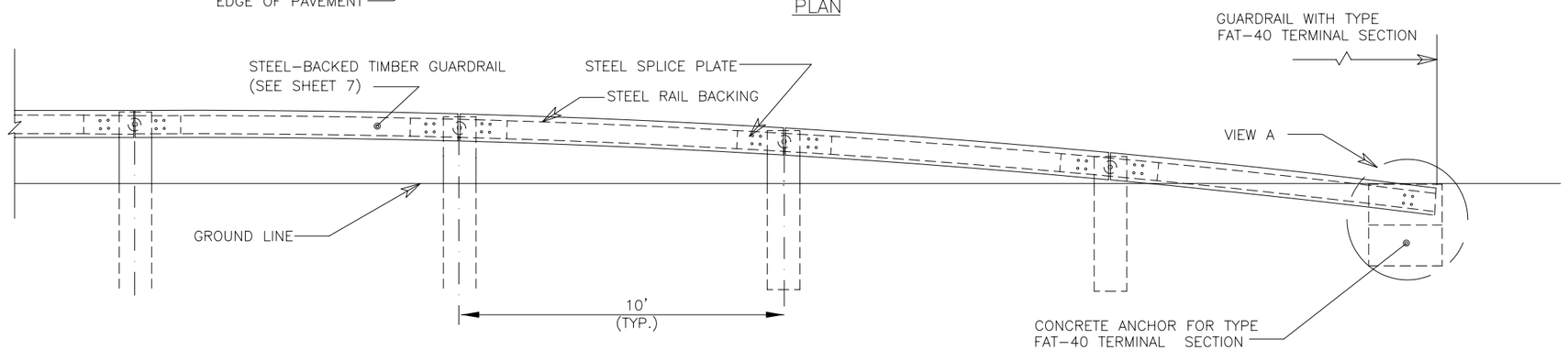
Illustration 9: 2002 NPS Drawing of Type Four Guardrail, Details Sheet 7

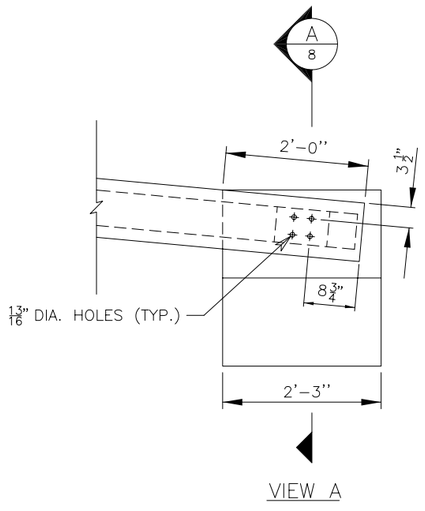


NOTES

1. FOR THE TYPE FAT–40 TERMINAL SECTION, EXTEND THE FILL WIDENING A MINIMUM OF 5 FEET BEHIND THE GUARDRAIL, UNLESS OTHERWISE DIRECTED BY THE CO.
2. THE GUARDRAIL FLARE SHOWN IN THE PLAN VIEW IS THE MINIMUM LENGTH AND RATE REQUIRED. AS DIRECTED BY THE CO, FLARE THE GUARDRAIL SO THAT THE TERMINAL SECTION IS OUTSIDE THE CLEAR ZONE. IF THE TERMINAL SECTION CANNOT BE LOCATED OUTSIDE THE CLEAR ZONE. IT SHOULD BE FLARED AS FAR AS PRACTICAL FROM THE ROAD AT THE MAXIMUM RATE INDICATED ON THE GUARDRAIL FLARE RATES TABLE.
3. SEE SHEET 7, STEEL–BACKED TIMBER GUARDRAIL, FOR TIMBER, STRUCTURAL STEEL, AND HARDWARE DETAILS.

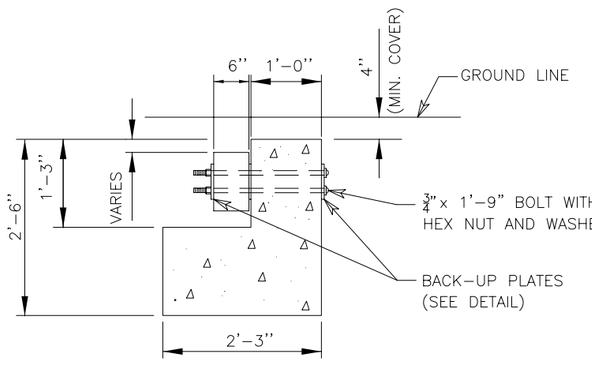
PLAN



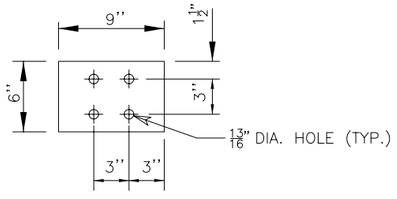


VIEW A

ELEVATION



A/8 SECTION



BACK–UP PLATE DETAIL
6"x ½" x 9"

GUARDRAIL FLARE RATES

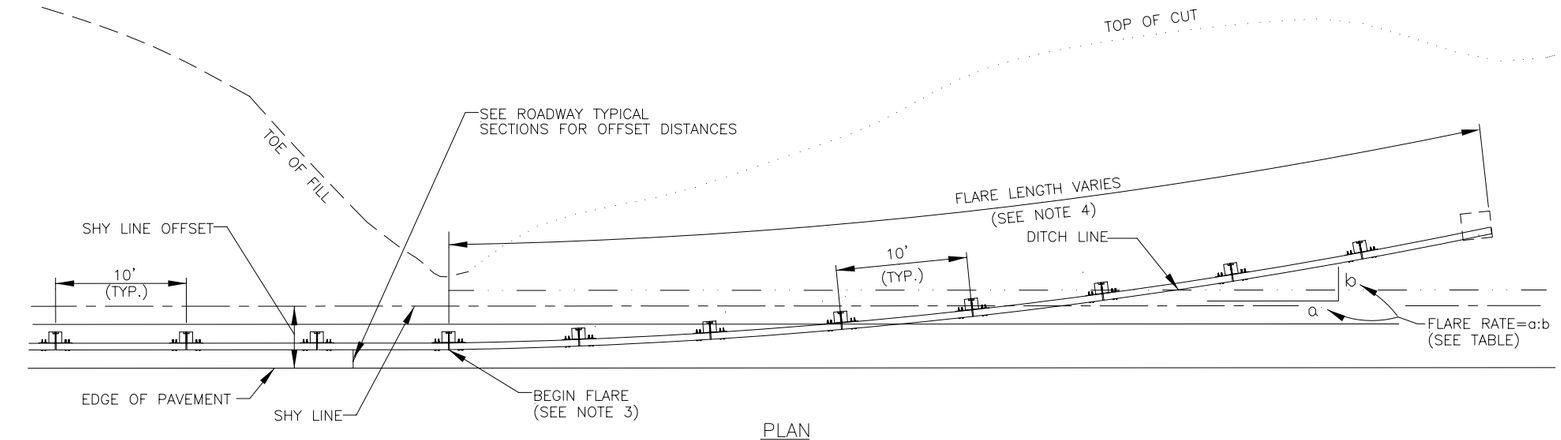
DESIGN SPEED (MPH)	SHY LINE OFFSET (FT)	FLARE RATE INSIDE SHY LINE (a:b)	FLARE RATE OUTSIDE SHY LINE (a:b)
60	8.0	26:1	13:1
50	6.5	21:1	11:1
40	5.0	17:1	9:1
30 AND LESS	3.5	13:1	7:1

NO SCALE

DESIGNED: HOLLISTER STAHLECKER DADD SAVAGE TECH. REVIEW: DSC DATE: 4/02	SUB SHEET NO.	TITLE OF SHEET DETAIL/STEEL–BACKED TIMBER GUARDRAIL SECTION, TYPE FAT–40 BLUE RIDGE PARKWAY	DRAWING NO. 601 41,071 PKG. NO. BLRI 159 ___ SHEET 8 OF 17

4/16/02 14:10 D:SAVAGE M:\b PA\BLRK\159\S\161/X61.DWG

Illustration 10: 2002 NPS Drawing of Type Four Guardrail, Details Sheet 8

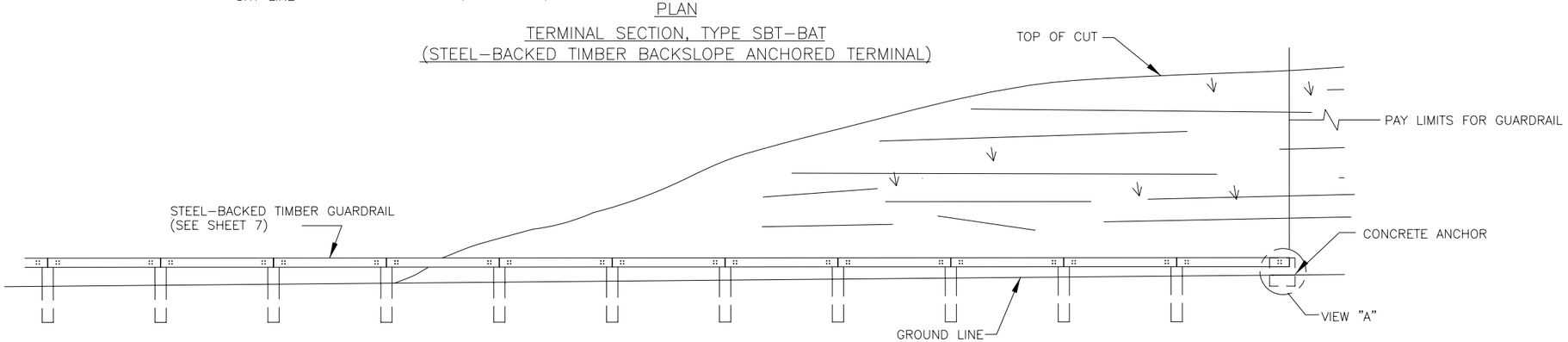


PLAN

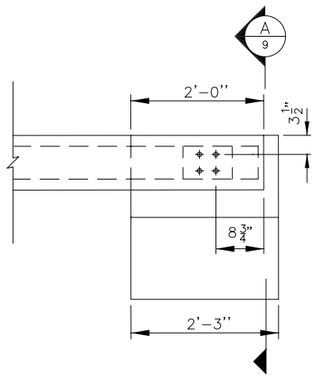
TERMINAL SECTION, TYPE SBT–BAT
(STEEL–BACKED TIMBER BACKSLOPE ANCHORED TERMINAL)

NOTES

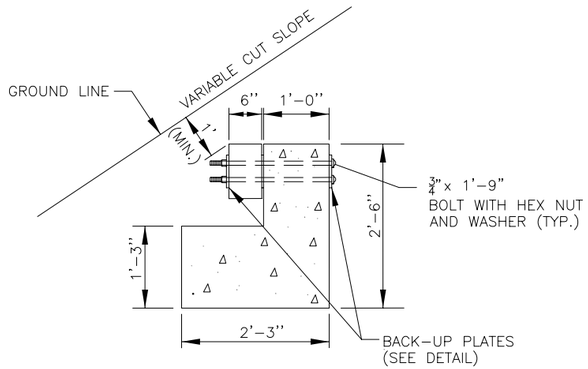
1. SEE DETAIL SHEET 7, 'STEEL–BACKED TIMBER GUARDRAIL', FOR TIMBER, STRUCTURAL STEEL, AND HARDWARE DETAILS.
2. FOR THE TYPE B, NON–BLOCKED–OUT GUARDRAIL, NO BLOCKS ARE INCLUDED.
3. BEGIN THE CUT FLARES AT THE NEAREST POST TO A TRANSITION POINT BETWEEN FILL AND CUT AS DIRECTED BY THE CO.
4. EXTEND THE FLARE INTO THE CUT UNTIL A MINIMUM 1–FOOT COVER IS OBTAINED OVER THE GUARDRAIL END.



