Historic Roads

Prepared by Timothy Davis, Lead Historian, National Park Service, Park Historic Structures and Cultural Landscapes Program

INTRODUCTION

Roads have long played a prominent role in shaping the national park experience. In addition to providing access to natural and cultural resources, park roads are often compelling cultural landscapes in their own rights. Their sensitive layout, impressive views, rustic guardrails and picturesque bridges make them highly attractive, especially when contrasted to most ordinary roads and highways. In many cases, the distinctive characteristics of historic park roads serve as defining elements of the National Park System, creating a sense of continuity from park to park and providing cherished memories of leisurely excursions through America's most beloved landscapes. The appeal of park roads is not limited to the classic "natural" parks and parkways. Roads play important roles in national military parks, as well, and contribute to the cultural landscapes of many historical parks. Even in newer parks, where the influence of traditional landscape aesthetics may not be as readily apparent, roadways exemplify changing patterns of park design and resource management.

The consistently compelling character of America's historic national park roads and parkways is by no means accidental; nor is its survival guaranteed. Historic park roads such as Glacier's Going-to-the-Sun Road, Yellowstone's Grand Loop, and Sequoia's Generals Highway reflect the collective efforts of generations of engineers, landscape architects, and park administrators. Similar skills and collaborations helped create the solemn avenues and winding tour roads of National Military Parks and the exquisitely designed carriage road systems absorbed into the National Park System in places like Acadia National Park, Marsh-Billings-Rockefeller National Historical Park, and Washington, D.C.'s Rock Creek Park. While there is growing appreciation for their significance, many historic

park roads are endangered by factors ranging from natural disasters and age-related deterioration to growing traffic burdens, evolving technological demands, and increasingly complex legal and financial concerns. Not only are historic roads among the most significant categories of cultural landscapes to be found within the National Park System, but developing policies for their evaluation and management is one of the most pressing stewardship challenges facing park administrators today.

Landscape Line 16: Historic Park Roads provides guidance to assist in the identification, inventory, evaluation, and treatment of historic park road resources. Its primary purpose is to serve as a guide for the preparation of Cultural Landscape Reports (CLRs). The underlying aim is to promote an approach to park road stewardship that combines rigorous research and thorough understanding of legal and technical issues, with sensitivity toward preservation concerns, aesthetic considerations, environmental issues, and other management challenges. Readers will find a brief account of park road history, an overview of park road terminology, a guide to research, documentation and evaluation methods, a summary of pertinent policies and guidelines, and a brief survey of potential treatment considerations. This document is meant to be used in concert with *A Guide to Cultural Landscape Reports: Contents, Procedures, and Techniques* and other publications in the *Landscape Lines* series. A bibliography is provided to direct researchers to supplemental material.

This *Landscape Line* focuses on the major tour roads that comprise the primary public arteries of the National Park System. While some of these tour ways incorporated pre-existing roads or road segments, most were newly developed by the National Park Service for explicitly recreational purposes and tend to have similar distinguishing characteristics. There are many other road types within the National Park Service's jurisdiction. These range from utilitarian maintenance roads and administrative networks to historic routes and traces that predate park development and contribute in various ways to many parks' character and significance. The former rarely require extensive analysis from a cultural resource standpoint, while the latter frequently involve complex and highly site-specific considerations that are beyond the scope of this publication. Many parks are also traversed by public highways administered by local, state, or federal authorities through cooperative agreements with the National Park Service, which have unique management requirements of their own. While this *Landscape Line* focuses on National Park Service-designed and maintained tour roads, many of the research strategies and treatments described herein may provide guidance for the management of related resources in other jurisdictions.

A Brief History Of National Park Roads

The first park roads were primitive wagon routes constructed by private entrepreneurs and the U.S. Army Corps of Engineers in the late nineteenth and early twentieth centuries. Tight budgets and the challenges of operating in remote and often hazardous terrain produced a pragmatic focus on providing basic access to key park features. Construction crews worked with hand tools and horse-drawn machinery to replace crude pack trails with rudimentary wagon roads. Road-builders generally followed the dictates of the existing terrain, occasionally using black powder to remove stubborn obstacles. Narrow stage roads clung to steep mountainsides, gaining or losing elevation with

Figure 1. Big Oak Flat Road, Yosemite National Park, 1903. (National Park Service Historic Photograph Collection [NPSHPC])

Figure 2. Tourists on Fall River Road, Rocky Mountain National Park, ca. 1924. (Rocky Mountain National Park).

switchbacks and dangerous hairpin turns. Horse-drawn stages raised clouds of dusts as they pounded along simple dirt and gravel surfaces.

Despite these constraints, the engineers and toll road operators established the foundations of today's park road systems, grading roadways, erecting bridges, constructing masonry retaining walls and safety barriers, and endeavoring to showcase park scenery without compromising it in the process. Notable road-building feats of the period include Yellowstone's Grand Loop (1883-1905), Mount Rainier's Nisqually Road (begun as a pack trail in the 1880s and improved and expanded by the Army Corps of Engineers 1903-1910), Rim Drive at Crater Lake (1913-1919), and the access roads to Yosemite Valley, which were initially constructed by private turnpike companies in the late-nineteenth and early twentieth centuries.

Many of these original roads have been altered substantially, both in location and in terms of width, grade, and associated features. The same is true of early engineering structures. Mount Rainier's timber trestles and Yellowstone's Golden Gate Viaduct (1884/1900) and "Chittenden Bridge" (1903) impressed early park visitors, but they have been replaced by more substantial structures designed to accommodate the demands of modern automobile traffic. Yosemite retains a few examples of early park bridge building, from simple concrete spans to the classic covered bridge at Wawona. U.S. Army Corp of Engineer-era bridges in Yellowstone include the elegant open-spandrel Canyon Bridge (1915) and a few smaller spans that have been bypassed or relocated.

The popularization of the automobile in the early years of the twentieth century created a new era in park road development. Automobiles were initially banned from national parks, but these prohibitions were soon relaxed as park managers joined automobile clubs and hospitality interests in promoting auto tourism as an ideal means of expanding support for the nascent national park system. Mount Rainier legalized automobiles in 1907. Crater Lake, Glacier, Yosemite and Sequoia followed between 1911 and 1913. Yellowstone was the last to accept cars, admitting motorists in 1915.

The motorization of park transportation had many advantages. Automobiles were faster and more comfortable than stagecoaches, greatly reducing the time and expense of park travel. This made the national park experience accessible to a larger and more democratic public, especially when visitors took advantage of newly developed free auto camps. Park visitation rose rapidly in the late-1910s and increased at an even greater rate throughout the 1920s. Replacing stagecoaches with motorized buses and private automobiles meant that visitors could cover more ground in a day, so the number of hotels and way stations was reduced in large parks like Yellowstone.

Park managers quickly recognized that adapting park circulation systems to accommodate the influx of motorists would be a difficult, expensive, and time-consuming process. They also realized that the way they addressed this challenge would have enormous impacts on the future of the National Park System. While it was essential to improve the safety and convenience of out-dated stage roads, it was understood that road development should be kept to the absolute minimum needed to provide access to key park features.

Congress was slow to commit significant funding, but NPS Director Stephen Mather secured a $7.5 million road-building appropriation in 1924, which led to a series of additional budget increases. New Deal programs such as the Public Works Administration and

the Civilian Conservation Corps channeled millions into park road development during the 1930s. In addition to upgrading existing roadways, new roads had to be developed in the many parks that were being added to the system. Because of the tremendous amount of high quality work accomplished during the 1920s-1930s, this period has been widely regarded as the "Golden Age" of national park road building. The character of the current national park road system was largely established during this era.

The preferred policy was to upgrade existing roads rather than construct new routes through undeveloped terrain. Narrow one-way roads were widened, dangerous sharp turns were eliminated, and grades were made more gentle and consistent. Pavements had to be improved, as dirt and gravel surfaces deteriorated rapidly under the stress of automobile traffic. Safety barriers also became more important, since vehicles were moving at significantly higher speeds. A variety of new facilities were developed to accommodate the needs of motorists. These included gas stations, garages, parking lots, scenic turnouts, expanded lodging and dining facilities, and enhanced entrance stations and sign systems. Great care was taken to ensure that these upgrades were constructed as sensitively as possible and that new roads and related developments harmonized with their natural and cultural surroundings.

This task was overseen by NPS landscape architects working in close collaboration with engineers from the U.S. Bureau of Public Roads (BPR). The interbureau agreement between the NPS and the BPR played a fundamental role in guaranteeing the aesthetic quality and technical excellence of park roads. Under this arrangement, which began in the early 1920s and was formalized in 1926, the NPS outlined the general location and aesthetic goals of each project. BPR engineers then conducted surveys and developed detailed plans for NPS approval. The BPR supervised day-to-day construction while NPS personnel monitored projects for conformance with guidelines developed to ensure that park roads exhibited high standards of design and execution. This arrangement, which still governs the relationship between the NPS and the BPR's successor agency, the Federal Highway Administration (FHWA), was hailed by both parties as an exemplary model of interagency collaboration.

Figure 3. Going to the Sun Road, Glacier National Park, 1932. (Glacier National Park)

The BPR's engineering expertise enabled the NPS to undertake a more ambitious construction program than it could have accomplished on its own. The NPS, in turn, encouraged the BPR to pay greater attention to the aesthetic aspects of road construction. While the NPS established the general parameters of the projects and prepared most of the architectural treatments for bridges, guard walls, and related structures, BPR engineers ensured that proposals were technically feasible and made many attractive and innovative design recommendations of their own. The spectacular cliff-side location of Glacier's Going-to-the-Sun Road was developed by BPR engineers after NPS designers proposed a technically simpler but more visually disruptive route. It was this bold yet sensitive solution that cemented the NPS-BPR collaboration and set the tone for subsequent park road-building efforts.

The NPS-BPR partnership produced a distinctive cultural landscape that has become a defining characteristic not just of national park roads, but of the National Park System in general. NPS landscape architects and BPR engineers drew on nineteenth-century carriage road design techniques, while updating these practices to accommodate the demands of automobile traffic and the technical challenges of national park environments.

Figure 4. Generals Highway, Sequoia National Park, ca. 1936. (vintage postcard: Davis)

Park roads were configured to showcase park landscapes in the most attractive and engaging manner. Where roadside vegetation obstructed appealing views, trees were cut to create carefully framed vistas. Variety of scenery was sought to maintain the motorist's interest. In forested areas, the distance between the edge of the road and the treeline was manipulated to achieve a variety of effects, from a narrow wooded aisle to a broad green corridor, or an alternating series of smaller and larger "rooms" carved out of the surrounding woodlands. Trees, shrubs, and unique rock formations were allowed to remain much closer to the pavement than on conventional roadways, bringing motorists into intimate contact with their surroundings.

Hazardous curves were eliminated to accommodate automobile traffic, but prolonged straight-aways were avoided as much as possible. Sinuous curves were considered more attractive and curvilinear alignments allowed road builders to follow the contours of the land more closely, reducing the need for expensive, environmentally destructive, and visually unappealing excavations. Road widths were narrower than contemporary highways, rarely exceeding twenty-two feet, with limited use of shoulders. Curbs were only constructed on the most highly developed roadways and heavily used visitor service areas.

The NPS realized that it could not afford to provide all park roads with modern reinforced concrete or bituminous "asphalt" paving during this initial improvement campaign, but tried to stabilize as much of its road network as possible with various oil-treated gravel or macadam surfaces. Local rock was often used for the crushed-stone component of park road pavements. Not only did this save on material and hauling expenses, but it helped the roads blend in with their surroundings.

Where excavations were unavoidable, park road builders tried to minimize disruptions and rehabilitate areas disturbed during the construction process. Instead of leaving steep, raw cuts along newly graded roadways, roadside embankments were sloped back gradually and rounded to resemble natural contours. Sodding and planting programs helped stabilize disturbed roadsides and naturalize their appearance.

Visitor safety concerns led the Park Service to develop an array of attractive guard wall designs. Constructed of locally quarried hand-laid stone masonry in most cases, the walls had a pleasingly rugged appearance and mirrored the hues and texture of neighboring outcrops. Both flat-topped and crenellated walls were popular. Rugged log guardrails were used in many locations and a few hybrid designs of stone and timber were employed. The subtle variations among different styles may not be apparent to casual observers, but the sensation of driving along winding mountain roadways flanked by rugged stone or timber barriers became an integral component of the park experience. Traditional split rail fences became a similarly characteristic feature of parkways leading through southern agricultural landscapes. Agricultural fencing and more ornate ironwork barriers were also present in military parks, mostly predating NPS-development.

Figure 5. Roadside revegetation, Glacier National Park, 1933. (Glacier National Park)

Figure 6. Classic crenellated stone guardwall, West Side Highway, Mount Rainier National Park. (Historic American Engineering Record [HAER] 1993)

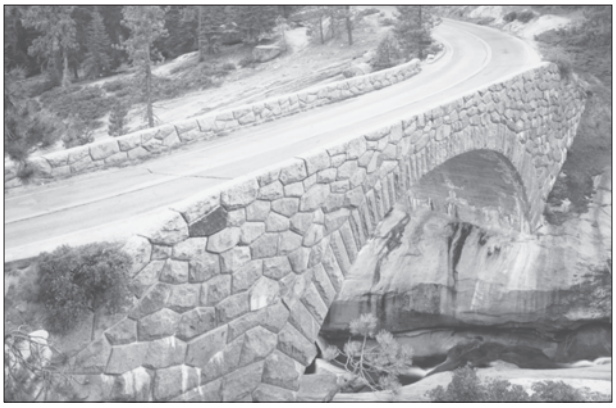

Figure 7. Clover Creek Bridge, Generals Highway, Sequoia National Park. (HAER 1993)

While the BPR ensured that park bridges employed the latest technological advances, the architectural designs and surface treatments reflected the NPS's naturalistic design philosophy. Many bridges were constructed of reinforced concrete and then faced with rustic stone veneers. Steel girders were often disguised behind heavy timbers. As with guard wall construction, NPS guidelines called for locally quarried stone and random masonry patterns. Culvert headwalls and retaining walls were also given rustic stone treatments where they were visible to the public.

Entrance stations were integral components of the roadway landscape and similarly embodied the rustic aesthetic. Architectural treatments varied considerably within the general rustic framework, however, as designers employed local materials and evoked regional building traditions. Southwestern parks often employed adobe or concrete designed to emulate adobe, while Appalachian parks and parkways mimicked mountaineer building practices. Variations on the Colonial Revival were also popular, especially in eastern historical parks.

Similar policies shaped the design of other visitor facilities, from comfort stations and concessions to water fountains and wayside exhibits. The iconic brown wooden signs familiar to generations of park visitors became standard features of the park landscape at this time.

The visual appeal, intimate scale, and rustic associations of roads constructed during this period profoundly shaped the way visitors experienced national parks. By encouraging motorists to slow down and enjoy their surroundings, moreover, park roads provided an important management function, exemplifying what contemporary transportation planners refer to as "traffic calming." A leaflet provided to park motorists underscored this philosophy, advising "Park roads are for leisurely driving only. If you are in a hurry, you might do well to take another route, and come back when you have more time."

A large number of important projects were completed during this period, producing some of the most spectacular scenic drives in the world and firmly establishing the distinctive character of America's

Figure 8. Rustic Entrance Station, Glacier National Park, ca. 1935. (Glacier National Park)

Figure 9. Rustic entrance sign, Crater Lake National Park, ca. 1935. (NPSHPC)

national park roads and parkways. Glacier's Going-to-the Sun Road was widely hailed for its spectacular views and technical difficulty when it opened in 1933. So were Rocky Mountain National Park's Trail Ridge Road (1932) and Sequoia's Generals Highway (1935). The major entrance roads to Yosemite were significantly rebuilt, with major relocations undertaken to accommodate automobile traffic. The union of engineering and aesthetics was epitomized in Yosemite's Wawona Tunnel (1933), which framed a stupendous view of the valley that motorist's could pull over to enjoy in more leisurely fashion from an observation platform constructed on fill excavated from the tunnel bore. Yellowstone did not receive any major new roads or dramatic relocations, but grades and curves were eased, bridges were upgraded, and oil treatments were applied to stabilize road surfaces. Mount Rainier's Nisqually Road was widened, paved, and straightened and several new routes were designed to provide access to previously remote sections of the park. Numerous other parks received vital improvements to their road systems during this period.

In addition to adding and improving roadways in the traditional western wonderlands, the NPS undertook a major effort to develop additional parks in the eastern United States. Recognizing that the vast majority of visitors would be traveling by automobile, the NPS outfitted these parks with motor roads from the start. Engineers and landscape architects combined the lessons learned in western park construction with new approaches to recreational motorway development pioneered by eastern parkway designers in places such as Westchester County, New York. The result was an impressive collection of scenic roadways located within a day's drive of America's major metropolises.

Shenandoah National Park's Skyline Drive (1934-39) exemplified the determination to bring the national park experience within reach of eastern motorists, along with the tendency for tour roads to become signature park features. Great Smoky Mountains National Park's most prominent scenic drive was the Newfound Gap Road. Numerous stone-faced bridges were required to span the park's streams but the most striking road-related structure remains the "Loopover" at Newfound Gap (1934), a stone-faced corkscrew bridge that replaced a series of dangerous and unsightly switchbacks. Acadia National Park augmented an existing system of picturesque carriage drives with an equally scenic series of motor roads designed by the NPS and BPR.

Parkways played an important role in the NPS's effort to reach a broader audience during the 1930s. After developing Colonial Parkway as a relatively short link between the historic sites of Jamestown, Yorktown, and Williamsburg, the NPS greatly expanded the concept with the Blue Ridge and Natchez Trace Parkways (authorized in 1936 and 1938, respectively), which eventually extended well over 400 miles apiece. These parkways showcased cultural landscapes and human history along with natural scenery. Split-rail fences, historic log cabins, and service facilities designed to mimic vernacular buildings celebrated regional culture and exposed urban motorists to America's agrarian heritage. The location, acquisition, design, and development of these two extraordinary linear parks was such an ambitious task that Blue Ridge Parkway was not completed until 1987 and the Natchez Trace is only now nearing completion.

Figure 10. Blue Ridge Parkway, ca. 1940. (vintage postcard: Davis)

Figure 11. Chickamauga Chattanooga National Military Park. (HAER 1997)

As part of a major reorganization of government bureaus in 1933, the NPS inherited several parkways and park road systems in the Washington, D.C. area, including Rock Creek Park, Rock Creek and Potomac Parkway, George Washington Memorial Parkway, and the drives along the National Mall and Potomac Park. The same government reorganization gave the NPS authority over most of the nation's military parks. These unique reservations, intended to preserve and commemorate significant battlefields such as Gettysburg, Shiloh, and Vicksburg, were previously administered by the War Department. Their roads had been developed by a variety of special commissions to showcase historic battlefields and associated commemorative elements. Bridges, road surfaces, and related features were generally constructed to very high standards due to the reverence accorded these symbolically important sites. The Park Service attempted to preserve the character of these reservations while upgrading their road systems to accommodate automobile traffic and increased visitation.

The impressive quality and extent of the roads completed during the Golden Age of park road development reflected both the design expertise of the NPS and BPR and the changing technologies of road building. The invention of dynamite and adoption of gasoline- and diesel-powered machinery enabled the NPS to overcome obstacles that had stymied earlier road builders. New Deal programs also played an indispensable role in NPS road-building efforts from 1933-1942. While private contractors conducted most of the highly technical work, the Civilian Conservation Corps (CCC) and its predecessor, the Emergency Conservation Work (ECW) program provided invaluable sources of manpower. The labor-intensive work of grading and revegetation provided employment for thousands of CCC enrollees. CCC workers constructed many miles of guard wall, guardrail, and stone-lined gutters, along with campgrounds, picnic shelters and other visitor facilities.

World War II put a temporary end to NPS road building activities. When recreational travel resumed in the late 1940s, the NPS was not prepared to accommodate the influx of traffic. New facilities were needed to handle the ever-increasing numbers of park visitors and years of neglect had created significant maintenance backlogs. The situation worsened during the early 1950s, as expanding automobile ownership, increased leisure time, and rapidly improving highways brought unprecedented crowds into the parks. The NPS responded with an ambitious ten-year development program called Mission 66, which was intended to bring the parks in line with contemporary needs in time for the agency's fiftieth anniversary in 1966.

Mission 66 resulted in a comprehensive upgrading of roads and related facilities, along with a significant increase in the number of parks and a resulting expansion in total road mileage. Few new roads were built in existing parks, but many prewar roads were widened, straightened, and paved to accommodate larger, faster, and more numerous automobiles. Parking lots, campgrounds, and visitor facilities were expanded and a number of older bridges were replaced with new

Figure 12. Mission 66 roadway, Natchez Trace Parkway, 1959. (NPSHPC)

structures better-suited to modern traffic demands. The rustic design policies that dominated prewar park development gave way to an explicitly modern approach that embraced contemporary architectural styles and materials. The new roads and road improvements were clearly modern as well, with wider, straighter pavements and relatively unadorned bridges.

