MOUNT RAINIER NATIONAL PARK ROADS AND BRIDGES
MOUNT RAINIER NATIONAL PARK
PIERCE COUNTY
WASHINGTON

HAER NO. WA-35

WRITTEN HISTORICAL AND DESCRIPTIVE DATA
~~PHOTOGRAPHS~~
REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
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HISTORIC AMERICAN ENGINEERING RECORD

MOUNT RAINIER NATIONAL PARK ROADS AND BRIDGES
Mount Rainier National Park
HAER No. WA-35

Location:	Mount Rainier National Park, Longmire vicinity, Pierce and Lewis counties, Washington Quadrangles: Randle, WA; Mount Rainier East, WA; Mount Rainier West, WA; Golden Lakes, WA; Mowich Lake, WA; Sawtooth Ridge, WA; Mount Wow, WA.
Construction dates:	1900-1960s
Designer:	Private parties, State of Washington, U.S. Army Corps of Engineers, National Park Service, Bureau of Public Roads, various contractors and subcontractors
Engineers:	Eugene V. Ricksecker, U.S. Army Corps of Engineers; George Goodwin, National Park Service; numerous engineers associated with the Bureau of Public Roads
Original Owners:	Land in the unreserved public domain, James Longmire and family, the Mount Rainier Mining Company, and the U.S. Forest Service
Present Owner:	Mount Rainier National Park, National Park Service
Original Use:	Private toll roads, park roads
Present Use:	Park road system
Significance:	The Mount Rainier National Park road system reflects its evolution from a primitive single-track toll road providing access from Longmire Springs to Paradise Valley to a modern system of scenic park highways and lesser access roads. The first roads were built by private individuals and mining concerns. Following the designation of Mount Rainier National Park in 1899, the U.S. Department of the Interior assiged th U.S. Army Corps of Engineers to the park. The Corps constructed the first major park road, the Nisqually Road to Paradise Valley. Subsequent roads were constructed by the National Park Service and after 1925, by the Bureau of Public Roads, an agency of the U.S. Department of Agriculture. The resulting park roads and road-related structures were carefully designed to harmonize with the park's outstanding scenery.
Project Information:	Documentation of the Mount Rainier National Park Roads and Bridges was conducted by the Historic American Engineering Record in the summer of 1992 in cooperation with Mount Rainier National Park. The project team consisted of Todd A. Croteau, HAER Architect and Field Supervisor; Architectural Technicians Bryan D. Fish, Daniella Trettel and Julie Ann Dickson; and HAER staff photographer Jet Lowe. Logistical support for the project was provided by the park and by the adjacent Gifford Pinchot National Forest, U.S. Forest Service. Richard H. Quin, Historian

This report is an overview history for the Mount Rainier National Park Roads and Bridges Recording Project. Other documentation prepared in conjunction with this project includes measured drawings, historical reports or large-format photographer for the following roads and structures:

PARK ROADS	
Nisqually Road	WA-119
Carbon River Road	WA-120
Mowich Lake Road	WA-121
West Side Road	WA-122
Stevens Canyon Highway	WA-123
East Side Highway	WA-124
Mather Memorial Parkway	WA-125
Yakima Park Highway	WA-126
STRUCTURES	
Chinook Pass Entrance	WA-43
Nisqually River Suspension Bridge	WA-44
Paradise River Fourth Crossing Bridge	WA-45
Edith Creek Bridge	WA-46
Paradise River First Crossing Bridge	WA-47
Christine Falls Bridge	WA-48
Dry Creek Bridge	WA-49
Klickitat Creek Bridge	WA-50
St. Andrews Creek Bridge	WA-51
South Puyallup River Bridge	WA-52
White River Bridge	WA-53
Fryingpan Creek Bridge	WA-54
Laughingwater Creek Bridge	WA-55
Deadwood Creek Bridge	WA-56
Deer Creek Bridge	WA-57
Stevens Creek Bridge	WA-58
Nickel Creek Bridge	WA-59
Muddy Fork Cowlitz River Bridge	WA-60
Nisqually River Bridge	WA-61
Paradise River Second Crossing Bridge	WA-62
Box Canyon Tunnel	WA-70
Stevens Canyon Tunnel	WA-74
East Side Highway Tunnel	WA-75
Sunbeam Creek Culvert	WA-76
North Puyallup River Bridge Ruins	WA-77

INTRODUCTION

Standing off to the west side from the main Cascade Range, Mount Rainier's distinct dome-shaped form is clearly visible from the Puget Sound to the west and the "Inland Empire" region of eastern Washington. The mountain's base covers about a third of the three hundred square miles of Mount Rainier National Park. The lower main range of the Cascades marches down the east side of the park, and the Tatoosh Range sits astride its central southern border. Nearly half of the park is located above 5,000' elevation, and half this area is covered by perpetual snow and ice.

A carefully-planned and designed road network provides access to many areas of the park. In the southwest, the park's oldest route, the Nisqually Road, runs through lowland forests to Longmire and then climbs to the subalpine zone at Paradise Valley on the southern flank of the mountain. The West Side Road (largely closed to public travel since 1989) runs across the lower flanks of the mountain north as far as Klapatche Ridge. In the northwest corner, the dead-end Carbon River and Mowich Lake roads penetrate five or six miles into the park. The Mather Memorial Parkway crosses the park's northeast corner. From it, the Yakima Park Highway winds along the White River for several miles before climbing to Yakima Park, the highest point reached by the park road system. At Cayuse Pass, the East Side Highway leaves the Mather Memorial Parkway and drops to Ohanapecosh in the park's southeast corner. On the south side of the park, the Stevens Canyon Highway provides a connection between the Nisqually and East Side roads; this most recent park highway drops from subalpine meadows down Stevens Canyon to the Ohanapecosh River valley.

Mount Rainier's roads were designed as scenic highways, and provide access to a wide range of natural attractions, including glaciers, waterfalls, box canyons, and mountain lakes. Scenic vistas and turnouts are provided where the best views can be obtained. The roads were often routed to present the traveler coming a round a curve with an unexpected view. Prominent roadside features are interpreted through displays, signage and observation trails.

Park roads follow the natural contours of the land where possible, winding in and out of stream valleys and over and around the many ridges extending from the central mass of the mountain. Straight line stretches or "tangents" are rare, and could not have been constructed in many places anyway. Curves are generally of low radius, and are superelevated or "banked" to allow vehicles to easily negotiate them. Even where straight stretches could have been built, reverse curves were often used to avoid presenting motorists with the conventional highway driving experience. Many park bridges are designed as curved structures. Others are built on a tangent, but the roadway crosses on a sweeping curve. Such designs allow the flow of the road "ribbon" to continue uninterrupted.

Most of the road-related structures in the park are constructed in the so-called "rustic style" of architecture, a design theme popularized by the

National Park Service and employed extensively at Mount Rainier for all kinds of buildings and structures. "Rustic" design dictated the use of natural materials in designs prepared specifically for particular sites, taking into account the surroundings, along with landscaping with native plants to blend new structures with the adjacent wilderness. Road related structures constructed in the style include the park's splendid collection of stone-faced arch bridges, a timber suspension bridge, log portals at several entrances, and an overpass trail bridge at another entry portal. Miles of masonry retaining and parapet walls, three tunnels, and a series of viaducts carry the road along or through steep "sidehill" areas. These structures were generally employed to reduce blasting and the accompnient highly-visible scarring of cliffsides. Native stone and timber was used in much of this construction, helping the structures harmonize with their settings. Some structures integrate into their settings so well that most motorists take no notice of them.

CHAPTER I

THE BIG CHILL

> Doubly happy, however, is the man to whom lofty mountain tops are within reach, for the lights that shine there illuminate all that lies below.
>
> --John Muir, *Sleep Trails*

Mount Rainier, the fifth highest point (14,411.1') in the conterminous United States, dominates the eastern half of the state of Washington and the Puget Sound area. The immense, snow-clad peak rises high above the other peaks of the Cascade range and is the most dramatic landmark of the Pacific Northwest. It is the key feature of Mount Rainier National Park.

The Indians knew the mountain as "Takhoma" or "Tahoma," the "Great Snow Mountain." They also called it "Old He," or "Largest of Peaks;" "Tacob" or "Tacobet," meaning "Big Snow," and "Saghalie Illahe," meaning something like "Land of Peace" or "City of Refuge." Some referred to the peak as the "Great Mother."[1] Despite their numerous names for the mountain, the Indians apparently never took up permanent residence on the mountain slopes, and approached it only for berry-picking, hunting, and ceremonial purposes.

The mountain was given its present Anglo name by Captain George Vancouver of Britain's Royal Navy on 8 May 1792 while his sloop *Discovery* lay at anchor in Discovery Bay at the eastern edge of the Straits of Juan de Fuca. Vancouver named the icy dome after his friend, Rear Admiral Peter Rainier, who never saw the place.[2]

The first Euro-American known to enter what is now Mount Rainier National Park was Dr. William Fraser Tolmie, medical officer for the Hudson's Bay Company. Tolmie set out from Fort Nisqually (near present DuPont, Washington) in August 1833 on a "botanising" trip. He approached the mountain from the northwest side along the Mowich River, reaching the Mowich Lake area. Tolmie collected a number of specimens on his trip; he was also the first man to report the existence of glaciers in territory now belonging to the United States.[3] Tolmie's trip was apparently the only incursion of British subjects to the area; in 1846, Britain signed a treaty recognizing lands south of the 49th parallel as belonging to the United States. Washington became a territory in 1853, and a state in 1889.

One of the most important early pioneering trips was that of James Longmire (1820-1897), an early settler of Yelm Prairie who in 1854 penetrated the Mount Rainier country seeking a better pass over the Cascades than that provided by the Naches Pass to the north. Longmire had followed the Oregon Trail to the Washington region in 1853, and was part of the first wagon train to cross the Cascades north of the Columbia River. A rancher, farmer and entrepreneur,

Longmire served in the first Washington state legislature and played a prominent role in the early development of the Mount Rainier area. Longmire's 1854 journey took him up the Cowlitz River to its headwaters. Seven years later, he opened a crude trail to Bear Prairie, located just south of the present park boundaries. These trips acquainted Longmire with the region, and he quickly established a reputation for familiarity with the surrounding country and for his affable relations with area natives.[4]

A young lieutenant from Fort Steilacoom, August Valentine Kautz, attempted to climb Mount Rainier in 1857, but was driven back by storms and the approach of night somewhere around 12,000' in elevation.[5] Kautz Creek and a series of ill-fated bridges across the stream were later named after him. This was the first attempted ascent of the mountain.

Citizens of Pierce County surveyed a road route over Cowlitz Pass, 5 miles southeast of the present park boundaries, in 1861 and 1862. In 1868 and 1869, a second survey was run through the pass for a potential railway route.[6] Nothing came of either survey, and today the pass, on the edge of the William O. Douglas Wilderness, is crossed only by the Pacific Crest National Scenic Trail.

The first successful ascent of Mount Rainier is generally attributed to Hazard Stevens and Philomon Beecher Van Trump, who climbed the mountain on 18 August 1870. They were given considerable assistance by James Longmire, who guided them to the base of the mountain. Longmire also secured for the climbers the services of a local Indian guide, Sluiskin, who accompanied the first two as far as Paradise Valley.[7] In October, Samuel E. Emmons and A. D. Wilson of the U.S. Geological Survey made another successful climb.[8]

Stanford University geologist Bailey T. Willis, a member of the Northern Transcontinental Survey, conducted exploratory work in the area immediately northwest of the mountain in the early 1880s. His work attracted the attention of the Northern Pacific Railway, which hoped to develop the rich coal fields around present Wilkeson. After hearing enthusiastic reports from Willis, the railway company's president, Thomas F. Oakes, accompanied by assistant general manager J. M. Buckley and Vermont Senator George Edmunds, visited the remote northern flank of the mountain. Oakes was convinced that the mountain had great potential for tourism, in the same manner that the company was already profiting from promoting Yellowstone National Park.[9]

Interestingly, the first suggestions for the creation of a national park at Mount Rainier came from two foreign visitors. In 1883, Kark von Zittel, a German geologist, and James Bryce, a member of the British Parliament, visited the north side of the mountain that year and were awed by the massive Carbon and Mowich glaciers, great stands of tall trees, and by the wild and picturesque scenery. The two wrote members of Congress urging the preservation of the mountain country by the creation of a national park along the lines of Yellowstone (1872) or as a national reserve, after the example set by the creation of the Yosemite Valley reserve in 1864.[10]

P. B. Van Trump, accompanied by James Longmire and George Bayley, made another ascent of Mount Rainier in 1883. On the group's return, Longmire discovered a group of chemical springs southwest of the peak. He came back several months later, filed a mineral claim on the property, and constructed a small log hotel in the wilds. In 1884, he opened a rough trail to the springs from Succotash Valley (now Ashford) to his new holdings,[11] the first route into what is now the national park. Part of the route followed the track of the old Cowlitz Trail, which Longmire had helped construct.[12] Interest in mountain climbing continued to grow, and by the end of the century a number of climbing parties made attempts on the mountain; others sought out the mineral waters of "Longmire Springs. "

More interest in the establishment of a national park to protect Mount Rainier was expressed in 1888 when the City of Tacoma received a petition from some local citizens asking the City to request the Territorial Legislature to ask Congress to set the mountain and all lands for a distance of 20 miles around it as a national park.[13] Although nothing came of the proposal, the idea continued to surface, and the park was formally designated little more than a decade later.

Also in 1888, the famed naturalist John Muir climbed Mount Rainier with Van Trump and seven other members of the Ingraham party. Muir wrote his wife that he had not intended to climb the mountain, "but got excited and soon was on top."[14] The naturalist supported the protection of the mountain as a national park, but feared that only the mountain itself would be protected, leaving the vulnerable foothills open to the depredations of loggers. "The icy dome needs none of man's care," he warned, "but unless the reserve is guarded the flower bloom will soon be killed, and nothing of the forests will be left but black stump monuments."[15] Muir also offered some observations on the difficult route from the Puget Sound: "The distance to the mountain from Yelm Prairie in a straight line is about fifty miles. But by the Mule-and-Yellow Jacket trail, that we had to travel, it is one hundred miles. For, notwithstanding a part of the trail runs in the air where the wasps work hardest, it is far from being an air-line as is commonly understood."[16]

That same year, Elcaine Longmire's wife, Martha, climbed as far as Paradise Valley, which she rewarded with its name on account of the profusion of alpine wildflowers.[17] The valley was destined to be the main attraction for future tourists.

James Longmire, hoping to attract more visitors to his medicinal springs, replaced his original 1885 hotel with a two-story split-cedar log structure in 1890. He then began soliciting Pierce County to build a proper road to the springs. Longmire made speeches before the Washington Alpine Club and the Tacoma Academy of Science, stressing the importance of mountain tourism. The commissioners agreed that a road should be built but were unable to appropriate funds. Undaunted, Longmire personally began construction of a wagon road from Yelm Prairie. Several Indians assisted Longmire and his

family in the endeavor. The road was completed in 1891 at a cost of about $100 a mile, and the first real "tourists" arrived. A year later, the Longmires opened a horse trail to Paradise Valley. These early visitors were attracted by the medicinal springs, but carried back reports of the stunning mountain scenery. Longmire collected tolls for the use of the road in early years. With his son, Elcaine, he also began operating pack trains to convey visitors in from Yelm.[18] Although the first visitors were drawn to Longmire Springs for the alleged hydrotherapeutic benefits, they carried back reports of the stunning beauty of Mount Rainier, and soon genuine tourists began making the trip to take in the scenery. One of these, Alfred Lovell, stated that Longmire's road was ill-suited for wagon travel, as it was not graded and the stumps had not been taken out.[19] The Longmire holdings, adjacent to the later park development of Longmire, remained in family hands until 1939, when they were purchased by the National Park Service.

On 20 February 1893, President Benjamin Harrison issued a proclamation creating the "Pacific Forest Reserve," which set aside the entire Cascade chain in the state of Washington. President Grover Cleveland changed the name to the "Mount Rainier Forest Reserve," and a few years later the area immediately surrounding the mountain was designated as the "Mount Rainier National Forest." Federal designation of the forest reserve made national park status much easier to obtain.[20]

By 1894, the campaign to have Mount Rainier designated a national park gained momentum. That year, the National Geographic Society, the Geological Society of America, the American Association for the Advancement of Science, the Appalachian Mountain Club, and the Sierra Club were instrumental in having a bill introduced in Congress for the creation of the "Washington National Park" surrounding Mount Rainier. Although this first bill did not pass, its sponsor, Senator Watson Squire of Washington state, continued to push for designation.[21] The Northern Pacific Railway arranged for Olin D. Wheeler, editor of its magazine, *Wonderland*, and a company photographer to climb the mountain in 1894. While Wheeler's account was aimed at increasing the railway's business, it contributed to the interest in the national park campaign.[22]

James Longmire, always seeking means to draw more visitors to his establishment, financed Harry Carter's reconstruction of the horse trail from Longmire Springs to Paradise Valley in 1895. This rough foot and pack trail enabled visitors to reach the fabled flower fields of Paradise Valley. Two years later, James Skinner opened a crude tent hotel at Alta Vista on the edge of Paradise Park. John L. Reese, who acquired it in 1898 when Skinner departed for the Klondike, was not satisfied with its location, and relocated the camp to Theosophy Ridge to the immediate south. The tent hotel was known as the "Camp of the Clouds," and it catered to early tourists.[23]

Cycling was becoming popular in western Washington at this time, and the League of American Wheelmen, a cyclists' organization, lobbied the Pierce County commissioners to improve the road to Mount Rainier. By the early

1900s, they had succeeded in having the road rerouted up the Nisqually River valley to the foothills. They said that a paved road would make one of the most glorious drives in the country available to cyclists.[24]

As the nineteenth century came to a close, the only road into the present park was the wagon road to Longmire Springs and its rough extension to Paradise Valley. But interest in the mountain was increasing, and following the designation of Mount Rainier National Park in 1899, demands for improved access would lead to the construction of an amazing park highway.

CHAPTER II

FIRST ROAD

> Today, six-cylinder cars purr over a perfect highway that bends and twists upward so gently that we who traveled the old trail are lost in wonder at the transformation.
>
> --*The Mentor*, 1918

Mount Rainier National Park was created by an act of Congress (30 Stat. L., 993) and signed by President William McKinley on 2 March 1899. The land was taken from the Pacific National Forest Reserve. The original park boundaries encompassed an 18-mile square, containing 207,782 acres or 325 square miles.[25] This was the fifth national park to be created. Despite the designation, no monies or staff were immediately available for the new park. It was not until 1902 that an administrative apparatus was created. That year, Secretary of the Interior Ethan Allen Hitchcock placed the park under the temporary jurisdiction of Grenville F. Allen, "Forest Supervisor for the State of Washington" for the Department of the Interior (after 1 July 1905, "Forest Supervisor for the Mount Rainier Forest Reserve," U.S. Department of Agriculture). The next year, Allen was given two seasonal rangers and a budget of a few hundred dollars to oversee and manage the immense national park.[26]

While the mountain was now protected, the lowland environment that John Muir had urged be preserved was not entirely included in the park. The act creating the park allowed mining and exploration for minerals to continue within the park boundaries. Congress was criticized for trading off valuable lands in other states to acquire certain economically-insignificant tracts around the mountain that had been owned by the Northern Pacific Railway. Environmental historian Alfred Runte calls the 1899 act "an example of scenic preservation designed to the specifications of big business and frontier individualism, not the needs of the environment."[27]

In 1903, the Secretary of the Interior requested an appropriation of $3,000 for management of the park and the construction of roads and trails. Forest Superintendent Allen reported that there was but one road into the park, the 6-mile track to Longmire Springs. On account of the difficult conditions, only some 300 visitors a year were making trips to the park.[28] Through careful lobbying by Washington Congressman Francis W. Cushman and conservation groups, Congress was convinced to appropriate funds for improvements. The Sundry Civil Appropriations Act of 3 March 1903 directed the Secretary of War "to cause a survey to be made of the most practical route for a wagon road" into the park, and appropriated $10,000 for the project. Major John Millis of the U.S. Army Corps of Engineers was placed in charge of the work.[29] The Corps of Engineers had recently completed the Grand Loop Road [HAER No. WY-25]

in Yellowstone National Park, and the Army was administering that park along with Yosemite and Sequoia. At Mount Rainier, the park administration remained under control of an Interior Department appointee, but the new park road was to be built under direction of the Corps.

Despite lobbying from citizens of King County, Seattle, Enumclaw and Yakima for their own proposed routes into the park, a decision was made to reconstruct the existing road from Tacoma via Ashford. The survey for the new "Government Road" [HAER No. WA-119] got underway in midsummer, under the general supervision of Eugene V. Ricksecker, Assistant Engineer for the Corps. By the end of July, the survey was approaching the Nisqually Glacier at the head of Nisqually River, and by the end of September was complete to the Nisqually River.[30] The first segment of the road was put out for bids on 8 September; however, all bids came in too high and were rejected. The survey party neared the "Camp of the Clouds" at Paradise Valley before an early snowfall halted the work. They had generally followed the route of the old Longmire trail.[31]

In February 1904, Millis estimated the cost of the new road at $183,000.[32] The new Sundry Civil Appropriations Act of only authorized another $30,000, of which $6,000 was to be used to continue the survey. The remaining money was allocated to begin construction. A new survey party was to begin a location survey from the east side of the park, working back towards Paradise; Junior Engineer John Zug was placed in charge of this crew in July.[33]

Completion of the Tacoma Eastern Railway to Elbe in May 1904 provided for much easier access to the gateway of the park. Longmire Springs could now be reached in less than eight hours from Tacoma. Over the summer, the railway was extended another 8 miles to serve coal mines at Ashford, further reducing the time required to reach the mountain.[34] With the completion of the railway spur, daily stage service was inaugurated between Ashford and Longmire Springs.[35] For the rest of the park's first decade, most visitors would arrive by rail. Increasing visitation brought on by completion of the rail link made new demands for the immediate construction of the park road.

As the new "Government Road" was not designed for commercial purposes, the usual practice of choosing the shortest distance between two points, with due regard for gradient, did not apply. Instead, the route was planned as a pleasure road for the enjoyment of park visitors and to offer better access to Paradise Valley, the usual beginning point for summit attempts. Ricksecker specified that the new road would follow the natural terrain wherever possible, utilizing series of graceful curves. Many of these would present the user with unexpected views of the stunning mountain scenery. A maximum ruling grade of 4 percent, considered the steepest over which horses could trot and the steepest which could be negotiated by cyclists, was exceeded only in very short stretches.[36] The road was designed as a wagon road, not to accommodate automobile traffic.

Seven principal bridges were required, the longest of which were a 240' bridge across Paradise River and a 180' trestle across Van Trump Creek. Ricksecker recommended that the Van Trump Creek and first Paradise River bridges be built of steel or concrete, or preferably in combination; wood, he reasoned, could be satisfactory for the other spans.[37] As it turned out, funds could not be secured for more durable construction and all the early bridges were constructed of wood.

Construction began in August 1904, and continued until November when it was halted by winter weather. In this first and almost every subsequent winter season, the extreme winter conditions at Mount Rainier would force seasonal halts to construction operations. The work was not resumed in the spring of 1905 because of financial problems encountered by the contractor.[38]

Lieutenant Zug's party completed its work on the east side of the park in late 1904. The party surveyed a road route from the head of the American River along the Cascade Crest and over into the Ohanapecosh Valley, then up Olallie Creek over the Cowlitz Divide into Cowlitz Park. The cost of a road along this route was estimated at $104,490. If built, the road would later be connected with the government road near Paradise Valley.[39]

Mining claims remained active in the park boundaries. Acting Superintendent Allen reported seventeen active claims in his 1904 report to the Secretary of the Interior. He suggested that most of the claims had been taken out in good faith, but were probably worthless. Little or no valuable prospecting had been done.[40] While the industry met with little success at Mount Rainier, one mining company would later construct a service road which would open up access to the White River basin.

A meeting of representatives of the Sierra Club and the Mazamas, a Portland mountaineering group, was held at Paradise in July 1905 to make recommendations on the improvements to the national park. Better access was one of the main priorities. The joint report stressed that "Too much emphasis cannot be placed on the means of access to the various regions of this great park." It called for the speedy completion of the government road from Longmire Springs to Paradise. However, both groups strongly favored the construction of improved trails, as a good trail network could be installed "at a tithe of the cost of the Government Road."[41]

While in the park, the Sierra Club members made a climb of Mount Rainier. One of the participants was Stephen Tyng Mather, a wealthy industrialist from California who would take over the administration of the national parks in 1915 and became the first director of the National Park Service two years later. Mather considered the climb a turning point in his life, filling him with an enthusiasm for mountaineering. Afterwards, he participated in a major climb almost every summer.[42] The 1905 climb acquainted him with Mount Rainier, a park with which he would later be intimately involved.

Hiram Chittenden, having been promoted to Major following the completion of his work in Yellowstone National Park, was placed in overall supervision of the road project in the spring of 1906.[43] Work on the road resumed that spring with hired labor under government supervision, and 7 miles of road between the western park boundary and Longmire Springs, were completed. The Secretary of the Interior requested another $70,000 for road construction in the Fiscal Year 1907 budget.[44]

Grenville Allen, still Acting Superintendent of Mount Rainier National Park, warned that with the pending completion of the road, a new constituency would begin to make demands on the park.

> Upon the completion of the Government Road it is probable that there will be a desire to take automobiles into the park. The presence of these contrivances would be a source of great annoyance and some danger to the public generally. It may be that by the use of hired automobiles will eventually be the cheapest method by which to travel thru the park, but until this condition obtains they should be prohibited.[45]

At this point, visitation was still rather limited, with only 1,986 visitors reported for 1906.[46] However, as Allen predicted, the advent of a motor road would lead to vastly increased numbers of park users. Motorists pressured the park administration for entry into the park. By order of the Secretary of the Interior, automobiles were at last permitted to enter the park on 7 August 1907. On that date, a small caravan entered the park and proceeded as far as Longmire Springs; the total number vehicles for the year was only sixty. Regulations for the use of automobiles were published in conjunction with the opening. A permit, good for a year, cost $5.00. Travel was permitted only from 9:00 AM to 11AM and from 3:30 PM to 5:30 PM. The speed limit was 6 mph except on the rare straight stretches. Penalty for violations was ejection from the park.[47] [See Appendix I for a copy of the 1908 regulations.]

Park reports indicate a "neat lodge" was established at the Nisqually entrance for motorists to obtain permits. Superintendent Allen requested funds to build a cabin for the ranger who collected the fees, and in May 1908, the park's first ranger residence was completed.[48] Known as the "Oscar Brown Cabin" after its first occupant, the distinctive stick-style cabin remains in use (in 1992, it was occupied by the park superintendent) and is one of the park's oldest structures.

The order, incidentally, made Mount Rainier the first major national park in which automobiles could be legally operated. Although cars had been driven in Yosemite in 1900 and several other parks even earlier, their use was quickly prohibited. Mount Rainier's new road, still under construction, was the first park road officially opened to the new form of transportation. The Interior Department lifted the ban on automobiles in other parks over the next decade, and by 1916 motorists generally had access throughout the system.

Interestingly, women were not allowed to drive on the upper part of the Nisqually Road for the first seven years. In response to a complaint, the Secretary of the Interior in 1914, Franklin K. Lane, offered this explanation for the park policy:

> We have, however, felt it necessary, during the past few seasons, to prevent women, and boys under twenty-one years of age driving cars around the dizzy Ricksecker point between the snout of the Nisqually Glacier and Narada Falls. The road is narrow at this point, and if a machine should go over it would drop nearly three thousand feet before striking an object of any kind. We are improving this road, making it wider at the Point and constructing a parapet which will make the road safe for any driver of ordinary experience. As soon as this work is completed we shall remove the restriction in question.[49]

Relatively few automobiles visited the park in the early years. The Nisqually Road was far from complete, and offered only limited access to the park's interior. Automobiles were still uncommon, being too expensive for most Americans. The wealthy public that owned most automobiles in the early twentieth century was generally accustomed to travel by rail, and for a few years more most visitors traveled by rail to Ashford and then entered the park by stage.

Major Chittenden in 1907 suggested a "round-the-mountain" road system to provide for improved access and greater tourist use of Mount Rainier National Park. He recommended that it be constructed as a horse trail just below the glacier line, and then upgraded to a wagon road.[50] Over the next three decades, this circuit road concept would govern park road planning and development. But at the moment, the Corps of Engineers and the park administration remained focused on the completion of the "Government Road" to Paradise. The 1907 construction season was a short one, with crews working only from June to September. Clearing work was continued above Longmire Springs. An overhead hewed timber Howe truss bridge of 75' span was constructed over Van Trump Creek Canyon below Christine Falls.[51]

As of July 1908, the acting park superintendent reported that 14 miles of the new road had been completed, with 11 miles remaining unfinished. The road this year reached the Nisqually Glacier. This was noted as a major feat, as it was the first road in the country to reach an active glacier. A 100' wooden Howe truss bridge was erected across the river at this point. Visitation increased rapidly as the road began to provide better access; by the end of the year, 2,826 visitors were recorded, and 117 automobile permits had been issued.[52]

Acting Superintendent Allen reported that the automobiles were generally well-received. However, he pointed out that only the imposition of a strict speed limit protected motorists from considerable danger. He was willing to allow cars to use the road if drivers could be convinced of the need to adhere to

the speed restrictions. "The owners of the automobiles derive a great deal of pleasure from the use of the road," he noted, "and I do not think that there is now any very general objection to them on the part of the public."[53]

Eugene Ricksecker urged that the road be completed to Paradise Park in time for the opening of the Alaska-Yukon-Pacific Exposition which would be held in Seattle in 1909.[54] In an October 1907 letter to the Secretary of the Interior, he also suggested that the road be extended up to Camp Muir:

> In order to place the extensive views from the higher elevations within the reach of those now barred by the fatigue of tedious climbing on foot, it is suggested that the terminus of the road now building to Camp of the Clouds (elev. 5600) be placed as near Camp Muir (approx. elev. 10,000) as it is practicable to get it, and that a trail be made from end of road to Gibraltar Rock (approx. elev. 12,000) with such safety devices around this rock, now the most dangerous portion of the ascent of the Mountain, as will materially lessen the danger.[55]

Ricksecker also urged the construction of a stone shelter in the crater at the summit, stating it would be "a great public comfort."[56] Nothing came of any of these suggestions, and the summit is still reached only by "tedious climbing on foot."

Eighteen miles of the new park road were finished by 1 July 1909, and another 2 miles, while not complete, were open for use. The number of visitors had grown in one year to 3,787. Of these, 3,670 arrived on the new road, 467 in automobiles. Cars could travel as far as the Nisqually Glacier, and by the end of the next season, to Narada Falls. Park rangers were provided this year with a motorcycle for patrol work on the new road; its cost of operation for the year was $15.00. The first automobile accidents were recorded at this time. The most serious was occasioned by a car being run off a bank by an incompetent driver, with the result that the owner, a Mr. Schoenfield of Tacoma, broke his arm. The other three were relatively minor.[57]

The road was completed to Paradise Valley, a distance of 25 miles, in 1910. Acting Superintendent Allen commended Ricksecker, calling the road "one of the best scenic routes in America." Immediately, the number of visitors soared. A total of 7,754 visitors entered the park that year. The number entering by car passed the number arriving by stage, 4,413 to 2,620, and two auto stages began operating out of Ashford. The government allotted $1,000 for the maintenance of the new road. Some final work remained to be done, and cars could still pass no further than Narada Falls.[58] However, the era of the automobile had begun in Mount Rainier National Park.

The Corps of Engineers maintained that since the road had been planned as a *wagon* road, substantial work would be required to make it safe for the use of automobiles. They held that the road was too narrow, and argued that the road should be "metaled,"or surfaced with rolled crush stone or cinders, to bear

the heavier traffic loads.[59] However, autos continued to use the road in its existing condition.

Superintendent Hall requested that "an archway of rustic design" be constructed to mark the entrance to the park. On a visit from Seattle in 1910, Secretary of the Interior Richard A. Ballinger agreed, and directed Hall to proceed with its construction. Hall reported the completion of the peeled cedar log structure at the west entrance in the spring of 1911.[60] This continued the use of the "rustic style" begun at Mount Rainier with the construction of the Nisqually entrance station and the Oscar Brown Cabin.

President William Howard Taft, accompanied by a large party, visited the park in automobiles on 8 October 1911. His car is popularly referred to as the first to reach Paradise Valley. Actually, the presidential touring car bogged down in the mud above Narada Falls, and had to be dragged to the valley by a team of mules.[61] However, a vehicle driven by a Mr. Lynn Miller, who was accompanied by Superintendent Hall and Edward Allen, had driven to Paradise Valley in August,[62] and construction vehicles had almost certainly traversed the entire route.

In his 1911 annual report, Hall recommended extension of the government road one mile further up Paradise Valley, and the construction of a spur road from a point 4 miles above Longmire Springs to Indian Henry's Hunting Ground, a broad meadowland on the mountain's southwest flank. He also called for the survey of a road route around the north and east sides of the mountain. Hall urged construction of access roads into the northwest part of the park, and in the southeast to connect with the Yakima County road system, as well as branch roads to various points of interest.[63]

Assistant Secretary of the Interior Carmi A. Thompson astonished the Tacoma Commercial Club and Chamber of Commerce by promising to support "a road up Mount Rainier." Speaking at a December 1911 dinner held in his honor, Thomson told the gratified audience that the proposal was feasible.

> Gentlemen, I have seen your mountain. I have come to know something about it. I have seen your road, a remarkable engineering feat; I have seen the accessibility of the park and the attractions of the glaciers. I, like the average man, like to climb mountains in an auto. Yours is the only one obliging enough to let me. I am going back east to do what I can--to bend every effort toward the development of the park I have to come to know about.[64]

Even if Thompson "bent every effort" when he got back east, his summit road plan was evidently never considered.

The Corps of Engineers withdrew from the park at about this time. Responsibility for further road improvements and maintenance was transferred to the park administration. The Corps would not be involved in the

construction of the future roads, but its legacy, the Nisqually Road, remains the principal park thoroughfare and one of the most scenic motorways in the country.

To foster further development of the park, civic and commercial interests in the Puget Sound cities organized the Seattle-Tacoma Rainier National Park Committee in 1912. The five organizing bodies were the New Seattle Chamber of Commerce, the Seattle Commercial Club, the Rotary Club of Seattle, the Tacoma Commercial Club and Chamber of Commerce, and the Rotary Club of Tacoma. The new joint committee formulated a nine-point policy, aimed chiefly at the development of an improved park road system. Wanting to press its case before Congress in Washington, the committee appointed road engineer Samuel C. Lancaster as its special commissioner. Lancaster was to work with the Washington legislative delegation, Interior Department officials, and Congressional appropriations committees in an effort to secure at least $100,000 for further development of park roads.[65]

Lancaster maintained a busy schedule of meetings with Washington legislators and officials, and in January 1913 was able to arrange a meeting with President Taft. With the President's apparent support, Lancaster sought an appropriation for at least $100,000, and Senator Wesley L. Jones introduced a bill that month to authorize $175,000 for the park. However, Congress was unwilling to make such a major commitment, and only $23,500 was appropriated for 1913-1914, $10,000 of which was to go towards a new road survey, the rest for salaries and maintenance.[66]

Survey funds provided for the investigation of a road route from a point on the existing road at or near Longmire Springs to the east boundary of the park. New Superintendent Ethan Allen suggested that, because of interest from the Washington State Highway Commission, the road would be a segment of a new state road linking the east and west ends of the state. The proposed road would be surveyed to connect with Washington State Route 5 near the Cowlitz River and the McClellan Pass Highway now under construction.[67] The chosen route would run south of the Tatoosh Range along Skate Creek and then up the Ohanapecosh River. Most of the route was outside the park, but due to the low elevation, would be open for travel much of the winter.[68] This road was not built. However, the Skate Creek Road (Forest Service Road 52) was constructed along part of the route south of the present park boundaries in the 1950s.

The first surveys for the "Wonder Road" encircling Mount Rainier were conducted in 1913.[69] The route as originally proposed would leave the government road near Christine Falls, double back over the hills to Indian Henry's Hunting Ground, drop into the Tahoma Creek Valley, then climb though St. Andrew's Park and around the snout of the Mowich Glacier to reach Spray Park. From there, it would cross Moraine Park, the valley below the Winthrop Glacier, and then ascend again to Grand Park and the Sourdough Range at Sunrise Park, thence southward below the toe of the Emmons Glacier to Summerland and Cowlitz Park, and finally west to a junction with the existing road at Paradise. Between 80 and 100 miles of road construction would be

required, at a cost of approximately $10,000 a mile, or roughly a million dollar appropriation.[70] The proposed road would follow much of the route of the famed Wonderland Trail encircling Mount Rainier.

More permits for automobile livery services were issued in 1913, including licenses to the Tacoma Auto Livery Company, St. Helens Garage, and August Cultum. The "Kum-an-go Transportation Company" was issued a permit to operate a seventeen-passenger auto stage between the park entrance and Longmire Springs, and J. L. Reese was authorized to care for and cover cars at the Nisqually Glacier.[71] Superintendent Ethan Allen, who succeeded Hall that year, applied to the Interior Department for funds to purchase the park's first car and truck.[72]

The State of Washington began construction of the "McClellan Pass Highway" through the Cascades in 1913. The road would leave the Pacific Coast Highway in the Seattle suburb of Auburn, then run east and south through Enumclaw and Greenwater to the park's northwest boundary. It would head south along the west side of the main Cascade crest (then outside the park boundaries) to Cayuse Pass, then east over the crest at Chinook Pass. From there, it would follow the American River and its tributaries down the east side of the Cascades to Yakima. The first link of the road was built from Auburn to Greenwater, and by 1916 the road was approaching the north boundary of the park.

The Government Road was finally opened to cars for the entire length to Paradise in July 1915. However, due to the narrow width of the road, the last 7 miles were operated on a one-way control system, with uphill and downhill traffic allowed only at certain times. Small frame cabins were built to house traffic control rangers at Glacier Bridge and Narada Falls.[73]

The survey for the extension of the road to the east boundary of the park was completed under contract by W. M. Bosworth in the fall of 1914. The proposed route would be 44 miles in length.[74] Again, funds were not released for construction, and it would be nearly sixty years before the Stevens Canyon Highway finally provided for east-west travel across the park.