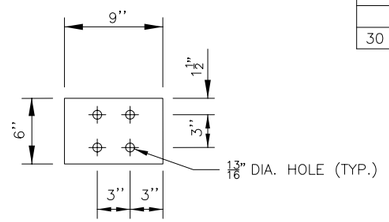
ELEVATION



VIEW A



A/9 SECTION



BACK–UP PLATE DETAIL
6"x ½" x 9"

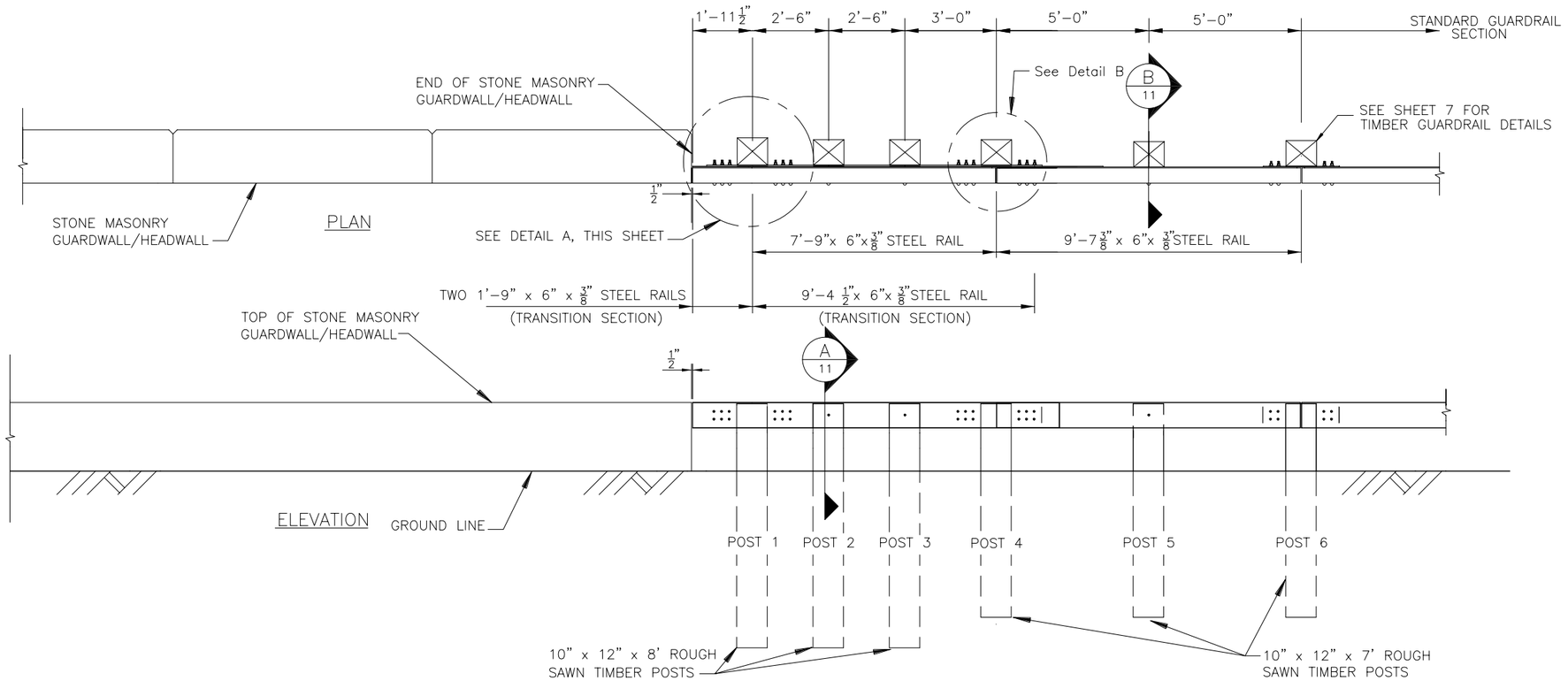
GUARDRAIL FLARE RATES

DESIGN SPEED (MPH)	SHY LINE OFFSET (FT)	FLARE RATE INSIDE SHY LINE (a:b)	FLARE RATE OUTSIDE SHY LINE (a:b)
60	8.0	26:1	13:1
50	6.5	21:1	11:1
40	5.0	17:1	9:1
30 AND LESS	3.5	13:1	7:1

Illustration 11: 2002 NPS Drawing of Type Four Guardrail, Details Sheet 9

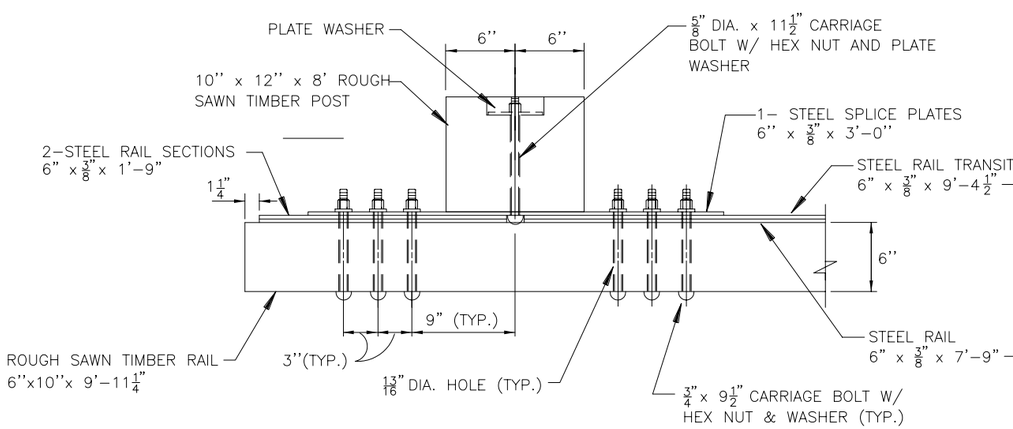
DESIGNED: HOLLISTER STAHLECKER SAVAGE TECH. REVIEW: DSC DATE: 4/02	SUB SHEET NO.	TITLE OF SHEET DETAIL/STEEL–BACKED TIMBER GUARDRAIL TERMINAL SECTION, TYPE SBT–BAT BLUE RIDGE PARKWAY	DRAWING NO. 601 41,071 PKG. NO. BLRI 159 SHEET 9 OF 17

4/16/02 14:12 D:\SAVAGE\ R15 P:\BLRI\159\SI61\X62.DWG

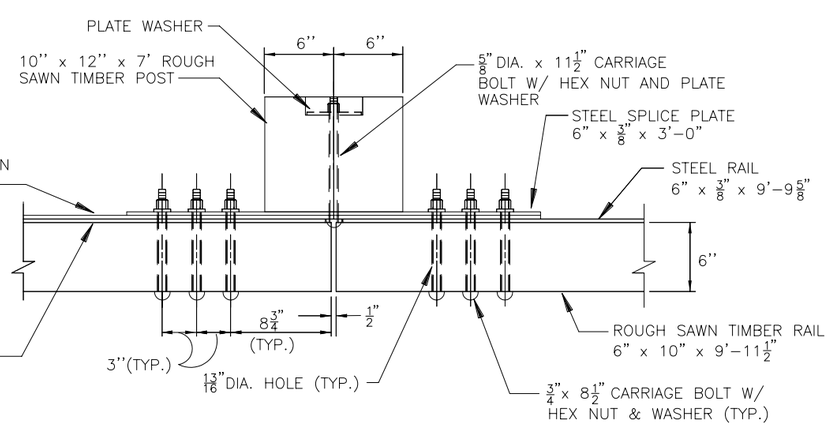


NOTES

1. SEE SHEET 11 FOR SECTIONS A AND B, STEEL RAIL LAYOUTS, AND OTHER DETAILS.
2. USE WEATHERING STEEL FOR ALL STRUCTURAL STEEL AND FASTENER HARDWARE.
3. IF THE HEIGHT OF THE EXISTING STONE MASONRY GUARDWALL / HEADWALL HEIGHT IS NOT 2'–3", TAPER THE HEIGHT OF THE TRANSITION SECTIONS SHOWN TO MATCH THE EXISTING STONE MASONRY GUARDWALL/HEADWALL HEIGHT.



DETAIL A
POST CONNECTION PLAN

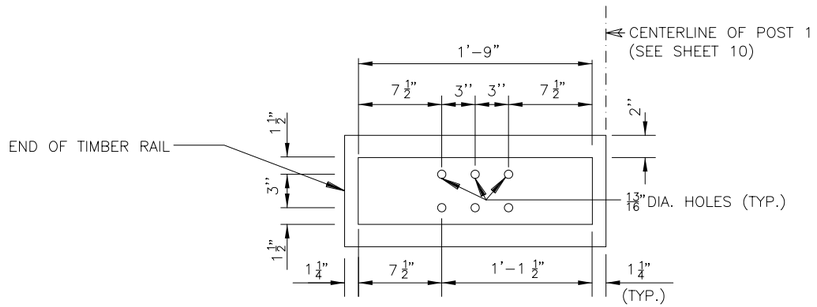


DETAIL B
POST CONNECTION PLAN

NO SCALE

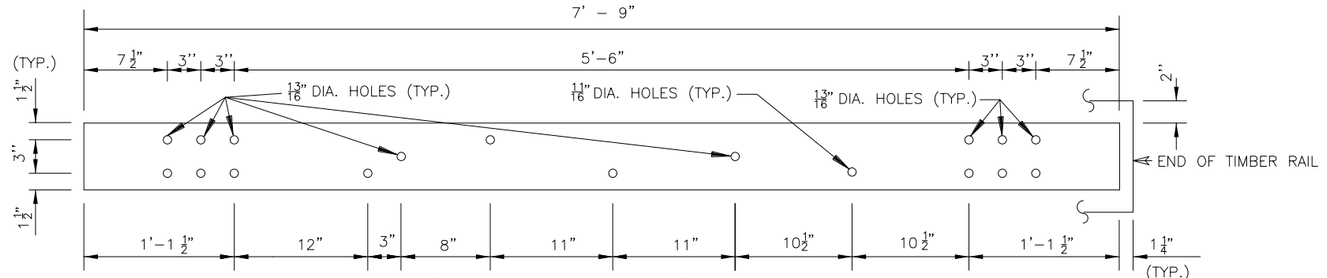
DESIGNED: HOLLISTER STAHLECKER	SUB SHEET NO.	TITLE OF SHEET: DETAIL/STEEL–BACKED TIMBER GUARDRAIL TERMINAL SECTION, ADJACENT TO STONE MASONRY GUARDWALL/HEADWALL	DRAWING NO. 601 41,071	
CADD: SAVAGE			PKG. NO. BLRI 159	SHEET 10 OF 17
TECH. REVIEW: DSC		BLUE RIDGE PARKWAY		
DATE: 4/02				

