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# Rim Drive Cultural Landscape Report Crater Lake National Park, Oregon



Stephen R. Mark  
Jerry Watson

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USDI – National Park Service

2009



Building a retaining wall as part of grading Rim Drive on Dutton Cliff. Wendall C. Struble, Bureau of Public Roads; courtesy of Federal Highway Administration, Vancouver, Washington.

Cover Photos: (Top) A portion of west Rim Drive (road segment 7-A) during the 1950s. *Crater Lake National Park Museum and Archives Collections*

(Bottom) Entrance Station at the Diamond Lake (North) Junction, 1937. *Fred Cleator, U.S. Forest Service*. Back cover photo: Crater Lake and Rim Drive (Segment 7-B) from Rugged Crest. *Oregon State Highway Commission*.

Cover design and formatting: Mary Williams Hyde

Image on title page: Truck dumping into an Adun Paving Machine, road segment 7-C, 1938. *Struble, BPR*.

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Crew paving with half-inch minus top coat, 1938. *W. C. Struble, Bureau of Public Roads; courtesy of Wade Johnston, FHWA.*

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Part of road segment 7C-1 below Anderson Point contained the heaviest cut on Rim Drive. A slide here in 1942 required considerable scaling to stabilize this slope. *Struble, BPR-FHWA.*

# Acknowledgments

There are times when ambition should be curbed, at least that is one lesson which emerges in hindsight. No one could have foreseen the project's complexity at the start, much less all of its permutations. The idea of documenting Rim Drive and developing guidelines for preserving the road did not begin with us. Cathy Gilbert and David Louter from the old Pacific Northwest Regional Office made a reconnaissance trip to Crater Lake for these reasons in 1994, only to be followed by Rene Senos and Rebecca Dietz (graduate students from the University of Washington) who drafted a cultural landscape inventory in 1997. We began our work in 2000, after a Historic American Engineering Record team (consisting of Sarah Lehman, Walton Stowell, Simona Stoyanova, and Christian Carr) produced a number of drawings focused on Rim Drive as part of a larger project aimed at documenting all of the park's roads. Steve continued that work with an "addendum" to the HAER project (OR-107) in 2003, one that represented the historian's contribution, but which also became the basis for chapter one in this volume.

Assisting Robin (Lee) Gyorgyfalvy with a corridor management plan supplement for the larger Volcanic Legacy Scenic Byway (for which Rim Drive is arguably the centerpiece) brought us two additional years of project funding beyond what funding from the Cultural Resources Preservation Program of the National Park Service initially supplied in 2000 and 2001. Instrumental in this effort through the Scenic Byways Program were Christina Lillienthal at the Umpqua National Forest and Pam Palmer, budget analyst at Crater Lake National Park.

We had made good progress toward a full draft by the spring of 2004, when the two of us gave a presentation on Rim Drive at the biennial "Preserving the Historic Road in America" conference held in Portland. About that time Steve finished a guidebook for the Crater Lake Natural History Association titled *Rhapsody in Blue: Historic Rim Drive* which drew on some of our work, as did a much shorter piece for the *Pacific Northwest Quarterly*.

## RIM DRIVE CULTURAL LANDSCAPE REPORT

Drafting a National Register nomination for Rim Drive could not have proceeded very far without Robert Hadlow at the Oregon Department of Transportation providing a copy of his national historic landmark nomination for the Columbia River Highway. This gave Steve an all-important model used in the format of the Rim Drive nomination, but one that still underwent some revision after Laurin Huffman (NPS), Ian Johnson (National Register coordinator at Oregon SHPO) and Tim Davis (NPS) reviewed it.

A number of individuals helped us to secure the images used to illustrate this report and other related documents. Included among those we wish to thank are Bill Alley (formerly of the Southern Oregon Historical Society), Mary Benterou (National Park Service), Lynn Jeche (Klamath County Museum), Wade Johnston (Federal Highway Administration), Lisa Miller (National Archives and Records Administration), Pat Solomon (Oregon Department of Transportation), and Kelly Young (NPS). Steve Spencer did his best to process the photographs that accompany my nomination, and Chris Wayne (NPS) generated an important map for that submittal through the park's geographic information systems laboratory. Dave Brown at the Federal Highway Administration office in Vancouver kindly supplied full-size copies of all pertinent road profiles, though the park's former chief of maintenance, Karl Bachman, showed us how to access all of the Bureau of Public Roads' completion reports available through the NPS with the Denver Service Center's electronic technical information system.

Two landscape architects deserve our thanks for their contributions to this project. Cathy Gilbert wrote the original project proposal funded by the NPS in 2000 and then recruited Jerry Watson from the University of Washington to be co-author. The hand of UW's Iain Robertson became more evident near the end of this project, for he played the key editorial role in helping to meld two voices into one. Iain also made a number of helpful suggestions which we incorporated into the final draft. He gave this long-running project some necessary perspective by supplying his thoughts about how Rim Drive is experienced in 2007, something that became the basis for the foreword in this document.

## Foreword

With so much attention fixed in a document like this on how well the material manifestations of a scenic road can be judged against an ideal dubbed “design with nature,” it is easy to forget how people experience Rim Drive. There is a need in this cultural landscape report to conceptualize Rim Drive as a structure with component parts, locked into a space consisting only of immediate surroundings called the “roadway” which is punctuated by stops designed individually as a way to enhance nature’s variety and sublime qualities. A larger landscape context, one that intrigues visitors to drive the road, can largely go missing from a work aimed at illuminating the original design intent and then preserving what resulted from it.

A landscape architect known to both of us recently provided some “Notes on the Experience of Rim Drive” consisting of several pages. Iain Robertson rightly characterizes the road as a constantly changing experience, with a sequence of views that are often vast in scale. It is to journey through a post-apocalyptic landscape, where the devastating power and fury of Mazama’s great eruption furnishes the rim with its pervasive character of crumbling instability. That the beauty of Crater Lake could arise from cataclysm makes it one of the purest expressions of the sublime in nature, at least in the eyes of many. Seeing this landscape as an expression of time--endless in duration on the human scale, but really quite short in relation to the enormous breadth of eons--is essential. Power and beauty are also critical to understanding the lake’s genesis, and thus the road around its rim. These form a trinity for those seeking the larger meanings associated with this place, but these concepts are also useful in organizing how Rim Drive is experienced.

Set into a preliminary geographic context, Crater Lake and its road circuit are atop of a peak like some others in the Cascade Range whose weathered faces receive rain and snow from prevailing southwest winds. Far from a smooth shaven cone, pre-eruption Mazama exhibited protrusions from numerous side vents. Flows were likely evident in lop-sided extrusions on the mountain’s flanks, but they also contained valleys carved by glaciers. The great eruption created a caldera along a ring fracture

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zone which also broke ridges and truncated the upper ends of valleys whose creeks drain into the larger Rogue or Klamath drainage basins.

Aridity accentuates the dramatic tension of Rim Drive, since angular forms resulting from the eruption are only slightly muted or softened by vegetation. Great fields of pumice punctuate stands of mountain hemlock, true fir, and lodgepole pine below the rim and down Mazama's slopes toward other mountains in the distance. Crags and abrupt precipices lead the viewer to the sometimes placid and indescribably blue water of Crater Lake. Driving, and time spent outside of a car in this setting, forces visitors to look inward and then outward for contrast, surprise, and maybe some new insights.

Large-scale panoramas stand in opposition to enclosure when the road is situated in one of the valleys, yet this feeling changes abruptly to an exposure when motorists cross an open ridgeline. At this point Rim Drive climbs skyward, seemingly intent on releasing its traffic into the air, only to descend into subalpine forests of deep seclusion. The more open slopes are characterized by almost sterile pumice, which is sometimes adorned by sedges and knotweed, but vertical cuts place Rim Drive on ledges often strewn with rockfall. Crumbling edges, dizzy heights, and dark woods make Rim Drive restless rather than repetitive if only visitors perceive the changing scene as a story. This one is cinematic, with the road's alignment able to supply running commentary on a volcanic landscape that is special, sublime, and a monument to uncertainty.

A cultural landscape report should take into account the broader aspects of a setting such as the rim of Crater Lake which affect the material qualities of its circuit road. Yet the experience of Rim Drive, as well as its design and construction, changes along the route, and the current condition of component parts form the background to treatment of a complex cultural resource. Treatment recommendations form the heart of this report, ones which range from the specifics of stone masonry to preserving the elements of what manifests itself as visual unity. Our intended audience is the park's maintenance staff, who will surely do their utmost to perpetuate the road and its contributing features for decades to come.

Stephen R. Mark  
Jerry Watson

# Management Summary

Road transportation in America's national parks is more than just moving people between destinations. As a key to managing human use, roads provide visitors the opportunity to sightsee and explore the park's natural ecosystems. To enable more Americans to experience national parks, the NPS began to encourage "motor tourism" in the early part of the twentieth century. This created a demand for modern highways that would allow Americans to view the scenic splendor of protected landscapes like Crater Lake National Park. Rim Drive, the focus of this study, has thus symbolized the connection many Americans have with nature, as ones who see a composition of unspoiled wilderness from a road. This is a cultural landscape, one encompassing and embodying a built environment, but also human attempts to create meaning from nature. Assimilation of this landscape in the visitor's imagination has played an integral part of developing a sense of place, so that Crater Lake and its setting can also manifest part of American national identity.

In the nineteenth century, Andrew Jackson Downing became one of the main agents making this linkage of nature by introducing the idea of the picturesque to designers in the United States. Downing adapted the ideas of emulating wild nature evident in the English landscape garden and promoted the creation of landscape settings in the United States that allowed for a heightened sense of one's physical and visual experience of nature. The work of Downing's protégé, Frederick Law Olmsted Sr., and other nineteenth century landscape architects followed in this tradition, motivated by the desire to enhance the experience of movement through a space by siting circulation paths, plant massings, and architectural features in a complex arrangement to create a series of pictorially composed scenes. This Picturesque vision has played a critical role in shaping the vision behind the design of America's scenic highways. Rim Drive, for example, had to be made accessible and amenable through the construction of roads, sculpted slopes, constructed vistas, and rustic architectural features that serve to integrate the road into the landscape. It became a corridor designed explicitly to transform the visual experience into a series of views depicting a changing landscape. Rim Drive is also the hub to Crater Lake National Park's vehicular circulation system. Designed and constructed to provide primarily

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vehicular access to the park's scenic features, the road provides numerous observation stations, sub-stations and parking areas that afford views and constructed vistas of Crater Lake, its geological formations, and surrounding environs. The road is circuitous, aligned around the caldera, starting from the junction at Rim Village, and then going clockwise to Park Headquarters in Munson Valley.

Rim Drive is situated where altitude and abundant snowfall restrict access by vehicles to the summer months, yet many (if not most) of the park's 500,000 visitors each year make a point of driving at least a portion of the loop. Designed to "present" the lake, Rim Drive is sited so as to avoid impinging on the beauty of this setting, where the rugged surroundings are still shaped by the cataclysmic eruption of Mount Mazama more than 7,700 years ago. From the rim, most visitors are struck by the intense color of the lake and a setting where walls tower from 550 to 1,900 feet above the surface. Much of the national park encompassing the lake and its immediate surroundings is heavily forested, yet distant peaks and other topographic features characterizing this portion of the Cascade Range can be seen from Rim Drive. For the purposes of this report, Rim Drive includes all of what the NPS once referred to as Route 7 (Rim Village/North Junction/Grotto Cove/Kerr Notch/Park Headquarters). It also includes Route 9 (road to Cloudcap viewpoint from Rim Drive) and a shorter spur to what is now a picnic area from Vidae Falls; total length for the three roads is 30.6 miles.

### *Historical Overview*

William Gladstone Steel, the founder of Crater Lake National Park, passionately promoted Crater Lake as a world wonder, worthy of receiving investment capital aimed at improvements in visitor access and facilities. Steel lobbied for a system of park roads designed specifically for automobiles, with a proposed loop route around Crater Lake touted to become one of the greatest scenic roads in the world. Construction of the road system by the Army Corps of Engineers began in 1913, just as Steel exchanged his role of concessionaire for that of park superintendent. Work continued for another five seasons, with the rim circuit being the most expensive and difficult part of the park road system to build and maintain. Once Congress created the National Park Service, Steel gave up his post as superintendent in 1916, but often expressed general dismay at the system of park roads. The Army Corps of Engineers received only enough funds during that period to grade the park roadways just 12 feet wide. Although this relatively narrow width had once reflected standard practice for scenic highways, the park's earliest road alignments too often posed difficulties for motorists.

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Drivers also had to contend with the ubiquitous dust, as well as many steep grades (particularly on the Rim Road), and numerous sharp curves. Steel and the NPS agreed on the need to reconstruct these roads, especially in the wake of rapidly expanding automobile ownership during the 1920s, a time when cars became both faster and heavier. Highway designers responded with wider roadways and lengthened curves, as well as efforts to reduce grades. Funding to begin reconstruction of Rim Road finally came in 1931. By that time, Steel tried to make a case for placing a portion of the reconstituted circuit road inside the caldera left by the collapse of Mount Mazama, a scheme that NPS officials considered chimerical due to the problems posed by a highway placed on unstable rock and the likelihood of defacing cliffs rising high above Crater Lake.

Although Congress directed the NPS to manage Crater Lake and other national parks, the agency could not act unilaterally in matters like the location and design of a new “Rim Drive.” For one thing, the Bureau of Public Roads (BPR) conducted road location surveys and design work on federal highway projects subject to NPS approval. BPR engineers assembled bid documents, awarded contracts, and directly supervised all three phases of road construction—grading, surfacing, and paving. Outsiders such as John C. Merriam, a paleontologist who headed a private foundation devoted to scientific research called the Carnegie Institution of Washington, also exerted some influence on the design for Rim Drive. Stephen T. Mather, first director of the NPS, recruited Merriam to help make educating visitors about nature a permanent part of park operations. Merriam proved to be the main impetus behind building the Sinnott Memorial at the park’s most popular viewpoint in order to provide summer visitors with an orientation to Crater Lake. Merriam knew that the lake’s beauty served as the main attraction, but he also hoped visitors might like a brief presentation by trained naturalists who could help them appreciate the park’s geological story from an open parapet high above Crater Lake. Upon its completion in 1931, the Sinnott Memorial’s popularity with visitors quickly became evident. The NPS thus embraced other ideas from Merriam, such as naturalists leading a “caravan” of cars around the lake on a new Rim Drive that had designated stopping points called “observation stations.”

These stations afforded visitors with particularly striking views or illustrated some important aspect of the park’s geological story derived from research funded by the Carnegie Institution. Road location and design for Rim Drive incorporated site plans for these stations and the sub-stations (not a stopping point on the Rim Caravan, but developed to highlight some important aspect of the park) as well as designated parking areas. Merriam also called for the BPR and NPS to avoid infringing

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on what he called the “primitive picture” of Crater Lake and its setting, so that the road would not divert visitor attention from appreciating nature, especially at major viewpoints. NPS engineers and landscape architects expended great energy to make sure that the designed spaces found contiguous to the drive served to define the “pace and sequence” of the park experience. In addition, the scarred or “unpleasant” areas were to be carefully screened so that they did not detract from the beauty of the site. Views of Rim Drive from the lake, or across the lake were considered undesirable, and evidence of the original road were also considered inappropriate, so they were screened from sight of the visitors where possible.

Merriam and his colleagues provided general guidance, but the NPS landscape architects exerted the most influence over the design of specific stations, substations, and parking areas. They also supplied drawings that furnished the basis of specifications written for masonry work, planting, and slope treatments executed by contractors. The landscape architects routinely consulted with BPR engineers on most aspects of road building on Rim Drive, a project that had to be built in phases over a decade due to funding and the relatively short construction season. Rim Drive was virtually complete at the start of American involvement in World War II, and was judged by contemporary designers and park administrators to be a superb expression of what the NPS and BPR could achieve when combining function with aesthetics. The road not only achieved visual unity with the park setting, it effectively extended the use of rustic architecture from developed areas (sites like Rim Village, where the Sinnott Memorial and Crater Lake Lodge are located) to a designed linear landscape.

Rustic architecture followed from an older tradition in developing private estates and public parks, that of designing with nature through use of native materials. The aim is to make facilities blend with their setting, yet also reflect a certain spirit of place. Renowned landscape architect Frederick Law Olmsted, Jr., pointed to how well design with nature had been executed at Crater Lake, after a visit at Merriam’s behest, having been especially taken with the use of volcanic material known as andesite which dominated masonry structures like buildings, walls, and guardrails. Although rustic architecture can influence how people experienced a rugged vista, an open field, or forested terrain, it succeeds by enhancing the scene (generally, as foreground features) in a way that visitors scarcely notice its presence. Crenulated masonry guardrails along Rim Drive, for example, serve as both safety barrier for motorists and a way to frame views of Crater Lake. Although the structures and associated landscape features of Rim Village and Park Headquarters are of interest to architectural enthusiasts, Rim Drive is arguably the best example of how the design principles of rustic architecture were applied to a circuit road in any national park,

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and may well represent a better example of the period's design tenets than any of the buildings.



Rim Drive near the Watchman Overlook. *Oregon State Highway Commission* .

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Rim Drive remains in remarkably good condition, with very few changes to the roadway and associated features undertaken since its completion in 1941. This is largely due to the interplay of factors like the road's closure from November to June, a design speed of 35 miles per hour, the extremely low accident rate, and a relatively sparse daily volume of traffic—especially on that portion of the circuit away from the six-mile segment that connects the northern and southern park entrances. Moreover, realignment and major rehabilitation involving the widening of Rim Drive could not be justified in a park where annual visitation has averaged 500,000 or less since the 1970s. Road designers assumed some growth in visitation numbers through time (273,000 visitors came to Crater Lake in 1941), so that it is not surprising that Rim Drive continues to serve as the linchpin in a circulation system which attracts relatively little fanfare or complaint. NPS landscape architects also brought their expertise to bear in formulation of contract documents, especially in the design of bid items such as masonry features and planting. They worked with engineers from the Bureau of Public Roads (BPR) to finalize road location and design, particularly in places where site plans were needed. The BPR meanwhile developed plans, specifications, and estimates in addition to supervising contractors. Road construction came in conjunction with projects devised solely by the NPS for building trails, park facilities, and signs along the circuit.

Given its location far from populated areas, as well as the factors controlling both park visitation and use of the road by motorists, it is not surprising that Rim Drive has heretofore received little recognition as being historic. Although it exemplifies rustic architecture of the 1930s, this road was never marketed as a through route like the Going-to-the-Sun Highway in Glacier National Park. The NPS has worked to document rustic architecture at Crater Lake and other national park areas since 1983 or so, but most of the inventory and evaluation targeted buildings and associated landscape design of specific sites. Even with a context study of national scope that covered NPS designed landscapes of the period 1916 to 1942, Rim Drive and other cultural resources like it in a number of national parks posed a challenge for those who might nominate them to the NRHP. This is because of the fundamental differences between sites associated with visitor facilities and linear structures like roads.

### *Study Boundaries*

The focus of this cultural landscape report is Rim Drive and its designed features. As such, it includes the roadway, slope treatments, cuts, fills, planting beds, as well as road-related features intended for cross drainage, safety barriers, retaining walls, and use by pedestrians. These landscape features are located within the clearing limits es-

## MANAGEMENT SUMMARY

established for Rim Drive during the initial phase of road construction. Clearing limits on this road, however, vary depending on the topography (one NPS official calculated their average in 1973 as being around 85 feet wide), but do not encompass remnants of temporary “tote” roads, planting associated with old road obliteration, borrow pits outside this roadway, or the sites of construction camps used by contractors. Since emphasis in the report is more properly placed on a variety of structures intended to help visitors experience Crater Lake from the rim, the study boundaries are necessarily long (some 30 miles) and narrow (85 feet or less).

### *Purpose and Methods*

Rim Drive was constructed with naturalistic design principles to serve both as a scenic road (for park visitation) that is both functional and an interpretive tool to educate the public about Crater Lake. These historical design tenets first presented during the period of significance (1926-1941) continue as the thematic rationale for Rim Drive, and as guiding principle for assessing Rim Drive and its qualities as a designed cultural landscape. The study conducted over a four year period included collaboration on Supplement III of the Corridor Management Plan for the Volcanic Legacy Scenic Byway (of which Rim Drive is a part), a project coordinated by the U.S. Forest Service through staff at the Winema National Forest from 1999 to 2001.

A need to develop a set of preservation guidelines to shape future undertakings on Rim Drive serves as the primary purpose behind this study. It centers on an assessment of a designed landscape within the existing road corridor, but it does not address the cultural landscape associated with traditional uses of the rim by native peoples, a topic addressed in a separate report on traditional use of the Crater Lake area by park-associated Indian tribes (*In the Footprints of Gmukamps* by Douglas Deur, 2008). Discussion of archeological resources, whether historic or possibly prehistoric, that adjoin the road are also omitted, largely due to the sensitivity of this information. The cultural landscape report focuses instead on the material manifestations of road design and construction that took place between 1926 and 1941—within the larger period of significance (1916 to 1942) established for rustic architecture and naturalistic landscape design practiced by the NPS. The earlier Rim Road is referenced in the site history section, but the authors intentionally narrowed the scope of their report to the circuit road presently in use. Time and available funding simply did not permit documentation and evaluation of the earlier circuit, even if portions of it are still evident in conjunction with Rim Drive and worthy of future inventory efforts.

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An identified need to manage Rim Drive holistically served as the primary justification of this CLR. Like other historic roads, it faces a variety of threats that could potentially destroy or severely compromise character-defining features. These include realignment, widening, the use of non-native materials that depart in character from extant historic fabric, the addition of new facilities like restrooms and picnic areas, poor repair of masonry features, and deferred maintenance in general. Before treatment recommendations could address such threats, the need to determine Rim Drive's eligibility for the National Register of Historic Places dictated that the authors had to develop an approach to identifying character-defining features. This approach would allow them to assess the significance and integrity of the road in light of NRHP criteria, even in the absence of standardized guidance such as a National Register bulletin. The CLR document thus became a basis for both a nomination to the NRHP, as well as guidelines for future management and maintenance.



Cross drainage failure on the East Rim Drive, 1950s. *CLNPMAC, 8898.*

This report follows previous NPS practice of documenting designed cultural landscapes through a historical narrative focused on design and construction which precedes discussion of how physical factors help shape spatial organization in the built environment. Existing conditions in the designed landscape are then divided into a “typology” so that historic resources can be placed into categories and then evaluated as to whether they are contributing features. Although this approach has been used with designed landscapes like Rim Village, the site-based typology had to be modified somewhat to accommodate the linear character of Rim Drive. Differences between

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roads and developed areas as distinct types of landscapes are also evident in the report's appendices, especially where the documentation of masonry features supports the assessments of integrity and corresponding treatment recommendations.

### *Summary of Findings*

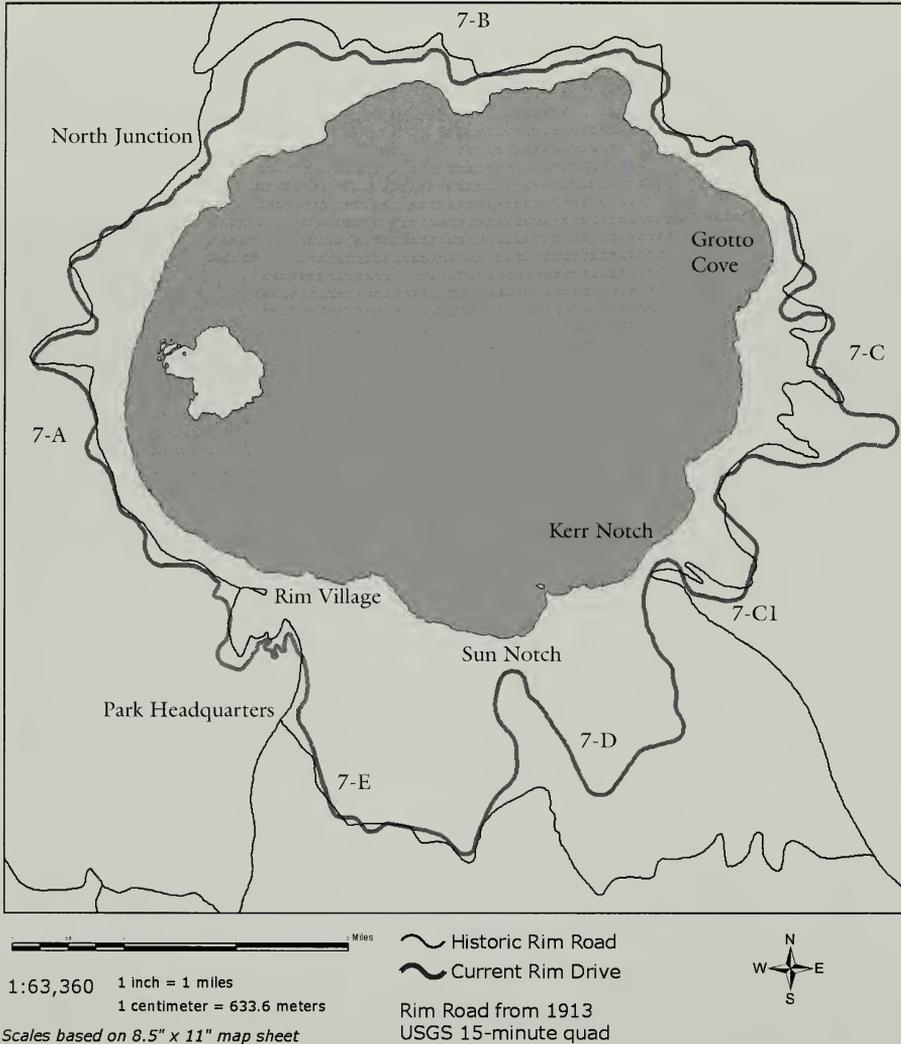
The road and its associated circulation features contain a number of contributing resources that define the historical character of Rim Drive as it was designed and built between 1931 and 1941. These resources should be managed holistically (rather than treated in isolation as "sites") since three non-conforming nodes (Watchman Overlook, North Junction, and Cleetwood Cove parking lot/trailhead) have already lost integrity. The three nodes diminish an experience intended to bring about visual unity through the use of rustic architecture and naturalistic design in presenting Crater Lake and its setting to park visitors. More subtle alterations, such as not following historic specifications for masonry guardrail have also impinged on the integrity of Rim Drive, though these blemishes are generally reversible. Some small-scale features such as rustic wood signs with raised lettering can be restored, particularly where they serve to indicate specific localities on the road. Structures such as culverts and other cross-drainage features like paved ditches simply need to be maintained.

Recommendations made in this report are aimed at both preserving a historic property as well as a functioning system for vehicular circulation that enhances the experience of visiting this national park. Most recommended treatments stem from identifying character-defining features and then applying the Secretary of the Interior's Standards for Treatment of Cultural Landscapes. The treatment recommendations focus on rehabilitating masonry features, conservation of historic plant materials, and ways to sensitively integrate new structures and/or elements into the linear landscape of Rim Drive. Historic structures such as retaining walls, parapet walls, guardrail, and cross drainage devices with stone headwalls were originally designed as an integrated system compatible with the roadway and the landscape. It is important to preserve the integrity of these features and prevent their destruction, or modification in ways that significantly alter historic detailing, materials and proportion.

The design relationship between the roadway and the landscape is an essential component of Rim Drive, as the unity of the circuit and its placement in the landscape, represents the defining cultural feature of Crater Lake National Park. While many of the threats to the integrity of Rim Drive comes from changes in use, many of the destructive actions occurring on and along this historic roadway have come from the

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inconsistent or irregular application of design standards. It is the intention of the cultural landscape report to recommend specific changes, policies, or procedures that indicate the existence of standards, as existing or with minor modification, that contribute to or are compatible with preservation guidelines. The engineers, landscape architects, planners, architects and tradesmen who developed, designed, and built Rim Drive were developing a corridor for transportation, recreation, environmental management, and educational enhancement.



Locations of old Rim Road and Rim Drive. *Chris Wayne, NPS.*

## CHAPTER ONE

# DESIGN AND CONSTRUCTION

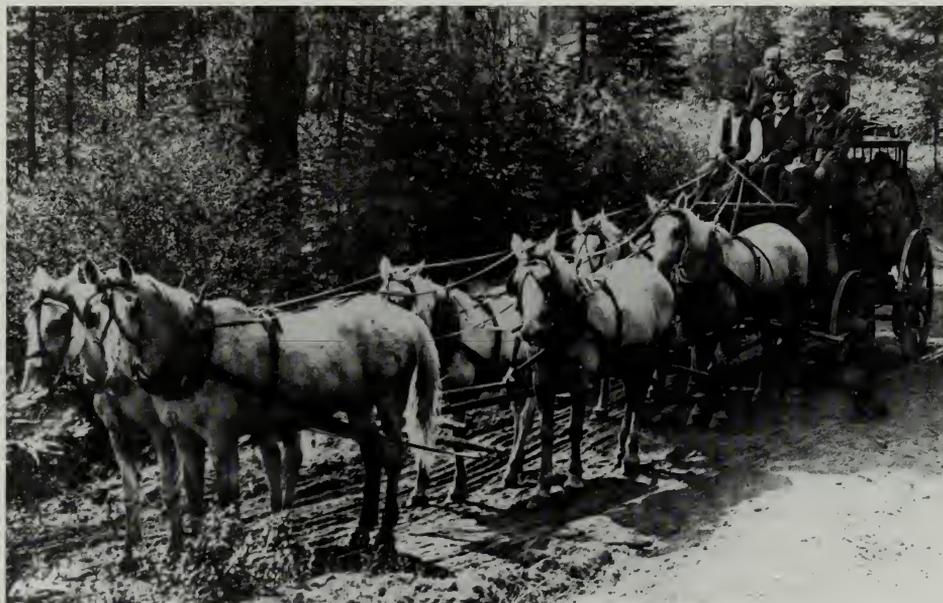
*This chapter aims at providing background and specific details that factor into successive chapters, specifically those that are focused on treatment. Most of it is taken directly from documentation prepared in 2003 as part of the Historic American Engineering Record project on the roads of Crater Lake National Park. As an overview, it necessarily hits only the highlights and is derived more from the perspective of landscape architecture than from highway engineering. A full set of final construction reports prepared by Bureau of Public Roads engineers John Sargent and Wendell C. Struble was subsequently located, as were the as-built drawings in plan and profile views. These documents should be consulted, if only to appreciate the complexities associated with the biggest project ever undertaken at Crater Lake, but also to reference quantities, costs and the engineer's comments on the contractor's performance. As such, the following narrative lacks the kind of contextual framework that allows any real comparison with Rim Drive's contemporaries within the national parks or among the public roads in Oregon. The National Register nomination for Rim Drive nevertheless includes a beginning for future work in this respect.*

Only one road ran through Crater Lake National Park when Congress established it on May 22, 1902. The Fort Klamath – Rogue River wagon road served as an approach route for visitors to the lake, though they still needed to follow a trail marked by blazes for the final two and one-half miles to the rim. A better road on the other side of the Cascade Divide (one going through Munson Valley) reached the site later called Rim Village in 1905, but those desiring to do a circuit around Crater Lake were faced with a cross-country pack trip lasting several days.

The first clamor for a circuit road came from park founder William G. Steel, but only after, he started a concession company to provide visitor services at Crater Lake in 1907. Steel told one newspaper that the road's construction was imminent that September, an announcement that largely stemmed his optimism about public and private investment at Crater Lake, as fueled by visits from Secretary the Interior James R. Garfield and railroad magnate Edward H. Harriman, president of the

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Southern Pacific. Garfield left office after the presidential election of 1908, while Harriman died soon thereafter, but Steel continued his pursuit of funding for roads both to and within the park through the Oregon congressional delegation. His first taste of success in this regard came in June 1910, when Congress appropriated \$10,000 for the Army Corps of Engineers to make a survey and provide estimates for future road construction at Crater Lake.<sup>1</sup>



Stagecoach carrying the Secretary of the Interior James A. Garfield, on his way to Crater Lake in August 1907. The first car reached the rim later that summer. *Crater Lake National Park Museum and Archives Collections (CLNPMAC)*.

A party of 26 men began work to prepare plans, specifications, and estimates for a park road system in August. The engineer in charge came to Crater Lake having studied a topographic map, quickly becoming convinced that a “main highway” or “boulevard” following the rim was feasible, with roads and trails to points of interest radiating from it. As the center of circulation, such a road followed long established precedents, given how circuits for riding and walking had served as the standard way of viewing European parks since the eighteenth century. Prominent landscape designers in the United States during the middle part of the nineteenth century like Andrew Jackson Downing embraced this convention as the desire for public and private parks spread across the Atlantic. It was Downing who provided a hierarchy of service, approach, and circuit roads in his work, and this heavily influenced the design of circulation systems in American national parks. The concept of circuit road



### Building the first Rim Road

Estimates for construction of a complete road system in Crater Lake National Park also reflected the emphasis on a circuit of the rim. Roughly two-thirds of the \$627,000 needed to complete the grading for this system in 1911 would go to building the “main highway,” one that the Army Corps of Engineers wanted to locate as “near to the edge of the crater as can be done at as many points as possible.” They figured an average cost of building each mile of road to be \$13,000, with the construction estimates based on a sub-grade 16 feet wide and an eventual surfaced width of 12 feet.<sup>3</sup> This figure did not include paving at another \$5,000 per mile, nor the need for guard wall as a safety barrier. The engineer in charge of the survey, however, believed that the latter could be hand laid with “dry rubble” without increasing the total estimated cost.

Road building started during the summer of 1913, with work supervised by the Army Corps of Engineers continuing over the next six years. Construction proceeded from the park’s east entrance to Lost Creek, where the Rim Road was to commence. Crews hired on a day labor basis created a circuit from there, with some working west to Rim Village via Munson Valley, while the others went north to Kerr Notch and then along the eastern rim of Crater Lake.<sup>4</sup>



Grading with a team, note the use of a plow. *National Archives and Records Administration (NARA), Record Group (RG77), Washington, DC.*

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Several cars traversed the roughly graded Rim Road in the fall of 1918, but the reluctance of Congress to provide funds for surfacing meant that the engineers could not finish what they started. They left the park in July 1919, having expended approximately \$417,000 for equipment, supplies, and labor. This amount covered work on an entire park road system, one the engineers described as allowing for visitors to see the principal scenic features by wagon or automobile, though the dust and ruts often made travel “slow, disagreeable, and in some places dangerous.”<sup>5</sup>

### **Need for Reconstruction**

The National Park Service assumed control of the roads in Crater Lake National Park once the engineers departed, but available funding allowed crews it hired to open the circuit each summer by hand shoveling, followed several weeks later by horse drawn equipment that removed rocks from the roadway. By 1923, Park Superintendent C.G. Thomson lamented to NPS director Stephen T. Mather that a rising number of vehicles made maintenance difficult in the absence of surfacing material, since the annual re-grading each fall could not adequately alleviate the problems associated with a rough dirt road. Publicly, however, Thomson extolled the numerous wonders seen from the Rim Road in promoting the park to visitors. According to him, the circuit should be seen as “not a joy ride, but a pilgrimage for the devotees of Nature.” It was where “a hundred views of the magic blue lake and its huge shattered frame” highlighted the “thirty four miles of amazing beauty, three hours of vivid and changeful panorama.” He knew what 200 cars per day over the course of nine weeks each summer could do to such an earth graded road, but Thomson counseled prospective visitors to “approach the experience [of driving around the rim] in a leisurely and appreciative mood, and great will be your reward.”<sup>6</sup>

No matter how reverent the motorist, few considered the Rim Road to be adequately constructed as passenger cars became heavier and faster during the 1920s. Within a decade of the circuit’s “completion” by steam shovel and horse-drawn grading equipment, the narrow roadway made passage of vehicles headed in opposite directions difficult. Even though the average radius of curves “greatly exceeded” 100 feet, with none being less than 50 feet, they seemed tight by the highway standards of 1926. It needed to be lengthened so drivers could better sustain the posted speed throughout their journey around the rim. Variance in grade between two and eight (with some stretches of road at ten percent for short distances) represented another design problem at a time when engineers agreed that five percent should be the maximum allowed.

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Automobile on newly graded section of the old Rim Road, 1913. *NARA, RG77, DC.*



The rough condition of the Rim Road necessitated use of a patrol car in the early 1920s. *Matilda Hall (Alex Sparrow), CLNPMAC, 8885.*

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Metamorphosis of the Rim Road into a new circuit of Crater Lake took place as the state highway system and forest roads around the park experienced both steady and dramatic changes spurred by an infusion of federal highway funds expended through the Bureau of Public Roads (BPR). The road system in Oregon grew with the help of funds authorized by the congressional acts of 1916 and 1925 that were aimed at providing the states with aid in building highways. BPR subsequently supervised contracts to upgrade approach roads to the park, such as the Crater Lake Highway (numbered as 62 after 1926), which had been part of the state system beginning in 1917. It also took the lead in the improvement of the federal system of roads, such as U.S. 97 (also known as The Dalles – California Highway) that served as the main north-south corridor through central Oregon, one that ran just east of the park. Throughout the 1920s and 30s, several roads built in the national forests near Crater Lake became part of the state highway system, including one connecting Union Creek with the south shore of Diamond Lake, and then over to U.S. 97.



Dust conditions on one of the park's approach roads, about 1925. *CLNPMAC, 8885.*

The most profound effect on the park visitation from building new roads, however, came in 1940. Realignment of U.S. 97 away from Sun Mountain and Fort Klamath dramatically reduced visitor traffic through the east entrance, but opening the Willamette Highway (numbered 58) from the north allowed park visitors to save about two hours over what had been the quickest route from Eugene. Previous work to provide a passable road through the park (much of it involved upgrading the Diamond Lake Auto Trail into the North Entrance Road) to a new “north en-

trance,” in concert with the effort to connect Diamond Lake with U.S. 97 played an important part in the park’s visitation reaching the unprecedented figure of 252,000 that year. At that point the western portion of the Rim Drive began to serve as both through route and a portion of the circuit road around Crater Lake.



Rocky sections of the old road made traveling around the rim an adventure. *CLNPMAC.*

### Designing a new “Rim Drive”

On the most basic, functional level, there are several main reasons as to why the NPS and BPR undertook reconstructing the Rim Road. These addressed ameliorating a narrow, rough, dusty road with sharp curves and steep grades. Significant increases in visitation during the 1920s brought more traffic to the park, though at least one observer noticed that the existing road was so difficult to traverse that only a small proportion of motorists attempted to go around the lake.<sup>7</sup>

The NPS wanted the new Rim Drive to be a more pleasant visitor experience, but not a super-highway on which motorists “would speed around the lake and pass by scenes of beauty in their rush to make the lake circuit.”<sup>8</sup> BPR engineers thereby aimed for constant average design speed of 35 miles per hour, one avoiding shifting gears on ascent or braking on descent. Instead of the switchbacks and short radial curves evident in places along the old road, designers preferred curvilinear alignment that allowed vehicles to maintain the design speed despite curves and changes

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in grade. These alignments allow for constantly changing views by making use of continuous (also called reversing) curves instead of long straight sections (tangents), and can eliminate the need for cuts and fills that are both unsightly and expensive.



One of the viewpoints along the western part of the Rim Road. Note the rather narrow roadway in relation to the car. *Frank Patterson, Alex Sparrow Collection, Southern Oregon Historical Society (SOHS).*

Engineers who located the first Rim Road attempted to provide viewpoints of the lake in as many places as possible. This kind of location diminished the interest inherent in being routed away from the lake in some sections, or the excitement of visitors in reaching certain viewpoints by trail. The road also created some scarring evident from a few places on the rim since the Army Corps of Engineers had virtually no funding to address landscape concerns if such expertise had been available. Designers of Rim Drive aimed for visual unity in reconstructing the road, something that included removing it from what visitors saw when they stopped at the main focal points, or vistas. Unity also encompassed the consolidation of park facilities and integrating trail location and design with that of the road.

The third rationale behind reconstructing the Rim Road lay in providing an intended, rather than incidental, link between a road circuit presenting central features and their interpretation to visitors. John C. Merriam, who probably served as the leading figure in creating a formalized interpretive program at Crater Lake, remained adamant that the road primarily serve the purpose of “showing the great features” of the lake and its caldera. He thus decried any attempt to make it a link in a

larger through route connecting various points and thought it best to avoid allowing any part of the Rim Road to become a segment of the park's approach roads. The circuit should instead be part of a plan aimed at presenting features of the region "determined by experts to be of outstanding importance" since he felt that Crater Lake offered "one of the greatest opportunities for teaching fundamental understanding of Nature."

With Crater Lake showing, "the most extreme elements of beauty and power in contrast" that plan included the development of "stations" where certain views helped visitors appreciate elements derived from the geological story of Crater Lake and those arising from elements of pictorial beauty.<sup>9</sup> He cautioned, however, that the "hand of the schoolmaster" not be overly evident at these particular places.



John C. Merriam

The most overt attempt to educate visitors would instead be made at the Sinnott Memorial in Rim Village, a place Merriam referred to as "Observation Station No. 1." He saw it as the "main project," though "minor projects" of building the road, some trails, as well as additional observation stations had to be closely coordinated with developing the Sinnott Memorial for visitor orientation.<sup>10</sup>

Where interpretation had formerly been incidental to the experience of traveling Rim Road during the 1920s, the slow metamorphosis of reconstruction was intended to bring this function to visitors in a more concrete way. Each of the seven observation stations built as part of Rim Drive were intended to serve as stops on the naturalist-led caravan that traversed the road in a clockwise fashion, from Rim Village to Kerr Notch. All were chosen part of displaying a different aspect of the lake's beauty, and then spaced proportionately around the lake, with each intended to have hard-surfaced parking for a minimum of 50 cars.

Plans for each observation station should match the "unique beauty of the lake itself," since Merriam thought represented "a supreme opportunity to teach the significance of beauty through offering to the visitors the experience of beauty." The points chosen by Merriam and his associates on the western side of the rim were accessible by trail so that in no case might the road come near enough to be "a disturbing element to one who wishes to observe the lake in quiet."<sup>11</sup> This was something of a contrast with the stations located on the northern or eastern side of the lake, where all four were part of planning and design of the road. NPS landscape

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Ranger-naturalist with visitors at Discovery Point (Observation Station No. 2), during the summer of 1957. *Raymond K. Rundell, CLNPMAC, 8885.*

architect Francis G. Lange designated three of the four stations (Skell Head, Cloud-cap, and Kerr Notch) as “parking overlooks,” though this term also applied to two substations.

Merriam wanted a leaflet describing the stations of Rim Drive to be available at the Sinnott Memorial, in conjunction with adequate signs at each station. These stops might also include an inconspicuous holder for literature describing the station for those who did not visit Rim Village first. As a designer, Lange supplied a more detailed vision for the stations adjoining the road. They should contain, in his words, “...a small promontory circulation point with the necessary stone guard rail (log, if found more suitable) and an interestingly treated sign distinguishing the point in question, as well as denoting any other unusual features. It is also suggested that a suitable mounted binocular glass be set up at each point where found desirable, being mounted on an appropriate stone base.”<sup>12</sup> For those stations accessible by trail, Lange recommended “...stone steps if necessary, then a small promontory platform, some treatment of guard rail, possibly a sign and then a binocular mounted on a stone base.”<sup>13</sup>



Visitors at Kerr Notch (Observation Station No. 8) in 1940. *Oregon State Highway Commission.*

Beneath the observation stations in a hierarchy of developed viewpoints along Rim Drive lay the substations, numbering thirteen in 1934, but increased (at least in plans) to seventeen a year later. Substations shared many similarities with the observation stations, in being chosen for aesthetic or educational reasons, but did not

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function as stops on the caravan trip, nor were all of them formally developed with paved parking areas, signs, or masonry guardrail. Unlike the stations, they sometimes highlighted features situated away from Crater Lake, and often focused on specific geological features.



Reflection Point, one of the substations in road segment 7-C1. *Francis G. Lange, NARA, RG 79, Pacific Southwest Region, San Bruno, California (SB).*

Developed pullouts or “parking areas” served as the next level below the substations in the hierarchy. Although not chosen at random, these stopping points lacked the aesthetic values attributed to the observation stations and substations. Lange commented in 1938 about an effort to restrict the number of such points, yet where “an interesting view of the Lake can be obtained,” he wrote, an effort “has been made to provide accommodations.” He also noted in the same report that where “excellent” views of the hinterland existed, several small parking areas were provided.

Preserving the primitive “picture” of Crater Lake received greater emphasis from the engineers and landscape architects as they planned the reconstruction of Rim Road than the interpretation of beauty and geological features. Merriam stressed Crater Lake and its rim was one of the three most beautiful places in the world and that every effort should be made to make sure that the road did not impose itself on views of Crater Lake or the surrounding region. Landscape architect Merel Sager described how greatest damage to park landscapes came from the construction of



Parking area over Steel Bay, on the north side of Crater Lake, with Llao Rock in the distance. *Lange, NARA, RG 79, SB.*

roads, and urged that an “intelligent and comprehensive program of roadside development” could better fit these roads into their setting. This was intended to involve the road as seen in the landscape and the landscape as seen from the road.

Rim Drive followed the old Rim Road wherever possible to minimize impact, while landscape architects and the foremen under contract also paid special attention to planting the noticeable cuts in new sections and trying to disguise (or “obliterate”) abandoned stretches of old road when funding allowed. Contract provisions called for protecting all trees not within the clearing limits (or “right of way”), placing dark soil and trees on conspicuous cuts and covering fills to diminish the ragged appearance of large rocks. Another dimension to the work involved “bank sloping,” where flattening and rounding was aimed at stabilizing cut and fill slopes to permit establishment of vegetation, while warping aided transition between the bank and roadway. All of these measures reflected the standard practice of providing landscape treatments as a contribution to the utility, simplicity, economy, and safety of scenic highways built primarily for the enjoyment of motorists. The national parks received special attention in this regard, partly because the NPS pioneered many of the standardized landscape treatments in road design.<sup>14</sup>

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Placing dark soil on a fill, 1935. *Lange, NARA, RG 79, SB.*

### **Collaboration with the Bureau of Public Roads (BPR)**

After working to solidify a working relationship with BPR over the next year or so, NPS director Stephen T. Mather signed an inter-bureau agreement on January 18,

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1926. Under its terms, the NPS and BPR were to use “every effort to harmonize the standards of construction” with those of the Federal Aid Highway System located outside the parks. The NPS gained a measure of control over its need to continually upgrade park roads in the face of increased vehicle speeds and a massive increase in automobile ownership. The inter-bureau stipulated that the NPS reimburse BPR for overhead expenses from the annual appropriations for park roads. This included various levels of investigation and survey, the preparation of bid documents (derived from the plans, specifications, and estimates, or PS&E), as well as salaries for engineers to supervise and inspect contracted work.



Road location survey party on the north side of Crater Lake. *G.V. Robinson, CLNPMAC.*

Once initiated, projects followed a familiar sequence that began with road location. After reconnaissance, engineers did a preliminary survey (or P-line) of road location to obtain topography for representative cross sections. The P-line allowed for curvature and connecting tangents to be placed by “projection” back in the office, a step resulting in the semi-final location (or L-line). Staking in the field or final road location, necessitated the establishment of benchmarks on the ground, as well as any adjustments to grade or positioning of cross-drainage. All stages of road location were subject to NPS approval, with most of the changes provided by landscape architects.

The process of road design along Rim Drive was shared between the BPR and NPS. At a landscape scale, BPR designed three basic elements of the road: horizontal alignment, vertical alignment, and cross-section. Design of curves and tangents in a planar

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relationship is horizontal alignment, with preference given to use of spiral transition curves instead of tangents throughout most of the circuit. These made for a sympathetic alignment in relation to the park landscape, but also brought average speed and design speed closer together for the purposes of safety. Vertical alignment or “profile” is how the located line in plan view fits the topography in three dimensions, especially in reference to grade, sight distance, and cross drainage. The banking or “superelevation” of curves represented one particularly significant part of vertical alignment, since adequate sight distance in relation to the design speed needed to be maintained, particularly where a combination of curvature and grade occurred. The third element, cross-section, is a framework in which to place individual features and their relationship to each other features such as road width, crown, surface treatment, and slope were usually depicted through drawings of typical sections.

At the scale of individual features, the NPS worked to provide BPR with standard guidance for the design of road margins (shoulder, ditch, bank sloping), drainage structures (culvert headwalls and masonry “spillways”), and safety barriers (masonry and log guardrails) along Rim Drive. As the lead NPS landscape architect for much of the project, Lange produced planting plans in conjunction with a number of site plans for areas along the road corridor that needed individualized treatment beyond the standard measures described in the contract specifications.



Clearing and grubbing between Kerr Notch and Anderson Point, 1935. *Lange, NARA RG 79, SB.*

## RIM DRIVE CULTURAL LANDSCAPE REPORT



Old road obliteration through use of bank sloping along the northern part of Rim Drive.  
*Lange photo pair, CLNPMAC.*

Road construction consisted of three types of contracts beginning with the grading phase. Each contained numerous items bid on the basis of unit prices for each. BPR engineers, in consultation with NPS engineers and landscape architects, provided estimates for the items, starting with clearing vegetation from the roadbed. Removing stumps and other obstacles to rough grading through blasting or burning constituted a separate item called grubbing. The subsequent rough grading with heavy

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machinery began with excavation, usually divided into separate bid items called “unclassified” and “Class B,” with the latter often specified by the NPS to avoid damage to natural features.

Rough grading also included items such as moving excavated material based on estimated volumes need for cuts and fills, placement of concrete or metal culverts as cross-drainage, as well as the flattening of slopes at prescribed ratios to control erosion. Completing the earth-graded road involved several items under the heading of “finish grading.” This step included fine grading of the sub-base and shoulders, as well as bank sloping. Depending on how much funding was available, subcontractors handled the stone masonry for culvert headwalls, guardrails, and retaining walls at this stage. Other subcontracted items under the heading of finish grading included old road obliteration and special planting once bank sloping had been accomplished.

With the grading phase completed, a separate contract for preliminary surfacing could be let. This next phase of road construction involved laying a base course of crushed rock on the roadway, followed by a top course of finer material to provide a definite thickness and protection for the earthen road underneath. This type of contract might include items, usually subcontracted, such as building masonry structures like guardrail (often on fills created during rough grading that had to settle over the winter) or special landscaping provisions to be completed as part of executing site plans or working drawings provided by the NPS.

Bituminous surfacing, or paving with asphalt, was done through another contract. This phase of road construction involved laying aggregate (crushed stone and sand) along a specified width of roadway as a base, then followed by placement of a bituminous “mat” as binder. The thin surfacing of bitumens known as a “seal coat” served as the final step. Completion of the paving contract generally signified the end of BPR involvement with construction. Road maintenance and post construction items thus became NPS responsibility.

Reconstructing three miles of approach road between Park Headquarters and Rim Village set the NPS/BPR collaboration in motion at Crater Lake. With the location survey completed several months prior to formal approval of the inter-bureau agreement, the grading contract commenced during the summer of 1926. The project reduced the maximum grade (from 10.9 percent to 6.5 percent) of this approach and produced a new roadway 20 feet in width. As a precursor to reconstructing to reconstructing the Rim Road, this realignment became known for how visitors obtained their first view of Crater Lake as a spectacular and sudden scenic encounter.



The collaborative nature of designing park roads such as Rim Drive dictated repeated field visits involving managers, engineers, and landscape architects prior to letting contracts for grading or other construction. Gathered at Kerr Notch in 1934 were (left to right): Armin Doerner (landscape architect), David Canfield (park superintendent), Isabelle Story (NPS Washington Office), John Sargent (BPR engineer), William Robertson and Ward Webber (NPS engineers), and Francis Lange (landscape architect). *Lange, CLNPMAC.*

Landscape architects with the NPS chose the point of “emergence,” an alignment allowing visitors to enter a new “plaza” developed on the western edge of Rim Village or begin a circuit around the lake.

The initial step in planning for reconstruction of the Rim Road took place once the inter-bureau agreement had been signed. The BPR reconnaissance survey of the park’s road system in 1926 furnished a starting point and allowed Superintendent C.G. Thomson to reference estimated construction costs in a report on his priorities for road and trail projects over the next five years. NPS officials in Washington requested the report in connection with allocating the congressional appropriation for park roads and trails, a separate process from the site development plans of the period that were aimed at facilities for areas like Rim Village.

Rudimentary lists of projects with estimated costs evolved over the next five years to a bound set of drawings by landscape architects showing the proposed site development in the context of projected park-wide circulation. Formal adoption of these “master plans” by the NPS came as appropriations for park development steadily increased, but these documents remained apart from planning for the location and design of roads. BPR accomplished these tasks through its usual process prior to

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letting contracts for road construction, subject to NPS approval. Master plans contained some information about Rim Drive and other road projects, but only as context for what the NPS landscape architects hoped to accomplish in a “minor developed area” such as the Diamond Lake (North) Junction or at the “parking overlooks” like Kerr Notch, Skell Head, or Cloudcap.



Snow removal on the Rim Road below the Watchman, July 1917. *Earl Russell Bush, CLNPMAC, 8885.*

## Road Location

The idea of better positioning the park for through travel in reference to the location of U.S. 97 drove Thomson's priorities in his report about possible road projects in 1926. A rerouted East Entrance Road received top choice for the time being, but Thomson wanted the west Rim Road improved "as soon as appropriations would permit" in order to better "take care of travel from Crater Lake to Diamond Lake." He reasoned that this section received more use than any other on the Rim Road, thereby meriting consideration when more money became available, especially since a new location near the Watchman might help get the entire circuit open earlier in the season. Given the park's short season, Thomson emphasized the importance of the Rim Road to the visitor experience by describing the circuit as "easily one third of the value of our Park and until it is fully open, thousands of people are denied" what he called "their greatest reaction."<sup>15</sup>



Snow removal on Rim Drive below the Watchman, May 1958. *Rundell, CLNPMAC, 8885.*

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The BPR reconnaissance survey not only allowed Thomson to reference the construction estimates in his priorities, but also allowed him to comment on proposed road locations. It designated the Rim Road as Route 7 in the park and divided the circuit into five segments, labeling them as A, B, C, D, and E. Thomson took an immediate dislike to what BPR proposed as 7-E, a road segment four miles long and running from Sun Notch to Crater Lake Lodge by way of Garfield Peak. In addition to being very expensive, the proposed road location necessitated two tunnels and a “gash across the face” of Garfield Peak, which is “altogether too beautiful to be subjected to the unconscious vandalism of ambitious engineers.”



Sun Notch in the summer of 1931. Note the engineer's stake next to the figure at center left. *Merel Sager, NARA, RG 79, SB.*

Oddly enough, given his comment on the location of 7-E, Thomson endorsed what BPR proposed for segment 7-D. He envisioned that “all travel will enter the pinnacles (East) entrance” and then proceed to the rim to enjoy what Thomson thought to be the preeminent view of Crater Lake at Kerr Notch. In spite of the cut required across the face of Dutton Cliff on two sides, he waxed about how vehicles might travel “practically on contours” to Sun Notch. Visitors might thus enjoy a panorama of the Klamath Basin and the “tumbled” Cascade Range.

By urging that segment 7-A be given first priority for fiscal year 1929, Thomson stated that the stretch of road between Rim Village and the Diamond Lake (North) Junction constituted “practically a main stem for us.” It not only carried traffic to and from Diamond Lake, but also was the most traveled section used by visitors who did not go all the way around the rim. He believed construction of this segment of 6.7 miles might take only one season, to be followed by the other segments over the next four years.<sup>16</sup>

In response, BPR conducted a preliminary location survey as another preliminary step toward construction during the summer of 1928. Beginning from Park Headquarters in Munson Valley, they went over Thomson’s preferred line for 7-E to Sun Notch in July and then pushed toward Kerr Notch on the reconnaissance line for 7-D. The location crew left Crater Lake at the end of September, having run a P-line for those two segments as well as the one connecting Rim Village with the Diamond Lake Junction. They did so abruptly, after receiving word from Washington that there would be no funding for road construction at the park in 1929.

The delay may have been fortuitous since Thomson transferred to Yosemite National Park in early 1929 and the new superintendent, E.C. Solinsky, wanted additional study of the P-line and segment 7-A in particular. One of his reasons pertained to a plan for building a new administration building at Rim Village. Solinsky believed that such a structure obviated the need for a ranger station there, so the latter could be located at the Diamond Lake Junction. Since he intended it to serve as an entrance (checking) station, Solinsky recommended postponing the building programmed for 1929 until the location of the junction could be finalized.

Another reason for further study pertained to Merriam’s desire for designing roads and trails “with special reference” to presenting park features and those in the surrounding region “which have been determined by experts to be of outstanding importance.” The Laura Spelman Rockefeller Memorial supplied a grant for a study of the educational possibilities of the parks in 1928, one administered by a committee

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Building the Sinnott Memorial, 1930. *CLNPMAC*, 8885.