Also in 1914 the Mount Rainier Mining Company began construction of a service road on the east flank of the mountain. A permit for the work was issued by the Department of the Interior because the company had a legal mining claim. The road left the McClellan Pass Highway (under construction by the State of Washington) at Greenwater and climbed along the north bank of the White River to Glacier Basin, a distance of about 12 miles. The road was completed in 1916, and the company began running an auto truck to its claims. The park supervisor warned that with the completion of the McClellan Pass Highway, there would be considerable pressure from tourists to use the mining road.[75]

The park administration first considered construction of a connecting road across the north side of the park between Carbon River and the end of the mining road at Glacier Basin. However, following a reconnaissance trip in

October 1915, Park Supervisor Dewitt L. Reaburn expressed doubts as to whether the road should be constructed. He stated it would be "a tortuous road at high elevations" and entail "an enormous expense." He reported that the state had just finished final surveys for the McClellan Pass Highway. As he expected this road to be completed the next year [it was not completed until 1932], Reaburn urged construction instead of the proposed south side road.[76]

Surveys for the other roads around the mountain were now being conducted in full force. A route for an automobile road into the Carbon River Valley was surveyed by a party under the direction of engineer J. G. Morgan in October and November 1915. The line followed the south bank of the river to Cataract Creek near the snout of the Carbon Glacier. Reaburn noted that construction of the road would shorten the distance to the park boundary from Tacoma by 21 miles and from Seattle by 41 miles, and open up the "most rugged side of the mountain" to tourist travel.[77]

Engineer Morgan had also begun work on another survey for an east-west road, leaving the government road at Inspiration Point and passing *via* Reflection Lakes, Stevens Canyon, the south end of the Cowlitz Divide, the Ohanapecosh and Chinook rivers to connect with the new McClellan Pass Highway at Cayuse Pass. The route would be approximately 26 miles in length.[78] No funds were appropriated for construction, though, and it would be another decade before serious consideration was given to a route across the south side of the park.

The government road to Paradise, now called the "Nisqually Road," was considerably improved in 1915, and $32,364.19 spent on repairs and surfacing. The work included widening, construction of rock and timber crib retaining walls and guard rails, and surfacing with cemented gravel.[79]

In 1916, Mount Rainier National Park was placed in the charge of the new National Park Service, which was established in August. The new agency used its limited staff to oversee a program of development of the parks, while at the same time protecting the natural and cultural resources. Two years later, the agency organized offices to direct some phases of park development; of these, the Engineering and Landscape Engineering Divisions would oversee road construction and improvement projects in the parks.

The Washington state legislature appropriated funds in 1916 to extend the McClellan Pass Highway from Greenwater to the park's north boundary. The state also appropriated funds for the construction of the eastern link from Yakima to Chinook Pass; these were subsequently suspended on account of the World War. Supervisor Reaburn reported news of the appropriations, and suggested the work would spur demands for the extension of the Nisqually Road to a junction with the new state highway.[80] In the park, the National Park Service took over the lower 3 miles of the Mount Rainier Mining Company road along White River. The Park Service soon established a ranger station and entrance on the lower part of the road near the northeast corner of the park, and a little later the White River Campground at the end of the park segment.

Visitors immediately began using the road, even though the connecting state highway was still unfinished.[81]

The Interior Department ordered a survey for a new road along the west side of the park in 1916. This would be the first link of Chittenden's proposed mountain circuit road system. The surveyors located a line departing from the Nisqually Road near the Tahoma Creek Bridge, then running north via Tahoma Creek, Round Pass, Puyallup River, Sunset Park, Mowich River, Crater Lake (Mowich Lake), Ipsut Pass and Ipsut Creek to connect with another proposed road up the Carbon River. The surveyors estimated the cost of the road at $600,000, or about $15,000 a mile. The survey report also included investigations of a "North Side Road," which would have run from Carbon River (where a new hotel was proposed), east by Crescent Lake, Moraine Park, Mystic Lake, the snout of Winthrop Glacier, Grand Park and Frozen Lake, to connect with the mining road at Glacier Basin. The 30-mile road would have had a 6 percent maximum grade and would cost about $15,000 per mile. This route was rejected on account of high costs and landscape concerns.[82]

An "ultimate development plan" for Mount Rainier was formulated by the National Park Service in 1920. The chief component was construction of the round-the-mountain road. The first step would be to construct a road up the Carbon River to a point near the Carbon Glacier. This road would then be extended west to Mowich Lake, and then south to a connection with the Nisqually Road near Tahoma Creek. Another segment would be constructed from the Nisqually Road near Narada Falls down Stevens Canyon to Ohanapecosh Hot Springs near the southeast corner of the park. The final link would run north from this point up along the Ohanapecosh River to White River, where it would connect with the McClellan Pass Highway under construction. (The report did not concern an extension from the White River area back to Carbon River.) Several miles of road would be constructed each year in order to spread out the costs.[83] This proposal reflects Hiram Chittenden's 1907 suggestion for a circuit road and the later "Wonder Road" concept.

Construction of the lower 5 1/2 miles of the Carbon River Road in the park's northwest corner began in 1921. Contractors White, Brown & Leahy built the road to Ipsut Creek and provided it with a gravel surfacing. A contract was issued in 1922 to extend the road 2 1/2 miles to Cataract Creek near the snout of the Nisqually River.[84] The connecting county approach road was completed in 1925.[85]

CHAPTER III

ROADS AND THE NATIONAL PARKS

By the 1920s, ownership of automobiles had become fairly widespread. Mass production had lowered costs, and now a new segment of the population could travel and enjoy the national parks. Until this time, only the well-to-do could afford the high costs of rail travel and lodging. Now motorists could reach the parks, and this new constituency made demands for other sorts of developments, including automobile-accessible campgrounds and inexpensive lodging units.

Stephen Mather, the first director of the National Park Service, recognized this trend. An avid car-camper and motorist himself, Mather strongly supported road construction programs in the parks, reasoning that motorists support improvements in the parks. In the agency's first report, Mather reported that there had been "an astonishing increase in travel" since automobiles had been admitted to the national parks. He observed

> American motorists are intensely interested in the national parks, are visiting them in ever increasing numbers, and are contributing, by way of automobile fees, large sums of money toward park improvement and administration. They have a right, then, to expect that the Federal Government will pursue a broad policy in the extension of road systems in the several parks, and that they should enjoy all privileges not inconsistent with good administration of the parks' management and protection.[86]

Mather sought to tie visits to the national parks to the "See America First" program, which promoted American attractions over traditional destinations abroad. He wanted people to think of the national parks as ultimate destinations for vacations, with national monuments serving as "way stations" along the way.[87] To provide for the new visitors, parks would require extensive improvements to their generally primitive road systems, and all sorts of other developments would also be necessitated: campgrounds and picnic areas, parking areas, sewerage systems, etc. Mather probably could not have conceived of the eventual congested conditions in the parks caused by this automobile-oriented policy.

In 1918, Mather and his assistant, Horace M. Albright, formulated a "Statement of Policy" regarding development of the national parks. This set forth an agency dictate that improvements must be designed to fit into their surroundings. The principle was repeated in that year's annual report to the Secretary of the Interior: "All of the improvements in the parks must be carefully harmonized with the landscape, and to this end engineers trained in landscape architecture or fully appreciative of the necessity for maintaining

the parks in their natural state must be employed to carry out improvement work."[88]

This philosophy fostered a close relationship between the planning staffs of the National Park Service's Engineering Division in Portland, Oregon, and the Division of Landscape Engineering in San Francisco. In major projects, such as the planning and design of park roads and bridges, the Engineering Division would be responsible for the design, preparation of specifications, and construction supervision. The Landscape Engineering Division would prepare sheets of architectural details, and visit project sites to study how to integrate the developments with the landscape. Such factors as natural materials, color, scale and massing would strongly influence the design and location of improvements. Although some generic plans were developed, in most cases facilities and structures were designed for individual parks and specific settings. Interestingly, none of the landscape architects with the Landscape Engineering Division had any experience with such design considerations, but in most cases the structures designed wholly or in part by the office successfully harmonized with their surroundings. This attention to landscape details distinguished the National Park Service's road program from ordinary road building practices.

By the end of the decade, most of the visitors to the national parks were motorists. Unlike the early visitors, this new constituency was no longer restricted to the upper classes, but included more members of the middle and working classes. Many arrived with camping gear, and did not have to deal with the park concessionaires. In Mount Rainier National Park, the numbers of automobiles entering each year steadily increased through this period. The old stage lines quickly replaced their coaches with motor vehicles, but as private ownership of automobiles continued to rise, fewer and fewer visitors arrived on public transportation. The railway, which once carried the majority of visitors to the Mountain, lost most of its passengers and ceased to provide passenger service little more than a decade later.

Superintendent Peters Proposes a Major Road Program

Park Superintendent W. H. Peters wrote Park Service Director Mather in June 1922, describing the Mount Rainier National Park road system and its limitations.

> Mount Rainier is at present served by three short road projects, all of which are dead-end roads, that is, they have no connection to others in or out of the park. This road system consists of the Nisqually River road, which connects with the Tacoma Mountain Highway at the Nisqually or Southwesterly park entrance and extends through the park nineteen miles to Paradise Valley, there terminating at an elevation of 5500 feet. Second in importance in the park roads is the Carbon River road now under construction, which connects with the Tacoma-Fairfax Mountain highway at the northwesterly entrance to the park, and follows the Carbon River

> Valley through the park for a distance of five miles. . . . The third and last road serving Mount Rainier National Park connects with the state highway, known locally as the Naches or McClelland [*sic*] Pass highway at the northeast corner of the park and extends a distance of thirteen miles into the park to Glacier Basin. . . . It will thus be seen that the entire park has at the present time only twenty-eight miles of primary road and nine miles of secondary road.[89]

Peters outlined a proposal for "the necessary ultimate road development work to make Mount Rainier National Park accessible to the large demand now being made by the traveling public." While his proposal would not open all of the park to automobile travel, it would put much more of the reserve in the reach to motorists. He urged that early work concentrate on the south and west sides of the park with the aim of providing connections to the new state roads at the northwest and southeast corners of the park. The state connecting roads on these sides of the park were nearly complete, while work was still in progress on roads to the northeast. He reported that the public demanded construction of the West Side Road to provide a link through the park to the state approach roads. Since the State of Washington had already spent nearly $7 million on park approach roads, he suggested that the Park Service was obligated to provide the remaining link. Its completion would also, with the ongoing projects in the east, provide for three sides of the long-discussed "round-the-mountain" road. The Superintendent vigorously supported the circuit plan:

> What is needed to properly connect these [state] roads and make the park accessible is a highway encircling the Mountain. Fortunately, the state has adopted a program that solves this problem on two sides of the park. The completion of the project across the north side of the park will give an entirely new and much shorter route across the Cascade mountains and will make the park as readily accessible to the residents of Yakima and Ellensburg and other portions of eastern Washington, as it is now to Seattle, and Tacoma. Such a road system will make the park readily accessible from all sides and will give connections between all park approach roads and at the same time complete one of the World's most spectacular scenic highways.[90]

Just as important to Peters were improvements to the existing Nisqually Road. He noted that the state had adopted a program calling for a concrete pavement from Tacoma and Seattle to the Nisqually Entrance, and had already completed the work as far as La Grande, 33 miles from Tacoma. The State Highway Commission had given him assurances that the surfacing would be completed to the park during the summer of 1923. Peters called the paved road "one of the greatest assets to the park ever considered," but predicted it would "be utterly and entirely useless in its purpose" unless the work was extended into the park to Longmire. The 6 1/2 miles between the park entrance and Longmire required extensive annual maintenance by park crews at considerable cost, and

way if at all possible to have them removed. Down timber taken from the right of way or naturally accumulated should be removed when possible.

"Monotony must be avoided in road location. Where woodlands and open country intermingle the roads should be carried through the woods for a time, then across an open space giving the variety of light and shade and avoiding mile after mile of sameness.

"Long straight stretches of road are to be avoided as a general rule. At the same time possible blind curves and hairpin turns should be eliminated, as a means of minimizing accidents.

"In the construction of bridges and culverts native materials should be utilized as far as possible. In many places, of course, a concrete arch or girder bridge is the only solution within a reasonable expenditure, but where possible a facing of native rock should be used. Often a log bridge or at least a log railing might be a happy solution."

Tomlinson wrote Director Mather in July 1923, asking him to release funds for immediate repairs. He warned that despite the recent work, the Nisqually Road was disintegrating rapidly. Timber cribbing had been used to support the road in places and was rotting away. Four wooden bridges were rotting, too, and had only remained serviceable by being propped and braced several times each season. The Nisqually Glacier Bridge was in particularly bad condition, and Tomlinson warned that he might soon have to close the road on its account.[93]

In November 1923, National Park Service Chief Civil Engineer George E. Goodwin calculated the costs for construction of 43.4 miles of the West Side Highway, reconstruction of 8.5 mile and surfacing of 16.5 miles of the Nisqually Road, and surfacing of the Carbon River Road at $1,380,150. Goodwin told the Portland, Oregon, Chamber of Commerce that the projects were necessary to make the park accessible "to be seen and enjoyed by the thousands of eastern tourists who come to the west each year." He stated that the National Park Service was preparing a major system-wide road development program and asked the Chamber for support in obtaining the funding.[94]

Considerable repairs were made to the Nisqually Road that season, but its overall condition had quickly deteriorated again. In August 1924, Superintendent Tomlinson reported that the road had been in good shape at the beginning of the summer but now was in a "general worn out condition" on account of the lack of a good surfacing. He complained that "It has reached the stage where its maintenance is constantly increasing while its condition is gradually growing worse."[95]

More and more tourists were visiting Mount Rainier each year, and most arrived in cars. Despite competition from automobiles, railways were still carrying a number of visitors to the park. In 1924, the Chicago, Milwaukee and St. Paul Railway inaugurated its "National Park Limited" electrified train service between Seattle and Ashford, stopping only at Tacoma. At Ashford, passengers were met by auto stages operated by the Rainier National Park Company. Round trip fare from Seattle to Longmire was $7.00, and to Paradise, $10.00. From Tacoma, return fare to Longmire was $5.00 and to Paradise, $8.00. Two trains left daily from 22 June to 7 September. The new service met with little success, and in 1928 passenger and mail service to Ashford was discontinued.[96]

1925 Road Program and the Bureau of Public Roads

Through the efforts of Director Mather and park supporters, in 1924 the National Park Service received a $7.5 million appropriation for road improvements in the national parks. To plan for the allocation of its share of the funds, a three-year road development program was prepared for Mount Rainier National Park. The first priority was improving the 21-mile Nisqually Road. Contracts for the construction of five concrete and two rustic log bridges were let on 1 August. At the same time, engineers were collecting data for other road improvements and surfacing. A total of $1.024,000 was authorized for road development in the park over the three year period, of which $235,000 was available the first year. Most of the money ($210,000) was

allocated for the repairs and improvements to the Nisqually Road, and the remainder was set aside for surveys of the proposed West Side Road and a reconstructed White River Road.[97]

The program was endorsed by the Rainier Park Advisory Board, but the group protested it was insufficient for the park needs. The Board criticized the lack of access in the park in a circular printed in June 1925. The broadside informed "Mr. Good Citizen" that usable highway mileage in the park totaled less than 25 miles, as opposed to 200 to 300 miles in other similar national parks. The Board noted that the State of Washington, aided to some extent by U.S. Forest Service and Federal aid funds, had spent more than $7 million on road improvements to the four corners of the park, while the National Park Service had only been allotted $282,089 for road work at Mount Rainier. The Board urged Congress to appropriate more funds to make a parkwide road network a reality.[98]

The National Park Service continued the reconstruction and widening of the Nisqually Road with force account labor. Crews began on the section between Longmire Springs and the Nisqually Entrance. Much of the work amounted to grubbing, as the road had been built over logs and stumps and these had to be removed. The clearing and grubbing work was completed in March 1926 and the crews moved on to the section between Longmire and the Glacier Bridge. The Park Service also let contracts for the construction of log stringer bridges over Tahoma Creek, Kautz Creek, a concrete arch over the Nisqually River at the Glacier Bridge site, a concrete girder bridge over the Paradise River on the Narada Cut-Off, and stone-faced concrete arches over Edith Creek, and the Paradise River Crossing. Plans and specifications were also complete for new bridges over the Paradise River at Narada Falls (First Crossing) and Van Trump Creek at Christine Falls, but funds were not available for their construction. The original plans for the bridges were produced by the National Park Service Engineering Division in Portland, Oregon; architectural detail sheets were prepared by the Division of Landscape Engineering in San Francisco.

The Park Service completed its plans for the reconstruction of the Nisqually Road and began the work. It also conducted a series of surveys for the West Side Road and the extension of the West Side Road. But the Service's Engineering Division proved incapable of managing the massive system-wide road program. Considerable problems were encountered in the 1924-25 reconstruction of the El Portal Road [HAER No. CA-150] in Yosemite National Park, and Director Mather made the decision to turn to the Bureau of Public Roads for the planning and supervision of major road projects in the national parks.

Mather became familiar with the Bureau's work when he inspected a road the BPR had just completed in the Jackson Hole, Wyoming, area. He then asked the BPR's regional director to provide an engineer to survey a route for a road across Glacier National Park. The BPR assigned engineer Frank A. Kittredge to the task, and the engineer oversaw the surveys and construction of the "Going-to-the-Sun Road" [HAER No. MT-67], a spectacular scenic mountain parkway constructed through some of the roughest terrain in the Rocky Mountains. The

road showcased many of the park's most outstanding features and caused little damage to the landscape through which it passed. Mather was favorably impressed with Kittredge's work (he later became NPS Chief Civil Engineer, Superintendent at Yosemite National Park, and Director of the Western Regional Office), and asked the Bureau of Public Roads to take over the parks road program.

A Memorandum of Agreement was entered into by the two agencies in June 1925. Under its terms [see Appendix II], the BPR would take over surveys, engineering and construction supervision for all major road projects in the national parks. The National Park Service retained design control and final approval of all work, and the Department of the Interior continued to control all related appropriations. The NPS Engineering and Landscape Engineering divisions worked closely with the BPR in the design of roads and road-related structures.

Revised Road Budget, August 1925

On 15 August, NPS Acting Chief Civil Engineer Bert H. Burrell wrote Horace Albright, then Superintendent at Yellowstone National Park and Mather's Field Assistant, arguing the funds allocated for the Nisqually Road improvements were insufficient. He cited traffic studies which showed that more than 1,000 private automobiles visited Paradise each day during the season, and this figure did not include park transportation, trucks or delivery vehicles. Such traffic demanded a modern hard surface pavement from the park entrance to Paradise Valley. Gravel surfacing had proven insufficient, as heavy traffic either swept the gravel to the sides or pounded it into the soft subgrade. The gravel also produced prodigious clouds of dust, and trees and shrubs were coated for a distance extending 200' feet from the roadway. This effect, he claimed, was "robbing the foliage of its beauty and leaving the forest as a gray, unsightly mass." A dustless pavement, was in his terms, not only desirable but "a necessity." Burrell inspected the log cribbing holding up the road at several points and estimated it had a life of five years or less; these needed replacement with dry stone walls, or preferably, masonry retaining walls. Narrow places and curves needed widening, and much of the road would have to be reconstructed in order to provide for a modern pavement of 18' width. He called for use of concrete pavement, stating that neither asphaltic concrete or penetration macadam would stand the Rainier traffic. Simply resurfacing the road with gravel would not do.[99]

Burrell reported that he had arranged a meeting at Mount Rainier with Superintendent Tomlinson, NPS Assistant Landscape Engineer Thomas C. Vint, and NPS Engineer R. N. Kellogg. Other participants were Asahel Curtis, Chairman, and Herbert Evison, Assistant Secretary, representing the Rainier Park Advisory Board. Burrell suggested the following reallocation of the remaining $1,014,000 in the park road account:

Bridges under contract	$75,000
Misc. obligations under contract	10,000

West Side Road survey being done by BPR	15,000
White River Road survey to Yakima Park .	10,000
Carbon River Road relocation survey . . .	1,500
West Side Road contract for 15 miles . .	600,000
Nisqually Road, 21 miles by contract at $7,000/mile for betterment only	147,000
Nisqually Road, 10 miles, to be graveled by force account, to serve until 1926	25,000
Total estimated expenditures	$953,500
Leaving balance of	$70,500

The balance would be used to meet contingencies which might arise before the next appropriation. Summing up, Burrell explained that there were not sufficient funds to pursue the White River Road contract in the NPS $7.5 million road program budget. The $43,000 previously allocated for the project would hardly suffice for a quarter of the proposed construction. He had also reviewed the Carbon River Road situation, and after making a visit to the site, estimated the work would cost double the original calculations, and wanted consideration of an alternative route a little farther from the river bed at the base of the Tolmie Peak-Alki Crest ridge. This would alleviate the problems caused by constant flooding and the eliminate the need for expensive cribbing along the banks. Surfacing of the Nisqually Road should, he suggested, be deferred until the 1928 appropriation, when funds might be secured for a proper concrete pavement. The road funds would now be used for reconstruction and surface preparation, and for a temporary gravel surfacing. Contracts for the construction of the West Side Road were being prepared. Over the next three years, another $103,400 would be go toward improving the Nisqually Road and $600,000 to construct the West Side Road.[100]

Tomlinson reported on the meeting with Burrell, Vint, Kellogg, and the Rainier Park Advisory Board representatives, indicating that considerable disagreement was expressed over the existing progress. The park had been attempting to accomplish more than the available funds would permit, and this had resulted in lower standards of construction. It seemed inappropriate for the federal government to provide for roads in the national parks that were inferior to the state and county connecting roads. The government already obligated the states to higher standards when allocating Federal Aid funds for road construction. All participants at the meeting were in agreement on the need for higher standards.[101]

Two days later, Tomlinson commented again on the proposed Mount Rainier road program. Due to delays in obtaining survey data, no contracts could be let that season for work on the West Side Road. He recommended that all contracts be held until spring, when a large appropriation would be available, allowing for bids to be let for the complete construction of the next 15-mile section. Tomlinson proposed reallocation of the remaining funds in his 1925 road budget. For the reconstruction and surfacing of the Nisqually Road and between the park entrance and Longmire, he proposed $61,150. Another $10,000 would go toward new surveys, and $75,000 in bridge contracts had already been awarded.

The Carbon River Road would get $5,000 for surveys and $70,000 for relocation and betterment. Another $25,000 in survey funds would be released for later work on the West Side and White River roads.[102]

These estimates did not provide for paving the Nisqually Road between the park entrance and Longmire, as available monies would not cover the cost of the paving required. All the paving work should be delayed until the new 1928 appropriation made funds available. The participants in the meeting also developed this proposed budget for a second (1928) three-year road budget cycle, including $600,000 for construction of the Yakima Park Highway, $146,000 for permanent surfacing and improvements to the Nisqually Road, $70,000 to widen the upper segment of the Carbon River Road, and $1,080,000 for further construction on the West Side Road.[103]

In October 1925, Bureau of Public Roads Regional Director Lawrence Hewes requested the Park Service suspend its work on the Nisqually Road reconstruction pending the turnover of the project to the BPR for administration. Mather agreed but stipulated that the project must be expedited due to its critical importance; the road was the main artery in Mount Rainier and disruptions during construction would severely inconvenience visitors. The BPR decided not to rely on the NPS surveys for the upper 12 miles of the road and began resurveying this line before issuing bids. Park Service crews continued the clearing and grubbing work.[104]

The Bureau of Public Roads assumed the survey of the West Side Road and prepared to let contracts for its southern section in 1926. The BPR also began a survey for the reconstruction of the White River Road and its extension to Yakima Park. The two surveys were funded out of the first year appropriation for the three-year road program.[105]

The Rainier National Park Advisory Board, consisting of a membership from chambers of commerce and civic organizations across the state (but principally in the Puget Sound area), met in Seattle on 16 January 1926 to discuss park matters. Superintendent Tomlinson reported on the road reconstruction work planned and in progress. Although generally pleased with the program, the board wanted to see the work extended and accelerated, and adopted the following list of priorities for the road work:

1. Reconstruction of the Nisqually Road
2. Construction of the West Side Road to Sunset Park
3. Construction of a new White River Road to Yakima Park
4. Completion of the West Side Road from Sunset Park to Fairfax (this work to be carried out simultaneously with construction of the White River Road)
5. Construction of a road down Stevens Canyon from Narada Falls to the Ohanapecosh Hot Springs area.[106]

The Advisory Board expressed its concern that securing funding for so many projects might be difficult, and expressed its desire to cooperate with the

National Park Service to assist with the planned work. The board appointed a subcommittee to devise ways to help find the needed funds.[107]

The Board entertained a startling road proposal at the same meeting. George W. Garrett of Puyallup, Washington, offered plans for a tunnel 20 miles long, winding just below the surface of the mountain, complete with stopping places and viewing windows. Garrett suggested the road would offer "supremely scenic" views and would eliminate the danger of the 14,000' ascent. It would make the summit accessible at all times of the year. He even offered plans for a parking lot in the crater.[108] The idea was not pursued.

The State of Washington was constructing Primary State Highway 5, the "National Park Highway," which actually consisted of several separate arteries approaching the park boundaries. One segment, the "Mountain Highway" from Tacoma to Ashford and the Nisqually Entrance, was resurfaced in 1925 and 1926, leaving less than 7 miles of the route unpaved.[109] The McClellan Pass Highway, now renamed the "Naches Pass Highway" (as it turned out, the road crossed neither pass, but rather Cayuse and Chinook passes) was extended south to the White River Ranger Station in 1925.[110] To the southeast, another segment of Route 5 was being extended from Chehalis to Lewis (now Packwood). A private connecting road soon reached the Ohanapecosh Hot Springs.

At a joint banquet of the Seattle and Tacoma chambers of commerce, the Rainier National Park Company presented Mather with another plan to encircle the mountain with a motor road. The plan called for the completion of the planned segment of the West Side Road and construction of 40 or so more miles of road. The new segments would provide access to Spray Park, Mowich Lake, Chinook Pass and Yakima and Ohanapecosh parks. Mather did not respond directly to the proposal, but did assure those in attendance that there would "be no stalling" of the ongoing park road program.[111]

Daniel R. Hull, Chief of the NPS Landscape Engineering Division, was in the park in June 1926 to inspect the ongoing road reconstruction work. While in the park, he met with BPR Assistant Engineer Elliott in reference to landscaping work for the new roads. Dr. Hewes and Elliott inspected the work again in July. NPS Landscape Architect Ernest A. Davidson was assigned to the park in July 1926 and became intimately involved in the road and bridge work. Director Mather made an inspection visit in September.[112] Surveys were still underway for the West Side Road and the White River Road reconstruction.

Superintendent Tomlinson wrote Mather in September 1926 to inquire about the planned road allocation for the upcoming year. He stated that the park would be in a position to contract about $760,000 on additional projects in January. The BPR had completed the surveys and plans for the Yakima Park Highway, so bids could be advertised. Surveys were also complete for the reconstruction and surfacing of the upper part of the Nisqually Road. This project involved reconstruction of 1.3 miles at Inspiration Point and one mile at Ricksecker Point, where a 60' reinforced concrete viaduct would be required. The Christine Falls Bridge and two smaller spans required replacement.

Tomlinson also reported that surveys and plans should be made for the north end of the West Side Road, and estimated the projects would cost $780,000.[113]

The Bureau of Public Roads was now instructed to begin new surveys for a "South Side Highway." In October 1926, NPS landscape architect Davidson and BPR engineer C. R. Short made a reconnaissance survey of a route down Stevens Canyon. The route would drop from the Nisqually Road near Inspiration Point and run by Reflection Lakes, then down Stevens Canyon to the Muddy Fork of the Cowlitz River, and then up the river to Ohanapecosh Park before veering northeast to cross the Cascade crest at Cayuse Pass.[114]

The ongoing reconstruction of the Nisqually Road entailed replacement of six bridges, over Tahoma, Kautz and Edith creeks [HAER No. WA-46], the Paradise River Second and Fourth Crossing bridges [HAER Nos. WA-62 and WA-45], and the Glacier Bridge. The joint bridge contract was completed by the Tillamook, Oregon firm of Feldschau and Chaffee in October 1926; together with two reinforced concrete culverts, the work cost $58,083.94. Contracts for new bridges at Christine and Narada Falls were awarded to Portland, Oregon contractor John D. Tobin in July 1927. The two stone-faced reinforced concrete bridges [HAER Nos. WA-47 and WA-48] were completed in June 1928 and attracted favorable comments from park visitors. Reconstruction of the upper 8 miles of the Nisqually Road was completed late in 1929 by John Hampshire of Grants Pass, Oregon.[115]

A staff meeting was held at the National Park Service's San Francisco office on 20 February 1928 to discuss the Mount Rainier National Park road program. In attendance were Superintendent Tomlinson, NPS Acting Director Arno E. Cammerer, Chief Landscape Engineer Thomas C. Vint, H. B. Hommon, G. A. Moskey, and A. W. Burney. The consensus was that while work should be pressed on the West Side Road, it was impractical to begin work on the upper section until the lower segment was complete. The contract for clearing the upper section of the Yakima Park Highway would be let, as well as part of the grading. The Park Service also agreed to construction by force account of a spur road to the planned new hotel site in Paradise Valley. [This was the Paradise Lodge, no longer extant. The Jackson Visitor Center stands on part of its site.][116]

Accelerated Construction Program, 1928

Asahel Curtis, Chairman of the Rainier Park Advisory Board, in March 1928 pressed the National Park Service to hasten the letting of contracts for the ongoing construction work. He argued that clearing and grubbing contracts in particular should be awarded as soon as possible, as the required burning could only be done at certain times. Grading and final construction projects were delayed by the slow progress of clearing work. The construction season at Mount Rainier was so short as to demand that every advantage be taken. To this end, he urged the Park Service to call for bids for the following projects before June: Yakima Park Highway above White River crossing, clearing, grubbing, grading and surfacing; Yakima Park Highway below crossing, clearing of at least three miles of the 5.38 mile section; Mowich Lake Road,

clearing from park boundary to Mowich Lake; West Side Road, Klapatche Ridge section, clearing of at least 4 additional miles. If funds permitted, the contract should be let for the White River Bridge, as construction vehicles had to use the old mining road for access to the upper section.[117]

National Park Service Chief Civil Engineer Kittredge responded to Curtis at the end of the month, agreeing to let contracts for all the work proposed except for the clearing below the White River crossing and the White River Bridge contract. In addition to Curtis's recommendations, the Park Service would also release bids for the complete construction, including grading and gravel surfacing, of the road from Mowich Lake to the park boundary. Funds would also be appropriated for complete construction of the Klapatche Ridge section of the West Side Road as soon as the construction of the lower section of the road progressed sufficiently to make it practicable, and monies for continuing the road southward from Mowich Lake could probably be obtained the next year. The two deferred projects on the Yakima Park Highway would be undertaken when funds were available to build the entire road. This delay would not be serious, as none of the road could be used until all was complete.[118]

In August 1928, the National Park Service requested the BPR investigate a new route from Paradise Valley to Cayuse Pass. The new road would leave the Nisqually Road at Inspiration Point or from a point a mile closer to Paradise Valley. From Reflection Lakes, the road would drop down Stevens Canyon to the Muddy Fork of the Cowlitz. From there, three alternatives were offered: (1) a route up the Muddy Fork, following the same line as the 1926 Davidson-Short survey; (2) a lower route dropping farther down Stevens Canyon to Nickel Creek, then north up the east side of the creek over a series of switchbacks; and (3) a route up the west side of Nickel Creek to St. Johns Fall. All three routes would then ascend the Cowlitz Divide to Indian Bar and a crossing of the Ohanapecosh River. The road would then drop to Boulder Creek, then run along a ridge south of Double Peak and down to Needle and Boundary creeks, and finally east to Cayuse Pass. BPR engineer J. B. Reher estimated the cost of the cheapest alternative at $3,321,935.[119]

National Park Service planners considered the BPR survey reports for the "South Side Road" and in September 1929 asked the Bureau to investigate an alternative route traversing the higher regions between Reflection Lakes and the Muddy Fork. NPS landscape engineers suggested that the route would provide a closer approach to the scenery at the immediate base of Mount Rainier. BPR engineer Kellogg (formerly with the NPS Engineering Division) conducted a new survey. The line left from Inspiration Point and followed the Reher line for the first 1.2 miles. The line then swung north of Louise Lake along Mazama Ridge, crossed Stevens Creek near the head of its canyon, then swung around Stevens Ridge to Williwaukas Creek. The road then turned Fan Ridge and crossed Fan Creek Gorge before dropping to the Muddy Fork and Nickel Creek. It followed the latter up to Nickel Creek Meadows where it would join the Reher line. Kellogg warned against consideration of the route, claiming that it would involve expensive and difficult construction, including five

major bridges, some up to 300' long over 200' deep canyons, and several short tunnels; he calculated the cost of the surveyed section alone at $1,585,970. Kellogg was then asked to resurvey the 8 miles from Stevens Creek to Nickel Creek at a lower line midway down the canyon. Although the line would also require several major bridges, he suggested that short tunnels could be used to straighten out the route and eliminate some minor bridges. He estimated the cost of this proposal at $1,204,479, as opposed to $1,270,060 for the same section in his original survey.[120]

Kellogg produced a final survey report for the South Side Road in 1930. He recapitulated the earlier surveys as far as the Muddy Fork of the Cowlitz. From there, however, he suggested a new route swing southeast around Backbone Ridge, which would carry the road outside the park on forest service land for about a mile. (As an alternative, the road could be carried over the ridge and then down Ollalie Creek, but this would require excess curvature and construction in poor terrain, and was not recommended. Another alternative would following existing lines to Nickel Creek, then swing south to Backbone Ridge.) From Backbone Ridge, the new line would drop around the Cowlitz Divide to the Ohanapecosh River, which it would cross just north of Cougar [Panther] Creek. The road would then head upstream along the river's east bank, crossing Deer and Dewey creeks before reaching Cayuse Pass and a connection with the Naches Pass Highway. Kellogg also proposed a "scenic spur road" to the high country of Cowlitz Park. His estimate for the total cost of a highway along the "upper" or Stevens Ridge line (including the spur road) at $3,398,000. By contrast, the alternate route crossing Ohanapecosh Park could cost as much as a million dollars more, although it was shorter and offered better scenic views. However, the damage to the park landscape involved in the construction of such a road would be horrendous. BPR Senior Engineer Elliott warned that it would "practically destroy the area which [the] road is to open up;" however, because of the better scenery which could be obtained, Elliott favored the Stevens Ridge-Ohanapecosh Park route, despite the extra cost.[121] However, a decision was made to minimize the impact on the landscape, and the "low-line" route down Stevens Canyon was adopted. A formal location survey, staking out the route, was run late in 1930; this was called the "P" line.[122]

Rainier Park Advisory Board Chairman Asahel Curtis, pushed for the "scenic" or high-line route, and pressed Director Albright to keep the road up through the Cowlitz Divide. The Mountaineers and the Sierra Club opposed construction in this high country.[123] Albright decided to check for himself, and made a three-day inspection tour on horseback of the proposed routes for the "South Side" or Stevens Canyon Road in July 1931. He was accompanied by staff of the NPS Landscape Architecture Division, Park Service Chief Civil Engineer Frank Kittredge, BPR engineers and regional office staff, Dr. E. I. Meinecke of the Bureau of Plant Industry, and General Manager Paul Sceva of the Rainier National Park Company. After viewing the proposed lines, Albright rejected any construction in the Indian Bar-Ohanapecosh Park-Double Peak areas, and ordered attention to be directed to the route down Stevens Canyon to the

Ohanapecosh River, then north up the river to Cayuse Pass. He forthwith ordered the BPR crews back into the field for a new series of surveys.[124]

The final location surveys for the Stevens Canyon Road were begun in August. Two lines were run between Reflection Lakes and the Muddy Fork, one running along the top of the ridge and dropping into Muddy Fork Canyon near the Cowlitz Glacier, the other following Stevens Canyon. More reconnaissance work was conducted in September for the section between the Cowlitz Divide and the Ohanapecosh River and the Chinook Creek canyons. In 1933, the 6-mile "L" line survey was run between Backbone Ridge and the planned East Side Road, then nearing construction. In the following year, the crews ran the line from the Stevens Creek crossing to the Muddy Fork's spectacular Box Canyon, then continued the line between Box Canyon and Backbone Ridge.[125]

Not only were the new park roads being planned to carefully harmonize with the park highways, but so were the road-related structures, including the bridges already mentioned and at Longmire, a new "rustic style" service station. This timber structure [HABS No. WA-177] was designed in 1929 by Associate Landscape Architect Ernest Davidson to replace an existing ten-year old station.[126] It remained in use in 1992 and has been listed as a National Historic Landmark for its significance as the oldest surviving "rustic style" gas station located in a national park.

In 1931, the park purchased a Sno-Go plow and began keeping the Nisqually Road open as far as the Nisqually Glacier Bridge. Previously, the road had not been maintained beyond Longmire. The road plowing shortened the winter distance to Paradise Valley considerably and helped encourage winter use of the park.[127]

Floods in October 1934 destroyed 3,000' of the Carbon River Road at Six Mile Creek (evidently Cataract Creek). Emergency Conservation Works personnel constructed a temporary detour and the road reopened,[128] but recurring floods would lead the park administration to close it at Ipsut Creek.