Illustration 12: 2002 NPS Drawing of Type Four Guardrail, Details Sheet 10



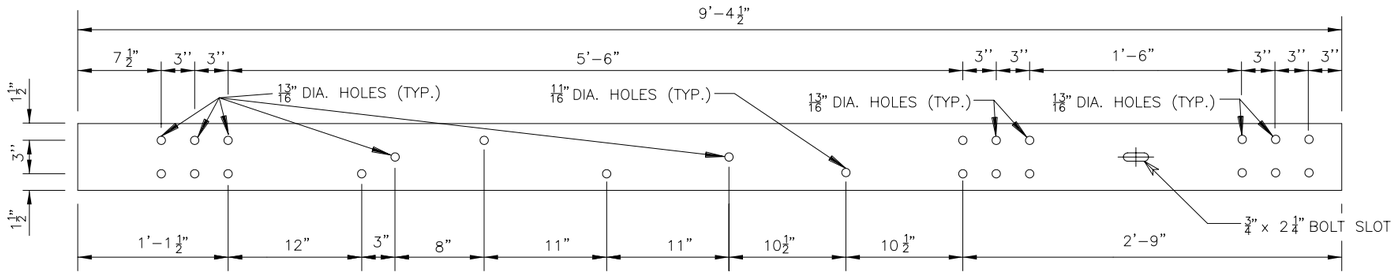
STEEL RAIL DETAIL–TRANSITION SECTION

6"x 3/8"x1'–9"



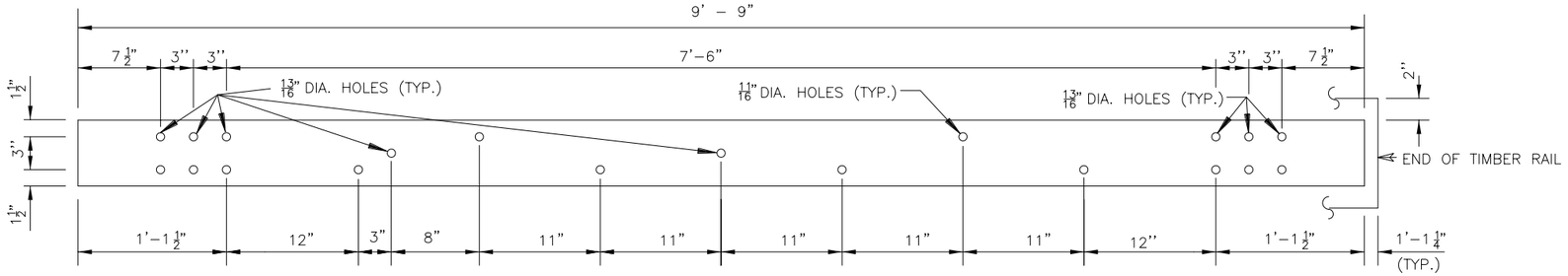
STEEL RAIL DETAIL–TRANSITION SECTION

6"x 3/8"x7'–9"



STEEL RAIL DETAIL–TRANSITION SECTION

6"x 3/8"x9'–4½"

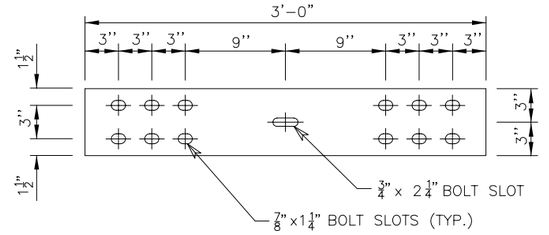


STEEL RAIL DETAIL–TRANSITION SECTION

6"x 3/8"x9'–9"

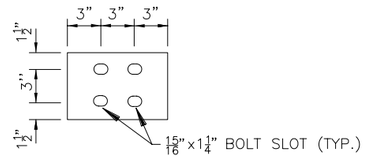
NOTE

1. PRE–DRILL 5/8 –INCH HOLES IN TIMBER RAIL AND 3/8 –INCH HOLES IN THE WOOD SPACER BLOCK FOR THE 5/8 –INCH LAG SCREWS.



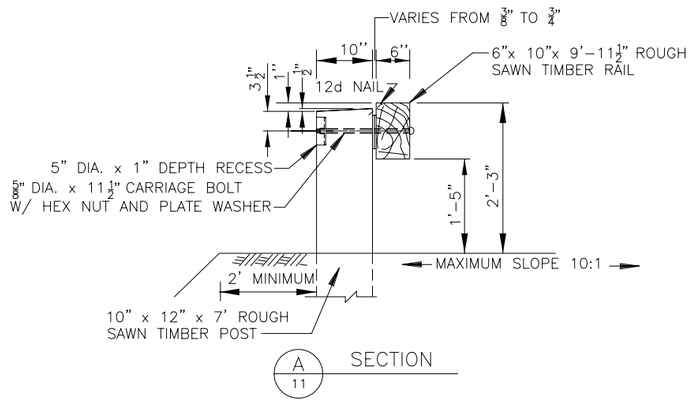
STEEL SPLICE PLATE DETAIL

6"x 3/8"x3'–0"

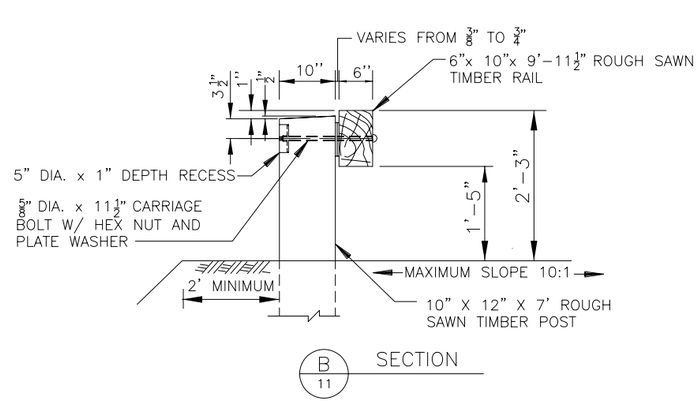


STEEL BEARING PLATE DETAIL

6"x 3/8"x9"



A 11 SECTION



B 11 SECTION

NO SCALE

DESIGNED: HOLLISTER STAHLECKER	SUB SHEET NO.	TITLE OF SHEET: DETAIL/STEEL–BACKED TIMBER GUARDRAIL TERMINAL SECTION, ADJACENT TO STONE MASONRY GUARDWALL/HEADWALL	DRAWING NO. 601 41,071	
DRAWN: SAVAGE			PKG. NO. BLRI 159	SHEET 11 OF 17
TECH. REVIEW: DSC				
DATE: 4/02		BLUE RIDGE PARKWAY		