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headed by Merriam. Most of the field visits associated with the study took place over the next summer, followed by recommendations to congressional representatives well positioned in the appropriations process. At Crater Lake, the study effort translated into money for building the Sinnott Memorial with a special \$10,000 appropriation as well as funds to hire a permanent park naturalist and an expanded summer staff of ranger naturalists.

Merriam visited the park in August 1929 and paid special attention to the location of Rim Drive. He then wrote to the deputy NPS director, Horace Albright, about the need for someone who understood the park's geological features to assist with locating segment 7-A. This recommendation brought about an on-site inspection of the P-line in October 1929, beginning at Rim Village and going clockwise on the old road to Kerr Notch. Arthur L. Day, volcanologist at the Carnegie Institution of Washington and head of its Geophysical Laboratory, served as Merriam's representative. Joining him at the meeting were the district and resident BPR engineers (J.A. Elliott and John R. Sargent, respectively), as well as NPS chief engineer Frank Kirtledge, chief NPS landscape architect Thomas Vint, and Solinsky.<sup>17</sup>



Visitor at the Sun Creek viewpoint on the “low line” between Lost Creek and Vidae Falls. *Sparrow Collection, SOHS.*

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The group recommended keeping the road as close to the rim as possible over the first mile from Rim Village, but with additional easy curvature to the first volcanic dike visible at the Discovery Point Overlook. They suggested elimination of a tight radial turn at the foot of the Watchman, and then chose a line that kept the road away from views of Crater Lake until the Watchman Overlook. Kittredge noted how BPR appeared to have “solved” the snow problem around the Watchman, presumably by running a lower line than the one adopted by the old Rim Road.

BPR opted for a low line around Liao Rock, though the group favored a spectacular “ledge route” involving sidehill excavation and a series of “window tunnels” on the lake side to obtain better views and reduce two miles of travel in reaching Steel Bay. Everyone came to agreement over leaving the Rock of Ages (Mazama Rock) undisturbed. All of them wanted the road to reach the top of Cloudcap, but no one thought of marring the fringe of whitebark pine overlooking the lake. This portion of the circuit required further study, the group advised, especially if it stayed close to the rim. The group endorsed the surveyed line between Cloudcap and Kerr Notch, with the stipulation that visitors should be able to reach the viewpoint for Cottage Rocks (Pumice Castle), as well as the Sentinel Point and Kerr Notch localities.

Although the group did not review the P-line between Kerr Notch and Sun Notch, Kittredge characterized it as requiring heavy blasting to make a roadway across sheer cliffs. He saw no way around blasting, but thought damage could be limited if care was used in preventing material from “flowing” down slopes. Kittredge also mentioned two prospective routes beyond Sun Notch, with a decision needed about whether to bypass Park Headquarters and go to Rim Village by way of Garfield Peak instead. One that did just that came to be known as the “high line.” The other route, a “low line” largely utilized the existing road connecting Lost Creek to Vidae Falls.

With segment 7-A scheduled for bid in the fall of 1930, the next phase of location work focused on it. Resident BPR engineer John R. Sargent took charge of the L-line survey for the initial part of Rim Drive after NPS landscape architect Merel Sager found the P-line unsatisfactory in “numerous” places.<sup>18</sup> Sager effected revision of the old line in line with advice from Merriam, Harold C. Bryant (assistant director of the NPS as head of the branch of research and education in the Washington Office), and Bryant’s deputy, geologist Wallace W. Atwood. Sager and Vint went over the revised line with Sargent in August, with Sager returning in October to meet with Sargent about designating certain places along segment 7-A to receive Class B excavation. Clearing by NPS crews under BPR supervision commenced



Rim Drive's location in the vicinity of Cloudcap. Note the wye intersection and spur road to summit in the center of photo.

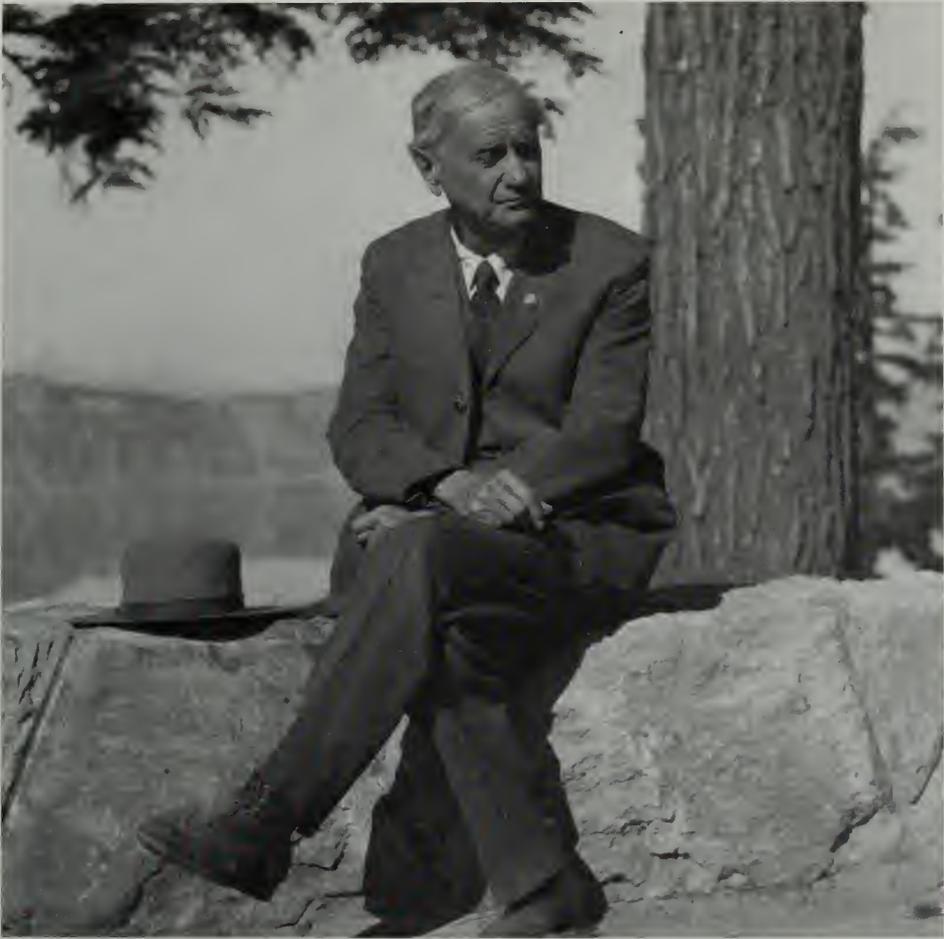
shortly thereafter as a way to allow the prospective grading contractor the benefit of a full working season in 1931.

L-line surveys continued over the following summer and proceeded quickly enough over segments 7-B and 7-C for the NPS to pre-advertise bidding on them in November 1931. The location work covered a new road of just over 13 miles, one now routed almost to the base of Mount Scott. This line avoided the ten to twelve percent grades on the old Rim Road's ascent of Cloudcap through use of a dead-end spur road to the top. After some discussion, the NPS chose a line having a gentler grade routed away from the rim down to the Cottage Rocks viewpoint, instead of going down the south face of Cloudcap. The portion of segment 7-C between Cloudcap and Kerr Notch then became known as 7-C1 and subsequently divided into two grading contracts, units 1 and 2.

Park Superintendent David Canfield could thus confidently assert by November 1934 that the award of two grading contracts in 7-C1 brought the Rim Drive three-quarters of the way around the caldera. Anticipated construction, Canfield noted, would provide the planned connection with the East Entrance and U.S. 97, leaving only a quarter of the circuit "untouched" except for survey work. Location of that remaining quarter became contentious, beginning with a salvo launched in May

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1931 by Park Commissioner William Gladstone Steel. He wanted a road built from the base of Kerr Notch to Crater Lake Lodge inside the caldera at a four percent grade, a route to be accompanied by a tunnel leading to the water.



William Gladstone Steel at Rim Village, 1931. *CLNPMAC*.

Albright, now director of the NPS, dismissed the idea as “chimerical.” Bryant wrote to Steel and attempted to point out that the new road’s alignment was aimed at preventing it from being visible at a distance to those standing on the rim.<sup>19</sup>

In any event, Sager pointed to a pair of big problems associated with any “high line” route proposed for connecting Sun Notch with Rim Village, starting with the outlay needed for obliterating scars on the sides of Garfield Peak. He also called the con-

struction of a tunnel proposed by BPR “inadvisable,” owing to the prevailing rock types on the ridge above Crater Lake Lodge. Albright intended to study the high line in relation to the low line favored by Sager and other landscape architects in July 1931, as part of his stop to attend the dedication of the Sinnott Memorial. The director ran out of time to make a field inspection of segment 7-E on that visit to the park, then deferred a decision on it, but finally decided not to build a road into Sun Notch by the end of June 1933. Albright wrote to Solinsky on his last day as director in August and ordered that a “primitive area,” a roadless tract prohibiting vehicular access, be shown on master plans for the lands north of the old Rim Road between Lost Creek and Park Headquarters.<sup>20</sup>

BPR’s engineers, and Sargent in particular, did not easily give up on the high line. Sargent persuaded Lange and the new superintendent, Canfield, to walk the surveyed line of roughly three miles between Sun Notch and the lodge in July 1935. Lange went into considerable detail about the many construction and landscape problems posed by going through with the high line project in a memorandum to the NPS office of plans and design in San Francisco. He also pointed to the face of Dutton Cliff in segment 7-D as offering the “outstanding” problem, since the road location through large slides of loose rock would be difficult to camouflage. To put a road into Sun Notch around Dutton Ridge struck him as contrary to the park idea of “preserving those areas which are worthy of protection and keeping out any possible development.” Dutton Ridge in particular seemed to him as a “spectacular creation,” while the primitive area around it gave Lange the impression of being the first person to visit. He concluded the memorandum with a plea to keep any road at least several hundred feet below the rim at Sun Notch in the event that the higher line of segment 7-D won out over the low line.<sup>21</sup>

Kittredge and the resident NPS engineer, William E. Robertson, also walked the high line within days of Lange’s field trip. They did so in response to a news article that appeared in a Portland paper, one that came in the wake of Concessionaire Richard W. Price taking his case for the high line to the chamber of commerce in Klamath Falls. The local congressional representative contacted Secretary of the Interior Harold Ickes at roughly the same time, and Ickes then referred the query to NPS director Arno B. Cammerer. Albright’s successor dispatched Associate Director Arthur Demaray to Crater Lake for an on-site inspection of the two road locations, and told Ickes that the matter would receive further consideration upon Demaray’s return to Washington. Kittredge’s assessment of the high line from Sun Notch to Rim Village focused on the impact to Garfield Peak, though he offered the possibility of two one-way roads traversing the cliff face.”

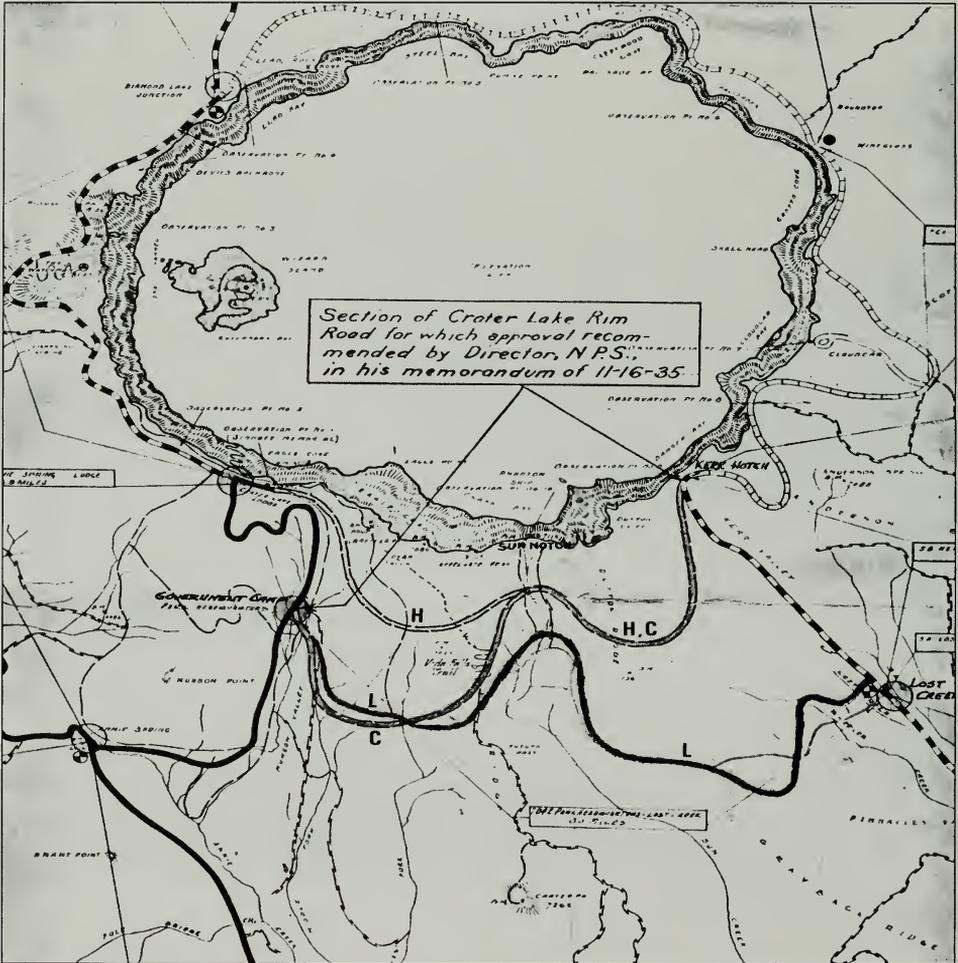


Section of Dutton Cliff at road station 470 prior to rough grading, 1936. *Lange, NARA, RG 79, SB.*

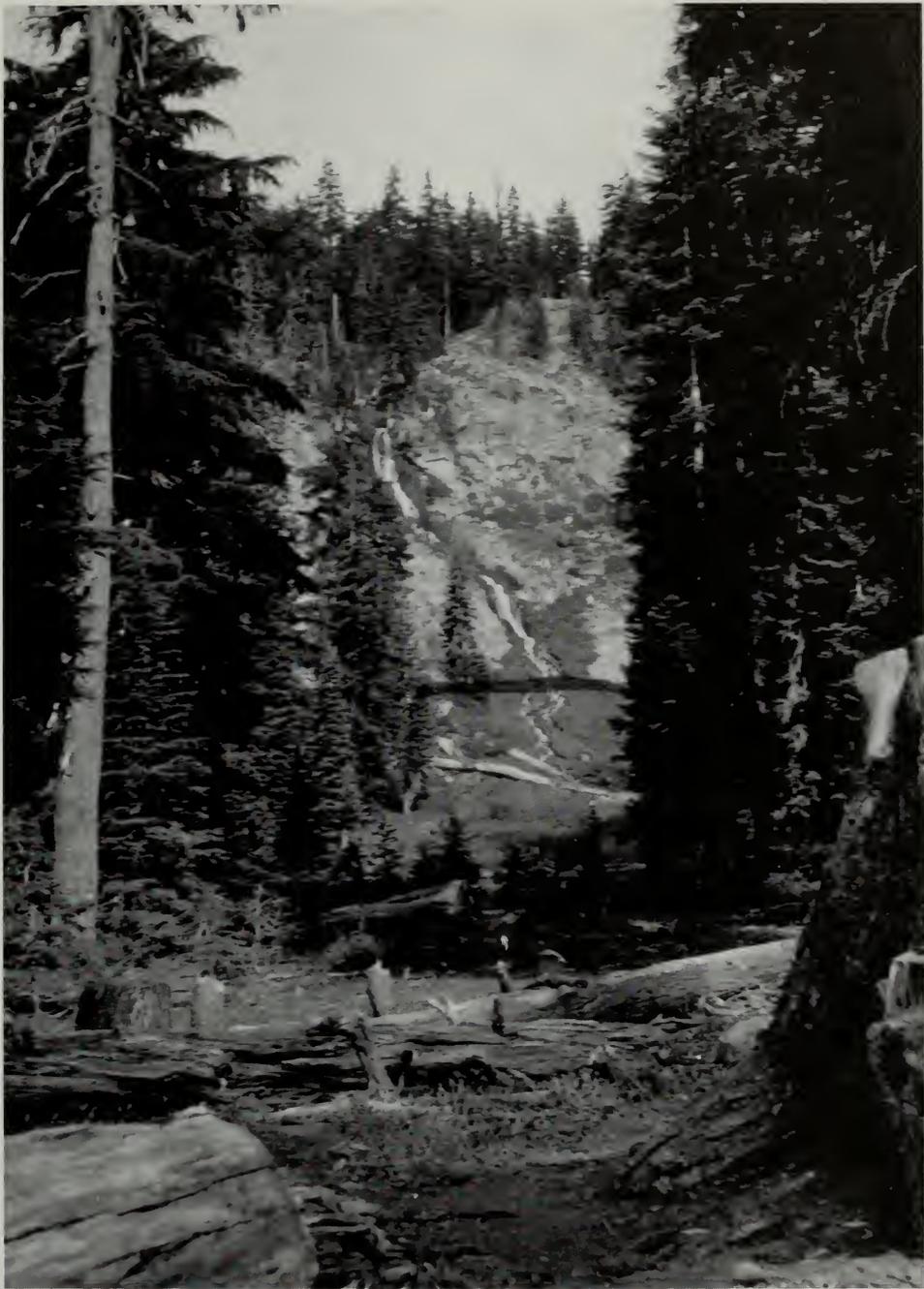
In his reply to Kittredge, Demaray dismissed the high line location for 7-E due to its impact on Garfield Peak. He told Kittredge that further consideration should be given to the high line in 7-D, one that ran “from Kerr Notch around Dutton Ridge

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to Sun Meadow, then joining the present road [from Lost Creek] at the Vidae Falls.” This amounted to a “combination line,” one that Canfield strongly supported when he asked Cammerer to transfer funds originally programmed for the low line route and instead put them toward building segment 7-D. Lange again warned that such a road would “deface and permanently injure” the cliffs of Dutton Ridge, though he injected some levity into the situation by offering BPR the paraphrase “You take the high line and I’ll take the low line,” sung to the tune of “Loch Lomond.”



A master plan sheet of 1936 with the park’s road system shows how the “combination line” (marked “C”) borrowed from both the “high line” (“H”) and “low line” (“L”). CLNPMAC.



Horizontal line at center was intended to show the location of a proposed bridge to span the road crossing at Vidae Falls. *Lange, NARA, R6 79, SB.*

Cammerer went ahead with recommending the “combination line” of a high 7-D and a low 7-E to Ickes on November 16, 1935. The secretary approved it several weeks later and his office issued a press release to that effect.<sup>22</sup> Sargent confidently anticipated the decision by completing the fieldwork for what he called the “final located line” between Kerr Notch and Vidae Falls by late October, so that plans could be completed over the winter. Engineers estimated this stretch of 5.5 miles as the most time consuming portion of Rim Drive to build, so BPR divided it into three units (as 7-D1, 7-D2, and 7-E1) for the purposes of bids on future grading contracts. Sargent also ran a P-line of 4.3 miles for the last segment of Rim Drive, one connecting Vidae Falls with Park Headquarters, in the fall of 1935. His successor, Wendell C. Struble, revised the line over the following summer to eliminate about a mile of road construction, mainly because he and Lange agreed that the new line effectively reduced the scar width of 7-E2 as seen from Crater Lake Lodge.

The problem of how to approach Vidae Falls from Sun Notch and then cross the creek remained, since Vint pointed out that Sargent’s line came too close to the falls and made any road crossing involving a fill too noticeable. He recommended that the line follow an approach road down to the proposed Sun Creek Campground (a development intended for the interfluvium between Vidae and Sun creeks near the old Rim Road), so that any fill used to span Vidae Creek might then be less obvious. A higher location required a bridge, Vint noted, one preferably built of logs. Canfield questioned the cost in relation to an expected life of 15 years, while also suggesting some revisions to a design used for the log bridge built over Goodbye Creek (located two miles south of Park Headquarters) in 1929.

Resolution to the Vidae Falls dilemma did not come until January 1938, after Cammerer wrote to Canfield’s successor, Ernest P. Leavitt. Not only did he want the new superintendent’s views on the controversial location of segment 7-D, but took that opportunity to express a preference for a bridge at Vidae Falls. Leavitt responded emphatically with reasons for why the line from Kerr Notch to Vidae Falls constituted a serious mistake, but then gave Cammerer a number of reasons why a fill made better sense than a bridge at the falls.<sup>23</sup> Demaray informed Leavitt in January 1938 that a fill had been approved, largely due to the “depleted condition” of funds for roads and trails during the current fiscal year and the small allotment anticipated for 1939. At this point the associate director regarded any lingering questions over the location of Rim Drive as “closed,” since a contract for grading 7-E2 had been awarded the previous fall.



Rough grading along segment 7-A during the summer of 1932. *Sager, NARA, RG 79, SB.*

### **Construction of Rim Drive**

#### *Segment 7-A (Rim Village to Diamond Lake Junction)*

With roughly \$250,000 allotted for grading just shy of six miles between Rim Village and the Diamond Lake Junction, BPR advertised for bids on May 1, 1931. P.L. Crooks Construction Company of Portland was awarded the contract and began work in June by establishing their camp near the Devil's Backbone. Work proceeded quickly from Rim Village, with roughly one quarter of the job completed in only three weeks.

The contractor's workforce of 90 men (increased to 125 by mid-July) soon began to encounter rougher terrain, where blasting and other means were needed to move more than 50,000 cubic yards of rock per mile.<sup>24</sup> Just the first four rock cuts (which averaged 35 feet in depth) consumed over half of the estimated 150,000 pounds of powder as needed for the entire job. The remaining seven cuts were not thought to be so difficult, with the exception of one running by the Watchman Overlook that measured over 90 feet deep.

By early July, the NPS made note that four steam shovels were working to widen the existing road while "every effort" went toward retaining "as much of the natural beauty of [this] section as possible." One of the measures taken limited the contractor to small quantities of powder when blasting, thus throwing rock into the road-

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way rather than the “right of way.” This method facilitated more effective debris removal by truck and reduced the length of fill faces, while also preserving vegetation. Crews dug trenches at the toe of fills to hold rocks from rolling further down slope, and protected tree trunks with planking to prevent injury from flying rocks. The contractor later modified this practice through using worn truck tires, placing one on top of the other around tree trunks. It protected the trunk on all sides and allowed crews to move the tires from one rock cut to another as blasting progressed.

With all of the anticipated blasting and rock removal, the NPS tried to warn potential visitors about finding “some inconvenience” and advised them to take the “east drive” in preference to the west, even forecasting that the latter might be closed for two week intervals beginning in August. Despite this gloomy prediction, traffic flow on the west rim remained “unhampered” throughout the season. Much of the reason lay in constructing contiguous cuts and fills in half sections, thereby permitting the passage of vehicles. The project even allowed inauguration of the Rim Caravan that summer, a regularly scheduled excursion conducted by ranger naturalists that featured half of its 16 stops within the first six miles of road beyond Rim Village.<sup>25</sup>



View of the Rim Road in foreground from Hillman Peak with a section of Rim Drive (the horizontal line at center) in the distance. *Lange, NARA, RG 79, SB.*

By November 1, the job stood at approximately 75 percent complete. This was despite utilizing “as much hand labor as possible” to help alleviate local unemployment problems. Two of the heaviest cuts (one being near the Watchman Overlook) remained for the 1932 season, yet the four months spent on the job construction that summer did not quite bring it to completion. Aside from some finish grading, most

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of the remaining work related to landscape items. These, however, remained limited in comparison to subsequent grading contracts on other segments of Rim Drive. Old road obliteration, for example, took place only where abandoned sections touched on the new roadway. Consequently, long pieces of the old Rim Road remained plainly visible from high points such as the Watchman or Hillman Peak.



The sparse vegetation at road station 200 (later known as the “Watchman Overlook”) made the old road especially difficult to hide with planting. *Lange, CLNPMAC.*

This somewhat patchy approach to landscape work also applied to the masonry items. Whereas the contractor saw the culvert headwalls to completion, only 250 yards of retaining wall and guardrail were built. These structures appeared on the Watchman grade, where the NPS had the most concern for safety.<sup>26</sup> The need for additional masonry wall along the road margins commanded sufficient attention such that the NPS referred to the next contract as “Surfacing and Guardrail” when BPR advertised for bidders in the summer of 1932.

Although a surfacing contract was awarded that fall, the successful bidder (Homer Johnson Company of Portland) did not begin work until August 1933 due to a record snow year. Barely two months elapsed before the onset of winter suspended the job, but unusually dry conditions allowed work to resume in April 1934. It proceeded quickly enough for final inspection of the surfacing to take place less than six months later, mainly because the Johnson plant produced 550 tons of crushed rock per day.



Masonry guardrail delineating the Discovery Point parking area, 1935. *Lange, NARA, RG 79, SB.*

A subcontractor, Angelo Doveri of Klamath Falls, handled construction of the guardrails. The resident landscape architect for the season of 1934, Armin Doerner, described a slow start during the late spring and early summer. He found that different workers each tried to express “his own ideas about masonry,” so it proved difficult to obtain “a uniform type of wall” at first. When Doerner and the BPR inspector finally agreed on the style wanted, the work improved and it proceeded at a faster pace. Sargent and Doerner agreed to the locations of the walls, starting with two relatively short ones near Rim Village and another of some 500 feet in length at the Discovery Point Overlook. By the final inspection in October, Doerner thought the guardrail had a “very pleasing” appearance aside from some imperfections. One was the trimming, which made it difficult to obtain the specified amount of weathered surface. Achieving the desired variety of color in the walls became problematic when quarrying all of the rock from the same locality.

The surfacing contract did not include enough funding to provide masonry guardrail to line the outer edge of each viewpoint, nor at the road margin where 7-A had been located along a precipice. Engineers tried to mitigate the latter problem by banking the road toward the inside slope, as they did along parts of the Watchman grade. The lack of guardrail, however, became even more noticeable at the Diamond Lake Overlook near Hillman Peak, a viewpoint whose outer edge had initially



A section of masonry guardrail at the Discovery Point parking area, 1934. Note the relatively uniform color of the wall. *Armin W. Doerner, NARA, RG 79, SB.*

been delineated with irregularly spaced boulders having jugged ends. Their appearance put this substation markedly out of character with the rest of Rim Drive, so Lange prevailed on a CCC crew who partly buried treated logs to line the outer edge of the overlook in 1936. Each of the logs was chamfered at each end (BPR referenced it as Type A-4) to provide better visual transition when spaced at regular intervals, since Lange hoped to bring weathered boulders to the site and alternate them with the logs. This treatment represented something of a stopgap measure in the absence of masonry guardrail.

Doerner criticized another flaw in the surfacing phase of road construction in 7-A in 1934. He took aim at certain daylighted cuts (ones where equipment created open areas devoid of vegetation) that became pullouts once they had been surfaced with crushed rock. Not only were these unintentional additions superfluous since plenty of stopping places had been provided in the plans, but their appearance was so unsightly that Doerner wanted the surface material removed. He wrote that these flat areas should be allowed to grow over with a natural ground cover, since apparently there was no way to haul additional material to these sites and obliterate the pullout by bank sloping. The only obliteration stipulated in the surfacing contract for 7-A aimed at removing the quarry and crusher site from the view, along with cleaning up camp located near Devil's Backbone. Johnson's reluctance to do the latter may have stemmed from plans that targeted some of the camp buildings being used for the paving phase of road construction during the summer of 1935.

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Views of road station 230 (later known as the “Diamond Lake Overlook”) before placement of log guardrail (top) and after placement of log guardrail (bottom). *Lange, NARA, RG 79, SB.*

BPR awarded the contract for paving 7-A to J.C. Compton of McMinnville, who then started giving the road a bituminous surface treatment. This job consisted of several steps, with the first being the spreading of aggregate (or “prime coat,” as Lange called it). The laying of a bituminous “mat” of at least three inches in depth came next, one extending over the entire roadway and parking areas. Lange thought



Bituminous mat at road station 260 in 1935. *Lange, NARA, RG 79, SB.*

the black color of the mat fit “well with the surrounding country,” and remarked how it presented “fine appearance in relation to existing natural features.”<sup>27</sup> The last step in the paving contract started with application of a seal coat or wearing course to a width of 18 feet in accordance with federal highway standards of 1932. Its black color was then altered with a fine coat of rock, which upon rolling and brushing, yielded what Lange called a “uniform medium gray color.” The contractor completed this step on segment 7-A by October 1935, returned the following year to finish a related paving job (on the North Entrance Road, route 8) and restore the site of his construction camp located near Devil’s Backbone.

Road striping did not come until 1938, but was in accordance with earlier advice from Lange, who advised that a “yellow or similar colored line” could serve the purpose. He did not favor a continuous line over the entire road, but rather use of the stripe on curves or other areas in need of such marking to insure the safety of motorists.



Contractor's camp located near road station 270 in 1935. *Lange, NARA, RG 79, SB.*

*Segment 7-B (Diamond Lake Junction to Grotto Cove)*

Pre-advertising for bids on grading the stretch of road from the Diamond Lake (North) Junction to the point half a mile past Wineglass took place in the fall of 1932. Insufficient funding prevented letting a contract until September of the following year, at which time the award went to the Von der Hellen and Pierson firm of Medford. The contractors went to work in October 1933, but BPR suspended the job upon the first snowfall several weeks later. In contrast to what NPS crews accomplished prior to the contract award in segment 7-A, the clearing and grubbing of 7-B became the contractor's responsibility. They moved ahead on the basis of plans calling for a roadway of 22 feet with a ditch three feet wide. Another contract had to be let, this time to Dunn and Baker of Klamath Falls, in order to widen the roadway another two feet. It came as the result of a visit to the park by Secretary of the Interior Harold Ickes in July 1934. Ickes ordered the widening in his role as head of the Public Works Administration which paid for building the road.

Much of the work performed on the first grading contract in 7-B took place during the long summer season of 1934. Von der Hellen and Pierson set up camp near the Wineglass, at a secluded spot where water could be pumped from the lake some 650 feet below them. In contrast to grading segment 7-A, the grading contract for 7-B required comparatively little blasting and hauling of rock. The contractors could thus use caterpillar tractors and scrapers in handling the pumice material. They had some assistance from the final located line that called for five tangents of various

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lengths, but with several rock cuts required as part of preventing overly heavy curvature in the alignment. Doerner gave the contractors high marks where soil was used to cover the toe of the slope high marks for not scattering stumps beyond the clearing limits (or “right of way”) when blasting stumps, despite the road being characteristically close to the rim in many places. He also commented on the care taken with dumping rock at the ends of deep fills so that deep trenches at the bottom of fill slopes might catch debris from rolling any further. The contractors then used plenty of soil to completely cover rock at the bottom of such fills.



Trees planted to stabilize fill. *Lange, NARA, RG 79, SB.*

Subsequent widening of the roadway began in September 1934, but Dunn and Baker found it impossible to take the same protective measures. Crews had to bring the rock back up slope by hand in many places after it damaged trees. The road widening meant that Von der Hellen and Pierson could disregard some of the required bank sloping and shoulder rounding. Similar to the previous grading contract for 7-A, however, these contractors still had responsibility for other kinds of landscape work. Doerner reported that the masonry retaining walls and culvert headwalls in 7-B displayed good workmanship during the long season of 1934, though completion of these items did not come until the following summer. Most of the old road obliteration in 7-B came in 1935, when Von der Hellen and Pierson hired a landscape supervisor under Lange’s supervision. As resident landscape architect for the NPS, Lange saw an obliteration program to be “of immediate value to



Building masonry guardrail in segment 7-B, 1934. *Doerner, NARA, RG 79, SB*

the natural appearance of new road construction” because it went beyond planting the ends of old road segments as was done during the grading of 7-A. With a crew of four to ten men, the landscape foreman planted approximately 100 whitebark pine and 50 lodgepole pine over 1.2 miles of old roadbed in 1935. The difficult growing conditions meant that some 75 cubic yards of soil covering was used in conjunction with a scheme that included spreading duff and small branches so as to eventually produce a “uniform” line of planting “unnoticeable to all but those accustomed to the old road location.” Lange took a number of photographs to show the effectiveness and appearance of such efforts, as part of his plan to obliterate ten miles of old road. He estimated this multi-year project needed roughly 5,000 trees as well as 2,000 loads of soil, and required the services of two or three supervisors and twenty laborers.

Grading and widening the roadway also necessitated what Lange called “special planting” aimed at large slopes exposed by construction. The foreman and his crew treated two sections of segment 7-B in 1935, with the first located near the Wine-glass road camp where they treated a cut slope with some trees and dark soil so as to diminish the intensity of the vivid red color seen from Cloudcap.<sup>28</sup> Work began by digging parallel trenches filled with mountain hemlock branches to hold the “new soil” and aid establishment of trees transplanted at the site. This procedure was also used to conceal a white line created by grading near Steel Point that could be seen from the Crater Lake Lodge.<sup>29</sup>

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One of the steps taken in special planting at road stations 1039-1045 involved trenches filled with hemlock branches to hold the dark top soil. Planting of sedges and trees followed placement of the top soil so as to diminish the intense red color seen from Cloudcap and the size of this daylighted slope. *Lange, NARA, RG 79, SB.*



Top soil placement following planting of sedges and trees. *Lange, NARA, RG79, SB.*



Old road obliteration through tree planting and placement of duff at road station 1140, 1935. *Doerner, NARA, RG 79, SB.*

Production of surfacing material for 7-B started even before the successful bidder, A. Milne of Portland, began opening a quarry near the Wineglass road camp in September 1935. The contractor then set up a crushing plant there, an operation that Lange described as well screened from the road. It could produce a relatively large amount of material at 1,500 tons per day when running at capacity during the short working season. Virtually all of the actual surfacing with crushed rock took place in 1936, once the plant at quantities for both 7-B and 7-C. With the paving of those road segments not due until 1938, BPR advised the NPS that maintenance crews should apply a light oil treatment in the interim to prevent loss of the soft rock quarried and processed for surfacing material at the road camp.

Milne's subcontractor for the masonry guardrails made good progress in only two months on the job in 1935, completing almost half of the stipulated 450 lineal yards in segment 7-B. Lange seemed pleased with the pace at which work on the guardrails proceeded, but he commented that the first sections of wall built where the road first touched the rim east of Llao Rock were not entirely satisfactory. Within a short time, however, he remarked about how this item became "exceedingly well done" and included photographs in his annual report of some representative guardrails from this road segment. Failure to provide such barriers, especially

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Guardrail lining Rim Drive near road station 1043 (Cleetwood Cove vicinity) during the surfacing phase of building segment 7-B, 1936. *Lange, NARA, RG 79, SB.*

where the road ran close to a precipice concerned Lange, though he did not cast blame for the oversight. He instead called for the NPS or BPR to provide some rule for such areas in future contracts, whether the remedy lay in stone masonry or partially buried logs in combination with seated boulders.



Log guardrail near road station 1045 in 1936. *Lange, NARA, RG 79, SB.*

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Since funds for additional masonry guardrail seemed out of the question, logs treated with creosote of varying lengths were placed to line road margins where the danger appeared to be the most acute. Lange preferred logs to alternate with boulders and produced a drawing to that effect, but the BPR district engineer did not believe that estimates in the existing advertised contract allowed for the cost of gathering and placing boulders. Lange nevertheless wanted spaces left between the logs in order to allow for the future introduction of boulders as part of a subsequent contract, so the installation of these barriers proceeded accordingly in 1936. Logs were also used to define islands in what Lange called “traffic control areas” at road junctions. The surfacing contract provided for treating the Diamond Lake Junction with partially buried logs having chamfered ends and some planting once fine grading of the site had been completed as part of the surfacing contract.<sup>30</sup>

### *Segments 7-C and 7-C1 (Grotto Cove to Kerr Notch)*

Available funds for letting a grading contract from Grotto Cove and the summit of Cloudcap in September 1933, mixed with some short-term uncertainty over the L-line near Mount Scott, resulted in splitting segment 7-C away from what was now called (for contracting purposes, at least) 7-C1. The grading contract for 7-C and the spur road to Cloudcap (4.4 miles in all) went to Dunn and Baker, who were also awarded the contract for widening 7-B and 7-C in 1934. It made for a smooth transition, especially since this firm had the benefit of a long working season that year.



Treated logs used to define the road wye at the North Junction, 1936. Lange, NARA, RG 79, SB.

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Small parking areas near Scott Bluffs after completion of surfacing, 1938. *Lange, NARA, RG 79, SB.*

Clearing and grubbing were included within the bid items for grading 7-C, just as they had been for the previous segment. Other similarities to previous grading contracts were items like the masonry headwalls for culverts and the limited amount of old road obliteration. Dunn and Baker experienced more difficulty than Von der Hellen and Pierson with rocks rolling beyond the toe of fills during blasting operations. Some damage, for example, resulted in an accidental overcharge of powder sent a large quantity of rock below a cut near Scott Bluffs. Having to repair the damage made the most challenging part of rough grading even slower, since the stipulated light shooting had to be followed by construction of a retaining wall. Superintendent Canfield described these rock formations as difficult, but ones that the contractors handled efficiently and in the same manner as those in segment 7-A.

After completing most of the items as part of widening 7-B and 7-C, Dunn and Baker went to work during the summer of 1935 grading one of two units in segment 7-C1. This section of 1.5 miles extended from the Cloudcap Junction (where the spur road to the summit diverges from Rim Drive) to Sentinel Rock. Von der Hellen and Pierson, meanwhile, started grading the other unit of 7-C1 (a section of 2.4 miles of road between Sentinel Rock and Kerr Notch) that summer after having finished grading in 7-B.

All the rough grading in segments 7-C and 7-C1 meant that the amount of landscape work accomplished during the 1935 season was relatively small, apart from subcontractors finishing the culvert headwalls and some planting related to old road obliteration in the Cloudcap vicinity.<sup>31</sup> Lange made a point, however, of describing



An example of a parking area unintentionally created by a low-angle cut. *Lange, CLNPMAC.*

two associated problems that rose to the top of his list to correct over the following summer. One resulted from cuts where one side of the cut was too low in height to be properly sloped. He acknowledged that a number of landscaped parking areas were necessary for visitors to enjoy the scenery and make repairs to their vehicles if necessary, but any proliferation of unintended parking areas detracted from Rim Drive being able to harmonize with its surroundings. Lange wanted these areas converted into slope banks where at all possible, and then showed an example of the recommended treatment in his annual report for 1936.<sup>32</sup>

An even larger problem stemmed from daylighting prominent viewpoints in segment 7-C for fill material, thereby compounding the challenge of having to obliterate old road on soils that tested virtually sterile. Lange began making an argument for extensive landscape treatment of what he began to call “parking overlooks” in 7-C and 7-C1 as part of his season ending report for 1935. He pointed to certain examples, such as the excessive daylighting at Skell Head, in identifying five localities for special landscape treatment as part of a future surfacing contract.

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Skell Head parking overlook prior to landscape treatment, 1935. *Lange, NARA, RG79, SB.*

Lange made preliminary sketches of five “parking overlooks,” going somewhat beyond what had become the standard treatment for viewpoints along Rim Drive. In addition to masonry guardrail to delineate the edge of the rim for motorists, Lange added a bituminous walk running the full length of the wall as well as a stone curb to separate the viewing platform from parking. Each of the five overlooks featured an island defined by a combination of weathered boulders and logs so as to protect a small amount of planting that consisted of native shrubs and trees. He argued that the islands helped to diminish the size of each of the daylighted overlooks, thereby placed each of them into proper scale in relation to Rim Drive. They also provided greater safety by separating motorists using the road from those leaving or entering each overlook.

After describing how the stations located along Rim Drive might appear in his season-ending report for 1935, Lange obtained topography and other engineering data from BPR for the parking overlooks over the following summer. Whereas segments 7-A and 7-B had so far represented missed opportunities to properly develop the stations and substations along Rim Drive through the contracting process, Lange wanted to show what could be achieved at viewpoints located in 7-C and 7-C1. He included photographs in his reports of progress made at four parking overlooks in 7-C through the surfacing contract (the same one awarded to Milne for 7-B) during 1936, with each showing how the masonry guardrail looked in relation to logs used for demarcating the islands. Although still in the rough grading stage of construction, Lange anticipated similar landscape treatments at four parking overlooks in



Cloudcap parking overlook, 1936. *Lange, NARA, RG 79, SB.*

segment 7-C1. Rejection of bids for the 7-C1 surfacing contract in the fall of proved to be an eventual boon to the development of the parking overlooks, since BPR subsequently doubled the amount available for landscaping these viewpoints. The move reflected the need to transport and place weathered boulders, as well as the use of topsoil, peat, and fertilizers as soil amendments prior to planting some 400 trees and 600 shrubs at the parking overlooks. Lange produced site plans for seven overlooks located between the Wineglass and Kerr Notch, which were formally approved in December 1936 and then incorporated in the revised set of plans, specifications, and engineering estimates used to solicit bids at the end of June 1937.<sup>33</sup>

BPR awarded the surfacing contract for 7-C1 to the Portland firm of Saxton, Looney, and Risley in July, with the job getting underway in late August. The contractors made relatively quick work of spreading a base course over the four miles of this road segment, completing it in the fall of 1937. The landscape component was only half finished by the end of the season, even though the two supervisors who reported to Lange directed a crew of twelve laborers. Planting required hauling topsoil and peat from “pits” located near Park Headquarters, in addition to using three tons of fertilizer obtained in Klamath Falls. Lange described preparation of the planting beds as a base of peat, to be followed by placing shrubs or trees, with topsoil and fertilizer put “around but not too close to the root system.”

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Wetland near Park Headquarters used for the extraction of peat, 1934. *Lange, NARA, RG 79, SB.*

Duff was then scattered throughout the immediate vicinity of the planting. Crews followed the same procedure when planting at the parking overlooks during the 1938 season, but this time under the supervision of new foremen. They planted a total of 625 trees, as well as 2,300 shrubs and plants at the viewpoints over two summers.<sup>34</sup>



Completed log steps between the parking overlook and trail to Sentinel Point, 1938. *Lange, CLNPMAC*



Drinking fountain and planting bed at Kerr Notch, 1938. *Lange, CLNPMAC.*

The masons, meanwhile, added to guardrail previously completed in 7-C by finishing another 750 lineal feet of guardrail in 7-C1 that season. They also continued to place what Lange described as “excellent stone curbing” at the overlooks, in addition to the weathered boulders indicated on the site plans. He also assisted them with a working drawing for steps leading to a trail at Sentinel Point and provided a sketch for the stone drinking fountain installed at Kerr Notch. The additional touch of paving walks at four parking overlooks in 7-C came as part of the paving contract awarded in June 1938 to Warren Northwest, a construction company with regional offices in Portland.

The contractor erected their plant at the Wineglass road camp over the following month, situating it so as to be equidistant from both ends of a job that called for paving approximately twelve miles of Rim Drive between the Diamond Lake Junction to the road summit atop Cloudcap. In contrast to the work completed in 1936 along the six miles of segment 7-A, this contract included paving “gutters” in accordance with guidance developed by Thomas E. Carpenter, deputy chief architect for the NPS. His work reflected a trend toward shallower ditches requiring less maintenance, given that the bituminous paving acted as a seal against run off that might otherwise disintegrate surfacing material used to protect a road’s sub-grade. The gutters were to work in concert with catch basins or inlets connected to culverts placed underneath the road at regular intervals. For this contract, the “invert” was

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set at five inches below the seal coat, with an actual level depth of three inches in the paved gutter.<sup>35</sup> Lange commented that the gutters had an “excellent appearance” in his report for September 1938, but the contractor returned in 1939 to do additional sealing because cold weather the previous fall caused some cracking.<sup>36</sup>



Section of ditch near the Diamond Lake Junction after an initial step in paving, the application of plant mix. *Lange, CLNPMAC.*



View of the adjacent road section showing finished treatment with seal coat given to both the ditch and travel lanes. *Lange, NARA, RG79, SB.*

## RIM DRIVE CULTURAL LANDSCAPE REPORT

With the paving contract essentially completed, Lange used a number of photos in his season-ending report for 1938 to show how landscape treatments improved typical road sections in 7-B and 7-C. In contrast to the numerous landscape items left unfinished in segment 7-A, both of the latter segments exhibited good examples of old road obliteration, bank sloping, and special landscape treatments such as adding dark soil to reduce scarring. Paving and placement of catch basins in conjunction with the placement of backfill for gutters seemed to signify that the new Rim Drive was “rapidly becoming a reality,” with all work projected to be finished in the fall of 1940. He made a point of depicting the finished parking overlooks in 7-C and 7-C1 since they demonstrated how to rehabilitate damaged areas while properly developing the observation stations and substations. The only thing missing from 7-C1 was the paving, but it went to the top of Superintendent Leavitt’s funding requests for roads and trails beginning in 1939.



Termination of paved gutter into a catch basin at center left. *Lange, NARA, RG 79, SB.*

### *Segment 7-D (Kerr Notch to Sun Notch)*

Formal adoption of the so-called “combination line” in December 1935 pushed BPR to finalize plans to locate Rim Drive between Kerr Notch and Sun Notch.

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Building the “pioneer” road through 7-D1 during the summer of 1937 involved major excavation in the cut across the face of Dutton Cliff. The line of rock below the road in the foreground represents an attempt to catch material before it fell further downhill and picked up speed. *Lange, NARA, RG 79, SB.*



Subcontractors built a masonry retaining wall in 1938 to connect hand placed walls erected the previous summer. Lange liked how the walls looked, but made repeated mention of the damage to trees from falling rock brought by road building. *Lange, NARA, RG 79, SB.*

Instead of “skirting” Dutton Ridge as the official press release had claimed, the road location required major cuts on both sides. The large amount of excavation anticipated caused BPR to split 7-D into two grading contracts, with 7-D1 originally projected to encompass about 2.7 miles from Kerr Notch to a point on the south side of Dutton Ridge where the road would crest. The lowest bid on this first contract, one that required a staggering 176,000 cubic yards of excavation, was rejected in July 1936 due to being considerably above the engineer’s estimate. The need to make an award within existing allotments led to another advertisement for bids a month later, this time with the distance of 7-D1 reduced to just over two miles. It went to Orino Construction of Spokane, who then set up camp on Sand Creek in Kerr Valley and began their clearing operations. Dunn and Baker, meanwhile, won the contract for grading the next 2.9 miles of road. This included both 7-D2 (which ran from the end of Orino’s contract on Dutton Ridge over to Sun Notch) and the adjoining 7-E1. They could do little more than establish camp on Vidae Creek before the construction season came to an end.

With the grading contract for 7-D1 estimated to be some 70 percent excavation, Lange warned that the job required extremely careful measures to protect trees. He made special reference to fill material, which could escape in areas dominated by long and continuous slopes. With blasting operations imminent in July 1937, Lange

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described how the ground cover of willows and other plants located beyond the grading line were already being struck by falling material. It upset him enough to write that the location for 7-D should never have been approved because of the resulting damage, though this sentence was subsequently scratched out on his report.<sup>37</sup>

Blasting by Orino over the next few weeks gave Lange and resident engineer Struble almost opposite impressions. Whereas Struble described the contractor's progress as unsatisfactory due to extreme care taken with type "B" excavation, Lange wrote about Orino permitting a number of excessive shots not in accordance with instructions from BPR. Slides traveled, he observed, far below the necessary line of repose. This damaged trees to such an extent that the majority had to be removed. Crews pruned trees where blasted material hit their tops, while cuts were treated with creosote if the damage did not require removal. Lange gradually prevailed upon Struble to require Orino to protect trees in subsequent blasting by shooting with less powder. The difficulty of grading in such terrain, however, made complete protection "almost impossible," even when trees from the roadway were placed against those situated below the grading line.

Cuts represented another aspect of rough grading that detracted from what Lange had described as an area that was "originally admired for its stately and primitive character." One of these measured approximately 145 feet to the roadbed from the crest of the cut, and made for constant danger from falling rocks due to so much loose material on Dutton Cliff. An "epidemic" of minor accidents kept the park physician busy, such that Leavitt noted that the men hired by Orino seemed especially prone to broken ribs.<sup>38</sup> Not only were equipment operators vulnerable, but also those men working on several hundred feet of hand placed retaining wall. Lange described the item as necessary in order to give the roadway its designed width of 24 feet. He especially liked how the wall blended with the surroundings from point above Kerr Notch, writing that the massive rocks obtained in the cuts were well selected for color and uneven faces.

The difficulties encountered by Orino in grading 7-D1 during the 1937 season (his crews consumed more than 60 percent of the allotted time yet completed only a third of the job) contrasted markedly with how Dunn and Baker fared in 7-D2. On the south and west sides of Dutton Ridge and then above Sun Meadow required about 50 percent rock work, but the contractors found it easier than what engineers had estimated. The progress on grading 7-D2 stood at almost full completion by October 1937, with only finish grading and some landscape details thus expected for the following season. Lange identified "very little" damage to trees, either in



A “spillway” built in segment 7-D2, 1937. *Lange NARA, RG 79, SB*

burning those cleared from the roadway or during grading operations. He described how log cribbing used on this job reduced injury to standing trees and noted that

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the contractors retrieved all of the rocks passing beyond the desired point of repose at the toe of each fill.

Lange seemed particularly pleased with the masonry features along 7-D2, making special reference to what later became known as “spillways,” in his season-ending report for 1937. He included a photograph showing a floor laid to catch run off derived from continual seepage on slopes, to be connected with a culvert as part of cross drainage. The masonry component of this grading contract was otherwise limited to building culvert headwalls, most of which appeared along the south side of Dutton Ridge, where snowmelt created seasonal runoff.

Guardrails were to be part of the surfacing contract, but Lange could not help noticing how the road location he so heavily criticized opened some fine views along this section of Rim Drive. After securing topographic data from BPR, he prepared sketches for parking areas like Sun Notch along 7-D2. These became part of finish grading in 1938, as did additional bank sloping and covering a portion of the scar on Sun Grade with dark soil.



Oil treatment placed on segment 7-D1 in 1939 prior to surfacing in the vicinity of road station 460 where both the lake and Kerr Valley can be seen. *Lange, NARA, RG 79, SB.*

Orino completed most of the rough grading in 7-D1 during the 1938 season, but all of the time allotted for the contract had long since elapsed. A somewhat sympathetic Lange explained that the number and size of the retaining walls needed along the eastern side of Dutton Ridge justified an extension. The hand placed walls

begun in 1937, for example, were placed on each end of a masonry wall to span one of the fills. Others required masonry walls roughly 25 feet in height, with one noteworthy example exceeding twice that measurement.<sup>39</sup>

The fills settled sufficiently for construction of masonry guardrail to move forward as part of the grading contract for 7-D1 during the 1939 season. Lange expressed some hesitancy in allowing Orino to extract rock from the Watchman for some 3,000 lineal feet of guardrail, but he and Leavitt relented once the contractor agreed to use a heavy crane for obtaining material. This method eliminated new “tote” roads and other construction impacts associated with reopening the site that had been “restored” since 1936. Struble thought the guardrail component was especially well organized during the summer of 1939, so that the masons completed the job by August 20. Lange saw the rock selection and workmanship as very good, commenting on how the guardrail had been introduced to “best advantage, resulting in varying curves to fit the terrain.”

In his season-ending report for 1939, Lange called the provisions for protecting the landscape in 7-D1 “commendable” despite his misgivings about the road’s location. Damaged trees were removed, pruned, or had cuts created by flying rock treated with creosote. Other measures included special planting on slopes below the fills so as to reduce future damage from rock fall on the East Entrance Road, as well as some fairly extensive bank sloping and regrading as part of old road obliteration around Kerr Notch. Several small items had to be deferred to future contracts, with one example being Lange’s proposal to plant the areas adjoining each of the three spillways in 7-D1 so as to better “reproduce” the natural stream bed adjoining the road.

After inviting bids for surfacing 7-D along with segment 7-E in August 1939, BPR awarded the contract to Orino several weeks later. Despite being largely devoid of landscape items, this job included a provision for building more than 300 cubic yards of masonry guardrail in 7-D2.<sup>40</sup> The contract centered on producing aggregate for the next two phases of construction, so Orino set up a rock crushing plant in June 1940 not far from the camp he occupied along Sand Creek during the grading contract.

The nearby quarry yielded enough rock for a base and top course of surfacing material, but also some 27,000 tons of aggregate to be stockpiled for future paving of the remaining segments of Rim Drive.<sup>41</sup> This “leg up” approach to paving left out a mere \$70,000 needed for plant mix, labor, and equipment to place a bituminous surface

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Lange's photo of oil treatment of the roadway in segment 7-D1 was meant to convey the idea for parking areas to have a lighter color finish than that of the road when finally paved. *Lange, NARA, RG 79, SB.*

on segments 7-C1, 7-D, and 7-E. The paving job represented the final piece after the government spent a little more than \$2 million in contracts for building Rim Drive since 1931. Difficulties with obtaining equipment for the rock crusher, however, hindered progress on the surfacing contract so that production of aggregate was not completed until September 1941. In the mean time, the contractor applied a "double prime bituminous surface treatment" to the unsealed roadbed as a temporary measure for carrying traffic until such time that actual paving took place.

American involvement in World War II allowed for only enough funding to remove slides that resulted during the winter of 1941-42. With paving put on indefinite hold, the suggested treatment of the parking areas became a forgotten item. Lange used a photo to depict one such stopping place in 7-D1 as part of his final report at Crater Lake for 1939. With the masonry guardrail completed, he remarked that the parking areas should be given a lighter color finish than that of the road.<sup>42</sup>

*Segment 7-E (Sun Notch to Park Headquarters)*

The initial P-line run by BPR assigned segment 7-E to a route linking Sun Notch with Rim Village, but the subsequent adoption of a “combination line” led to dividing the segment into two pieces for contracting purposes. A sort of “middle line” connected Sun Notch with Vidae Falls and became 7-E1, while 7-E2 roughly corresponded to the old “low line” running from Vidae Falls to Park Headquarters. Some adjustment to the road mileage stipulated in the respective grading contracts was still necessary, however, due to the uncertainty that existed in 1936 over what the site development around Vidae Falls might entail. This resulted in shortening the contract for grading 7-E1 by four tenths of a mile so that it could be combined with 7-D2 and then advertised for bid.



Bank sloping through a slide below Applegate Peak in segment 7-E1, 1937. Warping at road margin to the right. *Lange, NARA, RG 79, SB.*

Dunn and Baker completed all of the rough grading and most of the finish portion of the contract in 7-E1 during the 1937 season. Just over a mile in length, 7-E1 turned out to be relatively easy work. In running above the western margin of Sun Meadow and along the bottom of a slide on the flank of Applegate Peak, the new road provided Lange with an opportunity to show a particularly good example of

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Ditch and slope treatment along segment 7-E2, 1938. *Lange, NARA, RG 79, SB.*

bank sloping through a heavy rock slide. The only other landscape item that he or the superintendent noted in 7-E1 concerned the need to obliterate an old “motor trail” improved by the CCC in 1933, one that started toward Sun Notch where the old Rim Road crossed Sun Creek.<sup>43</sup>

BPR awarded the contract for grading 7-E2 to E.L. Gates of Portland in October 1937. This meant that work on the final 3.3 miles of Rim Drive began the following spring, with the nagging question of whether to construct a bridge or use fill to span Vidae Creek finally resolved. Gates constructed the fill over the following summer, one that included placement of a pipe culvert with stone headwall at both ends.<sup>44</sup> Lange estimated the contractor to have completed 90 percent of the rough grading in 7-E2 that season. Photographs in his final report 1938 showed some highlights of the job, including ditch and slope treatment along one stretch of road, some old road obliteration through bank sloping, and placement of what he called a “culvert drain” with rough stone pavement less than a mile from Park Headquarters.

Aside from planting, most of the remaining items in the grading contract for segment 7C-2 pertained to completing the road connection below Vidae Falls to the proposed Sun Creek Campground. A need to relieve pressure on the campground at Rim Village drove selection of new sites such as Sun Creek, away from where the lake could be seen. As one of several satellite areas, NPS officials hoped that a new

campground below Vidae Falls might provide an attractive alternative to the problems associated with overuse in Rim Village. Superintendent Leavitt liked the Sun Creek site, but did not want it opened for use by visitors until properly developed so as to avoid damage to the trees and ground cover. The first step toward building the campground came in the form of a serpentine road going down a quarter mile from Vidae Falls to an area that once served as an informal picnic site on the old Rim Road. A bank slope constructed at its intersection with the Rim Drive served the dual purpose of reducing the campground road's presence to motorists traveling the main route, yet also afforded sufficient visibility from one road to the other.