While Mission 66 enabled the National Park System to accommodate vast increases in visitation, the program was controversial at the time and continues to be regarded with ambivalence today. By the mid-1950s, environmentalists and wilderness advocates were protesting the program in general and park road development policies in particular. In addition to complaining about stripped-downed Modernist esthetics, critics contended that the NPS was building too many roads and "improving" others to the point where they lost their scenic beauty and romantic appeal. The most controversial of these projects was the reconstruction of Yosemite's Tioga Road, which was ardently opposed by Ansel Adams, the Sierra Club, and other wilderness advocates. While this project proceeded as planned, environmentalists successfully opposed road development in other locations, curtailing a number of projects such as the extension of the Blue Ridge and George Washington Memorial Parkways, the improvement of the Denali Road, and the creation of a parkway along the historic Chesapeake and Ohio Canal.

By the mid 1960s the Park Service was beginning to reexamine its road-building policies. In many new parks in the Pacific Northwest and Alaska, construction was limited to minor approach roads that did not penetrate into the heart of undeveloped areas. In 1967 the Park Service assembled a multidisciplinary panel to develop a new series of road policies and design standards. The panel concluded that additional road development should be kept to a minimum and issued guidelines intended to ensure that future improvement and rehabilitation programs would reflect the spirit of prewar park roads. The panel also advised the NPS to begin looking at ways to facilitate alternative transportation, leading to the use of shuttle buses in some of the most crowded parks. The 1969 National Environmental Policy Act helped limit development by mandating rigorous environmental review for major construction projects.NPS park road managers addressed these challenge in many locations, devising alternative transportation systems for congested areas like Yosemite Valley and attempting to ensure that new projects were attractive, safe, and environmentally sensitive. The FHWA continued to provide technical support and design guidance. Constructed between 1979 and 1983, Blue Ridge Parkway's Linn Cove Viaduct exemplified the blending of modern design and technology with greater ecological awareness. In order to avoid scarring the hillside, the viaduct was built of precast concrete segments that were lowered into place by crane. The complex engineering and elegant, environmentally sensitive design received praise on technological, ecological, and esthetic grounds.

By the 1980s a growing awareness of the historical importance of park roads was beginning to spread throughout the cultural resource community. Many cultural resource managers began to recognize the importance of preserving historic roads and related resources, particularly those associated with the Golden Age of park-road-building between the two World Wars. Not only was there greater awareness that these roadways exemplified an important era in Park Service history, but for many park professionals and visitors alike, they epitomized the national parks' role in twentieth-century American life. The interest in historic roads was not limited to the grand tour roads of the classic "natural" parks. Growing appreciation for the historical significance of roadways has also been seen in military parks and historic sites. The role of circulation systems for park administrative and residential areas is

also gaining attention. Roads built during the Mission 66 program are already being scrutinized for their significance as resources from an important period of NPS history.

A number of efforts have been initiated to help protect and preserve these vital historic resources while educating decision-makers and the general public about the historic significance and contemporary importance of America's national park roads and parkways. Recent preservation-related activities include a major documentation effort funded by the Park Roads Program and undertaken by the Historic American Engineering Record, a surge of nominations to the National Register of Historic Places, the pending development of a Historic Roads National Register Bulletin and the designation of Glacier National Park's Going-to-the-Sun Road as a National Historic Landmark. These efforts have encouraged park road managers to pursue policies aimed at reconciling modern standards of safety and efficiency with traditional conceptions of landscape aesthetics and resource stewardship. Glacier, Acadia, and many other parks have gone to great lengths to preserve the historic character of their road-related resources.

Figure 13. Linn Cove Viaduct, Blue Ridge Parkway, completed 1984. (HAER 1997)

ANATOMY OF A PARK ROAD

The following outline of park road terminology should help historical landscape architects and cultural resource managers understand the ways in which roads are conceived, constructed, and evaluated. Improving communication among the disciplines involved in historic road stewardship is essential. Not only do engineers and landscape architects frequently seem to speak different languages, but they often use similar words to mean different things. This can be particularly confusing in regard to condition assessments and treatment recommendations. Road conditions that cultural resource specialists might consider "good" from the perspective of historic integrity frequently provoke "poor" ratings from engineers focused on technical performance. Terms like "reconstruction" and "rehabilitation" also have more pragmatic connotations for engineers, who are generally less concerned with maintaining original appearances than with enhancing safety and efficiency.

Employing a shared vocabulary and developing a greater awareness of highway engineering concerns will improve the quality of historic road CLRs while enhancing interdisciplinary collaboration between cultural resource specialists, historical landscape architects, and engineers. This brief overview of highway engineering concerns can also help researchers understand historic plans and design documents.

Highway engineers generally conceive of roads in terms of three basic components: **Plan**, **Profile**, and **Cross-Section**. These elements have various subcomponents, all of which may not be present depending on the age and technical sophistication of the road.

Plan

The basic components of a park road plan are location and alignment. **Location** refers to the macro-scale issue of the road's placement within a park. Location is determined through the establishment of **controls**, which are typically the significant natural or cultural features that a road is intended to access, either physically or visually; or conversely, to avoid, for technological, environmental, or economic reasons. In modern usage the term control often refers to addi-

tional non-geographical factors as well, such as design speed, vehicle length, traffic volume, and other cultural and technological issues. Once controls are established, road designers assess the best way to link the points, determining a general road location that balances aesthetic attributes with pragmatic engineering concerns. After this location is approved, surveyors establish a precise **center-line** for the actual roadway.

Horizontal alignment generally consists of a combination of curves and straight segments, which are characterized in road-related terminology as **horizontal curves** and **tangents.** Horizontal curves can either be simple **radial curves**, which are easier to design and construct but harder to negotiate at higher speeds, or **spiral curves** of constantly varying radius, which are technically more complex, but visually more appealing and better-suited for contemporary automobile traffic. Park road designers generally favored curvilinear alignments and sought to avoid prolonged tangents as unsightly and overly conducive to high-speed driving. While winding roads helped keep speeds within reasonable limits, the suggested **minimum radius** of curves was gradually increased as vehicles improved and drivers' expectations changed. Curves on historic park roads were often significantly tighter than the minimum radii employed on more heavily traveled general-purpose roadways.

Surveyors established the horizontal alignment of the road by surveying points at 100' intervals or **stations** along the centerline of the proposed roadway. These stations serve as a basis for all future road measurements, which are often expressed as the station number plus the number of additional feet, eg., station 12+25, 12+35, 12+35.82, etc

Profile

The **profile** of a road denotes the vertical dimensions of its location. As with horizontal alignment, vertical alignments, or profiles, were generally calculated to maximize scenic potential and driving ease while minimizing construction expense and environmental disruption. By carefully coordinating the plan and profile (horizontal and vertical alignments) to follow the lay of the land as closely as possibly, park road designers sought to create three-dimensional artworks that blended

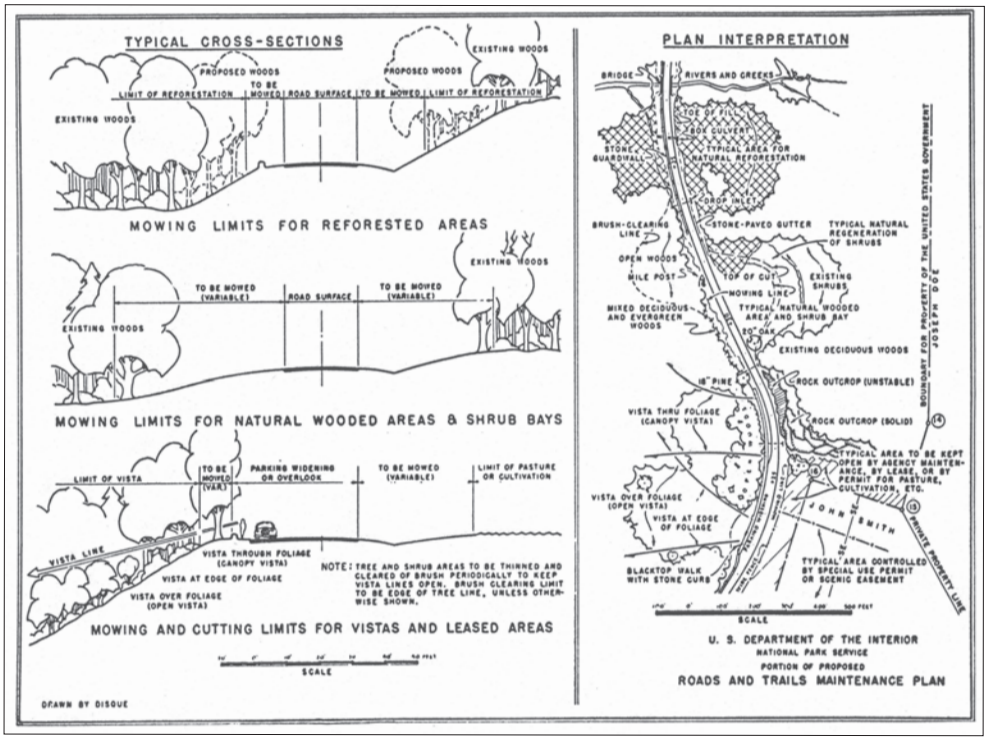

Figure 14. Typical Maintenance Plan and Section for Park Road or Parkway. (Bayliss 1957)

seamlessly with the surrounding terrain. When it was impossible to follow the natural contours of the land, designers tried to create a balance between **cuts** and **fills** in order to produce a relatively steady vertical angle or **grade** without resorting to hauling extra fill from **borrow pits** or having to dispose of excavated **spoils** through expensive **over-hauling** or unsightly **side-casting (**a practice that was putatively proscribed by the late-1920s but not entirely abandoned in practice). A **ruling grade** was generally established to excessively steep climbs and dangerous descents. For automobile roads in mountainous areas, a 5% ruling grade was generally considered desirable, though exceptions up to 8% were occasionally permitted. Grades were often lowered at curves to provide gentler **compensatory grades** designed to offset the loss in speed induced by tight curvature.

Cross section

A vertical slice taken across a typical section of the road is known as a **cross section**. The cross section identifies the dimensions, locations, and materials of the basic park road structure and characterizes its immediate surroundings (sometimes referred to as the **road prism**). Cross section components include pavement, base (or "subgrade"), shoulders, medians (if present), curbs, gutters or other drainage systems, side slopes, tree-line (or "clear-zone"), and additional features such as safety barriers, retaining walls, signs, lighting, etc.

A **typical section** is usually generated to guide the development of a roadway or component project; alternative sections are often developed to address changing topographical conditions or other design concerns. Cross sections for new construction generally depict the pre-existing ground level as a reference for grading or filling operations.

The typical pre-automotive park road **pavement** often began as a simple graded **dirt** surface. Most park roads were eventually improved with **gravel**, **crushed stone,** or **macadam** (crushed stone bound together with progressively finer particulates). Early accounts will occasionally refer to these processes as "metaling." On more substantial park roads, a crushed-stone **base course** or **sub-grade** enhanced the stability of the travelway. As automobiles rendered these surfaces obsolete, various binding materials were employed to create more durable pavements. **Penetration oil** and **asphaltic compounds** were applied directly to existing gravel or macadam surfaces, temporarily alleviating dust and deterioration problems and creating hybrid pavements such as **bituminous macadam**. More substantial **Portland cement concrete** pavements enjoyed considerable popularity in the 1920s-30s, especially for heavily trafficked parkways, where rigid concrete's enhanced durability and superior smoothness justified the additional cost. By the 1940s, **bituminous concrete** – crushed stone mixed with bituminous compounds either on site **(road mix**) or in

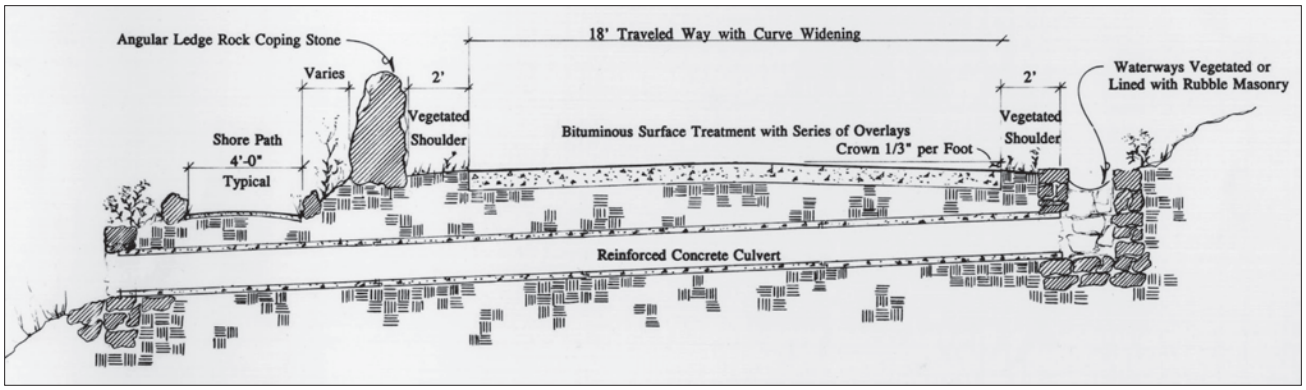

Figure 15. Illustrative section showing pavement, drainage, coping stone and path, Eagle Lake Motor Road, Acadia National Park, 1993. (Foulds/NPS 1993)

a central or portable plant (**plant mix**) – became the most common paving material, especially as durability and performance improved through additional research. All these surfaces required substantial and well-drained sub-grades.

In addition to specifying the width, thickness, and consistency of the pavement and base, the cross section characterizes the geometry of the surface. Pre-automotive roads were conspicuously convex, with a high central **crown** that shed water into roadside **ditches**. While raw, unimproved ditches were the norm for most early park roads, **paved gutters** lined with native rock or cobblestone were often constructed when erosion problems existed or appearance was a significant concern. The traditional crown-and-ditch configuration posed significant safety hazards as operating speeds increased, but improved pavements were capable of shedding water with a minimal central rise.

Traditional deep and narrow ditches gradually gave way to broader and shallower configurations that were more forgiving to errant automobiles. Replacing ditches and gutters with underground **drainage systems** further enhanced safety and roadside beauty. Curbs were often employed to channel water into **curb or drop inlets**, where it was directed away from the roadway using **drains** and **culverts**. Culverts were also used to channel minor water sources under the roadway. The visible component of the culvert, or **headwall**, was usually accorded a compatible treatment if it could be seen by the visitor. Higher speeds also necessitated the introduction of **superelevation**, or banking, which tilted the pavement in complex three-dimensional arcs to counteract centripetal forces.

Early park roads were barely wide enough to accommodate one carriage or stagecoach. By the mid-1920s, park road standards called for 18'-22'-wide driving surfaces, which were considered wide enough to allow oncoming autos to pass safely. As late as the 1950s, 22' was deemed a sufficient width for most two-lane park roads. Park road pavements were occasionally flanked by 3'-4' graded **shoulders**. Shoulders were often turfed after the construction process; in other cases, depending on the erosion potential, nature was simply allowed to take its course. Rural parkways typically followed park road standards for pavement and shoulder width, while

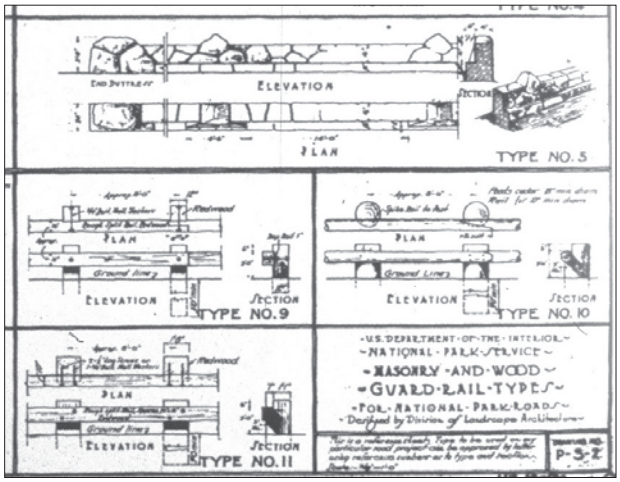

Figure 16. Typical guardwall details by Division of Landscape Architecture, ca. 1930. (NPS)

suburban commuter routes such as George Washington Memorial Parkway and Baltimore-Washington Parkway were constructed with four-lane pavements forty-feet or more in width. By the 1940s, planted **medians** of varying width separated opposing lanes of traffic on high-volume parkways.

Park road development often required cutting into slopes or filling depressions to provide a sufficiently wide and stable roadbed. The cross section typically provided a **grading profile** that stipulated the desired angle and contours of **cut slopes** and **fill slopes**. While conventional highway engineers favored flat slopes and steep 1:1 angles, park road designers preferred more gentle 2:1, 3:1, or even 4:1 slopes rounded to resemble natural topography. It was not always possible to maintain these ideals in steep and rocky terrain. Many park roads are bordered in part by nearly vertical rock cuts, **retaining walls** of hand-laid stone, cement-rubble, or rip rap, or by log, steel, or concrete **cribbing**, rock-filled wire-mesh **gabions**, or, more recently, **mechanically stabilized earth**.

Safety barriers are another component of the cross section. Typical historic park road safety barriers include **dry-laid stonewalls**, **mortared stonewalls**, and **log** or **timber guide rails**. Later modifications may include **stone-faced concrete-core walls**, **steel-backed timber guardrails**, **w-beams** of **galvanized** or **Cortan steel**, and **simulated stone** barriers

comprised of reinforced concrete molded and colored to resemble authentic stonework. **Guardwalls** and **guardrails** are sturdily constructed to protect vehicles from roadside or median hazards. **Guiderails** and **guideposts** are generally less substantial and are intended to delineate the roadway or warn of roadside hazards. **Curbs** also help to delineate roadways, though their use is generally restricted to higher volume parkways, urban park roads, and developed areas such as parking lots, scenic pullouts, and visitor centers. Park roads may also be bordered by **ornamental fencing** of **stone**, **iron**, or **wood**. **Split-rail** fencing is particularly prevalent in southeastern parks.

The cross section may also depict the location of significant natural or cultural features, and delineate the desired setback of the **tree-line**, which can be varied for scenic effect. As speeds rose and safety concerns mounted, this line has generally been pushed further away from the travel surface to create a broader **recovery zone** free of obstacles that might endanger errant motorists. The placement of signs, lighting standards, and other roadside features can also be depicted in the cross section.

Major Structures

Bridges and other major structures are integral components of park road landscapes, but they are generally evaluated independently, both for maintenance purposes and to determine their cultural significance as engineered or architectural features. The CLR and related research activities should address these structures in regard to broader landscape concerns, detailed technical analyses or construction histories are generally unnecessary.

When analyzing a **bridge** for CLR purposes, it is important to describe its location and appearance and characterize its contributions to the overall park road landscape. Brief descriptions, construction chronicles, and contextual information relating specific structures to broader NPS trends should be sufficient in most cases. The basic structural system should be identified, the surface treatment described, dimensions noted, and siting issues discussed, along with any significant historical associations or modifications.

Viaducts share many design and construction characteristics with bridges but function primarily to carry roads over inhospitable terrain such as steep slopes and deep ravines, where they often pose attractive and environmentally appealing alternatives to extensive excavations. As with park bridge design, their visible components were often harmonized with the surrounding landscape with rustic stone veneers.

Tunnels can also minimize the visual and environmental impact of park roads, concealing their presence along sidehills and allowing road designers to bore through spurs and outcrops instead of drastically reconfiguring them. When a spur or outcrop was not considered significant enough to warrant the expense of tunnel construction, **daylighting** the roadway by leveling the outside of the cut opened up views and produced a more naturalistic appearance. Tunnel characteristics that should be noted include basic dimensions, **portal** configuration and materials, number and nature of windows or **adets** (if present), significant views from portals (if present), and overall landscape design and orientation considerations.

Associated Features

The following features can also contribute to the appearance and significance of park road landscapes. Their location, physical characteristics, and development should be addressed in park road histories, existing condition documentation, and treatment plans. The extent to which these features are discussed will depend on their perceived significance and impact on the park road landscape.

Scenic pullouts and **waysides** are integral components of park road landscapes. Their location, configuration, paving materials, drainage considerations, curbing and associated planting design should be described and analyzed in the same manner as the main roadways. Architectural features such as **comfort stations** and **wayside exhibits** ranging from simple resource identification to more elaborate interpretive efforts should also be considered. Even such mundane features as **picnic tables, benches**, **trash receptacles**, and **water fountains** should be described and evaluated for their design implications and historical significance.