4/16/02 14:14 D.SAVAGE R15 P:\BLRI\159\ST617766.DWG

Illustration 13: 2002 NPS Drawing of Type Four Guardrail, Details Sheet 11

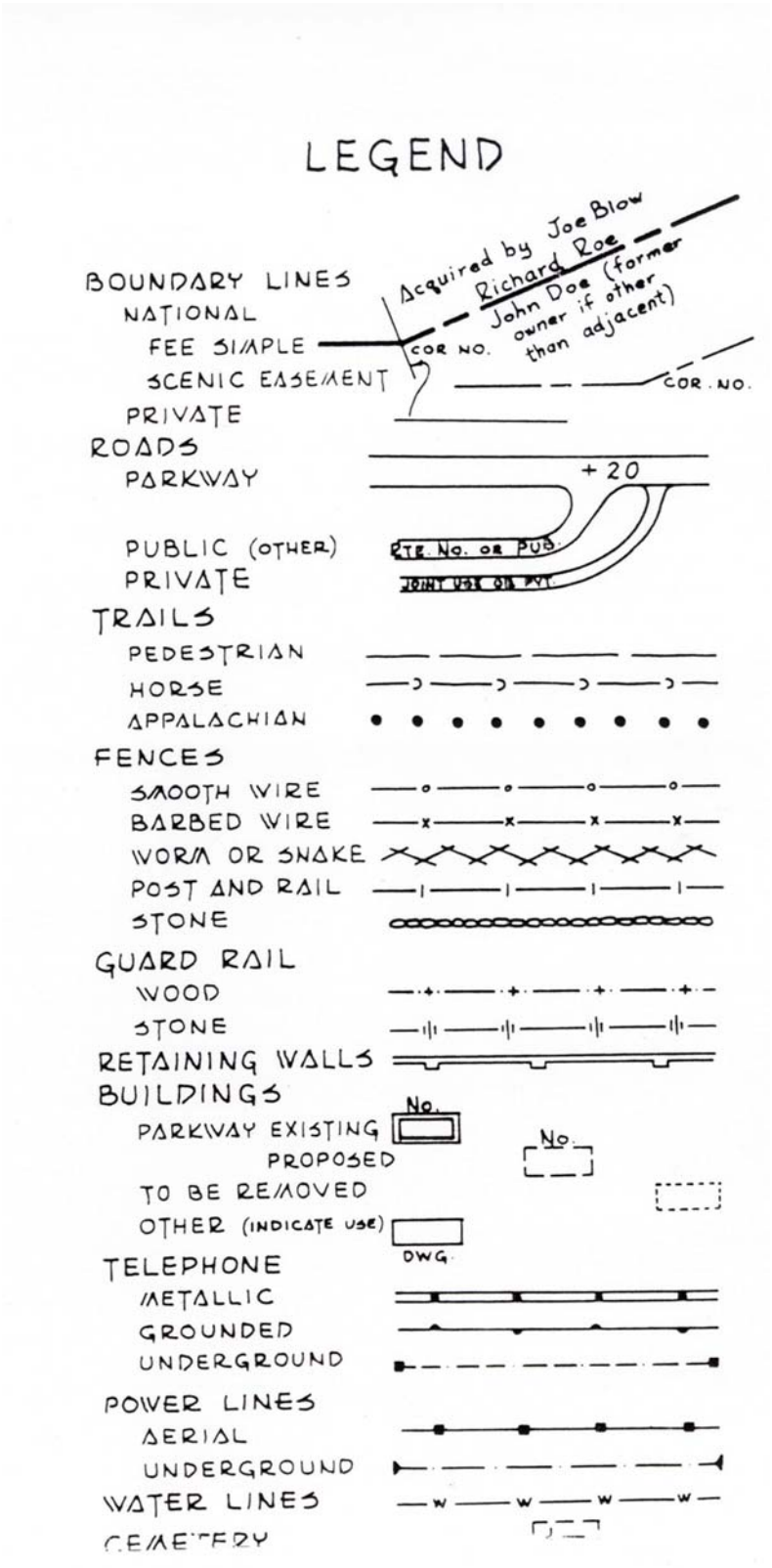


Illustration 14: NPS PLUM Map Legend

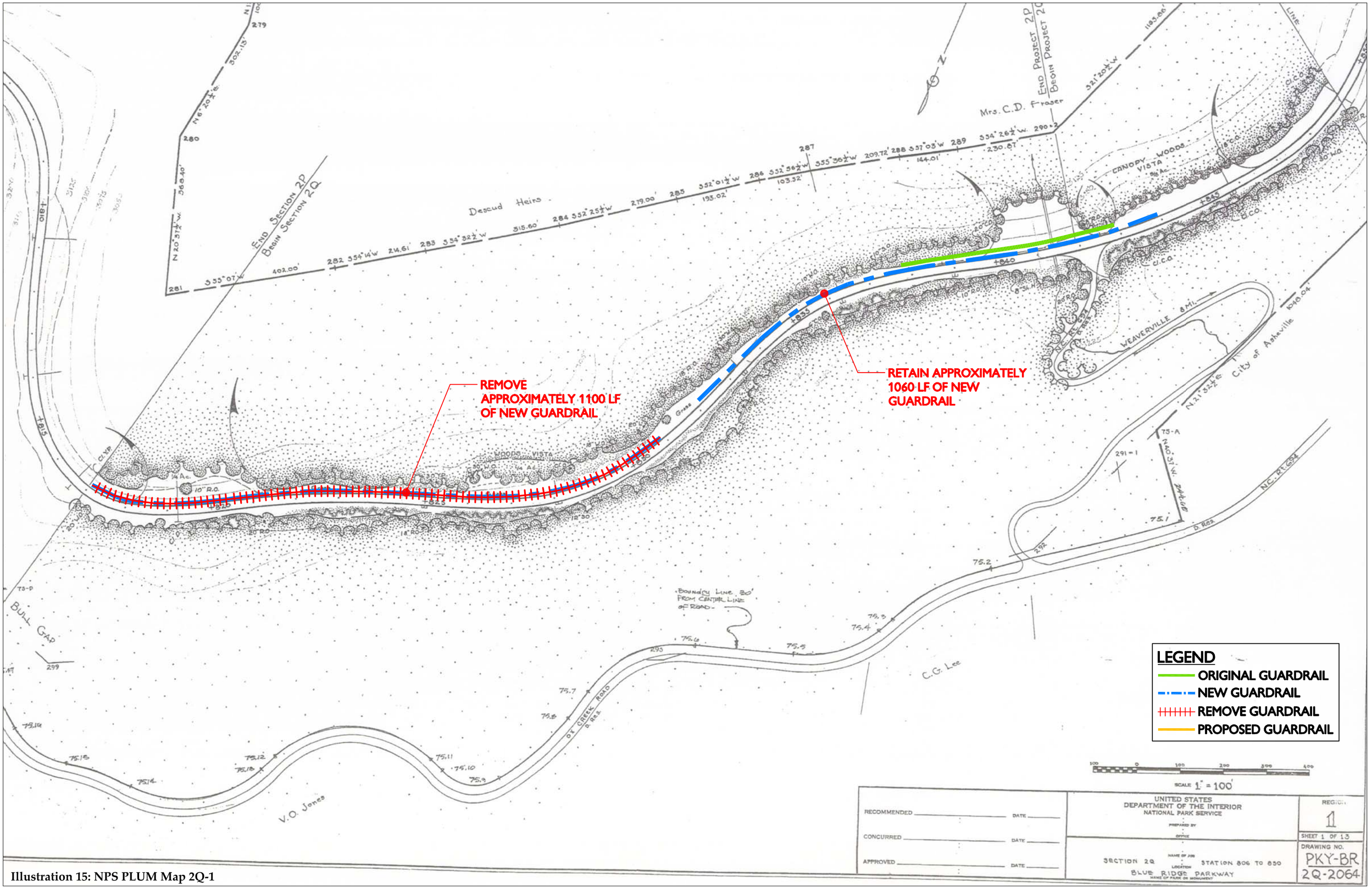


Illustration 15: NPS PLUM Map 2Q-1

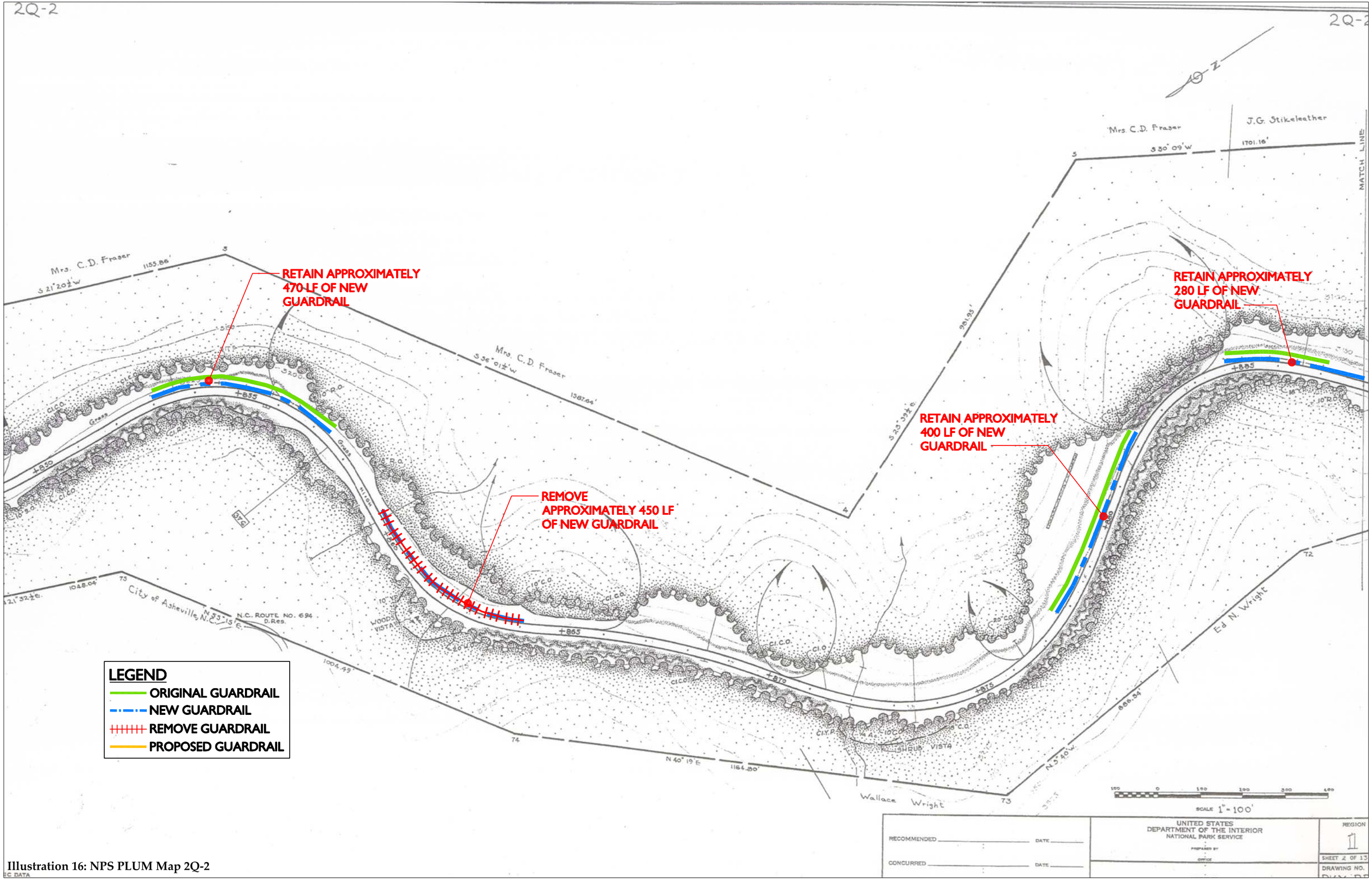


Illustration 16: NPS PLUM Map 2Q-2

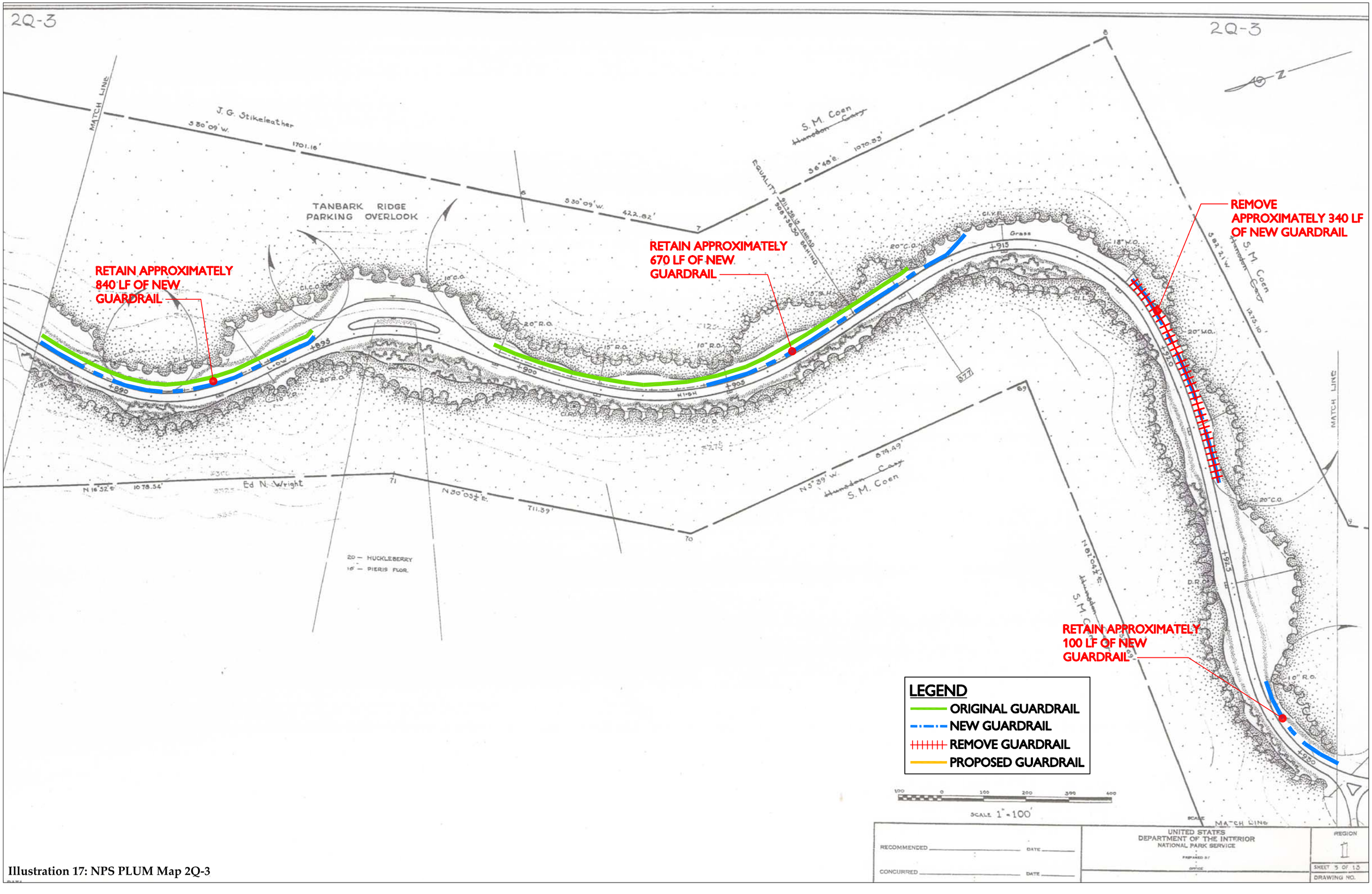


Illustration 17: NPS PLUM Map 2Q-3