Site of future parking area at the “base” of Vidae Falls, 1938. The intersection of Rim Drive with a road to the proposed Sun Creek Campground is shown at top right. *Lange, CLNPMAC.*

Plans for a stopping point beneath the waterfall called for widening the road fill on the upstream (or northern) side of Rim Drive, so as to allow for parallel parking. Installation of a stone drinking fountain at this parking area came in July 1939, but construction of additional landscape features had to wait until the subsequent surfacing contract was let. These included building a raised walk four feet wide in front of Vidae Falls, and separated from the roadway by a stone curb. Just as they had in 7-D, Lange and other NPS landscape architects anticipated distinguishing the Vidae Falls parking area from Rim Drive through the use of pavement having a rougher texture and somewhat lighter color finish.<sup>45</sup>

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Planting the fill “below” Vidae Falls, 1939. Darker areas indicate the sprinkler system in operation. *Lange, CLNPMAC.*

Introduction of the fill spanning Vidae Creek constituted what Lange termed as the “major landscape problem” in 7-E2. He reported that it required more than 1,000 yards of topsoil in preparation for planting the entire slope as part of making the fill conform to surrounding terrain. This effort required more than 5,000 plants, shrubs, and trees. Al Lathrop, formerly one of Lange’s assistants for CCC work, had charge of a crew numbering ten men and paid by the contractor. They needed sixteen days to plant a mix of species that included willows, mountain hemlock, huckleberry, purple-flower honeysuckle (twinberry), and spirea. A sprinkling system was needed so that the plantings on the fill could initially be watered every day, then two or three times per week until early autumn. Lange described the source of water as a “reservoir” built at the “head” of Vidae Falls, located about 100 feet above the fill and out of sight from Rim Drive. From there a three inch line was placed to one side of the falls and connected to smaller lines spaced about 30 feet on centers across the planted slopes of the fill. He estimated it might take two or three seasons for the planting beds to provide the desired effect.<sup>46</sup>

Leavitt expressed some satisfaction in writing to Cammerer that all grading contracts let in conjunction with building Rim Drive were finally complete as of September 1939. Lange mentioned this milestone in his season-ending report for the year and optimistically projected the surfacing phase to be finished in 1940, with the paving

to follow in 1941. The surfacing of 7-E did indeed come about over the following season, but the funding request for paving this road segment languished throughout World War II and for more than a decade afterward. In the interim NPS employees simply had to make do using oil and asphalt treatments aimed at protecting the sub-grade and surfacing material of this road segment.

### Other designed features along Rim Drive

A series of contracts let for grading, surfacing, and paving represented the most visible and costly parts of road construction, yet the NPS also took the lead in designing and building trails, structures, and signs on Rim Drive. The latter group did not require contracts or the need for BPR oversight, and could be funded from park accounts for projects (generally through hiring temporary employees from these accounts, a method called “day labor”) or through allotments from work relief programs like the CCC. In each case, these designed features were intended to meld with the contracted items as a part of Rim Drive’s overall circulation system.



Two visitors on the trail to Sentinel Point, about 1936. *George Grant, CLNPMAC, 8885.*

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Crew building the Discovery Point Trail, 1932. *Sager, NARA, RG 79, SB.*

*Trails*

With only a few notable exceptions, most of the foot trails built during the 1930s were intended to provide park visitors with distinctly different views of Crater Lake from points not reached by road. Trails allowed relatively easy access to a couple of observation stations located along the western portion of Rim Drive, while also giving visitors the opportunity to reach viewpoints such as Mount Scott and Sentinel Point on the opposite side of the lake. Like roads, they were built to specified standards that required (at least in several instances) reconstructing earlier work on prominent features like Garfield Peak or the Watchman. Much like his BPR colleagues, the NPS resident engineer took the lead in locating trails, though final approval of the route along with measures to protect vegetation came through the lead landscape architect on site.

NPS resident engineer William E. Robertson located a new trail linking the western end of Rim Village with Discovery Point during the summer of 1932. This occurred once Merriam and Wallace W. Atwood selected a site for an observation station, one serving as the end of the footpath from Rim Village and a viewpoint that required only a short walk from the nearby parking area on Rim Drive. The Discovery Point Trail thus consisted of two segments, with the longest having easy grades lasting for nearly a mile along the rim before it met the large parking area at Station 55.<sup>47</sup> From there the trail made a short climb to the observation station at Discovery Point. Crews built the trail in roughly three weeks in 1932, while Robertson noted that he consulted Sager both before and during construction.

Work on reconstructing the trail to the top of Watchman also took place in 1932, starting from a point on the old Rim Road that was situated above the new location for Rim Drive. This path utilized portions of a rough trail made the previous summer to transport materials for constructing the lookout and trailside museum, but with better curvature and the addition of features like hand-placed retaining wall and stone slabs for use as benches. The completed trail started near the Watchman Overlook on Rim Drive and incorporated a piece of the old Rim Road to a point where the path built by day labor brought park staff and visitors to the summit. As with other popular trails where dust was perceived as a problem, crews oiled the finished surface.

A trail planned for connecting the parking area at the Diamond Lake Junction with the viewpoint selected by Merriam as the fourth observation station along Rim Drive did not materialize. It probably stemmed from a decision made in 1934 to

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Ranger-naturalist and a group of visitors from the Rim Caravan at Merriam Point, about 1936. *Grant, NPS Historic Photographs Collection.*

transfer funds earmarked for development of three observation stations and instead finance repairs at the Sinnott Memorial. Without money to build masonry guardrail and install a viewfinder at the observation station, there seemed to be little need for a short trail from the junction to what became known as Merriam Point or a longer path to Llao Rock.<sup>48</sup>

None of the remaining observation stations beyond the Diamond Lake Junction featured trails. CCC enrollees improved a path linking Sentinel Point with the corresponding parking overlook at substation 7-B in 1940, once the steps forming a trailhead were completed through the surfacing contract. The CCC also extended a rough “service road” part way up Mount Scott by building a horse trail that reached the summit. This provided a better way of packing supplies to a lookout located more than two miles away from Rim Drive. Visitor use as a foot trail came as a secondary consideration, at least initially, so the connection between trailhead and parking area remained weak.<sup>49</sup>



Park ranger on a portion of the completed Mount Scott Trail, 1933. *Sager, NARA, RG 79, SB*

Building foot trails became even less of a priority once Rim Drive proceeded past Kerr Notch toward Park Headquarters. Nothing more than social trails resulted at Sun Notch, for example, despite the importance placed on the site by an art professor who had been commissioned by Merriam to study the park's aesthetic values in 1932.<sup>50</sup> In a similar vein, Lange suggested extending a trail begun by the CCC near Vidae Falls in 1934 to Garfield Peak, or making a loop with an overlook so that visitors could view the falls from above.<sup>51</sup> Neither idea came to fruition, though CCC enrollees built one new mile of trail to the top of Crater Peak in 1933. Visitors traveling by foot or horseback on a fire road that commenced where Rim Drive ran near Tututni Pass could thus reach the summit of the prominent cinder cone from various viewpoints around the park. The trail through the Castle Crest Wildflower Garden near Park Headquarters originated in 1929, though not in reference to any future location of Rim Drive. A new parking area intended to serve as the trailhead, however, came about as part of the grading contract for 7-E2 in 1938. This development corresponded with an effort led by the chief park naturalist to reconstruct the trail that summer.<sup>52</sup>

### *Buildings*

The NPS actively encouraged visitors to see the Sinnott Memorial “as soon as possible” upon arriving in the park because it helped them locate places of interest.

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Although situated in Rim Village, “Observation Station No. 1” functioned as the main orientation point prior to participating in a naturalist-led Rim Caravan or taking a self-guided excursion on Rim Drive.<sup>53</sup> In this respect, the official park brochure for 1938 described the parapet as featuring high-powered field glasses

“...trained on the important features, helping the visitor to understand the geological history of the lake and to appreciate the relationship between the scenic and scientific. Displays in the exhibit room, maintained in connection with the observation station, further aid the visitor to appreciate the beauties of the park and to interpret the moods of Crater Lake.”

Built in 1930, the Sinnott Memorial’s design borrowed heavily from the slightly larger Yavapai Station erected on the south rim of the Grand Canyon in 1927. Merriam was the main force behind both buildings and saw to it that each incorporated an open porch or parapet along with an enclosed display room or museum. Merel Sager drew the plans for the Sinnott Memorial, but Merriam expressed the underlying purpose of the building as

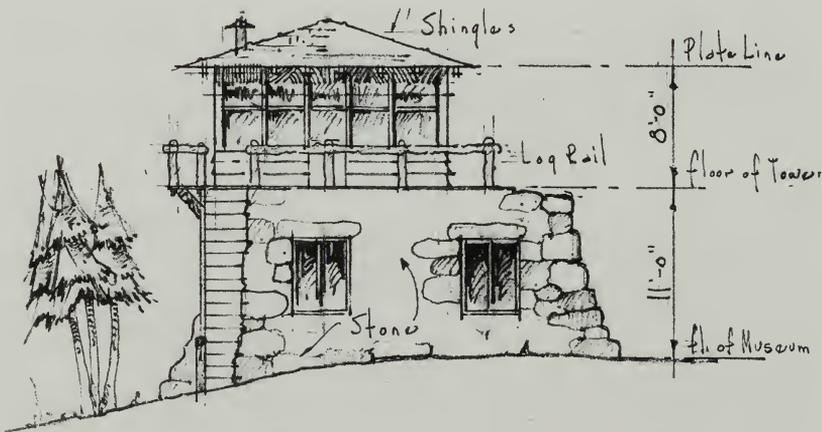
“...a window through which it is planned to show the visitor things of major interest at the Lake. The active use of the structure is strictly that of looking out and the museum aspect should be reduced to a minimum, using only such materials as are helpful in development of the window idea.”



Preliminary sketch of the Sinnott Memorial by A. Paul Brown, 1929. At that point the design showed great affinity to the Yavapai Station at the Grand Canyon. *Lange, CLNPMAC, 10137.*

despite becoming operational with the installation of parapet exhibits in 1931, Merriam and park officials did not consider the Sinnott Memorial completed until August 9, 1938. That morning an exhibition in its museum room opened, one aimed at helping visitors appreciate the aesthetic values of Crater Lake. The featured photographs, paintings, and lighted transparencies were intended to induce visitors to see various aspects of beauty for themselves. Merriam and his associates hoped that a “new phase” of educational work at Crater Lake might thus begin, one where the interpretation of scenic and scientific values at the Sinnott Memorial might inspire visitors as they explored the park on their own.

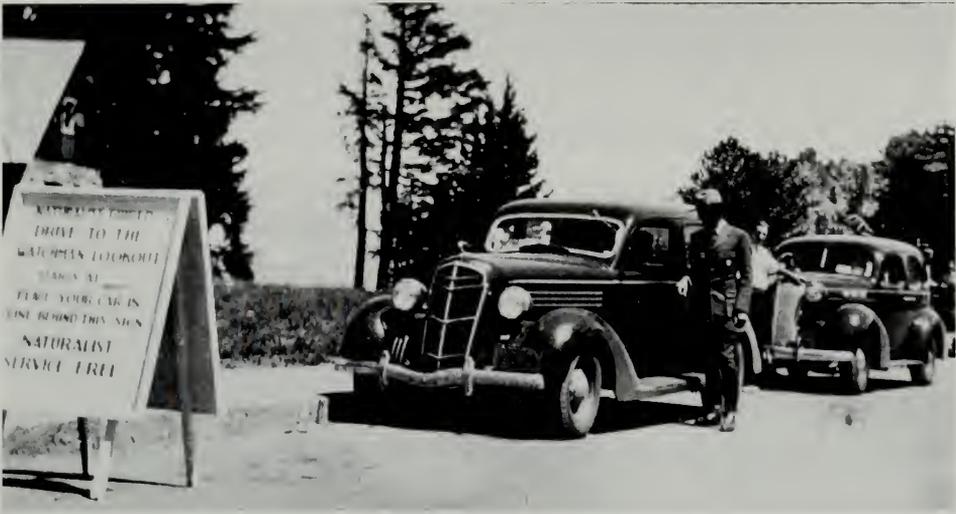
Apparent success with reaching visitors at the Yavapai Station prompted NPS Chief Naturalist Ansel Hall to suggest in early 1930 that a fire lookout planned for the Watchman be enlarged to accommodate an “educational lookout station or branch museum” on the lower floor.<sup>54</sup> Albright and Merriam received copies of Hall’s letter to Solinsky, and by March, landscape architect Charles E. Peterson had prepared a sketch for the building that included an elevated lookout with a “trailside museum” adjoining it but at ground level next to a “terrace” on the lake side. After making a more definite study of the building’s location, Sager sent Hall a revised sketch by Lange in June 1931 incorporating all three elements. An allotment of \$5,000 and the final drawings prepared by Lange allowed laborers to complete most of the building that summer. Work at the site continued in 1932, at which time workmen built a masonry parapet wall around the point in front of the building along with a bituminous walk. Hall installed field glasses for the use of visitors, as part of reinforcing the dual purpose of the structure.



Sketch of the Watchman Lookout by Lange, June 1931. *CLNPMAC*, 10137.

## DESIGN AND CONSTRUCTION

Assistant Superintendent and Chief Park Naturalist Donald Libbey described plans for exhibits and the mounting of range finders at each corner of the parapet prior to official opening of the Watchman Observation Station in 1933, but his transfer that year put installation of those interpretive devices on indefinite hold. The NPS, however, continued to promote the building as an observation station throughout the 1930s by offering a shortened version of the full Rim Caravan, one that ran from Rim Village to the Watchman Overlook and culminated with a hike to the lookout. It became so popular that this trip became a daily feature of the naturalist program, relegating the full Rim Caravan to the status of a special offering held just once a week.<sup>55</sup>



Visitors and their vehicles assembled at Rim Village for the daily naturalist-led trip to the Watchman. *CLNPMAC, 8885-C229.*

Visitors arriving through the park's north entrance obtained their first view of Crater Lake at the Diamond Lake Junction, where the NPS a ranger station had been built that became known to employees as the "North House" in 1930. The initial design for exterior walls called for logs, but Sager drew the final plans to specify the use of stone masonry in line with the precedent established at Rim Village. It contained public restrooms, made possible by piping water from a spring located near the Devil's Backbone, with an office situated between them. In being slightly recessed into a gentle slope back from the rim, the structure provided an attractive seasonal residence that could also double as a visitor contact facility. Nevertheless, the park's master plan started calling for its removal in 1939, since improvement of the North Entrance Road (route 8) in the interim allowed for fee booth and associated quarters to be located next to the park boundary.



The North House with construction in progress, 1930. *CLNPMAC, 8889-147.*

Funds for building a “checking kiosk” near the North House became available in the fall of 1933, but work did not begin until the following summer. Robertson commented that frequent storms led to periodic delays during the project, one finally completed over the summer of 1936. Until that time rangers collecting park entrance fees at the road junction enjoyed no protection from the elements because the North House had been located some 80 feet removed from Rim Drive. This operation remained difficult, however, because the volume of traffic that resulted from opening the Willamette Highway in 1940 led to longer lines and congestion at the road junction. Consequently, the NPS built another kiosk near the actual north entrance in July 1941 that Superintendent Leavitt described as greatly improving fee collection. Despite the advantages of being on the rim to provide visitor information, moving the fee operation spelled a quick end to the kiosk’s effective life.<sup>56</sup>

A development seen as complementary to the Diamond Lake Junction was briefly considered for Kerr Notch near the end of 1936, though not referenced in the site plan by Lange for a parking overlook. Envisioned for the junction of Rim Drive and the East Entrance Road, a ranger station similar in size and appearance to the North House would take the place of a log structure built in 1917 near the park boundary some seven miles distant. Crews razed the latter structure in 1938, but the new ranger station at Kerr Notch did not materialize even though the building could have used the same water system that allowed use of a drinking fountain at the parking overlook.

DESIGN AND CONSTRUCTION



Site of the proposed checking station near Kerr Notch, 1939. The Pinnacles Road is at left, with Rim Drive (segment 7-D1) at center. *Lange, NARA, RG 79, SB.*



A typical directional sign placed along segment 7-C1, 1938. *Lange, NARA, RG 79, SB.*

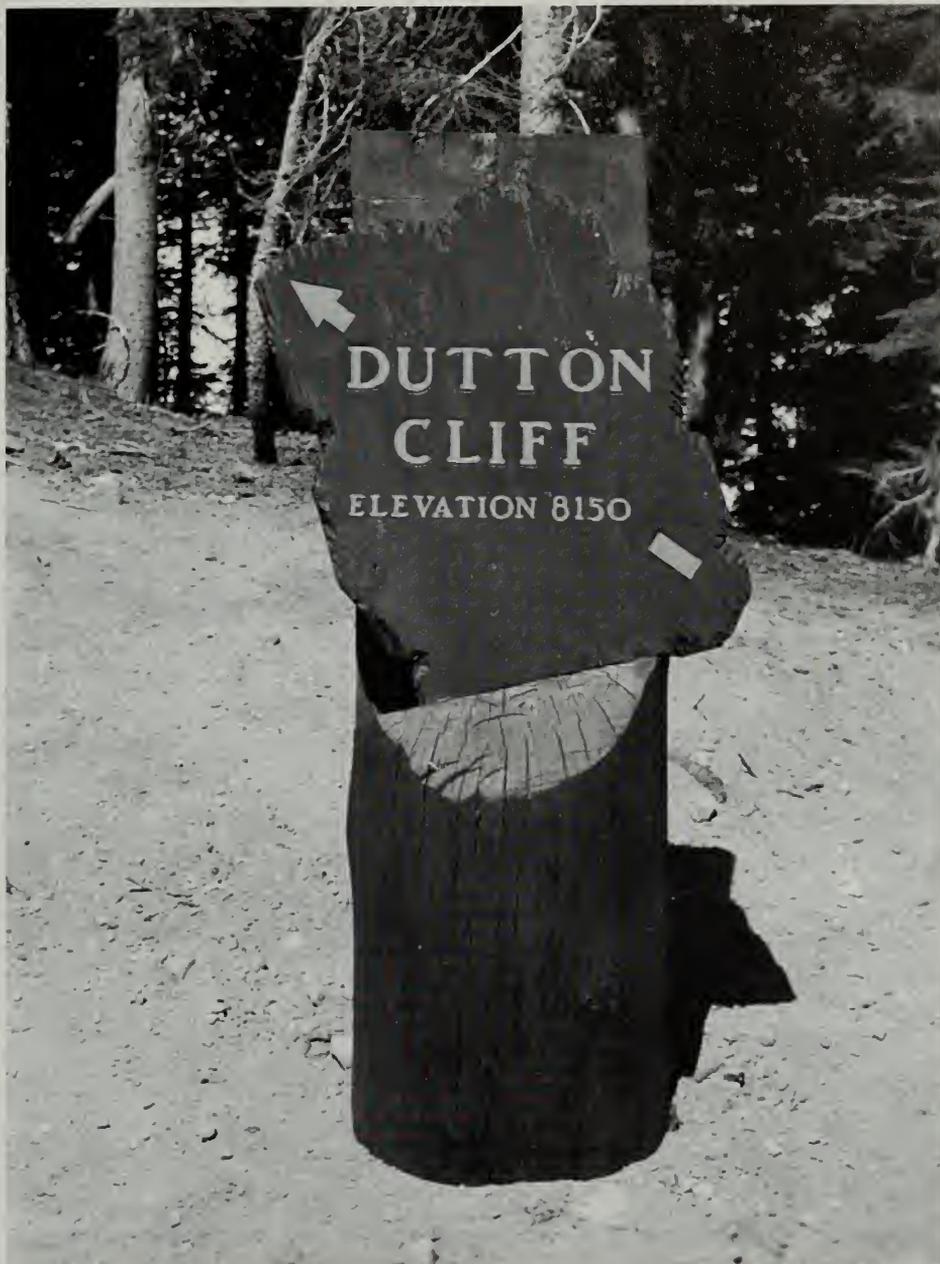
*Signs*

Customized signage for Rim Drive evolved from a CCC project begun in 1936 at Park Headquarters that aimed to replace various types of metal signs posted throughout the park. Enrollees produced hand-carved wood signs of varying sizes with raised letters painted chrome orange (for visibility at night) against a dark brown background, based on Lange's drawings of entrance, directional and building signs. Their production and placement greatly accelerated over the summer of 1938 after establishing an outdoor workshop at the CCC camp near Annie Spring. Lange reported that 200 signs had been completed by November, including some that identified parking areas and points of interest on Rim Drive. Through photographs in his season-ending report, he attempted to show how this type of sign possessed good visibility, if properly placed, for conveying mileage and direction on Rim Drive. These examples included signs mounted in triangular configuration at road junctions and others slotted into bollards.



Directional sign slotted into bollards near Rim Village, 1938. *Lange, NARA, RG 79, SB.*

CCC enrollees produced more signs at Camp Oregon Caves over the following winter and began installing them upon returning to Crater Lake for the 1939 season. They reestablished a workshop at the park that summer in order for a crew of 15 men to carve, assemble, and then place 80 signs. Lange provided “field sketch details” as drawings for the crew to follow as he had the previous year, but the signs completed that year varied somewhat more in size and shape because of more emphasis on the individualization for points of interest located along Rim Drive. Although he originally expected to complete the project by October, the shift away



Sign used to indicate a point of interest, 1939. *Lange, CLNPMAC, 8885-4078.*

from standardization may have accounted for why the crew did not finish installation of the remaining signs until 1940.<sup>57</sup>

The sign project's apparent success stood in sharp contrast to having much in the way of orientation markers or literature describing each of the observation stations, ideas once advanced by Merriam and embraced to some degree by the naturalists. At one point Libbey had plans drawn to install markers similar to one on top of Pilot Butte in Bend (a state park whose orientation devices impressed Merriam), but he transferred before the NPS could fund the project. Lange's recommendation in 1935 for a "binocular instrument" at each of the observation stations quickly dropped off the list of prospective projects, as did the suggestion from Merriam about placing inconspicuous holders for interpretive literature targeted specifically at the stations and substations. The latter probably resulted when no one came forward to implement the recommendation by Merriam that experts produce literature for each of these stations, even after Howel Williams began his classic study of the park's geology in 1936 and actively continued his fieldwork through 1939.<sup>58</sup>

### **Postwar Changes**

World War II effectively delayed the full completion of Rim Drive until the Mission 66 years of park development, largely because budgets at Crater Lake and elsewhere in the National Park System remained at barely custodial levels until 1957. At that point, an infusion of project funding began to come as part of preparing for the fiftieth anniversary of the NPS (to be celebrated in 1966) something that also corresponded to greater annual visitation that drove the need for new facilities as well as the redesign of existing ones. NPS officials cited Rim Drive as an outstanding example of past collaboration with BPR at the beginning of "Mission 66," and they even singled out the park's road system as illustrating the type of control exerted by the NPS planning process. Master plans and related documents supposedly guarded against "whims of opinion or varying methods of development" brought by changes in personnel.<sup>59</sup>

The "progression of work and revision" guided by the park's master plan for the most part centered on building new employee housing at Park Headquarters and developing a campground near Annie Spring, though a number of smaller projects were also funded by Mission 66. As for changes along Rim Drive during this period, only the parking and trail to the lake at Cleetwood Cove merited attention through revision of the master plan. By the end of Mission 66, however, the master plans once prepared by resident landscape architects and then approved by the superintendent and personnel in central offices had largely given way to sporadic site plans and other assistance supplied by professional staff stationed away from the park.



Visitors at one of the parking areas on west Rim Drive, about 1955. *Oregon State Highway Commission.*

Much of the Rim Drive became a one-way system oriented clockwise beginning in 1971 in response to a management objective that arose from concern on the part of some in the NPS that the road between Rim Village and the Diamond Lake Junction had become too congested. As the greatest change to circulation around the rim since adoption of the “combination line” between Kerr Notch and Park Headquarters, the one-way system seemed to create more problems than it solved. NPS planners stationed in Denver observed that it generated a greater number of traffic accidents (due to higher vehicle speeds in the absence of opposing traffic) and many complaints over the 16 summers that it remained in force.<sup>60</sup> The supposedly problematic road segment 7-A opened for two-way traffic again in 1976, so that discussion of widening that portion of Rim Drive gained momentum. Previous development at the Watchman Overlook and subsequent reconfiguration of the Diamond Lake Junction, however, had greater impact on the road as originally designed and built.

#### *Segment 7-A (Rim Village to Diamond Lake Junction)*

The most pervasive addition stemming from Mission 66 along this portion of Rim Drive came in the form of interpretive panels mounted on bases composed of stone

## RIM DRIVE CULTURAL LANDSCAPE REPORT

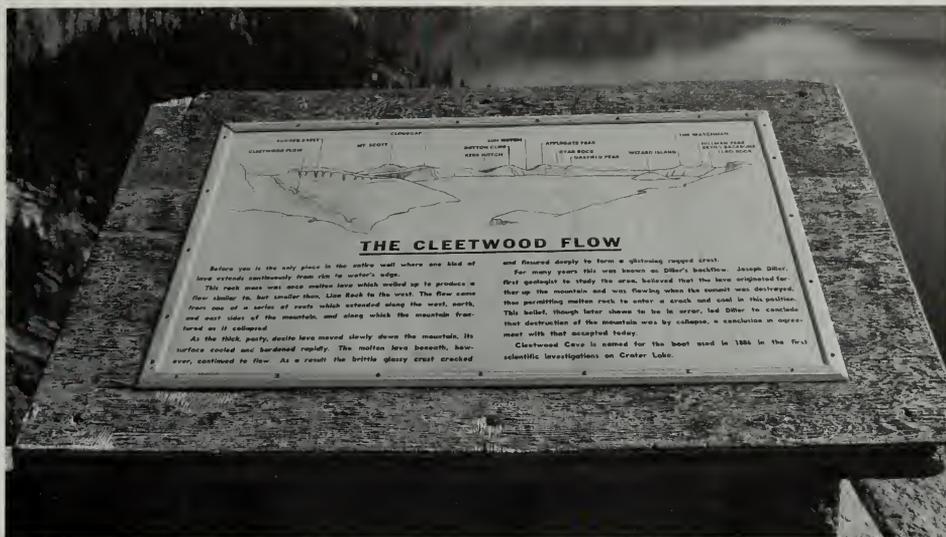
masonry to match the guardrails. They were intended to help make the circuit a self-guided tour, serving the dual purpose of enhancing visitor understanding and dispersing use over a wider area away from Rim Village. Six of the thirteen locations initially chosen for these devices on Rim Drive fell within this road segment, including the most elaborate development associated with wayside exhibits, a cluster of five panels installed during the summer of 1959 at the Diamond Lake Overlook. More typical were the single panels on bases incorporated into the masonry guardrails at the Discovery Point parking area, the Union Peak Overlook, and where glacial scratches can be seen near the Diamond Lake Junction.



The “Diamond Lake Overlook,” with wayside exhibits place between the log guardrails in 1959. *CLNPMAC*.

Construction of stone bases for the wayside exhibits began in 1958 under a contract, with work taking place intermittently through the next four seasons. In most places complementary to the masonry guardrails, the five bases built at the Diamond Lake Overlook were free standing at first, filling the gaps originally left for placing boulders between the log barriers. A new masonry parapet was built to incorporate the bases at this site by 1963, but it and another section of guardrail added over the following decade failed to match the original masonry guardrail constructed elsewhere along Rim Drive.<sup>61</sup>

## DESIGN AND CONSTRUCTION



Metalphoto interpretive plaque. *Jerry Watson.*

The interpretive panels proved to be the most problematic part of wayside exhibits since the routed plastic could not hold up to direct sun, windblown pumice, moisture, and vandalism. Routed aluminum soon became the favored material in some locations, but the NPS began replacing panels with the more durable metalphoto plaques by 1966. The latter type of interpretive marker lasted for more than two decades before these were superseded by a new set of fiberglass exhibit panels beginning in 1987. Neither generation of wayside exhibit panels, however, achieved the thematic unity in their content as envisioned by the interpretive concept statement composed for the park's master plan in 1972.<sup>62</sup>

Initial discussions about adding picnic areas along Rim Drive took place before the war, during the season of 1939, when park visitation reached a new high of 225,100 that year.<sup>63</sup> With attendance steadily increasing, especially during the summer season, to 360,000 by 1956, the onset of Mission 66 represented an opportunity to go forward with one of the secondary park priorities listed in the master plan. Park laborers leveled and then surfaced six areas around the rim in 1957, with one located in segment 7-A. It became known as the Discovery Point Picnic Area once pit toilets and tables built with concrete ends and redwood lumber took had been installed during the summer of 1958.<sup>64</sup> Subsequent development at this picnic area consisted of paving the parking lot and delineating it with boulders as a control device, in addition to the inevitable replacement of tables, toilets, and garbage cans.

RIM DRIVE CULTURAL LANDSCAPE REPORT



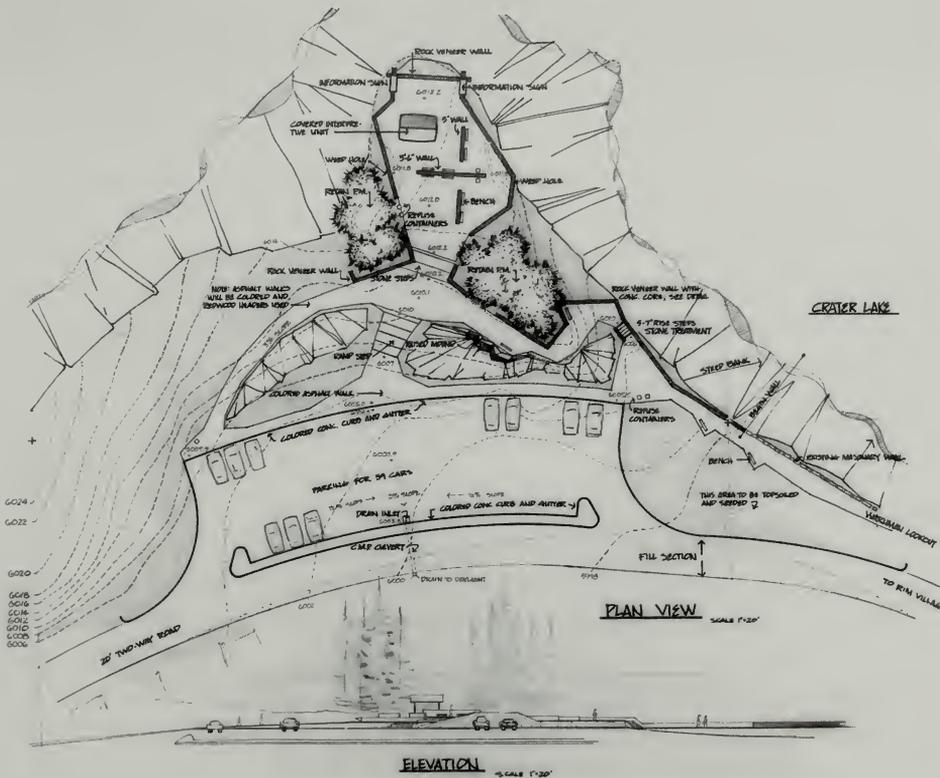
Road grading at the Discovery Point picnic area, 1957. *CLNPMAC, 8885-631.*



Parking at road station 200, the "Watchman Overlook," 1961. Note the visitors near the edge. *Vernon D. Dame, CLNPMAC, 8885-631.*

## DESIGN AND CONSTRUCTION

The Mission 66 prospectus drafted in 1956 critiqued the parking overlooks and turnouts, particularly those along segment 7-A, as being too few in number. As a way to draw people away from Rim Village these stopping places were deemed too small, especially where views had been enhanced through the addition of wayside exhibits. This enthusiasm for altering the size and number of viewpoints along Rim Drive eventually faded, as the master plan approved in April 1965 restricted its call for additional parking to the Diamond Lake Junction. Planners from the NPS service center in San Francisco nevertheless proposed a site study for the Watchman Overlook after one of them observed its “hazardous condition” in August 1966. They recommended more formalized parking and extending the masonry guardrail from the road margin to provide a measure of safety for visitors who walked to an adjacent ledge for a view of the lake.<sup>65</sup>





Visitors at road station 290 during a holiday weekend, 1961. *Dame, CLNPMAC, 8885-636*

A site plan produced several months later thus called for slight realignment of the road on additional fill so as to accommodate 39 cars. It also recommended, “hardening” the viewpoint with a colored asphalt walk, one whose outer edge would be bordered by a wall consisting of stone veneer and a concrete core. With construction funds in relatively short supply when compared to the Mission 66 program of just a few years earlier, the project at Watchman Overlook remained on hold until the early months of 1971. At that point, another site plan suggested dropping the realignment and reworked the design to yield parking for 30 cars that could be oriented diagonally in line with the implementation of a one-way road system. The revised site plan included new features to Rim Drive such as bituminous curb, contrived rock “outcrops,” and masonry piers linked by pressure treated wood peeler cores as a safety barrier. Construction at the Watchman Overlook thus began in 1972, though completion of all items in the contract took another two summers. As a cue for visitors to stop, the separated parking and conspicuous design features at the Watchman Overlook quickly made it the most popular stopping place on Rim Drive, even if most park employees expressed little hesitation in referring to the locality by its resulting nickname of the “corrals.”<sup>66</sup>

With the resumption of two-way traffic along segment 7-A, park officials wanted to widen the paved surface of Rim Drive from 18 feet to 22, and then 24 feet. As they explained to engineers from the Federal Highway Administration (formerly known



## RIM DRIVE CULTURAL LANDSCAPE REPORT

Realignment of the Diamond Lake Junction came as part of rehabilitating the North Entrance Road in 1985. A new “T” intersection replaced the original road wye and the new alignment gave precedence to a through route over continuation of the circuit. It also came with a new parking area intended to relieve pressure on the parking areas further south that consistently ranked second in popularity among all of the viewpoints on Rim Drive. According to the NPS justification for this project, the new parking area was to serve as part of a development that included hard surfaced walkways allowing for handicapped access to a pair of overlooks. The design, though still largely conceptual, called for exhibits and masonry guardrail at the pedestrian viewpoints.<sup>68</sup>

What planners hailed as possessing the potential to become the most popular stop along Rim Drive soon showed unsightly wear because the NPS failed to construct the walkways and view points. Safety concerns on the part of some employees led to erection of wood rail fence at the most conspicuous overlook in 1995, but snow loading dictated an almost annual replacement of the horizontal members. With little else in place to restrict visitor impact to this site, overuse had meanwhile destroyed much of the vegetation between the parking lot and the rim.



Contractors building masonry wall on the Discovery Point Trail, 1958. *Rundell, CLNPMAC.*

## DESIGN AND CONSTRUCTION



Resident landscape Architect John S. Adams developed a new style of routed wood sign for trailheads like the one near Discovery Point during the early years of Mission 66. *Bruce Black, CLNPMAC, 8885-393.*

Other changes along segment 7-A also affected related original designed features in the form of trails, buildings, and signs. Funding from Mission 66 allowed contractors to repair parts of the Discovery Point Trail (a project that included adding masonry wall near the parking area) and to pave the path leading from an unsurfaced parking area near the Devil's Backbone to the top of that volcanic dike. The most ambitious trail project along the west Rim Drive, however, took place in 1994. It aimed to provide hikers on the Pacific Crest Trail with an alternative to a route through the park that followed a series of fire roads and lacked any view of Crater Lake. By connecting the Discovery Point Trail with pieces of the old Rim Road, this alternative route required volunteers and day labor to build 2.5 miles of new tread in order for hikers to reach the Diamond Lake Junction on a trail.<sup>69</sup>

## RIM DRIVE CULTURAL LANDSCAPE REPORT

At the Watchman Lookout, meanwhile, the exhibits in its trailside museum remained in place for only thirteen years. Their removal in 1975 appeared to be triggered by approval of the interpretive prospectus as part of the master plan three years earlier, which saw no real need for them, yet the authors of the next prospectus in 1980 called for their restoration. Restoring the lookout begun under the Fee Demonstration Program in 1999 aimed to bring back the building's original appearance and initially included an exhibit component in its scope of work, but cost overruns after two seasons put the partially completed project on indefinite hold. The Fee Demonstration program also provided funding for a vault toilet at the Watchman Overlook in 2001, one of several such facilities around the park to be faced with stone and topped by a roof structure.

Although the Watchman Lookout was maintained (and in some respects, enhanced) for interpretive use during Mission 66, park employees removed both the North House and the adjacent checking kiosk at the Diamond Lake Junction in May 1959. A small parking area next to the site of the North House remained until the intersection was realigned in 1985, but without a short trail to the rim. Large boulders eventually took the place of treated logs to line the island in the road wye, while wood routed signs indicated direction for motorists instead of the customized markers built and installed by the CCC. The wood routed signs eventually gave way in 1995 to brown metal "Unicor" markers with standardized white lettering at this and other road junctions throughout the park. Motorists had to rely on maps and the wayside exhibits by this time to furnish reference points to find their location on Rim Drive, as most of the signs that had once marked various localities on the circuit had since disappeared.<sup>70</sup>

### *Segment 7-B (Diamond Lake Junction to Grotto Cove)*

Even if wayside exhibits seemed to be the most ubiquitous addition resulting from Mission 66 to Rim Drive, they remained scarcely in evidence along the northern part of the circuit. One of these interpretive devices could be seen at the so-called Cleetwood "backflow," in the masonry guardrail, across from where wind erosion on the cut slope created during rough grading had resulted in chronic raveling. The other wayside exhibit attempted to convey the "story" of soil at Palisade Point, but in a somewhat secluded location below the masonry guardrail.

Both picnic areas in segment 7-B followed a standardized road loop designed by the resident landscape architect, John S. Adams, in March 1957. These sites were placed just over a mile apart that summer, with another five tables installed down slope

## DESIGN AND CONSTRUCTION



The Diamond Lake (North) Junction during the summer of 1981. *NPS files.*

of the parking lot for Cleetwood Cove in 1966. The latter possessed the largest number of tables at any picnic area on Rim Drive, even though it remained the most difficult one for visitors to use. In addition to the walk needed for amenities like toilets and garbage cans situated at the parking area, the site lacked surfaced paths and shade during the midday hours.<sup>71</sup>



Park employee using a chainsaw as part of sign replacement at the Diamond Lake Junction, 1960. *Greg Hartell, CLNPMAC, 8893.*



Raveling on the road cut above Cleetwood Cove. *CLNPMAC 8898*.

Development of a new trail to the lakeshore at Cleetwood Cove with associated parking came in response to the difficulties associated with an existing trail from Rim Village. In addition to the existing trail beginning some 900 feet above the water, increased annual visitation to the park after World War II made parking for boat trips and other activities on Crater Lake an additional source of congestion at Rim Village. Cleetwood Cove, by contrast, offered a southern exposure (thereby eliminating much of the hand shoveling required to open a path to the water each spring) and a potential trailhead only 700 feet above the lake. Construction of a new trail began in July 1958 so that it became passable the following summer, but regrading of steep sections and other work delayed full completion of this day labor project until September 1962.

Parking at the Cleetwood Cove trailhead initially consisted of simply widening the road shoulders, but this solution quickly became inadequate. The resident NPS landscape architect, Joseph T. Clark, responded in July 1961 with a site plan for a lot holding 100 cars. He proposed an assembly area at the trailhead, one to be separated from the road by metal guardrail. The plan also called for an elongated parking area across Rim Drive from the trailhead, oriented perpendicular to the road instead of parallel. With an adequate entranceway, the parking lot site might also be large enough to allow development of a picnic area with some 30 tables or even a

## DESIGN AND CONSTRUCTION



Bench in assembly area adjacent to the Cleetwood Cove trailhead, 1964. *Don Robinson, CLNPMAC 8885-1715.*

campground. The initial plan called for a plumbed restroom (comfort station) and septic system, though this facility and the proposed drinking fountains depended upon locating a supply of water. In the absence of springs or other sources, contractors began drilling a well in 1962. It remained dry even after a second attempt at locating a potable water supply three years later.<sup>72</sup>



Cleetwood Cove parking area, 1967. *K. R. Cranson, CLNPMAC.*

## RIM DRIVE CULTURAL LANDSCAPE REPORT

Grading the lot above Cleetwood Cove began in the fall of 1961, but lack of water effectively limited development of amenities other than parking to portable toilets and five picnic tables. These facilities became inadequate as the number of boat tours increased over the next two decades, so landscape architect Joe Dunstan sketched several alternatives aimed at relieving poor circulation and overcrowding in 1991, primarily as a starting point in design. Little in the way of changes resulted from this effort, with the only additional development at the site resulting from a spillage problem associated with fuel delivery to the tour boats. The Fee Demonstration Program thus funded construction of a fuel transfer building faced with cut stone situated between the parking lot and Rim Drive in 1998.



The Grotto Cove Nature Trail with masonry guardrail and metal photo plaques, 1968.  
*Cranson, CLNPMAC, 8885-2019.*

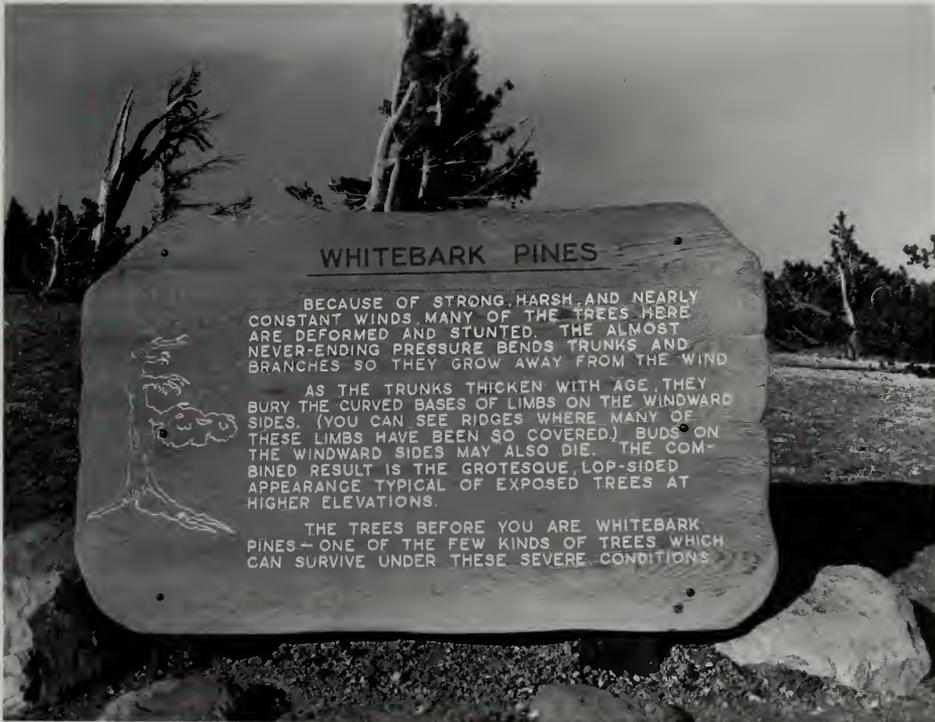
### *Segments 7-C and 7-C1 (Grotto Cove to Kerr Notch)*

Placement of wayside exhibits and other interpretive markers more closely corresponded to the earlier list of stations and substations in these two road segments than elsewhere on Rim Drive. All but two substations located between the Wineglass and Kerr Notch received some type of marker, though in one case (the Grotto

## DESIGN AND CONSTRUCTION

Cove Nature Trail) this type of interpretation persisted for only a decade. Established in 1968 to promote handicapped accessibility, the trail made use of small metal photo plaques mounted on posts along a masonry guardrail in order to identify plants along a paved walk originally built as part of the parking overlook.<sup>73</sup> Panels on stone bases appeared at five other points along segments 7-C and 7-C1 during Mission 66, with the only divergence from this type of marker being a wood routed signboard placed near the road loop on Cloudcap.

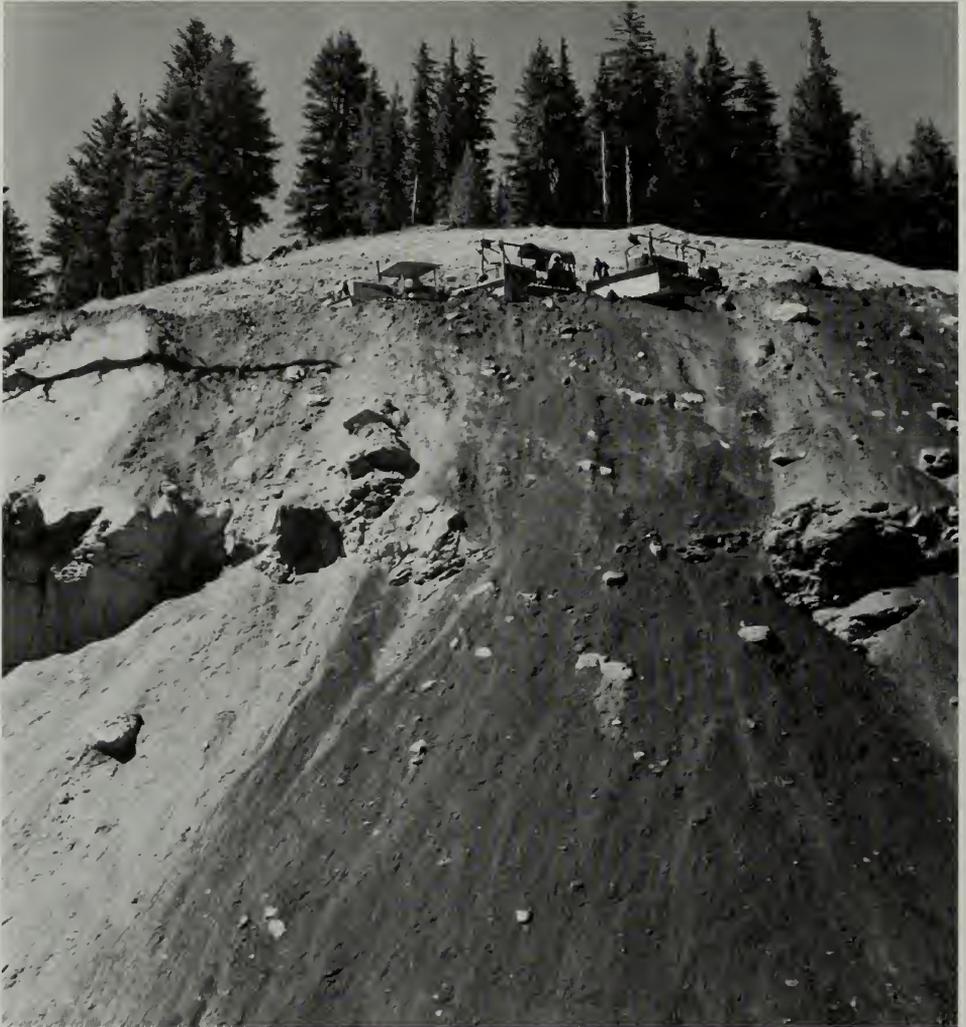
Funding from Mission 66 also brought about construction of two picnic areas in segment 7-C. One of them, the site near Skell Head, appeared largely as an afterthought in a dense thicket of lodgepole pine and thus received little use in comparison to the other six sites on Rim Drive. Visitors could, by contrast, obtain an impressive view of Mount Scott and the landscape beyond it from the other picnic area. The name for this picnic area came from the Whitebark pines that provided shade for three tables, which are located just one-tenth of a mile from the Mount Scott trailhead.<sup>74</sup>



Routed wood interpretive marker at the Cloudcap parking overlook, 1962. *Dame, CLNPMAC, 8885-924.*

## RIM DRIVE CULTURAL LANDSCAPE REPORT

Paving of segment 7-C1 (along with 7-D and 7-E) during Mission 66 in some ways represented belated completion of the road construction begun more than 25 years earlier. In the interim, BPR helped the NPS address the most persistent maintenance problem on Rim Drive over the first decade or so of the road's existence, slides at Anderson Point that periodically closed the road. Through a minor change in alignment and measures aimed at slope stabilization, BPR engineers supervised laborers hired by the NPS so as to reduce the incidence of future slides at this location over the summer of 1952. Roughly 100 lineal feet of masonry guardrail replaced an earlier stone barrier along this section the following year in order to complete the project.<sup>75</sup>



Scaling on Anderson Point, 1952. *CLNPMAC, 8885-4379.*

## DESIGN AND CONSTRUCTION

### *Segment 7-D (Kerr Notch to Sun Notch)*

Aside from the belated paving of this road segment in 1960, only one project during the Mission 66 period took place in this road segment. It came in response to rock-fall that repeatedly damaged, and in some cases, destroyed masonry guardrail along a section of road along Dutton Cliff in 7-D1. After considering construction of “rock sheds” to alleviate this problem during the first part of Mission 66, the NPS let a contract in 1966 to repair some of the guardrail and retaining wall, in conjunction with establishing some additional cross drainage in this section of road. Work also involved replacing damaged sections of the original guardrail with removable metal posts, a measure dependent upon annual installation by maintenance crews and one destined to last no more than a few years.<sup>76</sup>

On the other side of Dutton Cliff, along segment 7-D2, continual slides and rock fall resulted in an attempt to cut the slope back similar to Anderson Point in the early 1970s, followed repairing and rebuilding masonry guardrail along this so-called “Sun Grade” section in 1985. They employed day labor rather than contractors for the latter job, one that portions of guardrail were rebuilt across the road from slopes composed of glacial material. Cuts made as part of the original grading contract, however, remained subject to erosion and raveling, particularly where the slope face remained wet.



Terminus of Rim Drive at Park Headquarters during the mid 1950s. This intersection was realigned northward in 1958 to a point where it ran through the gas station building at right. CLNPMAC, 8885.

## RIM DRIVE CULTURAL LANDSCAPE REPORT

### *Segment 7-E (Sun Notch to Park Headquarters)*

Aside from one road realignment near the intersection where Rim Drive terminated at Park Headquarters, virtually all of the postwar changes in this road segment took place in the vicinity of Vidae Falls.<sup>77</sup> Development of the Mazama Campground as a major Mission 66 project turned the attention of park officials away from overnight facilities below Vidae Falls, though grading for a picnic area took place in 1958 where the campground road built in concert with segment 7-E met the old Rim Road. Lack of adequate cross drainage for the loop road at this picnic area eventually led to rehabilitation of the site in 2001, a project that included placement of a vault toilet and new tables. At that point, the trailhead for the route to Crater Peak also became part of the picnic area, largely because parking for hikers had previously been situated on a blind curve near Tututni Pass.



Excavating the cut at Anderson Point, 1937. Struble, BPR-FHWA.

# Notes

*Source citations derived from manuscript material (correspondence, memoranda, reports) are abbreviated in most cases since copies from originals held at the National Archives branches (those being in Seattle, Washington, and San Bruno, California) as well as from park files are included within loose-leaf binders compiled by the authors. Collection information pertaining to the binders is given in the bibliography of this document, whereas manuscripts located in other repositories are noted below in full.*

<sup>1</sup> The item was simply a rider on the much larger civil sundry appropriations bill, “\$10,000 for surveys in Crater Park,” *Medford Mail Tribune*, June 26, 1910. This legislation called for “surveying, locating, and preparing plans and estimates for roads and trails in Crater Lake National Park.” It is quoted in Jay J. Morrow, Report upon Crater Lake National Park, in *Annual Report of the Chief of Engineers, 1912, Appendices GGG, HHH, and III* (Washington, DC: Government Printing Office, 1912), p. 1340.

<sup>2</sup> Gilbert to Morrow, March 1, 1911, p. 2. The approach road from Fort Klamath represented something of an exception, in that it would follow the edge of Annie Creek Canyon.

<sup>3</sup> William J. Carroll, Junior Engineer, to Morrow, November 15, 1911, pp. 2-10. The estimates included clearing, grubbing, three classes of excavation (earth or sand, loose rock, and solid rock), corrugated metal culverts for cross drainage, rip rap for ditches, and crushed rock or macadam for surfacing material.

<sup>4</sup> The engineers opted for hired labor instead of contracts because they believed this system to be more economical due to its flexibility; Jay J. Morrow, “Report upon Crater Lake National Park,” in *Annual Report to the Chief of Engineers, Appendix FFF* (Washington, DC: Government Printing Office, 1914), p. 1554. This report and others appearing as appendices to annual transmittals in 1915, 1916, 1917, and 1919 summarize the progress of grading operations in closing the road loop around Crater Lake. More detailed accounts of operations and expenditures related to road building during these years can be found in Record Group 77, Boxes 406-410, CLP files 100-224, National Archives, Seattle, as well as MS-591, Southern Oregon Historical Society, Medford.

<sup>5</sup> The quote first appeared in Arthur Williams, “Report upon Crater Lake National Park,” in *Annual Report of the Chief of Engineers to the Secretary of War* (Washington, DC: Government Printing Office, 1916), p. 1847, and then repeated by his successor George A. Zinn in his reports for 1917 (p. 1957) and 1919 (p. 2093).

NOTES TO PAGES 15-34

- <sup>6</sup> Thomson, *The Rim Road – A Wonder Drive* (Portland: Scenic America Company, ca. 1924), pp. 4-5.
- <sup>7</sup> David H. Canfield, “Building the Rim Road at Crater Lake,” *The Earth Mover* 23:4 (April 1936), pp. 7-8.
- <sup>8</sup> USDI-NPS, Information for the Press, [October 1936], p. 2.
- <sup>9</sup> Merriam, Crater Lake (written on the Steamer Statendam, en route London) memorandum, May 28, 1931, p. 4; Merriam to Ansel F. Hall, October 17, 1931, p. 1.
- <sup>10</sup> Ansel F. Hall, Memorandum for Dr. J.C. Merriam: Meeting of Crater Lake Committee, March 9, 1931, p. 1.
- <sup>11</sup> Merel S. Sager, Report to Chief Landscape Architect (hereafter RCLA), July 4 – August 1, 1930, p. 3. Merriam’s associates on the short-lived “educational committee” were Arthur L. Day, Wallace W. Atwood, and Harold C. Bryant. Sargent listed the Watchman Overlook as an observation station in his memorandum, whereas the committee may have intended that the summit of the Watchman serve as the station given Merriam’s preference for trails leading away from parking areas.
- <sup>12</sup> Lange, Report to the Chief Architect, November 1, 1935, Part III, Rim Road, p. 9. The “binocular glass” may have been in accordance with the precedent set at the Sinnott Memorial with fixed viewfinders, though Merriam remarked on several occasions how he thought the device atop of Pilot Butte, near Bend, was worthy of emulation elsewhere.
- <sup>13</sup> Ibid. The justification for funding received in 1934 described the stations as “platforms fronted with stone parapet wall, seats and other necessary equipment that will be used in telling the visitors of the interesting features viewed from that particular station.” Six Year Program [for Crater Lake National Park], 1933-38, p. 7.
- <sup>14</sup> Laurence I. Hewes, *American Highway Practice*, p. 198. As a general rule, the most comprehensive landscape treatments ran somewhere between three and five percent of the total construction cost; Hewes, p. 200.
- <sup>15</sup> Thomson to Horace Albright, Assistant Director, June 22, 1927, p. 2.
- <sup>16</sup> Ibid.. Thomson saw the East Entrance to Lost Creek road segment and the Lost Creek to Kerr Notch piece of the approach road (route 5) from U.S. 97 in the second year. The Kerr Notch to Sun Notch (7-D) and the Sun Notch to Park Headquarters (his 7-E) segments would follow in year three. These were to precede the Kerr Notch to Wineglass segment (7-C) in year four and the Wineglass to Diamond Lake Junction (7-B) in year five. Construction of the North Entrance Road (route 8) would also come in year five.

## NOTES TO PAGES 36-45

<sup>17</sup> Kittredge, Minutes of Conference and Inspection Trip, October 2, 1929, p. 1.

<sup>18</sup> Sager, Report to the Chief Landscape Architect, July 4-August 1, 1930, p. 4. Landscape architects became the lead reviewers of road locations for the NPS in accordance with Director Mather's pronouncement that all developments in the parks should first "fit into the picture," according to a circular letter dated February 25, 1926. This reinforced previous direction given to superintendents that no buildings could be erected in the parks without design first being approved by the landscape division; Director's Annual Report (hereafter DAR) 1921 (Washington, DC: Government Printing Office, 1922), p. 57.

<sup>19</sup> Albright to Solinsky, May 22, 1931, and Bryant to Steel, May 11, 1931.

<sup>20</sup> Albright to Solinsky, August 9, 1933; Office of the Superintendent, CLNP, Memorandum for the Press, August 11, 1933. Albright seemed to have reached a decision in July according to BPR records; L.I. Hewes, Deputy Chief Engineer, to H.K. Bishop, Chief, Division of Construction, July 15, 1933.

<sup>21</sup> Lange to William G. Carnes, Field Trip with Superintendent Canfield and John R. Sargent, August 17, 1935, pp. 1-4. Lange wanted the road location at Sun Notch to be as much as 5,000 feet below the rim. This recommendation corresponded somewhat to that of Worth Ryder (a professor of art at the University of California) in his report to Merriam several years earlier; Ryder, Report on Survey of CLNP, August 1932, p. 6. Ironically, Merriam wrote himself a memo a week or so prior to Lange's trip with Canfield and Sargent about whether landscape architects sufficiently understood the major values to be preserved in parks in order to sufficiently protect them. Merriam even used a hypothetical cliff face as an example; Merriam, Relation of Landscape Student to Problem of Protecting Primitive, July 30, 1935, pp. 1-7, C-A 284, Carton 2, Writings 1930 - , Bancroft Library, University of California, Berkeley.