The upper section of the Nisqually Road was covered with a bituminous surfacing in the mid 1930s. The first, 1935, contract provided for minor reconstruction of the road in places and the production of bituminous aggregate. The main contract, awarded to Warren Northwest, Inc. in 1937, was for a 2" bituminous surfacing for the section between the Nisqually Glacier and Paradise.[129] Another contract was let in November 1936 for construction of masonry guardrail, resloping and slope stabilization of this same section. Alex Baseloff of Seattle was awarded the contract. The work began in June 1937 and was completed thirteen months later.[130]

Following the reconstruction work on the upper end of the Nisqually Road, the National Park Service and the Bureau of Public Roads turned their attention to the lower section between Longmire and the park entrance. Mitchell Brothers of Seattle was awarded a contract in 1930 for covering 12 miles of road with asphaltic macadam; the work was completed in July 1931.[131] The BPR let the

contract for the asphaltic paving of 11.77 miles to Stillwell Brothers, another Seattle contractor.[132]

Superintendent Tomlinson reflected that motorists were now a clearly different type of visitor to the park. In their early years, most motorists merely used the park road for access to the park for hiking, climbing and camping. By the early 1930s, though, most visitors preferred to see the park from their cars. He claimed that "more than 90% or more of those who can see the wonders of the area from their cars are satisfied to remain in them. Only the hardiest of mountaineers, who only enjoy scenery after strenuous exertion, will leave their cars to hike down across canyons and over ridges to see the country beyond the parking areas."[133]

Paradise Scenic Loop, 1920s-1930s

In the late 1920s, the Rainier National Park Company, the chief park concessionaire, proposed construction of a "scenic loop" road in upper Paradise Valley. The company hoped the road would attract more visitors to the its Paradise Inn and other operations. The proposal was endorsed by Asahel Curtis, chairman of the Rainier National Park Advisory Board.[134]

Park Service Engineer Kellogg began a reconnaissance survey for the "scenic loop" in May 1927. He investigated routes to Glacier Overlook, to Alta Vista, and even across the terminal moraine of the Paradise Glacier. Kellogg reported that roads in this environment could only be constructed at tremendous cost.[135] BPR District Engineer C.H. Purcell, Highway Engineer Elliott, and Kellogg accompanied NPS Landscape Architecture Division Chief Vint, made an inspection of the Paradise area in July 1927. Vint wanted to see both the route of the proposed "scenic loop" and also the route selected for a short connecting road to a new hotel site in the upper end of the Valley.[136]

In September 1927, Kellogg made another reconnaissance survey of the entire loop. This was soon changed to a location survey of the first 2 miles and a reconnaissance of the remainder. Two lines were run, one on a 5 percent grade, and one on a 7-8 percent grade. A one-way road was at first contemplated for the entire route, but following preliminary investigations, it was deemed advisable to design a standard 18' two-way road for the first 3 miles to Timber Line Ridge. Kellogg recommended that the road be terminated here. The balance would involve construction over "exceptionally difficult" terrain subject to slides and very heavy snows, and to scour from glacial floods. Even at the proposed terminus, the road probably could not be cleared from snow any longer than from 15 August to 1 October, or about a month and a half only. Such considerations, he observed, should prohibit consideration of the entire loop.[137] In estimating costs, Kellogg broke the road project down into three sections:

Paradise Inn-Alta Vista	$185,243
Alta Vista-Timber Line Ridge	228,565

Mazama Ridge (discouraged)	206,816
TOTAL ESTIMATED COST	$620,624[138]

At a meeting of National Park Service senior officials in February 1928, Superintendent Tomlinson made a presentation on the park's road program, again asking about the "scenic loop." Vint indicated his opposition to the project, feeling that its construction would destroy the splendid foreground views from the Paradise area. He also criticized the project on basic engineering grounds: snow removal would be extremely expensive, and the road could only be maintained for a few months each year.[139] Director Mather ruled against the project in August 1928, citing not only the high cost estimates but the almost certain devastation of the fragile mountain meadows. The company then asked Congressman Louis Cramton for support.[140]

Cramton urged the Park Service to reconsider the project, and in 1928 the NPS directed the Bureau of Public Roads to resurvey a possible route for the road. BPR surveyors ran two lines in 1928, one with a 6 percent grade and one with an 8 percent grade. The latter line was recommended because it would cost less and would involve a shorter, less conspicuous route. A new final location survey (staking) was run on the latter line in 1931. The BPR estimated the cost of the loop road at $147,363.[141] Superintendent Tomlinson continued to support the project and wrote NPS Director Horace Albright that he felt the road could be constructed by park crews for only $50,500. Albright wrote back, indicating there were no funds to begin construction.[142] This marked the end of serious discussion of the scenic loop road; today, the Skyline Trail follows much of the proposed route.

In 1928, park force account crews began construction of a spur road to a new hotel site in the upper end of Paradise Valley. Special attention was devoted to preserving the high meadow landscape so as not to spoil side hills, to protect vegetation, and to prevent rocks from rolling beyond the line of fill and causing damage. The road was completed in 1929 at a cost of approximately $24,000.[143] The new Paradise Lodge opened in 1931.

CHAPTER IV

WEST SIDE STORY

The first planned segment of the proposed "Round-the-Mountain" circuit road was the West Side Road [HAER No. WA-122], construction of which began in the late 1920s. The road was planned to leave the Nisqually Road near the park entrance and head north across the western flank of the mountain to a connection with the Carbon River Road in the northwest corner of the park. However, surveys suggested that the final segment of the proposed road would involve extraordinary expense and cause irreparable damage to the park landscape. A decision was made to concentrate on the construction of the southern part of the road while surveying possible alternatives on the north end.

A survey for a road up the west side of the park had been conducted in 1916 for the Interior Department. However, no funds were appropriated for construction. Six years later, Park Superintendent W. H. Peters urged the National Park Service to reconsider the project and release funds for construction. In a letter to Director Mather, Peters emphasized the need for the West Side Road.

> It is of the utmost importance that a connection be made between the Southwesterly and Northwesterly corners of the park. The public has for a long period expected the Government to build this so-called Westside Highway having been constantly promised that, with the completion of park approach roads such roads would be extended and connected by a system of inter-park highways. The State of Washington and Counties adjacent to the park have shown their good faith by expending nearly seven million dollars in such approach roads and have adopted a program which when completed will have cost the state close to double that sum, while to date the Government has spent less than $200,000 on actual road construction in the park. It seems distinctly our duty to connect these state projects.
>
> The completion of the Westside highway when considered in connection with the State's road program will give three sides of the much discussed "Around the Mountain Road". . . Aside from such consideration as keeping faith with the people of the State of Washington and as the fact that such an encircling road would be the world's most scenic and spectacular highway. . . such a road will give a shorter and more scenic route for both North and South and East and West travel.[144]

The Park Service agreed that the road should be built, and in July 1922, NPS Associate Engineer Victor A. Endersby began a new survey, starting in the

north on the Carbon River Road at Ipsut Creek. The line followed Ipsut Creek for 8 1/2 miles up a steep and winding grade to 5,050' Ipsut Pass. As the distance covered was only 2 1/2 miles by air, it was clear a considerable number of switchbacks and curves would be required. From Ipsut Pass, the road would drop to Mowich Lake, then climb along the side of Eagle Cliff to Spray Park before dropping south and southwest to a crossing of the South Fork Mowich River. A 1,000' tunnel would be required to carry the road through Division Rock between the North and South forks of the river. From the South Fork crossing, the survey line then headed northwest for several miles along the ridge above Rushingwater Creek before turning south and southeast to cross the North Puyallup River. The road would then turn west to Klapatche Point, before resuming its southward route across St. Andrews Creek and Round Pass to Tahoma Creek, then back south southwest to join the Nisqually Road a mile east of the park entrance. Several alternate routes were suggested in the roughest terrain.[145]

Following the agreement between the National Park Service and the Bureau of Public Roads under which the Bureau took charge of major road projects in the national parks, the BPR was instructed to conduct a new location survey for the road. The BPR survey began that fall. It recommended a road running north from the Nisqually Road to Tahoma Creek and Round Pass, then through the basins of the North and South Puyallup rivers, then over and through a series of ridges to Mowich Lake.

Thomas Vint made a field trip over the proposed route in August in company of Asahel Curtis and BPR engineers Short and Elliott. On 20 August, Vint reported his recommendations to Superintendent Tomlinson. Vint agreed that the road should not be pushed north through either Division Rock or Ipsut Pass. He argued that the difficult terrain would make any route expensive and impractical. The beautiful Ipsut Creek valley would be reduced from a lovely gorge to "an extremely visible example of extravagant road construction, destroying one of the landscape views the Park Service was bringing people into the park to see." Vint approved the route of the southern half of the road; however, he suggested that new surveys be undertaken for the north end.[146] The park administration still professed an interest in developments at Spray Park, but BPR District Engineer C. H. Purcell suggested that the meadows and Mowich Lake might better be reached by a new road up from a point on the Carbon River Road near Fairfax.[147]

The BPR next ran a survey line for a new northern terminus for the road. The line began at the park's western boundary near the Fairfax road. The route would traverse 4 miles of the adjacent Rainier National Forest before reaching the park boundary, then climb west to Mountain Meadows, crossing Meadow Creek before climbing along Elizabeth Ridge to Mowich Lake. The road would join the southern segment of the West Side Road in the Mowich River basin. The surveys were reviewed by the park staff and the Landscape Engineering Division and accepted.[148]

Superintendent Tomlinson then wrote Mather, recommending that, since the Ipsut Creek route would be too difficult and expensive to construct and would result in damage to the landscape, work on the north end survey should be suspended and alternative routes be investigated. The survey crews would be shifted to the south side of the road corridor, and the first contracts should be let on this section. The superintendent added that since road construction would be less expensive on the southern segment, more miles could be obtained for the same funds. The arrangement would also simplify administration, as the segment would connect with the Nisqually Road, while the northern segment might not be directly accessible from the south for some time.[149] (It remains isolated.)

In March 1926, the BPR completed its plans for the 13.6-mile lower section of the West Side Road and for the "Yakima Park Highway," the extended White River Road. The contracts and specifications for the work were also prepared so that work could proceed as soon as the necessary funds became available.[150]

The first contracts for construction on the West Side Road were opened at the BPR's Portland, Oregon district office in June 1926. This section, extending north from the Nisqually Road to the Puyallup River drainage, was awarded to Portland contractor Joplin & Eldon on the basis of its low bid of $306,094. The BPR warned the firm that its estimate was too low (its own engineers had placed the cost $113,000 more) but the bid was accepted by the Department of the Interior. Joplin & Eldon subcontracted the clearing work to Aldman & Lickman, who began work in August. After a month, however, the subcontractors abandoned the work after realizing the contract would not be profitable. The clearing was then sublet to De Long & Company. Another month was lost in the organizational change. Joplin & Eldon was forced to use its own crews to hasten the work. The clearing work was advanced enough by November for excavation work to begin, but winter weather soon forced delays in the work, and it was not until the following spring that fair progress was made. Even so, when winter conditions forced a shutdown in December, the firm was 3 1/2 months behind schedule, and the National Park Service considered annulling the contract.[151]

The $14,300 contract for clearing and grubbing a 3-mile section at Klapatche Ridge was awarded in August 1927 to the Lidral Construction Company of Seattle. The company set up camp and began work a month later. Although Superintendent Tomlinson noted that this company's bid was also far below estimates and predicted problems and delays, Lidral completed its clearing and grubbing work on schedule in August 1928.[152]

The BPR resurveyed the northern section of the road between Mountain Meadows and Mowich Lake. The new line would follow Meadow Creek to its headwaters, then around a loop before crossing the ridge and dropping to Mowich Lake. The survey line was approved by Chief Landscape Architect Vint and the proposed route was adopted.[153] The first contract for construction on this northern or Mowich Lake section was let in the fall of 1927. The clearing work for the first 5.3 miles was planned for the spring of 1928, but had to

be postponed on account of the state's failure to construct the 11-mile access road from Fairfax. The U.S. Forest Service appropriated $24,000 for construction over 3 miles of Forest Service land. However, since the state had not built the access road, any contractor working on the park segment would be required to construct a "tote" road from Fairfax, greatly adding to the expense of the project. The National Park Service refused to release the funds for its section until the state had completed the connecting link.[154]

The lush mountain meadows at Spray Park were still under consideration as a destination point for the north part of the road in September 1927. That month, BPR engineer Short located a possible route along the north edge of the meadows and a 1,500' spur road to a hotel site. The main road would terminate in a loop overlooking Mist Park and the Carbon River valley.[155] Much of this route is today followed by the Wonderland and Spray Park trails. Tremendous environmental damage that would have been caused by this proposed development, which was never funded.

Opposition was again surfacing to the proposed "round the mountain" road plan. In February 1928, George V. Caesar, a manufacturers' agent from Tacoma, wrote National Park Service Acting Director A.E. Demaray to protest the proposed circuit road system.

> The Rainier National Park is not very large--when compared to such parks as Glacier and Yellowstone--and a road encircling the mountain would, in my opinion, operate to destroy the primitiveness of a disproportionately large area. It would also increase the risk of forest fires in the heavily timbered area on the western slopes of the peak. It would seem to me that the present entrance approaches on the south, east and north should be ample to for all those who really wish to see and enjoy that magnificent region.[156]

This view had by now been generally accepted, and that year, the National Park Service, in line with recommendations made by The Mountaineers, adopted a new policy under which the northern third of the park and several other high park areas were to be designated as "roadless areas," free from any commercial developments and open only to foot or horse travel. The West Side Road would not be extended beyond the North Puyallup River, and no roads would be constructed from Carbon River to Mowich Lake and Sunrise.[157]

In February 1928, Superintendent Tomlinson attended a meeting of senior Park Service officials at the agency's San Francisco office. He made a presentation on the needs and problems of the ongoing road improvement work at Mount Rainier. At the meeting, a decision was reached to let the contract for the section of the West Side Road between the park's west boundary and Mowich Lake that year. Work was to continue on the White River Road to Yakima Park, but no funds were authorized for the extension of the southern section of the West Side Road beyond Klapatche Ridge.[158]

Another West Side Road contract was let in June 1928 to Alvin C. Greenwood of Portland, Oregon, who bid $216,924 for the clearing, grubbing, grading and draining the 4-mile section between Round Pass and Klapatche Ridge. Greenwood received a second, $18,400 contract for the same work on the Klapatche Ridge-North Puyallup River segment.[159]

The Mount Rainier National Park appropriation for 1929 included $240,000 for extension of the West Side Road from Round Pass to Klapatche Ridge. No funds were appropriated for the section between Mowich Lake and Carbon River, as a decision on the route had not been reached and the state had not budgeted the required connecting link between Fairfax and the park boundary.[160]

On 18 June 1929, the Interior Department awarded the contract for the construction of the road between the park boundary and Mowich Lake [HAER No. WA-121] to Lucich and Company of Seattle on the basis of its low bid of $11,091.25. The work was completed in October.[161] Grading work for another 2.5 miles near the park boundary was carried out by Rumsey & Company in 1931 and 1932.[162] The state then began reconstruction grading of the approach road from Fairfax and surfaced it to the national forest boundary in 1932.[163]

Joplin & Eldon finished work on the Nisqually Road-Round Pass section in November 1929. Total cost of the work, including BPR engineering fees, was $350,860.87.[164] The 9-mile section was opened to public on the 4th of July, 1930; Superintendent Tomlinson reported that it had been oiled and was in "perfect condition." This southernmost section included parking areas at Round Pass, Tahoma Vista and Fish Creek. The Tahoma Vista development included a masonry wall around the parking area and a picnic area with rustic stone fountain, and Round Pass had an observation area offering splendid views of Mount Rainier. The remaining sections to the North Puyallup River were scheduled for completion in 1931.[165]

Elich & Company of Seattle received the $144,586.20 contract for the construction of another .7-mile section of road in the North Puyallup River area in June 1930, and C. R. Johnson of Portland, Oregon, was awarded the $20,455 contract for clearing a 1.5-mile section at Klapatche Ridge.[166] Two substantial bridges would be required on the central section at St. Andrews Creek [HAER No. WA-51] and the South Puyallup River [HAER No. WA-52]. The contract for their construction was awarded in July to the W. T. Butler Company of Seattle, which had submitted the low bid of $36,580. The two bridges, both rustic stone-faced reinforced concrete arch structures with masonry railings, were completed in August 1931; their total cost, including engineering fees, was $41,985.94.[167]

Greenwood finished grading work on the 4-mile Klapatche Ridge section in August 1930. Elich & Company completed their operations in the North Puyallup area at about the same time.[168] On 7 November 1930, in the course of contractor Johnson's clearing project, a fire escaped from smoldering brush piles. High winds spread it over the slope of the Puyallup Canyon, up the ridge to Sunset Park, and down into the North Mowich River Canyon.

Practically all of Sunset Park was burned. Rains that night extinguished the fire, but not until 3,500 acres had burned.[169] After sixty-two years, the landscape still shows the effects of the fire, especially in the higher areas around Sunset Park.

The grading work was extended to the South Puyallup River in 1931, and the upper 6 miles of the road was surfaced with crushed rock. The grading was done by Myers and Coulter of Seattle under a $161,705 contract; they subcontracted the surfacing work to Fred G. Redmon, who completed the work in September 1932.[170]

With the Mowich Lake section and the state connecting road complete, dedication ceremonies were held at the new Mowich Lake Entrance on 2 September 1933. The entrance marker was patterned after gateway pylons at an old Hudson's Bay Company post, and commemorated the 100th anniversary of the visit of Dr. William Fraser Tolmie to the region. A month later, the state began widening the approach road from Fairfax to a full-width two way road.[171]

The final contracts for the Mowich Lake section were awarded in 1932 and 1934. This work was completed and accepted on 6 September 1935. The road was now complete and from the west boundary to Mowich Lake. However, the road remained closed to private traffic for two decades. The Park Service claimed that since the area was so close to centers of population, it would have to develop new camping, sanitary and parking facilities to accommodate the expected surge of visitors. Such developments would entail great expense and would damage the fragile landscape in the area. Despite protests from citizens and their legislators, the road was not opened until 1955.[172]

An unusual log stringer bridge was constructed across the North Puyallup River in 1933 and 1934. The structure stood high over the river on log-faced reinforced concrete piers and masonry abutments. The bridge was built by Carl Bjork on the basis of his bid of $34,687. The bridge was completed in July 1934, and an adjacent parking area a month later.[173] One of the most forceful examples of the "rustic style"of architecture, the North Puyallup Bridge was dynamited by park maintenance crews in the 1970s; parts lie in the river bed and can still be seen.

Following the completion of the bridge, the road was opened for the entire completed length to the North Puyallup. Roadside cleanup and landscaping work continued, carried out largely by Emergency Conservation Works personnel. Visitors immediately began travelling over the road, and the west side of the mountain attracted considerable attention.

But the remaining section between the North Puyallup and Mowich Lake was never built. In April 1935, Park Service Landscape Architect Ernest Davidson wrote Chief Landscape Architect Vint to express his opposition to the construction of the segment. He considered Mowich Lake, the largest in the park, to be a "worthy objective" for the existing stub road. The same applied to the North Puyallup terminus, as its location just below the

Hanging Glacier was, in his terms, "the *most* spectacular [point]. . . reached by any park road." Davidson offered a convincing argument against further road work.

> To complete BOTH road systems seems to me to be overdoing the highway development of Mt. Rainier, to the definite detriment of National Park scenic and wilderness values. To connect this West Side project will involve some of the most expensive and most difficult highway construction in the Park. Viewed merely from the point of making available fine scenery to the traveling public, I feel that the dead-end legs as now existing will be equal to a connected highway, since it will compel tourists to stop, get out of their autos and spend some time at the road termini instead of simply buzzing along over the connected road and perhaps never stopping the auto. While the scenery along the incompleted proposed line is excellent, it is not greatly different or better than that already available from the dead-end roads. Let us save at least the Mowich valleys from the inevitable destruction and desecration incidental to highway construction, along this side of Mt. Rainier Park. . . As a matter of preservation of Park values, and economy, it is recommended that the program of connecting the West Side Highway be abandoned.[174]

Records in the Mount Rainier National Park archives offer several other reasons for the halt to the project. A memorandum states that Park Superintendent Preston P. Macy is said to have indicted Secretary of the Interior Harold Ickes ordered a halt to the project. Superintendent Macy also supposedly once claimed to have halted the project himself through procrastination. (It should be noted, however, that he did not become superintendent until the 1950s.) Opposition from conservation groups and reaction to the awful damage caused by the Sunset Park fire have also been advanced as reasons.[175] Whatever the case, the West Side Road was never completed beyond the North Puyallup River. In the northwest corner of the park, the Carbon River and Mowich Lake roads remained dead-end stubs unconnected to the rest of the park road system. Suspension of the West Side Road project effectively marked the end of the long-standing"Round-the-Mountain" road strategy.

CHAPTER V

ON THE EAST SIDE

The early park road projects had focused on the west side of the park. As late as 1920, there was only one road on the east side of the park, the Mount Rainier Mining Company's service road to Glacier Basin. The National Park Service took over the lower 3 miles of the road in 1916, and some visitors managed to drive into the park over the unfinished Naches Pass Highway and the "White River Road." Surveys for other roads across the east side of the park had been made as early as 1904, but no construction had taken place.

From the north, the Naches Pass Highway was approaching the park boundary. By 1919, the road was completed and surfaced from Auburn to The Dalles, a distance of 19 miles. The state then appropriated funds for the next 10 miles to the White River Ranger Station. Completion of this segment would provide a connection in the park with the White River Road.[176] The final plans for the highway involved construction of a segment along the west side of the Cascade crest south to Cayuse Pass, then another climb east over the crest at Chinook Pass. Although most of the route lay outside what was then the park's eastern boundary, the new road would provide easy access to the northeast corner of Mount Rainier.

As noted earlier, proposals for a round-the-mountain road system included a "North Side Road" which would have connected the Carbon River area with the end of the mining road, providing for east-west access across the park across the north flank of the mountain. However, following inspection by Park Service administrators, the route was rejected on account of the extremely high costs of construction and the certain devastation of the most fragile section of the park landscape.

Superintendent Roger W. Toll advocated the high subalpine meadows at "Summer Land" as the terminus for the "North Side Road," National Park Service Chief Civil Engineer George E. Goodwin favored Glacier Basin for the terminus. Inspecting a park map, Goodwin suggested a line beginning at Carbon River and passing Crest Falls, Windy Gap, Vernal Falls, the snout of the Winthrop Glacier, Garda Falls, Berkeley Park and Frozen Lake before dropping to Glacier Basin. In his opinion, "Summer Land" was not nearly so suitable as a link for the connecting road,[177] which was never built anyway.

The Naches Pass Highway was completed to the park boundary in 1923 and proved immediately popular. Acting Superintendent C. L. Nelson reported in June that 210 more cars and 1,105 more people entered at White River than at the Nisqually Entrance, and that the staff on the east side of the park were "literally overwhelmed." In July, 646 more cars arrived than had entered the entire year before.[178] The reason, of course, was the easy access from the

Puget Sound cities. Far more visitors were expected when the Naches Pass Highway was completed over Chinook Pass to Yakima.

The park's section of the White River Road required constant maintenance. The road followed the river banks for the first 2 1/2 miles not far above the water level, and frequently washed out. Park Service maintenance crews responded by constructing long sections of rock-filled cribbing. The park only maintained the first 4 miles of the road, but Acting Superintendent Nelson reported in 1922 that the public demanded extension of the road as "evidenced by the number of cars which try to get over the rock-strewn wagon tracks beyond our surfacing."[179] In 1924, flood waters caused another $3,000 of damage to the road. The new park superintendent, O. A. Tomlinson, suggested the road should be relocated to a bench higher above the river. In his road report to the Washington office, he described the road's condition as "very poor," with no surface or drainage. The upper part to Glacier Basin poorly constructed and maintained; it was "merely brushed out." While difficult for automobile travel, he reported that "hundreds of cars" persisted until they became stuck or the road became too narrow. He urged immediate attention to the matter on account of the rapidly-increasing visitor interest in the area. Tomlinson also supported the extension of the road to Summerland or Yakima Park.[180]

In 1924, he National Park Service agreed to reconstruct the White River Road and extend it to the high subalpine meadows at Yakima Park. The White River Campground and other spots along the existing road had been investigated for a proposed large development including a hotel and visitor services, but these were rejected as unsuitable. Superintendent Tomlinson wrote the Enumclaw Commercial Club explaining why Yakima Park was selected for the new development.

> The only location suitable for development is in Yakima Park, an alpine meadow about two and a half miles long by a half to three quarters wide lying at an elevation of about 6,200 feet. This meadow, or park commands sweeping views of the north side of Mount Rainier and the Cascade Range. It is within easy access of many points of interest on Mount Rainier and the various ranges and alpine parks on the north side.[181]

Yakima Park was judged to have the finest view of Mount Rainier of any spot in the park. A large hotel and campground were recommended for the new development. Tomlinson estimated that 10 miles of new road would be required to reach Yakima Park and that the entire project would cost between $450,000 and $500,000.[182]

A rough road was constructed to Ohanapecosh Hot Springs, then just outside the park boundary, in early 1924. The single-lane track, built by the developers of the thermal springs, was intended to connect at Lewis (Packwood) with a new state highway being built by the State of Washington and the U.S. Forest Service. The new State Route 5, or "Cowlitz-Naches

Road," was part of the state's "National Park Highway" system, which consisted of all the state approach roads to Mount Rainier National Park. The new highway left Chehalis and then ran east and northeast through Morton and Randle to Lewis. From there, the forest service road would continue north across national forest land to the park boundary. Plans were to extend the road through the park to connect with the Naches Pass Highway at Cayuse Pass. The state and Forest Service roads were completed in rough form to the Clear Fork of the Cowlitz River, 5 miles northeast of Lewis, in July 1924. Superintendent Tomlinson warned that thousands of new visitors would be visiting the Ohanapecosh area, and that the park had absolutely no facilities for their accommodation.[183]

Washington's State Department of Highways surveyed the 5 miles between Clear Fork and the existing park boundary near Ohanapecosh late in 1925. That winter, work began on reconstructing and surfacing State Route 5 at Lewis. The reconditioned road was built to an 18' standard and surfaced with crushed rock by 1927.[184] Not surprisingly, considerable numbers of visitors began to show an interest in the Ohanapecosh Hot Springs and the southeast area of the park.

The state conducted a location survey for the extension of the Naches Pass Highway south to Chinook Pass in 1926, The following year, the legislature appropriated $1,258,000 for improvements to State Route 5, or the National Park Highway, which consisted of all the state approach roads to Mount Rainier National Park. The majority of the appropriation, some $977,000 went to the Naches Pass Highway, and went for construction of 8 miles of the road between the park entrance and Chinook Pass, as well as improvements between the pass and Yakima. Work was underway by the summer of 1927.[185]

More extensive repairs were made to the White River Road, and park crews assisted in the repair of the White River bridge outside the park boundaries in 1925.[186] Despite the considerable work, Superintendent Tomlinson complained its condition was deteriorating, and that construction should be pushed on the new road.

> No sooner is one rough place repaired than others, worse, are worn. By the time a second or third dangerously rutted section is repaired the first work must be done over. The worst feature of it all is the gradual deterioration of the old road despite all the work done and expenditures made, giving the impression to visitors that we either do not know how to maintain roads or else we are not cognizant of the needs.[187]

The Park Service then asked the Bureau of Public Roads, which had just assumed responsibility for major park road projects, to survey a route for a new White River Road. The survey was conducted late in 1925 under the charge of BPR engineer Short. The proposed line left the Naches Pass Highway near Deadwood Creek, rising from 3,675' to 6,450' at Yakima Park, making the latter the highest point in the park accessible by car. The survey took into account the round-the-mountain road concept still guiding park road planning,

and project engineers suggested that the road would probably be extended to the Elysian Fields area and a meeting with a road from Carbon River, completing the "North Side" link.[188]

Construction of the new "Yakima Park Highway"[HAER No. WA-126] began in 1927, with the first, $116,580 contract being let for a section beginning at the new White River crossing and extending 2 miles up towards Yakima Park. The project was completed by Seattle contractor A. C. Goerig in September 1928.[189]

In July, the Bureau of Public Roads awarded a $153,102 contract for the final construction of the White River Road section between the White River crossing and the park boundary to the Lidral Construction Company. Another, $33,345 contract was awarded to J. D. Tobin for the construction of a stone-faced reinforced concrete spandrel arch bridge over White River [HAER No. WA-53].[190] A. C. Goerig was awarded a second, $60,555 contract in August for clearing the section between the river crossing and the park boundary. Another contract for a mile of road between the park boundary and the Naches Pass Highway was let in the fall.[191]

Director Mather inspected the work on the Naches Pass Highway in the summer of 1928, and recommended that special provisions be made to protect the scenery along the new road, not only inside the park, but also on the approaches through national forest lands. Mather suggested the road should be named the "Cascades Parkway." In Yellowstone National Park in July, Mather met with Charles Donnelly, president of the Northern Pacific Railway Company, and H. S. Rhodes, president of the Rainier National Park Company, and outlined plans to save the timber along a 75-mile stretch of the road from near Enumclaw to Naches. The timber belt would provide motorists approaching Mount Rainier with a forested scenic route or parkway.[192]

Mather suffered a stroke in Chicago in November 1928, while en route to the Northwest to promote the timber protection scheme. When his assistant, Horace Albright visited him in the hospital, Mather tried to indicate his interest in the "Cascades" parkway project, which was one of his chief priorities in the Northwest. Mather did not make a substantial recovery, and resigned in January 1929; he died ten months later. Supporters of the parkway proposal subsequently mounted a campaign to push the road to completion and rename it for Mather. The proposal was supported by the Rainier Park Advisory Board, the Automobile Club of Washington and the Stephen T. Mather Appreciation Fund. Enactment would set aside a half-mile wide timber belt on both sides of the road within the adjacent national forest lands (including portions now lying in Mount Rainier National Park).[193]

The lower 4 miles of the new state highway segment were graded in 1928. SuperintendentTomlinson reported that the remaining section as far as Chinook Pass would be contracted in the spring of 1929, and that the entire road from Auburn to Yakima was scheduled for completion in the summer of 1930.[194]

Also in 1928, the Bureau of Public Roads began the reconstruction of 6 miles of the approach road between Lewis and the Clear Fork of the Cowlitz River. The Bureau hoped to complete the road in time for the 1929 summer season. The remaining section of road to Ohanapecosh Hot Springs remained a private track passable only in summer.[195]

The White River Bridge was completed in July 1929, and was inspected that month and accepted by Horace Albright, who had succeeded Mather as director of the Park Service.[196] The $126,960 contract for clearing, grading and preliminary construction of the remaining section of the White River Road between the river and Yakima Park was let to A. C. Goerig. Goerig's crews also constructed a small stone-faced steel girder and reinforced concrete bridge across Deadwood Creek [Dry Creek Bridge, HAER No. WA-49]. The total cost of this section was $151,465.22.[197] The contract for a bridge across Fryingpan Creek was awarded to Portland contractor A. F. Berni in July 1930. This structure [HAER No. WA-54] was an uncommon three-hinged steel web girder bridge. Berni began work in July and completed the bridge in July 1931.[198] Another bridge contract for the road was awarded in July 1930 to J. F. Ward of Seattle. The new Klickitat Creek Bridge [HAER No. WA-50], a substantial stone-faced reinforced concrete arch structure, was completed in October.[199] A rustic log stringer bridge was built across Shaw Creek. The road was scheduled to open for visitor use in July 1931.

With the completion of the Naches Pass Highway and the White River Road planned for 1930, the park administration again promoted a connecting road between Paradise and the East Side down the Stevens Canyon. In his 1929 annual report, Superintendent Tomlinson warned that the Yakima Park area would quickly become the most crowded section of the park, and urged construction of the linking road as soon as possible.[200]

The Mount Rainier National Park boundaries were extended by a 31 January 1931 act of Congress east to the Cascade crest and southeast to include the Ohanapecosh Hot Springs area. This boundary adjustment brought into the park the central 12 miles of the Naches Pass Highway, and also the eastern terminus of the new White River Road.

On 24 March, Secretary of Agriculture Arthur M. Hyde issued an executive order setting aside the half-mile timber belt along the 50 miles of proposed parkway on forest service land. The Land Classification Order set apart a total of 24,500 acres for recreational purposes and to protect the standing timber for scenic purposes. The order designated the section of road through forest service lands as the "Mather Memorial Parkway."[201] Prompted by National Park Service Director Horace Albright, Secretary of the Interior Ray Lyman Wilbur in turn gave the same name to the section of road within the national park boundaries. Wilbur's proclamation, issued on 23 April, was the final act in the creation of the parkway [HAER No. WA-125], which remains a unique example of a joint National Park Service/U.S. Forest Service scenic parkway.[202]

Surfacing work on the Yakima Park Highway was done under a $208,665.93 contract awarded to John Strom and Company. The work continued beyond the deadline into July of 1931, forcing a delay in the road's opening until 15 July. Two days later, the road and the new "Sunrise" development at Yakima Park were inspected by Director Albright. As predicted, the road proved an immediate hit with park visitors and the new facilities and parking lots were quickly over-taxed.[203] Over the next several seasons, Sunrise proved a more popular destination than Paradise. Superintendent Tomlinson praised the cooperation between the Bureau of Public Roads and the National Park Service Landscape Architecture Division, which resulted in a road which took full advantage of the magnificent mountain scenery.

> The new White River Highway to the Sunrise Area typifies the best in National Park Service Landscaping and Engineering. Well-planned, and constructed with reference to the best natural features of the district through which it passes, it brings out the best of scenic values, at the same time disturbing but little the natural beauty of the country. Bridge work and masonry is made of natural rock along the roadway, harmonizing completely with the landscape; roadsides are cleaned, and in many cases natural growth is already obscuring the scars made necessary by construction.[204]

The Mather Memorial Parkway was not completed until the fall of 1931. On 13 September, citizens of Enumclaw and Yakima met at Tipsoo Lake in a ceremony marking the completion of the intra-state highway. The grading work was completed in October, and the road was surfaced in the spring of 1932. The road was opened to public use on 15 June. Formal dedication ceremonies were held at Tipsoo Lake on 2 July. A bronze plaque in memory of Director Mather was unveiled, and addresses were delivered by Governor Roland H. Hartley and Professor Edmund S. Meany of the University of Washington.[205]

As the Mather Parkway neared completion, the Bureau of Public Roads was instructed to begin planning the "East Side Road" [HAER No. WA-124] between the Ohanapecosh terminus of the state/Forest Service road and the new parkway. The BPR established a survey camp in the southeast corner of the park and began running its location surveys in June 1931. The survey team, under the charge of BPR Senior Engineer Inspector Foreman E. D. Kinney, was to locate a line to connect with the parkway in the vicinity of Cayuse Pass or Tipsoo Lake, and to investigate several crossings of the Cowlitz Divide. Superintendent Tomlinson and the Park Service Landscape Architecture Division worked closely with the Bureau to ensure that the chosen line would properly protect and display the landscape through which it would pass.[206]

The East Side Road was constructed between 1932 and 1940. Contractors for the work were the Grays Harbor Construction Company from eastern Washington; Myers & Coulter and J.D. Harms of Seattle, Colonial Construction of Spokane; Bonneveille, Oregon contractor Sam Orino, and Milo Janovich. The southern section was graded as far as Ohanapecosh Hot Springs in June 1933 and cars

began entering the southeast corner of the park, even though the surfacing had not been applied. While this work was in progress, the 3 miles across Forest Service land between the Clear Fork and Ohanapecosh Hot Springs were surfaced, providing a paved route into the park's southeast corner. This lower project, like those in the park, was supervised by the Bureau of Public Roads.[207]

In February 1932, the Seattle Chamber of Commerce asked the Washington State Department of Highways to exclude all trucks and commercial vehicles from the Mather Memorial Parkway. Buses would be permitted. The proposal was endorsed by Superintendent Tomlinson. The parkway remained a state highway under state maintenance, despite the transfer of the central section to the Park Service. No entrance fees were collected, and the road was closed each winter, as the state made no effort to keep it plowed.[208]

All yearly, monthly, weekly and daily visitation records for the Sunrise and White River areas were soon broken. The highest point reached by a motor road in the park, Sunrise now rivaled Paradise as a destination point for visitors. In addition to visitor facilities, new housekeeping cabins were available, offering lower-cost accommodations for tourists. The new development was well-received; by 1934, as many as 1,200 cars were making the trip on summer weekends.[209]

Superintendent Tomlinson wanted to develop visitor facilities on the Mather Memorial Parkway at Tipsoo Lake and Chinook Pass, including an entrance arch, ranger station, picnic area, water supply, comfort station, 200-car parking lot and community kitchen, and asked NPS Chief Landscape Architect Vint to prepare plans for the development. Only part of the request was approved. Civilian Conservation Corps personnel built a picnic area and two comfort stations at Tipsoo Lake in 1933. They then began construction of an overpass bridge and entrance arch at Chinook Pass. This distinctive "rustic style" log and masonry structure [HAER No. WA-43] was completed in 1936.[210]

Use of the Mather Memorial Parkway was limited to vehicles weighing less than 5,000 pounds and traveling for pleasure purposes only by an executive order issued 25 May 1936 by L. V. Murrow, Director of the Washington State Department of Highways. The order later became the object of concern over possible interpretation, and today commercial vehicles are permitted to use the road outside the national park boundaries.[211]

Funds for the central 4.03-mile section of the East Side Road came in part from appropriations from the Public Works Administration and various Depression-era work programs. This work involved the construction of a 507' tunnel north of Deer Creek, and was carried out by contractor Sam Orino. Orino also received an $80,626.80 contract for the surfacing of the 7.8 miles of road extending north from the park boundary. The projects met with considerable delays, occasioned in part by collapses in the tunnel, and Orino did not complete the work until November 1937. A $114,423 contract was then

let to the Mirene Company for surfacing the upper part of the road. The company began work in August 1938.[212]

The East Side Highway involved the construction of four major structures. The tunnel, as noted, was completed by Sam Orino under his grading contract. The structure, which features rustic ashlar stone arch portals, was completed in October 1939 at a cost of $288,596. Orino also built a "rustic-style" reinforced concrete arch bridge faced in dense grey conglomerate [HAER No. WA-57] over Deer Creek under the same contract; it was completed in August 1939 at a cost of $69,614.11.[213] The permanent bridge across Laughingwater Creek [HAER No. WA-55] was built by the Portland, Oregon firm of Joplin & Eldon at a cost of roughly $60,000. The three-span continuous concrete beam bridge was reported by the BPR engineer as being the longest continuous beam bridge yet attempted in the Pacific Northwest. [214] Cougar Creek was spanned by a rustic log stringer bridge which has since been replaced.

The Public Roads Administration, Depression-era successor to the Bureau of Public Roads, oversaw the construction of a new bridge spanning Deadwood Creek on the Mather Memorial Parkway in 1936-39.[215] The graceful open-spandrel arch bridge [HAER No. WA-56] reflects the stream-lined design of the 1930s and marked a departure from the "rustic style" which had prevailed in bridge design in the park over the last two decades. The structure is deteriorating and is presently (1992) scheduled for replacement.