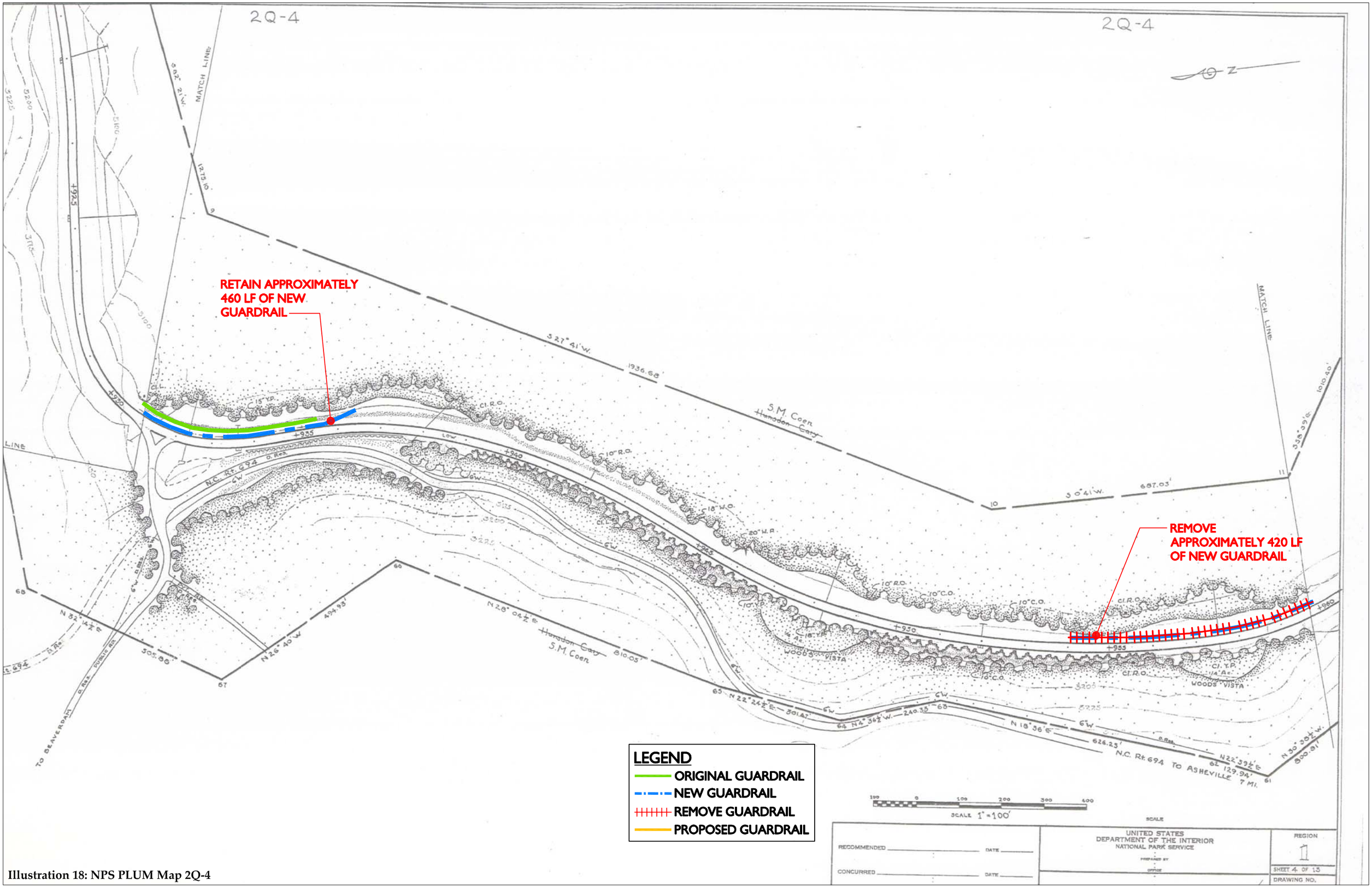


Illustration 18: NPS PLUM Map 2Q-4

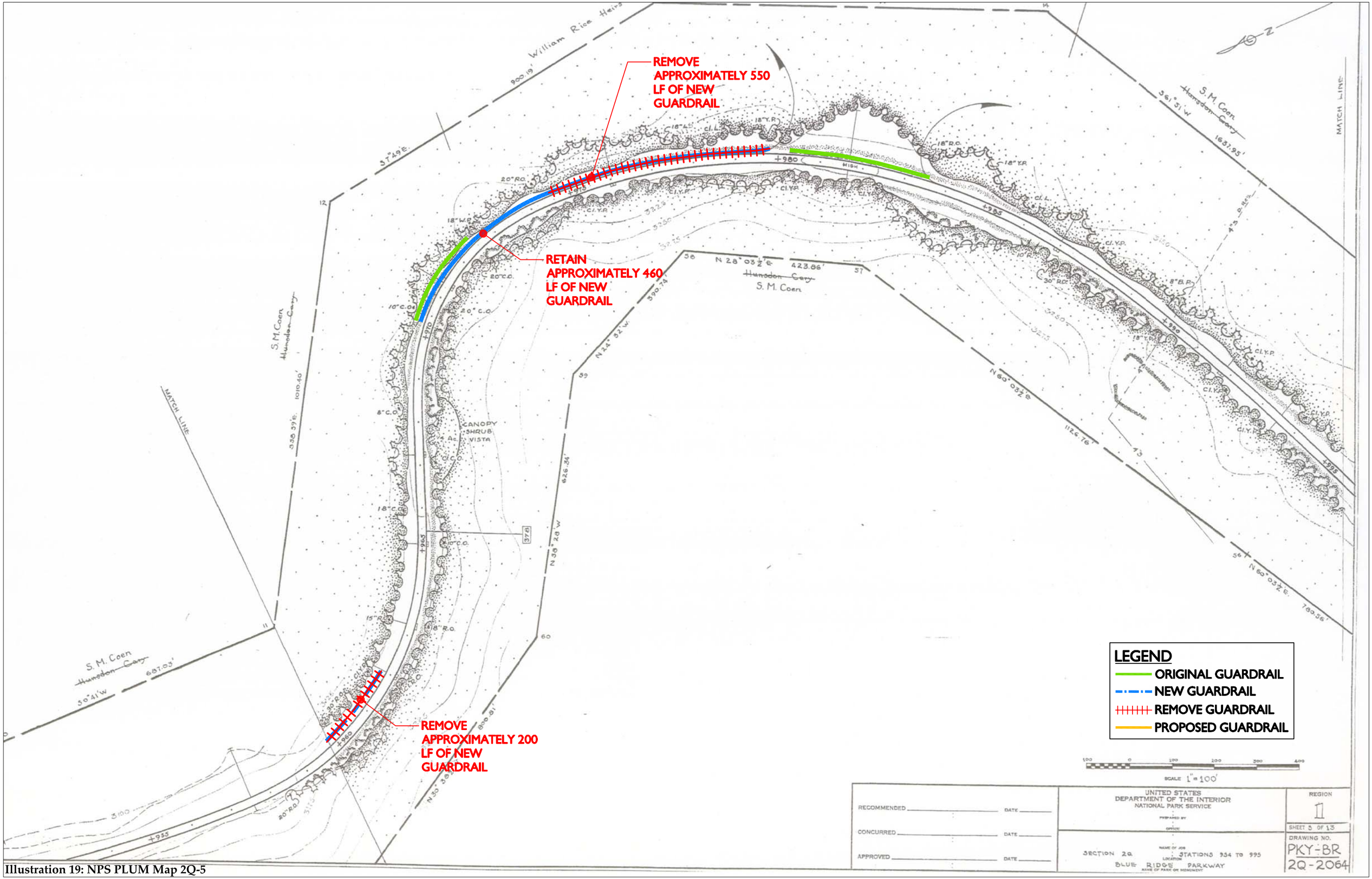


Illustration 19: NPS PLUM Map 2Q-5

RETAIN APPROXIMATELY
220 LF OF NEW
GUARDRAIL

MATCH LINE

S.61°01'W. 1607.95'

S.23°34'E. 1483.02'

S.M. Coen
Hunsdon Cary

S.40°53'E. 613.14'

S.12°14'E. 643.65'

Charles Speed

N.17°35½'W. 1210.97'

N.43°13'W. 734.97'

N.20°29'W. 381.61'

Hunsdon Cary
S.M. Coen

N.20°29'W. 1143.25'

N.24°15½'E. 442.20'

N.89°05'E. 780.56'