<sup>22</sup> Cammerer, Memorandum for the Secretary, November 16, 1935; USD1, Memorandum for the Press, December 13, 1935. The announcement did not end discussion of segment 7-D by the landscape architects. Regional Landscape Architect Ernest A. Davidson wrote about "the job which none of us will be proud of in the future," during the following summer after a field inspection in hopes that his boss might have the location reexamined; Davidson to Vint, July 24, 1936, p. 2.

<sup>23</sup> Cammerer to Leavitt, November 22, 1937, and Leavitt to Cammerer, December 1, 1937, pp. 4-6. A rather heated exchange of letters of the decision about 7-D followed; Demaray to Leavitt, December 21, 1937, and Leavitt to Cammerer, January 2, 1938.

<sup>24</sup> "Park Contractor Hurries Work on Lake Rim Route," *Medford Mail Tribune*, July 6, 1931. The terrain dictated so much curvature and changes in grade that straight sections with correspondingly little rock removal were limited to one short tangent.

<sup>25</sup> D.S. Libbey, Instructions and Text for Rim Auto Caravan, appended to Ansel F. Hall, Report to the Director on the Establishment of a Naturalist Conducted Automobile Rim Tour, July 15, 1931, Box 88, John C. Merriam Papers, Library of Congress. The stops in segment 7-A were: Discovery Point, at the radial curve on the foot of Watchman (on the old Rim Road), Watchman Overlook, Diamond Lake Overlook, Devil's Backbone, the glacial striae near the Diamond Lake Junction, and the North House near Merriam Point.

<sup>26</sup> Sager, Report to the Chief Landscape Architect, October 29, 1932, p. 8. The quantity of guardrail may have been limited by several factors. The contract amount might be the most obvious, but there was some uncertainty on the part of landscape architects as to whether contractors could produce the type of wall desired, given the difficulties experienced in Rim Village with building the parapet wall as part of the promenade. Another factor was that most of the grading work in 1932 took place on "green" fills, which often required needed one winter to settle before construction of guardrails might begin; Hewes, *American Highway Practice*, p. 432.

<sup>27</sup> Lange, Report to the Chief Landscape Architect, October 1, 1935, p. 7, and RCA, November 1, 1935, p. 6. The contractor used a Jaeger spreader for the prime coat, then plant mix that melded a two and one-quarter inch mat with RC3 oil; Canfield, "Building the Rim Road," p. 10. The total depth of crushed aggregate was seven and a half inches; R.D. Nehler, Area Design Engineer, to A.R. Westby, Chief June 23, 1977.

<sup>28</sup> The work was undertaken on a section stretching from Station 1039 to Station 1045 at the Palisades; Lange, Report to the Chief Landscape Architect, October 1, 1935, p. 6, and Lange, Report to the Chief Architect (annual report), November 1, 1935, Part III, Special Planting.

<sup>29</sup> Lange referenced the section as Station 1170 (located on Rugged Crest between Pumice Point and slightly west of Steel Point) with a short description of the work; Lange, Report to the Chief Architect (annual report), November 1, 1935, Part III, Other Special Planting.

<sup>30</sup> Lange recommended such treatment of three road junctions in 1935: Diamond Lake Junction (or the "North Entrance," as it was sometimes called), Lost Creek Junction (where route 5 met the Rim Drive near Kerr Notch), and the Government Camp – Rim Junction (where route 4 met the Rim Drive at Rim Village); Lange, Report to the Chief Architect (annual report), November 1, 1935, Part III Traffic Control Areas. He included short narratives on the work at Diamond Lake Junction in his Monthly Narrative Report to the Chief Architect, Part II, North Entrance Junction.

<sup>31</sup> The planting took place at Station 730 and involved 60 whitebark pine, 35 lodgepole pine and 25 cubic yards of topsoil; Lange, RCA (annual report), November 1, 1935, Part III, Special Planting.

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<sup>32</sup> Lange, Report to the Chief Architect (annual report), November 1, 1935, Part III, Cuts, and Report to the Chief Architect (annual report), November 1, 1936, Part II, Major Roads. Slope ratios in such treatments could range from 1:6 to 1:10, depending on terrain. District Landscape Architect Harry Langley wrote that this kind of regrading to improve daylighted cuts had already improved the road's appearance; Langley, Report to the Chief Architect, September 3, 1936, p. 2.

<sup>33</sup> Struble, Engineer's Estimate for 7-C1 surfacing contract, May 20, 1937. The seven site plans (for Kerr Notch, Reflection Point, Sentinel Point, Cloudcap, Skell Head, and two unnamed viewpoints above Grotto Cove) are shown on five sheets, all drawn by Lange. They are numbered consecutively, beginning with C.L. 3067A, "Parking Area at Kerr Notch," November 30, 1936. The others follow with the same date and are grouped as item 264, catalog number 8899, CLNPMAC. No drawing for the Cottage Rocks Parking Overlook survives, though Lange remarked that "this area will correspond in treatment to the above named (meaning the seven overlooks) areas;" Lange, Monthly Narrative Report to the Chief Architect, August 1, 1936, p. 3.

<sup>34</sup> Howard Buford and C. Risley worked as foremen during the 1938 season; succeeding S. W. Black and R. Saxon who were hired in 1937, Lange, Monthly Narrative Report to the Chief Architect, October 25-November 25, 1938, Major Roads, p. 5. Fertilizers used at the parking overlooks were composed of "steamed bone, ammonium sulphate, muriate of potash, super phosphate, tankage, etc."

<sup>35</sup> Carpenter, Report to the Chief Architect, March 22, 1938, pp. 4-7, to accompany Preliminary Studies for Road Design, in Soulliere, *Historic Roads in the National Park System (Denver:USDI-NPS, 1995)*, pp. 165-168. Carpenter to Lange, April 29, 1938 and May 12, 1938. The contract called for some 2,000 square yards of paved gutter, along with installation of bituminous bank protectors at each spillway.

<sup>36</sup> Inspection of park roads by a NPS engineer in the spring of 1939 seemed to affirm the wisdom of paving gutters. Those road margins without this device exhibited water from snowmelt having seeped beneath the pavement, then worked to soften the subgrade; A.E. Underhill to Regional Director, May 12, 1939, p. 2.

<sup>37</sup> Lange, Monthly Narrative Report to the Chief Architect, June 25-July 25, 1937, p. 5.

<sup>38</sup> Superintendent's Monthly Report, September 3, 1937, p. 7.

<sup>39</sup> Both the NPS and BPR wanted a passable route around Crater Lake for the 1939 season, due an anticipated increase in visitation stemming from a Worlds Fair held on Treasure Island near San Francisco; W.H. Lynch, BPR district engineer, to Leavitt, January 6, 1938. Almost all of the work on masonry walls took place in 1938-39 because Orino failed to reach those sites with his grading equipment in 1937, foiling plans to construct wall footings that season; Struble, Monthly Narrative Report Data, November 20,

1937, remarks section. Hewes pointed to the largest wall as an attractive example of such work in his *American Highway Practice*, p. 64.

<sup>40</sup> The guardrails were referenced as “Type 2,” Class “A” cement stone masonry and provided general specifications. These described “Individual stones shall in general have a thickness of not less than ten inches, a width of not less than one to one and one-half their thickness, with a minimum of twelve inches and a length of not less than one to one and one-half their width.”

<sup>41</sup> A.B. Lewellen, Engineer’s Estimate, Surfacing and Bituminous Aggregate Production, 7-C1, 7-D1, D2, E1, E2, May 26, 1939; SAR 1940, p. 12. The stockpile of crushed rock produced in 1939-40 was not used in the paving project completed in 1960; Neal G. Guse, Assistant Superintendent, to A.W. Parsons, [BPR] District Engineer, March 4, 1963.

<sup>42</sup> Lange, Monthly Narrative Report to the Chief of Planning, September 25-October 25, 1939, Major Roads, p. 7. At one point Lange also hoped to landscape the parking areas in 7-D1 by using topsoil, fertilizer, trees, and shrubs, but apparently these items fell out of the surfacing contract; May 27, 1937, p. 2. The particular parking area Lange referenced in his 1939 report also merited brief mention in a road guide to the park; George Ruhle, *Along Crater Lake Highways* (Crater Lake: Crater Lake Natural History Association, 1953), p. 28.

<sup>43</sup> It ran for 1.5 miles and was still in existence in 1944 as the “Sun Notch – Sun Valley Trail,” see Development Outline, Road and/or Trail System Plan, March 1944, Existing Trails sheet.

<sup>44</sup> Lange prepared a drawing to show how the fill would appear in cross section as C.L. 2012, “Cross section to accompany plans for proposed fill at Vidae Creek,” February 8, 1938, item 147, catalog 8899, CLNPMAC.

<sup>45</sup> The main components in the site plan for this parking area are in C.L. 2087 and 2087-A, “Parking Area, Vidae Creek Falls,” in tracings of June 1, 1939 and July 4, 1939, catalog 10137, Francis G. Lange Collection of Professional Papers, CLNPMAC. Carpenter questioned the use of stone rather than log for curbing at the site, but apparently accepted Lange’s reasoning and the idea of differentiating the paving material; Carpenter to Lange, August 11, 1939, pp. 1-2.

<sup>46</sup> Struble wrote that the plan for installing the sprinkling system was approved by the resident NPS engineer; Monthly Narrative Report Data, July 20, 1939, remarks section. Most of the system remained intact for the next decade or so; David R. Simon to John B. Wosky, Superintendent, August 29, 1953. The superintendent’s reply indicated that the system still supplied water for the drinking fountain; Wosky to Simon, September 8, 1953.

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<sup>47</sup> This footpath was also known as the “Sunset Trail” to NPS staff during the 1930s, supposedly because that time of day was the best time to walk it; Development Outline, Road and/or Trail System Plan, March 1944.

<sup>48</sup> See sheets titled “Minor Developed Areas” on various master plans dated 1935, 1936, 1939/40, 1947, 1953, and 1956; catalog 8899, CLNPMAC. The proposed features at this observation station are described by Sargent, Digest Memorandum, p. 3. A trail from the junction to Liao Rock was suggested in a list of proposed CCC projects attached to correspondence from Earl A. Traeger to J. Volney Lewis, January 27, 1936, under “project 78.”

<sup>49</sup> One of the proposed projects in the 1939 development outline for the park’s master plan was an “End of the Mt. Scott Trail,” possibly in concert with improving the trailhead. The original justification for a trail to the summit touted its future importance in serving “large numbers” of visitors who wished to make the trip; Six Year Program, 1933-38, p. 10.

<sup>50</sup> Worth Ryder wanted great care taken in designing a trail along the rim at this point, writing that Sun Notch could be made into “the most delightful scenic wonder of the entire Park.” His recommendation for a trail between Garfield Peak and Sun Notch was likewise ignored; Ryder to Merriam, Recommendations in General, appended to a report with cover letter, September 6, 1932.

<sup>51</sup> It remained on the park’s trail inventory until 1944, though only half completed according to the original plan of going only to a viewpoint on Vidae Cliff; Lange, Report for the Month of September 1934 to the Chief, Western Division, p. 2. Some traces of it persist east of the falls.

<sup>52</sup> Reconstruction of the trail is noted in Superintendent’s Monthly Report, September 8, 1938, p. 4, though reference to a new trailhead and other improvements appeared in John E. Doerr, Additional Remarks to Accompany Form Sheet of Educational Activities for August 1938, p. 2; catalog 8894, CLNPMAC. There is reference to sketches and drawings for new parking areas along Rim Drive in 1938, though no numbers were assigned and the parking area is not specifically identified in surviving NPS reports. Information about the Castle Crest Wildflower Garden is in Cathy Gilbert and Marsha Tolon, *Cultural Landscape Recommendations: Park Headquarters at Munson Valley, Crater Lake National Park* (Seattle: USDI-NPS, 1991), pp. 43-45. Some detail about the trail reconstruction is in Erica Owens, Castle Crest Wildflower Trail, NPS cultural landscapes inventory, 2001.

<sup>53</sup> The idea of observation stations came through Merriam; see Sargent, Digest Memorandum, p. 1.

<sup>54</sup> Hall to Solinsky, January 22, 1930. Chief Landscape Architect Thomas Vint also drew a connection between the educational purposes that could be served at both the Sinnott Memorial and the Watchman; Vint to Albright, February 6, 1930.

## NOTES TO PAGES 85-92

<sup>55</sup> [M.V. Walker], Outline of Work for July 1940, p. 1, catalog 8894, CLNPMAC. The official NPS brochure of 1938 (p. 9) identified the Watchman Lookout as the caravan's primary objective.

<sup>56</sup> Superintendent's Monthly Report, August 7, 1941, p. 3. Although used periodically throughout the 1940s, removal of the kiosk was first proposed in the master plan sheet for minor developed areas, CL - 2021C, September 1953; item 123, catalog 8899, CLNPMAC.

<sup>57</sup> Lange noted that he produced 200 FSD drawings for signs in 1938; He generally did not go into detail about specific signs, though did identify specific locations on the Rim Drive in one monthly report in 1939, naming 11 localities; Lange, Monthly Narrative Report to the Chief of Planning July 25-August 25, 2939, p. 1. For a partial list of signs placed on Rim Drive by the program, see Park Road Sign Program and Inventory, August 21, 1956, item 124, catalog 8899, CLNPMAC. Lange noted the delay in finishing the installation of signs in 1939, but also estimated that another 150 signs were needed in recommending future CCC projects; Lange to Leavitt, September 25, 1939, p. 1. The signs needed yearly maintenance, where the CCC sign crew repainted the letters and background of all rustic wood signs.

<sup>58</sup> Sargent quoting Merriam and other members of the "educational committee" in his Digest Memorandum on Rim Observation Stations [June 1934], p. 5. The work by Williams resulted in two notable publications: *Crater Lake: The Story of Its Origin* (Berkeley: University of California Press, 1941) and *The Geology of Crater Lake National Park, Oregon* (Washington, DC: Carnegie Institution of Washington, 1942).

<sup>59</sup> Dudley C. Bayliss, "Planning Our National Park Roads and Our National Parkways," *Traffic Quarterly* (July 1957), pp. 421-422. Special reprints of the article were sent to most of the parks as part of publicizing Mission 66.

<sup>60</sup> Group Superintendent Ernest J. Borgman commented that congestion followed wherever the NPS designated a turnaround point in segment 7-A. The initial turnaround for two-way traffic from Rim Village was at the Watchman Overlook, followed by the Discovery Point parking area; Borgman to Rutter, November 5, 1973, p. 1. Another unintended effect of clockwise circulation was that visitors going through the North Entrance often missed the Sinnott Memorial and summer visitor center in Rim Village; Elva [Michael] to Paul Crawford, August 9, 1971. A greater number of accidents received comment in Jon Hamen and Bill Koning, Trip Report, April 2, 1976, pp. 3-4. Many of the complaints arose from the lack of sufficient signage; Borgman to Rutter, op. cit.

<sup>61</sup> The new wall at this overlook was noted by Warren Johnson, Narrative Statement for Completion Report, Interpretive Roadside Markers January 23, 1964. Drawings for the bases are in CL - 3139, "interpretive Device," June and November 1957, three sheets, TIC. Woods and Sons were the contractors who built the stone bases. Subsequent work in 1960s and 70s resulting in new masonry guardrail, piers, and

curb along segment 7-A regrettably failed to match the standard set by original stonework and the bases.

<sup>62</sup> The wayside exhibits manifested the intent behind the substations listed by Sargent and Lange, though the markers were added to fewer localities. Planners urged thematic unity in the content of wayside exhibits in both the Interpretive Concept Statement [cover memo dated April 4, 1972], pp. 8-9, and the resulting Interpretive Prospectus of 1972, p. 11, with the latter document even recommending a return to Rim Caravan on p. 13. Another prospectus, one written by staff at the Harpers Ferry Center of the NPS, took an opposite view, recommending site-specific exhibits instead of attempting sequential interpretation through waysides to reinforce a theme; HFC, Interpretive Prospectus, approved May 7, 1980, p. 9. This document set the approach to content taken by the subsequent generation of fiberglass panels; David Guiney, Wayside Exhibit Planner, HFC, Wayside Exhibit Plan (revision dated September 25, 1984), introductory section.

<sup>63</sup> J. Carlisle Crouch, et al., Recommendations of Camp Ground Committee, CLNP, June 30, 1940, pp. 4-5. The group recommended an area near Discovery Point and one in the vicinity of Wineglass. By 1944 Superintendent Leavitt added Kerr Notch as a potential candidate; Leavitt, Development Outline, Outlying Units and Isolated Buildings [March 1944], p. 4. Chief landscape architect Thomas Vint remained vague about locations, but agreed with the need for these facilities; Vint, Crater Lake Notes, July 18, 1944, pp. 4-5.

<sup>64</sup> T.J. Adams, Completion Report, Picnic Site Development, 3/2/59, p. 1. The location and configuration of each picnic area are shown in drawing CL – 3136B, “Picnic Roads, Rim Drive,” March 17, 1957, and January 7, 1958, two sheets, TIC. This site later took on the name “Lightning Spring Picnic Area” due to its location opposite one of the unintended turnouts criticized by Doerner and Lange. The latter served as a parking area for visitors who wished to hike down a fire road, making a descent to the spring and a connection with the Pacific Crest Trail.

<sup>65</sup> The recommendation may have been taken more seriously than previous suggestions from personnel in central offices because it corresponded with Director George Hartzog’s visit to the park; Carl W. Alleman, Chief Landscape Architect, DCSSC, to Kenneth L. Raithel, September 8, 1966. The primary rationale behind this project was restated with some clarification by the park’s assistant superintendent; Robinson to DCSSC, January 12, 1967.

<sup>66</sup> The cue of “importance” and statistics indicating the popularity of this overlook are discussed in Bo Shelby and Donald W. Wolf, Social Impacts of Design Alternatives, Crater Lake National Park, Oregon State University Cooperating Park Studies Unit report 81-2, pp. i-ii, 47-49.

<sup>67</sup> Nehler to Westby, June 23, 1977, pp. 2-4. Authors of the master plan some twelve years earlier cautioned against any realignments on Rim Drive, though they supported widening to create ten foot

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lanes; Fritz and Robinson, February 1965, Chapter 3, Section 1, p. 8.

<sup>68</sup> Judy Rosen, et al., Environmental Assessment, Rehabilitation of North Entrance Road, August 1984, accompanied by an unnumbered drawing, "Rim Drive/North Entrance Road," July 1984, sheet two of three.

<sup>69</sup> Uwe Nehring, Environmental Assessment, Pacific Crest Trail Reroute, My 11, 1994, pp. 2-3. The "rerouted" PCT opened in 1995; Superintendent's Annual Report 1995, p. 8. This alternate soon had to shed its name of "Pacific Crest Trail" due to failure to meet the design standards set by the governing Pacific Crest Trail Conference. Some dry laid walls and signs are associated with it in places and are visible from points along Rim Drive.

<sup>70</sup> NPS landscape architect John S. Adams designed a new graphic for wood routed signs in 1959, one depicting Crater Lake and used to indicate and various features like trailheads on Rim Drive. These signs, like the customized markers built by the CCC had largely disappeared within two decades. Unlike some other national parks, the Unicorn signs have been limited to indicating mileage or direction near the road junctions, with the only other metal signage being limited to standard traffic control devices for indicated stops and speed limits.

<sup>71</sup> There is some doubt about whether a site plan guided the installation which is noted by T.J. Adams, Account 1454 – Picnic Areas [facility inventory], January 6, 1967, and on a separate sheet listing construction costs between 1962 and 1972. The two areas added to Rim Drive during the early stages of Mission 66 became known as the Grouse Hill Picnic Area (two tables) and the Cleetwood (later Pumice Point) Picnic Area (four tables); Ruhle; *Along Crater Lake Roads*, p. 14.

<sup>72</sup> U.S. Geological Survey personnel initially thought conditions were favorable for perched groundwater in the lower reaches of pumice the drill site; B.L. Foxworthy to James M. Siler, September 4, 1962, p. 2. After several attempts to find water through a well drilled at a spot near the north end of the parking area failed, the USGS recommended a halt to the project; Manuel Morris to J. Leonard Volz, October 19, 1965.

<sup>73</sup> Sentinel Point and Reflection Point (substations 7-B and 7-C, respectively) did not receive markers. The main interpretive idea behind the Grotto Cove Nature Trail was to show how extreme environmental conditions controlled plant growth; see the Ruhle guides (p. 25 in the 1953 edition, and p. 17 in the 1964 revision) for comment on the carpeting by dwarf monkeyflowers in this locality. This plant, whose diminutive size contrasts markedly with the two other species of monkeyflower that can be seen in the Castle Crest Wildflower Garden, but several other plants are also present along the 100 feet or so of the walk. The grade is almost level in this location, hence the idea for the park's first handicapped accessible trail; Larry Smith to Steve Mark, June 12, 2002. A bituminous walk and guardrail are shown at this loca-

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tion by Lange, drawing CL – 3070A, “Parking Areas – Stations 946+00 to 949+00 & 953+00 to 958+00,” November 30, 1936, one sheet (bottom), Item 264, catalog 8899, CLNPMAC. The die seemed to be cast concerning the fate of this educational offering when a brief comment (about how a review should be made of the trail’s adequacy) appeared in the Interpretive Comment Statement, April 4, 1972, p. 12. The plaques subsequently disappeared, as did the masonry guardrail at the site, though the bituminous walk remains in place.

<sup>74</sup> Three new tables were installed in 2001, a project that included paving and placing a vault toilet faced with stone masonry. See Gordon Toso, project proposal attached to Install Vault Toilets and Rehabilitate Whitebark and Vidae Falls Picnic Areas, Section 106 compliance documentation, Project 000011a, January 10, 2000, p. 2, site plans and sketches attached. The Skell Head Picnic Area was proposed for elimination at that time; David J. Harry and Gordon Toso, project proposal attached to Section 106 compliance documentation, Project 000013, January 10, 2000, map and photo attached.

<sup>75</sup> Much of the work involved excavating the slope above the road and placing a rock embankment below it; Plans for Proposed Project No. 7-C1, Slope Stabilization, Crater Lake Rim Road, 1951, sheets 2 and 3 of 13. The slope is described by H.S. Shilko in a memorandum to the regional engineer, BPR, March 26, 1952, pp. 1-2. Only one other change to the designed landscape in 7-C1 was noted during the Mission 66 period. This consisted of removing trees and leveling a small area at the Kerr Notch Parking Area as part of expanding it; Superintendent’s Monthly Report, July 9, 1958, p. 6. Removing the steps leading to the Sentinel Point Trail and an opening in the in the masonry guardrail went undocumented, as did the disappearance of signs built by the CCC during the 1970s.

<sup>76</sup> G.D. Smith, Drawing CL – 3243A, “Rock Wall and Guard Posts, Dutton Ridge – Rim Road,” February 1966, five sheets, TIC. Upright log guideposts with reflectors appeared in 1962 as part of a paving project aimed largely at routes 3 and 4 (Munson Valley Road); Construction Cost Summary CL 3-A8, 4-A4, B4 & 7-E3, september 17, 1962.

<sup>77</sup> Realignment in 1958 moved the road junction near headquarters about 200 feet north of its former location; John S. Adams, Drawing CL – 2267, “Suggested Road Relocation,” December 5, 1955, two sheets, Item 189, catalog 8899, CLNPMAC. It also resulted in obliteration of two buildings, a service station and restroom, constructed in 1926. A new gas station with restrooms was constructed that year across from the junction, but removed in 1991. The one change that took place at the Vidae Falls Parking Area was removal of the drinking fountain sometime after 1953, though the water system stayed largely in place. The fountain’s demise may have stemmed from contamination found in water samples; Superintendent’s Monthly Report, September 7, 1960, p. 4.



Steam shovel excavating at road station 130, segment 7-A, in 1932. *Sargent, BPR-FHWA.*

## CHAPTER TWO

# EXISTING CONDITIONS

While present circumstances are certainly shaped by the past with respect to continuity and change, the cultural landscape of Rim Drive is defined by factors that go beyond design and construction. The effect of natural systems and features in the park is perhaps best described through soils, hydrology associated with cross drainage, and predominate vegetation patterns. All designed landscapes have spatial organization, through which circulation is likely the most insightful way of judging how a site or district (linear or not) works. In the case of Rim Drive, views and vistas also function as a controlling element of road alignment. As for “pieces” of the landscape that can be assessed and then preserved through recommended treatments, several categories have been adopted in this report. In regard to their size, these are: engineered features (roads, trails, drainage devices), designed sites (or nodes, defined as where subsidiary parts of Rim Drive are centered), buildings and small-scale features, with planting concepts and materials being probably the least distinguishable from their setting.

### **Natural Systems and Features**

Crater Lake National Park lies on the crest of the Cascade Range in southern Oregon, in the heart of the Pacific Northwest’s volcanic belt. This belt is 20 to 25 miles wide from north to south, and is known as the High Cascades. It is a chain of Pliocene (5 million years ago to 2 mya) and younger volcanic cones, extending 500 miles from Lassen Peak in the south to Mount Baker in the north. Among its high peaks is Mount Shasta (14,162 feet) in northern California, Mount McLoughlin (9,495 feet) Mount Thielsen (9,182 feet) and Diamond Peak (8,744 feet) in southern Oregon, as well as the Three Sisters (consisting of North, Middle, and South Sister) in central Oregon, all of which can be seen from high points in the park. Mount Mazama also lies within this chain, ostensibly rising from a base of between 5,000 to 6,000 feet. When Mazama reached its maximum height, the summit could have been anywhere between 10,000 and 12,000 feet, and it supported many gla-

ciers that advanced and retreated several times. Mount Mazama erupted during a period of increased volcanic activity throughout the region, spewing pumice and ejecta over more than 5,000 square miles. When the climactic eruption of 7,700 years ago was over, Mount Mazama's summit had collapsed and disappeared. It left in its place a caldera between five and six miles wide and 4,000 feet deep, now occupied by Crater Lake. Precipitous, barren walls rise 2,000 feet above the lake and give this water body a dramatic and geologically important setting. To the west of Crater Lake, the headwaters of the Rogue and Umpqua Rivers have cut deep canyons through the rocks of the older Western Cascades and their tributaries have carved north-south trending valleys.

Mount Mazama's formation closely resembles that of Rainier and Shasta, in that it grew almost entirely by eruption of andesitic lavas and ashes from closely spaced vents. Glaciers advanced and retreated several times while the mountain grew, as evidenced by glacial moraines and tills interbedded among lava flows. Glaciation is visible on some caldera walls especially the north wall near Red Cloud Cliff, where layers of volcanic rock alternate with glacial debris. The last glaciers advanced down the slopes around the caldera scratching and polishing lava surfaces, but also formed the basis of valleys drained by Sun, Sand, and Munson creeks. The caldera walls display the geologic layering of lava flows accumulated during the volcano-building phase, sometimes in cross-section. Hillman Peak, Garfield Peak, and Sentinel Rock are, for example, the remains of stratovolcanoes and domes that made up Mount Mazama and whose "plumbing" can be seen as part of the caldera.



Wizard Island and Crater Lake from the Watchman Overlook. *Jet Lowe, Historic American Engineering Record, 1999.*

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Geologists have determined that the collapse was a relatively quick event of perhaps a few hours or days. The caldera was partly filled with pyroclastic materials and rock debris from its unstable walls and all the surrounding valleys were partially filled with hot pyroclastic flows. The initial explosions sent gas-impregnated pumice and scoria down the slopes that destroyed the forests. Carbonized logs buried in the pumice deposits indicate the presence of western white pine, (*Pinus monticola*), white fir, (*Abies concolor*), lodgepole pine (*Pinus contorta*), sugar pine (*Pinus lambertiana*), western yellow pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). Renewed volcanism after the mountain's collapse covered part of the caldera floor with andesite lava and built Wizard Island, Merriam Cone, and other volcanoes now hidden beneath the lake's surface. All volcanic activity subsequent to the climactic eruption has occurred within the caldera itself. These flows somewhat sealed the caldera floor, allowing the closed basin to eventually accumulate approximately 4.6 trillion gallons of water from hydrothermal input, rainfall, and snowmelt.

The natural grandeur of Crater Lake derives from this violent geologic past and inspires visitors to use Rim Drive as a means to optimize views of Garfield Peak, Wizard Island, Hillman Peak, Llao Rock, Cloudcap, Kerr Notch, Phantom Ship, and Dutton Cliff. Crater Lake National Park's relief varies from just under 4,000 feet at its southwest corner to the 8,929-foot summit of Mount Scott.

### Soils

The volcanic activity of Mount Mazama has profoundly influenced regional soils and vegetation. Pleistocene and more recent volcanic activity has blanketed the area contiguous to Crater Lake National Park with large deposits of pumice and volcanic ash, which show relatively little development in profile. Soils along Rim Drive, and throughout Crater Lake National Park, are predominately post-Mazama age pumice, alluvium, and glacial debris. These are well drained soils, exceedingly poor in composition, and virtually sterile in several locations. Till or morainal soils occur in areas glaciated, such as in Munson Valley to the rim, and at the heads of Sun and Kerr valleys. Forest duff is thin and patchy throughout the park, but is thicker and more developed at some distance from the rim, in the lower elevations. Soils formed in scoria, pumice, and ash that predominate in the park, occur both on plateaus and in canyons at elevations from 4,400 to 7,000 feet. Pumice deposits are capable of absorbing significant volumes of snow melt, so surface streams are relatively few—even with prodigious amounts of snow. Clean, rounded pumice has a natural angle of repose between 26 and 30 degrees, according to engineers with the Federal Highway Administration, so that anything situated on steeper slopes will erode.

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Surface morphology is also critical, since gradient and drainage directly influence soil quality. Wind exposure is important, as soils formed on the windy ridges are very different from those in the sheltered areas adjacent to Rim Drive. There is also continual transfer of mass down slope; thus slope gradients along the road corridor thus have important implications: upper slopes are susceptible to erosion, while lower slopes are recipients of deposition. As subject to continual disturbance, soils on the slopes are generally well drained as permeability is very rapid, and as such, periodic runoff from rain or snow tends to move through the landscape at a diminished rate.



Pumice slopes atop Red Cloud Cliff. *Jet Lowe, HAER.*

Unlike most soils that are subject to erosion by water, the primary cause of soil erosion in the park is wind deflation. Pumice deposits have an extremely high water holding capacity (up to thirty percent of their total volume); as a result, runoff channels in park pumice soils are rounded and poorly defined. As such, there is little trace of soil erosion even on the precipitous slopes along Rim Drive. Channeling moisture during periods of increased precipitation or the annual spring snow melt (seventy percent of the park's annual precipitation occurs as snow), is the job of the road's cross drainage devices and these minimize damage to soil margins during the runoff. The primary soil limitation along Rim Drive is infertility due to poor soil development, and this is the key factor determining plant composition, succession, and

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distribution. Soil improvement was a major management concern during road construction and necessitated the slew of amendments to facilitate planting schemes. In some locations, more than a thousand yards of topsoil were used to prepare slopes and denuded areas for planting and to make fills conform to the surrounding terrain.

### Hydrology

Crater Lake, the deepest water body in the United States, is a closed-basin lake formed after the eruption of 7,700 years ago. This lake is isolated from surrounding streams and rivers and has no visible inflow from outside. The caldera's steep walls result in a very small watershed, thus external flows of nutrients to the lake from the watershed are low. These conditions contribute to the lake's low nutrient level and exceptional clarity. Average annual precipitation is 168 cm (66 inches), with an annual average snowfall of 522 inches. Snow depths are typically 10 to 12 feet by midwinter. Most precipitation comes in winter and spring; summer and early autumn are characterized by drought-like conditions.

The surface elevation of Crater Lake is 6,178 feet above mean sea level. It is estimated that 30 percent of the lake's annual water loss is through evaporation and 70 percent through seepage. Lake level has varied within a range of 16 feet over the past century, perhaps because some extruded lavas of the caldera rest on glacial debris. In many areas of the park at altitudes below 6,500 feet, the occurrence of perched ground water is shown by numerous springs. The depth of the water table is unknown in most locations, so the existence of productive perched ground-water bodies cannot be predicted. The few permanent watercourses along Rim Drive occur along Dutton Ridge, Vidae Falls, and near the Castle Crest Wildflower Garden.

Impervious surfaces on Rim Drive increase the volume and velocity of surface runoff and reduce infiltration. This affects the hydrology of areas adjacent to the road, particularly the quantity and timing of flows. Larger peak flows increase the energy available for erosion and can affect roadbed stability. The biggest environmental concern associated with the road system is increased sediment in Crater Lake from disturbed areas that drain to it. These include drains and pullouts with insufficient buffer strip between them and the lake. Road ditches can also create runoff channels in previously non-channelized locations. The drainage systems on Rim Drive, however, generally intercept surface flow from the road, channel it to culverts and discharge it to surface flow away from the lake basin. This expanded channel network, one that increases the volume and speed of peak flows, since flows over impervious surfaces are faster than in the subsurface.



Vidac Falls and a portion of east Rim Drive. *Jet Lowe, HAER.*

Reduced infiltration increases surface flow since water is not stored in the soil. Although difficult to quantify, Rim Drive thus directly and indirectly alters the surface and subsurface flow rates, as well as volumes affecting the adjacent landscape. Increases in peak flows make more water available for sub-surface erosion, which can affect road stability. Surface erosion is dependent on many factors, including rainfall and snow runoff, soil conditions, road surfacing, gradients and cross slopes, traffic volumes and the effectiveness and spacing of drainage structures. The properly located and sized drainage structures are keys to regulating volumes of surface flow and resulting erosion.

### **Vegetation Patterns**

Conifer forests dominate mountain slopes in the Crater Lake region, with their over-story species an indicator of what shapes the composition of forest ecosystems. As a way to simplify vegetation dynamics, the older concept of life zones is used here to indicate the control exerted by altitude on overall patterns. Rim Drive passes through several life zones, which combined with seasonal changes, present an ever-changing vegetative landscape mosaic of open sub-alpine meadows, coniferous forests, and low shrubs. At Crater Lake, the park's vegetation can be grouped in life zones that are more or less distinct from each other, even with allowances made for

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differences in slope, aspect, and microclimatic differences. They are summarized here for contrast, though the life zones also provide some indication of trends over the larger landscape.

The Transition Zone is dominated by mixed conifer forest occurs at elevations between 4,400 and 5,500 feet. For the most part, it is located well below Rim Drive, near the park's south entrance, covering 31.4 square miles or 12 percent of the park. Certain southwest slopes near Rim Drive (particularly in road segments 7-B and 7-E) nevertheless display affinities to mixed conifer forest near the South Entrance. Transition zone soils in the park reach depths of 200 to 300 feet and consist of fine, well-drained volcanic dust over ash and cinders. The dominant tree species are western yellow pine (*Pinus ponderosa*), western white pine (*Pinus monticola*), sugar pine (*Pinus lambertiana*), white fir (*Abies concolor*), and Douglas fir (*Pseudotsuga menziesii*). Ponderosa pine typifies the transition zone, typically occurring in warmer locations such as open meadows and along roadbeds. A small area of ponderosa pine is, however, established on the north rim of the caldera between Cleetwood Cove and Wineglass. It is somewhat of an oddity because ponderosa pine in the park is usually found in areas at elevations from 4,500 to 5,500 feet.



A portion of west Rim Drive and Crater Lake from the Watchman Lookout. *Jet Lowe, HAER.*

The Canadian (or true fir) Zone roughly extends from an elevation of 5,500 to 6,500 feet and covers 102.7 square miles of the park. Elevational control varies widely, however, since this zone is largely defined by moisture, exposure, drainage, and humidity. A prevalent species is lodgepole pine, such that the valleys and lower open slopes that radiate from the caldera support dense stands of this species. Lodgepole pine also forms mixed stands with other tree species, notably mountain hemlock (*Tsuga mertensiana*), subalpine fir (*Abies lasiocarpa*), and Shasta red fir (*Abies magnifica shastensis*). The majority of lodgepole pine forests are seral, usually developing after fire or major disturbance. Lodgepole pine thrives on dry, well-drained sites that have coarse textured pumice soils. Prolific seeding follows fires and allows it to quickly establish dominance especially on sites where competition from other species is limited. Lodgepole pine owes its wide distribution to frequent fires and resistance to lower temperatures occurring during the early growing season. Fire suppression policies within and outside the park is resulting in lodgepole pine being supplanted by other species, notably Shasta red fir that intergrades with noble fir (*Abies procera*) in this part of the Cascade Range.

Shasta red fir are scattered throughout the upper reaches of the park and are most common in hemlock forests up to the rim, and on the caldera's inner walls. This forest type is well developed on west-facing slopes of the Cascade Range, where two climatic features are prevalent. The first is in places where much of the annual precipitation falls as snow and accumulates to depths of two or more meters. Secondly, at sites where plant moisture stresses are minimal or do not generally occur during the short summer growing season.

Forests of mountain hemlock are also widely distributed in this zone, being characterized by a mosaic of forest patches and tree groups interspersed with shrubby or herbaceous sub-alpine plant communities. Subalpine fir is typically mixed with other conifers in forest meadows and open parklands. Cool summers, cold winters and deep snow packs are more important to the viability of subalpine fir than total precipitation. Shrubs common to this life zone are several species of currant (*Ribes* spp.), broom and dwarf huckleberry (*Vaccinium caespitosum* and *V. scoparium*), various willows (*Salix* spp.), and woodrush (*Luzula glabrata*).

The Hudsonian (or subalpine) Zone extends from an elevation of 6,500 to 9,000 feet, and includes the park's sub-alpine areas that are characterized by sparse vegetation and dry summer conditions. In sub-alpine meadows and parklands, "tree dominance" gives way to shrubs and herbaceous plants under harsh conditions, like those on Cloudcap and Mount Scott. Soil moisture in this high elevation zone is quickly

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lost to the evaporation that limits species diversity and plant numbers. Pumice fields and outwash flats are exceedingly difficult settings for plant dispersal and development. Rates of decomposition and incorporation of organic matter into the soil are generally slow, owing to low temperatures and heavy snow packs.

Mountain hemlock, the dominant tree in this zone, is found in open meadows, pumice, talus slopes, and along streams. Whitebark pine (*Pinus albicaulis*) occupies pumice slopes, rocky crests, exposed areas on the rim and the tops of dormant volcanic cinder cones. This pine often serves as a pioneer tree species in the park's open sub-alpine meadows. Bitterbrush (*Purshia tridentata*), and Shasta red fir occur in both the Canadian and the Hudsonian zones, as does lodgepole pine. At the park's highest elevations on Mount Scott and Cloudcap, whitebark pine grows in pure stands. Montane meadows are interspersed throughout these forest zones, though they are usually confined to wet areas along streams or springs.

### Spatial Organization

The spatial organization of Rim Drive remains relatively intact and continues to exemplify the design elements developed during the historic period of significance. Its configuration is best characterized as a curvilinear loop that follows the caldera rim closely where possible, moving gracefully through the landscape for a total length of 30.6 miles. This curvilinear alignment expands periodically into articulated spaces located adjacent to the road axis. The components that define and articulate the road's overall spatial organization are its numerous designated pullouts and parking areas. These designed features provided stopping points that afford important views and vistas for the visitor. The pullouts are articulated in a hierarchical manner and are bounded and defined by the road on one side, with the rim or a ledge in most cases on the other.

Spaces inviting visitors to stop were articulated at several different levels: observation stations, substations, and parking areas. There are seven primary observation stations on Rim Drive: Discovery Point, the Watchman, Merriam Point, Pumice Point, Skell Head, Cloudcap, and Kerr Notch. Originally serving as stops on naturalist led caravans, observation stations could contain one or more of the following features: parapet walls, stone curbing, bituminous walkways, planting areas, and (where feasible) a drinking fountain. Substations were generally smaller (but not always) and at their most developed, consisted of bituminous surfaced parking areas with stone masonry features, planting beds, and scenic overlooks. Parking areas were functionally organized as bituminous surfaced pullouts with stone masonry guardrails and curbing.

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Native rock was used for stone masonry guardrails, parapet walls, retaining walls, curbing, and drinking fountains. All of these were battered or “rustic,” but were also carefully sited as integral components of stations and parking areas. The stations, all of which are extant, were designed to display different views of the lake and surrounding landscape, but also to cumulatively and subtly influence the character of the visitor’s experience.



Substation at Grotto Cove. *Jet Lowe, HAER.*

Although Rim Drive was conceived as a curvilinear and contiguously organized circulation system, the road's physical form, design character, and experience change as it moves through varied landscapes. Rim Drive can be divided into five segments based on its chronological development, though these segments also display differences in design, engineering, and landscape treatments. Each segment shares characteristics in common with the entire Rim Drive, but also displays a distinct character derived from the landscape characteristics of the portion of the rim it transects. The form of the rim's topography creates spaces in the landscape, which support specific uses and features, but also directs or creates views. As engineered features and individual structures, foot trails built during the 1930s were intended to provide park visitors with distinctly different views of Crater Lake from points not reached by Rim Drive. Trails allowed relatively easy access to two observation stations on the western portion of Rim Drive (Discovery Point and the Watchman Lookout) and also gave access to viewpoints such as Mount Scott and Sentinel Point. The NPS also provided the Bureau of Public Roads (BPR) with standard guidance for the design of road margins (shoulder, ditch, bank sloping), drainage structures (culvert headwalls and masonry “spillways”), and safety barriers (masonry and log guardrails). Francis Lange, lead NPS landscape architect for much of the project,

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produced site plans for areas that needed individualized treatment beyond the standard measures in centered on the roadway.

### *Circulation*

Vehicular circulation along Rim Drive road and its contiguous designed spaces define the “pace and sequence” of the park experience. The primary design goal was to show the “great features” of the caldera and lake, and to provide intense or concentrated views of interesting places and sites. As such, circulation consists of four parts: roads and parking (vehicular circulation) as well as walkways and trails (pedestrian circulation). Rim Drive is a bituminous-surfaced two-lane, two-way road having a paved surface ranging from 18 to 24 feet, with either two or three foot shoulders. It begins at the junction with Rim Village, and circumnavigates the caldera rim in a clockwise direction and terminates at Park Headquarters. Scenic vistas and the road’s curvilinear alignment are the primary factors shaping the spatial experience. Parking is hierarchical, at least in the original design, in that it is intended to consist of observation stations, substations, and parking areas. While these areas share common characteristics, none are intended to be alike and each has markedly different dimensions. Pedestrian circulation is more formalized at the walkways because these are separated from automobiles by stone curb. Trails are similarly distinct, though other devices (such as wooden bollards, cut slopes, or stonework) are used to enforce this separation.

As a circuit for vehicles, designers intended that Rim Drive occupy the top rung in a traditional hierarchy of park roads. A portion of the circuit (the Munson Valley Road connecting Rim Village with Park Headquarters) is in fact an approach route, but Rim Drive proper possesses an entirely different function of presenting the park’s central feature in different ways as part of a loop. The spur road to Cloudcap can be considered part of the circuit because of this central purpose, whereas the Sun Creek Campground road below Vidae Falls is a service route, much like others built in 1958 to link Rim Drive to the five picnic areas. Rim Drive primarily serves park visitors, though a portion of it (segment A) acts as a through route running north to south between state highways 62 and 138 which cross the Cascade Range in this part of Oregon. The through route (which also includes the Munson Valley and North Entrance approach roads) is the most heavily used part of the park’s vehicular circulation system over the summer travel season.

With only a few exceptions, most of the foot trails built during the 1930s were intended to provide park visitors with distinctly different views of Crater Lake from

points not reached by road. Like roads, they were built to standards that required (at least in several instances like the Watchman or the Castle Crest Wildflower Garden) reconstructing earlier work. Much like his colleagues in the Bureau of Public Roads, the NPS resident engineer took the lead in locating trails, though the lead landscape architect on site also had a role as consultant before each project received final approval by the park superintendent and his superiors.

### *Views and Vistas*

Design intent included “scenic preservation,” so views focused on geologic and natural features, while scarred or “unpleasant” areas were carefully screened so as to not detract from the beauty of the site. Views of Rim Drive from the lake, or across it were considered unpleasant, as were glimpses of the original circuit road built by the Army Corps of Engineers. Designers wanted to make the road alignment part of the rim, yet remain invisible from the lake, or from any major viewpoint on the rim.

Views along the Rim Drive were meant to capture the essence of the scene. Vistas, by contrast, tended to center on distant objects but employ framing devices such as trees. Examples of the distinction can be seen at two observation stations; one is Merriam Point, where Crater Lake and distant peaks can be seen in wide-angle view, whereas trees frame the view of Phantom Ship from Kerr Notch. Geological features were generally regarded as secondary to the lake, whether as a view or vista, though there are substations and parking areas situated away from Crater Lake that center on specific landscape features such as Union Peak, Mazama Rock, and Vidae Falls.

### **Engineered features**

As described in the design and construction section of this report, the basic elements of linear transportation systems usually fall to engineers, whether they design roads or trails. Highways represent the most complex challenge for these engineers, due to vehicle speeds and the expense of construction. To reiterate, the design of curves and tangents in a planar relationship is horizontal alignment—whereas how the located line fits the topography in three dimensions (especially where grade, sight distance, and cross drainage are concerned) is vertical alignment. Cross-section is a framework in which to place individual features and their relationship to each other. Usually depicted through drawings and typical sections, these individual features include road width, crown, surface treatments, and slope. The gradients of side slopes, for example, were reduced to less than angles of repose; this largely prevented slipping and washing, while facilitating planting and growth for stability.

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Typical section of Rim Drive showing a daylighted cut, road segment 7-B. *Steve Mark.*

The typical section for Rim Drive is a twenty-four foot bituminous-surfaced roadbed with an eight inches gravel sub-grade with two-foot shoulders on cuts but six foot shoulders on fills. The maximum gradient is eight percent, except on a small section near Mount Scott where a ten percent grade was used. Curves were designed with spiral transitions and super elevations based on a 35 miles per hour speed limit. At the heart of the road structure is its earth base, over which the wider roadway is imposed. Once grading was completed, crews placed a sub-grade of crushed one-inch minus rock. This was rolled, compacted, and covered with a surface of two inches of slow-curing bituminous material. Although black bituminous material known as asphalt has been used as a “wearing course” for centuries, (there are naturally occurring deposits of asphalt, or rock asphalt), the bituminous material used on Rim Drive is a by-product of refining crude oil. What motorists see as the road is its bituminous surface, one that consists of aggregate and asphaltic coatings, overtopped by a final “chip seal coat,” a layer of uncoated aggregate that gave it its coarse pebbled texture. The surface is durable and is resistant to the actions of most acids, alkalis, and salts. It is a very strong paving material able to sustain heavy traffic loads while remaining flexible enough to withstand environmental conditions and stresses.

Engineered features at the landscape scale translate into entire road segments which went through all phases of construction (clearing, grading, surfacing, and paving), in-

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dividual trails, and even projects (such as the fill below Vidae Falls) that required special design in reference to the three basic elements. They also include locating more site-specific impacts to maintain vertical alignment such as cuts and fills. At an even finer scale is the design of individual components where the NPS exercised its prerogative in supplying BPR with standard guidance for design of road margins (shoulder, ditch, bank slopes), drainage features (culvert headwalls, paved ditches, drop inlets, and masonry spillways) and safety barriers (log and masonry guardrails). Taken as a whole, the engineered structures on or associated with Rim Drive are narrow and form something of a corridor. For purposes of categorization, there are five road segments that can be considered discreet structures at the landscape scale. These include segments 7-A, 7-B, 7-C (but also route 9, the Cloudcap spur road), 7-D, and 7-E (including an access road to the proposed Sun Creek Campground below Vidae Falls and the massive fill used for bridging Vidae Creek on Rim Drive). The four trails (Discovery Point, Watchman, Mount Scott, and Castle Crest Wildflower Garden) are obviously less complex in comparison to designing a road segment, but nonetheless include the four basic phases of construction, site-specific impacts, and individual components necessary to a linear transportation system.



Tree protection device and culvert headwall visible on fill as part of road segment 7-A near the Discovery Point parking area. *Steve Mark.*

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### *Road Structures*

**Road segment 7-A** (Rim Village to the Diamond Lake Junction, mile 0.0 to 5.9) represents the first stage of building Rim Drive. All phases of construction (clearing, grading, surfacing, and paving) were completed in five seasons, yet a lack of funding made this road segment (which is the most heavily used of the five on Rim Drive) the least complete in regard to masonry guardrail at stopping places, old road obliteration, bank slopes, and planting. Nevertheless, this structure includes the road base, surfacing material, wearing course, ditches, cross drainage devices, retaining walls, masonry guardrail, and stonework aimed at protecting some trees on fills.

**Road segment 7-B** (Diamond Lake Junction to Grotto Cove, mile 5.9 to 14.5) has suffered far less from damage to its masonry features caused by the annual spring opening of the road since it lies beyond the junction and has a southern aspect. Masonry guardrails in this segment show little damage and have required almost no repair, though the original log guardrails have all rotted and were removed by 1970. Estimates and funding were generally better along this road segment than in 7-A, though there are no devices to separate passing motorists from those who stop at viewpoints except for stop signs at two picnic areas and the Cleetwood Cove Parking Area. This structure includes those components identified under the previous segment along with old road obliteration and one section of paved ditch with drop inlet for drainage.

**Road segment 7-C and Cloudcap Spur** (Grotto Cove to Kerr Notch, mile 14.5 to 23.2) represents the third stage of building Rim Drive, but arguably the most distinctive part of Rim Drive since all seven parking overlooks (see the Designed Sites section of this chapter) are located within it. As a structure, it includes the components identified in the previous two road segments, but also has a wye intersection where Rim Drive meets the spur route to Cloudcap.

**Road segment 7-D** (Kerr Notch to Sun Notch, mile 23.2 to 27.1) has proven to be the most expensive to build and maintain, owing to the excavation and cut slopes needed on both sides of Dutton Ridge. Near Kerr Notch are the highest retaining walls in the park, but the masonry guardrail topping them has been continuously battered by rockfall to the point where some is missing. Conditions are better away from rockfall zones and components of the road structure are almost all original. Included among them are several masonry spillways which appear where permanent streams are diverted beneath Rim Drive through a culvert.

**Road segment 7-E** (Sun Notch to Park Headquarters, mile 27.1 to 31.6) includes the structural design components identified in the first road segment, but also two masonry spillways and a service road that links the Vidae Falls Parking Area with what is now a picnic area below it. The service road has the only other masonry devices used to protect trees than the ones found in 7-A, but also a now wooded bankslope that screens the road's intersection with Rim Drive. There are only three parking areas along segment 7-E (the fewest in all five parts of Rim Drive) since Crater Lake cannot be seen from it.

**Vidae Falls Parking Area and Fill** (mile 28.6) is a response to the problem of Rim Drive crossing the lower part of Vidae Falls. It consists of a massive fill having a pipe culvert that allows water to pass under the road. A parking area for visitors to stop and admire the falls parallels the road on one side of the fill, one where pedestrians are separated from vehicles by a stone masonry curb and surfaced walkway. The fill, planted with native shrubs and other vegetation in 1939, is now dominated by trees that have seeded there from surrounding forest so that few visitors realize that part of the falls are missing.



Dry laid retaining wall on the Watchman Trail. *Steve Mark.*

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### *Trail Structures*

Discovery Point Trail (mile 0.0 to 1.2) still links two observation stations, the first being Sinnott Memorial (in Rim Village) where visitors can walk west to a parking area on Rim Drive, and then a much shorter footpath to the station at Discovery Point. Trail width is approximately four feet wide over its entire length, though this structure also includes other components: earth base, an unpaved tread surface, varied gradients (in reference to NPS trail standards of the 1930s), dry laid stone retaining walls, bank sloping (rounded slopes or raking trail margins back using standard ratios), and overlooks (planned views).

Watchman Trail (0.7 miles long from Watchman Overlook) makes use of the old Rim Road for almost half of its length, so there is a difference in width between older section (12 feet) and the section built by the NPS in 1932 (6 feet) to connect Rim Drive with the observation station at Watchman Lookout. The 1932 trail section includes all the components listed for the Discovery Point Trail and some informal stone benches.

**Mount Scott Trail** (2.5 miles long from trailhead at mile 17.6 on segment 7-C) climbs to the park's highest point. Built as a horse trail to service the fire lookout at the summit, it has been a hiking trail exclusively since the 1950s. This structure averages four feet wide and contains the components listed for the Discovery Point Trail. Its trailhead remains in unfinished condition with unsurfaced parking.

**Castle Crest Wildflower Garden** (0.3 mile loop from trailhead at mile 31.0 on road segment 7-E) can also be accessed by a spur trail leading from Park Headquarters. In addition to those components listed under the Discovery Point Trail, this route has stone steps and wooden footbridges reconstructed from the original spans built by the Civilian Conservation Corps. Trailhead parking adjacent to Rim Drive is delineated by stone masonry piers and logs. The predominant counterclockwise pedestrian circulation of the trail is at odds with the original pattern because of a shift in the interpretive focus from wildflowers to forest succession.

### *Drainage Devices*

What all the engineered structures have as a common denominator is the need for drainage to handle excess water which might otherwise destroy these structures. On Rim Drive this is accomplished two ways. The first is through unsurfaced ditches which feed culverts, thus effecting cross drainage. Culverts consist of concrete pipes,

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concrete box sections and corrugated metal to transport runoff across the roadway. A few culverts are used for permanent watercourses, but most convey spring run-off or runoff from major storms. Most of Rim Drive's culverts originate from original construction and are galvanized corrugated metal or concrete. There are a total of 113 culverts on Rim Drive, almost all having a stone masonry headwall on the upstream side of the culvert. Their distribution is 30 culverts with stone inlet headwalls in segment 7-A, 28 in segment 7-B, 26 in segment 7-C and C-1, 22 in segment 7-D, and 27 in segment 7-E which also has the only two culverts (at the Vidae Falls fill and at mile 29.1 near Park Headquarters) with stone headwalls on both its inlet and outlet.

Existing slopes, drainage patterns, and vegetative cover were considered when drainage courses were designed. Specifically, repose of slope, gracefulness of lines in the landscape, layout of stonework and joint separation were important design considerations. Headwalls are located on the upslope side of culverts to protect against backwash erosion, support a wider roadbed and articulate the rustic character of adjacent structures. Most headwalls are flat and rectangular but some are arched with covered cheek walls and mortared joints. Arched headwalls are faced with stone carefully detailed to keying patterns of the arch's ring stones. Inlets and outlets are a major component of the cross drainage system and are constructed of stone or galvanized metal. There are several locations where native stone is used to convey run off or snow melt. A rustic architectural style is used on some outlets, which are laid without mortar.



Opening for a drop inlet. *Jerry Watson*

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The other type of drainage utilizes paved ditches on both sides of the roadway that lead to a drop inlet. They are effective because they resist abrasion by traffic and reduce water penetration. Open bituminous surfaced road drains or “gutters,” generally found along road margins in segments 7-B and 7-C, are easily inspected for blockages and can be constructed relatively quickly and inexpensively, but are also effective at draining road sub-grades--provided they flow to adequate outfalls. Water flows to these roadside ditches or gutters, which are connected to drop inlets. The inlets then carry the water in a culvert down the slope to a discharge area below the roadbed. The quantities of water to be drained depend on rainfall intensity, duration, and frequency, along with the size and character of areas drained. Their design is normally predicated on short and intense summer storms, thus winter snowpack runoff can sometimes overload this type of drainage system.

Concrete catch basins and steel sloped culverts are examples of drop inlets found on the margins of Rim Drive in segments 7-D and 7-E. A drop inlet is normally used to drop low to medium volumes of water over a sharp incline of 30 percent or more. Drop inlets on Rim Drive usually consist of two components, a vertical pipe and a horizontal pipe. The drop pipe can be square or round in cross-section and is constructed of concrete or corrugated steel. Drop inlets on road margins of Rim Drive allow rapid removal of surface water, with the entry point normally concentrating the flow to a small area. This point can plug with debris, or local scouring can occur, due to the high velocity of the water. Protection of the bed and edges of what is a permanent watercourse was accomplished by means of rock armor, gabions, and headwalls at the point of entry in order to prevent erosion by water discharging from pipes during peak runoff.

Drainage for trails is, by contrast, largely supplied by “sheeting,” where the tread is sloped so that water runs off uniformly. The unsurfaced condition and narrow width of the four trails connected with Rim Drive generally precludes drainage underneath the structure, so sheeting is a practical means of shedding water where there are no perennial streams or seasonal channels. This minimizes annual maintenance, though water bars or drainage dips can be made with hand tools. There are places where logs or stone are included on one side to create the effect of check dams (the southwest facing section of the Watchman Trail is one example) or lined with rock, as at several places in the wetland of the Castle Crest Wildflower Garden. Footbridges in the Garden represent another form of allowing for drainage over permanent streams forming the headwaters of Munson Creek, analogous in cross drainage to the much larger fill on Vidae Creek where road segment 7-E crosses it.