The new East Side Road opened to public travel in the summer of 1940. A dedication ceremony, sponsored by the Southwest Washington Good Roads Association, was held at the north portal of the tunnel on 16 June 1940. Tacoma Mayor Harry P. Cain drove the first car through the tunnel. The total cost of the new road was roughly $1.5 million.[216] The Mirene Company's surfacing of the upper 6 miles was not completed until the following year; cost of this work was $144,873.07.[217]

A stone marker was erected at the wye between the Yakima Park Highway and the Mather Memorial Parkway in 1940. The ashlar-cut granite marker was originally signed "Mount Rainier National Park--Yakima Park," but was later resigned to mark the Mather Memorial Parkway. The $5,000 marker was designed by the National Park Service Branch of Plans and Design.[218]

A ski area was developed on an experimental basis at Cayuse Pass in the late 1940s. As part of the project, a large parking area was constructed on the west side of the road a half mile south of the pass. The lot provided space for snow removal equipment and for skier parking. The ski area was later abandoned, but the parking area remains.[219]

CHAPTER VI

DEPRESSION-ERA PROGRAMS

The Great Depression caused major economic disruptions in the Pacific Northwest as well as in other sections of the country. Thousands of people were thrown out of work, and the region's logging industry collapsed. Tourist visitation to the park plummeted as most people were struggling just to hold on. Despite the hard times, the Mount Rainier park roads benefitted from various New Deal programs because road projects on federal lands could rapidly engage large numbers of unemployed workers. Many of these programs were enacted in the "Hundred Days" period following President Franklin D. Roosevelt's inauguration on 4 March 1933.

Federally-funded road construction projects in the early 1930s provided much needed relief for local men left out of work by the Depression. Fortunately, six major road projects were completed at Mount Rainier during this difficult period, and hundreds of workers were employed from nearby communities. Most of these men were not carried on the park payroll, but were employed by contractors on the various projects. The major projects undertaken in this period were the reconstruction of the Nisqually Road, the completion of the West Side Road, and the construction of the Mather Memorial Parkway, the Yakima Park Highway, the East Side Road and the Stevens Canyon Road.

In the early days of the Depression, the parks were instructed to investigate and report on the labor conditions in their neighborhoods. Administrators worked with local welfare agencies to secure unemployed men for work on major construction projects. At Mount Rainier, Superintendent Tomlinson and his staff attempted to utilize the unemployed in the area in the massive road construction projects then underway. To provide for the employment of a larger number of men, contractors were ordered to work forces in two sets of teams on thirty-hour weeks. One group would work Mondays, Tuesdays and Wednesdays, and the other group Thursdays, Fridays and Saturdays. The contractors were compelled to hire men through the county welfare committees. However, this often resulted in considerable problems and delays. In his December 1932 monthly report, Tomlinson reported that the county committees were providing the contractors with crews of ex-clerks, preachers, doctors, lawyers and dentists. Many of these came to work improperly clothed and suffered from cold on the job. Their inexperience and, in many cases, inability to do the work, caused myriad problems.[220]

The first program of roadside cleanup began in 1930 with park crews under the supervision of NPS Landscape Engineer Davidson. Efforts were concentrated on the Nisqually Road around Narada Falls and in the lower Paradise Valley. Timber from old bridges, logs and brush was collected and burned. Rocks from

slides and heavy excavation blasting were dumped in draws. The first year program cost $5,000.[221]

Some work in the park was funded the Civil Works Administration. The East Side Highway was funded in part by appropriations from the Public Works Administration and various other emergency employment acts.[222] But the most important of the programs at Mount Rainier was the famous Civilian Conservation Corps (CCC) program. In April 1933, less than a month after President Franklin Delano Roosevelt took office and began initiating his "New Deal" programs, Mount Rainier National Park was notified to begin planning programs that would utilize workers from the newly created CCC. Park staff immediately began preparing a work program in conjunction with the U.S. Army, which was to administer the CCC program. By the end of month, the first enrollments were being made in Washington state, and roughly 1,000 men had entered barracks at Vancouver and Fort Lewis.[223]

The CCC was a unit of the Emergency Conservation Works (ECW) program, and engaged unemployed youths on massive public works projects across the nation. CCC youths worked under military-style discipline under charge of reserve officers. In 1937, the CCC was reorganized as a separate unit from the ECW. Most of the workers serving at Mount Rainier were from the related Emergency Conservation Works (ECW) program, though both units did extensive work in the park.

Work camp locations were determined at the request of the President, on advice from the Director of Emergency Conservation Works and the Special Advisory Council guiding the program. Five camps were established at Mount Rainier, at Tahoma Creek, St. Andrews Creek, Narada Falls, White River, and Ohanapecosh; Longmire was used as a staging area..[224]

The civilian program was administered along military lines, with Brigadier General Joseph C. Castner, commanding general at Fort Lewis, serving as district commander for the CCC. First Lieutenant Frank L. Beadle of the Sixth Engineers at Fort Lewis supervised the construction of the camps at Mount Rainier. The camps generally consisted of wooden mess halls and bath houses surrounded by tent cabins which housed the recruits.[225] Some structures were designed to be dismantled in the fall to prevent collapse by heavy snow loads.

The youths worked in squads of eight men each, headed by a foreman. Park rangers and fire marshals trained the foremen, who in turn instructed the recruits. Park officials directed all work, while army officers were in charge of camp organization and supply. Discipline was largely "moral suasion," with army officers trying to lead, rather than drive, the workers.[226]

The park and the army made arrangements to have all camps fully staffed and completed by 1 July 1933, the target date set by President Roosevelt for all camps to be operational.[227] Five CCC companies with an aggregate of 1,000 men

arrived in the park in 1933. Three of the companies consisted of men from New York City's East Side, one company was from Chicago, and one from Western Washington state. The Washington contingent was the first to arrive, setting up camp in May. The other workers arrived in April.[228]

The Washington state workers were established in the permanent camp at Tahoma Creek on the West Side Highway. A New York outfit, Company 1232, occupied temporary quarters at Longmire before building a camp at Narada Falls. Company 1231, also from New York, established its camp at St. Andrews Creek on the West Side Road. A third New York group, Company 1229, located on White River near the northeast entrance to the park. The Chicago company set up at Ipsut Creek on the Carbon River road.[229]

Many of the New York boys were bewildered by their experience. Some had never been off pavement in their entire lives, and were confused by the unfamiliar scenes of their cross-country travel and by Mount Rainier National Park. Some boys from the Bowery told Park Superintendent Tomlinson that they had never even been to Central Park, had never seen a tree in its natural state, and didn't know that mountains existed. Although some of the boys admitted being homesick, most were excited by the challenge and threw themselves into the work with enthusiasm.[230]

The main aegis for ECW work at Mount Rainier was forest protection. This was extended to mean roadside cleanup work, but largely consisted of removal of snags and clearing of fire hazards.[231] Such work constituted landscape protection, not landscape preservation. The landscape work was done under supervision of two landscape architects assigned by the NPS Branch of Plans and Design in San Francisco. Park landscape architects Russell L. McKown and Halsey M. Davidson each supervised two or three of the work camps. Landscape foremen and erosion control foremen were appointed at each camp.[232]

The first priority of the program was forest conservation, and the recruits were put to work cleaning up wind-blown areas which had been identified as fire hazards. Some workers were assigned to "blank bank stabilization" along the roads, which was defined as preventing slides along the roadsides by planting trees and shrubs or by placing logs along the banks to stop falling debris.[233]

Halsey Davidson described roadside cleanup operations in his 1933 annual report on E.C.W. activities at Mount Rainier:

> Roadside cleanup, an activity which proved of large proportions, occupied one or more crews during the entire season. To realize the great amount of work involved one must picture a forest road leading through a dense forest of hemlock, Douglas fir, spruce and cedar, with underbrush almost impenetrable and fallen trees criss-crossed everywhere. Such were the conditions of this entire area. Only such of the debris as was considered hazardous from the standpoint of fire, was removed. Green shrubs, logs covered with

> moss and damp decaying vegetable matter not only are not a fire hazard but contribute much to the beauty of the forest. Therefore special care was taken to leave such areas undisturbed in removing the dry material which constitutes a fire menace....Debris thus collected was burned in small piles in the road or hauled to open spaces on the river bar where larger fires could be built. No burning took place except in rainy weather or late in the fall when no danger attended.[234]

Dangerous snags and timber leaning over the road were removed as a safety concern. However, snag removal soon included trees farther and farther from the roads, and Park landscape architect Davidson complained that the dead timber should not be removed except where absolutely necessary.

> Snags are a perfectly normal and natural part of the forest; are interesting and often beautiful in the natural landscape; are magnets which attract bird and small animal life to the vicinity of the roads. As snags go, the ones along the roadside are least fire-hazardous (sic) of any, inasmuch as they can quickly be reached and cut should fire get to them, and are easily detected in case of lightning ignition which rarely occurs in areas where roads exist.[235]

Davidson also reported some incidental damage to roadside trees by burning operations, but stressed that "Much excellent work was accomplished."[236]

Other road work included snow removal, windfall cleanup, slide removal, culvert and roadside ditch clearing, and shoulder and rock wall repair. The Tahoma Creek Camp personnel did roadside cleanup on the Nisqually and West Side roads. Workers from the White River Camp helped with erosion control and bank sloping on the new Yakima Park Highway. They also planted shrubs at the White River Entrance to conceal equipment and wood sheds from the road. Among the plants set out by the camp in the their projects were maple, ash and other trees, huckleberries and Oregon grape.[237]

Camp No. 6 was organized at Ohanapecosh Hot Springs in April 1934.[238] Men from this camp carried out various maintenance work on the West Side Road and the Nisqually Road, then under construction. The work included cleaning ditches, removing slides, building up shoulders, cleaning out culverts and removing debris along the road. Rock outcroppings left in the ditches were blasted out, and vegetation along the road was removed. A total of 21.5 miles of road was maintained in the 1935 season.[239]

Although most of the CCC/ECW road work was related to landscaping and roadside cleanup, the crews also constructed several road-related structures. Workers from ECW Camp 5 constructed a rustic entrance arch like that at the Nisqually Entrance over the Carbon River Road at the park boundary in 1933.[240] At Chinook Pass, an unusual log stringer and masonry structure, serving as entrance gateway and trail bridge [HAER No. WA-43], was completed in 1936 by a CCC crew under the direction of the park landscape architect. E.C.W. crews

from Camp No. 3 at Carbon River constructed the Dr. William Fraser Tolmie memorial entrance pylon [no longer extant] at the Mowich Lake Entrance in 1933. The parking area at the Tipsoo Lake picnic area was paved in 1935.[241] ECW personnel also constructed the improvements at Tahoma Vista on the West Side Road and supposedly, several sections of retaining walls along park roads. The Civilian Conservation Corps program was dissolved in 1942, but not before the workers had completed much important work at Mount Rainier.

The Bureau of Public Roads required contractors to engage labor through reemployment bureaus set up to serve displaced workers. BPR Chief Thomas MacDonald insisted upon adherence to regulations concerning minimum wages, maximum hours men could work, and labor-intensive construction methods. The intent was to hire as many workers as possible.[242]

In July 1939, the BPR was reorganized as the Public Roads Administration and attached to the new "Federal Works Agency" under terms of President Roosevelt's 1 July 1939 reorganization The agency was directed to engage unemployed men for its projects. The Public Roads Administration remained in the new organization until July 1949, when it was reconstituted as the Bureau of Public Roads and placed under the General Services Administration. In August, the BPR was transferred to the Department of Commerce. Today, it is part of the Federal Highway Administration of the U.S. Department of Transportation.[243]

CHAPTER VII

THE "RUSTIC STYLE" AT MOUNT RAINIER

Mount Rainier National Park contains one of the most significant and extensive collections of intact National Park Service "rustic style" structures. These range from small comfort stations and ranger patrol cabins to the log blockhouses at Yakima Park and the rambling Alpine chalet-style Paradise Inn. These structures, constructed of native materials and designed to carefully relate to their surroundings, reflect the National Park Service's policy that improvements in the park should not detract from the awesome scenery. The style was widely used throughout the park system in the first half of the twentieth century, and dominated construction at Mount Rainier through this period.

"Rustic" design can be traced to late nineteenth century romantic attitudes concerning nature. Architect Andrew Jackson Downing, in *A Treatise on the Theory and Practice of Landscape Gardening Adapted to North America* (1841), *Cottage Residences* (1842) and *The Architecture of Country Houses* (1850), wrote extensively on the need for buildings and support structures to relate to their environment. Improvements need not be merely functional, but with careful design, could attain something of the "picturesque," which he defined as "beauty manifested with something of rudeness, violence, or difficulty." Among the plans and designs he offered for sundry villas and stately houses were several rural farmhouses of natural materials, designed and landscaped for wild or country settings. Some characteristics of these designs were embodied in the "rustic style," such as the use of native timber and stone, projecting low pitched roofs supported by brackets or exposed purlins, and appropriate landscaping to help structures harmonize with their sites. Downing refers to "rustic beauty" in his description of the desired effect.[244]

Other influences were the great estates and country parks of the day, with their mixes of formal and "wild" terrain, winding roads, masonry and unpeeled timber construction, and picturesque structures like pavilions, shelters and scenic overlooks. The establishment of great public parks in the late nineteenth century significantly heightened recognition of the importance of landscape planning.[245]

The embryonic nineteenth-century conservation movement was also influential. Frederick Law Olmsted, the first to call himself a "landscape architect," set forth certain principles concerning design of developments in the parks in his master plan for the Yosemite reserve (then under state administration, and not yet a national park) in 1865. Olmsted insisted that all developments be subjected to close scrutiny, as preservation of the landscape was of the utmost importance; after all, the land had been set aside for conservation purposes. Better access was needed, he conceded, and he suggested a system of winding carriage drives with "suitable resting places" and turnouts at various

intervals. Roads would be built to offer the "best views" of the scenery, and constructed as inconspicuously as possible, in order to "reduce the necessity for artificial construction within the narrowest possible limits."[246] Olmsted's report was suppressed by the Yosemite Board of Commissioners, but his general precepts came to be accepted as appropriate guidelines for park planning. His son, Frederick Law Olmsted, Jr., helped draft the August 1916 "Organic Act" which created the National Park Service, and advised with the new agency on sundry landscape concerns.

The Organic Act dictated that the new National Park Service was to "conserve the scenery and the natural and historic objects and wildlife therein by such means as shall leave them unimpaired for the enjoyment of future generations."[247] In order to meet its preservation mandate, the agency required new developments to be designed to be as unobtrusive as possible so as not to detract from the scenery. Park staff utilized rustic design for many park improvements, as such structures successfully integrated with their settings.

Buildings and structures constructed in the rustic style were characterized by their use of native timber and stone, low pitched roofs with overhanging eaves, rambling plans, irregular shaping of elements, and a deliberate overscaling of components to help structures harmonize with natural settings. Both broken range masonry and the rounded boulders found throughout the park were used in various park bridges and structures, as well as peeled logs of varied species.

In the 1930s, the National Park Service issued two general design guides for park developments, *Park Structures and Facilities* (1935) and *Park and Recreation Structures* (1938). The two guides were essentially a portfolio of the NPS's achievements in "rustic" design. The books stressed the importance of designing structures in a sympathetic relationship to their settings. Arno Cammerer, then Director of the Park Service, outlined the basic tenets of the style in the introduction to *Park Structures and Facilities*.

> In any area in which the preservation of the beauty of nature is a primary purpose, every modification of the natural landscape, whether it be by construction of a road or erection of a shelter, is an intrusion. A basic objective of those who are entrusted with the development of such areas. . . [is] to hold these intrusions to a minimum and so to design them that, besides being attractive to look upon, they appear to belong to and be a part of their settings.[248]

In 1936, the Park Service issued another publication on Emergency Conservation Works programs in the national parks. It summarized the general landscape design process as beginning with a choice of locations which do not "tear up" the landscape or intrude upon important views. This was followed by a study of natural design and materials and other important features. Structures were designed using indigenous materials. Finally, landscaping with native plants

would hide construction damage. The Branch of Plans and Design, successor to the Landscape Architecture Division, worked with the parks on development of "master plans" governing future development.[249]

"Rustic style" structures at Mount Rainier date to 1908, when the Oscar Brown cabin was established at the Nisqually Entrance. Over the next three and a half years, the style dominated construction in the park. Park Service Historian Barrett Kennedy defined the general characteristics of "rustic" design at Mount Rainier:

1. Structures must be scaled to site and environment.
2. Natural features and vegetation screens are integral to site design.
3. The intelligent use of materials reinforces the marriage between the man-made and the natural world.
4. Design emphasis on the horizontal creates the illusion of a low profile, and with the use of massive stone footings, battered corners, and foundation plantings, ties structures firmly to the ground. A shallow pitched roof with oversized verge members, thick eave lines, and rough cedar shakes eliminates any remaining sense of verticality, and complements the image and scale of the Northwest forests.
5. Color selections from a palette of earth tones blend structures with the natural landscape.
6. Structures are designed as a whole, to be viewed from all sides and perspectives.[250]

Not only a different, more naturalistic architecture was prescribed for the parks, but different construction methods were called for as well. Work was to be carried out so as to cause as little environmental damage as possible, using common local materials. Developments were to be carefully conceived to reduce the number of structures to a minimum.[251]

Occasionally, structures were designed to invoke associations with the historic architecture of a region. One of the best examples of this "pioneer" variant of the "rustic style" is the "Stockade" or south blockhouse at Yakima Park, constructed in 1930-31 as a ranger station and administration building. Patterned after an early Northwest blockhouse, the two-story structure is of log construction, automatically achieving a certain harmony with the standing timber nearby. Its cantilevered second story, shallow hipped roof, and rubble stone foundations give a particularly bold effect. Albert Good praised the structure, stating that "the avoidance of rigid, straight lines, and over-sophistication, gives the feeling of having been executed by pioneer craftsmen with limited hand tools. It thus achieves sympathy with natural surroundings and the past." A second structure patterned after the original was constructed in 1939. The Sunrise Visitors Center, connecting the two blockhouses, was completed in 1943.[252] Park Service landscape architect Ernest Davidson designed a blockhouse patterned after a Hudson's Bay Company post for use as an entrance station on the Mowich Lake Road in 1931, but funds

were not appropriated for its construction. Only a log pylon which was to have supported a pair of gates was constructed, and it is no longer present.

The 1916-17 Paradise Inn is constructed in another rustic variant, the "Alpine Chalet" style. The structure, designed by the Tacoma firm of Heath, Grove and Bell, is characterized by its steep gambrel roofs, massive log framing elements, and numerous dormers. The structure is clad in cedar shingles, fireplaces are of native stone, and the lobby's fittings and furniture are all of rustic design. The 1920 Paradise Inn Annex and the nearby Guide House (1920) and Paradise Ranger Station (1921) are all of complementary design.[253]

The "rustic style" was so successful that many visitors now come to expect it on their visits to the national parks. Widely implemented between the 1920s and the 1940s, its presence is so pervasive that it has become a part of the "national park experience." Writing on its implementation at Mount Rainier National Park, Park Service regional historian Stephanie Toothman called the style a "reflection and result of the philosophic approach" to architecture by the NPS.

> It represents a conscious attempt to create an architectural vocabulary that expresses a very clearly-stated philosophy about the interaction of man and nature within the boundaries of our great natural area parks. The tangible expressions of this philosophy are so widespread both through our national and state park systems that they have become transmuted in our consciousness into a norm—we expect "rustic" structures in our natural park areas, they are integral to the way parks should look.[254]

After World War II, the "rustic style" lost popularity. The required hand labor and craftsmanship was no longer obtainable, and such construction could not keep pace with the rising demand for park facilities. New architects and planning staff were trained in other schools of design, and few "rustic style" buildings were built in the parks in the post-war years.[255]

CHAPTER VIII

HOW THEY DID IT

The working relationship between the Bureau of Public Roads and the National Park Service was spelled out in the final Memorandum of Agreement between the two agencies signed in in June 1926. Under its terms, a project would be initiated only at the written request of the Director of the National Park Service to the Chief of the Bureau of Public Roads. At the same time, the Director would instruct its Landscape Engineer to cooperate with the BPR in making a preliminary investigation for the work. The Chief of the Bureau would then order the investigation and preparation of a preliminary estimate for costs of construction. The Park Superintendent, the NPS Landscape Engineer, and the BPR District Engineer were to set the time for the field examination. Afterwards, the following reports were to be prepared:

- Report to the Chief of the BPR by the BPR representative on the location and construction of the proposed project, along with an estimate for the costs. (Copies to the Park Service in duplicate and to the Park Superintendent).

- Report to the Park Service by the NPS Landscape Engineer on all landscape features of the proposed project. (Copies to the BPR in duplicate and to the Park Superintendent.)

- Report of the Park Superintendent to the Park Service, commenting on the above reports and making recommendations with respect to the project. (Copies to the BPR in duplicate through the District Engineer, and to the Park Service in duplicate through the Field Assistant.)[256]

After consideration of the reports, the National Park Service was to inform the Bureau whether it wished to pursue the work as a major project to be undertaken by the BPR, or as a minor project without the services of the Bureau. (These smaller projects are sometimes referred to as "force-account" projects, and were carried out by NPS crews or, occasionally, contractors under NPS supervision.) In general, "major" projects had an estimated cost of $5,000 or more per mile.[257]

If the work was determined a "major project," then the Director of the National Park Service was to formally request the services of the BPR in handling the project to completion. Upon receipt of such notice, the Bureau was to instruct its District Engineer to proceed, in cooperation with the Park Superintendent and the NPS Landscape Engineer, with location surveys, and to prepare plans, specifications, and estimates for the project. The location survey report, together with comments from the Landscape Engineer and Park Superintendent, were then to be submitted to the Park Service for approval.

If the Park Service approved the plans, specifications and estimates, it was to forward its approval in writing to the Bureau and instruct the Park Superintendent to proceed with advertising for bids. The bids were to be opened and tabulated by the Park Superintendent and the BPR District Engineer. The recommendation for the award was to be made by the Superintendent in concurrence with the District Engineer, and was to be forwarded to the Director of the Park Service, along with the three low bids and a tabular statement of all bids received. The award itself was made by the Secretary of the Interior.

On notice of the award, the Park Superintendent and the Bureau were to be immediately advised so that a formal contract could be executed between the contractor and the Department of the Interior. The work was to be prosecuted by the District Engineer in accordance with the plans and specifications approved for the project. These specifications were to govern all ordinary landscape features of the work, but minor alterations not requiring a modification of the agreement could be ordered by the District Engineer in writing, with the written concurrences of the Landscape Engineer.

Payments were to be made by the Park Service's agent as work progressed. Disbursements were to be made to the contractor on the basis of monthly estimates approved by the District Engineer. The Park Service was to reimburse the Bureau of Public Roads for actual expenses incurred in surveys, preparation of plans and estimates, and construction supervision. The BPR was to provide the NPS with an estimate of the costs to be incurred for the project, and the Park Service was to set up an account on its books for such expenses. Reimbursements for the actual BPR work were to be made from time to time when vouchers were submitted. Before approving the final settlement with the contractor, the District Engineer was to obtain from the Park Superintendent and the Landscape Engineer written recommendations for acceptance of the project. The District Engineer was then to approve the contract and forward the contractor's final voucher, through the Chief of the BPR, to the Park Service, accompanied by the recommendations for final acceptance by the Secretary of the Interior. The voucher was then to be submitted to the General Accounting Office for final settlement.[258]

Preliminary Considerations

Selection of a route involved a number of considerations. Special attention was devoted to scenic attractions and vistas, and to the location of accompanying camp sites, entrance stations, or other developments. In some cases, the roads were planned to extend to the park boundaries even before connections with the outside state road system were complete. As an inside system with no proper outlet would be useless, the Interior Department refused to appropriate construction funds until connecting state roads were under contract and nearing completion. For example, the construction of the Carbon River Road was delayed when the state and Pierce County were slow to complete the connecting approach road from Fairfax.

Once a general route had been selected, a preliminary reconnaissance survey was undertaken. The party included an engineer from the Bureau of Public Roads (in the case of Rainier, from the Bureau's District 8 office in Portland, Oregon) and support staff, and a representative of the National Park Service's Landscape Engineering Division (or its successors). The BPR engineer was charged with the usual road-building considerations, including location of rights-of-way, choice of stream crossings (taking in mind the special needs for placement of bridge abutments or foundations), and preparation of estimates for the cost of the work. The landscape engineer or architect helped to choose a route which would take advantage of the natural features while at the same time causing minimal damage to the same. Dudley Bayliss described this involvement in his 1957 road study. He was writing about national *parkways*, whose needs sometimes differed park roads, but the role of the landscape engineer in route survey and planning was the same.

> The landscape architect familiarizes himself with all points of scenic value en route whether they be landscape, topographic, or scientific in nature; anything that would afford visible or physical pleasure to the motorist or stimulate his interest in the parkway environment is taken into consideration. If a choice is possible, the landscape architect seeks for variation. . . The greater the length of the project, the more important this variety of location becomes. The same type of landscape or location can become monotonous no matter what the locale may be. . . Other important considerations of selecting a route involve the historic, scientific and archeological subject matter which may be encountered en route.[259]

A typical survey report discussed such considerations as topography, forest cover, snow conditions (including potential drifting and banking in rock cuts, and solar exposure (important in keeping roads dry and an aid in early snow melting). Amounts of clearing, grubbing and excavation, and discussions of expected gradient and alignment conditions, required bridges and other structures, special subgrade treatments and likely sources for construction materials were evaluated. Drawings of typical roadway cross sections, route maps, and photographs interpreting the route were generally attached. These reports offer considerable insight into why particular road locations were selected.

On the Yakima Park Highway, for example, the location survey was conducted by BPR Associate Highway Engineer C. R. Short in the autumn of 1925.[260] As was typical of the BPR survey reports, Short not only made recommendations for an efficient motor route, but took into account scenic opportunities presented by the landscape. He suggested bridge locations, camp sites, and a location for a "checking" or entrance station at what was then the park boundary. His report also discussed the amount of clearing and grubbing work which could be expected, drainage considerations, and sources for sand and gravel.[261]

Surveys for the Stevens Canyon Highway proved highly complicated, as several different routes were investigated and rejected, and survey crews were kept busy for years. Possible routes considered included lines through the Indian

Bar and Ohanapecosh Park areas (which would have devastated these fine subalpine meadows) and routes along Mazama Ridge and the upper slope of Stevens Creek Canyon. In the end, a route lower down the Stevens Creek Canyon and around Backbone Ridge was adopted. National Park Service Director Horace Albright personally inspected the proposed routes, and directed BPR engineers to avoid the high country and to plan the road down Stevens Canyon. Some surveys continued on the east end of the road after construction began on the west.

Final Location Surveys

Once the general route of the road had been determined, a final location survey was completed by a larger crew. Stakes were set to mark the centerline and rights-of-way. BPR and NPS officials then inspected the staked line for suitability. The Bureau of Public Roads followed a general staking practice it developed a decade or so earlier.

> In staking out, the stakes should be marked in such a way that the location shall be visible from points some distance away. The proposed roadway should then be carefully studied from selected points, both upon the roadway site and a distance from it, in order to determine if there may not be changes which shall add to the attractiveness of the views which may be obtained by travelers or to insure that the roadway may have an harmonious setting when viewed from the outside. It will be necessary, in order to make sure of not missing attractive views which might be brought out by a little change, to occasionally climb a tree along the route and study the possibilities from such vantage point. It may be advisable for some reasons to locate the road through an open or bare spot. Such places should not avoided on account of unattractiveness until a study has been made to determine whether the unattractiveness may not be eliminated by a judicious planting of trees and shrubs or possibly by the introduction of a small lake or pond. No pains should be spared to insure the best possible solution at all points, keeping in mind the possibility of such a location as will preclude relocation after the road has been built.[262]

Center line stakes were placed at 100' stations and cross sections were taken at each for the necessary widths on each side in order that estimates could be made for the amounts of materials which would be required or have to be excavated.[263] Staking was usually completed before contracts were advertised so potential bidders could have an opportunity to inspect the route.

Preparation of Plans and Estimates

The engineers attempted to begin planning work for the road projects while the survey teams were still in the field, as the plotting of the notes sometimes occasioned the need for further work. Once the preliminary plans were drawn up, they had to be carried out into the field and compared with the landscape in order to determine the road's final appearance on the ground. Cuts, fills, culverts, ditches and bridge approaches all had to be provided for. Considera-

tion also had to be given to the landscape effects, and here the special services of Park Service landscape engineers and architects resulted in plans for roads that would befit the majestic park setting. Each piece of necessary work was included on the plans. At the same time, the project specifications were prepared, giving quantities of materials and special details.

Plans for the roads were generally worked up in the District 8 Office of the Bureau of Public Roads in Portland, Oregon. However, plans for a number of the park bridges and structures were prepared at the Bureau's Western Regional Office in San Francisco. Architectural plans for some structures were prepared by the Park Service's Landscape Engineering Division and its successors.

Once the plans and specifications were complete, estimates were prepared for the cost of the proposed work. These included all details of the work, from clearing and grubbing operations through surfacing and final cleanup. Once the estimates were prepared, they were submitted to the National Park Service for approval. If the plans, estimates, and specifications were approved, the Department of the Interior would authorize the Bureau of Public Roads to advertise the projects for bids. This process generally took considerable time; in the case of the Yakima Park Highway, construction did not begin until two years after the first location survey was conducted.

Specifications even included standards for signage to be used during construction. Some of these were standard highway signs available from manufacturers; others were to be made specially to order. Designs for the signs were adapted from the "Manual and Specifications for U.S. Standard Road Markers and Signs."[264]

Award of Contracts

When the final location survey was complete, the project was divided into sections, and contracts were prepared for the individual segments. The contracts were advertised regionally and the bids were opened at the BPR district office; often, the park superintendent was present at the opening. The data was then transmitted to Washington, D.C., for approval by the director of the National Park Service. All awards of contracts were made by the Secretary of the Interior on recommendation from the Bureau of Public Roads and the Park Service. The contracts stipulated a beginning date of construction and the allotted amount of time for the completion of the project; failure to complete the work on time invoked considerable penalties. Contractors were required provide evidence of financial stability and to post bonds for their work; in several cases, companies defaulted and projects were completed by contractors provided by the bonding company. The Deadwood Creek Bridge [HAER No. WA-56] is a good example; when The Construction Company of Roseburg, Oregon failed to make progress on the project, the company's contract was annulled and contractors Williams & Douglas of Tacoma finished the bridge for the bonding company. Like the contracts, bonds had to be approved by the Secretary of the Interior. The contracts and bonds, upon

approval, were transmitted to the Audit Division of the General Accounting Office. Payments were made on the voucher system outlined on page 29.

Each contractor worked under the supervision of an engineer from the Bureau of Public Roads, who was titled "Resident Engineer" for the project. Many of the contractors sublet parts of their work, such as masonry walls or steel work, to specialists in these branches of construction.

Construction Camps

Since the work took place in the rather undeveloped national park, contractors generally quartered their men in construction camps on or near the project sites. Maintaining workers in such remote places was a major task, as huts had to be built, provisions had to be supplied for the men (and in many cases, for draft animals), and stores of all kinds and machinery had to be collected before work could proceed. On clearing and grubbing contracts, where no road yet existed, pack trains were sometimes required to bring in camp materials and supplies. More than a dozen work camp sites were identified in the recording project and are indicated on HAER drawing WA-35.

In order to reduce the impact on the environment, contractors were often required to establish their work camps in the project right-of-ways. Interesting arrangements were made by some of the contractors. Reference is made to a "moving camp" on the lower part of the Nisqually Road. White River Road contractor A. C. Goerig established one of these on his grading contract. Photographs in a BPR final construction report show that the "camp" consisted of a number of tent-cabins mounted on wooden sleds, which were dragged along the road by a caterpillar tractor as the work progressed.

Camps were not always conveniently sited, and merely reaching the project sites was sometimes difficult for crews. On the 1934-35 clearing project on the Stevens Canyon Highway in Stevens Canyon, the contractor established his construction camp on Stevens Creek three miles beyond the completed road near the center of the work. This forced clearing crews to climb 400' to 500' over steep and hazardous rock slopes to reach their project. The situation was unavoidable, as there was no flat ground higher in the canyon for the camp.[265]

In the late 1930s, the National Park Service adopted a policy forbidding the establishment of engineers' camps for park road projects. In the construction of the East Side Highway, BPR engineers were quartered at the Courtright Creek Bridge site on the Randle-Yakima or White Pass Highway, then under construction under BPR supervision.

Traffic Control

Many of the park road projects involved completely new construction, and generally did not inconvenience park visitors. However, as roads were reconstructed or bridges were replaced, special provisions had to be made to allow visitor and/or construction traffic to proceed. These might include temporary closures, scheduling of work for off-peak hours, use of flagmen and pilot vehicles, of the construction of temporary bridges or structures. As most road work was done on the basis of contracts for individual segments projects, only certain parts of the park road network were likely to be under construction at one time.

Temporary timber bridges or trestles were constructed at many crossings so as to allow traffic, whether construction vehicles or park visitors, to proceed. Details of the temporary bridges constructed at Mount Rainier are included in the individual road reports.

The Yakima Park Highway opened three years before the bituminous surfacing was applied. When this work was subsequently done, a strip half the width was paved at one time, allowing traffic to use the other lane. Vehicles were escorted between flagman stations at both ends of the construction zone by a pilot vehicle.[266] Flagmen are also used in the course of many maintenance operations related to park roads.

The 1911-1926 "control system" limiting traffic on the Nisqually Road to uphill or downhill traffic at specified times was necessitate by the narrow nature of the road. The system, fully described in the related road report, was discontinued following widening of the road and construction of the Ricksecker and Narada cut-offs.

Clearing

The first road construction operation was clearing trees and brush along the staked roadway. Much of the initial work, bucking and felling, was done by hand, using axes, saws and brush hooks. Contracts generally provided for increased payment rates for the removal of dangerous trees and snags. Several men generally followed behind the slashers, piling the slashings in the right-of-way. [267] The debris was usually burned under supervision of park rangers or fire wardens.

During the clearing work on the White River crossing-Yakima Park segment of the Yakima Park Highway project, contractor Goerig's crews used draft teams to drag all trees and brush into windrows at the lower slope stake line. These windrows helped protect the natural surface formations and vegetation on the steep hillsides. According to the resident engineer, "this method proved very satisfactory, and a very few rocks passed through the windrow of trees."[268] On Goerig's grading contract for the section extending east of the park boundary, the contract price was $1,000 an acre on account of windfalls and heavy timber. Goerig subcontracted the work to a gang of fourteen Russians for $400, making a nice profit on the work. The men were paid $7.40 a day for

heavy labor. Burning of brush and logs in the right-of-way was supervised by a representative of the adjacent Rainier National Forest.[269]

Grubbing

The next phase of work, grubbing, consisted of removing snags and stumps left from the clearing work. Horse teams and small gas "donkey" engines were occasionally used to pull larger trees and snags; in some other cases, stumps were "shot light," that is, loosened or blown from the ground with light charges of explosives. They would then be dragged away by gas shovels or teams. In order to reduce damage to the surrounding timber, stumps were usually shot only hard enough to crack them; they were then removed with hand tools or with a gas shovel. On the Yakima Park Highway project, the stumps were and used in reinforcing the windrows at the toe of the slope.[270]

On most other projects, the debris from operations was piled and burned on the right-of-way. In order to protect the park's marvelous timber stand, the National Park Service placed severe restrictions on burning operations and assigned rangers or fire wardens to the projects. Some of these wardens were obtained from the U.S. Forest Service. Nevertheless, accidents did happen. A fire escaped from burning operations on contractor C. R. Johnson's clearing project for the Klapatche Ridge section of the West Side Road and devastated 3,500 acres in the Puyallup River canyon and Sunset Park in November 1930. At other times, long rainy seasons and the high water content of some of the native trees (like hemlock) made burning difficult.[271]

Excavation

Where only soil covered the route, grading equipment could move in immediately to shape the road. However, this was the exception, and considerable excavation was required for most road segments. Large rock outcrops, benching and sidehill work required extensive and difficult excavation using explosives and power equipment. Excavation crews also dug out trenches for drainage culverts and quarried stone for masonry construction.

Dirt and gravel overburden over the rock was first removed. Blasting crews moved in next, placing explosives. Over the years, black powder, TNT and other forms of blasting powder were used at Mount Rainier. The landscape engineers overseeing the project generally forbade the use of "gopher holes," or blasting in drilled holes using large amounts of explosives, as this practice tended to scatter debris and damage the surrounding landscape. Crews often had to explode several charges to achieve the same result. After the detonation, power shovels and cranes loaded the debris onto dump trucks, and on one Yakima Park Highway project, onto a relocatable small "dinky" railroad running to the dump sites. Contractors were prohibited from disposing of excavated materials by "side-casting," or dumping the debris down the sides of the mountains, as this would have been highly visible. Most of the excavated materials were used to construct embankments or to build up shoulders. Topsoil and humus removed with the overburden was used to cover rock embankments.[272]

On Goerig's Yakima Park Highway section, a small "pioneer" shovel cut through the Type "B" sections, and handled about one-third of the excavation. Crews simultaneously constructed a trail along the grade by hand, using shovels and picks and "shooting very light." When a 9' road had been roughly forced through a section, "gophers," or small charges consisting of about 1/2 pound of blasting powder to the yard, were used to blast away rock in the way. Most of the material was hauled away and used on fill sections.[273]

Construction Materials

Great quantities of stone were used in the construction of the park roads. Crushed stone was used for roadway subgrades, backfilling of bridges, and concrete aggregates. Larger rock went into numerous embankments and approach fills, and was used in special embankments for slope stabilization. Dressed stone was required for bridges, retaining walls, tunnel portals, and some other structures. National Park Service policy and the general tenets of the "rustic style" dictated the use of native materials for construction, and the rock used in the construction of park road structures was generally obtained from sources inside the park. In some cases, however, stone was secured outside the park. For example, the contractor for the St. Andrews Creek and South Puyallup River bridges [HAER Nos. WA-51 and WA-52] decided he could purchase stone from a quarry at Index, Washington, cheaper than he could have it quarried in the park. Most of the stone used in park bridges was native granite, but andesite and conglomerate were also employed.