MATCH LINE

LEGEND

- ORIGINAL GUARDRAIL
- NEW GUARDRAIL
- REMOVE GUARDRAIL
- PROPOSED GUARDRAIL

100 0 100 200 300 400

SCALE 1" = 100

RECOMMENDED _____ DATE _____

CONCURRED _____ DATE _____

APPROVED _____ DATE _____

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

PREPARED BY

OFFICE

REGION 1

SHEET 6 OF 13

DRAWING NO. PKY-BR 2Q-206

NAME OF JOB

SECTION 2Q STATIONS 989 TO 1032

LOCATION

BLUE RIDGE PARKWAY

NAME OF PARK OR MONUMENT

BASIC DATA

Illustration 20: NPS PLUM Map 2Q-6

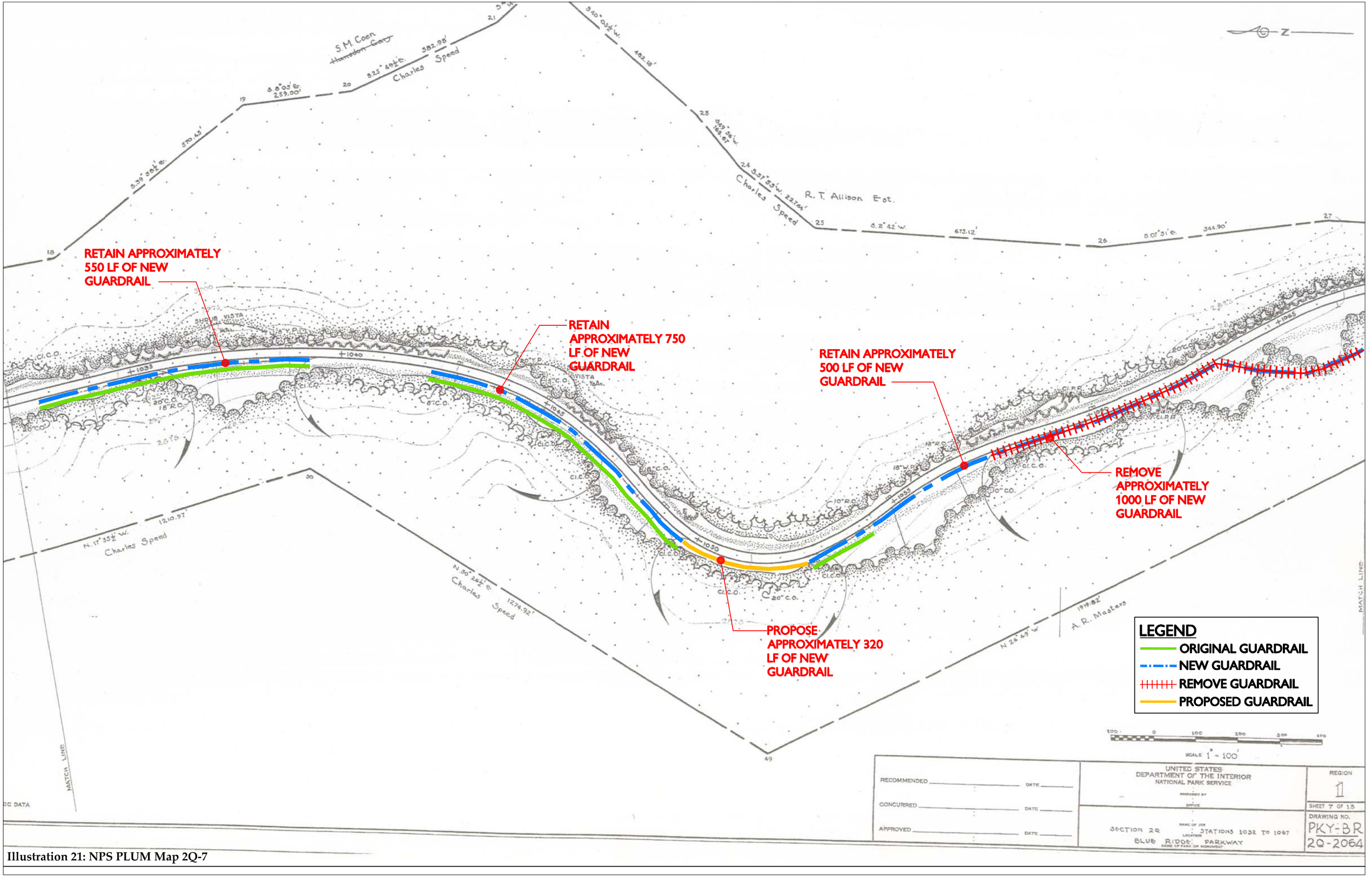


Illustration 21: NPS PLUM Map 2Q-7

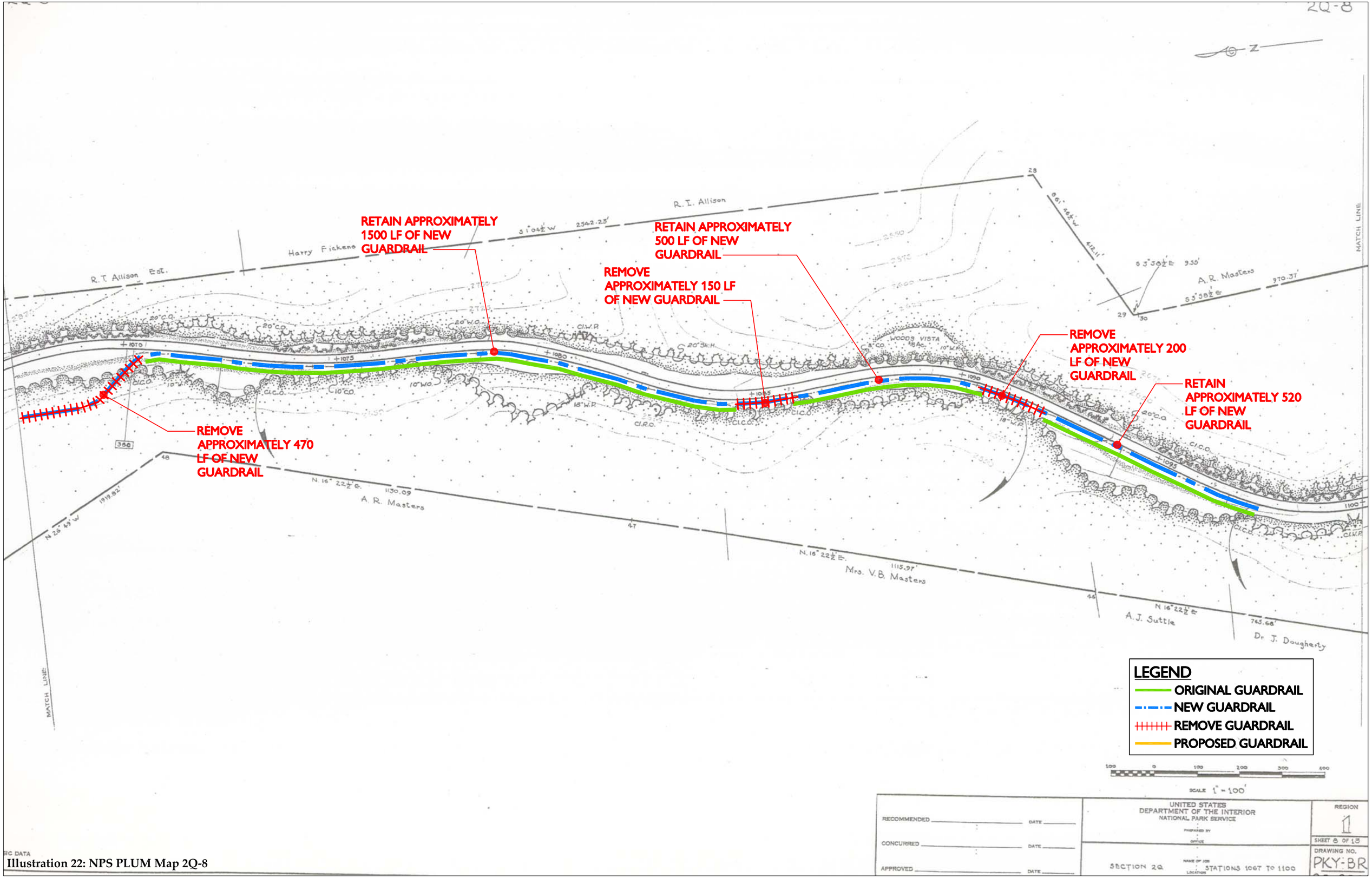


Illustration 22: NPS PLUM Map 2Q-8

APPENDIX A

BLUE RIDGE PARKWAY – CULTURAL LANDSCAPE REPORT
Summary of Kick-Off Meeting Minutes
NPS Headquarters – Asheville, N.C.
09.11.02

In Attendance:

Gary Johnson	National Park Service (NPS) - Asheville
Al Hess	NPS - Asheville
Larry Hultquist	NPS - Asheville
Susan Hitchcock	NPS - Atlanta
Robert (Bob) Blythe	NPS - Atlanta
Anne Wilfer	The Jaeger Company (TJC)
Jason Justice	TJC

Action items are italicized.

- Don't want us to waste time digitizing outstanding info. on Parkway Land Use Maps (PLUM) drawings – in-house NPS CAD operator will do this in the future.

- Focus Report on Existing Conditions, Recommendations & Treatment Options – history has been well documented.

- Struggle for control between NPS & Federal Highway Administration:
    - NPS = discretionary, implement guardrails on an as need basis
    - Federal Hwy Administration = would like to put guardrails EVERYWHERE, no specific guidelines - (FHWA – green book - for design details)

- NPS guardrail installations documented by an "oral tradition"

- Gary Eberhardt helped uphold design integrity, worked w/ orig. Landscape Architects, now only (1) LA in dept. at a time, therefore mentoring process is getting lost.

- *Interview: Al Hollister, Gale Stolicker w/ NPS - living authorities*

- Steel guardrails & reflectors will be the next push by FHWA

- Need designs for the future that are compatible w/ Pkwy

- Improve safety standards, but maintain visual integrity

- Still some flexibility to eliminate proposed projects from inventory

- Examples of over design or BAD design:
    - Dingle Creek Bridge - awkward retrofit railing – needs a better design
    - Folk Art Center - excessive use – tunnel effect – taller rails, interfere w/ views - no interruption, block grass bays & pull-off areas, hazardous around traffic islands – too close to road, forces bikers/joggers into road

- NPS has a database of accident reports from park rangers

- Noted increase of motorcycle accidents, however more guardrails would not help

- Unique BRP features:
    - No side striping on roadway
    - BRP contains 42% of all signs in entire park system (14,000)
    - Primarily used during daylight hours
    - Closed for icy conditions
    - 28-year cycle for re-paving (NPS prefers at least every 20-yrs)
    - Maximum speed limit 45 mph

GUARDRAIL DOCUMENTATION *to expand*:

- Stone Walls originally served as 'guardrails' – fieldstone from dynamite blasts (for tunnel excavation & road construction) came first, then granite from local quarry (now closed)

- 4 different types of existing guardrails:

    1. Reinforced concrete post w/ timber rail, double bolted, low, no steel backing (drawing details dated 1953) (revised plan w/ steel 'reinforcing' dated 1958)

    2. Timber 'Guide' Rail w/ timber posts, double bolted, low, no steel backing (detail dwg. dated 1965)

    3. Timber Guard Rail w/ timber posts, triple bolted, "original" steel-backed design w/ 'L' shaped brace plate

    4. Timber Guard Rail w/ timber posts, quadruple bolted, taller, heavier lumber, steel backing (recently installed 2001)

* *Research NPS Archives to see if there were any other types of guardrails, detail drawings, dates for other known types listed above*

- Issues: how to determine where to add new guardrails? Procedure for upgrades?

- Criteria for locating new guardrails:
    - Outside curves, especially w/ steep drop-offs

- NOT necessary if:
    - In straight-aways
    - Road is well banked (super elevated) in curves
    - Shoulder is bermed and vegetated
    - Drop-offs are heavily wooded – trees will act as a buffer

- Replacement of Guide Rails is a high priority – too low, have sunken

- Proposed taper flared extensions to ex. Guardrails to improve safety

- Proposed connections to link ex. Guardrails to tunnels & stone wall segments – need better detailing

APPENDIX B

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)

Guardrail Inventory

Description	Milepost	Side	Existing Length	Add to Beginning	Add to End	Proposed Length	Modified Rail	Comments
Section 2-A Virginia/North Carolina State Line								
Fox Hunters Paradise PO	218.60	LT	450	20 roll down	0	320		Old rail, Concrete posts **REMOVE 132 ft. from gate along access road**
Big Pine Creek Bridge #3	223.78	RT	200	30 roll down	30 roll down	260	90	Old rail, Concrete posts, Edge of deck slab needs repair
Big Pine Creek Bridge #3	223.78	LT	150	30 roll down	60 cut	240	110	Old rail, Concrete posts, Edge of deck slab needs repair
Big Pine Creek Bridge #6	224.70	RT	164	40 roll down	40 cut	250	120	Old rail, Concrete posts, Edge of deck slab needs repair
Big Pine Creek Bridge #6	224.70	LT	144	40 roll down	40 cut	240	120	Old rail, Concrete posts, Edge of deck slab needs repair
Brush Creek Bridge	227.45	RT	228	40 cut	30 roll down	300	140	Old rail, Concrete posts, Edge of deck slab needs repair
Brush Creek Bridge	227.45	LT	224	30 roll down	20 roll down	280	130	Old rail, Concrete posts, Edge of deck slab needs repair
Section 2-B								
Little Glade Creek Bridge	231.80	RT	68	30 roll down	30 roll down	130	50	Old rail, Concrete posts
Little Glade Creek Bridge	231.80	LT	68	30 roll down	30 roll down	130	50	Old rail, Concrete posts
Section 2-C								
Air Bellows Gap	237.20	RT	342	0 roll down	30 cut	380		Old rail, Concrete posts
Air Bellows Gap	237.20	LT	292	10 roll down	20 roll down	330		Old rail, Concrete posts
	237.50	RT	498	50 roll down	40 roll down	0		Old SB, beginning 1 and last 1 rail not SB **REMOVE**
Section 2-D								
	252.20	RT	540	40 roll down	0 cut	40		SB, beginning 2 and last 1 rail not SB
	252.60	LT	750	0 roll down	0 roll down	0		New SB Guardrail **(Project 2D14)**
	253.30	RT	876	50 roll down	0 cut	50		SB, beginning 2 rails not SB
	260.60	RT	430	40 cut	40 roll down	80		SB, beginning 2 and last 2 rail not SB