## Designed Sites

These are areas along the road corridor of Rim Drive that are stopping places where the NPS individualized treatment beyond the standard measures described in contract specifications for the engineered structures (road segments). Francis Lange's designs for seven "parking overlooks" comprise the majority of sites, though three unrelated developments at the Watchman Overlook, Diamond Lake (North) Junction, and Cleetwood Cove Parking Area have to be included. In all cases, the site plans for these ten areas are specific about circulation (separating vehicles and pedestrians), but also provide ways to separate Rim Drive from designed sites through use of planting beds or at least a constricted road connection having a stop sign. The Lange group has stone masonry features and remnant plantings, whereas the others contain formalized parking lots delineated with concrete curb and sidewalks.

Lange's site plans date from 1936, at a point where his previous experience with design and construction on Rim Drive convinced him and other NPS landscape architects of the need for parking overlooks. The design of facilities aimed at safer visitor use and restoring native vegetation to virtually sterile soils. The seven areas were previously designated observation stations or substations in the hierarchy of stopping places, yet each has the same types of individual features: paved parking area, planting bed, curb, walkway, and masonry guardrail that forms a parapet wall. Each of them, however, respond to a different set of site conditions and, in so doing, are the most individualized expressions of how to design with nature at specific nodes on Rim Drive. All of the Lange "parking overlooks" occur in road segment 7-C (which includes segment 7-C1 and route 9). Going clockwise, they can be found at the following sites: Grotto Cove, Skell Head, Cloudcap, Cottage Rocks, Victor View (Sentinel Point), Reflection Point, and Kerr Notch.

**Grotto Cove** (mile 14.5) has defined planting beds in two locations (stations 946-949 and stations 953-958) that separate those who stop at either from passing motorists on Rim Drive. The substation has stone curb to separate pedestrians from cars, as well as bituminous paving on walkways situated between the curb and masonry guardrails. One of the walkways is extended beyond the vehicle parking to provide a short, but level, trail intended to facilitate viewing dwarf wildflowers blooming on adjacent slopes in midsummer.

**Skell Head** (mile 15.3) is the largest of all parking overlooks, since Lange had to design for rehabilitation of a site denuded by contractors for fill material. Plant diversity in the large bed separating the parking for this observation station is low due

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to almost sterile soil. The raised walkway follows the masonry guardrail to delineate the site extends for more than 400 feet, thus creating the longest parapet on Rim Drive. Like Grotto Cove, all stonework is original and untouched, though the logs that once delineated the planting bed as edge features are missing—as they are at other sites.

**Cloudcap** (mile 18.9) is the highest point on Rim Drive, the observation station being reached at the terminus of a spur road that diverges from the main circuit. The culmination comes in a one-way loop that passes by a parapet with masonry guardrail delineating a raised walk like the other parking overlooks. This one differs from others in having an oval shaped area, much of it a bank slope, intended to facilitate the vehicular circulation pattern, but the bank slope also protects a preexisting stand of whitebark pine and a small amount of remnant plantings. This development also erased traces of the old Rim Road that once ran across the site; the nearby remnants are now cleverly screened from view of motorists and pedestrians.

**Cottage Rocks** (mile 21.0) sits below the north end of Cloudcap on Rim Drive. This substation lacks a planting bed for separating the circuit road from parking at this viewpoint, yet otherwise resembles the other six sites by having the original masonry guardrail, a raised walk, and stone curbing. The intended view is both Crater Lake and a picturesque formation called Pumice Castle (formerly “Cottage Rocks”) affixed to Red Cloud Cliff.

**Victor View** (mile 21.2) hides traces of the old Rim Road by overtopping it through use of a short loop from Rim Drive. This substation is also known as Sentinel Point Overlook, though a short trail leads from the other side of this parapet to Sentinel Point. The original opening in the masonry guardrail and some log steps below have been blocked up and regraded, but this site otherwise contains all its original features save the rustic sign that once identified it on Rim Drive.

**Reflection Point** (mile 21.4) is the second largest parking overlook, though built as a substation. The planting bed separating Rim Drive and parking for vehicles is smaller than at Victor View because the old Rim Road did not infringe on this overlook. The raised walk and parapet wall are curvilinear, measuring some 300 feet in extent.

**Kerr Notch** (mile 23.2) has a greater sense of separation from Rim Drive than other parking overlooks, largely due to the dense subalpine forest which screens vehicles parked there from the main circuit. It is designed as an observation station, but like Victor View, the Kerr Notch design is intended to hide the old Rim Road by largely

overtopping it. Along the parapet wall, next to where a view of Phantom Ship is framed by surrounding trees, is planting bed adjacent to a boulder that was once a drinking fountain but no longer operates.

The three other designed sites are located between Rim Village and Grotto Cove, but whose designs bear little relation to the parking overlooks in terms of how they were integrated with Rim Drive. The Cleetwood Cove Parking Area/Trailhead (1961-63), North Junction Parking Area (1986-87), and Watchman Overlook (1972-73) are responses to changing needs after Rim Drive was essentially completed in 1941. Unlike the six picnic areas added to the circuit by means of small connecting roads in 1958, the three sites represent marked departures from the collaborative design that characterized the building of Rim Drive.

**Watchman Overlook** (mile 4.0) is the most heavily used of any viewpoint on the road circuit, having been developed in response to a perceived safety hazard. Grading of road segment 7-A in 1931-32 allowed for parallel parking on the side of Rim Drive away from the lake, but there was little in the way of visitor facilities aside from a trailhead for the Watchman Lookout, which has a retaining wall capped by masonry guardrail nearby. Subsequent development moved the parking across Rim Drive to a lot with parallel stalls, at a site where pedestrians are separated from vehicles on a viewing platform delineated with pressure-treated wood peeler cores and masonry piers.



North Junction parking area and Rim Drive. *Jet Lowe, HAER.*

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**North Junction Parking Area** (mile 5.9) became the second most popular stopping place on Rim Drive once a rectangular lot overtopped the original road wye in this location. It is the first place visitors can see Crater Lake coming from the park's north entrance, but pedestrian circulation at the site has not been formalized with respect to areas between vehicle parking and lake viewpoints. The lot came about as part of a project to reconstruct the North Entrance Road, but no funding to mitigate trampling of vegetation and social trails has been forthcoming, even though a site plan from 1984 showed hardened paths and masonry guardrail along the rim.

**Cleetwood Cove Parking Area/Trailhead** (mile 10.7) came about as part of moving the main trail to Crater Lake from Rim Village to a site requiring 200 less vertical feet of climb with a better (southern) aspect. The parking area is oriented perpendicular to the road instead of parallel (as was the case with original construction of stopping places on the road), but Rim Drive also separates the parking area from the trailhead. Like The Watchman Overlook and North Junction sites, parking at Cleetwood Cove is defined by concrete and asphalt instead of stone masonry curbs. Randomly placed boulders at this site are attempts to control the overflow parking of vehicles from using an area adjacent to the trailhead, though cars can sometimes line the road away from the parking area.

### **Buildings and Small-Scale Features**

**Watchman Lookout.** Although buildings can be categorized as structures, they are fundamentally architectural in character rather than the individual components grouped together as road segments or trails. The only extant building designed to be part of Rim Drive's circulation system during the period of road construction is the Watchman Lookout. Designed by Francis Lange in 1931 and situated at the terminus of the Watchman Trail, this structure exemplifies NPS rustic architecture and continues to serve a dual role in detecting wildfires over many miles, but also an educational function that made it an observation station during years of the ranger-led rim caravans. A wood framed second story rests on the irregularly shaped first floor and largely consists of a four-sided observation room enclosed with eight foot glass plate windows allowing for detection of forest fires, surrounded by a recently restored log catwalk. Below the observation room are two flush toilets that no longer operate and a storage area. The educational facility consists of an adjoining trailside museum lit by daylight through two windows, though there are currently no exhibits on display. Wayside exhibit panels are nevertheless mounted on bases at the open-air parapet several feet away from the museum.

**Mount Scott Lookout and Wineglass Cabin.** Two other buildings are fifty years or older, though not necessarily associated with Rim Drive. Contractors erected the wood frame lookout on the summit of Mount Scott in 1952 to replace an earlier cupola-style fire detection structure built from a standardized Forest Service plan. It is two stories in height and did not feature as an observation station (unlike the Watchman) and there are no wayside exhibits or other educational devices. Far more concealed is the Wineglass Patrol Cabin, located about mile 13 (road segment 7-B), and sited below the grade of Rim Drive. Screened from view by dense native vegetation, this patrol cabin is used sporadically during the winter months. A small building of simple rustic character, its shape, roofline, windows, and doors, construction details are basic and functional. The date of original construction is unknown, but the cabin has been significantly altered with subsequent additions, but still is wood-frame with a pier and pad foundation sheathed in board and batten sidings with cedar shake roofing. It has a small porch with rough-hewn decking and an overhanging roof. Its central door is on the north side, though there is a tower for winter entry and two ladders for access during those months. A metal stovepipe with flashing and spark arrester penetrates the roof, while secondary buildings placed adjacent to the cabin include a roughly framed wooden lean-to with a metal roof, and a fiberglass portable toilet is located nearby.



Fuel transfer building and Cleetwood Cove parking area. *Jerry Watson.*

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**Other buildings.** Most other existing buildings along the road circuit date from 1998 and later. The oldest structure in this latter group is a fuel transfer building at the Cleetwood Cover Parking Area. In contrast to the Watchman Lookout, where stone masonry is structural, the fuel transfer building has a rock veneer over a concrete superstructure. Somewhat similar are the prefabricated concrete vault toilets in four places near Rim Drive (Watchman Overlook, Pumice Point Picnic Area, Whitebark Pine Picnic Area, and Vidae Falls Picnic Area). Each of these toilets are generally smaller than the fuel transfer building, but NPS crews used native stone to face them starting in 2000 in an attempt to mimic older masonry structures like the Watchman Lookout.

**Small-scale features** on Rim Drive include a variety of functional and aesthetic elements. This includes signage (such as wooden locational signs identifying places like Vidae Falls and the fiberglass interpretive panels), stone bases for the interpretive panels which are usually added to older masonry guardrail, fencing (like the wood peelers lining walkways at the Watchman Overlook or the more simple construction above the parking lot at the North Junction), in-kind replacements for picnic tables added in 1958 at five locations along Rim Drive, garbage cans at five picnic areas, and one stone drinking fountain located at Kerr Notch. Only one original sign and the drinking fountain represent original small-scale features on the road circuit, in that both date from 1938.

The importance of an original sign at Vidae Falls is symbolic, in that it is a manifestation of the great lengths Lange went to as a designer to provide variety in the signs so that each one placed by the CCC reflected the individuality of sites identified along Rim Drive. Most were gone by 1970, some being replaced by routed wood signs as early as 1955 that had bright yellow or crème colored lettering. Some of the latter remain at picnic areas or trailheads, but just like their rustic predecessors, the vast majority of the routed signs have also disappeared. There are thus several sign typologies on Rim Drive, ranging from more traditional wooden signs (Lange's plans even have been used to replicate original signs in several places like the Mount Scott Trailhead) to contemporary metal signs suspended with two square wooden posts instead of shorter logs with larger diameters. Metal traffic control devices (stop signs, etc.) are in place and generally conform to standards listed in the Manual of Uniform Traffic Control Devices. Most traffic signs have a sheer metal signboard covered with a heat applied vinyl overlay. Posts are either wood or steel.

Interpretive display panels, by contrast, date from 1958, but the original plastic panels were replaced beginning in 1966 with metal-photo plaques. A wayside exhibit



Section of parapet wall at Skell Head with the wayside exhibit mounted on a stone masonry base. *Jet Lowe, HAER.*

plan from 1984 prompted park staff to replace most of the metalphoto plaques with fiberglass panels in 1987-88. All of the panels were mounted on stone bases built to match the character and integrity of the original masonry guardrails and parapet walls. A few of the bases are free-standing, but some of the panels are mounted vertically by means of long steel posts.

At the Watchman Overlook, post and rail fencing with stone masonry piers as structural elements delineate the caldera's edge, reinforcing the curvilinear alignment of the viewing platform in an attempt to unite this designed site with the landscape. The fence evokes the post and peg construction style, but uses exposed threaded bolts as fastening devices. Piers used in conjunction with the fencing reference the historic stone masonry guardrails found to the southwest of the site, but there are differences in height, color variation, and how stone used in the piers is used as a veneer over concrete cores. Simple post and rail fencing is used above the North Junction parking area as a way to identify the caldera edge.

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Picnic tables placed in five areas along Rim Drive have concrete bases and supports, but the durable Port Orford-cedar is used on the tabletops and benches. The design is a standardized one dating from 1957 or so, but all the wooden components of the tables have since been replaced; most in 1997. In close proximity are metal garbage cans, usually painted brown, but all are from 1965 or later. Like other small-scale features along Rim Drive, they rarely interfere with the overall character of the road circuit, but lack a unified theme.

### Planting Concepts and Materials

Existing and introduced native vegetation from elsewhere in the park became integral components of Rim Drive's designed features. The design intent was to preserve as much as possible of the existing landscape in the road corridor, and to plant native trees and shrubs on denuded slopes. Where the BPR did not incorporate sections of the old Rim Road into the new alignment, these sections had their ends touching Rim Drive obliterated by laying sod and then planting trees and shrubs. Planting was also done to stabilize fills below the surface of Rim Drive, taking its cue from existing vegetation. At road margins planting could stabilize daylighted slopes and integrate them into the surrounding landscape. Planting beds and elliptically shaped islands were used in the seven parking overlooks in road segment 7-C to define and articulate space. These features reflected and accentuated naturally occurring vegetation, though the soil in some places tested at least 96 percent sterile, making the introduction of topsoil and other materials necessary for the success of plantings.



Old Rim Road in the foreground with Rim Drive at left. *Jet Lowe, HAER.*

Most of the planting done as part of “old road obliteration” consisted of small trees chosen to match the composition of surrounding forests. They were to provide screening from the view of motorists and pedestrians who might otherwise easily discern the old Rim Road’s alignment from Rim Drive. Most of this work occurred in four of the five road segments (7-B, 7-C, 7-D, and 7-E) and involved mountain hemlock, Shasta red fir, and whitebark pine, depending upon what was already thriving at the site that required screening. Most of the planted specimens are extant, and seven decades later are part of an indecipherable native forest holding segments of the old Rim Road. Much of the west Rim Drive (segment 7-A) was not planted, so the old road has remained visible, especially where the alignment occurred above the newer circuit. These visible sections were converted to a hiking trail in 1994, following something of a precedent set by the NPS in 1932 when it incorporated a short (0.3 mile) section of the old road into the Watchman Trail.

Fills and daylighted slopes were generally stabilized with trees planted (or in some cases seeded) to match the surrounding forests, though some remained exposed where the surrounding country was largely barren. This is the case near the Watchman Overlook in road segment 7-A, and the section of segment 7-C that is south of where the Cloudcap spur road intersects Rim Drive at a wye. In most other cases, however, the planting is naturalistic—in that lodgepole pine, mountain hemlock, or Shasta red fir stabilizes cut and fill slopes where ratios might vary from 1.5:1 to 4:1. Shrubs and even herbaceous cover was planted in certain places, most notably on the massive Vidae Creek fill in 1939, a structure which has since been covered mostly by hemlock and red fir trees resulting from natural seeding by the adjoining forest.

Planting beds in the group of parking overlooks vary in size, but exhibit a wider variety of plants than is the case in old road “obliteration” or where most fills and slopes have been stabilized with native trees. At stations 953-958 overlooking Grotto Cove, the bed is dominated by manzanita, whereas the bed at Skell Head has only some sedges and knotweed amid the far more dominant cover popcorn pumice. Trampling by visitors has denuded the small planting bed at Kerr Notch, yet some of the beds at Cloudcap, Victor View, and Reflection Point are really islands of pre-existing vegetation (trees, shrubs, sedges) that required relatively little additional planting. None of them retain their original edging of treated and partially buried logs with chamfered ends.

## CHAPTER THREE

# ANALYSIS AND EVALUATION

Approved by the National Register of Historic Places and the NPS in 1996, the multiple property documentation form, “Historic Park Landscapes in National and State Parks,” was written by historian Linda McClelland as part of a context statement for park design implemented between 1916 and 1942 (the time span McClelland showed to be the period of significance). It provides a national template for identifying, evaluating and nominating park landscapes and similar resources to the National Register of Historic Places. The form also supplies historic context for properties designed and built in national and state parks during the interwar period. By tracing several broad and interrelated themes in American history such as conservation, public recreation, and landscape architecture, McClelland described characteristics that make individual properties eligible for listing. The characteristics of historic park landscapes, as articulated in McClelland’s work, include: land use activities, patterns of spatial organization, responses to natural environments, cultural traditions, circulation networks, vegetation related to land use, structures and small-scale features, clusters, and archaeological sites. Rim Drive is eligible for listing on the National Register of Historic Places because it embodies all of the listed characteristics of naturalistic design practiced by the National Park Service. As a typology, each characteristic serves to reinforce the significance of Rim Drive and provides a way to demonstrate how the road’s integrity underpins a designed linear landscape.

**Land use activities.** The primary land use activity occurring along Rim Drive from 1916 to 1942 was that of tourism. Winter weather conditions, however, confined travel on Rim Drive to the period between July and October. Visitors in motorized vehicles used the road, whether to view the lake and its surroundings from a car, or to reach the park’s maintained trails that featured different views of Crater Lake. Land use since park establishment in 1902 has been planned and administered to enhance recreational tourism. Creation of the NPS in 1916 accelerated making the rim accessible to visitors as a means to enhance their sightseeing experience, though construction of the old Rim Road was well underway by that time. Several minor



Visitors at what later became known as “Victor View” prior to construction of the parking overlook, about 1936. *George Grant, CLNPMAC.*

physical changes have been made to Rim Drive (see site history section of this report), but the primary land use patterns and activities in the park reinforce vehicular and pedestrian access. Some areas along the rim are not, however, reached by road or trail though it is possible to walk cross-country across them due to the mostly open terrain.

**Patterns of spatial organization.** Park planners intended the circuit of Rim Drive around the lake to be the top rung in a traditional hierarchy of park roads. A portion of the circuit, the Munson Valley Road connecting Rim Village with Park Headquarters, also functions as an approach road, but the function of Rim Drive is to provide a sequence of changing views. Because it also serves this function, the spur road to Cloudcap can be considered part of the circuit. Spatial organization of Rim Drive has thus remained the same as during the period of significance. The slight adjustment within the circuit resulting from rehabilitation work at the Diamond Lake (North) Junction in 1985, has not significantly affected the integrity of the road, even if the work replaced the original wye with a “T” intersection--thereby turning west Rim Drive (Segment 7-A) into a through route to the park’s north entrance by way of route 8. This through route is the most heavily used part of the park’s road system during the summer season. Segments 7-B, 7-C, 7-D, and 7-E) account for

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most of the mileage on Rim Drive (over 23 miles), though slightly compromised by the addition of small access roads and sometimes paved loops to access picnic areas. These accretions are nevertheless in keeping with original design intent and are only six in number.

**Response to the natural environment.** The rim's topography has in large part determined the alignment of Rim Drive. Constraints imposed by the design requirements for curvilinear forms, minimal grades on the road and the goal of providing varied overlooks for motorists, resulted in an alignment the majority of which cannot be seen from virtually all of the eight observation stations and many of the substations. This is an overarching design achievement and thus an important part of the road's significance. The design of Rim Drive also exemplifies visual unity in its integration of the road into surrounding topography, especially given its location in a sub-alpine environment, which is characterized by open meadows, scattered conifer groves, steep slopes, and rock outcroppings and scree laden slopes. Despite the engineering challenges of the site, Rim Drive's alignment and designed features blend unusually well with its dramatic surroundings. This is due in part to the use of native stone for components like masonry guardrail, but also to the wearing course or pavement which is predominately grey in color to match dominant parts of the landscape like Llao Rock.

**Cultural traditions.** Like other units of the national park system developed during the interwar period, Crater Lake National Park, possesses a somewhat individualized form of rustic architecture and naturalistic landscape design in accordance with Albert Good's treatise, *Park and Recreation Structures*, issued by the NPS in 1938. In this publication, Good expresses ideas that derive from older notions of park design, principally those used in English estates during the eighteenth century that were adapted for use in the United States by landscape architects like Andrew Jackson Downing and Frederick Law Olmsted. This cultural tradition also emphasized adherence to traditional practices in building structures and designed landscape features. Contract specifications and construction methods reinforced the idea that human artifice had to be subordinated to the surrounding park environment, yet still provide an individualized response to each setting and its prevailing conditions. Aside from the subsequent site plans developed for construction at locations such as the Watchman Overlook and Cleetwood Cove, the characteristics described by Good remain quite evident along Rim Drive and still strongly influence how visitors perceive the road as foreground to the larger "presentation" of Crater Lake.

**Circulation networks.** Beginning in 1910, the Army Corps of Engineers planned the park's circulation system around a proposed circuit road, though Rim Drive (which was really aimed at reconstructing the original Rim Road) did not begin to assume its present form until 1931, and was not substantially completed until a decade later. Since then, Rim Drive has served vehicular circulation with only minimal changes. Rim Drive has three approach roads, though the original East Entrance is no longer connected to roads outside the park. These roads allow for two-way traffic around the rim during the summer season. Three fire roads or "truck trails" begin from Rim Drive, but in reality are service roads that can no longer be used by motor vehicles because they have been designated as trails. Most pedestrian circulation dates from the 1930s, in particular the trail system connected to Rim Drive. A slight modification was made to the trail system in 1994 when the Discovery Point Trail was linked with pieces of the old Rim Road and some additional sections of trail. Completed by volunteers, the latter forms a continuous footpath along the western portion of the rim.



Whitebark pine ready for special planting at Cloudcap, 1935. *Lange, NARA, RG 79, SB*

**Vegetation.** The linear landscape of Rim Drive passes through two types of vegetation. One is the naturally occurring sub-alpine trees, shrubs, and ground cover plants (forbs and sedges). The other consists of native trees, shrubs, and ground cover plants that were planted or transplanted to "naturalize" areas disturbed by construction. The process of "naturalization" also involved obliterating the old road where it impinged on views of the new Rim Drive, screening facilities from the view

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of visitors, and controlling erosion by planting to stabilize fills and daylighted areas. Although the native vegetation provided a “palette” for planting associated with construction of Rim Drive, these efforts also required soil amendments to make the predominately sterile pumice soils suitable for growth of plantings. Amendments included peat and top soil from bogs in the park, as well as commercial fertilizers. This naturalistic planting provided a foundation for the largely unchanged appearance of road shoulders, bank slopes, fills, and some parking areas along Rim Drive. In almost all locations, the designers and construction crews (landscape architects and supervisors, contract crews, and CCC enrollees) succeeded in erasing any distinction between what could be perceived as “formal” planting design and the preexisting native vegetation. Such was the success of its integration that it is often impossible to differentiate between areas that were planted and the native vegetation.

**Structures and small-scale features.** The natural character of Crater Lake National Park inspired the development of a common design scheme (a phrase used in the broadest sense), for most of the masonry components of the park’s built environment and a similar use of masonry is evident in national, state, and even city parks located elsewhere on the west coast dating from that period. Nevertheless, what sets Crater Lake apart from other places is to the degree to which the park’s masonry features still largely dominate the experience of the park facilities and how well adapted the masonry is to each individual situation. Standard approaches to park design existed in the 1930s, but the rustic stone medium allowed for variation in its use and this was even encouraged. Talented landscape architects like Francis Lange could thus predicate site designs on the distinct “genius loci” of each place, though Lange also took care to provide visual unity throughout the park. No undertaking the size of Rim Drive can be perfect, yet the road’s most distinctive qualities and character demonstrate a remarkable degree of success throughout its length and in its detailed treatment, a success that owes much to Lange’s influence.

In 1926, BPR issued specifications for Type 2 guardrail and various masonry features with illustrated sheets. The hierarchical design approval process in both bureaus that led to contract provisions that ensured a certain amount of uniformity. This marriage of function and aesthetics in the design and construction of these sorts of masonry facilities is unusual because of its scale (there are roughly seven miles of masonry guardrail on Rim Drive, for example) and the way it is permitted individual flair in construction is evident in even small architectural or landscape details. Lange had less to say about the largest structures, those of entire road segments, which were planned and designed by BPR engineers. He and other NPS landscape architects could revise contract specifications to serve better the ideal of



This parking overlook (later called “Victor View”) as it appeared when complete in 1938. Note the small amount of fill at left. *Lange, CLNPMAC.*

designing with nature, and supplied drawings to show how a fill (like the one below Vidae Falls) or parking overlook should appear. NPS engineers like William Robertson were able to exert more direct control over day labor projects such as trail construction, while Lange furnished the drawings for signs, though these undertakings can be seen as ancillary to the main project of building Rim Drive.

The road and its associated features are not free from flaws, but the only significant ones that can be traced back to its design and construction consist of inadequate provision for masonry guardrail and pedestrian circulation at sites like the Watchman Overlook and Merriam Point in segment 7-A. Less significant was the failure to fully provide safety barriers along the roadway near the rim in segment 7-B, lack of a designed trailhead for Mount Scott in segment 7-C, failure to implement a site plan for parking and trail access to Sun Notch in segment 7-D, and allowing a confused transition between parking and the trailhead at the Castle Crest Wildflower Garden in segment 7-E.

**Clusters.** McClelland’s multiple property documentation makes a case for widening the scope of cluster arrangements beyond what are generally known as “developed areas” like model villages or facilities at administrative sites. She saw scenic overlooks (especially those where roads like Rim Drive meet parking areas that feature masonry guardrail, sidewalks, curbing, and signs) as well as other facilities such as trail-side museums (especially ones where there is a parapet or terrace) as cluster



Road wye at the start of Rim Drive, looking east toward Rim Village, 1935. *Lange, NARA, RG 79, SB.*

arrangements. Rim Drive's observation stations and substations, particularly those built from Lange's site plans, are examples of the former and the Watchman Lookout exemplifies the latter type of cluster. Some clusters no longer exist, like the one at Diamond Lake (North) Junction where demolition of the buildings in 1959 was followed by removal of small-scale features like the buried logs (most had rotted) used for delineation and the rustic wood signage. Two subsequent clusters such as the Watchman Overlook and Cleetwood Cove were imposed on Rim Drive, with little regard for visual unity with the rest of the circuit.

**Archaeological sites.** One of the most remarkable aspects of Rim Drive is how closely it mimics and provides reminders (at least in the physical sense) of this cultural landscape seen from the perspective of park-associated Indian tribes. The most clearly identifiable archaeological resources in this regard are the rock stacks associated with ritual use of the landscape. It is true, as McClelland asserts, that such sites are likely to remain intact within the more remote parts of a park, but past and present use of the rim for religious reasons often involves piling rocks at prominent places located away from on-going use associated with recreational or scenic tourism. Rim Drive provides access to traditionally used religious places, though its construction undoubtedly disturbed what tribal members continue to perceive as a larger sacred site—the rim of Crater Lake.

Several types of historic archeological sites are associated with the design and construction of Rim Drive. Those incorporated into plans and design of the road were the screening, removal, or in some cases re-contouring of construction camps. Removal of a large camp below Devil's Backbone (in 1936) is a good example of "naturalization" during the post-construction phase. Development of the Skell Head observation station was largely restoration, since it came after fill had been extracted from the site during the grading phase of building segment 7-B on Rim Drive.

More subtle archaeological signatures include screening done through the use of "banksloping" that hides a roadside borrow pit in segment 7-D and the obliteration of "tote" roads to quarries like the one located south of the Dutton Ridge road summit. Other sites associated with the construction of Rim Drive remained out of public view and were thus somewhat undisturbed. These include a construction camp near Vidae Creek below the falls in segment 7-E, and the site of a camp and rock crushing equipment at the Roundtop Quarry in segment 7-B. Other types of archaeological sites include those created by attempts to hide ends of the old Rim Road, especially where the new alignment departed from the old alignment. The planting used to hide these segments makes the old road virtually invisible to motorists on Rim Drive, but visitors on foot may find the occasional can dump or an oiled surface that was a piece of the old road. Several sections of the old road can be easily hiked, and one of these is maintained as part of the contemporary trail system above the west Rim Drive. Subtle visual evidence of other sections of the old Rim Road still exists.

### *Statement of Significance*

Rim Drive and the associated landscape features that were designed and built between 1931 and 1941 are significant as a historic designed landscape under National Register Criterion A: for its association with events that made significant contributions to the broad patterns of American history; and under Criterion C: for the distinctive characteristics of a type, period, or method of construction.

**Criterion A:** Rim Drive is a central part of efforts by the NPS and BPR to develop and manage one of the oldest national parks in the United States. Existing topography and designed elements (such as the road, its envelope, masonry features, drainage structures, plantings, and connecting trails) contribute to the naturalistic character of the district. Enough components of the designed landscape survive to demonstrate the ideas behind planning, design, and construction of park circuit roads during the 1930s. The goal of these ideas was visual unity with the park set-

## ANALYSIS AND EVALUATION

ting through use of rustic architecture and naturalistic planting so that increasing visitor use could harmonize with its sub-alpine environment. Construction of Rim Drive as overseen by the NPS and BPR represents a Depression-era work relief project like others that produced major improvements to infrastructure in national parks and other areas.

**Criterion C:** The designed linear landscape of Rim Drive has statewide significance as an expression of design with nature that was adapted to individual national parks by the NPS during the period of 1916 to 1942. This “style” (actually a long-held tradition in developing park landscapes for visitor use) influenced state parks throughout the country and recreational sites on the national forests in the Pacific Northwest. In western national parks like Crater Lake, structural forms were designed to fit local needs or conditions, but were also sited to blend with their setting by incorporating native shapes and textures, most conspicuously in masonry features. Principal features of the Rim Drive designed landscape are its alignment and the visual unity provided by designed components built from the historic period. These are sited against a rugged backdrop, and are so carefully constructed that Rim Drive seems to barely disturb the rim of Crater Lake. The resulting “picture” was enhanced by the judicious use of native soil and plant materials that contribute to the road’s highly naturalistic appearance.

*The integrity of Rim Drive as a historic designed landscape is best defined by:*

**Location:** Rim Drive and its associated landscape features (cuts, fills, slope treatments, drainage structures, planted vegetation, trails, and detail elements like retaining walls, guardrail, steps, and walkways all remain in their original location.

**Design:** The original spatial organization for this road corridor, including land use activities, remains intact. Between the two terminal points Rim Village and Park Headquarters there is a hierarchical arrangements of overlooks (observation stations, substations, parking areas) that are expressed as nodes along the road’s curvilinear alignment. These were intended to enhance the functional and aesthetic experience of making a circuit around Crater Lake. Within the corridor, there are two non-contributing nodes, the Watchman Overlook and the Diamond Lake (North) Junction, where non-historic site designs interfere with the visual unity of Rim Drive. One accretion, the Cleetwood Cove parking area, is also a non-contributing feature because contemporary circulation and site design are currently at odds with original design intent and historic precepts governing design with nature. Although compromised to a lesser extent, the original planting scheme is still evident, even though

many historic plant materials have been lost due to natural processes or the lack of maintenance.

**Setting:** Other than some clear cuts visible beyond the park's western boundary it is virtually impossible to detect changes in the vistas seen from Rim Drive. Nor have views of the more proximate park landscape seen from the road changed perceptibly, so that the lake and surrounding peaks seem almost to have been frozen in time. There are several non-contributing sites along Rim Drive and some small accretions like picnic areas and vault toilets, but none of these facilities significantly disrupt the "presentation" of nature along the circuit.

**Materials:** In any assessment of integrity, it is necessary to define what terms mean. In the case of Rim Drive, materials related to stone masonry features like retaining walls and guardrail (see the inventory by Watson in Appendix 1) are classed as contributing (the feature almost wholly retains its historic appearance and contributes to the period of significance), compatible (the individual feature or features may have changed since the period of significance, but it retains an overall appearance that is compatible with historic elements of the period of significance), or non-contributing (the feature has lost any association with the period of significance even if some historic materials are present).

There are extant plant materials compatible with historic design intent, though the rather severe climatic conditions have reduced the number of species remaining. Some original plantings survive intact, mostly in the form of transplanted trees (whitebark pine, mountain hemlock), shrubs (manzanita, Pacific red elder, mountain ash), and sedges as ground cover. Sites such as Skell Head have proved to be so sterile or windswept that getting any plants to survive apart from sedges is difficult. Other places, such as the Vidae Falls fill, display a smaller range of plantings than intended because the natural process of seeding of trees from surrounding forest won out over the transplanted shrubs and forbs. The historic road structure of Rim Drive remains virtually intact, with only minute changes (such as the imperfectly executed widening on segment 7-A) evident to a discerning eye. More obvious from the standpoint of divergence from traditional materials is the wooden fencing at the Watchman Overlook and above the North Junction. These contrast so markedly from the masonry guardrail used everywhere else that they constitute a visual intrusion into the landscape. All masonry, whether original or of more modern vintage, utilizes the same native rock and mortar combination. Execution of stone masonry construction varies, though a basis for comparison is often present in the original work, especially where it has remained undisturbed.

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**Workmanship:** Rim Drive and its associated features are a superlative expression of how to use naturalistic design for the purpose of a circulation system. Construction took more than a decade and involved numerous contractors, subcontractors, and day laborers, yet virtually all parts of the project possess an overall cohesion. In almost all cases, it embodies a craft tradition frequently evident in naturalistic design during the interwar period. While this document places much emphasis on stone masonry, other types of workmanship should be evident from the original construction: finish grading, banksloping, paving (ditch sections and walkways), and screening old road sections are examples.



After development of a parking area above Steel Bay, 1936. Note the large bankslope at middle left. *Lange, NARA, RG 79, SB.*

**Character:** The historic district evokes an earlier time when great thought went into the design and development of a linear landscape that is integrated into the surrounding environment. Rim Drive's materials and structures present nature in a dignified, yet varied, way to national park visitors. This linear expression of naturalistic design succeeds in providing a foreground that is so well integrated into the landscape as to be almost unnoticed, focusing attention not on itself, but on the beauty so plainly evident within this volcanic setting.



Parking area above Steel Bay in 1934 before landscape treatment. *Lange, CLNPMAC.*

**Association:** Rim Drive continues to function as it did historically, with the circuit road open to vehicle traffic during the summer months and left to skiers during the winter. The historic district continues to reflect its associations with highway design of the 1930s through Rim Drive's vertical and horizontal alignment, curvature, grade, material features, pedestrian circulation system (trails and walkways), and spatial organization.



Finishing crew on slopes and ditches, segment 7-C, 1936. *Struble, BPR-FHWA.*

## CHAPTER FOUR

# PRESERVATION GUIDELINES

Although nominations to the National Register of Historic Places identify contributing features, this is different from “character-defining” features for the purposes of Section 106 consultation. Contributing features on the National Register nomination for the Rim Drive Historic District are, for the most part, an envelope holding interrelated components in the form of an entire road segment or trail that is an engineered structure. Similarly, a designed site such as a parking overlook also holds a variety of interrelated components aimed at visitors using a stopping place on Rim Drive. Each of these “envelopes” holds a number of “character-defining” features, each of which may be significant enough to where their removal or alteration might contribute to an “effect” on a historic property, where its ability to tell a story (or “integrity”) could be compromised without guidelines in place for preserving Rim Drive. The guidelines are aimed at components of contributing resources so as to preserve their integrity in the face of possible rehabilitation and continued maintenance. While some site-specific examples are used in this chapter, the aim is not to discuss a specific planting bed or section of masonry guardrail, but to identify patterns and provide general guidance for preserving the historic fabric of Rim Drive. The guidelines are intended to not only serve as guidelines for Section 106 consultation, but also as an instrument with which to inform future maintenance and funding priorities.

### *Major Features*

**Road Alignment.** Rim Drive is distinctive because the bulk of it is not visible from any single viewpoint along its length. The road’s thoughtful alignment to the landscape through which it passes is thus its most distinctive quality. Being carefully chosen, the alignment only minimally interferes with what John C. Merriam called the “primitive picture.” The engineers who designed Rim Drive responded to highway standards of the period and did not anticipate the width and size of modern recreational vehicles.



The Palisades as seen from Skell Head, about 1940. A portion of Rim Drive is visible below and to the left of Mount Thielsen. *National Park Service.*

However, relatively few of Crater Lake National Park's visitors use recreational vehicles, so there seems to be no need to make special accommodation for them. This is fortunate because, to accommodate contemporary recreational vehicles and buses, would require enormous realignment and expense resulting in the almost complete destruction of the historic fabric in the Rim Drive corridor.

*Realignment* refers to changing the horizontal or vertical alignment of Rim Drive. The term is used when there is a proposed shift in the road's location; i.e. alignment of a portion of the existing corridor. Realignment may be as simple as a shift in the travel lanes to reduce the sharpness of a curve, or as complex as constructing several miles of new road and abandoning the original alignment. Given the caldera's precipitous topography and frequent viewpoints along its rim, it is impossible to make alignment changes to accommodate large recreational vehicles without there being a dramatic impact on the natural and cultural landscape. Nor does it seem possible to improve upon how the existing alignment sequentially reveals the spectacular landscape through which it passes. Rim Drive serves as a modern scenic highway with a relatively low design speed. None of its grades or curves appear problematic enough to warrant a realignment project because visitation to the park (and it is essentially impossible to visit the park without driving along a portion of Rim Drive) has re-

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mained relatively steady at about 500,000 visitors per year since 1978. It should be further noted that tribal consultants who took part in the park's traditional use study strongly objected to further disturbance from road construction on the rim of Crater Lake, given its continuing importance to them for ritual purposes.

Rim Drive's paved width varies from 18 to 24 feet and the posted speed of 35 miles per hour allows opposing traffic to pass safely. One-way circulation along the Rim Drive was tried when park visitation was at its highest in the early 1970s, but this failed to relieve congestion at viewpoints along the western rim. Complaints persisted throughout the time of the one-way system because it substantially increased the distances that visitors had to travel. Planners also observed increases in average vehicle speeds well beyond posted limits, which compromised visitor safety and suggested that visitors actually saw less of Crater Lake than they did when Rim Drive was a slower, two-way road. Some park staff members have floated proposals for a short seasonal closure of the road to better accommodate bicyclists, though the length of any such closure remains undetermined.

**Curvature and grade.** Rim Drive's horizontal alignment and vertical grading (its three-dimensional design), are carefully related to and conversely constricted by the specific topographic conditions encountered around the rim of Crater Lake. Designed to fit the land with minimal disturbance to its surface, the road still provides access to segments and points along the rim. A curvilinear form on the horizontal plane is a way of minimizing steep or difficult grades and sharp turns, as was the road's vertical profile. (The Sun Creek Campground road presents the greatest challenges for large vehicles in this regard). Any changes to the curvilinear alignment or vertical grading of Rim Drive would affect its most critical design components and compromise the carefully designed sequential experience of the circuit. Restrictions on speed of travel, as well as type and condition of vehicles permitted on the road could well address future concerns about safety. No changes to the alignment or grading of Rim Drive should be permitted, except in response to natural changes such as landslides and rock falls. The areas most prone to rock fall have been the cut slopes on the Watchman grade, below Anderson Point, Dutton Cliff, and Sun Grade but there are few alternatives to any of these, aside from maintenance of the existing alignment. In modifying roads to accommodate larger vehicles or more traffic, the alignment's actual form is often considered by some to be less significant than physical features such as bridges and walls; this is emphatically not the case in Rim Drive. The curvilinear design of Rim Drive literally shapes visitor experience and is thus the most significant and integral part of its historic character and integrity.



A section of the west Rim Drive as seen from the Watchman, 1999. *Jet Lowe, HAER.*

**Sight distance.** Characterized by continuous curvilinear shapes, Rim Drive makes minimal use of straight-line tangents (there are only three tangents of any discernible length) and long segments of large radius curves. Sight distances are good due to the relatively open country through which the road passes and the long, gentle curves that are typical of the road's horizontal alignment. Given such conditions, there is little need to replace the one remaining road wye intersection with a "T" intersection at the junction with the Cloudcap spur road, where average daily traffic volumes are among the lowest in the park. The only place on Rim Drive where sight distances are a concern is the Diamond Lake Overlook, especially where northbound motorists attempt to turn into it across the oncoming traffic lane. The need to accommodate overtaking vehicles is slight on Rim Drive, as this is primarily a scenic experience and is negligible if motorists adhere to the posted speed. A long-standing sight distance problem at the old Crater Peak trailhead (where cars were parked in the roadway) was resolved in 2001 by moving it to the Vidae Falls picnic area. A similar solution may be desirable at Park Headquarters, where pedestrians cross the Munson Valley Road to reach a spur trail to the Castle Crest Wildflower Garden at the intersection entrance to Park Headquarters. Moving the pedestrian crossing uphill away from the intersection, in accordance with a plan drawn in 1936, would

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allow pedestrians and vehicles to obtain greater sight distance for a safer crossing, though this consideration may be offset by the possibility that downhill traffic may not have slowed sufficiently at this point to make it safer.

**Width.** Rim Drive's pavement width varies along its length but generally corresponds to traffic volumes. However, previous widening of west Rim Drive simply extended the paved surface to include some ditches. In some localities this project resulted in new problems such as cracked pavement and an undermined sub-base. There are few long-term solutions to these problems short of expensive reconstruction involving considerable fill. Such widening also alters drainage processes and structures and destroyed a portion of the original paved ditches in 1985 when a part of segment 7-B was widened in conjunction with reconstructing the North Entrance Road and Diamond Lake Junction. Such widening results in the loss of historic fabric and erosion of the integrity of the historic character with few functional benefits as current traffic volumes do not appear to warrant road widening. For these reasons, there should be no additional widening of Rim Drive.



NEW SIGHTSEEING THRILLS await you on the rim road around mile-high Crater Lake, a deep-blue body of water cupped in an extinct volcano. This beauty spot, the center of a National Park, is in the Cascade Mountains of South-Central Oregon.

Newspaper advertisement placed by the Oregon State Highway Commission in 1949. This section of road is 20 feet wide near Anderson Point. *Oregon Department of Transportation Archives.*

**Circulation.** Historic circulation features within the designed landscape, can occur as individual elements or as larger systems or networks. The roadway, trails, and promontory walkways are examples of different types of historic circulation systems. Routine maintenance of individual elements and entire systems or networks is essential to ensure their preservation and functionality. When changes to Rim Drive occur so that a specific feature or portion of a system no longer actively supports vehicular or pedestrian circulation, these components should be retained, but modifications which address contemporary circulation needs like vehicular speed limits, sight lines, and maintenance procedures (e.g. snowplowing) can be made. Consideration of such needs is essential for safety of users, and care to retain the historic character of circulation features important to the property's significance can be addressed. Alignment, surface treatment, width, edge, grade, materials and infrastructure are all essential attributes defining the character of circulation systems. Repairs and necessary replacement should respect their historic attributes.

**Plantings.** The planting beds that separate Rim Drive from the parking overlooks are essential to the road's integrity and should be retained. Plants within each bed need evaluation and assessment in order to determine their physical condition and appropriateness to site conditions. Site-specific plans for replacing or rejuvenating plants need to be developed as necessary. Where beds have lost plants due to visitor impacts, such as at Kerr Notch, or because of severe weather conditions, as at Skell Head, plant replacement should proceed based on individualized plans that follow historic design principles and respect each site's ecological imperatives. Historic design principles included the use of native plants (often transplanted), simple massing, and clear gradations of canopy, understory, and ground cover plants.

The site history section of this report provides many examples of using plants to cover and hide disturbed areas during the construction of Rim Drive. Although it can be labor intensive, planting is a far cheaper method of concealing disturbance than re-contouring old roads with the use of heavy equipment. The long-term success of plants may depend on whether heavy equipment used during the grading phase of construction avoided compacting the park's typically near-sterile soils. During planting, soil nutrients will likely be required in the form of forest duff, soil amendments, or even boughs placed in shallow trenches on daylighted slopes. In addition to concealing remnants of the old Rim Road and implementing naturalistic design in the corridor of Rim Drive, planting (usually trees) occurred to stabilize fill slopes. This did not take place where Rim Drive crossed pumice fields, like the slope below the Watchman Overlook, as well as the section of road between Cloudcap and Mount Scott.



Team and hand labor method of grubbing road segment 7-B, 1933. *Sargent, BPR-FHWA.*

**Slope Treatments.** These are graded cut or fill slopes between the road surface and the adjacent undisturbed ground disturbance. Designed to ensure Rim Drive’s stability, they also provide safety for road users, and minimize maintenance costs. Slope angles (or steepness) and height are historically significant components of the view corridor and experience, so these should be protected. Side slopes are frequently steeper than preexisting slopes and are thus susceptible to erosion. Treatments to minimize erosion include the use of standard slope ratios to reduce rock falls and raveling, but also aid sight distance around curves. Where cut slopes are laid back at a suitable angle on one side of the roadway, warping on the opposite side is a complementary means of obtaining transition between the road corridor and surrounding landscape. Warping at the foot of Applegate Peak, on the east Rim Drive in segment 7-E, is an excellent example of how to execute this treatment.

Constructing bank slopes is expensive, but they may be effective at removing informal parking areas or stabilizing blowing pumice. A dramatic example of this treatment occurs overlooking Steel Bay in segment 7-B. Slope rounding is another less expensive way to transition from road to surrounding landscape and can be seen along Rim Drive where through cuts are shallow in relation to shoulders. For example, a rounded bank slope was used to separate the Sun Creek campground road from Rim Drive.

Another example of slope treatment is piling slash along the toes of potentially eroding fill slopes, particularly those near runoff channels to trap sediment. When done concurrently with road maintenance, these rows of slash effectively control sediment movement while providing an economical way of disposing of roadway slash. Other, more general guidelines include minimizing earthmoving activities when soils are excessively wet, and confining disturbances to roadside vegetation to only what is necessary to maintain slope stability and to serve traffic needs. In addition, no woody debris should be incorporated in the fill portion of the road prism. Wherever possible, existing rooted trees and shrubs at the toe of the slope should be left to increase their stability. Avoid cutting into the toes of slopes when grading roads, pulling ditches, or plowing snow. The grading of road shoulders and informal pull-outs should occur only as necessary insofar as to maintain stable running surfaces and adequate surface drainage.

**Barriers.** Lange and other landscape architects used boulders on Rim Drive to discourage parking on road shoulders and to define vehicle spaces in several substations and parking areas. Large rocks were first used for parking and site definition in the 1930s and have helped to reduce the impact of informal parking on vegetation adjacent to Rim Drive. However, the use of boulders has proliferated in some places due to increased visitation and vehicular usage and this has led to some degradation of these sites.

In most cases, boulders were placed between logs to break up their lines rather than being used alone, similar to what merlons achieve as part of masonry guardrail. During the 1960s, lines of boulders were used as barriers or for spatial delineation, such as at Cleetwood Cove trailhead. This practice should be discouraged in favor of the log and boulder treatment Lange indicated on his site plans; adding new boulders as barriers along Rim Drive is thus not recommended. Concrete “Jersey barriers” convey an entirely inappropriate impression that is inimical to Rim Drive’s integrity. They should never be seen on Rim Drive. Similarly, galvanized steel guardrails should not be used on Rim Drive, nor the core-ten type steel barriers (which turn brown when they oxidize) be employed.

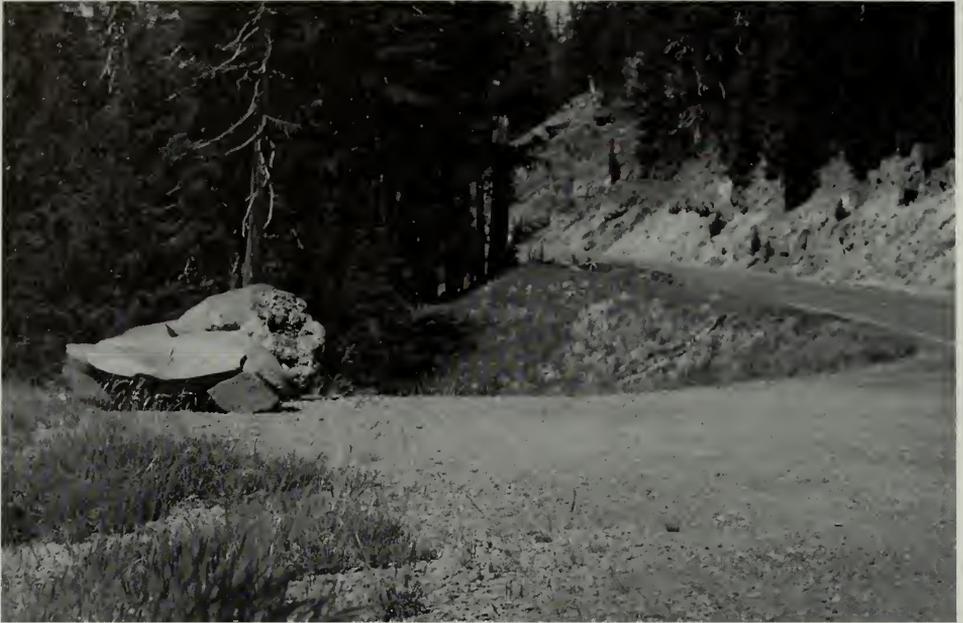
One of the most challenging problems that highway codes or standards pose for historic preservation at Crater Lake is the specified height of 42 inches for pedestrian barriers. This standard was applied in two building rehabilitation projects, the parapet at the Sinnott Memorial and a catwalk surrounding the Watchman Lookout, where barriers were raised a foot from the original height of 30 inches. This was done even though neither project represented a change in use (i.e., the so-called

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“code trigger,” where standards for new construction might apply). A workable design solution as achieved at the Sinnott Memorial where a metal rail conforms to the parapet, but functional problems resulted at the Watchman Lookout, where 42-inch high cable strands interfere with use of the fire finder. No attempt has yet been made to impose the 42 inch height standard on masonry guardrails along Rim Drive, though a wooden fence above the North Junction was partially justified by its greater height and less expense than a masonry guardrail. The fence is not only out of character but snow loads routinely break cross members. Snow loads have also greatly weakened the log peelers at the Watchman Overlook. Whether the higher barrier is any more effective as a safety measure than the masonry guardrail or parapet at 30 inches high is debatable, especially since there is little evidence to suggest that lower height has contributed to any visitor injury or fatality. The effectiveness of higher barriers is a subject that appears to be still in dispute among traffic engineers and safety experts.

Conformity with new highway standards is a topic that comes up during planning for rehabilitation of park roads. Several factors should be considered during discussions of standards for barriers like masonry guardrails: average daily and peak traffic volumes accident records, existing controls like posted speed limits and how these match road design speeds. These considerations may counter arguments in favor of imposing treatments like metal guardrails or Jersey barriers on Rim Drive. The use of partially buried logs in new projects is also worth considering, in light of their use in historic designs and the fact that very few accidents occur on Rim Drive. Historically, some logs had a life of 30 years, though logs currently on the market are younger and possess less strength and are likely to have shorter life spans. The U.S. Forest Service might supply culls or fallen logs from storms that would have qualities similar to ones available in the 1930s. A nearby source like the Prospect Ranger District should be investigated as a source for Douglas fir, for logs to separate plant beds from pavements or for parking delineation with boulders. The latter appears on many site plans from Francis G. Lange and was used in formerly extant sections of Rim Drive such as the road wye at the North (or Diamond Lake) Junction.

**Informal parking.** Motorists should be confined to existing surfaced areas, though there are several unsurfaced trailheads and the Dutton Ridge road summit where paving or better techniques for vehicle parking delineation is needed. It is possible to largely eliminate informal parking on level areas adjacent to the roadway by installing planted bank slopes. Fill material would thus have to be brought on site and re-graded. Informal pullouts created by visitors searching for better views or as alternatives to existing parking sites have caused shoulder erosion problems in some



A flattened cut on the west Rim Drive used to collect rockfall and occasionally by visitors for parking. *Jerry Watson.*

high use areas, especially near Cleetwood Cove, which is routinely full on summer days when boat tours operate. Vehicles spill onto adjacent road shoulders and impact vegetation, disrupting the intended sequencing of landscape views.

Many locations along the entire length of Rim Drive have been repeatedly used for informal or overflow parking. They total 75 and these informal pullouts are especially evident in road segments 7-A and 7-B. The vast majority of them are redundant, filling the same needs as the existing formalized sites. Informal pullouts are effectively blocked with large boulders (usually from the annual road opening) along the road's shoulder, but they also detract from the character of Rim Drive. Parking management with boulders should only be permitted as a temporary solution. One of the appendices contains an analysis and comprehensive review of all informal pullouts on Rim Drive. Eleven of the pullouts ought to be upgraded to the condition of formalized sites to define them and reduce roadside erosion. Additional large-scale shoulder paving, however, should not be done. The other informal pullouts could be scarified, planted with native flora, and then fenced until the vegetation is established in order to obliterate them. Those revegetated should be filled with a 50-50 mix of gravel and soil, compacted, and re-seeded with native plants during the right season.

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**Buildings.** Despite being relatively few in number on Rim Drive, buildings can be very noticeable intrusions. They can add diversity and a pleasing scale to the enormity of these surroundings. Buildings should not be all of the same design but can reflect the same architectural philosophy. Stone detailing, proportion, texture, and color all help integrate built structures into the landscape.

Construction of new buildings along Rim Drive should only occur when absolutely necessary and when no feasible alternatives exist. New buildings must be carefully sited to fit with topographic features and should be designed to reduce their physical and visual footprint. Any new structure should only be built after careful study and a thorough site survey, with attention paid to size and form of proposed structures. Plants could be used to reduce the building's obtrusiveness by partially screening them and aiding the visual and physical transition between ground surfaces and structures. Of great concern are proposed buildings at the Cleetwood Cove parking area, where an inharmonious fuel transfer structure was constructed in 1998 without an adequate site plan, and structures on skids remain.

Similarly, vault toilets faced with native stone were placed at four sites along Rim Drive in 2001. Even though base topography surveys are available, they were installed without a site plan. More sensitive siting might have been possible which could have greatly reduced their obtrusiveness on Rim Drive without any loss of functional convenience. Although they provide for a legitimate visitor need, their integration with the surroundings is minimal. As an example, the one at Watchman Overlook could have been built into a nearby slope and is not handicapped accessible. Elsewhere, toilets at Pumice Point and Vidae Falls are in such heavy shade that bacterial action on their solid waste cannot function as intended. No additional vaults should be added along or near Rim Drive unless site plans are formulated and then approved in reference to this report. Toilets should not be placed near observation stations or substations, nor should any be permitted without site planning and a design that considers visitor circulation patterns, the distance to existing facilities, and impact on the historic scene.

As a general rule, wood framing in extant or proposed buildings should be dark colored (in most cases, the traditional chocolate brown is preferred), whereas light colors, particularly grey or white, may call undue attention to them. This is especially true when buildings are sited at high points or alone against the horizon, something which should be discouraged by careful site planning.

When existing buildings require preservation, rehabilitation, or restoration, historic fabric should be retained if possible. Any structural repairs have to be compatible with the original work and materials, but also documented in sufficient detail to inform future maintenance. A cultural cyclic maintenance program should be established for the Watchman Lookout, as the NPS has for other historic buildings in the park. If buildings are of minimal significance (such as the Wineglass cabin), or do not merit preservation because of advanced deterioration or poor design, they can be removed.



Building the retaining wall and guardrail at Scott Bluffs, 1934. *Doerner, NARA, RG 79, SB.*

**Stone structures.** Stonework along Rim Drive exhibits many of the classic elements of 1930s scenic road design, including the use of a palette of natural materials for curbing and stone guardrail, as well as the blending of stone masonry into the surroundings. Stonework was central to naturalistic landscape design on Rim Drive and was a major compositional element that, according to Albert Good, “unites and harmonizes manmade elements with a park’s natural setting.” Stone guardrails, retaining and parapet walls and curbing are important features in defining the historic character of Rim Drive and should be preserved in all historic structures. Indeed, the original materials themselves possess an authentic and intrinsic historical value. Stone masonry creates a consistent design theme within the park and the relationship of stone features to their surrounding environments is extremely important in maintaining visual scale and character.

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To preserve the stone masonry, all structures should be properly maintained so they can serve contemporary needs. Regular inspections and immediate corrective actions may forestall costly major repairs and replacement. If material deterioration or damage precludes repair, stone features should be replaced with like materials and construction methods should match the original in forms and details to be contributing or compatible with the original work.

An assessment of stone features and structures on Rim Drive was based on two criteria: historic integrity and structural stability. Historic integrity included assessment of type of stone; use of merlons; shape, color, size of stones and jointing all of which reflected work contributing to the historic period of significance. Structural stability included an assessment of the degree of undermining cracking, leaning, and popping of stone from their mortar.