Some large boulders were quarried, but explosives generally were used to loosen rock from native formations. Charges were shot light to avoid pulverizing the stone, then the rock was pulled out with power equipment. Some of the stone used in retaining walls and bridges was massive in size, requiring very heavy hoisting equipment. On one project, the contractor had to fill the back of the crane's cab with several tons of scrap iron to provide additional counterweight.[274] Rock cutting was carried out with jackhammers and the customary masons' tools: hammers and tongs, plugs and feathers, etc. Smaller headwalls, certain embankments, and some parapet walls were laid by hand or with small portable derricks. Larger stones were placed with cranes or other power equipment.

All cement and most sand was trucked in from commercial plants outside the park. On some projects, sand and gravel for concrete aggregates was taken from streambeds at or near the construction sites. Since the glacial silt mixed with these materials was undesirable, washing plants were employed. Small screening plants were used to sort the gravel by size. BPR final construction reports describe several of these operations. On the White River Bridge [HAER No. WA-53] project, Higdon Brothers, a subcontractor, operated a combined washing and screening plant at the gravel pit one mile down White River from the bridge; this consisted of a revolving screen with 1 3/4" openings for the gravel and 1/4" openings for the sand. A stream of water was directed at the revolving screen and washed gravel and organic matter free from the sand.[275]

A rock crusher for the 1933 resurfacing of the Nisqually Road was constructed on the road two miles north of Longmire by Emergency Conservation Works personnel. The resident park engineer described the equipment as the plant neared completion:

> The Proposed set-up for the Crushing Plant is as follows: The crushed rock will be moved from the rock crushers, by means of a belt conveyor to the top of the bunkers where it will go through a rotary screen and washing equipment, the screened rock will be placed in the hoppers according to size while that not passing the screens will be returned to the crushers by another belt conveyor. The plant is to be powered by two, 75 horse power diesel engines and will have a capacity of 100 tons per hour.[276]

Sand and gravel were often tested by the Bureau of Public Road's laboratories prior to use. Water was easily available in the park, often, too available.

Grading

The roadbed was shaped during grading operations. Early operations, such as those involved in the initial construction of the Nisqually and Carbon River roads, were described in 1911 at the National Parks Conference at Yellowstone.

> If the route be over ground on which it is possible to use plow and grader, the work can be quickly and cheaply done. On ground that is comparatively flat the entire width of the road should be plowed, then the greater part of the road can be made with grader. For practical road building the blade grater is the best. After plowing, start with the grader and move the earth toward the center sufficient to make the necessary crown, which should be from one-half to five-eighths of an inch to each foot width of road. In throwing up the crown, care should be taken to break up the sod. If the sod is tough and does not break up easily, it should be removed from the road. After the sod is disposed of, the earth breaks up easily and can be spread in thin layers until the proper height of crown is attained. The common slip or fresno* can be used to fill in low places, after which the grader should be used to smooth down high places and give the road a uniform grade. Sidehill grades are worked largely on the same principle, excepting that the earth is most all moved one way, and where the hill slope is steep slips and fresnos are used until sufficient earth is removed to enable the grader to be used.[277]

Rough "pioneer" roads were usually opened up first by bulldozers to allow heavier power shovels in to remove dirt and overburden. Once a rough roadway had been shaped across bedrock surfaces, drilling and blasting followed, then

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* A modified buck or drag scraper with two blades, developed by the Fresno Agricultural Works in California.

removal of the shattered material. If a second shovel was available, it would move in next, followed by blade machines for the finishing work. When contractors had enough equipment and conditions permitted, the grading work was prosecuted from both ends of the project.

The grading work usually cut at least a foot below the profile grade for the road; this cut was later backfilled with selected granular material from other cuts. Subgrade reinforcement was necessary in places in order that the granular top fill would remain in place. Various section plans of roadways in the final construction reports shows how fill materials were to have been placed on different roads.

Compressors and jackhammers were used for drilling the surface rock, which was shot in large pieces. Care was taken in shooting to prevent blasted rock from being hurled outside the roadway, and rock that was thrown out had to be retrieved. Some rock was dug out for use in masonry construction. Shovels moved in next to shape the roadway. Equipment used in final grading operations included caterpillar tractors, "tumble-bug fresnos" and "heavy blade machines," and necessary small tools. Material was generally hauled off by gas dump trucks; however, in the case of the construction of roadway near the White River Bridge [HAER No. WA-58] on the Yakima Park Highway, a light "dinky" railroad was used for the transport of fill materials from the grading work. Equipment used on the early grading operations on the Stevens Canyon Highway project included Marion, Northwest and Lima power shovels, Linn tractors, Mack and White dump trucks, and caterpillar tractor bulldozers. Finishing work was done with smaller blades and hand tools.[278]

Road construction in the higher areas was often relatively easy compared to sidehill work in the valleys. Decomposed volcanic pumice, varying in size from small rocks down to ordinary sand, becomes more common, and was "an ideal steam shovel job" according to BPR engineers. They rated loose talus as "perfect from a contractor's viewpoint." Cemented glacial deposits were not too difficult, and required only light shooting to reduce to sand and gravel.[279] Still, such work sometimes required slope flattening and stabilization, which was not necessary in rock cuts.

Drainage

Conditions at Mount Rainier are very wet, as the park is subject to long-lasting rains and enormous amounts of snow. [Indeed, the world record snowfall, 1,122", was recorded at Paradise Valley in the winter of 1971-1972]. Run off from the snow in late spring and summer cascades down all sides of the mountain, and all the park roads had to be constructed with attention to the significant drainage requirements. In many cases, problems were avoided through the construction of raised or filled sections. In other places, perforated iron pipe was used to drain off water. Where conditions necessitated, concrete pipe, corrugated iron or reinforced concrete box culverts were constructed. These often feature rubble masonry headwalls and wing walls and the reinforced concrete structures can be quite substantial; for instance, Sunbeam Creek passes under the Stevens Canyon Highway in a fine

box culvert faced with native stone in the same manner as a number of the park's "rustic style" bridges.

Construction of roadside ditches and culverts was carried out as part of the road grading contracts. Drainage ditches line most sections of the road, and collect surface water and convey it to the culverts. These are specified in the typical roadway sections adopted for the individual road construction contracts. Ditches drain from the roadway and intercept overflow waters, preventing damage to the roadway surface.

Most of the culverts are fairly small, from 18" to 48" in diameter, and are usually constructed from cast iron or concrete pipe. Final construction reports indicate that cast concrete pipe for most culverts was procured from Tacoma or Chehalis, Washington, and cast iron pipe from Portland, Oregon.

At several locations on the Stevens Canyon Highway, several steep ravines were lined with rubble masonry which were designed to divert run-off into catch basins and culverts at the bottom of the slope. To prevent the culverts from being clogged with debris, the culvert entries were covered with grates of steel bars. These structures can be seen in the upper end of Stevens Canyon.

Surfacing

The earliest park roads were surfaced with dirt, river gravel or volcanic ash "ejectamenta." Park Superintendent Edward S. Hall described the materials used in the construction of the Nisqually Road in a presentation he made on the Rainier park roads at the 1911 National Parks Conference.

> Dirt for surfacing is very scarce, volcanic ash being used where obtainable. This ash makes a solid and dry covering when mixed with the proper amount of moisture and clay but wears rapidly and is hard to secure in any quantity, as only a thin strata underlies a heavy growth of timber and moss. At a point 11 1/2 miles above Longmire Springs a deposit of clay mixed with sand and gravel has been opened and is being used for surfacing across meadows and rock slides. This is the only suitable soil for surfacing so far found in any quantity.
>
> Unlimited quantities of tough rock for macadam are found along the road in the park. One large slide of columnar basalt, broken ready for the crusher, has 3,000 feet of road constructed through it, and many fine ledges of granite are cut by the road from Nisqually Glacier to the head of Paradise Valley. The value of material found in the park for binding purposes in macadam construction has not been proven, but the cementing properties of the soft rock and hard pan on Ricksecker Point is very noticeable.[280]

In swampy areas and river washes, dirt and ash surfaces could not be used, and gravel was spread wherever possible to provide a better footing. Parts of Carbon River Road were "corduroyed," that is, provided with a staked log subgrade which was subsequently covered over with dirt or gravel. Standard

plans for such work were issued by the Park Service's Engineering Division in 1920.[281] Corduroyed roads did not constitute permanent construction, and when the gravel or dirt washed off, motorists often had the sensation they were driving over a washboard.

Gravel was used for a long period as a road surface, but proved impracticable after automobile traffic reached moderate levels. It simply could not stand up to high levels of motor vehicles. Inspecting the Nisqually Road in 1925, National Park Service Acting Chief Civil Engineer Bert H. Burrell noted the material's problems and urged paving the park roads.

> Gravel surfacing is not sufficient to withstand this traffic, as clearly shown on the road from the park gate to Longmire, where practically all gravel has been swept to either side of the roadbed leaving it bare except for what had been pounded into the soft subgrade. The unsuitability of gravel as a surfacing material is seen even this early in the season, in the appearance of the trees and undergrowth which are heavily whitened with dust, in places for a distance as far as 200 feet from the roadway, robbing the foliage of its beauty and leaving the forest as a gray, unsightly mass. The remedy, if Rainier's beautiful forest growth is to be presented in all its natural glory, is dustless pavement not alone from the Gates [Nisqually Entrance] to Longmire, but on to Paradise and the Public Camps. This is not alone desirable, it is a necessity.[282]

By the late 1920s, bituminous asphalt surfacing was being used on the main park roads; however, gravel remained (and remains) the surface material for the West Side, Carbon River, Mowich Lake, and many subsidiary roads. Bituminous macadam was constructed by spreading layers of crushed stone over a prepared base and pouring a bituminous binder over each course. The bitumens constituting the binder were produced in the heat refining of crude petroleum. The bituminous compounds were usually shipped by rail to the nearest railhead and then trucked to the park.

Surfacing was generally done under separate contracts. In the case of the Nisqually Road and the Yakima Park Highway, one contractor was charged with preparation of crushed rock or all oil rock materials to be used in the road construction, while other contractors used some of the materials for their own surfacing projects. In some cases, general paving projects also provided for developments along the roads; in others, these were paved under special contracts or on a force account basis. Surfacing work was generally done by companies specializing in such work.[283]

The Yakima Park Highway was surfaced in 1934-35 to a standard (Type 501) developed by the Bureau of Public Roads. The work was described in detail in the BPR final construction report and in a 1934 article in *Western Construction News*. The new highway was given an 18' bituminous macadam mat, widened on the hard curves. This bituminous surfacing contracts also included

paving of the parking areas at Yakima Park and Sunrise Point, the various turnouts, and the wye with the Mather Memorial Parkway. The 15.5-mile paving project was typical of those for other park roads. The first, $60,000, contract, awarded to Joslin & McAllister of Spokane, provided for the production of oil rock materials and preliminary reshaping of the roadway. Rock aggregates were stockpiled along the road. The contractors' gravel plant utilized a 15" x 24" Universal primary jaw crusher, 10" x 20" secondary crushers, and a 3' Symons cone crusher driven by a 75-hp semi-diesel and 120-hp diesel engines. The main paving work was done under a subsequent, $78,450 contract to Babler Brothers of Portland, Oregon. On this project, the contractor used a 7/8 yard Koehring power shovel for shoulder build-up and ditch cleaning, and ten Ford dump trucks for hauling. At the same time, two Austin-Western 10' power blades began smoothing the roadway and parking areas.[284]

On this project, the emulsified asphalt, produced by the Shell Oil Company, arrived at Enumclaw, the nearest railhead, where it was unloaded and heated to just above 110°, then transferred to eight 1,000-gallon Ford oil trucks and transported to the project. The asphalt was unloaded into an 1,100-gallon pressure distributor/sprayer. Gravel aggregates were unloaded from the stockpiles with two Austin-Western Badger power shovels into the Mack trucks. Lighter, 1/2-ton Ford trucks were used for the fine spotting work. The contractor also employed a trailer for moving the power equipment, another trailer mounted with a toolhouse and service shed, and Chevrolet cars for superintendence and crew transportation.

Once the subgrade had been smoothed, it was watered by a 1,000-gallon GMC water tank truck and rolled for uniform compaction with two Austin-Western 10-ton rollers. Surplus fill from these operations was windrowed to the sides and used in building up the shoulders. Work was scheduled so that about one-and-a-half miles of subgrade was prepared ahead of the bituminous surfacing operations. The contractor aimed at laying about one mile of bituminous surfacing per day. A strip half the width of the road was surfaced at one time so the other lane could carry traffic over the road.

An Adnun blacktop paver, a recently developed machine, laid the crushed rock base for the bituminous mat. This machine spread the aggregates, bladed the surface, then fine spotted (voids filled with additional chips) and rolled the surface. The BPR inspector reported that the machine did excellent work, producing a surface with a more uniform texture and more true to contour than older methods. The light rolling forced the choke rock chips down into voids and produced a hard enough surface to withstand truck traffic during the application of rock chips. These were spread with 5-yard Mack trucks equipped with spreader boxes. A thin course of base rock, 1 1/4" to 2 1/4" in size, was spread over the roadway. This was followed by a lighter course of choke rock chips, 1/8" to 3/8" in diameter, which was then rolled into the surface, filling the voids.

Next, a penetration grade of emulsified asphalt was applied to the surface at a rate of .70 gallon per square yard. The contractor found that heating the mix to a temperature of 110° Fahrenheit gave best results. Key rock, sized from 3/8" to 3/4", was spread on the mix immediately. This was followed by a thorough brooming (sweeping off loose rock), fine spotting, and rolling. A second coat of emulsified asphalt was then applied, and another course of rock chips, 1/8" to 3/8" in size, was spread over the fresh mix. The surface was broomed, spotted and rolled again, then traffic was allowed on the road for ten days.

The road was then closed again and thoroughly cleaned of any loose rock, dirt and dust. A seal coat of emulsified asphalt was applied, followed by another course of 1/8" to 3/8". This was followed by more brooming, fine spotting, and rolling. Then the final (that is, fourth) application of emulsified mix was spread, followed by fine screenings no larger than 1/8" in size. As these screenings varied in moisture content, they sometimes clogged the spreader boxes on the trucks and had to be spread by hand shovel from the trucks. The road was broomed again and opened to traffic.[285]

Project Cleanup

Construction operations, no matter how carefully handled, always altered the landscape. Blasted areas, cliffside cuts, flattened slopes and new embankments were particularly visible, and provisions were made to hide some of the damage through landscaping.

Native plants and trees were specified for revegetation work. Due to the short planting season, especial care had to be taken in transplanting larger trees and shrubs, including digging holes the previous day, carefully balling roots, and transporting the plants no more than 20 miles early in the morning to prevent the soil ball from drying out. Most of the planting was done on rainy or cloudy days. Emergency Conservation Works personnel were taught the proper varieties for various locations and climate conditions, and the reason for the special precautions in transplanting. The extra attention paid off; plantings at Longmire, for instance, had a 95 percent success rate. Among the trees and plants used in revegetation work included Western hemlock, Western redcedar, Grand fir, Douglas fir, Noble fir, Western white pine, Black alder, Vine maple, Dogwood, Huckleberry, Oregon grape, and Ovate salal.[286]

Certain road contracts contained landscaping provisions. For instance, on the Stevens Canyon Highway main grading project, the contractor was required to furnish and plant trees, shrubs and plants on berms and along low embankments.[287] Unfortunately, no planting list survives with the project reports, but it can be assumed that indigenous plants were specified for the work.

The State of Washington did similar work on the Mather Memorial Parkway. In his November 1933 report, Superintendent Tomlinson discussed the state's roadside cleanup work:

> Under the authorized Civil Works Program the State Highway Department of Washington has undertaken a great deal of roadside improvement on all approach roads leading to Mount Rainier National Park. Urged by the Federation of Garden Clubs and the local chapter of the National Association for the Preservation of Roadside Beauty, some excellent work in the removal of stumps, logs, snipe signs* and other objectionable debris on the rights-of-way is being done. Many unsightly borrow pits, abandoned sections of road, bridges, etc., are being eliminated or obliterated. It is hoped that transplanting of trees, shrubs and the sowing of wild flower seeds, etc., will be done where required by the organizations interested.[288]

Where "tote roads" constructed for the movement of contractors' equipment were no longer required, steps were taken to obliterate them. Dirt from fill slopes would be pulled back on the road, along with loose material from cut slopes. Windfalls and brush would be dragged across the road, and the surface would be planted in native shrubs and trees taken from adjacent thickets.[289]

ECW crews planted trees and shrubs at the St. Andrews Creek Bridge and at new bridge sites on the Yakima Park Highway. "Project Cleanup" should not be confused with "roadside cleanup," the clearing of snags and timber close to park roads, another program largely carried out by ECW personnel in the 1930s.

Project Acceptance

Contracts for construction projects stipulated the number of calendar days required for completion. Contractors who failed to finish their work on time were fined for any overruns. The calendar was adjusted for weather and fire hazard conditions. The stated schedule helped assure that road and bridge projects were completed in a timely fashion; nevertheless, contractors frequently ran over time and were fined accordingly.

On completion of the work, the resident engineer would file a final construction report with the Bureau of Public Roads. The District Engineer (based in Portland, Oregon) would then recommend approval of the project. A representative of the National Park Service's Landscape Engineering Division (or its successors) would inspect the project and issue a recommendation for the project's acceptance. The Park Superintendent was also required to sign off on the project before the Director of the Park Service would formally request approval of the work. Final approval was made by the Secretary of the Interior.

Labor

Construction of roads in the rugged terrain at Mount Rainier was a major engineering feat, and entailed extremely hard work. The early roads were constructed largely with hand tools, supplemented occasionally by black powder and the "split rail drag," a horse-drawn grader. Such work was not only

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* Unauthorized advertising posters and signs.

difficult but frequently dangerous. Crews worked long days on the projects and were quartered in isolated construction camps in the wilderness.

Workers were generally employed by contractors for the individual road projects. On smaller projects, workers were engaged by the Park Service as "force account" labor. The "station gang" system, in which groups of eight or ten workers were responsible for construction of masonry work and structures, was used in Glacier National Park[290] and perhaps in other parks, but no records of this practice were found at Mount Rainier.

Most wages were based on the prevailing (low) wage scales. By the late 1930s, many workers had joined labor unions and wages were based on negotiated agreements. On the Yakima Park Highway project, contractor A.C. Goerig paid the Seattle wage scale for shovel runners, truck drivers and mechanics. The BPR Engineer noted that "He also ran a first class cook house, which is very essential in holding labor." Goerig did encounter problems with subcontractors on his White River section clearing project. The subcontractor's workers decided that the wages were insufficient after completing 30 percent of the project and abandoned the work, forcing Goerig to complete the clearing with his own forces.[291]

During the latter years of the Depression, contractors were required to engage all workers, with the exception of administrative, supervisory and skilled labor classes, through the National Reemployment Service offices at Tacoma and Chehalis. Minimum wages in 1938 were skilled labor, $1.20/hour; intermediate labor, $0.75/hour, and common labor, $0.50/hour. Certain occupational skills were later covered by the Davis-Bacon Act. The 40-hour work week was in effect.[292]

This arrangement was generally successful, but in some cases, labor furnished by the reemployment offices was inferior. Work in Stevens Canyon was hampered because workers were not accustomed to dangerous sidehill work, and many quit. In some cases, contractors paid higher than minimum wages in order to secure more competent labor.[293]

Labor relations were generally affable, but there were occasional difficulties. The Corps of Engineers had faced problems with laborers on the early construction of the Nisqually Road when some troublesome workers who had quit or been fired attempted unsuccessfully to dissuade other workers from joining the contractor's forces. They cited poor pay, bad drinking water, and hard work. Eugene Ricksecker denied the problems, but admitted that workers were prone to go into towns on payday sprees and sometimes did not return. The Forest Supervisor in charge of the park for the Interior Department complained that a survey crew was cutting green trees for firewood against park regulations and carrying firearms without permission.[294]

Labor problems hampered some late 1930s projects. On 24 May 1939, the American Federation of Labor (AFL) called for a strike against Stevens Canyon Highway contractor Sam Orino for work on the Randle-Yakima Highway outside the

park and extended the strike declaration to his contracts at Mount Rainier. The crews went out on strike but signed up with the Congress of Industrial Organizations (CIO) and resumed their work on 5 June.[295]

BPR project engineers occasionally criticized contractors for engaging incompetent labor. Holmberg and Norton, contractors on the first Stevens Canyon Highway grading project, "apparently did not include the system of discharging worthless labor," reported the resident engineer, who noted that "regardless of worth, a man once hired was engaged for the entire season." This policy had apparently demoralized the other workers.[296] In all fairness, construction reports indicate that the majority of road workers were competent and hard-working.

CHAPTER IX

ROADWAY DESIGN

EARLY ROADS

Like the many "rustic style" buildings and structures at Mount Rainier, the park roads were designed to integrate with the rugged mountain landscape. The main roads were all designed as scenic routes, and routed to take advantage of the park's outstanding attractions, including old growth-forests, rushing waterfalls, enormous glaciers, and of course, myriad views of the greatest mountain of the Pacific Northwest. When the act creating Mount Rainier National Park was signed into law by President William McKinley in March 1899, only a primitive wagon track provided access to the new reserve. This was James Longmire's 1891 toll road (really an improved trail) from Yelm Prairie (near Tacoma) to his Longmire Springs development, which was extended in 1895 in rough form to Paradise Valley. Failing to get the Territorial Legislature to fund construction of a road into the area, Longmire supposedly engaged his family and a few hired hands to build the road. If so, its construction ranks as a major feat. The area was covered by dense stands of virgin forests, and crossed by myriad small and not-so-small streams. The Longmire route was the forerunner of the "Mountain Highway," today's Washington Highway 7.[297]

Unfortunately, little information appears to have been recorded about the Longmires' road-building efforts. Descendants indicated that hand tools were used exclusively in the work. In boggy places, logs were split in half and laid with the flat side up. Maintenance, too, was difficult, as the road passed through dense forest, meaning that fallen snags and growing brush would constantly require removal. In 1904, the trail was described as "rough, rocky and very steep." Horses could travel all the way to Paradise, but the trip was difficult; walking was preferable over much of the trail. A trip from Longmire Springs to Paradise usually took about four hours.[298] Despite the hardships involved in a journey, by the end of the nineteenth century, considerable numbers of tourists were making the trip to Paradise Valley.

Prior to the establishment of the National Park Service in 1916, road improvements in the national parks were the responsibility of the Department of the Interior. Having no highway engineers or road-building personnel in his department, the Secretary of the Interior asked the War Department to oversee road construction in several of the early parks, including Yellowstone, Sequoia and Crater Lake. The Secretary of War assigned the U.S. Army Corps of Engineers to the task, and new roads were built in the parks and older routes were improved. The 1890s great loop road in Yellowstone National Park, largely built under the direction of the Major Hiram M. Chittenden of the Corps, was particularly successful and attracted considerable acclaim. The loop road displayed many of the park's marvel attractions and set the standard for future park scenic roads.

In 1904, the Corps of Engineers was ordered to design and oversee construction of a new access road for the five-year old Mount Rainier National Park. Although other routes were suggested by various Washington communities, a decision was reached to build a new road along the general route of the old Longmire trail to Paradise. Major John Millis of the Corp's Seattle office was in overall charge of the project, but Eugene V. Ricksecker, a talented civilian engineer assigned to the office, oversaw the location surveys and designed the new "Government Road."

In the construction of the Nisqually Road, the Corps of Engineers established a principle that the park roads would be routed to feature the park's scenery at its best. Instead of constructing a bee-line route to Paradise Valley, Ricksecker located a route which wound among the many attractions of the southern part of the park as it made a steady, though sometimes circuitous, climb to Paradise. (Building a straight-line route in the rugged terrain would have been an impossible task, anyway.) He designed the road as a scenic route intended to show park visitors examples of the varied natural wonders at Mount Rainier– forests, waterfalls, glaciers, and mountain meadows—with the "prime object," he wrote, "of giving the best views and passing as many important attractions as possible."

Landscape concerns weighed heavily in Ricksecker's design. Although the right-of-way was to be cleared to a width of about 60', the finest trees of different varieties were to be left standing. The natural contours of the land would be followed wherever possible, as curves "laid with mathematical precision" would be distracting. Ricksecker intended to use the park's scenic features to keep the traveler in a state of expectancy at each turn.

As much of the road from the park entrance to Paradise passed through dense virgin forest, relatively few open views of the mountain would be available until the higher country was reached. This was no real shortcoming, however, as the visitor would be able to find interest in the ever-changing forest. The lower stretches of the road wound through groves of enormous old-growth trees. Higher up, the forest gave way to subalpine meadows, affording fine vistas of Mount Rainier. Ricksecker designed the road to pass close by two fine waterfalls and right to the end of Nisqually Glacier.

Construction began in 1904, and in 1910 the road was completed to Paradise Valley. In 1907, Major Chittenden, now in charge of the Corp's Seattle office with responsibility for the Mount Rainier road project, suggested the "round-the-mountain" road system which would govern park road planning and development for the next three decades.[299]

The Corps of Engineers withdrew from Mount Rainier following completion of the Nisqually Road. The road was widened somewhat by park crews between 1911 and 1915 and automobiles began travelling over the entire length. Unfortunately, it had been designed as a wagon road, and increasingly heavy automobile traffic forced the National Park Service to reconstruct the road in the 1920s.

The Nisqually Road project furthered the concept that roads in the national parks were different from ordinary routes. Most subsequent roads at Mount Rainier and other national parks were designed as scenic routes, highlighting each park's special scenic or cultural attractions. At the 1911 National Parks Conference held at Yellowstone, S. F Ralston, Supervisor of Glacier National Park, identified the distinguishing characteristic of park roads.

> The roads to be built in the national parks should differ from the ordinary road, in that their purpose is to better display the natural scenic beauty of our national playgrounds and thereby encourage our own people to visit these spots of scenic interest and save to our country the wealth now annually contributed to Europe through the medium of the American tourist. . . To this saving extent our roads will be both commercial and scenic, and should follow well-chosen points of vantage to show to the tourist, to the best advantage, the magnitude and splendor of the park. In fact, all considerations bespeak the selection of these routes.[300]

In 1914, the Department of the Interior entered into an agreement with the Office of the Public Roads (OPR), an agency of the U.S. Department of Agriculture, under which the OPR would furnish an engineer to the Interior Department for planning park road construction and design. The engineer would remain on the OPR payroll but the Interior Department was to pay for expenses.[301] Under terms of this agreement, T. Warren Allen, Chief of the Division of Parks and Forest Roads in the OPR, visited Mount Rainier National Park to investigate the road situation there. In an address at the third National Park Conference, held in Berkeley, California in 1915, Allen offered some general observations on the future development of park roads at Mount Rainier:

> . . . development of the park will, of necessity, be along radial and, for the present, disconnected lines. It is a case of first building radial roads to connect with the Washington State road system, and later, when more money is available, to build a connecting rim road. The present development is radial into the park from the southwest, reaching the Nisqually Glacier, Paradise Park, and surrounding attractions. It is my opinion that the next development should be radial into the park from the northwest, by way of the Carbon River, to reach Spray Park, Moraine Park, etc.[302]

Interestingly, both Chittenden and Allen conceived a "radial" road network for the park. The difference is that Allen proposed roads that were "radial into the park," whereas in Chittenden's "Round-the-Mountain" proposal, radial meant circumferential around the mountain. Warren's predictions of a radial road system with several spokes leading into the park came true, and his agency (promoted to Bureau status in 1919) would oversee all the major park road construction projects after 1925.

At the Berkeley conference, Allen described his road philosophy for the national parks and forests. First, the park or forest itself should not dictate the flow of traffic, and the engineer should first consider locations of roads as if the designated park or forest did not exist. Then other factors would be taken into consideration, including potential fire lookout locations, and, in the national forests, locations of tracts of merchantable timber. Potential hotel and campground locations should be taken into account. The actual relationship of the road to the scenery was the last factor. Allen claimed that, with proper design, engineers could execute "a harmonious blending of the handiwork of man with that of God."[303]

The National Park Service was created in August 1916 and the principal national parks and monuments, including Mount Rainier, were placed under its administration. The Park Service Engineering Division, organized in 1917, became responsible for road-building projects in the national parks. The division surveyed routes for new roads, prepared roadway specifications, and designed bridges and other required structures. At Mount Rainier, the division supervised the construction of the Carbon River Road, designed a number of the park bridges, and conducted the first surveys for the West Side Road.

The new agency's director, Stephen Tyng Mather, was in general a strong conservationist, but he also advocated development of the parks in order to draw increasing numbers of visitors. An automobile enthusiast, he supported accelerated road construction in the national parks, recognizing that motorists would soon overtake visitors arriving by rail. Motorists "had a right," Mather concluded, "to expect that the Federal Government will pursue a broad policy in the extension of road systems in the several parks."[304] This pro-automobile policy often resulted in an endless cycle: as new roads were put into service, tourist use would increase, and the roads would have to be improved, which brought in more visitors, etc. Many of the problems in the parks today—parking, traffic congestion, and general over-crowding—can be traced to this philosophy.

Landscape Concerns

In 1918, Mather and his assistant, Horace Albright, worked out a "Statement of Policy" regarding improvements in the national parks. This set forth on paper the long-standing Park Service dictum that developments must be designed to fit into their surroundings. The principles were restated in Mather's report that year to the Secretary of the Interior: "All of the improvements in the parks must be carefully harmonized with the landscape, and to this end engineers trained in landscape architecture or fully appreciative of the necessity for maintaining the parks in their natural state must be employed to carry out improvement work."[305]

The National Park Service Division of Landscape Engineering in Portland, Oregon was charged with implementing the new policy. The office helped design new park buildings and structures, including road-related structures, to blend

with their surroundings. Staff from the office would investigate project sites and study the natural resources in the vicinity. Such elements as natural color, material, scale and massing would be incorporated into the project designs. Structures were distinctively tailored for the individual parks and the specific project sites. None of the Division's staff came to the office with special training in rustic work, but the structures they designed generally harmonized with natural settings, and in doing so, reinforced the Park Service's responsibility for preservation of park resources.[306]

In 1928, Thomas C. Vint succeeded Daniel R. Hull as chief of the office, which was renamed the Division of Landscape Architecture and relocated to San Francisco. The office hired a number of new landscape architects and assigned them to work on projects in the various parks over the summer and then return to the San Francisco office to complete plans and drawings. These field staff were often responsible for several park units. Landscape Architect Ernest A. Davidson was the first resident architect assigned to Mount Rainier, and was closely involved with its numerous road and road-related structure projects. Davidson was also resident architect for Glacier National Park, where he monitored much of the work on the "Going-to-the-Sun Road."

Jean Ewen, an assistant highway engineer for the Bureau of Public Roads, in 1934 described the aims of the Landscape Engineering Division in the construction of park roads.

> The Landscape Division's problems are difficult. It is the intention at all times to maintain the landscape in as near its original condition as possible, to hold all scars from construction operations at a minimum, and to bring out in the location and construction the best features of the park, without undue emphasis on the construction that makes possible the unlimited variety of views and vistas of this wonderland.[307]

The park landscape architect was especially concerned with roadside cleanup, which was described as "restoration of natural conditions along highways by cleanup and repair of construction damage; covering by planting of cut slopes; screening undesirable views and vista clearing for good ones; planting out old roadways and borrow pits; and may include roadside structures as fountains, parking area development, etc."[308] Dudley Bayliss, writing on park roads in 1957, identified other activities as

> supervision of clearing and limitation of blasting; prevention of disposal of rock and excavation to disfigure natural stream beds or to cause unsightly fill-slopes; selection of stone for drainage and bridge structures; selection of quarries and borrow pits out of sight of the parkway or other public roads; avoidance of unnecessary cutting of trees which might be saved close to the road proper through the use of tree protection or through careful construction methods; placing of the contractor's road camp in a

> location within the right of way which can later be restored to its former condition with little or no damage to the natural landscape; maintenance and protection of natural stream beds or lakes insofar as possible through the use of toe walls and hand placed stone embankment.[309]

Roadside landscaping included flattening of cut slopes and replanting them with native trees, shrubs and grasses. New plants were extended into the mature growth beyond the road cut to soften the margin. Rock exposed in excavation work was blended with new plantings. Trees were planted at bridge sites to conceal construction damage and to help the structures blend into the scenery. The National Park Service soon adopted a policy of excluding all exotic seeds and plants from the national parks. Exotic species around park hotels, lodges and private dwellings were to be removed and replaced with indigenous species. Non-native species were considered threatening, in that they might compete with native species in the park ecosystems. This policy was an extension of the agency's mandate to "conserve the scenery."[310]

The Landscape Architecture Division specified that natural vegetation was to be protected during the course of road-building work; destructive blasting practices would be avoided, and native materials would be used in construction. The division's staff, which assisted with surveys and design and monitored construction work, helped assure that the environment was given special attention during the design and construction of park roads. These "necessary evils" were carefully designed to fit into park landscapes harmoniously.

In 1924, the National Park Service received a $7.5 million appropriation for a major system-wide road construction program. In his annual report which announced the five-year program, Director Mather promised "Particular attention will also be given to laying out the roads themselves so they will disturb as little as possible the vegetation, forests and rocky hillsides though which they are built." Developments were to be carefully conceived to reduce the number of structures to a minimum. A May 1925 Interior Department press release, issued in conjunction with road program, offered some additional insights into the park road planning philosophy of the day. Mather assured "extreme care" would be taken to change the landscape crossed by park roads as little as possible. The new roads would take full advantage of the natural scenery, as there usually was no prescribed course and time was of "secondary importance" [to the motorist]. Engineers would be alert to protect the landscape resources, giving special attention to trees, boulders and other attractive features. "Monotony" was to be avoided in road location; routes through forest cover and open parkland should be mixed where possible, and long straight stretches were discouraged.[311]

The most difficult task was to design the roadways themselves so that they "lay lightly on the landscape," meaning the roads should follow natural contours rather than "curves laid with mathematical precision." Edges of roads should be softened to reduce the sensory demarcation between them and the

scenery. The landscape architects dictated the flattening and rounding of cut slopes, designed scenic vistas through selected clearing, and revegetation of slopes and banks with plantings of native species.[312] These practices are largely responsible for the character of the roads in the national parks; it should be noted, though, that such work represents a manipulation of the landscape, not preservation or landscape restoration.

Before the agreement was reached between National Park Service and the Bureau of Public Roads, Director Mather had his administrative assistant, A. E. Demaray, investigate the working relationship between the BPR and the U.S. Forest Service. Demeray reported that Forest Service officials were generally pleased with the arrangement, but warned the Park Service to "retain absolute and final control over the standards on which park roads should be built." Perhaps on account of the warnings, the National Park Service would retain ultimate control over the road projects. In addition to the requirements for written approval from the Director, the Department of the Interior (not the BPR's parent Department of Agriculture) appropriated and controlled all project funds. Thomas Vint insisted that NPS Landscape Engineering Division remain involved in the road design process in order to uphold the National Park Service's mission to "conserve the scenery." He set forth several basic guidelines concerning landscape design and the park roads. Only native materials should be used for developments along the roads, and construction damage, such as stumps, broken rock or borrow pits should not be visible. Vint said "the finished road should minimize the effects of the work of the hand of man so that the effects of the work of nature will predominate in the picture."[313]

In 1928, during the course of the early construction of the Yakima Park Highway, considerable damage was done to the landscape along the right of way. The contractor was working under BPR supervision, and National Park Service Director Mather complained about the devastation to Bureau Chief Thomas H. MacDonald. The BPR Chief responded immediately, promising "to impress [on his men] more than ever the ideals of care and craftsmanship," but suggested that such problems would be inevitable if tight deadlines were to be met.

> Our engineers have had instructions to preserve the scenic features, and this instance is not so much a result of carelessness or lack of interest, as it is evidence of the very strong desire to make rapid progress and to get the roads open in record time. I know how desirable it is to get these roads into service, but I ask you to join with me in bringing home to the whole force employed in building these roads that we will take sufficient time to preserve the natural beauty and to build the roads in the most finished way practicable within reasonable cost limits. We cannot hurry the construction and at the same time prevent destruction. Both the Park Service and this Bureau will have to accept a reasonable rate of speed and careful construction, or we will be unable to prevent completely other occurrences like this one in Mt. Rainier Park.[314]

Mather replied immediately, thanking MacDonald for "the spirit" in which he had written. Mather agreed that such problems would invariably occur, and suggested that "as time goes on and the men in both our Bureaus have the object lesson actually before them in the careful preservation of scenic features that they will more and more become enthusiasts for this line of endeavor."[315] BPR Western Regional Director Lawrence Hewes admitted that landscape concerns had not always been taken seriously and mistakes had been made, but stated that the NPS landscape engineers had convinced him of the importance of landscape engineering in the planning and construction of the roads. The BPR was benefiting from these new skills. From then on, Dr. Hewes promised the BPR would take greater care with respect to the landscape on its other projects, not only in the other parks and the national forests, but in its other road-building programs.[316]

OTHER ROAD PROPOSALS

Increasing visitation to Mount Rainier put pressure on the Park Service to open up other sections of the park by constructing new roads. Surveys were made in 1905-06 by the Corps of Engineers for a "South Side Road" running east from Paradise across the park and over the Cascade crest to Yakima. In the 1910s, the park administration urged consideration of a "North Side Road" which would have connected the Carbon River area with a mine service road at Glacier Basin, providing for east-west access across the park across the north flank of the mountain. The State of Washington was engaged in the construction of a new highway along the northeast side of the park, and the Park Service was being urged to construct a "West Side Highway" between Carbon River and the Nisqually Road.