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
Section 2-E								
	262.60	LT	536	0 cut	0 cut	0		SB, good shape
	262.80	LT	698	0 cut	0 cut	0		SB, good shape, Some realignment needed, **Raise 2 posts**
	263.80	LT	568	40 roll down	0 cut	40		SB, beginning 2 rails not SB
	264.20	LT	1,174	20 cut	0 cut	1,200		Old rail, Wood posts
	274.85	RT	320	20 roll down	30 roll down	50		SB, beginning 2 and last 2 rail not SB
	275.35	RT	270	20 roll down	20 roll down	40		SB, beginning 2 and last 2 rail not SB
	277.20	LT	760	30 roll down	0 roll down	790		Old rail, Concrete posts
	277.35	LT	210	0 roll down	0 cut	210		Old rail, Concrete posts
	278.60	LT	434	0 roll down	0 cut	440		Old rail, Concrete posts
	278.70	LT	910	0 cut	30 roll down	940		Old rail, Concrete posts
Wild Cat Road	279.40	RT	160	30 cut	30 roll down	60		SB, beginning 2 and last 2 rail not SB
Wild Cat Road	279.40	LT	140	30 cut	30 roll down	60		SB, beginning 2 and last 2 rail not SB
Private Drive	279.55	RT	160	50 cut	40 roll down	90		SB, beginning 2 and last 2 rail not SB
Private Drive	279.55	LT	190	50 cut	50 roll down	100		SB, beginning 2 and last 2 rail not SB
Laxon Road	280.25	RT	150	40 roll down	40 roll down	80		SB, beginning 2 and last 2 rail not SB, **Realign 3 posts**
Laxon Road	280.25	LT	150	50 roll down	40 roll down	90		SB, beginning 2 and last 2 rail not SB, **Realign 3 posts**
Between Pkwy & 441/221	281.50	RT	5,480	0 roll down	0 roll down	1,600		2,550' Old rail wood posts, 2,746' SB; **Leave 1,056 ft. of existing on N. end, Remove and replace 1,600 ft. (double rail), and leave 2,640 ft. on S. end.**
Triplet Road	282.02	RT	160	50 roll down	50 roll down	100		SB, beginning 2 and last 2 rail not SB, Rails are low but tie into bridge parapet
Triplet Road	282.02	LT	160	50 roll down	50 roll down	100		SB, beginning 2 and last 2 rail not SB, Rails are low but tie into bridge parapet

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
SR 1509	283.01	RT	120	40 roll down	40 roll down	80		SB, beginning 2 and last 2 rail not SB
SR 1509	283.01	LT	120	50 roll down	50 roll down	100		SB, beginning 2 and last 2 rail not SB
	284.50	LT	310	20 cut	30 roll down	360		Old rail, Concrete posts
Blackberry Road	288.80	RT	120	40 roll down	50 roll down	90		SB, beginning 2 and last 2 rail not SB, **Needs some realignment**
Blackberry Road	288.80	LT	120	40 roll down	50 roll down	90		SB, beginning 2 and last 2 rail not SB
Section 2-G								
321 S. Ramp	291.95	RT	250 ??	0 roll down	0 roll down	0		New SB Guardrail **(Project 2G11)**
321 S. Ramp	291.95	LT	130 ??	0 roll down	0 'W' beam	0		New SB Guardrail **(Project 2G11)**
	292.00	LT	570	0 'W' beam	0 roll down	0		New SB Guardrail **(Project 2G11)**
Flat Top Road	292.00	RT	140	0	0	0		New SB Guardrail **(Project 2G11)**
Flat Top Road	292.00	LT	150	0	0	0		New SB Guardrail **(Project 2G11)**
Moses Cone Carriage Rd	294.00	RT	160	0 roll down	0 roll down	0		New SB Guardrail **(Project 2G11)**
Moses Cone Carriage Rd	294.00	LT	150	0 roll down	0 roll down	0		New SB Guardrail **(Project 2G11)**
Section 2-H								
	301.30	LT	550	0 cut	0 cut	0		SB, Good Condition
	301.45	LT	510	0 cut	50 roll down	50		SB, beginning 2 and last 2 rail not SB, **Realign 40 ft. on S. end**
S. End-Linn Cove Viaduct	303.90	LT	768	20	0	20		SB, beginning 2 rails not SB, **Raise 2 posts, Realign 2 posts**
N. End Stack Rock PO	304.85	LT	551	30 roll down	0 cut	30		SB, beginning 2 rails not SB, **Flare beginning 30 ft. into Stack Rock PO**
	304.90	LT	310	0 cut	0 cut	0		SB, **Lower 6th post from N. end**
Section 2-J								
N. end U.S. 221 bridge	305.25	LT	130	10 cut	0 wall	140		Old rail, Wood posts
S. end U.S. 221 bridge	305.25	LT	420	0 wall	10 cut	430		Old rail, Wood posts

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
N. end U.S. 221 bridge	305.30	RT	100	20 roll down	0 wall	120		Old rail, Wood posts
S. end U.S. 221 bridge	305.30	RT	1,050	0 wall	10 roll down	1,060		Old rail, Wood posts
S. of Grandfather Mtn. PO	306.65	RT	542	30 roll down	10 cut	40		SB, beginning 2 rails not SB, **Realign 31 posts**
	306.85	RT	563	80 cut	30 cut	110		SB, beginning 2 and last 2 rail not SB **Realign 21 posts**
	310.45	LT	550	30 roll down	30 cut	610		Old rail, Concrete posts
	316.00	RT	400	60 cut	50 cut	510		Old rail, Concrete posts
Section 2-K								
	319.10	LT	733	30 cut	0 cut	30		SB beginning 2 rails not SB, **Realign 21 posts**
	219.25	LT	478	0 roll down	0 cut	0		SB, **Realign 21 post**
	319.35	LT	441	0 cut	0 cut	0		SB
	319.40	LT	253	40 cut	0 cut	40		SB, beginning 2 rails not SB
	319.55	LT	553	20 cut	30 cut	610		Old SB, end rail not SB, **Replace old SB**
	319.75	LT	520	0 cut	0 cut	520		Old SB, beginning 1 and last 1 rail not SB, **Replace old SB**
	320.00	LT	573	0 rock	0 cut	0		SB, **Realign 22 posts**
	320.15	RT	693	30 roll down	30 cut	60		SB, beginning 2 rails not SB, **Slide area needs repaired, Raise 10 posts, Realign 20 Posts**
	322.10	LT	742	30 cut	20 tree	50		SB, beginning 2 and last 2 rail not SB, **Raise 1 post, Realign 16 posts**
	322.90	LT	482	20 cut	0 wall	510		Old rail, Wood posts
	325.65	LT	522	0 roll down	0 roll down	0		New SB, **Realign 6 posts**
Section 2-L								
Begin Project 2L11, M21	327.45							**FUTURE PROJECT**
Altapass Road	327.45	RT	60	60 roll down	40 roll down	160		Old rail, Concrete posts

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
Altapass Road	327.45	LT	71	30 roll down	30 roll down	130		Old rail, Concrete posts
	329.60	LT	600	0 cut	0 cut	600		Old rail, Concrete posts
Lynn Gap	332.50	RT	81	40 roll down	20 roll down	140		Old rail, Concrete posts
Lynn Gap	332.50	LT	71	30 tree	30 roll down	130		Old rail, Concrete posts
	334.90	RT	342	40 cut	20 cut	410		Old rail, Concrete posts
Bearwallow Gap	335.40	RT	81	20 roll down	20 roll down	120		Old rail, Concrete posts
Bearwallow Gap	335.40	LT	70	20 roll down	60 roll down	150		Old rail, Concrete posts
Section 2-M								
Gooch Gap	336.30	RT	81	20 roll down	30 roll down	130		Old rail, Concrete posts
Gooch Gap	336.30	LT	71	20 roll down	20 roll down	110		Old rail, Concrete posts
End of Project 2L11, M21	336.30							**FUTURE PROJECT**
	346.90	LT	141	20 roll down	20 roll down	180		Old rail, Concrete posts
	347.10	LT	102	110 roll down	80 roll down	290		Old SB, **Slide area needs repair, Rail too low, Replace**
	347.20	LT	496	10 cut	20 roll down	530		Old rail, Concrete posts, **Slide area needs repair**
Section 2-N								
S. end Rough Rdg. Tunnel	349.10	LT	422	0 cut	30 roll down	460		Old rail, Concrete posts
	349.40	LT	863	10 roll down	30 cut	910		Old rail, Wood posts
	349.50	LT	121	10 cut	20 cut	150		Old rail, Wood posts
	349.65	LT	1,120	30 cut	10 roll down	1,160		Old rail, Wood posts
	349.95	LT	231	20 cut	20 roll down	0		Old rail, Wood posts, **REMOVE**
	350.00	RT	290	10 cut	10 roll down	310		Old rail, Wood posts
	350.05	LT	381	10 cut	20 roll down	0		Old rail, Wood posts, **REMOVE**

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
	350.29	LT	171	20 cut	0 roll down	190		Old rail, Wood posts
	350.40	LT	381	0 roll down	10 cut	390		Old rail, Wood posts
	350.50	LT	410	10 cut	10 roll down	430		Old rail, Wood posts
	350.60	LT	310	10 cut	30 roll down	350		Old rail, Wood posts
	351.30	LT	682	10 cut	10 cut	710		Old rail, Wood posts
	351.50	LT	701	10 cut	30 cut	740		Old rail, Wood posts
	351.70	LT	1,800.00	0 cut	0 cut	0		New SB Guardrail **(Project 2M19, N13)**
	355.05	RT	451	20 roll down	20 roll down	490		Old rail, Wood posts
	355.15	RT	442	20 roll down	50 roll down	0		Old rail, Wood post, **REMOVE**
	355.50	LT	1,091	0 roll down	20 roll down	0		Old rail, Wood post, **REMOVE**
	355.90	LT	805	10 cut	20 cut	840		Old rail, Wood posts
	356.20	LT	663	40 cut	20 cut	730		Old rail, Wood posts
	356.30	LT	220	0 cut	20 cut	240		Old rail, Wood posts, **Remove metal plate 'Gone to Harley Heaven"**
	356.50	LT	923	10 cut	10 roll down	950		Old rail, Wood posts
	356.70	LT	924	20 cut	10 cut	960		Old rail, Wood posts
	356.85	LT	300	0 roll down	0 wall	300		Old rail, Wood posts
	357.00	LT	421	0 wall	10 cut	430		Old rail, Wood posts
	357.20	LT	1,037	10 roll down	30 roll down	1,080		Old rail, Wood posts
	357.80	LT	955	20 roll down	10 roll down	990		Old rail, Wood posts
	358.10	LT	903	20 roll down	10 cut	940		Old rail, Wood posts
	358.25	LT	151	20 cut	20 cut	190		Old rail, Wood posts
	358.30	LT	181	10 cut	10 cut	200		Old rail, Wood posts

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
	358.35	LT	1,224	20 cut	30 roll down	1,280		Old rail, Wood posts
Section 2-P								
S. of Balsam Gap PO	359.80	RT	382	0 roll down	30 cut	420		Old rail, Wood posts
	359.95	RT	391	20 cut	20 cut	430		Old rail, Wood posts
	360.05	RT	431	20 cut	20 roll down	470		Old rail, Wood posts
	360.15	RT	402	20 roll down	0 roll down	430		Old rail, Wood posts
	360.65	RT	352	10 roll down	10 roll down	380		Old rail, Wood posts
	360.72	RT	381	10 cut	20 roll down	410		Old rail, Wood posts
Glassmine Falls PO	361.20	RT	280	10 cut	20 cut	310		Old rail, Wood posts
	361.30	RT	922	10 cut	0 roll down	0		Old rail, Wood posts **REMOVE**
	361.35	LT	311	20 roll down	20 roll down	350		Old rail, Wood posts
	361.50	RT	982	0 roll down	50 cut	560		Old rail, Wood posts, **Remove 480 ft. from N. end and tie into cut**
	361.70	RT	643	20 cut	20 cut	690		Old rail, Wood posts
	361.90	RT	613	10 roll down	20 cut	650		Old rail, Wood posts
	362.20	RT	1,070	60 roll down	60 roll down	0		Old rail, Wood posts, **REMOVE**
	262.40	RT	1,010	60 cut	30 cut	1,100		Old rail, Wood posts
	362.70	RT	1,240	20 roll down	10 cut	570		Old rail, Wood posts, **Remove 700 ft. on N. end**
	362.90	RT	530	70 cut	40 roll down	0		Old rail, Wood posts, **REMOVE**
	363.20	RT	610	30 cut	50 roll down	690		Old rail, Wood posts
Graybeard Mtn. PO	363.40	RT	1,170	60 cut	0 roll down	0		Old rail, Wood posts, **REMOVE**
	363.60	RT	410	60 roll down	50 roll down	0		Old rail, Wood posts, **REMOVE**
	364.10	LT	380	30 rock	50 roll down	460		Old rail, Wood posts