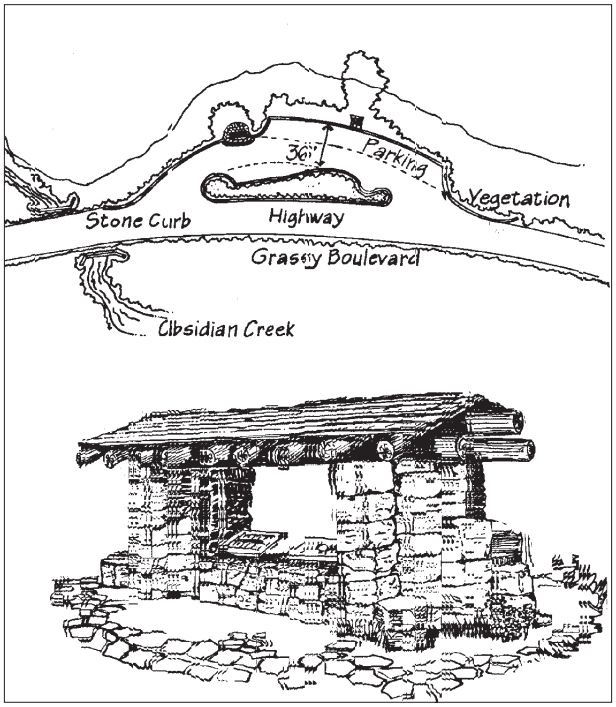

Figure 17. Obsidian Creek Interpretive Wayside, Yellowstone National Park. (HAER 2000)

Signs are fundamental aspects of park road landscapes. Their location, content, and design details should be described, along with any available information about their placement and evolution over time. **Entrance signs** can be particularly significant, in both visual and symbolic terms. Many parks retain historically significant entrance signs dating to park road development in the 1920s and 1930s. The significance of Mission 66-era signs and roadside interpretive strategies is also becoming increasingly appreciated. Historical parks — and commemorative military parks, in particular — often contain a higher density of informational signs and commemorative markers. These signs and **tablets** may have considerable historical significance. **Statues** and other **memorials** may contribute to the appearance and significance of park road landscapes and were often sited and designed in reference to circulation systems.

Roadside lighting is another associated feature that may affect the visual character of park road landscapes and can exhibit significant geographic and temporal variation.

Entrance stations, when present, are highly significant road-related features that play important roles in shaping visitors' perceptions of park road landscapes. While detailed consideration is best reserved for historic structures reports or independent determinations of eligibility, their location, appearance, and basic history should be related in the CLR.

Similar considerations apply to facilities such as **visitor centers**, **campgrounds**, and **maintenance areas**, which were often developed in association with park roads and significantly affect their location and related visitor experiences, but will generally merit independent analysis.

Figure 18. Sprague Creek Campground, Glacier National Park. (HAER 2000)

The View from the Road

The preceding elements all contribute to the motorist's impression of park road landscapes. Planting plans and vegetation management also play important roles in shaping the view from the road. The art of park road design entails manipulating these components to produce appealing visual effects. The various elements must be combined in a unified and harmonious manner that can be appreciated by motorists moving at slow to moderate speeds. Since road construction frequently disrupted the surrounding terrain, park road designers also employed remedial landscaping to conceal their interventions so that motorists could believe they were traveling through undisturbed natural and cultural settings.

The emphasis on native materials and naturalistic design also shaped the development of **planting plans** and **vegetation management** schemes. When planting or roadside **revegetation** efforts were called for, park road designers generally worked with native species arranged in naturalistic groupings – though definitions of these terms have evolved significantly over time. Many "native" materials were acquired from commercial nurseries and transported significant distances to supplement locally transplanted specimens. Historic planting designs occasionally incorporated **exotic plant materials**. In these cases, non-native roadside plants may have historical significance and should be treated accordingly.

Subtle variations in roadway alignment allowed for **specimen tree preservation** and the retention of other natural or cultural features. **Roadside cleanup programs** removed downed timber from the motorist's view, creating a more manicured appearance than is found in most parks today. Other tools for managing the view from the road included **scenic easements** and **agricultural leases**, which were intended to prevent conflicting land uses and promote traditional farming practices that reduced maintenance costs while enhancing the roadside's visual and symbolic appeal. While the resulting landscapes may appear natural to contemporary observers, evidence of these design practices can often be found in documentary sources and historic photographs.

Park road designers also employed sophisticated strategies to choreograph scenic effects. Inserting a slight tangent to produce prolonged **axial views** was a popular way of showcasing significant scenery, as was aligning the roadway so that compelling features appeared on the outside of curves. Natural rises and ridge crests could be used to provide sweeping **panoramas**. **Vista cutting** was a common means of creating attractive views in forested terrain. **Canopy views**, where only the lower branches were removed, afforded a more subtle variation of this strategy. While subsequent vegetation growth has occluded many of these **historic designed vistas**, their location and purpose can often be identified by historic documents, plans, and photographs. By manipulating alignment, profile, vegetation, and other roadside features park road designers also controlled the motorist's **sight distance**, balancing the desire to produce visual variety and picturesque intimacy with the need to ensure safety at reasonable driving speeds.

Understanding all of these elements – plan, profile, cross-section, major structures (bridges, viaducts, tunnels), associated features (scenic pullouts, waysides, historic wayside furnishings, architectural elements, lighting, entrance stations, visitor centers, campgrounds, maintenance areas), planting design, views and vistas – enhances the cultural landscape researcher's ability to identify historic park road characteristics and development patterns, evaluate their significance, and propose appropriate treatments and stewardship programs.

HISTORIC ROADS AND THE CLR

Managing America's national park roads has become an increasingly complex task. Not only has the number of visitors increased markedly, but most park roads were designed for significantly shorter and lighter vehicles moving at slower speeds than are common today. Technical challenges have been exacerbated by the fact that many historic roads are showing their age and require extensive maintenance, repair, and rehabilitation. New engineering standards, enhanced liability concerns, and multiplying regulatory frameworks require contemporary road managers to be conversant

with a broad range of technical, legal, and bureaucratic issues. Changing visitor expectations also place conflicting demands on historic road managers: while some motorists relish the opportunity to experience the intimate scale and leisurely pace traditionally associated with park travel, others are intent on arriving at the next destination as quickly as possible.

The Cultural Landscape Report (CLR) can play an important role in the treatment of historic road resources. In addition to proposing specific solutions to immediate resource challenges, the CLR's historical narrative, site survey, analysis, and treatment recommendations can contribute to the development of General Management Plans, Environmental Impact Statements, and National Register Nominations and Determinations of Eligibility. The CLR's primary purpose, however, is to formulate a comprehensive stewardship plan that guides specific landscape treatment activities and sets broader, long-term preservation goals.

The decision to develop a CLR for a historic road will be based on the resources' perceived significance and the degree to which it constitutes a distinctive cultural landscape in relationship to the broader context of the park. In many cases, historic roads can be considered contributing elements to larger cultural landscapes, in which case they are most appropriately discussed in the circulation section of more broadly scoped CLRs. If the historic road possesses a distinct character as an identifiable cultural landscape in its own right, or constitutes a complex managerial challenge that requires specific treatment solutions that may not be applicable on a park-wide basis, then an independent CLR is probably warranted. In situations where a historic road is the dominant feature of a park, the road CLR may be the most appropriate framework for addressing treatment options for associated landscape elements.

The scope of a historic road CLR will depend on the nature of the resource, the availability of research materials, and the park's general management goals and specific road-related concerns. The CLR should define the site boundaries, document the road's history and current conditions, articulate its character-defining features, identify the range of stewardship challenges to be addressed, and outline a treatment plan that proposes appropriate solutions that conform to all relevant managerial goals, policy guidelines, and regulatory frameworks.

The historic road CLR should include an introductory overview, a site history, existing condition descriptions, an analysis and evaluation section, a treatment component, a record of treatment, and associated bibliographies, graphic material, and supplemental documentation. The general format and content of the CLR are described in more detail in *A Guide to Cultural Landscape Reports: Contents, Processes, and Techniques*. This *Landscape Line* supplements the basic CLR guidelines with information tailored specifically to the challenges of historic park road stewardship.

A CLR will be more effective if it is completed before the planning and design phases of related road projects are finalized. The CLR team should work closely with park staff, regional cultural landscape specialists, and the NPS Park Roads and Parkways Program in order to identify upcoming projects that might impact historic park road resources. Ideally, a CLR should help set the broader goals and specific treatment recommendations for road projects, and not serve as a remedial document calling for amendments to proposals developed along more narrowly technical grounds.

Unless a road has been determined eligible for the National Register of Historic Places, however, cultural resource specialists do not typically have an official role in park road projects. When cultural resource specialists are included in the planning process, their ability to implement preservation-oriented treatment plans is generally more limited than when dealing with resources over which they have more independent control. Fortunately, park road management has become an increasingly multidisciplinary process. By collaborating in the planning and design process, cultural resource specialists can help produce more historically appropriate and context-sensitive solutions.

Since park road management is a complex multidisciplinary endeavor, it is important to examine materials and consult specialists in relevant fields such as history, archeology, natural resource management, planning, compliance, and interpretation. Sidebar 1 provides a list of planning, management, research, and

SIDEBAR 1: PLANS, REPORTS, AND INVENTORIES THAT MAY PROVIDE TECHNICAL DATA OR PLANNING GUIDELINES OF USE IN DEVELOPING THE CLR.

General Management Plan [GMP]. As the first phase of planning for a national park service unit, a GMP ensures that each park has a clearly defined direction for long-term resource preservation and visitor use. GMPs typically contain mission goals and management prescriptions that address the preservation of park resources, types and areas of development, visitor carrying capacities, and potential boundary modifications. Historic roads stewardship concerns should be addressed when developing new GMPs.

Historic Resource Study [HRS]. A HRS for a park evaluates cultural resources within historic contexts. Through documentary research, typically led by a historian, and field investigations, the HRS narrative describes the resource's history, integrity, authenticity, associative values, and significance. The HRS includes National Register nominations for qualifying resources and is a principal tool for completing more detailed studies.

Historic Structures Report [HSR]. A HSR is the primary guide to treatment and use of a historic structure. The purpose, content and use of the report parallel that of a CLR. HSRs may exist for bridges, tunnels, entrance stations, and other major structures. The treatment and use of a major road feature, such as a bridge or tunnel, or associated road feature, such as an entrance station, should be determined in conjunction with the overall stewardship strategy of the road.

List of Classified Structures [LCS]. The LCS is an evaluated inventory of all prehistoric and historic structures in the National Park System having historical and/or architectural/engineering significance. The LCS provides baseline data for a park, including the location of prehistoric and historic structures, description, historical significance, and management decisions. Any constructed historic park road feature may be found on the LCS.

Cultural Landscape Inventory [CLI]. The CLI is an evaluated inventory of all cultural landscapes in the National Park System that are listed in or eligible for the National Register of Historic Places. The CLI provides baseline data for a cultural landscape, including roads and road-related resources. Information recorded in the inventory includes location, physical description, historical chronology, period of significance, landscape characteristics, and management decisions.

Archeological Overview and Assessment. This report describes and assesses known and potential archeological resources in a park area. The overview summarizes existing archeological data while the assessment evaluates the data. Further investigation requires an archeological identification and evaluation study to identify the location and characteristics of some or all sites in an area. Data is entered into the Archeological Sites Management Information System (ASMIS).

Ethnographic Overview and Assessment. This document reviews existing information on park resources valued by associated traditional communities. The information comes from archives, publications, and interviews with community members and other stakeholders.

National Register of Historic Places. The National Register of Historic Places lists numerous park roads and related features. The National Register Information System (NRIS) database should be consulted for relevant listings. The full text of nominations and copies of supporting documentation can be obtained by contacting the National Register or may be available in park files.

Historic American Engineering Record (HAER). From 1988 to 2002 HAER conducted an extensive survey of National Park Roads and Parkways. HAER reports typically include a comprehensive narrative history, individual reports on bridges and tunnels, measured and interpretive drawings, and extensive large-format photographic documentation. The HAER collection should be consulted to determine if the road under consideration has received this level of documentation.

Road Inventory Program (RIP). The FHWA's Federal Lands Highway Program (FLHP) maintains a videographed inventory and associated condition assessment for all paved NPS roads. A pavement surface-condition rating is also provided. The videos often contain information on historic features, landscape character, and general road conditions.

Bridge Inspection Program (BIP). The FHWA also inventories and inspects NPS bridges. An evaluation of each bridge's load-carrying capacity is performed to determine if any deficiencies exist; if necessary, appropriate action such as warning signs, bridge closing, rehabilitation or replacement, is recommended. In addition to basic structural data, BIP reports may contain information on historic aspects, materials and conditions.

Servicewide Traffic Accident Reporting System (STARS): STARS is a NPS Park Roads Program database that provides information on the location, frequency, and severity of traffic accidents. This information is critical for maintaining road safety. It can also demonstrate historically low accident rates for park roads or park road segments that can be used to justify design exceptions or counter proposed "upgrades" that adversely impact historic road features.

Traffic Monitoring System: The NPS Park Roads Program monitors traffic in thirty-three of the most heavily used park units. The selection of parks is periodically adjusted in response to visitation trends. If the road under study is part of this group, the data can be useful for formulating treatments and policies.

inventory documents that can contribute to the development of a historic road CLR. All of these materials may not be available for every historic road resource, but efforts should be made to locate and examine relevant studies early in the CLR development process.

Formal public outreach is generally beyond the scope of the CLR, but it is important to consider visitor perspectives and the needs of adjacent communities. Involving the public in the planning stages of park road stewardship is generally a wise and effective strategy. When the public is not informed until late in process, ill feelings may occur and treatment may be delayed while differences are resolved. In many cases, public opinion can also play an important role in fostering support for the preservation of historic park road landscapes.

By synthesizing a wide range of technical, cultural, and natural resource-based material and carefully evaluating resource capabilities and programmatic concerns, the historic road CLR provides a broad-based framework for ensuring that park road stewardship embodies technically appropriate, context-sensitive, and historically informed design solutions and management strategies.

HISTORICAL RESEARCH

The successful stewardship of park roads requires a thorough understanding of the history of the resources under consideration. By discovering the site-specific concerns and broader contexts that motivated road-builders, establishing the initial "as-built" conditions of the resources, tracing their evolution over time, and understanding the ways in which earlier visitors experienced and valued them, historical research can help contemporary road managers evaluate the significance and integrity of historic roads and formulate appropriate policies for their stewardship and interpretation.

Historical research should be conducted to determine the original condition of the site; the goals, methods, and results of the initial road-building project or projects; the subsequent evolution of the road(s), road-related features, and surrounding cultural landscapes; the social, technological, aesthetic, and bureaucratic contexts in which these developments occurred; and the ways in which designers, park managers, visitors, and other commentators responded to the road-building process and products. Once these factors are clearly understood, it is possible to make informed judgments about a historic road's character, significance, and integrity–key components of the CLR, the National Register of Historic Places review process, and cultural resource management in general.

Park road histories should be developed by researchers or teams of researchers with demonstrated expertise in historical research and writing. Depending on the character of the historic road and the resources available, other professionals may be involved, including highway engineers, historical landscape architects, horticulturalists, historical architects, and cultural anthropologists. The historical report should be peer-reviewed and edited to conform to current professional standards. Additional information on the preferred format can be found in *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques*.

The park road history should generally take the form of a chronological narrative tracing the resource's inception, development, and evolution. When writing the history of a park with multiple roads, it may be easist to provide a general context covering road development issues on a park-wide basis and then trace the evolution of individual roads in separate sections. In the case of particularly long roads such as national parkways, an overview of the broader goals and history of the project should be followed by sections on discrete segments of the resource divided according to logical administrative, geographic or temporal boundaries. After tracing the development of individual sections, it is generally advisable to assess the project's impact and reception as a whole, chronicling subsequent modifications and management issues on an as-needed basis. Sidebar 2 provides a checklist of concerns that should be addressed in the history portion of the CLR.

While the historical narrative will reflect the individual nature of every project, the concerns that the historian should attempt to cover include: the broader cultural currents and site-specific issues that gave rise to the project; the major agencies and individuals involved; the evolution of the design scheme or schemes; the details

of the construction process with particular attention paid to unusual, innovative, or paradigmatic practices or technologies; the ways in which these practices accorded with or differed from standard engineering procedures and broader trends in park road development; and the basic dates and legislative and financial parameters of the project. Original completion dates and as-built conditions should be described, along with related ceremonies or reactions to the project or its components. Similar information should be presented for roads that were developed by non-NPS entities or individuals, insofar as available sources permit

Since park roads and their surroundings tend to evolve over time, it is important to trace subsequent alterations along with the social, environmental, or technological factors that influenced these changes. Gauging popular responses to park road building practices by surveying tourist literature, travel diaries, and similar sources can provide important insights into the ways in which park roads were experienced and given meaning by their intended audiences. These reactions help establish the historical significance of a road or related resource. Popular and professional commentary often played an important role in shaping subsequent alterations to park roads and related resources.

Important primary sources for park road research include park legislation and the records of related hearings, superintendent's reports, planning documents, construction reports, correspondence between key figures, and maintenance and management reports that chronicle post-construction changes and concerns. Historic plans and construction photographs afford invaluable insights. The quality and availability of these documents vary considerably. Some parks have maintained extensive and well-cataloged historical collections; others have not. In general, it is easier to find documentation for projects completed prior to the 1950s, but significant amounts of later material can often be found. Documentary sources for roads that were developed by other agencies and individuals prior to NPS acquisition are generally harder to locate, if they exist at all.

Park archives often contain the most pertinent information, but supplementary material can frequently be found in state and local historical collections, university libraries, and independent research centers. These repositories may be particularly useful for researching pre-NPS road development. The National Archives and Records Administration (NARA) center in College Park, Maryland, the various regional NARA repositories, and regional Park Service collections and records centers should be checked for official correspondence and other records. The NPS Denver Service Center's Technical Information Center (TIC) is an important source of design drawings along with related textual materials. The National Register of Historic Places database should also be consulted to determine whether or not roads and related features are listed, in which case the nominations may provide considerable information.

It is generally useful to look beyond the official administrative record and try to find accounts of park road development and related issues in contemporary newspaper and magazine articles, in travel books, and in tourist brochures, automobile club bulletins and related ephemera such as postcards, scrapbooks, diaries, and letters. Local libraries and historic collections can be particularly valuable sources in this regard. Oral histories may be available for some projects, especially those involving the Civilian Conservation Corps.

A number of professional journals and popular periodicals routinely covered park road-relates subjects. These include: *American Civic Annual, American Forests, American Highways, American Planning and Civic Annual, American Motorist, City Planning Civil Engineering, Engineering News-Record, Landscape Architecture Quarterly, Parks and Recreation, Public Roads, Traffic Quarterly, Transactions of the American Society of Civil Engineers.*

Historians should conduct as much original research as the project's scope permits, but it is advisable to make use of secondary sources to maximize efficiency and avoid redundancy. The bibliography lists a number of key works on the history of American parks, landscape architecture, highway engineering, and related social trends. Valuable information can often be found in NPS-produced secondary sources such as historic resource studies, administrative histories, special resource studies, historic structures reports, cultural landscape reports, archeological surveys, HAER documentation, and National Register nominations and Determinations of Eligibility.

NPS theme studies provide valuable contextual information and should be consulted and invoked where appropriate. Some of the most pertinent for park road research include *Landscape Architecture in the National Park Service*, *Rustic Architecture in the National Park Service*, *the Civilian Conservation Corps*, *Mission 66 Visitor Centers*, and the forthcoming *Mission 66 Planning, Architecture, and Landscape Design*. A brief history of NPS road development accompanied by extensive graphic documentation and construction details can be found in *America's Park Roads and Parkways: Drawings from the Historic American Engineering Record* (Davis, Croteau and Marston 2004). While it is important to summarize contextual information, the historian should not attempt to provide a comprehensive history of these topics within the scope of a CLR.

Since CLRs address resources that are potentially eligible for listing on the National Register of Historic Places, it is important for historians to be aware of the procedures, concerns, and terminology that factor into this process. Explicitly linking a road's development to authoritative theme studies and identifying primary periods of significance will facilitate subsequent evaluation procedures. It may also be desirable to make connections with the broader themes and patterns of American history articulated in various National Register and NPS Park History program publications. These alternative themes may be particularly useful for contextualizing roads that do not fit the pattern of classic tour road development.

Historical research should provide practical guidance for maintenance, preservation and rehabilitation activities. Archival research can help identify the appearance and location of historic features, playing a key role in existing condition surveys and condition assessments. Historic design details and construction processes can be used to repair or reconstruct lost or impaired features.

CLR research may also lead to a park road's recognition as a National Historic Landmark, a National Historic Civil Engineering Landmark, a National Scenic Byway or an All- American Road. All of these designations will have important implications for subsequent management practices and for the development of specific treatment plans.

Park road research can also serve important educational and public relations functions. Building a broad constituency for historic roads is a crucial component of park road stewardship. Public presentations of park road history through various interpretive media can raise public awareness of the historic attributes and cultural significance of these under-appreciated resources. Popular support for park road preservation can be particularly effective in the case of major reconstruction projects for which the National Environmental Policy Act requires mandatory public review.

SIDEBAR 2: HISTORICAL RESEARCH CHECKLIST

Historic Context

- Themes or associated events (social, political, economic, environmental) that influenced road development or use ° Adherence to local, regional, or national design standards

Development History

- Evidence of prehistoric use or associated sites
- Agencies and individuals involved
- Legislative and financial parameters of the project
- Evolution of design scheme
- Designers and builders of the road, design intent, width, grade, origin, route or alignment, destination, views, natural features, cultural sites, dates of construction
- Materials used and sources
- Tools and equipment used for construction and maintenance; unusual, innovative, or paradigmatic construction techniques or technologies; ways in which these practices accorded with or differed from standard engineering procedures and broader trends in park road development
- Types and extent of features such as paving materials, drainage systems, retaining walls and barriers, tunnels and bridges, plant materials
- Completion dates, as-built conditions, ceremonies held, responses in popular and professional publications

Management History

- Location and frequency of road repairs or rationale for closures and reroutes
- Successes and failures of maintenance solutions
- Changes in location, design, materials, or use, along with information about social, environmental, or technological factors influenced these changes

Existing Conditions Documentation

The documentation of a historic road's existing condition is a critical component of the CLR process. Existing condition documentation should be based on detailed fieldwork and provide a comprehensive survey of the site's features along with assessments of their current condition. By providing a precise record of significant landscape features, the existing condition survey makes it possible to evaluate a site's historic integrity, identify stewardship concerns at both macro and micro levels, and provide a baseline for the treatment recommendations and subsequent implementation and monitoring activities.