Whether they are masonry guardrail, retaining walls, culvert head walls, curbing, or even spillways, there are distinct mortar characteristics; some joints are deeply raked with recessed mortar, creating strong shadow lines, some have mortar flush with a stone surface, and others have beads that project beyond the stone face. In addition to mortar style, distinctive stone color and finish features contribute to the overall historic character of Rim Drive. Masonry rock walls were intended to be a safety barrier as well as a unifying feature framing the foreground for views extending to the horizon. To soften the appearance of walls and integrate them with the landscape, the stone face was battered. The use of rock with uneven coloring and facing is an essential part of design intent.

Stone masonry features built during the period of significance can be divided into the following groups:

**Masonry guardrails** are defined as having a height of three feet or less, as measured from the highest point. They can define one road margin, served as a protective device on steep slopes, and provided definition and organization to Rim Drive's vehicular (and sometimes pedestrian) circulation and planting schemes. The historic guardrail is "type 2," from the standardized plan of 1926 that shows battered native stone mortared to form an even line 30 inches from grade, but the line is broken regularly with merlons which are some six inches higher. In contrast to retaining walls, the guardrail appears largely above grade and has a characteristically varied appearance, but with mortar joints raked back so as to show the predominance of native stone.

**Retaining walls** are defined as walls greater than four feet in height and hold masses of earth or stone in place at the edge of terraces or excavations. They can be dry laid or mortared, but the latter dominates along Rim Drive. By their nature, retaining walls are essential to the structural stability of the road bed while contributing to the historic significance and visual character of Rim Drive. Some of the masonry walls are very large features whose purpose is to stabilize steep cut slopes, measuring up to roughly 60 feet in height. They usually have curvilinear faces, with courses vertically placed to support the slope. Dry laid walls are rarely more than 20 feet high, but usually slope to reduce slippage between courses.

**Culvert headwalls** are smaller features than guardrail or retaining walls, being generally placed on the upstream side of cross drainage. They are intended to prevent undermining of the road base by presenting an impermeable surface, yet direct water through the culvert. Many of them possess a similar character to the best masonry guardrail or retaining wall, in that the native rock (andesite) exhibits different colors, is of a certain size, and has relatively small joints in proportion to the stone. In only a couple of instances do the headwalls appear on both sides of a culvert, though this only occurs where the downhill side of the culvert is visible from a trail or stopping place.

**Curbing** is defined as four-foot sections of cut stone, nine inches above grade, and a minimum of four inches wide. It is cut from native andesite with colors and textures selected to match masonry guardrail, retaining walls, and some culvert headwalls. Curbs are battered in a way most compatible to adjacent masonry guardrail at the parking overlooks in road segment 7-C, or other parking areas like Vidae Falls. Other examples of curbing can be found in Rim Village and Park Headquarters, where they are used to separate pedestrian walkways from vehicular circulation features such as roads and parking.

**Spillways** are found in conjunction with culvert headwalls, where perpetual streams are tunneled into Rim Drive's cross drainage in road segments 7-D and 7-E. Instead of battered stone, spillways generally utilize flagstone which is mortared and then lines the drainage either horizontally or vertically up to 45 feet in length. They are built to match their surroundings, so much so that most are virtually indistinguishable from a fully natural stream, at least to passing motorists.

Some park-wide preservation and maintenance guidelines for stone masonry and dry laid resources are in a separate booklet by Abby Glanville. Her work also includes an inventory and photo log.



Laying and shaping a gutter section. Note template in foreground. *Struble, BPR-FHWA.*

**Bituminous ditches and walkways.** Away from the road surface and most parking areas, those who built Rim Drive used asphalt as part of the systems constructed for cross drainage in road segments 7-B and 7-C. As paved ditches or “gutters,” bituminous features conveyed water at a relatively shallow depth to drop inlets faced by asphalt. As a way of protecting the road margins, the bituminous ditch did not exceed two inches in depth of asphalt on any side but extended distances of a quarter mile or more.

Walkways, by contrast, are a pedestrian circulation feature that spanned the distance between curbs and masonry guardrail, as part of site plans from Francis Lange. This feature supplies a wearing course over an earthen base at what Lange referred to as “parapets,” or elevated walkways at Grotto Cove, Skell Head, Cloudcap, Cottage Rocks, Victor View, Reflection Point, Kerr Notch, and Vidae Falls.

Any attempts to repair or restore these two types of features should be done with historically appropriate materials. In many (if not most) cases, this means cold as-

phalt instead of hot mix, with cues taken from historic photographs taken by the BPR engineers. For walkways there needs to be a surface treatment somewhat similar to chip sealing so that the intended gray color is produced. Care should be taken that individual fines are not so small as to defeat the purpose of the surface treatment. Where work is needed on concrete sidewalks (located at the Watchman Overlook, North Junction, and Cleetwood Cove parking area), these should be finished with rough, non-slip surfaces that do not show hair cracks.

*Strategies for Preserving Historic Design*

The fundamental principle that should guide all preservation and rehabilitation of Rim Drive's cultural features is to respect the character and integrity of the site. Management should thus aim to retain designed elements in the landscape, to avoid as much as possible changing, or replacing them, and to ensure that alterations or additions respect the original design intent. Effective project planning includes securing appropriate materials and using construction methods that add to the visitor experience and appropriately complement the park setting. Naturalistic design depends on a sensitive "reading of the landscape" to derive a fitting design solution using a palette of native materials. Historic design approaches, methods and materials can be successfully applied to current design problems, and where historic techniques varies from contemporary code standards and interpretations. The key to resolving legal entanglements is to clearly express agency intent (in this case preserving the integrity of a historic road) and meticulously documenting decisions made during the planning and construction of projects. Courts do not question projects that are consistently implemented in this way, nor do they hold the government liable when agency intent is clear and backed by documentation.

In regard to acquiring materials as part of preserving Rim Drive, general recommendations can be grouped into four categories. These are fill, stone, plants, and paving.

**Fill.** Hauling dirt is expensive. Now that Rim Drive is complete, the need for large-scale excavation is rare. When material is needed to build a bank slope or create a level grade for a structure, fill may have to be acquired from outside the park unless another earth-moving project is underway within the park. Imported fill should be free of exotic or non-native seed, and should match the park's volcanic soils in color and other characteristics.

**Stone.** The best material for guardrails and other masonry features is andesite from the Watchman flow. Rock fall from Dutton Ridge has generally made for inferior

## PRESERVATION GUIDELINES

structures, the stone being smaller and less diverse in color. There are few practicable substitutes for boulders from the Watchman flow, so consideration should be given to how additional material can be taken from this flow without causing adverse visual impacts associated with roadside removal. A crane-like hoist might allow removal of suitable andesite with minimal impact. Alternatively, excess boulders currently used as barriers elsewhere in the park could be used in guardrails or other structures if they are shaped and dressed.

**Plants.** Appropriate standards and techniques for collecting plant material for revegetation are similar to those for acquiring fill. Most desirable is salvaging plants when other projects or disturbances create opportunities. Growing plants from seed can provide new stock fully adapted to specific site conditions. Depending on species, seed gathered in the fall may require acclimation in cold storage facilities away from the park a practice that requires adequate funding. Cuttings from plants such as willows are another option for re-vegetating disturbed areas. Survival rates for cuttings and seed-grown plants are enhanced by careful and continuous maintenance until the plants are established.

**Bituminous paving.** The original design intent called for a distinction in color between the road surface and parking areas, something that might be supplied by adequately screened rock chips. As stated earlier, chip seals can change the color of predominately black asphalt surfaces to various shades of gray or even other colors. The paved ditches in road segments 7-B and 7-C, as well as the surface of Rim Drive in general should not be compromised by hot mix patches that are discernibly different than the predominate shade of gray.

With respect to aesthetic components of historic design, much of this document has focused on the qualities and preservation of materials and construction methodologies, but equally or more important is perpetuating traditional design, construction and maintenance practices.

**Coping lines.** As important as key characteristics of stone size, color, contrast, and proportion in masonry guardrails and retaining walls is the necessity of allowing each site to dictate wall location, extent and curvature. The term “coping line” refers to the practice of breaking even planes at regular intervals to “balance” designed foreground features with their rugged topographic backgrounds. Thus the tops of masonry guardrails, whose forms respond to site topographic irregularities, are often broken with merlons, though this should not be done where walls are set against slopes. This treatment is evident in some segments of the promenade at Rim

Village. The masonry structure lacks merlons when placed in clumps of trees or where it forms open “bays” like the one where the Mather plaque can be seen west of Crater Lake Lodge. Individual sites should dictate design choices, but the precedents at Rim Village may apply if new observation stations are built.

**Vista clearing.** Where dead trees obscure views of Crater Lake, as in portions of segment 7-B, it may be desirable to test different ways to blast tops out of them. Complete removal of trees at the rim is not recommended as this may contribute to slope destabilization and stumps may be aesthetically undesirable. Although it should be used sparingly, vista clearing may be desirable where it allows remaining trees to frame views of the lake or surrounding peaks or where it allows better views of interesting features such as glades or waterfalls that are otherwise hidden.

**Screening.** Planting or earth mounds may be desirable to hide unsightly intrusions in the landscape. In either case, this is the recommended method for concealing old roads. Additional “obliteration” is limited by the availability of disease-free whitebark pine, as these trees threatened by blister rust. Screening may be desirable in trail realignments, such as those suggested for Sun Notch or the Castle Crest Wildflower Garden spur, to discourage use of discontinued trail segments. Foundation planting techniques that were used in the 1930s to aid in the visual transition between ground surfaces and buildings could be used around vault toilets. Planting plans should be developed to screen larger scale intrusions such as equipment and facilities at the Cleetwood Cove parking area.



Detail of a portion of Skell Head parking overlook showing completed bituminous mat and sidewalks, 1938. *Struble, BPR-FHWA.*

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### Secretary's Standards

The following guidelines for Rim Drive are derived from the *Secretary of the Interior's Standards for Rehabilitation* (1990). The Secretary's Standards should be used as the basis for determining the appropriateness of rehabilitation projects and new construction.

- The historic character of a cultural feature of the Rim Drive shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize Rim Drive shall be avoided.
- Each property shall be recognized as a physical record of its time, place and use.
- Most cultural features change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.
- Distinctive features, construction techniques, or examples of craftsmanship that characterize Rim Drive should be preserved.
- Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old design, color, texture, and other visual qualities and, where possible, materials. Replacement or missing features shall be substantiated by documentary, physical or pictorial evidence.
- Chemical or physical treatments, such as sandblasting, that cause damage to historic materials, shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.
- New exterior alterations or related new construction shall not destroy historic materials characterizing Rim Drive. New additions adjacent or related new construction can be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property would be unimpaired.

If Rim Drive is to retain its historic character and experiential qualities, park managers must assess the changes that have and are occurring on the road circuit and its associated features. Careful monitoring from which park managers can develop comprehensive preservation indicators is necessary in order to evaluate the effectiveness of routine operations and make any necessary adjustments. An effective preservation program would ideally have a regular, full time maintenance staff trained in historic preservation. The team should be multi-disciplinary and include individuals experienced in structural restoration of stone masonry, facility management, slope stabi-

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lization, and revegetation. Consistency in staffing from year to year is certainly desirable, especially in supervisory positions.

In terms of general recommendations for maintenance operations, a coordinated program for inspection, monitoring, and record keeping should be developed. This should include condition assessment for drainage, the roadway, guardrails, retaining walls, and slope stability for implementation aimed at protecting historic features of Rim Drive. This has been done piecemeal for some components (such as FHWA studies of retaining walls, rock fall, and bench erosion), but not consistently or comprehensively. Next, horizontal and vertical positioning sensors should be used on all snowplows that clear the road, while GPS or satellite-based equipment should be used for all roadway inventories and mapping. Cleaning out and minor repairs of inlets, culverts, and other drainage devices should take place on a cyclical basis at set intervals. And finally, heavy equipment operations at or near the Watchman flow of andesite should be organized to provide masons with an adequate selection of rock from which they begin stonework.



Graded road and masonry guardrail on Sun Grade, road segment 7-D, 1938. Note the "gutter line" at right. *Struble, BPR-FHWA.*

## CHAPTER FIVE

# SPECIFIC TREATMENT RECOMMENDATIONS

The primary focus of specific treatment recommendations is on stabilization and preservation of significant features along Rim Drive. The recommendations are largely intended to protect the character and integrity of the original work completed during the period of significance. They are organized into five categories: stone masonry, plantings, small-scale features, road structure, and drainage. Observations covered the general condition of resources within these categories of designed features, though no subsurface investigations were made.

The design relationship between the road alignment and the surrounding landscape is a fundamental and essential component of Rim Drive, as the unity of the road and its placement in the landscape are a preeminent cultural feature of Crater Lake National Park. While many of the threats to the integrity of Rim Drive come from changes in use, other destructive actions have come from inconsistent or irregular application of historic design standards. Safety concerns can work against the preservation of historic resources, and while it is essential to maintain safe driving conditions for contemporary users, it is also essential to preserve the original uses and functions of Rim Drive that, if changed, would jeopardize its character and function.

If the geometry of Rim Drive's alignment is one of its most recognizable and significant characteristics, then placement of the roadway within the natural landscape minimized the visual impact of pavement, accentuated landscape features, and made Rim Drive a dominant component in the overall visitor experience. Locating new and incompatible uses in this landscape corridor could threaten this most distinctive attribute, yet it is equally critical to maintain the historic road alignment (both vertical and horizontal) that is so integrally tied to the landscape. Moreover, all of the historic structures (such as stone retaining and parapet walls, headwalls and guardrails) and other types of original features are tied to these two types of alignment. It is for this reason that stone masonry is considered first among the six categories of features covered by treatment recommendations in this chapter.



Masonry guardrail at the Cloudcap observation station, 2007. *Steve Mark.*

*Stone masonry.* Among the most durable of building materials, stone is susceptible to damage by improper maintenance or repair techniques. There is great variation in the properties of different types of stone, in its appearance, and in how well it performs in construction. Color, hardness, texture, strength and resistance to weathering vary not only from one kind of stone to another, but also between two pieces of the same type of stone. The design of stone masonry guardrails, as well as retaining and parapet walls, reflects the fact that stone is strong in compression and weak in tension and torsion. The andesite used on Rim Drive is dense and hard, thus having low porosity and permeability. It resists wear and has a high resistance to weathering.

All rock eventually breaks down, and building stone is subject to the same fate. As soon as it is collected, stone is susceptible to weathering and decay. These processes may be extremely slow, with chisel marks still being clearly seen after several decades. Or they may be rapid, requiring replacement in less than 50 years. Slow and gradual wear over hundreds of years is not a matter of concern, but continual rapid wear or a sudden increase in the rate of decay is a concern—even if actual losses are not great.

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It is possible to slow the rate of decay if appropriate construction methods are used to protect stone from moisture. Most stone deterioration on Rim Drive is caused by water-related problems including moisture and frost action that makes stone flake, powder, crumble, and spall.

The decay of mortar joints can usually be attributed to a combination of natural physical, chemical, and organic processes working together and exacerbated, or even precipitated, by defective materials, careless workmanship and poor design. Stone often has naturally occurring cracks that usually run across the beds. Cracks are often so fine as to be virtually invisible, but they constitute a source of weakness. When stones are worked, cracks can usually be detected by a dead sound when they are tapped with a hammer. Cracks may also result from stone being quarried or moved using high explosives. Such cracks may run in all directions, yet cracks running through several stones in a wall are likely the result of settling. This effect is made worse by hard mortars, which do not allow for movement. All stone is more or less porous absorbing moisture from the atmosphere, rain, groundwater and condensation. Moisture within stone gives rise to destructive crystallization of soluble salts as well as freeze-thaw action in the cold climates.

Organic attack on masonry involves both physical and chemical processes and is due chiefly to vegetation growth. Weeds, small shrubs, and vines growing in joints can extend roots and tendrils deep into the cores of walls, forcing masonry apart and opening pathways for moisture to penetrate. Mosses and lichens may secrete acids that erode stone and mortar and, like other forms of vegetation, encourage water retention.

Structural failures, settlement, inappropriate mortars, perished joints and pointing, and poorly implemented restoration techniques may predispose stonework to decay. In particular, retention of moisture in open joints can cause serious problems. The joints in stone masonry walls, much like skin pores, allow moisture to evaporate. If pointing makes them too dense, moisture will be forced to pass through the stone—bringing crystals to its surface. Mortar joints also absorb seasonal movement of walls especially during winter. Lime mortar is slightly flexible and permits walls to move and breathe while strong cement mortar is dense and will not.

The masonry condition should be classified with reference to three distinct headings; namely, stonework in general, joints, and the condition of the rocks. Masonry inspection should determine the existing condition of structures, focusing on the degree of material integrity. It can also help determine the extent to which the structure's original form has survived and whether it has it been altered over time.

*Factors influencing treatment:*

**Moisture and construction defects**

- Evidence of poor drainage
- Presence of saturated masonry, particularly below projecting stone courses
- Poor detailing of stonework

**Organic attack**

- Presence of algae, lichens and mosses
- Vegetation causing retention of moisture
- Plants that secrete acids
- Root penetration into joints and foundations

**Structural defects**

- Cracks in masonry
- Spalling, bowing (vertical bulges)
- Leaning or bulging of walls
- Signs of settling
- Failure of structural support
- Efflorescence

**Masonry joints**

- Perished or decayed joints
- Rainwater penetration
- Poor pointing
- Inappropriate or identifiably different mortar from that used at most of the site

**General conditions**

- Decayed surfaces
- Scaling and spalling
- Incorrectly bedded stones
- Eroded corner stones

Stone masonry can deform elastically over time to accommodate small amounts of movement, but large movements typically cause cracking which may appear along mortar joints or through the stones. Cracking can result from differential settlement of foundations, shrinkage during drying, expansion and contraction due to thermal and moisture variations, improper support spans over openings, differential settle-

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ment of building materials, expansion of salts, and the bulging or leaning of walls. A clean crack indicates recent movement; a dirty or previously filled crack may be inactive. Compare the width of cracks to the age of the masonry; a half-inch crack in a recently restored stone wall may indicate rapid settling, yet one of the same size may indicate very slow movement in a masonry guardrail 70 years old. While different causes call for different treatments, cracks caused by thermal expansion and contraction may open and close with the season. The latter may gradually expand as mortar debris accumulates, forcing them farther apart after each cycle.

### *General considerations:*

- Wall bulges indicate movement, so corrective action is necessary to avoid structural failure.
- Solid walls tolerate movement less if the outer face of the wall is moving; immediate action may be necessary.
- Small cracks may be patched; large cracks may require reconstruction of the damaged area.
- The type of soil influences drainage to and away from the structure.
- Vibrations from the roadbed may cause mortar joints to fail, but this is likely to vary due to a number of factors.

The most important qualities of mortar are its ability to bond to masonry and its internal strength. The plastic nature of fresh mortar permits it to fill the voids between the stones that do not exactly fit together and to become gradually adjusted to movements within a wall or other structure that occur during construction. Poorly made mortar may exhibit random cracking at bond joints. Until the end of the nineteenth century, the standard mortar for masonry was a mixture of sand and pure lime or lime-possolan-sand. These low-strength mortars allowed masonry to absorb considerable strain and the tendency to crack was limited. When cracks did appear in mortared joints, they were to a great extent capable of chemical reconstitution or self-healing. Older mortars (or mortars of any age that uses hydrated lime) tend to be softer and may require pointing, but otherwise may be sound.

Deterioration of mortar is usually associated with excessive moisture. In the case of Rim Drive, this is often caused by heavy snow loading or the freeze thaw cycle. High-strength mortars are to be approached cautiously, as they should not be used to point mortar of a lower strength because they are less flexible. The choice of mortar must thus reconcile competing requirements. A hard dense mortar will resist weather, but will make the stonework rigid and risk damage to the stone. Too soft a



Repairing a portion of a masonry guardrail on west Rim Drive, 2002. *Jerry Watson.*

mortar will wash causing unequal stresses on the masonry. Mortar acts as a drainage system to equalize hydrostatic pressure within masonry and maintaining its porosity is essential to permit water to flow to exterior surfaces.

*General considerations for mortar:*

- It should be noted that mortar between dressed stones is used to keep them apart rather than stick them together. If stones are properly worked and bonded most retaining wall, guardrail, or parapet wall can be constructed without using mortar; when mortar is used, it must be strong enough to resist being washed out by rain and to resist frost damage.
- Mortar must retain some flexibility over a long period, and be sufficiently permeable to allow any moisture within the walls to evaporate through the joints rather than through the face of the stone.
- *Hard and fast rules about the proportions of components for mortars cannot be made.* When dealing with historic stonework, it is best to test mortar to deter-

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mine the original mix, something that is essential if the repairs are to mirror the character and integrity of the original work.

- Properties that must be considered when judging the suitability of mortar include cohesiveness, adherence, strength, setting time, hardening time, handling ease, and the degrees of expansion and solubility.
- Mortar color and texture are important considerations for preserving the stone masonry on Rim Drive; colored mortar, obtained by incorporating mineral or earth pigment, was used in much of the original stone masonry to increase the visual continuity of wall surfaces.

The physical and chemical properties of the historic mortar are not important as long as the new mortar conforms to the following criteria:

- It must match historic mortar in color, texture, and tooling.
- Sand must match the sand in the historic mortar.
- To approximate the color of the original mortar a sample of it should be crushed and shaken up in a glass of water. The appearance of the particles that settle out will help determine the ingredients for the new mortar.
- New mortar must have greater vapor permeability and have a softer compressive strength than the stonework and the historic mortar.
- Mortars must carry the load for which they are designed, be durable, give protection against frost and rain; possess good working qualities so that it can be easily applied; and fill vertical as well as horizontal joints.
- Do not assume that hardness or high strength is a measure of appropriateness, particularly for lime-based historic mortars.
- Stresses caused by expansion, contraction, moisture migration, or the settling of structures must be accommodated and in masonry structures should be relieved by the mortar rather than by the stone.
- Mortars stronger in compressive strength than the stone will not “give,” causing stresses to be relieved by stone cracking and spalling.
- When moisture evaporates from masonry, it may deposit soluble salts on the surface as efflorescence or below the surface as sub-florescence; the former are relatively harmless, but salt crystallization within a stonewall cause parts of the outer surface to spall or delaminate.
- Replicating unique or individual historic mortars requires writing separate specifications for each project. Sources for special materials should be included whenever possible.
- Red pigments, sometimes in the form of stone dust, and other pigments were commonly used to match or contrast with the color of surrounding stone col-

ors; modern pigments matched to the historic pigments can be added to the mortar at the job site.

- Contemporary mixtures for mortar can incorporate special agents such as air entraining agents that help mortar to resist freeze-thaw damage, accelerators reducing mortar freezing prior to setting, and retarders extending mortar setting time.
- Any admixtures for specific conditions should be selected by qualified NPS staff as part of project specifications; most often, modern chemical additives are unnecessary and may have detrimental effects and should be used with care in historic masonry projects.
- Sand must be free of impurities such as salts or clay particles. The three key characteristics of sand are: particle shape, particle size gradation, and void ratios. (Rounded or natural sand is preferred for repointing mortar because it is usually similar to sand in historic mortars and provides a better visual match. It also has better working qualities or plasticity and is more easily forced into joint, forming better contact with remaining mortar and masonry surfaces. Although manufactured sand is typically more readily available, it is usually possible to locate a supply of rounded sand).
- The gradation of sand (its particle size distribution) is important in determining a mortar's durability and cohesiveness. For optimum performance, mortars must contain a certain percentage of large to small particle sizes. Acceptable particle size distributions may be found in ASTM C 144 (American Society for Testing and Materials).

The pattern and detailing of mortar joints on the face of stone guardrails retaining walls, and parapet walls affects their appearance and resistance to weathering. Joint thickness can vary for aesthetic and structural reasons. Stone guardrails, retaining and parapet walls and curbing on Rim Drive were constructed of very durable andesite, which was moved locally and built to high standards of design and workmanship. The durability of stones and quality of workmanship varies along the road circuit, with the original stone masonry construction guidelines called for the use of stones roughly shaped to insure close joints; bedded to form a uniform surface with broken joints, and completely filled with mortar after stones were placed.

Close examination of masonry by experienced observers is the best way to diagnose defective stones and joints. In addition to identifying the extent and cause of decay, this assessment should include documenting the location of the masonry; the historic significance of the original, un-repaired masonry (so that this factor can be balanced against the aesthetic significance of the original design when restored), the

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nature of defects in terms of whether they cause the masonry to be structurally compromised or are just aesthetically undesirable, the accessibility for repair work, as well as the availability of suitable materials and skilled labor.

**Repointing** consists of removing deteriorating mortar from joints and replacing it with fresh mortar. It is probably most often practiced in preserving and restoring historic stone masonry. When done well, it safeguards structural integrity and maintains historic character. Defective joints may lead to rapid disintegration of masonry, regardless of the condition of the stones. Joint decay may be caused by use of mortar that is inappropriate or too strong, poor jointing, inadequate detailing, and normal weathering processes. Poorly laid joints not only loosen the stones, but also encourage moisture penetration, frost action, and vegetative growth.

### *Recommendations for repointing:*

- Inspection is necessary to ensure that the proposed repointing work is physically and visually appropriate; historic mortar should be analyzed to determine appropriate mixes for repointing so they match the original and do not damage the stonework.
- Although not crucial to a successful repointing project, a mortar analysis by a qualified laboratory may provide useful information on the original ingredients for projects of special historic significance, though specifications should not be based solely on laboratory analysis, as specific field and construction conditions may affect the condition and performance of the mortar.
- Field and construction conditions may include the original water content, rate of curing, and weather conditions during original construction, the method of mixing and placing the mortar, and the cleanliness of sand.
- Because sand is the largest ingredient in mortar, laboratory analysis can identify sand by gradation and color allowing the color and texture of mortars to be matched with original mortars.
- Correct mortars should be used in all restoration work; cement mortars that are too hard for old masonry can lead to stone cracking, whereas broken or chipped stone edges along joints may indicate mortar that is too hard.
- To absorb slight movements and vibrations the mortar joints must be slightly weaker than the stone itself; otherwise, slight movements might cause the stone to crack or spall.
- To prevent freezing or excessive evaporation of the water in the mortar, repointing is best carried out when wall temperatures are between 40 and 95 degrees.

- During hot weather, repointing should be done on the shady side of walls to slow setting and walls should be covered with burlap or a tarpaulin while the mortar sets.
- It should not be necessary to cut out old pointing with a chisel; if mortar cannot be raked out, it should be able to withstand more years of weathering. (An exception may be made when work is carried out high on retaining or parapet walls, where there is doubt about the strength of pointing. An exception can also be made where hard cement pointing is causing stone damage).
- Old pointing should be removed to a depth at least twice the width of the joint and dust washed out with a water spray. It is essential that old bedding material, stone, and adjacent pointing be thoroughly dampened before repointing begins.
- An expertly done job includes preparing joints properly, getting good color and texture matches, and filling joint so that mortar adheres properly.
- Pointing should be slightly recessed so that mortar does not spread over or "butter over" the rounded edges of stones. When stones are "battered over," there is a thin wedge of mortar along their edges, a "feather edge," which, in time, may weather off and "pocket" thus accelerating moisture penetration and decay of the masonry. Exposed joints must be from one inch to one and a half inches, not exceeding two and a half inches or below three quarters of an inch, and all joints should be raked out to a depth of one half inch. New pointing should harmonize in color and texture with the old and should never be darker than the color of the stone.
- In order to make a slightly roughened face on the joint, a good mason modifies a smooth finish on mortar joints struck with a steel trowel with stippling from a bristle brush. Joints should be brushed along joints rather than at right angles to them to avoid smearing mortar on stones. Finished joints may be sprayed with a fine jet of water after the initial set to bring out the texture and color of the sand.
- Preparing the joints properly, getting a good color and texture match, and filling the joint so that the mortar will adhere properly is the job of an expert.
- When repointing stone, feather edges should be avoided; they break off easily, carrying particles of stone with them and leaving cavities through which moisture may enter. New pointing is to be pressed fully into the joint, leaving no voids and the joint should be fully filled flush, but kept off the face of the stone. New pointing should be protected from rainwater and from over rapid drying until the surface set is complete. Mortar that cracks is unacceptable.
- Rim Drive masonry typically has rather wide joints and it was the historic practice to apply pointing liberally. Current restoration practices keep pointing

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back to show the edges of stones but without leaving ledges that may hold water. Pointing in wide, deep joints are particularly prone to crack as it dries especially at the junction of mortar and stone. When fully set such cracks may be detected by the hollow sound produced when tapping with the head of a chisel.

- Mortar joints that shape and collect rather than shed water further aggravate the problem. Once water penetrates into the small cracks in the joints, it further deteriorates the mortar, especially in northern climates, or at high elevations where the water freezes and exerts a powerful expansion force.
- Joints should be cleaned out thoroughly and well mixed to avoid poor bonding between mortar and masonry.
- Re-mortaring cyclical cracks may hold them open and cause further cracks. Such cracks should be cleaned and protected by flexible sealants.
- Mortar stains should be removed from walls after pointing, by scrubbing the stonework with wire brushes using a water and muriatic acid solution in the proportions 20 parts of water to 1 part acid.
- No mortar joints are permanent, though a good pointing should last between 50 to 100 years.

Masonry features, particularly guardrails and retaining walls, are vulnerable to water erosion and the freeze/thaw action of ice, which is particularly pronounced on Rim Drive. Damage to stone guardrails, retaining walls, parapet walls and curbing is also caused by attrition from wind and wind borne solids; stresses caused by thermal variations or freeze/thaw; and, most importantly, by pressures brought from the crystallization of soluble salts. Most forms of decay of stone and mortar are caused by moisture and this is true on Rim Drive where water is the primary factor involved in the deterioration of stone masonry structures.

The effects of wind erosion, thermal stresses and the dynamic movement of snow and ice are also more pronounced on Rim Drive than in less elevated and exposed situations. Recurrent freezing and thawing often dislodges mortar and pieces of stone that have been loosened by other physical forces. Cracks across the face of stones may be the result of frost damage, which happens when stones are saturated with water followed by ice forming deep in the pores and exerting enormous pressures sufficient to break the stone. Frost damage can also work on small cracks resulting from blasting. Another source of damage, one affecting the preservation of the largest masonry structures, are the soluble salts occurring within original or introduced stone.



Wizard Island Overlook (substation 2-B) on west Rim Drive after a late summer storm, 1999.  
*Jet Lowe, HAER.*

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**Retaining walls** can be particularly vulnerable to the rising “damp, ” or moisture carried upward through a wall from the ground. Salts may be carried toward the wall’s face where they crystallize and disintegrate stone surfaces. This can also happen due to poor construction techniques, injudicious methods of restoration, and road salt.

### *Recommendations for retaining walls:*

- Footings of retaining walls must be built on solid foundations that spread the load, or weight of the walls, over a wider area or bearing surface than the wall width itself. In this way the weight of the wall is more evenly distributed and the likelihood of settling reduced.
- Higher and heavier walls require correspondingly wider and deeper foundations and if soft or yielding ground is encountered, piling may be necessary to carry the wall's weight.
- Differential settling is likely to occur when some wall footings are on rock and others are on pumice, sand, or gravel. Settling of the foundation will be uneven, as portions, resting on rock will not settle while portions resting on sand, gravel, or pumice will settle by different amounts.
- Footings resting on solid rock do not require cutting a level footing bed over the entire rock surface, nor even cutting a series of horizontal steps as is frequently done in softer soils. However, it is necessary to roughen the rock surface to prevent footings from slipping.
- Footing courses built on slopes always possess the potential to slide. This tendency to slide may be overcome by cutting horizontal steps in the slopes to provide footings with horizontal bearings.
- Effective retaining walls must lean against the bank to prevent soil from shifting. Friction between stones, the downward force of gravity, and the angle of batter of the wall hold stonework in place.
- A batter of 8 to 12 inches is typical for walls from two to five feet high giving a batter angle of 5 to 10 degrees. In dry laid stonewalls, rocks with the largest surfaces should be used as capstones and the next largest stones should be used for the foundation course.
- Foundation stones should be at least 6 to 8 inches thick and preferably 12 to 18 inches thick. In wide foundations, it may be necessary to run two courses side by side to reach the bank. Foundation stones should be set on gravel, rock rubble, or compacted mineral soil base with their top surfaces pitched slightly back toward the bank to establish the batter that the wall will need. Care should be taken not to pitch any stones in retaining walls

away from the bank and towards the face of the wall as this will encourage slippage out of the wall and reduce its structural stability accordingly.

- Prior to placement and setting on the wall, each stone should be cleaned and thoroughly saturated with water. Stones should not be dropped on courses already set or slid down over wall surfaces but should be set without jarring stone already laid. Large stones should be handled with a Lewis winch or other appliance, which will not cause scratches or disfigurement.
- Rocks should be well bedded in freshly made mortar and settled in place with a wooden maul before the mortar sets. Whenever possible face joints should be pointed before the mortar sets. Joints that cannot be pointed should be prepared for pointing by raking them out to a depth of about two inches before mortar sets.
- Stone faces should not be smeared with the mortar forced out of joints or used in pointing. Hammering, rolling or turning of stones on the wall should not be allowed. Avoid seepage of moisture from beds and joints that may cause discoloration of exposed surfaces.
- The height of retaining walls depends on the height of banks being protected and height will determine thickness. A wall two feet high must be at least 20 inches thick, and the gravel, sand, or mineral soil used as a backing between the wall and bank may vary in thickness from 6 to 24 inches. Taller walls up to six feet high should be 30 to 36 inches thick.
- When about three courses of rock have been laid, the wall should be back-filled with gravel, small rock or compacted mineral soil, which should be packed under the edges of and in between foundation stones to create a solid, even surface.
- A string line is essential for long retaining walls to ensure that they run straight and true. Once several courses have been set, it should be possible to remove the string and check the wall's straightness by sighting down its length from one end.
- With each course, establish the wall's ends first and then lay the rest of the course in toward the middle or work toward the wall ends. Corners and ends are the most exposed and vulnerable spots in walls, so they should be built with carefully selected large stones.
- Stone mass is very important to wall stability. Care should be taken to ensure that each course breaks with the location of vertical joints in the course below, i.e. by staggering joints.
- Compact fill material using rock-tamping bars.
- To adjust the rock heights or angles use wedge stones.
- A key to building structurally sound retaining walls is creating tight joints

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by getting as much contact between stones as possible.

- If banks being retained are at the same height from one end to the other, then capstones will also be level from end to end. If soil banks slope, then retaining walls should do the same.
- Properly set capstones are a protective course that prevents stones in the wall from loosening. Setting capstones is tedious and time-consuming, particularly when level tops are important.
- Repointing work should be unobtrusively dated and documented to aid future treatment. Stone should be cleaned and reused whenever possible.

As they age, **masonry guardrails** may begin to bulge or only its outer width.

Bulging may develop so slowly that masonry does not crack and the bulge may go unnoticed. When whole walls bulge, this is usually due to thermal or moisture expansion of its outer surface or contraction of its inner surface. This expansion is difficult to reverse because once walls are pushed out of place it is difficult to pull them back to their original positions. Masonry debris accumulates behind such bulges and prevents the course from returning to its original position. Bulges in solid masonry walls usually result in mortar losing its bond strength. When masonry guardrail leans, it is invariably outward and this represents a serious condition usually caused by poor design and construction practices such as inadequate structural tying or bad foundation work. Tilting or leaning is most commonly associated with guardrails that are subject to heavy winter snow loads. When whole guardrails lean, rebuilding the entire structure and possibly its foundation may be the only answer.

### *Recommendations for masonry guardrail:*

- New or reconstructed masonry guardrails should be built to conform to dimensions and design of the historic period of significance. General construction for guardrail masonry should be identical with that for masonry walls, except that individual stones should be between 8 and 14 inches high and between 12 and 36 inches long.
- All stones should be dressed to the required size, and shaped before being laid. The bottom bed shall be the full size of the stone, and no stone shall have an overhanging top. The exposed faces of stones should not be excessively undercut at its bottom as this gives it a top heavy, unstable appearance. Avoid the common faults of cut stone, which are coarseness of shape and surfaces, as well as poor workmanship laying them.
- Mortar should be kept back from stone faces to avoid having the edges of stones chip off. As with other masonry walls, joints should be well raked out

and pointing mortar properly laid.

- Bearing stones used to distribute weight evenly throughout the wall are called templates. The pressure per square inch allowed on the stonework in the wall under the template, as specified by original design, governs template size.
- Guardrails built on top of retaining walls should be constructed as integral parts of those walls and should show no conspicuous junction lines of mortar joints. The top course of stones should be the full width of railings and with transverse joints only. Small flat rocks should not be used in top courses.
- Boulders may be plugged and feathered to obtain weathered surfaces.
- Rocks should be laid with their major axes horizontal. The four corners of adjacent stones should never be laid contiguously.
- Rock should be thoroughly wetted prior to being laid and fully bedded in mortar. Mortar should be mixed until it assumes a uniform color after which water should be added as mixing continues until it attains a consistency easily handled and spread with a trowel.
- Stone that are loosened after mortar is set should be removed the mortar cleaned off and they should be re-laid with fresh mortar.

**Curbing** installed during the period of significance was typically dressed on site. Curb stones are typically three to four foot long rectangles with exposed vertical surfaces that rise five to six inches above the road in surfaced parking areas and have a batter steeper than one inch per three inches of height. Alternatively, more contemporary curbing materials used at North Junction, the Watchman Overlook and Cleetwood Cove are concrete. It has a rounded profile and finished appearance. Curbs are either barrier or mountable type and might be Portland cement concrete or bituminous. These are less than six inches high and have rounded or sloping faces.

*Recommendations for curbs:*

- Repairs to historic stone curbing should follow the guidelines for the original work. Historic curbing defines and articulates historic observation stations, substations, and parking areas and original materials be retained and repaired as part of Rim Drive's historic fabric. All aspects of curb detailing, stone color, texture, size, radii, corners, and termini, are critical to preserving their appearance.
- Repairs to parking areas should ensure that the historic reveal of stone curbs is maintained, particularly when repaving is undertaken.
- Curbs should never be used as surfaces where paint serves as a guide for striping of parking areas. Stone curbs should be protected from road oil when chip sealing of Rim Drive, Park Headquarters, and Rim Village occurs.

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Portion of Vidae Falls parking area showing curb, original Civilian Conservation Corps sign, and planting on fill. *Steve Mark.*

- Consideration should be given to replacing the concrete curbs at the Watchman Overlook and North Junction parking areas with stone; similar replacement might also be considered at the Cleetwood Cove parking area.

**Stone steps**, like the ones in the Castle Crest Wildflower Garden, can be taken up and re-laid more easily than concrete steps and are also more durable. Stone used for steps should be two or three inches thick and rectangular in shape. It is laid on two to three inch thick sand or cinder beds. Stone edges typically rest on small beds of concrete or one-to-one cement mortar is put into cracks to create joints that prevent water penetration and freezing problems. Steps subjected to more traffic should be constructed in a more substantial manner with stones that are typically three to four inches thick. Wherever possible, stones for steps should be the same width as the sidewalk. When there is danger of frost getting under the sidewalk, steps should be supported at their ends and carried below the frost line. If bearing is provided along the entire length of stone steps they are prone to rock from side to side when stepped on or crack if there is settlement in the foundations, extra long steps, may however, require a middle bearing.

*Recommendations for steps:*

- Stone steps should be firmly supported at each end, but left free in the middle. If the stones forming the steps have a bearing along their entire length, they might, after a slight settlement in the foundations, rock from side to side when stepped upon, or they could crack.
- Great care must then be taken to have the middle and two end supports exactly on a line. Each step should overlap the one below at least one and a half inches, and should have an outward pitch of about one half inch.

*Other Facets of the Designed Landscape*

**Planting beds** and elliptically shaped islands were used at parking overlooks on east Rim Drive to define and articulate paths and separate parking areas from the roadway. Plants in these designed spaces reflected and accentuated naturally occurring vegetation. Although they varied considerably in size, island beds were usually triangular in shape, with an average length of 200 feet and a width of 90 feet. As main features in the designs for the parking overlooks, the islands were also used to collect and direct road and parking runoff away from the caldera.

Any treatment of living vegetation must acknowledge that the processes affecting germination, growth, seasonal change, maturity, decay, and death, are dynamic. Practices such as pruning, fertilizing, and propagation, can maintain healthy vegetation and reduce the need for more extreme measures at a latter date. When replacement of individuals or groups of plants is necessary, care should be taken to insure that replacement vegetation matches the historic in habitat, form, color, texture, fruit/flower and scale—though changes may be necessary when it is apparent that species used in historic plant schemes were unsuited to site conditions.

*Recommendations for plantings:*

- Reestablish key cultural and native vegetation from the historic period at observation stations, sub-stations and parking area plant beds.
- In collaboration with natural resources management staff, conduct a comprehensive analysis of the presence, health and compositions of existing vegetation and use this to develop a vegetation management plan addressing the maintenance and replacement of native plants and plants introduced during the historic period.

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Crew moving trees for planting at road station 1039, Segment 7-B, 1935. *Lange, NARA, RG 79, SB.*

- Use only plants indigenous to the park and individual sites.
- Re-vegetate disturbed areas, such as unintended and un-surfaced parking areas, with plants that conform to ecological and visual qualities of adjacent landscapes. These areas should be fenced off until the vegetation is re-established and these should be filled with a 50-50 mix of gravel and soil, compacted, and reseeded with native plants during the appropriate season.
- Plants used to restore trampled areas or places impacted by vehicles should be grouped in ways that reflects natural regeneration patterns.
- Where plant beds were not developed during Rim Drive's construction (along the western and northern sections), the possibility of adding beds should be examined.
- Planting should respond to transitions among forests, glades, and pumice fields.
- Soil amendments and fertilizers should be used where plant establishment is difficult, a conditions that may include most areas on the rim if necessary.
- Transplanting may be needed where side casting during road maintenance operations increases damage caused by natural rock falls such as below Sun Grade and Dutton Cliff. It is likely that natural erosion and rock fall events on Dutton Ridge (and to a lesser extent, the Watchman Grade) will continue, so casting rocks below the road should be prohibited as a means of disposal.

Historic small-scale features such as signs, benches, and a drinking fountain add diversity and another dimension of interest to the landscape, but are not dominant elements. Precedents set by the sign program and picnic facilities of the 1930s provide abundant opportunities for low-cost restoration projects. Historic small-scale features include an array of functional elements such as directional and locational signage (wood rustic and porcelain enamel), curbing (stone masonry), steps (stone and log), a stone drinking fountain, and edge treatments (boulder and log).

Small-scale elements may be movable or permanently installed, used seasonally or continuously, and be independent of other elements or part of a system. They may be functional or decorative, or both. These elements are, of course, small in comparison with the vast scale of Rim Drive's cultural landscape, yet add to it in no small measure.

*General recommendations for small-scale features:*

- The location, aesthetic, and construction of small-scale elements should be carefully considered in both routine maintenance and work that is more extensive. Some small-scale elements have direct functional or associative relationships with other elements or features in the landscape. Moving them may diminishes their importance and falsify their historic integrity, so of particular concern is the relocation of such elements to accommodate new uses.
- Routine maintenance of these features will increase their life. When they are too deteriorated to repair, replacement (in whole or in part) should match the original design, materials, and finish and placed in the same location.

Although various plans have been drafted and approved in recent decades (the most recent being in 1997), none of them made a comprehensive evaluation of how signs may aid the visitor experience. These plans inventoried existing signs and provided guidance for using different types of signs for functional purposes such as traffic control or indicating trail destinations. Implementation of a sign program like that of the Civilian Conservation Corps between 1935 and 1940 at Crater Lake offers a practical alternative for fabricating directional and locational signage. In contrast to more contemporary efforts in most national park units, it had both a functional purpose and served to individualize Crater Lake among parks, but also unified the built environment.

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**Customized signs** for Rim Drive evolved from a CCC project begun in 1935 at Park Headquarters, where the NPS goal was to replace several types of standard porcelain enamel signs. CCC enrollees produced hand-carved wood signs of varying sizes with raised letters painted chrome orange (for visibility at night) against a dark brown background. These were based on Lange's sketches and drawings, some of which survive. Their production and placement greatly accelerated during the summer of 1938, after an outdoor workshop at the CCC camp near Annie Spring was established. Lange reported that 200 signs had been completed by November, including some that identified parking areas and points of interest on Rim Drive. Photographs show how this type of sign possessed good visibility, if properly placed, and were useful for conveying distances and directions on Rim Drive. These included signs mounted in triangular configurations at road junctions and others slotted into bollards.

Subsequent adoption by the NPS of standards for traffic control devices (such as stop signs) precludes a return to the individualized stop signs with raised lettering that Lange designed. Nevertheless, opportunities exist for restoration and creative adaptation of historic styles for directional, locational, or informational signs that could aid visual unity on Rim Drive. The number of signs needed and their placement in the landscape are also important considerations in treating Rim Drive holistically.

A positive trend that should continue is the design and fabrication by park staff of rustic locational signs based on historical precedent. This work is aided by a computerized template for letter making, based on a font created by Lange. These furnish a distinct contrast with the brown metal signs and standard font in use in other NPS areas. These 'generic' signs do little to differentiate Rim Drive from any other highway on which they appear and their repetition around the lake may detract from the experience of Rim Drive and its setting. Furthermore, their siting and support by two wooden posts in accordance with guidance developed from crash testing conducted elsewhere, at average highway speeds (55 mph, as opposed to 35 mph) also detracts from the scene.

### *Recommendations for signs:*

- The number of brown metal signs should be reduced, first by eliminating the mileage signs placed at every intersection in 1994. Listing distances could be done on the park's approach roads instead of Rim Drive.
- Where directional signs are desired, restoring the type built by CCC is sug-



Sign near the Cleetwood Cove parking area, 2003. *Jerry Watson.*

gested, but placement might vary in order to minimize safety concerns. Since warnings about entering the caldera could be discordant in a unified (or at least complementary) sign scheme, it is worth experimenting with the historic “Do Not Venture Over Wall sign” (CP233) at strategic points. Some wood-routed signs from Mission 66 persist on Rim Drive (Cloudcap is an example), in a medium more acceptable than the metal signage, so consideration might be given to whether this type of sign could be used in other areas.

- A uniform system that is rustic in character should be used to name locations, particularly at the parking overlooks with no signs at present.

In regard to one of the parking overlooks (Kerr Notch), there is only one **drinking fountain** on Rim Drive, a feature similar to stone fountains located at Rim Village and Park Headquarters. Restoration of this fountain may not be feasible, since the spring located nearby has been capped, presumably in response to restrictions on open sources of drinking water.

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The fountain (at center) as it appeared in 2007. *Steve Mark.*

### *Recommendations for drinking fountains:*

- Leave the fountain at Kerr Notch in place, whether it is feasible to make it operational again or not. It is part of the historic design intent, though a sign could be placed on the other side of the parking area informing visitors that potable is available at Lost Creek Campground three miles away on the Pinnacles Road.
- It may be possible to add a new fountain as part of site rehabilitation at the Diamond Lake (North) Junction, since there is a spring located below the caldera rim. This spring might be a source of water for the fountain as the no longer extant North House once drew on it. If this placement is viable, then the fountain should be made from a hewn boulder with a casement for a bubbler as at Kerr Notch.
- Investigate whether it is both desirable and feasible to restore the fountain that once existed at Vidae Falls. It was located on one end of the walkway, but drew from untreated surface water (the pipeline is still in place), but the NPS removed this fountain in the 1960s.

Most of the **wayside exhibits** appeared on Rim Drive during the 1950s and early 60s, with the original exhibits largely replaced by fiberglass-imbedded panels during the 1980s. Opinions differ about the effectiveness of waysides, but fiberglass panels are easily scratched (often by receding snowpack that has pumice intermixed with it) and often fade with exposure to intense sunlight. Although these exhibits represent an accretion of latter additions to the historic scene, it is unlikely that the NPS will move away from this medium for such signs, and interpretive panels can be defended as a providing for the original design intent to educate and inform visitors as they traveled along Rim Drive. Other panel materials, such as porcelain enamel, could be considered in future iterations of these exhibits.

*Recommendations for wayside exhibits:*

- Damaged stone masonry bases at the Diamond Lake Overlook should be repaired or removed.
- The exhibits at Cleetwood Cove parking area should be replaced, especially the ones here and other localities which are vertical in their orientation and have metal legs instead of stone masonry bases.
- No new accretions of stone masonry bases should be permitted to the original masonry guardrail.
- Consideration should be given to building a new exhibit at the Dutton Ridge road summit, since the panoramic views of the Klamath Basin would permit interpretation of park-associated Indian groups; this is part of an effort to interpret their traditional uses of the park and its surroundings; (see the plan by Douglas Deur). Stone masonry should be used as a base for the panel.

All of the extant **picnicking facilities** along Rim Drive came about in the late 1950s, but came in response to a need recognized in 1940. Although non-historic, the tables (and their replacements, which appeared in 1997) could be further studied for optimal placement with respect to daily periods of shade, proximity to vehicle parking, and views of Crater Lake. The Port Orford-cedar **picnic tables**, and **stone fireplaces** with a metal plate made a durable and aesthetically pleasing combination, having a life cycle of more than two decades. Original tables are still in existence at Lava Beds National Monument.

*Recommendations for picnic tables and fireplaces:*

- Consideration might be given to future replacement of tables and fireplaces below Vidae Falls with ones modeled after facilities designed in the 1930s

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since the original plans for this area once called for a small campground like the one built at Cold Spring on the South Entrance Road.

- Complete the obliteration of the Skell Head picnic area by removing concrete bases of the tables.
- Fireplaces can be problematic where picnic areas are located near the rim and relatively exposed. Most picnic areas receive relatively light use in the midday hours, often by visitors who are not expecting nor intending to cook food as they might in the park's two campgrounds or at the picnic grounds located at Rim Village.

Most masonry guardrails on Rim Drive double as seating, reducing the need for separate **benches**. An exception is at the Watchman Overlook, where some visitors lean against the log peelers and at the non-historic Cleetwood Cove parking area and trailhead. A couple of rough-hewn boulders, flat enough to be used for seats, occur on the Watchman Trail and this treatment could be applied elsewhere if a need exists. Masonry or dry laid stone benches recessed into slopes are other types of seating built along trails during the 1930s (such as those on trails at Oregon Caves National Monument), but these do not appear at Crater Lake except at the formalized bay below Crater Lake Lodge in Rim Village.



Bench placed on the Garfield Peak Trail by the Civilian Conservation Corps in 1937. *Lange, NARA, RG79, SB.*

*Recommendations for benches:*

- Careful study should precede any design or placement of wooden benches along trails or at observation stations. This is particularly important at presently undeveloped sites like Discovery Point, Sun Notch, and Merriam Point.
- Replacing the log benches with stone at a rest station along the Castle Crest Wildflower Garden might be considered.

Poorly placed **refuse containers** at most of Rim Drive's parking areas can detract from the intended visitor experience. Garbage cans are generally needed where visitors congregate in relatively large numbers (such as the Watchman Overlook, North Junction, Cleetwood Cove) and at picnic areas.

*Recommendations for refuse containers:*

- If garbage cans are placed along Rim Drive, they should be small and unobtrusive.
- Cans with multiple compartments (like those in use during the 1990s with latches underneath the lids) are not recommended as they are large and obtrusive, creating an aesthetic problem. Many visitors find them difficult to use and are thus more likely to leave trash in the open.
- Small, single containers will work well in the picnic areas, as long as trash removal occurs daily during the summer season.

The **post and rail fence** at the Watchman Overlook was designed for aesthetic and safety purposes, defining the boundaries of this development. It contributes enough visual interest to draw motorists to the space, but has no precedent and detracts from the overall historic character of Rim Drive. Visually it is discordant and distinctly different from the masonry guardrail which represents a unifying element, while also receiving failing marks in serving as a trailhead. Even less is achieved at the North Junction, where a somewhat homespun fence has become part of a site where pedestrian circulation is not formalized, or coherent.

*Recommendations for fencing:*

- Wooden fences similar to the one erected above the North Junction in 1996 are not recommended as pedestrian barriers since they do not last long in areas receiving heavy snowfall. Cross members may fail, thus presenting a safety hazard for visitors. Type 2 guardrails are an alternative, and indeed were

## SPECIFIC TREATMENT RECOMMENDATIONS

part of a site plan approved in 1984.

- Log peelers like those used at the Watchman Overlook should not be used since these also are prone to failure, though not as quickly as fences. The fence defines the edge of the viewpoint, but also encloses it, giving rise to the disparaging nickname of “corrals.”

The primary factor in failure of **road structure** (whether it is the roadbed or sub-grade) is erosion by water, most of which comes from rain and snowfall. Water penetrates pavements through cracks and infiltrates laterally by way of shoulders and ditches, or from high groundwater. Water movement responds to the forces of gravity, capillary action, osmotic pressure, and temperature changes, or other pressure differences. Free water is a problem because it can decrease pavement strength. It can, however, be removed by gravity drainage. Surveillance of bituminous road surfaces for cracks is an important road maintenance activity because failures may cause rapid deterioration of the pavement and sub grade materials. Prompt attention to minor faults can obviate major failures and costly repairs, but also prevent the development of conditions hazardous or inconvenient to users.



Section of east Rim Drive near the Dutton Ridge road summit, 2007. Note some sealing of cracks near the pavement edge. *Steve Mark.*

## RIM DRIVE CULTURAL LANDSCAPE REPORT

Maintenance crews need to understand highway geometrics, surface drainage, non-pavement subsurface drainage, climate conditions, and soil properties if they are to assess adequately Rim Drive's condition and needs. Two criteria are used to calculate necessary permeability (a) time for a certain percentage of water to drain; and (b) in-flow-outflow volumes. The drainage layer and/or base can then be designed to meet the road's permeability, strength, load-distribution, and construction stability requirements. An assessment of water's infiltration into the pavement structure should be an integral part of the maintenance process. This is particularly important in gauging material strength, as is how water is removed through vertical infiltration or by a lateral subsurface drainage system.



Section of east Rim Drive between Sun Notch and Vidae Falls, 2007. Some deterioration of the road is visible along its left edge. *Steve Mark.*

In contrast to road surfaces, the sub-grade includes all material between the graded ground surface and the pavement structure. Flows or seepages of sub-surface water from cut banks large enough to harm the roadbed will require attention to the soil below the road particularly its ability to hold and transmit water, which varies from one soil type to another. Resolving subsurface seeps and flows will require drainage redesign for both sides of Rim Drive, and may complicate the design of the road's cross section.

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The performance of pavement structures depends directly on the physical properties and condition of underlying soils. A soils analysis may require modifying natural soil conditions and then altering a road's cross-section. These changes may preserve existing materials by creating more uniform conditions below the road and eliminate problems such as pockets of soil with high moisture content and unstable sub-grade soils. Geo-textiles can be applied where separating areas of unlike materials is needed within embankments, or in separating aggregate bases from sub-grades.

### *Recommendations for road surfaces and maintaining the sub-grade:*

- Rim Drive and other roads should be inspected at regular intervals, especially after heavy rainfall or snowfall, to detect problems and to schedule repairs.
- Shape road shoulders and fill ruts and holes with gravel or compacted fill to maintain surface drainage and reduce potential erosion.
- Geo-textiles could be used for sub-grade reinforcement and decrease stress in foundation soils by spreading the load of the road uniformly and to reduce crack reflection when placing new bituminous overlay over a cracked or broken pavement.
- Geo-textiles can also be used to cover and stabilize the bottom of cuts where soft soils make placement of sub-grade material difficult to achieve by other means.
- Where ground water might intrude into sub-grade materials, perforated pipe drain systems should be installed.
- Geo-textiles might also be used in restoration projects where a permeable fabric is needed to provide a flow path for water such as behind retaining and parapet walls and to protect against erosion at culvert inlets and outlets.

**Slope treatments** involve the grading of cut or fill slopes between the road surface and the adjacent undisturbed ground surface. Their slopes are designed ensure the road's stability, provide safety for road users, and minimize maintenance costs. Slope angles and height are historically significant components of the view corridor and experience, so should be protected. Slope treatments are frequently less steep than preexisting slopes and are not as susceptible to erosion. Treatments to minimize erosion include the use of standard slope ratios to reduce rock falls and raveling, in addition to aiding sight distance around curves. Where cut slopes are laid back at a suitable angle on one side of the roadway, the warping of slope on the opposite side is a complementary transition between the road corridor and surrounding landscape. Francis Lange, for example, pointed to warping at the foot of Applegate Peak in segment 7-E as an excellent execution of this treatment.