If all these plans had all been carried out, the "Round-the-Mountain" road proposal would have been largely realized. However, the high costs of construction in the mountainous terrain forbade construction of several of the links. Park Service policy generally maintained that one road into each park was enough, and that the rest of the scenery should be preserved to be seen by hikers or trail riders.[317] Director Mather maintained

> It is not the plan to have the parks gridironed with roads, but in each it is desired to make a good sensible road system so that visitors may have a good chance to enjoy them. At the same time large sections of each park will be kept in a natural wilderness state without piercing feeder roads and will be accessible only by trail by the horseback rider and hiker. All this has been carefully considered in laying out our road program.[318]

In 1928, Mather designated Mount Rainier's glacial zone and a number of other undeveloped areas in the park as a "wilderness area" to remain accessible only by trail. Developments, including new roads, would not be permitted. By the mid 1930s, areas not already considered for development were generally treated as permanent wilderness. Research areas for the protection of plants, animals and natural features were established, and "sacred zones," special areas

within or adjacent to park developments, were likewise protected.[319] The new park landscape protection policy meant that roadbuilding would be limited in much of the park, and no circuit road system would be completed.

The Rainier National Park Company, the chief park concessionaire, proposed construction of a "scenic loop" road in the upper part of Paradise Valley in the late 1920s, hoping to attract more visitors to its Paradise Inn and other operations. The proposal was endorsed the Rainier National Park Advisory Board and park superintendent O. A. Tomlinson. In May 1927, a Park Service engineer inspected routes to Glacier Overlook, to Alta Vista, and even across the terminal moraine of the Paradise Glacier, but recommended against construction, as roads in such a severe environment could only be constructed at tremendous cost. NPS Landscape Engineer Thomas C. Vint inspected the proposed "scenic loop" in July and voiced his opposition to the project, feeling that its construction would destroy the splendid foreground views from the Paradise area. He also criticized the project on basic engineering grounds: snow removal would be extremely expensive, and the road could only be maintained for a few months each year. Director Mather ruled against the project in August 1928, citing not only the high cost estimates but the almost certain devastation of the fragile mountain meadows.[320]

The landscape protection policy was apparently also the chief reason behind the decision not to complete the West Side Road between Mowich Lake and the North Puyallup River. Between the two points, a long westward spur of Mount Rainier extends nearly to the park boundary. The route planned through this stretch would have carried the road through the fragile Golden Lakes or across subalpine meadows at Sunset Park (5,600'+). Farther north, two more steep ridges and the North and South Mowich rivers would have to be crossed. Construction would have been difficult and expensive and cause great damage to the highly sensitive alpine terrain. Before funds were appropriated for construction in these areas, a November 1930 fire escaping from a contractor's clearing operations on the adjacent Klapatche Ridge section devastated Sunset Park.

Landscape concerns apparently weighed heavily in the decision to halt construction. Completion of the road across the park would have encouraged heavy use of an area in which the Park Service was ill-prepared to deal with large numbers. In response to a December 1937 query by U.S. Representative John M. Coffee, NPS Associate Director A. E. Demaray indicated that, since the Mowich Lake section was located so close to the population centers of the Puget Sound cities, the Park Service would be forced to develop new parking, camping and sanitary facilities to accommodate much larger crowds if the road was extended. As the topography was so wild, developments would entail huge expenses and cause great damage to the park landscape. He indicated that the extension of the West Side Road would cost some $3 million, which the Service did not have in its budget.[321] By this point, the National Park Service was more concerned with finishing the East Side and Stevens Canyon highways, completion of which would allow, for the first time, east-west access the

park, and a direct road connection within the park between Longmire and Sunrise. The final link of the West Side Road was never built.

ROADWAY STANDARDS

While it might have been assumed the Army engineers might have constructed a road laid out along the most direct and efficient course, as befits military road construction, the Corps of Engineers had recognized that roads in the national parks had another purpose, to make accessible the major features of a park. This precedent had been set in the construction of the Grand Loop Road at Yellowstone National Park in the 1890s.

Eugene Ricksecker's plans and specifications for the Nisqually Road survive in the park archives and provide good information on the roadway design of the 1904-10 construction period. A drawing on linen graph paper in the collection shows two typical cross sections for the road below Longmire Springs. On flat terrain, the width of the roadway was to be 16', sloping from the crown of the roadway 1' per foot. Ditches were to be provided at the sides where possible. On side hill sections, slopes would be cut back to a 1:1 or 1:1 1/2 maximum, with a small ditch at the base of the upper slope. The upper slope could be increased to provide material for fill areas.[322]

The Corps of Engineers withdrew from the park before the creation of the National Park Service, and for a year road affairs were handled directly by the Department of the Interior. With the creation of the Park Service in August 1916, the responsibilities for road construction were delegated to the new agency. The Park Service organized the Engineering and Landscape Engineering Divisions to handle the work, and established a principle that national park roads would be designed to harmonize with the landscape.

An NPS spokesperson described planning roads as "the reverse of the famous principle of the ostrich," in that they "should provide a maximum of scenic view, at the same time being as inconspicuous as possible themselves." Engineering texts of the day suggested that grades should not exceed 7 percent, as motorists would be forced down into lower gears in order to climb the grades.[323] At Mount Rainier, the Army Corps of Engineers, the National Park Service and the Bureau of Public Roads all designed park roads rarely exceeding 6 percent. Park administrators sometimes boasted of the "modern, high-gear" roads they were providing in the park.

Following a visit to the park in 1919, NPS Landscape Engineering Chief Charles Punchard urged that construction camps remaining along the sides of the road be removed, as they were very conspicuous. He also criticized the location of borrow pits at the roadsides, and recommended that in the future, such pits and quarries be located in less visible places and accessed by minor service roads. He reported that he was favorably impressed with the rustic log arch and other structures at the Nisqually entrance.[324]

In 1921, the Engineering Division prepared a sheet of typical road sections for the Carbon River Road at Mount Rainier. The roadway on level might range from 10'-16' in width depending on conditions. The surface was to be crowned, sloping 2 1/2" from the center to the road apron. Ditches 3' wide and 1' deep were to be constructed on both sides of the road where possible. Sloping on cut sections varied, from a maximum 3:1 slope for rock cuts, 2:1 for hard earth sections, and 1:1 for soft material; on these sections, ditches were to be placed on the upslope side only, as drainage was to follow the natural contour on the other side.[325]

In March 1925, National Park Service Chief Civil Engineer George E. Goodwin circulated Blueprint No. 221, drawn up by the Engineering Division, showing standard road sections approved for construction and improvements for roads in the national parks. In a cover memorandum to all park superintendents, Goodwin indicated that Director Mather favored the "Type II" road design, which specified a 16' roadbed at profile grade, with shoulders and ditches extending the roadway width to 20' or 22'. Plans were provided for construction on level terrain, side hill sections, superelevated roadway, and for retaining walls and raised embankments.[326]

Later in 1925, park road planners began basing their designs on standard road plans published by the Bureau of Public Roads. The first to be adopted in Mount Rainier National Park was the revised 1924 Forest Highways Standard, drawn up by the BPR for road construction in the national forests. An 18' roadway based on the standard was adopted by the Park Service for the reconstruction of the Longmire section of the Nisqually Road.[327]

Park Superintendent O. A. Tomlinson wrote Park Service Director Albright in June 1929 to urge that all new park roads be constructed to an 18' minimum width. Tomlinson stated that the 16' Forest Service Standard that had been adopted was inadequate for the 30 mph speeds at which many vehicles were travelling over the park roads. He suggested that it would be more economical to build the roads to the 18' width, rather than construct narrower roads and widen them later. The 18' standard was adopted that year. It provided for an 18' surface, a 24' roadbed measured shoulder-to-shoulder, and 1' minimum depth ditches on both sides; these varied in width to suit drainage conditions.[328]

The Yakima Park Highway was typical of late 1920s roadway design at Mount Rainier. It was constructed with a 24' roadway, shoulder to shoulder, an 18' roadbed covered with 8" of gravel, and incorporating widening and superelevation on sharp curves. The road was surfaced with a bituminous macadam treatment in 1934-35.[329]

The 1933 Forest Highway Standard, adopted as a minimum by the Bureau of Public Roads and the National Park Service for roads in the national parks, called for 24' roadbeds with 5' minimum ditches and maximum grades of 6 percent, compensated for curvature. Of course, roadway widths had to be adapted to suit field conditions. On the Stevens Canyon Highway, for instance, parts of

the road were planned for and constructed on 16', 24' and 26' roadbeds, and considerable variations were employed on curved and superelevated sections. Curves in some sidehill country proved impossible to build to the standards. The most notorious example is probably the sharp switchback curve at The Bench; here the road makes a 60° loop reversing onto 20° curves at each end.[330]

Dudley Bayliss of the National Park Service defined the characteristics of national park roads and national parkways in a July 1957 issue of *Traffic Quarterly*. The article was reprinted by the Park Service and states the agency's road policy during the "Mission 66" period. He stressed that park roads were "radically different" than high-speed state highways, and offered a number of distinctions. Park roads did not necessarily take a straight course to their destinations. As there was no real need to provide for the most direct routes across the landscape, the roads were planned to maximize scenic opportunities. The roads followed natural contours where possible; they were "laid on the ground," rather than cut through it. Designed as *low speed roads* to entice the visitor to slow down and enjoy the scenery, they could be more easily fitted into the landscape. In order to facilitate interpretation of park features, roads could sometimes be planned to present sites in chronological or thematic order. Roads might go to some additional length to reach scenic points. Parking areas and turnouts at such locations were part of the normal construction. The adjacent landscape was to be carefully protected, and construction damage-scars, cut slopes, gouges—were to be replanted with native vegetation. Selected vistas were occasionally opened up and understory plants thinned, and landscape maintenance plans provide for mowing and vista maintenance.[331] The roadside landscape is managed and controlled.

Writing on changing parks road policy, Bayliss noted "The trend in recent years is swinging toward curvilinear alignment, controlled access, variable medians and grades for separated roadways, and wider rights of way for the more advanced highways as well as parkways."[332]

Park roads today reflect their various periods of origin and subsequent reconstruction. Traffic lanes on the paved park roads are generally 10' in width each. Shoulders are provided on some road sections, and vary in width, generally about 2'. Slopes are sometimes reconstructed on flatter than natural slopes and provided with drainage ditches at the bottom. Such a treatment not only allowed herbage to establish itself and hide the scarring, but it also reduced the chance of slides. Cleared safety or recovery zones are rarely available. Shoulders and catch basins are generally vegetated with grass. Some cut slopes have been revegetated with native plants; this work was first carried out by Emergency Conservation Works personnel in the 1930s and has been continued under subsequent road contracts and by park maintenance crews.

All the park roads hold to gentle grades not exceeding 5 or 6 percent except for very short stretches. Where they run close to cliffs, parapet walls, guard rails or border stones line the roads, so motorists are not subjected to the "white-knuckle" driving experience encountered on some mountain roads.

NPS Chief Landscape Engineer Daniel R. Hull once wrote that designing roads with gentle grades and easy curves helped alleviate "the feeling that one must hold his breath for fear of toppeling (*sic*) over to the depths below."[333] Still, some visitors are terrified on some sections of the park roads, and rangers occasionally have to "rescue" panicky drivers.

CHAPTER X

ROAD-RELATED STRUCTURES

BRIDGES

Bridges and other major structures were constructed before the final road surfacing was applied. Some bridges and tunnels were built under grading or roadway construction contracts; in most instances, however, bridges and structures were contracted separately. In several cases at Mount Rainier, bridge contracts were combined.

A wide variety of bridges was employed over the years. Early bridges on the Nisqually Road were generally of timber construction. Simple log stringer spans carried the road over Kautz and Tahoma creeks. Van Trump Creek below Christine Falls was crossed by a wooden Howe truss deck bridge with a 75′ span in 1907. This structure only lasted nine years; it was replaced in 1916 by a high wooden trestle a little closer to the falls. The 90′ Nisqually Glacier Bridge (1908) below Nisqually Glacier and three bridges over the Paradise River--at the First, Second and Fourth crossings (all ca. 1910)--were sturdy Howe truss structures, constructed of intersecting sawn diagonal members strengthened by vertical iron or steel reinforcing rods.

A deep ravine just beyond Narada Falls at the base of the switchbacks was spanned by the unusual "Horseshoe Bridge," a high elevated 182′ long trestle which bore the road across the ravine while making a nearly 180° curve on a 50′ radius. This 1911 timber structure was swept away by a rockslide in 1915 and replaced by a high fill section. This roadway section has since been abandoned; traffic now passes around the switchbacks over the 1926 Narada Cut-off road.

In 1911, Superintendent Edward S. Hall requested funds to build a suspension bridge across the Nisqually River at Longmire Springs. It would carry a short spur road to the Eagle Peak trailhead and to U.S. Forest Service lands south of the park boundary. Hall was able to secure match funding for the structure from the National Park Service and the Forest Service, and Forest Service engineer W. S. Heering designed a light suspension bridge for the crossing. The "Pony Bridge," as it was called, was constructed at a cost of about $800.[334]

Interior Department special inspector E. A.Keys visited the park that year and reported that the wood bridges then in use were for the most part in good condition. However, bridges in the lowland forest west of Longmire Springs would soon require replacement. Keys urged their replacement with steel or reinforced concrete spans, as the local timber was unsuitable.

> Notwithstanding the fact that the road is largely through a heavily timbered country where cedar is available for construction, and which is a wood that lasts very well in the weather, but is not very strong, yet I believe that it would be economy in the long run to replace these bridges as it becomes necessary with steel or re-inforced concrete, preferably re-inforced concrete, especially for the shorter bridges.[335]

As a matter of economy, timber bridges continued to be employed fairly frequently at Mount Rainier through the 1930s. The Park Service Engineering Division prepared standardized designs for short-span wooden girder and deck bridges in 1920 for the Carbon River Road construction project. These structures used main girders up to 33" in diameter, planking decks attached with spikes, and 3" pole rails at the sides. Specifications generally suggested the use of cedar logs.[336]

Charles P. Punchard, chief of the new National Park Service Landscape Engineering Division, made an inspection tour of Mount Rainier National Park in May 1919 and submitted a report to NPS Director Mather on 9 June. In the report, he criticized the general appearance of the park's bridges:

> The park contains several bridges, but I did not see any bridge which could be called attractive. I appreciate the fact that these streams are glacial streams and capable of any manner of antics at very short notice, therefore the necessity for as large an opening as possible, but I feel that more attention should be given to the design of these structures above the roadway. This may be accomplished by means of logs or native stone, and should result in a more substantial looking structure than the present ones. . . I would recommend that upon the contemplation of the replacement of any bridge that designs be made for this purpose and a certain type adopted.[337]

In early 1920, Punchard wrote Superintendent Roger Toll to inquire as to whether Mount Rainier National Park planned the construction of any new bridges, and if so, to suggest their construction in stone. He offered to provide some sketches of possible plans. However, Toll replied that the park had no plans for any bridges except those of the least expensive construction, and declined the offer for assistance.[338]

The Tahoma Creek and Kautz Creek bridges on the Nisqually Road were replaced again in 1925 with log stringer spans. Over the next decade, Shaw Creek on the Yakima Park Highway and Panther Creek on the East Side Highway were spanned by these attractive structures. The log stringers, laid in parallel longitudinally, were entirely structural, and not surface decoration applied to the sides of the bridges. Unfortunately, none of these bridges survives; all were replaced in the 1950s and 1960s by modern reinforced concrete and steel girder bridges. The main objection to timber bridges was their comparative shortness of life under the park's weather conditions.

A long rustic timber clad bridge was completed across the North Puyallup River on the West Side Road in 1934 by Seattle contractor Carl Bjork. The structure featured three 60' log stringer spans supported by masonry-clad concrete abutments and concrete bents clad in timber cribbing. Immense stringers were used for the main spans, and 36" logs served as guard rails on the decks. A fine view of the North Puyallup Glacier could be had from the bridge, and parking areas were provided so that visitors could enjoy the site.[339] This section of the West Side Road that was abandoned in the 1970s and converted to a trail, and the unique structure was blown up by park maintenance crews. Only partially dismantled, parts of the structure still lie in the river bed.

Of the park's numerous log and timber bridges, only the Nisqually Suspension Bridge at Longmire survives today, and the 1923-24 structure has been reconstructed. Rustic log towers once supported the suspension cables bearing a lattice deck truss. In 1951-52, the bridge was rebuilt with dimensional lumber. The popular bridge retains some of the original character, but only a few parts of the cable hardware are original.

The first reinforced concrete bridge constructed in the park was the second Tahoma Creek Bridge, completed in 1915 by Tacoma contractors McHugh and Creelman at a cost of $2,365. The structure was designed by Mark Daniels, "General Superintendent and Landscape Engineer of the National Parks." Daniels, a Los Angeles landscape architect, did much of the park planning in the period immediately before the creation of the National Park Service. The bridge had two 30' spans supported by a central pier. Park Superintendent Ethan Allen cautioned against the use of a central pier, as it would almost impossible to obtain a proper footing in the boulder-strewn streambed. Debris would probably lodge against the pier, he warned, and cause it to be undermined. This is exactly what occurred in December 1917; the bridge was destroyed by failure of the central support. When the deck collapsed, it obstructed the flooding stream, washing out the approaches. Park crews had to dynamite the remains in order to return the stream to its channel. The replacement bridge was another cedar log stringer span, which cost much less than the concrete structure. The Kautz Creek Bridge was washed out at the same time and replaced with another log stringer bridge; both spans were replaced again in 1925 and in the 1960s.[340]

By the mid-1920s, the "rustic style" was being employed in the design of the park bridges. Albert Good, the consulting architect who prepared a series of design guides, insisted on the use of native materials in bridge construction, as their use constituted "a convincingly appropriate and harmonious medium of structural interpretation." Stone bridges, he said, "seem almost to spring from the stream or river bank when truly related in color, texture, and scale to adjacent rock outcrops." He offered some general guidelines on bridge design:

> In general, bridges of stone or timber appear more indigenous to our national parks than spans of steel or concrete, just as the

> reverse is probably true for bridges in urban locations or in connection with broad main highways. Probably there are few structures so discordant in a wilderness environment as bridges of exposed steel construction. . . Too great "slickness" of masonry or timber techniques is certain to depreciate the value of these materials for park bridges. Rugged and informal simplicity in use is indisputably the specification for their proper employment in bridges.
>
> In no park structure more than bridges is it of such importance to steer clear of the most common errors in masonry. Shapeless stones laid up in the manner of mosaic are abhorrent in the extreme. In bridges particularly there is merit in horizontal coursing, breaking of vertical joints, variety in size of stones—all the principles of sound construction and pleasing appearance in any use of masonry. Often the creation of an effect that recalls any natural ledge formations in the vicinity is the indicated technique for the masonry of the bridge. The curve of the arch, the size of the pier, the height of the masonry above the crown of the arch are all of great importance to the success of the masonry bridge.[341]

Something almost intangible was called for in bridge design. Engineers had to venture beyond "sheer perfection" and overemphasize structural elements in order to maintain scale with the rugged scenery.[342] Keeping in relative scale with the scenery meany that many of the stone-faced park bridges are of considerably more bulk and scale than required for road and stream requirements; arch ring stones or voussoirs are 12' longer on some bridges.

Between 1917 and 1924, new bridges in the park were designed by the Park Service's Engineering Division; designs were reviewed and approved by staff from the Landscape Engineering Division. After 1925, the major new park spans were designed by the Bureau of Public Roads under terms of its agreement with the Park Service.

BPR engineers prepared the construction drawings and specifications, advertised contracts, and oversaw contractor operations on the projects. Plans for the bridges at Mount Rainier were prepared at the BPR's western regional office in San Francisco or its district office in Portland, Oregon. The Bureau also assigned resident engineers to the various projects.

While the BPR was responsible for engineering considerations, the National Park Service Landscape Engineering Division (and its successor offices) prepared the architectural plans, specifying design details for the structures. For masonry-faced bridges, architectural plans specified the stone to be used and usually included detailed sheets showing how the arch ring stones should be cut. Other specifications sometimes included color of mortars, surface treatments and project cleanup. The division also concerned itself with landscape details at the bridge sites and sometimes modified

designs for site considerations. For instance, the office changed the design of the Christine Falls Bridge on the Nisqually Road from a straight bridge to one on a curve. Sometimes plantings, for instance the placement of "sentinel trees", might be dictated, or special precautions prescribed for existing trees at the sites. Landscape restoration or revegetation work at the site was supervised by a landscape architect assigned by the division.

The bridge design process began with the initial road surveys, and bridge sites were carefully investigated. The location survey engineer had to site crossings where the geology favored placement of abutments. The engineer would also note such factors as whether or not a "tote road" would be required to reach the site or whether some necessary materials, such as stone for the masonry and sand and gravel for concrete aggregates, were available nearby. Site considerations were especially important where the erratic glacial streams were prone to shift their banks. The Fryingpan Creek Bridge site on the Yakima Park Highway was especially difficult, as the creek shifted wildly and its western shore was subject to much erosion. This may have been a factor in the choice of three-hinged steel web arch bridge for the site, as placement of proper timber falsework for a masonry arch might have proved impossible. The White River Bridge and Shaw Creek bridge sites on the same road were also subject to the vagaries of shifting streams, but suitable footings were located for foundations and abutments for the more common concrete arch structures.

A number of the park bridges were designed as curved structures so as not to interrupt the road "ribbon" with broken-back curves (where a flowing curve is interrupted by a straight-line segment). Maintaining the curve was especially important in where mountain streams had cut deep valleys. In some cases, roads curve across bridges built on a tangent; a good example is the Stevens Creek Bridge. This bridge spans the stream on its straight concrete arch girder frame, but the road crosses on a radius, and the wing walls are curved to allow the curved to follow the roadway. The bridge is also superelevated to allow vehicles to more easily negotiate the curve.

The size of stone used in the masonry facing of the stone-veneered park bridges was specified by the landscape architect. The color and texture of stone sometimes varied, providing a diversity in tone and texture effects. The Landscape Engineering Division approved all quarry sites and stone samples. Stones with weathered surfaces were preferred, but some contracts allowed unweathered stones to be introduced up to 50 percent of the wall surface.[343]

The side masonry walls and voussoirs were generally placed first and the concrete was poured against them. The masonry concealed the reinforced concrete and gave bridges the appearance of stone construction. Granite, andesite, and conglomerate was used at Mount Rainier for the facing of the bridges. In most cases, stone was taken from quarry locations in the park, generally rock cuts on adjacent highway construction contracts. In the case of the St. Andrews Creek and South Puyallup River bridges [HAER Nos. WA-51 and

WA-52], the stone was obtained outside the park, it being determined by the contractor that a lower unit price could be had. To secure accurate placement of the masonry voussoirs, and wall sections, some contractors laid the plan out full-size on platforms and made exact outline patterns for all the stones. This greatly facilitated cutting and placing the stones.

After the structures were completed, contractors were required to "true up" the road, or provide a proper grade connection from the approach to the road. Application of permanent surfacing was generally done under separate contracts. Bridge sites on the Yakima Park Highway were landscaped with native plants by personnel from Emergency Conservation Works Camp No. 5 at White River in 1933. Shrubs were planted in the river beds to "relieve monotony." Raw cuts between the White River Bridge and the park entrance were planted with vine maples and other fast-growing trees.[344]

Special precautions were taken to avoid dumping debris into streams or otherwise disturbing the highly-visible bridge sites. To protect abutments from scouring, large boulders were occasionally placed as rip-rap on the banks below the bridge. Gas shovels were sometimes used to shift boulders from the stream bed. In the case of the Fryingpan Creek Bridge and perhaps other structures, gas trucks dumped boulders from other excavation down the slope, where a shovel picked them up and put them into place.[345]

CULVERTS

While bridges carry the park roads over rivers and major creeks, culverts and ditches are required over smaller watercourses and to provide for drainage beneath the roads. In planning these structures, engineers had to take into account factors such as the size of the drainage area, steepness of slopes, soil types and local rainfall.

Loose rock fill and log culverts were used in the early construction of the Nisqually Road by the U.S. Army Corps of Engineers. These were generally constructed by laying parallel logs as the sides of the culvert, then installing a cover of log puncheons. However these culverts worked, they were clearing too few in number to properly drain the road. Reporting to the Interior Department in 1911, special inspector Keys criticized the provisions for drainage along the new road.

> The road most of the way benches back into the side hill intercepting drainage from the steep slopes, thus making the road practically an intercepting ditch for the drainage which comes down from the hill sides. I have been into the park twice, once in May and this time in October. Both times there was evidence of a great deal of water from the side hill though, perhaps this may disappear during July and August of dry years, yet in view of the fact that the country is timbered there will always be more or less water coming down from the side hills. . . There should also be constructed on the up hill side a good ditch to intercept all

> water and carry it to the culverts, thus keeping the [proposed] macadam road well drained.[346]

Keys indicated that terra cotta pipe culverts had been specified in some places, but road records do not mention them.[347]

As the Nisqually Road was subsequently reconstructed, corrugated iron pipe or reinforced concrete box culverts replaced earlier works. Still, log culverts were used into the 1920s, especially on the Carbon River Road construction. In March 1920, the National Park Service Engineering Division issued standard plans for three types of cedar log culverts to be adapted to local conditions. Whole and quarter-round peeled logs were used laid in parallel to form the sides of the culvert; these were then capped with log slabs and filled over. The office also issued a set of plans for a series of combination log and stone culverts and timber causeways in 1922;[348] some of these may have constructed at Mount Rainier, though no indication is given in park road records.

After 1925, BPR standard specifications offered plans for culverts and drainage structures which were adapted to individual site requirements. These plans were offered as general drawings with separate tables specifying required diameters of pipes or concrete boxes.

Albert Good's *Park and Recreation Structures* called the culvert "the boy that is father to the bridge." Successful culvert or drainage structures were rarely noticeable, being designed to pierce the roadway below profile grade. The culverts and fill areas were sometimes extended to the sides of the road, allowing landscape plantings to completely hide the crossing. Larger culverts often required substantial masonry headwalls as a safety barrier and to firmly anchor the structure. Where culverts were constructed of concrete or metal pipe, the masonry was usually extended into the opening so as not to be an apparent veneer. The same masonry considerations guiding bridge construction and other structural work applied to headwall construction. The procedure for building reinforced concrete box culverts was first to pour the bottom slab, then erect headwalls. Next the sidewalls were poured, and finally, the top slab.[349]

Standardized plans for culverts and drainage structures were issued by the Bureau of Public Roads in May 1935. The BPR prescribed typical culverts with concrete or masonry headwalls, paved culvert inlets, underdrains, catch basins and footings for pipe culverts.[350] Culverts based on these plans, modified for site requirements, are featured on all the park roads. Masonry headwalls are generally constructed at both ends of culverts, but on some culverts, headwalls are located at the intake only. Footings often extend below the intakes to prevent headwalls from washing out.[351]

VIADUCTS

Bridges and culverts were constructed to carry roads across perennial and intermittent streams, and for run-off drainage. Where the road had to be supported high over dry gulches, or in a few cases, thin air, a third type of structure, the viaduct, was employed. At Mount Rainier, these were chiefly used on the Stevens Canyon Highway to carry the road around steep sidehill sections or over dry ravines, alleviating the need for bench cuts, extensive embankments, or high retaining walls. In these cases, the viaducts helped reduce damage to the steep hillsides and may have proven more economical than heavy excavation or benchwork.

In 1925, as the National Park Service's Engineering Division was preparing plans and specifications for the reconstruction of the Nisqually Road, it issued plans for the "Ricksecker Viaduct," intended to carry the Nisqually Road around a badly raveling slope at Ricksecker Point. The design was a 102' 6" reinforced concrete slab structure supported on concrete piers. Broken range masonry abutments and a masonry guard rail on the downslope side added a "rustic" touch. A log rail supported on intermediate piers was located on the inner face of the guard wall.[352] The structure was never built. The Bureau of Public Roads took over administration of the road project that year, and the agency specified the use of stone embankments in place of the viaduct.

The Public Roads Administration issued plans in the spring of 1940 for two reinforced concrete viaducts for the upper reaches of Stevens Canyon on the Stevens Canyon Highway project. However, due to a shortage in materials during World War II, completion of the structures was postponed for more than a decade. The two structures were completed by contractors Hawkins and Armstrong in October 1952. The larger has a steel girder and concrete slab deck supported by flared reinforced concrete piers bearing it approximately 30' above a ravine; the other tunnel is a shorter viaduct consisting of a deck supported by steel girders and shorter piers. A very short viaduct is located just above the northwest portal to the upper tunnel. The three viaducts on the Backbone Ridge section of the road were constructed in 1954 and 1955 as part of a larger contract involving bridges across Falls Creek and the Ohanapecosh River.[353] All the Stevens Canyon Highway viaducts are faced with masonry or bordered with masonry parapet walls.

TUNNELS

Three tunnels were employed on the park roads, two on the Stevens Canyon Highway and the other on the East Side Highway. Construction of the tunnels allowed the roads to be built through mountain spurs and ridges, reducing the need for cliffside scarring and additional curvature. Tunnels are featured on may national park roads where a cut might ordinarily have been made because they help limit the damage caused by the new road.

Two of the park tunnels feature masonry portals. The upper tunnel on the Stevens Canyon Highway (1937) has a.formal cut stone portal with arch radiating voussoirs and ashlar cut headwalls. The headwalls were designed

with planting pockets above the entrances. Trees or shrubs planted in the pockets would hide some scarring at the tunnel faces and help enable the structure to blend with its surroundings. This treatment was prescribed by the Branch of Landscape Architecture of the National Park Service's Western Office of Design and Construction in San Francisco. The tunnel's reinforced concrete lining was prefabricated in 10' chords. Curved sections were cast-in-place and formed to the curve in the tunnel centerline. Spaces between the tunnel lining and roof of the bore were filled with rock.[354]

The 1940 tunnel on the East Side Highway was designed with a portal of arch radiating voussoirs but specifications called for the use of broken range masonry. The tunnel headwalls and web walls were gently crowned at the roof but were not provided with planting pockets. The raised walls form catch basins, helping to protect motorists from stones dislodging from the cut slope above the portal face. The tunnel was lined with pneumatic concrete or gunite. A temporary timber lining was installed following drilling operations. Formwork was then constructed using the existing timber sets from the temporary lining for structural members. A concreting machine then pumped Class "D" concrete behind the forms from a pipe located over the crown of the tunnel vault. The area between the tunnel arch and the rock bore was then backfilled with pneumatic concrete. Pouring of the lining and the backfilling took place from the lower end. Exposed surfaces of the lining were given a rubbed finish, except for 30' lengths at the ends, for which a "bush hammer finish" was specified.[355]

In 1952, the Muddy Fork or Box Canyon Tunnel [HAER No. WA-70] was completed under supervision of the Bureau of Public Roads. The tunnel was bored by the pioneer method, meaning a smaller diameter pilot tunnel was drilled first and the bore was later expanded. Unlike the other park tunnels, a decision was made to construct no masonry portals but rather to leave the openings as plain bores into the rock faces. A planned reinforced concrete lining was never installed due to the excellent nature of the rock that was encountered. Tunnels without masonry portals had been employed before in the national parks, as with the 1926 West Side Tunnel [HAER No. MT-76] in Glacier National Park, but not at Mount Rainier.

RETAINING WALLS, GUARDRAILS AND PARAPETS

A variety of retaining walls, parapet walls and guard rails border sections of roads in Mount Rainier National Park and serve a number of purposes. In some cases, the road is benched out from sidehill terrain and requires support from substantial retaining walls backfilled with gravel and rock. Other retaining walls are used for slope stabilization in cuts. Most "white knuckle" sections of the road are bordered by stone parapet walls, metal guard rails, or large boulders called "border stones." These structures are obviously intended to prevent errant vehicles from going off the road. Guard walls and related works also define the boundaries of parking areas, scenic vistas, and other developments.

In the early construction of the Nisqually Road (1904-10), the Corps of Engineers employed timber cribbing, generally stone-filled, for most retaining walls, as not enough money had been appropriated for the construction of permanent stone structures. Parapet walls were noticeably lacking, and Inspector Keys warned that the situation was very dangerous. "There is no guard wall or rail on the outer edge of this road, and should a stage go over this edge it would fall many hundred feet. I believe from Gap Point . . . to the Nisqually River below is about 1000 feet, almost vertical."[356] Border stones were later placed at certain points along the road, and some of these can be seen on the abandoned section of the road under the new Glacier Bridge.

In 1922, the National Park Service's Engineering Division published a standard design for log crib embankments for road support. Cedar or tamarack logs were to be used where available; all logs but cedar were to be peeled to retard rotting. In their construction, a bed log was to be laid a solid surface, then a solid floor of 8" logs was to be laid the full length of the road. The crib was then to be built up with side logs anchored inward by tie logs spaced at 8' intervals; the exterior wall was to be battered 1:6. As the logs went up, the crib was to be backfilled with rock.[357] Some of these structures were used on the Carbon River Road constructed under the Division's supervision, and on the Nisqually Road.

NPS Acting Chief Civil Engineer Bert H. Burrell criticized the use of log cribs as "less permanent than the roadway itself." He argued that "Log cribs are temporary at best, and I mean by temporary something that cannot last in a state of usefulness more than fifteen years when new." Log structures were only occasionally employed after the mid 1920s, although rock-filled timber cribs were frequently used as revetments to protect portions of the Nisqually, Carbon River and White River roads from flooding by their namesake rivers. Log cribbing was used for slope stabilization on the Nisqually Road near the park entrance by Emergency Conservation Works crews in 1933.[358]

Park and Recreation Structures (1935) recommended construction of retaining and border walls in stone rather than wood for reason of permanence. Timber, though, might prove acceptable where it was abundant, and was especially appropriate in wooded areas. The design guide warned against any general adherence to any single design for retaining and parapet walls. "Miles of stone barrier with crenelles and merlons of fixed length and height ticking off on the consciousness with pendalumlike routine" was far too monotonous. "Better to borrow something of Nature's variety," suggested the architect. Changes in length and height better reflected the irregular "rhythm of Nature." Special attention was required where guard rails and parapets merged with native rock outcrops.[359]

Standardized plans for retaining and parapet walls were provided by the Bureau of Public Roads and adapted to site requirements on various park roads. These plans were generally attached to road project plans, and the types of structures to be employed were described in the specifications. These were issued and revised over a number of years. For instance, the Stevens Canyon

Highway plans included several design sheets for different retaining walls, dated April 1935. Several types of standard treatments were specified, including dry rubble and placed rock embankments, dry rubble embankments, concrete gravity-type retaining walls, and special embankments for slope stabilization. Most retaining walls were constructed on a triangular cross-section with the base generally half the height of the wall. Larger rock were generally placed in the lower part of the embankments, graduating to smaller sizes in the upper courses. Rocks of the same size were not to be bunched together, and were to bulge from the wall face 1" to 4". On steeper slopes, the surface was to be roughly stepped to better bear the weight of the wall. The angle of slope was to be determined by field engineers but ordinarily did not exceed a batter of 10:1; the engineers also specified the width and thickness of footings and the extent of the work. Drains and underdrains were placed as required.[360]

Rock was usually quarried at locations along the right-of-way and taken occasionally from large boulders. The stone was sorted as to size, stockpiled on the road, and hauled to the sites as required. Sand and cement was usually obtained from commercial sources. Some stone was placed by hand; in other cases, derricks or power equipment was employed.

Some retaining walls were constructed on the upslope side of roads for purpose of slope stabilization. These included low breast walls at the base of steep slopes prone to slides and special rock embankments for gentler slopes. Areas at the base of eroding talus slopes were especially dangerous if not stabilized. Specifications indicated that they were to be backfilled with rock raked down from above or from fill supplies. Certain walls served as catch basins and were left unfilled.[361] Good examples of the latter can be seen on the Stevens Canyon Highway at Inspiration Point and on the Yakima Park Highway above the White River crossing. Some more gently sloped stone-stabilized embankments were subsequently partially covered over with dirt. According to a BPR project engineer, this treatment "gave a very pleasing effect from a landscape standpoint and in time should allow some growth to cover the embankment."[362] The earth would promote natural growth and help conceal construction damage.

Most of the retaining walls are of uncoursed masonry construction. On the Backbone Ridge section of the Stevens Canyon Highway, one large retaining wall is constructed from prefabricated interlocking concrete panels; stone facing and coping on the upper parapet largely conceal its concrete construction from motorists passing over the road.

Parapet or guard walls top many retaining walls and are also used separately to protect vehicles from veering off the road in dangerous places. As with the retaining walls, most are adapted from standard plans developed by the Bureau of Public Roads. Several different treatments were used at Mount Rainier, but those based on two BPR standard plans were the most commonly used. Type 1 walls were flat-topped broken range masonry walls averaging 2' high. Type 2 walls featured regularly spaced crenel stones, a somewhat more

formal treatment. Spacing of the crenels varies with different stretches of wall. Excellent examples can be seen on the Yakima Park Highway, West Side Road, and Nisqually Road, and are featured on other park roads as well. Type 2 wall was subsequently used in a number of the other western parks. Linda Flint McClelland, architectural historian for the National Register of Historic Places, states that the crenulations were "inspired by the jagged glacial peaks" in the open alpine terrain, and that its use became so prevalent in the western parks that it was "the hallmark of National Park roads in Western parks."[363]

Along the Mather Memorial Parkway, a log border rail remains for a distance of half a mile on the side of the road in the Mather Overlook area north of Cayuse Pass. The peeled logs, averaging 14' in length, rest in metal cradles. These form a very low barrier, only about 18" high, and have been criticized by park rangers as being ineffective; the park is now (1992) considering their replacement. Similar log border rails were once used on the upper section of the Yakima Park Highway but have been replaced with Type 2 masonry parapet walls. At Reflection Lakes on the Stevens Canyon Highway, 36" logs were half buried to form the perimeter of the parking area, but were later replaced with Type 1 masonry parapets.

In Stevens Canyon proper, immense border stones line sections of the road. Rangers criticize their use as well; motorists sometimes collide head-on into the stones, or run off the road in places between them. (Some of the latter are apparently suicides, according to rangers; these would have found some hole or opportunity in almost any case.) A parapet wall constructed recently on the same section is built from prefabricated concrete units faced with a paneled veneer with a stone pebble finish; the work is definitely inferior to any other on the highway.

Parapet walls are also used to bound parking turnouts and scenic vistas. The flat walls at the Box Canyon site and the Christine Falls parking areas serve only to define the parking areas, not really to deter vehicles. Their convenient height allows them to serve as benches, adding to the delight of visitors who would rather tarry while others in their party walk the interpretive trails. These are generally low stone walls matching the treatment found on adjacent sections of the road. Low parapets also define the parking areas at the Tahoma Vista and Sunrise Point developments.