Before conducting the survey, the CLR team should review existing historical information and graphic materials. Historic plans, maps, and photographs should be consulted to assist in the identification and evaluation of road features. Contemporary data sources such as maintenance reports, the Cultural Landscape Inventory (CLI), the List of Classified Structures (LCS), Facility Management Software System (FMSS), and the FLHP's Road Inventory Program (RIP) may provide further guidance. Park resource managers, engineering personnel and maintenance staff can offer invaluable assistance based on their firsthand knowledge of historic road resources.

This background information should be consolidated and compiled in formats that allow easy reference in the field. The location and character of key features such as vistas, pullouts, bridges, drainage systems, safety barriers, and other associated landscape elements should be noted for inspection in the field. If a road system is complex, or excessively long it may be desirable to divide the road into discrete segments according to logical geographic boundaries or historical development patterns. The CLR team should consult with park administrators, who may have already divided the road into management subunits. Consistent boundaries, terminology, and resource identification will facilitate all phases of the CLR process and make the results more useful for park staff and other potential partners.

A clean base map is essential for developing existing condition documentation. Depending on the scale of the road system or individual road, a USGS map of 1:24,000 or a more detailed map may be appropriate. In some cases, both scales will be useful. At the general survey level for a park road system, park road, or parkway, base maps should portray basic information such as road alignments, typical pavement widths, bridge locations, safety barrier types and locations, significant road features, principal vistas, and distinguishing landscape characteristics for various road segments. It is critical to keep precise records that identify the name of the road or road segment, the location of features (either in distance from a prominent intersection or, for more precision, in reference to official station numbers found on engineering documents) and their materials, dimensions, construction style, and condition.

For a comprehensive inventory or to guide specific treatment actions, more detailed maps and drawings may be needed to adequately depict each road segment, associated feature, or characteristic landscape type. Site plans, measured drawings, and sketches can document road alignments, cross sections, construction details for pavements, guard walls and other engineered elements, along with roadside landscape characteristics and contributing features such as signs, pullouts, bridges, and entrance stations. Deviations from historic conditions should be noted and problem areas described in both graphic and narrative form. Since the length of most park roads precludes precise mapping of the entire road corridor, an effective strategy is to articulate representative roadway cross-sections and character-defining landscape views while reserving measured drawings for significant subcomponents and contributing features. Examples of this type of graphic documentation can be found in *America's Park Roads and Parkways: Drawings from the Historic American Engineering Record*.

Photographic documentation plays an essential role in the existing conditions survey. Key features should be photographed to document character-defining details and depict their overall contributions to the historic road landscape. Since park tour roads were intended to provide calculated visual experiences, photographs should capture the motorist's perspective along with planned views from associated scenic lookouts. Videography can

be a useful research tool, and sequenced stills might be incorporated into the CLR to demonstrate visual progressions and scenic variation. Both digital and traditional photographic technologies can be employed. Consideration should be given to using color media, especially when documenting the ways in which historic road-builders attempted to harmonize structures with native landscapes. For practical reasons, however, most CLRs will be printed in black and white.

Geographic Position System (GPS) units, measuring wheels, and digital measuring devices are useful in calculating distances and defining the precise locations of documented features. Computer technology, including Computer-Aided Design (CAD), Geographic Information Systems (GIS) and GPS can be useful in documenting historic road features and presenting the results of both historical and existing condition research. With GIS technology, many kinds of data can be linked together, including photographs, drawings, databases, and textual descriptions. This information can then be manipulated to illustrate original development patterns, subsequent alterations, existing conditions, and proposed treatment plans.

The end result of the existing conditions documentation phase should be a precise, detailed, and accurate record of the historic road's current physical status. This graphic and narrative record should be annotated to denote alterations that have occurred since the road was

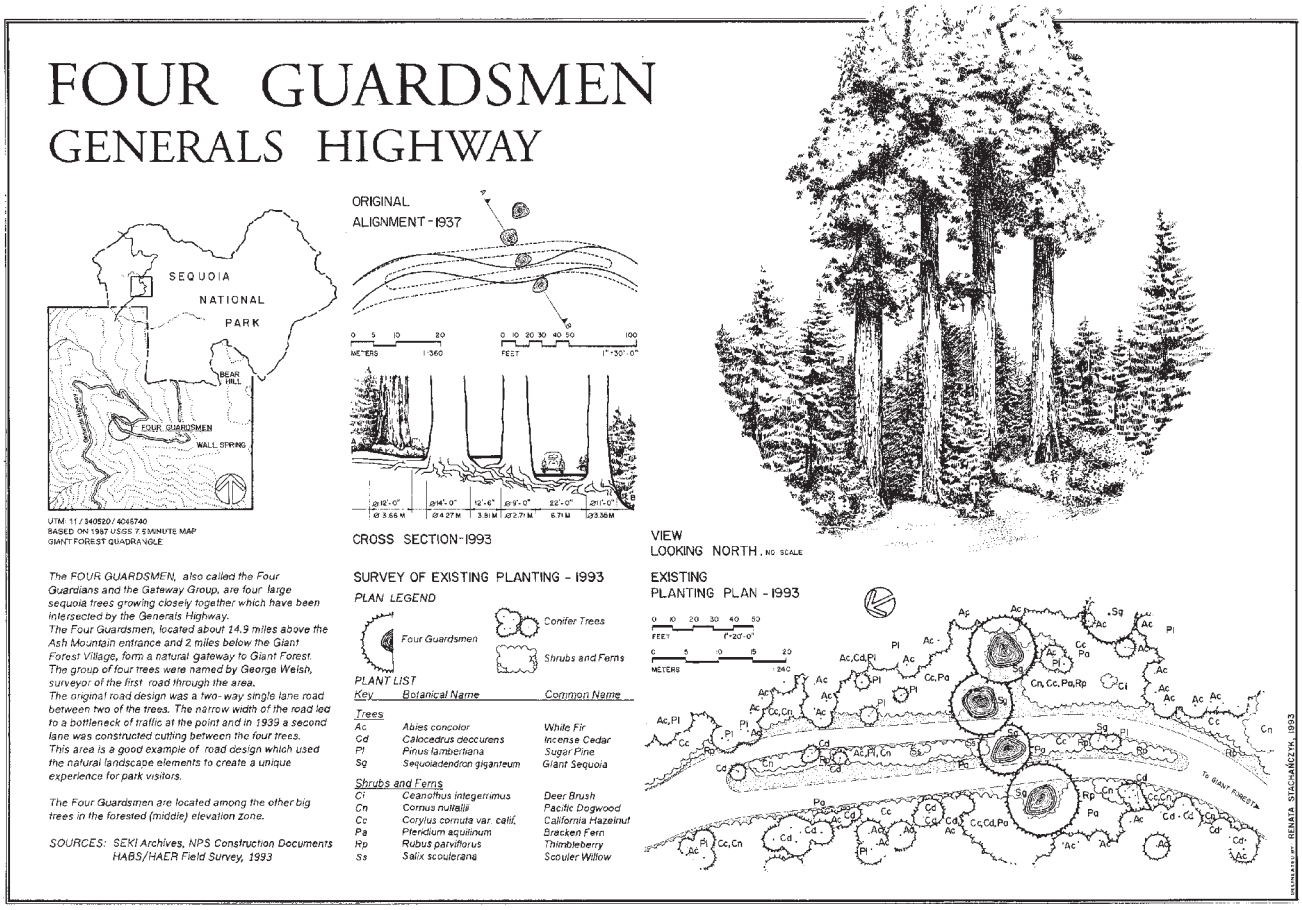

Figure 19. Documentation of significant road feature on Sequoia National Park's Generals Highway, showing general location, plan, section, interpretive view, and historic alignment changes. (HAER 1993)

completed and/or after the conclusion of revisions undertaken during its designated period of significance. Whether these changes were the result of natural processes, intentional actions, or unplanned activities, the existing condition survey will serve as the basis for evaluations of historic integrity and the development of cultural landscape treatment plans. Deviations from original conditions should be clearly noted on a feature by feature basis as well as for the overall resource.

A Guide to Cultural Landscape Reports provides additional information on existing condition survey formats and terminology. Sidebar 3 provides suggestions for evaluating historic park roads through the CLR's standard framework of thirteen landscape characteristics. Rigid applications of these taxonomies are not mandatory, however, and the existing condition survey should employ terms and categories that are bested suited to the resource under examination.

SIDEBAR 3: EVALUATION OF LANDSCAPE CHARACTERISTICS FOR ROADS

Natural Systems and Features

Summarize the natural systems (geomorphology, geology, hydrology, ecology, climate, vegetation, etc.) that influenced road development and the physical form of the road corridor.

- Describe the broad natural character of the region or regions through which the road passes (alpine, desert, rain forest, coastal, etc.) and discuss the impact of these characteristics on design, construction, and experience (deserts or rocky terrain will produce a different landscape character and require different engineering measures than a temperate alluvial plain or region of rolling hills, etc.)
- Identify any distinctive natural features that affect the road's location and disposition (the desire to showcase an attractive lake or peak, the need to take advantage of a mountain pass or cross a canyon or river, the presence of other natural attractions or obstacles,etc.)
- Discuss how local climatic concerns or other natural processes influenced the road's development and evolution (the need to accommodate excessive water-runoff, for instance, or the conscious arrangement of roads and vegetation to facilitate snow melt)
- This should be done at the macro scale of the road's general location and the micro scale of the design and location of individual features and roadway segments

Spatial Organization

Describe the three-dimensional organization of the road corridor's physical forms, emphasizing the ways in which these characteristics define the spatial and visual character of the roadway landscape

- Document the road's current location and identify historic alignments that may have been altered, bypassed or abandoned
- Determine the boundaries that will be used for CLR purposes (generally this will be a corridor including the road surface, shoulders, and all bordering areas that bear evidence of grading, planting, and other interventions; boundaries may also include contiguous viewsheds and their logical physical limits; scenic pullouts, waysides, and roadside service areas should be included; associated campgrounds and visitor facilities may be included in the park road's boundaries or considered independently, depending on their scope and development history; in some cases, especially with parkways, a historic park road's boundaries may coincide with NPS property lines)
- Distant views and landmarks should be identified and analyzed for their impact on the roadway's location, design, and visual experience, but generally should not be included within the boundaries of the historic road CLR
- Document the road in terms of plan, profile and section, demonstrating how the alignment and roadway prism shape the physical and experiential character of the park road landscape: describe the character and frequency of the road's curves and straightaways (tangents); describe the nature and extent of grades: is the road primarily flat or hilly? Is the profile consistent, gently undulating, bumpy and irregular? Document the dimensions and character of the road prism, including travel surface, shoulders, side slopes and treeline
- Since most park roads exhibit considerable variation in spatial character and geometry, it is often desirable to identify representative roadway segments and document their distinguishing characteristics in terms of plan, profile, section, and overall experience
- Identify changes that have occurred since the original design or period of significance
- Any horizontal expansion of the travel surface, shoulders, or roadside clear zone should be carefully noted; changes in profile and alignment should also be closely monitored
- Speed, scale, and sight distance are crucial elements of a park road's spatial organization; changes in any of these variables should be carefully noted, since they can have exponential impacts on the experiential character of park road landscapes

Land Use

Describe the patterns of human activity that have influenced the landscape of the road corridor

- Typical land uses might include agriculture, logging, mining, and recreation; if present, identify the nature, appearance, and social and ecological impacts of these activities
- Park-related land uses should also be considered, including passive and active recreation, commemoration, historic preservation, interpretation, parking, lodging, maintenance, and administration
- Describe any current or historic management activities aimed at retaining, restoring, or remediating the impact of land uses (such as agricultural leases, concessions, mowing, and revegetation)
- Land uses that occur beyond park boundaries should be described if they are visible from the road or associated viewpoints; changes between historic and contemporary views should be noted, along with any broad trends or specific developments that will impact historic viewsheds; scenic easements and other existing or proposed viewshed management practices should be described

Cultural Traditions

Identify practices of construction, design, and use associated with cultural traditions and ethnographic groups that influenced the development of the road corridor. These may include:

- Historic, prehistoric, ethnographic or vernacular sites, structures, and artifacts that influenced the road's location and overall design
- Historic, prehistoric, ethnographic or vernacular building practices that provided design cues for the park road landscape (typical examples include "vernacular" split rail fences, "Appalachian-style" visitor facilities, and "adobe" walls, signs, and structures; Colonial Parkway's rough-aggregate concrete pavement designed to mimic historic marl roads is an exceptional example of road-builders intentionally evoking local traditions; Colonial Revival elements could be categorized as reflections of cultural traditions, as could explicitly "Modern" materials and motifs)
- The influence of historic tourist practices should also be considered in this category: tourist practices can influence the location, alignment, design, and materials of park roads. For example, roads designed to be enjoyed from small vehicles at slow speeds by visitors on extended vacations will exhibit different characteristics than roads designed to be experienced at higher speeds by visitors on more compressed schedules; the frequency, location, and design of lodgings and other visitor facilities will also reflect historical tourist practices
- Evolving cultural traditions also affected the location and content of roadside interpretation, which became more extensive as guided tours gave way to independent motor travel; the emphasis of interpretive texts may vary from the celebration of scenic wonders to folksy history to more rigorously interpreted ecological and cultural information

Cluster Arrangement

Describe the location of buildings, structures, and support facilities along the road corridor and identify the patterns that govern their placement

- Identify the historic and current location of structures, pullouts, parking lots, campgrounds, individual campsites, etc
- Describe the relationship between these facilities and the ordering principles that determined their layout, identifying variations that may reflect different eras or development strategies

Circulation

Since a park road is, by definition, a circulation element, the emphasis should be on identifying the ways in which it accommodates basic circulation functions and the individual road or road segment's relationship to broader park-wide or even regional circulation networks

- If the road or roads predated park development, describe historic circulation function(s)
- Describe the basic circulation function the road is intended to perform in the park (does it connect scenic features, recreational features, historic sites, administrative elements, etc? — or combinations thereof?)
- Describe the road's relationship to other roads within the park or surrounding area, both in general terms and in regard to intersection locations and designs (noting any changes that have occurred)
- Describe the road's relationship to other circulation systems such as sidewalks, foot paths, bridle trails, boat launches, maintenance networks, fire roads, etc.· Identify seasonal variations in circulation, such as the influence of snowfall, rainy periods, visitation patterns associated with natural cycles like foliage or cultural factors such as holidays and special events
- If more than one road is being examined, articulate the relationships between the various segments, identifying historic and contemporary travel patterns, hierarchies of use, interpretation, or management

- Identify major changes that have occurred to the circulation system, including full or partial closures, bypasses, changes between one- and two-way traffic, the addition of multiple lanes, the impact of new roads, bridges, tunnels or other developments altering historic travel patterns or design concerns, etc.
- Describe relevant external influences on the park road's circulation functions, such as increased or decreased traffic loads due to surrounding development or road construction
- Identify other impacts on the road's circulatory function, such as changing vehicle standards, visitation numbers, and usage patterns

Topography

Detail how the road relates to specific topographical conditions

- How is the road located in response to topographic features such hills, valleys, ridges, passes, ravines, lakes, watercourses, etc?
- How do the location and design of the roadway reveal, conceal, and/or showcase topographic features (and how are these techniques sequenced for varied scenic effects?)
- How does the horizontal and vertical alignment (plan and profile) relate to topographical conditions? Does the road climb steeply or gradually? With many switchbacks or fewer longer curves? Where and how are curves located? Does the road generally follow natural contours, winding around obstacles, or does it slice through the terrain on notable cuts and fills? How else does the basic topography affect the design and experience of the roadway? Does the topography necessitate bridges, viaducts, retaining walls, guardwalls, etc?
- When cuts and fills are necessary, are the slide slopes harmonized with the natural topography or are disturbances to the natural topography plainly evident? If rock ledges were cut, is this obvious or were the cut surfaces "naturalized" by concealing drill marks, coloring, etc?
- How are scenic pullouts, parking areas and other associated features sited in relationship to topography?

Vegetation

Characterize the roadside vegetation and its impact on the road's development and visual character

- Describe the basic massing and character of the existing vegetation; identify both general patterns and individual species
- Describe the ways in which designers placed the roadway and manipulated the character and massing of surrounding vegetation help define the park road experience, paying particular attention to the ways in which designers manipulated these elements through planting, clearing, trimming and other techniques
- Distinguish between indigenous and non-native species, noting whether non-native species were associated with road's development or pre-existing land uses, or reflect post-development processes
- Try to distinguish between vegetation that was present during the period of significance and subsequent alterations stemming either from natural processes or management policies: have historic views been occluded, clearings grown in, or treelines moved forward or back?
- Determine the health of the vegetation: have disease, invasive species or other influences affected the health of the vegetation?
- Identify changes and threats to vegetation that may not be contiguous but plays a significant role in constituting the view from the road

Buildings and Structures

Identify the location, character, and basic dimensions of buildings and major structures found along the roadway, including:

- Engineering structures such as bridges, viaducts, retaining walls and other slope stabilization devices, guardwalls, guard rails, and drainage features including culverts, culvert headwalls, and gutters
- Park-related constructions such as entrance stations, entrance arches, wayside kiosks and other interpretive facilities, comfort stations, visitor centers, administrative buildings and maintenance facilities
- Pre-existing resources such as historic buildings and agricultural structures, statues, and monuments
- For each building or structure, briefly note its condition and impact on the park road landscape

Views and Vistas

Describe the views and vistas that collectively comprise the park road's scenic character

- Describe the general view of and from the road, which may exhibit considerable variation: what does the roadside scenery consist of? Are vegetation and other objects close to the travel surface, distant, at various distances? Is there a general sense of enclosure, openness, exposure, variation? Are there notable sequences? Does the road provide sweeping panoramic vistas, occasional glimpses of scenic attractions, intimate proximity to natural or historic features, etc? How do the road and associated features contribute to the landscape experience? How are all these impressions created through combinations of road design, topography, and vegetation?
- Identify designed views and vistas intended to showcase exceptional scenery, either from a stationary position such as a pullout or overlook, or displayed in motion as highlighted through axial alignments, curves or other design elements; describe both the nature of the scenery and the techniques used to display it
- Identify and describe view-framing devices such as vista-cutting, canopy views, and tunnel portals or adets
- Determine if changes in vegetation have impacted intended views and vistas (either by obscuring planned views or by opening up new ones)
- Determine if changing land uses or other factors have altered views, either within the study area, the broader park, or the surrounding locale
- Identify general trends or specific projects that may impact park road viewsheds

Constructed Water Features

Identify constructed water features that contribute to the park road landscape

- Describe the location and character of dams, canals, constructed waterfalls, ponds, or reservoirs that are constituents of the park road landscape
- Identify instances in which stream courses and other "natural" water features have been manipulated to enhance the appearance or function of the park road corridor
- Describe changes that have occurred since the road's development, either through natural processes or managerial actions

Small-scale Features

Document the location, character, age, and condition of small-scale features that contribute to the appearance and/or pragmatic function of the park road landscape, which may include

- Park development-related features such as road signs, interpretive signs, other directional and administrative signage, fences, water fountains, watering stations for horses or automobiles, curbs, lane-striping, reflectors, picnic tables, benches, trash receptacles, etc.
- Pre-park development-era features such as historic fences, monuments, tablets, and displays; vernacular landscape features such as stonewalls or other agricultural relics; other small-scale features reflective of previous land uses

Archeological Sites

The CLR survey should note the location and condition of known surface and subsurface sites of prehistoric and historic activities within the road corridor or associated with the historic road, including

- Prehistoric sites such as Native American architecture, mounds, trails, and other sites
- Historic sites and structures related to specific events such as battles, migrations, encampments, celebrations, etc
- Historic roads and related structures pre-dating park development
- Historic sites and structures related to pre-park activities such as settlement, agricultural, logging, mining, and transportation (including trails, railroads, and canals)
- Historic sites and artifacts related to park roads and associated developments, including: overlaid pavements and associated road features directly within the current road prism; archeological evidence of former plantings or landscape management practices; abandoned road segments and fragments (such as travel surfaces, ditches, culverts, curbing, retaining walls, guardwalls, etc.); abandoned bridges, bridge abutments, and fragments; road construction or maintenance camps and facilities; quarries and borrow pits; travel-related sites and artifacts such as parking areas, campsites, food & lodging concessions, gas stations, stagecoach loading platforms, etc. (most of these associated facilities should be noted in brief unless they are either within the road corridor or contribute strongly to its significance)

ANALYSIS AND EVALUATION

This component of the CLR compares existing resources to historical conditions in order to assess the integrity of historic park roads and related resources, establish their significance, and identify principle preservation concerns.

This procedure involves articulating the park road's significance, identifying aspects of the park road landscape that define its historic character, and then evaluating the current condition of the resource to determine whether or not it possesses sufficient integrity to convey its historic character and significance. This process is an important step toward developing specific treatment plans and broader stewardship policies.