Constructing bank slopes is generally more expensive, but may be effective at removing informal parking areas or stabilizing blowing pumice. An example of this treatment occurs overlooking Steel Bay in segment 7-B. By contrast, slope rounding is another less expensive way to transition from road to surrounding landscape and can be seen along Rim Drive where through cuts are shallow in relation to shoulders. A rounded bank slope, for example, was used to separate what was intended as the Sun Creek campground road from Rim Drive.



Bank slope separating east Rim Drive (left) from the road to Vidae Falls picnic area, 2007. *Steve Mark.*

*Recommendations for slope treatments:*

- Pile slash along the toes of potentially erodible fill slopes, particularly those near runoff channels, to trap sediment where necessary. When done concurrently with road maintenance, these rows of slash effectively control sediment movement.
- Confine disturbances to roadside vegetation to only what is necessary to maintain slope stability and to serve traffic needs.
- Do not incorporate woody debris in the fill portion of the road prism. Wherever possible, leave existing rooted trees and shrubs at the toe of fill slopes to increase their stability.

## SPECIFIC TREATMENT RECOMMENDATIONS

- Grade road shoulders and informal pull outs only as necessary to maintain stable running surfaces and adequate surface drainage.
- Avoid cutting into the toes of cut slopes when grading roads, pulling ditches, or plowing snow.
- Consider using bankslopes when attempting to obliterate informal parking areas. In most of the 75 locations on Rim Drive, fill material would have to be brought on site and re-graded. Informal parking areas are especially evident in segments 7-A (21) and 7-B (22). Eleven of the 75 should be upgraded to the formal parking areas with paving. Additional delineation of parking areas with large boulders is not recommended.

**Cross drainage** is the best way to control erosion, and thus keep Rim Drive and other roads usable. This prevents water from accumulating on road surfaces by channeling it through ditches and/or drainage structures on to vegetation and ground litter. It thus goes without saying that effective road design includes removal of surface water. Rim Drive uses a combination of crowned and cross-sloped road surfaces to shed water from the wearing course. The drainage system then removes storm water, runoff, or seepage from the road structure and includes water-diversion structures, most especially cross drainage, which can be composed of pipe culverts, open-top culverts, broad-based dips and even water bars. These are spaced to minimize water flow volumes and the force associated with substantial increase in volume, as well as to avoid ditch erosion.

As part of the original design intent for Rim Drive, engineers recommended that the ditches or “gutter,” and shoulders have a heavier and more coarse aggregate as surfacing material than the one used on the road’s seal coat. One of the main purposes was to obtain a texture that would help define the limits of the travel lanes (there being no edge striping, or “fog lines” at the time). They also called for some difference in the color of ditches as part of the drainage system in order to visually separate them from the roadbed.

Engineers designed the drainage system to transport water and discharge at a lower point than the Rim Drive’s sub-grade in order not to undermine the road structure. Ditches are thus placed parallel to the road to collect water before channeling it to drop inlets, culverts, and French drains. The BPR engineers designed a drop inlet for Rim Drive that was derived from a type previously installed on the Redwood Highway in northern California. Drop inlets catch water from paved ditches and then to a culvert often leading to the toe of a fill. In contrast to unlined earth



A spillway located at road station 242, segment 7-E, in 2007. *Steve Mark.*

## SPECIFIC TREATMENT RECOMMENDATIONS

ditches elsewhere on Rim Drive, the bituminous paved ditches could carry more volume because there is less friction. The location of drop inlets tended to be governed by where surface water could erode the sub-grade, or where it seemed quite likely. This type of drainage system is difficult and expensive to repair. If malfunctioning, storm and spring runoff can increase the velocity of sheet flows then quickly clog outflow pipes to damage the roadbed.

Corrugated metal pipe (CMP) culverts are the most common culverts and have been used where only small amounts of water need to be discharged. The concrete pipe culverts are also original, but can be used where greater volumes are anticipated. In both cases, a headwall (generally masonry, but sometimes dry laid) is used to channel flows underneath the road surface without undermining it on the side of the inlet. Spillways are simply a more elaborate means of accomplishing this where volumes of water to be conveyed are greater and persist throughout the year. Outlets are generally bereft of headwalls, with the lone exception being located below the massive fill at Vidae Falls.

### *Recommendations for drainage systems:*

- High erosion areas along Rim Drive should be identified using geographic information system stored in a data library, so that this can be plotted and used with other data appropriate to the project, such as maps of soil characteristics that influence erosion and sediment yield. GIS can be used to compare the condition of the road with budget constraints and environmental concerns, while maintenance can also consider future road management objectives, traffic needs, budget constraints, and environmental concerns.
- Rock piles, slash, and log chunks should be used where necessary to dissipate the energy of water and reduce erosion at outlets.
- No drainage structures should discharge onto erodible soils or fill slopes without outfall protection.
- Prevent or dissipate down slope movement of material with sediment catch basins, drop inlets, headwalls, or recessed cut slopes. As part of this effort, route road drainage where necessary through adequate filtration or sediment-settling structures to ensure sediment does not reach surface water.
- Clear debris from culverts, ditches, dips and other drainage structures to decrease clogging that can cause washouts. Place the debris where it cannot be washed back into these structures or into open water.
- The use of riprap around culvert inlets may be considered in extreme cases to prevent water from eroding and undercutting them.

- Culvert headwalls need occasional cleaning to make sure they funnel water properly.
- “Blowouts” in pumice adjacent to road shoulders are caused by seasonal snowmelt in areas where cross drainage is obstructed or impaired. Blowouts should be addressed before erosion problems magnify and undermine the road base.
- Spillways and drop inlets at paved ditches require similar attention and may require extracting large rocks that might clog them.
- The outer edges of paved ditches may require patching where they have been damaged or eroded. Minor patching, however, can prove to be ineffective without a more holistic look at why the surfaces of these ditches have deteriorated. Repair should adhere to the character and integrity of the original work.
- Sealing of road pavement cracks needs urgent attention where they have spread from the shoulder to the centerline. Sealing material should be colored to match the pavement.
- Mortared headwalls should be repointed following the guidelines in the stone masonry treatment section. Headwalls needing repair should use stone from the original work and compatible mortar. Dry laid headwalls should be repaired without the use of mortar. Experienced stonemasons familiar with historic preservation techniques should be employed for this work.
- Repair or replacement of drainage features must consider the character-defining parts of the system. There is an inventory of these components by Watson, including photo-documentation and condition assessment that is not included in this report. Locations are provided in BPR profiles of Rim Drive.

**Soil stabilization** measures are used where soil is exposed and natural re-vegetation is inadequate to prevent erosion and the transport of sediment. It is always more efficient and cost effective to prevent erosion than it is to repair damage caused by erosion. Compaction is a soil stabilization practice that improves soil stability by increasing its shear resistance and restricting water percolation and movement. Effective compaction decreases erosion on fill slopes, thus decreasing the need to widen them. It increases the load-carrying capacity of sub-grades and base courses, decreasing the need for surface rock, and provides additional lateral support for structures such as culverts and bridge abutments. Compaction can also reduce the undesirable settling in fill slopes. Compaction in most aggregate base and surface courses can increase lifespan and reduce maintenance. As a result, bituminous surface courses placed over compacted bases are less susceptible to cracking and deflection. Compaction may add to construction costs, but this increase may be justified by cost sav-

## SPECIFIC TREATMENT RECOMMENDATIONS

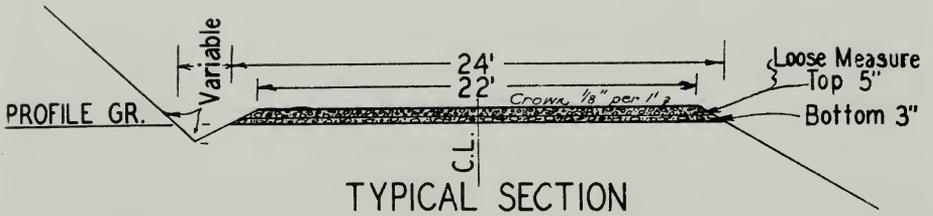
ings from reduced maintenance and operation costs, along with fewer environmental problems.

### *Recommendations for soil stabilization:*

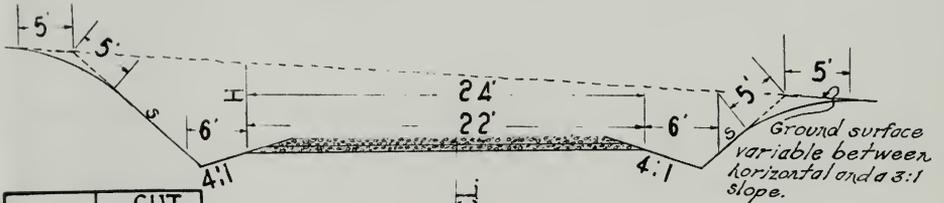
- Use mulch and seed, or seed alone, where this will reduce erosion into streams and wetlands.
- Mulches, such as straw, woodchips or bark, retain soil moisture, increase seed germination, and protect soil surfaces from erosion due to runoff and cloud-bursts. Mulches can be used to: (1) promote natural re-vegetation and (2) cover and protect seeds spread over an area. Application of mulch should follow immediately after seeding. Netting may be necessary to hold mulch in place on steep slopes or where water channels.
- Seed mixtures should include fast growing species for quick soil protection and perennial species for longer soil protection until native vegetation is reestablished.

Engineers from the Federal Highway Administration, the successor to BPR, have addressed the areas of bench erosion and rock fall in separate studies. Bench erosion refers to the undermining of road surface (particularly evident in places along road segment 7-A), pavement cracking where it may go beyond the capacity of conventional sealing, and the potential failure of the sub-grade because of erosion underneath walls. Rock fall along Rim Drive was evaluated using a rating system developed by the Oregon Department of Transportation, though some adjustments are needed to reflect average daily traffic and the seasonality of events. Evaluation of alternatives at each site will follow, so developing specific recommendations referencing bench erosion and rock fall is outside the scope of this report. Nevertheless, cultural landscape considerations should aid the planning and design of projects aimed at mitigating hazards along Rim Drive.

U.S. DEPARTMENT OF INTERIOR  
 NATIONAL PARK SERVICE  
 CRATER LAKE NATIONAL PARK - ORE.  
 PROJECT NO. 7A & 8 SURFACING & GUARD RAIL



Location Of Guard Rail		
Sta.	to	Sta.
10+63		11+48
12+41		13+06
55+40		59+90
115+75		118+50
290+10		292+10
299+00		303+00



ft	CUT SLOPE(S)
0+0.5'	2:1
5+0.8'	1 1/2:1
8+0.20'	1:1

SLOPE TREATMENT IN EARTH CUTS

Page from a surfacing contract let in 1932 by the Bureau of Public Roads.

## CHAPTER SIX

# OPPORTUNITIES FOR RESTORATION

NPS or Federal Highway Administration funding could be used to improve individual sites and maintain the condition of cultural and natural resources. Such projects could be based on, or consider the intention of, original plans and specifications. Relatively small expenditures on landscape improvements can enhance visitor enjoyment, while maintaining highway safety and prolonging Rim Drive's functional life. The recommendations follow the road in a clockwise direction, beginning west of Rim Village. Both mileages and original road stations (RS) are used for reference.

### *Junction of Rim Drive and Munson Valley Road (mile 0.0; RS 0+00):*

Signage at this intersection needs some improvement to lessen confusion among visitors, particularly where they enter Rim Village. For Rim Drive, there is an opportunity to restore historic signs, especially where distances and location (names of individual sites) are concerned.

### *Discovery Point Parking Area and trailhead (mile 1.1; RS 56-60):*

This site is dominated by an expanse of asphalt similar in size to parts of Rim Village, though it is not bounded by buildings. There is little separation of vehicles and pedestrians, perhaps because 1931-32 funding for segment 7-A did not include devices like curbs and walkways. Separation of parking and Rim Drive is also missing, though sight distances are such that this omission is not a safety hazard. A planting bed is more useful in resolving surface drainage problems on the site, though further investigation of drainage over the entire area is also needed. The conceptual plan by Robin Gyorgyfalvy on page 38 of the Corridor Management Plan for the Volcanic Legacy Scenic Byway provides a starting point. A planting bed could provide separation, but plant selection should take into account the fact that this site is largely free from winter snow due to scouring. The trailhead to Discovery Point should have a sign, which could also indicate the trail connection to Rim Village.

*Lightning Spring picnic area and trailhead (mile 2.5; RS 126-128):*

There seems to be little reason for providing two separate functions (picnicking and parking for hikers) in such close proximity to each other. Neither function featured as part of planning in the 1930s, since the “trailhead” resulted from the intersection of a fire road, which corresponded to one of the flattened cuts that motorists use as informal parking. It remains un-surfaced, but removal involves bringing fill to build a bank slope so that hikers would then have to cross Rim Drive from the picnic area. There are several tables at the picnic area, and one recently added trash container. A trail around the west rim enters just north of the picnic area, though it is often difficult to tell where one use begins and the other ends. Better transition as well as a sign in the picnic area is needed, if only to indicate mileage to the closest points of interest that could be reached by trail. The old rim road route up the Watchman, for example, could be highlighted or interpreted in greater depth.

Although a conceptual plan by Gyorgyfalvy (on page 39 of the CMP) is a starting point, redesign is recommended for the parking area, picnic facilities, and trailhead. Reconfiguring the parking area and its connection to Rim Drive could be combined with adding a vault toilet and interpretive sign at the picnic area. Hardening the surface of a connecting trail leading from the picnic area to the Rim Trail (which passes just north of the site) is needed to clarify the pedestrian circulation. At the trailhead and picnic area, reducing the size of the parking area (to three cars) but adding one interpretive sign nearby is recommended.



Watchman Overlook as it appeared in 1932. *Sargent, BPR-FHWA.*

## OPPORTUNITIES FOR RESTORATION

### *Watchman Overlook (mile 3.9; RS 196-202):*

The nickname “Corrals” suggests a livestock enclosure, yet this is the most heavily used viewpoint outside Rim Village. Its current configuration resulted from a site plan developed in 1973, which was a simplified and cheaper version of one drawn in 1966. Deterioration of the peeler logs that delineate pedestrian circulation is evident. These have been effective at protecting the remnant whitebark pines at the overlook, but the site is markedly inharmonious with historic design principles. Apart from two wayside exhibits there is little interpretation provided at this site, nor is there information about the trail (much of which is the old Rim Road), one which gives hikers access to most of the western rim. A design utilizing additional masonry guardrails and providing more signs could improve its appearance and make up for the neglect that it suffered when landscape features were not installed during the original road construction.

Instead of appearing cordoned off, the whitebark pine could become central features in planting beds delineated by guardrails (which occurs at Rim Village) and perhaps augmented by other native plants. The extant beds are covered with gravel which needs to be removed, then replaced with pumice or topsoil and planted with native vegetation. This should be part of a larger site plan that allows for handicapped accessibility for at least a portion of the overlook. Other components might include signs indicating additional parking parallel to Rim Drive, and foundation plantings could help integrate the large and obtrusive vault toilet with its open setting.

In line with the recommendations made on pages 40 and 41 of the CMP, this site could orient visitors to both the scenic byway and the immediate surroundings. A stronger connection with the trail to the Watchman Lookout is also recommended in accordance with the drawings of the site by Leslie Jehnings, as is a hardened trail leading from the parking area to the old Rim Road trail route going in the opposite direction.

### *Diamond Lake Overlook (mile 4.7; RS 233-235):*

The masonry guardrail along the parapet at this substation is possibly the worst in the park because its builders did not examine work elsewhere to establish standards for materials, construction and detailing. The austere level of funding during construction of road segment 7-A forced Lange to use less expensive methods such as treated logs without boulders between them. Much of the subsequent masonry guardrail intended is so poorly constructed that Lange’s log and boulder design

would represent a vast improvement. Retention of the bases for wayside exhibits may be incompatible with historic precedent but it may be possible to group exhibits in a different manner from the Mission 66 design to make them more compatible with Lange's design.

A planting bed separating Rim Drive from the overlook's parking may be desirable, but any trees should not interfere with already limited sight distances. A combination of shrubs, ground cover and possibly rock might work best. The addition of any such bed, however, must take the annual spring opening with heavy equipment into account. Gyorgyfalvy's concept sketch following page 42 of the CMP represents a starting point for discussion of what a site plan could include, especially in regard to circulation and interpretation.



Men loading rock at substation 3-B in 1934. *Sargent, BPR-FHWA.*

*Substation 3-B, below the Devils Backbone (mile 5.6; RS 281):*

Wallace Atwood identified this substation as indicative of glacial activity; however, it contained a road camp and site for collecting rock during construction and is thus larger and more level than its surroundings. A planting bed could reduce the visibility of this large and seemingly unnecessary expanse of asphalt, as might the addition of wayside exhibits. Interpretive devices provide visitors with a reason for stopping, apart from easy access to snow in midsummer. The Devils Backbone is slightly further north on Rim Drive where an unsurfaced parking area provides space for two or

## OPPORTUNITIES FOR RESTORATION

three vehicles. Remnants of a bituminous surfaced trail give hikers access to the top of the backbone (a large dike plainly evident inside the caldera). This path intersects the western rim trail at a right angle but there is no sign indicating where it leads. A more clearly defined (paved) parking area and trail and informational signs could help with interpreting the Devils Backbone.

### *Substation 3-D and other parking areas (mile 5.9; RS 290-303):*

Several stopping points were formed as a result of realigning the original traffic lanes during the “widening” project of the 1970s. This removed the need for pedestrians to cross the road from parking areas once located on the western shoulder of Rim Drive. Many visitors coming from the North Entrance Road stop at the newer parking areas on the eastern edge of Rim Drive after obtaining their first view of Crater Lake. To reach these parking areas, however, they cross the opposing lane (and in front of oncoming traffic) almost impulsively, thus creating potential danger to other motorists. Returning to the original alignment is clearly not viable, so separation devices in the parking areas such as plant beds are recommended where there is sufficient space. These beds could help hide the poorly reconstructed masonry guardrail on this short section of Rim Drive which bears no relation to the original Type 2 guardrail and is missing merlons in several sections.

### *Diamond Lake (North) Junction and Merriam Point (Mile 6.1; RS 1400-1403):*

The Corridor Management Plan makes a case (on pages 43-44) for a stronger sense of arrival at this site, since it is the first glimpse of Crater Lake that visitors can have when traveling the byway from the north by way of SR 138 and the North Entrance Road. It represents an opportunity to orient visitors to both the byway and the park’s geological story, yet existing facilities consist of a parking lot with little signage and no formalized pedestrian circulation to where the lake can be seen. Ideally, this should be at Merriam Point—but only some visitors can find that site.

The current parking lot and “T” intersection resulted from a site plan approved in 1984. In this plan, pedestrian circulation led from the parking lot to a masonry guardrail at the rim on a hardened path. Pedestrian circulation devices were not constructed, so a much wider un-surfaced social trail formed that leads visitors to a wooden fence at the rim. Other social paths have formed to the left and right, cutting a wide swath through what little remains of the native knotweed-dominated vegetation. A social trail leads on to Merriam Point, which is also denuded of vegetation by increased foot traffic.

## RIM DRIVE CULTURAL LANDSCAPE REPORT

As a way to begin restoration, consideration of the 1947 site plan for the Merriam Point Observation Station is recommended though the current parking component is better addressed by Gyorgyfalvy's conceptual plan following page 44 of the CMP. The older plan provides base topography for the station and shows a hardened path from the parking space to the rim. Lange's brief written description of what an observation station could provide furnishes some guidance and can be added to the certainty that the fence south of Merriam Point should be replaced by a Type 2 masonry guardrail. It has to be accompanied by bituminous paved trail that will serve to connect the parking lot with viewpoints along the rim. Other components of the site might include the parking lot entrance being changed to handle exit travel only, whereas its north entrance (on Segment 7-B) would handle those entering and exiting the lot. Other recommendations are shown Gyorgyfalvy's conceptual plan: these include re-design of the trail head, interpretive signage, a more clearly defined parking lot, and a vault toilet that is designed and constructed to blend into the site. A toilet could also be incorporated within a reconstructed North House ranger station. Such a structure could also provide exhibits and a better means for the NPS to make personal contact with visitors.



Rolling a gutter section in road segment 7-B. *Struble, BPR-FHWA.*

### *Road shoulders along segment 7-B (mile 6.2 to mile 14.5):*

Historically, treated logs were the preferred method for providing symbolic safety barriers where construction funding did not include masonry guardrails. These logs

## OPPORTUNITIES FOR RESTORATION

have been removed as they deteriorated over 30 years, but have not been replaced aside from a few treated posts with reflectors of a 1968 vintage. Restoration of logs may be feasible in a few short sections between the North Junction and Grotto Cove, though more study and evaluation is necessary. Alternatives to the one steel guardrail on Rim Drive could also be assessed.

### *Cleetwood Cove Parking Area and Trailhead (mile 10.9; RS 1166):*

As the most problematic place on Rim Drive, Cleetwood Cove suffers from poor circulation and inadequate site design. These problems have accentuated as parking demands increased in response to growing popularity of boat tours. Lack of space in the lot at peak times results in vehicles being parked along the shoulder of Rim Drive. The problem might be alleviated by building a one-way exit from the parking lot west of the present intersection. This would eliminate the need for the small radius turnaround that poses problems for larger vehicles, especially when cars are parked in it or nearby.

A comprehensive site plan for the area should be developed to address both vehicular and pedestrian circulation as well as parking needs. It should also address the appearance of the temporary ticket booth and portable toilets structures sited near the lot entrance. Changes in the placement of these structures are somewhat restricted by a fuel transfer building that was erected in 1998 on a prominent spot near Rim Drive.

Although expansion of parking to the north and west may be desirable, the current configuration of the lot is somewhat constrained to the west by the sloping hillside. A segment of the old Rim Road lies to the north, as does a weather station and a site where unsuccessful drilling for water occurred in the 1960s. Still, it may be possible to design a one way exit road to Rim Drive in order to lessen congestion on summer days.

The existing trailhead requires just as much attention, in that large boulders presently separate pedestrians from Rim Drive, but there is weak delineation. It lacks seating or other amenities, and little vegetation survives where the ground has been trampled into loose pumice by heavy foot traffic. Planting beds could improve the site's appearance and function, especially if they had a gently contoured berm in conjunction with the use of native plants and partially buried boulders. Re-design of the approach to this trailhead is recommended, as is replacement of interpretive signage with a more compatible material than fiberglass embedment and steel posts.

*Mazama Rock (Mile 12.0; RS 1125-1124):*

As an unusual geological formation located along Rim Drive, this site historically merited sub station status, just as several others oriented away from the lake have in other road segments. There is little other than a paved parking area on the site, which has no compelling need for safety barriers or other devices used for delineation. A sign interpreting Mazama Rock could be added in accordance the educational purpose of Rim Drive and the recommendation by Gyorgyfalvy on page 47 of the CMP.



Partially assembled concrete pipe culvert near toe of fill, road segment 7-B, 1934. *Doerner, NARA, RG 79, SB.*

*Palisade Point (Mile: 12.8; RS 1068-1065):*

A portion of this substation's parking area lacks a masonry guardrail and thus has no safety barrier to prevent a possible drop of some 500 feet. Although there has not been an accident at this location, construction of some sort of safety barrier is recommended and should be considered a high priority. A masonry guardrail would be best, but if this is not possible, Lange's log and boulder treatment might be considered. This design approach is aesthetically preferable to metal guardrails, which are at odds with the historic design and appearance. Gyorgyfalvy (page 48 in the CMP) further recommends consideration of a planting bed to separate the parking area from Rim Drive, especially if a new masonry guardrail was used to extend the length

## OPPORTUNITIES FOR RESTORATION

of the existing one. An interpretive sign could be incorporated into the new guardrail, which would have a planting bed between it and Rim Drive, thus better formalizing vehicular circulation at the site.

### *Entrance to Roundtop Quarry (mile 13.8; RS 987-985):*

Visitor access to the quarry is blocked by a cable barrier, but it is only a short distance to the site of a contractor's camp that dates back to construction of Rim Drive, where an old fire road heads northeast toward Sharp Peak. Some re-grading and additional clean up should be done if the site ever becomes a formal trailhead, though the service road's connection to Rim Drive may also require additional work on sight distance and width to ensure the safety of motorists. Gyorgyfalvy recommended scarifying soil and regrading to more natural contours (page 49, CMP), then planting in and around this intersection. Conifers and shrubs would be emphasized, since the intent would be for screening. Stone and/or logs could be considered for use as barriers to prevent vehicular access.

The Wineglass Cabin is located less than a quarter mile south of the intersection, being situated below the road next to the rim. This structure may date from road construction done in 1916 by the Corps of Engineers, though it has since acquired some unflattering additions that compromise the cabin's integrity. Despite being shown in at least one BPR photo of the 1930s (possibly as a tool house or other staging structure), this building is not associated with the designed landscape of Rim Drive. While it could remain more or less hidden in place, the cabin (which rests on wooden skids) should not be moved to a more prominent place on the circuit.

### *Grotto Cove Overlooks (mile 14.5; RS 958-945):*

The Grotto Cove overlooks (stations 946-949, and 950-958, respectively) constitute fine examples of original work with the exception of an alteration made to the short trail section, where the masonry guardrail next to the rim has been removed and left on the shoulder of Rim Drive about a mile to the south. Restoration of the guardrail along the trail is recommended for several reasons: its location is indicated on one of Lange's site plans; a safety barrier is essential in this location if it is to be accessible to the handicapped and if the interpretive devices (dating from its use as a handicapped accessible trail beginning in 1968) are returned to this location. Gyorgyfalvy notes on page 50 of the CMP that erosion occurs between the two parking areas at this site, something which might require attention and edge treatment.



Heavy fill at Wineglass prior to surfacing. Contractor's camp at left. *Struble, BPR-FHWA.*

*Skell Head picnic area (Mile 15.1; RS 925):*

Like other picnic areas on Rim Drive, the one near Skell Head shows little evidence of formal design. The site consists of a small entry road that allowed visitors to park near two tables situated on the old Rim Road. Because it lacks views of the lake and surrounding country, it is little used despite the fact that it is out of the wind, a situation very different than nearby Skell Head. Closure was approved and partly implemented in 1998, but facilities are still visible because the entry road is not barricaded. It is recommended that the tables and bituminous paving be removed.

*Skell Head Observation Station (Mile 15.3; RS 920-910):*

The Skell Head site presents one of the most difficult re-vegetation challenges in the park. The large planting bed supports only sedges in pumice "gravel" indicating how the effects of wind, sterile soil, and lack of precipitation make for extremely difficult growing conditions and limit success with planting. Another planting bed, shown on Lange's site plan of 1936, is closer to the masonry guardrail and between parking and the parapet walkway. It is now filled exclusively with crushed rock. Different plants should be tried in the smaller bed to determine whether it is possible to re-vegetate it. Trampling by foot traffic may be too great for plants to succeed in this location, however. Gyorgyfalvy observed (page 51 of the CMP) that drainage needs to be redirected on the northeast part of the site to keep runoff from entering the caldera. There is also a "blow-out," on the south side of Rim Drive, across from

## OPPORTUNITIES FOR RESTORATION

the observation station, that needs more definitive treatment. She also recommended that large boulders be placed on the southwest end of the site and screened with vegetation. There is an opportunity to restore Lange's log and boulder treatment which once delineated the planting bed. It may also be feasible to locate a trailhead which leads to Cascade Spring and a nearby waterfall, or possibly a path to Cloudcap using the Old Rim Road which can be found just south of the parking overlook at Skell Head.

### *Mount Scott Trailhead (mile 17.7; RS 792-790):*

Like the other trailheads such as ones for Discovery Point, Lightning Spring, and Sun Notch, this parking area lacks a sense of arrival. A trail sign installed in 2004 and modeled on a Lange design improves the situation slightly, but further steps could improve the site. The parking area should be paved and delineated by Lange's alternating log and boulder treatment. Rustic style signs indicating the hiking opportunity should be placed at a suitable distance from the parking area on Rim Drive. Additional study at the site may yield ideas as to how trail access from the parking area could be improved, particularly where placement of interpretive signage concerned. Whether it needs formal entry should be evaluated, with Gyorgyfalvy's conceptual plan (see drawing after page 51 in the CMP) being one alternative.



View of road wye to Cloudcap, 2007. *Steve Mark.*

*Cloudcap Observation Station (Mile 18.9; RS 726-724):*

Several minor improvements appear to warrant consideration at this site. As Gyorgyfalvy suggested some additional planting in the ellipse would follow from the original site plan drawn by Lange (page 53, CMP), as might the alternating log and boulder treatment indicated on that sheet. There is a social trail that leads away from the parking area where some minor trampling of the existing vegetation is evident; this could be addressed with native materials and vegetation. The interpretive sign recommended by Gyorgyfalvy could be placed near where the old Rim Road reaches the extant parking area, though this should be subject to further study of what impacts might result if visitors become aware of this potential trail that terminates at the parking overlook at Cottage Rocks (Pumice Castle) viewpoint.

*Cottage Rocks (Pumice Castle) Overlook (Mile 21.0; RS 604):*

What appears to be a pavement patch in this parking suggests that there may have been a planting bed separating the parking lot from Rim Drive, but no additional evidence has been found to support this observation. Such a planting bed may be desirable, though its installation is not urgent. The Gyorgyfalvy conceptual plan (following page 55 of the CMP) provides some guidance, though improving the drainage pattern to resolve erosion problems is more critical to the site's integrity. This parking overlook, like other sub-stations, would benefit from a rustic-style location sign. Putting such signs up each summer and removing and storing them in the winter would entail maintenance costs, but these markers are invaluable as orientation points for motorists on Rim Drive and protecting them from winter damage would increase their life spans. Historic photographs should be used to identify the appropriate locations for these signs. Where these images are not helpful or nonexistent, the sign inventories done in the 1950s can be used. Consideration might be given to establishing a trail up the north side of Cloudcap from this location, as the views are superb. Following the old Rim Road alignment will minimize tread work, and possibilities exist for interpreting a whitebark pine forest as well as several conspicuous cuts and radial curves on the old road.

*Sentinel Point Overlook (Mile 21.2; RS 587-585):*

The only improvement needed for this substation is a location sign based on historic photographs. Publicizing the trail to Sentinel Point should be studied, as it would offer adventurous visitors a riveting experience. This might require removal of the masonry patch in the guardrail and installing log steps like those depicted in one of

## OPPORTUNITIES FOR RESTORATION

Lange's photographs. Placement of a wood-rustic location sign, one based on historic precedent, is recommended.

### *Reflection Point Overlook (21.5; RS 576-573):*

This parking overlook, like other sub stations, would benefit from a rustic location sign. The overlook's name could be interpreted with a wayside exhibit, though new construction here (and at any places where the original designed landscape features predominate) must be compatible with existing historic stone masonry in terms of rock size and color, mortar, joint detailing, and construction techniques. It is recommended that new construction not be added into the existing parapet.

### *Anderson Point (mile 22.8; RS 517-515):*

It is unfortunate that the place where there are excellent views of Wizard Island and where the caldera appears as a particularly pronounced bowl is a location where the topography does not permit a parking area. A flattened cut just north of Anderson Point could be paved though this would require crossing the opposing lane to reach it. Visitors can also go a short distance from the cut in the opposite direction (south) in order to see a dry laid retaining wall on the old Rim Road by looking upslope and to the right. A trail above Rim Drive could be built with minimal side hill excavation from Kerr Notch to this wall, and then continue on the old Rim Road alignment to Reflection Point. Such one-way trails will receive little use, however, without development as a loop. This prospect is worthy of independent study as part of park wide assessment that examines how to best locate and design more trails.

The cut at Anderson Point, which has exceeded all others on the Rim Drive in the volume of excavated material, may soon require additional work. This is well beyond the scope of any scaling project and will probably include the retaining wall. It is possible that a parking area like the one described in the previous paragraph might be included in the project.

### *Kerr Notch Observation Station (Mile 23.4; RS 477-475):*

The original parking delineation on the side of this overlook facing away from the curb and masonry guardrail could be restored using the log and boulder treatment shown on Lange's site plan. Other restoration work could include repair of the drinking fountain and planting shrubs in the small bed adjacent to the fountain to discourage trampling by visitors. A historic locational sign should be restored, but reference to "Phantom Ship Overlook" (used in place of Kerr Notch) should be



Log and boulder treatment at Kerr Notch, 1938. *Lange, NARA, RG79, SB.*

eliminated from all signs and the NPS park brochure mainly because there are several places where the Phantom Ship can be seen. Removal of all metal signs is recommended, except where it is necessary to indicate the location of, or distance to, the Cleetwood Cove parking area. A vault toilet should not be installed at or near Kerr Notch, as toilet facilities are available in three locations within a short drive.

*Dutton Cliff (Mile 23.9 to 24.5; RS 466-438):*

Persistent rock fall along this half-mile stretch of Rim Drive continues to present problems for visitor safety and or the integrity of the masonry guardrail and some retaining walls. Nevertheless, damaged or missing guardrail sections should be restored and it should be replaced in places where it was removed in 1968 as part of an experiment using portable edge barriers. Installation of concrete footers to stabilize the guardrail could undermine the retaining walls and is therefore not recommended. Rock fall should be hauled away as part of ongoing road maintenance and not piled for long periods at pull-outs or flattened cuts near Kerr Notch. Although “scaling” (clearing rock from the cliff before it reaches the road) has been done with some success, such treatment should be done sparingly, unless it can be accomplished in a safe and sensitive manner.

## OPPORTUNITIES FOR RESTORATION

### *Dutton Ridge Road Summit (Mile 25.9; RS 350):*

The unpaved pullout at Dutton Ridge was proposed as a ninth observation station after World War II, when visitor numbers at the East Entrance declined as a result of greater use of the North Entrance following relocation of U.S. Highway 97. Rim caravans could thus continue beyond Kerr Notch, and make additional stops here and at Sun Notch. This location provides sweeping views of the Klamath Basin, where a wayside exhibit could interpret topographic features important to park associated Indian tribes. The parking area should be paved and possibly defined by Lange's log and boulder treatment. The need for a planting bed separating Rim Drive and parking area should be studied as part of the site design, but more critical is placement of interpretive signage recommended by Douglas Deur (see pages 51-58 in his exhibit plan).



A portion of Rim Drive at the Dutton Ridge road summit looking east toward the Klamath Marsh, 1939. *Lange, NARA, RG 79, SB.*

### *Sun Notch (Mile 27.1; RS 277-280):*

After World War II, NPS planners identified the rim viewpoint at Sun Notch as a prospective tenth observation station for the Rim Caravan. The existing “trail,” however, is actually a network of social paths that lack design integrity and have caused unsightly impacts, particularly along the rim. Rehabilitation is essential and should consist of a curvilinear loop trail through the woods, one designed to dis-

courage visitors from straying into the meadow before reaching the rim. Re-design of pedestrian circulation on this site in the configuration of a loop is urged; see recommendations and conceptual plan by Gyorgyfalvy (pages 59-60, CMP), as well as the site plan by Leslie Jehnings. Obliteration of the abandoned trail is a necessary step as part of rehabilitation, to be done in conjunction with re-vegetation using native plants.

The parking area should be more clearly defined and it may be possible to reduce its size, though re-design is necessary to improve the sense of arrival (see site plan by Jehnings). Entry from the parking lot to a new loop trail could include interpretive signage or perhaps a brochure. The shape of a new parking lot should be more curvilinear and clearly defined; the alternating log and boulder treatment is recommended. There seems to be no need for a planting bed separating the lot from Rim Drive because of relatively light traffic volume and good sight distances.

*Vidae Falls Parking Area (Mile 28.6; RS 207-205):*

Trampling at the base of the waterfall where the water flows into a culvert indicates poor pedestrian circulation at this site, something which points to the need for a comprehensive site plan. Gyorgyfalvy identified (pages 61-62, CMP) several possibilities for redesigning how visitors use the area, including viewpoints. One of them could be utilizing a trail located east of the cascade, but it is presently difficult to find. Disturbance to riparian vegetation is evident at the parking area where visitors have gone beyond the walkway and curb at the parking area. It may be possible to add new tread to reestablish the old trail (started in 1934 by the Civilian Conservation Corps) leading uphill to a suitable viewpoint. A sign for the Crater Peak trailhead should be added at the junction of Rim Drive and the road to Vidae Falls picnic area. Where the Crater Peak Trail crosses Vidae Creek, some vista clearing could be done to restore a view of the falls. The picnic area loop experiences a sheet wash drainage problem from the road connecting it with Rim Drive. This should be resolved before cracks and potholes form. Interpretive signage could be added, depending upon study that should precede a finalized site plan. Gyorgyfalvy identified one topic (how water from Vidae Falls eventually reaches the Klamath River and Pacific Ocean), though another could be the fill on which Rim Drive is placed in crossing Vidae Creek.

*Castle Crest Wildflower Garden Parking Area (Mile 31.0; RS 37-36):*

Stone masonry piers have replaced the treated wooden bollards at this unpaved parking area which is one of the park's most popular trailheads. Re-design of

## OPPORTUNITIES FOR RESTORATION



Vidae Falls, prior to placement of curb and walkway. Note drinking fountain at far left. *Struble, BPR-FHWA.*

the entry sequence has been undertaken, mostly in the form of “benching” the trail to avoid gullying and to better separate the loop from a spur trail leading to Park Headquarters. A suitably designed “trail shrine” for orientation that is in keeping with structures from the 1930s is one possibility for creating a better sense of arrival and providing visitors with a short orientation, along with indicating the intended direction of pedestrian circulation. Realignment of the spur trail may also be desirable. So too might be realigning a portion of the loop which once ascended a slope to the north going above the wetland.



Warning sign placed by CCC enrollees at various places at the rim. *CLNPMAC 8885.*

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Oregon State Highway Commission publicity photo taken near Anderson Point, late 1940s. Note that the road surface is not paved but instead treated with oil. *Oregon State Archives.*



Culvert installation and rough grading on road segment 7-D (Sun Grade), 1937. *Struble, BPR-FHWA.*

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8885 Crater Lake [National Park Service] Photographic File

8889 Building and Construction Files

8895 Biographical Files, John C. Merriam (Crater Lake memoranda, 1928-34)

8898 Interpretation Division Slide Images

8899 Drawings, Plans, and Maps

10137 Francis G. Lange Professional Papers

## APPENDIX 1

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### Inventory of Masonry Features: Retaining Walls, Guard Rails, Curbs, and Spillways

#### Segment 7-A: Mile-0.0-5.9 Rim Village to Diamond Lake Junction

##### Mile 0.2 (Road Stations 10-11)

	86 ft. Stone Masonry Guardrail
Historic Integrity	Contributing 76 feet non-contributing 10 feet
Structural Stability:	36 ft. fair- 19 ft. good-31 ft. poor
Footing:	Fair-Poor
Slope Stability	Fair-Good
Wall Stability	Fair
Wall Height:	2 ft.

##### Mile 0.2 (Road Station 13)

	57 ft. Stone Masonry Guardrail
Historic Integrity	Non-contributing 57ft.
Structural Stability	32 ft. Fair- 14 ft. Poor-11 ft. Good
Footing	Fair
Slope Stability	Good
Wall Stability	Good
Wall Height	2 ft.

##### Mile 1.1 Discovery Point, Observation Station #2 (Road stations 56-60)

	173 ft. Stone Masonry Guardrail
Historic Integrity	Compatible 173ft.
Structural Stability	112 ft. Poor-61 ft. Fair
Footing	Poor
Slope Stability	Poor
Wall Stability	Fair-Poor

APPENDIX 1

Wall Height 4 ft.

**Mile 2.3 Wizard Island Overlook, Substation #2-B (Road stations 116-118)**

239 ft. Stone Masonry Guardrail  
Historic Integrity 49 ft. Contributing- 36 ft. Non-contributing- 144 ft. Compatible  
Structural Stability 69 ft. Poor- 127 ft. Fair- 43 ft. Good  
Footing Fair  
Slope Stability Fair  
Wall Stability Fair  
Wall Height 2 ft.

**Mile 2.9 (Road stations 151-153)**

127 ft. Stone Retaining Wall and Stone Masonry Guardrail  
Historic Integrity 30 ft. Compatible-5ft. Non-contributing-92 ft. Contributing  
Structural Stability 63 ft. Fair 13 ft. Poor- 51 ft. Good  
Footing Good  
Slope Stability Good  
Wall Stability Good  
Wall Height 5.6 -11 ft.

**Mile 3.0 Union Peak Overlook, Substation #2-C (Road stations 154-157)**

360 ft. stone masonry guardrail and retaining wall  
Historic Integrity 35 ft. Compatible -10 ft. Non-contributing 315 ft. Contributing  
Structural Stability 9 ft. Poor- 106 ft. Fair- 225 ft. Good  
Footing Fair to Good  
Slope Stability Fair to Good  
Wall Stability Fair  
Wall Height 3 ft-11 ft.

**Mile-3.3 (Road stations 176-178)**

202 ft. Stone masonry guardrail  
Historic Integrity 202 ft. Contributing  
Structural Stability 113 ft. Good – 89 ft. Fair  
Footing Fair to Good  
Slope Stability Good  
Wall Stability Good  
Wall Height 2 ft.

**Mile 3.4 Substation #2-D (Road stations 179-182)**

425 ft. Stone Masonry Guardrail and Stone Retaining Wall

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Historic Integrity	240 ft. Contributing-136 ft. Non-contributing 49 ft. Compatible
Structural Stability	137 ft. poor-149 ft. Fair- 139 ft. Good
Footing	Fair
Slope Stability	Good
Wall Stability	Good
Wall Height	2 ft.-8 ft.

**Mile 3.9 Watchman Overlook (Road stations 196-198)**

	328 ft. stone masonry guardrail and retaining wall
Historic Integrity	256 ft. contributing 32 non-contributing-40 ft compatible
Structural Stability	24 ft. Poor-118 ft. Fair- 186 ft. Good
Footing	Fair
Slope Stability	Fair
Wall Height	3 ft.-15 ft.

**Mile 4.7 Diamond Lake Overlook, Substation #3-A (Road stations 233-235)**

	174 ft. Stone masonry guardrail
Historic Integrity	174 ft. non-contributing (constructed: 43 ft 1960s-131ft. 1970s)
Structural Stability	45ft- poor - 65ft. fair- 64ft. good
Footing	Fair-Good
Slope Stability	Good
Wall Height	2 ft.

**Mile-5.5 Parking Area (Road stations 290-293)**

	324 ft. Stone masonry guardrail
Historic Integrity	278 ft. compatible-50 ft. contributing
Structural Stability	250 ft. good 124 ft. fair
Footing	Fair
Slope Stability	Fair
Wall Stability	Fair
Wall Height	2 ft.

**Mile 5.7 Substation #3-C (Road stations 299-301)**

	146 ft. Stone masonry guardrail
Historic Integrity	146 ft. non-contributing
Structural Stability	59 ft. Poor-71 ft. Fair-16 ft. Good
Footing	Fair-Poor
Slope Stability	Fair
Wall Stability	Fair
Wall Height	3 ft.

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**Mile 5.8 Parking Area (Road stations 302-303)**

	212 ft. Stone masonry guardrail
Historic Integrity	212 ft. non-contributing
Structural Stability	63 ft. Poor-159 ft. Fair
Footing	Fair -Poor
Slope Stability	Good
Wall Stability	Fair
Wall Height	3ft.

**Segment 7-A Totals**

<b>Total linear feet:</b>	Stone Guardrail	3053 ft.
	Stone Retaining Wall	1440 ft.

**Character and Integrity:**

Contributing:	Stone Guardrail	1184 ft	32%
	Stone Retaining Wall	803 ft.	56%
Non-contributing:	Stone Guardrail	918 ft.	30%
	Stone Retaining Wall	383 ft.	27%
Compatible:	Stone Guardrail	951ft.	38%
	Stone Retaining Wall	254 ft.	17%

**Structural Stability:**

	Stone Guardrail	3053 ft.	
	Stone Retaining Wall	1440 ft.	
Stone Guardrail	Poor	692 ft.	23%
	Fair	1249 ft.	41%
	Good	1112 ft.	37%
Stone Retaining Wall	Poor	203 ft.	14%
	Fair	731 ft.	51%
	Good	506 ft.	35%

## Segment 7-B: Mile 5.9-14.5

### Diamond Lake Junction to Grotto Cove

#### Mile 8.6 Steel Bay Overlook #1 (Road stations 1264-1261)

	243 ft. Stone masonry guardrail
Historic Integrity	243 ft. contributing
Structural Stability	28 ft. Poor-167 ft. Fair- 48 ft. Good
Footing	Fair
Slope Stability	Fair
Wall Stability	Fair
Wall Height	2 ft.-4.2 ft.

#### Mile 8.8 Steel Bay Overlook #2 (Road stations 1256-1255)

	113 ft. Stone masonry guardrail
Historic Integrity	113 ft. contributing
Structural Stability	113 ft. Good
Footing	Fair-Good
Slope Stability	Fair-Good
Wall Height	2.1 ft.

#### Mile 9.5 Pumice Point, Observation Station #5 (Road stations 1229-1223)

	452 ft. Stone masonry guardrail
Historic Integrity	440 ft. contributing-12 ft. compatible
Structural Stability	452 ft. Good
Footing	Good
Slope Stability	Good
Wall Height	2 ft.

#### Mile 9.6 Parking Area (Road stations 1209-1206)

	323 ft. Stone masonry guardrail
Historic Integrity	300 ft. contributing-23 ft. compatible
Structural Stability	323 ft. Good
Footing	Fair -Good
Slope Stability	Good
Wall Height	2 ft.

#### Mile 9.6 Parking Area (Road stations 1203-1202)

	150 ft. Stone masonry guardrail
Historic Integrity	135 ft. contributing-15 ft. compatible
Structural Stability	150 ft. Good
Footing	Fair-Good
Slope Stability	Fair-Good

## APPENDIX 1

Wall Height	2 ft.
<b>Mile 9.9 Parking Area (Road stations 1195-1194)</b>	
	150 ft. Stone masonry guardrail
Historic Integrity	137 ft. contributing- 13 ft. compatible
Structural Stability	135 ft. Good-15 ft. Fair
Footing	Good
Slope Stability	Good
Wall Height	2ft.

<b>Mile 10.2 Steel Point (Road stations 1181-1178)</b>	
	258 ft. Stone masonry guardrail
Historic Integrity	248 ft. contributing-10 ft. compatible
Structural Stability	238 ft. Good- 20 ft. Fair
Footing	Good
Slope Stability	Good
Wall Height	2 ft.

<b>Mile 11.2 Cleetwood Backflow Parking Area (Road stations 1162-1155)</b>	
	353 ft. Stone masonry guardrail
Historic Integrity	283 ft. Contributing- 48 ft. Compatible-22 ft- Non-contributing
Structural Stability	92 ft. Fair- 261 ft. Good
Footing	Fair
Slope Stability	Fair
Wall Height	2 ft.

<b>Mile 11.3 Parking Area (Road station 1149)</b>	
	66 ft. Stone Retaining Wall and Stone Guardrail
Historic Integrity	59 ft. Contributing-6 ft. Compatible
Structural Stability	66 ft. Fair
Footing	Fair
Slope Stability	Fair
Wall Height	2 ft- 14 ft.

<b>Mile 11.9 Parking area (Road stations 1091-1088)</b>	
	297 ft. – 209 ft. guardrail -88 ft. retaining wall
Historic Integrity	264 ft. contributing-22 ft. compatible-11 ft. non- contributing
Structural Stability	265 ft. Good-32 ft. Fair
Footing	Fair
Slope Stability	Fair-Good
Wall Height	3 ft. – 6 ft.

**Mile 12.8 Palisade Point, Substation #5-B (Road stations 1068-1065)**

	378 ft. Stone Masonry Guardrail
Historic Integrity	363 ft. Contributing- 15 ft. Compatible
Structural Stability	128 ft. Poor- 250 ft. Fair
Footing	Fair-Poor
Slope Stability	Fair
Wall Height	2 ft.

**Mile 14.5 Grotto Cove #1, Substation #5-C (Road stations 956-953)**

	229 ft. Stone Masonry Guardrail with Stone Curbing
Historic Integrity	229 ft. Contributing
Structural Stability	229 ft. Good
Footing	Good
Slope Stability	Good
Wall Height	2 ft.

**Segment 7-B Totals**

<b>Total linear feet:</b>	Stone Guardrail	3133 ft.
	Stone Retaining Wall	363 ft.
	Stone Parapet Wall	229 ft.
	Stone Curbing	223 ft.

**Character and Integrity:**

Contributing:	Stone Guardrail	2855 ft.	91%
	Stone Retaining Wall	324 ft.	89%
	Stone Parapet Wall	229 ft.	100%
	Stone Curbing	223 ft.	100%
Non-contributing:	Stone Guardrail	33 ft.	1%
	Stone Retaining Wall	11 ft.	3%
Compatible:	Stone Guardrail	245ft.	8%
	Stone Retaining Wall	28 ft.	8%

**Structural Stability:**

Stone Guardrail	3133 ft.
Stone Retaining Wall	324 ft.
Stone Parapet Wall	229 ft.
Stone Curbing	223 ft.

APPENDIX 1

Stone Guardrail	Poor	264 ft.	8%
	Fair	842 ft.	27%
	Good	2027 ft.	65%
Stone Retaining Wall	Fair	98 ft.	31%
	Good	224 ft.	69%
Stone Parapet Wall	Good	229 ft.	100%
Stone Curbing	Good	223 ft.	100%

**Segments 7-C and 7-C1: Mile 14.5-23.4  
Grotto Cove to Kerr Notch**

**Mile 14.6 Grotto Cove #2, Substation #5-C (Road stations 949-946)**

	289 ft. 112 ft. stone curbing 289 ft. stone guardrail
Historic Integrity	289 ft. Guardrail and curbing contributing
Structural Stability	280 ft. Guardrail -Good 9 ft.-Fair-289 ft. Stone Curbing-Good
Footing	Good
Slope Stability	Good
Wall Height	2 ft.

**Mile-15.3 Skell Head, Observation Station #6 (Road stations 915-909)**

	445 ft. Stone Guardrail-144 ft. Parapet Wall-557 ft. Stone Curbing
Historic Integrity	445 ft. guardrail-contributing-120 ft. parapet wall-contributing 24 ft. Parapet Wall-compatible-557 ft. Curbing-contributing
Structural Stability	445 ft. Stone Guardrail-Fair- 112 ft. Guardrail-Poor 112 ft. Parapet Wall Poor- 32 ft. Parapet Wall Fair 500 ft. Stone Curbing-Good-57 ft. Stone Curbing-Fair
Footing	Poor
Slope Stability	Fair-Poor
Wall Height	4 ft. - 11 ft.

**Mile 16.7 Scott Bluffs Parking Area (Road stations 837-831)**

	559 ft. Stone-retaining walls
Historic Integrity	481 ft. Contributing-64 ft. non-contributing- 67 ft. missing 49 ft. -Compatible
Structural Stability	67 ft. Poor- (missing) 112 ft. Poor- 380 ft. Fair-Good
Footing	Good
Slope Stability	Good
Wall Height	6 ft. - 18 ft.

**Mile 18.9 Cloudcap, Observation Station #7 (Road stations 726-724)**

	238 ft. Parapet Wall and Stone Guardrail - 200 ft. Stone Curbing
Historic Integrity	238 ft. Parapet, guardrail, contributing-200 ft. Contributing
Structural Stability	238 ft. Parapet Wall, Stone Guardrail Fair to Good 185 ft. Stone Curbing-Good-15 ft. Fair
Footing	Fair
Slope Stability	Good
Wall Stability	Good
Wall Height	4 ft. - 6 ft.

**Mile 21.0 Cottage Rocks (Pumice Castle) Substation #7-A (Road station 604)**

	133 ft. Stone Masonry Guardrail, Parapet Wall and Curbing
Historic Integrity	133 ft. Stone Guardrail, Parapet Wall and Curbing-contributing
Structural Stability	133 ft Parapet Wall -Fair-Good-130 ft Curbing Fair-3 ft.-Poor
Footing	Fair
Slope Stability	Good
Wall Stability	Good
Wall Height	4 ft.

**Mile 21.2 Sentinel Point, Substation #7-B (Road stations 587-585)**

	247 ft. Stone masonry guardrail and parapet wall and curbing
Historic Integrity	239 ft. stone guardrail and parapet wall-contributing-9 ft. stone guardrail, and parapet wall-non-contributing-239 ft. stone curb-contributing
Structural Stability	239 ft. Stone masonry guardrail and parapet wall-Fair-Good 239-curb-ing-Fair
Footing	Fair
Slope Stability	Good
Wall Stability	Good

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Wall Height	4 ft.
<b>Mile 21.5 Reflection Point, Substation #7-C (Road stations 576-573)</b>	
	391 ft. Stone masonry guardrail, Parapet Wall and Stone Curbing
Historic Integrity	386 ft. Contributing- 5 ft. non-contributing
Structural Stability	372 ft. guard and parapet wall-Good 13 ft. guard and parapet wall-Fair-377 ft. curbing-Good-9 ft. curbing-Fair
Footing	Fair
Slope Stability	Good
Wall Stability	Good
Wall Height	3.5 ft.

**Mile 22.8 Anderson Point (Road stations 517-515)**

	223 ft. stone retaining wall
Historic Integrity	200 ft. contributing-23 ft. non-contributing
Structural Stability	187 ft. Fair- 36 ft. Poor (missing)
Footing	Good
Slope Stability	Good
Wall Stability	Fair-Good
Wall Height	6 ft.- 14.5 ft.

**Mile 23.4 Kerr Notch, Observation Station #8 (Road stations 477-475)**

	168 ft stone parapet wall, guardrail and curbing
Historic Integrity	168 ft. contributing
Structural Stability	168 ft. Good
Footing	Good
Slope Stability	Good
Wall Height	7 ft.

**Segment 7-C & 7C-1 Totals**

Total linear feet:	Stone Guardrail	2011 ft.	
	Stone Parapet Wall	1495 ft.	
	Stone Retaining Wall	817 ft.	
	Stone Curbing	1905 ft.	
Contributing:	Stone Guardrail	1924 ft.	96%
	Stone Parapet Wall	1452 ft.	97%
	Stone Retaining Wall	681 ft.	83%
	Stone Curbing	1905 ft.	100%
Non-contributing:	Stone Guardrail	35 ft.	2%
	Stone Parapet Wall	29 ft.	2%

RIM DRIVE CULTURAL LANDSCAPE REPORT

	Stone Retaining Wall	87 ft.	11%
	Stone Curbing	0 ft.	
Compatible:	Stone Guardrail	53 ft.	3%
	Stone Parapet Wall	14 ft.	1%
	Stone Retaining Wall	49 ft.	6%
Structural Stability:			
	Stone Guardrail	2011 ft.	
	Stone Parapet Wall	1495 ft.	
	Stone Retaining Wall	817 ft.	
	Stone Curbing	1905 ft.	
Stone Guardrail	Poor	125 ft.	6%
	Fair	394 ft.	20%
	Good	1492 ft.	74%
Stone Parapet Wall	Poor	153 ft.	10%
	Fair	502 ft.	34%
	Good	840 ft.	56%
Stone Retaining Wall	Poor	215 ft.	26%
	Fair	187 ft.	23%
	Good	415 ft.	51%
Stone Curbing	Poor	13 ft.	.06%
	Fair	334 ft.	17%
	Good	1568 ft.	82%

**Segment 7-D: Mile-23.4-27.1  
Kerr Notch to Sun Notch**

**Mile 23.9 Dutton Cliff Parking Area #1 (Road stations 466-459)**

	966 ft. Stone masonry guardrail
Historic Integrity	605 ft. Contributing-346 Non-contributing-15 ft. Compatible
Structural Stability	859 ft. Poor-107 ft. Fair
Footing	Fair
Slope Stability	Fair
Wall Stability	Poor
Wall Height	3 ft.

*Much guardrail missing: retaining wall dry laid except for Road station 459.*

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### **Mile 24.0 (Road stations 456-455)**

	148 ft. stone retaining wall –guardrail (destroyed)
Historic Integrity	148 ft. stone guardrail-non-contributing-148 ft. retaining wall-contributing
Structural Stability	148 ft. poor- guardwall-148 ft retaining wall Good
Footing	Good
Slope Stability	Good
Wall Stability	Good
Wall Height	11ft- 13ft.

### **Mile 24.1 Dutton Cliff Parking Area #2 (Road stations 453-450)**

	258 ft. stone guardrail
Historic Integrity	162 ft. non-contributing (destroyed) 96 ft. contributing
Structural Stability	162 ft. Poor- 96-Fair
Footing	Fair
Slope Stability	Fair
Wall Stability	Fair
Wall Height	3 ft.

### **Mile 24.2 (Road stations 449-446)**

	479 ft. stone retaining wall and guardrail
Historic Integrity	236 ft. non-contributing (destroyed), 36 ft. non-contributing-23 ft. compatible-184 ft. contributing
Structural Stability	272 ft.-Poor-107 ft. Fair- 100 ft. Good
Footing	Good
Slope Stability	Good
Wall Stability	Fair-Good
Wall Height	4 ft–32 ft.