ENTRANCES

In the early days of the national parks, visitors would register and make inquiries at the Superintendent's office or a ranger station. When automobiles were permitted in the parks, the Interior Department placed strict regulations on their operation. Vehicles were required to register and pay a fee. This necessitated the establishment of "entrance stations" at park gateways. Mount Rainier was the first park in which automobiles could legally be operated after the early Interior Department prohibition on their use was lifted, and was the first park provided with an entrance station.

A "neat lodge" was established in 1908 at the Nisqually Entrance for motorists to obtain permits. Superintendent Ethan Allen requested funds to build a cabin for the ranger who collected the fees, and in May 1908, the park's first ranger cabin was completed.[364] Known as the "Oscar Brown Cabin" after its first occupant, the distinctive stick-style cabin remains in use; in 1992, it was occupied by the park superintendent. The Nisqually Road was still under construction, and vehicles could proceed no further than Longmire Springs.

Allen's successor, Edward S. Hall, requested that "an archway of rustic design" be constructed to mark the entrance to the park. On a visit from Seattle in 1910, Secretary of the Interior Richard A. Ballinger agreed, and directed Hall to proceed with its construction. Hall reported the completion of the peeled cedar log structure at the west entrance in the spring of 1911. The Nisqually entrance "arch" was widened in 1924 as part of the reconstruction of the Nisqually Road.[365]

A drawing of the widened structure appears in *Park Structures and Facilities*. Four huge cedar logs, 36" to 45" in diameter and 15' high, supported two cedar logs of same diameter, across which were laid three more logs, each 38' long. A half-log sign, lettered "Mt. Rainier National Park," was suspended by metal chains from the central cross log. Wooden gates, constructed from horizontal logs 6" to 9" in diameter and 10" to 12" diameter posts, strengthened by a diagonal brace, were mounted on ball-bearing pivots. Albert Good, author of the study, noted that such overhead structures were no longer popular in park construction in the 1930s. While he thought entrance gates sometimes suggested entrance to a "burial park," he conceded that the Rainier entrance was particularly appropriate, as the "huge cedar logs used are doubtless representative of the size of the timber that features the region." The Nisqually gates reflected the character of the park and were a suitable gateway for the road through the old-growth forest.[366]

The park received a $3,000 appropriation for a new checking station for the Nisqually Entrance in 1926. The park considered the types recently constructed at Yellowstone and Yosemite national parks,[367] and finally adopted one of the Yosemite type, being constructed to the side of the road, rather than spanning the road as at Yellowstone. Based on plans drawn by NPS Chief Landscape Engineer Daniel R. Hull, the structure contained "an office-registration room and quarters for three bachelor rangers." The building was rehabilitated by the Civilian Conservation Corps in 1936; in addition to replacing the roof and installing a new concrete foundation, CCC crews remodeled the interior into two separate apartments. Wooden doors replaced the original log ones, the interior walls were covered with wallboard, and new fir floors were installed. In 1937, the CCC added a porte-cochere extending over the entrance road with a log and stone checking booth or kiosk built under the outer edge of the porch. The kiosk was destroyed in 1946 when it was struck by a Marine bus (the driver was cited for driving while intoxicated).[368] The present kiosk is a "Mission 66" era replacement.

Plans for an entrance station for the new Yakima Park Highway were received from the Landscape Architecture Division in 1929. Like the Nisqually Entrance, the new structure was to be a "rustic style" building, sided in logs and featuring an overhanging porte-cochere. This porte-cochere was an original feature, and was copied for use on the Nisqually Entrance. The entrance station was completed in 1931.[369] It now serves as the White River Ranger Station. The structure was designed as an entrance station because its location was the park boundary until 1932, when the park limits were extended east to the Cascade crest.

A second log entrance arch, patterned after the structure at the Nisqually Entrance, was erected at the Carbon River Entrance in the park's northwest corner in 1933 by personnel from the Emergency Conservation Works No. 5 Camp at Carbon River. This structure is no longer extant.[370]

Asahel Curtis, Chairman of the Rainier Park Advisory Board, tried to arrange for the construction of an impressive entrance station for the new Mowich Lake Road in time to commemorate the centennial of the 1833 visit of Dr. William Fraser Tolmie to the remote area. In 1929, Curtis had Superintendent Tomlinson send some plants from Mount Rainier to Tolmie's son, Simon Fraser Tolmie, then Prime Minister of British Columbia, inviting him to attend a celebration on the anniversary. Curtis wanted a memorial arch erected at the spot where Tolmie entered the park, and suggested it be incorporated into an entrance station for the new road. He proposed the theme of a Hudson's Bay Company post. Director Albright agreed to the concept, but insisted that the state would first have to complete its approach road from Fairfax.[371]

In the fall of 1931, Ernest Davidson was assigned to design an entrance station for the still-incomplete road. Curtis wrote Davidson, reminding him of his wish to base the design on a Hudson's Bay Company post. Davidson replied with a preliminary plan for a two-story log blockhouse, the gatehouse to a typical post. Superintendent Tomlinson was not impressed, but Curtis insisted that the design was appropriate. He contacted the Park Service's Washington office to urge acceptance of Davidson's plan, but was told that the agency could not appropriate funds for either the entrance station or completion of the road construction in time for the centennial event. Dismayed at the news (Premier Tolmie had already been invited to the celebration), Curtis arranged for the area at the entrance to be cleared and for a bronze plaque to be placed there in Dr. Tolmie's honor. The Park Service released $20,000 for the Mowich Entrance parking area in December 1931. A small contract for its construction was awarded in September 1932, and the parking area was completed the following July. With the completion of the western section of the road and the state approach road, the new entrance was dedicated in September 1933. Instead of the log blockhouse, only a simple log pylon stood to bear the plaque. The marker was dedicated in a ceremony held by the Rainier Park Advisory Board. Among the visitors were then-former Premier Tolmie and R. F. Tolmie, another son of the pioneer explorer-botanist-physician. More than 200 people attended the ceremony.[372] The pylon and plaque have disappeared.

As the Mather Memorial Parkway neared completion in 1931, Superintendent Tomlinson asked the Landscape Architecture Division to prepare plans for a sizeable development at Tipsoo Lake near the park entrance. He requested an entrance arch, ranger station, 200-car parking area, picnic area, water supply system and comfort station. As for the entrance arch, Tomlinson suggested a structure of stone construction, or at least featuring stone columns. Only part of Tomlinson's proposal was approved; the work included an entrance gateway, a picnic area at Tipsoo Lake, two "rustic style" comfort stations, two masonry fireplaces, a "bubbler" fountain, and a reduced parking area. Work started in 1933; the labor was done by Civilian Conservation Corps personnel.[373]

In 1934, CCC workers began construction of the entrance over the Mather Memorial Parkway at Chinook Pass [HAER No. WA-43]. The structure was designed as a pedestrian overpass bridge to carry the Cascade Crest Trail over the highway. CCC crews completed the work in 1936. The structure was constructed from massive log stringers resting on stone pylons; carved lettering (now replaced by wooden signboards) announced to motorists that they were entering the national park. Unlike the other park entrance structures, the Chinook Pass Entrance served a functional purpose by allowing hikers to cross the road safely above grade level. Use of the trail greatly increased after it was integrated into the Pacific Crest National Trail system.

There was no entrance station on the East Side Highway until 1951 when the White Pass Highway between Packwood and Naches was completed. A fee collection booth was established at the Ohanapecosh entrance, where fees from both north and south-bound vehicles were obtained. The fee collection system was quickly criticized by motorists' groups. By order of the Secretary of the Interior, the collection of entrance fees on the road was halted in 1955, as many motorists were using the East Side Road for through-park travel.[374] A fee booth was operated for a while at the entrance to the Ohanapecosh, but was soon discontinued.

The Nisqually Entrance arch was replaced in 1973 with a structure patterned after the original. A roughly identical structure was constructed over the East Side Highway one-half mile south of Ohanapecosh in 1976. The following year, another matching entrance structure was built over the Mather Memorial Parkway at the park's north boundary.[375]

SERVICE STATIONS

The "rustic style" was also used for service stations at Longmire and Sunrise. The Standard Oil Company's 1919 attractive wood and stone station was a copy of one recently constructed at Yosemite National Park. Ten years later, the structure was replaced with a new timber structure designed by NPS Associate Landscape Architect Ernest Davidson. The diminutive Longmire Service Station [HABS No. WA-??] featured whole log posts and beams supporting the front porch; log vergeboards and brackets, and a cedar shingle roof. It remained in use in 1992 and was been listed as a National Historic Landmark for its

significance as the oldest surviving "rustic style" gas station located in a national park.[376]

In 1931, the Associated Oil Company constructed a second rustic style service station in the park at Yakima Park as part of the new "Sunrise" development. The structure was designed by the Division of Landscape Architecture along with the Sunrise Lodge and the stockade-style administration building. The T-shaped wood and concrete frame structure was clad in stone and logs and topped by a low-pitched shingle roof supported by log purlins. Unlike the structure at Longmire, the Sunrise service station provided living quarters for the attendant. [377] The structure is no longer in use.

SCENIC VISTAS, INTERPRETIVE AREAS AND TURNOUTS

A number of scenic viewpoints were provided on the various park roads. Most of these were clear natural vistas of the majestic mountain scenery. In some cases, however, viewpoints were established or "improved" by the removal of obstructing trees and shrubs. Occasionally, excellent natural views were framed by the planting of native accent trees. Some viewpoints featured interpretive displays on various features; others simply allowed visitors to take in the staggering views. Rustic design was again reflected in some of these developments in the use of native masonry parapet walls and small rustic structures like comfort stations or shelters. Suggested plans for border walls, interpretive displays, comfort stations, "bubbler" fountains and roadside springs were provided in *Park and Recreation Structures*.

The Nisqually Road was designed to pass close by two splendid waterfalls, and turnouts and trails at both provide access to scenic viewpoints below the falls. At Christine Falls, the vista of the lovely waterfall on Van Trump Creek is framed by the rustic stone arch of the Christine Falls Bridge. A small observation bay is located on the west side of the bridge, and a larger parking area, the connecting trail, and the overlook are located on the east side. The Narada Falls development features a large parking area, a rustic wood and stone comfort station, and a foot trail leading to the foot of the falls. Access to the trail is provided by the Paradise River First Crossing Bridge. The other principal viewpoint on the road is Ricksecker Point, once called "Gap Point" but later renamed for the designer of the Nisqually Road. A small parking turnout allows visitors to take in a fine view of the Nisqually Glacier. The one-way scenic road segment was the original route of the Nisqually Road; the "Ricksecker Cut-Off" behind the point was constructed in the 1920s. A smaller scenic overlook is located at "Canyon Rim," a mile east of Narada Falls.

Most parking areas and turnouts were constructed under regular contract work for individual road segments. Several developments were constructed on the West Side Road. At Tahoma Vista, a long horseshoe curve was bounded by low stone "Type 2" crenelated masonry parapet walls, and the interior of the curve was surfaced for a parking area. A scenic vista with a large trough-type stone "bubbler" fountain, a rustic log and stone comfort station topped by a

shallow gable roof, and a cleared vista were included in the development. A picnic area was constructed nearby on the banks of Tahoma Creek. After the West Side Road was closed in 1989, the area was abandoned, and the view is blocked by encroaching trees. The picnic area was partially buried by a debris flow on the creek. Park records also refer to an observation tower at Round Pass, but today only a graveled parking area is located at the site. A tower would probably have been necessary for visitors to obtain a view, as the pass is located in dense woods. A parking turnout at the St. Andrews Creek Bridge served the several trails converging at the site and the nearby patrol cabin. Stone steps lead down from the bridge to the stream. Another large parking area at the road's terminus at Klapatche Ridge is built in part atop a masonry embankment, and partly over an area quarried for stone used on various structures along the road.

In the construction of the Yakima Park Highway, the sharp final switchback on Sunrise Ridge was selected for an observation point and parking area. A parking area of the same general design as the Tahoma Vista development was constructed. Both sides of the road all the way around the curve were bordered with Type 1 masonry guard walls, and the area inside the curve was surfaced for parking. The location offers excellent views down both sides of the ridge and the Cascade Range marching north and south. Mount Adams is visible to the south. The area was landscaped with heaths and other low plants by Emergency Conservation Works personnel from Camp No. 5 at White River.[378]

The principal viewpoint on the Mather Memorial Parkway is Mather Overlook, located just north of the Deadwood Creek Bridge. According to park rangers, this area was once separated from the roadway by a planted strip. Border stones and short segment of masonry parapet wall border the downslope side. A small display discusses glacial action. No other official turnouts are located on the road, though motorists often pull off to the road margins to take in the views. A paved area opposite the Yakima Park Highway wye is frequently used by motorists to check their road maps.

A major interpretive area was planned for the Box Canyon of the Cowlitz area when the Stevens Canyon Highway was being constructed. The NPS Branch of Plans and Design began working on plans in 1941, although work at the site did not begin for another decade. The development includes a large parking area, comfort station, a scenic overlook affording views of Mount Rainier and Mount Adams, an interpretive display, and a trail network including an overlook bridge. The 180' deep canyon is one of the most spectacular sites reached by the park road network. The parking area at Reflection Lakes was once bounded by large logs; today it is bounded by low masonry parapet walls. The largest scenic turnout on the road is the Backbone Ridge viewpoint A large parking area lines the west side of the road, and the viewing area is bordered by a new boundary wall of stone piers joined with square wooden beams.

Throughout the park, smaller turnouts provide parking for various trailheads. The apparent turnouts or parking areas at some bridge sites were not

constructed as such, but rather were approach fills for the temporary or previous spans at these locations. The old approaches for temporary bridges at Deadwood and Laughingwater creeks will be used as approaches for the new bridges now being planned (1992) for these crossings.

CAMPGROUNDS

Even before Mount Rainier National Park was established in 1899, private entrepreneurs operated primitive camps on the flank of Mount Rainier. These included John Reece's "Camp of the Clouds" at Paradise Valley and a tent camp at Indian Henry's Hunting Grounds on the southwest flank of the mountain. Tent cabins were offered by the two hotels at Longmire Springs in the early twentieth century.

A public campground was established on the White River Road below Glacier Basin in 1923. Seven years earlier, the National Park Service had taken over the lower section of the Mount Rainier Mining Company road. The oldest campground in the park, it remains in use. The rustic log-clad campground ranger cabin was built in 1927.[379]

In 1923, Park Superintendent Tomlinson requested permission to establish a new campground on the southeast side of the Nisqually River at Longmire. The project was approved and funding was authorized under the 1924 fiscal year. Designs for the new "Longmire Public Auto Camp" were prepared by Ernest A. Davidson, who also supervised the landscaping of the site. Access to the campground, completed in July 1925, was provided by the new Nisqually River Suspension Bridge. The Longmire Campground was closed in the 1980s and is being dismantled; however, a few campsites are used occasionally by park volunteers and official visitors. Another "public auto camp" was constructed at Ipsut Creek on the Carbon River Road in 1925.[380] Facilities have been improved and it remains open for use in summer and early fall.

The Klickitat Creek Bridge site on the Yakima Park Highway was suggested as a campground site in the location survey report. The BPR engineer reported that the stream was very beautiful and a camp site could be located in a fine stand of trees. However, no view of Mount Rainier could be obtained, and the recommendation was rejected. The Yakima Park Auto Campground was established in 1930 at Shadow Lake as part of the Sunrise development in the early 1930s; it was converted to a hike-in site in the 1970s.[381]

By the 1930s, some campgrounds at Mount Rainier were being constructed or adapted to the Meinecke system,* which specified the use of defined roadways and paths, designated campsites, and low wood or stone barriers to prevent vehicles from damaging adjacent trees and plants or their root systems.[382]

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* After Dr. E.A. Meinecke, Chief of the Bureau of Plant Pathology in the Interior Department, who issued standard plans for campgrounds.

The Civilian Conservation Corps constructed the campground at Ohanapecosh in 1935, four years after the area was added to Mount Rainier National Park. The campground and its structures was designed by the National Park Service's Western Division, Branch of Plans and Design. Two rustic log and stone comfort stations survive in the original part of the campground (B and C loops) on the west side of the river. The entire campground was expanded in the 1950s, and the new loops were provided with comfort stations of similar design.[383] A new visitor center and amphitheater were constructed in the 1960s, as well as the nearby Ohanapecosh Ranger Station and related employee housing. The latter developments were built as part of the "Mission 66" program. Campgrounds at Cougar Rock and Sunshine Point on the Nisqually Road and the primitive Mowich Lake Campground date from this period or later.

CHAPTER XI

A PARK-WIDE ROAD SYSTEM

Visitor: "How do I get to Paradise?"
Ranger Hegwood: "Get on your knees and pray, 'mam."

Construction of the Stevens Canyon Road

As the new Yakima Park Highway and Mather Memorial Parkways neared completion in the early 1930s, Mount Rainier National Park Superintendent O. A. Tomlinson urged the National Park Service to appropriate funds for the construction of the "South Side" or Stevens Canyon Road. The superintendent argued that the road was necessary to facilitate administration. As it was, no direct route existed between the east and west sides of the park, forcing park service to make long, circuitous trips between the principal park developments. The distance from Longmire to Sunrise, for instance, was 135 miles, much of which involved travel outside park boundaries. In his 1931 annual report, Tomlinson stated that "completion of this highway is now a very serious need and its construction should be given priority over other projects."[384]

Tomlinson's plea did not go unanswered, and the park's fiscal year 1931 appropriation allocated $200,000 to begin construction of the Stevens Canyon Road. Bids were let on 10 July for the first segment, extending 1.2 miles from the Nisqually Road at Inspiration Point to the saddle between Reflection Lakes and Louise Lake. The project was completed by Holmberg & Norman, Inc. in October 1933.[385] Construction of the next section began in 1934 under a second $200,000 appropriation. This 3.2-mile section extended the road to the Stevens Creek crossing. . The contract was awarded to the Colonial Construction Company, which completed the work in October 1935.[386] The firm also received the contract for the construction of the adjacent .94-mile section on the rugged east slope of Stevens Canyon. This work was finished in September.[387]

Work next began on the east end of the road. In November 1933, Sam Orino was awarded the segment between the East Side Road junction and Backbone Ridge. This section, which climbed the steep ridge on a series of five looping switchbacks, was completed in September 1935.[388] The contract for clearing the adjacent 2.6 mile section in Stevens Canyon was awarded in November 1934 to Erickson, Johnson & Smith Brothers of Naches, Washington. They began the work in July 1935 and finished operations in September.[389] Grading contracts for the 3.2-mile Backbone Ridge section were let in May 1935 to A. C. Greenwood and Lucich & Company. These contracts involved construction of two temporary wooden trestles and masonry retaining and guard walls. The grading on the section was completed in August 1938. Another section in Stevens Canyon was constructed in 1936 and 1937 by Elliott and Company of Seattle. The 1.2-mile segment involved grading work on the canyon's slopes and construction of the 210' upper tunnel.[390]

A right-of-way extending the road across a mile of the Columbia National Forest (adjoining Mount Rainier National Park) at Backbone Ridge was secured from the U.S. Forest Service, and in November 1936 the contract for the construction of 1.3 miles of the road along the east side of the ridge was let to Lucich & Company. The work was completed in August 1938.[391] Contracts for grading the sections extending from Backbone Ridge to Nickel Creek were awarded in 1938 and 1939, and the work was completed in August 1941.[392]

The contract for the Stevens Creek Bridge [HAER No. WA-58] was let to Sam Orino, who had just completed his clearing project on the upper section. Orino completed the bridge, a reinforced concrete rigid frame, tee beam span faced in native masonry, in July 1941 at a cost of $68,095.96.[393]

By this point, most of the grading work for the new road, a total of 22 miles, was complete. From the west end at the Nisqually Road, this included 6.3 miles of graded 24' roadbed, 0.8 mile graded 26' roadbed, 0.3 mile partially graded roadbed, 0.5 mile unconstructed, 3.6 miles graded 24' roadbed, 0.4 mile graded 26' roadbed, and 2.3 miles partially graded roadbed. The half-mile unconstructed section included the Muddy Fork bridge, the lower tunnel, and three reinforced concrete culverts. More bridges would be required at Nickel Creek, Falls Creek and the Ohanapecosh River.[394] Park officials predicted that the Stevens Canyon Road would be completed in 1933 or 1934. However, the United States' entry into World War II forced a halt to construction operations. Sam Orino, the remaining contractor, was forced to suspend work in August 1942 on account of the lack of steel for bridge construction. In September 1942, the Public Roads Administration formally ordered a halt to all work on the road. Nothing more was done until well after the war's conclusion.[395]

The Public Roads Administration attempted to resume work on the road in 1947 by advertising for bids for grading of the remaining roadbed and the construction of the Muddy Fork and Nickel Creek bridges. However, no bids were received, and the PRA was forced to suspend its plans.[396] By 1949, park officials estimated that the suspended work had resulted in a depreciation of approximately $1.5 millon. The first new contracts were not let until 1950. Contractors Hawkins & Armstrong of Seattle and J. H. and W. J. Conley of Portland, Oregon, received the contracts for the remaining grading work. Hawkins & Armstrong also had the contract for the construction of the bridge over the Muddy Fork of the Cowlitz River at Box Canyon [HAER No. WA-60]. The stone-faced reinforced concrete semi-elliptical arch bridge was completed in August 1952, and the contractors began work on the nearby Nickel Creek Bridge [HAER No. WA-59]. Like the Box Canyon bridge, the Nickel Creek span was a stone-faced reinforced concrete arch bridge like those built in the park three decades earlier. The two structures represent a survival of the so-called "rustic style" in park bridge construction. The Conleys completed the short tunnel at the Box Canyon site in September 1952. While these projects were underway, Oregon contractor Fred H. Slate constructed two reinforced concrete culverts and a high reinforced concrete viaduct near the upper tunnel. These

structures were completed in October 1955.[397] While the construction of the Stevens Canyon Road entailed great destruction of the canyon walls, the use of tunnels and viaducts helped lessen the amount of blasting and excavation required.

In August 1954, J. A. Terteling & Sons received the $544,406.35 contract for slope stabilization, lining of the upper tunnel, and surfacing of the entire road. Two months later, the Osberg Construction Company was awarded the contract for construction of viaducts at Backbone Ridge and temporary bridges over Falls Creek and the Ohanapecosh River.[398]

The National Park Service's ten-year "Mission 66" development program called for the expenditure of roughly $13.5 million on Mount Rainier National Park. Part of the program included the completion of the Stevens Canyon Road in the hope that visitation would be dispersed to other sections of the park.[399] The $98,961 contract for the permanent bridges over Falls Creek and the Ohanapecosh River were issued in July 1955 to the Wayne Construction Company of Seattle. Unlike the other spans, the two new structures were plain reinforced concrete and steel girder bridges. Following their completion, the entire road was surfaced with crushed gravel and then covered with bituminous asphalt. The total cost of the reconstruction grading and final construction (1950-1957) was $1,101,000.[400]

The Stevens Canyon Highway, last major link in the park road system, was finally opened to public travel on 4 September 1957. A ribbon-cutting ceremony was held at Box Canyon.[401] The park road network was now complete; no new major roads would be constructed, and over time, portions of some existing routes would be abandoned.

Postwar problems

Little construction work was done on the park roads in the early 1940s on account of the Second World War. A little work continued for a while on the Stevens Canyon Road. The Power House Bridge across Nisqually River was destroyed by floods in the fall of 1940, and the Christine Falls Bridge was damaged. Emergency funds were allotted for the replacement of the Power House span and repairs to the Christine Falls Bridge. The Tahoma and Kautz creek bridges were reconstructed in 1942 by replacing the guard rails and side stringers, widening the structures to 21'.[402]

The Skate Creek Logging Company began construction of a road to connect Ashford and Packwood soon after the war.[403] When completed, the road (now Forest Service Road 52) greatly reduced the travel time between the two points. Part of the route follows the survey line for the proposed 1913 east-west road (see page ?).

Restrictions on the Mather Memorial Parkway were revised by the State of Washington in July 1947. Commercial vehicles weighing more than 5,000 pounds

were still excluded, but buses in excess of the weight limit could travel over the road if a permit was obtained from the Department of Highways.[404]

A tremendous debris flow swept down the Kautz Creek valley on 2 October 1947, destroying a half mile of the Nisqually Road. The bridge was buried under thirty feet of debris. The Nisqually River also flooded, damaging the Glacier Bridge, and another segment of road near Longmire was washed out. Because Longmire was isolated, an emergency access road was constructed from the rear of the Longmire Campground to the Skate Creek Road, then under construction. Crews then turned to road and bridge repairs and reconstruction. An interpretive area at the Kautz Creek crossing was developed in the spring of 1948.[405]

In July 1949, the Public Roads Administration was transferred to the General Services Administration and its old name, the Bureau of Public Roads, was restored. In August the agency was shifted to the Department of Commerce.[406] The Bureau was transferred from Commerce to the Department of Transportation in 1966. The functions are assigned to the Federal Highway Administration, which continues to oversee the planning and construction of roads in the national parks.

Following the completion of the state's White Pass Highway (now U.S. 12) between Packwood and Naches in 1951, the National Park Service began collecting entrance fees on the East Side Road the following summer. An entrance station was established at Ohanapecosh, where fees from both north and south bound vehicles were collected. No fees were collected at Cayuse Pass, but signs there indicated that a fee would be taken at Ohanapecosh. The fee system was quickly attacked by commercial interests and motorists' groups. Judson C. Colburn, executive secretary-treasurer of the Washington State Resort Association condemned the system.

> This puts our beautiful highway in the toll bridge category. It is like charging the people to look at our natural scenery. The association is not opposed to charging a fee for visits to Rainier National Park, but why charge people who are driving across one corner on a business or other through trip?[407]

By order of Secretary of the Interior Douglas McKay, the collection of the fees was halted in 1955 because many of the motorists were judged to be using the road only for cross-park travel. The National Park Service then asked the state to take over maintenance of the road, but was refused. The state did agree to take on winter maintenance in the White River and Cayuse Pass areas on a reimbursable basis. A fee booth was later established at the entrance to the Ohanapecosh development but was soon removed.[408]

On 25 October 1955, flood waters swept away the Nisqually Glacier and Power House Bridges. (Bridges at both sites had been destroyed in previous floods.) A large washout a quarter-mile below Longmire forced the closure of the lower section of the road. A prefabricated Bailey bridge was installed at the Glacier crossing in November, enabling controlled, one-way traffic to

Paradise.[409] The National Park Service and the Bureau of Public Roads then determined that the next bridge across this troublesome crossing would be a high-level structure designed to withstand the recurring glacial floods.

Winter Opening of the Nisqually Road

With the conclusion of World War II and the relaxation of travel restrictions, the State of Washington and various groups began to agitate for the park administration to keep the Nisqually Road open to Paradise through the winter season. To state officials, Mount Rainier was the most promising site for winter sports activities, and pressed for the road to be plowed in order to stimulate winter use. In November 1945, Governor Mon C. Wallgren announced that he was asking the Washington Department of Highways to cooperate in keeping the road open through the winter. National Park Service Director Newton B. Drury stated that the state could take on the funding of snow removal operations, but that the Service would not reimburse the state under any circumstances. However, if supplementary funds could be made available, the Park Service might assume the responsibility. The state attorney general then ruled that state funds could not be used on national park roads. Mount Rainier park crews did attempt to keep the road open all winter, but "exceptionally heavy snows" forced its closure in January 1946.[410] The road was reopened, and park crews kept the road open for the next three seasons.

The park ceased clearing the snow from the road above Longmire in 1950 when the Rainier National Park Company suspended its winter operations at Paradise Valley. This action generated considerable criticism, and the park administration was instructed to keep the road open as far as Narada Falls. As this point was only a mile from Paradise by trail, close enough for fairly easy access on skis or snowshoes, winter use again increased.[411]

In his October 1953 monthly report, Superintendent Preston P. Macy reported that "There apparently is a concerted movement starting towards having the road to Paradise Valley open all-year." He reported that business interests in Tacoma, including resort owners, ski clubs and others had formed a group called "Greater Tacoma" for the purpose of promoting Paradise for winter sports activities. An Eatonville group called "Operation Bootstrap" had sent a committee to the park to obtain snow removal costs and other data.[412]

In January 1954, the Washington Department of Highways submitted to the Secretary of the Interior a report on an inspection of the road to Paradise with its opinion that the road could be maintained for safe winter use with only short closures during severe winter storms. Governor George Langlie wrote the Secretary stating general dissatisfaction with the park's winter closure of the road and urging further developments for winter sports activities, including the construction of an aerial tramway to about the level of Camp Muir and improvements to overnight facilities at Paradise.[413] The *Tacoma News-Tribune* of 25 May reported that a Senate subcommittee had tentatively approved a $60,000 appropriation to keep the road open year-round.[414]

This Narada Falls compromise had proved unacceptable to the commercial interests and winter sports enthusiasts. These groups mounted a concerted campaign to keep the road open all the way to Paradise. The *Washington Motorist* joined the "Modernize the Mountain" campaign, rallying affiliates of Washington motor clubs. The Park Service was generally opposed to any major new developments for winter use, and completely rejected plans for an aerial tramway. The Mountaineers supported the Park Service, and suggested development of a ski area at Corral Pass outside the park on Forest Service land. They argued that a "ski resort" at Paradise would be inconsistent with the park's conservation and preservation responsibilities. Devereaux Butcher of the National Parks Association denounced the development plans in the spring 1954 issue of *National Parks Magazine*.[415]

In response to the public clamor, the Park Service decided to reopen the road for the winter season of 1954-55. The Rainier National Park Company provided a ski tow and a lunch booth at Paradise, but did not reopen the Paradise Inn. The winter road opening proved extremely popular, and a 73 percent increase in use was recorded. Only 35 percent of the cars carried skis, indicating that most motorists were using the road for sight-seeing. The ski area at Cayuse Pass remained in use.[416]

Managing the System

In 1953, the Mount Rainier Mining Company was granted authority to reconstruct its road into Glacier Basin, although the park administration had hoped to prevent further development in this fragile area. The company rejected an offer of $10,000 for its properties, holding out for the sum of $252,000. The company was seeking a Defense Minerals Administration loan for development of its holdings. The park filed no objection, hoping the necessary investigation would prove the mineral values negligible.[417] The mining company engaged Seattle contractor Russ Boe to rebuild the upper part of the old mine service road. Park Ranger William J. Butler reported that it was graded 10' wide, and represented fair work, though it had a number wet spots. Culverts were made from old hot water heaters, with their ends cut out and welded together. The road followed the alignment well, and that the bulldozing had caused little damage. The company rejected another offer for its holdings in 1973, and remained the last private inholding in Mount Rainier National Park.[418] [Part of the upper section is now followed by the Glacier Basin Trail.]

A new prestressed concrete bridge was constructed over Shaw Creek on the White River Road in the summer and early fall of 1957 by Bellevue, Washington contractors J. E. Collins & Company and R. C. James & Son. Another new bridge was constructed on the East Side Road at Panther Creek this year by the same contractors.[419] Both of the bridges replaced original rustic log stringer spans. The entire East Side Road was resurfaced in 1958 at a cost of $456,925.64.[420] Following the work, the state took over regular maintenance of the East Side Road under a special use permit issued 21 January 1959.[421]

The next road project was the construction of a new road into Paradise Valley. This new two-way road left the Nisqually Road at Frog Heaven near Narada Falls and was completed in 1958 at a cost of $488,000; it was surfaced in 1962-63 at a further cost of $97,000. The old road above the junction with the Stevens Canyon Road became a one-way exit road (downhill) from Paradise.[422]

By this point, the park roads were becoming somewhat congested. The park's close proximity to the Puget Sound area made it a popular week-end getaway, and on summer weekends thousands of vehicles would pass over the park roads. On 19 September 1958, Campfire Day, the annual travel figure for Mount Rainier National Park passed the one million mark for the first time.[423]

The new high-level Nisqually Glacier Bridge [HAER No. WA-61] on the Nisqually Road opened to public use on 16 August 1960, although final work on the structure continued until 24 June 1961. A new reinforced concrete bridge across the Ohanapecosh River in the Ohanapecosh campground was placed in service in 1961, as was a new picnic area on the Stevens Canyon Road at Box Canyon.[424]

In 1965, the Federal Highway Administration recommended the replacement of the log stringer bridges over Kautz Creek and Tahoma Creek on account of the heavy vehicle use. The two structures were replaced with new steel and reinforced concrete spans in 1968.[425] The Stevens Canyon Road was resurfaced between 1966 and 1968 by the Cascade Asphalt Paving Company at a cost of $702,000.[426]

Two of the park roads were renumbered as state highways. The East Side Road was redesignated as Washington Highway 123 in 1968.[427] The Mather Memorial Highway is a segment of Washington Highway 410. While the Nisqually and Stevens Canyon roads form an extension of Washington Highway 706, these roads are maintained by the National Park Service and are not segments of the numbered route. The West Side, Carbon River, Mowich Lake and White River roads are park routes.

The world record winter snowfall of 1972 (1,122 inches at Paradise) caused widespread damage to the park road system. The Stevens Canyon Road was the hardest hit. Retaining walls at Backbone Ridge were swept away, and others at Inspiration Point and the upper tunnel were severely damaged. The heavy weight of the snow caused parts of the road to subside at twelve places for distances between sixty and four hundred feet in length.[428]

The old entry arch at the Nisqually Entrance was replaced in 1973. The new structure was a virtual copy of the 1911 structure (expanded in 1926), down to the hand-carved sign with the park name.[429] A new "rustic style" log entrance arch, matching those at the Nisqually and Ohanapecosh entrances, was erected this year on the Mather Memorial Parkway at the northeast entrance to the park.[430]

Easy access provided by the complete road system was a major factor in the continuing increased visitation to Mount Rainier National Park. By the 1970s,

all parts of the park adjacent to the road system were impacted by the steadily increasing numbers of users. Between 1973 and 1976, the National Park Service studied a proposal to close the West Side and Mowich Lake roads, which would make the western side of the park a vast roadless area. Public opposition, however, forced the agency to reconsider. In 1977, Russell Dickenson, Director of the Park Service's Pacific Northwest Regional Office, announced that he would recommend that the roads be kept open.[431] But the numbers continued to rise. A total of 2,437,332 visitors were logged that year, breaking the two million mark for the first time. This was an increase of nearly half a million over the previous year's count of 1,972,334.[432]

The Final Environmental Statement for the 1976 proposed park Master Plan suggested a study to consider alternative transportation systems for the park. The following goals would be sought: reduction of exhaust and noise from private vehicles, reduction of crowding in parking areas, elimination of congestion on park roads and the reduction of required road maintenance and repairs. It also called for studies of an interim bus system for the Paradise and Sunrise areas, and consideration of a ban on private vehicle access to Ipsut Creek, Mowich Lake, along with the closure of the West Side Road above Round Pass.[433] None of these proposals has been acted on. (Most of the West Side Road is now closed, but on account of flood damage and hazards, and not in response to the Master Plan proposals.)

A March 1988 cooperative agreement between the Washington Department of Transportation and the National Park Service affirmed that the state would maintain the Mather Memorial Parkway and East Side Roads, with the National Park Service paying the extra cost of maintaining the road to higher park standards. The state maintains a garage and gravel piles along the road north of Deadwood Creek.[434]

The West Side Road has been continually damaged by a series of debris flows on Tahoma Creek. Some of these were occasioned by *jökulhlaups* or glacial floods originating in a field of rotten ice below the South Tahoma Glacier. More than twenty debris flows have been documented since 1967. The section of road three miles north of the Nisqually Road has been the hardest hit. One flow stranded some visitors and their automobiles; the same flood buried a section of the Tahoma Creek picnic area and destroyed the trailhead and lower section of the Tahoma Creek Trail. Following a major debris flow in 1989, the road was closed at Fish Creek on account of the continuing extreme flood danger.[435] In the summer of 1992, the National Park Service was conducting hearings concerning the possible reconstruction or closure of the road.[436]

Around two million people a year now visit Mount Rainier National Park. The park's popularity is enhanced by its proximity to the Puget Sound cities. In 1918, travel writer Belmore Browne remarked on its accessibility, stating that "one can breakfast in the heart of a modern city and lunch among the glaciers. The ride over the splendid road that leads from the sea to the everlasting snow in the space of a few hours is one of the most remarkable journeys in the world."[437] The park today is less than two hours from Seattle and Tacoma, and

about ninety minutes from Yakima to the east. This proximity to population centers means that many park visits consist of day trips, though campgrounds and park hotels are frequently filled on weekends.

The main tourist season runs from midsummer into early fall, with visitation dropping off rapidly in October. The developments at Sunrise close in September, and the Yakima Park Highway remains open above the White River Bridge only during daylight hours until the winter closure. The Carbon River and Mowich Lake roads, the Stevens Canyon, Yakima Park and East Side Highways, and the Mather Memorial Parkway are usually closed from the first heavy snow until late spring. Tourist traffic picks up on the Nisqually Road after snow blankets the ground at Paradise Valley, a popular winter sports area.

During the summer season the roads carry heavy traffic loads but are rarely seriously congested. The dispersed arrangement of the park developments prevents major congestion at most developments and interpretive areas. Still, parking areas at Sunrise and Paradise frequently fill to capacity. The park conducted a survey of visitors in 1990 to gauge reactions to the development of a park transportation system (i.e., shuttle). Nearly half the visitors stated they would consider using such a system, especially if entrance fees were waived or if interpretation was provided, but considerable opposition was encountered from those who feared private vehicle use might be restricted.[438]

Such opposition is not surprising, as the park roads offer motorists a splendid experience. The roads carry visitors through old-growth forests, by waterfalls and mountain lakes, along the edges of steep canyons, and across rushing streams. The proposed roads and tunnels to the summit were never realized, but motorists can reach the high subalpine meadows at Paradise Valley and Yakima Park in air-conditioned comfort, all the while enjoying views of majestic Mount Rainier. Unfortunately, this ease of access means that many visitors never leave their cars, but for others, the Mount Rainier National Park road system is the jumping-off point for wilderness adventure.

The Mount Rainier road network represents a balance between the often conflicting needs of access and preservation. The roads reach many sections of the park, and provide connections with trails leading off in all directions. However, most of the north and west sections of the park are uncrossed by roads and are managed as designated wilderness. Current National Park Service policy prohibits the construction of new roads, and some environmentalists are now (1992) urging the permanent closure of the abandoned section of the West Side Road.