The analysis and evaluation section begins by establishing the road's significance in relation to broader themes in American history. While the general historical section traces the road's entire evolution in considerable detail, this component takes a more selective and analytical approach, identifying the most important aspects of the road's design, use, and development.

The basic approach for making determinations of significance is outlined in the National Register bulletin *How to Apply the National Register Criteria for Evaluation*. Additional guidance in applying National Register criteria to cultural landscapes can be found in the National Register bulletins *How to Evaluate Historic Designed Landscapes* and *Guidelines for Evaluating and Documenting Rural Historic Landscapes*.

Park roads are most likely to qualify under the National Register Criteria A: Association with events that have made a significant contribution to the broad patterns of our past; and/or C: Design/ Construction. Other criteria may also contribute to a park road's significance. A significant designer or administrator may have been associated with its development, for instance, or an important figure may have had some relationship to the site, making it eligible under Criterion B. For road's predating park development, significance may be associated with historical patterns of migration or commerce, or with a specific event such as a military engagement, political action, or cultural event. Many roads are likely to be eligible under several categories and should be evaluated accordingly. The ways in which the road embodies these criteria should be clearly demonstrated, along with the road's relationship to recognized contexts and theme studies.

The National Register and the NPS Park History Program have identified a broad array of historic themes and developed detailed context studies for many of them. Contexts and areas of significance that may prove useful for evaluating park roads include: Architecture, (especially "NPS Rustic Architecture"), Community Planning and Development, Conservation, Engineering, Entertainment/Recreation, Landscape Architecture (see context studies on "Landscape Architecture in the NPS, 1916-1941), Politics/Government, Social History, and Transportation. Sidebar 4 highlights several National Register nominations that demonstrate various approaches to the evaluation and registration of historic park road resources.

It is important to remember that a road need not possess national significance in order to be eligible for the National Register. Many park roads have considerable significance at the state or local level. If a historic road is a representative example of its type within a park, NPS region, or state, it may merit listing in the National Register and concomitant attention in the CLR.

Establishing the period of significance is a critical aspect of the evaluation process. Periods of significance should reflect historically-based dates of development or use, rather than arbitrary applications of the National Register's fifty-year eligibility standard. The "fifty-year rule" is not an absolute cut-off date, moreover. Consideration can be given for newer roads and related features of exceptional significance. If the majority of a road's resources were constructed more than fifty years prior to the evaluation, there is no need to demonstrate exceptional significance for contributing features from a later period as long as it represents a continuum of the historical development scheme. CLR preparation should also consider the prospects of roads that are approaching the fifty-year threshold. Many Mission 66-era park roads will soon be reaching the point of potential eligibility and CLRs should be developed with this fact in mind.

After identifying the context and period of a park road's significance, the next step is to delineate its character-defining features. Not all existing features are likely to be historic, nor will all historic elements necessarily qualify as character-defining features. Character-defining features are those aspects of a historic resource that are essential for conveying its identity and significance. In the case of historic park roads, character-defining features might include engineering factors such as pavement width, composition, curvature, and cross-section; structural elements such as bridges, culverts, signs, and guardwalls; broader landscape considerations such as vegetation, grading, roadside views, and designed vistas; and cultural associations or social practices such as motor tourism, auto-camping, public history, and commemoration.

Since road design standards change over time and landscape components may have been added or modified for various reasons, it is necessary to identify the features that defined the park road experience during the period of significance. Their historic characteristics and contributions to the overall park road landscape should be described in detail. Saying that a road "lies lightly on the land" or exhibits "naturalistic design" is not sufficient: specific dimensions, design techniques, materials, and landscape experiences should be articulated as precisely as possible. Subsequent deviations from historic standards should be carefully noted, along with the addition or removal of landscape elements. These determinations are essential for distinguishing between contributing and non-contributing features, assessing condition, and evaluating the overall integrity of park road landscapes. Seemingly minor variations in alignment, width, design speed, and vegetation management patterns can dramatically alter the character and integrity of historic park roads.

The National Register defines integrity as the ability of a resource to convey it historic significance. While integrity is often related to physical condition, the two terms are not synonymous. A resource may be in good condition from a maintenance standpoint, yet have little historic integrity, whereas a resource with high historic integrity may appear deficient from a purely functional standpoint. This distinction is particularly important for historic road evaluation, because measures intended to improve practical performance frequently compromise historic fabric and experiential character. This dichotomy should be kept in mind when interpreting materials that apply modern engineering standards to historic park road resources. In these documents, aspects of a road that the CLR might characterize as essential to its significance and integrity are often cited as technical problems in need of remediation. Technically-oriented condition analysis plays a role in the development of CLR treatment proposals, but the analysis and evaluation phase focuses on determining historic integrity as defined by National Register principles rather than by conformance to modern engineering standards.

In order to have integrity by National Register standards, a resource must retain sufficient physical evidence of its appearance during the period of significance for visitors to understand its historical character and significance. The National Register has identified seven qualities that must be evaluated in order to assess the integrity of a historic resource: location, design, setting, materials, workmanship, feeling, and association. Guidelines for applying these criteria to historic resources and cultural landscapes in general can be found in the previously cited National Register bulletins. The following paragraphs provide more specific guidance for evaluating the integrity of historic park roads.

Location is a fundamental aspect of a park road's integrity. To possess integrity a park road should generally occupy its original location, following the same route and providing access to the same sights and experiences that prevailed during the period of significance. While original location is a key concern, minor variations may be permissible, especially when they do not markedly alter the general park road experience. A modest relocation that carries the traveler through essentially the same terrain and maintains a similar relationship to the surrounding landscape might be allowable, as might minor reconfigurations of intersections or realignments of short road segments, unless the intersections or individual sections themselves are deemed inherently significant. Greater latitude should be allowed for lengthy park roads extending through relatively undifferentiated terrain than for comprehensively designed parkways where all aspects of location, alignment, and surrounding landscape development were more precisely planned and controlled.

Design incorporates the entire corpus of engineering, architectural, and landscape architectural techniques that establish a road's physical structure and experiential character, from the technical and aesthetic attributes of individual components to the appearance of distinctive sections to the general character of the park road as a whole. Key concerns include alignment, plan, cross-section, landscape design, and associated features, both large and small. It is important to consider both the condition of individual elements and the overall appearance of the park road landscape. All aspects of the road's designed landscape should be evaluated for conformance to historical appearances. Since concepts such as "NPS Rustic" or "Naturalistic Design" exhibited considerable regional and temporal variation, evaluation criteria should be location-based and time-specific. Selective alterations to individual components do not necessarily impair the integrity of the park road as a whole, but the overall impression produced by the park road's design should remain consistent with historical precedents. While technological upgrades can be accomplished in a context-sensitive manner, the cumulative effect of seemingly minor alterations in alignment, pavement width, guardwall height, and roadside grading and landscaping can severely compromise a park road's historic integrity. Strict conformance with historical appearances will be more important for parkways and other comprehensively designed roads nominated under Criteria C than for roads whose significance rests primarily in their association with historical events or their relationships to more general social patterns or processes.

Setting encompasses both the immediate roadside corridor and the broader environment visible from the travelway or associated viewpoints. While evaluation of the immediate roadway environment is closely related to the assessment of design, setting also applies to less overtly manipulated roadsides, whose character may be established by natural processes, agriculture, or other social practices. Historic photographs or written descriptions can often be consulted to evaluate the degree to which contemporary roadsides convey historical conditions. Setting also refers to the roads' relationship to broader landforms, landscapes, and cultural features. Integrity of setting can be compromised by natural processes such as floods or fires, or by social practices like logging, mining, or residential development, all of which can dramatically impact the view from the road. The cessation of traditional farming practices can adversely affect the setting of park roads intended to showcase agricultural heritage. Integrity may also be compromised if a road's significance is tied to its role in providing access to natural sites or cultural features that have been significantly altered or are no longer used according to historic patterns.

Materials clearly play a prominent role in establishing a park road's appearance and communicating its historical character. Assessing the degree to which the repair or replacement of original construction materials impairs a park road's integrity can create difficult judgments. Most park roads have been periodically resurfaced, so as long as the new surface retains the historic character (similar color, texture and basic composition), replacement should probably be condoned. The issue becomes more complex when evaluating masonry features such as guardwalls, gutters, curbs, and retaining walls. Modest repairs are usually unavoidable, but new materials and patterns should closely resemble historic fabric. Large-scale reconstructions and rehabilitations require careful consideration, especially when materials such as simulated stone are employed or the height, pattern, or coloration of the masonry is changed. The overall impact on the park road experience should be the determining factor. The relative significance of the feature should also be weighed. For roads where masonry guardwalls or traditional rail fencing contribute strongly to historic significance and character, material changes may have more profound effects on integrity than for roads where such features play less prominent roles. While vegetative materials clearly have finite lifespans, general massing and species composition should be consistent with historically significant conditions. Since vegetation is a dynamic resource, reasonable allowance should be made for natural evolutionary processes, which may have been envisioned by the original designers. The occlusion of planned vistas, encroachment of open spaces, and presence of invasive species are sources of concern, though these conditions can often be remedied through treatment.

Workmanship, or the visible evidence of group or individual craftsmanship, is another factor in evaluating the integrity of park roads. While most roads were produced through mechanized processes, traditional craftsmanship values were expressed in the construction of associated features such as guard walls, guard rails, culvert headwalls, signs, and other timber and masonry accouterments – much of which represents the historically significant handiwork of CCC enrollees. Replacing original hand-built features with mass-produced materials such as steel beams or simulated stone can seriously degrade the integrity of component resources and the park road as a whole. Even when hand labor is employed, deviations from historic masonry patterns and the use of rectilinear dimensioned lumber rather than hand-shaped timbers can have an adverse effect. On a more subtle level, modern grading practices can produce a cruder and more mechanistic appearance than was historically achieved through hand labor. Replacing slightly irregular field-based alignments with scientifically calculated curvature could also be seen as diminishing evidence of historic construction techniques and workmanship.

Feeling is a critical factor in evaluating the integrity historic park roads. In order to possess integrity of feeling, existing physical features must convey the road's historically significant character. While some modifications to original materials, workmanship, and location are permissible and perhaps inevitable, the overall impression conveyed by the park road landscape should enable modern viewers to partake in the same sensations that defined the park road experience during the period of significance. Since the park road experience is a dynamic impression produced by a complex combination of factors, the cumulative impact of incremental changes and seemingly minor alterations must be closely scrutinized. Speed and scale are important variables to consider along with more obvious changes to vegetation and constructed features. Studies have shown that minor increases in the width of the pavement, road prism, and rate of travel dramatically impact perceptions of the surrounding landscape. The traditional park road experience of winding slowly along a narrow pavement in close proximity to natural features is significantly compromised when speeds increase and the pavement or surrounding clear zone is perceptibly widened. If the park road's significance is tied to a specific period, design standard, and mode of experience, the historic impression as interpreted from plans, photographs, and contemporary accounts should form the basis of evaluation; the fact that a modernized park road follows a more or less historic alignment and is more attractively configured than a contemporary highway is not sufficient grounds to ascribe integrity of feeling.

Association, or the ability of a historic resource to provide a mental link to a historic event, period, or person, is a more abstract quality, but it also requires the presence of physical attributes that retain the ability to evoke past experiences. Location and setting may be more significant in this regard than materials and specific design attributes, but existing features must still communicate the essential character of the road's historic identity. Both the nature of the road's significance and the condition of character-defining features should be considered. A historic alignment may allow contemporary motorists to trace the same route as earlier visitors, but a high-speed modernized roadway flanked by imposing safety barriers and broad clear zones may not evoke the sense of adventure and accomplishment associated with early park travel. A reinforced concrete simulated-stone guardwall may be more attractive than a jersey barrier or steel w-beam, but it would be a stretch to claim that it conveys associations of traditional rustic construction practices or CCC-era social history. As with the evaluation of feeling, the overall impression afforded by the park road landscape, rather than the status of individual features, should guide the ultimate determination.

A historic road need not demonstrate integrity in every aspect to merit an overall positive evalution. The relative importance of the various aspects will depend on the nature of the roadway and its identified significance. A road that is listed primarily for its design and construction would be expected to exhibit considerable continuity in form, materials, and workmanship, while the integrity of a road that is linked to a specific event or individual may be evaluated more in terms of its location, setting, association, and feeling. It is important to remember that the feelings and associations generated by historic sites and locations are never enough to

justify a positive determination of integrity on their own: tangible physical evidence of a road's historic character must be present and readily visible in the contemporary landscape.

The National Register process also calls for the identification of contributing and non-contributing features. While this terminology is less critical for the CLR, the concept is useful for evaluating integrity and developing treatment plans. Generally speaking, aspects of the park road landscape that have been significantly altered or postdate the period of significance will not be considered contributing features, nor will period-correct elements that do not play significant roles in defining the resource's essential historic character. In some cases, historic features may have lost their individual integrity yet continue to play important roles in sustaining the overall character of the park road resource. A replacement guard wall, for instance, would possess no integrity of its own, but if it were reproduced convincingly, it could contribute to the overall historic appearance of the roadway. Landscape elements that have lost their historic character may also be returned to contributing status through remedial efforts outlined in the treatment section. Historic views could be reopened through selective cutting, original vegetation could be replanted, and various structural elements can be returned to their historic appearance. Where alterations are significant and irreversible, it may be necessary to designate entire sections of a road as non-contributing. This approach should be used sparingly, and only in situations where the broader park road landscape retains sufficient integrity to provide a strong sense of its historic character and identity.

While National Register guidelines should form the basis of the evaluations of significance and integrity, the CLR is not meant as a substitute for a National Register nomination or Determination of Eligibility (DOE). The CLR can build on or help to amend pre-existing nominations. When a DOE or nomination does not already exist, the research, documentation, and analysis conducted for the CLR can play an invaluable role in developing a formal submission. The CLR team should consult park and regional cultural resource specialists, National Register personnel, and State Historic Preservation Office staff to determine whether or not this would be a desirable course of action and then work closely with these experts to share research findings and collaborate in the preparation of any resultant DOEs or National Register nominations.

While the CLR analysis and evaluation process can assist in the preparation of National Register nominations and DOEs, its primary purpose is to identify resource management needs and set priorities for subsequent treatment plans. Understanding the significance, condition, and integrity of historic park road resources is a fundamental step in developing appropriate preservation plans and stewardship policies. The process for moving from research and analysis to the development of specific treatment recommendations is covered in the following section of this *Landscape Line*.

HISTORIC PARK ROAD TREATMENT

The treatment section of a historic road CLR builds on the research and analysis phases to produce a comprehensive park road stewardship strategy. The goal of the treatment plan is to retain the historically significant qualities of the park road, or, if necessary, to devise a program for returning the road and/or its component features to historically accurate conditions. The treatment plan must consider contemporary management concerns along with changing physical and technical factors, and may require innovative solutions to reconcile modern challenges with historical imperatives. It also needs to be sustainable, both environmentally and economically. Resource availability must be considered when proposing treatments that require significant initial outlays, long-term maintenance commitments, or unusual materials or technical expertise. The plan should articulate general policy goals, provide specific guidelines for the treatment and management of significant cultural resources, and propose measures for documenting treatment actions and evaluating their short and long term impacts.

The treatment plan should be devised in consultation with park staff and representatives from the various agencies involved in park road management. While all cultural resource specialists work within an ever-

SIDEBAR 4: EXAMPLES OF ROADS LISTED ON THE NATIONAL REGISTER OR AS NATIONAL HISTORIC LANDMARKS

Glacier National Park's **Going-to-the-Sun Road** was listed on the National Register in 1983. Since this was a relatively early park road nomination, the resource was categorized as a structure and the nomination emphasized engineered features such as bridges and tunnels, with limited reference to broader landscape characteristics. Boundaries were set at 15' on either side of the center line. The listed area amounted to just over 177 acres, stretching 48.7 miles from the eastern park boundary to an intersection several miles from the western boundary that represented a significant change in the historic location. The road was listed under the themes of engineering and park development, with a period of significance reflecting the original planning, design, and construction dates of 1921-1933. In 1997 the Going-to-the-Sun Road was designated a National Historic Landmark District. The NHL registration expanded the boundaries to 30' on either side of the center line and extended the period of significance to 1952, when the road was fully paved with bituminous concrete. The road was listed under NHL Criteria 1 & 4 and National Register Criteria A & C, with significance in landscape architecture, transportation, and politics. Greater emphasis was placed on broader landscape, planning and design concerns. The original width and alignment of the road were cited as retaining a high degree of integrity, along with the bridges, tunnels, substantial portions of the guardwalls, and the surrounding views and vegetation.

The 1987 National Register nomination **Multiple Resources for Zion National Park** included several roads and road-related features. The Zion-Mt. Carmel Highway (1926-1930) was listed as a contributing site with four major contributing resources: Zion-Mt. Carmel Highway Tunnel, Zion-Mt. Carmel Highway Switchbacks, Virgin River Bridge, and Pine Creek Bridge. Entrance signs, comfort stations, and the East Entrance Checking Station were listed as individual buildings. National Register Criteria A & C provided the basis of the road-related listings, for which the themes of landscape architecture, transportation, and NPS Rustic Style were invoked. A detailed addendum supported the 1996 listing of the scenic **Floor of the Valley Road** (1932-1942), which had been excluded earlier on the grounds that it lacked the engineering distinction of the Zion-Mt. Carmel Highway. The red-tinted pavement and native sandstone masonry were identified as character-defining features and retaining walls, drainage features, parking areas, and viewpoints were documented as contributing resources.

Shenandoah National Park's **Skyline Drive** was listed as a National Register Historic District in 1997. The extensively documented nomination supported its significance under Criteria A and C, emphasizing the areas of landscape architecture, transportation, social history, recreation, politics, engineering, conservation, and community planning and development. The 1931-1951 period of significance encompassed the drive's original planning and construction, along with important subsequent modifications prior to Mission 66. The drive's topography, vegetation, engineering, architecture, landscape design, and associated features were described at length. Recently reconstructed concrete-core guardwalls with hand-laid stone veneer created by splitting the original rockwork were deemed not to compromise the drive's historic integrity, despite their greater height and length and the switch from dry-laid to mortared construction.

Colonial Parkway, the primary circulation system of Colonial National Historical Park, was listed as a National Register Historic District in 2001, under Criteria A and C, with a period of significance stretching from 1930-1958. The latter date reflected the completion of final aspects of the parkway's development. Since primary development occurred during the 1930s, no exception was deemed necessary to qualify it as a resource achieving significance in less than fifty years. Colonial Parkway's significance rests in its role as an embodiment of park development and recreational trends of its period and in its status as an exceptionally intact example of 1930s landscape architecture and parkway design. Both the roadway itself and the broader parkway landscape were judged to possess a high degree of integrity. While several new grade-separation structures have been added, their massing and brick veneer harmonized with historic design standards. Bridge and pavement reconstructions similarly upheld traditional patterns. The Colonial Parkway nomination is an excellent illustration of a comprehensive landscape-based approach to park road documentation and evaluation.

The Natchez Trace Parkway in Mississippi contains several listed sections of the **Old Natchez Trace**, demonstrating the manner in which road-related sites predating NPS development have been recognized for their historic significance. A portion of the old trace in Madison County near the site of one of the earliest inns along the route was listed in 1976 for its significance in the areas of transportation, communication, and education. Another Madison County section including the **Old Natchez Trace and Choctaw Agency Site**, was listed in 1994. Of the 3.3 miles listed segment, which is distinguished by the remains of a 30'-wide surface that is occasionally sunken between high earthen banks, 1.4 miles are within parkway boundaries. This segment qualified for listing under Criteria A & D, on the grounds that the unpaved sunken roadway and overhanging vegetation evoke strong associations of the Old Natchez Trace, while both the Choctaw Agency site and the trace itself contain significant archeological resources.

expanding matrix of regulations, policies, and programmatic concerns, historic park road stewardship is further complicated by the array of agencies, authorities, and legal, technical, aesthetic, and ecological issues involved. In addition to complying with NPS planning regulations, General Management Plan prerogatives, and federal preservation and environmental protection laws, historic road CLRs must address the technical standards, policies, and protocols that inform contemporary highway engineering practice. This is particularly important in the treatment section of the CLR, where proposals must take into consideration national highway design standards along with the practical concerns and procedural requirements of the NPS Park Road Program (PRP) and its partners in the Federal Highway Administration's (FHWA) Federal Lands Highway Program (FLHP).

PRP staff and the regional FLHP coordinator should be closely consulted when developing the treatment component of the CLR. In addition to serving as liaisons with FHWA staff who will play a major role in implementing road projects, they can provide important guidance on technical and administrative matters, particularly in regard to coordinating CLR recommendations with PRP activities and published design standards.

Park Road Standards

The NPS has articulated its approach to park road design and management in a series of technical and administrative briefs dating back to the service's inception. The 1984 NPS *Park Road Standards* bulletin is the most recent publication in this series and should serve as the starting point for considerations of contemporary perspectives on design, function, and safety concerns. While the design specifications provided in the 1984 *Park Road Standards* adhere closely to general federal standards, the publication emphasizes that park roads are unique environments intended for leisurely recreational travel. Preserving the quality of the park road experience is an explicitly stated goal. When accommodating current or projected demands would entail measures that might compromise a park road's unique qualities, *Park Road Standards* recommends adopting policies to control incompatible uses. The CLR can call attention to these published policy goals to help make the case for context-sensitive park road stewardship.