### **Mile 24.4 Dutton Cliff Parking Area #3 (Road stations 444-443)**

	178 ft. Stone Retaining Wall and Stone Guardrail
Historic Integrity	32 ft.-non-contributing- 129 ft.- contributing- 18 ft. compatible
Structural Stability	37 ft. Poor- 141 ft. Fair
Footing	Good
Slope Stability	Good
Wall Stability	Good
Wall Height	6 ft.-20 ft.

### **Mile- 24.5 Dutton Cliff Parking Area #4 (Road stations 443-438)**

	889 ft. stone guardrail
Historic Integrity	23 ft.-non-contributing (destroyed)-25 ft.

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Structural Stability	compatible- 841 ft. contributing 37 ft. Poor- 194 ft. Fair-678 ft. Good
Footing	Fair
Slope Stability	Good
Wall Stability	Good
Wall Height	3 ft.

**Mile 26.2 Sun Grade (Road stations 332-326)**

	1058 ft. Stone Guardrail -152 feet of Stone Retaining Wall
Historic Integrity	1011 ft. contributing-26 ft. non-contributing-35 ft. compatible
Structural Stability	67 ft. Poor-518 ft. Fair-473 ft. Good (Stone Guardrail)
Footing	Fair-Good
Slope Stability	Good
Wall Stability	Good
Wall Height	4 ft.

**Mile 26.7 Sun Grade (Road stations 313-296)**

	2365 ft. stone guardrail - 923 ft retaining wall
Historic Integrity	336 ft. retaining wall (non-contributing) 145 ft. Stone Guardrail (Non-contributing) 255 ft. compatible- 1965 ft. Stone Guardrail Contributing
Structural Stability	323 ft.-Poor 1339 ft- Fair- 703 ft. Good
Footing	Fair
Slope Stability	Fair
Wall Stability	Fair
Wall Height	3ft-6ft.

**Segment 7-D Totals**

Total linear feet:	Stone Guardrail	6356 ft.	
	Stone Retaining Wall	2182 ft.	
Contributing:	Stone Guardrail	4847 ft.	76%
	Stone Retaining Wall	1239 ft.	57%
Non-contributing:	Stone Guardrail	1054 ft.	17%
	Stone retaining wall	587 ft.	27%
Compatible:	Stone guardrail	471 ft.	7%
	Stone Retaining Wall	356 ft.	16%

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Structural Stability:	Stone Guardrail	6356 ft.	
	Stone Retaining Wall	2182 ft.	
Stone Guardrail	Poor	1905 ft.	30%
	Fair	2502 ft.	39%
	Good	1949 ft.	31%
Stone Retaining Wall	Poor	681 ft.	31%
	Fair	358 ft.	16%
	Good	1113 ft.	51%

**(No retaining wall or guardrail in Segment 7-E)**

### Selected Stonework and Drainage Features

*(Rim Drive segments 7-D2, 7-E1, and 7-E2)*

#### **Mile 26.2 Sun Grade (Road station 330)**

Measurement            5 ft. high x 4 ft. wide  
 Classification        small masonry feature above culvert headwall  
 Historic integrity      contributing

#### **Mile 26.4 Sun Grade (Road station 319)**

Measurement            8 ft. high x 6 ft. wide  
 Classification:        small masonry feature above culvert headwall  
 Historic integrity      contributing

#### **Mile 26.6 Sun Grade (Road station 313)**

Measurement            20 ft. high x 7 ft. wide  
 Classification:        spillway  
 Historic integrity      contributing

#### **Mile 27.1 Sun Notch Parking Area (Road station 283)**

Measurement            66 ft. high x 4 ft. wide  
 Classification:        horizontal masonry drain  
 Historic integrity      contributing

#### **Mile 28.0 (Road station 242)**

Measurement            31 ft. high x 5 ft. wide  
 Classification:        spillway

Historic integrity contributing

**Mile 28.2 (Road station 239)**

Measurement 44 ft. high x 4 ft. wide

Classification spillway

Historic integrity contributing

**Mile 28.6 Vidae Falls Parking Area (Road stations 207-205)**

Measurement 170 ft. long of curb (all contributing)

Classification curbing

Historic integrity contributing

**Mile 30.1 (Road station 79)**

Measurement 24 ft. high x 4 ft. wide

Classification: spillway

Historic integrity contributing

**Mile 30.8 (Road station 41)**

Measurement 13 ft. long x 5 ft. wide

Classification: horizontal masonry drain

Historic integrity contributing

**Mile 30.9 (Road station 39)**

Measurement 4 ft. high x 5 ft. wide

Classification: masonry feature above culvert

Historic integrity contributing

**Mile 31.0 Castle Crest Wildflower Garden Parking Area (Road stations 37-36)**

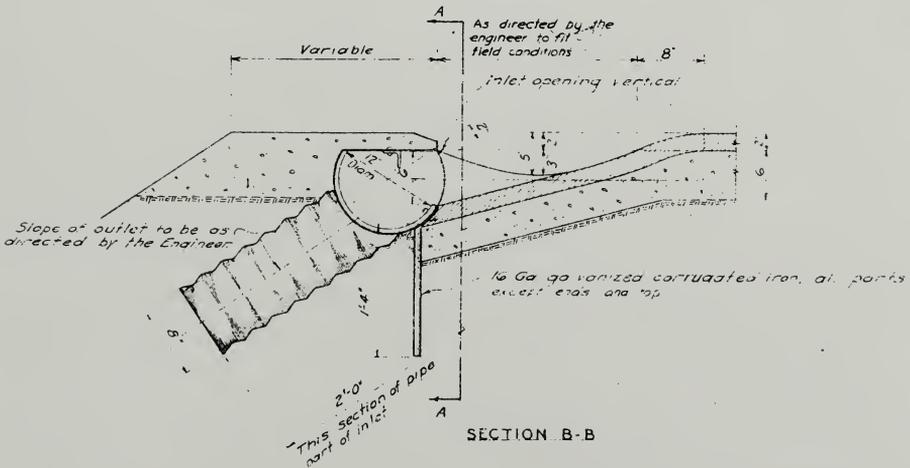
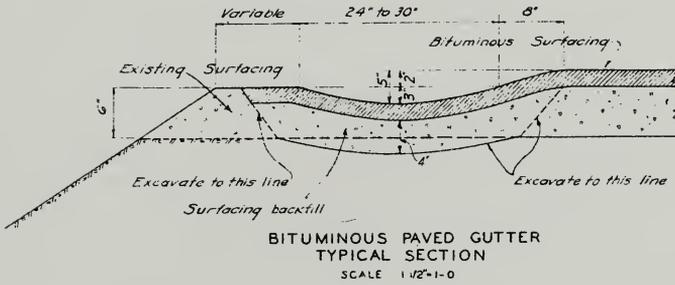
Measurement 40 in. long x 22 inches wide x 32 in. high (average)

Classification: masonry piers (15)

Historic integrity compatible

# APPENDIX 2

## Drawings and Site Plans



**SPILLWAY INLET & BANK PROTECTOR**  
SCALE 1/2"=1'-0"

BPR diagrams in Rim Drive paving contract (segments 7-B and 7-C), May 1938.

RIM DRIVE CULTURAL LANDSCAPE REPORT



—TYPE No 1A— ·ELEVATION· Scale  $\frac{1}{2}$ " = 1'

*PLAIN WALL WITH END BUTTRESS.*



—TYPE No 1B— ·ELEVATION No 1B· Scale  $\frac{1}{2}$ " = 1'

*WALL WITH CURB AND PAVEMENT.*



—TYPE No 2— ·ELEVATION· Scale  $\frac{1}{2}$ " = 1'



—TYPE No 3— ·ELEVATION· Scale  $\frac{1}{2}$ " = 1'

*ISOMETRIC SKETCH*



·END BUTTRESS·

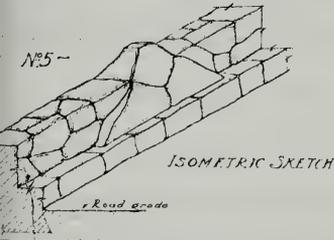
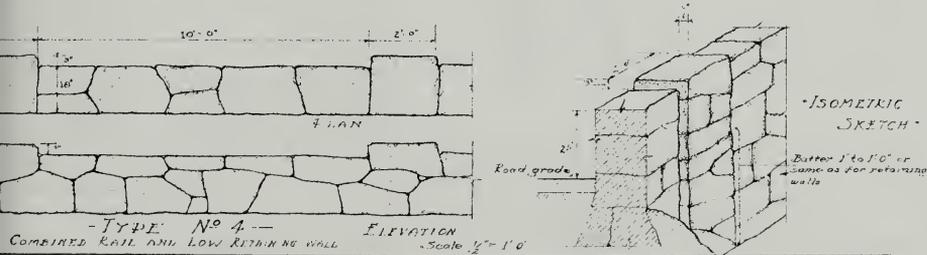
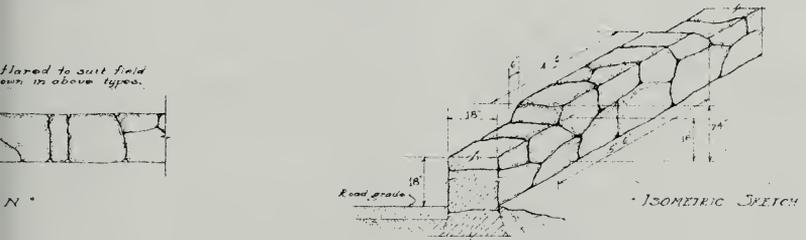
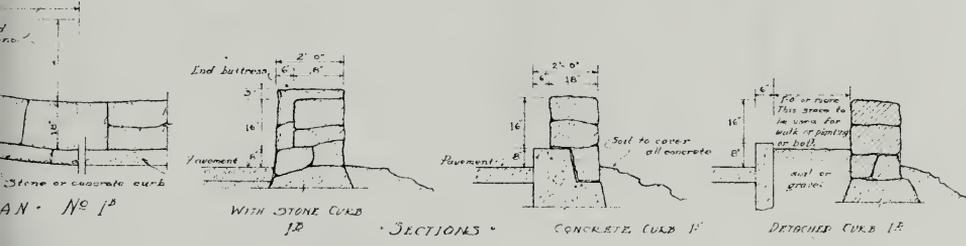
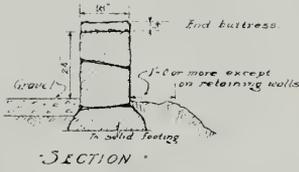
·ELEVATION·

Scale  $\frac{1}{2}$ " = 1'



·PLAN·

APPENDIX 2



This is a revision sheet superseding all of previous date. Guardrail type for any road will be selected and authorized for use by letter reference to above type and section numbers. No. C. Unit

Date Dec 16, 1929 Chief Landscape Architect

DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

STONE GUARDRAIL TYPES

NATIONAL PARK ROAD PROJECTS -

Designed by Landscape Division

Date 1/20/30

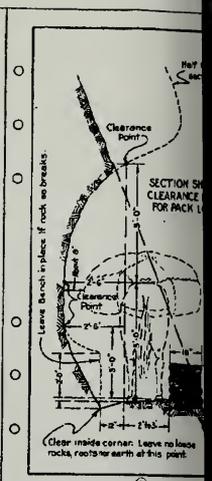
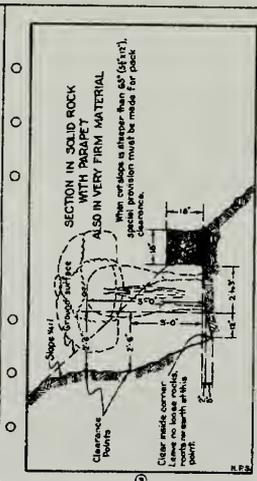
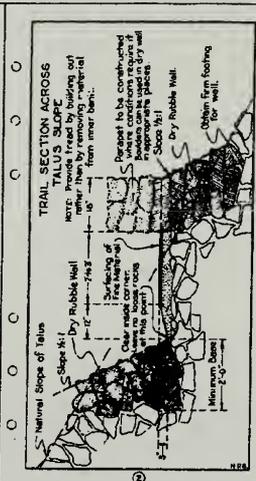
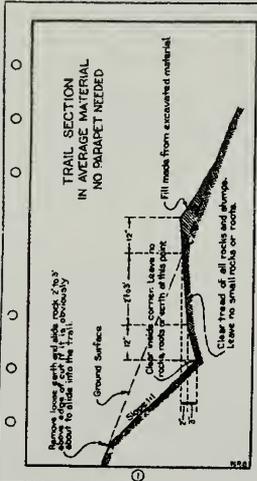
Dr. by I.A.B.

To be used

Ch. by

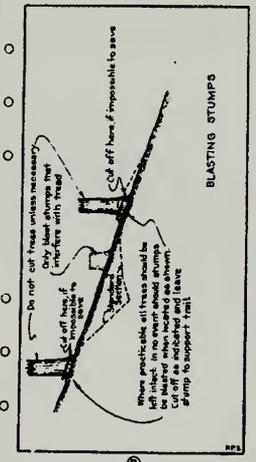
NPS drawing showing types of masonry guardrail, 1929. CLNPMAC 8899

# RIM DRIVE CULTURAL LANDSCAPE REPORT



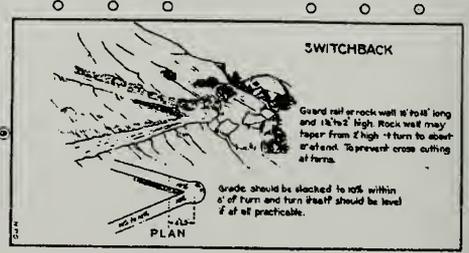
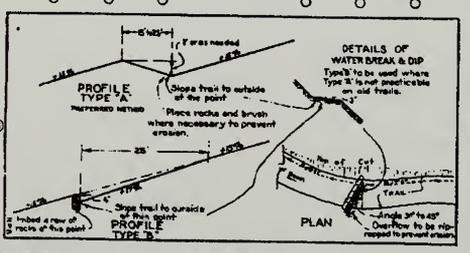
**YARDAGE TABLES**  
**4:1 BASE-BACK SLOPE 1/2" & 1/4"**  
 2" TREAD 12" SHOULDER

BACK SLOPE 1/2 to 1		BACK SLOPE 1/4 to 1	
Slope in %	CU YDS PER SECTION	Slope in %	CU YDS PER SECTION
34	21.4	42	27.3
36	23.6	44	28.8
38	26.3	46	30.7
40	29.4	48	32.2
42	33.1	50	34.1
44	37.5	52	36.3
46	42.8	54	38.3
48	49.8	56	43.6
50	58.1	58	48.4
52	68.7	60	56.9
54	81.1	62	68.1
56	111.2	64	78.3
58	154.7	66	93.2
60	248.8	68	117.7



**SPECIFICATIONS FOR TRAILS**  
**Trail Section**  
 The trail will be of the standard 4'-0" width. The slope of the cut will vary according to the hardness of the ground on which the trail is constructed.  
 Any part or all of the width may be carried on a well built of large stones, the supporting ground being braced as necessary to afford a stable foundation.  
 Where necessary to retain material on a steep slope a dry random rubble wall may be built along the down hill side of the trail. When crossing talus slopes it may also be necessary to construct a suitable dry random rubble wall on the up hill side to retain slide material along the trail. Surface of trail on talus slopes should be covered with dirt or other fine material.  
**Clearing**  
 Clear trees and brush to a sufficient width and height to provide an unobstructed passage of loaded pack animals and harness, even when the trees are loaded down with snow. Excavate clearing is not desired but should extend to a point of at least one foot beyond the limits of the excavation or fill, or wider if required by the needs of the Park Service. Clearing shall in all cases extend to a height of 16 feet above trail grade. Cut large trees only where it is impracticable to build around them, but not until after the Branch of Plans and Design has reviewed the situation.  
 Brush and logs from clearing are to be piled and burned under the direction of the Park Superintendent.  
**Landscaping**  
 All phases of trail location and construction features affecting landscaping will be reviewed and approved by the Branch of Plans and Design before construction is undertaken. It is also essential that all evidence of construction along the trail prior to retrace and hold is a minimum.

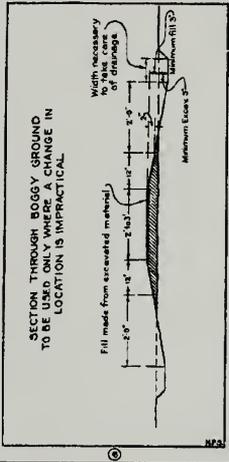
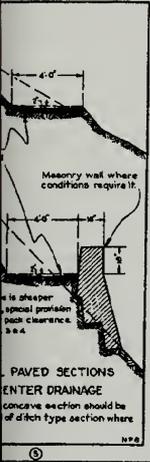
**SPECIFICATIONS FOR**  
**Grades**  
 A dip in the grade should be provided, possible, to dispose of drainage water. If drainage are such that it is unobtainable, a back grade necessary for a series of dips. The rate of grade should not be steeper except in extreme cases, and should be as near 1:10 as possible without unduly increasing the trail length. (See note page 11).  
 In short stretches of not over 100 feet of trail, may be used, providing a constant grade in all cases a grade up to 20% may be permitted only after a showing has been made that a grade is essential to avoid very serious construction cost.  
**Drainage**  
 Pipes, water breaks, culverts or traps should be provided where necessary for drainage water. Particular attention be paid to so locating the points for cross grade that shoulders or fills will not be used. Where suitable conditions do not exist or at which cross drainage must be provided trail surface and embankment must be equally protected by rip rap. A capacity of the precipitation and run off should be determined the type and spacing best suited conditions.  
 Generally speaking, dips or water lines to be preferred to culverts or traps. These latter two being considered only appropriate and necessary.  
 Drainage from switchbacks will not be done to prevent the discharge of a water into the trail below.  
**Switchbacks**  
 Switchbacks are not desired if a can be obtained for a curve.



9-5088

Compiled By R.S.D.	Drawn By A.S.D.	Typed By Cov. 434	Checked By L.C.	Revised 05/11/54
-----------------------	--------------------	----------------------	--------------------	---------------------

APPENDIX 2



YARDAGE TABLE  
BACK SLOPE 1 to 1  
64' TRAIL - 12" SHOULDER

BACK SLOPE 1 to 1			
SLOPE IN PERCENTS	SQU. YDS. PER STATION	SLOPE IN PERCENTS	CU. YDS. PER STATION
10	67	26	22.7
11	7.3	27	24.3
12	7.9	28	26.6
13	8.5	29	29.0
14	9.2	30	31.6
16	10.0	31	34.6
18	10.7	32	38.1
17	11.6	33	42.2
18	12.3	34	46.9
19	13.4	35	52.6
20	14.4	36	58.6
21	15.5	37	65.3
22	16.7	38	72.4
23	18.0	39	80.2
24	19.6	40	88.0
25	21.0		

N.P.S.

**IFICATIONS cost**  
It is used ample room should be furnished upon level rock. See page 6

masonry walls for trail construction as dry rubble walls. It is that a wall of higher type

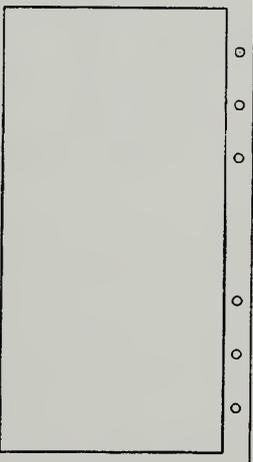
dry rubble wall must be a satisfactory and firm foundation. It has a slope toward the least 1" in 12". The outer face must have a better steeper face

Walls shall slope toward the 1/2" in 12". The stone shall be carefully bedded to prevent settling in the wall.

If a wall having a height of two or more feet is to be supported by a new fill it will be gravity action. When a wall is supported on a false section is permissible, but in no case shall be more than two feet base.

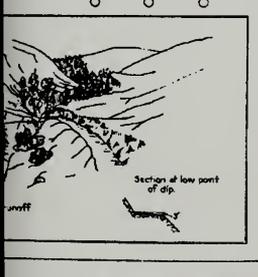
Design grades as to be of grade of appropriate to avoid all the strain being on few leg muscles.

N.P.S.



DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
STANDARDS  
FOR  
TRAIL CONSTRUCTION  
OFFICE OF THE CHIEF ENGINEER  
SAN FRANCISCO, CALIFORNIA  
OCTOBER 1934

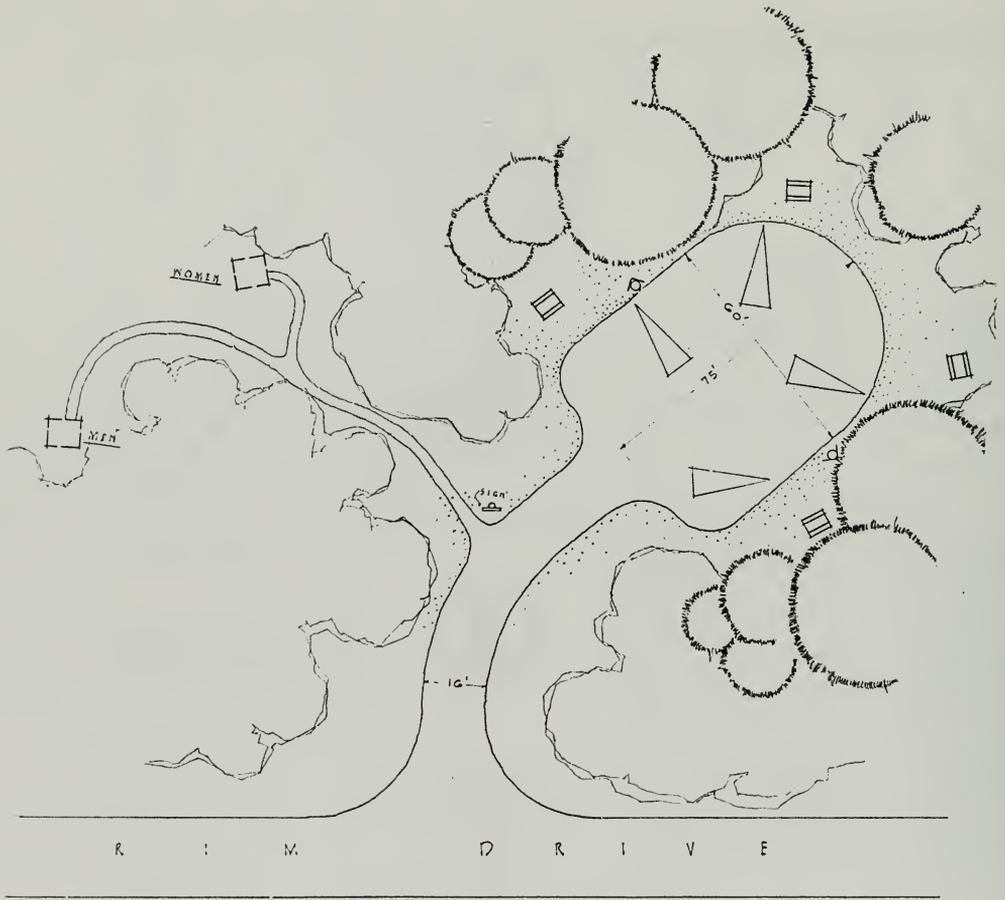
RECOMMENDED BY *[Signature]*  
Chief Engineer 10/34



DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
STANDARDS  
FOR  
TRAIL CONSTRUCTION  
OFFICE OF THE CHIEF ENGINEER  
SAN FRANCISCO, CALIF.  
OCT. 1934

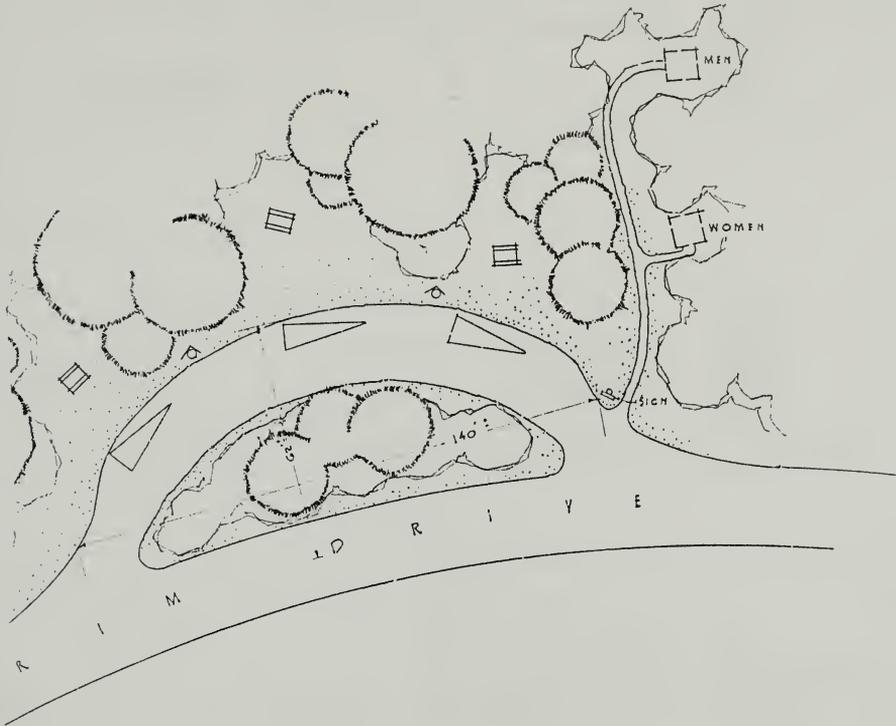
N.P.S.

RIM DRIVE CULTURAL LANDSCAPE REPORT



Concept drawing for picnic areas on Rim Drive, 1957. CLNPMAC 8899

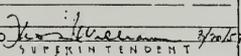
APPENDIX 2



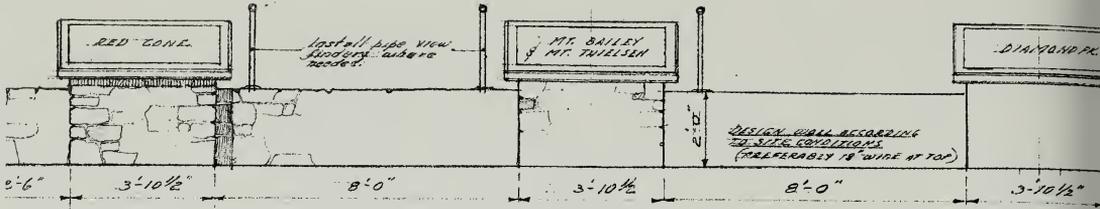
T Y P I C A L L A Y O U T S

REDUCED SIZE REPRODUCTION

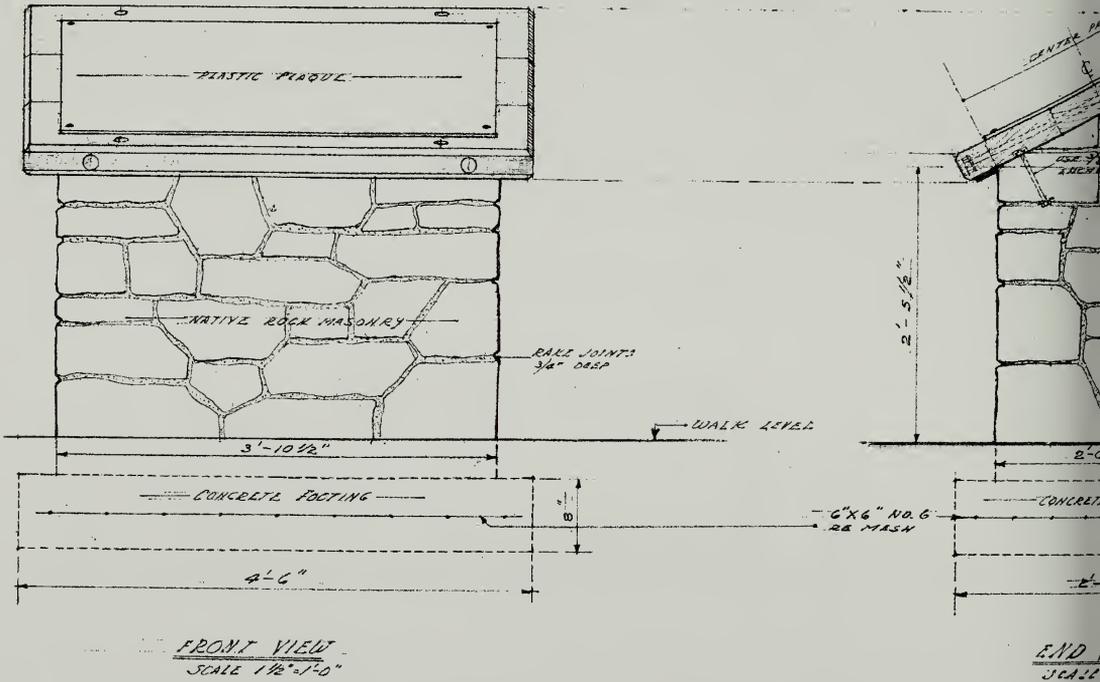
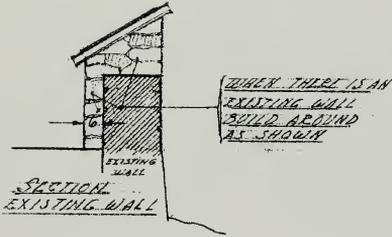
SCALE 1" = 20'-0"

RECOMMENDED	DATE	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE LANDSCAPE ARCHITECTURAL BRANCH PREPARED BY FIELD OFFICE <b>P I C N I C S I T E S</b> TITLE OF DRAWING R I M D R I V E LOCATION WITHIN AREA CRATER LAKE NATIONAL PARK NAME OF AREA
APPROVED	 SUPERINTENDENT	

RIM DRIVE CULTURAL LANDSCAPE REPORT



DEVICES USED IN  
SCALE 1/2"

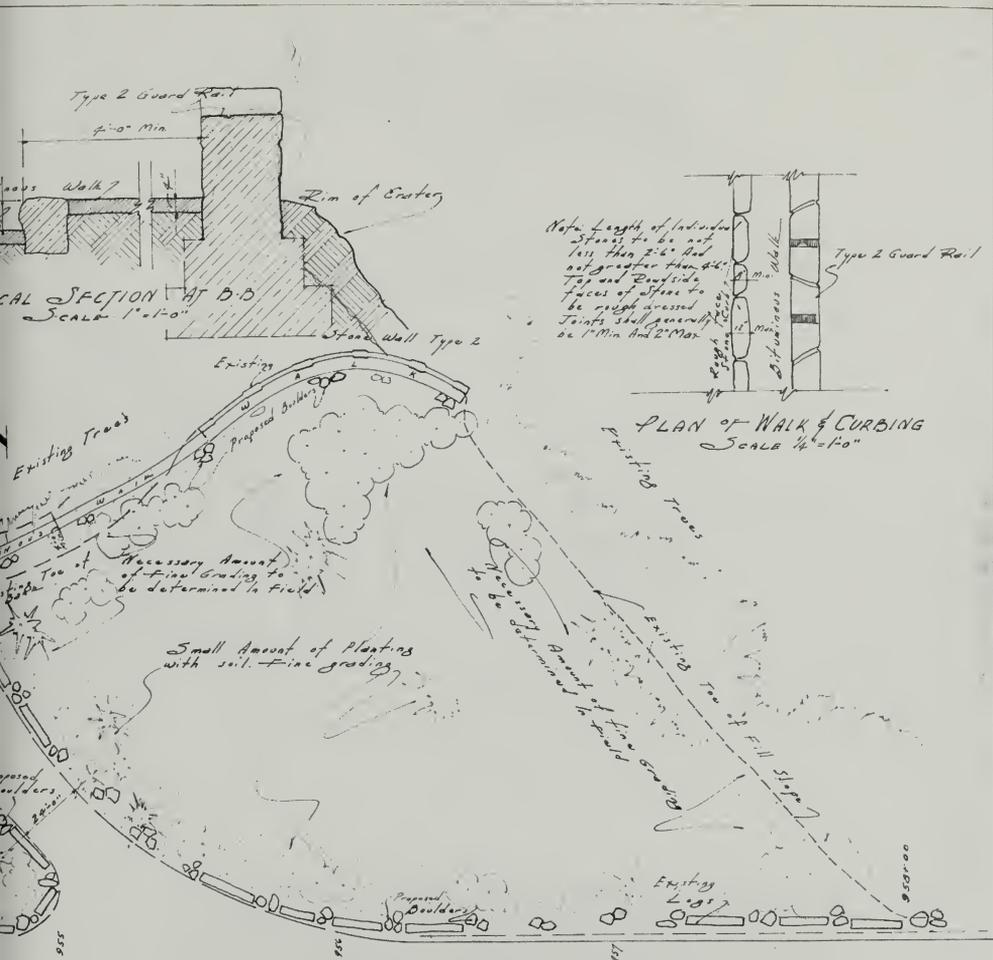


Stone masonry feature designed for use with wayside exhibits. Shown across the top is an elevation for the design at the Diamond Lake Overlook. CLNPMAC 8899.





APPENDIX 2



to 950+00

Shoulder

PLANS FOR  
PARKING AREAS - STATIONS 946+00 to 949+00 & 953+00 to 958+00  
210 W. Main Street, BOSTON  
GRAYSON LAKE NATIONAL PARK  
BRANCH OF PLANS & DESIGN  
NATIONAL PARK SERVICE  
November 30 - 1936

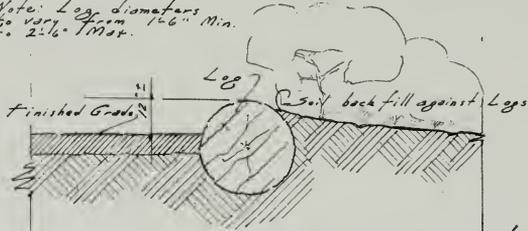
Recommended by J. E. Campbell, Date 12-14-36  
for Chief Architect

H.A.  
C.L. 3070

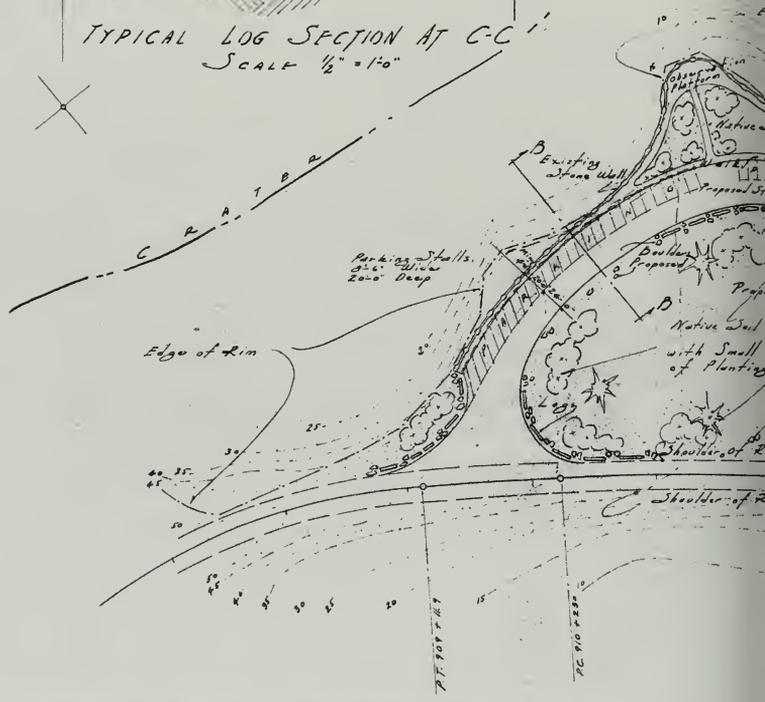
FOLD 9

RIM DRIVE CULTURAL LANDSCAPE REPORT

Note: Log diameters  
to vary from 16" Min.  
to 24" Max.



TYPICAL LOG SECTION AT C-C  
SCALE 1/2" = 1'-0"

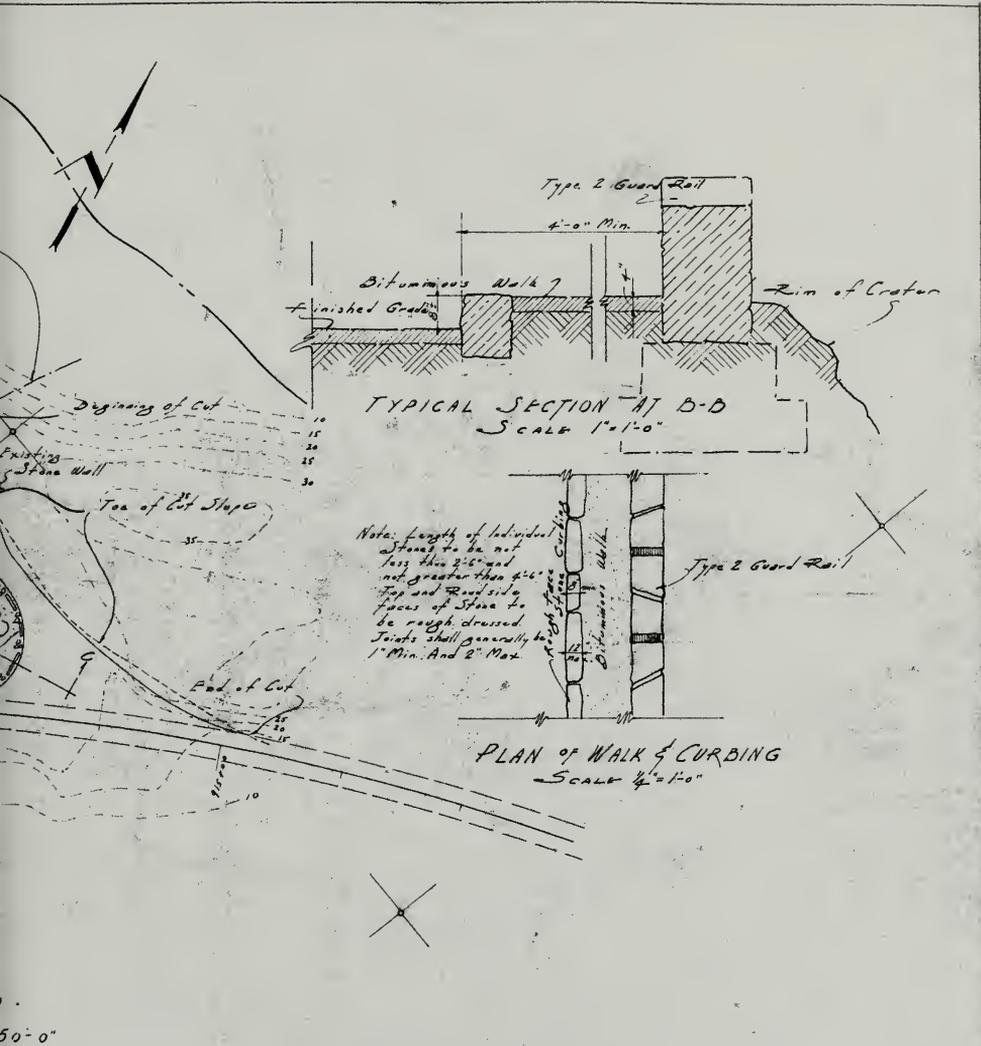


Completed parapet, 1938. Lange, CLNPMAC 10137.

Checked by  
 Approved for Approval  
 Date

S.K.  
S.C.

APPENDIX 2



Skull Head Observation Station by Francis G. Lange, 1936. CLNPMAC 8899.

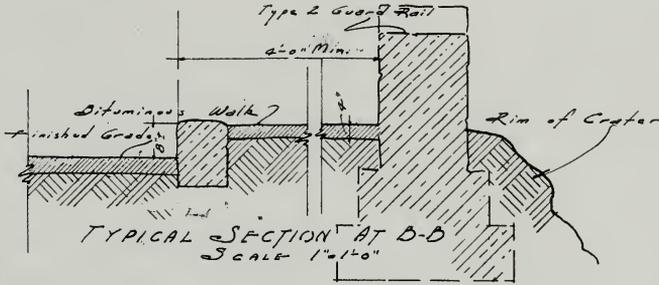
Recommended by E. Carpenter Date 12-14-36  
 For Chief Architect

PLAN FOR  
 PARKING AREA AT SKULL HEAD  
 HIGH ROAD, PARKING 76  
 CRATER LAKE NATIONAL PARK  
 BRANCH OF PLANS & DESIGN  
 NATIONAL PARK SERVICE  
 November 30-1936

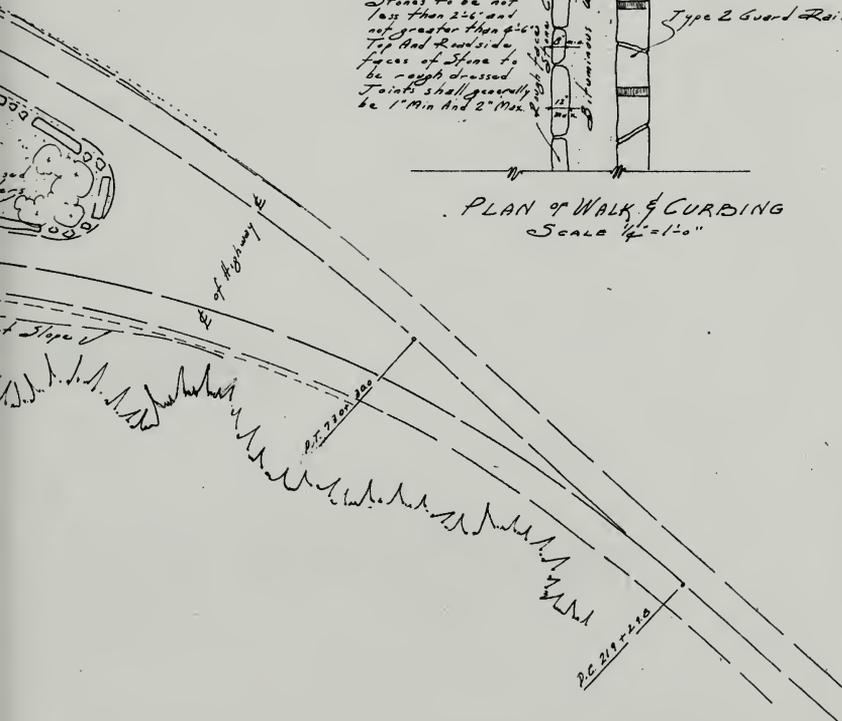
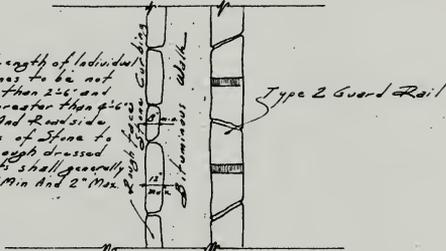
N.P.  
 CL 3069A



APPENDIX 2



Note: Length of individual Stones to be not less than 2'-6" and not greater than 3'-0". Top and Bottom of face of Stone to be rough dressed. Joints shall generally be 1" Min and 2" Max.

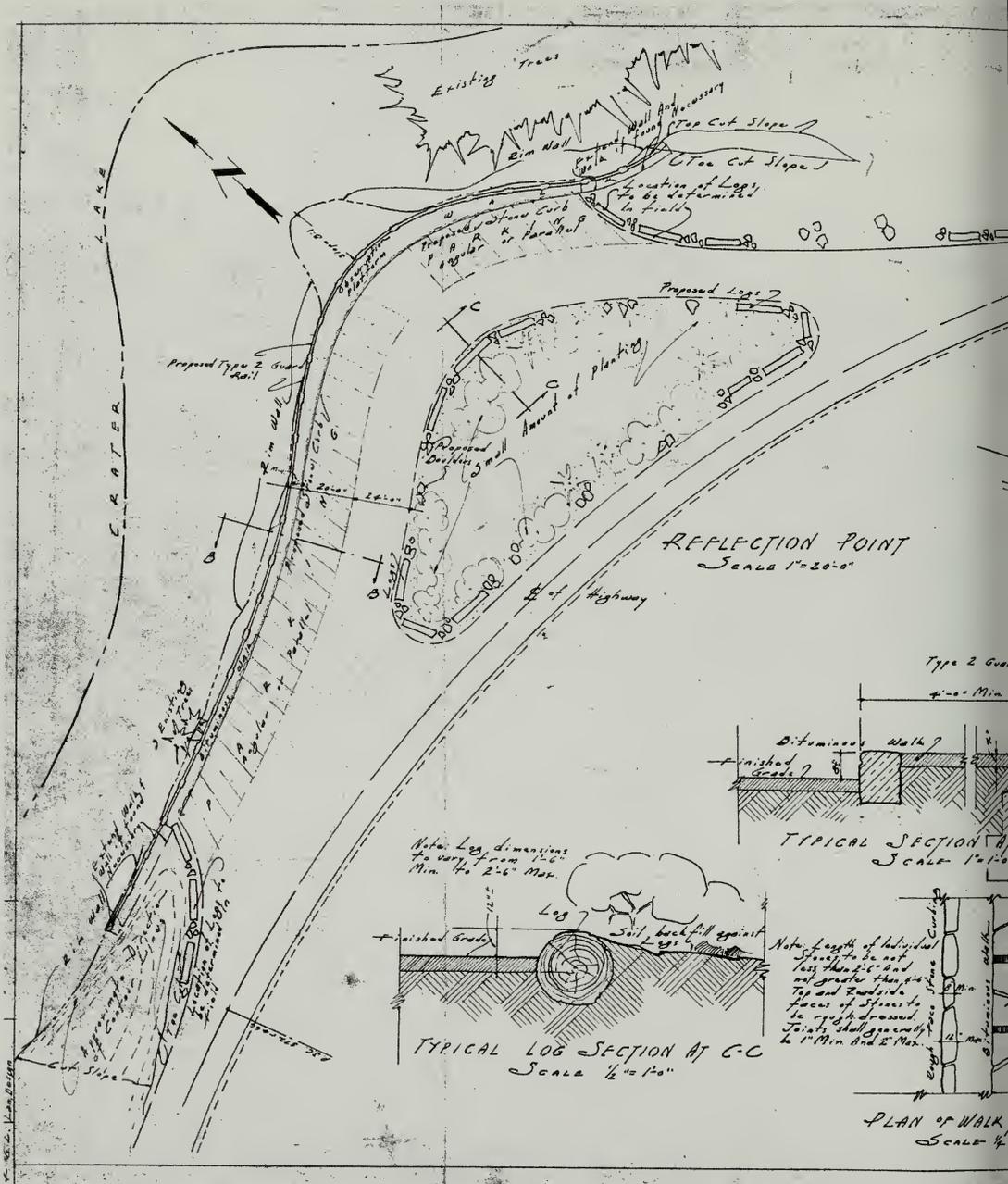


PLAN FOR  
 PARKING AREA AT CLOUD CAP  
 RIM OF CRATER F-01 UNIT  
 CRATER LAKE NATIONAL PARK  
 DRAWING OF PLANS & DESIGN  
 NATIONAL PARK SERVICE  
 November 30, 1936

Recommended Theo. S. Compton, District Engineer  
 for Chief Architect

N.P.  
 C.L. 3068A

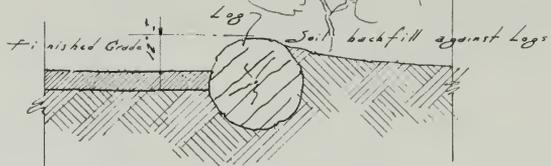
RIM DRIVE CULTURAL LANDSCAPE REPORT



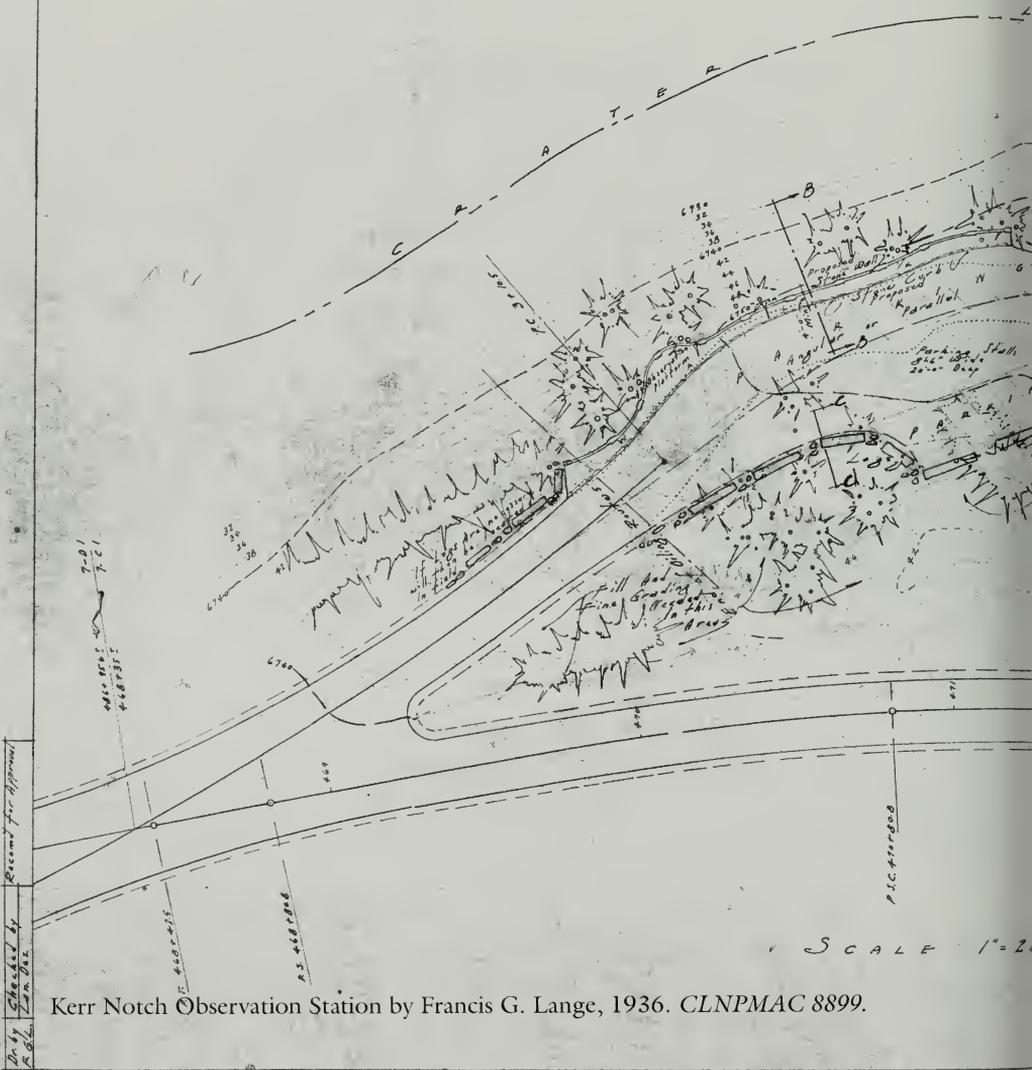


RIM DRIVE CULTURAL LANDSCAPE REPORT

Note: Log Diameters  
to vary from 1'-6" Min.  
to 2'-6" Max.

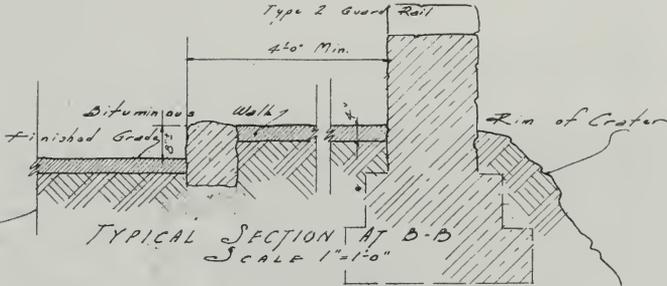


TYPICAL LOG SECTION AT C-C  
SCALE 1/2" = 1'-0"

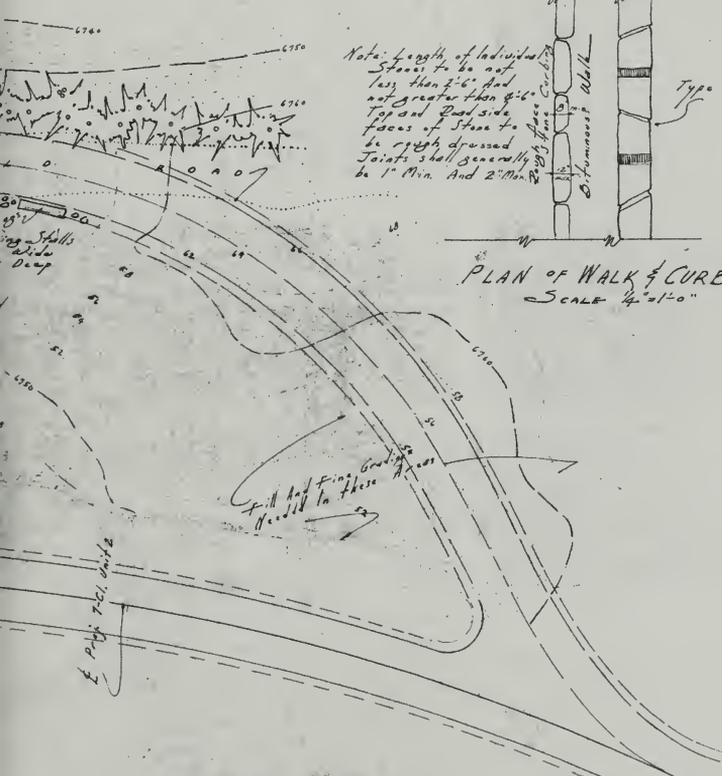
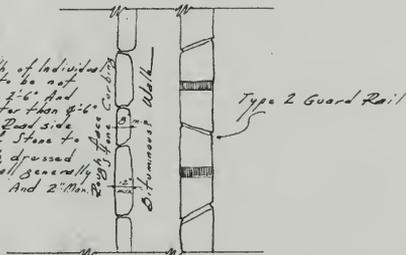


Kerr Notch Observation Station by Francis G. Lange, 1936. CLNPMAC 8899.

APPENDIX 2



Note: Length of individual  
Staves to be not  
less than 2'-6" and  
not greater than 3'-6"  
Top and End side  
faces of Staves to  
be rough dressed  
Joints shall generally  
be 1" Min. and 2" Max.



PLAN FOR  
PARKING AREA AT KERR NOTCH  
CALM ROAD PROJECT T.C.I. UNIT 2  
CRATER LAKE NATIONAL PARK  
BRANCH OF PLANS & DESIGN  
NATIONAL PARK SERVICE  
NOVEMBER 30 - 1936

Recommended by the Department  
for Chief Architect Date 12-14-36

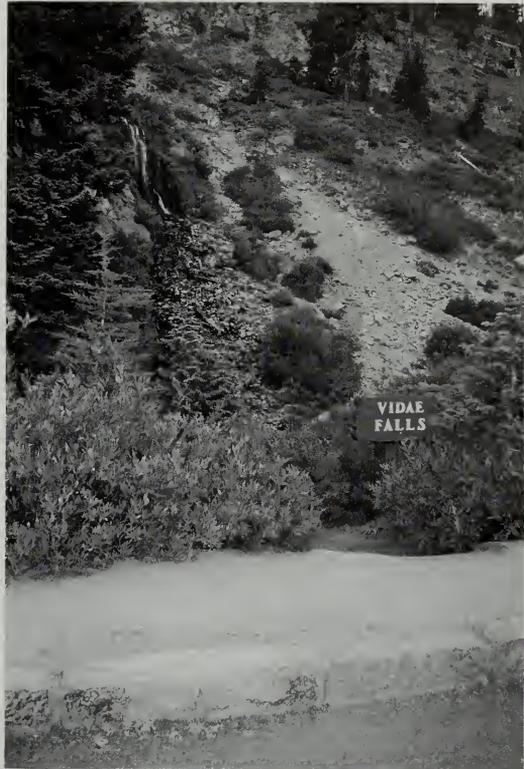
N.P.  
C.L. 3067A



APPENDIX 2



Portion of the parking area showing plantings, sign, and curb, 2007. Steve Mark.



Vidae Falls Parking Area by Francis G. Lange, 1939. Plan view shows location of irrigation lines for plantings on fill. CLNPMAC 10137.

SCALE 45 INCHES TO 1 MILE

RECOMMENDED DEPUTY CHIEF OF PLANNING DATE	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE BRANCH OF PLANNING AND DESIGN DESIGNED BY DATE	REGION IV SHEET OF
CONCURRED SUPERINTENDENT DATE	PARKING AREA LINDA COOPER 2002 SAGE NATIONAL PARK MADE TO ORDER ON REQUEST	DRAWING NO. NPS 2002
APPROVED REGIONAL DIRECTOR DATE		



Road construction east of the Castle Crest Wildflower Garden, 1939. *Struble, BPR.*

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