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
	364.30	LT	510	40 roll down	50 roll down	600		Old rail, Wood posts
S. End Craggy Pinnacle Tunnel	364.45	LT	350	0 tunnel	0 roll down	0		New SB
	364.50	LT	250	10 cut	0 roll down	260		Old rail, Wood posts
	364.60	LT	630	30 roll down	0 Cut	660		Old rail, Wood posts
	364.85	LT	410	40 cut	20 cut	470		Old rail, Wood posts
	365.00	LT	1,900	20 cut	40 cut	1,960		Old rail, Wood posts
	365.40	LT	790	0 wall	70 roll down	860		Old rail, Wood posts
S End Craggy Flats Tunnel	365.80	LT	1,700	0 roll down	0 cut	0		New SB
	368.60	LT	1,230	0 wall	60 roll down	1,290		Old rail, Wood posts
	368.90	LT	400	40 roll down	20 cut	460		Old rail, Wood posts
	369.20	LT	580	40 cut	40 roll down	660		Old rail, Wood posts
	369.60	LT	1,760	50 cut	20 cut	1,830		Old rail, Wood posts
	369.80	LT	590	10 cut	10 roll down	610		Old rail, Wood posts
	370.30	RT	170	30 cut	50 cut	250		Old rail, Wood posts
	370.30	LT	340	20 cut	40 cut	400		Old rail, Wood posts
	371.9 ??	LT	310	60 cut	50 roll down	420		Old rail, Wood posts
	372.10	LT	1,160	70 cut	40 roll down	1,270		Old rail, Wood posts
	373.90	LT	380	20 roll down	30 roll down	430		Old rail, Wood posts
	374.10	LT	360	40 roll down	20 cut	420		Old rail, Wood posts
	374.80	LT	760	30 cut	30 roll down	820		Old rail, Wood posts
	374.90	LT	370	40 cut	30 roll down	440		Old rail, Wood posts

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)

Guardrail Inventory

Description	Milepost	Side	Existing Length	Add to Beginning	Add to End	Proposed Length	Modified Rail	Comments
Section 2-Q								
Beginning of Project 2Q12	375.10					0		New SB Guardrail **UNDER CONTRACT**
End of Project 2Q12	383.50					0		New SB Guardrail **UNDER CONTRACT**
Section 2-R								
Begin Project 2R16	383.50					0		New SB Guardrail **PROJECTS COMPLETE**
U.S. 25	388.90	RT	150	90 roll down	0 roll down	240		Old SB
U.S. 25	388.90	LT	150	60 roll down	0 roll down	210		Old SB
Dingle Creek Bridge	390.80	RT	470	0 cut	0 Cut	0		New SB Guardrail **(Project 2R16)**
Dingle Creek Bridge	390.80	LT	320	0 roll down	0 Cut	0		New SB Guardrail **(Project 2R16)**
I-26 Bridge	391.70	LT	170	0 Bridge	50 cut	220		Old SB
Halfway Road, Private	392.70	RT	190	0 roll down	0 roll down	0		New SB Guardrail **(Project 2R16)**
End Project 2R16	393.50					0		New SB Guardrail **PROJECTS COMPLETE**
Section 2-S								
	394.60	LT	160	180 roll down	40 roll down	220		SB beginning 2 and last 2 rail not SB
	395.20	LT	600	160 roll down	40 cut	200		SB beginning 2 and last 2 rail not SB
	395.40	LT	300	50 cut	60 roll down	110		SB beginning 2 and last 2 rail not SB
	395.60	LT	550	40 roll down	40 roll down	80		SB beginning 2 and last 2 rail not SB
	395.70	LT	470	40 roll down	40 roll down	80		SB beginning 2 and last 2 rail not SB
	397.80	LT	490	0 cut	0 Cut	0		SB beginning 2 and last 2 rail not SB
	400.30	RT	250	40 roll down	40 cut	80		SB beginning 2 and last 2 rail not SB
	400.30	LT	260	40 cut	0 cut	40		SB beginning 2 and last 2 rail not SB

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
Section 2-T								
	402.30	LT	330	60 roll down	0 Cut	60		SB beginning 2 and last 2 rail not SB
Section 2-U								
	409.10	LT	500	40 roll down	40 roll down	80		SB beginning 2 and last 2 rail not SB
Wagon Road Gap	411.90	RT	250	40 roll down	40 cut	330		Old rail, Concrete posts
Wagon Road Gap	411.90	LT	200	40 roll down	0 wall	240		Old rail, Concrete posts
	412.00	RT	410	40 cut	30 cut	480		Old rail, Concrete posts
	412.60	LT	320	10 cut	150 wall	0		Old rail, Concrete posts **REMOVE**
	412.80	LT	360	120 cut	50 cut	0		Old rail, Concrete posts **REMOVE**
	413.20	LT	120	200 roll down	20 cut	340		Old rail, Concrete posts
	413.70	LT	210	160 roll down	40 ??	410		Old rail, Concrete posts
	414.10	LT	350	40 roll down	60 roll down	450		Old rail, Concrete posts
	414.30	LT	230	40 roll down	320 roll down	590		Old rail, Concrete posts
	414.90	RT	360	40 cut	40 roll down	440		Old rail, Concrete posts
	415.80	LT	210	40 roll down	40 cut	290		Old rail, Concrete posts
	417.50	LT	650	40 roll down	60 cut	750		Old rail, Concrete posts
	417.70	LT	410	40 cut	40 roll down	490		Old rail, Concrete posts
	417.90	RT	470	50 cut	50 cut??	570		Old rail, Concrete posts
Section 2-V								
	418.60	RT	900	30 cut	60 ??	990		Old rail, Concrete posts
	420.40	LT	260	40 roll down	40 roll down	340		Old rail, Concrete posts
	420.60	LT	370	40 roll down	20 roll down	470		Old rail, Concrete posts
	421.30	LT	270	50 roll down	40 cut	360		Old rail, Concrete posts

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
	422.00	LT	190	40 roll down	0 wall	230		Old rail, Concrete posts
Begin Project 2V13,W8	423.10							**FUTURE PROJECT**
Section 2-W								
	424.80	LT	410	40 roll down	40 roll down	0		Old rail, Concrete posts
	425.00	LT	570	40 roll down	50 cut	0		Old rail, Concrete posts
	425.20	LT	80	40 roll down	60 roll down	0		Old rail, Concrete posts
	426.40	LT	380	40 cut	60 roll down	0		Old rail, Concrete posts
	426.60	RT	420	40 roll down	60 cut	0		Old rail, Concrete posts
	427.70	LT	150	40 roll down	40 roll down	0		Old rail, Concrete posts
	428.30	LT	200	40 roll down	0 roll down	0		Old rail, Concrete posts
	429.90	RT	280	50 roll down	40 cut	0		Old rail, Concrete posts
	430.10	RT	280	50 roll down	40 roll down	0		Old rail, Concrete posts
	430.70	LT	370	40 roll down	40 roll down	0		Old rail, Concrete posts
	433.70	LT	290	50 cut	60 roll down	0		Old rail, Concrete posts
	434.90	LT	530	40 roll down	70 cut	0		Old rail, Concrete posts
End of Project 2V13,W8	435.00					0		**FUTURE PROJECT**
Begin Project 2W7, X8	435.00							New SB Guardrail **PROJECT COMPLETE**
Balsam Gap	435.10	LT	630	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	435.50	LT	270	0 roll down	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	437.30	RT	490	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	437.60	RT	370	0 cut	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	438.80	RT	390	0 cut	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	439.00	RT	360	0 roll down	0 cut	0		New SB Guardrail **(Project 2W7, X8)**

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
	439.80	RT	400	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	441.00	RT	170	0 cut	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	441.25	RT	240	0 rock	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	441.30	RT	160	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	441.30	LT	290	0 cut	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	442.00	RT	620	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	442.00	LT	170	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
Section 2-X								
Hood Road	444.50	RT	140	0 cut	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
Hood Road	444.50	LT	120	0 cut	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	445.05	LT	230	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	445.90	LT	830	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	446.50	LT	210	0 roll down	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	446.60	LT	380	0 cut	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	447.00	LT	250	0 roll down	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	447.60	LT	390	0 roll down	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	448.00	LT	400	0 cut	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	448.60	LT	460	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	448.80	LT	250	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	449.10	LT	560	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	450.40	LT	350	0 roll down	0 roll down	0		New SB Guardrail **(Project 2W7, X8)**
	451.00	LT	410	0 roll down	0 cut	0		New SB Guardrail **(Project 2W7, X8)**
	451.20	LT	450	0 roll down	0 cut	0		New SB Guardrail **(Project 2W7, X8)**

Blue Ridge Parkway - Replace Deficient Guardrail (North Carolina)								
Guardrail Inventory								
Description	**Milepost**	**Side**	**Existing Length**	**Add to Beginning**	**Add to End**	**Proposed Length**	**Modified Rail**	**Comments**
End of Project 2W7, X8	455.70							New SB Guardrail **PROJECT COMPLETE**
Section 2-Y								
Big Witch Gap	461.60	RT	0	0	0	200		**INSTALL NEW GUARDRAIL**
Big Witch Gap	461.60	LT	0	0	0	200		**INSTALL NEW GUARDRAIL**
South End of Parkway								
TOTAL						65,000	810	

Completed FHLP Projects

Future FHLP Projects

APPENDIX C

RECOMMENDED *REMOVALS* OF NEW GUARDRAIL INSTALLATIONS *May 2003*

SHEET #	MILE POST	TOTAL LF	REASON
2N-13	355+	450	Dense vegetation
2N-14	355+	1050	Guardrail Inventory recommendations
2N-16	-357	800	Good tree cover
2N-17	357+	300	Good vegetation, inside curve
2P-1	-360	450	Heavy vegetation
2P-3	361+	700	Heavy vegetation, Guardrail Inventory removal recommendation
2P-3	-361	420	Guardrail Inventory removal recommendation
2P-5	-363	700	Guardrail Inventory removal recommendation
2P-5	-363	650	Guardrail Inventory removal recommendation
2P-6	363+	1150	Guardrail Inventory removal recommendation
2P-7	-364	380	Guardrail Inventory removal recommendation
2P-8	364+	670	Straightaway, dense vegetation
2P-17	-370	350	Straightaway
2P-18	370+	250	Not necessary
2P-19	371	N.A.	Lane Pinnacle Overlook, wraps around overlook
2P-20	-372	190	Straightaway
2P-26	375+	1070	Encloses grass bays, good vegetation area, does not warrant guardrail
2Q-1	-376	1100	Straightaway
2Q-2	376+	450	Inside curve
2Q-3	377+	340	Straightaway
2Q-4	377+	420	Straightaway
2Q-5	378+	750	Encloses grass bay
2Q-7	-380	1000	Straightaway with trees, only a slight drop off
2Q-8	380+	820	Blocking grass bay, whole guardrail is too long, road is fairly straight with trees on both sides
2R-2	384+	470	NPS Headquarters - guardrails used as gateway features
2R-12	-390	800	Should go back to original length unless accident statistics warrant an extension
2U	-418	260	Straightaway - seems excessive
2Y-10	461+	430	Big Witch Gap - no need