While *Park Road Standards* promotes flexibility over the rigid application of formulaic technical criteria, the influence of such standards remains pervasive. The principal source of standards for road development in the United States is the American Association of State Highway and Transportation Officials' *A Policy on Geometric Design of Highways and Streets.* Commonly known as the AASHTO Green Book, this publication provides specifications, or "AASHTO standards," for virtually every aspect of road construction, from pavement width, curvature, and sight distance to guardwall location, height, and composition. While AASHTO standards are legally binding only for roads within the officially designated federal highway system (or where otherwise adopted by the governing agency), the Green Book's depth, breadth, and rigorously tested technical data make it the primary reference for highway engineers and transportation planners engaged in road-building and rehabilitation activities throughout the country. AASHTO's *Roadside Design Guide* provides additional information on roadside safety treatments, with extensive details on safety barriers, clear zones, and related matters that bear directly on park road management.

In proposing treatments for historic park roads, it is important to recognize that the solutions called for in modern engineering publications are not always compatible with efforts to maintain or restore historic integrity. The potential for conflict between historic values and contemporary technical criteria is greatest when applying standards prepared for modern highway construction to historic roads designed for different eras, different purposes, and different technical constraints. Since Green Book solutions may occasionally seem incompatible with traditional park road values, it is important to underscore that AASHTO standards are intended to serve as general recommendations rather than as inflexible stipulations. Unless a historic road is part of the federal highway system, it is permissible for the CLR to propose alternative solutions that are more historically appropriate and context-sensitive. The Green Book acknowledges that recreational roads have

unique requirements and endorses the use of site-specific design criteria "intended to protect, and enhance existing aesthetic, ecological, environmental, and cultural amenities." AASHTO standards for recreational roads with design speeds under 60 kph (37 mph) permit more horizontal curvature, narrower shoulders and recovery zones, and a greater diversity of safety barriers than called for in utilitarian highway development (AASHTO 2001; 443-53; quoted, p. 443).

The FHWA has similarly recognized the value of context-sensitive design and provided guidance for taking advantage of the inherent flexibility of AASHTO standards in its 1997 publication, *Flexibility in Highway Design.* Additional assistance in understanding AASHTO standards and coordinating them with historic preservation concerns can be found in Paul Daniel Marriott's *Saving Historic Roads: Design & Policy Guidelines* (Marriott 1998).

Since road standards are geared to projected use patterns, the manner in which a park road is officially classified plays an important role in defining standards and determining appropriate solutions. Both the NPS and AASHTO recommend different treatments depending on the functional classification and expected traffic burdens of a roadway. As outlined in the 1984 *Park Road Standards*, the major categories of NPS park roads are Principal Park Road/Rural Parkway, Connector Park Road, Special Purpose Park Road, and Primitive Park Road. Administrative roads have two subcategories and Urban Parkways and City Streets are also accorded separate guidelines. Where conditions warrant, it may be possible to reclassify a historic road to facilitate compliance.

In some cases, it may be desirable to propose solutions that exceed standard interpretations of flexibility. For legal and administrative reasons, it is necessary to document alternative treatments through what is known as the "design exception process." Demonstrating reduced travel speeds, light traffic volumes, and lower-than-normal accident rates can help make the case for context-sensitive design exceptions aimed at preserving the character-defining features of historic roads. All recommendations to explore the design exception option should be made in close consultation with park staff, PRP personnel, and regional FHWA officials. While the process can be time-consuming and challenging on technical, aesthetic, and bureaucratic levels, it can lead to creative solutions that harmonize the complex goals of resource protection, safety, and sustainability.

Compliance

Park road treatment proposals must also take into account the various compliance procedures that regulate development practices on federal lands. The National Environmental Policy Act (NEPA) and Section 106 of the Historic Preservation Act (Section 106) should be considered from the outset of the CLR process to avoid unnecessary problems when it comes time to implement treatment recommendations. Although the CLR does not legally require public input, the potential for treatment recommendations to affect visitors, neighbors, and natural resources suggests that the CLR scope of work consider the possibility of complying with the NEPA public input process. When an environmental assessment (EA), environmental impact statement (EIS), or Section 106 compliance process is required to implement the proposed treatment recommendations, all affected parties should be included in the CLR development process to facilitate subsequent administrative procedures.

In addition to these general compliance procedures, park road projects are potentially subject to review under Section 4(f) of the Department of Transportation Act of 1966, which declares it public policy to "preserve the natural beauty of the countryside and public park and recreation lands" and prohibits federal approval of transportation projects that use public parks, historic sites, recreation areas, or wildlife refuges unless there is "no feasible and prudent alternative" and the proposal "includes all possible planning to minimize harm" to the site. For 4(f) purposes, "use" is defined broadly enough to include noise and other indirect environmental impacts. Since 4(f) focuses specifically on a road's use of parkland, treatment recommendations that call for lane-widening, altered alignments, or the development of additional features may trigger 4(f) review. The CLR team should consult with the park FHLP coordinator throughout the report's process to ensure compliance. While Section 4(f) has the potential to be a strong ally in historic road preservation efforts, varying interpretations

of the legislation's key phrases can limit its effectiveness. Treatment recommendations should conform to the act's intentions. Section 4(f)'s planning requirement also makes it a potential source of funding for CLR development.

Given the extent of many park road systems, it may be advantageous to develop programmatic agreements to resolve compliance issues rather than deal with separate but similar sites on an individual basis. Standard roadway cross-sections, pavement widths, guard wall patterns, and vegetation management procedures can be generated to guide treatment activities along an entire roadway or sub component. Compliance agreements for individual sites with unique requirements should be developed independently.

Since road projects have limited funding for compliance-related activities, it is essential to work with the PRP and other potential partners to understand what projects are being scheduled, which have the potential to effect historic park roads, and when compliance mandates might help fund CLR development. PRP managers are beginning to recognize the merits of undertaking cultural landscape research to assist their park road projects and are coordinating with the regional cultural landscape programs to accomplish this effort.

Developing a Management Philosophy

The treatment section of the CLR should provide a management philosophy statement that defines the principle objectives of the historic road stewardship plan and outlines the general nature of the treatment activities required to achieve these objectives. This management philosophy statement should articulate both long-term stewardship strategies and specific treatment goals. It should clearly express the road's historic significance and outline the preferred approach to preserving the landscape's essential physical characteristics. The management philosophy should be consistent with general park resource management concerns, with FHWA requirements, and with the Secretary of the Interior's standards for the treatment of cultural landscapes.

The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes defines four general approaches to landscape stewardship: Preservation, Rehabilitation, Restoration, and Reconstruction. While one of these approaches will generally be defined as the principle treatment philosophy for the overall resource, individual segments and component features may require various treatments depending on existing conditions and management goals. It is important to remember that the highway engineering community employs similar terminology to describe different and in some cases contradictory processes. Communications with engineering staff should clearly establish which definitions of these terms are being applied and what the results of the proposed actions will entail.

Preservation retains the existing character and fabric of the historic park road landscape with the highest possible degree of integrity in regard to materials, setting, design, feeling, and location. Preservation-based treatment plans typically emphasize maintenance and stabilization regimes aimed at ensuring the longevity of existing features. Measures may be taken to protect and stabilize historic road resources, and limited and sensitive upgrading of technical systems is permissible, but distinctive materials, features, and design elements should not be substantially altered or replaced. When original features or materials have deteriorated to the point that they compromise the historic character or safety of the site, limited replacement-in-kind is permitted. Discreet stabilization measures designed to reinforce or extend the longevity of historic features can also play a part in preservation plans. These minor interventions should not impact the overall character and integrity of the historic park road landscape.

The ever-changing demands placed on park roads make strict preservation a difficult goal to achieve. Modern traffic burdens and safety requirements – along with general age-related deterioration of heavily used functional features – frequently mandate technical upgrades and material replacements that, even when kept within context-sensitive limits, exceed standard definitions of preservation. If a historic park road's design has been deemed extraordinarily significant (through NHL designation, for instance), or current use

can be maintained at or returned to levels commensurate with historic patterns, then preservation is a more viable option. Some historic roads or road segments have been preserved by restricting travel to one direction, regulating vehicle size, or reserving them for non-motorized travel.

Rehabilitation aims to protect the essential character of the park road landscape while accommodating compatible uses that may require modest alterations to the resource's physical fabric and design qualities. Rehabilitation allows for the replacement of deteriorated features on a wider scale than preservation-based treatments, along with more extensive substitution of compatible materials designed to meet current needs. Because rehabilitation-based treatment plans respond to current demands while safeguarding key historic values, they often provide the most acceptable means of resolving the inherent tensions of park road stewardship. The primary challenge in devising rehabilitation strategies is to identify character-defining features and ensure that planned alterations do not compromise the road's overall historic character.

Rehabilitation allows for minor lane-widening and alignment improvements, updating paving materials and technical systems, and the addition of compatible safety measures. It provides more flexibility for replacing hard-to-find plant species and construction materials, such as locally gathered stone, which is often no longer available due to changing environmental regulations. Modifications must be carefully considered and meticulously specified to ensure that they do not detract from the road's overall character and that remaining historic materials, features, and spatial relationships are protected.

Restoration focuses on returning a historic road to its appearance during the period of significance. This process may include the reconstruction of damaged or missing features and the removal of elements from other eras that detract from the historic scene. Limited upgrading of technical systems is permitted as long as these interventions are discreet and compatible. Existing features from the period of significance will be retained and stabilized. All changes should be carefully researched and specified to ensure that they are historically accurate in regard to design, materials, and overall impression. A long-term management plan should be devised to maintain the desired historical appearance.

Given the evolving demands on park roads, comprehensive restoration to historic periods is usually impractical, unless future use can be limited to compatible functions. Restoration may be a viable strategy for bypassed road segments or for roads where current use does not threaten the integrity of the resource. For historic road segments that function apart from the main visitor circulation system – such as the vernacular lanes of military parks or abandoned sections of the Old Natchez Trace – restoration may be a desirable and practical strategy. More limited restorations can play an important role in park road stewardship: vegetation can be restored to historic patterns, designed views can be restored through selective trimming, damaged or missing walls, signs and smaller features can be repaired or replaced in historically accurate patterns, and incompatible elements can be removed to reproduce historic appearances.

Reconstruction is the process of recreating a non-surviving site, structure, feature, or landscape. This approach should only be employed when the non-surviving resource is deemed exceptionally significant and sufficient documentary evidence exists to ensure an accurate replication of the historical antecedent. Because of the inherent technical challenges and philosophical implications, reconstructions require extensive consideration and high-level review, culminating with written approval from the NPS Director. If reconstruction is deemed a suitable strategy, the artificial nature of the landscape should be explicitly identified and interpreted.

While large-scale reconstruction will rarely be an appropriate strategy for historic park road management, it may occasionally be desirable to reconstruct short segments that have been lost through natural processes or administrative actions. A landslide may destroy a section of historic road, for instance, or an earlier alignment may be brought back into use for various reasons. The reconstruction of small-scale features can contribute to comprehensive stewardship plans guided

by other treatment philosophies. Even minor reconstructions should be carefully documented and conform to the Secretary of the Interior's standards.

Given the size and complexity of most historic park roads, it is likely that park road treatment plans will incorporate various treatment philosophies to address the range of conditions encountered along the roadway corridor. It is generally desirable to choose a primary stewardship philosophy based on the character and significance of the resource as whole and then articulate the nature and extent of site-specific treatments. The cumulative results of individual treatment recommendations should clearly reflect the guiding principles of the overall plan.

Developing the Treatment Plan

Once the overall treatment approach has been defined, a detailed historic road treatment plan should be developed. The treatment plan should outline the overall philosophy, provide general guidelines for treating common resource management issues, and include detailed specifications for the treatment of sites, features, and broader landscape or planning elements that have been identified as requiring restoration, preservation, rehabilitation, or reconstruction. Maintenance regimes should be outlined, both for resources currently deemed in satisfactory condition and to ensure the success and longevity of proposed enhancements. The treatment plan can also propose interpretative measures designed to enhance visitor awareness of the road's general history and significance or call attention to specific features or preservation measures.

The treatment plan should clearly articulate proposed alterations, material specifications, construction techniques, and maintenance directives, being sure to employ terminology and graphic conventions familiar to highway engineers, road construction contractors, and maintenance personnel. The "Anatomy of a Road" section should be consulted for clarification when necessary. Standard sections, plans, and profiles should be prepared according to the scope of the proposed interventions. Reproductions of historic plans, design details, and construction photographs can be useful for demonstrating design proposals and workmanship techniques. Additional information on the general form and content of the treatment plan, including cost estimates and project agreement forms, can be found in *A Guide to Cultural Landscape Report*s and the accompanying *Landscape Lines*.

Sidebar 5: Historic Park Road Treatment Guidelines

- Preserve as much of the historic road corridor as possible, including constructed features and associated landscape settings
- Consider managerial solutions before proposing physical alterations to historic road landscapes
- Promote alternative transportation to reduce traffic volume and control circulation patterns
- Maintain historic road alignments, cross-sections and profiles as closely as possible
- Realign roads only when absolutely necessary and try to retain historic character, views, width, and curvature
- Retain original road width where possible; consider alternative techniques such as stabilized shoulders
- Preserve, rehabilitate, or find compatible replacements for original paving materials
- Preserve, restore, or replace-in-kind historic features such as barrier walls, fences, and guardrails, curbs, gutters, culverts, signage, scenic pullouts, bridges, and tunnels
- Limit the construction of new barriers or systematic rehabilitation to areas with demonstrated safety hazards
- Use materials and construction methods that replicate the effect of historic building practices
- Modern materials and construction methods that reduce costs and enhance durability should only be used where they do not detract from historical character
- Choose materials and methods that are sustainable, compatible, and cost-effective in the long term
- Maintain and restore historic vegetation patterns, especially in regard to corridor-width, canopies, and planned vistas
- Protect associated scenic, natural, and cultural features that are part of the character of the road system including rock formations, vegetation, water bodies, views, agricultural areas, buildings, structures, markers, and monuments
- Preserve ethnographic resources and protect archeological sites
- Develop interpretation programs to enhance public awareness of park road history and build support for historic road preservation

While the CLR team or individual preparer will bear primary responsibility, the treatment plan should be developed in cooperation with park staff, PRP personnel, and the FHWA's regional FLHP coordinator. The State Historic Preservation Office should also be consulted when dealing with roads listed on or eligible for listing on the National Register. NPS regional staff can also provide guidance on various technical, programmatic, and philosophical matters. Valuable information can often be obtained from staff in parks that have extensive experience in historic park road management, such as Glacier, Acadia, Yellowstone, and Yosemite. Collaborating with all the relevant professional staff, partners, and regulatory officials throughout the CLR development process will greatly facilitate approval and implementation phases.

Historic Park Road Treatment Considerations

This section provides an overview of some of the most common treatment concerns associated with historic park road management. While a range of topics and potential solutions are discussed, this brief survey is neither comprehensive nor definitive. Every historic road presents unique challenges requiring individualized, site-specific solutions, while treatment techniques and stewardship philosophies are constantly evolving in response to new demands, new technologies, and ever-changing social, administrative, and financial concerns. While every historic park road project entails unique solutions, the following survey covers many of the ways in which the NPS and FHWA have collaborated to preserve and maintain America's national park roads and parkways.

Location and Alignment

Park road designers took enormous care to locate roads in relationship to natural and cultural features and produce alignments that combined beauty and utility through subtle adaptations to local conditions, scenic features, and administrative concerns. Any changes to these basic attributes should be carefully considered. While site-specific remediation may be merited to accommodate new programmatic demands, adapt to changing natural conditions, or alleviate demonstrated safety hazards, the systematic alteration of historic curvature to conform to contemporary design standards can significantly compromise a park road's experiential qualities and historic integrity. Original design intent can be illustrated with historic design documents and invoked to justify variations from current codes. Low accident history records can be employed to demonstrate the functional safety of roads that do not meet contemporary standards for minimum curvature. Regulatory measures such as lower speed limits, restrictions on vehicle length, and one-way circulation patterns can reduce potential hazards with minimal physical impact on historic resources.

These techniques were employed on Mount Rainier's Eastside Highway, where a proposed realignment would have significantly altered a historic bridge and its designed approaches. The significance of the original design was demonstrated and speed regulations and improved enforcement were combined with a modest increase in curve radius to produce a solution that reconciled contemporary safety concerns with park road preservation. In Sequoia National Park, tour bus companies agreed to stop using a particularly circuitous portion of the Generals Highway, making it possible to retain a series of tight curves that contribute significantly to the road's historic character and significance. In Yellowstone National Park, however, historic tour road

Figure 20. Classic park road with tight curvature calculated to provide thrilling views of natural scenery; changing historic alignment to conform to modern standards not recommended; Glacier Point Road, Yosemite National Park. (Davis 2000)

alignments were systematically modernized to accommodate contemporary traffic. While both horizontal and vertical curves were lengthened and regularized, spiral transitions were employed to evoke the historically winding alignment.

Profile

Since most existing park roads were designed with relatively gentle and consistent grades to accommodate mid-twentieth century automobiles, there is generally less pressure to alter their vertical alignment. The most common reasons for altering historic profiles are to reduce excessive vertical curvature that restricts sight distance or to smooth out "roller-coaster" dips and bumps. Minor regrading to eliminate dangerous blindspots can often be accomplished without dramatically altering overall road quality, but achieving complete conformance with contemporary standards in the mountainous terrain of many parks may require excessive excavation and/or dramatic relocations. While smoothing out minor irregularities may afford a more consistent and comfortable ride, excessive standardization can eliminate the sense of serendipity and dynamic interaction with the landscape that differentiates park road travel from ordinary motoring.

Historic bridges can produce profile irregularities that restrict sight distance or create sudden and potentially dangerous bumps, the effects of which are often rendered more hazardous by accompanying lane-width constrictions. During the rehabilitation of the White Bridge at Vanderbilt Mansion National Historical Site, the vertical alignment was raised and flattened to eliminate an abrupt roller-coaster profile that caused excessive wear and tear on vehicles, their occupants, and the bridge itself.

Pavement

Pavement rehabilitation is one of the most common and challenging aspects of historic park road management. Pavements wear out. Subgrades deteriorate. Vehicles get longer, wider, and heavier and many motorists want to drive faster and more effortlessly. Engineering standards evolve to accommodate these new demands, calling for wider travel lanes and broader shoulders. These alterations are often implemented during resurfacing projects, since FLHP funding for functional rehabilitation is generally accompanied by requests to adhere to prevailing standards.

Adding lanes, widening existing lanes, and expanding or adding shoulders may enhance travel flow, but at considerable cost to the historic integrity and experiential character of traditional park roads. Even seemingly minor lane-widening and shoulder adjustments can adversely affect historic character by increasing the pavement's domination of the forward view, creating greater separation between motorists and their surroundings and producing an incentive toward higher speeds, which further compromises the park road experience and may cause additional safety hazards.

Cultural resource specialists should work closely with park management, PRP staff, and FLHP engineers to underscore the importance of historic pavement configurations and ensure that pavement-widening is kept to the minimum consistent with visitor safety. Alternatives such as signage, speed reductions, and vehicle restrictions should be thoroughly explored. Minor widenings at curves and other hazard points, along with the introduction of occasional pullouts for slow-moving traffic, can alleviate many problems. Where systematic lane-widening is ruled unavoidable, the impact on the resource should be duly noted, even if this means acknowledging the loss of historic integrity.

The expansion or addition of paved shoulders can be a means of effectively widening the travel surface. This approach should be carefully reviewed, however, since the visual and perceptual results are similar to straightforward pavement widening. A less visually obtrusive means of enhancing safety and overall performance is to provide stabilized earth, gravel, or turf shoulders. Stabilized shoulders allow vehicles to recover from minor deviations or pull safely off the main travelway, yet they are less noticeable and more permeable than paved shoulders, reducing excessive water runoff concerns.

Modern motor traffic places tremendous demands on historic pavements, many of which were built with minimal sub grades and primitive surface materials.

(A)

(B)

(C)

(D)

Figure 21. Comparative views showing effects of changes to alignment, road width, and clear zone: (A) Classic narrow winding park road laid lightly on the land with tight curvature, relatively steep grade, and no shoulders, (Hawaii Volcanoes National Park); B) Longer curves, gentler grade, and slightly wider pavement, with minimal gravel shoulder and vegetation approaching the edge of travelway, (Yosemite National Park); C) Recently rehabilitated road with longer curves, wider paved shoulders and expanded clear zone, (Yellowstone National Park); D) Four-lane dual roadway with median in high traffic area. (Yellowstone National Park) (Davis 1996-2001)

While historic dirt, gravel, macadam, brick, and cobblestone surfaces should be preserved whenever possible, mid-twentieth-century concrete or bituminous aggregate pavements can often be replaced with improved modern materials without compromising the road's overall integrity. Major repaving projects often afford the opportunity to improve subgrades and drainage systems, further enhancing the performance and longevity of historic park roads. When historic surfaces have a distinctive tint, texture, or composition, these qualities should be reproduced with compatible modern materials. The red-tinged pavements that harmonize many Southwestern park roads with their surroundings have been retained through multiple resurfacings. When sections of Colonial Parkway required rehabilitation, considerable effort was made to emulate the original rough-textured concrete pavement, which was itself a 1930s attempt to evoke historic shell road surfaces in modern materials. A recent resurfacing project at Acadia National Park employed a coarse final "chip coat" layer to restore a rustic crushed-stone appearance that had been compromised by multiple overlays with conventional bituminous concrete.