This balance between access and conservation was described in a article about the park road system, still under construction, that appeared in the December 1934 edition of *Western Construction News*. It reflects on the success of the park road network in providing access to the stunning mountain landscape without causing great devastation to the same.

> Such highways as have been constructed or are programmed under the program for Mt. Rainier National Park cannot be considered as scars on the natural scenery for which the park was created or as desecrating nature's primitive beauty. With the improvements designed and constructed under the administrative policy of the National Park Service, it is only necessary for a visitor to step off the highway roadbed to be in the midst of primeval surroundings unchanged and undisturbed throughout the centuries. It would be indeed the height of preposterousness to claim that with the 325 square miles of the area of the park there are no primitive areas left for the nature lover, or that expenditures for highways are not warranted. It is much more reasonable and in keeping with the times to consider that the reservation of the area by the government for park purposes would not be justified unless the features that distinguish the area as of distinctive park characteristics are made accessible to all.[439]

A trip across the Mount Rainier roads is an unforgettable experience. The stunning vistas, massive trees, glistening glaciers and fields of mountain flowers are all displayed at their best. While most visitors are fixated by the views of the mountain in its splendor, few fail to take notice of the special way in which the roads were designed to relate to the magnificent environment. They marvel at many of the beautiful bridges and structures, but fail to notice other important ones, which harmonize so well with their surroundings that they attract no attention.

Pity the poor visitor who arrives on one of the common rainy or foggy days. The mountain is cloaked from view, the other fine views are likewise unavailable, and the motorist is likely only to remember curve after curve after curve. But on a fine day (or a moonlit night when the icy mountain stands out like a white beacon), the roads provide nothing but delight.

APPENDIX I

REGULATIONS OF JUNE 10, 1908
GOVERNING THE ADMISSION OF AUTOMOBILES

Pursuant to authority conferred by the act of March 2, 1899 (30 Stat., 993), setting aside certain lands in the State of Washington as a public park, the following regulations governing the admission of automobiles into the Mount Rainier National Park, during the season of 1908, are hereby established and made public:

1. No automobile will be permitted within the metes and bounds of the Mount Rainier National Park unless the owner thereof has first secured a written permit from the acting superintendent, G. F. Allen, Orting, Wash.

2. Applications for permits must show (a) Name of owner, (b) number of machine, (c) name of driver, and (d) inclusive dates for which permit is desired, not exceeding one year, and be accompanied by a fee of $5 for each machine.

Permits must be presented to the acting superintendent or his authorized representative at the park entrance on the government road. The permittee will not be allowed to do a transportation business in the park without license therefor from the Secretary of the Interior.

3. The use of automobiles will be permitted on the government road as far as completed from the western boundary of Mount Rainier National Park to beyond Longmire Springs, between the hours of 9 a.m and 11 a.m., and between the hours of 3.30 p.m. and 5.30 p.m., but such machines must be kept in advance of the stages.

During these hours horse teams may meet automobiles. At all other times automobiles are excluded from the use of roads within the park.

4. When teams approach, automobiles will take position on the outer edge of the roadway, regardless of the direction in which they are going, taking care that sufficient room is left on the inside for the passage of teams.

5. Automobiles will stop when teams approach and remain at rest until teams have passed or until teamsters are satisfied with the safety of their teams.

6. Speed will be limited to 6 miles per hour, except on straight stretches where approaching teams will be visible, when, if no teams are in sight, this speed may be increased.

7. Signal with horn will be given at or near every bend to announce to approaching teams the proximity of an automobile.

8. Teams have the right of way, and automobiles will be backed, or otherwise handled, as necessary, so as to enable teams to pass with safety.

9. Violation of any of the foregoing rules will cause the revocation of permit; will subject the owner of the automobile to any damages occasioned thereby, and to ejectment from the reservation; and be cause for the refusal to issue a new permit to the owner of the machine without prior sanction in writing from the Secretary of the Interior.

APPENDIX II

DEPARTMENT OF THE INTERIOR
MEMORANDUM FOR THE PRESS
MAY 12, 1925

The increased automobile travel throughout the country generally, and in the National Parks, has made necessary the construction and improvement of roads within the National Parks. In connection with this road work, it is essential that every care be taken to the end that no ugly scar be permitted to mar an otherwise perfect landscape.

"Now that road work is in progress in the National Parks made possible by the $7,500,000 road-building program authorized by Congress and by the policy of the Interior Department," said the Director of the National Park Service, "extreme care must be taken in the location of roads in order that the landscape traversed be changed as little as possible, while at the same time providing the greatest range of scenery to users of the road. The parks must not gridironed with roads, and scenic wilderness areas in the parks must be left untouched except by trail.

"In ordinary road building throughout the country the roads are laid out over rights of way of the rectangular or gridiron type, and little is left to the engineer's imagination in the matter of road alignment. Also, the road, primarily of commercial value to the community, is apt to go over the shortest possible route, both to lower the construction costs and for economy in time.

"In the national parks, however, we have no prescribed course or right of way that must be followed in the location of a road, and the element of time is of secondary importance. The main consideration is how to connect two given points by road in such a way as to gain the maximum scenic beauty with the least scarring of the countryside. This invariably calls for a compromise, choosing between a desired scenic effect and the possible loss of trees, boulders, or other attractive features in the landscape, and here the engineer must be ever on the alert to conserve the landscape.

"It is important that a road cover a territory that will create the maximum scenic vantage points rather that follow over a route devoid of interest. The road that is brought in close to natural features, but not endangering their native beauty, is always worth wile [*sic*] and whether it be a spring, waterfall, or rock cliff it will add interest for the traveler.

"Not only is it important to locate the road where it will come in close relation to natural features, but these features must be carefully watched during the constructicn period, A beautiful roadside spring might become void of all its native charm if not protected from stock and machinery during construction. Tree stumps should not be allowed to remain along the right of

way if at all possible to have them removed. Down timber taken from the right of way or naturally accumulated should be removed when possible.

"Monotony must be avoided in road location. Where woodlands and open country intermingle the roads should be carried through the woods for a time, then across an open space giving the variety of light and shade and avoiding mile after mile of sameness.

"Long straight stretches of road are to be avoided as a general rule. At the same time possible blind curves and hairpin turns should be eliminated, as a means of minimizing accidents.

"In the construction of bridges and culverts native materials should be utilized as far as possible. In many places, of course, a concrete arch or girder bridge is the only solution within a reasonable expenditure, but where possible a facing of native rock should be used. Often a log bridge or at least a log railing might be a happy solution."

APPENDIX III

MEMORANDUM OF AGREEMENT BETWEEN THE NATIONAL PARK SERVICE AND THE BUREAU OF PUBLIC ROADS RELATING TO THE SURVEY, CONSTRUCTION AND IMPROVEMENT OF ROADS AND TRAILS IN THE NATIONAL PARKS AND NATIONAL MONUMENTS

[FINAL WORDING, 1926]

WHEREAS, Certain acts of Congress have authorized the making of appropriations and have made appropriations and authorized the incurring of obligations for the survey, construction, reconstruction, and improvement of roads and trails in the national parks and national monuments under the jurisdiction of the Department of the Interior; and

WHEREAS, the Bureau of Public Roads of the United States Department of Agriculture has an engineering organization perfected for the purpose of making surveys and improving highways; and

WHEREAS, the National Park Service of the Department of the Interior, in the interest of economy and efficiency, desires to utilize the services of the existing road-building organization of the Bureau of Public Roads in the survey, construction, reconstruction and improvement of roads and trails within the national parks and national monuments, as authorized by Congress;

NOW, THEREFORE, the National Park Service, hereinafter referred to as the Park Service, and the Bureau of Public Roads, hereinafter referred to as the Bureau, do hereby mutually agree, as follows:

STANDARDIZATION OF CONSTRUCTION AND ARTICULATION OF HIGHWAYS

ARTICLE I.

(1) That the Park Service and the Bureau shall each use every effort to harmonize the standards of construction of roads and trails in the national parks and monuments with the standards adopted for the construction of roads which form a part of the Federal Aid Highway System and of roads and trails within the national forests and to secure the best modern practice in the location, design, construction and improvement thereof.

(2) That from time to time duly authorized representatives of the Park Service and of the Bureau will confer with authorized representatives of the United States Forest Service and the several State Highway Departments wherein the national parks and monuments are located, for the purpose of developing a general scheme of improvement by which the national park highways, highways forming a part of the Federal Aid Highway System, State highways, and the highways within the national forests will so articulate with and supplement each other as to form an interconnected system of highways.

INITIATION OF PROJECTS AND PRELIMINARY SURVEYS

ARTICLE II.

The services of the Bureau will be furnished only upon request in writing from the Director of the Park Service, and the following procedure shall be observed:

(1) Upon receipt of request from the Park Service the Chief of the Bureau will cause an investigation and a preliminary estimate of cost of the project to be made.

(2) Simultaneously with the above request the Park Service shall instruct its Landscape Engineer to cooperate with the engineers of the Bureau in making the preliminary investigation.

(3) The time for making the field examination of any such project shall be agreed upon by the Superintendent and Landscape Engineer of the Park Service and the District Engineer of the Bureau. When such field examination has been completed the following reports shall be prepared:

(a) Report to the Chief of Bureau by the Bureau representative on the location and construction of the proposed project, together with an estimate of the cost thereof. Copies of this report will be furnished to the Park Service in duplicate and to the Park Superintendent.

(b) Report to the Park Service by the Landscape Engineer on all landscape features of the proposed project. Copies of this report shall be furnished to the Bureau in duplicate and to the Park Superintendent.

(c) Report of the Superintendent of the Park to the Park Service commenting on the reports referred to in the next preceding paragraphs and making recommendations with respect to the proposed

project. Copies of the Superintendent's report and recommendation shall be submitted to the Chief of the Bureau in duplicate, through its District Engineer, and to the Park Service, in duplicate, through the Field Assistant, one copy of such reports to be retained by the District Engineer and Field Assistant, respectively, for their files.

(4) Upon receipt of the preliminary reports referred to above, the Park Service shall inform the Bureau whether it desires the work to be undertaken by the Bureau as a major project or whether the Park Service shall proceed with the work as a minor project without the services of the Bureau.

EXECUTION OF MAJOR PROJECTS

ARTICLE III.

(1) In case the project is a major one and the services of the Bureau are desired in the execution and completion thereof, the Director of the Park Service shall so notify the Chief of Bureau in writing and make request that the project be handled to completion by the Bureau in accordance with the procedure herein outlined.

(2) Upon receipt of such notice and request the Bureau will instruct its District Engineer to proceed, in cooperation with the Landscape Engineer of the Park Service and the Superintendent of the Park, with the location survey, and to prepare plans, specifications, and estimates for the project.

(3) When said plans, specifications and estimates have been prepared, and approval recommendations by the Landscape Engineer of the Park Service and the Superintendent of the Park, with the location survey, and to prepare plans, specifications, and estimates for the project.

(4) If the Park Service approves the plans, specifications and estimates, it shall so notify the Bureau in writing and instruct the Superintendent of the Park to advertise for proposals for the construction of the project.

(5) The advertisement for proposals shall specify the time and place of opening the bids, and the bids shall be opened and tabulated by the Superintendent of the Park and the District Engineer of the Bureau.

(6) The recommendation for award shall be made by the Park Superintendent, shall be concurred in by the District Engineer,

25. *Annual Report of the Secretary of the Interior*, 1899 (Washington, D.C.: Government Printing Office, 1900), 90; Hazard, 170.

26. Grater, 76; Martinson, *Wilderness*, 37-38; Robert N. McIntyre, "Short History of Mount Rainier National Park," typed MSS, (1952), 200.

27. Runte, 66-67.

28. *Report of the Secretary of the Interior*, 1903 (Washington, D.C.: Government Printing Office, 1904), 142, 163.

29. Ibid., 164; John Millis, Major, U.S. Army Corps of Engineers, to Eugene Ricksecker, Assistant Engineer, U.S. Army Corps of Engineers, 4 April 1903. MORA Archives, Eugene Ricksecker Letter Book, 1903-1906, entry #269; Ricksecker, "Road to Mount Rainier," typed MSS, n.d., in Ricksecker Letter Book.

30. Millis to George L. Gillespie, Brigadier General, U.S. Army Corps of Engineers, 31 July 1903. Ricksecker Letter Book, entry #37; Millis to Gillespie, 31 August 1903, Ricksecker Letter Book, entry #40; Millis to Gillespie, 30 September 1903, entry #70.

31. *Report of the Secretary of the Interior*, 1903, 164; Millis to Gillespie, 31 October 1903, Ricksecker Letter Book, entry #98; Millis to Gillespie, 30 November 1903, entry #107.

32. Millis to A. Mackenzie, Brigadier General, U.S. Army Corps of Engineers, 8 February 1904. Ricksecker Letter Book, entry #120.

33. Millis to Mackenzie, 18 June 1904. Ricksecker Letter Book, entry # 138-40; Millis to Ricksecker, 11 July 1904, entry #157.

34. Ibid..

35. *Report of the Secretary of the Interior*, 1904 (Washington, D.C.: Government Printing Office, 1905), 5-7.

36. Ibid., 14-19; Ricksecker to Millis, 14 May 1904, 9-10.

37. Ibid., 20.

38. *Report of the Secretary of the Interior*, 1905 (Government Printing Office, 1905), 182; *Annual Report upon the Construction, Repair and Maintenance of Roads and Bridges in the Yellowstone National Park, and the Road into Mount Rainier National Park; Survey for Wagon Road from Valdes to Fort Egbert, Alaska, and Survey for Military Trail between Yukon River and Coldfoot, Alaska, in the Charge of Hiram M. Chittenden, Major, Corps of Engineers, U.S.A., and John Millis, Major, Corps of Engineers, U.S.A., Being Appendixes FFF and KKK of the Annual Report of the Chief of Engineers for*

1905 (Washington, D.C.: Government Printing Office, 1905), 2839; John Millis to A.D. Miller, Seattle, WA, 30 June 1905. Ricksecker Letter Book, no entry #.

39. Libby Mills, "History of the East Side Development--Ohanapecosh Area," typed MSS, Summer 1977, 7. Copy in Longmire Library.

40. G.F. Allen, Forest Supervisor, Rainier National Forest Reserve, *Report of the Acting Superintendent of the Mount Rainier National Park to the Secretary of the Interior*, 1904 (Washington, D.C.: Government Printing Office, 1904), 6.

41. *Report of the Joint Committee of the Mazama Club and the Sierra Club on the Mt. Rainier National Park* (no place of publication listed, 1905), 6-8.

42. Robert Shankland, *Steve Mather of the National Parks* (New York: Alfred A. Knopf, rev. ed., 1954), 9.

43. Thompson, 192*n*.

44. Chittenden to A.D. Miller, 9 July 1906. MORA Archives, Ricksecker Letter Book, no entry #; *Report Upon the Construction, Repair and Maintenance of Roads in the Yellowstone National Park, Ernest D. Peek, 1st Lt., Corps of Engineers, U.S.A., in Charge, and Report Upon the Road into Mount Rainier National Park, Hiram M. Chittenden, Major, Corps of Engineers, U.S.A., in Charge: Annual Report of the Chief of Engineers*, 1907, Appendixes JJJ and KKK (Washington, D.C.: Government Printing Office, 1907), 858; *Report of the Secretary of the Interior*, 1905 (Washington, D.C.: Government Printing Office, 1906), 182.

45. Allen, *Report of the Acting Superintendent of the Mount Rainier National Park*, 1906 (Washington, D.C.: Government Printing Office, 1907), 7.

46. Ibid., 5.

47. Grater, 77; *Report Upon the Construction, Repair and Maintenance of Roads in the Yellowstone National Park, Ernest D. Peek, 1st Lt., Corps of Engineers, U.S.A., in Charge, and Report Upon the Road into Mount Rainier National Park, Hiram M. Chittenden, Major, Corps of Engineers, U.S.A., in Charge: Annual Report of the Chief of Engineers*, 1908, Appendixes JJJ and KKK (Washington, D.C.: Government Printing Office, 1908), 2554; *Coon Holler* (park employee newsletter), 14 January 1952, 2. [Actually, the first automobile evidently entered the park on 24 July, in violation of the ban on autos. The driver was informed that he was in the park contrary to park rules. This was evidently the first traffic violation in the park. (Chittenden to Secretary of the Interior, 27 July 1907. MORA Archives, H-14, Road Reports, 19-7-1913)]

48. Thompson, 142.

49. Franklin K. Lane, Secretary of the Interior, to W. L. Jones, U.S. Senate, 22 September 1917. National Archives and Records Administration, Record Group 48, Box 1991, File 12/7 Part 1, Complaints.

50. Ibid., 202.

51. *Report Upon the Construction, Repair and Maintenance of Roads*, etc., 1908, Appendixes III and JJJ (Washington, D.C.: Government Printing Office, 1908), 2553.

52. Allen, *Report of the Acting Superintendent of the Mount Rainier National Park to the Secretary of the Interior*, 1908 (Washington, D.C.: Government Printing Office, 1908), 8-10; *Report Upon the Construction, Repair and Maintenance of Roads*, etc., (1908), 2554; Thompson, 194.

53. Allen, *Report of the Acting Superintendent* (1908), 8-9.

54. Ricksecker to Chittenden, 15 April 1908. MORA Archives, Ricksecker Letter Book, no entry #.

55. Ricksecker to James R. Garfield, Secretary of the Interior, 18 October 1907. MORA Archives, Box H14, Road Reports, 1904-1907, Ricksecker file.

56. Ibid..

57. Allen, *Report of the Acting Superintendent of the Mount Rainier National Park to the Secretary of the Interior*, 1909 (Washington, D.C.: Government Printing Office, 1909), 7, 10-12; Samuel Estes, Park Ranger, to Acting Superintendent Mt. Rainier National Park, 11 September 1909. Filed with Acting Superintendent's Annual Report, 1909, MORA Archives, Box H2621.

58. Allen, *Report of the Acting Superintendent of the Mount Rainier National Park to the Secretary of the Interior*, 1910 (Washington, D.C.: Government Printing Office, 1910), 7-9.

59. *Report Upon the Construction, Repair and Maintenance of Roads in the Yellowstone National Park, C.H. Knight, Captain, Corps of Engineers, U.S.A., in Charge, and Report Upon the Road into Mount Rainier National Park, J.B. Cavanaugh, Major, Corps of Engineers, U.S.A., in Charge; and, Report Upon Crater Lake National Park: Annual Report of the Chief of Engineers*, 1912, Appendixes GGG, HHH and III (Washington, D.C.: Government Printing Office, 1912), 1340.

60. Ibid., 7; Emilie Martin, "Mount Rainier Park's New-Old Entry Portal," *Seattle Times Pictorial*, 18 November 1973.

61. Hall, *Report of the Superintendent of the Mount Rainier National Park to the Secretary of the Interior*, 1911 (Washington, D.C.: Government Printing Office, 1911), 10; Rensch, 30.

62. C. F. Brockman, *The Story of Mount Rainier National Park* (Longmire, WA: Mount Rainier National Park History Association, 1940), 30*n*.

63. Hall, *Report of the Superintendent* (1911), 13.

64. "Favors Road Up Mount Rainier," *Spokane Review*, 7 December 1911.

65. Martinson, "First Years," 30-31.

66. Ibid., 31-32.

67. Ethan Allen, Superintendent, Mount Rainier National Park, *Report of the Superintendent of the Mount Rainier National Park to the Secretary of the Interior*, 1913 (Washington, D.C.: Government Printing Office, 1913), 11-12.

68. Roger W. Toll, Superintendent, Mount Rainier National Park, Superintendent's Annual Report, 1919, 46. MORA Archives, Box H2621, Superintendents' Annual Reports 1917-1925 file.

69. Mills, 7.

70. Williams, 62-64, 67.

71. Need reference.

72. McIntyre, 221.

73. Martinson, *Wilderness*, 40; Thompson, 147. Archibald Duncan was the first ranger at Glacier Bridge; L.D. Boyle was at Narada Falls.

74. Ibid., 16.

75. Dewitt L. Reaburn, Supervisor, Mount Rainier National Park, *Report of the Supervisor of the Mount Rainier National Park to the Secretary of the Interior*, 1916 (Washington, D.C.: Government Printing Office, 1916), 54.

76. Reaburn to Stephen T. Mather, 1 November 1915. MORA Archives, File D22, Construction Programs 1913-1915.

77. Ibid., 54-55.

78. Ibid., 55.

79. Reaburn, *Report of the Supervisor of the Mount Rainier National Park to the Secretary of the Interior*, 1915 (Washington, D.C.: Government Printing Office, 1915), 7, 14.

80. Idem, Supervisor's Monthly Report, January 1916, 3. MORA Archives Box H2615, Superintendents' Monthly Reports 1913-1919 file; Toll, Superintendent's Annual Report, 1919, 41-42. MORA Archives Box H2621, Superintendent's Annual Reports 1917-1925 file.

81. Reaburn, Superintendent's Monthly Report, July 1917, 5. MORA Archives, Box H2615, Superintendents' Monthly Reports, 1913-1925 file; Toll, Superintendent's Annual Report, 1919.

82. Dewitt L. Reaburn, Supervisor, Mount Rainier National Park, Annual Report to the Secretary of the Interior, 1916, 9-10. MORA Archives, Box H2621, Superintendents' Annual Reports 1899-1917 file.

83. Idem, Superintendent's Annual Report, 1920, 37. MORA Archives, Box H2621, Superintendents' Annual Reports 1917-1925 file.

84. C.L. Nelson, Acting Superintendent, Mount Rainier National Park, Acting Superintendent's Annual Report, 1922, 7. MORA Archives Box H2621, Superintendents' Annual Reports 1917-1921 file; George E. Goodwin, Chief Civil Engineer, National Park Service, Portland, OR to R.D. Hill Company, Tacoma, WA, 28 October 1922. National Archives and Records Administration, Record Group 79, Entry 22, Box 16.

85. O.A. Tomlinson, Superintendent, Mount Rainier National Park, Superintendent's Annual Report, 1925, 3a. MORA Archives, Box H2621, Superintendents' Annual Reports 1917-1925 file.

86. Stephen T. Mather, *Progress in the Development of the National Parks* (Washington, D.C.: U.S. Department of the Interior, 1916), 6.

87. Anne F. Hyde, "From Stagecoach to Packard Twin Six: Yosemite and the Changing Face of Tourism, 1880-1930," *California History*, Summer 1990, 163.

88.

89. Peters to Mather, 9 June 1922, 1-2. MORA Archives, File D22, Construction Program 1922.

90. Ibid., 4.

91. Ibid., 4-6.

92. Tomlinson, Superintendent's Annual Report, 1923, 8. MORA Archives Box H2621, Superintendents' Annual Reports 1917-1921 file.

93. Tomlinson to Mather, 28 August 1924. MORA Archives, File D22, Construction Program 1924.

94. Goodwin to Portland Chamber of Commerce, Portland, OR, 5 November 1923. National Archives and Records Administration, Record Group 79, Entry 22, Box 1.

95. Tomlinson, Superintendent's Monthly Report, August 1924, 1. MORA Archives, Box H2615, Superintendents' Monthly Reports 1924-1927 file.

96. "Rainier National Park, Season 1924," Chicago, Milwaukee & St. Paul Railway Brochure, 1924, attached to Tomlinson, Superintendent's Monthly Report, June 1924. MORA Archives, Box H2615, Superintendents' Monthly Reports 1924-1927 file; Nadeau, v.

97.Tomlinson, Superintendent's Annual Report, 1925, 1a-2a, 10. MORA Archives, Box H2621, Superintendents' Annual Reports 1917-1925 file.

98. Rainier Park Advisory Board, "Mr. Good Citizen," circular, June 1925. MORA Archives, Box D30.

99. Bert H. Burrell, Acting Chief Civil Engineer, National Park Service, to Horace M. Albright, Superintendent, Yellowstone National Park, 15 August 1925. National Archives and Records Administration, Record Group 79, Entry 22, Box 18, 1-2.

100. Ibid., 2-5.

101. Burrell to Albright, 15 August 1925, 1-2. National Archives, RG 79 Entry 22 Box 18.

102. Ibid., 2-3.

103. Ibid..

104. R.N. Kellogg, Assistant Highway Engineer, National Park Service, "Report on Investigation of Nisqually Road, Longmire Section, in Mount Rainier National Park," 1. National Archives and Records Administration, Record Group 79, Entry 22, Box 11, Contract estimates file E.04-E.05-E.06.

105. Tomlinson, Superintendent's Annual Report, 1925, 1a-2a, 10. MORA Archives, Box H2621, Superintendents' Annual Reports 1917-1925 file.

106. Tomlinson, Superintendent's Monthly Report, January 1926, 1-2. Typed MSS, MORA Archives, Box H2615, Superintendents' Monthly Reports 1924-1927 file.

107. Ibid.

108. "Proposes to Park Autos in Crater of Mount Tacoma," *Tacoma News Tribune*, 15 January 1926.

109. Tomlinson, Superintendent's Annual Report, 1926, 4. MORA Archives, Box H2615, Superintendents' Annual Reports 1926-1932 file.

110. U.S. Department of the Interior, National Park Service, Denver Service Center, National Register of Historic Places nomination for the Mather Memorial Parkway, prepared by Harlan D. Unrau, Historian, Denver Service Center, 19 January 1990 (hereinafter cited as Unrau, Mather Parkway NR nomination), Sec. 8, p. 4.

111. "Plan to Encircle Mount Tacoma With Roads," *Tacoma News Tribune*, undated clipping. MORA Archives, File D22, Construction Program 1926.

112. Tomlinson, Superintendent's Monthly Report, June 1926, 2; Superintendent's Monthly Report, July 1926, 2-3; Superintendent's Monthly Report, September 1926, 1-2. MORA Archives, Box H2615, Superintendents' Monthly Reports 1924-1927 file.

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TRIM LINE

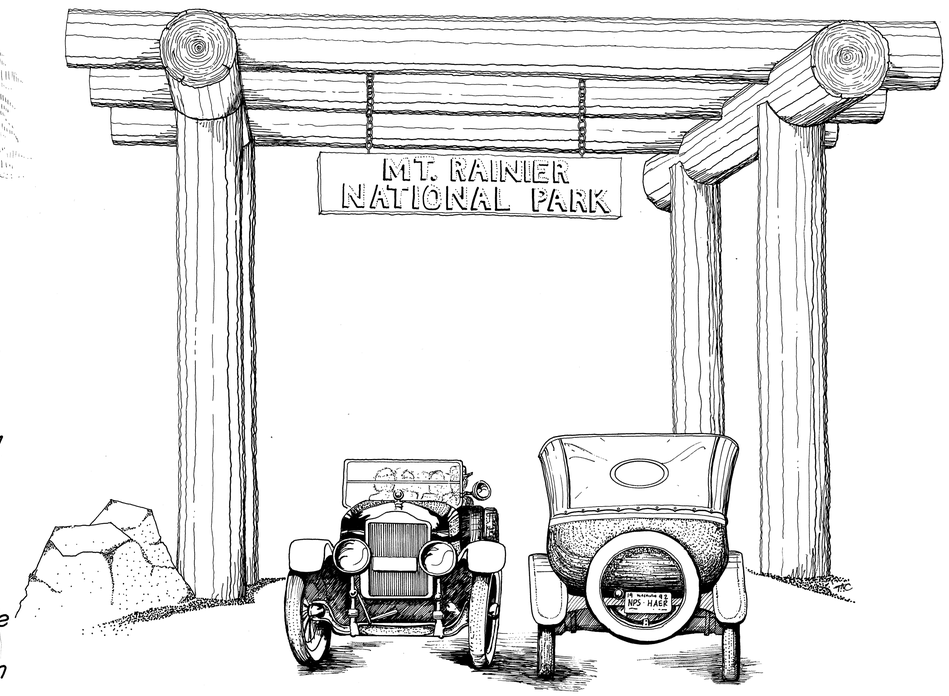
MOUNT RAINIER ROADS & BRIDGES
MOUNT RAINIER NATIONAL PARK, WASHINGTON

Design with the Land

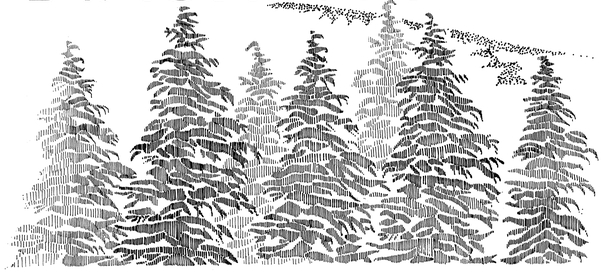
Mount Rainier is a dormant volcano rising to 14,410 feet above sea level, the top of which is covered with perpetual snow. Besides the mountain itself, the national park contains many features of scenic and scientific interest; including living glaciers, waterfalls, lakes, canyons, old-growth forests and subalpine meadows.

Mount Rainier National Park was established on March 2, 1899, contemporanious with the rise of the automobile and the desire to experience America's natural wonders. During the early national park years, pre-1916, the U.S. Army Corps of Engineers designed the park roads and bridges to harmonize with the superb scenery. Following the creation of the National Park Service in 1916, NPS engineers and landscape architects worked together to continue this tradition. Design and construction of park roads was transferred to the Bureau of Public Roads in 1925.

Between 1920 and 1940 the "Rustic Style" of architecture became the standard of design for park construction. Native stone, logs and other indigenous materials were commonly used for buildings, bridges, retaining walls, and signage. During this period, natural planting practices became the standard for revegetation work. Some of this work was carried out by the Emergency Conservation Works program, the parent organization of the Civilian Conservation Corps, a massive public works project that provided relief for many unemployed men during the Depression.



Nisqually Entrance Gate, based on historic photograph



The landscape work related to the roads and bridges of Mount Rainier National Park maintains a sensitivity to the natural features of the land. Most built components were designed so they integrated into the system as a whole, in harmony with the natural landscapes of the mountain region. Planned to preserve the natural beauty of the park, Mount Rainier's roads and bridges provide safe and convenient access for millions of visitors. Without them, the national park experience would be markedly different from today

Bridges of various construction have spanned Mount Rainier's major streams and lesser tributaries, many of which have been washed away by glacial mud flows or replaced due to decay in the harsh environment. The first bridges were constructed of logs or rough-hewn timber; only the Nisqually River Suspension Bridge remains. Many of the park bridges appear to be constructed of stone masonry. Actually, these arch bridges are built of concrete and merely faced in stone, characteristic of the NPS Rustic Style. Several exposed-concrete structures exist and an unusual three-hinged steel web-arch spans Fryingpan Creek. Even smaller bridges and culverts were designed to blend with the rugged mountain scenery. Most of the park bridges are constructed on tangents or curves, frequently superelevated or banked, offering a smooth transition from road to span. Such designs help the park roads sweep gracefully through the spectacular terrain.

This project is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering and industrial works in the United States. The HAER program is administered by the Historic American Buildings Survey/Historic American Engineering Record Division (HABS/HAER) of the National Park Service, U.S. Department of the Interior. The Mount Rainier Roads and Bridges Recording Project was cosponsored during the summer of 1992 by HAER under the general direction of Dr. Robert J. Kapsch, Chief; the National Park Service Roads and Bridges Program, John Gingles, Manager; and by Mount Rainier National Park, William Briggle, Superintendent.

The field work, measured drawings, historical reports, and photographs were prepared under the direction of Project Leader Eric N. DeLony, Chief of HAER. The recording team consisted of Todd A. Croteau, team supervisor; architectural technicians Bryan D. Fish and Daniela Trettel (U.S./ICOMOS, Argentina); and landscape architect Julie Ann Dickson Historical reports were prepared by project historian Richard H. Quin. Formal large-format photography was done by Jet Lowe, HAER staff photographer.

HISTORIC AMERICAN ENGINEERING RECORD
WA - 35

SHEET
1 OF 2

MOUNT RAINIER ROADS AND BRIDGES
PIERCE/LEWIS COUNTIES
WASHINGTON
MOUNT RAINIER NATIONAL PARK

DELINEATED BY: *Daniela Trettel, Todd A. Croteau, 1992*

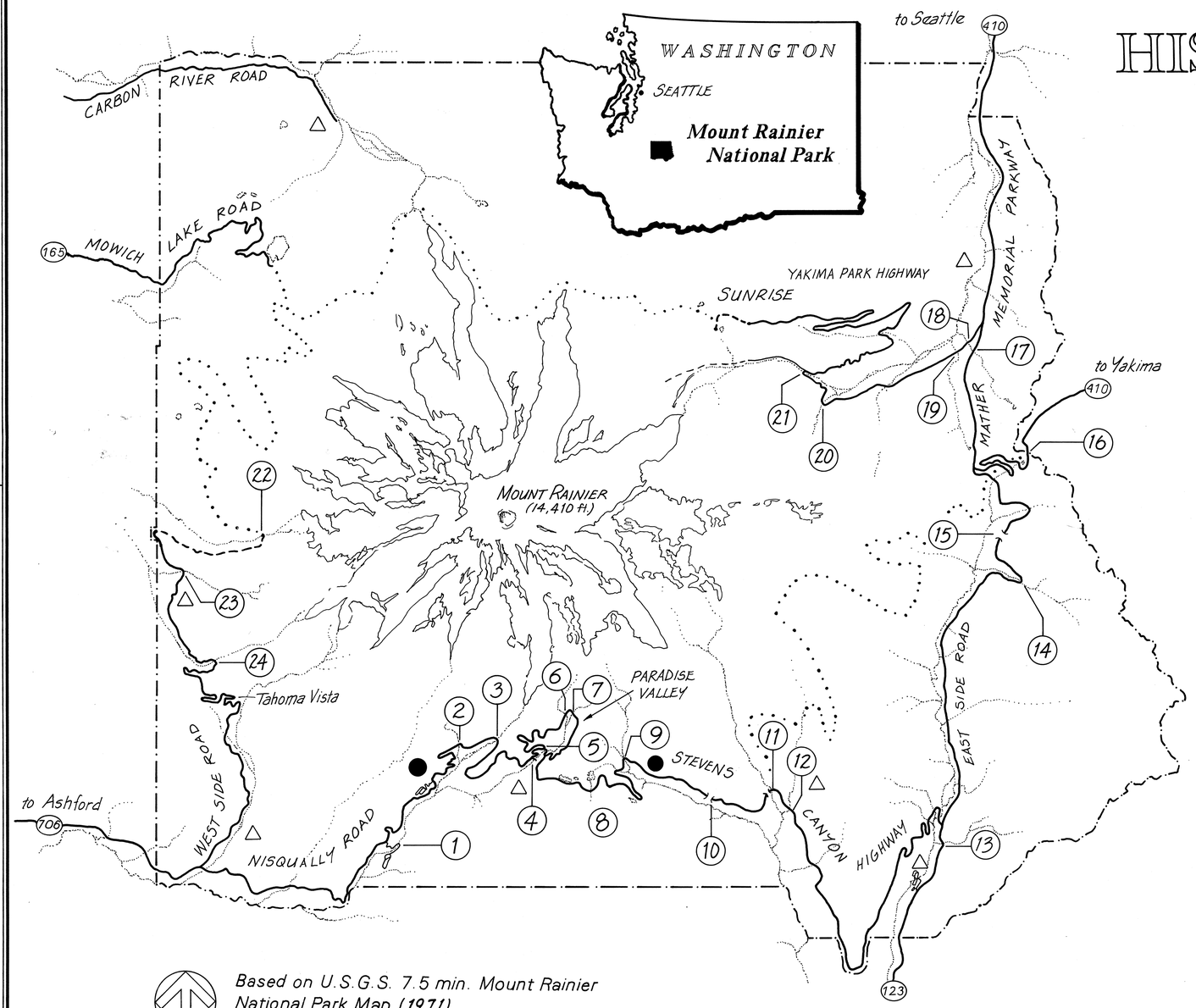
MOUNT RAINIER ROADS AND BRIDGES
RECORDING PROJECT
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR

103112

TRIM LINE

MOUNT RAINIER ROADS & BRIDGES

HISTORICAL BASE MAP
1899 ~ 1992



STRUCTURE	HAER No.
01. Nisqually River Suspension Bridge (1924-52)	WA-44
02. Christine Falls Bridge (1928)	WA-48
03. Nisqually Glacier Bridge (1957)	WA-61
04. Paradise River Bridge - 1st Crossing (1928)	WA-47
05. Narada Cut-off Bridge (1926)	WA-62
06. Edith Creek Bridge (1926)	WA-46
07. Paradise River Bridge-4th Crossing (1926)	WA-45
08. Sunbeam Creek Culvert (1935)	WA-76
09. Stevens Creek Bridge (1941)	WA-58
10. Stevens Canyon Tunnel (1937)	WA-74
11. Muddy Fork Cowlitz River Bridge (1952) (at Box Canyon)	WA-60
12. Nickel Creek Bridge (1952)	WA-59
13. Laughingwater Creek Bridge (1935)	WA-55
14. Deer Creek Bridge (1939)	WA-57
15. East Side Tunnel (1939)	WA-75
16. Chinook Pass Entrance Overpass (1936)	WA-43
17. Deadwood Creek Bridge (1937)	WA-56
18. Dry Creek Bridge (1929)	WA-49
19. Klickitat Creek Bridge (1930)	WA-50
20. Fryingpan Creek Bridge (1931)	WA-54
21. White River Bridge (1929)	WA-53
22. North Puyallup River Bridge (1934)	WA-77
23. St. Andrews Creek Bridge (1931)	WA-51
24. South Puyallup River Bridge (1931)	WA-52

Based on U.S.G.S. 7.5 min. Mount Rainier National Park Map (1971)

0 1 2 3 4 5 6 miles

0 1 2 3 4 5 6 kilometers

Legend:

- △ construction camp
- ○ borrow pit
- ● quarry site
- □ construction facility
- park boundary
- major road
- secondary road
- abandoned road
- proposed road
- river or creek

DELINEATED BY: Todd A. Croteau, 1992

MOUNT RAINIER ROADS AND BRIDGES RECORDING PROJECT
NATIONAL PARK SERVICE
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MOUNT RAINIER ROADS AND BRIDGES
MOUNT RAINIER NATIONAL PARK
PIERCE/LEWIS COUNTIES
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SHEET 2 OF 2

HISTORIC AMERICAN ENGINEERING RECORD WA - 35

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