A common paving practice that should be avoided is the repeated layering of new material over existing surfaces. The accumulation of multiple pavement courses over time alters the relationship between the travel surface and its surroundings, effectively lowering the height of

safety barriers or creating potentially dangerous dropoffs that are rendered more hazardous by the narrow lane-widths and minimal shoulders of historic park roads.

Drainage

Properly functioning drainage systems prevent water from accumulating on park road pavements or undermining the basic road structure. Most paved park roads employ a slight crown to shed water. On curves, a banked or "superelevated" pavement may direct water to the inward or downhill side. Pavement rehabilitation programs should retain historic configurations unless they have proven ineffective, in which case minor improvements can generally be made without compromising the road's historic character.

A variety of techniques were used to accommodate surface runoff and channel other water sources such as intersecting streams, springs, and waterfalls. Shallow swales or ditches positioned at the edge of the road shoulder were often sufficient in areas with modest rainfall, permeable soils, and moderate terrain. Where conditions were more extreme or a more finished look was desired, gutters lined with local rock or stone pavers afforded durable and attractive options. Stabilizing gutters in this manner was a labor-intensive process, so this technique is more likely to be found in commemorative military parks and on roads where the CCC was involved in construction or rehabilitation efforts.

Historic ditches, swales, and gutters require ongoing maintenance to remove obstructions and preserve their appearance and structural integrity. Many ditches and gutters become seriously clogged over time, requiring more extensive remedial efforts. Much gutter damage is due to natural processes, but historically significant stone gutters have also been compromised by over-pavement with bituminous concrete. While such modern surfaces may be less expensive to apply and easier to maintain than historic materials, this treatment is not desirable and should be reversed wherever possible. Care should be taken to restore the original configuration and preserve historic paving materials as much as possible. Replacement-in-kind is the preferred treatment for lost or damaged materials.

Figure 22. Attentive maintenance is necessary to ensure that historic drainage features such as these stone-lined gutters in Acadia National Park do not become obstructed by vegetation, siltation or other natural processes. (Foulds 1993)

Culverts are another means of controlling surface runoff and containing water sources that intersect the roadway. When culverts are used to divert surface runoff, they are often employed in association with drop inlets or curb inlets that collect water from the road surface. In some cases culverts may extend a significant distance from the roadbed to ensure that exiting water does not cause damaging erosion. Dimensions range from less than a foot in diameter for smaller culverts and underdrains to ten or twelve feet in span or diameter. Wider spans are generally referred to as bridges, though definitions vary considerably. In many cases the terms are used interchangeably. Historic construction materials include wood, stone, cast iron, vitrified clay, galvanized steel, and concrete. Headwalls, which help

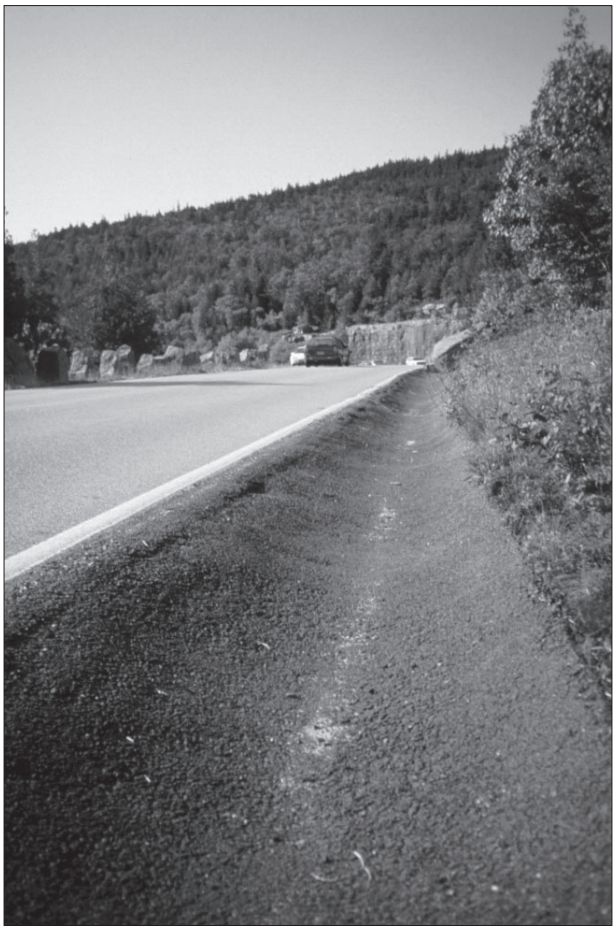

Figure 23. Many historic gutters have been overlain with bituminous concrete to ease maintenance and repair; such inappropriate treatments should be reversed whenever possible. (Foulds 1993)

channel water, secure the culvert, and stabilize the surrounding fill, were frequently constructed of native stone masonry or stone-faced concrete, especially when visible from the roadway or associated circulation networks.

Historic culverts may require a variety of treatments. They can clog with debris, collapse from excessive loads or material failure, and be undermined, dislocated or washed away by chronic or catastrophic flooding. Inlet grates, linings, and headwalls deteriorate, especially in the harsh environments of many national park roads. Road widening and realignment can also necessitate culvert replacement, extension, and relocation.

When culverts require treatment due to structural failures or roadbed alterations, there is usually no objection to replacing subterranean sections with modern materials or more efficient configurations. Exceptions may occur in the case of historic wood or masonry culverts whose materials and craftsmanship contribute measurably to the road's character and significance. When the actual materials and craftsmanship are deemed significant, as may be the case with hand-constructed culverts on some carriage drives or military park roads, or when the barrel of the culvert is visible to park users, then treatments should employ compatible materials and construction methods.

Most culvert treatment recommendations will concern headwalls, since these are usually the most visible and highly crafted elements. The preferred alternative is to preserve historic headwalls in place, stabilizing them and replacing lost or damaged materials in-kind using similar workmanship. On road-widening projects, it may be possible to relocate historic headwalls by moving them as integral units or by dismantling them for reassembly in conjunction with new or lengthened culverts.

If original headwalls are too deteriorated, or additional culverts are required for various reasons, existing headwalls, historic photos, or original plans can be consulted as the basis for reproductions, which should follow historical precedents as closely as possible. Since current laws generally prohibit quarrying within parks, imported materials should be matched as closely to historic stonework to avoid visual discrepancies. To save time and reduce on-site skill requirements, entire headwall assemblies can be precut and delivered to the site.

"Simulated stone," or reinforced concrete poured in forms designed to emulate traditional masonry, can be an economical alternative to hand-laid stone headwalls. The concrete surface should be tinted to harmonize with historic rockwork, either in the original mix or with surface color applications, which may be varied for greater naturalness. Though less desirable than authentic stonework, simulated stone is generally preferable to unadorned concrete. Some parks may consider it an acceptable solution, especially for less visible headwalls or locations where motorists will be passing at moderate speeds.

Neither simulated stone nor neo-rustic hand-crafted stonework is appropriate for headwalls or other features on park roads that historically displayed alternative masonry techniques. Colonial Parkway designers employed a Flemish-bond brick veneer to evoke historic masonry traditions, for instance, and some later parkways and park roads adopted a "streamlined" aesthetic of unadorned concrete, which should be retained for reasons of visual consistency and historic authenticity. Historic design motifs, colors, textures, dimensions, and construction techniques should be emulated as closely as possible when treating these headwalls.

Retaining Walls

Many historic park roads contain retaining walls and other structures designed to support the roadbed and stabilize slopes above or below the roadway. Generally constructed of locally quarried stone masonry, historic retaining walls vary from minor grade correctives a few feet in length and inches in height to immense structures towering hundreds of feet above steep cliffs and roaring rivers. Most range somewhere in between and, like headwalls and other examples of NPS rockwork, were designed to harmonize with their surroundings. In some cases, such as Glacier National Park's Going-to-the-Sun Road, retaining walls are spectacular structures that contribute substantially to the road's visual character and historic significance. In other cases, they are all but invisible to motorists, lying below the travelway or disappearing behind subsequent plant growth and soil accumulation.

Retaining wall treatments may range from minor repairs to significant structural rehabilitation to wholesale replacement when catastrophic failure occurs or road-widening or realignment requires changes in length, height, or location. Minor repairs should be aimed at preserving and stabilizing the original historic fabric. Permanently lost or damaged materials should be replaced in-kind whenever possible. Major stabilization efforts will generally require extensive collaboration with engineers and geotechnicians, especially when the original structure has exhibited signs of mechanical failure or the surrounding terrain has slumped or shifted. If significant alterations are required, rehabilitation measures should not detract from the appearance of walls and slopes that are visible to the public.

Figure 24. Historic stone culvert headwall salvaged and numbered for reassembly after road-widening is completed, Yellowstone National Park. (Davis 1996)

Figure 25. Modern pre-cut stone headwall awaiting installation on road rehabilitation project, Yellowstone National Park. (Davis 1996)

When natural forces, road-widening, or realignment projects necessitate the reconstruction, relocation, or extension of historic stone retaining walls, efforts should be made to salvage and reuse historic materials and emulate original design patterns and masonry techniques. Since the additional cutting and filling that often accompanies road-widening and realignments generally increases the need for retaining walls, salvaged materials will rarely be sufficient. Historical research can sometimes identify the location of original quarries, which can serve as sources of compatible material if quarrying within the park is allowed. Some parks have been able

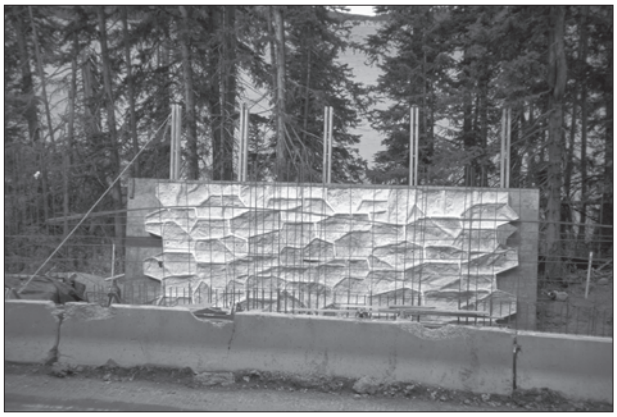

Figure 26. Formwork and foundation for simulated stone retaining wall, Yellowstone National Park. (Davis 1996)

Figure 27. Simulated stone retaining wall with integral culvert and crenellations: this treatment is best restricted to areas where visitors do not come close enough to discern the artificial nature of the materials, Yellowstone National Park. (Davis 1996)

to develop modest reserves of compatible material by collecting suitable stones from landsides and other naturally occurring rockfall. When rock must be imported from quarries outside the park, it should match the color, texture, and shapes of historic materials as closely as possible.

While traditional stone masonry techniques are preferable, stability factors and budgetary concerns may persuade parks to pursue other options. Reinforced concrete retaining walls faced with hand-laid stone veneer are generally more compatible with the historic character of park roads than simulated-stone fabrications, though the latter may be more economical in some situations. In either case, the scale, color, texture, and patterning should be based on local historic precedents, not on generic prototypes. For simulated stone, it is sometimes possible to ensure greater veracity by casting forms from historic rockwork. Joints between concrete sections will be less visible if they follow the "rock" contours and are tinted to match the "mortar" of the poured concrete. Tints can be applied to the simulated stonework, as well. When employed with skill and subtlety this technique can appear quite realistic to casual observers. As with culvert headwalls, the inauthenticity of simulated stone retaining walls will be less apparent if they are only used in areas where visitors are restricted to their cars and driving at moderate speeds.

Safety Barriers

Safety barriers such as guardwalls, guardrails, guiderails, and guideposts are common components of many historic park roads. Whether comprised of rugged boulders, hand-laid stone masonry, rough-hewn timbers, or hand-split rails, rustic safety barriers have long been character-defining features of national park road landscapes. While many of these barriers were intended to deflect vehicles traveling at relatively low speeds, their function has always been as much perceptual as physical. In addition to delineating the edge of the roadway, their rugged appearance provides psychological reassurance, while their rustic associations recall America's pioneer roots. Given their widespread presence, visual appeal, and compelling historical associations, rustic safety barriers can be considered character-defining features not just of individual park roads, but of the National Park System in general

While the historical significance and character-defining nature of traditional safety barriers is incontestable, developing appropriate treatment plans is one of the most challenging aspects of park road management. Not only is there considerable pressure to accommodate evolving engineering standards, but many historic walls and rails are showing their age. The normal deterioration of wood and masonry structures is often exacerbated by the harsh climates to which many park road barriers are subjected. Rockfall, avalanches, landslides, and vehicle impacts can cause problems ranging from minor damage to major failure. The need to develop preservation-oriented alternatives to

Figure 28. Historic stone safety barriers have functioned successfully in the low-speed, low-volume context of most park roads; Cadillac Mountain Road, Acadia National Park. (HAER 1995)

Figure 29. Motorists generally adapt their driving to park road conditions, making extensive guardwall construction unnecessary in locations with documented low accident rates such as this Lassen Volcanic National Park highway. (Davis 2001)

potentially incompatible rehabilitation or replacement programs is most pressing when severe physical deterioration is coupled with changing user demands and/or heightened managerial concerns for conforming with conventional engineering standards.

The CLR can be a persuasive vehicle for promoting treatments aimed at retaining or restoring historic guardwalls or guardrails, or, when absolutely necessary rehabilitating them in ways that retain the experiential character and historic integrity of park road landscapes. While visitor safety is clearly paramount, it is not always necessary to comprehensively upgrade historic barriers to conform with standards calculated for non-park roads. Preservation, minor rehabilitation, or replacement in-kind will be sufficient treatment alternatives in many cases. This is particularly true when low or non-existent accident history rates indicate that historic barrier systems have safely accommodated local demands. Not only do historic park roads generally experience lower speeds and traffic volumes than comparable non-park arteries, but park motorists typically adjust their driving behavior to accommodate the tight turns, narrow lanes, and steep side slopes that frequently characterize the park road experience. From a standard highway engineering perspective, these characteristics would normally mandate extensive retrofitting with new or improved safety barriers, but the inherent "traffic calming" nature of the park road experience has been demonstrated over decades of remarkably safe use.

While general AASHTO standards are often cited to support extensive guardwall rehabilitation and new construction on historic park roads, the official NPS *Park Road Standards* bulletin calls for a more conservative and context-sensitive approach. Observing that "Guardrail or guardwalls should be installed at points of unusual danger such as sharp curves or steep embankments, particularly at those points that are unusual compared to the overall characteristics of the road," the 1984 *Park Road Standards* advises that "The criteria used for warranting guardwall installation on high-speed, high-volume highways do not apply to low-speed, low-volume conditions found on most park roads" (NPS 1984, p. 32).

Interpretations of what constitutes unusual danger and acceptable criteria vary considerably from park to park and from profession to profession, which is why safety barrier treatment recommendations should be developed in consultation with park staff, PRP representatives, and FHWA engineers to ensure that all parties agree on a preferred course of action. The targeted construction of improved safety barriers in demonstrated problems areas may be necessary, in which case every effort should be made to harmonize with historic prototypes. Less physically obtrusive alternatives such as lowered speed limits, vehicle-size restrictions, and one-way traffic patterns should also be explored. The final decision on all such matters is the responsibility of the individual park superintendent.

The NPS and FHWA have worked cooperatively to develop a variety of safety barriers that meet contemporary standards while emulating historic design precedents to varying degrees. These treatments have been employed where existing barriers were considered unsafe or where additional safeguards were deemed necessary. In many cases, mutual decisions have been made to preserve, restore or replace historic guardwalls without major alterations so that the historic character and significance of roadway remains uncompromised. The degree to which guardwall additions and alterations will affect the overall historic integrity of a park road will depend on the nature of the revisions and the extent to which safety barriers serve as character-defining features.

Masonry Walls

Masonry guardwalls are among the most common and characteristic features of the national park road system. Some reflect the efforts of the Army Corps of Engineers and other pre-NPS proprietors, but most date from the "Golden Age" of park road-building between the two world wars, embodying the principles of rustic design propounded in contemporary plan books and discussed at length in various publications on NPS design history. Within the general rustic framework, there is considerable variety in size and shape, including flat-topped walls, various crenellated compositions, and large, independently-placed boulders. Rock size, conformation, and joinery vary considerably, generally reflecting local building patterns and native materials. Both dry-laid and mortared masonry were common. In some cases, unadorned concrete was used to harmonize with the surrounding terrain, evoke Southwestern adobe building styles, or produce an intentionally modern appearance.

Masonry guardwalls suffer various forms of physical failure. Individual stones and small segments can be damaged or dislocated by rockfall, vandalism, vehicle impact, and general weathering processes. Entire sections can be lost to landslides, avalanches, flooding, and major crashes. Road relocations, pavement-widening projects, and increased safety concerns can also create a need for wall rehabilitation, construction, or reconstruction.

For guardwalls that are in generally good condition, preservation accompanied by stabilization and routine maintenance is almost always the preferred policy. Where minor to moderate repairs are necessary, limited restoration with compatible materials and workmanship is generally the most desirable treatment. Suitable rock should be acquired through salvage or local quarrying from historic sources, or, if necessary, by matching sources beyond park boundaries. Dry-laid stone should not be repaired with mortared masonry techniques and concrete should never be substituted for mortar. Stone size, orientation, and coloring should match as closely as possible. Ideally, the weathered surfaces of stones should face outward to help harmonize repair work with historic fabric. Various weathering agents can be applied to speed the process if necessary. Tool marks from quarrying or cutting operations should not be visible.

Where the extent of the damage is more severe, or where major rehabilitation or new construction projects are being implemented, developing appropriate treatment strategies can be more challenging. Most of the techniques and concerns associated with headwalls and retaining walls also apply to historic guardwalls. The ideal solution from a preservation standpoint will generally be reconstruction or replication with in-kind materials and techniques, but practical, economic, and regulatory concerns may render alternative measures more compelling. Suitable stone and masonry expertise may not be available, costs associated with traditional materials and hand labor may be excessive, or the desire to accord with contemporary safety standards may mandate more substantial protection measures. In many cases, all these factors will come into play. Whatever the motivation, the adoption of new materials and techniques should be accompanied by a firm commitment to ensuring that these measures harmonize as closely with the existing physical fabric as possible and not impinge on the road's historic character and integrity.

Stone-faced reinforced concrete core guardwalls have been used on a number of park roads and parkways as a means of combining traditional park road aesthetics with modern safety standards. This technique can be effective on both accounts, but care must be taken to ensure that masonry patterns, materials, and broader design considerations are appropriate for the historical

character of the roadway. If the new walls are substantially higher, wider, or longer than their predecessors, if their overall extent or placement is significantly altered, if the stonework does not match, or if there is no local precedent for masonry structures, then the mere presence of hand-laid stone veneer does not automatically constitute context-sensitive design and significant degradation of historic integrity and experiential character may occur.

Similar concerns apply to the use of simulated stone guardwalls. Color, texture, "masonry" patterns, massing, and location should emulate local historical precedents. The most challenging harmonization issues occur where concrete simulations directly abut historic stone walls or natural rock formations. When simulated stone walls are employed on a large scale, their uniform massing can call unwanted attention to their artificiality. Vehicle impacts and rockfall can also shatter the illusion of authenticity by exposing the concrete and reinforcing steel beneath naturalistically sculpted facades. While minor repairs to traditional rock walls are often almost invisible, matching the form, tint, and texture of simulated stone walls may prove more difficult,

(A)

(B)

(C)

(D)

Figure 30. Masonry treatment options: A) The preferred treatment for deteriorated stone walls is to repair or replace in-kind with compatible materials and workmanship; this wall has been spot-repaired with historically accurate dry-laid stonework, (Robert Page 1992); B) Mixing drylaid and mortared construction is not ideal, but in this Skyline Drive example, considerable care was taken to match materials and masonry patterns, (Robert Page 1992); C) Stone-faced reinforced concrete core guardwalls can meet contemporary safety standards while maintaining a rustic ambience, (Davis 1994); D) Newly constructed hand-laid stone guard wall and curb at scenic overlook, Yellowstone National Park, (Davis 1996); E) Simulated stone was employed on Yosemite Park's El Portal

especially as the original material ages. The longevity of the tinting compounds employed to naturalize concrete surfaces may also become a treatment issue over time.

As with retaining walls and culvert headwalls, the artificial nature of simulated stone guardwalls will be less apparent if they are only employed in areas where visitors are unlikely to approach them closely. Some parks have constructed authentic stone walls at scenic pullouts and other parking areas while using simulated stone in intervening areas where motorists are unlikely to leave their cars.

Timber Barriers

Rustic timber barriers are another classic component of park road landscapes. Log guardwalls and guide rails were erected alongside many park roads to protect motorists and evoke cherished cultural traditions. Log and timber rails, sunken posts, and split rail fences were also used to control traffic on side roads and in administrative areas, to define parking areas, campgrounds, and pedestrian paths, and, in a more conceptual sense, to evoke America's agrarian heritage and pioneer spirit.

(E)

(F)

(G)

(H)

Road to replace extensive sections of historic stone walls lost in the 1997 flood; F) Precast simulated stone guardwalls on Baltimore-Washington Parkway were designed to provide a more formal effect, with regular coursing and a distinctive coping motif, (Lou DeLorme 1993); G) Long sections of simulated stone guardwall can appear unnaturally uniform, especially when contrasted to historic stone guardwalls, as in this reconstructed portion of Yosemite National Park El Portal Road, (Davis 2001); H) Rockfall and accidents can expose the artificiality of simulated stone construction, El Portal Road, Yosemite National Park. (Davis 2001)

(A)

(B)

Figure 31. Steel-backed timber guardrails closely resemble historical precedents while meeting contemporary safety standards; (A) Detail showing blockout and steel reinforcement; (B) Steel-backed rounded log rail in use, Yellowstone National Park. (Western Federal Lands Highway Division)

Timber barrier treatments must reconcile the desire to maintain traditional appearances and preserve aging handcrafted structures with need to provide appropriate safeguards for modern motorists. The safety issue will be of greater concern on main roadways than for campgrounds, pullouts, and administrative areas, where timber barriers serve mainly to contain and direct traffic. In these cases, it will generally be more admissible to employ a more strictly preservation-oriented approach. Even when preservation, replacement-in-kind, or context-sensitive rehabilitation are chosen as preferred treatment options, it may be difficult to find compatible materials or replicate the labor-intensive construction processes that produced the vast majority of original guardrails during the CCC-aided construction campaigns of the 1930s.

In many cases, deteriorated wood safety barriers have already been replaced with steel guardrails. Modern steel guardrails are also a common choice in situations where realignments, road-widening, or heightened safety concerns mandate new barrier construction. Steel guardrail is generally not the preferred choice from a preservation standpoint, but if this option is selected, brown paint or a pre-weathered material such as Cortan steel is preferable to conventional galvanized steel. Anchoring the beams with brown-stained wooden posts will provide a more context-sensitive approach than 100% steel construction. The State of New York has adopted a brown-toned steel-box beam guardrail for use on the Taconic State Parkway that more closely resembles wood construction and may be appropriate for some NPS applications.

Steel-backed timber guardrail provides a more context-sensitive solution and has been successfully employed in many parks to replace or augment historic log barriers. Milled timber rails provide a reasonably approximation of traditional NPS log construction and the steel-backing provides sufficient strength to satisfy contemporary safety standards for speeds up to 50 mph. For higher-speed applications, crashworthiness can be improved by adding a wooden spacer between the rail and post. This "blocked-out" configuration reduces the likelihood that vehicles will snag on a support post, producing a smoother, safer barrier. Rounded-front steel-backed timber guardrails have not received as extensive testing, but they also provide a high degree of safety with even greater historical veracity.

Major Structures

The treatment of major structures such as bridges, viaducts, tunnels, entrance stations, and visitor centers will generally be beyond the scope of the CLR. The CLR should consider the impact of alterations to these features, however, and may suggest general design principles to help ensure that proposed changes do not detract from the historic character and integrity of the overall park road landscape.

The CLR should emphasize that park bridges are not simply individual engineered structures but elements of larger landscape compositions. Whether intended to

harmonize with their natural surroundings, evoke local vernacular precedents, or contribute to the dignity of commemorative military parks, they were designed to fulfill practical requirements while answering deeply felt aesthetic and symbolic needs. Preserving their original form, function, and fabric should be the first priority.

If changing demands produce pressure to replace or significantly alter a historic structure, managerial solutions such as vehicle-size limitations and alternative traffic patterns should be thoroughly explored. For exceptionally significant bridges, it may even be warranted to construct a companion structure to accommodate modern traffic, preserving the historic span as a low-volume alternative or pedestrian route. If this option is pursued, a key question is whether to build the bypass in close proximity in order to showcase the historic structure and minimize additional road-construction, or locate it at a sufficient distance to fully preserve the setting and character of the original crossing.

Major rehabilitation or replacement projects should normally follow historical precedents as closely as possible. Recent NPS bridge rehabilitations and replacements have evoked historical precedents by employing hand-laid stone facing, simulated stone abutments, and historicist-inspired massing and details. Care must be taken to ensure that such practices truly reflect local precedents and that materials and workmanship harmonize with historical features and the surrounding natural landscape.

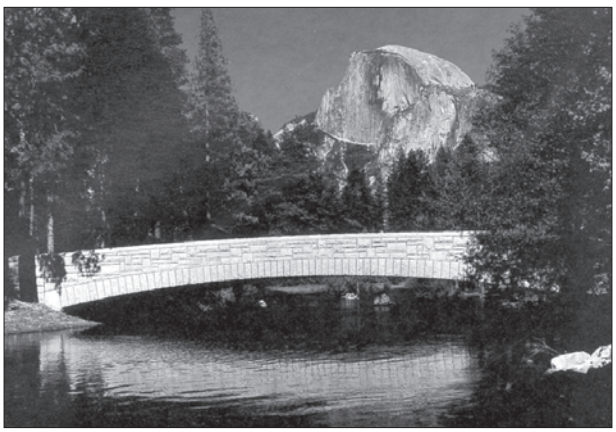

Figure 32. The 1994 reconstruction of Yosemite's Sentinel Bridge used masonry facing and a traditional arch profile to contextualize a modern concrete girder structure. (FHWA 1994)

Proposals to remove historic bridges or other road-related features in order to manipulate or "restore" associated ecological systems should carefully weigh the impact of such decisions on the historical integrity of the road and the broader cultural values of the affected park.

Minor Structures and Road-related Features

Minor structures such as signs, wayside exhibits, and comfort stations contribute to the overall character and integrity of park road landscapes. The classic routed wood signs – and even their brown metal successors – provide a sense of consistency and historical continuity both within individual parks and throughout the National Park System as a whole. Stone curbing around parking areas and scenic lookouts, "rustic" comfort stations, picnic shelters, water fountains, and interpretive kiosks may seem insignificant in and of themselves, but they help establish the tone and tenor of park road landscapes.

In some cases, minor structures may possess considerable significance in their own right. This is particularly true of entrance signs and waysides from the classic period of park development between the two world wars. The 1930s Obsidian Cliff wayside interpretation kiosk on Yellowstone National Park's Grand Loop Road, for instance, is independently listed in the National Register of Historic Places. Since motorist-oriented wayside interpretation played a major role in Mission 66 planning and design efforts, features from this era should be carefully evaluated and appropriate treatment measures devised.

When developing treatment recommendations for signs and other minor features, it is important to recognize that considerable variety exists within the general NPS rustic framework. Materials, architectural styles, sign fonts, and other design elements vary geographically, thematically, and temporally. Variations may occur not just from park to park, but within portions of a single park road system developed at different times or for

different reasons. CLR research should identify the correct historical precedents for specific sites and recommend appropriate treatments. Where variation is notable within an individual site or broader park road landscape, decisions must be made about whether to restore the consistent appearance of a single development period or preserve existing differences to illustrate changing historical practices.

Just as overtly modern intrusions may clash with traditional park road aesthetics, care should be taken not to impose inappropriately "rustic" features on park road landscapes where these elements have no historical precedents. Commemorative military parks and Colonial Revival-themed historical sites are obvious examples of this concern, but the distinctive forms of Mission 66 signage and associated structures should be respected as well. Even newer features, such as elements associated with the 1976 bicentennial celebration or other prominent cultural developments should be evaluated and treated in view of their potential future significance.

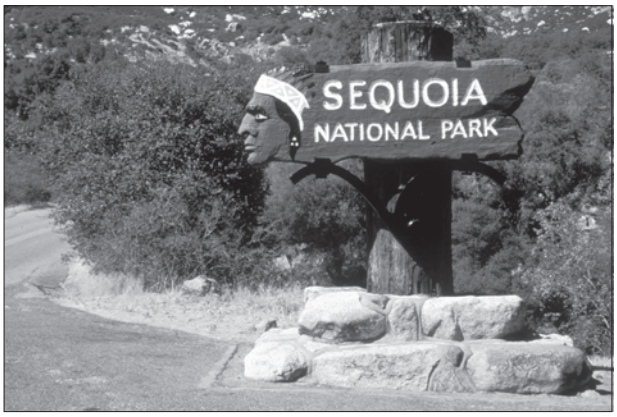

Figure 33. Sequoia National Park's classic rustic entrance sign was constructed by the CCC in 1935 and is listed on the National Register of Historic Places. (Robert Page n.d.)

Figure 34. Yellowstone's 1966 East Entrance Station epitomizes Mission 66's creative mingling of modern and rustic styling but is no longer able to accommodate the largest recreational vehicles, which must be routed around the structure. (Davis 1999)

Roadside Landscaping

Naturalistic roadside landscaping was one of the hallmarks of classic park road design. Great efforts were made to harmonize park roads with their surroundings by camouflaging signs of construction and blending engineered features with adjacent natural and cultural landscapes. Alignments were calculated to minimize topographic disruptions and preserve cultural resources. Where excavations were necessary, side slopes were gently graded and roundly sculpted, mimicking natural contours, promoting plant growth, and affording greater resistance to erosion. Rock cuts were fractured along inherent fault lines and drill marks were minimized to produce a more natural effect. Specimen trees were often preserved in close proximity to the roadway and treelines were generally varied to avoid the artificial appearance of a uniform corridor. Planting programs further enhanced the motorist's experience and concealed signs of construction. Native species in naturalistic groupings were preferred, but exotics such as Japanese honeysuckle were sometimes employed to reduce erosion. Vegetation management activities also included vista clearing to expose attractive views and agricultural leases to promote traditional land uses.

While these roadside landscape qualities may be subtler and harder to evaluate than the engineered structures and architectural features that often dominate historic road analyses and treatment plans, they play equally important roles in establishing the character and significance of park road landscapes. The CLR should provide comprehensive recommendations for ensuring the preservation, rehabilitation, or, if circumstances warrant, restoration, of historically significant roadside landscape characteristics.

Grading

Changes to historic alignments, profiles, and roadwidths will often have significant impacts on historic roadside landscapes. Judicious planning, clear specifications, and strict contract supervision are essential to minimize adverse effects on landforms, vegetation, and constructed features. Relocation and rehabilitation projects should follow the same principles that guided historic park road development, carefully coordinating horizontal and vertical curvature to ensure that modern revisions "lay lightly on the land" with minimal disruption of the surrounding terrain. Where substantial grade modifications are unavoidable, rock cuts should be naturalized and road banks sloped and rounded in conformance with traditional park road landscaping practices.

Vegetation Management

Vegetation management should promote the retention of historic plant materials, design schemes, and general landscape characteristics by outlining routine maintenance practices, proposing long term stewardship policies, and providing rehabilitation and restoration plans for areas that have been disturbed by natural disasters or construction-related activities.

Maintenance guidelines should outline the routine procedures required to preserve and stabilize roadside landscapes. These measures may include mowing, pruning, watering, invasive species control, and, in some cases, arrangements such as agricultural leases that rely on other parties to help maintain historic landscape qualities. Some parks have developed comprehensive maintenance regimes tied to detailed site plans. In some cases, such as the Blue Ridge Parkway, these maintenance plans date back to the original design and development period. In other cases, roadside landscape maintenance procedures are passed down by oral tradition and observation. Long-term maintenance personnel can be invaluable sources of assistance for identifying and formalizing historical landscape management practices. Historic photographs, plans, and written descriptions can also be used to identify desirable landscape qualities and develop appropriate maintenance procedures.

Figure 35. Native plant nursery for propagation of revegetation materials, Glacier National Park. (Davis 1996)

The adoption of new maintenance practices motivated by changing management priorities should be carefully reviewed for their impact on traditional landscape values. Allowing grassy areas to grow unchecked for extended periods may be economically and ecologically appealing, for instance, but the results may conflict with original design intentions and distort historically significant landscape qualities.

Revegetation

Where construction activities or natural processes produce a need for revegetation, CLR treatment recommendations should establish appropriate goals and procedures. While current NPS policies strongly favor indigenous species, historical precedents may mandate alternative approaches. Archival research and existing condition documentation of comparable landscapes will help determine what approaches, species, varieties, and configurations are most appropriate. In some instances, it may be possible and desirable to substitute more sustainable and indigenous plant materials if similar effects can be attained.

Since revegetation projects often involve both natural and cultural resources personnel, it is important to avoid misunderstandings about terminology and policy goals. For cultural resource management purposes, "restoration" means reestablishing the type of vegetation that existed during a specific historic period in order to convey past design practices and cultural values. For

Figure 36. Roadside revegetation with native plants, Glacier National Park. (Davis 1996)

natural resource specialists, "restoration," has more ecological connotations, and aims to establish environmentally appropriate plant associations that will become sustainable components of surrounding ecosystems. Natural resource personnel employ the term "reclamation" for more utilitarian revegetation practices designed to provide stable cover for disturbed areas such as roadsides. In reclamation-oriented revegetation, hardiness and visual appearances take precedence over indigenous ecological values. Since similar philosophies governed most historic roadside landscaping programs, natural and cultural resource personnel may find common ground with this approach.

Some parks have developed extremely sophisticated roadside revegetation practices in which seeds are collected from the immediate vicinity of projected disturbances and then propagated to reestablish native plant communities after the roadwork had been completed. Glacier National Park has been a leader in this movement, with strong support from the NPS Denver Service Center.

Clear Zones

In addition to combating the loss of historic vegetation caused by changes in pavement width and alignment, a common concern for many historic park road managers is the pressure to expand the clear zone on either side of the travelway. Widening the clear zone improves sight distances and affords additional room for motorists to avoid accidents, but increasing the distance

Figure 37. Traditional park road landscapes with vegetation extending close to the edge of the pavement create a unique travel experience where motorists are intimately surrounded by nature, Hawaii Volcanoes National Park. (Davis 1999)

Figure 38. Cutting a broad clear zone can improve safety by providing motorists more room to recover from potential accidents, but this approach markedly alters the motorist's perspective and produces greater separation between visitors and their surroundings, rehabilitation of East Entrance Road, Yellowstone National Park. (Davis 1996)

between the traveler and the treeline significantly alters the historic driving experience by eliminating the sense of intimacy and enclosure that serves as a distinguishing characteristic of many historic park roads. Extending sight distances and expanding recovery areas can also encourage motorists to drive faster, further compromising historical feelings and associations and negating gains in public safety.

Historic park road treatment recommendations should generally seek to preserve the original relationship between the roadway and treeline. Where treelines

must be reconfigured, they should be arrayed in irregular patterns to avoid an artificially uniform appearance, unless local vegetation patterns or historical precedents suggest alternative approaches. Herbacious plants and shrubs can further naturalize the transition between the road corridor and its surroundings.

Planned Vistas

Most park tour roads were designed to provide pleasing successions of subtly orchestrated views. Variations in alignment focused attention on scenic highlights, roadside vegetation was often cleared to open up extended vistas, and minor pullouts or elaborate wayside developments were constructed so that motorists could pause to enjoy the most spectacular scenic compositions.

Many of these planned vistas have been lost over time because of unintended plant growth. Expansive panoramas and carefully calculated views have been obscured by impenetrable curtains of greenery. Unconstrained growth has engulfed many roadside areas that were intentionally cleared to provide scenic variety, contrasts of openness and enclosure, or subtle glimpses into surrounding woodlands. In some cases, scenic pullouts replete with interpretive signage have been completely cut off from their intended views.

Whether caused by constraints on maintenance, lapses in institutional knowledge about design intent, or ecologically motivated decisions to "let nature take its course," the loss of planned views significantly compromises the historic integrity and experiential character of designed park roads.

The CLR should identify planned views that have been obscured by plant growth and recommend procedures to restore intended landscape effects. Potential conflicts with natural resource agendas may have to be addressed at the park management level. In some cases, the problem vegetation is comprised of non-native species, in which case removal will accord with both natural and cultural resource agendas. When native vegetation is the primary culprit, historic plans, photographs, and design directives can be mustered to help make the case for restoring scenic vistas.

Vista management may also include the selective planting of historically appropriate new vegetation.

(A)

(B)

Figure 39. Vegetation management is required to maintain views from historic designed vistas, both along roadsides (A) and at designated overlooks (B), Blue Ridge Parkway. (Davis 2001)

Figure 40. Development on adjacent lands can significantly affect planned vistas; if scenic easements cannot be enacted, new plantings such as those visible on the far side of this highlighted railroad corridor can screen objectionable views. (Davis 2001)

(A)

(B)

(D)

Figure 41. Regulatory measures can help to preserve historic road resources by creating an appropriate balance between resource capabilities and designated use: (A) Vehicle size limits enabled Glacier National Park to take a more preservation-oriented approach to managing the Going-to-the-Sun Road, (Davis 1996); (B & C) Yellowstone National Park preserved the historic "Silver Gate" geological feature by constructing a bypass for larger vehicles and limiting traffic to one direction, (Davis 1996); (D) Part of Yellowstone National Park's historic Mount Washburn road is preserved as a low-speed unpaved access road; the upper section is restricted to pedestrian use, (Davis 1996); (E) This segment of Yellowstone National Park's Grand Loop Road has been bypassed and converted for pedestrian use. (Davis 1999)

(C)

(E)

When adjacent land uses have evolved to produce scenes that are incompatible with park values, new plantings may be desirable to screen visitors from objectionable views.

Management Solutions

When modern demands conflict with historic park road values, managerial solutions often provide preferred alternatives to irreversible physical interventions. Speed limits, vehicle-size restrictions, and one-way traffic patterns can reduce pressures to widen and straighten historic roads or replace historic safety barriers with modern designs and materials. One-way traffic patterns and alternative transportation technologies such as shuttle buses can decrease crowding while increasing the effective carrying capacities of park roads and related facilities. Bypasses can be constructed to accommodate contemporary demands while preserving exceptionally important road segments or individual features. In some cases, it may even be desirable to close historic park roads to vehicular traffic and transform them into pedestrian paths or multi-use trails.

The desire to embrace creative approaches should not preclude careful evaluation of the potential effects of alternative solutions on historic park road resources. Some alternative transportation technologies may require wider, straighter, and more substantial roadbeds

(A)


(B)


(C)


(D)

Figure 42. Alternative transportation systems can reduce pressure to alter historic road resources by helping to accommodate increased demands: (A) Conventional shuttle, Tuolumne Meadows, Yosemite National Park, (Davis 2001); (B) Propane-powered people mover, Yosemite Valley, (Davis 2001); (C) Proposed light rail vehicle for Grand Canyon National Park, (Grand Canyon National Park 1997); (D) Modern tour bus designed to resemble classic 1930s park transportation. (Glacier National Park 2004)

than conventional vehicles, for instance, and bypass construction may have significant impacts on natural and cultural resources. The NPS is currently working with private partners to develop appropriately scaled shuttle buses based on historical prototypes and experimenting with various other technologies to lessen the impact of ever-increasing demands on historic park road resources.

Education and Interpretation

Education and interpretation can play important roles in creating supportive environments for park road preservation. Park personnel, FHWA staff, and the general public are more likely to support park road preservation efforts when they are given sufficient information to understand the significance of historic park roads and encouraged to appreciate their distinctive characteristics.

The research and evaluation components of the CLR can form the basis of internal briefings designed to educate park staff and cooperating professionals about historic park road preservation issues. Archival materials, historic film footage, vintage tourist literature underscoring the popular appeal of traditional park roads, and contemporary secondary sources and interpretive graphics such as the drawings produced by the Historic American Engineering Record's NPS Park Roads and Bridges documentation project can be used to make a strong case for the cultural significance and responsible stewardship of historic park roads.

Similar material can be used to develop public programs, interpretive kiosks, and educational literature about park road history and related preservation concerns. While a few parks have begun to interpret their historic park road resources, most visitors never learn about the design concepts, administrative achievements, and construction feats that produced these magnificent American landscapes.

When visitors and resource professionals learn to appreciate park road history and understand the challenges posed by park road preservation, they are more likely to support measures designed to balance contemporary desires with long term stewardship values.

Conclusion

Historic park road stewardship is one of the most pressing challenges facing the National Park Service today. The impressive mileage of historic park roads that extends throughout the National Park System is one of America's most beloved landscape legacies, yet these increasingly fragile resources must accommodate ever-evolving demands that were in many cases unimagined by the system's original creators. Developing appropriate solutions that reconcile contemporary circulation concerns with historical values is a complex process involving many agencies, individuals, and areas of technical expertise. The CLR can play a vital role in the development of sound stewardship practices by providing crucial historical information, conducting detailed surveys of existing conditions, and proposing comprehensive strategies for evaluating, treating, and interpreting these cherished American landscapes.

Figure 43. Educating the public about park road history can build support for stewardship measures: wayside exhibit providing history of Golden Gate Viaduct, Yellowstone National Park. (Davis 1996)

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Credits: Reviewers and contributors to this document include: Randy Biallas, Todd Croteau, Susan Dolan, Eliot Foulds, Jack Gordon, Cari Goetcheus, Lucy Lawliss, Christopher Marston, Beth Savage, Jim Vekasi, Marc Veneroso, and Len Warner.

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